Record Extension of Monthly Flows for the Colorado River System

by

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Executive Summary

The basic streamflow data that are primarily utilized for planning operational studies of the Colorado River system consists of 29 stations (sites). The database has varied record lengths, a few of the stations have lengths for the period 1906-2003 (98 years) and most of them have shorter records. In the past decades the U.S. Bureau of Reclamation conducted studies to extend the short streamflow records. The prime objective of the study reported herein has been to update the previous studies so as to extend the database for the stations of the Upper and the Lower Colorado basin to the common period 1906-2003. Another objective has been to define the statistical characteristics of the new extended data set. In the course of this study the previous record extensions were generally replaced allowing application of a consistent approach for the entire basin and improving methods as feasible.

The record extension study was based on the cumulative flows for the stations of the Upper basin and the intervening flows for the stations of the Lower basin. The basic record extension strategy performed the record extension at the annual time scale followed by a record extension at the monthly scale in such a way that the sum of the monthly flows adds up to the (previously extended) annual flows. The separate models for yearly and monthly scales are applied in order to preserve the variability and correlations within the various scales (monthly and yearly). The statistical method utilized is based on the multiple linear regression model that includes the error term so as to maintain a degree of variability in the extended records comparable to those of the historic records. The method required developing a procedure for selecting a single trace or single record extension from the multiple record extensions that arise when using the error term.

The performances of the extension techniques and the results thereof have been verified based on graphical and statistical comparisons between the historic time series and the extended series. It has been shown that in general the extended records have similar patterns and statistics as those shown by the historic records. In a few instances some discrepancies exist but in those cases either the effect is small or results from errors in the historic database of intervening flows particularly for the Lower basin. This is evident for example in the exceptionally large values of the serial correlations obtained for the annual intervening flows for several sites along the main stream of the Colorado. There is no reason why one cannot make further improvements to the extended flow estimates in the future, but to this date the new data base provides a reasonably good record.

1. Introduction

The Colorado River is one of the important river systems in the North American Continent. It is an important source of water supply for seven states in the western United States including Wyoming, Utah, Colorado, Nevada, Arizona, New Mexico, and California. In addition, it is also an important source of water for the northwestern part of the Republic of Mexico. The Colorado River system has been divided into two large basins: the Upper Colorado River basin and the Lower Colorado River basin where the division between the two is at the Lees Ferry gaging station. The river runs through vast areas of semiarid and arid environments that produce intermittent streamflows in some of the tributaries. Occasional periods of surplus and floods such as those in the early 1980's and periods of deficits and droughts, such as the recent drought at the beginning of this century, characterize the variability of the streamflow regime of the Colorado River.

The Colorado River system has been regulated with a number of within-the-year and over-the-year reservoirs. The Bureau of Reclamation (BOR) has been the leading agency in charge of the planning studies of the system's operations. For this purpose, it is necessary to conduct simulation studies using potential streamflow scenarios that may occur in the system in the future. Streamflow scenarios are typically developed based on stochastic modeling strategies, which in turn are based on historic streamflow data. The data base consists of monthly streamflows at 29 gaging stations where stations 1 through 21 are located in the Upper Colorado River while stations 22 through 29 are in the Lower Colorado River. The flow records available have varying lengths throughout the period 1906-2003. The main objective of the study described in this report is to obtain monthly streamflows of a common length, i.e. 1906-2003, for the entire river system.

In this report, we begin with a brief review of previous record extension methods (section 2) followed by a description of our modeling strategy for extending the records for all the sites that are incomplete (section 3). Then, section 4 summarizes the historic data that are available and utilized in this study and section 5 describes the results obtained. It includes comparisons of the statistical characteristics obtained from the historic and extended data. In addition, many tables and figures that support the study are included in the Appendices A through D.

2. Brief Review of Previous Record Extension Methods

Alternative approaches have been developed in literature for extending short records and filling in missing data. Most approaches are statistically based and utilize the autocorrelation and cross-correlation that may exist in and between the underlying data set. The types of approaches to be utilized in a particular case depend on the available data base, particularly the temporal scale and the spatial scale of the data. Some methods are quite simple based on traditional regression analysis while some others are more involved based on concepts of time series and stochastic models.

Methods for yearly record extension include time series models such as the AR(1) model in cases of single variables and approaches such as the Normal Ratio Method, Weighted Average Method, and applications of linear regression models in cases of more than one variable (Salas et al, 2006). Well-known references for estimation procedures regarding time series models and applications of linear regression are Brockwell and Davis (1991) and Johnson and Wichern (2002). The weighted average method (National Weather Service, 1972) employs the nearest reference sites (sites with longer data) to the target site where the weights are functions of the distances between the target and reference sites (sites with longer records). The sites are selected by dividing the surrounding area of the station with missing records in four quadrants from east, north, west, south, and east. More recently, a Bayesian method (Wang, 2001) has been proposed for flood record augmentation. Using a reference site, Wang applied a joint General Extreme Value probability model for annual maximum floods and Bayesian procedure for parameter estimation.

Back in the 1960's and 70's bivariate and multivariate linear regression models were developed for record extension of hydrologic data (e.g., Matalas and Jacobs, 1964; Gilroy, 1970; Moran, 1974) where the objective has been to improve the statistics of the sites with short records. Alley and Burns (1983) developed a record fill-in procedure to resolve the following three deficiencies: (1) a single station is often used for extending the entire record, (2) a single model may be formulated for a station using the data from all concurrent flow, i.e. the seasonality of streamflows is neglected, and (3) the expected value of the sample variance will be less than the population variance. Vogel and Stedinger (1985) conducted further studies along those lines and derived improved estimators for the mean and variance, i.e. estimators with lower variance than those of the unbiased maximum likelihood estimators of Matalas and Jacobs.

Methodologies for record extension of seasonal data such as monthly streamflows include the Normal Ratio Method and methods based on periodic time series models when dealing with a single variable. For multiple variables, the methods include: the Normal Ratio method, multiple linear regression, and use of time series and transfer function models. Kottegoda and Elgy (1979) developed a methodology to fill in missing flow data at several sites. The method is a modification of the multivariate AR(1) model making the model applicable for record extension. The model is applied to monthly data after seasonal (monthly) standardization. Simonovic (1995) utilized multiple nonlinear standardized correlation analysis for data interpolation, data extension, and data transfer. This method uses log-transformation along with a multiple regression model. The model was applied for record extension of monthly streamflows in Manitoba, but the results showed some significant underestimation of the variance. More recently, Moog et al. (1999) studied the effect of using power transformations instead of log-transformation for record extension of daily flows to overcome the underestimation of the variance when using log-transformation. The procedure gave good results in estimating order statistics of flow rate for non-extreme discharges.

The method applied in this report is based on Multiple Linear Regression (MLR). The MLR model can be described as

$$Y = \mathbf{X}\boldsymbol{\beta} + \varepsilon \tag{1}$$

where Y is the dependent variable with mean zero, $\boldsymbol{X}$ is a (n×1) vector of n independent (explanatory) variables also with mean zero, $\boldsymbol{\beta}$ is the parameter (1xn) vector traditionally estimated by least squares, and ε is the noise term typically assumed to be normally distributed with mean zero and variance σ_{ε}^{2}. As indicated previously, Matalas and Jacobs (1964) realized that the typical applications of (1) neglects the random term ε (or assumed it to be zero) and results in the underestimation of the variance of the extended record. On the other hand, if one chooses to utilize the model by generating the random term it will lead to multiple solutions, i.e. multiple extended records. Furthermore, the random generation of the noise term may produce a very low or very high value of Y that may not be consistent with the concurrent values of the variable X. Moreover, Matalas and Jacobs' model does not include the effect of serial correlation. Hirsch (1982) suggested some procedures to overcome some of the referred shortcomings in the applications of the Matalas and Jacobs' model. Likewise, Vogel and Stedinger (1985), and Grygier et al (1989) developed improved estimators and alternative models. Despite these advances, the inherent problems in the Matalas and Jacobs' model remain. In the study reported herein we develop a record extension modeling strategy that alleviates some of these problems.

3. Applied Methods for Record Extension

Record extension studies for the Colorado River have been undertaken in the past. For example, the records for stations 1 through 20 of the Upper Colorado River were extended in 1983 (BOR, 1983) based on the naturalized accumulated flows. The main procedure utilized was multiple linear regression on a monthly basis. The main reasons for updating the previous studies have been to take advantage of additional historic records that have become available in the past 20 years, to make the record extension for all sites in both the Upper and the Lower basins as needed, and to use and develop improved methods wherever possible. The improved methods include: a multiple linear regression model with noise, an algoritm for selecting a single record extension, a record extension strategy for both annual and monthly time scales and corresponding temporal adjustments, and spatial adjustments as needed. Further details about the methods are decribed below.

The record extension methods employed herein are based on the linear relationship between the reference sites (sites with longer records) and the target sites (sites with shorter records), i.e. the cross-correlation between them and the lagged temporal correlation (serial correlation) that may exist in the target site. For the purpose of this study, an exhaustive correlation analysis has been conducted in order to identify those sites that are significantly correlated with each target site for each month. Recall that the main objective of the record extension study is to estimate the monthly flows back to the year 1906. Although one may tackle this problem by extending the monthly records directly, an alternative approach has been followed. The yearly flows are extended first, and then the monthly flows are obtained under the condition that they add up to the previously extended annual flows. The main reason for extending the annual flows first is to assure that the annual variability of the extended records is reproduced to a degree that might have occurred during the extended period. Furthermore, the yearly cross-correlation between the target and reference site(s) is not the same as the cross-correlations at the monthly scale. Employing separate models for monthly and yearly scales with repetition and temporal adjustment allow the extended record of a target site to preserve the cross-correlation with other stations on different temporal scales. The overall record extension scheme is depicted in Figure 1. It involves generating 100 record extensions (100 traces), and a trace selection method (TSM) to obtain a single yearly record extension. The monthly record extension is performed using the monthly model with repetition and temporal adjustment to satisfy the additivity condition so that for a certain site, the monthly flows sum up to the corresponding yearly flows. Also 100 monthly record extensions are obtained and the TSM is utilized for selecting a single record extension. Furthermore, additional spatial adjustments are performed in order to maintain the spatial proportions of the flows at upstream and downstream stations.

3.1 Yearly Model

Consider that Q_ν denotes the yearly data where $\nu = 1,...,N$ and N denotes the number of years of record. The data may be standardized as

$$Y_\nu = \frac{Q_\nu - \mu_Q}{\sigma_Q} \tag{2}$$

where μ_Q and σ_Q represent the estimated mean and standard deviation of Q, respectively. The standardization is made after the original data has been transformed to a normal distribution if necessary. For instance, if logarithmic transformation is utilized the data must be standardized as

$$Y_\nu = \frac{\log(Q_\nu) - \mu_{\log(Q)}}{\sigma_{\log(Q)}} \tag{3}$$

where $\mu_{\log(Q)}$ and $\sigma_{\log(Q)}$ represent the estimated mean and standard deviation of log Q, respectively. Thus the record extension procedure will be conducted using the transformed and standardized variables as described above. After extending the records they are back-transformed and back-standardized to bring them back to the original data space.

The record extension method is based on the MLR described in Eq.(1). Since the dependent and independent (explanatory) variables are standardized in the record extension model, the yearly streamflows can be expressed as

$$Y_\nu = \left[\beta_1 \; \beta_2 \cdots \beta_{p+1}\right] \begin{bmatrix} Y_{\nu+1} \\ X_\nu^1 \\ \vdots \\ X_\nu^p \end{bmatrix} + \varepsilon_\nu \tag{4}$$

where Y_ν is the standardized yearly streamflow of the target site for year ν (the dependent variable), X_ν^j is the standardized yearly streamflow at the j^{th} reference site for year ν (the j^{th} independent variable), j=1,2,…,p, where p is the total number of reference sites, and ε_ν is the error term with mean zero and variance σ_ε^2. In addition, Eq.(4) includes the lag-1 variable $Y_{\nu+1}$ so as to account for the yearly serial correlation. It is important to include this term because annual streamflows are usually significantly autocorrelated. The parameters of the model in Eq.(4) are estimated by using the least squares method (Neter et al., 1996).

As indicated in section 2 above, generally the random term ε_ν is excluded when applying Eq.(4). A drawback of this approach is that the variance of Y_ν becomes underestimated. Therefore, in this study we devised an approach whereby a certain number of traces are generated, i.e., a certain number of extended records (e.g., 100 traces) from which one trace is selected utilizing a TSM as described below. In addition, three schemes are proposed to include the error term: random generation, bootstrapping, and k-nearest neighbor.

The record extension scheme employed in this study is summarized in Figure 2 assuming as an example the case where there is one reference site. There are a total of N_1 extension years and N_2 historic years. The record extension starts in year N_1. The record extension scheme proceeds as follows: (1) The deterministic term of the MLR model for year N_1 is obtained from the historic record based on the data $X^1_{N_1}$ and Y_{N_1+1}, (2) the error term ε_{N_1} is obtained by any of the three methods described further below, and (3) the quantity Y_{N_1} is obtained from Eq.(4) (i.e., adding the deterministic and error terms). The method is repeated so as to determine the total extended record $Y_1, Y_2, ..., Y_{N_1-1}, Y_{N_1}$.

Procedures for Determining the Error Term

(a) Random generation from normal distribution

This method is based on the assumption that ε_ν is an independent normal random variable. If the normal assumption is not satisfied, the dependent variable and/or the independent variable can be transformed before fitting the regression model. Thus normal random numbers with mean zero and standard deviation σ_ε are generated and used in Eq.(4).

(b) Bootstrapping (BOOT)

An alternative to transforming the data and using a normal error term is to obtain the error from Eq. (4) as

$$\varepsilon^*{}_\nu = Y_\nu - \left[\beta_1\ \beta_2 \cdots \beta_{p+1}\right] \begin{bmatrix} Y_{\nu+1} \\ X^1_\nu \\ \vdots \\ X^p_\nu \end{bmatrix} \quad , \quad \nu = N_1 + 1, ..., N_1 + N_2 - 1 \qquad (5)$$

Then, for record extension, ε_ν is randomly taken from the values $\varepsilon^*{}_\nu$ with replacement. Since the error term is selected from the historic data, the distribution of the error term is always the same as the historic. Srinivas and Srinivasan (2000, 2001, and 2005) applied this concept for generation of hydrologic data. Figure 2 shows schematically the procedure for obtaining the yearly extended value using BOOT for the error term.

(c) K- Nearest Neighbor Bootstrapping (KNNB)

The MLR model may not be appropriate in cases where the relation between the explanatory variables and the dependent variable is not linear and the variance of the error term is not constant. A simple case of non-constant variance of the error term along the dependent variable is depicted in Figure 3. By applying the K- Nearest Neighbor Bootstrapping (KNNB) method for determining the error term, it is possible to remedy the foregoing drawbacks. Lall and Sharma (1996) applied the KNNB method for the generation of yearly and monthly time series. In the present study the KNNB method has been modified so that it can be applied for data extension using the MLR model. The procedure is summarized in the following steps:

(i). Calculate the historic error term ε_v^* in the same manner as in the bootstrapping method above, i.e. using Eq.(5).

(ii). Estimate the "distances" between the fitted terms $\boldsymbol{\beta}\mathbf{X}_t^*$ and $\boldsymbol{\beta}\mathbf{X}_c$ as

$$d_c(t) = \sqrt{\left(\boldsymbol{\beta}\mathbf{X}_c - \boldsymbol{\beta}\mathbf{X}_t^*\right)^2} = \left|\boldsymbol{\beta}\mathbf{X}_c - \boldsymbol{\beta}\mathbf{X}_t^*\right| \quad , \; t = N_1 + 1, \ldots, N_1 + N_2 - 1 \qquad (6)$$

where $\boldsymbol{\beta}$ is the estimated parameters by the least squares method, $\boldsymbol{\beta X}_t^*$, t=N_1+1,…,N_2+N_1-1 is the vector of the known historic values, , and $\boldsymbol{\beta X}_c$ is the vector of the fitted term for the target year c. If the length of the historic concurrent yearly data is N_2 years, then N_2-1 distances are obtained by excluding the last observed value for the year N_1+N_2 because of the lag-1 term.

(iii). Order the distances from the smallest to the largest value and take the smallest k values from the N_2-1 values where k should be selected according to the allowance of the variance and the closeness to the historic value. The choice of k will be explained in some detail below.

(iv). One value must be chosen from the k values. One must weight the values so that the closer neighbors have higher weight and the farther ones lower weight. The weight is defined for the j^{th} ordered value as

$$K_j = \frac{1/j}{\sum_{j=1}^{k} 1/j} \quad , \quad j = 1,\ldots,k \tag{7}$$

where $\sum_{j=1}^{k} K_j = 1$

(v). Randomly select a single value from the foregoing k values using the estimated weights of step (iv). For example, Figure 2 shows that the year of the selected distance from the N_2-1 years is ω.

(vi). The historic error term ε_v^* of the selected year ω is used to extend the record for the target year c using Eq.(4).

(vii). Repeat the steps (ii) through (vi) until all records are extended.

The foregoing modified approach combines the parametric model MLR and the non-parametric technique KNNB. In this manner it is expected that the linear relation between the dependent and the explanatory variable(s) is captured by the parametric model, while the nonparametric model accounts for the remaining non-linear relation and non-homogeneity of the error term.

If the number of k values is increased then more variation on the error term is allowed. The opposite occurs if the number of k values is decreased. The KNNB method becomes identical to the BOOT method when the number of k values is equal to N_2-1 (the maximum). The selection of k should be made according to the allowance of the variability on the extended data and the preservation of the non-linearity and non-consistency of the error term. Lall and Sharma (1996) suggested a generalized cross validation method (GCV) in addition to the rule of thumb $n^{1/2}$ (n is the length of the historic records, e.g. $n = N_2$ in Figure 2). In this study we used k=7 as a default since the historic data are at least 50 years long ($50^{1/2} \approx 7$). A smaller value is chosen if the error term yields unrealistic values during the record extension. In the generated data reported by Lall and Sharma, the generated monthly data from KNNB tended to underestimate the variance and autocorrelation. The underestimation of the variance for the accumulated yearly data is more severe than for the monthly data. The limited number of the k-nearest neighbors produces this discrepancy.

3.2 Monthly Model

Let us consider that the monthly flows are denoted by $Q_{\nu,\tau}$, where $\tau = 1,...,12$ represents the month ($\tau = 1$ corresponds to October), ν denotes the year and we will assume that the data have been standardized seasonally. The equation for record extension at the monthly time scale is similar to that of the yearly model and is expressed as

$$Y_{\nu,\tau} = \left[\beta_1 \; \beta_2 \cdots \beta_{p+1}\right] \begin{bmatrix} Y_{\nu,\tau+1} \\ X^1_{\nu,\tau} \\ \vdots \\ X^p_{\nu,\tau} \end{bmatrix} + \varepsilon_{\nu,\tau} \qquad (8)$$

where $Y_{\nu,\tau}$ and $X_{\nu,\tau}$ represent the standardized data for each month. If monthly data are highly skewed, the log-transformation is applied prior to standardization. Otherwise, the nonparametric error selection with either the BOOT or KNNB method takes into account the skewness of $Y_{\nu,\tau}$. Using these procedures, the marginal distribution of $Y_{\nu,\tau}$ can be preserved because only the historic error term is employed in the record extension. The monthly model has been applied for each month and the error term has been included using similar procedures as previously described for the yearly model.

If the historic monthly data of a certain site are not intermittent, then the records are extended directly from Eq.(8). However, the monthly data at some sites, such as sites 22 and 27, are intermittent. In this case, a multiplicative model has been applied (for these cases) as

$$Z_{\nu,\tau} = G_{\nu,\tau} \cdot Y_{\nu,\tau} \tag{9}$$

where $G_{\nu,\tau}$ is a binary (0,1) process, i.e. $G_{\nu,\tau} = 0$ if $Z_{\nu,\tau} = 0$ while $G_{\nu,\tau} = 1$ if $Z_{\nu,\tau} > 0$, and $Y_{\nu,\tau}$ is the variable representing the amount of streamflow when $G_{\nu,\tau} = 1$. The $G_{\nu,\tau}$ process may be described by a periodic Markov Chain and parameterized by the marginal probabilities $p_\tau(0)$ and $p_\tau(1)$, and the transitional probability $p_\tau(i, j)$. For example, $p_\tau(0,1) = P[G_{\nu,\tau} = 1 | G_{\nu,\tau+1} = 0]$ is the transitional probability that the G process will be equal to 1 at time τ given that it is equal to 0 at time $\tau + 1$. Note that the conditioning is on $G_{\nu,\tau+1}$ because the record extension is performed back in time (i.e., the value at time $\tau + 1$ is known while the value at time τ is unknown). The model parameters can be estimated by either the method of moments or maximum likelihood. For record extension only the transitional probabilities $p_\tau(0,1)$ and $p_\tau(1,1)$ are needed. They are estimated respectively by

$$\begin{aligned} p_\tau(0,1) &= \frac{n(G_{\nu,\tau} = 1 | G_{\nu,\tau+1} = 0)}{n(G_{\nu,\tau} = 0)} \\ p_\tau(1,1) &= \frac{n(G_{\nu,\tau} = 1 | G_{\nu,\tau+1} = 1)}{n(G_{\nu,\tau} = 1)} \end{aligned} \tag{10}$$

where, for example $n(G_{\nu,\tau} = 0)$ is the number of times where $G_{\nu,\tau} = 0$. Once the parameters are estimated the G process may be generated as usual based on the Markov chain model. Alternatively, one may apply bootstrapping techniques. For example, a simple moving block bootstrapping is applied for the monthly binary process $G_{\nu,\tau}$. One year blocks of monthly binary values ($G_{\nu,\tau}$, $\tau = 1,2,..,12$) can be selected from the historic data.

3.3 The Temporal Adjustment Procedure

Temporal adjustment is required to meet the additivity condition between the monthly and yearly values. Proportional, power, and linear adjustments have been suggested for this purpose (Koutsoyiannis and Manetas, 1996). If the adjustment is applied directly to the extended monthly data, the monthly statistics may be significantly biased. An iteration procedure suggested by Koutsoyiannis and Manetas (1996) is used before the adjustment to avoid this bias. In this procedure, the generated monthly values are checked against the extended yearly values before applying the adjusting procedure. If the difference between the sum of the generated monthly values and the extended yearly value meets a specified criterion (see Eq.(11) below), then the generated monthly values are adjusted using the proportional adjustment given by Eq.(12). Otherwise, the monthly values are regenerated until the difference meets the criteria. The referred criterion is defined as,

$$d = \left| \ln(Q_\nu) - \ln(\sum_{\tau=1}^{\omega} Q'_{\nu,\tau}) \right| \le \varepsilon^{adj} \tag{11}$$

where Q_ν is the extended record for year ν, $Q'_{\nu,\tau}$ is the extended records for year ν and month τ, and ε^{adj} is the tolerance level (0.01~1). Once the extended monthly data meets the referred criteria, then the proportional temporal adjustment is made as

$$Q_{\nu,\tau} = \frac{Q_\nu}{\sum_{\tau=1}^{12} Q'_{\nu,\tau}} Q'_{\nu,\tau} \tag{12}$$

where $Q_{\nu,\tau}$ is the temporal adjusted monthly flow.

3.4 Trace Selection Method (TSM)

If the error term is included in Eq.(4) or (8), any number (n) of record extensions may be generated (for example, n =100). We will select one record that provides comparable variability to that exhibited by the reference site. The selection criterion is specified below.

For ease of explanation let us first define some notation and terms: h = length of the historic short record, e = length of the extended record, and $w = h + e$ = length of the whole record after the extension. Consider certain statistics s (e.g., the mean and standard deviation) that can be estimated from two parts of the record: $s(h)$, estimated from the historic short record and $s(w)$, estimated from the whole record. If the ratio $s(w)/s(h)$ is greater than 1 it implies that the record extension had the effect of increasing the value of the referred statistic while a ratio smaller than 1 will indicate the opposite. This ratio can be compared with the ratio $s^r(w)/s^r(h)$ obtained using the corresponding lengths of data of the reference site. The rationale is that the ratio for the reference site reflects the real change of the statistic during the two time periods. Thus the selection of the extended record (one out of the 100 record extensions) will be made based on which ratio is closest to the ratio obtained from the reference site.

Let us define the ratios for the target and reference sites respectively as

$$\Lambda = s(w)/s(h) \tag{13}$$

$$\Lambda^r = s^r(w)/s^r(h) \tag{14}$$

And the absolute error as

$$AE = \left|\Lambda - \Lambda^r\right| \tag{15}$$

The mean and the standard deviation are the two statistics used for the comparison. The sum of the absolute errors for the two statistics are estimated and the criteria is to select the extended record i that minimizes the sum

$$\min_i \left\{ \left|\Lambda m(i) - \Lambda m^r(i)\right| + \left|\Lambda s(i) - \Lambda s^r(i)\right| \right\} \tag{16}$$

where i refers to a specific generated extended record, i=1,…,n, n=number of traces generated (i.e., number of extended records), and Λm and Λs refer to the ratios for the mean and the standard deviation, respectively. The foregoing description of TSM is for annual record extension. For monthly TSM, the same concept applies except that the selection of the extended record is based on

$$\min_i \left\{ \sum_{\tau=1}^{\omega} \left| \Lambda m_\tau(i) - \Lambda m_\tau^r(i) \right| + \left| \Lambda s_\tau(i) - \Lambda s_\tau^r(i) \right| \right\} \tag{17}$$

where $\Lambda m_\tau(i)$ and $\Lambda s_\tau(i)$ refer to the ratios for the mean and the standard deviation for month τ, respectively.

3.5 Spatial Adjustment

River network systems posses the spatial property where the lower river stations are likely to have a higher value of streamflow than the upper river stations. Regardless, the streamflow records at upstream and downstream stations show certain proportionality between them. In order to maintain such condition a spatial adjustment may be needed. And the adjustment is applied on the accumulated flows to stabilize the intervening flows when small variations in the accumulated flows inadvertently affect the intervening flows. Since the record extensions for the Upper basin are based on the accumulated flows and for the Lower basin are based on the intervening flows, the spatial adjustment is applied on the extended accumulated flows for the sites of the Upper basin only.

The spatial adjustment is performed in the upstream direction and the correction is determined as:

$$\hat{Q}_t^{(i)*} = \hat{Q}_t^{(i)} \frac{r\hat{Q}_t}{\sum_{j=1}^{n} \hat{Q}_t^{(j)}}, \tag{18a}$$

$$r = \frac{1}{N} \sum_{t=1}^{N} \left[\left(\sum_{j=1}^{n} Q_t^{(j)} \right) / Q_t \right] \tag{18b}$$

where $\hat{Q}_t^{(i)}$ is the t-th extended record for the substation *i*, $\hat{Q}_t$ is the t-th concurrent value at the downstream station, $Q_t^{(j)}$ is the observed value at the substation *j*, Q_t is the observed value at the downstream station at time *t*, $\hat{Q}_t^{(i)*}$ is the adjusted value for the substation *i*, *n* is the number of upstream sites, and *N* is the number of observed records, respectively. Note that the ratio *r* is estimated from the historic values for the referred stations. Figure 4 shows an example of a stream network with two upstream stations 1 and 2 and a downstream station 3. The figure 4 (a) shows the historic flow data and the 4(b) shows the corresponding extended data. This spatial adjustment may cause some bias on the statistics of the extended records.

3. 6 Model Verification Criteria

Some simple analyses have been made to verify that the extended records are reasonable when compared to the available historic records. Recall that one hundred record extensions (samples) are generated for each site and only one of them is chosen. The selected extended record must have a time series pattern comparable to that of the reference site. A selection criterion was devised to assure such comparability. In addition, the variability of the extended record must be comparable to that of the historic record. Thus a comparison of the time series and basic statistics of the historic and extended records are made.

Firstly, the extended and historic time series are plotted concurrently in order to compare their time series patterns. The one hundred extended yearly records (samples) are plotted next to the historic. For the monthly time series, only the historic and the selected extended record are graphically displayed to avoid overcrowding the figures. In addition, some key statistical characteristics of the total extended data (historic plus extended) such as the mean, standard deviation, skewness, auto-correlation, maximum, and minimum are determined for the monthly and yearly streamflow data.

4. Description of the Colorado River Data

First of all, in consultations with BOR project counterparts it was decided to conduct the record extensions of the Upper Colorado River stations based on cumulative flows while the Lower Colorado sites are based on the intervening flows. In 1983 the Bureau of Reclamation (BOR, 1983) extended the streamflow records of the Upper Colorado River stations back to the year 1906 by using multiple linear regression (MLR) equations. Also the intervening flow records at some sites of the Lower Colorado River were extended using MLR (BOR, 1985; BOR, 1992) but the record extension was not through the year 1906. For simulation studies of the Colorado River system it is important that all the records have the same length. In this report we document the new record extension studies for both the Upper and the Lower Colorado stations. It was decided to redo the previous record extensions (as referred to above) to take advantage of the additional historic records obtained through the year 2003 and to apply improved record extension techniques.

Since the records of the Colorado River system have been acquired from various sources, one had to identify in which year the record extension should start for each site. Table 1 shows the existing lengths of records gathered from BOR reports and data files and USGS reports and websites. In addition, personal communications with USGS personnel and BOR personnel working on the Colorado River also helped in defining the data base period of record to be used in the analysis. Small portions of the previously extended records presented in the BOR reports (1983, 1985, and 1992) were used as necessary. The schematic diagram for the entire Colorado River System is depicted in Figure 5 where the locations of the 29 sites and major reservoirs are shown. Figure 6 shows the record lengths indicated in the referred BOR reports. For example the BOR report of 1983 utilized records for the Upper basin sites through the year 1978. Likewise, Figure 7 shows the records lengths (for all the sites except site 5) that were taken from the USGS website. In addition, the record lengths obtained from an Excel data file obtained from J. Prairie (data file compiled 9/23/2005) is shown in Figure 8. And Figure 9 shows the record lengths that were identified and utilized as the basis for the record extension studies described in this report. Further details explaining the rationale in identifying the data base record lengths are given in Table 2.

Some further considerations pertaining to the identification of record lengths and the record lengths to be extended for the Lower Basin stations are explained in more detail here. For this purpose it is convenient to make the following definitions and distintions: IF_i (intervening flow) = intervening flows associated with station i (i.e., gains and/or losses in the reach between site i and the inmediate upstream stations considered), AF_i (accumulated flow) = sum of the intervening flows from all upstream stations including station i; MF_i = measured flows at station i. Both IF and AF refer to naturalized flows (i.e., flows that would exisits at a given site or reach if there were no human intervention such as diversions, storage, etc). On the other hand, MF includes the effect of human intervention if there is any. However, $AF = MF$ if upstream from site i there is no human intervention.

For example, the intervening flows for site 23 (IF_{23}) may be estimated from the water mass balance equation as

$$IF_{23} = AF_{23} - AF_{20} - AF_{21} - AF_{22} \qquad (19)$$

where AF_i is the accumulated flow at site i. Figure 10 shows a schematic of this particular system. Or, if measured flow data are available for sites 20 and 23, the quantity IF_{23} can be estimated from the equation

$$IF_{23} = MF_{23} - MF_{20} - AF_{21} - AF_{22} \qquad (20)$$

where MF_i is the measured flow at site *i*. Furthermore, if the quantity IF_{23} is known, then from Eq.(19) one can calculate AF_{23} as

$$AF_{23} = IF_{23} + AF_{20} + AF_{21} + AF_{22} \tag{21}$$

For example, in the BOR report (1992) the quantity IF_{23} was obtained from Eq.(20) and AF_{23} from Eq.(21). The quantity IF_{23} was estimated back to 1923 using constant mean values for sites 21 for year 1923 and site 22 for years 1923-1925 (BOR, 1992). The *AF* records for site 22 for the period 1906-1925 and site 21 for the period 1906-1923 are extended in this study (note that for these sites *AF*=*IF*). In addition, the *MF* records for site 23 and 20 exist starting in 1923. Because the *AF* records for site 21 and 22 were extended, the quantity IF_{23} for the period 1923-1925 must be recalculated by Eq.(20) using the measured data MF_{20} and MF_{23}.

The records for site 22 for the period 1926-1947 were previously extended (BOR, 1985) utilizing the USGS data for the Little Colorado River at Grand Falls (i.e., site 22 = 1.1×Little Colo. at Grand Falls flow - 295). Figure 11 depicts the monthly time series for both stations for the period 1954-1959. The data for other years are not available for both sites, i.e. only 6 years of data are available for estimating the parameters of the regression equation. Nevertheless, the two time series are close to each other as shown in Figure 11. If the fitted regression model gives a close estimate of the dependent variable the effect of the error term is small. In this case, there is not much difference whether the error term is included or not in the regression equation. Therefore, it was decided to keep the previously extended data for site 22 for the period 1926-1947.

In addition, historic flow data for site 24 are available since 1930, and the record for 1910-1929 has been previously extended (BOR, 1985). A portion of this extended record, i.e.

the record for 1923-1929 was utilized to estimate the intervening flows for site 25 back to 1923. Therefore, the remaining missing records for 1906-1922 were extended in this study.

Measured data for site 27 (Bill Williams River below Alamo Dam) are available since 1940. The flow records for the USGS station Planet, AZ for the period 1914-1939 were used to represent the records of site 27. There are some differences in the amounts of the streamflows between site 27 and the Planet gage because the contributing area at the Alamo gage is 4,633 square miles and that for the Planet gage is 5,140 square miles. However, there are three reasons that may justify using the Planet data: (1) the amount of the streamflow from this tributary (site 27) is not significant compared to the main course of the Colorado, (2) the Planet data for the period 1935-1940 has been used for estimating the natural intervening flows for site 28, and (3) the record extension is not likely to yield better data than the gage data of the Planet, AZ unless there is highly correlated reference data. Therefore, the data for site 27 for 1914-1939 is employed as is while the records for the period 1906-1913 were extended in this study.

5. Results

The specification of the methods and data utilized for each site is presented in Table 3. The type of data utilized for each site is shown in column 2, i.e. accumulated flows (AF) for the sites of the Upper Colorado River and intervening flows (IF) for the Lower Colorado River. Note however that in the case of site 21 (Paria River) even though it is located in the Upper Colorado, the methodology utilized has been similar to that used for the Lower Colorado. The third and fourth columns in Table 3 show what techniques are used for modeling the error term in the MLR model. NOR signifies that the error term is generated from the normal distribution, KNN(k) means that the error term is computed with k-nearest neighbors, and BOOT indicates that bootstrapping is utilized. In most cases of the yearly record extension we utilized a normally distributed error. The exceptions are in the cases where the error term for the yearly record extension is not normally distributed or if the error term yields unrealistic values such as negative values for the accumulated flows. If the distribution of the error term is significantly skewed and the relation between the dependent and independent variables is nonlinear, then the dependent variable is transformed using the logarithmic transformation. The method employed for the monthly data is always a k-nearest neighbor except in two cases where bootstrapping (BOOT) is used to model the error term. Also note that the existing historic data for the sites of the Upper basin starts in October while the data for the Lower basin starts in January. Because the record extensions for the entire Colorado River system was based on the Water Year (which starts in October), the first three months of the first year of record for the sites of the Lower basin, i.e., October, November, and December (for example, for the water year 1923 of site 21) are completed for each month using the same MLR but without the error term.

The record extensions in this report are based on multiple linear regression models that are based on explanatory variables that include some reference sites to preserve the cross-correlations with those sites and the value of the next time period of the dependent variable in order to account for the serial correlation. The cross-correlations between the accumulated yearly flows for all sites are shown in Table A1 and the correlations between the intervening flows are shown in Table A2 of Appendix A. In addition, the month-to-month cross-correlations of the accumulated flows for all sites are shown in Tables A3-A14 and the monthly correlations for the intervening flows are shown in Tables A15-A26. The cross-correlations are employed to select the reference sites that will be included in the MLR models. The reference sites and their parameters (**β**) are presented in Tables 4 and 5 for each site, respectively. The numbers in bold in Table 4 indicate the reference site to be employed in selecting the single record extension using the trace selection method (TSM) as described in section 3.4. The criteria for choosing the reference sites to be considered in the MLR model include the strength of the relationship with the target site (measured by the cross-correlations), the proximity to the target site, and the length of the historic records.

For example, sites 18 and 19 are highly correlated (with each other.) One can employ one site as a reference site to extend the records of the other site as long as the data are available. However, the records of both sites are missing for the years 1911-1914. Therefore for this short period the accumulated flows for site 19 are extended using sites 8 and 5 as reference sites. Then the records of site 18 are utilized to extend the records of 19 for the years 1906-1910. After extending the records for site 19, the records for site 18 for the years 1910-1927 are extended using 19 as reference site.

The USGS site No 10128500 for the Weber River near Oakley, Utah (not part of the 29-sites of the Colorado River system) has a complete record (refer to Figure 12 for details). This site was utilized in the 1983 BOR report for extending the records for sites 11 and 14. In this record extension study we also used the Weber River data (referred to as site 30 in Table 4) for extending the records for sites 11, 14, and 17.

After a target site is extended, the site may be used as a reference site as well. With this strategy, the cross-correlations among the various sites in the Colorado River system data are properly preserved in the final extended records.

It is worthwhile to mention that the record length of the intervening streamflows is not always the same as that of the accumulated flows. Figure 13 illustrates this situation considering the record lengths for sites 3 and 4. Even though site 4 has a complete record of accumulated flows, the record length of the intervening flows for this site is not the same because the record length of the accumulated flows at site 3 (Figure 13) is shorter. In fact, the record length of the intervening flows at site 4 must be the same as that of the accumulated flows at site 3. This also implies that even though the records of intervening flows of a given site is complete, the records of intervening flows may have to be changed (recalculated) after the records of the accumulated flows at upstream sites are extended. This situation may also affect the time series and statistics of the intervening flows at monthly and yearly scales. That is, even though the statistics of the accumulated flows for sites with full record lengths do not change, the statistics of the intervening flows may change (e.g., the intervening flow statistics for sites 4, 8, 16).

5.1 Results of Record Extension of Yearly Flows

The yearly mean values of IF for the entire Colorado River system are presented in Figure 14. It gives some idea of how much each of the basins contributes to the total streamflow of the Colorado River. The time series of the yearly streamflows for all 29 sites are presented in Appendix B. The one hundred extended records (samples) are also superimposed with grey (color) lines. The current records, derived from the historic data and the previous record extension studies, are drawn as a black line while the new extended records are drawn in thick red dashed line. The superposed 100 samples represent the alternative record extensions due to the effect of the error term. If the one hundred extended series exhibit significant variability (e.g., the time series of the yearly intervening flows for site 23 shown in Figure B11), it implies that the effect of the error term is large and the effect (relationship) of the reference site(s) weak and vice versa (e.g., the time series of the yearly intervening flows for site 2 as shown in Figure B7). Recall that the TSM is used to choose one single series (from the 100 record extensions) so as to avoid unrealistic high or low values. For example, the selected series for site 22 (Figure B5) does not include unrealistic large values although some of the 100 samples have very large values compared to the historic record.

Note that some of the figures in Appendix B show only a single time series for the whole period 1906-2003 because full records for those sites were available, i.e. no record extension was necessary (e.g. the time series for site 8 of AF as shown in Figure B2). However, the intervening flows (e.g. for site 8) had to be recalculated (red line) after the records of the upstream stations (e.g., sites 2, 5, and 7) were extended. This way, the accumulated flows for site 8 remain unchanged (Figure B2). The same condition occurred for sites 4 and 16. On the other hand, the intervening flows for site 5 have not changed since there is only one upstream site (site 4) and this site has a complete record.

The extended records of intervening flows for the stream stations of the Lower Colorado River exhibit large variability as shown by the gray lines in Figures B11 and B12 for sites 21, 22, 23, 25, 26, 28, and 29. This is due to the effect of the random error term in the regression equation. But somewhat less variability is shown in Figures B5 and B6 for the corresponding accumulated flows. Furthermore, the extended intervening yearly flows for these sites appear to be more variable (random) than those of the upper basin stations because: (a) the sources of the intervening streamflows for this area are sudden local thunderstorms that are physically not related or connected with other parts of the basin, and (b) the intervening flows are estimated based on the water mass balance. For example, the IF for site 23 is estimated from Eq.(20) where the MFs (measured flows) for sites 20 and 23 are about one hundred times larger than the IFs for site 23 (estimated based on in yearly values as shown in Table 6). Small errors in estimating the MFs for sites 20 and 23 may significantly affect the estimates of IF for site 23. It is suspected that key statistics such as mean, standard deviation, skewness, and correlations may be affected by such errors.

The time series of the intervening flows for site 23 is shown in Figure B11. The high value observed in the extended part of the series (black full line) does not arise from the extension method but from the influence of the flows at the upstream stations. In other words, the value is calculated from Eq.(20) and Table 6 reproduces the calculations for the years 1923 and 1924. The magnitude of the yearly AF for site 21 is about 14 KAF (thousand acre feet) and that for site 22 is about 233 KAF, which are relatively small compared to the magnitudes of the MFs for sites 20 and 23. The relatively large magnitude of IF_{23} for the year 1923, which is about 560 KAF (refer to the bottom of Table 6) comes from the big difference of the measured flows for sites 20 and 23, which are about 16,237 KAF and 17,045 KAF, respectively (for the year 1923). Furthermore, this arises because of the big difference between the measured values for month 12. This will be discussed further in the next section.

The yearly key statistics (such as the mean, standard deviation, skewness coefficient, lag-1 serial correlation coefficient, and minimum and maximum values), for the whole data set (which includes the historic plus the extended data) and the corresponding historic statistics are shown in Tables 7 and 8 for the accumulated and intervening flows, respectively. For comparison corresponding tables numbered 7A and 8A are included where the same statistics are shown for the "historical + previous extended", which means that part of the total record was previously extended using the methods described in BOR reports (1983, 1985, 1992). The ratios of the statistics for the whole data set S_{Ext} over the corresponding historic statistics S_{His} are shown in Table 9 for both the accumulated flows and the intervening flows.

The mean values of the accumulated yearly flows based on the whole data tend to be slightly larger than those of the historic data in almost all sites except sites 22, 24, and 27. However, the differences are within 10%. The biggest difference is about 8% for site 18. Likewise, the differences for the standard deviation are within 9%. The differences for the skewness coefficient appear to be large, mostly underestimation as shown by the ratios in column 4 of Table 9. The skewness ratios for the accumulated flows vary in the range 0.34-1.08. However, one must note that the values of the skewnesses are generally small for most of the sites, and for those sites where the skewness are significant (e.g. sites 15, 17, 21, 22, 24, and 27) the historic skewnesses are 1.45, 1.26, 1.05, 1.95, 1.56, and 2.61 while for the whole series they are 1.03, 0.83, 0.84, 2.01, 1.68, and 2.67, respectively. The lag-1 serial correlation coefficient (r_1) for the historic accumulated flows varies in the range – 0.05 to 0.39. After the record extension the values of r_1 vary in the range –0.04 to 0.43.

The results for the intervening flows show somewhat larger variations than for the accumulated flows. The ratios for the mean (refer to Table 9) vary in the range 0.887-1.117 and for the standard deviation in the range 0.899-1.34, which show larger ranges than for the cumulative flows. The skewness coefficient of the historic series varies in the range –0.93 to 2.61 and for the whole record in the range –0.90 to 2.67. While the range appears to be similar some smaller values of the skewness are evident in the whole record compared to those of the historic intervening flows. However, given the large sample variability of this statistic the differences are considered to be unimportant. This is especially so if we consider that for the sites with the largest skewness coefficients, such as sites 15, 17, 21, 22, 24, and 27 for which the historic skewness are 1.45, 1.26, 1.05, 1.95, 1.56, and 2.61, the corresponding values based on the whole extended series are 1.03, 0.83, 0.84, 2.01, 1.68, and 2.67, respectively, values that are comparable.

The values obtained for the lag-1 serial correlation coefficients deserve consideration and concern, especially for some of the sites of the Lower basin. This concern is because of the large values of r_1 obtained for the historic records such as 0.73, 0.82, and 0.80 for sites 8, 26, and 29. Normally for natural annual flows one does not see such large values and generally they are smaller than 0.5. Rarely does one see values of r_1 larger than 0.5 for natural annual flows. On the other hand, one may find large values of r_1 due to the effect of storage from natural or human-made lakes and reservoirs or due to other factors such as non-stationarity due to large-scale climatic variability (or the effect of low frequency). One example is the case of the St. Lawrence River for which r_1 is about 0.71 due to the effect of the large storage provided by Lake

Ontario. Although one may argue that perhaps the nonstationarity phenomenon may explain such large values of r_1 observed in the intervening flows of some sites of the Colorado River, the problem is that the apparent non-stationarity at sites 26 and 29 are in the opposite direction (upward trend for site 26 and downward trend for site 29 as may be observed in Figure B12). It is suggested that perhaps the reason for such apparent nonstationarity for sites 26 and 29 may be the errors involved in estimating the intervening flows. For the most part the r_1 values obtained for the whole records are similar to those obtained from the historic series with large values of r_1 obtained for several sites as indicated above.

Regarding the minimum and maximum values of intervening flows obtained from the historic and the whole records, they are comparable for the most part although in certain cases some differences are evident. For example, for site 20 some negative values occur (Table 8 and Figure B10) in the whole extended record while a negative value does not occur in the historic series. However, only a few low values occur at the beginning of the record and should not cause significant effects. Note that the record extension for site 20 was based on the accumulated flows while the intervening flows for site 20 are calculated by

$$IF_{20} = AF_{20} - AF_8 - AF_{16} - AF_{17} - AF_{19}$$

The sites 8 and 16 have complete records while the records for sites 17, 19, and 20 were extended. The magnitude of AF for sites 17 and 19 are relatively small compared to those of the other sites. The magnitude of IF_{20} is mostly affected by the values of AF_8 and AF_{16} (for which no extensions were made), and from AF_{20}. Thus, even with "perfect" record extensions for sites 17, 19, and 20, the occurrence of some erratic value is unavoidable (such as the referred negative values for IF_{20}) because of the values AF_8, AF_{16}, and AF_{20} (note that these values are available for the entire period 1906-2003).

5.2 Results of Record Extension for Monthly Flows

Monthly time series and statistics of the accumulated and intervening flows are shown in Appendix C and D, respectively. Figures C1-C10 shows the monthly time series of the accumulated streamflows, and Figures C11-C20 show the intervening streamflows for all 29 sites. The full lines depict the historic series, while the thick line of segments with the x marks represent the new extended records.

Generally the extended monthly records of accumulated flows have similar periodic patterns and variability as the historic records have. In some cases though (e.g., for sites 20, 23, 25, 26, 28, and 29, most of them along the main stream in the lower basin) the monthly values for the extended data appear to be higher than those observed in the historic data. But this is not surprising since a similar pattern has been observed at site 16, which has a complete record. Likewise, the extended monthly time series patterns for the intervening flows are similar to those of the historic records. One may note that in some instances the variability obtained in the new extended record is more similar to the historic one than that shown by the record extensions obtained previously (e.g., site 10 in Figure C14).

In Appendix D, the monthly basic statistics of the accumulated streamflows are presented on the upper half of the page and the intervening streamflow statistics are shown on the lower half of the page. The black lines represent the monthly statistics estimated from the historic data while the red dashed lines with the x marks represent the monthly statistics obtained from the new extended data (whole data including the historic data.)

The monthly statistics for the accumulated flows for both the historic and whole extended record appear to be comparable for most of the sites with a few exceptions. For example, for site 17 there is a significant difference in the skewness coefficient for month 6 (March). It was decided not to change or recalculate the extended data because of the minor magnitude of streamflows for this site compared to other sites in the main stream such as site 16. Also, there are large differences in the skewness of month 12 for the accumulated monthly data for sites 26, 28, and 29. The skewness of the new extended data for month 12 is about 2 times that of the historic data. However, one must note that a similar difference is observed in the skewness coefficient of the accumulated flows for month 12 for site 16 (i.e., the skewness of the last 70 years for site 16 data is 1.2 while the skewness based on the full length is 2.02). Site 16 has a significant effect on the streamflows of the Lower Colorado River system. About one third of the total streamflows in the Lower basin of the Colorado River system comes from the accumulated flows of site 16. However, the skewness for the other main-stream sites in the Lower basin (i.e., sites 23 and 25 do not show a significant difference, perhaps because the record extension for these sites was only extended 17 years compared to the 29 years of record extension for sites 26, 28, and 29).

Regarding the monthly statistics of the intervening flows for the most part the statistics based on the historic records and the whole extended records are comparable with the exceptions of sites 6, 17, and 23 for a few months. For site 6 there is a large negative flow for month 12. It was decided not to modify that value because it did not affect other basic statistics such as the mean or standard deviation. Also for site 17 there is a significant difference in the skewness coefficient for month 6. In this case because of the minor effect this site has in the total streamflows (e.g. compared to flows for site 16) it was decided to keep the extended records without any adjustments.

During the preliminary record extension calculations for the Lower basin we noted that some significant departures of the intervening flow statistics may occur not necessarily because of the values obtained for the extended records but because of possible errors that may exist in the original flow data base (either AF or MF). For example, we noted that the standard deviation, skewness, and the maximum value for month 12 for site 23 showed big differences between the values estimated from the historic and the whole extended record. These differences resulted from a single value that occurred in month 12 of 1923. For illustration the value of IF_{23} for this year was recalculated after the records of sites 21 and 22 were extended using Eq. 20 as

$$IF_{23}(373.8) = MF_{23}(1310.8) - MF_{20}(878.3) - AF_{21}(1.0) - AF_{22}(57.8)$$

where the quantities correspond to month 12 of year 1923. The calculations on a monthly and yearly basis are shown in Table 6 for 1923 and 1924. The large value 373.8 of IF_{23} occurred because of the large difference in the MF values for sites 23 (1,310.8 KAF) and 20 (878.3 KAF). The time series of IF_{23} for month 12 is shown at Figure 15. It may be observed that the value 373.8 KAF is unrealistically large so that it affects the statistics for this month 12. Especially, the standard deviation for month 12 is approximately doubled and the skewness tripled if such a large value is included. Compared to other monthly statistics the effect on the standard deviation and the skewness is notable in that the smooth seasonality (periodicity) in the statistics appears to break. One may argue that perhaps the reason of such a large value in IF_{23} may be an underestimation in the extended values for AF_{21} and AF_{22}. However, that possibility is very unlikely because even if the extended values for AF_{21} and AF_{22} are taken to be the highest historic values for such month 12, the result for IF_{23} would still be a very large value compared to the rest of the IF values of the record. The conclusion from this argument is that the errors in either MF_{20} or MF_{23} or in both may be the reason for the outlier value obtained for IF_{23} for month 12. Thus it was decided to replace the referred value of IF_{23} by using a regression equation as a function of the IF values for sites 17 and 25. The required statistics and parameters of the regression equation are shown in Table 10. Thus the new estimate of IF_{23} for the month 12 becomes 15.17 KAF. The time series of IF_{23} for month 12 using the new value is shown in Figure 16.

In addition, note that for the sites with full record lengths, such as sites 4, 8, and 16 (Figures D4, D8, and D16) the monthly statistics of the intervening flows have been changed because the data for some of the upstream sites have been extended.

6. Summary and Conclusions

The basic streamflow data that are primarily utilized for planning operational studies of the Colorado River system consists of 29 stations (sites). The data base has varied record lengths, a few of the stations have lengths for the period 1906-2003 (98 years) and most of them have shorter records. In the past decades the Bureau of Reclamation conducted studies to extend the short streamflow records. The prime objective of the study reported herein has been to update the previous studies so as to extend the data base for the stations of the Upper and the Lower Colorado basin to the common period 1906-2003. Another objective has been to define the statistical characteristics of the new extended data set. In the course of this study the previous record extensions were generally replaced allowing application of a consistent approach for the entire basin and improving methods as feasible.

The record extension study was based on the cumulative flows for the stations of the Upper basin and the intervening flows for the stations of the Lower basin. The basic record extension strategy performed the record extension at the annual time scale followed by a record extension at the monthly scale in such a way that the sum of the monthly flows adds up to the (previously extended) annual flows. The separate models for yearly and monthly scales are applied in order to preserve the variability and correlations within the various scales (monthly and yearly). The statistical method utilized is based on the multiple linear regression model that includes the error term so as to maintain a degree of variability in the extended records comparable to those of the historic records at some referenced sites. The method required developing a procedure for selecting a single trace or single record extension from the multiple record extensions that arise when using the error term.

The performance of the extension techniques and the results thereof has been verified based on graphical and statistical comparisons between the historic time series and the extended series. It has been shown that in general the extended records have similar patterns and statistics as those shown by the historic records. In a few instances some discrepancies exist but in those cases either the effect is small or the discrepancies arise from errors in the historic data base particularly for the Lower basin. This is evident for example in the exceptionally large values of the serial correlations obtained for the annual intervening flows for several sites along the main stream of the Colorado. There is no reason why one can not make further improvements to the extended flow estimates in the future, but to this date the new data base provides a reasonable record.

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Preliminary Analysis

- Transformation
- Standardization
- Definition of the reference site(s) to be used to extend the records of the target station

Record Extension

Multiple Linear Regression Model with an autoregressive term: one target site at a time and one or more reference sites.

(1) Extension on yearly scale with trace selection method (TSM)

(2) Extension on monthly scale with the repetition and temporal adjustment, and spatial adjustment if necessary. Then selection of one single trace among the 100 traces with TSM

Schemes to deal with the noise term:

- Random generation from normal distribution
- Bootstrapping
- K- Nearest Neighbor Bootstrapping

Testing and Verification

- Key statistics for monthly and yearly scales
- Monthly and yearly time series

Figure 1. Overall procedure of the record extension method developed for the Colorado River system.

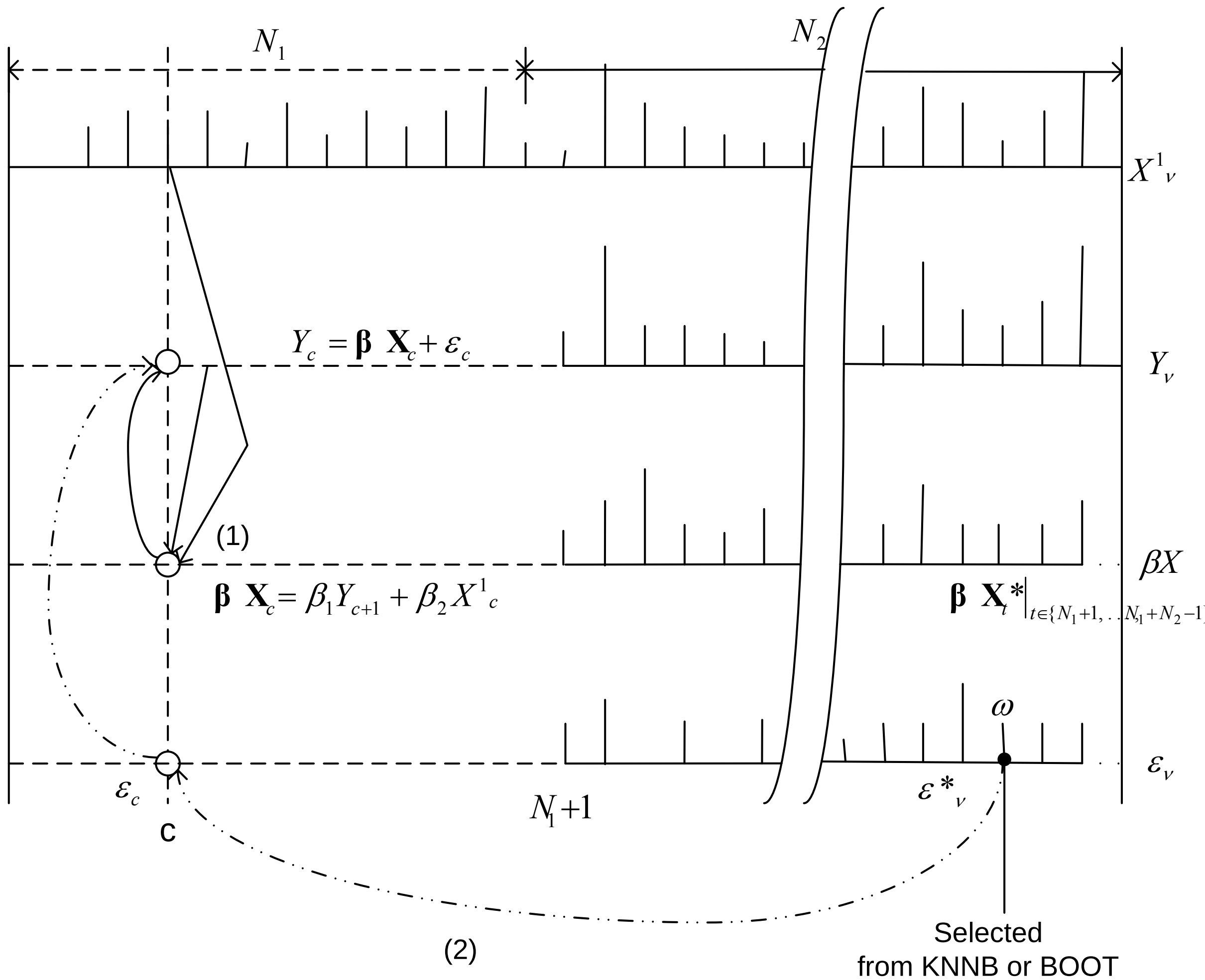


Figure 2. Schematic of record extension utilizing the MLR model assuming one reference site and methods KNNB or BOOT for determining the noise term. Three calculation steps are shown: (1) the fitted term $\boldsymbol{\beta}\mathbf{X}_c$ of the current year c, (2) the error term for the target year c is selected from the historical period, e.g. from the year ω, using either KNNB or BOOT methods, i.e. $\varepsilon_c = \varepsilon^*_\omega$, and (3) the extended record for the year c is determined as $Y_c = \boldsymbol{\beta}\mathbf{X}_c + \varepsilon_c$.

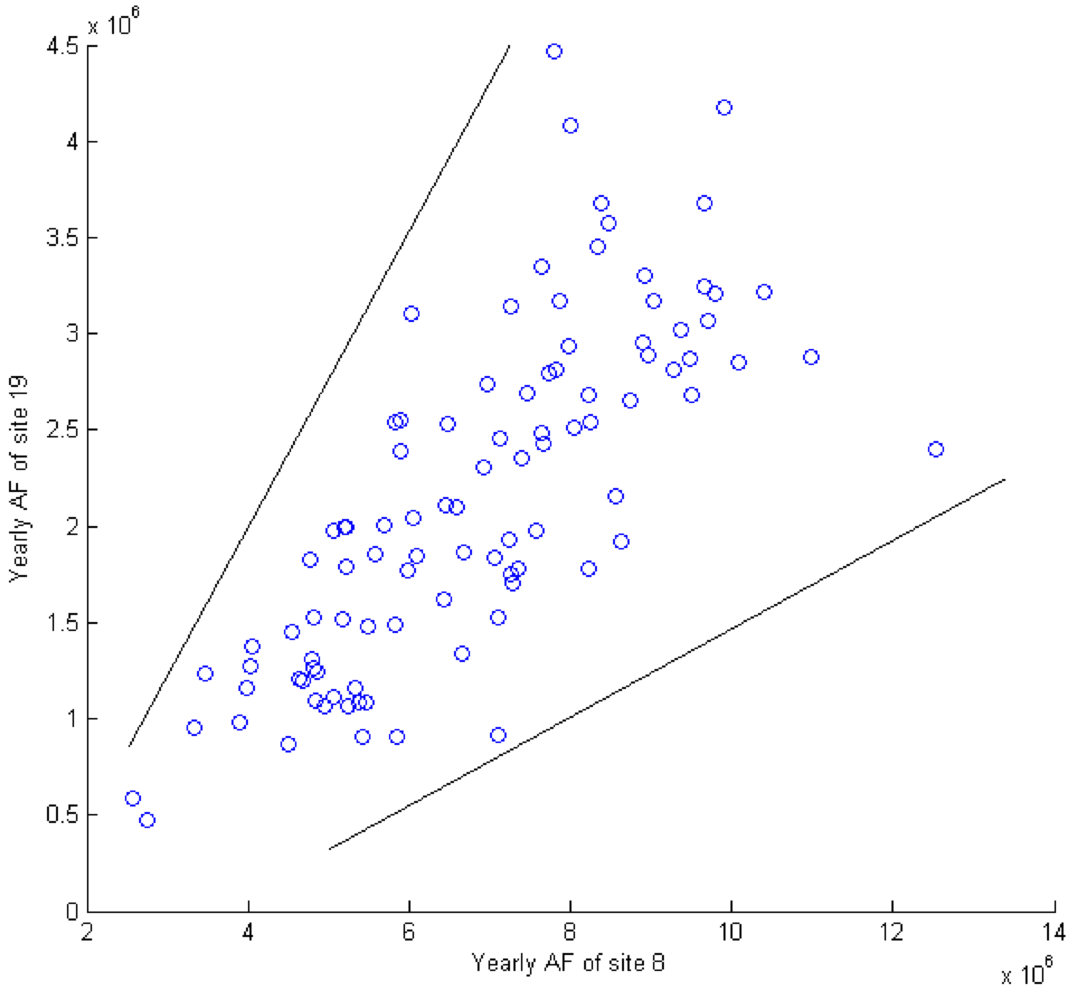
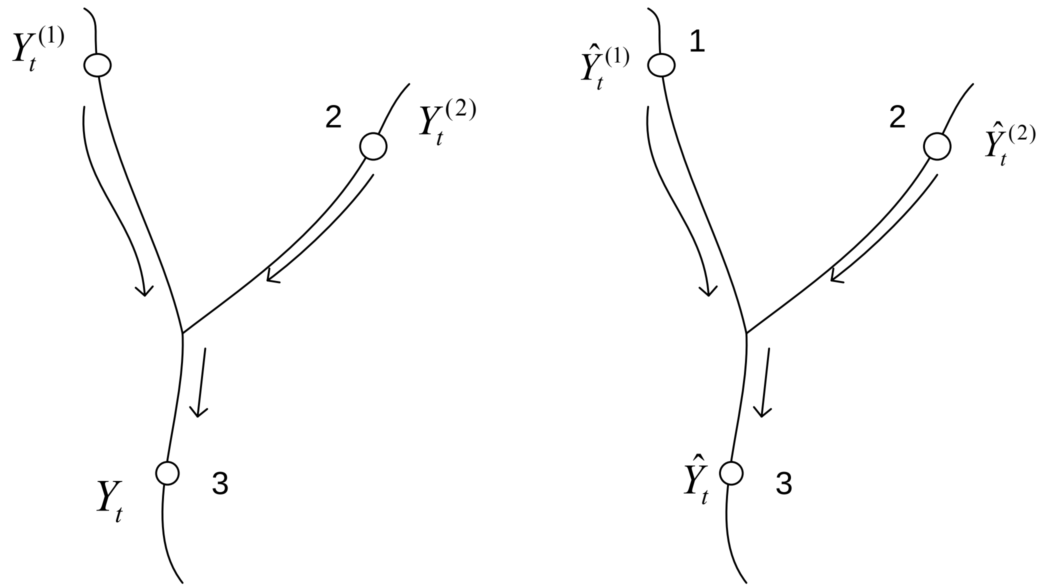


Figure 3. Scatterplot between the dependent variable *Y* (site 19) and the independent variable *X* (site 8).



(a) Historical **(b) After extension**

Figure 4. Stream network considering two upstream substations 1 and 2 and one downstream station 3. The spatial adjustment is performed on the substations to preserve the proportionality of the summed streamflow of the substations over the streamflow of the downstream station.

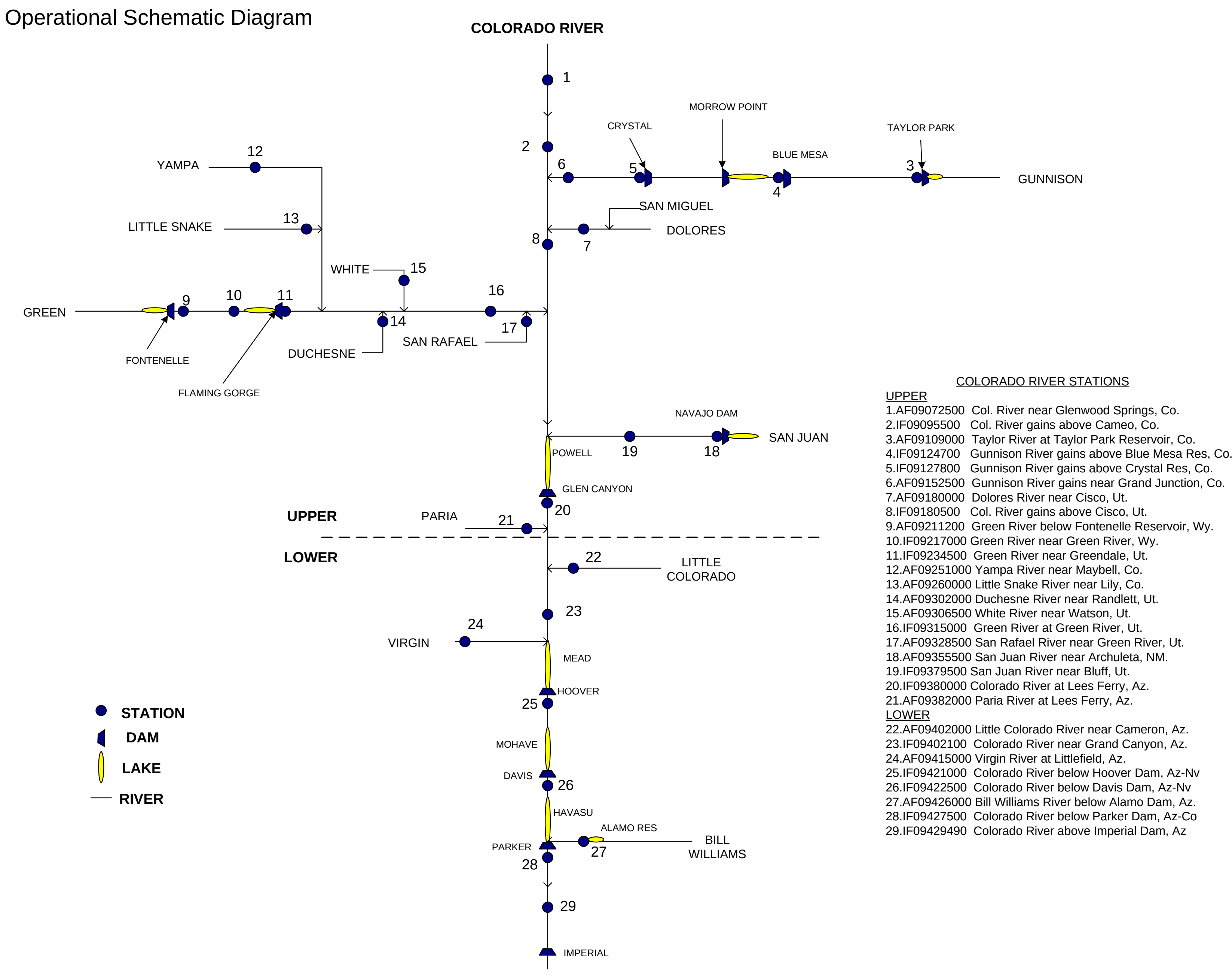


Figure 5. Schematic Diagram of the Colorado River system

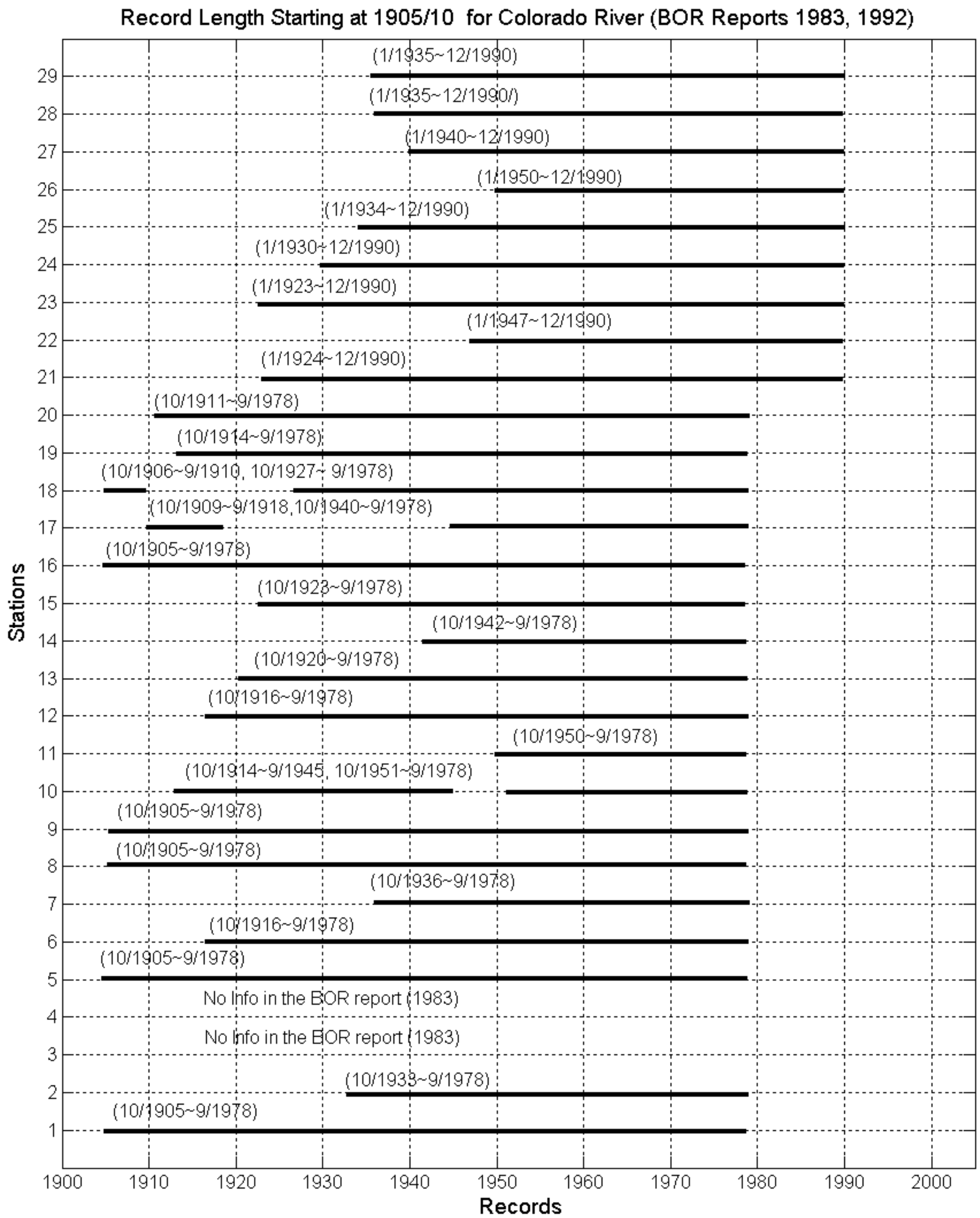


Figure 6. Record lengths of the Colorado River flows according to the information obtained from BOR reports. The record lengths correspond to the AF for the Upper basin stations (USBR, 1983) and the IF for the Lower basin (USBR, 1992). Note that the dates shown correspond to the calendar year.

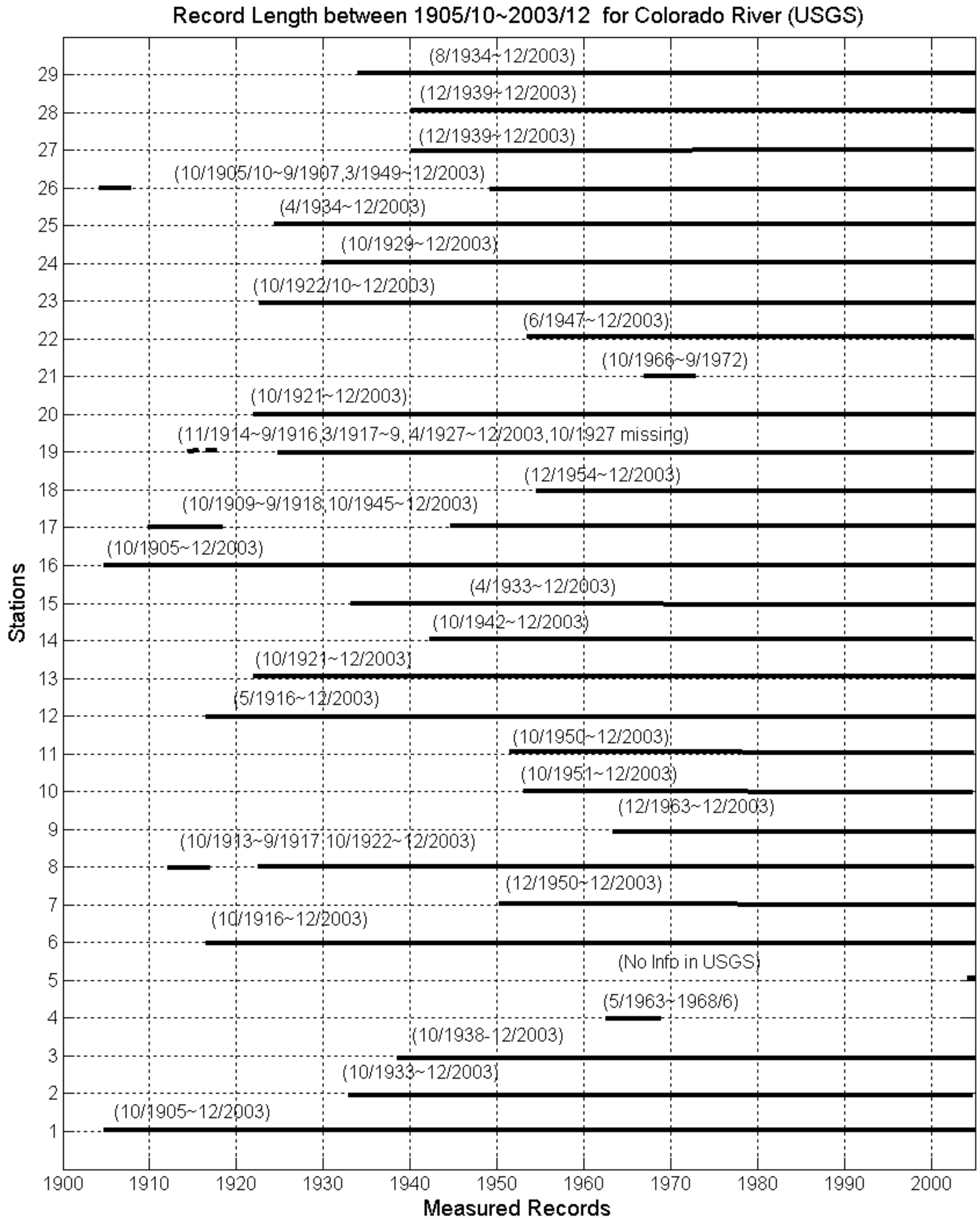


Figure 7. Record lengths of the Colorado River flows obtained from the USGS Website. The entire length correponds to the period 1906-2003. And the dates shown correspond to the calendar year.

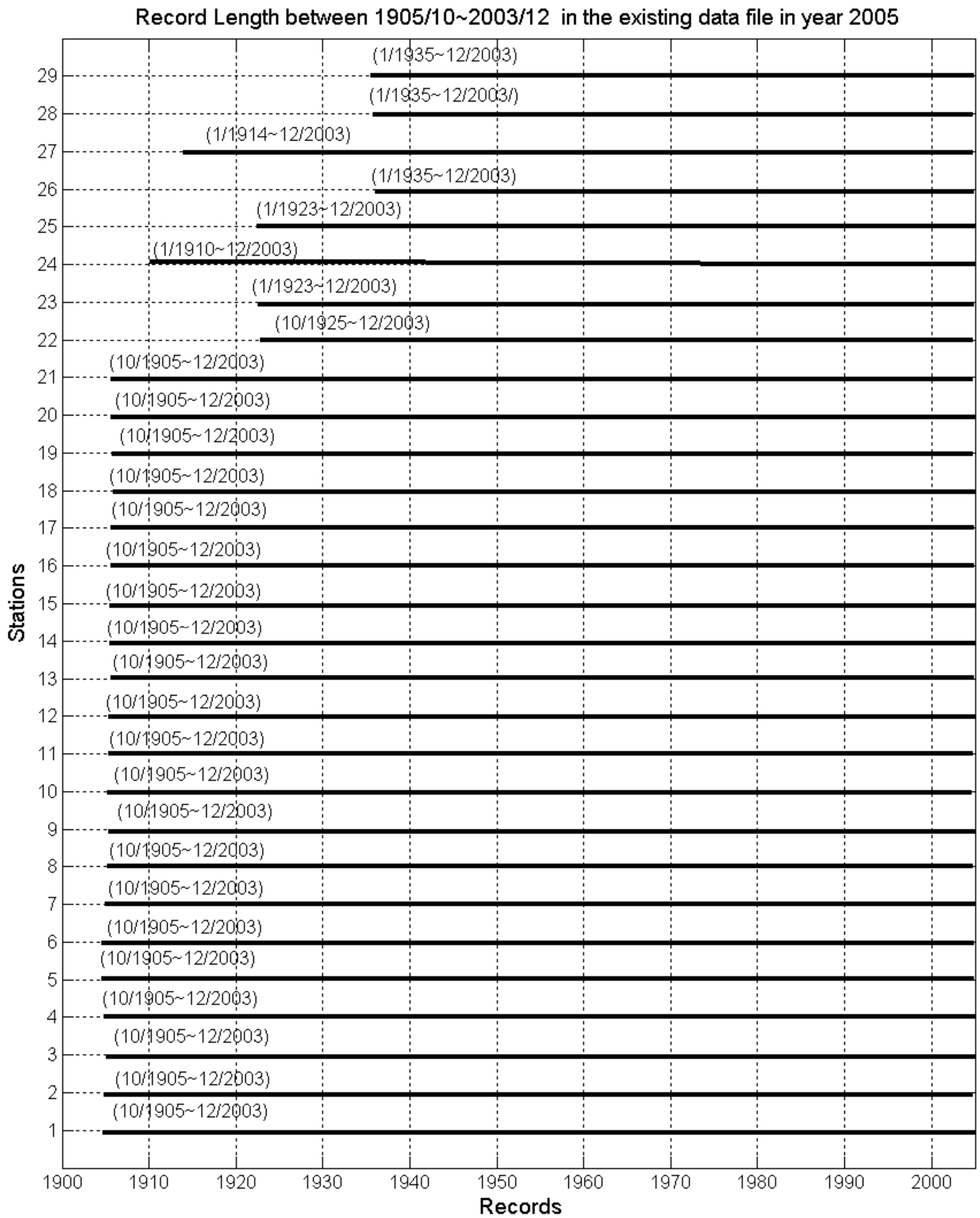


Figure 8. Record lengths of the Colorado River flows obtained from the excel data file compiled by J. Prairie for the period 1906-2003 (Prairie, 2005). The lengths correspond to AF for the sites of the Upper basin and IF for the sites of the Lower basin. The dates correspond to the calendar year.

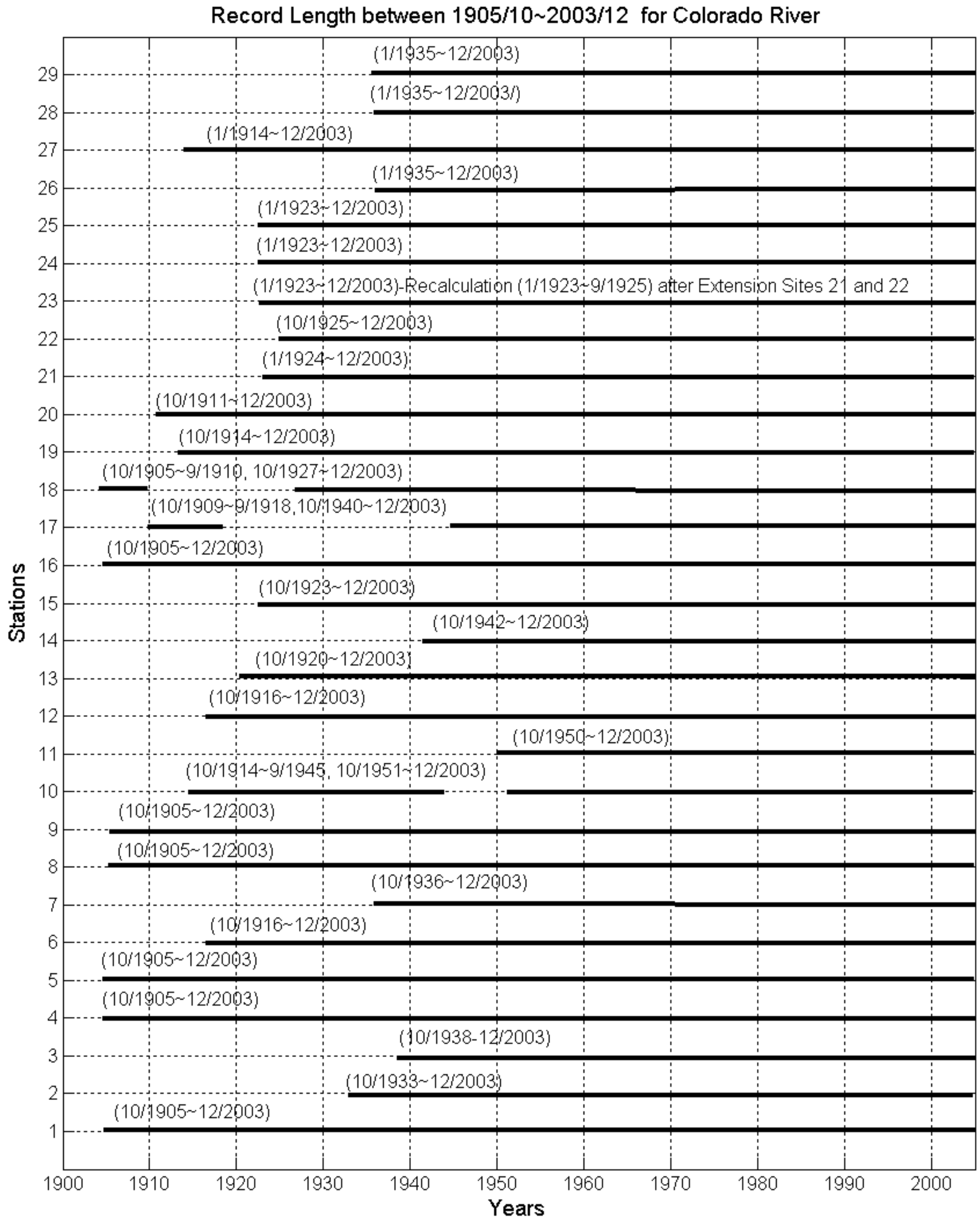


Figure 9. Record lengths of the Colorado River flows at 29 sites considered in the record extension study. The entire length (e.g. site 1) corresponds to the period October 1905-December 2003. The records shown for sites 1-20 (Upper basin) correspond to accumulated flows (AF) while the records for sites 21 (Upper basin) and sites 22-29 (Lower basin) are for the intervening flows. The dates shown correspond to the calendar year.

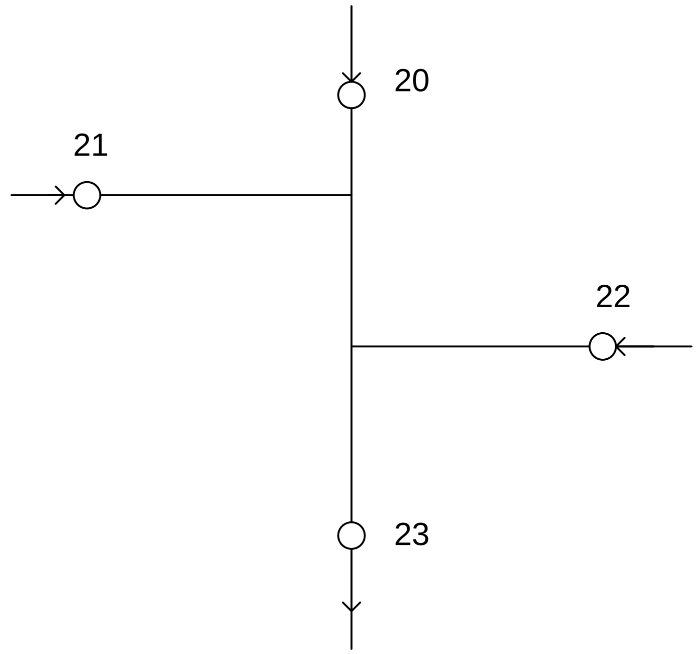


Figure 10. Spatial distribution of site 23 and its substations: the IF of site 23 is estimated by

$$IF_{23} = AF_{23} - AF_{20} - AF_{21} - AF_{22}$$

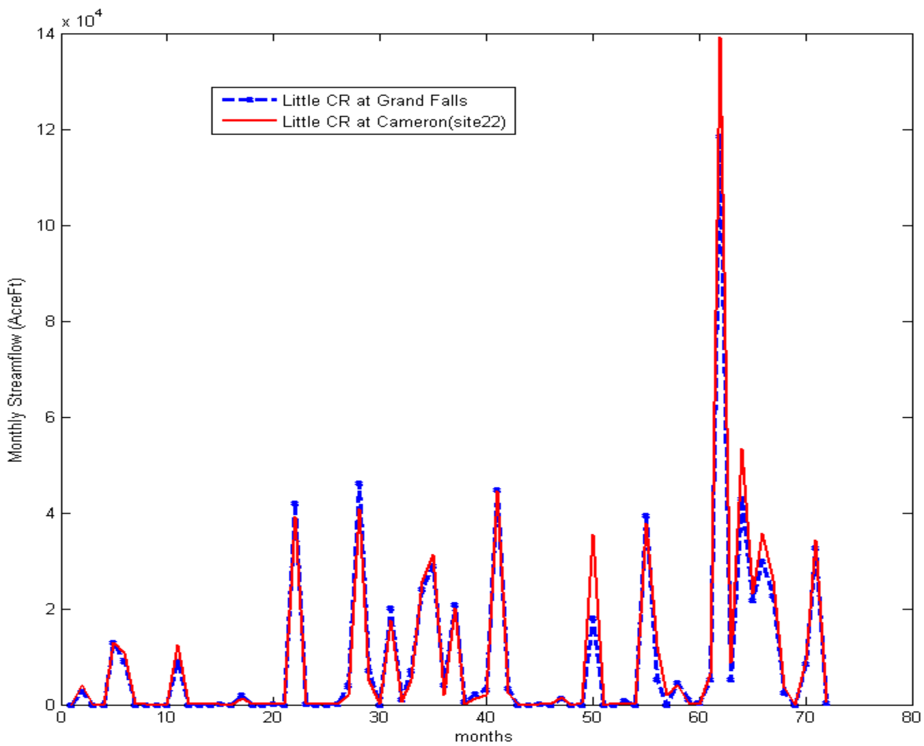


Figure 11. Comparing two time series: the Little Colorado River at Grand Falls (line of segments), and the Little Colorado River at Cameron, site 22 (full line) for the period 1954 - 1959.

USGS 10128500 WEBER RIVER NEAR OAKLEY, UT

- Summit County, Utah
- Hydrologic Unit Code 16020101
- Latitude 40°44'14",

Longitude 111°14'50" NAD27

Drainage area 162.00 square miles
Gage datum 6,640.00 feet
above sea level NGVD29

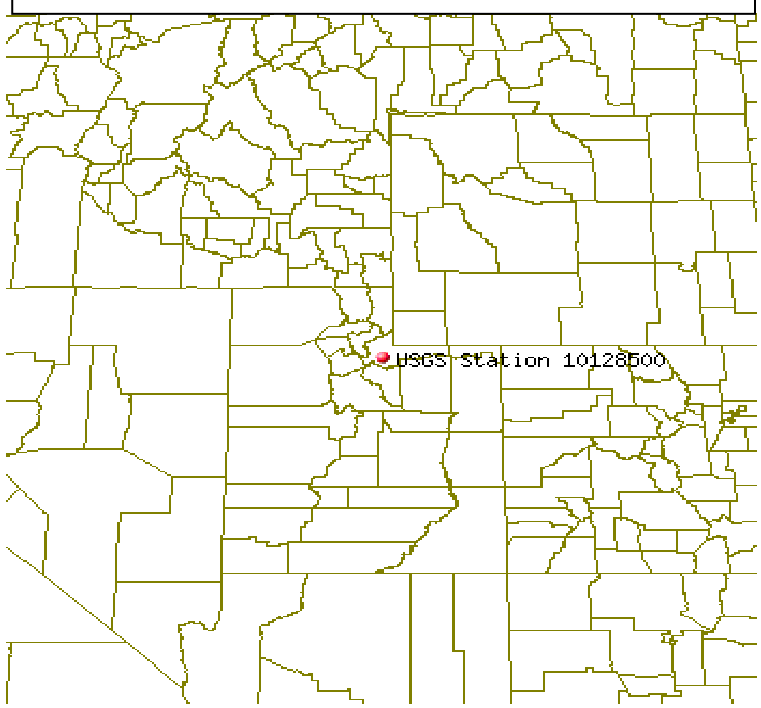


Figure 12. Information about the USGS gaging station # 10128500 used as a reference site in the record extension study.

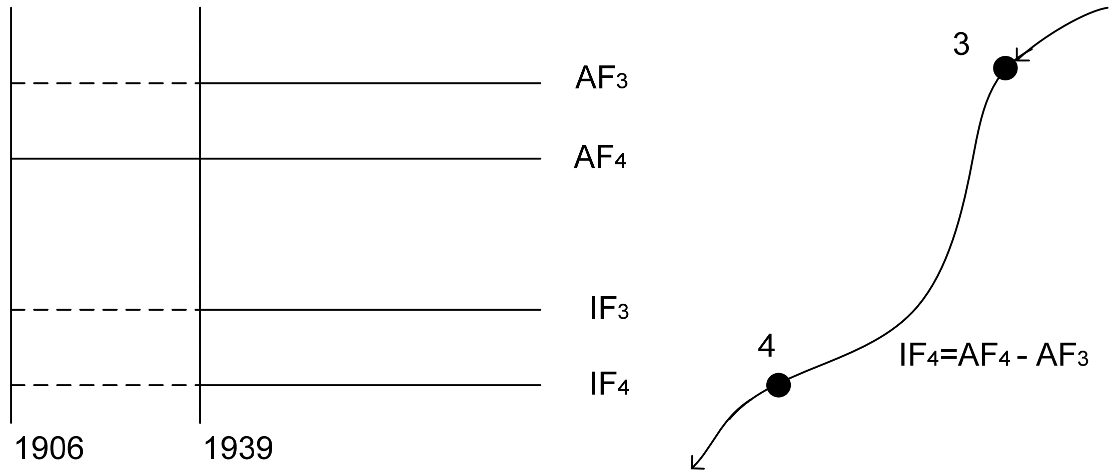


Figure 13. Record length and sketch for sites 3 and 4 where AF_i refers to the accumulated flow for site i and IF_i refers the intervening flow for site i. The graph in the left shows that the AF record for site 3 begins in 1939 while for site 4 it begins in 1906. However, because the IF in the reach 3-4, i.e. IF_4, is determined by $IF_4 = AF_4 - AF_3$, then the IF_4 record must begin in 1939.

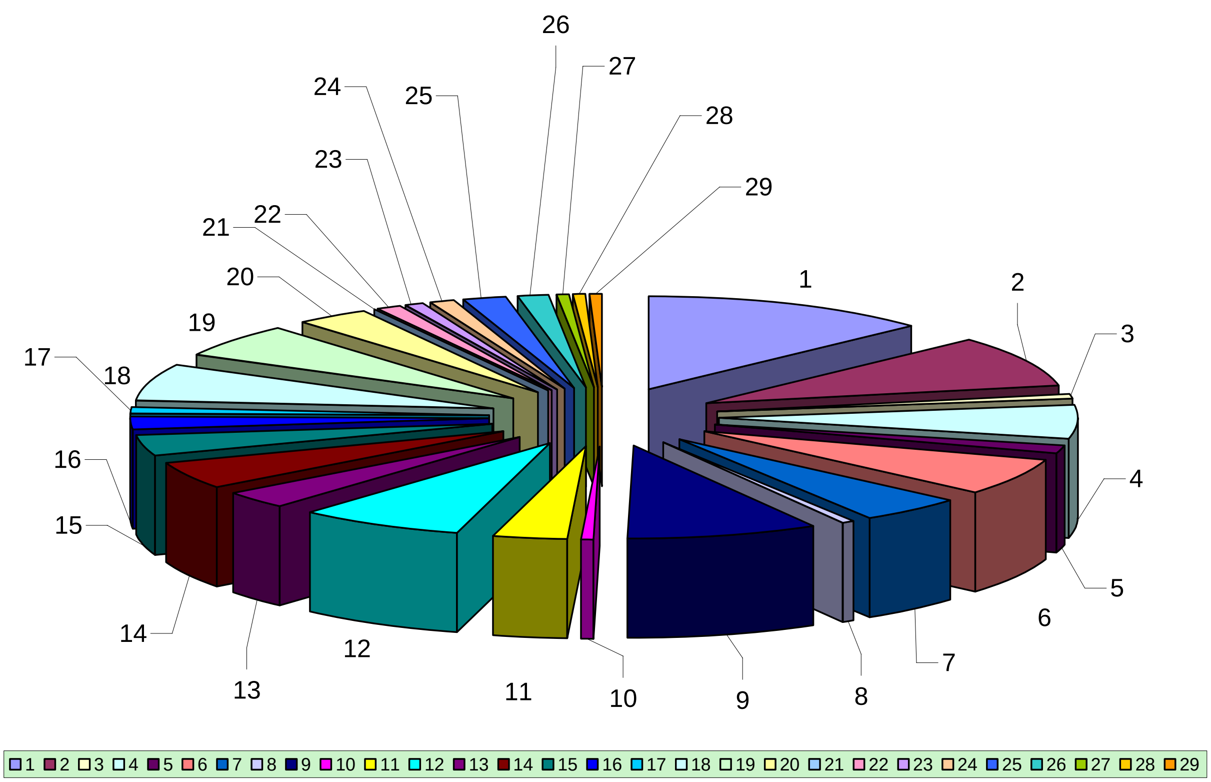


Figure 14. Pie diagram of the mean values of the yearly intervening streamflow for the Colorado River system

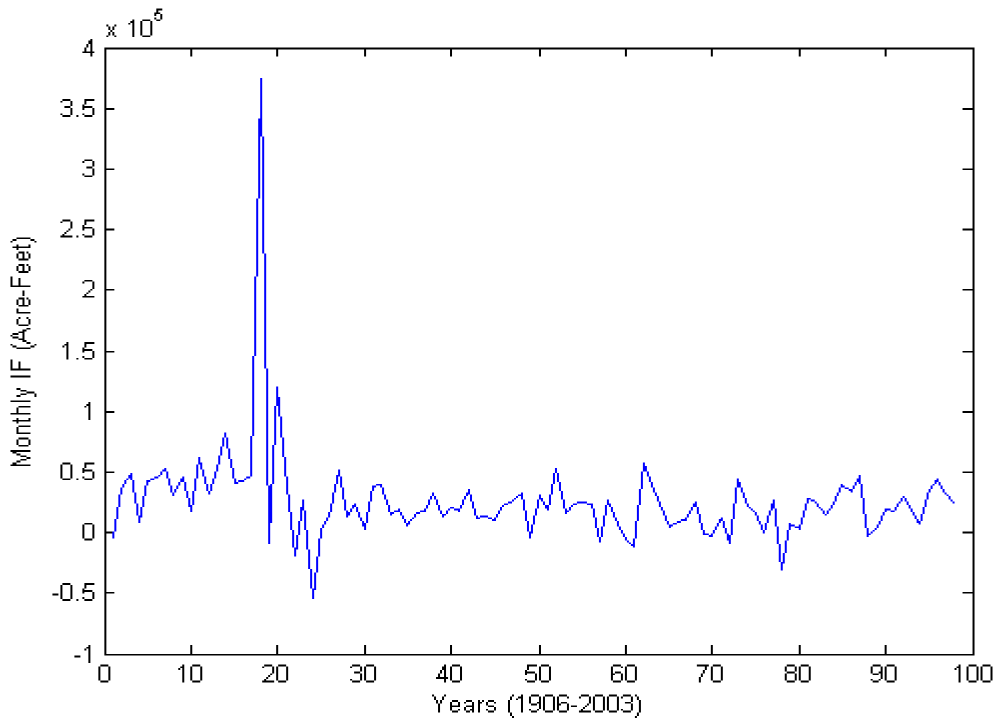


Figure 15. Time series of intervening flows for month 12 of site 23.

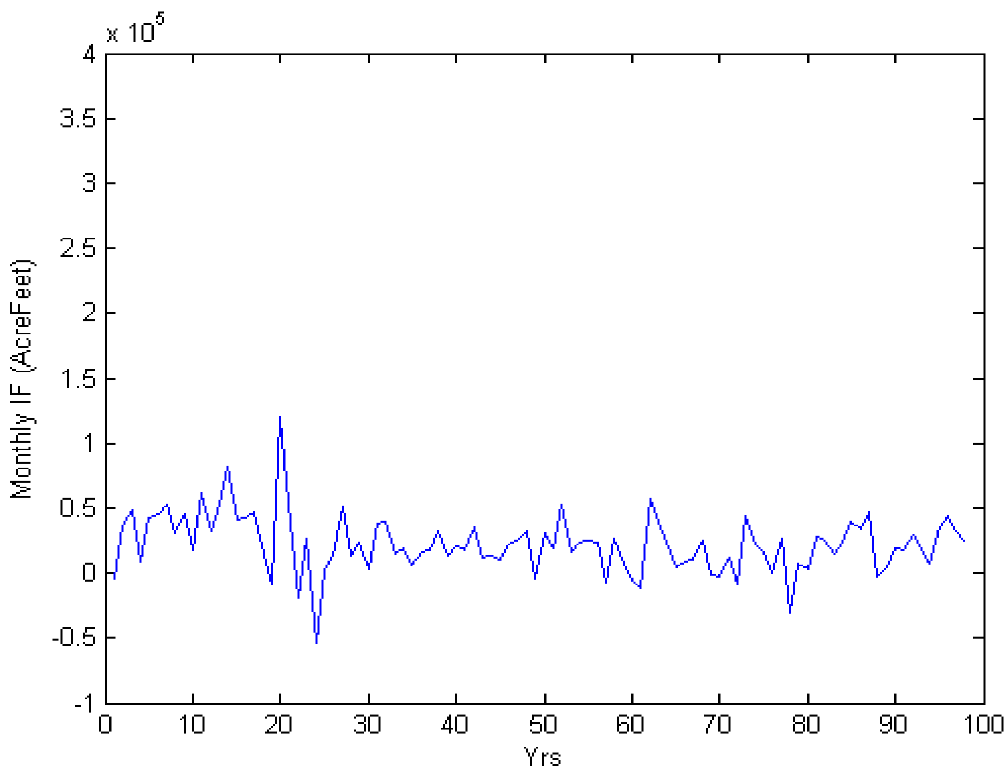


Figure 16. Time series of intervening flows for month 12 of site 23 after replacing the suspected outlier or erroneous value for the month 12 of 1923 by an estimated value from a regression equation (refer to Table 10).

Table 1. Gage numbers and record lengths defined from BOR reports and data files and USGS website.

Site Number	BOR			BOR 1983 Report		USGS Gauge Number	USGS website	
	1985 Report	2005 Data File	Current	from	to		from	to
1	9072500	9072500	9072500	Sep-05	Sep-78	9072500	Oct-1899	Sep-66
2	9095500	9095500	9095500	Oct-33	Sep-78	9095500	Oct-33	Sep-04
3	9109000	9109000	9109000	NA	NA	9109000	Oct-38	Sep-04
4	9124600	9124700	9124700	Oct-05	Sep-78	9124700	May-63	Jun-68
5	9127800	9127800	9127800	Oct-05	Sep-78	NA	NA	NA
6	9152500	9152500	9152500	Oct-16	Sep-78	9152500	Oct-1896	Sep-04
7	9180000	9180000	9180000	Oct-36	Sep-78	9180000	Dec-50	Sep-04
8	9180500	9180500	9180500	Oct-05	Sep-78	9180500	Oct-13 Oct-22	Sep-17 Sep-04
9	9211200	9211200	9211200	Oct-05	Sep-78	9211200	Dec-63	Sep-04
10	9217000	9217000	9217000	Oct-51 Oct-14	Sep-78 Sep-45	9217000	Oct-51	Sep-04
11	9234500	9234500	9234500	Oct-50	Sep-78	9234500	Oct-50	Sep-04
12	9251000	9251000	9251000	Oct-16	Sep-78	9251000	May-16	Sep-04
13	9260000	9260000	9260000	Oct-20	Sep-78	9260000	Oct-21	Sep-04
14	9302000	9302000	9302000	Oct-42	Sep-78	9302000	Oct-42	Sep-04
15	9306500	9306500	9306500	Oct-23	Sep-78	9306500	Apr-33	Sep-04
16	9315000	9315000	9315000	Oct-05	Sep-78	9315000	Oct-1894	Sep-04
17	9328500	9328500	9328500	Oct-40 Oct-09	Sep-78 Sep-18	9328500	Oct-09 Oct-45	Sep-18 Sep-04
18	9355500	9355500	9355500	Oct-27 Oct-06	Sep-78 Sep-10	9355500	Dec-45	Sep-04
19	9379500	9379500	9379500	Oct-14	Sep-78	9379500	Nov-14 Mar-17 Apr-27	Sep-16 Sep-17 Sep-2004 (10/1927/ Missing)
20	9380000	9380000	9380000	Oct-11	Sep-78	9380000	Oct-21	Sep-04
				BOR March 1992 report				
21	9382000	9382000	9382000	Jan-24	Dec-90	9382000	Oct-23	Sep-04
22	9402000	9402000	9402000	Jan-47	Dec-90	9402000	Jun-47	Sep-04
23	9402100	9402100	9402500	Jan-23	Dec-90	9402500	Oct-22	Sep-04
24	9415000	9415000	9415000	Jan-30	Dec-90	9415000	Oct-29	Sep-04
25	9421000	9421000	9421500	Jan-34	Dec-90	9421500	Apr-34	Sep-04
26	9422500	9422500	9423000	Jan-50	Dec-90	9423000	Mar-49	Sep-04
27	9426000	9426000	9426000	Jan-40	Dec-90	9426000	Dec-39	Sep-04
28	9427500	9427500	9427520	Jan-35	Dec-90	9427520	Jan-35	Sep-04
29	9429490	9429490	9429490	Jan-35	Dec-90	9429490	Oct-76 Aug-34	Sep-04 Sep-42

Table 2. Definition of Record Length up to Water Year (WY) 1906 for the Colorado River system

Site	The Upper Colorado River system
1	From the BOR Report 1983, the natural flow data are available since 1906. No record extension for this site is required.
2	From the BOR Report 1983, the records for this site exist since 1934. The records for the period 1906-1933 are extended in this current report.
3	The information about this station is not included in the BOR Report 1983. From the USGS website, the record length of the available records starts in 1939. It is assumed that the records for (1906-1938) were previously extended. The records for 1906-1938 are re-extended in this current report.
4	From the BOR Report 1983, the natural flows are available for 1906-1978. No record extension for this site is required. The station number was changed from 091246 to 091247 to reflect a slightly different location.
5	From the BOR Report 1983, the natural flow data are available since 1906. No record extension for this site is required.
6	From the BOR Report 1983, the records for this site exist since 1917. The records for 1906-1916 are extended in this current report.
7	From the BOR Report 1983, the records for this site exist since 1937. The records for 1906-1936 are extended in this current report.
8	From the BOR Report 1983, the records are available since 1906. No record extension for this site is required.
9	From the BOR Report 1983, the records are available since 1906. No record extension for this site is required.
10	From the BOR Report 1983, the records for this site exist during 1915-45 and 1952-1978. The records of 1906-1914 and 1946-1951 are extended in this current report.
11	From the BOR Report 1983, the records for this site exist since 1951. The records for 1906-1950 are extended in this current report.
12	From the BOR Report 1983, the records for this site exist since 1917. The records for 1906-1916 are extended in this current report.
13	From the BOR Report 1983, the records for this site exist since 1921. The records for 1906-1920 are extended in this current report.
14	From the BOR Report 1983, the records for this site exist since 1943. The records for 1906-1942 are extended in this current report.
15	From the BOR Report 1983, the records for this site exist since 1924. The records for 1906-1923 are extended in the current work.
16	From the BOR Report 1983, the natural flow data are available since 1906. No record extension for this site is required.
17	From the BOR Report 1983, the records for this site exist during 1910-1918 and 1941-1978. The records of 1906-1909 and 1919-1940 are extended in this current report.
18	From the BOR Report 1983, the records for this site exist for 1907-1910 and 1928-1978. In the BOR 1983 report, the records were extended using multiple regression. The previous extension (BOR, 1983) was used as is for 1906. The records for 1911-1927 are extended in the current study (this report.)
19	From the BOR Report 1983, the records for this site exist since 1915. The records for 1906-1914 are extended in this current report.
20	From the BOR Report 1983, the records for this site exist since 1912. The records for 1906-1911 are extended in this current report.
21	From the 1985 and 1992 BOR reports, the records for this site exist since 1924. The records for 1906-1923 are extended in this current report.
	The Lower Colorado River system
22	From the 1985 and 1992 BOR reports, the records for this site exist since 1947. The records for 1926-1946 were extended in the 1985 BOR Report. These extended records are kept. And the rest of the records for 1906-1925 are extended in this current report.
23	From the 1985 and 1992 BOR reports, the naturalized intervening flows were estimated since 1923. In the current report the records for sites 21 and 22 were extended through year 1923,

	then the naturalized intervening flows for this site (site 23) are recalculated for 1923-1925. The rest of the years (1906-1922) are extended in this current report.
24	From the 1985 and 1992 BOR reports, the records for this site since 1930. The records for 1906-1929 were extended in the 1985 BOR report. The records for 1906-1922 are re-extended in the current study. The extended records from the 1985 BOR report are used for the rest of the years 1923-1929.
25	From the 1985 and 1992 BOR reports the naturalized intervening flows for this site were calculated up to 1923. The records for 1906-22 are extended in this current report.
26	From the BOR Report 1985 and 1992, the naturalized intervening flows for this site were calculated since 1935. The intervening flow records for 1906-34 are extended in this current report.
27	From the 1985 and 1992 BOR reports, the records for this site exist since 1940. The records for 1914-1940 at site Planet, AZ were employed for this site. The records for 1906-1913 are extended in this current report.
28	From the 1985 and 1992 BOR reports, the naturalized intervening flows for this site were calculated since 1935. The intervening flow records for 1906-34 are extended in this current report.
29	From the 1985 and 1992 BOR reports, the naturalized intervening flows for this site were calculated since 1935. The intervening flow records for 1906-34 are extended in this current report.

Table 3. Methods used for record extension at each site

Site #	Data Used	Error Term		Remarks
		Yearly	Monthly	
2	AF	NOR	KNN (7)	
3	AF	NOR	KNN (7)	
6	AF	NOR	KNN (7)	
7	AF	NOR	KNN (7)	
10	AF	NOR	KNN (7)	
11	AF	NOR	KNN (7)	
12	AF	NOR	KNN (7)	
13	AF	NOR	KNN (7)	
14	AF	NOR	KNN (7)	
15	AF	NOR	KNN (7)	
17	AF	KNN (5)	KNN (3)	
18	AF	NOR	KNN (7)	
19	AF	KNN (7)	KNN (7)	
20	AF	KNN (7)	KNN (7)	
21	IF	KNN (7)	KNN (7)	- First 3months are extended separately with MLR and the same Ref sites
22	IF	NOR	BOOT	-Log-Transformed for the response variable (monthly and yearly) - Intermittent: Periodic Markov Chain - First 3 months are extended separately with MLR and the same Ref sites
23	IF	NOR	KNN (5)	- First 3 months are extended separately with MLR and the same Ref sites
24	IF	KNN(3)	KNN (3)	-Log-Transformed for the response variable (monthly and yearly) - First 3 months are extended separately with MLR and the same Ref sites
25	IF	KNN (7)	KNN (7)	- First 3 months are extended separately with MLR and the same Ref sites
26	IF	KNN (7)	KNN (7)	- First 3 months are extended separately with MLR and the same Ref sites
27	IF	KNN (3)	KNN (3)	-Log-Transformed for the response variable (monthly and yearly) - Intermittent (Block Bootstrapping) - First 3 months are extended separately with MLR and the same Ref sites
28	IF	NOR	BOOT	- First 3 months are extended separately with MLR and the same Ref sites
29	IF	NOR	KNN (7)	- First 3 months are extended separately with MLR and the same Ref sites

- KNN(*j*): indicates K-nearest neighbor bootstrapping with *j* number of neighbors.
- NOR: indicates the random term is generated from a normal distribution.
- BOOT: refers to bootstrapping method
- AF: Accumulated Flows and IF: Intervening Flows

Table 4. The reference sites used for record extension for each month and year. The bold number indicates the key reference site used for trace selection (site 30 refers to the USGS station 10128500 in Fig. 12, this site is not included in the Colorado River system but is used as reference site for record extension)

Months / Site #	1	2	3	4	5	6	7	8	9	10	11	12	Year
2	**1**,5	**1**,5	**1**,5	**1**,5	**1**,5	**1**,5	**1**,4	**1**,4	**1**,4	**1**,5	**1**,5	**1**,5	**1**,5
3	**5**,1	**5**,8	**5**,1	**5**,1	**5**,1	**4**,1	**4**,1	**4**,1	**4**,1	**4**,1	**5**,1	**4**,8	**4**,1
6	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1
7	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1	**8**,1
10	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**,16	**9**
11	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30	**9**,30
12	**1**,16	**1**, 16	**1**,16	**1**, 16	**1**,16	**1**, 16	**1**,16	**1**, 16	**1**,16	**1**, 16	**1**,16	**1**, 16	**1**,8,16
13	**16**,8,1	**16**,4	**16**,8	**16**,8	**16**,8	**16**,8	**16**,9	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8,1
14	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30	**16**,30
15	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8
17	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30	**16**,8,30
18	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**	**19**
19	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**	**8**,5 **18**
20	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	**16**,8	8,**16**
21	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**, 19	**18**	**18**, 19
22	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24	**27**,24
23	**27**	**24**,21	**27**,16	**24**,26	**24**,26	**21**	**18**,24	**25**	**25**,20	**27**	**25**,26	**18**	**25**,17
24	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21	**27**,21
25	**17**,20	**17**,24	**18**,,24	**19**,24	**19**, 24	**21**, 24	**17**,24	**18**,24	**24**	**17**,24	**19**,24	**21**,24	**18**,24
26	**28**,18	**29**,20	**29**,28	**28**,16	**29**,25	**29**,28	**29**,28	**29**,28	**29**,18	**29**,28	**29**,28	**29**,28	**29**,28
27	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**18**,19	**21**,19
28	**25**,29	**25**,29	**25**,29	**25**,29	**27**,18	**25**,18	**27**	**16**	**24**,25	**16**	**21**	**25**,21	**29**,21
29	**20**,24	**20**,18	**20**,18	**17**,18	**25**	**19**	**16**,20	**18**,19	**24**,25	**25**,18	**21**,20	**16**,20	**19**,20,24

Table 5. The parameter β in Eqs.(4) and (8) utilized for the record extension for each month and year of the Colorado River system

Site #	Variables in Eq.(4) or (8)	Months												Year
		1	2	3	4	5	6	7	8	9	10	11	12	
2	$Y_{\upsilon+1}$	0.22212	0.24255	0.28312	0.28144	0.31297	0.06195	0.00082	-0.04439	0.13939	0.12798	0.05478	0.21474	0.03035
	X^1_υ	0.50315	0.49924	0.42779	0.44642	0.39333	0.55732	0.70934	0.68014	0.57120	0.46356	0.63173	0.59947	0.63026
	X^2_υ	0.29606	0.22135	0.30170	0.26085	0.27252	0.47441	0.27729	0.37469	0.37886	0.39362	0.29217	0.30769	0.37890
3	$Y_{\upsilon+1}$	0.22788	0.24255	0.28312	0.26262	0.61197	0.61863	0.55643	0.17891	-0.22592	-0.12256	0.20516	0.25461	0.03831
	X^1_υ	0.63013	0.49924	0.42779	0.65282	0.28895	0.29073	0.27107	0.38150	0.20668	0.53557	0.70007	0.62516	0.74101
	X^2_υ	0.20465	0.22135	0.30170	0.07393	-0.02743	-0.01623	-0.00584	0.28073	0.56603	0.44798	0.10036	0.12159	0.21153
6	$Y_{\upsilon+1}$	0.40054	0.26855	0.50864	0.46387	0.40013	-0.08666	-0.05325	0.06862	0.18532	0.04219	0.10705	0.03147	-0.02369
	X^1_υ	0.60582	0.75200	0.52797	0.42503	0.61521	1.13746	0.94119	1.02754	1.04441	1.41814	1.24589	1.13648	1.16830
	X^2_υ	-0.02358	-0.08504	-0.04813	0.07100	-0.03559	-0.09021	0.02117	-0.15386	-0.25920	-0.50266	-0.39441	-0.24920	-0.19903
7	$Y_{\upsilon+1}$	0.09262	0.19374	0.57059	0.39742	0.07100	0.09530	0.23623	0.31926	0.27107	0.26790	0.38549	0.11611	0.01205
	X^1_υ	1.20132	1.01980	0.63149	0.57480	0.91589	1.15683	0.94750	0.97322	1.36574	1.24425	0.96424	1.38823	1.60256
	X^2_υ	-0.73414	-0.63393	-0.36038	-0.11701	-0.36059	-0.37055	-0.35400	-0.48707	-0.84314	-0.63738	-0.37306	-0.57267	-0.82440
10	$Y_{\upsilon+1}$	0.19669	0.20020	0.36840	0.36247	0.01574	0.04400	0.12308	0.01623	-0.03364	0.04391	0.10202	0.02198	0.00673
	X^1_υ	0.69275	0.69350	0.62152	0.54022	0.81332	0.92544	0.81179	0.90390	0.95541	0.95042	0.93552	0.96230	0.99118
	X^2_υ	0.03253	0.09306	0.11159	0.07541	0.13050	0.23511	0.03454	0.10681	0.02410	0.00190	-0.05157	0.01578	
11	$Y_{\upsilon+1}$	0.25440	0.20995	0.34160	0.41394	0.26235	0.30231	0.27790	0.18064	0.12007	0.01459	0.19650	0.13051	-0.00550
	X^1_υ	0.48389	0.58314	0.51552	0.26930	0.37208	1.14501	0.75327	0.66973	0.69690	0.79038	0.66090	0.71293	0.72832
	X^2_υ	0.18400	0.12547	0.14535	0.19713	0.34331	-0.10774	0.02103	0.22835	0.22743	0.23185	0.13832	0.15197	0.26683
12	$Y_{\upsilon+1}$	0.50290	0.55067	0.81045	0.56527	0.37608	0.14605	0.22991	0.28865	0.33050	0.15967	0.26933	0.43424	0.02899
	X^1_υ	0.34541	0.22847	-0.07037	0.09303	0.05908	0.14092	0.56708	0.38080	0.43531	0.45900	0.65621	0.28722	0.45295
	X^2_υ	0.15243	0.21371	0.17454	0.27753	0.54016	0.64283	0.29891	0.43103	0.33133	0.45625	0.08662	0.33513	0.16037
	X^3_υ													0.36410
13	$Y_{\upsilon+1}$	0.41226	0.12701	-0.06593	0.08156	0.08539	-0.16964	0.29098	0.31375	-0.22757	0.65633	0.68921	0.51555	-0.07187
	X^1_υ	0.26885	0.34902	0.57391	0.68508	0.80584	0.86268	0.77780	0.69969	0.93140	0.55284	0.46367	0.58079	0.92122
	X^2_υ	0.31858	0.27322	0.02694	-0.08067	-0.12642	-0.19734	-0.23412	-0.32217	0.08998	-0.04605	-0.22180	-0.25142	0.16817
	X^3_υ	-0.12493												-0.14385
14	$Y_{\upsilon+1}$	0.16563	0.32032	0.55048	0.56415	0.47039	0.34643	0.02275	0.09405	0.24217	0.31275	0.28610	-0.21444	-0.02480
	X^1_υ	0.86417	0.61077	0.32133	0.04708	0.21054	0.67707	0.71915	0.59803	0.67942	0.13482	0.67383	1.15604	0.85070
	X^2_υ	-0.23096	0.03928	0.15549	0.34975	0.24911	0.01073	0.03448	0.30745	0.13716	0.76071	-0.02732	-0.06082	0.09046
15	$Y_{\upsilon+1}$	0.56200	0.44539	0.61325	0.48131	0.10570	0.27971	0.32064	0.10562	0.24792	0.44077	0.50034	0.46831	0.00934
	X^1_υ	0.11649	0.12423	0.25026	0.23313	0.48446	0.70635	0.31236	0.29185	0.24916	0.12496	0.09238	0.16517	0.29467
	X^2_υ	0.30690	0.36928	0.09991	0.14698	0.10762	-0.08415	0.23208	0.54873	0.58743	0.51845	0.47000	0.32926	0.62194
17	$Y_{\upsilon+1}$	0.10563	0.43379	0.73334	0.36230	0.44862	0.35320	0.46276	0.14589	0.40350	0.56052	0.12478	0.32939	0.09625
	X^1_υ	0.38682	0.75615	-0.00106	0.05127	0.38117	0.12824	-0.11802	0.02485	0.35778	0.03870	0.66472	0.38760	0.38283

	X^2_υ	-0.06254	-0.18698	0.28354	0.17285	0.12822	0.14367	0.27971	0.42207	0.37967	0.24600	0.30092	0.23466	0.60518
	X^3_υ	-0.11028	-0.38355	0.24848	0.07846	-0.00415	-0.11973	0.27178	0.32295	-0.15223	0.35050	-0.29051	-0.10397	-0.15553
18	$Y_{\upsilon+1}$	0.19700	0.17747	0.32477	0.35158	0.12821	-0.04483	0.03984	0.10527	0.13856	-0.02282	0.06748	-0.01715	0.01196
	X^1_υ	0.91084	0.82165	0.68416	0.52741	0.82638	1.00237	0.92482	0.92991	0.89956	1.02375	0.87956	0.91914	0.97778
19	$Y_{\upsilon+1}$	0.27640	0.21337	0.21988	0.32458	0.29538	0.25023	0.27210	0.30625	0.38686	0.25476	0.14397	0.17711	0.00974
	X^1_υ	0.66560	0.79343	0.81644	0.64676	0.57952	0.78620	0.78831	0.71536	0.66349	0.81147	0.90249	0.97798	0.98492
20	$Y_{\upsilon+1}$	0.01606	-0.00514	0.03976	0.13836	0.12081	0.01926	0.06235	-0.01053	-0.01812	0.01052	0.07463	-0.02884	0.22499
	X^1_υ	0.24281	0.49159	0.38303	0.54016	0.44541	0.48187	0.32981	0.32681	0.35086	0.39563	0.29230	0.42669	-0.03228
	X^2_υ	0.70779	0.51139	0.62284	0.37108	0.47509	0.59010	0.63950	0.68520	0.69557	0.67247	0.67987	0.67686	0.33643
21	$Y_{\upsilon+1}$	0.11138	-0.01091	0.12894	0.22245	0.13190	0.42299	0.43925	0.01542	-0.13767	0.48211	0.08791	0.11701	0.14363
	X^1_υ	-0.59729	-0.10057	0.38601	0.02352	0.10355	-0.01229	0.19447	-0.07133	-0.18145	0.05869	0.21320	0.29235	0.17099
	X^2_υ	1.14846	0.50186	0.08924	0.44829	0.62100	0.43135	0.32056	0.53352	0.40591	0.17416	0.41326		0.41002
22	$Y_{\upsilon+1}$	0.22393	0.28763	0.63680	0.59589	0.47015	0.51205	0.47325	0.32377	0.28021	0.44691	0.24314	-0.10703	0.12446
	X^1_υ	-0.00023	0.08459	-0.01171	0.25611	0.17787	-0.02676	0.02866	0.03170	0.03983	-0.22906	0.08355	0.27289	0.44283
	X^2_υ	0.07255	0.29193	0.29250	0.05820	0.17999	0.24442	0.26957	0.40764	-0.12880	0.15274	0.40412	0.24702	0.25359
23	$Y_{\upsilon+1}$	0.33416	0.76539	0.55079	0.42703	0.24195	0.35372	0.32917	0.30166	0.33262	0.47337	0.12091	0.11168	0.28430
	X^1_υ	-0.16900	0.00359	0.13890	-0.34988	-0.27032	-0.07226	-0.31653	-0.01985	-0.30918	-0.26964	-0.18112	-0.24956	-0.10882
	X^2_υ		-0.12606	-0.11818	-0.13590	0.19150		-0.10037		0.67211		-0.25471		-0.22206
24	$Y_{\upsilon+1}$	0.62319	0.16541	0.07408	0.18339	0.04599	0.32946	0.65998	0.65733	0.28282	0.35708	0.02587	0.07818	0.03150
	X^1_υ	0.00553	0.07489	0.04144	0.10090	-0.03674	0.17628	-0.15418	0.10892	0.23636	0.10092	0.06378	0.04674	0.41575
	X^2_υ	0.21714	0.42721	0.42102	0.72955	0.95631	0.32274	0.34731	0.21874	0.19436	0.49691	0.36167	0.75429	0.37293
25	$Y_{\upsilon+1}$	0.50224	0.45493	0.52815	0.52450	0.50214	0.22520	0.36585	0.33823	0.16337	-0.14794	-0.03135	0.06800	0.34660
	X^1_υ	0.17897	0.15901	0.11234	0.09188	0.08071	0.26816	0.17333	0.01077	-0.23469	0.42704	0.66569	-0.08856	0.14615
	X^2_υ	0.23498	0.18385	0.21815	0.01657	0.31994	0.27962	0.07792	0.23323		0.29343	-0.28225	0.34913	0.20630
26	$Y_{\upsilon+1}$	0.31659	0.54351	0.11585	0.46510	0.58052	0.46088	0.56691	0.64929	0.63279	0.64307	0.80361	0.47409	0.68034
	X^1_υ	-0.27671	-0.13276	-0.19012	-0.23764	0.09325	-0.01315	-0.07688	0.08930	-0.10367	-0.17757	0.12881	0.01359	-0.17482
	X^2_υ	-0.28494	0.00564	-0.54932	-0.12443	0.27981	-0.18493	-0.32883	-0.07423	-0.17839	-0.06242	-0.13915	-0.12839	-0.15871
27	$Y_{\upsilon+1}$	0.62787	0.46800	0.74040	0.57931	0.37160	0.62486	0.28295	0.32747	0.76731	0.58311	0.66033	0.42134	0.17363
	X^1_υ	0.13520	0.07905	0.01228	-0.04412	-0.02753	0.20525	0.01676	-0.27889	-0.24337	-0.06535	0.02152	-0.35818	0.15704
	X^2_υ	-0.09340	0.04309	0.14821	0.32327	0.46090	0.08984	0.32038	0.44595	0.29216	0.13424	0.09271	0.51754	0.45604
28	$Y_{\upsilon+1}$	0.51937	0.68950	0.36013	0.32767	0.49507	0.43113	0.37396	0.35931	0.52657	0.34009	0.42671	0.19723	0.46708
	X^1_υ	0.25574	0.14902	0.27520	0.25620	0.03468	0.20501	-0.20721	-0.22392	0.24463	-0.15294	0.39917	0.27225	-0.19883
	X^2_υ	-0.41147	0.21478	0.36758	0.19473	0.08856	0.06370			-0.18228			0.17202	-0.18457
29	$Y_{\upsilon+1}$	0.47395	0.51232	0.04096	-0.05061	0.28657	0.51884	0.51276	0.41842	0.80231	0.60908	0.36858	0.46659	0.75532
	X^1_υ	-0.08523	-0.24420	-0.29356	-0.40003	-0.15242	0.02380	0.24576	0.09663	-0.13411	0.14433	0.41352	-0.23962	-0.08958
	X^2_υ	-0.04914	0.07476	-0.28232	-0.28676			0.06063	-0.43679	-0.03735	0.27795	-0.27644	-0.30797	-0.06060
	X^3_υ													0.059

Table 6. Recalculation of the monthly intervening flows for years 1923~1924 for site 23 (acre-feet). It shows that the large value of IF_{23} for month 12 of 1923 arises from the measured flow (MF) values for sites 20 and 23 that appear to be out of the norm (relative to each other).

Monthly			AF				IF		MF & IF 23		
Year	Water Year	Calendar Year	20	21	22	23	20	23	MF20	MF23	$IF_{23}(*)^{\dagger}$
1923	Mon 1	10/22	336,581	371	10,993	367,447	37	19,502	288,869	319,736	19,502
	Mon 2	11/22	400,845	919	0	425,718	8,653	23,954	398,737	423,610	23,954
	Mon 3	12/22	399,832	696	133	441,214	18,392	40,553	396,534	437,915	40,553
	Mon 4	1/23	375,213	772	166	403,250	2,031	27,100	372,615	400,653	27,100
	Mon 5	2/23	340,452	1,978	29,586	371,331	-20,441	-685	338,499	369,378	-685
	Mon 6	3/23	449,461	1,667	42,480	501,847	-30,442	8,239	446,769	499,156	8,239
	Mon 7	4/23	1,316,359	1,259	10,392	1,347,301	-63,554	19,291	1,275,174	1,306,116	19,291
	Mon 8	5/23	3,835,398	800	0	3,794,816	-290,659	-41,382	3,608,707	3,568,125	-41,382
	Mon 9	6/23	5,077,612	365	0	5,160,322	-50,496	82,345	4,560,397	4,643,107	82,345
	Mon 10	7/23	3,053,685	1,553	3,527	3,056,145	257,270	-2,621	2,324,231	2,326,691	-2,620
	Mon 11	8/23	1,744,686	2,810	77,948	1,836,303	241,168	10,859	1,348,423	1,440,040	10,859
	Mon 12	9/23	1,013,539	1,001	57,838	1,446,134	147,797	373,756	878,281	1,310,876	**373,756**
1924	Mon 1	10/23	747,521	2,419	1,582	773,347	41,043	21,824	726,783	752,608	21,824
	Mon 2	11/23	646,295	1,379	0	767,088	93,148	119,414	645,620	766,413	119,414
	Mon 3	12/23	423,825	926	54	596,175	32,045	171,370	421,190	593,540	171,370
	Mon 4	1/24	312,563	922	12	372,760	9,260	59,262	309,160	369,356	59,262
	Mon 5	2/24	506,890	1,706	464	531,739	29,865	22,679	504,341	529,190	22,679
	Mon 6	3/24	508,913	1,529	67,265	535,599	53,418	-42,108	505,428	532,114	-42,108
	Mon 7	4/24	1,665,561	1,341	34,080	1,694,718	-18,332	-6,264	1,634,578	1,663,735	-6,264
	Mon 8	5/24	3,264,099	321	0	3,203,841	-88,531	-60,579	3,054,704	2,994,446	-60,579
	Mon 9	6/24	3,780,821	208	140	3,808,193	177,488	27,024	3,126,347	3,153,719	27,024
	Mon 10	7/24	1,672,023	2,160	16,005	1,724,901	237,200	34,714	996,099	1,048,978	34,714
	Mon 11	8/24	720,755	365	10,842	757,340	77,401	25,378	298,092	334,677	25,378
	Mon 12	9/24	389,827	6,016	38,343	425,530	3,547	-8,656	239,861	275,564	-8,656

Yearly	Year	AF				IF		MF20	MF23	$IF_{23}(*)^{\dagger}$
		20	21	22	23	20	23			
	1923	18,343,663	14,191	233,063	19,151,828	219,756	560,911	16,237,236	17,045,403	560,912
	1924	14,639,093	19,292	168,787	15,191,231	647,552	364,058	12,462,203	13,014,340	364,058

† $IF_{23}(*) = MF_{23} - MF_{20} - AF_{21} - AF_{22}$

Table 7. Yearly statistics of the accumulated streamflows for the Colorado River system

Site #	Historical Mean	Historical Std	Historical Skew	Historical Acf1	Historical Min	Historical Max	Site #	Whole (Historical + Extended)* Mean	Whole Std	Whole Skew	Whole Acf1	Whole Min	Whole Max
1	2,117,560	553,100	0.16	0.17	892,990	3,444,795	**1**	2,117,560	553,100	0.16	0.17	892,989	3,444,794
2	3,383,485	917,623	0.59	0.28	1,618,357	6,253,842	2	3,580,294	934,273	0.25	0.26	1,618,355	6,253,842
3	143,505	41,279	0.66	0.22	62,132	255,612	3	154,372	43,108	0.29	0.28	62,131	255,612
4	1,109,527	341,853	0.05	0.25	342,568	1,854,888	**4**	1,109,527	341,853	0.05	0.25	342,568	1,854,888
5	1,314,410	408,426	0.14	0.25	425,260	2,392,575	**5**	1,314,410	408,426	0.14	0.25	425,260	2,392,577
6	2,320,947	741,232	0.24	0.30	778,008	4,288,811	6	2,355,220	724,565	0.14	0.26	778,010	4,288,811
7	786,086	381,968	0.62	0.22	195,214	1,753,100	7	813,287	360,718	0.44	0.23	195,215	1,753,100
8	6,824,630	1,965,948	0.20	0.29	2,572,171	12,533,652	**8**	6,824,630	1,965,948	0.20	0.29	2,572,171	12,533,652
9	1,332,749	405,651	0.11	0.18	477,600	2,428,403	**9**	1,332,749	405,651	0.11	0.18	477,600	2,428,406
10	1,378,275	435,721	0.12	0.23	466,300	2,525,568	10	1,425,075	441,826	0.05	0.22	466,300	2,525,568
11	1,921,269	641,228	0.39	0.26	744,092	3,458,589	11	1,997,820	627,489	0.19	0.25	686,625	3,458,589
12	1,202,899	385,133	0.47	0.29	411,384	2,290,883	12	1,230,193	391,510	0.42	0.23	411,384	2,290,882
13	449,341	158,810	0.42	0.23	127,751	942,900	13	464,638	164,381	0.44	0.18	127,750	942,899
14	758,429	290,791	0.72	0.33	241,187	1,634,167	14	796,949	301,565	0.56	0.30	165,024	1,634,167
15	553,740	167,024	1.45	0.37	254,756	1,284,700	15	578,462	167,798	1.03	0.36	254,755	1,284,700
16	5,415,641	1,642,136	0.34	0.31	1,879,422	9,297,304	**16**	5,415,641	1,642,136	0.34	0.31	1,879,420	9,297,304
17	172,426	84,176	1.26	0.39	47,232	448,150	17	184,509	82,030	0.83	0.43	47,232	448,149
18	1,069,743	504,569	0.40	-0.01	-18,468	2,529,699	18	1,157,709	520,991	0.19	0.12	-18,469	2,529,699
19	2,106,103	900,485	0.41	0.11	478,452	4,465,625	19	2,148,418	883,149	0.31	0.12	478,452	4,465,625
20	14,940,782	4,375,466	0.17	0.31	5,524,883	25,296,043	20	15,076,307	4,365,301	0.14	0.28	5,524,883	25,296,043
21	20,506	8,583	1.05	0.14	8,063	47,310	21	21,118	8,313	0.84	0.15	8,062	47,311
22	181,755	150,452	1.95	-0.05	10,234	815,833	22	180,415	140,404	2.01	-0.04	10,233	815,831
23	14,804,051	4,295,460	0.21	0.27	5,800,902	25,553,577	23	15,433,078	4,412,178	0.12	0.27	5,800,903	25,553,577
24	173,126	96,063	1.56	0.04	72,588	504,592	24	169,968	88,275	1.68	0.06	72,588	504,592
25	15,286,935	4,455,680	0.24	0.28	5,902,882	26,742,816	25	15,935,364	4,558,303	0.13	0.28	5,902,881	26,742,816
26	15,322,773	4,486,471	0.44	0.28	6,312,327	27,122,955	26	16,088,685	4,573,565	0.17	0.29	6,312,325	27,122,955
27	98,369	129,716	2.61	0.06	1,487	691,569	27	98,190	125,025	2.67	0.06	1,486	691,569
28	15,502,830	4,543,927	0.45	0.28	6,366,560	27,466,863	28	16,288,047	4,620,900	0.17	0.29	6,366,561	27,466,862
29	15,593,041	4,476,678	0.39	0.26	6,343,995	27,158,563	29	16,382,460	4,556,003	0.13	0.27	6,343,993	27,158,564

Note : Bold-typed site number indicates that the data for that site are not extended, i.e. complete records are available for those sites.
*Extended means that part of the record was extended using the methods in this study report.

Table 7A. Yearly statistics of the accumulated streamflows for the Colorado River system

Site	Whole (Historical + Previous Extended)*						Site	Whole (Historical + Extended)*					
#	Mean	Std	Skew	Acf1	Min	Max	#	Mean	Std	Skew	Acf1	Min	Max
1	2,117,560	553,100	0.16	0.17	892,990	3,444,795	**1**	2,117,560	553,100	0.16	0.17	892,989	3,444,794
2	3,563,683	931,687	0.28	0.24	1,618,357	6,253,842	2	3,580,294	934,273	0.25	0.26	1,618,355	6,253,842
3	150,410	40,886	0.31	0.18	62,132	255,612	3	154,372	43,108	0.29	0.28	62,131	255,612
4	1,109,527	341,853	0.05	0.25	342,568	1,854,888	**4**	1,109,527	341,853	0.05	0.25	342,568	1,854,888
5	1,314,410	408,426	0.14	0.25	425,260	2,392,575	**5**	1,314,410	408,426	0.14	0.25	425,260	2,392,577
6	2,355,775	722,950	0.14	0.27	778,008	4,288,811	6	2,355,220	724,565	0.14	0.26	778,010	4,288,811
7	823,237	360,526	0.38	0.20	195,214	1,753,100	7	813,287	360,718	0.44	0.23	195,215	1,753,100
8	6,824,630	1,965,948	0.20	0.29	2,572,171	12,533,652	**8**	6,824,630	1,965,948	0.20	0.29	2,572,171	12,533,652
9	1,332,749	405,651	0.11	0.18	477,600	2,428,403	**9**	1,332,749	405,651	0.11	0.18	477,600	2,428,406
10	1,423,910	440,119	0.12	0.20	466,300	2,525,568	10	1,425,075	441,826	0.05	0.22	466,300	2,525,568
11	1,956,884	633,470	0.27	0.26	550,169	3,471,718	11	1,997,820	627,489	0.19	0.25	686,625	3,458,589
12	1,232,512	390,913	0.40	0.24	411,384	2,290,883	12	1,230,193	391,510	0.42	0.23	411,384	2,290,882
13	466,029	172,393	0.66	0.17	127,751	974,370	13	464,638	164,381	0.44	0.18	127,750	942,899
14	781,504	267,387	0.63	0.35	241,187	1,634,167	14	796,949	301,565	0.56	0.30	165,024	1,634,167
15	569,197	159,278	1.18	0.34	254,756	1,284,700	15	578,462	167,798	1.03	0.36	254,755	1,284,700
16	5,415,641	1,642,136	0.34	0.31	1,879,422	9,297,304	**16**	5,415,641	1,642,136	0.34	0.31	1,879,420	9,297,304
17	177,766	80,436	1.08	0.40	47,232	448,150	17	184,509	82,030	0.83	0.43	47,232	448,149
18	1,157,174	524,671	0.24	0.11	-18,468	2,529,699	18	1,157,709	520,991	0.19	0.12	-18,469	2,529,699
19	2,146,414	880,486	0.31	0.12	478,452	4,465,625	19	2,148,418	883,149	0.31	0.12	478,452	4,465,625
20	15,083,475	4,366,256	0.14	0.29	5,524,883	25,296,043	20	15,076,307	4,365,301	0.14	0.28	5,524,883	25,296,043
21	20,432	7,996	1.08	0.15	8,063	47,310	21	21,118	8,313	0.84	0.15	8,062	47,311
22	184,049	134,997	2.12	-0.04	10,234	815,833	22	180,415	140,404	2.01	-0.04	10,233	815,831
23	15,432,360	4,404,731	0.11	0.27	5,800,902	25,553,577	23	15,433,078	4,412,178	0.12	0.27	5,800,903	25,553,577
24	185,191	97,087	1.32	0.14	72,588	504,592	24	169,968	88,275	1.68	0.06	72,588	504,592
25	15,928,145	4,542,219	0.12	0.28	5,902,882	26,742,816	25	15,935,364	4,558,303	0.13	0.28	5,902,881	26,742,816
26	16,061,922	4,532,891	0.16	0.28	6,312,327	27,122,955	26	16,088,685	4,573,565	0.17	0.29	6,312,325	27,122,955
27	101,784	124,784	2.60	0.07	1,487	691,569	27	98,190	125,025	2.67	0.06	1,486	691,569
28	16,255,726	4,585,790	0.16	0.28	6,366,560	27,466,863	28	16,288,047	4,620,900	0.17	0.29	6,366,561	27,466,862
29	16,366,377	4,547,438	0.12	0.27	6,343,995	27,158,563	29	16,382,460	4,556,003	0.13	0.27	6,343,993	27,158,564

Note : Bold-typed site number indicates that the data for that site are not extended, i.e. complete records are available for those sites.

*Previous extended means that part of the record was extended using the methods described in BOR reports (cited in the main text) and Extended means that part of the record was extended using the methods described in this study report.

Table 8. Yearly statistics of the intervening streamflows for the Colorado River system

Site	Historical						Site	Whole (Historical + Extended)					
#	Mean	Std	Skew	Acf1	Min	Max	#	Mean	Std	Skew	Acf1	Min	Max
1	2,117,560	553,100	0.16	0.17	892,990	3,444,795	**1**	2,117,560	553,100	0.16	0.17	892,989	3,444,794
2	1,384,968	422,859	0.99	0.38	725,366	2,809,047	2	1,462,734	409,532	0.53	0.37	725,367	2,809,045
3	143,505	41,279	0.66	0.22	62,132	255,612	3	154,372	43,108	0.29	0.28	62,131	255,612
4	888,786	294,110	0.33	0.20	280,436	1,610,270	**4**	955,155	301,813	0.03	0.25	280,436	1,610,270
5	204,883	86,820	1.16	0.45	69,600	555,878	**5**	204,883	86,821	1.16	0.45	69,600	555,878
6	1,022,362	379,878	0.60	0.35	352,749	1,896,236	6	1,040,810	356,451	0.44	0.30	352,749	1,896,236
7	786,086	381,968	0.62	0.22	195,214	1,753,100	7	813,287	360,718	0.44	0.23	195,215	1,753,100
8	85,484	186,126	-0.19	0.73	-284,476	530,363	8	75,829	167,275	-0.11	0.66	-284,476	530,365
9	1,332,749	405,651	0.11	0.18	477,600	2,428,403	**9**	1,332,749	405,651	0.11	0.18	477,600	2,428,406
10	87,640	52,685	0.59	0.40	-11,300	251,869	10	92,326	51,680	0.38	0.45	-11,300	251,869
11	518,673	230,798	0.88	0.29	168,623	1,212,138	11	572,746	223,187	0.62	0.27	168,623	1,215,004
12	1,202,899	385,133	0.47	0.29	411,384	2,290,883	12	1,230,193	391,510	0.42	0.23	411,384	2,290,882
13	449,341	158,810	0.42	0.23	127,751	942,900	13	464,638	164,381	0.44	0.18	127,750	942,899
14	758,429	290,791	0.72	0.33	241,187	1,634,167	14	796,949	301,565	0.56	0.30	165,024	1,634,167
15	553,740	167,024	1.45	0.37	254,756	1,284,700	15	578,462	167,798	1.03	0.36	254,755	1,284,700
16	361,516	197,883	0.76	0.23	78,844	880,148	16	347,579	189,458	0.50	0.23	-131,148	880,149
17	172,426	84,176	1.26	0.39	47,232	448,150	17	184,509	82,030	0.83	0.43	47,232	448,149
18	1,069,743	504,569	0.40	-0.01	-18,468	2,529,699	18	1,157,710	520,991	0.19	0.12	-18,469	2,529,699
19	922,771	383,505	0.73	0.06	336,375	2,009,442	19	990,709	388,201	0.52	0.17	336,374	2,009,443
20	523,588	208,881	0.73	0.38	32,462	1,144,080	20	503,108	279,942	0.17	0.27	-280,778	1,410,279
21	20,506	8,583	1.05	0.14	8,063	47,310	21	21,118	8,313	0.84	0.15	8,062	47,311
22	181,755	150,452	1.95	-0.05	10,234	815,833	22	180,415	140,404	2.01	-0.04	10,233	815,831
23	139,016	147,537	-0.93	0.31	-347,548	397,074	23	155,237	147,333	-0.90	0.28	-347,548	404,683
24	173,126	96,063	1.56	0.04	72,588	504,592	24	169,968	88,275	1.68	0.06	72,588	504,592
25	309,758	263,206	0.57	0.43	-244,766	1,088,937	25	332,319	258,485	0.44	0.45	-244,766	1,088,937
26	140,754	213,736	0.47	0.82	-343,334	862,824	26	153,322	200,689	0.31	0.79	-343,334	862,823
27	98,369	129,716	2.61	0.06	1,487	691,569	27	98,190	125,025	2.67	0.06	1,486	691,569
28	94,030	132,791	0.67	0.53	-118,594	482,824	28	101,172	124,926	0.54	0.51	-118,594	482,826
29	90,212	240,122	-0.30	0.80	-507,394	524,556	29	94,413	225,541	-0.19	0.78	-507,394	524,556

Note: the numbers in bold indicate that the original record lengths for the referred sites were complete (i.e. the records for these sites were not extended.)

Table 8A. Yearly statistics of the intervening streamflows for the Colorado River system

Site	Whole(Historical + Previous Extension)						Site	Whole (Historical + Extended)					
#	Mean	Std	Skew	Acf1	Min	Max	#	Mean	Std	Skew	Acf1	Min	Max
1	2,117,560	553,100	0.16	0.17	892,990	3,444,795	**1**	2,117,560	553,100	0.16	0.17	892,989	3,444,794
2	1,446,123	402,933	0.60	0.34	725,366	2,809,047	2	1,462,734	409,532	0.53	0.37	725,367	2,809,045
3	150,410	40,886	0.31	0.18	62,132	255,612	3	154,372	43,108	0.29	0.28	62,131	255,612
4	959,117	304,255	0.04	0.26	280,436	1,610,270	**4**	955,155	301,813	0.03	0.25	280,436	1,610,270
5	204,883	86,820	1.16	0.45	69,600	555,878	**5**	204,883	86,821	1.16	0.45	69,600	555,878
6	1,041,365	355,575	0.45	0.31	352,749	1,896,236	6	1,040,810	356,451	0.44	0.30	352,749	1,896,236
7	823,237	360,526	0.38	0.20	195,214	1,753,100	7	813,287	360,718	0.44	0.23	195,215	1,753,100
8	81,935	186,352	-0.56	0.67	-545,822	530,363	8	75,829	167,275	-0.11	0.66	-284,476	530,365
9	1,332,749	405,651	0.11	0.18	477,600	2,428,403	**9**	1,332,749	405,651	0.11	0.18	477,600	2,428,406
10	91,161	80,515	0.37	0.24	-254,628	429,866	10	92,326	51,680	0.38	0.45	-11,300	251,869
11	532,974	225,406	0.73	0.29	83,869	1,212,138	11	572,746	223,187	0.62	0.27	168,623	1,215,004
12	1,232,512	390,913	0.40	0.24	411,384	2,290,883	12	1,230,193	391,510	0.42	0.23	411,384	2,290,882
13	466,029	172,393	0.66	0.17	127,751	974,370	13	464,638	164,381	0.44	0.18	127,750	942,899
14	781,504	267,387	0.63	0.35	241,187	1,634,167	14	796,949	301,565	0.56	0.30	165,024	1,634,167
15	569,197	159,278	1.18	0.34	254,756	1,284,700	15	578,462	167,798	1.03	0.36	254,755	1,284,700
16	409,514	203,656	0.67	0.25	78,844	977,909	16	347,579	189,458	0.50	0.23	-131,148	880,149
17	177,766	80,436	1.08	0.40	47,232	448,150	17	184,509	82,030	0.83	0.43	47,232	448,149
18	1,157,174	524,671	0.24	0.11	-18,468	2,529,699	18	1,157,710	520,991	0.19	0.12	-18,469	2,529,699
19	988,831	383,528	0.46	0.17	336,375	2,009,442	19	990,709	388,201	0.52	0.17	336,374	2,009,443
20	519,433	275,854	0.26	0.27	-375,064	1,454,310	20	503,108	279,942	0.17	0.27	-280,778	1,410,279
21	20,432	7,996	1.08	0.15	8,063	47,310	21	21,118	8,313	0.84	0.15	8,062	47,311
22	184,049	134,997	2.12	-0.04	10,234	815,833	22	180,415	140,404	2.01	-0.04	10,233	815,831
23	144,403	140,660	-0.60	0.32	-347,548	585,772	23	155,237	147,333	-0.90	0.28	-347,548	404,683
24	185,191	97,087	1.32	0.14	72,588	504,592	24	169,968	88,275	1.68	0.06	72,588	504,592
25	310,595	239,039	0.62	0.42	-244,766	1,088,937	25	332,319	258,485	0.44	0.45	-244,766	1,088,937
26	133,777	179,283	0.67	0.81	-343,334	862,824	26	153,322	200,689	0.31	0.79	-343,334	862,823
27	101,784	124,784	2.60	0.07	1,487	691,569	27	98,190	125,025	2.67	0.06	1,486	691,569
28	92,020	111,226	0.85	0.53	-118,594	482,824	28	101,172	124,926	0.54	0.51	-118,594	482,826
29	110,652	203,531	-0.64	0.80	-507,394	524,556	29	94,413	225,541	-0.19	0.78	-507,394	524,556

Note: the numbers in bold indicate that the original record lengths for the referred sites were complete (i.e. the records for these sites were not extended.)

Table 9. The ratio of the whole and historical yearly statistics for the accumulated and intervening streamflows of the Colorado River system

Site #	Accumulated Flows Mean	Std	Skew	Acf1	Min	Max	Site #	Intervening Flows Mean	Std	Skew	Acf1	Min	Max
1	1	1	1	1	1	1	**1**	1	1	1	1	1	1
2	1.058	1.018	0.424	0.922	1.000	1.000	2	1.056	0.968	0.539	0.961	1.000	1.000
3	1.076	1.044	0.446	1.240	1.000	1.000	3	1.076	1.044	0.446	1.240	1.000	1.000
4	1	1	1	1	1	1	**4**	1.075	1.026	0.095	1.225	1.000	1.000
5	1	1	1	1	1	1	**5**	1	1	1	1	1	1
6	1.015	0.978	0.584	0.879	1.000	1.000	6	1.018	0.938	0.730	0.859	1.000	1.000
7	1.035	0.944	0.706	1.056	1.000	1.000	7	1.035	0.944	0.706	1.056	1.000	1.000
8	1	1	1	1	1	1	8	0.887	0.899	0.572	0.906	1.000	1.000
9	1	1	1	1	1	1	**9**	1	1	1	1	1	1
10	1.034	1.014	0.442	0.959	1.000	1.000	10	1.053	0.981	0.639	1.140	1.000	1.000
11	1.040	0.979	0.480	0.942	0.923	1.000	11	1.104	0.967	0.703	0.936	1.000	1.002
12	1.023	1.017	0.899	0.783	1.000	1.000	12	1.023	1.017	0.899	0.783	1.000	1.000
13	1.034	1.035	1.032	0.787	1.000	1.000	13	1.034	1.035	1.032	0.787	1.000	1.000
14	1.051	1.037	0.782	0.911	0.684	1.000	14	1.051	1.037	0.782	0.911	0.684	1.000
15	1.045	1.005	0.712	0.954	1.000	1.000	15	1.045	1.005	0.712	0.954	1.000	1.000
16	1	1	1	1	1	1	16	0.961	0.957	0.660	0.984	-1.663	1.000
17	1.070	0.974	0.658	1.086	1.000	1.000	17	1.070	0.974	0.658	1.086	1.000	1.000
18	1.082	1.033	0.493	-14.279	1.000	1.000	18	1.082	1.033	0.493	-14.279	1.000	1.000
19	1.020	0.981	0.769	1.059	1.000	1.000	19	1.074	1.012	0.709	3.001	1.000	1.000
20	1.009	0.998	0.820	0.899	1.000	1.000	20	0.961	1.340	0.228	0.717	-8.649	1.233
21	1.030	0.969	0.802	1.016	1.000	1.000	21	1.030	0.969	0.802	1.016	1.000	1.000
22	0.993	0.933	1.028	0.837	1.000	1.000	22	0.993	0.933	1.028	0.837	1.000	1.000
23	1.042	1.027	0.546	0.996	1.000	1.000	23	1.117	0.999	0.975	0.906	1.000	1.019
24	0.982	0.919	1.075	1.516	1.000	1.000	24	0.982	0.919	1.075	1.516	1.000	1.000
25	1.042	1.023	0.520	1.022	1.000	1.000	25	1.073	0.982	0.774	1.053	1.000	1.000
26	1.050	1.019	0.382	1.025	1.000	1.000	26	1.089	0.939	0.654	0.964	1.000	1.000
27	0.998	0.964	1.026	0.990	0.999	1.000	27	0.998	0.964	1.026	0.990	0.999	1.000
28	1.051	1.017	0.376	1.030	1.000	1.000	28	1.076	0.941	0.808	0.970	1.000	1.000
29	1.051	1.018	0.342	1.035	1.000	1.000	29	1.047	0.939	0.622	0.975	1.000	1.000

Table 10. Parameters and statistics employed to obtain the streamflow value for month 12 of 1923 for site 23.

Site	Parameters		Standardized values		Mean (month 12)	Std (month 12)
23	β_1	0.2843	$Y_{\upsilon+1}$	-0.36588	17647.29	18553.15
25	β_2	-0.10882	X^1_{υ}	0.102982	22790.43	55073.66
17	β_3	-0.22206	X^2_{υ}	0.081432	6784.537	4119.546

Appendix A

Cross correlations between the yearly (or monthly) intervening (or accumulated) streamflows for the 29 sites of the Colorado River system

Table A1 Cross-correlations of the yearly accumulated flows

Yr_acc	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Acc 10	Acc 11	Acc 12	Acc 13	Acc 14	Acc 15	Acc 16	Acc 17	Acc 18	Acc 19	Acc 20	Acc 21	Acc 22	Acc 23	Acc 24	Acc 25	Acc 26	Acc 27	Acc 28	Acc 29
Acc 1	1.00	0.98	0.90	0.88	0.89	0.84	0.60	0.90	0.66	0.69	0.76	0.92	0.77	0.69	0.83	0.86	0.71	0.52	0.55	0.88	0.18	0.26	0.88	0.32	0.87	0.87	0.18	0.87	0.87
Acc 2	0.98	1.00	0.92	0.90	0.92	0.91	0.68	0.95	0.66	0.68	0.76	0.93	0.80	0.74	0.87	0.88	0.76	0.57	0.61	0.93	0.20	0.30	0.92	0.38	0.92	0.92	0.23	0.92	0.92
Acc 3	0.90	0.92	1.00	0.93	0.93	0.89	0.62	0.89	0.65	0.67	0.72	0.84	0.73	0.69	0.78	0.82	0.66	0.59	0.61	0.87	0.18	0.25	0.87	0.30	0.86	0.86	0.22	0.86	0.86
Acc 4	0.88	0.90	0.93	1.00	0.99	0.93	0.75	0.93	0.60	0.63	0.70	0.84	0.73	0.71	0.79	0.82	0.78	0.71	0.71	0.91	0.27	0.33	0.91	0.41	0.90	0.90	0.28	0.90	0.90
Acc 5	0.89	0.92	0.93	0.99	1.00	0.95	0.76	0.95	0.59	0.62	0.70	0.86	0.74	0.72	0.81	0.82	0.78	0.69	0.71	0.92	0.24	0.34	0.92	0.41	0.92	0.91	0.28	0.91	0.92
Acc 6	0.84	0.91	0.89	0.93	0.95	1.00	0.88	0.98	0.55	0.57	0.66	0.85	0.75	0.74	0.86	0.82	0.78	0.74	0.78	0.96	0.31	0.44	0.95	0.50	0.96	0.95	0.35	0.95	0.96
Acc 7	0.60	0.68	0.62	0.75	0.76	0.88	1.00	0.86	0.35	0.38	0.47	0.64	0.62	0.65	0.72	0.65	0.73	0.85	0.89	0.86	0.43	0.62	0.86	0.65	0.87	0.87	0.51	0.87	0.87
Acc 8	0.90	0.95	0.89	0.93	0.95	0.98	0.86	1.00	0.59	0.61	0.69	0.89	0.78	0.77	0.89	0.85	0.81	0.73	0.77	0.98	0.31	0.43	0.97	0.51	0.97	0.97	0.34	0.97	0.97
Acc 9	0.66	0.66	0.65	0.60	0.59	0.55	0.35	0.59	1.00	0.99	0.96	0.67	0.74	0.75	0.53	0.85	0.56	0.27	0.29	0.67	0.04	0.03	0.66	0.23	0.65	0.65	0.09	0.65	0.65
Acc 10	0.69	0.68	0.67	0.63	0.62	0.57	0.38	0.61	0.99	1.00	0.97	0.64	0.72	0.75	0.50	0.87	0.47	0.23	0.31	0.68	0.10	0.09	0.63	0.23	0.61	0.66	0.05	0.60	0.63
Acc 11	0.76	0.76	0.72	0.70	0.70	0.66	0.47	0.69	0.96	0.97	1.00	0.73	0.79	0.83	0.62	0.93	0.59	0.31	0.39	0.77	0.12	0.17	0.73	0.29	0.72	0.75	0.09	0.71	0.72
Acc 12	0.92	0.93	0.84	0.84	0.86	0.85	0.64	0.89	0.67	0.64	0.73	1.00	0.84	0.71	0.88	0.90	0.71	0.51	0.55	0.89	0.18	0.29	0.88	0.35	0.87	0.88	0.17	0.87	0.87
Acc 13	0.77	0.80	0.73	0.73	0.74	0.75	0.62	0.78	0.74	0.72	0.79	0.84	1.00	0.84	0.73	0.92	0.77	0.49	0.54	0.86	0.21	0.31	0.85	0.50	0.85	0.85	0.25	0.85	0.85
Acc 14	0.69	0.74	0.69	0.71	0.72	0.74	0.65	0.77	0.75	0.75	0.83	0.71	0.84	1.00	0.68	0.91	0.83	0.53	0.59	0.85	0.25	0.37	0.83	0.51	0.84	0.86	0.23	0.84	0.84
Acc 15	0.83	0.87	0.78	0.79	0.81	0.86	0.72	0.89	0.53	0.50	0.62	0.88	0.73	0.68	1.00	0.83	0.71	0.54	0.61	0.88	0.29	0.39	0.87	0.39	0.86	0.86	0.16	0.86	0.86
Acc 16	0.86	0.88	0.82	0.82	0.82	0.82	0.65	0.85	0.85	0.87	0.93	0.90	0.92	0.91	0.83	1.00	0.82	0.53	0.56	0.92	0.17	0.26	0.92	0.41	0.91	0.91	0.20	0.91	0.91
Acc 17	0.71	0.76	0.66	0.78	0.78	0.78	0.73	0.81	0.56	0.47	0.59	0.71	0.77	0.83	0.71	0.82	1.00	0.61	0.64	0.85	0.35	0.44	0.84	0.59	0.85	0.86	0.32	0.85	0.85
Acc 18	0.52	0.57	0.59	0.71	0.69	0.74	0.85	0.73	0.27	0.23	0.31	0.51	0.49	0.53	0.54	0.53	0.61	1.00	0.98	0.78	0.53	0.73	0.77	0.59	0.77	0.76	0.51	0.77	0.77
Acc 19	0.55	0.61	0.61	0.71	0.71	0.78	0.89	0.77	0.29	0.31	0.39	0.55	0.54	0.59	0.61	0.56	0.64	0.98	1.00	0.81	0.47	0.69	0.82	0.60	0.82	0.82	0.55	0.82	0.82
Acc 20	0.88	0.93	0.87	0.91	0.92	0.96	0.86	0.98	0.67	0.68	0.77	0.89	0.86	0.85	0.88	0.92	0.85	0.78	0.81	1.00	0.31	0.46	1.00	0.56	1.00	1.00	0.35	1.00	1.00
Acc 21	0.18	0.20	0.18	0.27	0.24	0.31	0.43	0.31	0.04	0.10	0.12	0.18	0.21	0.25	0.29	0.17	0.35	0.53	0.47	0.31	1.00	0.59	0.41	0.62	0.41	0.40	0.60	0.41	0.42
Acc 22	0.26	0.30	0.25	0.33	0.34	0.44	0.62	0.43	0.03	0.09	0.17	0.29	0.31	0.37	0.39	0.26	0.44	0.73	0.69	0.46	0.59	1.00	0.53	0.70	0.51	0.53	0.68	0.52	0.53
Acc 23	0.88	0.92	0.87	0.91	0.92	0.95	0.86	0.97	0.66	0.63	0.73	0.88	0.85	0.83	0.87	0.92	0.84	0.77	0.82	1.00	0.41	0.53	1.00	0.57	1.00	1.00	0.36	1.00	1.00
Acc 24	0.32	0.38	0.30	0.41	0.41	0.50	0.65	0.51	0.23	0.23	0.29	0.35	0.50	0.51	0.39	0.41	0.59	0.59	0.60	0.56	0.62	0.70	0.57	1.00	0.61	0.61	0.71	0.62	0.62
Acc 25	0.87	0.92	0.86	0.90	0.92	0.96	0.87	0.97	0.65	0.61	0.72	0.87	0.85	0.84	0.86	0.91	0.85	0.77	0.82	1.00	0.41	0.51	1.00	0.61	1.00	1.00	0.38	1.00	1.00
Acc 26	0.87	0.92	0.86	0.90	0.91	0.95	0.87	0.97	0.65	0.66	0.75	0.88	0.85	0.86	0.86	0.91	0.86	0.76	0.82	1.00	0.40	0.53	1.00	0.61	1.00	1.00	0.40	1.00	1.00
Acc 27	0.18	0.23	0.22	0.28	0.28	0.35	0.51	0.34	0.09	0.05	0.09	0.17	0.25	0.23	0.16	0.20	0.32	0.51	0.55	0.35	0.60	0.68	0.36	0.71	0.38	0.40	1.00	0.41	0.41
Acc 28	0.87	0.92	0.86	0.90	0.91	0.95	0.87	0.97	0.65	0.60	0.71	0.87	0.85	0.84	0.86	0.91	0.85	0.77	0.82	1.00	0.41	0.52	1.00	0.62	1.00	1.00	0.41	1.00	1.00
Acc 29	0.87	0.92	0.86	0.90	0.92	0.96	0.87	0.97	0.65	0.63	0.72	0.87	0.85	0.84	0.86	0.91	0.85	0.77	0.82	1.00	0.42	0.53	1.00	0.62	1.00	1.00	0.41	1.00	1.00

Table A2 Cross-correlations of the yearly intervening flows

Yr	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.88	0.85	0.87	0.72	0.73	0.61	0.11	0.66	0.49	0.78	0.91	0.76	0.69	0.83	0.62	0.72	0.47	0.56	0.49	0.26	0.34	-0.20	0.37	0.39	-0.07	0.20	0.08	-0.25
Int 2	0.88	1.00	0.87	0.87	0.86	0.89	0.76	0.33	0.58	0.43	0.80	0.89	0.83	0.79	0.93	0.60	0.81	0.60	0.63	0.69	0.22	0.38	-0.21	0.48	0.49	-0.08	0.30	0.19	-0.34
Int 3	0.85	0.87	1.00	0.91	0.76	0.76	0.61	0.27	0.60	0.35	0.67	0.81	0.75	0.68	0.78	0.47	0.64	0.59	0.57	0.57	0.18	0.31	-0.14	0.31	0.39	-0.20	0.24	0.22	-0.12
Int 4	0.87	0.87	0.91	1.00	0.70	0.83	0.78	0.24	0.58	0.39	0.69	0.82	0.75	0.71	0.79	0.65	0.79	0.69	0.70	0.48	0.34	0.39	-0.26	0.41	0.44	-0.21	0.28	0.08	-0.06
Int 5	0.72	0.86	0.76	0.70	1.00	0.77	0.67	0.09	0.42	0.35	0.65	0.74	0.67	0.57	0.68	0.37	0.64	0.48	0.55	0.46	0.10	0.36	-0.10	0.37	0.52	-0.09	0.24	0.28	-0.40
Int 6	0.73	0.89	0.76	0.83	0.77	1.00	0.94	0.38	0.46	0.40	0.72	0.78	0.75	0.76	0.84	0.62	0.81	0.77	0.83	0.70	0.39	0.54	-0.22	0.64	0.64	-0.11	0.45	0.10	-0.27
Int 7	0.61	0.76	0.61	0.78	0.67	0.94	1.00	0.38	0.27	0.39	0.61	0.61	0.64	0.68	0.75	0.60	0.79	0.87	0.89	0.73	0.47	0.68	-0.23	0.68	0.65	-0.07	0.51	-0.04	-0.20
Int 8	0.11	0.33	0.27	0.24	0.09	0.38	0.38	1.00	0.09	0.09	0.23	0.31	0.29	0.40	0.35	0.28	0.53	0.37	0.33	0.14	0.25	0.13	-0.23	0.26	0.20	0.10	0.06	-0.03	-0.01
Int 9	0.66	0.58	0.60	0.58	0.42	0.46	0.27	0.09	1.00	0.59	0.75	0.63	0.70	0.72	0.48	0.55	0.43	0.21	0.29	0.30	0.08	0.04	-0.21	0.20	0.17	-0.10	0.04	-0.07	-0.14
Int 10	0.49	0.43	0.35	0.39	0.35	0.40	0.39	0.09	0.59	1.00	0.61	0.43	0.61	0.61	0.42	0.48	0.56	0.33	0.32	0.38	0.25	0.34	-0.39	0.43	0.18	-0.03	0.15	-0.29	-0.08
Int 11	0.78	0.80	0.67	0.69	0.65	0.72	0.61	0.23	0.75	0.61	1.00	0.75	0.81	0.87	0.79	0.60	0.75	0.48	0.52	0.71	0.19	0.31	-0.24	0.40	0.41	-0.07	0.18	0.08	-0.36
Int 12	0.91	0.89	0.81	0.82	0.74	0.78	0.61	0.31	0.63	0.43	0.75	1.00	0.82	0.71	0.89	0.59	0.69	0.47	0.58	0.59	0.23	0.28	-0.20	0.38	0.41	-0.04	0.18	0.11	-0.29
Int 13	0.76	0.83	0.75	0.75	0.67	0.75	0.64	0.29	0.70	0.61	0.81	0.82	1.00	0.85	0.73	0.68	0.78	0.50	0.52	0.58	0.23	0.34	-0.20	0.48	0.40	0.03	0.25	-0.05	-0.24
Int 14	0.69	0.79	0.68	0.71	0.57	0.76	0.68	0.40	0.72	0.61	0.87	0.71	0.85	1.00	0.79	0.74	0.83	0.60	0.58	0.64	0.33	0.37	-0.26	0.54	0.41	-0.03	0.25	-0.02	-0.27
Int 15	0.83	0.93	0.78	0.79	0.68	0.84	0.75	0.35	0.48	0.42	0.79	0.89	0.73	0.79	1.00	0.61	0.81	0.55	0.64	0.68	0.29	0.35	-0.34	0.46	0.51	-0.04	0.24	0.13	-0.30
Int 16	0.62	0.60	0.47	0.65	0.37	0.62	0.60	0.28	0.55	0.48	0.60	0.59	0.68	0.74	0.61	1.00	0.72	0.55	0.52	0.38	0.28	0.37	-0.31	0.47	0.31	0.01	0.19	-0.17	-0.10
Int 17	0.72	0.81	0.64	0.79	0.64	0.81	0.79	0.53	0.43	0.56	0.75	0.69	0.78	0.83	0.81	0.72	1.00	0.63	0.62	0.63	0.41	0.45	-0.34	0.61	0.57	0.01	0.33	-0.04	-0.23
Int 18	0.47	0.60	0.59	0.69	0.48	0.77	0.87	0.37	0.21	0.33	0.48	0.47	0.50	0.60	0.55	0.55	0.63	1.00	0.88	0.60	0.52	0.68	-0.19	0.59	0.44	-0.17	0.50	-0.07	-0.08
Int 19	0.56	0.63	0.57	0.70	0.55	0.83	0.89	0.33	0.29	0.32	0.52	0.58	0.52	0.58	0.64	0.52	0.62	0.88	1.00	0.65	0.55	0.70	-0.06	0.63	0.48	0.00	0.52	0.01	-0.27
Int 20	0.49	0.69	0.57	0.48	0.46	0.70	0.73	0.14	0.30	0.38	0.71	0.59	0.58	0.64	0.68	0.38	0.63	0.60	0.65	1.00	0.25	0.28	-0.19	0.50	0.40	0.03	0.23	0.04	-0.42
Int 21	0.26	0.22	0.18	0.34	0.10	0.39	0.47	0.25	0.08	0.25	0.19	0.23	0.23	0.33	0.29	0.28	0.41	0.52	0.55	0.25	1.00	0.57	-0.01	0.69	0.23	-0.01	0.59	-0.19	-0.06
Int 22	0.34	0.38	0.31	0.39	0.36	0.54	0.68	0.13	0.04	0.34	0.31	0.28	0.34	0.37	0.35	0.37	0.45	0.68	0.70	0.28	0.57	1.00	-0.15	0.65	0.42	0.00	0.62	-0.14	-0.04
Int 23	-0.20	-0.21	-0.14	-0.26	-0.10	-0.22	-0.23	-0.23	-0.21	-0.39	-0.24	-0.20	-0.20	-0.26	-0.34	-0.31	-0.34	-0.19	-0.06	-0.19	-0.01	-0.15	1.00	-0.14	-0.37	0.03	-0.03	0.17	-0.22
Int 24	0.37	0.48	0.31	0.41	0.37	0.64	0.68	0.26	0.20	0.43	0.40	0.38	0.48	0.54	0.46	0.47	0.61	0.59	0.63	0.50	0.69	0.65	-0.14	1.00	0.49	0.06	0.70	-0.16	-0.18
Int 25	0.39	0.49	0.39	0.44	0.52	0.64	0.65	0.20	0.17	0.18	0.41	0.41	0.40	0.41	0.51	0.31	0.57	0.44	0.48	0.40	0.23	0.42	-0.37	0.49	1.00	-0.08	0.50	0.05	-0.10
Int 26	-0.07	-0.08	-0.20	-0.21	-0.09	-0.11	-0.07	0.10	-0.10	-0.03	-0.07	-0.04	0.03	-0.03	-0.04	0.01	0.01	-0.17	0.00	0.03	-0.01	0.00	0.03	0.06	-0.08	1.00	-0.02	-0.38	-0.55
Int 27	0.20	0.30	0.24	0.28	0.24	0.45	0.51	0.06	0.04	0.15	0.18	0.18	0.25	0.25	0.24	0.19	0.33	0.50	0.52	0.23	0.59	0.62	-0.03	0.70	0.50	-0.02	1.00	0.00	-0.14
Int 28	0.08	0.19	0.22	0.08	0.28	0.10	-0.04	-0.03	-0.07	-0.29	0.08	0.11	-0.05	-0.02	0.13	-0.17	-0.04	-0.07	0.01	0.04	-0.19	-0.14	0.17	-0.16	0.05	-0.38	0.00	1.00	-0.22
Int 29	-0.25	-0.34	-0.12	-0.06	-0.40	-0.27	-0.20	-0.01	-0.14	-0.08	-0.36	-0.29	-0.24	-0.27	-0.30	-0.10	-0.23	-0.08	-0.27	-0.42	-0.06	-0.04	-0.22	-0.18	-0.10	-0.55	-0.14	-0.22	1.00

Table A3 Cross-correlations of the monthly accumulated flows for month 1

Mon1	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.95	0.82	0.73	0.75	0.71	0.34	0.78	0.50	0.52	0.58	0.81	0.46	0.43	0.67	0.71	0.31	0.42	0.38	0.68	0.06	0.17	0.67	0.17	0.67	0.67	0.09	0.68	0.69
Acc 2	0.95	1.00	0.88	0.77	0.80	0.82	0.47	0.88	0.54	0.54	0.63	0.85	0.49	0.48	0.77	0.77	0.39	0.51	0.48	0.79	0.14	0.21	0.78	0.21	0.77	0.77	0.11	0.78	0.79
Acc 3	0.82	0.88	1.00	0.71	0.76	0.83	0.42	0.82	0.52	0.48	0.57	0.69	0.44	0.36	0.66	0.67	0.29	0.44	0.42	0.70	0.12	0.18	0.69	0.12	0.67	0.67	-0.01	0.68	0.67
Acc 4	0.73	0.77	0.71	1.00	0.98	0.74	0.53	0.80	0.37	0.43	0.52	0.79	0.51	0.26	0.63	0.62	0.44	0.70	0.61	0.75	0.08	0.11	0.72	0.23	0.71	0.70	-0.02	0.70	0.70
Acc 5	0.75	0.80	0.76	0.98	1.00	0.80	0.53	0.83	0.40	0.44	0.54	0.78	0.46	0.30	0.64	0.64	0.44	0.69	0.60	0.76	0.07	0.12	0.74	0.21	0.73	0.72	0.00	0.73	0.73
Acc 6	0.71	0.82	0.83	0.74	0.80	1.00	0.64	0.90	0.47	0.45	0.54	0.71	0.37	0.42	0.75	0.68	0.22	0.58	0.58	0.81	0.24	0.23	0.80	0.15	0.80	0.80	0.05	0.80	0.80
Acc 7	0.34	0.47	0.42	0.53	0.53	0.64	1.00	0.75	0.24	0.24	0.38	0.48	0.53	0.22	0.53	0.50	0.38	0.73	0.80	0.83	0.29	0.26	0.83	0.27	0.82	0.82	0.02	0.81	0.79
Acc 8	0.78	0.88	0.82	0.80	0.83	0.90	0.75	1.00	0.53	0.51	0.62	0.80	0.52	0.45	0.80	0.77	0.45	0.73	0.72	0.93	0.22	0.25	0.92	0.27	0.91	0.91	0.09	0.91	0.91
Acc 9	0.50	0.54	0.52	0.37	0.40	0.47	0.24	0.53	1.00	0.94	0.89	0.46	0.38	0.63	0.47	0.79	0.24	0.27	0.26	0.55	0.18	0.21	0.53	0.26	0.53	0.53	0.03	0.53	0.53
Acc 10	0.52	0.54	0.48	0.43	0.44	0.45	0.24	0.51	0.94	1.00	0.92	0.52	0.47	0.70	0.47	0.82	0.52	0.40	0.29	0.57	0.22	0.28	0.60	0.36	0.59	0.64	0.08	0.58	0.59
Acc 11	0.58	0.63	0.57	0.52	0.54	0.54	0.38	0.62	0.89	0.92	1.00	0.62	0.56	0.71	0.58	0.90	0.55	0.46	0.37	0.68	0.24	0.23	0.68	0.39	0.67	0.69	0.09	0.66	0.67
Acc 12	0.81	0.85	0.69	0.79	0.78	0.71	0.48	0.80	0.46	0.52	0.62	1.00	0.54	0.53	0.79	0.78	0.42	0.54	0.46	0.77	0.13	0.08	0.74	0.23	0.74	0.74	0.05	0.75	0.76
Acc 13	0.46	0.49	0.44	0.51	0.46	0.37	0.53	0.52	0.38	0.47	0.56	0.54	1.00	0.22	0.58	0.64	0.17	0.54	0.55	0.64	0.33	0.01	0.64	0.24	0.62	0.60	-0.11	0.59	0.57
Acc 14	0.43	0.48	0.36	0.26	0.30	0.42	0.22	0.45	0.63	0.70	0.71	0.53	0.22	1.00	0.46	0.78	0.65	0.34	0.26	0.52	0.11	0.16	0.53	0.40	0.57	0.67	0.12	0.58	0.60
Acc 15	0.67	0.77	0.66	0.63	0.64	0.75	0.53	0.80	0.47	0.47	0.58	0.79	0.58	0.46	1.00	0.74	0.52	0.55	0.45	0.75	0.22	0.11	0.74	0.23	0.73	0.73	0.10	0.73	0.73
Acc 16	0.71	0.77	0.67	0.62	0.64	0.68	0.50	0.77	0.79	0.82	0.90	0.78	0.64	0.78	0.74	1.00	0.47	0.52	0.48	0.83	0.23	0.20	0.80	0.34	0.80	0.80	0.08	0.81	0.81
Acc 17	0.31	0.39	0.29	0.44	0.44	0.22	0.38	0.45	0.24	0.52	0.55	0.42	0.17	0.65	0.52	0.47	1.00	0.39	0.57	0.56	0.29	0.35	0.56	0.41	0.59	0.59	0.22	0.61	0.61
Acc 18	0.42	0.51	0.44	0.70	0.69	0.58	0.73	0.73	0.27	0.40	0.46	0.54	0.54	0.34	0.55	0.52	0.39	1.00	0.97	0.84	0.46	0.58	0.90	0.43	0.89	0.88	0.13	0.87	0.86
Acc 19	0.38	0.48	0.42	0.61	0.60	0.58	0.80	0.72	0.26	0.29	0.37	0.46	0.55	0.26	0.45	0.48	0.57	0.97	1.00	0.86	0.43	0.56	0.88	0.33	0.87	0.86	0.12	0.85	0.85
Acc 20	0.68	0.79	0.70	0.75	0.76	0.81	0.83	0.93	0.55	0.57	0.68	0.77	0.64	0.52	0.75	0.83	0.56	0.84	0.86	1.00	0.35	0.36	0.99	0.33	0.99	0.99	0.10	0.98	0.98
Acc 21	0.06	0.14	0.12	0.08	0.07	0.24	0.29	0.22	0.18	0.22	0.24	0.13	0.33	0.11	0.22	0.23	0.29	0.46	0.43	0.35	1.00	0.45	0.44	0.29	0.44	0.43	0.13	0.43	0.42
Acc 22	0.17	0.21	0.18	0.11	0.12	0.23	0.26	0.25	0.21	0.28	0.23	0.08	0.01	0.16	0.11	0.20	0.35	0.58	0.56	0.36	0.45	1.00	0.50	0.28	0.54	0.54	0.37	0.53	0.54
Acc 23	0.67	0.78	0.69	0.72	0.74	0.80	0.83	0.92	0.53	0.60	0.68	0.74	0.64	0.53	0.74	0.80	0.56	0.90	0.88	0.99	0.44	0.50	1.00	0.44	0.99	0.99	0.14	0.99	0.98
Acc 24	0.17	0.21	0.12	0.23	0.21	0.15	0.27	0.27	0.26	0.36	0.39	0.23	0.24	0.40	0.23	0.34	0.41	0.43	0.33	0.33	0.29	0.28	0.44	1.00	0.48	0.46	0.15	0.47	0.44
Acc 25	0.67	0.77	0.67	0.71	0.73	0.80	0.82	0.91	0.53	0.59	0.67	0.74	0.62	0.57	0.73	0.80	0.59	0.89	0.87	0.99	0.44	0.54	0.99	0.48	1.00	1.00	0.18	1.00	0.99
Acc 26	0.67	0.77	0.67	0.70	0.72	0.80	0.82	0.91	0.53	0.64	0.69	0.74	0.60	0.67	0.73	0.80	0.59	0.88	0.86	0.99	0.43	0.54	0.99	0.46	1.00	1.00	0.18	1.00	0.99
Acc 27	0.09	0.11	-0.01	-0.02	0.00	0.05	0.02	0.09	0.03	0.08	0.09	0.05	-0.11	0.12	0.10	0.08	0.22	0.13	0.12	0.10	0.13	0.37	0.14	0.15	0.18	0.18	1.00	0.21	0.22
Acc 28	0.68	0.78	0.68	0.70	0.73	0.80	0.81	0.91	0.53	0.58	0.66	0.75	0.59	0.58	0.73	0.81	0.61	0.87	0.85	0.98	0.43	0.53	0.99	0.47	1.00	1.00	0.21	1.00	0.99
Acc 29	0.69	0.79	0.67	0.70	0.73	0.80	0.79	0.91	0.53	0.59	0.67	0.76	0.57	0.60	0.73	0.81	0.61	0.86	0.85	0.98	0.42	0.54	0.98	0.44	0.99	0.99	0.22	0.99	1.00

Table A4 Cross-correlations of the monthly accumulated flows for month 2

Mon2	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.95	0.67	0.57	0.67	0.74	0.31	0.83	0.55	0.50	0.56	0.73	0.32	0.52	0.70	0.69	0.37	0.46	0.47	0.75	0.17	0.15	0.76	0.09	0.76	0.75	0.19	0.79	0.80
Acc 2	0.95	1.00	0.72	0.62	0.71	0.82	0.40	0.90	0.60	0.56	0.61	0.78	0.40	0.60	0.74	0.76	0.42	0.49	0.49	0.82	0.10	0.08	0.81	0.12	0.80	0.80	0.16	0.83	0.82
Acc 3	0.67	0.72	1.00	0.68	0.74	0.72	0.29	0.74	0.56	0.46	0.49	0.67	0.44	0.53	0.64	0.64	0.43	0.45	0.46	0.69	0.22	0.06	0.69	0.14	0.68	0.67	0.27	0.69	0.69
Acc 4	0.57	0.62	0.68	1.00	0.93	0.68	0.51	0.69	0.48	0.40	0.49	0.66	0.50	0.47	0.65	0.59	0.23	0.61	0.60	0.67	0.10	0.07	0.68	0.10	0.65	0.64	0.11	0.63	0.62
Acc 5	0.67	0.71	0.74	0.93	1.00	0.81	0.52	0.77	0.49	0.43	0.49	0.69	0.46	0.45	0.70	0.62	0.28	0.63	0.63	0.73	0.14	0.11	0.74	0.09	0.72	0.71	0.12	0.71	0.71
Acc 6	0.74	0.82	0.72	0.68	0.81	1.00	0.57	0.93	0.55	0.49	0.54	0.71	0.36	0.53	0.74	0.69	0.43	0.63	0.64	0.85	0.19	0.13	0.85	0.16	0.83	0.83	0.17	0.84	0.83
Acc 7	0.31	0.40	0.29	0.51	0.52	0.57	1.00	0.63	0.26	0.27	0.34	0.48	0.33	0.38	0.50	0.45	0.30	0.61	0.55	0.60	0.19	0.21	0.59	0.28	0.59	0.59	0.04	0.56	0.54
Acc 8	0.83	0.90	0.74	0.69	0.77	0.93	0.63	1.00	0.60	0.53	0.58	0.78	0.43	0.62	0.78	0.76	0.48	0.65	0.65	0.91	0.24	0.19	0.90	0.22	0.88	0.88	0.21	0.89	0.88
Acc 9	0.55	0.60	0.56	0.48	0.49	0.55	0.26	0.60	1.00	0.93	0.87	0.55	0.39	0.68	0.54	0.81	0.44	0.33	0.36	0.67	0.18	0.04	0.65	0.24	0.66	0.66	0.21	0.67	0.68
Acc 10	0.50	0.56	0.46	0.40	0.43	0.49	0.27	0.53	0.93	1.00	0.90	0.52	0.41	0.74	0.52	0.83	0.45	0.39	0.37	0.65	0.17	0.01	0.67	0.37	0.65	0.61	0.16	0.63	0.67
Acc 11	0.56	0.61	0.49	0.49	0.49	0.54	0.34	0.58	0.87	0.90	1.00	0.60	0.45	0.72	0.60	0.89	0.43	0.42	0.40	0.71	0.10	-0.05	0.72	0.37	0.69	0.65	0.09	0.68	0.71
Acc 12	0.73	0.78	0.67	0.66	0.69	0.71	0.48	0.78	0.55	0.52	0.60	1.00	0.37	0.62	0.75	0.76	0.42	0.57	0.53	0.76	0.13	0.10	0.76	0.21	0.76	0.75	0.11	0.77	0.77
Acc 13	0.32	0.40	0.44	0.50	0.46	0.36	0.33	0.43	0.39	0.41	0.45	0.37	1.00	0.46	0.35	0.62	0.29	0.49	0.44	0.58	0.27	0.02	0.61	0.26	0.57	0.58	-0.03	0.52	0.49
Acc 14	0.52	0.60	0.53	0.47	0.45	0.53	0.38	0.62	0.68	0.74	0.72	0.62	0.46	1.00	0.59	0.87	0.72	0.51	0.47	0.74	0.28	0.04	0.75	0.50	0.74	0.75	0.15	0.71	0.72
Acc 15	0.70	0.74	0.64	0.65	0.70	0.74	0.50	0.78	0.54	0.52	0.60	0.75	0.35	0.59	1.00	0.72	0.47	0.55	0.52	0.77	0.20	0.08	0.76	0.21	0.75	0.74	0.15	0.76	0.75
Acc 16	0.69	0.76	0.64	0.59	0.62	0.69	0.45	0.76	0.81	0.83	0.89	0.76	0.62	0.87	0.72	1.00	0.63	0.54	0.56	0.90	0.24	0.11	0.88	0.31	0.88	0.88	0.08	0.87	0.86
Acc 17	0.37	0.42	0.43	0.23	0.28	0.43	0.30	0.48	0.44	0.45	0.43	0.42	0.29	0.72	0.47	0.63	1.00	0.40	0.37	0.61	0.61	0.27	0.60	0.46	0.65	0.64	0.14	0.64	0.62
Acc 18	0.46	0.49	0.45	0.61	0.63	0.63	0.61	0.65	0.33	0.39	0.42	0.57	0.49	0.51	0.55	0.54	0.40	1.00	0.96	0.76	0.31	0.30	0.83	0.38	0.81	0.80	0.06	0.78	0.75
Acc 19	0.47	0.49	0.46	0.60	0.63	0.64	0.55	0.65	0.36	0.37	0.40	0.53	0.44	0.47	0.52	0.56	0.37	0.96	1.00	0.79	0.37	0.37	0.82	0.21	0.80	0.79	0.09	0.77	0.75
Acc 20	0.75	0.82	0.69	0.67	0.73	0.85	0.60	0.91	0.67	0.65	0.71	0.76	0.58	0.74	0.77	0.90	0.61	0.76	0.79	1.00	0.36	0.22	0.99	0.27	0.98	0.97	0.13	0.96	0.94
Acc 21	0.17	0.10	0.22	0.10	0.14	0.19	0.19	0.24	0.18	0.17	0.10	0.13	0.27	0.28	0.20	0.24	0.61	0.31	0.37	0.36	1.00	0.54	0.40	0.49	0.40	0.40	0.35	0.37	0.35
Acc 22	0.15	0.08	0.06	0.07	0.11	0.13	0.21	0.19	0.04	0.01	-0.05	0.10	0.02	0.04	0.08	0.11	0.27	0.30	0.37	0.22	0.54	1.00	0.27	0.41	0.31	0.34	0.13	0.31	0.33
Acc 23	0.76	0.81	0.69	0.68	0.74	0.85	0.59	0.90	0.65	0.67	0.72	0.76	0.61	0.75	0.76	0.88	0.60	0.83	0.82	0.99	0.40	0.27	1.00	0.44	0.98	0.98	0.13	0.97	0.95
Acc 24	0.09	0.12	0.14	0.10	0.09	0.16	0.28	0.22	0.24	0.37	0.37	0.21	0.26	0.50	0.21	0.31	0.46	0.38	0.21	0.27	0.49	0.41	0.44	1.00	0.55	0.56	0.23	0.53	0.51
Acc 25	0.76	0.80	0.68	0.65	0.72	0.83	0.59	0.88	0.66	0.65	0.69	0.76	0.57	0.74	0.75	0.88	0.65	0.81	0.80	0.98	0.40	0.31	0.98	0.55	1.00	1.00	0.19	0.99	0.98
Acc 26	0.75	0.80	0.67	0.64	0.71	0.83	0.59	0.88	0.66	0.61	0.65	0.75	0.58	0.75	0.74	0.88	0.64	0.80	0.79	0.97	0.40	0.34	0.98	0.56	1.00	1.00	0.18	0.99	0.97
Acc 27	0.19	0.16	0.27	0.11	0.12	0.17	0.04	0.21	0.21	0.16	0.09	0.11	-0.03	0.15	0.15	0.08	0.14	0.06	0.09	0.13	0.35	0.13	0.13	0.23	0.19	0.18	1.00	0.22	0.24
Acc 28	0.79	0.83	0.69	0.63	0.71	0.84	0.56	0.89	0.67	0.63	0.68	0.77	0.52	0.71	0.76	0.87	0.64	0.78	0.77	0.96	0.37	0.31	0.97	0.53	0.99	0.99	0.22	1.00	0.99
Acc 29	0.80	0.82	0.69	0.62	0.71	0.83	0.54	0.88	0.68	0.67	0.71	0.77	0.49	0.72	0.75	0.86	0.62	0.75	0.75	0.94	0.35	0.33	0.95	0.51	0.98	0.97	0.24	0.99	1.00

Table A5 Cross-correlations of the monthly accumulated flows for month 3

Mon3	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.93	0.68	0.36	0.65	0.74	0.24	0.80	0.47	0.56	0.54	0.58	0.35	0.46	0.54	0.60	0.59	0.43	0.43	0.77	0.13	0.17	0.76	0.11	0.72	0.70	0.06	0.71	0.70
Acc 2	0.93	1.00	0.71	0.38	0.71	0.81	0.31	0.86	0.47	0.53	0.54	0.63	0.42	0.53	0.55	0.67	0.61	0.47	0.45	0.83	0.20	0.07	0.80	0.14	0.76	0.74	0.06	0.73	0.72
Acc 3	0.68	0.71	1.00	0.57	0.70	0.69	0.23	0.72	0.46	0.45	0.50	0.48	0.44	0.49	0.37	0.60	0.45	0.43	0.44	0.68	0.30	0.16	0.67	0.17	0.64	0.60	0.20	0.64	0.65
Acc 4	0.36	0.38	0.57	1.00	0.72	0.49	0.57	0.59	0.32	0.35	0.48	0.49	0.33	0.50	0.49	0.55	0.36	0.57	0.52	0.57	0.31	0.08	0.57	0.17	0.54	0.53	0.21	0.53	0.53
Acc 5	0.65	0.71	0.70	0.72	1.00	0.83	0.49	0.77	0.41	0.49	0.50	0.58	0.35	0.48	0.54	0.60	0.47	0.61	0.57	0.74	0.32	0.08	0.72	0.13	0.67	0.65	0.10	0.64	0.64
Acc 6	0.74	0.81	0.69	0.49	0.83	1.00	0.47	0.86	0.42	0.48	0.48	0.57	0.35	0.51	0.54	0.58	0.60	0.61	0.60	0.83	0.27	0.17	0.81	0.20	0.78	0.77	0.12	0.76	0.74
Acc 7	0.24	0.31	0.23	0.57	0.49	0.47	1.00	0.58	0.19	0.20	0.21	0.44	0.07	0.46	0.52	0.36	0.38	0.62	0.61	0.55	0.17	0.06	0.55	0.28	0.54	0.56	0.13	0.52	0.48
Acc 8	0.80	0.86	0.72	0.59	0.77	0.86	0.58	1.00	0.47	0.51	0.53	0.67	0.41	0.60	0.61	0.69	0.67	0.63	0.65	0.92	0.29	0.16	0.90	0.27	0.86	0.86	0.15	0.85	0.82
Acc 9	0.47	0.47	0.46	0.32	0.41	0.42	0.19	0.47	1.00	0.76	0.69	0.45	0.39	0.52	0.34	0.66	0.30	0.24	0.21	0.54	0.28	0.17	0.54	0.19	0.52	0.50	0.24	0.51	0.51
Acc 10	0.56	0.53	0.45	0.35	0.49	0.48	0.20	0.51	0.76	1.00	0.83	0.41	0.29	0.67	0.43	0.72	0.41	0.43	0.28	0.62	0.34	0.23	0.62	0.20	0.58	0.56	0.06	0.51	0.52
Acc 11	0.54	0.54	0.50	0.48	0.50	0.48	0.21	0.53	0.69	0.83	1.00	0.50	0.45	0.66	0.41	0.80	0.48	0.49	0.34	0.70	0.32	0.10	0.68	0.19	0.64	0.63	0.04	0.59	0.59
Acc 12	0.58	0.63	0.48	0.49	0.58	0.57	0.44	0.67	0.45	0.41	0.50	1.00	0.22	0.46	0.54	0.61	0.52	0.47	0.41	0.64	0.08	0.00	0.61	0.08	0.56	0.56	-0.04	0.53	0.52
Acc 13	0.35	0.42	0.44	0.33	0.35	0.35	0.07	0.41	0.39	0.29	0.45	0.22	1.00	0.34	0.16	0.61	0.38	0.27	0.23	0.51	0.22	-0.01	0.48	0.07	0.42	0.44	0.23	0.41	0.39
Acc 14	0.46	0.53	0.49	0.50	0.48	0.51	0.46	0.60	0.52	0.67	0.66	0.46	0.34	1.00	0.56	0.74	0.65	0.55	0.42	0.67	0.46	0.06	0.67	0.37	0.66	0.65	0.19	0.61	0.57
Acc 15	0.54	0.55	0.37	0.49	0.54	0.54	0.52	0.61	0.34	0.43	0.41	0.54	0.16	0.56	1.00	0.55	0.57	0.51	0.46	0.63	0.11	0.05	0.63	0.04	0.56	0.56	0.01	0.52	0.50
Acc 16	0.60	0.67	0.60	0.55	0.60	0.58	0.36	0.69	0.66	0.72	0.80	0.61	0.61	0.74	0.55	1.00	0.59	0.42	0.35	0.84	0.34	0.07	0.79	0.19	0.73	0.73	0.09	0.68	0.66
Acc 17	0.59	0.61	0.45	0.36	0.47	0.60	0.38	0.67	0.30	0.41	0.48	0.52	0.38	0.65	0.57	0.59	1.00	0.55	0.51	0.75	0.30	0.05	0.77	0.25	0.76	0.75	0.17	0.73	0.70
Acc 18	0.43	0.47	0.43	0.57	0.61	0.61	0.62	0.63	0.24	0.43	0.49	0.47	0.27	0.55	0.51	0.42	0.55	1.00	0.92	0.72	0.43	0.30	0.79	0.38	0.80	0.80	0.23	0.79	0.74
Acc 19	0.43	0.45	0.44	0.52	0.57	0.60	0.61	0.65	0.21	0.28	0.34	0.41	0.23	0.42	0.46	0.35	0.51	0.92	1.00	0.71	0.41	0.38	0.77	0.31	0.76	0.78	0.33	0.77	0.74
Acc 20	0.77	0.83	0.68	0.57	0.74	0.83	0.55	0.92	0.54	0.62	0.70	0.64	0.51	0.67	0.63	0.84	0.75	0.72	0.71	1.00	0.36	0.18	0.97	0.25	0.92	0.92	0.14	0.88	0.85
Acc 21	0.13	0.20	0.30	0.31	0.32	0.27	0.17	0.29	0.28	0.34	0.32	0.08	0.22	0.46	0.11	0.34	0.30	0.43	0.41	0.36	1.00	0.20	0.39	0.79	0.45	0.43	0.53	0.47	0.48
Acc 22	0.17	0.07	0.16	0.08	0.08	0.17	0.06	0.16	0.17	0.23	0.10	0.00	-0.01	0.06	0.05	0.07	0.05	0.30	0.38	0.18	0.20	1.00	0.35	0.26	0.42	0.43	0.29	0.44	0.47
Acc 23	0.76	0.80	0.67	0.57	0.72	0.81	0.55	0.90	0.54	0.62	0.68	0.61	0.48	0.67	0.63	0.79	0.77	0.79	0.77	0.97	0.39	0.35	1.00	0.30	0.96	0.96	0.20	0.93	0.90
Acc 24	0.11	0.14	0.17	0.17	0.13	0.20	0.28	0.27	0.19	0.20	0.19	0.08	0.07	0.37	0.04	0.19	0.25	0.38	0.31	0.25	0.79	0.26	0.30	1.00	0.43	0.42	0.46	0.47	0.48
Acc 25	0.72	0.76	0.64	0.54	0.67	0.78	0.54	0.86	0.52	0.58	0.64	0.56	0.42	0.66	0.56	0.73	0.76	0.80	0.76	0.92	0.45	0.42	0.96	0.43	1.00	0.99	0.31	0.98	0.96
Acc 26	0.70	0.74	0.60	0.53	0.65	0.77	0.56	0.86	0.50	0.56	0.63	0.56	0.44	0.65	0.56	0.73	0.75	0.80	0.78	0.92	0.43	0.43	0.96	0.42	0.99	1.00	0.29	0.97	0.94
Acc 27	0.06	0.06	0.20	0.21	0.10	0.12	0.13	0.15	0.24	0.06	0.04	-0.04	0.23	0.19	0.01	0.09	0.17	0.23	0.33	0.14	0.53	0.29	0.20	0.46	0.31	0.29	1.00	0.41	0.44
Acc 28	0.71	0.73	0.64	0.53	0.64	0.76	0.52	0.85	0.51	0.51	0.59	0.53	0.41	0.61	0.52	0.68	0.73	0.79	0.77	0.88	0.47	0.44	0.93	0.47	0.98	0.97	0.41	1.00	0.99
Acc 29	0.70	0.72	0.65	0.53	0.64	0.74	0.48	0.82	0.51	0.52	0.59	0.52	0.39	0.57	0.50	0.66	0.70	0.74	0.74	0.85	0.48	0.47	0.90	0.48	0.96	0.94	0.44	0.99	1.00

Table A6 Cross-correlations of the monthly accumulated flows for month 4

Mon4	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.86	0.55	0.48	0.62	0.58	0.20	0.69	0.39	0.49	0.56	0.49	0.40	0.36	0.47	0.64	0.32	0.34	0.31	0.71	0.22	-0.03	0.60	0.16	0.56	0.55	-0.08	0.52	0.48
Acc 2	0.86	1.00	0.65	0.54	0.76	0.72	0.32	0.80	0.43	0.51	0.58	0.57	0.44	0.47	0.54	0.73	0.37	0.45	0.33	0.81	0.18	-0.04	0.71	0.12	0.64	0.61	-0.08	0.58	0.50
Acc 3	0.55	0.65	1.00	0.64	0.69	0.67	0.22	0.68	0.44	0.49	0.45	0.50	0.38	0.44	0.35	0.60	0.28	0.36	0.38	0.66	0.17	0.07	0.62	0.06	0.54	0.51	-0.02	0.50	0.45
Acc 4	0.48	0.54	0.64	1.00	0.72	0.59	0.46	0.67	0.44	0.45	0.52	0.44	0.32	0.41	0.36	0.57	0.30	0.48	0.40	0.62	0.00	0.11	0.59	0.03	0.51	0.48	0.04	0.45	0.39
Acc 5	0.62	0.76	0.69	0.72	1.00	0.82	0.34	0.69	0.53	0.60	0.64	0.54	0.39	0.48	0.42	0.72	0.32	0.51	0.41	0.79	0.21	0.10	0.76	0.10	0.70	0.69	-0.02	0.65	0.57
Acc 6	0.58	0.72	0.67	0.59	0.82	1.00	0.42	0.75	0.42	0.53	0.58	0.53	0.32	0.46	0.43	0.64	0.40	0.52	0.45	0.79	0.20	0.04	0.72	0.17	0.65	0.63	0.05	0.61	0.53
Acc 7	0.20	0.32	0.22	0.46	0.34	0.42	1.00	0.56	0.13	0.15	0.21	0.25	0.14	0.38	0.32	0.28	0.28	0.57	0.47	0.47	0.14	0.10	0.44	0.23	0.33	0.31	0.31	0.33	0.26
Acc 8	0.69	0.80	0.68	0.67	0.69	0.75	0.56	1.00	0.42	0.47	0.53	0.55	0.44	0.54	0.52	0.71	0.46	0.53	0.50	0.86	0.22	0.06	0.78	0.19	0.65	0.62	0.10	0.61	0.53
Acc 9	0.39	0.43	0.44	0.44	0.53	0.42	0.13	0.42	1.00	0.81	0.72	0.49	0.39	0.50	0.33	0.61	0.34	0.26	0.18	0.58	0.16	0.08	0.54	0.19	0.48	0.48	-0.01	0.43	0.37
Acc 10	0.49	0.51	0.49	0.45	0.60	0.53	0.15	0.47	0.81	1.00	0.67	0.41	0.37	0.54	0.31	0.60	0.37	0.50	0.29	0.65	0.17	-0.03	0.57	0.08	0.46	0.39	-0.06	0.40	0.35
Acc 11	0.56	0.58	0.45	0.52	0.64	0.58	0.21	0.53	0.72	0.67	1.00	0.57	0.44	0.55	0.37	0.73	0.54	0.57	0.32	0.75	0.12	0.00	0.68	0.08	0.60	0.56	-0.07	0.56	0.47
Acc 12	0.49	0.57	0.50	0.44	0.54	0.53	0.25	0.55	0.49	0.41	0.57	1.00	0.29	0.46	0.49	0.63	0.48	0.43	0.26	0.60	0.06	-0.02	0.55	0.04	0.44	0.45	0.01	0.43	0.33
Acc 13	0.40	0.44	0.38	0.32	0.39	0.32	0.14	0.44	0.39	0.37	0.44	0.29	1.00	0.32	0.23	0.62	0.26	0.31	0.15	0.52	0.16	0.02	0.51	0.11	0.40	0.38	-0.02	0.36	0.34
Acc 14	0.36	0.47	0.44	0.41	0.48	0.46	0.38	0.54	0.50	0.54	0.55	0.46	0.32	1.00	0.34	0.48	0.51	0.46	0.17	0.51	0.20	-0.12	0.41	0.07	0.31	0.31	-0.08	0.26	0.15
Acc 15	0.47	0.54	0.35	0.36	0.42	0.43	0.32	0.52	0.33	0.31	0.37	0.49	0.23	0.34	1.00	0.47	0.43	0.42	0.23	0.54	0.02	-0.12	0.46	-0.02	0.38	0.35	-0.07	0.35	0.28
Acc 16	0.64	0.73	0.60	0.57	0.72	0.64	0.28	0.71	0.61	0.60	0.73	0.63	0.62	0.48	0.47	1.00	0.36	0.26	0.20	0.85	0.19	0.02	0.77	0.12	0.64	0.61	-0.05	0.58	0.53
Acc 17	0.32	0.37	0.28	0.30	0.32	0.40	0.28	0.46	0.34	0.37	0.54	0.48	0.26	0.51	0.43	0.36	1.00	0.48	0.28	0.60	0.25	-0.05	0.52	0.29	0.50	0.51	0.01	0.49	0.38
Acc 18	0.34	0.45	0.36	0.48	0.51	0.52	0.57	0.53	0.26	0.50	0.57	0.43	0.31	0.46	0.42	0.26	0.48	1.00	0.77	0.64	0.29	0.28	0.71	0.30	0.67	0.67	0.26	0.64	0.53
Acc 19	0.31	0.33	0.38	0.40	0.41	0.45	0.47	0.50	0.18	0.29	0.32	0.26	0.15	0.17	0.23	0.20	0.28	0.77	1.00	0.59	0.50	0.57	0.71	0.47	0.72	0.70	0.54	0.73	0.68
Acc 20	0.71	0.81	0.66	0.62	0.79	0.79	0.47	0.86	0.58	0.65	0.75	0.60	0.52	0.51	0.54	0.85	0.60	0.64	0.59	1.00	0.30	0.17	0.93	0.25	0.83	0.81	0.14	0.79	0.72
Acc 21	0.22	0.18	0.17	0.00	0.21	0.20	0.14	0.22	0.16	0.17	0.12	0.06	0.16	0.20	0.02	0.19	0.25	0.29	0.50	0.30	1.00	0.51	0.43	0.85	0.50	0.48	0.52	0.49	0.49
Acc 22	-0.03	-0.04	0.07	0.11	0.10	0.04	0.10	0.06	0.08	-0.03	0.00	-0.02	0.02	-0.12	-0.12	0.02	-0.05	0.28	0.57	0.17	0.51	1.00	0.50	0.52	0.61	0.62	0.90	0.63	0.66
Acc 23	0.60	0.71	0.62	0.59	0.76	0.72	0.44	0.78	0.54	0.57	0.68	0.55	0.51	0.41	0.46	0.77	0.52	0.71	0.71	0.93	0.43	0.50	1.00	0.37	0.94	0.92	0.45	0.91	0.86
Acc 24	0.16	0.12	0.06	0.03	0.10	0.17	0.23	0.19	0.19	0.08	0.08	0.04	0.11	0.07	-0.02	0.12	0.29	0.30	0.47	0.25	0.85	0.52	0.37	1.00	0.48	0.45	0.54	0.47	0.47
Acc 25	0.56	0.64	0.54	0.51	0.70	0.65	0.33	0.65	0.48	0.46	0.60	0.44	0.40	0.31	0.38	0.64	0.50	0.67	0.72	0.83	0.50	0.61	0.94	0.48	1.00	0.98	0.55	0.99	0.94
Acc 26	0.55	0.61	0.51	0.48	0.69	0.63	0.31	0.62	0.48	0.39	0.56	0.45	0.38	0.31	0.35	0.61	0.51	0.67	0.70	0.81	0.48	0.62	0.92	0.45	0.98	1.00	0.56	0.99	0.95
Acc 27	-0.08	-0.08	-0.02	0.04	-0.02	0.05	0.31	0.10	-0.01	-0.06	-0.07	0.01	-0.02	-0.08	-0.07	-0.05	0.01	0.26	0.54	0.14	0.52	0.90	0.45	0.54	0.55	0.56	1.00	0.59	0.61
Acc 28	0.52	0.58	0.50	0.45	0.65	0.61	0.33	0.61	0.43	0.40	0.56	0.43	0.36	0.26	0.35	0.58	0.49	0.64	0.73	0.79	0.49	0.63	0.91	0.47	0.99	0.99	0.59	1.00	0.97
Acc 29	0.48	0.50	0.45	0.39	0.57	0.53	0.26	0.53	0.37	0.35	0.47	0.33	0.34	0.15	0.28	0.53	0.38	0.53	0.68	0.72	0.49	0.66	0.86	0.47	0.94	0.95	0.61	0.97	1.00

Table A7 Cross-correlations of the monthly accumulated flows for month 5

Mon5	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.89	0.54	0.49	0.65	0.56	0.12	0.66	0.48	0.50	0.63	0.56	0.40	0.60	0.41	0.70	0.52	0.26	0.11	0.64	0.14	-0.05	0.57	0.16	0.51	0.50	-0.22	0.37	0.35
Acc 2	0.89	1.00	0.58	0.60	0.69	0.67	0.22	0.76	0.48	0.47	0.66	0.64	0.43	0.66	0.49	0.76	0.47	0.37	0.16	0.73	0.10	-0.04	0.65	0.12	0.55	0.54	-0.16	0.44	0.41
Acc 3	0.54	0.58	1.00	0.67	0.66	0.68	0.29	0.66	0.37	0.34	0.42	0.51	0.35	0.44	0.36	0.58	0.44	0.38	0.25	0.62	0.22	0.06	0.58	0.23	0.53	0.53	-0.14	0.44	0.43
Acc 4	0.49	0.60	0.67	1.00	0.73	0.63	0.35	0.68	0.32	0.30	0.42	0.48	0.37	0.43	0.38	0.57	0.35	0.47	0.32	0.67	0.15	0.09	0.61	0.11	0.53	0.51	0.01	0.46	0.47
Acc 5	0.65	0.69	0.66	0.73	1.00	0.74	0.21	0.60	0.41	0.47	0.57	0.52	0.28	0.49	0.37	0.61	0.35	0.42	0.25	0.66	0.08	0.01	0.60	0.04	0.54	0.55	-0.12	0.45	0.41
Acc 6	0.56	0.67	0.68	0.63	0.74	1.00	0.51	0.81	0.34	0.33	0.48	0.52	0.24	0.45	0.46	0.58	0.39	0.59	0.44	0.74	0.19	0.13	0.70	0.18	0.62	0.62	0.03	0.55	0.54
Acc 7	0.12	0.22	0.29	0.35	0.21	0.51	1.00	0.66	0.05	0.04	0.03	0.29	0.27	0.25	0.29	0.27	0.16	0.64	0.65	0.59	0.31	0.31	0.58	0.24	0.48	0.47	0.35	0.51	0.55
Acc 8	0.66	0.76	0.66	0.68	0.60	0.81	0.66	1.00	0.38	0.35	0.49	0.62	0.49	0.58	0.52	0.70	0.46	0.63	0.48	0.86	0.22	0.12	0.78	0.20	0.67	0.65	0.02	0.58	0.59
Acc 9	0.48	0.48	0.37	0.32	0.41	0.34	0.05	0.38	1.00	0.81	0.77	0.40	0.37	0.46	0.36	0.60	0.57	0.14	-0.05	0.43	-0.10	-0.16	0.34	-0.09	0.27	0.27	-0.20	0.16	0.16
Acc 10	0.50	0.47	0.34	0.30	0.47	0.33	0.04	0.35	0.81	1.00	0.69	0.32	0.35	0.34	0.29	0.60	0.39	0.25	0.01	0.43	-0.02	-0.02	0.37	-0.07	0.38	0.36	-0.20	0.26	0.28
Acc 11	0.63	0.66	0.42	0.42	0.57	0.48	0.03	0.49	0.77	0.69	1.00	0.58	0.48	0.48	0.52	0.79	0.51	0.45	0.08	0.63	-0.01	0.06	0.58	-0.02	0.59	0.59	-0.03	0.49	0.47
Acc 12	0.56	0.64	0.51	0.48	0.52	0.52	0.29	0.62	0.40	0.32	0.58	1.00	0.45	0.48	0.68	0.75	0.55	0.41	0.21	0.68	0.10	-0.01	0.60	0.10	0.51	0.52	-0.07	0.44	0.42
Acc 13	0.40	0.43	0.35	0.37	0.28	0.24	0.27	0.49	0.37	0.35	0.48	0.45	1.00	0.28	0.34	0.75	0.26	0.26	0.09	0.56	-0.03	-0.09	0.43	-0.04	0.30	0.28	-0.18	0.18	0.19
Acc 14	0.60	0.66	0.44	0.43	0.49	0.45	0.25	0.58	0.46	0.34	0.48	0.48	0.28	1.00	0.35	0.55	0.46	0.35	0.20	0.57	-0.01	-0.05	0.50	0.03	0.43	0.42	-0.16	0.36	0.35
Acc 15	0.41	0.49	0.36	0.38	0.37	0.46	0.29	0.52	0.36	0.29	0.52	0.68	0.34	0.35	1.00	0.62	0.54	0.50	0.28	0.59	0.10	0.06	0.56	0.13	0.50	0.50	0.01	0.44	0.44
Acc 16	0.70	0.76	0.58	0.57	0.61	0.58	0.27	0.70	0.60	0.60	0.79	0.75	0.75	0.55	0.62	1.00	0.58	0.40	0.16	0.82	0.15	-0.02	0.72	0.16	0.63	0.62	-0.19	0.48	0.46
Acc 17	0.52	0.47	0.44	0.35	0.35	0.39	0.16	0.46	0.57	0.39	0.51	0.55	0.26	0.46	0.54	0.58	1.00	0.42	0.20	0.56	0.28	0.22	0.56	0.28	0.65	0.66	0.02	0.60	0.64
Acc 18	0.26	0.37	0.38	0.47	0.42	0.59	0.64	0.63	0.14	0.25	0.45	0.41	0.26	0.35	0.50	0.40	0.42	1.00	0.85	0.77	0.47	0.48	0.81	0.40	0.78	0.78	0.38	0.78	0.79
Acc 19	0.11	0.16	0.25	0.32	0.25	0.44	0.65	0.48	-0.05	0.01	0.08	0.21	0.09	0.20	0.28	0.16	0.20	0.85	1.00	0.64	0.56	0.62	0.74	0.46	0.73	0.72	0.62	0.78	0.79
Acc 20	0.64	0.73	0.62	0.67	0.66	0.74	0.59	0.86	0.43	0.43	0.63	0.68	0.56	0.57	0.59	0.82	0.56	0.77	0.64	1.00	0.38	0.30	0.96	0.34	0.87	0.85	0.19	0.79	0.78
Acc 21	0.14	0.10	0.22	0.15	0.08	0.19	0.31	0.22	-0.10	-0.02	-0.01	0.10	-0.03	-0.01	0.10	0.15	0.28	0.47	0.56	0.38	1.00	0.82	0.61	0.95	0.73	0.72	0.60	0.77	0.77
Acc 22	-0.05	-0.04	0.06	0.09	0.01	0.13	0.31	0.12	-0.16	-0.02	0.06	-0.01	-0.09	-0.05	0.06	-0.02	0.22	0.48	0.62	0.30	0.82	1.00	0.55	0.77	0.62	0.65	0.85	0.73	0.71
Acc 23	0.57	0.65	0.58	0.61	0.60	0.70	0.58	0.78	0.34	0.37	0.58	0.60	0.43	0.50	0.56	0.72	0.56	0.81	0.74	0.96	0.61	0.55	1.00	0.56	0.96	0.95	0.39	0.91	0.90
Acc 24	0.16	0.12	0.23	0.11	0.04	0.18	0.24	0.20	-0.09	-0.07	-0.02	0.10	-0.04	0.03	0.13	0.16	0.28	0.40	0.46	0.34	0.95	0.77	0.56	1.00	0.70	0.69	0.60	0.74	0.74
Acc 25	0.51	0.55	0.53	0.53	0.54	0.62	0.48	0.67	0.27	0.38	0.59	0.51	0.30	0.43	0.50	0.63	0.65	0.78	0.73	0.87	0.73	0.62	0.96	0.70	1.00	0.99	0.40	0.98	0.96
Acc 26	0.50	0.54	0.53	0.51	0.55	0.62	0.47	0.65	0.27	0.36	0.59	0.52	0.28	0.42	0.50	0.62	0.66	0.78	0.72	0.85	0.72	0.65	0.95	0.69	0.99	1.00	0.46	0.98	0.95
Acc 27	-0.22	-0.16	-0.14	0.01	-0.12	0.03	0.35	0.02	-0.20	-0.20	-0.03	-0.07	-0.18	-0.16	0.01	-0.19	0.02	0.38	0.62	0.19	0.60	0.85	0.39	0.60	0.40	0.46	1.00	0.57	0.54
Acc 28	0.37	0.44	0.44	0.46	0.45	0.55	0.51	0.58	0.16	0.26	0.49	0.44	0.18	0.36	0.44	0.48	0.60	0.78	0.78	0.79	0.77	0.73	0.91	0.74	0.98	0.98	0.57	1.00	0.98
Acc 29	0.35	0.41	0.43	0.47	0.41	0.54	0.55	0.59	0.16	0.28	0.47	0.42	0.19	0.35	0.44	0.46	0.64	0.79	0.79	0.78	0.77	0.71	0.90	0.74	0.96	0.95	0.54	0.98	1.00

Table A8 Cross-correlations of the monthly accumulated flows for month 6

Mon6	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.94	0.74	0.68	0.73	0.71	0.49	0.78	0.63	0.61	0.66	0.62	0.37	0.53	0.34	0.69	0.49	0.36	0.37	0.69	-0.03	0.05	0.66	0.12	0.60	0.60	-0.05	0.55	0.53
Acc 2	0.94	1.00	0.78	0.70	0.74	0.80	0.61	0.87	0.69	0.64	0.71	0.70	0.43	0.63	0.37	0.76	0.56	0.47	0.48	0.80	-0.02	0.06	0.76	0.20	0.70	0.69	0.03	0.65	0.64
Acc 3	0.74	0.78	1.00	0.68	0.64	0.61	0.45	0.69	0.58	0.49	0.53	0.65	0.55	0.51	0.28	0.62	0.54	0.29	0.31	0.63	-0.01	0.04	0.58	0.15	0.52	0.51	0.08	0.49	0.49
Acc 4	0.68	0.70	0.68	1.00	0.93	0.70	0.51	0.67	0.67	0.56	0.62	0.64	0.35	0.35	0.29	0.56	0.52	0.42	0.39	0.59	-0.12	0.02	0.55	0.09	0.49	0.49	-0.08	0.44	0.44
Acc 5	0.73	0.74	0.64	0.93	1.00	0.79	0.58	0.73	0.64	0.55	0.66	0.63	0.31	0.42	0.31	0.61	0.52	0.47	0.45	0.65	-0.03	0.03	0.61	0.12	0.56	0.57	-0.02	0.53	0.51
Acc 6	0.71	0.80	0.61	0.70	0.79	1.00	0.79	0.92	0.59	0.56	0.62	0.75	0.36	0.52	0.50	0.70	0.44	0.64	0.63	0.83	0.05	0.15	0.80	0.23	0.75	0.75	0.07	0.72	0.70
Acc 7	0.49	0.61	0.45	0.51	0.58	0.79	1.00	0.86	0.41	0.47	0.47	0.63	0.46	0.55	0.55	0.66	0.46	0.80	0.80	0.85	0.17	0.35	0.85	0.36	0.82	0.82	0.24	0.80	0.81
Acc 8	0.78	0.87	0.69	0.67	0.73	0.92	0.86	1.00	0.66	0.61	0.64	0.76	0.47	0.64	0.50	0.78	0.58	0.71	0.71	0.92	0.08	0.22	0.89	0.31	0.84	0.84	0.10	0.80	0.80
Acc 9	0.63	0.69	0.58	0.67	0.64	0.59	0.41	0.66	1.00	0.86	0.84	0.67	0.41	0.51	0.25	0.74	0.66	0.41	0.39	0.67	-0.14	-0.02	0.63	0.26	0.59	0.59	-0.03	0.54	0.54
Acc 10	0.61	0.64	0.49	0.56	0.55	0.56	0.47	0.61	0.86	1.00	0.88	0.58	0.34	0.36	0.41	0.78	0.19	0.33	0.37	0.63	-0.11	0.24	0.48	0.09	0.43	0.51	-0.08	0.37	0.38
Acc 11	0.66	0.71	0.53	0.62	0.66	0.62	0.47	0.64	0.84	0.88	1.00	0.62	0.33	0.52	0.50	0.88	0.32	0.46	0.44	0.69	-0.01	0.24	0.64	0.11	0.57	0.63	0.05	0.52	0.52
Acc 12	0.62	0.70	0.65	0.64	0.63	0.75	0.63	0.76	0.67	0.58	0.62	1.00	0.41	0.39	0.56	0.78	0.29	0.37	0.41	0.70	-0.05	0.12	0.62	0.03	0.52	0.53	-0.09	0.47	0.47
Acc 13	0.37	0.43	0.55	0.35	0.31	0.36	0.46	0.47	0.41	0.34	0.33	0.41	1.00	0.36	0.31	0.62	0.14	0.15	0.29	0.56	0.03	0.12	0.42	0.06	0.36	0.36	0.00	0.32	0.36
Acc 14	0.53	0.63	0.51	0.35	0.42	0.52	0.55	0.64	0.51	0.36	0.52	0.39	0.36	1.00	0.48	0.75	0.58	0.35	0.45	0.67	0.16	0.30	0.64	0.19	0.59	0.61	0.10	0.55	0.56
Acc 15	0.34	0.37	0.28	0.29	0.31	0.50	0.55	0.50	0.25	0.41	0.50	0.56	0.31	0.48	1.00	0.61	0.29	0.36	0.35	0.55	0.06	0.16	0.57	0.02	0.46	0.47	0.02	0.42	0.45
Acc 16	0.69	0.76	0.62	0.56	0.61	0.70	0.66	0.78	0.74	0.78	0.88	0.78	0.62	0.75	0.61	1.00	0.64	0.54	0.57	0.88	0.05	0.14	0.85	0.25	0.78	0.78	0.06	0.73	0.73
Acc 17	0.49	0.56	0.54	0.52	0.52	0.44	0.46	0.58	0.66	0.19	0.32	0.29	0.14	0.58	0.29	0.64	1.00	0.50	0.66	0.61	0.54	0.46	0.60	0.33	0.59	0.61	0.37	0.61	0.62
Acc 18	0.36	0.47	0.29	0.42	0.47	0.64	0.80	0.71	0.41	0.33	0.46	0.37	0.15	0.35	0.36	0.54	0.50	1.00	0.96	0.81	0.44	0.64	0.84	0.47	0.85	0.85	0.42	0.84	0.84
Acc 19	0.37	0.48	0.31	0.39	0.45	0.63	0.80	0.71	0.39	0.37	0.44	0.41	0.29	0.45	0.35	0.57	0.66	0.96	1.00	0.84	0.48	0.60	0.88	0.55	0.90	0.90	0.43	0.89	0.89
Acc 20	0.69	0.80	0.63	0.59	0.65	0.83	0.85	0.92	0.67	0.63	0.69	0.70	0.56	0.67	0.55	0.88	0.61	0.81	0.84	1.00	0.23	0.37	0.99	0.36	0.94	0.94	0.23	0.91	0.90
Acc 21	-0.03	-0.02	-0.01	-0.12	-0.03	0.05	0.17	0.08	-0.14	-0.11	-0.01	-0.05	0.03	0.16	0.06	0.05	0.54	0.44	0.48	0.23	1.00	0.63	0.38	0.68	0.50	0.50	0.62	0.56	0.55
Acc 22	0.05	0.06	0.04	0.02	0.03	0.15	0.35	0.22	-0.02	0.24	0.24	0.12	0.12	0.30	0.16	0.14	0.46	0.64	0.60	0.37	0.63	1.00	0.56	0.69	0.66	0.69	0.51	0.69	0.69
Acc 23	0.66	0.76	0.58	0.55	0.61	0.80	0.85	0.89	0.63	0.48	0.64	0.62	0.42	0.64	0.57	0.85	0.60	0.84	0.88	0.99	0.38	0.56	1.00	0.42	0.97	0.97	0.31	0.94	0.93
Acc 24	0.12	0.20	0.15	0.09	0.12	0.23	0.36	0.31	0.26	0.09	0.11	0.03	0.06	0.19	0.02	0.25	0.33	0.47	0.55	0.36	0.68	0.69	0.42	1.00	0.57	0.57	0.60	0.62	0.61
Acc 25	0.60	0.70	0.52	0.49	0.56	0.75	0.82	0.84	0.59	0.43	0.57	0.52	0.36	0.59	0.46	0.78	0.59	0.85	0.90	0.94	0.50	0.66	0.97	0.57	1.00	1.00	0.44	0.98	0.98
Acc 26	0.60	0.69	0.51	0.49	0.57	0.75	0.82	0.84	0.59	0.51	0.63	0.53	0.36	0.61	0.47	0.78	0.61	0.85	0.90	0.94	0.50	0.69	0.97	0.57	1.00	1.00	0.42	0.98	0.97
Acc 27	-0.05	0.03	0.08	-0.08	-0.02	0.07	0.24	0.10	-0.03	-0.08	0.05	-0.09	0.00	0.10	0.02	0.06	0.37	0.42	0.43	0.23	0.62	0.51	0.31	0.60	0.44	0.42	1.00	0.58	0.58
Acc 28	0.55	0.65	0.49	0.44	0.53	0.72	0.80	0.80	0.54	0.37	0.52	0.47	0.32	0.55	0.42	0.73	0.61	0.84	0.89	0.91	0.56	0.69	0.94	0.62	0.98	0.98	0.58	1.00	0.99
Acc 29	0.53	0.64	0.49	0.44	0.51	0.70	0.81	0.80	0.54	0.38	0.52	0.47	0.36	0.56	0.45	0.73	0.62	0.84	0.89	0.90	0.55	0.69	0.93	0.61	0.98	0.97	0.58	0.99	1.00

Table A9 Cross-correlations of the monthly accumulated flows for month 7

Mon7	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.96	0.78	0.83	0.81	0.76	0.32	0.75	0.55	0.55	0.62	0.79	0.37	0.49	0.58	0.74	0.54	0.30	0.28	0.72	-0.10	0.08	0.71	0.10	0.67	0.66	-0.11	0.66	0.67
Acc 2	0.96	1.00	0.78	0.83	0.82	0.83	0.39	0.82	0.56	0.56	0.64	0.81	0.43	0.58	0.68	0.79	0.63	0.40	0.39	0.80	-0.07	0.10	0.78	0.18	0.75	0.74	-0.10	0.74	0.74
Acc 3	0.78	0.78	1.00	0.68	0.66	0.60	0.15	0.55	0.39	0.38	0.40	0.53	0.24	0.30	0.45	0.48	0.49	0.22	0.19	0.51	-0.25	-0.09	0.49	0.05	0.44	0.44	-0.20	0.44	0.44
Acc 4	0.83	0.83	0.68	1.00	0.98	0.83	0.50	0.82	0.58	0.62	0.62	0.65	0.34	0.47	0.51	0.69	0.61	0.49	0.47	0.78	-0.03	0.09	0.75	0.24	0.73	0.72	-0.07	0.72	0.72
Acc 5	0.81	0.82	0.66	0.98	1.00	0.86	0.53	0.84	0.55	0.59	0.61	0.66	0.38	0.50	0.53	0.69	0.62	0.50	0.50	0.79	-0.01	0.10	0.76	0.25	0.74	0.74	-0.07	0.74	0.74
Acc 6	0.76	0.83	0.60	0.83	0.86	1.00	0.74	0.97	0.54	0.54	0.60	0.74	0.46	0.59	0.68	0.76	0.60	0.65	0.65	0.92	0.12	0.19	0.90	0.38	0.89	0.89	-0.01	0.89	0.88
Acc 7	0.32	0.39	0.15	0.50	0.53	0.74	1.00	0.81	0.42	0.42	0.44	0.46	0.35	0.48	0.48	0.55	0.33	0.71	0.75	0.78	0.47	0.42	0.77	0.58	0.80	0.79	0.16	0.79	0.79
Acc 8	0.75	0.82	0.55	0.82	0.84	0.97	0.81	1.00	0.58	0.58	0.63	0.76	0.45	0.64	0.71	0.80	0.60	0.70	0.70	0.95	0.20	0.30	0.94	0.45	0.93	0.93	0.03	0.93	0.93
Acc 9	0.55	0.56	0.39	0.58	0.55	0.54	0.42	0.58	1.00	0.97	0.92	0.48	0.48	0.55	0.43	0.78	0.41	0.33	0.35	0.67	0.14	0.22	0.66	0.29	0.64	0.64	-0.01	0.64	0.65
Acc 10	0.55	0.56	0.38	0.62	0.59	0.54	0.42	0.58	0.97	1.00	0.95	0.48	0.44	0.49	0.42	0.78	0.43	0.44	0.42	0.67	0.20	0.33	0.66	0.37	0.63	0.72	0.00	0.62	0.64
Acc 11	0.62	0.64	0.40	0.62	0.61	0.60	0.44	0.63	0.92	0.95	1.00	0.59	0.62	0.61	0.52	0.89	0.56	0.47	0.47	0.76	0.22	0.43	0.76	0.41	0.74	0.78	-0.01	0.73	0.74
Acc 12	0.79	0.81	0.53	0.65	0.66	0.74	0.46	0.76	0.48	0.48	0.59	1.00	0.48	0.57	0.73	0.78	0.59	0.35	0.33	0.74	-0.03	0.17	0.75	0.17	0.72	0.72	-0.10	0.72	0.72
Acc 13	0.37	0.43	0.24	0.34	0.38	0.46	0.35	0.45	0.48	0.44	0.62	0.48	1.00	0.55	0.41	0.74	0.34	0.35	0.43	0.61	0.21	0.22	0.62	0.23	0.63	0.65	0.03	0.64	0.63
Acc 14	0.49	0.58	0.30	0.47	0.50	0.59	0.48	0.64	0.55	0.49	0.61	0.57	0.55	1.00	0.46	0.78	0.71	0.48	0.51	0.70	0.21	0.29	0.69	0.37	0.71	0.75	-0.01	0.72	0.71
Acc 15	0.58	0.68	0.45	0.51	0.53	0.68	0.48	0.71	0.43	0.42	0.52	0.73	0.41	0.46	1.00	0.72	0.57	0.39	0.41	0.72	0.01	0.30	0.70	0.24	0.68	0.68	-0.07	0.68	0.68
Acc 16	0.74	0.79	0.48	0.69	0.69	0.76	0.55	0.80	0.78	0.78	0.89	0.78	0.74	0.78	0.72	1.00	0.62	0.46	0.50	0.90	0.17	0.31	0.89	0.39	0.88	0.88	-0.03	0.88	0.88
Acc 17	0.54	0.63	0.49	0.61	0.62	0.60	0.33	0.60	0.41	0.43	0.56	0.59	0.34	0.71	0.57	0.62	1.00	0.55	0.57	0.72	0.19	0.28	0.70	0.48	0.72	0.74	-0.08	0.71	0.68
Acc 18	0.30	0.40	0.22	0.49	0.50	0.65	0.71	0.70	0.33	0.44	0.47	0.35	0.35	0.48	0.39	0.46	0.55	1.00	0.97	0.78	0.53	0.58	0.81	0.66	0.83	0.82	0.28	0.83	0.83
Acc 19	0.28	0.39	0.19	0.47	0.50	0.65	0.75	0.70	0.35	0.42	0.47	0.33	0.43	0.51	0.41	0.50	0.57	0.97	1.00	0.79	0.57	0.60	0.82	0.69	0.83	0.83	0.28	0.83	0.83
Acc 20	0.72	0.80	0.51	0.78	0.79	0.92	0.78	0.95	0.67	0.67	0.76	0.74	0.61	0.70	0.72	0.90	0.72	0.78	0.79	1.00	0.29	0.40	1.00	0.54	0.99	0.99	0.07	0.99	0.99
Acc 21	-0.10	-0.07	-0.25	-0.03	-0.01	0.12	0.47	0.20	0.14	0.20	0.22	-0.03	0.21	0.21	0.01	0.17	0.19	0.53	0.57	0.29	1.00	0.68	0.35	0.79	0.39	0.40	0.55	0.41	0.40
Acc 22	0.08	0.10	-0.09	0.09	0.10	0.19	0.42	0.30	0.22	0.33	0.43	0.17	0.22	0.29	0.30	0.31	0.28	0.58	0.60	0.40	0.68	1.00	0.47	0.68	0.45	0.52	0.44	0.47	0.46
Acc 23	0.71	0.78	0.49	0.75	0.76	0.90	0.77	0.94	0.66	0.66	0.76	0.75	0.62	0.69	0.70	0.89	0.70	0.81	0.82	1.00	0.35	0.47	1.00	0.55	0.99	0.99	0.10	0.99	0.99
Acc 24	0.10	0.18	0.05	0.24	0.25	0.38	0.58	0.45	0.29	0.37	0.41	0.17	0.23	0.37	0.24	0.39	0.48	0.66	0.69	0.54	0.79	0.68	0.55	1.00	0.61	0.61	0.31	0.61	0.61
Acc 25	0.67	0.75	0.44	0.73	0.74	0.89	0.80	0.93	0.64	0.63	0.74	0.72	0.63	0.71	0.68	0.88	0.72	0.83	0.83	0.99	0.39	0.45	0.99	0.61	1.00	1.00	0.13	1.00	1.00
Acc 26	0.66	0.74	0.44	0.72	0.74	0.89	0.79	0.93	0.64	0.72	0.78	0.72	0.65	0.75	0.68	0.88	0.74	0.82	0.83	0.99	0.40	0.52	0.99	0.61	1.00	1.00	0.13	1.00	1.00
Acc 27	-0.11	-0.10	-0.20	-0.07	-0.07	-0.01	0.16	0.03	-0.01	0.00	-0.01	-0.10	0.03	-0.01	-0.07	-0.03	-0.08	0.28	0.28	0.07	0.55	0.44	0.10	0.31	0.13	0.13	1.00	0.15	0.16
Acc 28	0.66	0.74	0.44	0.72	0.74	0.89	0.79	0.93	0.64	0.62	0.73	0.72	0.64	0.72	0.68	0.88	0.71	0.83	0.83	0.99	0.41	0.47	0.99	0.61	1.00	1.00	0.15	1.00	1.00
Acc 29	0.67	0.74	0.44	0.72	0.74	0.88	0.79	0.93	0.65	0.64	0.74	0.72	0.63	0.71	0.68	0.88	0.68	0.83	0.83	0.99	0.40	0.46	0.99	0.61	1.00	1.00	0.16	1.00	1.00

Table A10 Cross-correlations of the monthly accumulated flows for month 8

Mon8	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.97	0.92	0.84	0.82	0.74	0.41	0.81	0.55	0.61	0.64	0.78	0.21	0.63	0.73	0.75	0.71	0.46	0.47	0.79	-0.09	0.05	0.78	0.16	0.76	0.76	0.04	0.76	0.76
Acc 2	0.97	1.00	0.92	0.89	0.88	0.83	0.52	0.89	0.56	0.62	0.66	0.82	0.27	0.69	0.82	0.79	0.75	0.56	0.57	0.87	-0.03	0.08	0.86	0.25	0.84	0.84	0.10	0.84	0.84
Acc 3	0.92	0.92	1.00	0.85	0.83	0.73	0.36	0.78	0.54	0.60	0.61	0.70	0.15	0.62	0.69	0.69	0.67	0.47	0.48	0.76	-0.12	-0.03	0.75	0.10	0.73	0.73	0.07	0.73	0.73
Acc 4	0.84	0.89	0.85	1.00	0.99	0.91	0.62	0.91	0.51	0.56	0.64	0.77	0.27	0.67	0.78	0.75	0.74	0.64	0.65	0.88	-0.05	0.07	0.87	0.28	0.86	0.86	0.12	0.86	0.86
Acc 5	0.82	0.88	0.83	0.99	1.00	0.93	0.65	0.92	0.49	0.55	0.63	0.79	0.33	0.66	0.79	0.76	0.73	0.63	0.65	0.88	-0.02	0.08	0.87	0.29	0.86	0.86	0.13	0.86	0.87
Acc 6	0.74	0.83	0.73	0.91	0.93	1.00	0.84	0.97	0.46	0.52	0.63	0.82	0.38	0.71	0.86	0.80	0.72	0.78	0.79	0.94	0.11	0.22	0.94	0.50	0.93	0.93	0.24	0.93	0.93
Acc 7	0.41	0.52	0.36	0.62	0.65	0.84	1.00	0.83	0.28	0.35	0.45	0.63	0.38	0.61	0.69	0.63	0.53	0.82	0.85	0.81	0.33	0.49	0.81	0.73	0.82	0.82	0.32	0.82	0.82
Acc 8	0.81	0.89	0.78	0.91	0.92	0.97	0.83	1.00	0.49	0.56	0.65	0.85	0.38	0.75	0.89	0.83	0.74	0.77	0.78	0.97	0.10	0.25	0.96	0.50	0.96	0.96	0.23	0.96	0.96
Acc 9	0.55	0.56	0.54	0.51	0.49	0.46	0.28	0.49	1.00	0.95	0.92	0.50	0.37	0.73	0.50	0.77	0.58	0.28	0.30	0.61	-0.03	0.04	0.61	0.20	0.60	0.60	0.15	0.60	0.60
Acc 10	0.61	0.62	0.60	0.56	0.55	0.52	0.35	0.56	0.95	1.00	0.95	0.57	0.41	0.76	0.53	0.82	0.51	0.32	0.36	0.66	0.00	0.11	0.64	0.24	0.61	0.68	0.24	0.61	0.63
Acc 11	0.64	0.66	0.61	0.64	0.63	0.63	0.45	0.65	0.92	0.95	1.00	0.71	0.52	0.82	0.66	0.90	0.64	0.42	0.47	0.78	0.02	0.26	0.77	0.34	0.74	0.78	0.25	0.74	0.75
Acc 12	0.78	0.82	0.70	0.77	0.79	0.82	0.63	0.85	0.50	0.57	0.71	1.00	0.50	0.68	0.87	0.86	0.71	0.55	0.55	0.85	-0.04	0.15	0.86	0.34	0.84	0.85	0.21	0.85	0.85
Acc 13	0.21	0.27	0.15	0.27	0.33	0.38	0.38	0.38	0.37	0.41	0.52	0.50	1.00	0.47	0.45	0.61	0.26	0.24	0.26	0.47	0.08	0.26	0.51	0.28	0.53	0.53	0.32	0.54	0.53
Acc 14	0.63	0.69	0.62	0.67	0.66	0.71	0.61	0.75	0.73	0.76	0.82	0.68	0.47	1.00	0.70	0.89	0.83	0.62	0.66	0.85	0.07	0.34	0.85	0.53	0.85	0.86	0.23	0.85	0.85
Acc 15	0.73	0.82	0.69	0.78	0.79	0.86	0.69	0.89	0.50	0.53	0.66	0.87	0.45	0.70	1.00	0.84	0.72	0.57	0.62	0.88	0.03	0.23	0.86	0.39	0.84	0.84	0.18	0.84	0.84
Acc 16	0.75	0.79	0.69	0.75	0.76	0.80	0.63	0.83	0.77	0.82	0.90	0.86	0.61	0.89	0.84	1.00	0.76	0.56	0.58	0.91	0.01	0.22	0.91	0.43	0.90	0.90	0.22	0.90	0.90
Acc 17	0.71	0.75	0.67	0.74	0.73	0.72	0.53	0.74	0.58	0.51	0.64	0.71	0.26	0.83	0.72	0.76	1.00	0.58	0.63	0.81	-0.01	0.33	0.82	0.43	0.81	0.85	0.05	0.81	0.81
Acc 18	0.46	0.56	0.47	0.64	0.63	0.78	0.82	0.77	0.28	0.32	0.42	0.55	0.24	0.62	0.57	0.56	0.58	1.00	0.99	0.80	0.35	0.54	0.79	0.70	0.80	0.79	0.26	0.79	0.79
Acc 19	0.47	0.57	0.48	0.65	0.65	0.79	0.85	0.78	0.30	0.36	0.47	0.55	0.26	0.66	0.62	0.58	0.63	0.99	1.00	0.82	0.35	0.51	0.82	0.71	0.83	0.83	0.31	0.83	0.83
Acc 20	0.79	0.87	0.76	0.88	0.88	0.94	0.81	0.97	0.61	0.66	0.78	0.85	0.47	0.85	0.88	0.91	0.81	0.80	0.82	1.00	0.12	0.31	1.00	0.55	1.00	1.00	0.25	1.00	1.00
Acc 21	-0.09	-0.03	-0.12	-0.05	-0.02	0.11	0.33	0.10	-0.03	0.00	0.02	-0.04	0.08	0.07	0.03	0.01	-0.01	0.35	0.35	0.12	1.00	0.41	0.15	0.54	0.18	0.17	0.42	0.18	0.18
Acc 22	0.05	0.08	-0.03	0.07	0.08	0.22	0.49	0.25	0.04	0.11	0.26	0.15	0.26	0.34	0.23	0.22	0.33	0.54	0.51	0.31	0.41	1.00	0.38	0.64	0.44	0.38	0.10	0.43	0.42
Acc 23	0.78	0.86	0.75	0.87	0.87	0.94	0.81	0.96	0.61	0.64	0.77	0.86	0.51	0.85	0.86	0.91	0.82	0.79	0.82	1.00	0.15	0.38	1.00	0.55	1.00	1.00	0.27	1.00	1.00
Acc 24	0.16	0.25	0.10	0.28	0.29	0.50	0.73	0.50	0.20	0.24	0.34	0.34	0.28	0.53	0.39	0.43	0.43	0.70	0.71	0.55	0.54	0.64	0.55	1.00	0.59	0.59	0.41	0.59	0.59
Acc 25	0.76	0.84	0.73	0.86	0.86	0.93	0.82	0.96	0.60	0.61	0.74	0.84	0.53	0.85	0.84	0.90	0.81	0.80	0.83	1.00	0.18	0.44	1.00	0.59	1.00	1.00	0.28	1.00	1.00
Acc 26	0.76	0.84	0.73	0.86	0.86	0.93	0.82	0.96	0.60	0.68	0.78	0.85	0.53	0.86	0.84	0.90	0.85	0.79	0.83	1.00	0.17	0.38	1.00	0.59	1.00	1.00	0.30	1.00	1.00
Acc 27	0.04	0.10	0.07	0.12	0.13	0.24	0.32	0.23	0.15	0.24	0.25	0.21	0.32	0.23	0.18	0.22	0.05	0.26	0.31	0.25	0.42	0.10	0.27	0.41	0.28	0.30	1.00	0.29	0.29
Acc 28	0.76	0.84	0.73	0.86	0.86	0.93	0.82	0.96	0.60	0.61	0.74	0.85	0.54	0.85	0.84	0.90	0.81	0.79	0.83	1.00	0.18	0.43	1.00	0.59	1.00	1.00	0.29	1.00	1.00
Acc 29	0.76	0.84	0.73	0.86	0.87	0.93	0.82	0.96	0.60	0.63	0.75	0.85	0.53	0.85	0.84	0.90	0.81	0.79	0.83	1.00	0.18	0.42	1.00	0.59	1.00	1.00	0.29	1.00	1.00

Table A11 Cross-correlations of the monthly accumulated flows for month 9

Mon9	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.98	0.92	0.88	0.88	0.86	0.65	0.92	0.63	0.67	0.73	0.91	0.64	0.67	0.89	0.84	0.73	0.58	0.60	0.90	0.01	-0.04	0.90	0.26	0.90	0.90	0.08	0.90	0.90
Acc 2	0.98	1.00	0.93	0.92	0.92	0.91	0.70	0.96	0.63	0.66	0.73	0.92	0.68	0.70	0.93	0.86	0.78	0.63	0.66	0.94	0.03	-0.05	0.94	0.33	0.94	0.94	0.13	0.94	0.94
Acc 3	0.92	0.93	1.00	0.94	0.93	0.90	0.68	0.92	0.61	0.64	0.69	0.85	0.62	0.67	0.85	0.79	0.71	0.67	0.70	0.90	0.05	-0.02	0.90	0.30	0.90	0.90	0.20	0.90	0.90
Acc 4	0.88	0.92	0.94	1.00	1.00	0.97	0.81	0.96	0.55	0.59	0.66	0.87	0.64	0.72	0.89	0.81	0.79	0.78	0.81	0.94	0.06	-0.02	0.94	0.37	0.94	0.94	0.17	0.94	0.94
Acc 5	0.88	0.92	0.93	1.00	1.00	0.98	0.82	0.97	0.53	0.57	0.65	0.88	0.66	0.72	0.90	0.81	0.80	0.77	0.80	0.94	0.05	-0.03	0.94	0.40	0.94	0.94	0.18	0.94	0.94
Acc 6	0.86	0.91	0.90	0.97	0.98	1.00	0.86	0.98	0.50	0.52	0.63	0.88	0.71	0.75	0.92	0.82	0.84	0.79	0.82	0.96	0.04	-0.03	0.96	0.48	0.96	0.95	0.19	0.95	0.95
Acc 7	0.65	0.70	0.68	0.81	0.82	0.86	1.00	0.84	0.34	0.38	0.48	0.71	0.64	0.69	0.75	0.69	0.78	0.86	0.87	0.84	0.02	0.03	0.84	0.54	0.84	0.84	0.23	0.84	0.84
Acc 8	0.92	0.96	0.92	0.96	0.97	0.98	0.84	1.00	0.56	0.59	0.68	0.92	0.73	0.76	0.95	0.86	0.85	0.75	0.78	0.98	0.03	-0.03	0.98	0.45	0.98	0.97	0.18	0.97	0.97
Acc 9	0.63	0.63	0.61	0.55	0.53	0.50	0.34	0.56	1.00	0.98	0.96	0.65	0.58	0.70	0.58	0.82	0.51	0.26	0.28	0.65	0.12	0.01	0.65	0.20	0.65	0.65	-0.04	0.65	0.65
Acc 10	0.67	0.66	0.64	0.59	0.57	0.52	0.38	0.59	0.98	1.00	0.96	0.62	0.56	0.67	0.49	0.83	0.37	0.17	0.28	0.66	0.24	-0.16	0.57	0.16	0.57	0.59	-0.02	0.57	0.59
Acc 11	0.73	0.73	0.69	0.66	0.65	0.63	0.48	0.68	0.96	0.96	1.00	0.73	0.66	0.82	0.62	0.92	0.53	0.28	0.38	0.76	0.23	-0.17	0.69	0.29	0.69	0.70	-0.06	0.69	0.70
Acc 12	0.91	0.92	0.85	0.87	0.88	0.88	0.71	0.92	0.65	0.62	0.73	1.00	0.80	0.73	0.93	0.91	0.79	0.57	0.59	0.92	0.04	-0.10	0.92	0.36	0.91	0.91	0.10	0.91	0.91
Acc 13	0.64	0.68	0.62	0.64	0.66	0.71	0.64	0.73	0.58	0.56	0.66	0.80	1.00	0.73	0.76	0.86	0.71	0.41	0.48	0.79	0.03	-0.20	0.79	0.52	0.78	0.78	0.13	0.78	0.77
Acc 14	0.67	0.70	0.67	0.72	0.72	0.75	0.69	0.76	0.70	0.67	0.82	0.73	0.73	1.00	0.74	0.91	0.82	0.52	0.60	0.83	0.17	-0.15	0.81	0.60	0.82	0.83	-0.03	0.82	0.82
Acc 15	0.89	0.93	0.85	0.89	0.90	0.92	0.75	0.95	0.58	0.49	0.62	0.93	0.76	0.74	1.00	0.89	0.81	0.58	0.66	0.94	0.10	-0.15	0.94	0.44	0.94	0.94	0.20	0.94	0.94
Acc 16	0.84	0.86	0.79	0.81	0.81	0.82	0.69	0.86	0.82	0.83	0.92	0.91	0.86	0.91	0.89	1.00	0.84	0.56	0.58	0.93	0.08	-0.05	0.93	0.45	0.93	0.93	0.03	0.93	0.93
Acc 17	0.73	0.78	0.71	0.79	0.80	0.84	0.78	0.85	0.51	0.37	0.53	0.79	0.71	0.82	0.81	0.84	1.00	0.62	0.67	0.87	0.07	-0.16	0.85	0.58	0.86	0.87	0.04	0.86	0.86
Acc 18	0.58	0.63	0.67	0.78	0.77	0.79	0.86	0.75	0.26	0.17	0.28	0.57	0.41	0.52	0.58	0.56	0.62	1.00	0.99	0.76	0.18	-0.10	0.74	0.47	0.74	0.73	0.30	0.74	0.74
Acc 19	0.60	0.66	0.70	0.81	0.80	0.82	0.87	0.78	0.28	0.28	0.38	0.59	0.48	0.60	0.66	0.58	0.67	0.99	1.00	0.79	0.14	-0.06	0.79	0.52	0.79	0.79	0.30	0.79	0.80
Acc 20	0.90	0.94	0.90	0.94	0.94	0.96	0.84	0.98	0.65	0.66	0.76	0.92	0.79	0.83	0.94	0.93	0.87	0.76	0.79	1.00	0.09	-0.13	1.00	0.50	1.00	1.00	0.17	1.00	1.00
Acc 21	0.01	0.03	0.05	0.06	0.05	0.04	0.02	0.03	0.12	0.24	0.23	0.04	0.03	0.17	0.10	0.08	0.07	0.18	0.14	0.09	1.00	0.01	0.15	0.22	0.15	0.15	0.09	0.15	0.15
Acc 22	-0.04	-0.05	-0.02	-0.02	-0.03	-0.03	0.03	-0.03	0.01	-0.16	-0.17	-0.10	-0.20	-0.15	-0.15	-0.05	-0.16	-0.10	-0.06	-0.13	0.01	1.00	-0.11	-0.12	-0.21	-0.21	-0.06	-0.21	-0.19
Acc 23	0.90	0.94	0.90	0.94	0.94	0.96	0.84	0.98	0.65	0.57	0.69	0.92	0.79	0.81	0.94	0.93	0.85	0.74	0.79	1.00	0.15	-0.11	1.00	0.51	1.00	1.00	0.22	1.00	1.00
Acc 24	0.26	0.33	0.30	0.37	0.40	0.48	0.54	0.45	0.20	0.16	0.29	0.36	0.52	0.60	0.44	0.45	0.58	0.47	0.52	0.50	0.22	-0.12	0.51	1.00	0.52	0.52	0.21	0.52	0.51
Acc 25	0.90	0.94	0.90	0.94	0.94	0.96	0.84	0.98	0.65	0.57	0.69	0.91	0.78	0.82	0.94	0.93	0.86	0.74	0.79	1.00	0.15	-0.21	1.00	0.52	1.00	1.00	0.21	1.00	1.00
Acc 26	0.90	0.94	0.90	0.94	0.94	0.95	0.84	0.97	0.65	0.59	0.70	0.91	0.78	0.83	0.94	0.93	0.87	0.73	0.79	1.00	0.15	-0.21	1.00	0.52	1.00	1.00	0.21	1.00	1.00
Acc 27	0.08	0.13	0.20	0.17	0.18	0.19	0.23	0.18	-0.04	-0.02	-0.06	0.10	0.13	-0.03	0.20	0.03	0.04	0.30	0.30	0.17	0.09	-0.06	0.22	0.21	0.21	0.21	1.00	0.22	0.22
Acc 28	0.90	0.94	0.90	0.94	0.94	0.95	0.84	0.97	0.65	0.57	0.69	0.91	0.78	0.82	0.94	0.93	0.86	0.74	0.79	1.00	0.15	-0.21	1.00	0.52	1.00	1.00	0.22	1.00	1.00
Acc 29	0.90	0.94	0.90	0.94	0.94	0.95	0.84	0.97	0.65	0.59	0.70	0.91	0.77	0.82	0.94	0.93	0.86	0.74	0.80	1.00	0.15	-0.19	1.00	0.51	1.00	1.00	0.22	1.00	1.00

Table A12 Cross-correlations of the monthly accumulated flows for month 10

Mon10	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.99	0.89	0.86	0.88	0.89	0.70	0.95	0.66	0.69	0.70	0.85	0.45	0.64	0.87	0.80	0.67	0.50	0.55	0.91	0.08	-0.01	0.91	0.17	0.90	0.90	0.10	0.90	0.90
Acc 2	0.99	1.00	0.91	0.89	0.91	0.93	0.71	0.98	0.67	0.69	0.71	0.84	0.47	0.69	0.88	0.82	0.72	0.53	0.58	0.94	0.08	-0.01	0.93	0.18	0.93	0.93	0.08	0.93	0.92
Acc 3	0.89	0.91	1.00	0.94	0.96	0.95	0.71	0.93	0.63	0.66	0.67	0.80	0.51	0.70	0.85	0.78	0.68	0.63	0.67	0.90	0.13	0.04	0.89	0.16	0.89	0.89	0.05	0.89	0.89
Acc 4	0.86	0.89	0.94	1.00	0.99	0.96	0.84	0.94	0.63	0.69	0.70	0.86	0.60	0.75	0.86	0.84	0.78	0.76	0.78	0.93	0.16	0.04	0.93	0.28	0.93	0.92	0.03	0.93	0.93
Acc 5	0.88	0.91	0.96	0.99	1.00	0.98	0.82	0.96	0.63	0.68	0.69	0.86	0.56	0.75	0.87	0.83	0.77	0.74	0.76	0.94	0.15	0.03	0.93	0.26	0.93	0.93	0.02	0.93	0.93
Acc 6	0.89	0.93	0.95	0.96	0.98	1.00	0.82	0.97	0.63	0.65	0.69	0.80	0.55	0.75	0.89	0.81	0.76	0.72	0.77	0.95	0.15	0.06	0.95	0.22	0.95	0.95	0.03	0.95	0.95
Acc 7	0.70	0.71	0.71	0.84	0.82	0.82	1.00	0.82	0.50	0.55	0.57	0.78	0.56	0.64	0.75	0.73	0.66	0.79	0.82	0.83	0.22	0.06	0.83	0.39	0.83	0.83	0.06	0.83	0.84
Acc 8	0.95	0.98	0.93	0.94	0.96	0.97	0.82	1.00	0.66	0.69	0.71	0.86	0.54	0.72	0.91	0.84	0.77	0.66	0.71	0.97	0.14	0.02	0.97	0.25	0.97	0.97	0.06	0.97	0.97
Acc 9	0.66	0.67	0.63	0.63	0.63	0.63	0.50	0.66	1.00	0.96	0.97	0.69	0.53	0.74	0.61	0.88	0.62	0.36	0.40	0.76	0.10	0.04	0.76	0.17	0.75	0.75	-0.05	0.75	0.75
Acc 10	0.69	0.69	0.66	0.69	0.68	0.65	0.55	0.69	0.96	1.00	0.99	0.74	0.43	0.75	0.56	0.93	0.57	0.34	0.42	0.76	0.11	0.24	0.73	0.18	0.73	0.76	-0.07	0.74	0.74
Acc 11	0.70	0.71	0.67	0.70	0.69	0.69	0.57	0.71	0.97	0.99	1.00	0.77	0.47	0.82	0.61	0.94	0.64	0.39	0.48	0.80	0.14	0.22	0.78	0.21	0.78	0.80	-0.10	0.78	0.78
Acc 12	0.85	0.84	0.80	0.86	0.86	0.80	0.78	0.86	0.69	0.74	0.77	1.00	0.50	0.69	0.89	0.89	0.70	0.55	0.60	0.89	0.12	0.03	0.92	0.21	0.91	0.92	0.01	0.91	0.91
Acc 13	0.45	0.47	0.51	0.60	0.56	0.55	0.56	0.54	0.53	0.43	0.47	0.50	1.00	0.47	0.42	0.75	0.58	0.57	0.53	0.59	0.35	0.18	0.56	0.29	0.58	0.57	-0.19	0.57	0.59
Acc 14	0.64	0.69	0.70	0.75	0.75	0.75	0.64	0.72	0.74	0.75	0.82	0.69	0.47	1.00	0.58	0.87	0.73	0.51	0.58	0.78	0.13	0.12	0.77	0.21	0.77	0.77	-0.08	0.77	0.77
Acc 15	0.87	0.88	0.85	0.86	0.87	0.89	0.75	0.91	0.61	0.56	0.61	0.89	0.42	0.58	1.00	0.82	0.66	0.53	0.64	0.89	0.31	0.31	0.88	0.35	0.87	0.87	0.02	0.87	0.87
Acc 16	0.80	0.82	0.78	0.84	0.83	0.81	0.73	0.84	0.88	0.93	0.94	0.89	0.75	0.87	0.82	1.00	0.82	0.56	0.58	0.92	0.18	0.09	0.92	0.23	0.92	0.92	-0.05	0.92	0.92
Acc 17	0.67	0.72	0.68	0.78	0.77	0.76	0.66	0.77	0.62	0.57	0.64	0.70	0.58	0.73	0.66	0.82	1.00	0.57	0.56	0.79	0.15	0.13	0.81	0.38	0.83	0.83	-0.02	0.83	0.84
Acc 18	0.50	0.53	0.63	0.76	0.74	0.72	0.79	0.66	0.36	0.34	0.39	0.55	0.57	0.51	0.53	0.56	0.57	1.00	0.97	0.71	0.18	0.05	0.70	0.25	0.69	0.69	0.06	0.69	0.70
Acc 19	0.55	0.58	0.67	0.78	0.76	0.77	0.82	0.71	0.40	0.42	0.48	0.60	0.53	0.58	0.64	0.58	0.56	0.97	1.00	0.77	0.20	0.11	0.77	0.30	0.77	0.77	0.04	0.77	0.78
Acc 20	0.91	0.94	0.90	0.93	0.94	0.95	0.83	0.97	0.76	0.76	0.80	0.89	0.59	0.78	0.89	0.92	0.79	0.71	0.77	1.00	0.19	0.06	1.00	0.32	1.00	1.00	0.03	1.00	1.00
Acc 21	0.08	0.08	0.13	0.16	0.15	0.15	0.22	0.14	0.10	0.11	0.14	0.12	0.35	0.13	0.31	0.18	0.15	0.18	0.20	0.19	1.00	0.48	0.18	0.60	0.19	0.19	-0.04	0.19	0.19
Acc 22	-0.01	-0.01	0.04	0.04	0.03	0.06	0.06	0.02	0.04	0.24	0.22	0.03	0.18	0.12	0.31	0.09	0.13	0.05	0.11	0.06	0.48	1.00	0.08	0.04	0.03	0.05	-0.11	0.03	0.04
Acc 23	0.91	0.93	0.89	0.93	0.93	0.95	0.83	0.97	0.76	0.73	0.78	0.92	0.56	0.77	0.88	0.92	0.81	0.70	0.77	1.00	0.18	0.08	1.00	0.32	1.00	1.00	0.04	1.00	1.00
Acc 24	0.17	0.18	0.16	0.28	0.26	0.22	0.39	0.25	0.17	0.18	0.21	0.21	0.29	0.21	0.35	0.23	0.38	0.25	0.30	0.32	0.60	0.04	0.32	1.00	0.34	0.34	0.07	0.34	0.35
Acc 25	0.90	0.93	0.89	0.93	0.93	0.95	0.83	0.97	0.75	0.73	0.78	0.91	0.58	0.77	0.87	0.92	0.83	0.69	0.77	1.00	0.19	0.03	1.00	0.34	1.00	1.00	0.03	1.00	1.00
Acc 26	0.90	0.93	0.89	0.92	0.93	0.95	0.83	0.97	0.75	0.76	0.80	0.92	0.57	0.77	0.87	0.92	0.83	0.69	0.77	1.00	0.19	0.05	1.00	0.34	1.00	1.00	0.03	1.00	1.00
Acc 27	0.10	0.08	0.05	0.03	0.02	0.03	0.06	0.06	-0.05	-0.07	-0.10	0.01	-0.19	-0.08	0.02	-0.05	-0.02	0.06	0.04	0.03	-0.04	-0.11	0.04	0.07	0.03	0.03	1.00	0.05	0.05
Acc 28	0.90	0.93	0.89	0.93	0.93	0.95	0.83	0.97	0.75	0.74	0.78	0.91	0.57	0.77	0.87	0.92	0.83	0.69	0.77	1.00	0.19	0.03	1.00	0.34	1.00	1.00	0.05	1.00	1.00
Acc 29	0.90	0.92	0.89	0.93	0.93	0.95	0.84	0.97	0.75	0.74	0.78	0.91	0.59	0.77	0.87	0.92	0.84	0.70	0.78	1.00	0.19	0.04	1.00	0.35	1.00	1.00	0.05	1.00	1.00

Table A13 Cross-correlations of the monthly accumulated flows for month 11

Mon11	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.98	0.84	0.77	0.81	0.82	0.67	0.92	0.65	0.70	0.74	0.67	0.23	0.46	0.75	0.78	0.54	0.36	0.46	0.85	0.20	0.16	0.84	0.25	0.84	0.85	0.01	0.85	0.84
Acc 2	0.98	1.00	0.87	0.80	0.84	0.86	0.71	0.95	0.64	0.69	0.73	0.66	0.23	0.48	0.78	0.79	0.57	0.37	0.48	0.88	0.18	0.16	0.86	0.26	0.86	0.87	-0.01	0.87	0.86
Acc 3	0.84	0.87	1.00	0.89	0.91	0.89	0.71	0.89	0.57	0.60	0.63	0.57	0.31	0.52	0.71	0.73	0.52	0.48	0.56	0.84	0.22	0.21	0.83	0.22	0.83	0.83	-0.05	0.83	0.83
Acc 4	0.77	0.80	0.89	1.00	0.99	0.92	0.77	0.89	0.52	0.55	0.57	0.62	0.52	0.52	0.78	0.78	0.66	0.68	0.73	0.90	0.35	0.31	0.90	0.32	0.89	0.89	-0.08	0.89	0.89
Acc 5	0.81	0.84	0.91	0.99	1.00	0.95	0.80	0.92	0.53	0.57	0.59	0.64	0.45	0.52	0.79	0.78	0.65	0.65	0.72	0.91	0.32	0.28	0.91	0.31	0.91	0.90	-0.10	0.90	0.90
Acc 6	0.82	0.86	0.89	0.92	0.95	1.00	0.86	0.95	0.54	0.57	0.61	0.59	0.40	0.55	0.82	0.77	0.60	0.62	0.72	0.94	0.31	0.28	0.94	0.33	0.94	0.93	-0.11	0.93	0.92
Acc 7	0.67	0.71	0.71	0.77	0.80	0.86	1.00	0.85	0.39	0.44	0.48	0.60	0.33	0.37	0.75	0.64	0.51	0.66	0.76	0.86	0.28	0.30	0.86	0.40	0.86	0.86	-0.05	0.86	0.85
Acc 8	0.92	0.95	0.89	0.89	0.92	0.95	0.85	1.00	0.59	0.63	0.67	0.65	0.37	0.49	0.85	0.81	0.63	0.53	0.64	0.95	0.28	0.26	0.95	0.35	0.94	0.94	-0.04	0.94	0.94
Acc 9	0.65	0.64	0.57	0.52	0.53	0.54	0.39	0.59	1.00	0.94	0.92	0.54	0.23	0.58	0.45	0.81	0.52	0.18	0.25	0.62	0.17	0.05	0.61	0.15	0.59	0.60	0.01	0.59	0.59
Acc 10	0.70	0.69	0.60	0.55	0.57	0.57	0.44	0.63	0.94	1.00	0.97	0.66	0.14	0.53	0.44	0.85	0.40	0.14	0.26	0.64	0.10	0.02	0.65	0.15	0.70	0.70	0.02	0.70	0.70
Acc 11	0.74	0.73	0.63	0.57	0.59	0.61	0.48	0.67	0.92	0.97	1.00	0.72	0.12	0.58	0.49	0.87	0.45	0.17	0.28	0.67	0.12	0.01	0.70	0.15	0.76	0.77	0.05	0.77	0.77
Acc 12	0.67	0.66	0.57	0.62	0.64	0.59	0.60	0.65	0.54	0.66	0.72	1.00	0.05	0.43	0.70	0.75	0.46	0.28	0.49	0.70	0.07	0.04	0.76	0.22	0.76	0.77	-0.06	0.77	0.75
Acc 13	0.23	0.23	0.31	0.52	0.45	0.40	0.33	0.37	0.23	0.14	0.12	0.05	1.00	0.13	0.37	0.58	0.35	0.44	0.44	0.47	0.39	0.30	0.44	0.44	0.41	0.38	-0.04	0.38	0.41
Acc 14	0.46	0.48	0.52	0.52	0.52	0.55	0.37	0.49	0.58	0.53	0.58	0.43	0.13	1.00	0.29	0.66	0.49	0.26	0.30	0.52	0.15	0.09	0.51	0.05	0.54	0.53	-0.09	0.53	0.55
Acc 15	0.75	0.78	0.71	0.78	0.79	0.82	0.75	0.85	0.45	0.44	0.49	0.70	0.37	0.29	1.00	0.72	0.46	0.60	0.66	0.87	0.37	0.34	0.87	0.38	0.88	0.88	-0.03	0.88	0.87
Acc 16	0.78	0.79	0.73	0.78	0.78	0.77	0.64	0.81	0.81	0.85	0.87	0.75	0.58	0.66	0.72	1.00	0.69	0.49	0.52	0.88	0.32	0.20	0.87	0.35	0.86	0.85	-0.04	0.85	0.85
Acc 17	0.54	0.57	0.52	0.66	0.65	0.60	0.51	0.63	0.52	0.40	0.45	0.46	0.35	0.49	0.46	0.69	1.00	0.23	0.33	0.62	0.20	0.25	0.61	0.20	0.67	0.64	0.03	0.66	0.69
Acc 18	0.36	0.37	0.48	0.68	0.65	0.62	0.66	0.53	0.18	0.14	0.17	0.28	0.44	0.26	0.60	0.49	0.23	1.00	0.95	0.70	0.52	0.56	0.68	0.41	0.67	0.66	-0.07	0.66	0.67
Acc 19	0.46	0.48	0.56	0.73	0.72	0.72	0.76	0.64	0.25	0.26	0.28	0.49	0.44	0.30	0.66	0.52	0.33	0.95	1.00	0.79	0.49	0.54	0.81	0.49	0.81	0.80	-0.04	0.80	0.81
Acc 20	0.85	0.88	0.84	0.90	0.91	0.94	0.86	0.95	0.62	0.64	0.67	0.70	0.47	0.52	0.87	0.88	0.62	0.70	0.79	1.00	0.35	0.34	1.00	0.46	0.99	0.99	-0.06	0.99	0.99
Acc 21	0.20	0.18	0.22	0.35	0.32	0.31	0.28	0.28	0.17	0.10	0.12	0.07	0.39	0.15	0.37	0.32	0.20	0.52	0.49	0.35	1.00	0.50	0.41	0.62	0.39	0.39	-0.01	0.40	0.42
Acc 22	0.16	0.16	0.21	0.31	0.28	0.28	0.30	0.26	0.05	0.02	0.01	0.04	0.30	0.09	0.34	0.20	0.25	0.56	0.54	0.34	0.50	1.00	0.43	0.45	0.32	0.28	0.13	0.34	0.36
Acc 23	0.84	0.86	0.83	0.90	0.91	0.94	0.86	0.95	0.61	0.65	0.70	0.76	0.44	0.51	0.87	0.87	0.61	0.68	0.81	1.00	0.41	0.43	1.00	0.47	0.99	0.99	-0.06	0.99	0.99
Acc 24	0.25	0.26	0.22	0.32	0.31	0.33	0.40	0.35	0.15	0.15	0.15	0.22	0.44	0.05	0.38	0.35	0.20	0.41	0.49	0.46	0.62	0.45	0.47	1.00	0.36	0.35	0.11	0.36	0.38
Acc 25	0.84	0.86	0.83	0.89	0.91	0.94	0.86	0.94	0.59	0.70	0.76	0.76	0.41	0.54	0.88	0.86	0.67	0.67	0.81	0.99	0.39	0.32	0.99	0.36	1.00	1.00	-0.02	1.00	0.99
Acc 26	0.85	0.87	0.83	0.89	0.90	0.93	0.86	0.94	0.60	0.70	0.77	0.77	0.38	0.53	0.88	0.85	0.64	0.66	0.80	0.99	0.39	0.28	0.99	0.35	1.00	1.00	-0.02	1.00	0.99
Acc 27	0.01	-0.01	-0.05	-0.08	-0.10	-0.11	-0.05	-0.04	0.01	0.02	0.05	-0.06	-0.04	-0.09	-0.03	-0.04	0.03	-0.07	-0.04	-0.06	-0.01	0.13	-0.06	0.11	-0.02	-0.02	1.00	0.02	0.02
Acc 28	0.85	0.87	0.83	0.89	0.90	0.93	0.86	0.94	0.59	0.70	0.77	0.77	0.38	0.53	0.88	0.85	0.66	0.66	0.80	0.99	0.40	0.34	0.99	0.36	1.00	1.00	0.02	1.00	1.00
Acc 29	0.84	0.86	0.83	0.89	0.90	0.92	0.85	0.94	0.59	0.70	0.77	0.75	0.41	0.55	0.87	0.85	0.69	0.67	0.81	0.99	0.42	0.36	0.99	0.38	0.99	0.99	0.02	1.00	1.00

Table A144 Cross-correlations of the monthly accumulated flows for month 12

Mon12	Acc 1	Acc 2	Acc 3	Acc 4	Acc 5	Acc 6	Acc 7	Acc 8	Acc 9	Ac 10	Ac 11	Ac 12	Ac 13	Ac 14	Ac 15	Ac 16	Ac 17	Ac 18	Ac 19	Ac 20	Ac 21	Ac 22	Ac 23	Ac 24	Ac 25	Ac 26	Ac 27	Ac 28	Ac 29
Acc 1	1.00	0.97	0.79	0.71	0.72	0.69	0.56	0.85	0.54	0.57	0.63	0.76	0.25	0.42	0.68	0.70	0.54	0.47	0.44	0.76	0.13	0.23	0.74	0.18	0.72	0.73	0.01	0.70	0.69
Acc 2	0.97	1.00	0.85	0.76	0.77	0.78	0.65	0.91	0.55	0.59	0.64	0.76	0.28	0.44	0.74	0.73	0.54	0.50	0.50	0.81	0.16	0.27	0.79	0.20	0.77	0.78	0.05	0.76	0.75
Acc 3	0.79	0.85	1.00	0.75	0.78	0.80	0.61	0.84	0.47	0.49	0.51	0.60	0.18	0.39	0.58	0.57	0.39	0.51	0.52	0.73	0.10	0.24	0.70	0.11	0.69	0.69	0.03	0.68	0.66
Acc 4	0.71	0.76	0.75	1.00	0.99	0.88	0.77	0.84	0.50	0.49	0.57	0.67	0.46	0.46	0.70	0.76	0.51	0.82	0.79	0.85	0.27	0.47	0.84	0.25	0.82	0.81	0.13	0.80	0.79
Acc 5	0.72	0.77	0.78	0.99	1.00	0.91	0.78	0.86	0.50	0.50	0.59	0.66	0.40	0.48	0.68	0.75	0.50	0.82	0.80	0.86	0.24	0.47	0.85	0.22	0.83	0.82	0.11	0.81	0.80
Acc 6	0.69	0.78	0.80	0.88	0.91	1.00	0.86	0.93	0.45	0.48	0.55	0.58	0.34	0.51	0.75	0.68	0.40	0.67	0.74	0.87	0.23	0.46	0.85	0.21	0.84	0.83	0.06	0.82	0.80
Acc 7	0.56	0.65	0.61	0.77	0.78	0.86	1.00	0.87	0.34	0.36	0.45	0.45	0.52	0.44	0.66	0.64	0.32	0.70	0.82	0.89	0.39	0.62	0.89	0.24	0.87	0.86	0.15	0.85	0.84
Acc 8	0.85	0.91	0.84	0.84	0.86	0.93	0.87	1.00	0.50	0.53	0.60	0.66	0.43	0.49	0.79	0.75	0.48	0.63	0.70	0.93	0.29	0.46	0.91	0.24	0.90	0.89	0.11	0.88	0.87
Acc 9	0.54	0.55	0.47	0.50	0.50	0.45	0.34	0.50	1.00	0.96	0.91	0.55	0.24	0.58	0.39	0.79	0.35	0.41	0.37	0.58	0.09	0.12	0.56	0.05	0.56	0.56	-0.02	0.54	0.54
Acc 10	0.57	0.59	0.49	0.49	0.50	0.48	0.36	0.53	0.96	1.00	0.94	0.56	0.21	0.44	0.39	0.80	0.21	0.14	0.28	0.56	0.15	0.05	0.56	0.05	0.53	0.54	0.01	0.50	0.51
Acc 11	0.63	0.64	0.51	0.57	0.59	0.55	0.45	0.60	0.91	0.94	1.00	0.64	0.24	0.51	0.49	0.89	0.29	0.20	0.38	0.66	0.19	0.06	0.65	0.09	0.60	0.61	-0.01	0.57	0.58
Acc 12	0.76	0.76	0.60	0.67	0.66	0.58	0.45	0.66	0.55	0.56	0.64	1.00	0.14	0.51	0.78	0.76	0.48	0.37	0.38	0.61	0.19	0.17	0.63	0.30	0.64	0.64	0.00	0.63	0.62
Acc 13	0.25	0.28	0.18	0.46	0.40	0.34	0.52	0.43	0.24	0.21	0.24	0.14	1.00	0.20	0.38	0.55	0.16	0.58	0.60	0.60	0.52	0.50	0.62	0.32	0.59	0.56	0.21	0.56	0.57
Acc 14	0.42	0.44	0.39	0.46	0.48	0.51	0.44	0.49	0.58	0.44	0.51	0.51	0.20	1.00	0.29	0.69	0.41	0.28	0.42	0.57	0.35	0.06	0.57	0.29	0.57	0.60	0.07	0.54	0.55
Acc 15	0.68	0.74	0.58	0.70	0.68	0.75	0.66	0.79	0.39	0.39	0.49	0.78	0.38	0.29	1.00	0.67	0.44	0.53	0.52	0.72	0.27	0.41	0.70	0.36	0.67	0.66	0.05	0.65	0.65
Acc 16	0.70	0.73	0.57	0.76	0.75	0.68	0.64	0.75	0.79	0.80	0.89	0.76	0.55	0.69	0.67	1.00	0.59	0.70	0.68	0.87	0.35	0.37	0.85	0.26	0.84	0.83	0.13	0.82	0.82
Acc 17	0.54	0.54	0.39	0.51	0.50	0.40	0.32	0.48	0.35	0.21	0.29	0.48	0.16	0.41	0.44	0.59	1.00	0.22	0.30	0.49	0.38	0.21	0.51	0.32	0.52	0.56	0.32	0.51	0.52
Acc 18	0.47	0.50	0.51	0.82	0.82	0.67	0.70	0.63	0.41	0.14	0.20	0.37	0.58	0.28	0.53	0.70	0.22	1.00	0.97	0.85	0.49	0.57	0.86	0.20	0.73	0.71	0.09	0.69	0.70
Acc 19	0.44	0.50	0.52	0.79	0.80	0.74	0.82	0.70	0.37	0.28	0.38	0.38	0.60	0.42	0.52	0.68	0.30	0.97	1.00	0.88	0.54	0.70	0.89	0.28	0.86	0.85	0.21	0.84	0.84
Acc 20	0.76	0.81	0.73	0.85	0.86	0.87	0.89	0.93	0.58	0.56	0.66	0.61	0.60	0.57	0.72	0.87	0.49	0.85	0.88	1.00	0.49	0.60	0.99	0.35	0.98	0.97	0.18	0.96	0.95
Acc 21	0.13	0.16	0.10	0.27	0.24	0.23	0.39	0.29	0.09	0.15	0.19	0.19	0.52	0.35	0.27	0.35	0.38	0.49	0.54	0.49	1.00	0.49	0.53	0.80	0.58	0.57	0.65	0.62	0.64
Acc 22	0.23	0.27	0.24	0.47	0.47	0.46	0.62	0.46	0.12	0.05	0.06	0.17	0.50	0.06	0.41	0.37	0.21	0.57	0.70	0.60	0.49	1.00	0.64	0.14	0.31	0.42	-0.03	0.28	0.25
Acc 23	0.74	0.79	0.70	0.84	0.85	0.85	0.89	0.91	0.56	0.56	0.65	0.63	0.62	0.57	0.70	0.85	0.51	0.86	0.89	0.99	0.53	0.64	1.00	0.40	0.98	0.98	0.18	0.96	0.95
Acc 24	0.18	0.20	0.11	0.25	0.22	0.21	0.24	0.24	0.05	0.05	0.09	0.30	0.32	0.29	0.36	0.26	0.32	0.20	0.28	0.35	0.80	0.14	0.40	1.00	0.36	0.36	0.55	0.42	0.43
Acc 25	0.72	0.77	0.69	0.82	0.83	0.84	0.87	0.90	0.56	0.53	0.60	0.64	0.59	0.57	0.67	0.84	0.52	0.73	0.86	0.98	0.58	0.31	0.98	0.36	1.00	0.99	0.20	0.98	0.97
Acc 26	0.73	0.78	0.69	0.81	0.82	0.83	0.86	0.89	0.56	0.54	0.61	0.64	0.56	0.60	0.66	0.83	0.56	0.71	0.85	0.97	0.57	0.42	0.98	0.36	0.99	1.00	0.10	0.99	0.97
Acc 27	0.01	0.05	0.03	0.13	0.11	0.06	0.15	0.11	-0.02	0.01	-0.01	0.00	0.21	0.07	0.05	0.13	0.32	0.09	0.21	0.18	0.65	-0.03	0.18	0.55	0.20	0.10	1.00	0.34	0.37
Acc 28	0.70	0.76	0.68	0.80	0.81	0.82	0.85	0.88	0.54	0.50	0.57	0.63	0.56	0.54	0.65	0.82	0.51	0.69	0.84	0.96	0.62	0.28	0.96	0.42	0.98	0.99	0.34	1.00	0.99
Acc 29	0.69	0.75	0.66	0.79	0.80	0.80	0.84	0.87	0.54	0.51	0.58	0.62	0.57	0.55	0.65	0.82	0.52	0.70	0.84	0.95	0.64	0.25	0.95	0.43	0.97	0.97	0.37	0.99	1.00

Table A15 Cross-correlations of the monthly intervening flows for month 1

Mon1	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.71	0.81	0.68	0.45	0.53	0.26	0.20	0.50	0.04	0.47	0.85	0.48	0.46	0.69	0.54	0.26	0.46	0.31	0.36	0.09	0.14	-0.02	0.21	0.20	-0.12	0.12	0.15	0.11
Int 2	0.71	1.00	0.80	0.76	0.50	0.82	0.52	0.37	0.54	-0.03	0.52	0.82	0.50	0.47	0.87	0.68	0.50	0.59	0.45	0.57	0.30	0.20	-0.01	0.37	0.25	-0.25	0.16	0.19	-0.07
Int 3	0.81	0.80	1.00	0.84	0.56	0.76	0.39	0.38	0.51	-0.11	0.51	0.75	0.53	0.34	0.74	0.61	0.34	0.54	0.35	0.36	0.13	0.13	0.11	0.17	0.11	-0.21	-0.01	0.17	-0.07
Int 4	0.68	0.76	0.84	1.00	0.36	0.48	0.52	0.33	0.34	-0.14	0.41	0.75	0.64	0.36	0.74	0.40	0.23	0.61	0.48	0.27	0.14	0.09	0.01	0.27	-0.07	-0.19	0.04	-0.02	-0.05
Int 5	0.45	0.50	0.56	0.36	1.00	0.49	0.25	0.11	0.29	0.00	0.36	0.38	0.06	0.24	0.32	0.41	0.19	0.29	0.20	0.17	-0.03	0.07	0.03	0.06	0.38	-0.12	0.07	0.34	-0.03
Int 6	0.53	0.82	0.76	0.48	0.49	1.00	0.69	0.03	0.42	-0.04	0.46	0.59	0.50	0.51	0.69	0.52	0.41	0.74	0.44	0.63	0.33	0.21	0.11	0.37	0.32	-0.11	0.04	0.11	-0.13
Int 7	0.26	0.52	0.39	0.52	0.25	0.69	1.00	0.28	0.25	0.07	0.46	0.43	0.60	0.44	0.50	0.43	0.23	0.81	0.80	0.85	0.39	0.30	0.20	0.42	0.20	-0.05	0.04	-0.15	-0.27
Int 8	0.20	0.37	0.38	0.33	0.11	0.03	0.28	1.00	0.29	-0.15	0.32	0.47	0.39	0.33	0.39	0.27	0.20	0.38	0.29	-0.14	-0.02	0.09	-0.12	0.20	0.17	-0.12	0.13	0.10	-0.11
Int 9	0.50	0.54	0.51	0.34	0.29	0.42	0.25	0.29	1.00	0.13	0.53	0.55	0.46	0.65	0.49	0.60	0.21	0.40	0.24	0.26	0.18	0.23	-0.41	0.34	0.17	-0.16	0.05	0.11	-0.01
Int 10	0.04	-0.03	-0.11	-0.14	0.00	-0.04	0.07	-0.15	0.13	1.00	-0.02	-0.11	-0.11	0.35	-0.03	0.19	0.24	0.17	0.23	0.02	0.18	0.36	-0.21	0.45	0.15	0.04	0.14	-0.07	0.12
Int 11	0.47	0.52	0.51	0.41	0.36	0.46	0.46	0.32	0.53	-0.02	1.00	0.55	0.50	0.50	0.55	0.39	0.28	0.33	0.09	0.44	0.08	0.08	-0.19	0.35	0.26	-0.01	0.07	0.08	-0.05
Int 12	0.85	0.82	0.75	0.75	0.38	0.59	0.43	0.47	0.55	-0.11	0.55	1.00	0.51	0.56	0.79	0.62	0.35	0.52	0.37	0.50	0.14	0.04	-0.02	0.32	0.24	-0.13	0.07	0.14	0.07
Int 13	0.48	0.50	0.53	0.64	0.06	0.50	0.60	0.39	0.46	-0.11	0.50	0.51	1.00	0.27	0.58	0.48	0.12	0.53	0.44	0.56	0.35	-0.07	0.07	0.31	-0.20	-0.16	-0.10	-0.22	-0.22
Int 14	0.46	0.47	0.34	0.36	0.24	0.51	0.44	0.33	0.65	0.35	0.50	0.56	0.27	1.00	0.60	0.66	0.47	0.45	0.26	0.44	0.13	0.16	-0.32	0.41	0.36	0.17	0.12	0.10	0.06
Int 15	0.69	0.87	0.74	0.74	0.32	0.69	0.50	0.39	0.49	-0.03	0.55	0.79	0.58	0.60	1.00	0.61	0.51	0.53	0.36	0.63	0.23	0.09	-0.07	0.39	0.20	-0.15	0.14	0.14	-0.04
Int 16	0.54	0.68	0.61	0.40	0.41	0.52	0.43	0.27	0.60	0.19	0.39	0.62	0.48	0.66	0.61	1.00	0.42	0.57	0.43	0.44	0.27	0.19	-0.18	0.34	0.29	-0.04	0.16	0.20	-0.11
Int 17	0.26	0.50	0.34	0.23	0.19	0.41	0.23	0.20	0.21	0.24	0.28	0.35	0.12	0.47	0.51	0.42	1.00	0.34	0.28	0.29	0.38	0.34	0.08	0.34	0.30	-0.14	0.22	0.27	-0.02
Int 18	0.46	0.59	0.54	0.61	0.29	0.74	0.81	0.38	0.40	0.17	0.33	0.52	0.53	0.45	0.53	0.57	0.34	1.00	0.90	0.64	0.48	0.66	0.05	0.44	0.20	-0.25	0.13	-0.12	-0.09
Int 19	0.31	0.45	0.35	0.48	0.20	0.44	0.80	0.29	0.24	0.23	0.09	0.37	0.44	0.26	0.36	0.43	0.28	0.90	1.00	0.57	0.53	0.86	0.07	0.37	0.17	-0.22	0.18	-0.25	-0.04
Int 20	0.36	0.57	0.36	0.27	0.17	0.63	0.85	-0.14	0.26	0.02	0.44	0.50	0.56	0.44	0.63	0.44	0.29	0.64	0.57	1.00	0.43	0.06	0.05	0.35	0.29	0.03	0.07	-0.03	-0.29
Int 21	0.09	0.30	0.13	0.14	-0.03	0.33	0.39	-0.02	0.18	0.18	0.08	0.14	0.35	0.13	0.23	0.27	0.38	0.48	0.53	0.43	1.00	0.72	0.00	0.53	0.12	-0.13	0.20	-0.14	-0.07
Int 22	0.14	0.20	0.13	0.09	0.07	0.21	0.30	0.09	0.23	0.36	0.08	0.04	-0.07	0.16	0.09	0.19	0.34	0.66	0.86	0.06	0.72	1.00	-0.12	0.43	0.13	-0.20	0.37	-0.08	0.16
Int 23	-0.02	-0.01	0.11	0.01	0.03	0.11	0.20	-0.12	-0.41	-0.21	-0.19	-0.02	0.07	-0.32	-0.07	-0.18	0.08	0.05	0.07	0.05	0.00	-0.12	1.00	-0.17	-0.04	-0.01	-0.22	0.00	-0.09
Int 24	0.21	0.37	0.17	0.27	0.06	0.37	0.42	0.20	0.34	0.45	0.35	0.32	0.31	0.41	0.39	0.34	0.34	0.44	0.37	0.35	0.53	0.43	-0.17	1.00	0.16	-0.01	0.14	0.02	-0.21
Int 25	0.20	0.25	0.11	-0.07	0.38	0.32	0.20	0.17	0.17	0.15	0.26	0.24	-0.20	0.36	0.20	0.29	0.30	0.20	0.17	0.29	0.12	0.13	-0.04	0.16	1.00	-0.01	0.15	0.35	0.10
Int 26	-0.12	-0.25	-0.21	-0.19	-0.12	-0.11	-0.05	-0.12	-0.16	0.04	-0.01	-0.13	-0.16	0.17	-0.15	-0.04	-0.14	-0.25	-0.22	0.03	-0.13	-0.20	-0.01	-0.01	-0.01	1.00	0.14	-0.32	-0.09
Int 27	0.12	0.16	-0.01	0.04	0.07	0.04	0.04	0.13	0.05	0.14	0.07	0.07	-0.10	0.12	0.14	0.16	0.22	0.13	0.18	0.07	0.20	0.37	-0.22	0.14	0.15	0.14	1.00	0.01	0.04
Int 28	0.15	0.19	0.17	-0.02	0.34	0.11	-0.15	0.10	0.11	-0.07	0.08	0.14	-0.22	0.10	0.14	0.20	0.27	-0.12	-0.25	-0.03	-0.14	-0.08	0.00	0.02	0.35	-0.32	0.01	1.00	-0.28
Int 29	0.11	-0.07	-0.07	-0.05	-0.03	-0.13	-0.27	-0.11	-0.01	0.12	-0.05	0.07	-0.22	0.06	-0.04	-0.11	-0.02	-0.09	-0.04	-0.29	-0.07	0.16	-0.09	-0.21	0.10	-0.09	0.04	-0.28	1.00

Table A16 Cross-correlations of the monthly intervening flows for month 2

Mon2	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.71	0.60	0.52	0.48	0.64	0.33	0.18	0.55	0.05	0.50	0.76	0.33	0.52	0.71	0.43	0.39	0.53	0.45	0.51	0.17	0.17	0.14	0.23	0.43	0.11	0.20	0.37	-0.13
Int 2	0.71	1.00	0.64	0.62	0.39	0.77	0.48	0.07	0.55	0.11	0.42	0.81	0.45	0.59	0.71	0.39	0.41	0.49	0.37	0.57	-0.01	-0.07	0.00	0.33	0.32	0.13	0.10	0.10	-0.29
Int 3	0.60	0.64	1.00	0.67	0.36	0.59	0.29	0.36	0.52	-0.12	0.36	0.75	0.45	0.53	0.68	0.23	0.45	0.50	0.41	0.40	0.22	0.03	0.10	0.30	0.29	0.04	0.28	0.17	-0.19
Int 4	0.52	0.62	0.67	1.00	0.12	0.39	0.45	0.10	0.43	-0.14	0.41	0.65	0.53	0.47	0.66	0.12	0.31	0.57	0.52	0.32	0.13	0.07	0.20	0.32	0.14	-0.09	0.16	-0.16	-0.21
Int 5	0.48	0.39	0.36	0.12	1.00	0.52	0.24	-0.06	0.21	0.07	0.10	0.33	0.09	0.11	0.37	0.27	0.22	0.33	0.30	0.31	0.16	0.12	0.17	0.09	0.30	-0.03	0.02	0.28	0.10
Int 6	0.64	0.77	0.59	0.39	0.52	1.00	0.66	0.14	0.47	0.08	0.45	0.58	0.29	0.58	0.62	0.46	0.48	0.69	0.48	0.60	0.18	0.09	-0.01	0.38	0.43	0.17	0.15	0.10	-0.24
Int 7	0.33	0.48	0.29	0.45	0.24	0.66	1.00	0.10	0.26	0.06	0.17	0.46	0.35	0.37	0.46	0.30	0.33	0.65	0.38	0.56	0.25	0.25	-0.12	0.39	0.26	0.04	0.07	-0.20	-0.32
Int 8	0.18	0.07	0.36	0.10	-0.06	0.14	0.10	1.00	0.23	-0.13	0.09	0.22	0.25	0.32	0.21	0.22	0.29	0.23	0.24	0.07	0.40	0.25	-0.16	0.23	0.19	0.11	0.24	0.00	-0.31
Int 9	0.55	0.55	0.52	0.43	0.21	0.47	0.26	0.23	1.00	0.29	0.44	0.54	0.39	0.69	0.55	0.41	0.42	0.41	0.37	0.38	0.18	0.02	0.03	0.38	0.37	0.10	0.24	0.05	-0.03
Int 10	0.05	0.11	-0.12	-0.14	0.07	0.08	0.06	-0.13	0.29	1.00	0.11	0.11	0.07	0.41	0.18	0.29	0.24	0.04	-0.06	0.29	0.00	-0.07	-0.04	0.17	0.23	0.07	-0.16	-0.24	-0.03
Int 11	0.50	0.42	0.36	0.41	0.10	0.45	0.17	0.09	0.44	0.11	1.00	0.51	0.15	0.41	0.51	0.19	0.26	0.23	0.16	0.36	-0.07	-0.11	0.04	0.19	0.12	0.14	-0.04	0.33	-0.18
Int 12	0.76	0.81	0.75	0.65	0.33	0.58	0.46	0.22	0.54	0.11	0.51	1.00	0.38	0.68	0.77	0.28	0.50	0.58	0.45	0.50	0.15	0.14	0.06	0.43	0.45	0.09	0.15	0.19	-0.23
Int 13	0.33	0.45	0.45	0.53	0.09	0.29	0.35	0.25	0.39	0.07	0.15	0.38	1.00	0.38	0.35	0.34	0.27	0.48	0.45	0.54	0.26	0.03	0.24	0.36	0.01	0.00	-0.03	-0.48	-0.33
Int 14	0.52	0.59	0.53	0.47	0.11	0.58	0.37	0.32	0.69	0.41	0.41	0.68	0.38	1.00	0.68	0.49	0.73	0.48	0.37	0.56	0.28	0.02	-0.26	0.50	0.41	0.19	0.15	-0.05	-0.22
Int 15	0.71	0.71	0.68	0.66	0.37	0.62	0.46	0.21	0.55	0.18	0.51	0.77	0.35	0.68	1.00	0.31	0.58	0.53	0.49	0.58	0.20	0.14	0.05	0.35	0.44	0.07	0.19	0.13	-0.24
Int 16	0.43	0.39	0.23	0.12	0.27	0.46	0.30	0.22	0.41	0.29	0.19	0.28	0.34	0.49	0.31	1.00	0.59	0.51	0.48	0.63	0.34	0.31	-0.16	0.27	0.37	0.12	-0.06	-0.07	-0.19
Int 17	0.39	0.41	0.45	0.31	0.22	0.48	0.33	0.29	0.42	0.24	0.26	0.50	0.27	0.73	0.58	0.59	1.00	0.40	0.37	0.66	0.62	0.27	-0.34	0.49	0.41	0.06	0.14	-0.03	-0.26
Int 18	0.53	0.49	0.50	0.57	0.33	0.69	0.65	0.23	0.41	0.04	0.23	0.58	0.48	0.48	0.53	0.51	0.40	1.00	0.83	0.66	0.31	0.34	-0.02	0.40	0.29	-0.02	0.06	-0.16	-0.35
Int 19	0.45	0.37	0.41	0.52	0.30	0.48	0.38	0.24	0.37	-0.06	0.16	0.45	0.45	0.37	0.49	0.48	0.37	0.83	1.00	0.55	0.42	0.48	0.13	0.39	0.24	0.03	0.12	-0.21	-0.24
Int 20	0.51	0.57	0.40	0.32	0.31	0.60	0.56	0.07	0.38	0.29	0.36	0.50	0.54	0.56	0.58	0.63	0.66	0.66	0.55	1.00	0.39	0.27	0.06	0.42	0.30	0.16	0.05	-0.22	-0.41
Int 21	0.17	-0.01	0.22	0.13	0.16	0.18	0.25	0.40	0.18	0.00	-0.07	0.15	0.26	0.28	0.20	0.34	0.62	0.31	0.42	0.39	1.00	0.57	-0.02	0.49	0.18	0.08	0.34	-0.28	-0.23
Int 22	0.17	-0.07	0.03	0.07	0.12	0.09	0.25	0.25	0.02	-0.07	-0.11	0.14	0.03	0.02	0.14	0.31	0.27	0.34	0.48	0.27	0.57	1.00	0.03	0.43	0.17	0.03	0.13	-0.02	-0.01
Int 23	0.14	0.00	0.10	0.20	0.17	-0.01	-0.12	-0.16	0.03	-0.04	0.04	0.06	0.24	-0.26	0.05	-0.16	-0.34	-0.02	0.13	0.06	-0.02	0.03	1.00	-0.10	-0.23	0.08	-0.04	-0.12	0.00
Int 24	0.23	0.33	0.30	0.32	0.09	0.38	0.39	0.23	0.38	0.17	0.19	0.43	0.36	0.50	0.35	0.27	0.49	0.40	0.39	0.42	0.49	0.43	-0.10	1.00	0.37	0.12	0.23	-0.24	-0.24
Int 25	0.43	0.32	0.29	0.14	0.30	0.43	0.26	0.19	0.37	0.23	0.12	0.45	0.01	0.41	0.44	0.37	0.41	0.29	0.24	0.30	0.18	0.17	-0.23	0.37	1.00	0.04	0.25	0.29	0.05
Int 26	0.11	0.13	0.04	-0.09	-0.03	0.17	0.04	0.11	0.10	0.07	0.14	0.09	0.00	0.19	0.07	0.12	0.06	-0.02	0.03	0.16	0.08	0.03	0.08	0.12	0.04	1.00	0.01	-0.02	-0.32
Int 27	0.20	0.10	0.28	0.16	0.02	0.15	0.07	0.24	0.24	-0.16	-0.04	0.15	-0.03	0.15	0.19	-0.06	0.14	0.06	0.12	0.05	0.34	0.13	-0.04	0.23	0.25	0.01	1.00	0.04	0.03
Int 28	0.37	0.10	0.17	-0.16	0.28	0.10	-0.20	0.00	0.05	-0.24	0.33	0.19	-0.48	-0.05	0.13	-0.07	-0.03	-0.16	-0.21	-0.22	-0.28	-0.02	-0.12	-0.24	0.29	-0.02	0.04	1.00	0.31
Int 29	-0.13	-0.29	-0.19	-0.21	0.10	-0.24	-0.32	-0.31	-0.03	-0.03	-0.18	-0.23	-0.33	-0.22	-0.24	-0.19	-0.26	-0.35	-0.24	-0.41	-0.23	-0.01	0.00	-0.24	0.05	-0.32	0.03	0.31	1.00

Table A17 Cross-correlations of the monthly intervening flows for month 3

Mon3	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.58	0.60	0.23	0.49	0.68	0.44	0.14	0.47	0.16	0.32	0.54	0.31	0.51	0.53	0.19	0.74	0.55	0.39	0.56	0.15	0.14	0.02	0.08	0.22	0.22	0.03	0.16	-0.26
Int 2	0.58	1.00	0.54	0.36	0.49	0.64	0.56	-0.06	0.36	0.05	0.33	0.65	0.42	0.55	0.56	0.21	0.59	0.55	0.33	0.53	0.22	-0.08	-0.06	0.14	0.09	0.17	0.03	-0.05	-0.36
Int 3	0.60	0.54	1.00	0.54	0.21	0.53	0.41	0.23	0.47	-0.12	0.41	0.53	0.41	0.54	0.44	0.16	0.51	0.51	0.41	0.26	0.30	0.14	0.03	0.17	0.16	-0.08	0.20	0.23	-0.13
Int 4	0.23	0.36	0.54	1.00	-0.28	0.21	0.58	0.35	0.24	-0.03	0.51	0.57	0.34	0.52	0.50	0.10	0.43	0.53	0.36	0.02	0.31	0.04	0.09	0.26	0.00	-0.06	0.23	-0.12	-0.13
Int 5	0.49	0.49	0.21	-0.28	1.00	0.51	0.28	-0.28	0.21	0.17	-0.15	0.18	0.09	0.14	0.17	0.09	0.29	0.25	0.15	0.43	0.08	-0.01	-0.06	0.00	0.06	0.13	-0.16	0.11	-0.15
Int 6	0.68	0.64	0.53	0.21	0.51	1.00	0.65	0.00	0.41	0.08	0.30	0.44	0.34	0.50	0.47	0.12	0.75	0.65	0.48	0.63	0.20	0.20	-0.01	0.22	0.27	0.19	0.07	0.04	-0.40
Int 7	0.44	0.56	0.41	0.58	0.28	0.65	1.00	0.22	0.37	-0.07	0.22	0.56	0.45	0.51	0.55	0.22	0.53	0.80	0.74	0.54	0.35	0.08	-0.06	0.29	0.12	0.17	0.20	-0.26	-0.51
Int 8	0.14	-0.06	0.23	0.35	-0.28	0.00	0.22	1.00	0.18	-0.20	0.22	0.22	0.24	0.23	0.14	0.17	0.21	0.21	0.36	-0.05	0.24	0.16	-0.02	0.23	0.08	0.02	0.16	0.02	-0.17
Int 9	0.47	0.36	0.47	0.24	0.21	0.41	0.37	0.18	1.00	0.00	0.34	0.43	0.44	0.68	0.39	0.26	0.46	0.46	0.26	0.22	0.42	0.25	0.02	0.29	0.15	0.06	0.34	-0.04	-0.19
Int 10	0.16	0.05	-0.12	-0.03	0.17	0.08	-0.07	-0.20	0.00	1.00	0.07	0.04	-0.18	0.15	0.16	0.12	0.01	0.00	-0.28	0.24	-0.05	0.01	-0.24	-0.13	-0.08	0.12	-0.55	-0.26	-0.16
Int 11	0.32	0.33	0.41	0.51	-0.15	0.30	0.22	0.22	0.34	0.07	1.00	0.45	0.42	0.39	0.27	0.00	0.37	0.37	0.18	0.31	0.15	-0.09	-0.09	0.09	0.24	0.10	0.03	0.16	-0.19
Int 12	0.54	0.65	0.53	0.57	0.18	0.44	0.56	0.22	0.43	0.04	0.45	1.00	0.23	0.53	0.55	0.05	0.65	0.51	0.33	0.29	0.10	0.03	0.00	0.10	0.05	0.14	-0.03	0.00	-0.23
Int 13	0.31	0.42	0.41	0.34	0.09	0.34	0.45	0.24	0.44	-0.18	0.42	0.23	1.00	0.38	0.18	0.36	0.40	0.30	0.29	0.35	0.22	-0.01	-0.13	0.12	-0.01	0.05	0.25	-0.27	-0.23
Int 14	0.51	0.55	0.54	0.52	0.14	0.50	0.51	0.23	0.68	0.15	0.39	0.53	0.38	1.00	0.66	0.19	0.65	0.54	0.29	0.30	0.46	0.06	-0.10	0.37	0.10	0.08	0.20	-0.12	-0.42
Int 15	0.53	0.56	0.44	0.50	0.17	0.47	0.55	0.14	0.39	0.16	0.27	0.55	0.18	0.66	1.00	0.04	0.69	0.49	0.39	0.41	0.11	0.10	0.12	0.09	-0.03	0.14	0.01	-0.08	-0.32
Int 16	0.19	0.21	0.16	0.10	0.09	0.12	0.22	0.17	0.26	0.12	0.00	0.05	0.36	0.19	0.04	1.00	0.19	0.09	0.01	0.26	0.19	-0.03	-0.26	-0.02	0.03	-0.10	-0.01	-0.24	-0.08
Int 17	0.74	0.59	0.51	0.43	0.29	0.75	0.53	0.21	0.46	0.01	0.37	0.65	0.40	0.65	0.69	0.19	1.00	0.57	0.43	0.60	0.27	0.04	-0.05	0.24	0.25	0.21	0.17	0.02	-0.42
Int 18	0.55	0.55	0.51	0.53	0.25	0.65	0.80	0.21	0.46	0.00	0.37	0.51	0.30	0.54	0.49	0.09	0.57	1.00	0.70	0.52	0.44	0.30	-0.07	0.39	0.30	0.21	0.22	-0.07	-0.47
Int 19	0.39	0.33	0.41	0.36	0.15	0.48	0.74	0.36	0.26	-0.28	0.18	0.33	0.29	0.29	0.39	0.01	0.43	0.70	1.00	0.34	0.36	0.43	0.17	0.32	0.21	0.16	0.39	-0.07	-0.38
Int 20	0.56	0.53	0.26	0.02	0.43	0.63	0.54	-0.05	0.22	0.24	0.31	0.29	0.35	0.30	0.41	0.26	0.60	0.52	0.34	1.00	0.06	0.19	-0.14	0.02	0.23	0.26	-0.12	-0.07	-0.47
Int 21	0.15	0.22	0.30	0.31	0.08	0.20	0.35	0.24	0.42	-0.05	0.15	0.10	0.22	0.46	0.11	0.19	0.27	0.44	0.36	0.06	1.00	0.19	0.08	0.79	0.17	-0.02	0.55	-0.06	-0.08
Int 22	0.14	-0.08	0.14	0.04	-0.01	0.20	0.08	0.16	0.25	0.01	-0.09	0.03	-0.01	0.06	0.10	-0.03	0.04	0.30	0.43	0.19	0.19	1.00	0.31	0.27	0.26	0.14	0.24	0.02	-0.01
Int 23	0.02	-0.06	0.03	0.09	-0.06	-0.01	-0.06	-0.02	0.02	-0.24	-0.09	0.00	-0.13	-0.10	0.12	-0.26	-0.05	-0.07	0.17	-0.14	0.08	0.31	1.00	0.26	-0.11	-0.01	0.29	0.06	0.17
Int 24	0.08	0.14	0.17	0.26	0.00	0.22	0.29	0.23	0.29	-0.13	0.09	0.10	0.12	0.37	0.09	-0.02	0.24	0.39	0.32	0.02	0.79	0.27	0.26	1.00	0.31	-0.02	0.46	0.07	-0.12
Int 25	0.22	0.09	0.16	0.00	0.06	0.27	0.12	0.08	0.15	-0.08	0.24	0.05	-0.01	0.10	-0.03	0.03	0.25	0.30	0.21	0.23	0.17	0.26	-0.11	0.31	1.00	-0.05	0.34	0.33	0.00
Int 26	0.22	0.17	-0.08	-0.06	0.13	0.19	0.17	0.02	0.06	0.12	0.10	0.14	0.05	0.08	0.14	-0.10	0.21	0.21	0.16	0.26	-0.02	0.14	-0.01	-0.02	-0.05	1.00	-0.03	-0.29	-0.41
Int 27	0.03	0.03	0.20	0.23	-0.16	0.07	0.20	0.16	0.34	-0.55	0.03	-0.03	0.25	0.20	0.01	-0.01	0.17	0.22	0.39	-0.12	0.55	0.24	0.29	0.46	0.34	-0.03	1.00	-0.02	0.01
Int 28	0.16	-0.05	0.23	-0.12	0.11	0.04	-0.26	0.02	-0.04	-0.26	0.16	0.00	-0.27	-0.12	-0.08	-0.24	0.02	-0.07	-0.07	-0.07	-0.06	0.02	0.06	0.07	0.33	-0.29	-0.02	1.00	0.32
Int 29	-0.26	-0.36	-0.13	-0.13	-0.15	-0.40	-0.51	-0.17	-0.19	-0.16	-0.19	-0.23	-0.23	-0.42	-0.32	-0.08	-0.42	-0.47	-0.38	-0.47	-0.08	-0.01	0.17	-0.12	0.00	-0.41	0.01	0.32	1.00

Table A18 Cross-correlations of the monthly intervening flows for month 4

Mon4	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.34	0.47	0.40	0.44	0.41	0.34	-0.03	0.39	0.09	0.43	0.52	0.43	0.37	0.46	0.13	0.46	0.41	0.21	0.38	0.25	-0.07	-0.05	0.25	0.18	-0.09	-0.09	0.25	-0.14
Int 2	0.34	1.00	0.52	0.38	0.56	0.45	0.49	-0.26	0.34	-0.02	0.32	0.50	0.32	0.46	0.51	0.16	0.41	0.51	0.04	0.34	0.05	-0.04	0.26	0.01	0.03	-0.03	-0.04	0.18	-0.40
Int 3	0.47	0.52	1.00	0.55	0.34	0.46	0.46	0.04	0.43	0.04	0.19	0.55	0.36	0.49	0.43	0.09	0.40	0.45	0.29	0.16	0.15	0.04	0.10	0.08	0.04	-0.15	0.04	0.29	-0.22
Int 4	0.40	0.38	0.55	1.00	0.01	0.35	0.57	0.11	0.38	-0.04	0.39	0.50	0.37	0.37	0.34	0.05	0.40	0.53	0.26	0.14	-0.07	0.12	0.06	-0.02	0.01	-0.05	0.07	0.04	-0.26
Int 5	0.44	0.56	0.34	0.01	1.00	0.43	0.30	-0.41	0.35	0.12	0.19	0.34	0.26	0.35	0.26	0.14	0.25	0.41	0.16	0.50	0.32	0.00	0.26	0.21	0.24	-0.04	0.00	0.16	-0.16
Int 6	0.41	0.45	0.46	0.35	0.43	1.00	0.47	-0.20	0.34	0.08	0.30	0.43	0.26	0.40	0.33	0.08	0.56	0.47	0.26	0.31	0.17	-0.06	0.00	0.21	0.13	0.01	0.05	0.22	-0.32
Int 7	0.34	0.49	0.46	0.57	0.30	0.47	1.00	-0.07	0.45	-0.14	0.39	0.50	0.28	0.52	0.46	-0.09	0.43	0.78	0.35	0.32	0.16	0.20	-0.10	0.20	-0.05	0.00	0.19	0.10	-0.38
Int 8	-0.03	-0.26	0.04	0.11	-0.41	-0.20	-0.07	1.00	-0.01	-0.22	-0.03	0.00	0.10	0.07	0.02	0.06	0.00	-0.09	0.15	-0.35	0.02	0.08	-0.18	0.00	-0.25	-0.08	0.08	0.05	0.12
Int 9	0.39	0.34	0.43	0.38	0.35	0.34	0.45	-0.01	1.00	-0.19	0.27	0.46	0.46	0.60	0.36	-0.07	0.34	0.52	0.15	0.46	0.18	0.07	-0.04	0.11	0.04	0.07	0.04	-0.05	-0.29
Int 10	0.09	-0.02	0.04	-0.04	0.12	0.08	-0.14	-0.22	-0.19	1.00	-0.17	-0.03	-0.18	-0.03	-0.09	-0.01	0.05	0.00	-0.09	0.31	-0.03	-0.17	-0.10	-0.05	-0.12	0.03	-0.17	-0.09	0.05
Int 11	0.43	0.32	0.19	0.39	0.19	0.30	0.39	-0.03	0.27	-0.17	1.00	0.63	0.28	0.34	0.33	-0.22	0.47	0.41	0.11	0.24	-0.04	0.02	0.03	0.03	0.25	0.05	-0.03	0.24	-0.38
Int 12	0.52	0.50	0.55	0.50	0.34	0.43	0.50	0.00	0.46	-0.03	0.63	1.00	0.33	0.52	0.50	-0.09	0.60	0.48	0.19	0.22	0.05	-0.02	0.18	0.08	0.03	-0.01	0.00	0.15	-0.43
Int 13	0.43	0.32	0.36	0.37	0.26	0.26	0.28	0.10	0.46	-0.18	0.28	0.33	1.00	0.39	0.24	0.21	0.27	0.33	0.13	0.22	0.16	0.01	0.15	0.14	0.00	-0.03	0.01	0.17	-0.09
Int 14	0.37	0.46	0.49	0.37	0.35	0.40	0.52	0.07	0.60	-0.03	0.34	0.52	0.39	1.00	0.40	-0.39	0.50	0.44	-0.01	0.26	0.22	-0.12	0.06	0.05	-0.11	0.04	-0.09	0.06	-0.48
Int 15	0.46	0.51	0.43	0.34	0.26	0.33	0.46	0.02	0.36	-0.09	0.33	0.50	0.24	0.40	1.00	-0.07	0.53	0.42	0.10	0.33	0.03	-0.10	0.21	0.03	-0.06	-0.07	-0.10	0.25	-0.26
Int 16	0.13	0.16	0.09	0.05	0.14	0.08	-0.09	0.06	-0.07	-0.01	-0.22	-0.09	0.21	-0.39	-0.07	1.00	-0.17	-0.13	0.08	0.01	0.10	0.06	0.05	0.07	0.01	-0.34	0.07	0.18	0.35
Int 17	0.46	0.41	0.40	0.40	0.25	0.56	0.43	0.00	0.34	0.05	0.47	0.60	0.27	0.50	0.53	-0.17	1.00	0.49	0.14	0.36	0.22	-0.04	-0.04	0.29	0.19	0.26	0.01	0.24	-0.42
Int 18	0.41	0.51	0.45	0.53	0.41	0.47	0.78	-0.09	0.52	0.00	0.41	0.48	0.33	0.44	0.42	-0.13	0.49	1.00	0.46	0.43	0.29	0.29	-0.14	0.32	0.21	0.12	0.27	0.08	-0.40
Int 19	0.21	0.04	0.29	0.26	0.16	0.26	0.35	0.15	0.15	-0.09	0.11	0.19	0.13	-0.01	0.10	0.08	0.14	0.46	1.00	-0.01	0.49	0.66	-0.02	0.51	0.31	-0.06	0.66	0.13	-0.02
Int 20	0.38	0.34	0.16	0.14	0.50	0.31	0.32	-0.35	0.46	0.31	0.24	0.22	0.22	0.26	0.33	0.01	0.36	0.43	-0.01	1.00	0.06	0.01	-0.18	0.04	0.29	0.22	0.04	0.13	-0.08
Int 21	0.25	0.05	0.15	-0.07	0.32	0.17	0.16	0.02	0.18	-0.03	-0.04	0.05	0.16	0.22	0.03	0.10	0.22	0.29	0.49	0.06	1.00	0.52	-0.17	0.86	0.28	-0.10	0.54	0.01	0.07
Int 22	-0.07	-0.04	0.04	0.12	0.00	-0.06	0.20	0.08	0.07	-0.17	0.02	-0.02	0.01	-0.12	-0.10	0.06	-0.04	0.29	0.66	0.01	0.52	1.00	-0.25	0.54	0.46	-0.03	0.92	-0.01	0.18
Int 23	-0.05	0.26	0.10	0.06	0.26	0.00	-0.10	-0.18	-0.04	-0.10	0.03	0.18	0.15	0.06	0.21	0.05	-0.04	-0.14	-0.02	-0.18	-0.17	-0.25	1.00	-0.25	-0.21	-0.19	-0.17	0.10	0.03
Int 24	0.25	0.01	0.08	-0.02	0.21	0.21	0.20	0.00	0.11	-0.05	0.03	0.08	0.14	0.05	0.03	0.07	0.29	0.32	0.51	0.04	0.86	0.54	-0.25	1.00	0.31	-0.05	0.55	0.05	0.04
Int 25	0.18	0.03	0.04	0.01	0.24	0.13	-0.05	-0.25	0.04	-0.12	0.25	0.03	0.00	-0.11	-0.06	0.01	0.19	0.21	0.31	0.29	0.28	0.46	-0.21	0.31	1.00	0.12	0.39	0.30	0.10
Int 26	-0.09	-0.03	-0.15	-0.05	-0.04	0.01	0.00	-0.08	0.07	0.03	0.05	-0.01	-0.03	0.04	-0.07	-0.34	0.26	0.12	-0.06	0.22	-0.10	-0.03	-0.19	-0.05	0.12	1.00	0.00	-0.30	-0.14
Int 27	-0.09	-0.04	0.04	0.07	0.00	0.05	0.19	0.08	0.04	-0.17	-0.03	0.00	0.01	-0.09	-0.10	0.07	0.01	0.27	0.66	0.04	0.54	0.92	-0.17	0.55	0.39	0.00	1.00	-0.06	0.18
Int 28	0.25	0.18	0.29	0.04	0.16	0.22	0.10	0.05	-0.05	-0.09	0.24	0.15	0.17	0.06	0.25	0.18	0.24	0.08	0.13	0.13	0.01	-0.01	0.10	0.05	0.30	-0.30	-0.06	1.00	0.11
Int 29	-0.14	-0.40	-0.22	-0.26	-0.16	-0.32	-0.38	0.12	-0.29	0.05	-0.38	-0.43	-0.09	-0.48	-0.26	0.35	-0.42	-0.40	-0.02	-0.08	0.07	0.18	0.03	0.04	0.10	-0.14	0.18	0.11	1.00

Table A19 Cross-correlations of the monthly intervening flows for month 5

Mon5	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.56	0.46	0.43	0.48	0.38	0.34	-0.05	0.48	0.04	0.55	0.56	0.39	0.65	0.41	0.40	0.56	0.34	0.04	0.12	0.16	0.12	0.20	0.16	0.16	-0.09	-0.05	0.05	-0.15
Int 2	0.56	1.00	0.46	0.58	0.28	0.52	0.35	-0.16	0.43	-0.08	0.65	0.61	0.34	0.57	0.47	0.36	0.34	0.48	0.07	0.28	0.05	0.01	0.12	0.07	0.04	-0.06	0.01	0.33	-0.13
Int 3	0.46	0.46	1.00	0.57	0.26	0.58	0.59	0.10	0.36	-0.10	0.35	0.54	0.27	0.45	0.38	0.36	0.47	0.53	0.45	0.11	0.33	0.28	0.15	0.32	0.16	0.08	0.12	0.21	-0.04
Int 4	0.43	0.58	0.57	1.00	0.05	0.37	0.47	0.12	0.28	-0.07	0.48	0.49	0.35	0.42	0.38	0.36	0.40	0.49	0.23	0.16	0.13	0.17	0.02	0.10	0.13	-0.16	0.15	0.26	0.03
Int 5	0.48	0.28	0.26	0.05	1.00	0.16	0.10	-0.43	0.28	0.17	0.24	0.29	0.04	0.34	0.16	0.16	0.13	0.23	-0.01	0.27	-0.04	-0.01	0.20	-0.08	0.19	0.25	-0.07	-0.07	-0.35
Int 6	0.38	0.52	0.58	0.37	0.16	1.00	0.53	-0.05	0.22	-0.12	0.44	0.37	0.14	0.33	0.41	0.28	0.42	0.56	0.38	-0.08	0.24	0.19	0.13	0.26	0.12	0.03	0.15	0.25	-0.03
Int 7	0.34	0.35	0.59	0.47	0.10	0.53	1.00	0.30	0.20	0.18	0.25	0.49	0.32	0.33	0.39	0.25	0.46	0.71	0.55	-0.01	0.33	0.25	-0.16	0.22	0.13	0.08	0.17	0.28	0.30
Int 8	-0.05	-0.16	0.10	0.12	-0.43	-0.05	0.30	1.00	-0.01	-0.04	0.06	0.07	0.33	0.08	0.06	0.03	0.08	0.15	0.14	-0.26	0.05	0.02	-0.31	0.03	0.02	-0.26	0.02	0.03	0.14
Int 9	0.48	0.43	0.36	0.28	0.28	0.22	0.20	-0.01	1.00	0.02	0.35	0.37	0.40	0.51	0.42	0.21	0.37	0.27	-0.11	0.05	-0.11	-0.13	0.11	-0.14	0.01	0.01	-0.20	-0.18	-0.02
Int 10	0.04	-0.08	-0.10	-0.07	0.17	-0.12	0.18	-0.04	0.02	1.00	-0.12	0.04	0.14	-0.13	-0.10	0.30	0.11	0.05	0.20	0.00	0.22	0.14	-0.10	0.14	0.16	0.00	-0.04	-0.10	0.05
Int 11	0.55	0.65	0.35	0.48	0.24	0.44	0.25	0.06	0.35	-0.12	1.00	0.72	0.44	0.40	0.58	0.35	0.43	0.54	0.18	0.15	0.06	0.08	0.05	0.11	0.13	-0.09	0.14	0.30	-0.34
Int 12	0.56	0.61	0.54	0.49	0.29	0.37	0.49	0.07	0.37	0.04	0.72	1.00	0.46	0.49	0.70	0.34	0.61	0.48	0.14	0.05	0.10	0.11	0.08	0.11	0.17	0.12	0.04	0.23	-0.14
Int 13	0.39	0.34	0.27	0.35	0.04	0.14	0.32	0.33	0.40	0.14	0.44	0.46	1.00	0.28	0.34	0.61	0.23	0.26	-0.04	-0.06	-0.03	-0.01	-0.17	-0.04	-0.06	-0.17	-0.05	-0.08	0.00
Int 14	0.65	0.57	0.45	0.42	0.34	0.33	0.33	0.08	0.51	-0.13	0.40	0.49	0.28	1.00	0.36	0.08	0.46	0.37	0.11	0.24	-0.01	-0.05	0.04	0.03	0.07	-0.01	-0.16	0.09	-0.13
Int 15	0.41	0.47	0.38	0.38	0.16	0.41	0.39	0.06	0.42	-0.10	0.58	0.70	0.34	0.36	1.00	0.21	0.59	0.50	0.23	-0.04	0.10	0.12	0.15	0.14	0.24	0.05	0.02	0.13	-0.03
Int 16	0.40	0.36	0.36	0.36	0.16	0.28	0.25	0.03	0.21	0.30	0.35	0.34	0.61	0.08	0.21	1.00	0.30	0.30	-0.01	0.03	0.34	0.21	0.04	0.34	0.15	-0.09	0.06	0.02	-0.09
Int 17	0.56	0.34	0.47	0.40	0.13	0.42	0.46	0.08	0.37	0.11	0.43	0.61	0.23	0.46	0.59	0.30	1.00	0.48	0.40	0.12	0.39	0.29	0.14	0.41	0.35	0.22	0.02	0.26	0.11
Int 18	0.34	0.48	0.53	0.49	0.23	0.56	0.71	0.15	0.27	0.05	0.54	0.48	0.26	0.37	0.50	0.30	0.48	1.00	0.64	0.14	0.47	0.40	-0.02	0.40	0.43	0.05	0.37	0.22	0.00
Int 19	0.04	0.07	0.45	0.23	-0.01	0.38	0.55	0.14	-0.11	0.20	0.18	0.14	-0.04	0.11	0.23	-0.01	0.40	0.64	1.00	0.11	0.68	0.65	0.03	0.59	0.48	0.18	0.52	0.05	-0.05
Int 20	0.12	0.28	0.11	0.16	0.27	-0.08	-0.01	-0.26	0.05	0.00	0.15	0.05	-0.06	0.24	-0.04	0.03	0.12	0.14	0.11	1.00	0.09	-0.12	-0.04	0.10	0.08	0.09	-0.06	0.01	-0.09
Int 21	0.16	0.05	0.33	0.13	-0.04	0.24	0.33	0.05	-0.11	0.22	0.06	0.10	-0.03	-0.01	0.10	0.34	0.39	0.47	0.68	0.09	1.00	0.84	0.20	0.95	0.54	0.18	0.60	0.03	-0.08
Int 22	0.12	0.01	0.28	0.17	-0.01	0.19	0.25	0.02	-0.13	0.14	0.08	0.11	-0.01	-0.05	0.12	0.21	0.29	0.40	0.65	-0.12	0.84	1.00	0.19	0.82	0.63	0.12	0.86	0.14	-0.14
Int 23	0.20	0.12	0.15	0.02	0.20	0.13	-0.16	-0.31	0.11	-0.10	0.05	0.08	-0.17	0.04	0.15	0.04	0.14	-0.02	0.03	-0.04	0.20	0.19	1.00	0.25	0.13	0.28	0.04	-0.17	-0.13
Int 24	0.16	0.07	0.32	0.10	-0.08	0.26	0.22	0.03	-0.14	0.14	0.11	0.11	-0.04	0.03	0.14	0.34	0.41	0.40	0.59	0.10	0.95	0.82	0.25	1.00	0.55	0.18	0.61	0.08	-0.08
Int 25	0.16	0.04	0.16	0.13	0.19	0.12	0.13	0.02	0.01	0.16	0.13	0.17	-0.06	0.07	0.24	0.15	0.35	0.43	0.48	0.08	0.54	0.63	0.13	0.55	1.00	0.30	0.51	0.03	-0.27
Int 26	-0.09	-0.06	0.08	-0.16	0.25	0.03	0.08	-0.26	0.01	0.00	-0.09	0.12	-0.17	-0.01	0.05	-0.09	0.22	0.05	0.18	0.09	0.18	0.12	0.28	0.18	0.30	1.00	0.10	-0.14	-0.20
Int 27	-0.05	0.01	0.12	0.15	-0.07	0.15	0.17	0.02	-0.20	-0.04	0.14	0.04	-0.05	-0.16	0.02	0.06	0.02	0.37	0.52	-0.06	0.60	0.86	0.04	0.61	0.51	0.10	1.00	0.25	-0.08
Int 28	0.05	0.33	0.21	0.26	-0.07	0.25	0.28	0.03	-0.18	-0.10	0.30	0.23	-0.08	0.09	0.13	0.02	0.26	0.22	0.05	0.01	0.03	0.14	-0.17	0.08	0.03	-0.14	0.25	1.00	0.12
Int 29	-0.15	-0.13	-0.04	0.03	-0.35	-0.03	0.30	0.14	-0.02	0.05	-0.34	-0.14	0.00	-0.13	-0.03	-0.09	0.11	0.00	-0.05	-0.09	-0.08	-0.14	-0.13	-0.08	-0.27	-0.20	-0.08	0.12	1.00

Table A20 Cross-correlations of the monthly intervening flows for month 6

Mon6	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.58	0.53	0.65	0.50	0.59	0.53	0.08	0.63	0.18	0.57	0.56	0.18	0.47	0.35	0.38	0.26	0.39	0.30	-0.19	-0.04	0.19	0.05	-0.02	-0.04	0.17	-0.11	0.19	-0.31
Int 2	0.58	1.00	0.48	0.46	0.43	0.79	0.64	-0.10	0.53	0.09	0.62	0.60	0.23	0.57	0.38	0.26	0.32	0.51	0.42	-0.14	0.03	0.11	0.07	0.13	0.13	-0.24	0.11	0.43	-0.09
Int 3	0.53	0.48	1.00	0.53	0.34	0.48	0.39	0.05	0.33	0.05	0.36	0.57	0.37	0.37	0.28	0.05	0.22	0.20	0.11	-0.10	-0.05	0.02	-0.20	-0.10	-0.05	-0.02	0.07	0.21	0.03
Int 4	0.65	0.46	0.53	1.00	0.38	0.50	0.60	0.01	0.66	0.21	0.43	0.59	0.16	0.11	0.34	0.10	0.07	0.45	0.22	-0.22	-0.14	0.20	-0.05	-0.03	-0.09	-0.02	-0.10	0.18	-0.08
Int 5	0.50	0.43	0.34	0.38	1.00	0.48	0.53	-0.13	0.31	0.12	0.56	0.31	0.06	0.42	0.19	0.31	0.30	0.42	0.33	-0.20	0.15	0.28	0.07	0.08	0.27	0.15	0.12	0.24	-0.34
Int 6	0.59	0.79	0.48	0.50	0.48	1.00	0.75	-0.01	0.54	0.11	0.58	0.68	0.29	0.51	0.51	0.35	0.38	0.63	0.54	-0.14	0.12	0.25	0.10	0.21	0.19	-0.08	0.11	0.40	-0.11
Int 7	0.53	0.64	0.39	0.60	0.53	0.75	1.00	0.09	0.40	0.26	0.57	0.60	0.34	0.52	0.58	0.34	0.47	0.83	0.66	-0.21	0.24	0.49	-0.06	0.28	0.25	0.00	0.26	0.25	0.05
Int 8	0.08	-0.10	0.05	0.01	-0.13	-0.01	0.09	1.00	0.25	-0.24	-0.16	0.02	0.15	0.17	0.10	0.19	0.21	0.07	0.28	-0.03	0.22	0.27	-0.23	0.05	0.08	0.05	-0.05	0.09	0.36
Int 9	0.63	0.53	0.33	0.66	0.31	0.54	0.40	0.25	1.00	0.34	0.58	0.63	0.27	0.34	0.27	0.28	0.15	0.35	0.28	-0.18	-0.12	0.16	0.10	0.10	0.02	0.02	-0.07	0.34	-0.12
Int 10	0.18	0.09	0.05	0.21	0.12	0.11	0.26	-0.24	0.34	1.00	0.41	0.26	0.33	0.28	0.53	0.12	0.22	0.26	0.21	-0.50	0.09	0.24	-0.04	0.16	0.03	0.11	0.01	-0.33	-0.04
Int 11	0.57	0.62	0.36	0.43	0.56	0.58	0.57	-0.16	0.58	0.41	1.00	0.51	0.22	0.58	0.53	0.35	0.38	0.57	0.45	-0.57	0.13	0.23	0.05	0.14	0.18	-0.07	0.25	0.37	-0.22
Int 12	0.56	0.60	0.57	0.59	0.31	0.68	0.60	0.02	0.63	0.26	0.51	1.00	0.39	0.44	0.58	0.08	0.26	0.38	0.29	-0.25	-0.06	0.14	-0.06	0.04	0.00	0.04	-0.07	0.33	-0.05
Int 13	0.18	0.23	0.37	0.16	0.06	0.29	0.34	0.15	0.27	0.33	0.22	0.39	1.00	0.33	0.34	0.14	0.06	0.17	0.18	0.13	0.04	0.11	-0.17	0.07	0.00	0.12	-0.02	0.07	0.28
Int 14	0.47	0.57	0.37	0.11	0.42	0.51	0.52	0.17	0.34	0.28	0.58	0.44	0.33	1.00	0.54	0.49	0.58	0.38	0.48	-0.24	0.17	0.31	-0.03	0.22	0.04	0.10	0.16	0.26	-0.03
Int 15	0.35	0.38	0.28	0.34	0.19	0.51	0.58	0.10	0.27	0.53	0.53	0.58	0.34	0.54	1.00	0.35	0.27	0.36	0.34	-0.31	0.05	0.13	-0.23	0.04	-0.04	0.01	0.02	0.06	0.18
Int 16	0.38	0.26	0.05	0.10	0.31	0.35	0.34	0.19	0.28	0.12	0.35	0.08	0.14	0.49	0.35	1.00	0.36	0.38	0.51	-0.16	0.20	0.36	-0.05	0.13	0.14	0.15	0.17	0.14	-0.17
Int 17	0.26	0.32	0.22	0.07	0.30	0.38	0.47	0.21	0.15	0.22	0.38	0.26	0.06	0.58	0.27	0.36	1.00	0.53	0.75	-0.30	0.66	0.53	0.02	0.37	0.25	0.20	0.37	0.23	-0.06
Int 18	0.39	0.51	0.20	0.45	0.42	0.63	0.83	0.07	0.35	0.26	0.57	0.38	0.17	0.38	0.36	0.38	0.53	1.00	0.77	-0.29	0.44	0.66	0.00	0.47	0.44	-0.08	0.43	0.24	-0.07
Int 19	0.30	0.42	0.11	0.22	0.33	0.54	0.66	0.28	0.28	0.21	0.45	0.29	0.18	0.48	0.34	0.51	0.75	0.77	1.00	-0.12	0.64	0.67	0.01	0.56	0.46	0.12	0.43	0.13	-0.16
Int 20	-0.19	-0.14	-0.10	-0.22	-0.20	-0.14	-0.21	-0.03	-0.18	-0.50	-0.57	-0.25	0.13	-0.24	-0.31	-0.16	-0.30	-0.29	-0.12	1.00	-0.04	-0.22	0.00	0.00	0.05	0.03	-0.04	-0.02	0.03
Int 21	-0.04	0.03	-0.05	-0.14	0.15	0.12	0.24	0.22	-0.12	0.09	0.13	-0.06	0.04	0.17	0.05	0.20	0.66	0.44	0.64	-0.04	1.00	0.60	-0.15	0.67	0.57	0.10	0.63	0.00	-0.10
Int 22	0.19	0.11	0.02	0.20	0.28	0.25	0.49	0.27	0.16	0.24	0.23	0.14	0.11	0.31	0.13	0.36	0.53	0.66	0.67	-0.22	0.60	1.00	-0.26	0.66	0.50	0.16	0.42	0.09	-0.05
Int 23	0.05	0.07	-0.20	-0.05	0.07	0.10	-0.06	-0.23	0.10	-0.04	0.05	-0.06	-0.17	-0.03	-0.23	-0.05	0.02	0.00	0.01	0.00	-0.15	-0.26	1.00	-0.10	0.09	-0.04	0.00	0.14	-0.36
Int 24	-0.02	0.13	-0.10	-0.03	0.08	0.21	0.28	0.05	0.10	0.16	0.14	0.04	0.07	0.22	0.04	0.13	0.37	0.47	0.56	0.00	0.67	0.66	-0.10	1.00	0.61	0.02	0.58	0.04	-0.10
Int 25	-0.04	0.13	-0.05	-0.09	0.27	0.19	0.25	0.08	0.02	0.03	0.18	0.00	0.00	0.04	-0.04	0.14	0.25	0.44	0.46	0.05	0.57	0.50	0.09	0.61	1.00	-0.16	0.58	0.19	-0.13
Int 26	0.17	-0.24	-0.02	-0.02	0.15	-0.08	0.00	0.05	0.02	0.11	-0.07	0.04	0.12	0.10	0.01	0.15	0.20	-0.08	0.12	0.03	0.10	0.16	-0.04	0.02	-0.16	1.00	-0.11	-0.35	-0.38
Int 27	-0.11	0.11	0.07	-0.10	0.12	0.11	0.26	-0.05	-0.07	0.01	0.25	-0.07	-0.02	0.16	0.02	0.17	0.37	0.43	0.43	-0.04	0.63	0.42	0.00	0.58	0.58	-0.11	1.00	0.08	-0.01
Int 28	0.19	0.43	0.21	0.18	0.24	0.40	0.25	0.09	0.34	-0.33	0.37	0.33	0.07	0.26	0.06	0.14	0.23	0.24	0.13	-0.02	0.00	0.09	0.14	0.04	0.19	-0.35	0.08	1.00	0.11
Int 29	-0.31	-0.09	0.03	-0.08	-0.34	-0.11	0.05	0.36	-0.12	-0.04	-0.22	-0.05	0.28	-0.03	0.18	-0.17	-0.06	-0.07	-0.16	0.03	-0.10	-0.05	-0.36	-0.10	-0.13	-0.38	-0.01	0.11	1.00

Table A21 Cross-correlations of the monthly intervening flows for month 7

Mon7	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.76	0.66	0.80	0.57	0.63	0.38	-0.06	0.55	0.11	0.71	0.83	0.32	0.51	0.57	0.29	0.45	0.36	0.22	-0.21	-0.11	0.17	-0.29	0.09	-0.02	-0.12	-0.11	0.29	0.04
Int 2	0.76	1.00	0.53	0.75	0.67	0.84	0.60	0.07	0.54	0.05	0.64	0.82	0.63	0.72	0.85	0.25	0.65	0.52	0.45	-0.44	0.02	0.11	-0.27	0.24	0.21	-0.07	-0.07	0.21	-0.10
Int 3	0.66	0.53	1.00	0.53	0.42	0.41	0.15	-0.20	0.32	-0.21	0.30	0.50	0.37	0.25	0.44	0.17	0.27	0.15	0.06	-0.04	-0.31	-0.15	0.05	-0.05	-0.04	-0.08	-0.23	0.12	-0.02
Int 4	0.80	0.75	0.53	1.00	0.73	0.69	0.65	0.08	0.58	0.20	0.64	0.72	0.32	0.50	0.50	0.34	0.57	0.58	0.39	-0.31	0.00	0.22	-0.50	0.28	0.10	-0.14	-0.03	0.23	0.09
Int 5	0.57	0.67	0.42	0.73	1.00	0.69	0.61	0.05	0.34	0.05	0.59	0.63	0.44	0.53	0.48	0.16	0.65	0.50	0.46	-0.43	0.08	0.23	-0.30	0.32	0.28	-0.11	-0.07	0.16	-0.16
Int 6	0.63	0.84	0.41	0.69	0.69	1.00	0.82	0.03	0.47	0.10	0.62	0.69	0.49	0.69	0.69	0.29	0.72	0.73	0.61	-0.38	0.20	0.27	-0.38	0.46	0.48	-0.12	0.03	0.12	-0.09
Int 7	0.38	0.60	0.15	0.65	0.61	0.82	1.00	0.09	0.46	0.26	0.54	0.47	0.43	0.59	0.66	0.48	0.67	0.89	0.76	-0.42	0.51	0.54	-0.63	0.72	0.50	-0.03	0.18	0.00	0.00
Int 8	-0.06	0.07	-0.20	0.08	0.05	0.03	0.09	1.00	0.08	0.07	0.02	0.15	-0.02	0.33	0.21	0.05	0.21	0.13	0.07	-0.28	0.04	0.03	-0.17	-0.03	-0.06	0.05	0.09	0.07	0.12
Int 9	0.55	0.54	0.32	0.58	0.34	0.47	0.46	0.08	1.00	0.35	0.76	0.50	0.45	0.52	0.41	0.43	0.42	0.42	0.35	-0.28	0.16	0.23	-0.40	0.32	0.08	0.08	-0.01	0.12	0.08
Int 10	0.11	0.05	-0.21	0.20	0.05	0.10	0.26	0.07	0.35	1.00	0.44	0.18	0.20	0.13	0.12	0.27	0.25	0.20	0.26	-0.25	0.39	0.51	-0.44	0.45	-0.06	0.20	0.10	-0.27	0.08
Int 11	0.71	0.64	0.30	0.64	0.59	0.62	0.54	0.02	0.76	0.44	1.00	0.68	0.77	0.64	0.69	0.36	0.67	0.51	0.48	-0.48	0.30	0.52	-0.29	0.42	0.05	0.03	0.08	0.16	-0.07
Int 12	0.83	0.82	0.50	0.72	0.63	0.69	0.47	0.15	0.50	0.18	0.68	1.00	0.50	0.63	0.74	0.14	0.58	0.38	0.33	-0.39	-0.04	0.19	-0.27	0.20	0.14	-0.01	-0.10	0.25	-0.06
Int 13	0.32	0.63	0.37	0.32	0.44	0.49	0.43	-0.02	0.45	0.20	0.77	0.50	1.00	0.61	0.42	0.29	0.58	0.40	0.50	-0.18	0.21	0.29	-0.01	0.26	0.26	0.16	-0.01	0.00	-0.28
Int 14	0.51	0.72	0.25	0.50	0.53	0.69	0.59	0.33	0.52	0.13	0.64	0.63	0.61	1.00	0.69	0.30	0.71	0.56	0.49	-0.60	0.25	0.31	-0.28	0.39	0.24	0.04	0.03	0.21	-0.18
Int 15	0.57	0.85	0.44	0.50	0.48	0.69	0.66	0.21	0.41	0.12	0.69	0.74	0.42	0.69	1.00	0.21	0.69	0.42	0.40	-0.25	0.01	0.23	-0.41	0.33	0.42	-0.10	-0.06	0.14	0.01
Int 16	0.29	0.25	0.17	0.34	0.16	0.29	0.48	0.05	0.43	0.27	0.36	0.14	0.29	0.30	0.21	1.00	0.37	0.39	0.27	0.11	0.30	0.37	-0.39	0.44	0.25	-0.06	0.03	0.03	0.36
Int 17	0.45	0.65	0.27	0.57	0.65	0.72	0.67	0.21	0.42	0.25	0.67	0.58	0.58	0.71	0.69	0.37	1.00	0.60	0.61	-0.63	0.28	0.41	-0.39	0.52	0.32	0.10	-0.08	0.03	-0.20
Int 18	0.36	0.52	0.15	0.58	0.50	0.73	0.89	0.13	0.42	0.20	0.51	0.38	0.40	0.56	0.42	0.39	0.60	1.00	0.80	-0.36	0.57	0.60	-0.51	0.67	0.31	-0.10	0.34	0.04	-0.05
Int 19	0.22	0.45	0.06	0.39	0.46	0.61	0.76	0.07	0.35	0.26	0.48	0.33	0.50	0.49	0.40	0.27	0.61	0.80	1.00	-0.43	0.65	0.69	-0.29	0.70	0.33	0.07	0.25	-0.08	-0.28
Int 20	-0.21	-0.44	-0.04	-0.31	-0.43	-0.38	-0.42	-0.28	-0.28	-0.25	-0.48	-0.39	-0.18	-0.60	-0.25	0.11	-0.63	-0.36	-0.43	1.00	-0.25	-0.38	0.27	-0.37	-0.01	-0.02	-0.08	-0.03	0.27
Int 21	-0.11	0.02	-0.31	0.00	0.08	0.20	0.51	0.04	0.16	0.39	0.30	-0.04	0.21	0.25	0.01	0.30	0.28	0.57	0.65	-0.25	1.00	0.77	-0.24	0.80	0.28	0.11	0.60	-0.18	-0.10
Int 22	0.17	0.11	-0.15	0.22	0.23	0.27	0.54	0.03	0.23	0.51	0.52	0.19	0.29	0.31	0.23	0.37	0.41	0.60	0.69	-0.38	0.77	1.00	-0.43	0.70	0.16	0.07	0.41	-0.22	-0.13
Int 23	-0.29	-0.27	0.05	-0.50	-0.30	-0.38	-0.63	-0.17	-0.40	-0.44	-0.29	-0.27	-0.01	-0.28	-0.41	-0.39	-0.39	-0.51	-0.29	0.27	-0.24	-0.43	1.00	-0.50	-0.26	0.04	-0.13	0.03	-0.18
Int 24	0.09	0.24	-0.05	0.28	0.32	0.46	0.72	-0.03	0.32	0.45	0.42	0.20	0.26	0.39	0.33	0.44	0.52	0.67	0.70	-0.37	0.80	0.70	-0.50	1.00	0.30	0.07	0.33	-0.16	-0.07
Int 25	-0.02	0.21	-0.04	0.10	0.28	0.48	0.50	-0.06	0.08	-0.06	0.05	0.14	0.26	0.24	0.42	0.25	0.32	0.31	0.33	-0.01	0.28	0.16	-0.26	0.30	1.00	-0.22	0.27	0.07	0.05
Int 26	-0.12	-0.07	-0.08	-0.14	-0.11	-0.12	-0.03	0.05	0.08	0.20	0.03	-0.01	0.16	0.04	-0.10	-0.06	0.10	-0.10	0.07	-0.02	0.11	0.07	0.04	0.07	-0.22	1.00	-0.13	-0.60	-0.34
Int 27	-0.11	-0.07	-0.23	-0.03	-0.07	0.03	0.18	0.09	-0.01	0.10	0.08	-0.10	-0.01	0.03	-0.06	0.03	-0.08	0.34	0.25	-0.08	0.60	0.41	-0.13	0.33	0.27	-0.13	1.00	-0.24	0.03
Int 28	0.29	0.21	0.12	0.23	0.16	0.12	0.00	0.07	0.12	-0.27	0.16	0.25	0.00	0.21	0.14	0.03	0.03	0.04	-0.08	-0.03	-0.18	-0.22	0.03	-0.16	0.07	-0.60	-0.24	1.00	0.09
Int 29	0.04	-0.10	-0.02	0.09	-0.16	-0.09	0.00	0.12	0.08	0.08	-0.07	-0.06	-0.28	-0.18	0.01	0.36	-0.20	-0.05	-0.28	0.27	-0.10	-0.13	-0.18	-0.07	0.05	-0.34	0.03	0.09	1.00

Table A22 Cross-correlations of the monthly intervening flows for month 8

Mon8	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.81	0.86	0.82	0.66	0.57	0.41	-0.18	0.55	0.11	0.58	0.80	0.23	0.62	0.72	0.46	0.71	0.41	0.44	-0.12	-0.09	0.10	-0.24	0.16	0.25	-0.04	0.09	0.00	-0.08
Int 2	0.81	1.00	0.77	0.86	0.81	0.79	0.67	0.10	0.50	0.19	0.61	0.83	0.53	0.69	0.89	0.27	0.77	0.59	0.61	-0.23	0.13	0.11	-0.10	0.32	0.23	0.01	0.23	0.05	-0.29
Int 3	0.86	0.77	1.00	0.82	0.60	0.48	0.31	0.16	0.49	0.09	0.45	0.67	0.33	0.58	0.65	0.29	0.63	0.41	0.41	-0.02	-0.04	-0.01	-0.07	0.04	0.10	0.02	0.12	-0.02	-0.13
Int 4	0.82	0.86	0.82	1.00	0.85	0.77	0.67	-0.02	0.49	0.22	0.62	0.81	0.34	0.63	0.77	0.41	0.79	0.61	0.62	-0.23	0.00	0.05	-0.26	0.30	0.38	-0.09	0.16	0.10	-0.05
Int 5	0.66	0.81	0.60	0.85	1.00	0.74	0.69	-0.03	0.35	0.29	0.63	0.78	0.55	0.52	0.75	0.16	0.66	0.53	0.58	-0.41	0.08	0.21	-0.06	0.31	0.24	-0.12	0.13	0.22	-0.16
Int 6	0.57	0.79	0.48	0.77	0.74	1.00	0.92	0.04	0.43	0.36	0.69	0.77	0.41	0.69	0.82	0.40	0.71	0.80	0.81	-0.32	0.25	0.32	-0.26	0.65	0.44	-0.15	0.37	0.10	-0.23
Int 7	0.41	0.67	0.31	0.67	0.69	0.92	1.00	0.14	0.28	0.39	0.65	0.61	0.47	0.62	0.68	0.26	0.65	0.84	0.87	-0.36	0.54	0.53	-0.19	0.75	0.46	-0.19	0.35	0.07	-0.21
Int 8	-0.18	0.10	0.16	-0.02	-0.03	0.04	0.14	1.00	-0.10	0.24	0.16	0.02	0.25	0.35	0.14	0.02	0.24	0.20	0.08	0.14	-0.03	0.15	0.08	0.17	0.15	0.06	0.11	-0.02	-0.05
Int 9	0.55	0.50	0.49	0.49	0.35	0.43	0.28	-0.10	1.00	0.25	0.62	0.55	0.34	0.72	0.50	0.49	0.47	0.28	0.35	-0.11	-0.02	0.08	-0.12	0.20	0.12	0.02	0.23	-0.05	-0.08
Int 10	0.11	0.19	0.09	0.22	0.29	0.36	0.39	0.24	0.25	1.00	0.58	0.22	0.48	0.48	0.25	0.29	0.45	0.30	0.35	-0.08	0.25	0.28	0.07	0.45	0.47	-0.05	0.13	0.15	-0.07
Int 11	0.58	0.61	0.45	0.62	0.63	0.69	0.65	0.16	0.62	0.58	1.00	0.71	0.81	0.74	0.69	0.29	0.70	0.53	0.56	-0.27	0.14	0.44	0.05	0.42	0.41	-0.01	0.22	-0.01	-0.32
Int 12	0.80	0.83	0.67	0.81	0.78	0.77	0.61	0.02	0.55	0.22	0.71	1.00	0.53	0.67	0.88	0.40	0.71	0.52	0.56	-0.37	-0.04	0.24	-0.22	0.35	0.29	-0.03	0.25	0.09	-0.19
Int 13	0.23	0.53	0.33	0.34	0.55	0.41	0.47	0.25	0.34	0.48	0.81	0.53	1.00	0.67	0.48	-0.06	0.53	0.31	0.34	-0.14	0.07	0.35	0.29	0.34	0.10	0.03	0.34	0.17	-0.37
Int 14	0.62	0.69	0.58	0.63	0.52	0.69	0.62	0.35	0.72	0.48	0.74	0.67	0.67	1.00	0.74	0.50	0.83	0.65	0.66	-0.13	0.14	0.36	-0.10	0.54	0.33	0.02	0.23	0.03	-0.21
Int 15	0.72	0.89	0.65	0.77	0.75	0.82	0.68	0.14	0.50	0.25	0.69	0.88	0.48	0.74	1.00	0.39	0.76	0.58	0.60	-0.33	0.03	0.23	-0.26	0.44	0.25	-0.03	0.21	0.05	-0.29
Int 16	0.46	0.27	0.29	0.41	0.16	0.40	0.26	0.02	0.49	0.29	0.29	0.40	-0.06	0.50	0.39	1.00	0.45	0.36	0.29	-0.01	-0.03	0.23	-0.28	0.31	0.46	0.01	0.07	-0.22	0.15
Int 17	0.71	0.77	0.63	0.79	0.66	0.71	0.65	0.24	0.47	0.45	0.70	0.71	0.53	0.83	0.76	0.45	1.00	0.62	0.63	-0.14	0.15	0.29	-0.24	0.47	0.41	0.05	0.05	0.06	-0.15
Int 18	0.41	0.59	0.41	0.61	0.53	0.80	0.84	0.20	0.28	0.30	0.53	0.52	0.31	0.65	0.58	0.36	0.62	1.00	0.90	-0.13	0.37	0.46	-0.22	0.70	0.41	-0.12	0.28	0.04	-0.24
Int 19	0.44	0.61	0.41	0.62	0.58	0.81	0.87	0.08	0.35	0.35	0.56	0.56	0.34	0.66	0.60	0.29	0.63	0.90	1.00	-0.16	0.45	0.55	-0.10	0.74	0.36	-0.03	0.39	0.08	-0.34
Int 20	-0.12	-0.23	-0.02	-0.23	-0.41	-0.32	-0.36	0.14	-0.11	-0.08	-0.27	-0.37	-0.14	-0.13	-0.33	-0.01	-0.14	-0.13	-0.16	1.00	-0.07	-0.25	0.12	-0.20	0.25	-0.12	-0.23	0.01	0.16
Int 21	-0.09	0.13	-0.04	0.00	0.08	0.25	0.54	-0.03	-0.02	0.25	0.14	-0.04	0.07	0.14	0.03	-0.03	0.15	0.37	0.45	-0.07	1.00	0.29	0.06	0.55	0.19	-0.15	0.51	0.03	-0.04
Int 22	0.10	0.11	-0.01	0.05	0.21	0.32	0.53	0.15	0.08	0.28	0.44	0.24	0.35	0.36	0.23	0.23	0.29	0.46	0.55	-0.25	0.29	1.00	0.11	0.58	0.15	-0.07	0.11	0.03	-0.14
Int 23	-0.24	-0.10	-0.07	-0.26	-0.06	-0.26	-0.19	0.08	-0.12	0.07	0.05	-0.22	0.29	-0.10	-0.26	-0.28	-0.24	-0.22	-0.10	0.12	0.06	0.11	1.00	-0.07	-0.46	-0.04	0.11	0.06	-0.21
Int 24	0.16	0.32	0.04	0.30	0.31	0.65	0.75	0.17	0.20	0.45	0.42	0.35	0.34	0.54	0.44	0.31	0.47	0.70	0.74	-0.20	0.55	0.58	-0.07	1.00	0.36	-0.09	0.42	0.05	-0.18
Int 25	0.25	0.23	0.10	0.38	0.24	0.44	0.46	0.15	0.12	0.47	0.41	0.29	0.10	0.33	0.25	0.46	0.41	0.41	0.36	0.25	0.19	0.15	-0.46	0.36	1.00	-0.17	-0.06	0.09	0.21
Int 26	-0.04	0.01	0.02	-0.09	-0.12	-0.15	-0.19	0.06	0.02	-0.05	-0.01	-0.03	0.03	0.02	-0.03	0.01	0.05	-0.12	-0.03	-0.12	-0.15	-0.07	-0.04	-0.09	-0.17	1.00	-0.02	-0.36	-0.37
Int 27	0.09	0.23	0.12	0.16	0.13	0.37	0.35	0.11	0.23	0.13	0.22	0.25	0.34	0.23	0.21	0.07	0.05	0.28	0.39	-0.23	0.51	0.11	0.11	0.42	-0.06	-0.02	1.00	-0.14	-0.22
Int 28	0.00	0.05	-0.02	0.10	0.22	0.10	0.07	-0.02	-0.05	0.15	-0.01	0.09	0.17	0.03	0.05	-0.22	0.06	0.04	0.08	0.01	0.03	0.03	0.06	0.05	0.09	-0.36	-0.14	1.00	0.05
Int 29	-0.08	-0.29	-0.13	-0.05	-0.16	-0.23	-0.21	-0.05	-0.08	-0.07	-0.32	-0.19	-0.37	-0.21	-0.29	0.15	-0.15	-0.24	-0.34	0.16	-0.04	-0.14	-0.21	-0.18	0.21	-0.37	-0.22	0.05	1.00

Table A23 Cross-correlations of the monthly intervening flows for month 9

Mon9	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.90	0.86	0.86	0.77	0.78	0.67	-0.17	0.63	0.41	0.62	0.89	0.60	0.66	0.89	0.54	0.73	0.54	0.62	0.35	0.11	-0.24	-0.29	0.29	0.13	-0.15	0.15	-0.05	-0.12
Int 2	0.90	1.00	0.88	0.90	0.90	0.87	0.78	0.34	0.53	0.32	0.64	0.88	0.74	0.72	0.94	0.55	0.80	0.65	0.71	0.23	0.12	-0.22	-0.18	0.48	0.01	-0.22	0.28	-0.06	-0.20
Int 3	0.86	0.88	1.00	0.93	0.78	0.78	0.71	0.20	0.53	0.39	0.51	0.79	0.60	0.62	0.81	0.34	0.66	0.68	0.72	0.26	0.14	-0.14	-0.26	0.33	0.20	-0.32	0.27	0.05	-0.02
Int 4	0.86	0.90	0.93	1.00	0.88	0.90	0.85	-0.02	0.53	0.33	0.60	0.86	0.62	0.69	0.87	0.53	0.80	0.77	0.82	0.33	0.13	-0.20	-0.25	0.39	0.21	-0.29	0.19	0.02	0.00
Int 5	0.77	0.90	0.78	0.88	1.00	0.89	0.81	0.06	0.42	0.24	0.56	0.84	0.69	0.59	0.85	0.51	0.74	0.64	0.74	0.27	0.06	-0.20	-0.12	0.51	-0.02	-0.32	0.27	-0.07	-0.23
Int 6	0.78	0.87	0.78	0.90	0.89	1.00	0.93	0.36	0.39	0.24	0.65	0.83	0.67	0.73	0.87	0.61	0.86	0.76	0.82	0.29	0.08	-0.15	-0.13	0.63	0.07	-0.23	0.22	-0.17	-0.15
Int 7	0.67	0.78	0.71	0.85	0.81	0.93	1.00	0.39	0.19	0.27	0.53	0.67	0.58	0.66	0.77	0.56	0.81	0.88	0.91	0.27	0.11	-0.15	-0.05	0.63	0.11	-0.25	0.28	-0.12	-0.13
Int 8	-0.17	0.34	0.20	-0.02	0.06	0.36	0.39	1.00	-0.08	0.01	0.29	0.29	0.40	0.41	0.34	0.07	0.57	0.12	0.30	0.12	-0.06	-0.12	0.12	0.36	-0.03	0.15	0.06	-0.22	-0.28
Int 9	0.63	0.53	0.53	0.53	0.42	0.39	0.19	-0.08	1.00	0.47	0.65	0.62	0.56	0.66	0.49	0.37	0.36	0.15	0.27	0.17	0.20	-0.14	-0.21	0.15	0.07	-0.02	-0.03	-0.10	0.00
Int 10	0.41	0.32	0.39	0.33	0.24	0.24	0.27	0.01	0.47	1.00	0.24	0.27	0.29	0.38	0.33	0.22	0.32	0.31	0.37	0.22	0.30	-0.18	-0.01	0.19	0.25	-0.02	0.15	0.02	0.03
Int 11	0.62	0.64	0.51	0.60	0.56	0.65	0.53	0.29	0.65	0.24	1.00	0.71	0.70	0.90	0.72	0.57	0.74	0.41	0.39	-0.09	0.11	-0.16	-0.13	0.50	0.06	-0.08	-0.13	-0.24	-0.29
Int 12	0.89	0.88	0.79	0.86	0.84	0.83	0.67	0.29	0.62	0.27	0.71	1.00	0.79	0.72	0.92	0.57	0.75	0.52	0.60	0.28	0.08	-0.19	-0.28	0.38	0.04	-0.12	0.12	-0.09	-0.19
Int 13	0.60	0.74	0.60	0.62	0.69	0.67	0.58	0.40	0.56	0.29	0.70	0.79	1.00	0.72	0.77	0.63	0.70	0.40	0.48	0.22	0.03	-0.18	0.03	0.50	-0.10	0.03	0.12	-0.17	-0.34
Int 14	0.66	0.72	0.62	0.69	0.59	0.73	0.66	0.41	0.66	0.38	0.90	0.72	0.72	1.00	0.77	0.59	0.83	0.54	0.55	-0.01	0.16	-0.15	-0.14	0.60	0.07	-0.10	-0.02	-0.20	-0.17
Int 15	0.89	0.94	0.81	0.87	0.85	0.87	0.77	0.34	0.49	0.33	0.72	0.92	0.77	0.77	1.00	0.60	0.85	0.59	0.66	0.26	0.10	-0.18	-0.25	0.47	0.09	-0.16	0.21	-0.07	-0.19
Int 16	0.54	0.55	0.34	0.53	0.51	0.61	0.56	0.07	0.37	0.22	0.57	0.57	0.63	0.59	0.60	1.00	0.63	0.45	0.47	0.30	0.03	-0.16	-0.05	0.50	0.01	0.02	0.20	-0.14	-0.35
Int 17	0.73	0.80	0.66	0.80	0.74	0.86	0.81	0.57	0.36	0.32	0.74	0.75	0.70	0.83	0.85	0.63	1.00	0.61	0.65	0.17	0.06	-0.16	-0.12	0.59	0.16	-0.12	0.04	-0.19	-0.20
Int 18	0.54	0.65	0.68	0.77	0.64	0.76	0.88	0.12	0.15	0.31	0.41	0.52	0.40	0.54	0.59	0.45	0.61	1.00	0.91	0.20	0.17	-0.13	-0.07	0.46	0.14	-0.31	0.31	0.00	0.09
Int 19	0.62	0.71	0.72	0.82	0.74	0.82	0.91	0.30	0.27	0.37	0.39	0.60	0.48	0.55	0.66	0.47	0.65	0.91	1.00	0.30	0.23	-0.20	-0.02	0.52	0.16	-0.27	0.34	0.08	0.02
Int 20	0.35	0.23	0.26	0.33	0.27	0.29	0.27	0.12	0.17	0.22	-0.09	0.28	0.22	-0.01	0.26	0.30	0.17	0.20	0.30	1.00	0.00	-0.24	0.35	0.01	0.17	0.04	0.44	0.22	-0.03
Int 21	0.11	0.12	0.14	0.13	0.06	0.08	0.11	-0.06	0.20	0.30	0.11	0.08	0.03	0.16	0.10	0.03	0.06	0.17	0.23	0.00	1.00	-0.09	-0.20	0.23	0.11	0.08	0.07	-0.13	0.09
Int 22	-0.24	-0.22	-0.14	-0.20	-0.20	-0.15	-0.15	-0.12	-0.14	-0.18	-0.16	-0.19	-0.18	-0.15	-0.18	-0.16	-0.16	-0.13	-0.20	-0.24	-0.09	1.00	-0.16	-0.13	0.28	0.14	-0.05	-0.23	0.15
Int 23	-0.29	-0.18	-0.26	-0.25	-0.12	-0.13	-0.05	0.12	-0.21	-0.01	-0.13	-0.28	0.03	-0.14	-0.25	-0.05	-0.12	-0.07	-0.02	0.35	-0.20	-0.16	1.00	0.07	-0.32	0.10	0.08	0.01	-0.06
Int 24	0.29	0.48	0.33	0.39	0.51	0.63	0.63	0.36	0.15	0.19	0.50	0.38	0.50	0.60	0.47	0.50	0.59	0.46	0.52	0.01	0.23	-0.13	0.07	1.00	-0.19	-0.05	0.21	-0.33	-0.31
Int 25	0.13	0.01	0.20	0.21	-0.02	0.07	0.11	-0.03	0.07	0.25	0.06	0.04	-0.10	0.07	0.09	0.01	0.16	0.14	0.16	0.17	0.11	0.28	-0.32	-0.19	1.00	-0.26	-0.14	0.17	0.48
Int 26	-0.15	-0.22	-0.32	-0.29	-0.32	-0.23	-0.25	0.15	-0.02	-0.02	-0.08	-0.12	0.03	-0.10	-0.16	0.02	-0.12	-0.31	-0.27	0.04	0.08	0.14	0.10	-0.05	-0.26	1.00	-0.10	-0.20	-0.29
Int 27	0.15	0.28	0.27	0.19	0.27	0.22	0.28	0.06	-0.03	0.15	-0.13	0.12	0.12	-0.02	0.21	0.20	0.04	0.31	0.34	0.44	0.07	-0.05	0.08	0.21	-0.14	-0.10	1.00	0.12	-0.20
Int 28	-0.05	-0.06	0.05	0.02	-0.07	-0.17	-0.12	-0.22	-0.10	0.02	-0.24	-0.09	-0.17	-0.20	-0.07	-0.14	-0.19	0.00	0.08	0.22	-0.13	-0.23	0.01	-0.33	0.17	-0.20	0.12	1.00	0.09
Int 29	-0.12	-0.20	-0.02	0.00	-0.23	-0.15	-0.13	-0.28	0.00	0.03	-0.29	-0.19	-0.34	-0.17	-0.19	-0.35	-0.20	0.09	0.02	-0.03	0.09	0.15	-0.06	-0.31	0.48	-0.29	-0.20	0.09	1.00

Table A24 Cross-correlations of the monthly intervening flows for month 10

Mon10	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.92	0.86	0.84	0.83	0.83	0.77	0.21	0.66	0.49	0.58	0.92	0.30	0.58	0.86	0.64	0.64	0.49	0.58	0.79	0.08	-0.05	-0.17	0.18	0.42	0.10	0.11	-0.25	-0.21
Int 2	0.92	1.00	0.91	0.92	0.90	0.94	0.82	0.39	0.63	0.51	0.69	0.92	0.51	0.71	0.95	0.74	0.80	0.62	0.74	0.87	0.09	0.01	-0.06	0.28	0.49	0.01	0.04	-0.18	-0.08
Int 3	0.86	0.91	1.00	0.95	0.91	0.86	0.78	0.27	0.60	0.56	0.58	0.87	0.53	0.67	0.89	0.59	0.67	0.70	0.74	0.71	0.20	0.03	-0.11	0.16	0.35	-0.11	0.06	-0.11	0.04
Int 4	0.84	0.92	0.95	1.00	0.78	0.89	0.86	0.34	0.62	0.56	0.67	0.86	0.53	0.73	0.83	0.61	0.78	0.77	0.77	0.68	0.14	0.05	-0.04	0.19	0.42	-0.09	0.04	-0.10	0.09
Int 5	0.83	0.90	0.91	0.78	1.00	0.82	0.80	0.14	0.52	0.44	0.59	0.85	0.26	0.61	0.81	0.48	0.65	0.54	0.57	0.73	0.05	-0.05	-0.14	0.21	0.34	-0.03	-0.01	-0.14	-0.14
Int 6	0.83	0.94	0.86	0.89	0.82	1.00	0.89	0.44	0.56	0.48	0.69	0.82	0.54	0.72	0.86	0.68	0.85	0.71	0.78	0.82	0.16	-0.01	0.04	0.30	0.46	-0.01	0.03	-0.22	0.05
Int 7	0.77	0.82	0.78	0.86	0.80	0.89	1.00	0.33	0.42	0.42	0.63	0.74	0.37	0.63	0.81	0.68	0.70	0.79	0.92	0.73	0.23	-0.05	-0.02	0.37	0.36	0.00	0.12	-0.14	-0.03
Int 8	0.21	0.39	0.27	0.34	0.14	0.44	0.33	1.00	0.18	0.25	0.20	0.33	0.63	0.13	0.33	0.34	0.59	0.37	0.40	0.40	0.23	0.12	0.32	0.37	0.51	0.19	0.03	-0.13	0.17
Int 9	0.66	0.63	0.60	0.62	0.52	0.56	0.42	0.18	1.00	0.61	0.73	0.74	0.42	0.74	0.55	0.60	0.56	0.33	0.41	0.54	0.11	0.23	-0.08	0.18	0.31	0.03	-0.07	-0.20	-0.03
Int 10	0.49	0.51	0.56	0.56	0.44	0.48	0.42	0.25	0.61	1.00	0.47	0.51	0.51	0.51	0.50	0.54	0.45	0.49	0.52	0.50	0.34	0.22	-0.18	0.16	0.35	0.02	-0.04	-0.24	0.16
Int 11	0.58	0.69	0.58	0.67	0.59	0.69	0.63	0.20	0.73	0.47	1.00	0.65	0.60	0.89	0.64	0.67	0.77	0.55	0.65	0.62	0.25	0.10	0.06	0.38	0.29	-0.07	-0.15	-0.23	-0.03
Int 12	0.92	0.92	0.87	0.86	0.85	0.82	0.74	0.33	0.74	0.51	0.65	1.00	0.41	0.65	0.89	0.71	0.67	0.53	0.60	0.79	0.14	-0.04	-0.11	0.20	0.40	0.04	0.00	-0.20	-0.15
Int 13	0.30	0.51	0.53	0.53	0.26	0.54	0.37	0.63	0.42	0.51	0.60	0.41	1.00	0.61	0.42	0.55	0.74	0.57	0.44	0.37	0.35	0.15	0.44	0.28	0.47	-0.14	-0.21	-0.11	0.52
Int 14	0.58	0.71	0.67	0.73	0.61	0.72	0.63	0.13	0.74	0.51	0.89	0.65	0.61	1.00	0.63	0.55	0.77	0.62	0.65	0.60	0.21	0.12	0.11	0.28	0.23	-0.09	-0.08	-0.16	0.06
Int 15	0.86	0.95	0.89	0.83	0.81	0.86	0.81	0.33	0.55	0.50	0.64	0.89	0.42	0.63	1.00	0.65	0.73	0.54	0.68	0.76	0.31	-0.03	-0.12	0.30	0.46	0.06	0.02	-0.19	-0.09
Int 16	0.64	0.74	0.59	0.61	0.48	0.68	0.68	0.34	0.60	0.54	0.67	0.71	0.55	0.55	0.65	1.00	0.69	0.51	0.55	0.65	0.26	0.07	0.05	0.42	0.46	0.15	0.08	-0.19	-0.08
Int 17	0.64	0.80	0.67	0.78	0.65	0.85	0.70	0.59	0.56	0.45	0.77	0.67	0.74	0.77	0.73	0.69	1.00	0.61	0.62	0.67	0.27	0.13	0.10	0.45	0.60	0.01	-0.02	-0.07	0.19
Int 18	0.49	0.62	0.70	0.77	0.54	0.71	0.79	0.37	0.33	0.49	0.55	0.53	0.57	0.62	0.54	0.51	0.61	1.00	0.81	0.48	0.18	0.16	0.12	0.26	0.28	-0.07	0.07	-0.09	0.29
Int 19	0.58	0.74	0.74	0.77	0.57	0.78	0.92	0.40	0.41	0.52	0.65	0.60	0.44	0.65	0.68	0.55	0.62	0.81	1.00	0.64	0.19	0.11	0.11	0.30	0.28	-0.05	0.05	-0.13	0.05
Int 20	0.79	0.87	0.71	0.68	0.73	0.82	0.73	0.40	0.54	0.50	0.62	0.79	0.37	0.60	0.76	0.65	0.67	0.48	0.64	1.00	0.10	-0.05	-0.02	0.39	0.40	0.10	0.10	-0.21	-0.25
Int 21	0.08	0.09	0.20	0.14	0.05	0.16	0.23	0.23	0.11	0.34	0.25	0.14	0.35	0.21	0.31	0.26	0.27	0.18	0.19	0.10	1.00	0.40	-0.01	0.59	0.14	0.07	-0.05	-0.07	0.09
Int 22	-0.05	0.01	0.03	0.05	-0.05	-0.01	-0.05	0.12	0.23	0.22	0.10	-0.04	0.15	0.12	-0.03	0.07	0.13	0.16	0.11	-0.05	0.40	1.00	-0.39	0.22	0.05	0.02	-0.10	-0.25	0.12
Int 23	-0.17	-0.06	-0.11	-0.04	-0.14	0.04	-0.02	0.32	-0.08	-0.18	0.06	-0.11	0.44	0.11	-0.12	0.05	0.10	0.12	0.11	-0.02	-0.01	-0.39	1.00	0.13	-0.03	-0.19	-0.32	0.06	0.31
Int 24	0.18	0.28	0.16	0.19	0.21	0.30	0.37	0.37	0.18	0.16	0.38	0.20	0.28	0.28	0.30	0.42	0.45	0.26	0.30	0.39	0.59	0.22	0.13	1.00	0.40	0.06	0.08	-0.01	0.04
Int 25	0.42	0.49	0.35	0.42	0.34	0.46	0.36	0.51	0.31	0.35	0.29	0.40	0.47	0.23	0.46	0.46	0.60	0.28	0.28	0.40	0.14	0.05	-0.03	0.40	1.00	0.01	0.09	0.11	0.24
Int 26	0.10	0.01	-0.11	-0.09	-0.03	-0.01	0.00	0.19	0.03	0.02	-0.07	0.04	-0.14	-0.09	0.06	0.15	0.01	-0.07	-0.05	0.10	0.07	0.02	-0.19	0.06	0.01	1.00	0.04	-0.34	-0.52
Int 27	0.11	0.04	0.06	0.04	-0.01	0.03	0.12	0.03	-0.07	-0.04	-0.15	0.00	-0.21	-0.08	0.02	0.08	-0.02	0.07	0.05	0.10	-0.05	-0.10	-0.32	0.08	0.09	0.04	1.00	0.12	-0.14
Int 28	-0.25	-0.18	-0.11	-0.10	-0.14	-0.22	-0.14	-0.13	-0.20	-0.24	-0.23	-0.20	-0.11	-0.16	-0.19	-0.19	-0.07	-0.09	-0.13	-0.21	-0.07	-0.25	0.06	-0.01	0.11	-0.34	0.12	1.00	0.10
Int 29	-0.21	-0.08	0.04	0.09	-0.14	0.05	-0.03	0.17	-0.03	0.16	-0.03	-0.15	0.52	0.06	-0.09	-0.08	0.19	0.29	0.05	-0.25	0.09	0.12	0.31	0.04	0.24	-0.52	-0.14	0.10	1.00

Table A25 Cross-correlations of the monthly intervening flows for month 11

Mon11	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.89	0.80	0.75	0.66	0.68	0.67	0.34	0.65	0.34	0.66	0.88	0.12	0.35	0.72	0.56	0.53	0.32	0.51	0.66	0.16	0.04	-0.24	0.19	0.44	0.18	0.04	0.04	-0.21
Int 2	0.89	1.00	0.85	0.78	0.75	0.78	0.74	0.32	0.59	0.28	0.65	0.87	0.05	0.37	0.85	0.66	0.56	0.27	0.50	0.82	0.03	0.07	-0.23	0.27	0.50	0.07	-0.04	0.11	-0.25
Int 3	0.80	0.85	1.00	0.90	0.61	0.74	0.74	0.33	0.56	0.16	0.58	0.74	0.20	0.48	0.75	0.52	0.51	0.49	0.59	0.65	0.15	0.18	-0.09	0.18	0.37	0.01	-0.04	0.13	-0.09
Int 4	0.75	0.78	0.90	1.00	0.46	0.70	0.74	0.47	0.50	0.16	0.52	0.65	0.48	0.56	0.79	0.63	0.66	0.71	0.71	0.69	0.37	0.23	-0.11	0.23	0.27	-0.03	-0.10	0.20	0.00
Int 5	0.66	0.75	0.61	0.46	1.00	0.63	0.71	0.13	0.36	0.19	0.57	0.74	-0.16	0.16	0.51	0.40	0.30	0.22	0.38	0.44	0.05	-0.02	-0.21	0.13	0.64	0.00	-0.14	0.13	-0.28
Int 6	0.68	0.78	0.74	0.70	0.63	1.00	0.83	0.26	0.45	0.12	0.67	0.70	0.27	0.54	0.75	0.56	0.60	0.57	0.68	0.71	0.23	0.07	-0.11	0.25	0.43	-0.08	-0.17	0.09	-0.16
Int 7	0.67	0.74	0.74	0.74	0.71	0.83	1.00	0.31	0.45	0.07	0.59	0.74	0.05	0.33	0.71	0.53	0.49	0.49	0.71	0.61	0.09	0.19	-0.11	0.20	0.54	0.09	-0.11	0.09	-0.22
Int 8	0.34	0.32	0.33	0.47	0.13	0.26	0.31	1.00	0.18	0.08	0.30	0.28	0.57	0.13	0.50	0.53	0.62	0.38	0.29	0.35	0.31	0.30	-0.06	0.33	0.07	0.20	0.05	0.31	0.16
Int 9	0.65	0.59	0.56	0.50	0.36	0.45	0.45	0.18	1.00	0.37	0.66	0.63	0.12	0.53	0.41	0.44	0.42	0.16	0.27	0.31	0.12	0.00	-0.16	0.16	0.31	0.11	0.06	-0.07	-0.06
Int 10	0.34	0.28	0.16	0.16	0.19	0.12	0.07	0.08	0.37	1.00	0.17	0.25	-0.03	0.29	0.20	0.29	0.35	0.05	0.00	0.34	-0.09	0.12	-0.35	0.09	0.14	0.13	0.03	-0.25	-0.12
Int 11	0.66	0.65	0.58	0.52	0.57	0.67	0.59	0.30	0.66	0.17	1.00	0.70	0.29	0.55	0.66	0.62	0.62	0.20	0.40	0.66	0.06	-0.01	-0.09	0.21	0.47	0.01	0.08	0.24	-0.13
Int 12	0.88	0.87	0.74	0.65	0.74	0.70	0.74	0.28	0.63	0.25	0.70	1.00	-0.03	0.30	0.70	0.52	0.40	0.27	0.47	0.61	0.06	-0.01	-0.23	0.23	0.49	0.12	-0.05	0.01	-0.30
Int 13	0.12	0.05	0.20	0.48	-0.16	0.27	0.05	0.57	0.12	-0.03	0.29	-0.03	1.00	0.45	0.36	0.59	0.59	0.47	0.30	0.39	0.41	0.25	0.20	0.31	-0.23	-0.09	-0.05	0.19	0.36
Int 14	0.35	0.37	0.48	0.56	0.16	0.54	0.33	0.13	0.53	0.29	0.55	0.30	0.45	1.00	0.32	0.34	0.54	0.41	0.28	0.28	0.19	0.09	0.05	0.12	0.00	-0.07	-0.13	0.07	0.10
Int 15	0.72	0.85	0.75	0.79	0.51	0.75	0.71	0.50	0.41	0.20	0.66	0.70	0.36	0.32	1.00	0.64	0.62	0.60	0.69	0.87	0.37	0.13	-0.26	0.32	0.47	0.14	0.01	0.17	-0.20
Int 16	0.56	0.66	0.52	0.63	0.40	0.56	0.53	0.53	0.44	0.29	0.62	0.52	0.59	0.34	0.64	1.00	0.73	0.39	0.41	0.60	0.23	0.13	-0.14	0.30	0.32	0.09	-0.05	0.18	-0.09
Int 17	0.53	0.56	0.51	0.66	0.30	0.60	0.49	0.62	0.42	0.35	0.62	0.40	0.59	0.54	0.62	0.73	1.00	0.36	0.28	0.54	0.29	0.21	-0.16	0.30	0.19	0.02	0.03	0.26	0.13
Int 18	0.32	0.27	0.49	0.71	0.22	0.57	0.49	0.38	0.16	0.05	0.20	0.27	0.47	0.41	0.60	0.39	0.36	1.00	0.79	0.58	0.53	0.46	-0.16	0.37	0.10	0.02	-0.03	0.12	0.13
Int 19	0.51	0.50	0.59	0.71	0.38	0.68	0.71	0.29	0.27	0.00	0.40	0.47	0.30	0.28	0.69	0.41	0.28	0.79	1.00	0.71	0.53	0.45	-0.18	0.38	0.46	0.14	-0.12	0.16	-0.06
Int 20	0.66	0.82	0.65	0.69	0.44	0.71	0.61	0.35	0.31	0.34	0.66	0.61	0.39	0.28	0.87	0.60	0.54	0.58	0.71	1.00	0.33	-0.06	-0.30	0.37	0.39	0.12	-0.05	0.05	-0.28
Int 21	0.16	0.03	0.15	0.37	0.05	0.23	0.09	0.31	0.12	-0.09	0.06	0.06	0.41	0.19	0.37	0.23	0.29	0.53	0.53	0.33	1.00	0.39	-0.16	0.61	0.15	0.00	0.07	0.31	0.34
Int 22	0.04	0.07	0.18	0.23	-0.02	0.07	0.19	0.30	0.00	0.12	-0.01	-0.01	0.25	0.09	0.13	0.13	0.21	0.46	0.45	-0.06	0.39	1.00	-0.18	0.66	0.20	0.09	0.17	0.36	0.31
Int 23	-0.24	-0.23	-0.09	-0.11	-0.21	-0.11	-0.11	-0.06	-0.16	-0.35	-0.09	-0.23	0.20	0.05	-0.26	-0.14	-0.16	-0.16	-0.18	-0.30	-0.16	-0.18	1.00	-0.24	-0.38	-0.30	-0.08	-0.07	0.18
Int 24	0.19	0.27	0.18	0.23	0.13	0.25	0.20	0.33	0.16	0.09	0.21	0.23	0.31	0.12	0.32	0.30	0.30	0.37	0.38	0.37	0.61	0.66	-0.24	1.00	0.27	0.18	0.22	0.27	0.18
Int 25	0.44	0.50	0.37	0.27	0.64	0.43	0.54	0.07	0.31	0.14	0.47	0.49	-0.23	0.00	0.47	0.32	0.19	0.10	0.46	0.39	0.15	0.20	-0.38	0.27	1.00	0.13	-0.01	0.09	-0.17
Int 26	0.18	0.07	0.01	-0.03	0.00	-0.08	0.09	0.20	0.11	0.13	0.01	0.12	-0.09	-0.07	0.14	0.09	0.02	0.02	0.14	0.12	0.00	0.09	-0.30	0.18	0.13	1.00	0.14	-0.35	-0.33
Int 27	0.04	-0.04	-0.04	-0.10	-0.14	-0.17	-0.11	0.05	0.06	0.03	0.08	-0.05	-0.05	-0.13	0.01	-0.05	0.03	-0.03	-0.12	-0.05	0.07	0.17	-0.08	0.22	-0.01	0.14	1.00	-0.13	-0.11
Int 28	0.04	0.11	0.13	0.20	0.13	0.09	0.09	0.31	-0.07	-0.25	0.24	0.01	0.19	0.07	0.17	0.18	0.26	0.12	0.16	0.05	0.31	0.36	-0.07	0.27	0.09	-0.35	-0.13	1.00	0.16
Int 29	-0.21	-0.25	-0.09	0.00	-0.28	-0.16	-0.22	0.16	-0.06	-0.12	-0.13	-0.30	0.36	0.10	-0.20	-0.09	0.13	0.13	-0.06	-0.28	0.34	0.31	0.18	0.18	-0.17	-0.33	-0.11	0.16	1.00

Table A26 Cross-correlations of the monthly intervening flows for month 12

Mon12	Int 1	Int 2	Int 3	Int 4	Int 5	Int 6	Int 7	Int 8	Int 9	Int 10	Int 11	Int 12	Int 13	Int 14	Int 15	Int 16	Int 17	Int 18	Int 19	Int 20	Int 21	Int 22	Int 23	Int 24	Int 25	Int 26	Int 27	Int 28	Int 29
Int 1	1.00	0.77	0.75	0.68	0.34	0.62	0.54	0.08	0.54	0.12	0.50	0.75	0.22	0.41	0.70	0.34	0.54	0.48	0.42	0.50	0.16	0.19	-0.13	0.17	0.02	0.10	-0.01	-0.05	-0.34
Int 2	0.77	1.00	0.82	0.76	0.51	0.76	0.67	-0.06	0.50	0.23	0.45	0.73	0.06	0.39	0.76	0.39	0.49	0.43	0.49	0.49	0.06	0.18	-0.10	0.16	0.05	-0.01	0.04	0.16	-0.34
Int 3	0.75	0.82	1.00	0.86	0.57	0.71	0.72	-0.01	0.43	0.08	0.32	0.61	0.05	0.34	0.61	0.29	0.35	0.64	0.61	0.44	0.03	0.29	0.01	0.08	0.01	0.00	-0.01	0.05	-0.27
Int 4	0.68	0.76	0.86	1.00	0.34	0.71	0.80	-0.12	0.48	0.00	0.38	0.61	0.48	0.47	0.77	0.58	0.35	0.79	0.74	0.52	0.35	0.36	-0.25	0.11	-0.03	-0.02	-0.01	-0.02	-0.27
Int 5	0.34	0.51	0.57	0.34	1.00	0.58	0.62	-0.15	0.26	0.11	0.27	0.36	-0.16	0.24	0.19	0.16	0.20	0.44	0.36	0.24	-0.12	0.18	-0.11	-0.09	0.09	-0.21	0.01	0.16	-0.22
Int 6	0.62	0.76	0.71	0.71	0.58	1.00	0.84	0.04	0.42	0.12	0.50	0.70	0.24	0.54	0.72	0.33	0.35	0.64	0.62	0.48	0.21	0.21	-0.11	0.16	0.12	-0.13	-0.06	0.05	-0.28
Int 7	0.54	0.67	0.72	0.80	0.62	0.84	1.00	0.06	0.27	0.09	0.39	0.57	0.06	0.46	0.49	0.35	0.31	0.70	0.74	0.40	0.04	0.31	0.05	0.10	0.10	0.04	0.07	0.06	-0.40
Int 8	0.08	-0.06	-0.01	-0.12	-0.15	0.04	0.06	1.00	0.02	-0.30	0.08	0.02	0.44	-0.06	0.08	0.10	0.23	0.05	0.14	0.14	0.37	0.19	0.05	0.26	0.02	-0.03	0.15	0.13	0.16
Int 9	0.54	0.50	0.43	0.48	0.26	0.42	0.27	0.02	1.00	0.05	0.64	0.52	0.24	0.45	0.37	0.47	0.17	0.13	0.27	0.40	0.12	0.02	-0.05	0.03	0.14	-0.06	-0.06	-0.02	-0.14
Int 10	0.12	0.23	0.08	0.00	0.11	0.12	0.09	-0.30	0.05	1.00	0.03	0.13	-0.23	-0.05	0.18	0.16	0.10	0.13	0.07	0.24	0.13	0.06	-0.05	0.13	0.23	-0.07	0.23	-0.01	-0.03
Int 11	0.50	0.45	0.32	0.38	0.27	0.50	0.39	0.08	0.64	0.03	1.00	0.60	0.19	0.47	0.52	0.26	0.27	0.14	0.28	0.41	0.06	0.02	-0.06	0.25	0.16	-0.02	-0.12	0.16	-0.29
Int 12	0.75	0.73	0.61	0.61	0.36	0.70	0.57	0.02	0.52	0.13	0.60	1.00	0.12	0.57	0.78	0.20	0.46	0.41	0.38	0.39	0.19	0.14	-0.02	0.26	0.14	0.02	0.03	0.10	-0.21
Int 13	0.22	0.06	0.05	0.48	-0.16	0.24	0.06	0.44	0.24	-0.23	0.19	0.12	1.00	0.08	0.39	0.72	0.04	0.36	0.61	0.50	0.53	0.13	-0.03	0.08	-0.26	-0.27	-0.21	-0.01	0.08
Int 14	0.41	0.39	0.34	0.47	0.24	0.54	0.46	-0.06	0.45	-0.05	0.47	0.57	0.08	1.00	0.43	0.25	0.40	0.38	0.41	0.32	0.39	0.08	0.08	0.44	0.16	-0.06	0.08	-0.12	-0.12
Int 15	0.70	0.76	0.61	0.77	0.19	0.72	0.49	0.08	0.37	0.18	0.52	0.78	0.39	0.43	1.00	0.37	0.52	0.58	0.48	0.40	0.28	0.21	-0.27	0.28	-0.07	-0.07	0.02	0.08	-0.17
Int 16	0.34	0.39	0.29	0.58	0.16	0.33	0.35	0.10	0.47	0.16	0.26	0.20	0.72	0.25	0.37	1.00	0.56	0.36	0.61	0.59	0.49	0.19	-0.18	0.09	-0.06	0.01	0.33	0.07	-0.27
Int 17	0.54	0.49	0.35	0.35	0.20	0.35	0.31	0.23	0.17	0.10	0.27	0.46	0.04	0.40	0.52	0.56	1.00	0.22	0.31	0.42	0.55	0.26	-0.08	0.48	0.16	0.13	0.32	0.02	-0.18
Int 18	0.48	0.43	0.64	0.79	0.44	0.64	0.70	0.05	0.13	0.13	0.14	0.41	0.36	0.38	0.58	0.36	0.22	1.00	0.86	0.22	0.24	0.42	-0.23	0.10	-0.07	-0.13	0.05	-0.09	-0.04
Int 19	0.42	0.49	0.61	0.74	0.36	0.62	0.74	0.14	0.27	0.07	0.28	0.38	0.61	0.41	0.48	0.61	0.31	0.86	1.00	0.60	0.58	0.52	-0.13	0.20	0.03	0.09	0.11	-0.01	-0.27
Int 20	0.50	0.49	0.44	0.52	0.24	0.48	0.40	0.14	0.40	0.24	0.41	0.39	0.50	0.32	0.40	0.59	0.42	0.22	0.60	1.00	0.49	0.05	-0.05	0.25	0.39	0.10	0.11	0.10	-0.30
Int 21	0.16	0.06	0.03	0.35	-0.12	0.21	0.04	0.37	0.12	0.13	0.06	0.19	0.53	0.39	0.28	0.49	0.55	0.24	0.58	0.49	1.00	0.29	-0.05	0.87	0.39	-0.02	0.38	0.23	0.15
Int 22	0.19	0.18	0.29	0.36	0.18	0.21	0.31	0.19	0.02	0.06	0.02	0.14	0.13	0.08	0.21	0.19	0.26	0.42	0.52	0.05	0.29	1.00	-0.02	0.14	0.12	0.20	-0.05	-0.05	-0.16
Int 23	-0.13	-0.10	0.01	-0.25	-0.11	-0.11	0.05	0.05	-0.05	-0.05	-0.06	-0.02	-0.03	0.08	-0.27	-0.18	-0.08	-0.23	-0.13	-0.05	-0.05	-0.02	1.00	-0.02	0.01	-0.08	-0.07	0.00	-0.06
Int 24	0.17	0.16	0.08	0.11	-0.09	0.16	0.10	0.26	0.03	0.13	0.25	0.26	0.08	0.44	0.28	0.09	0.48	0.10	0.20	0.25	0.87	0.14	-0.02	1.00	0.41	-0.06	0.20	0.20	0.03
Int 25	0.02	0.05	0.01	-0.03	0.09	0.12	0.10	0.02	0.14	0.23	0.16	0.14	-0.26	0.16	-0.07	-0.06	0.16	-0.07	0.03	0.39	0.39	0.12	0.01	0.41	1.00	0.12	0.04	0.37	0.14
Int 26	0.10	-0.01	0.00	-0.02	-0.21	-0.13	0.04	-0.03	-0.06	-0.07	-0.02	0.02	-0.27	-0.06	-0.07	0.01	0.13	-0.13	0.09	0.10	-0.02	0.20	-0.08	-0.06	0.12	1.00	0.22	-0.22	-0.51
Int 27	-0.01	0.04	-0.01	-0.01	0.01	-0.06	0.07	0.15	-0.06	0.23	-0.12	0.03	-0.21	0.08	0.02	0.33	0.32	0.05	0.11	0.11	0.38	-0.05	-0.07	0.20	0.04	0.22	1.00	-0.05	-0.12
Int 28	-0.05	0.16	0.05	-0.02	0.16	0.05	0.06	0.13	-0.02	-0.01	0.16	0.10	-0.01	-0.12	0.08	0.07	0.02	-0.09	-0.01	0.10	0.23	-0.05	0.00	0.20	0.37	-0.22	-0.05	1.00	0.02
Int 29	-0.34	-0.34	-0.27	-0.27	-0.22	-0.28	-0.40	0.16	-0.14	-0.03	-0.29	-0.21	0.08	-0.12	-0.17	-0.27	-0.18	-0.04	-0.27	-0.30	0.15	-0.16	-0.06	0.03	0.14	-0.51	-0.12	0.02	1.00

Appendix B

Time series of yearly accumulated and intervening streamflows

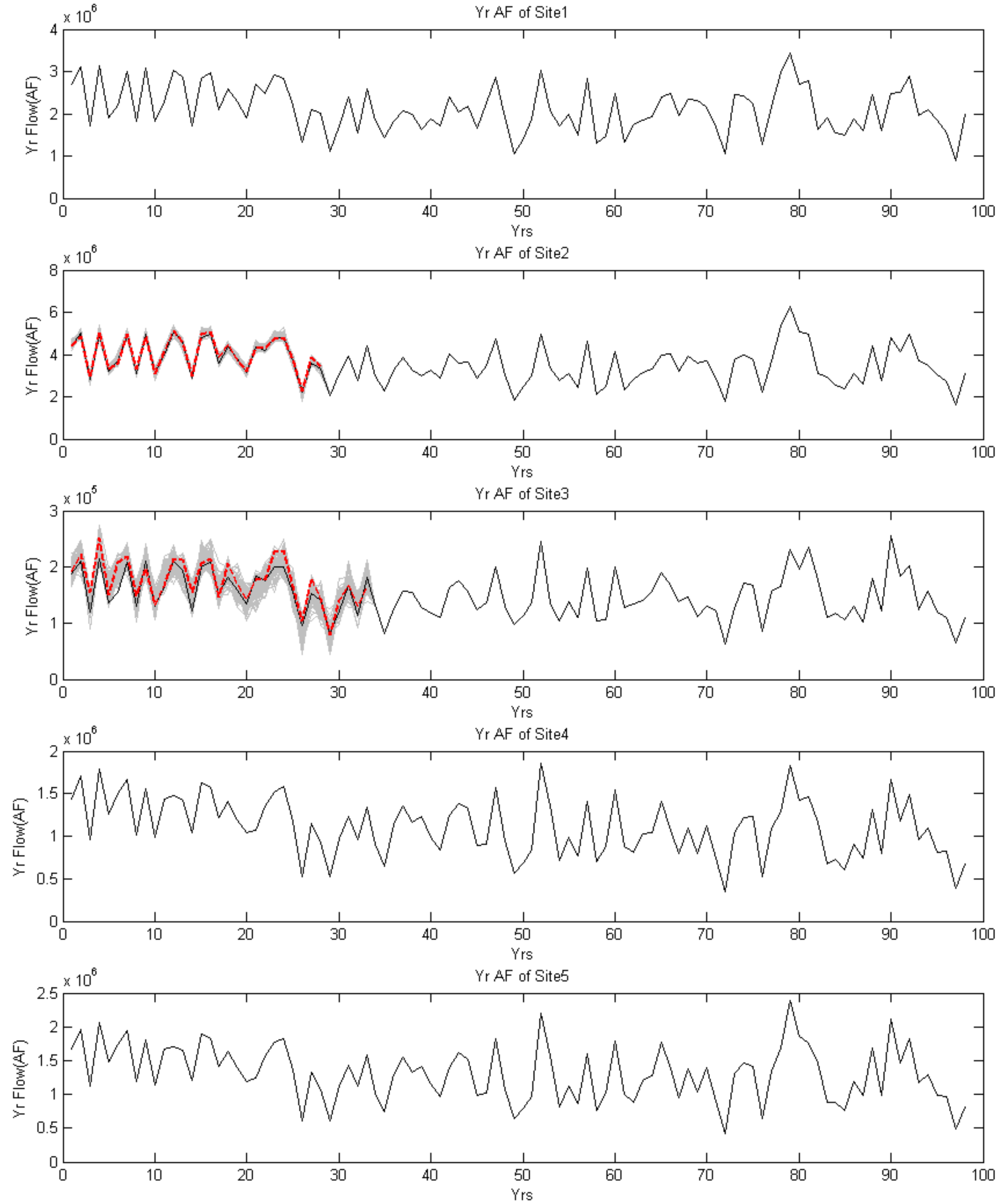


Figure B1. Time series of the yearly accumulated flow for sites 1-5(— : current, grey:100 samples,▪▪ : the new extension)

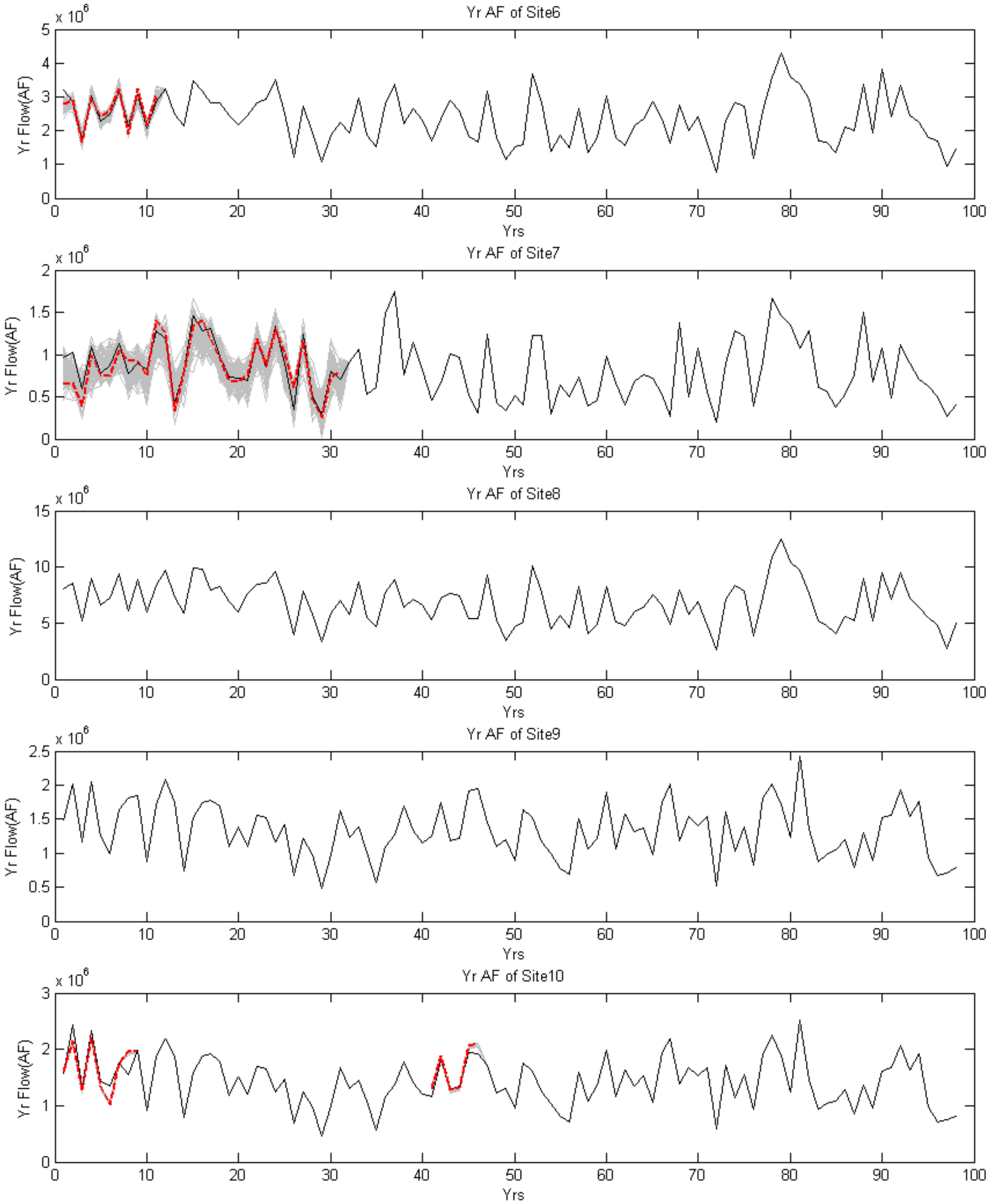


Figure B2 Time series of the yearly accumulated flow for sites 6-10(— : current, grey:100 samples,▪▪ : the new extension)

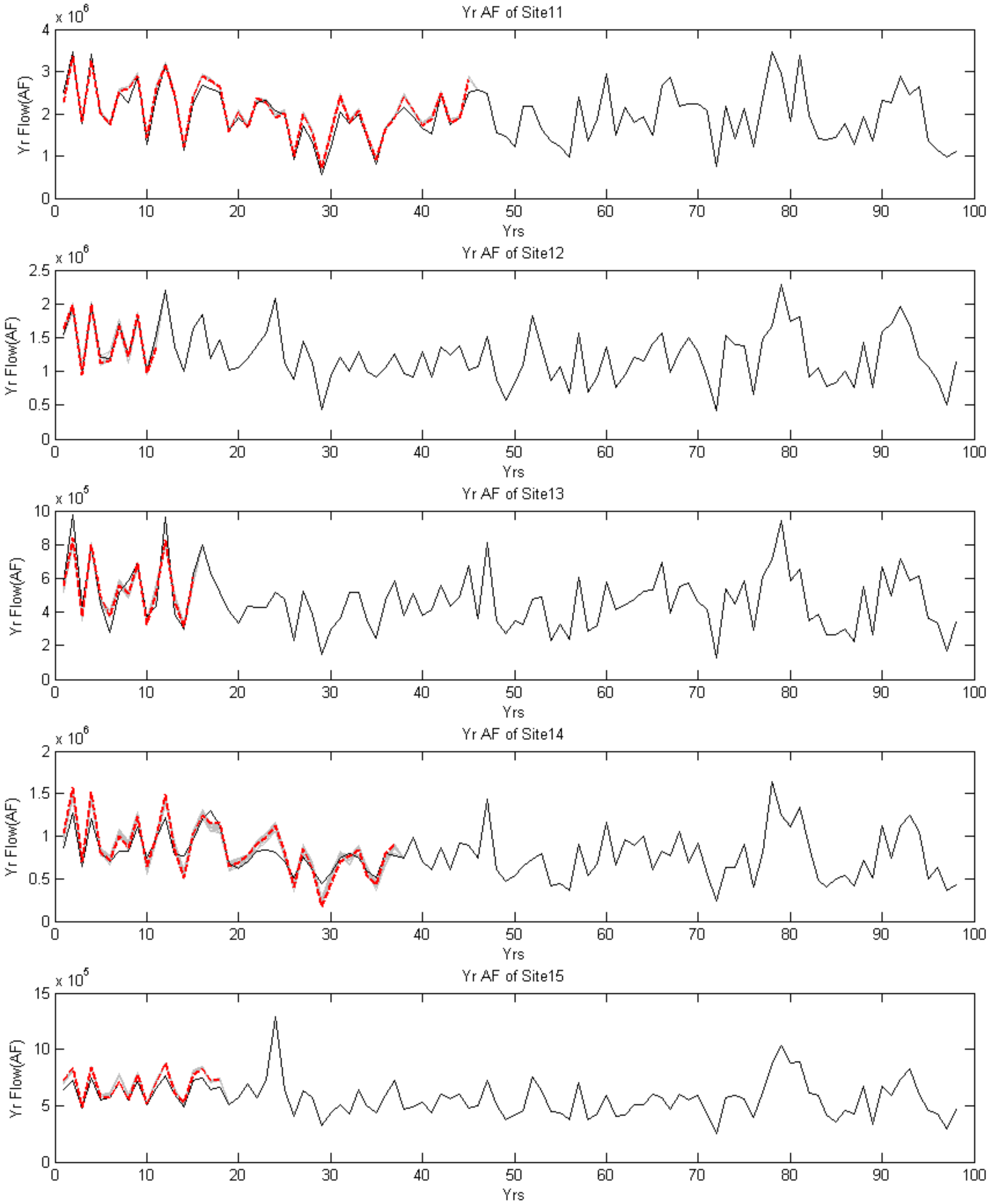


Figure B3 Time series of the yearly accumulated flow for sites 11-15(— : current, grey:100 samples, ▪▪ : the new extension)

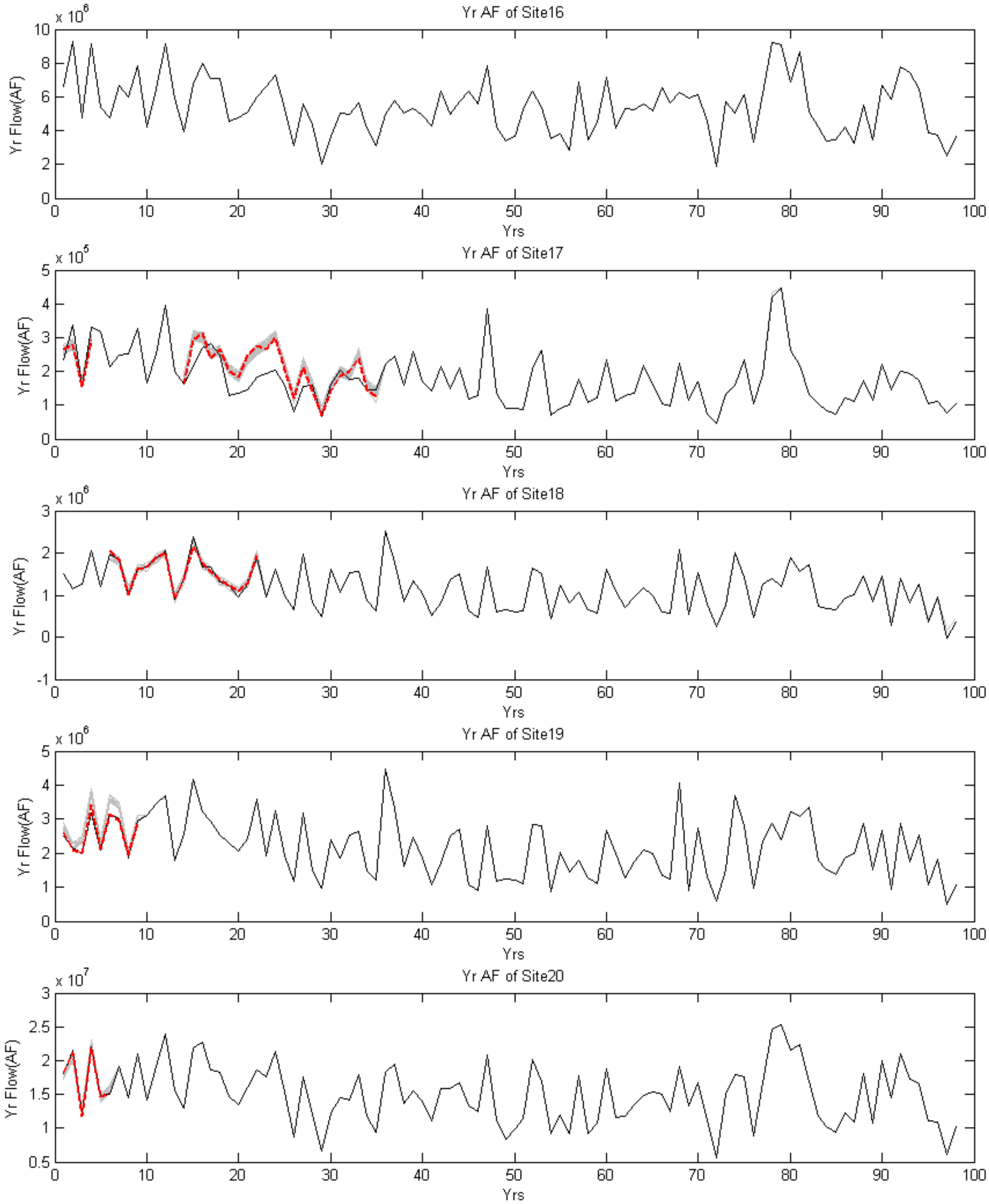


Figure B4 Time series of the yearly accumulated flow for sites 16-20(— : current, grey:100 samples,▪▪ : the new extension)

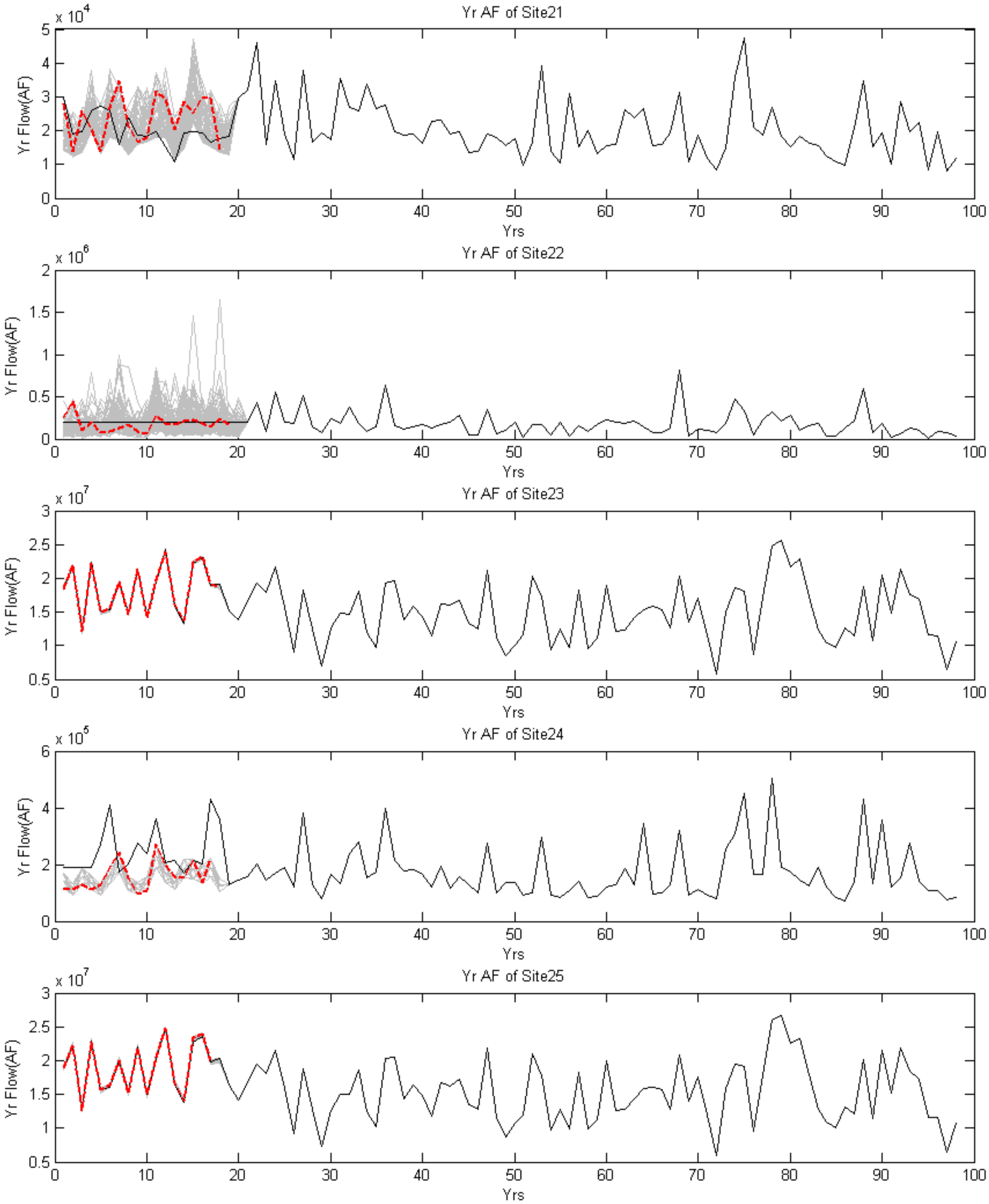


Figure B5 Time series of the yearly accumulated flow for sites 21-25(— : current, grey:100 samples, ▪▪ : the new extension)

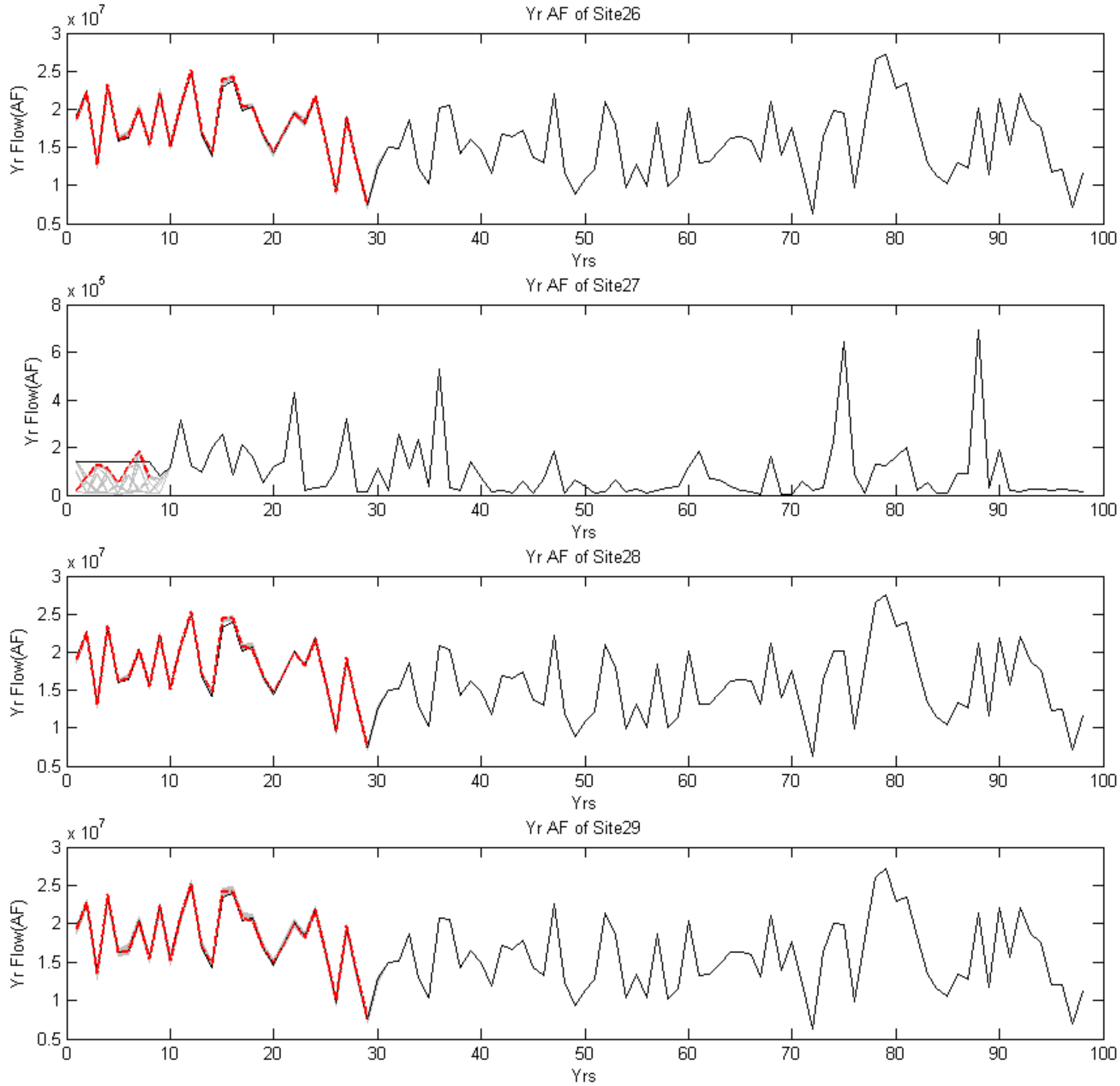


Figure B6. Time series of the yearly accumulated flow for sites 26-29(— : current, grey:100 samples,▪▪ : the new extension)

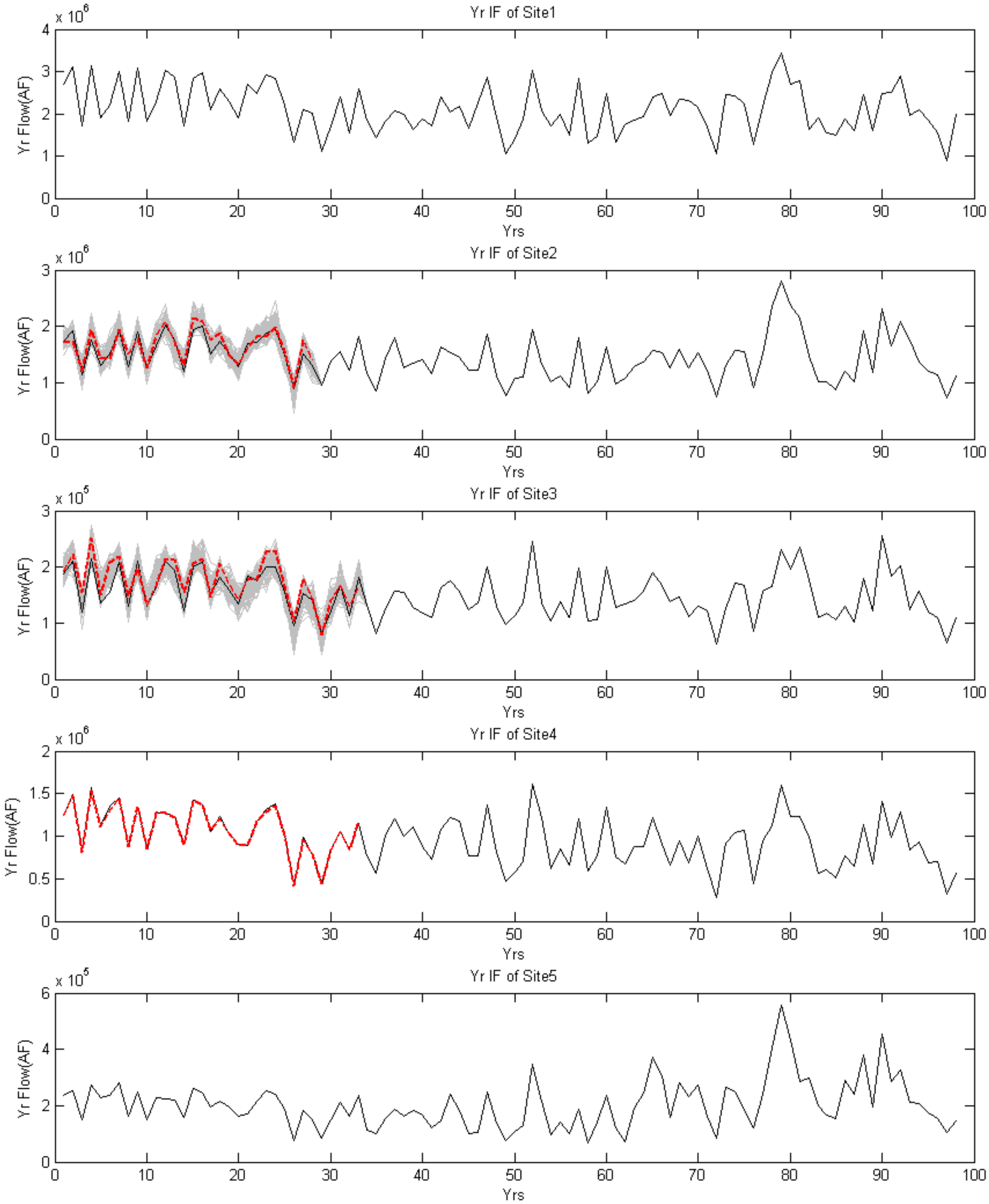


Figure B7 Time series of the yearly intervening flow for sites 1-5(— : current, grey:100 samples,▪▪ : the new extension)

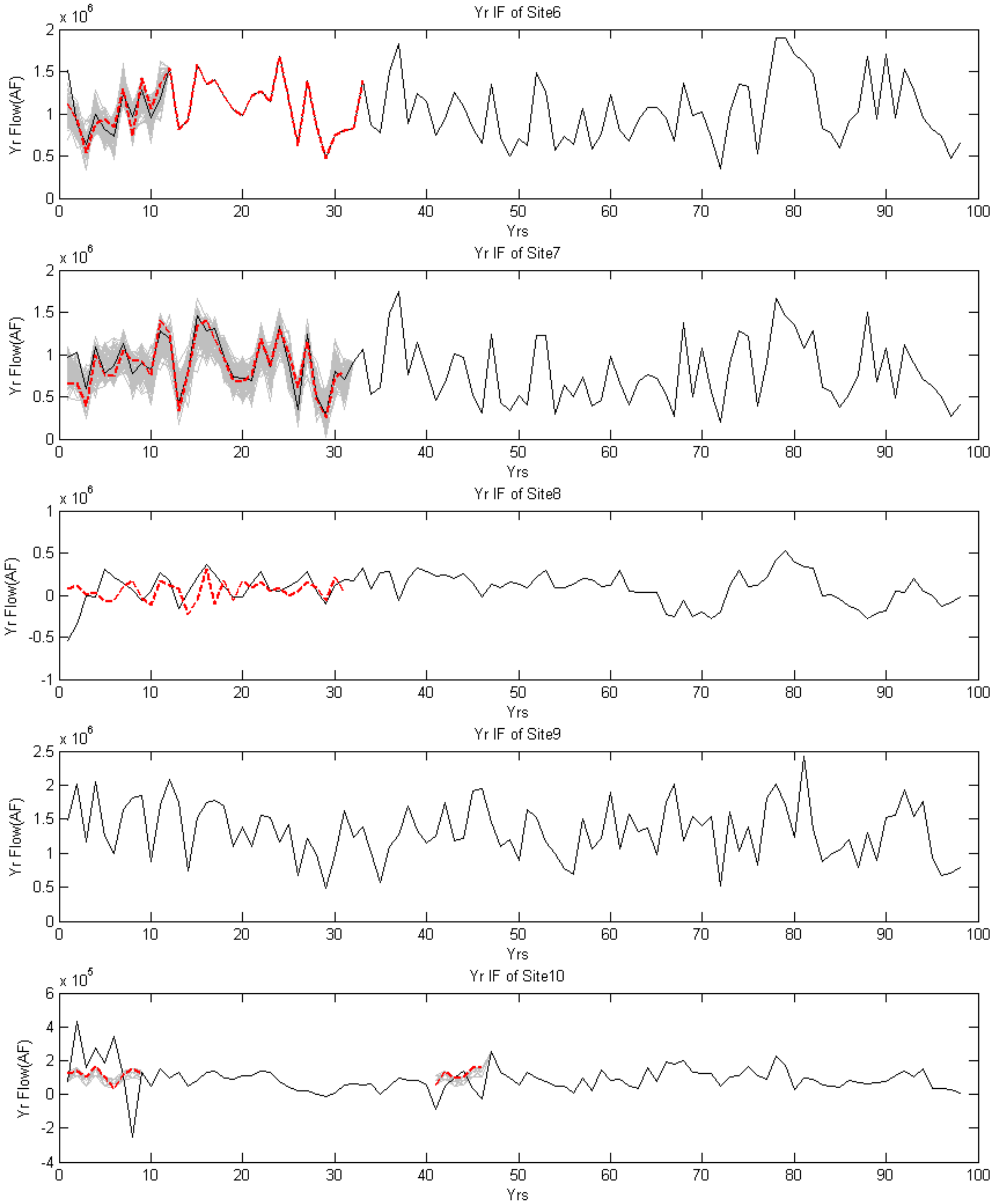


Figure B8 Time series of the yearly intervening flow for sites 6-10(— : current, grey:100 samples,▪▪ : the new extension)

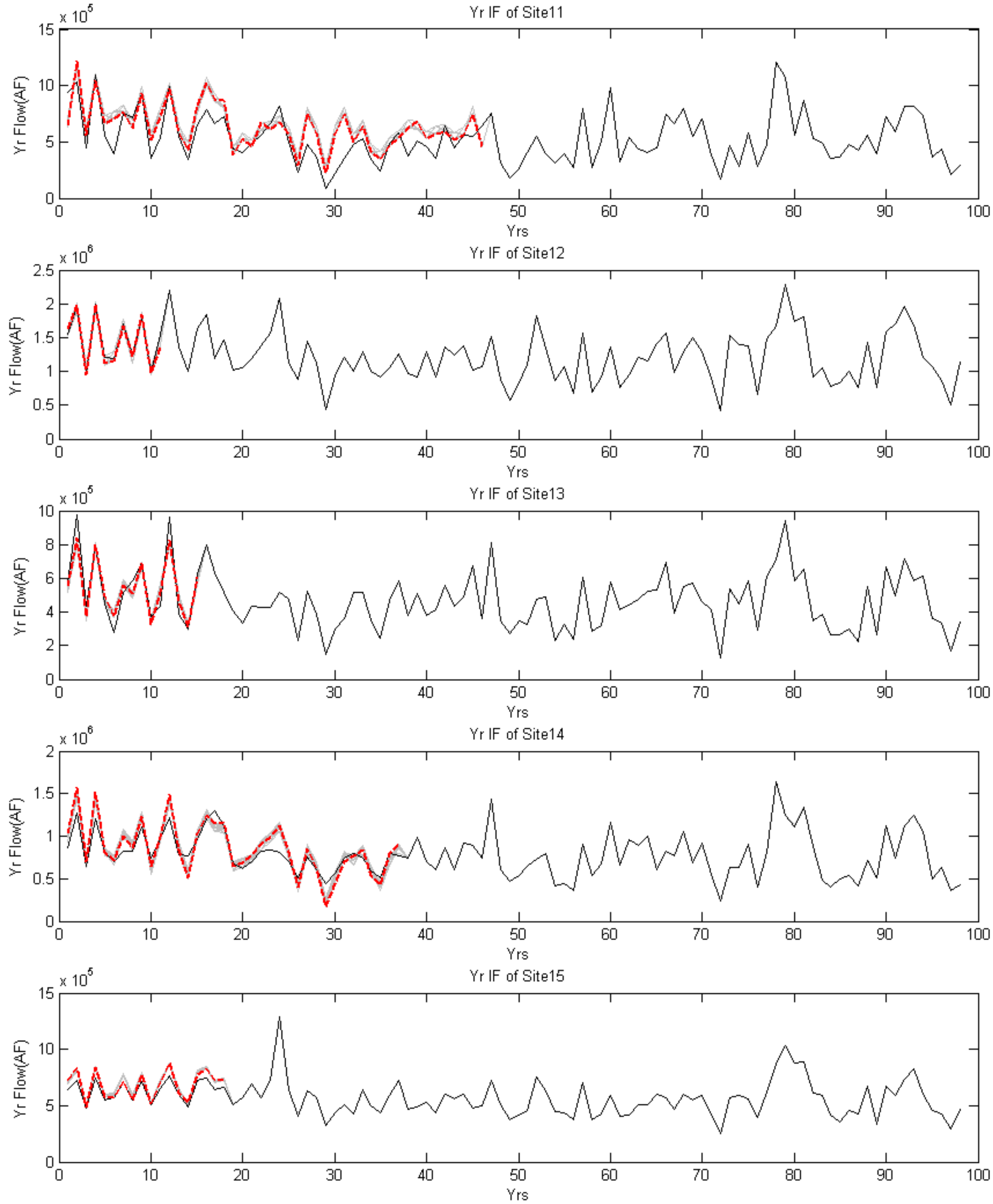


Figure B9. Time series of the yearly intervening flow for sites 11-15 (— : current, grey:100 samples, ▪▪ : the new extension)

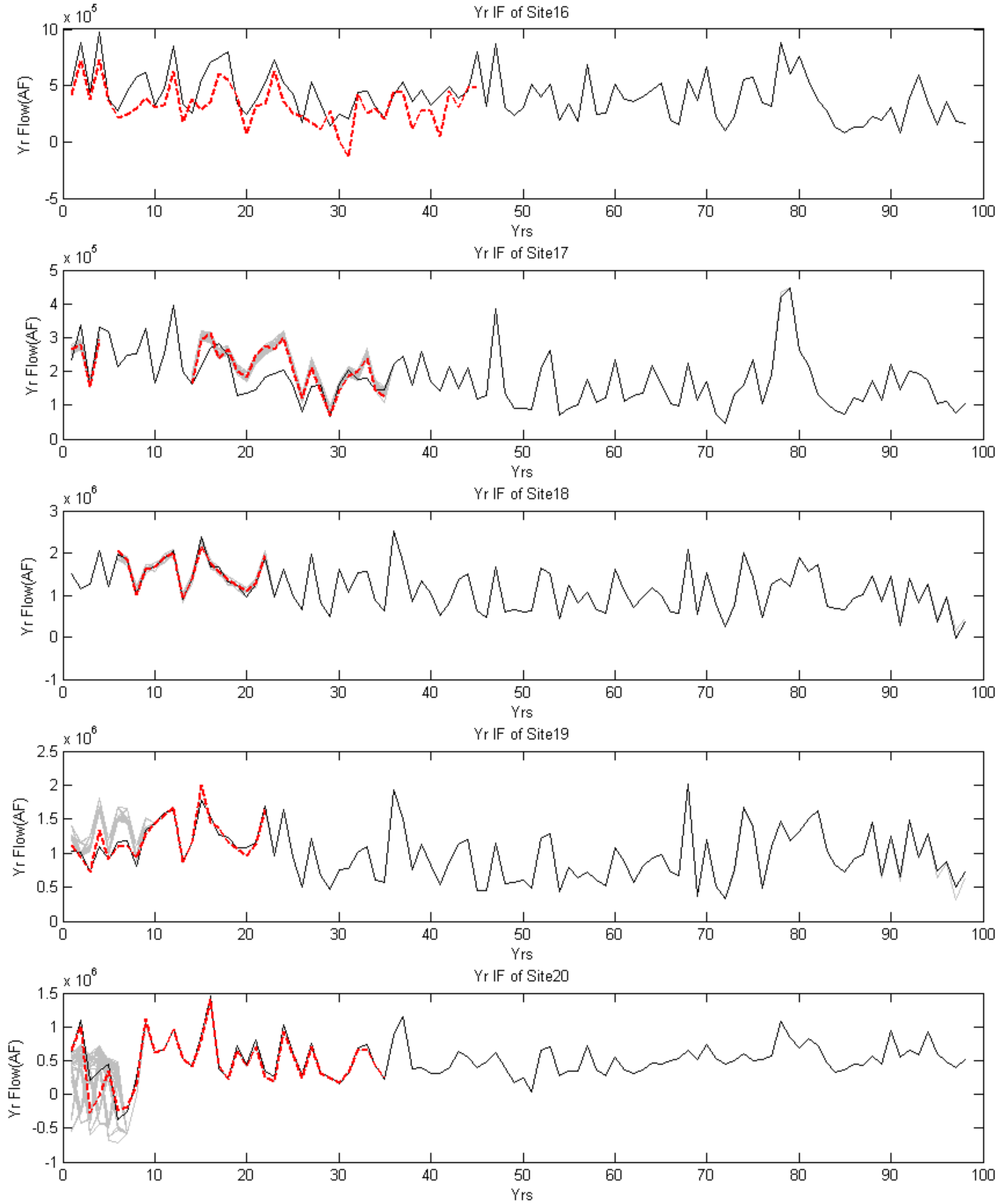


Figure B10. Time series of the yearly intervening flow for sites 16-20(— : current, grey:100 samples, ▪▪ : the new extension)

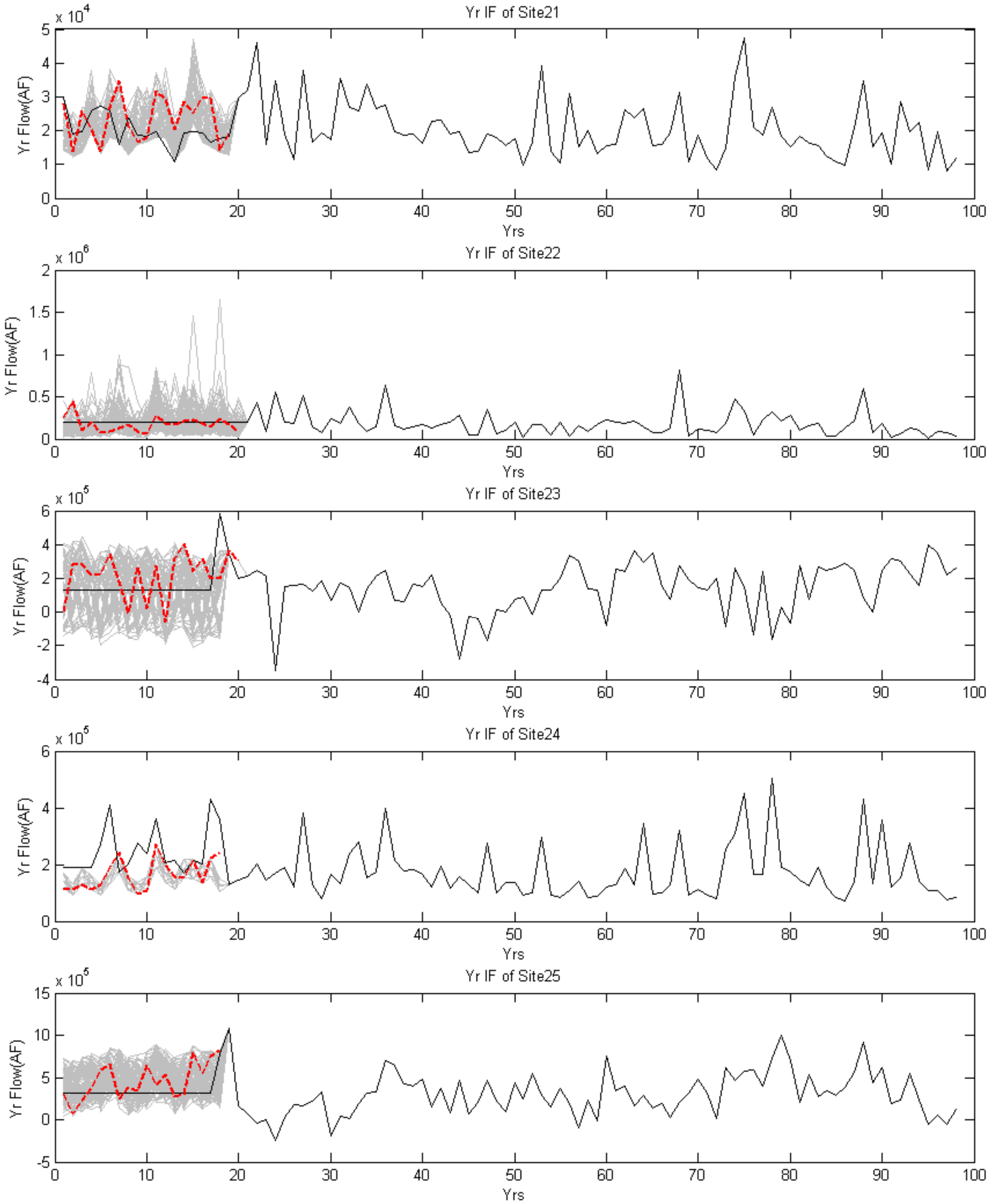


Figure B11 Time series of the yearly intervening flow for sites 21-25(— : current, grey:100 samples, ▪▪ : the new extension)

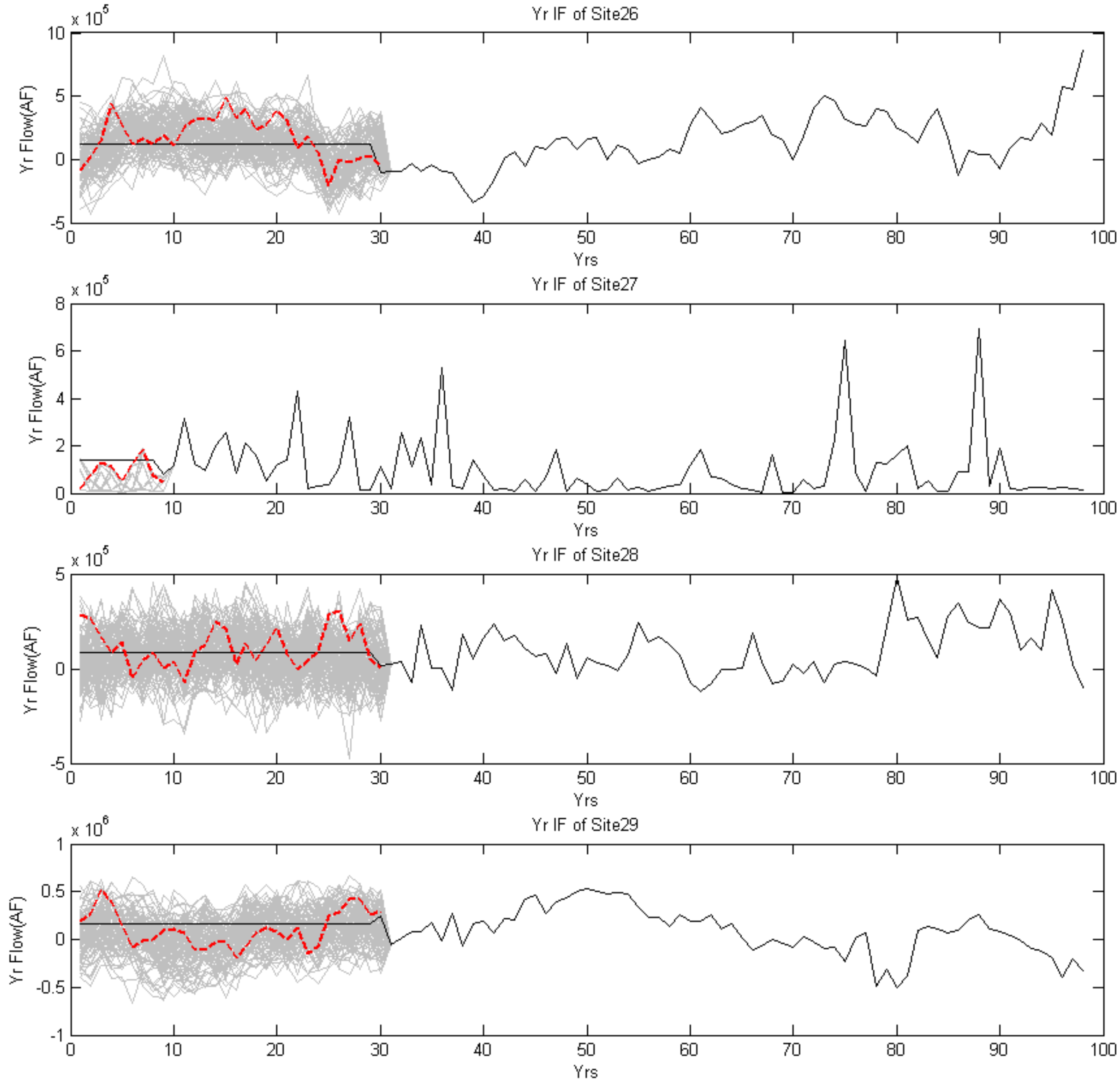


Figure B12 Time series of the yearly intervening flow for sites 26-29(— : current, grey:100 samples, ▪▪ : the new extension)

Appendix C

Time series of monthly accumulated and intervening streamflows of the Colorado River at 29 stations

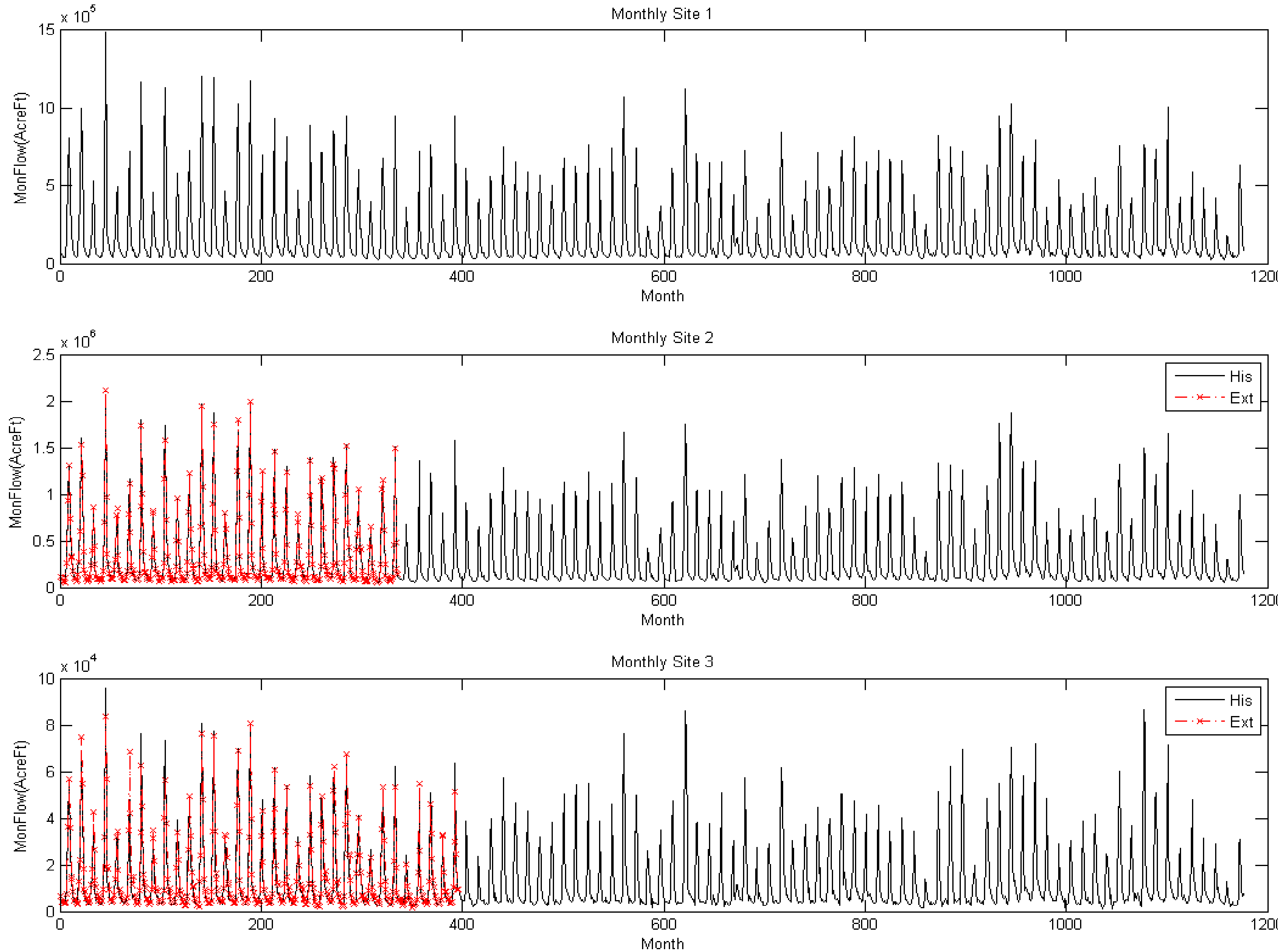


Figure C1 Time series of the accumulated streamflow for site 1-3 (— : current data, –x–: the new extension)

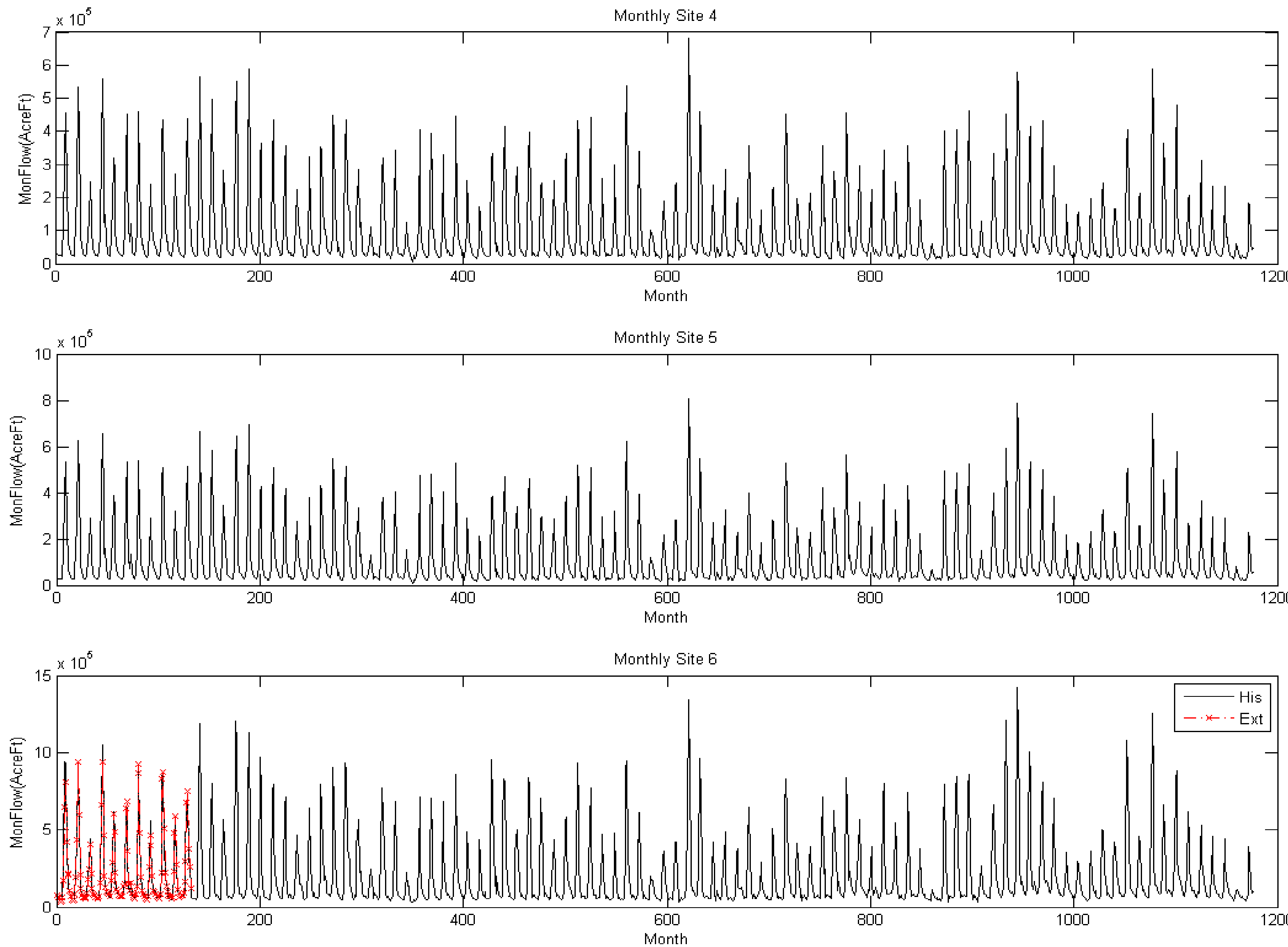


Figure C2 Time series of the accumulated streamflow for site 4-6 (— : current data, –x–: the new extension)

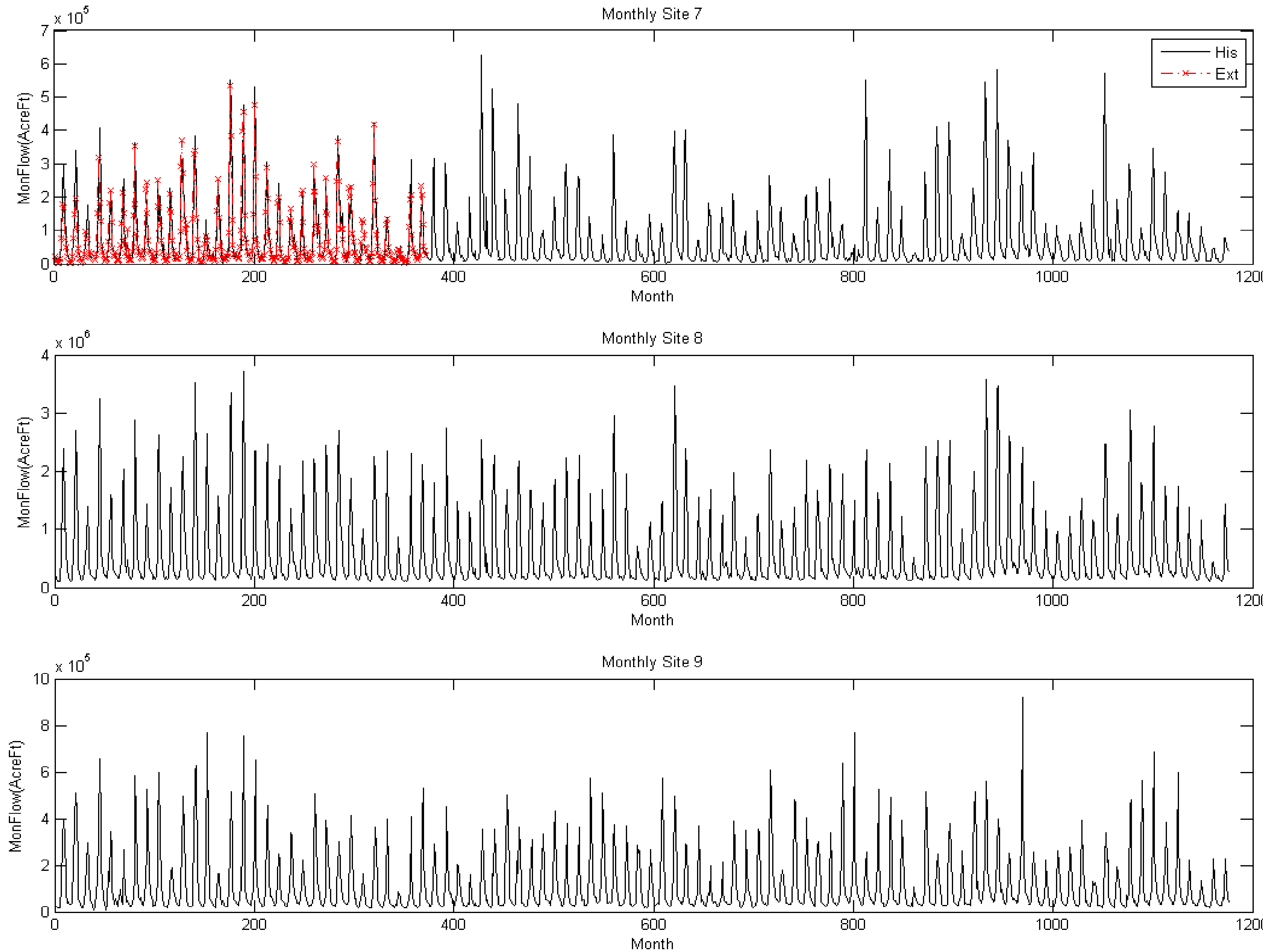


Figure C3 Time series of the accumulated streamflow for site 7-9 (— : current data, –x–: the new extension)

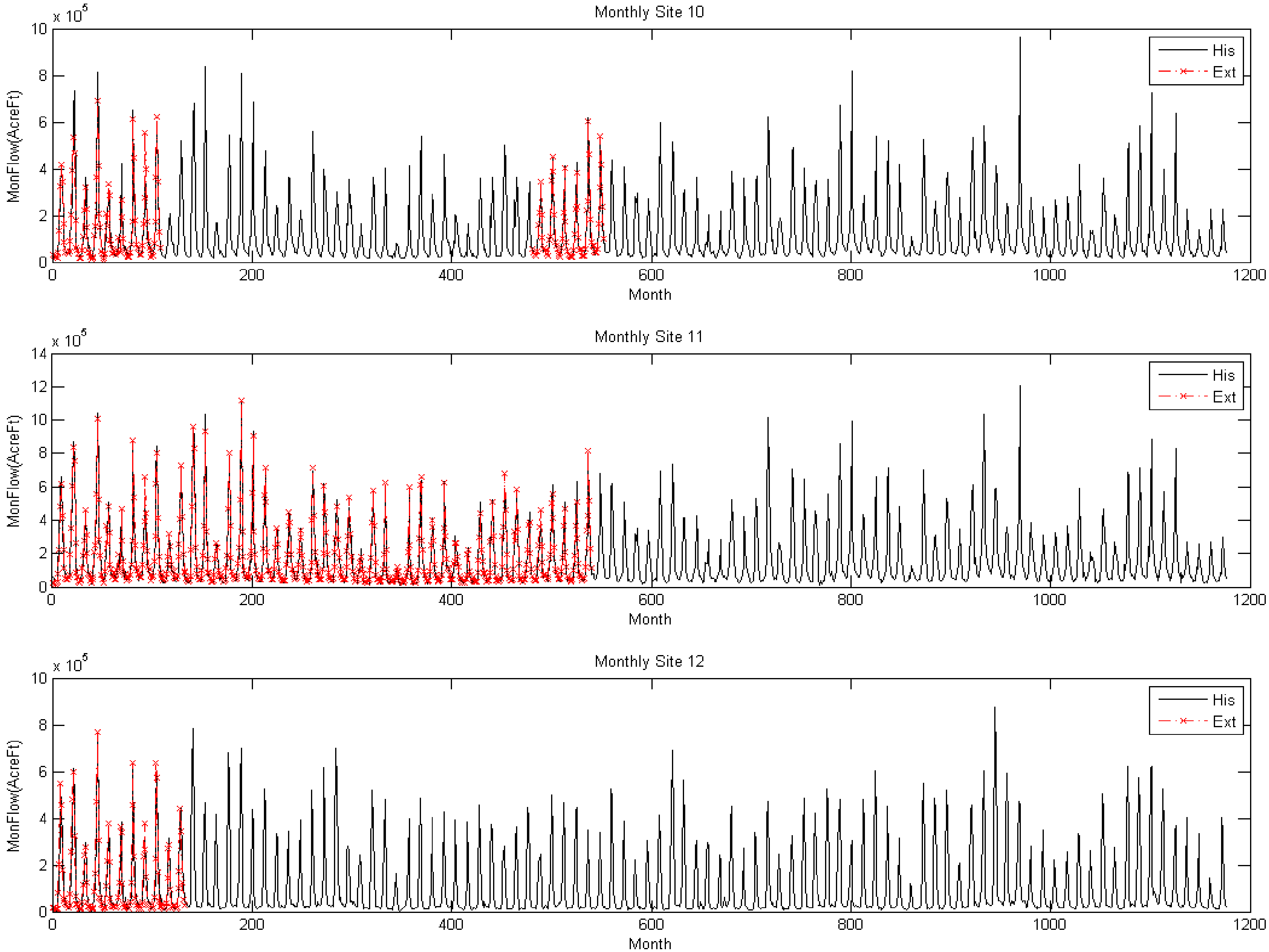


Figure C4 Time series of the accumulated streamflow for site 10-12(— : current data, –x–: the new extension)

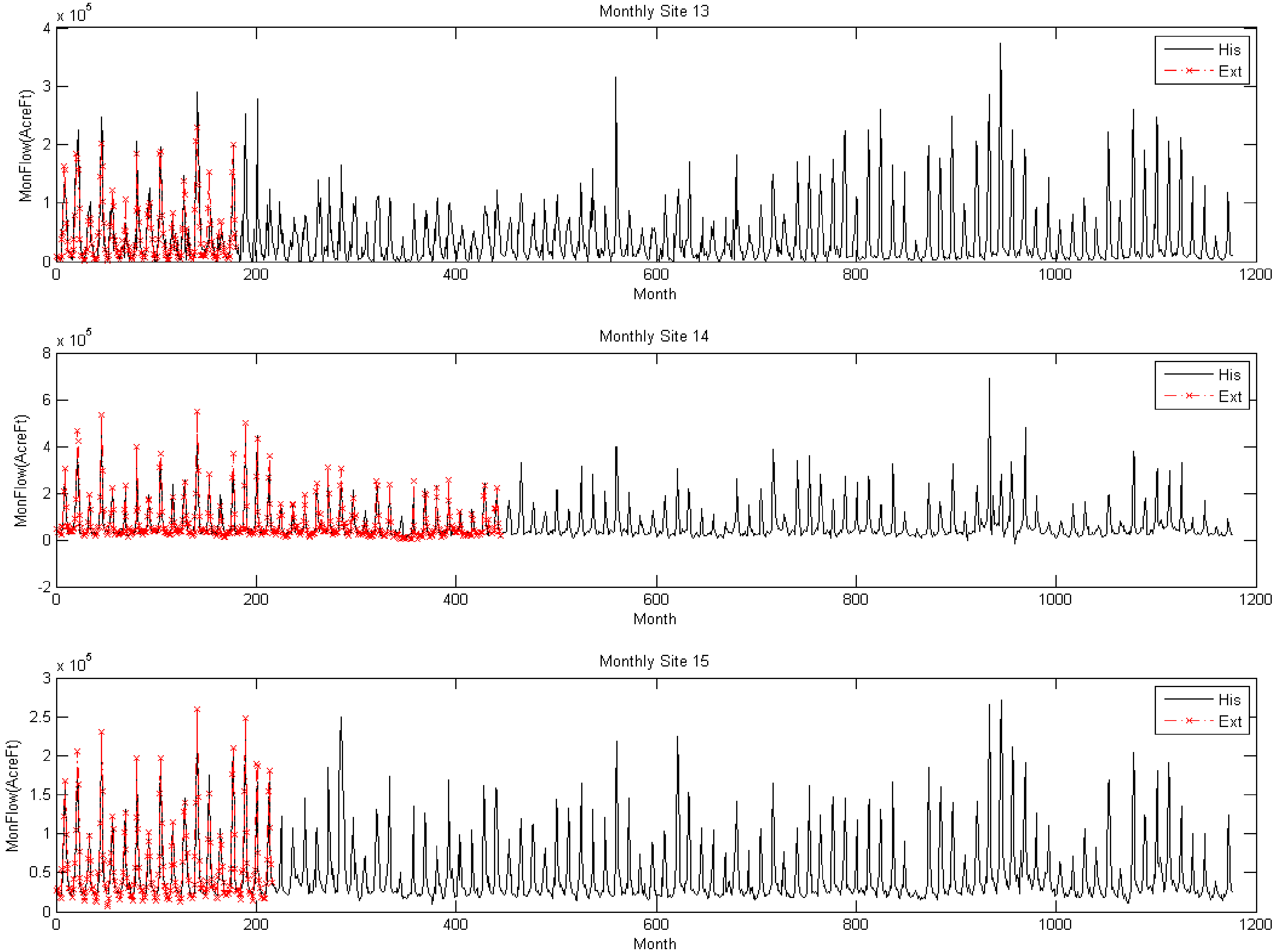


Figure C5 Time series of the accumulated streamflow for site 13-15(— : current data, –x–: the new extension)

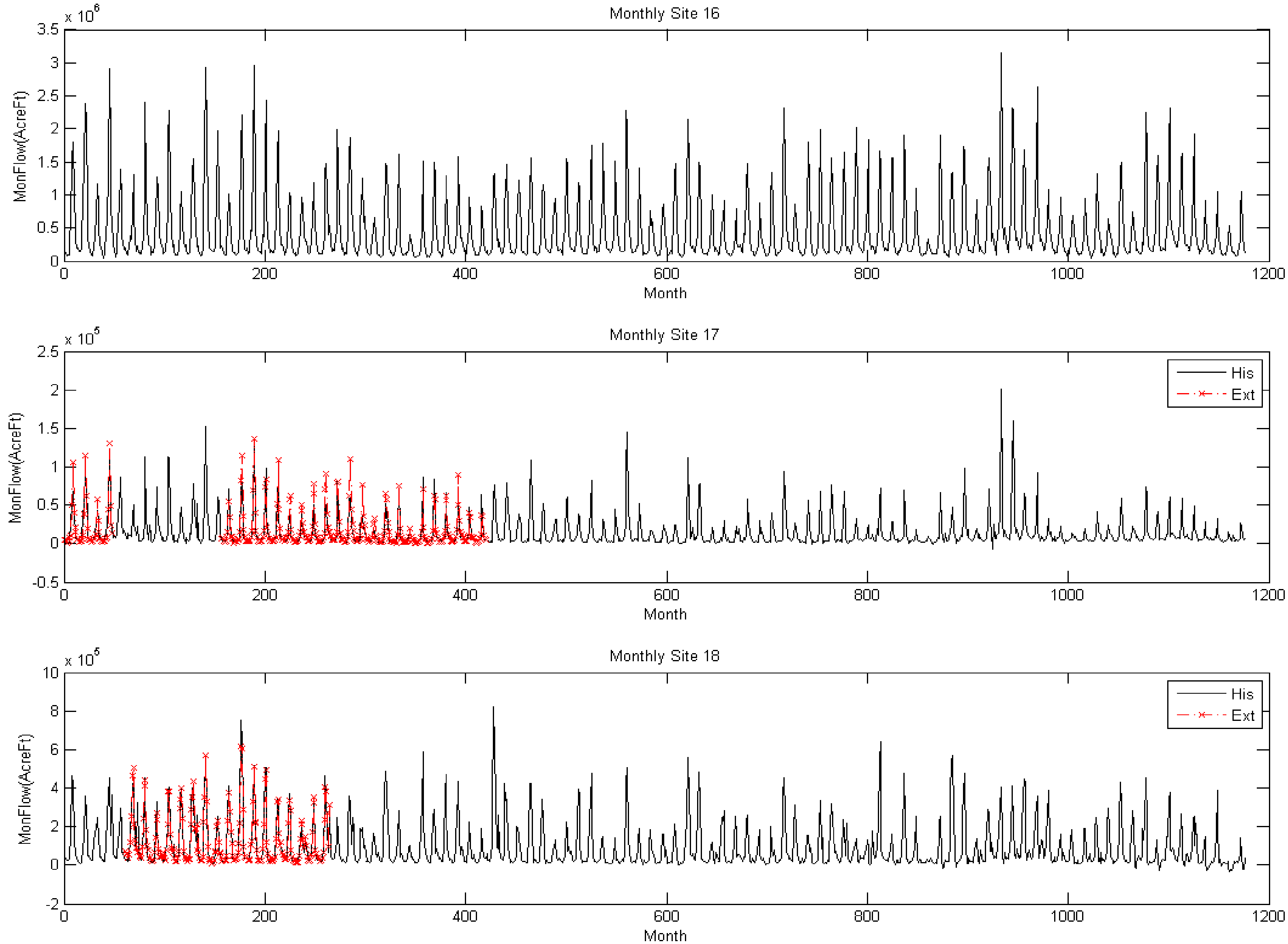


Figure C6 Time series of the accumulated streamflow for site 16-18(—— : current data, –x–: the new extension)

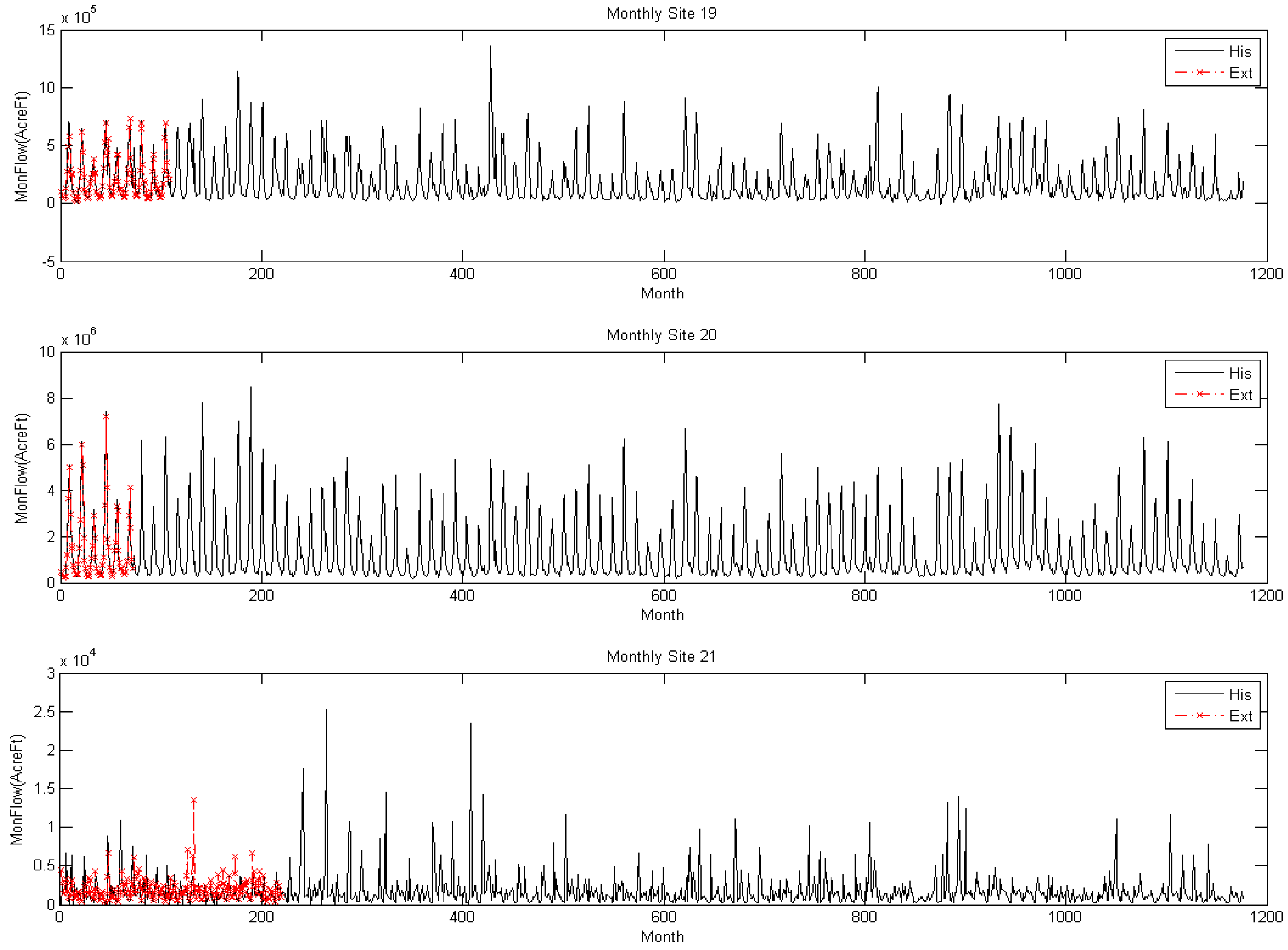


Figure C7 Time series of the accumulated streamflow for site 19-21(— : current data, –x–: the new extension)

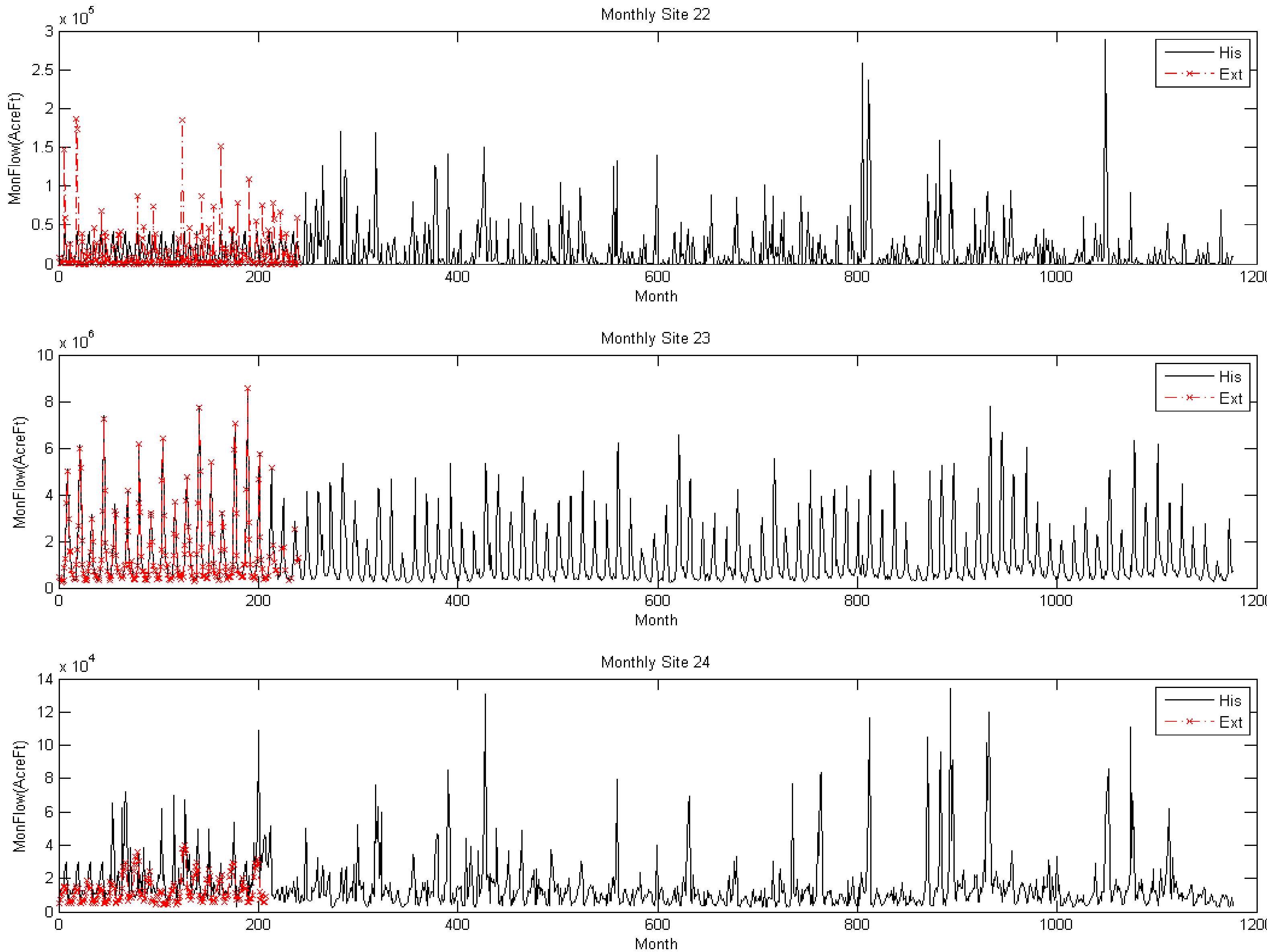


Figure C8 Time series of the accumulated streamflow for site 22-24(—: current data, –x–: the new extension)

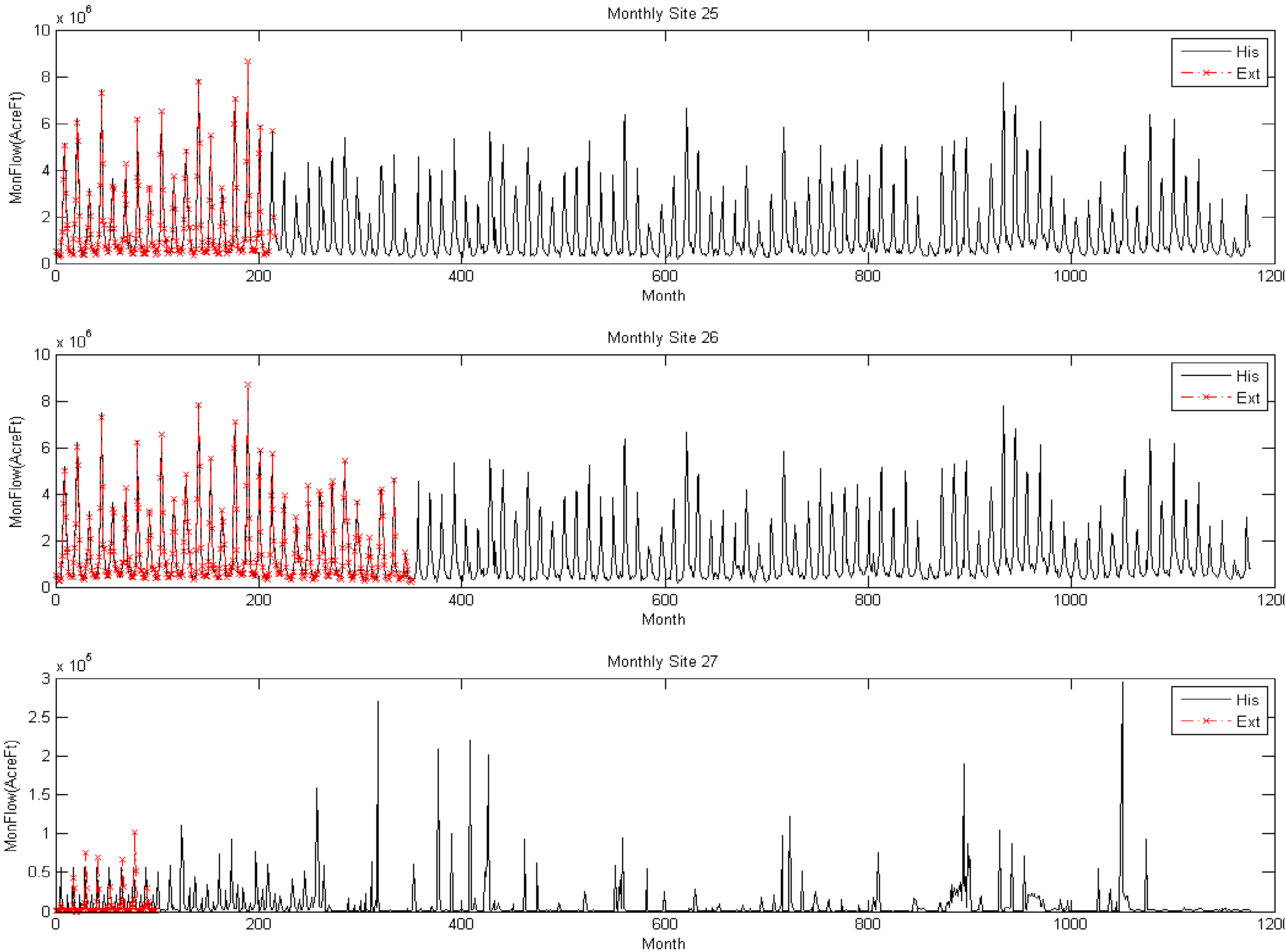


Figure C9 Time series of the accumulated streamflow for site 25-27(— : current data, –x–: the new extension)

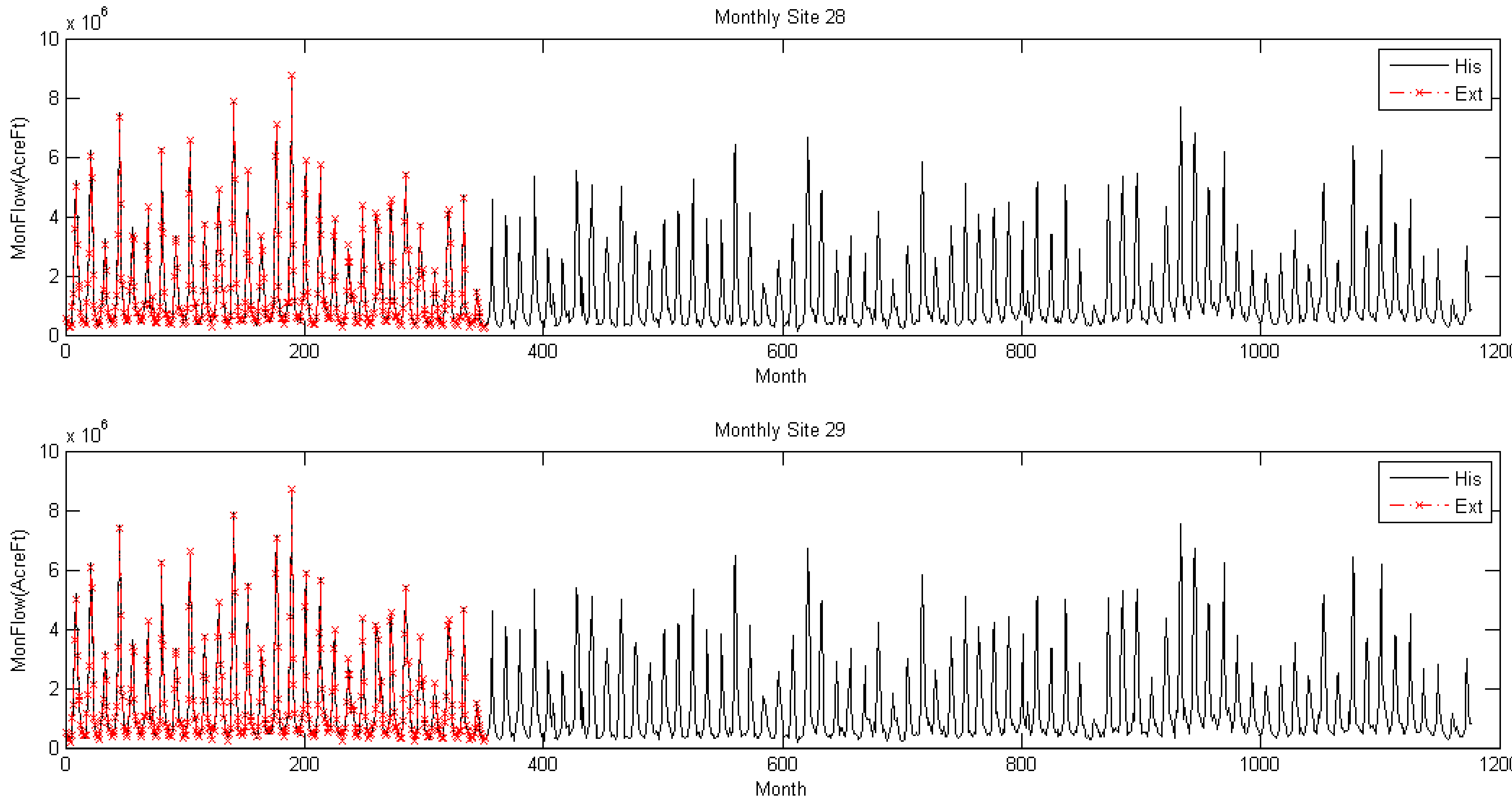


Figure C10 Time series of the accumulated streamflow for site 28-29(— : current data, –x–: the new extension)

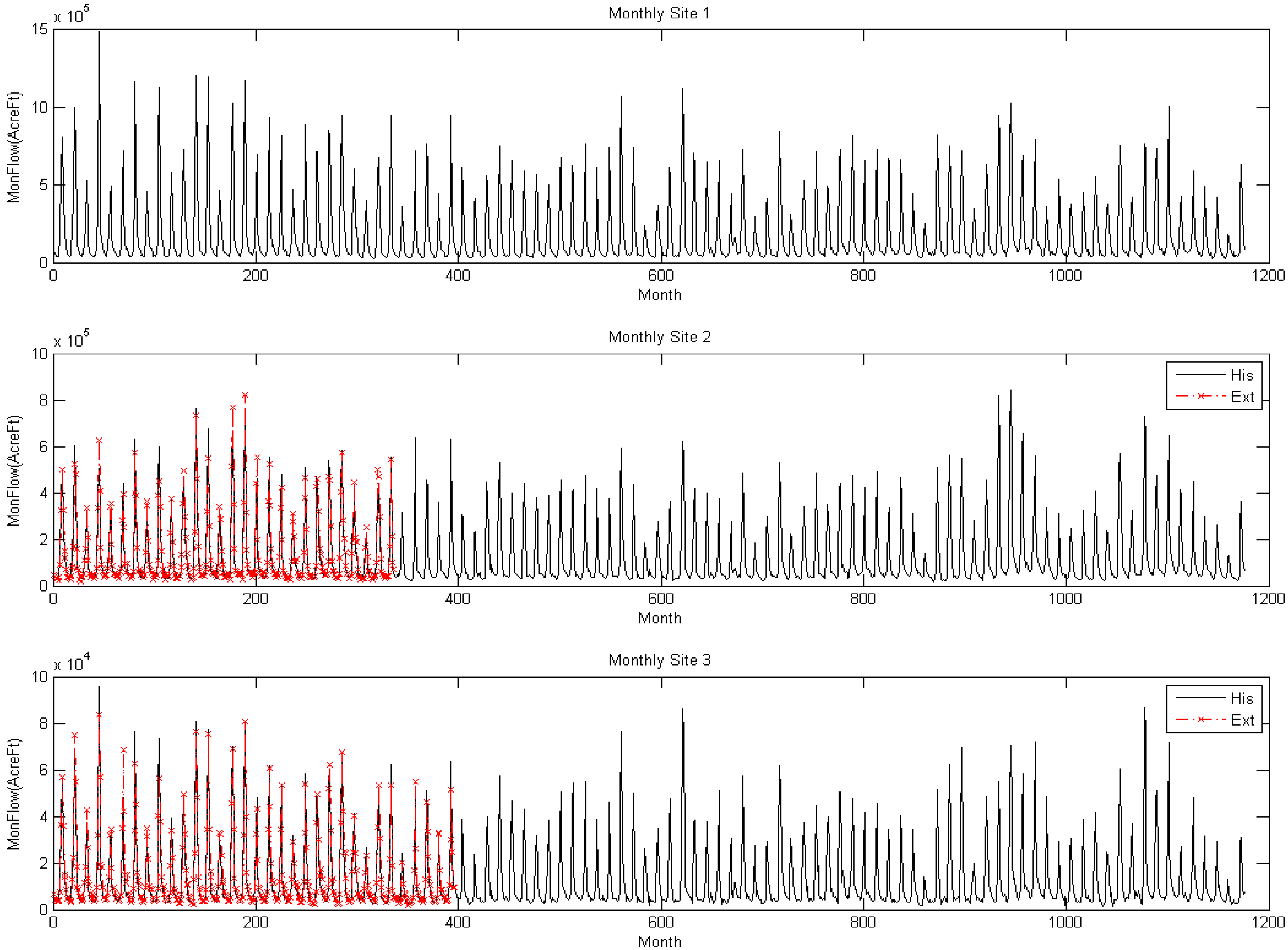


Figure C11 Time series of the intervening streamflow for site 1-3(— : current data, –x–: the new extension)

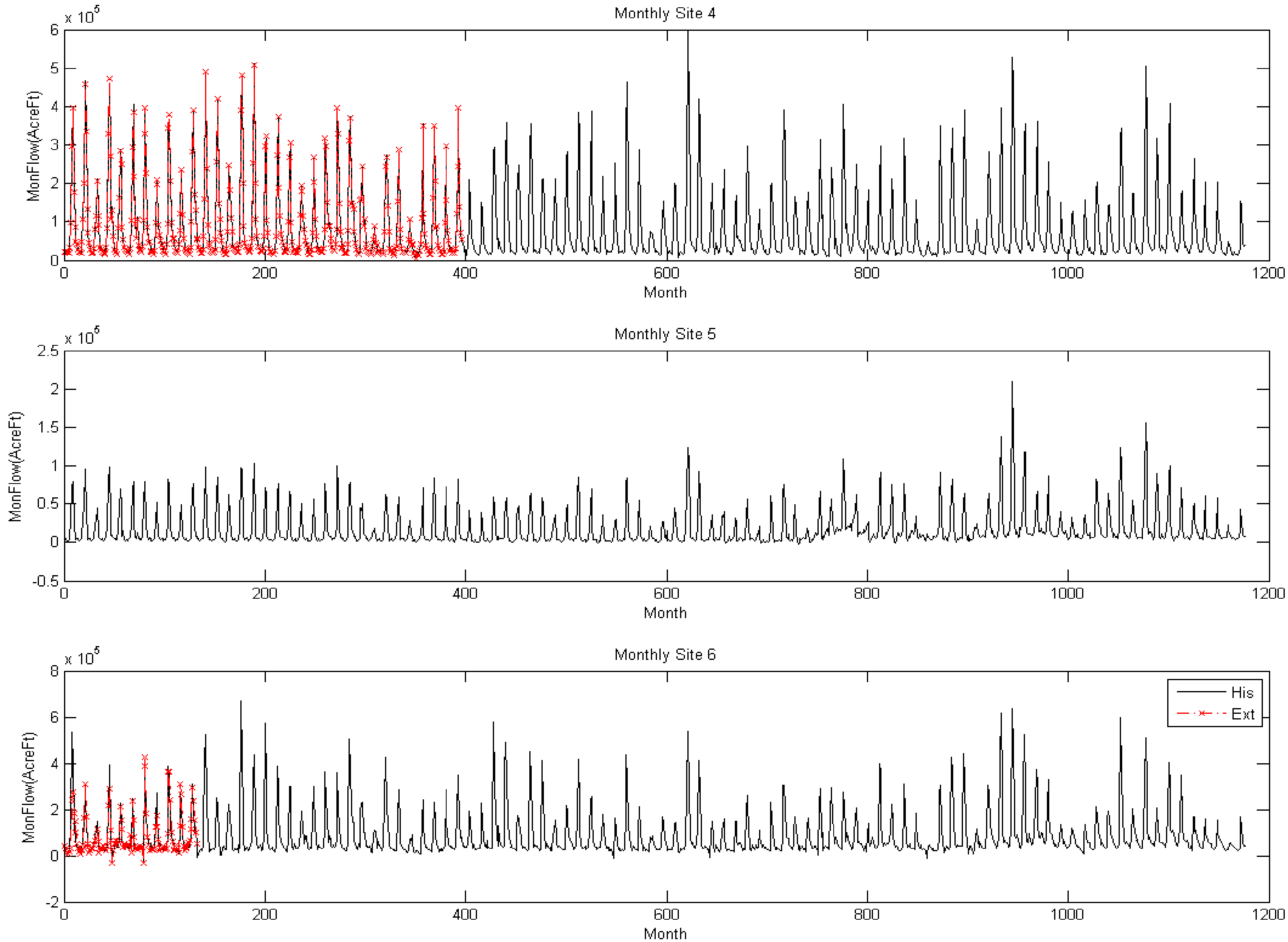


Figure C12 Time series of the intervening streamflow for site 4-6 (— : current data, –x–: the new extension)

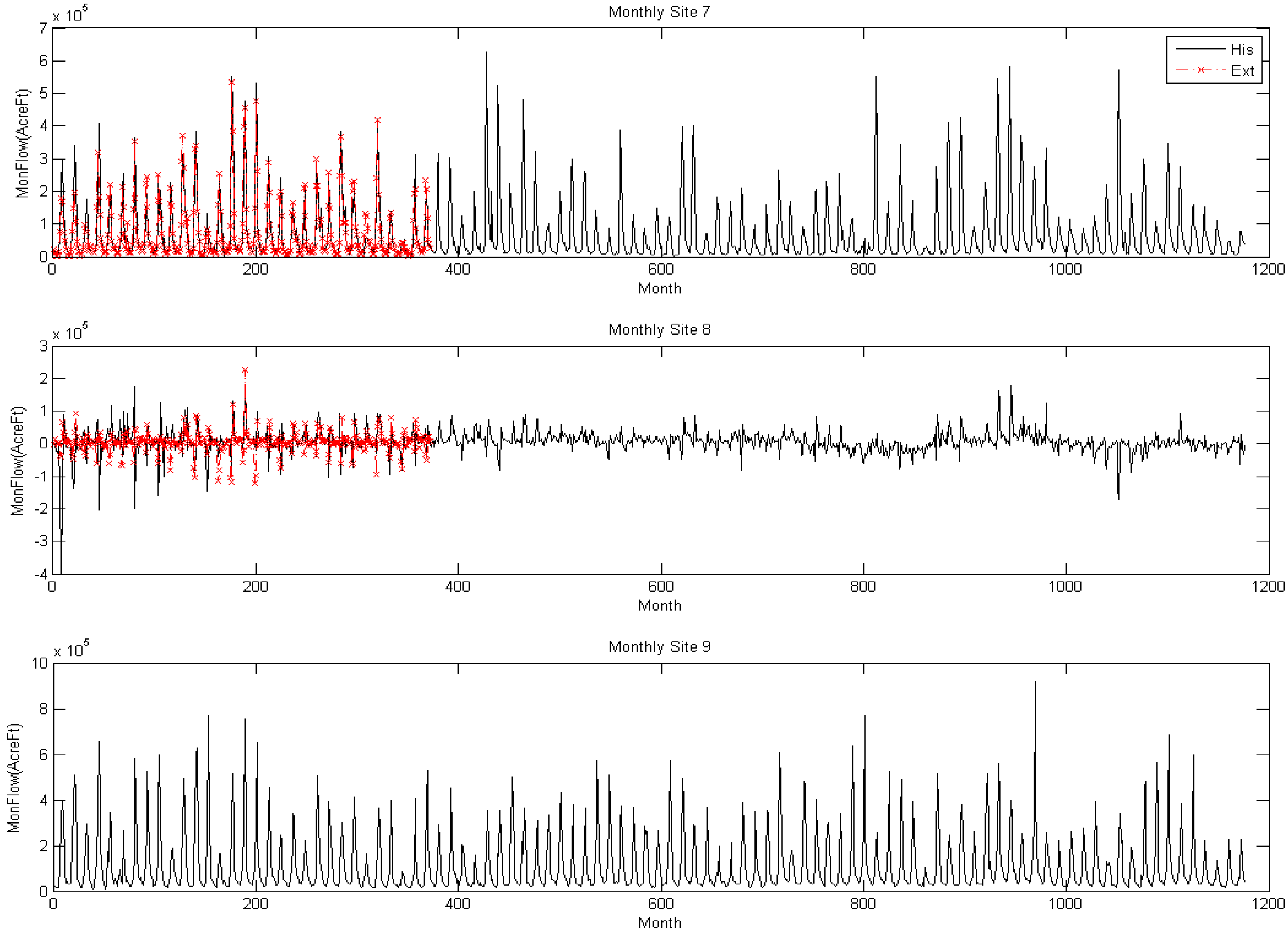


Figure C13 Time series of the intervening streamflow for site 7-9 (— : current data, –x–: the new extension)

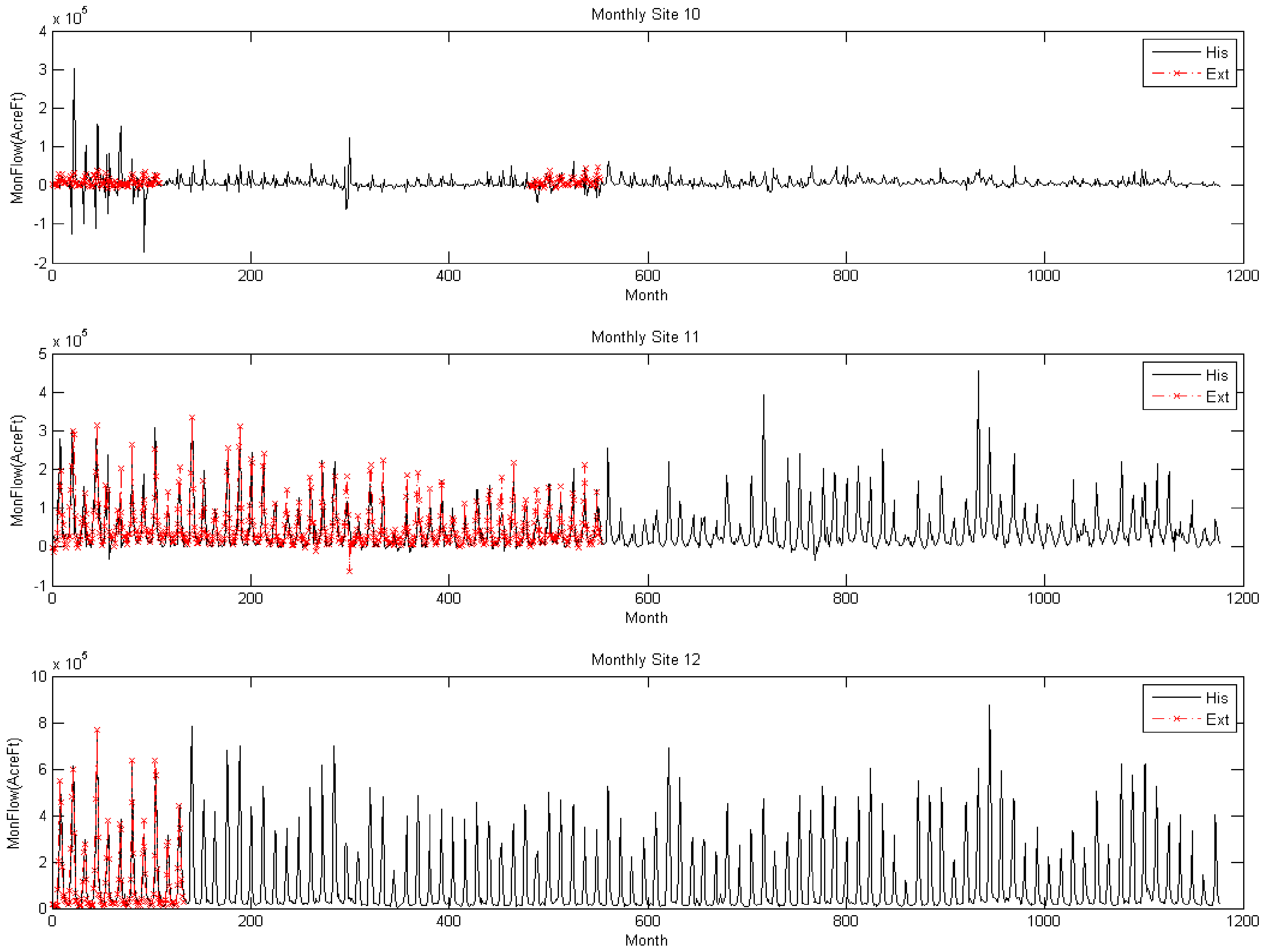


Figure C14 Time series of the intervening streamflow for site 10-12 (— : current data, –x–: the new extension)

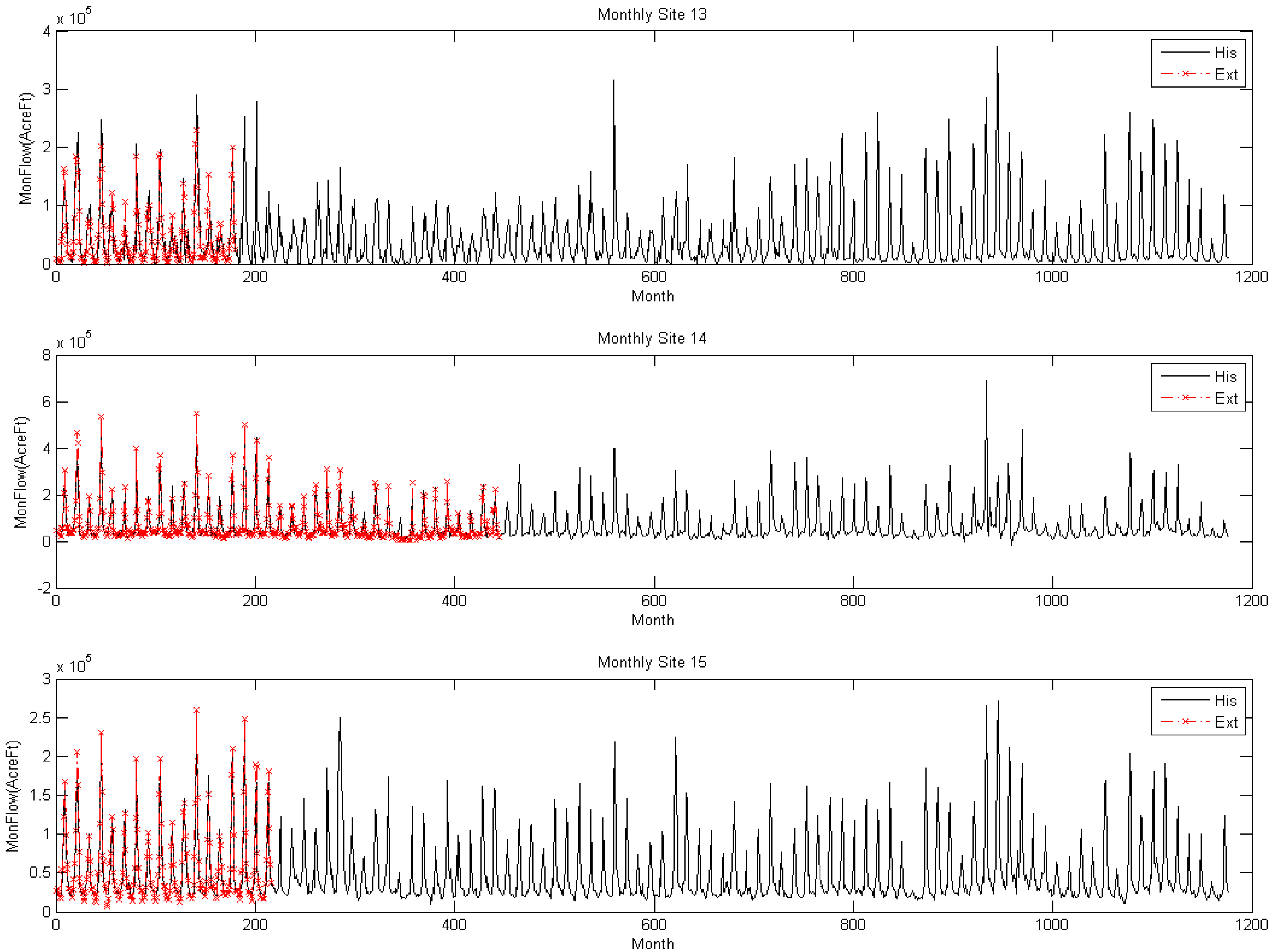


Figure C15 Time series of the intervening streamflow for site 13-15 (—— : current data, –x–: the new extension)

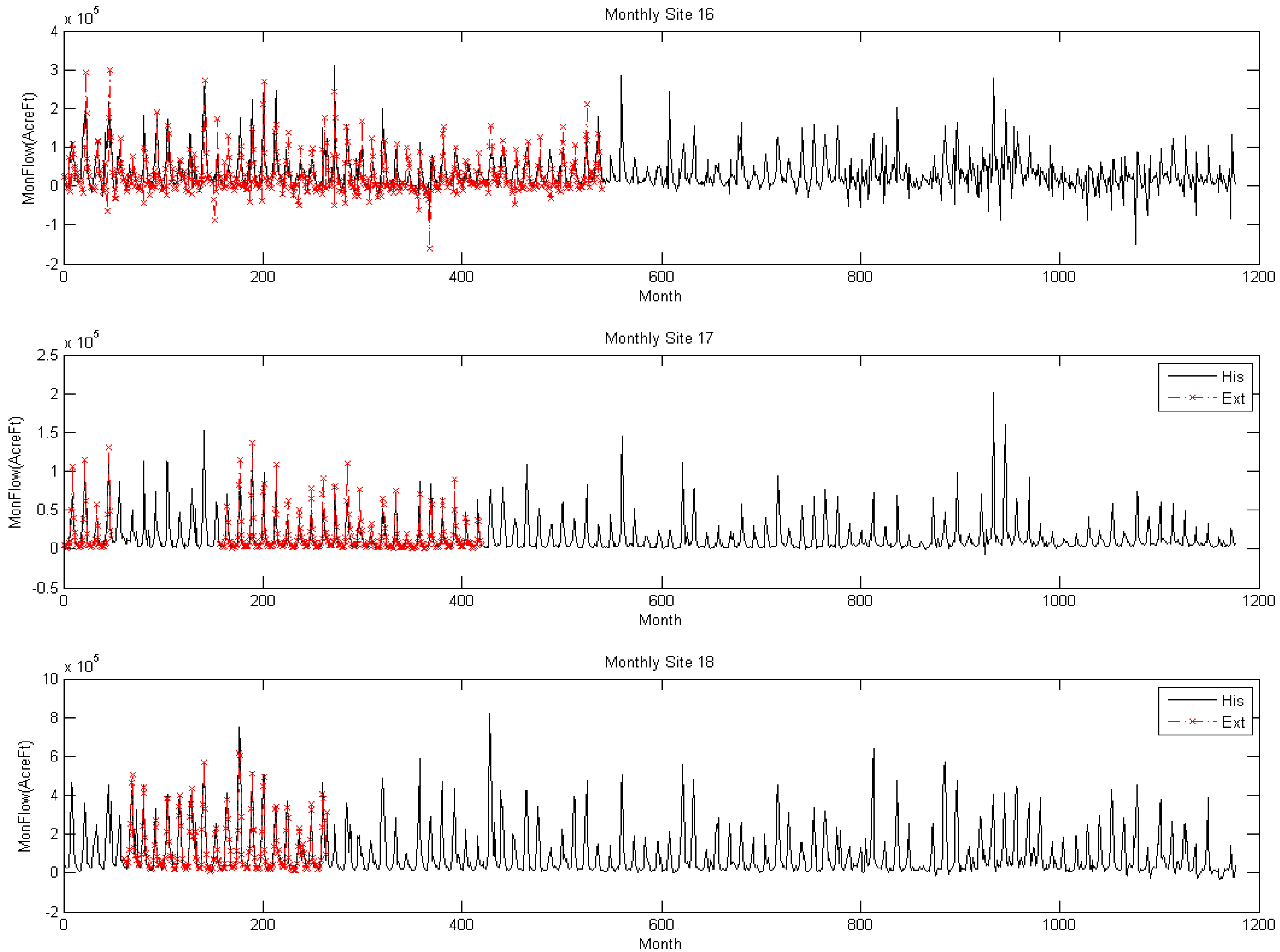


Figure C16 Time series of the intervening streamflow for site 16-18 (—: current data, –x–: the new extension)

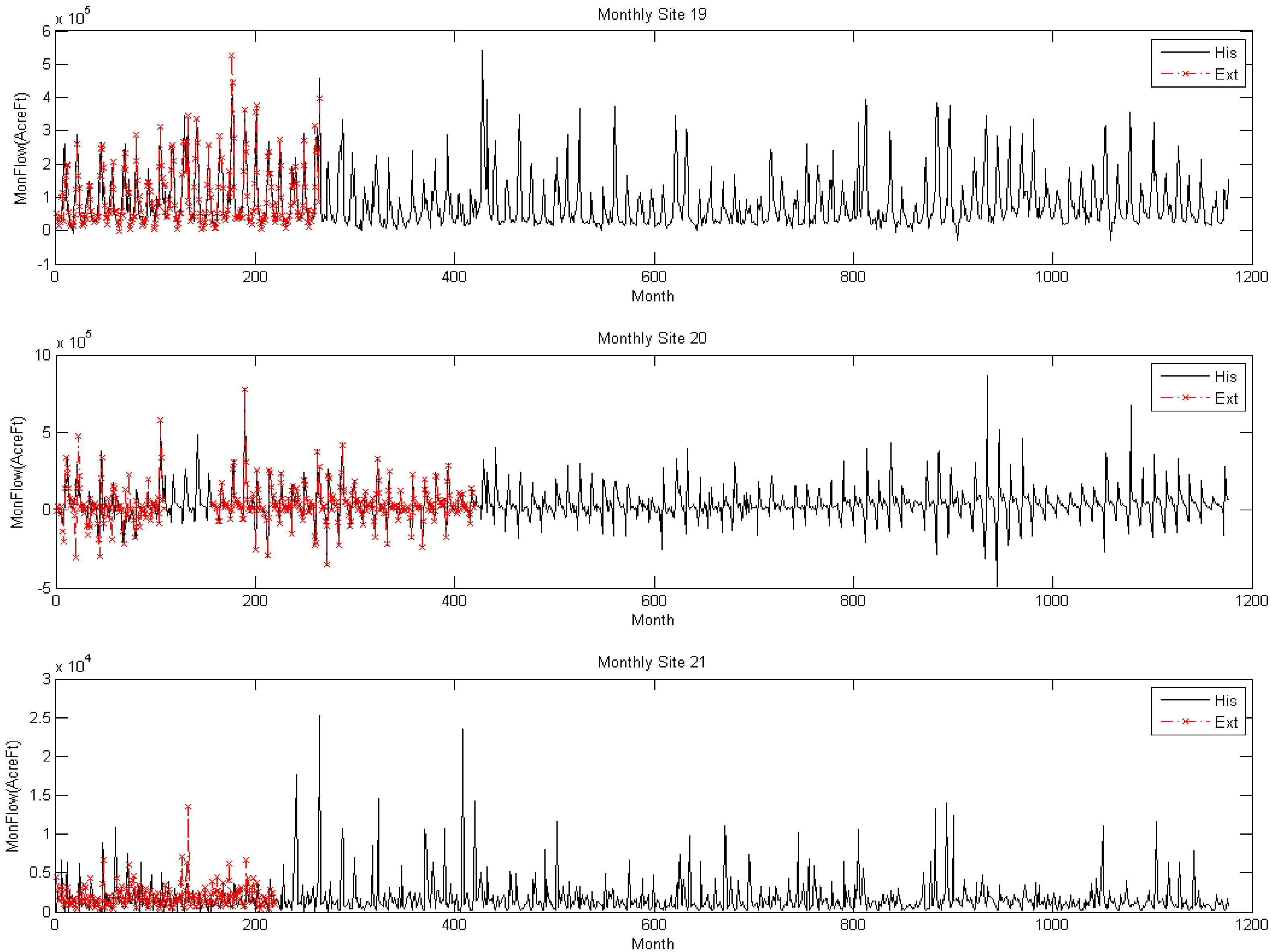


Figure C17 Time series of the intervening streamflow for site 19-21 (—: current data, –x–: the new extension)

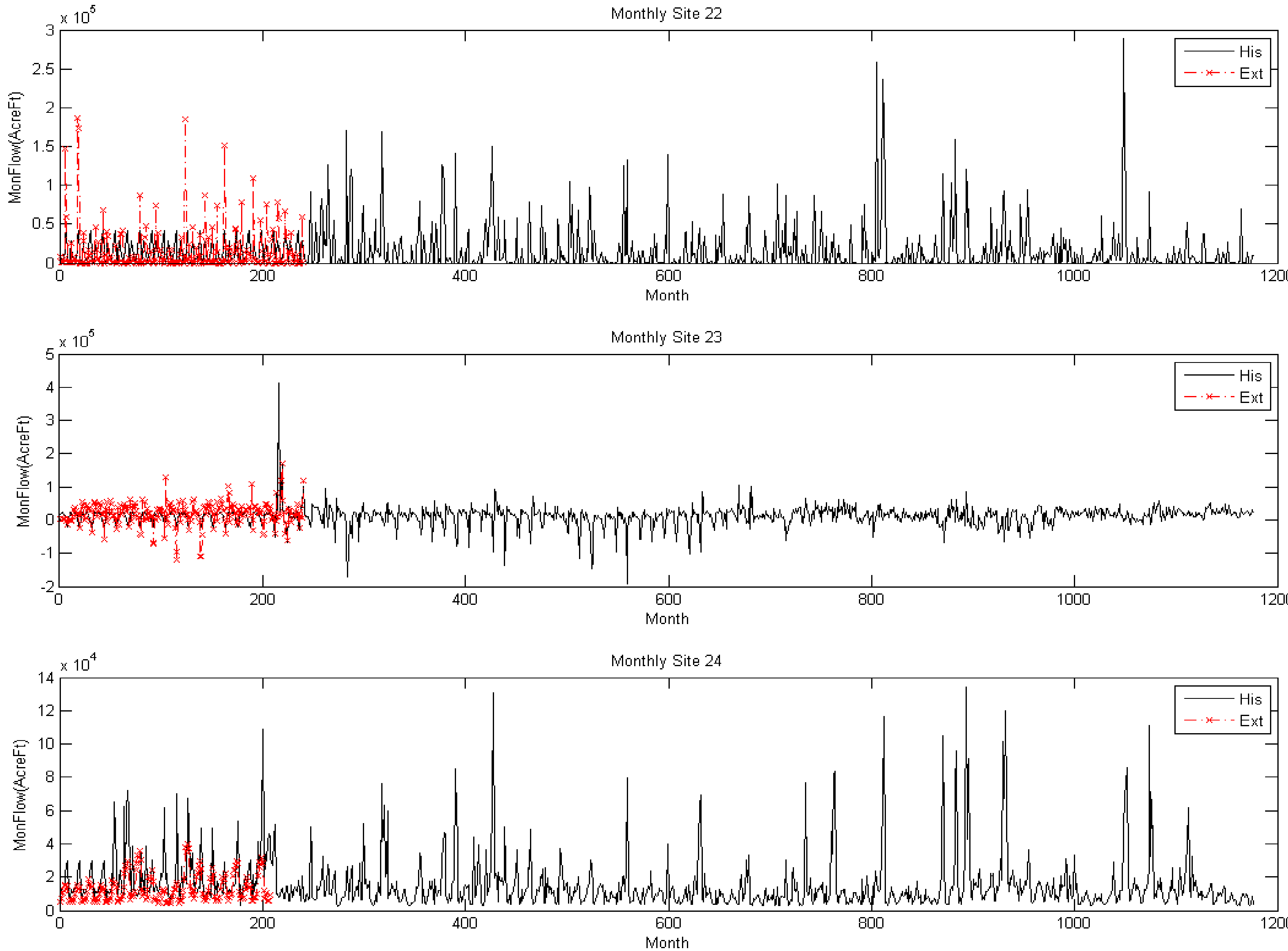


Figure C18 Time series of the intervening streamflow for site 22-24 (— : current data, –x–: the new extension)

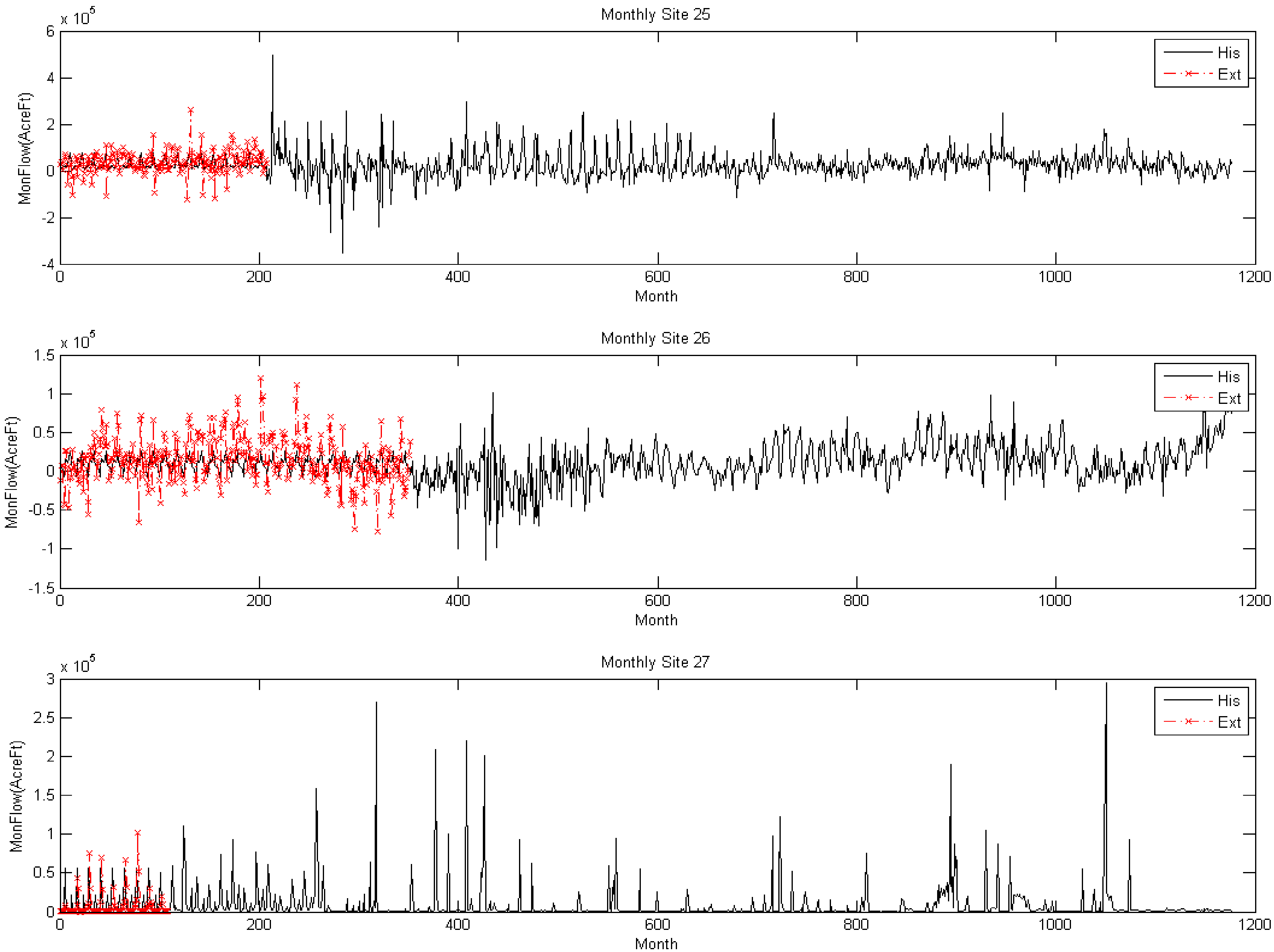


Figure C19 Time series of the intervening streamflow for site 25-27 (— : current data, –x–: the new extension)

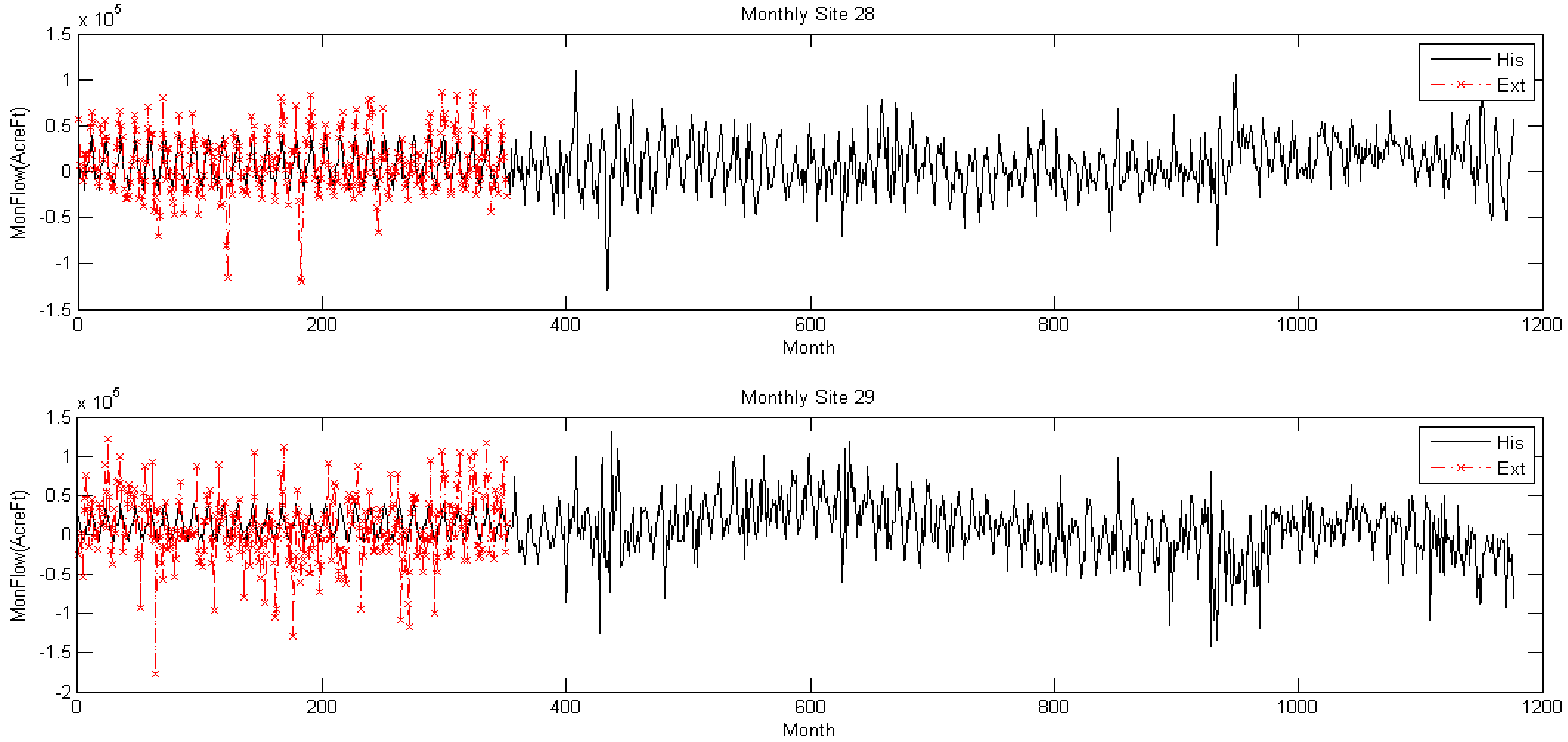


Figure C20 Time series of the intervening streamflow for site 28-29 (— : current data, –x–: the new extension)

Appendix D

Monthly statistics of the accumulated and intervening streamflows of the Colorado River at 29 sites

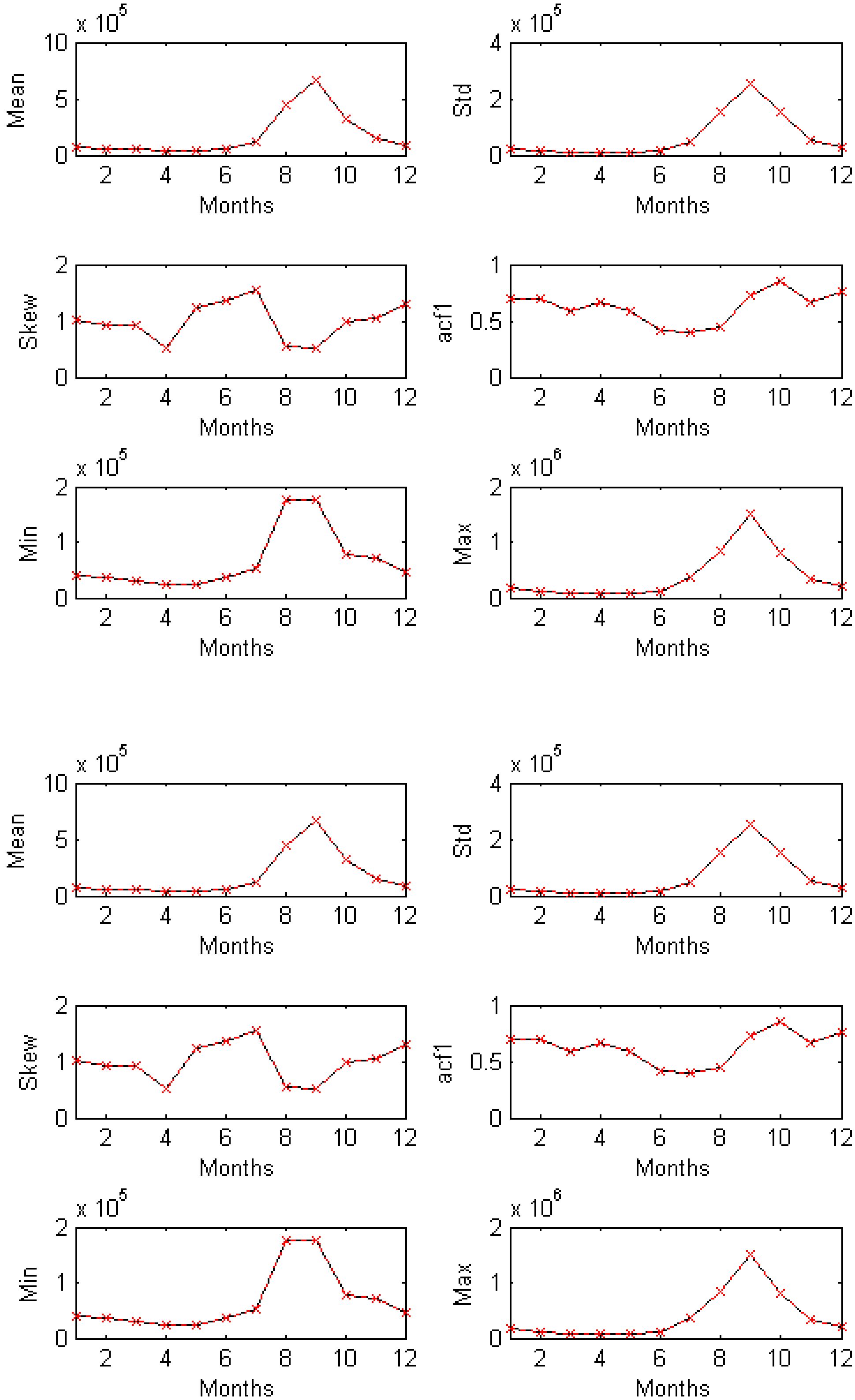


Figure D1 Monthly key statistics of the accumulated and intervening flows for site 1 (--x : whole, —:hist)
(upper: accumulated flow, lower: intervening flow)

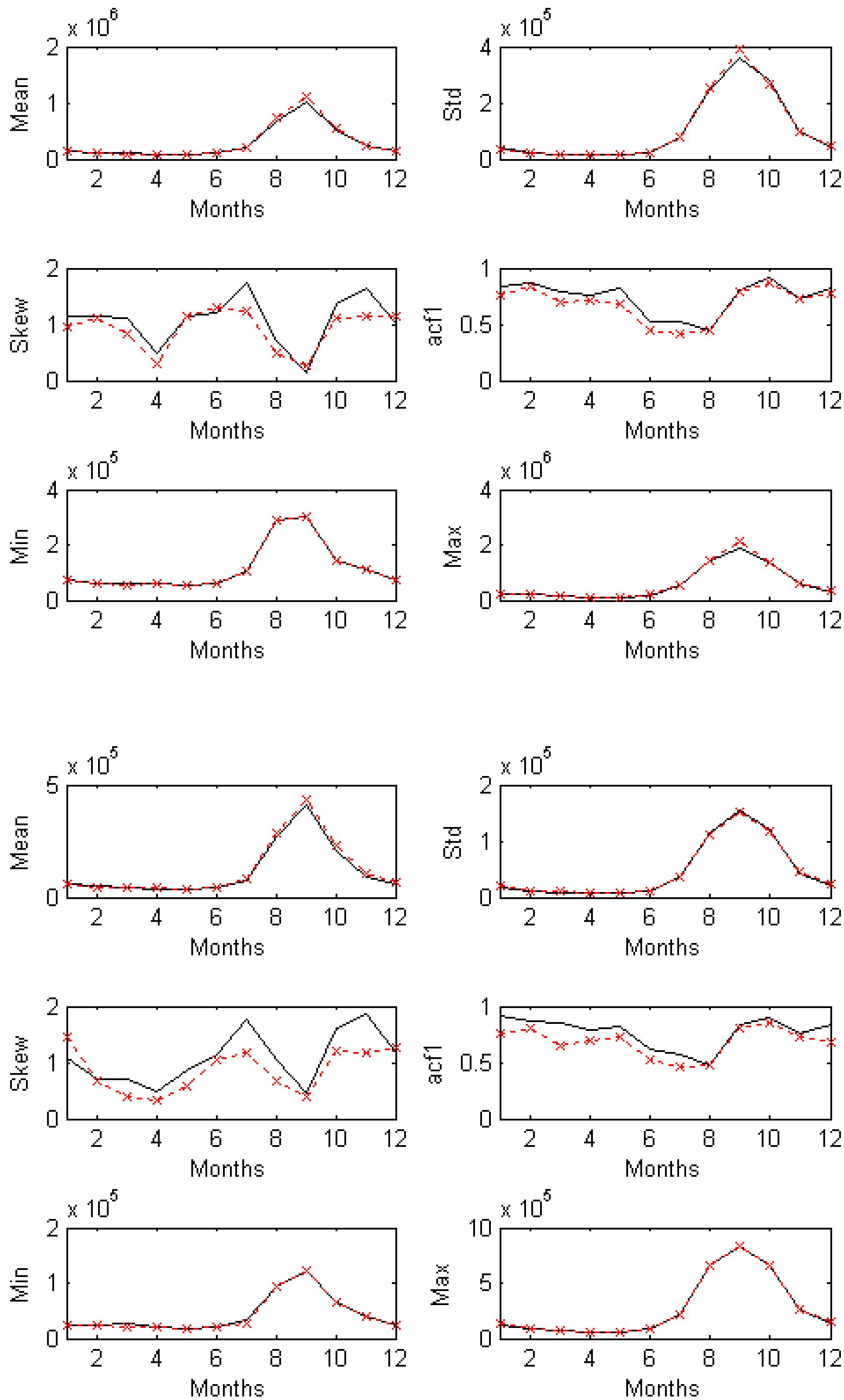


Figure D2 Monthly key statistics of the accumulated and intervening flows for site 2 (--x : whole, —:hist)

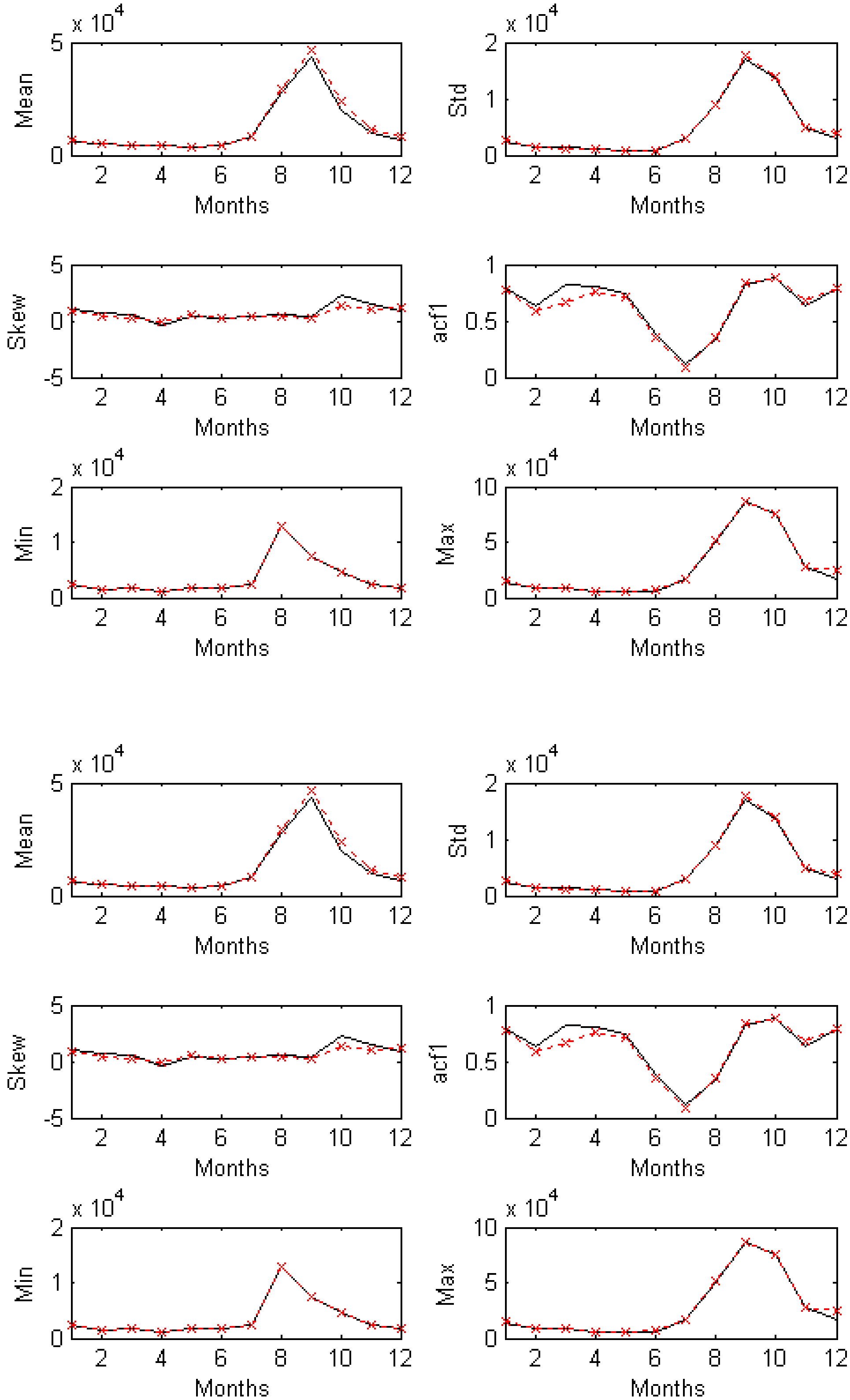


Figure D3 Monthly key statistics of the accumulated and intervening flows for site 3 (--x : whole, —:hist)

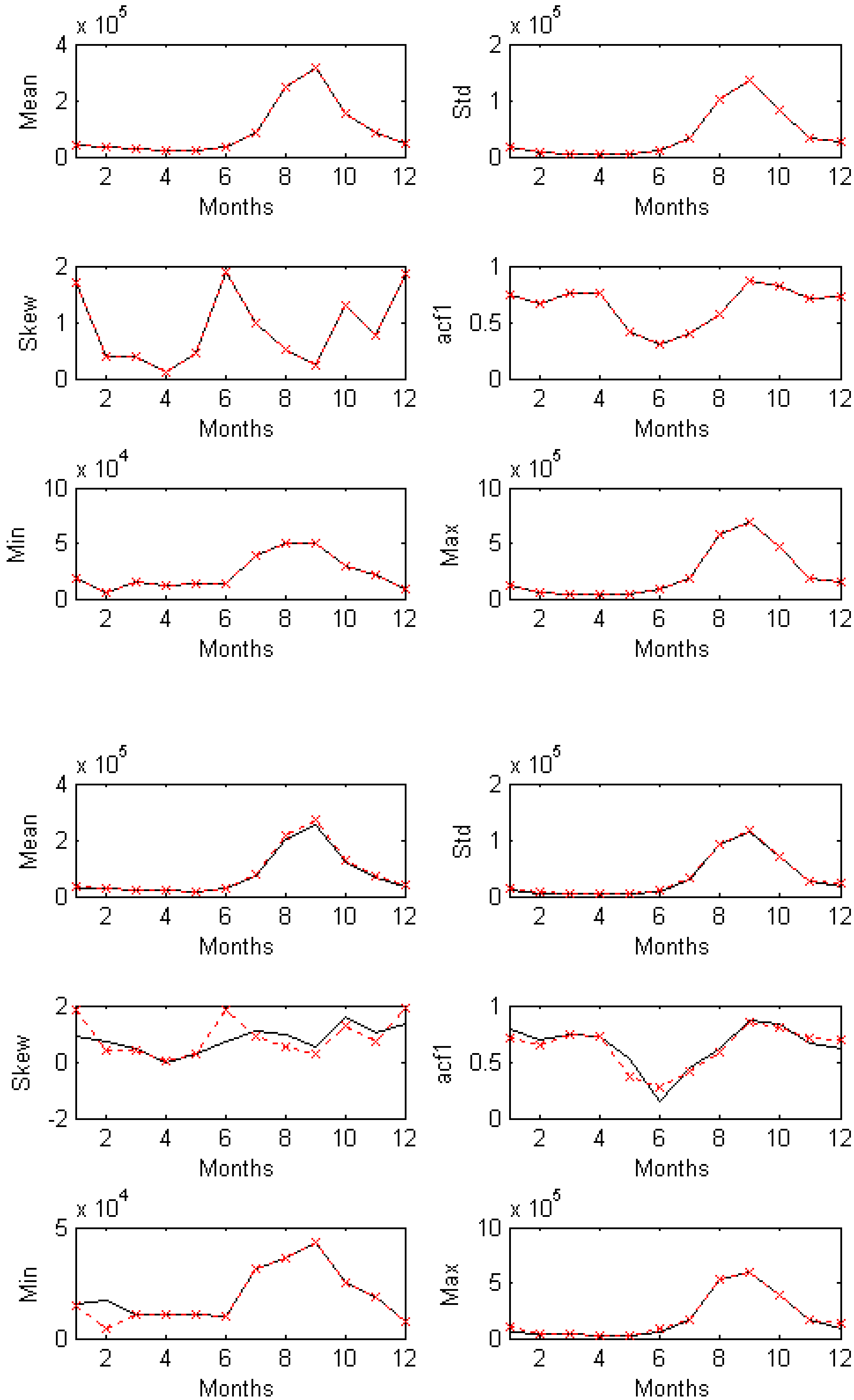


Figure D4 Monthly key statistics of the accumulated and intervening flows for site 4 (--x : whole, —:hist)

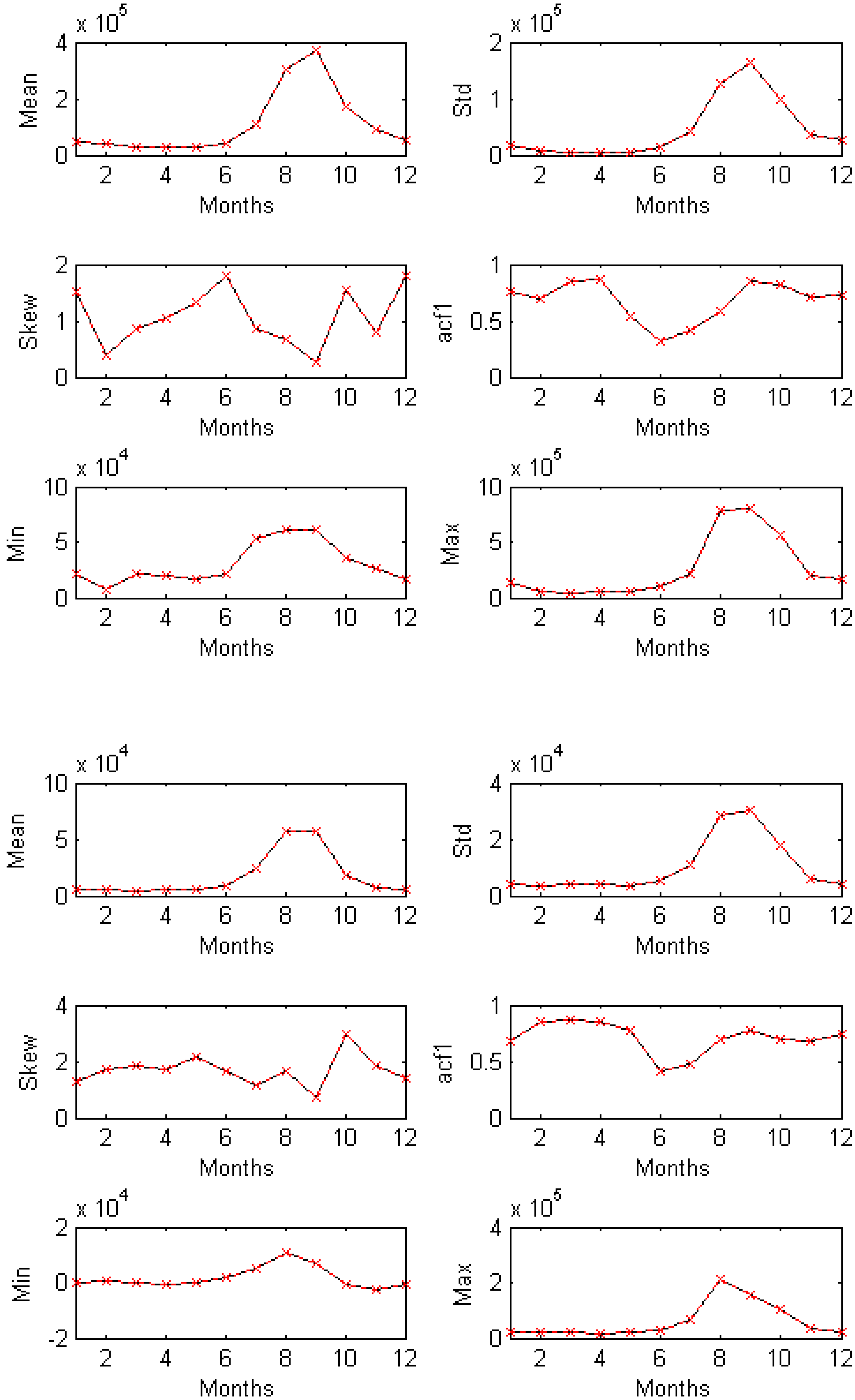


Figure D5 Monthly key statistics of the accumulated and intervening flows for site 5 (--x : whole, —:hist)

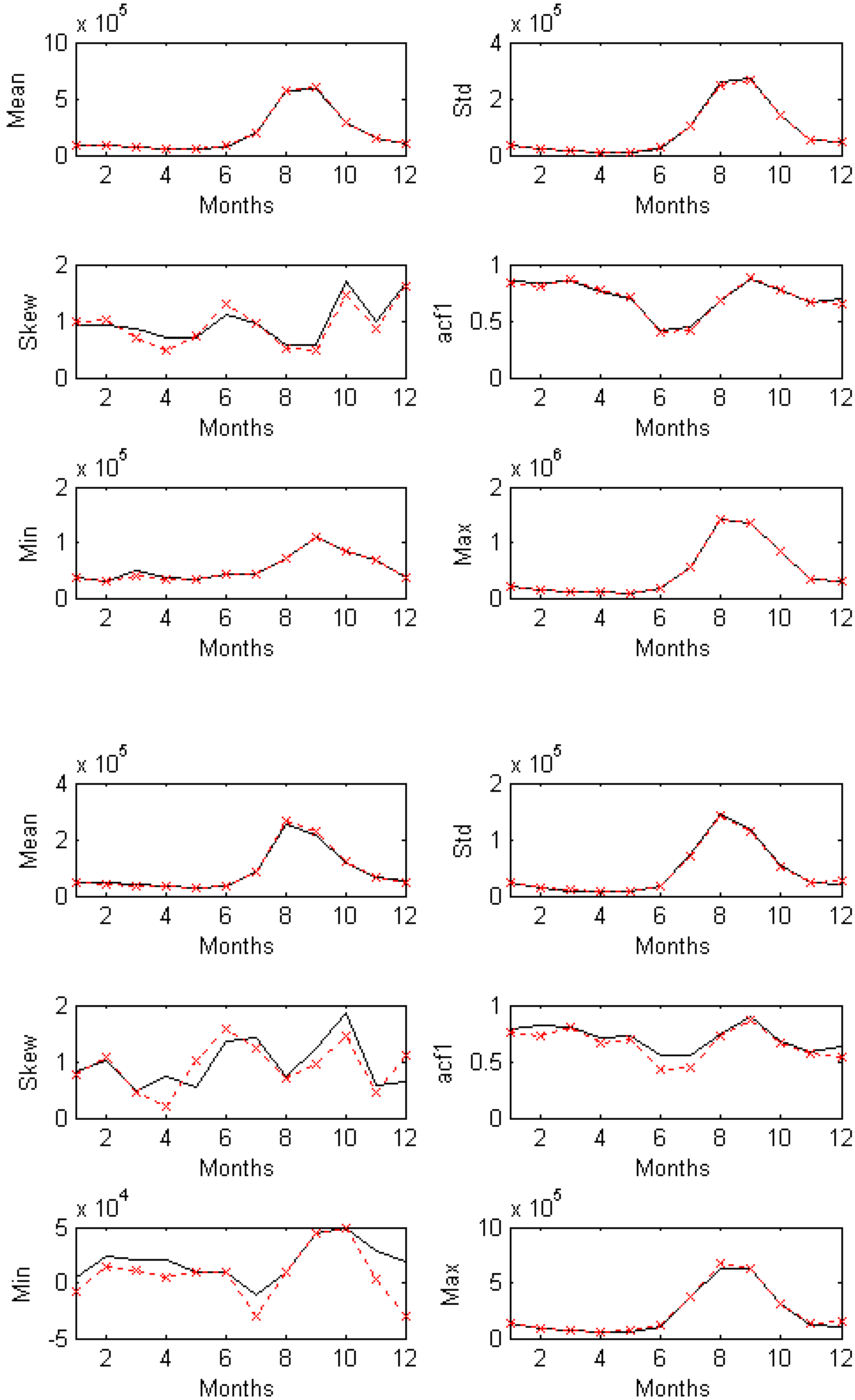


Figure D6 Monthly key statistics of the accumulated and intervening flows for site 6 (--x : whole, —:hist)

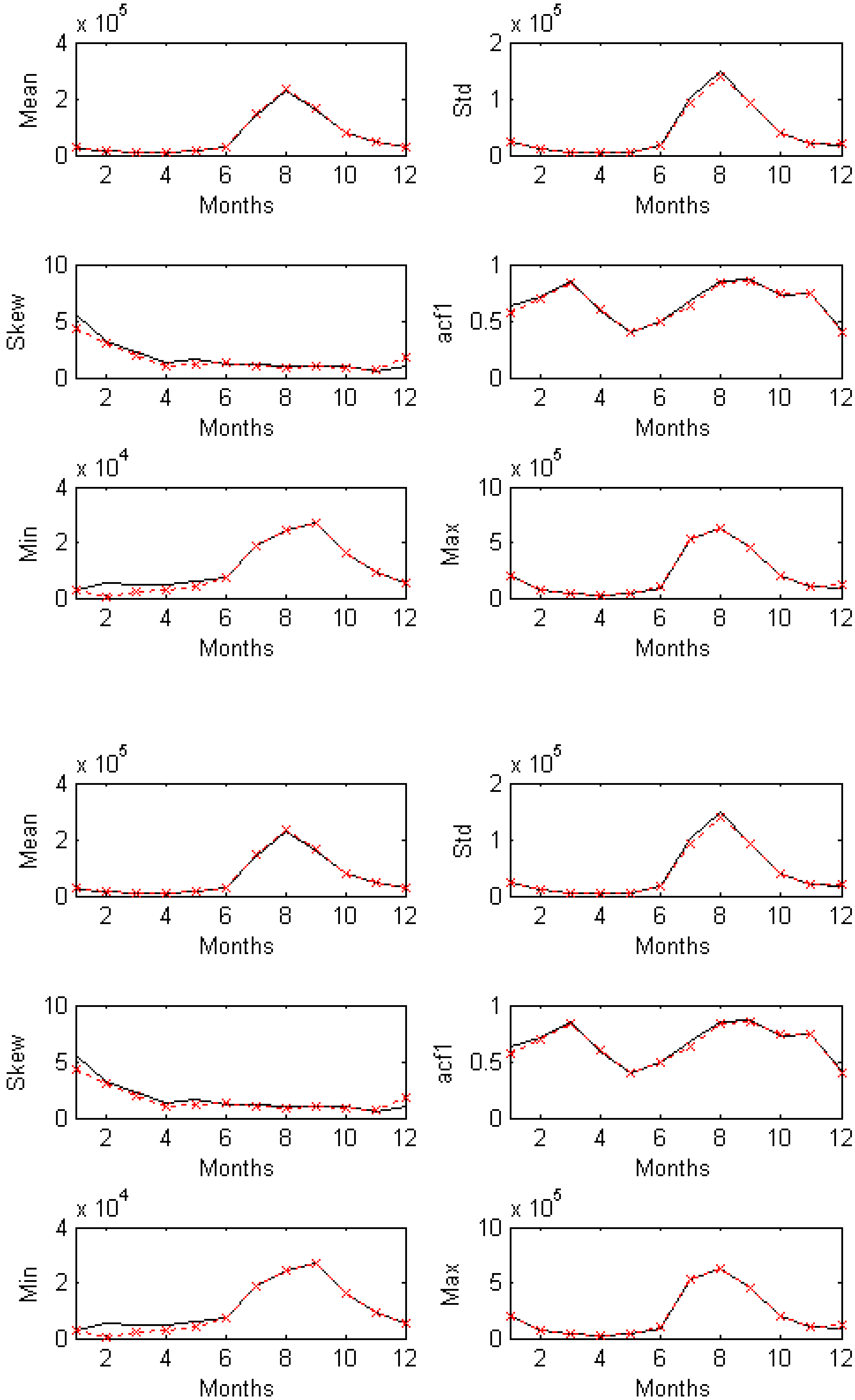


Figure D7 Monthly key statistics of the accumulated and intervening flows for site 7 (--x : whole, —:hist)

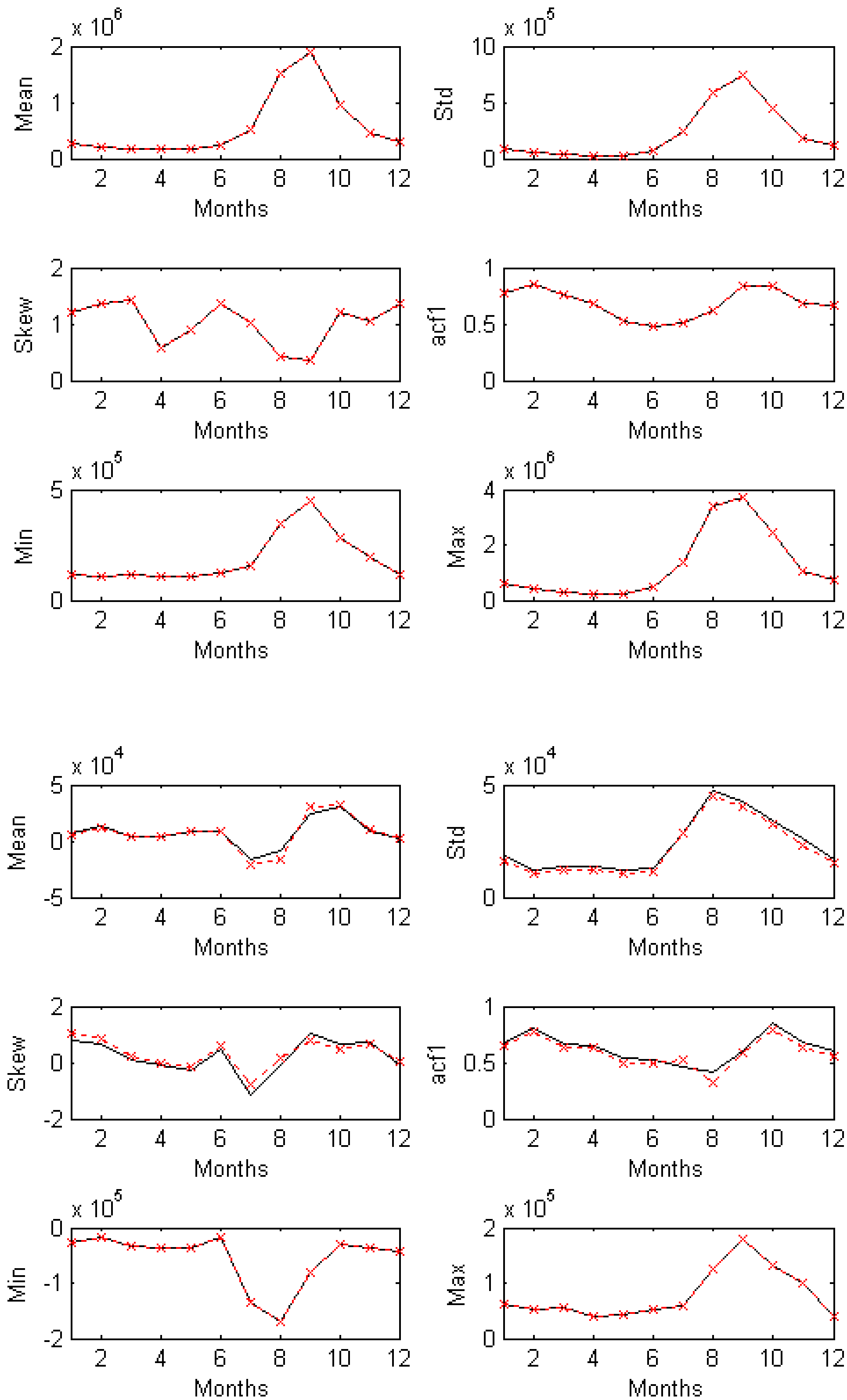


Figure D8 Monthly key statistics of the accumulated and intervening flows for site 8 (--x : whole, —:hist)

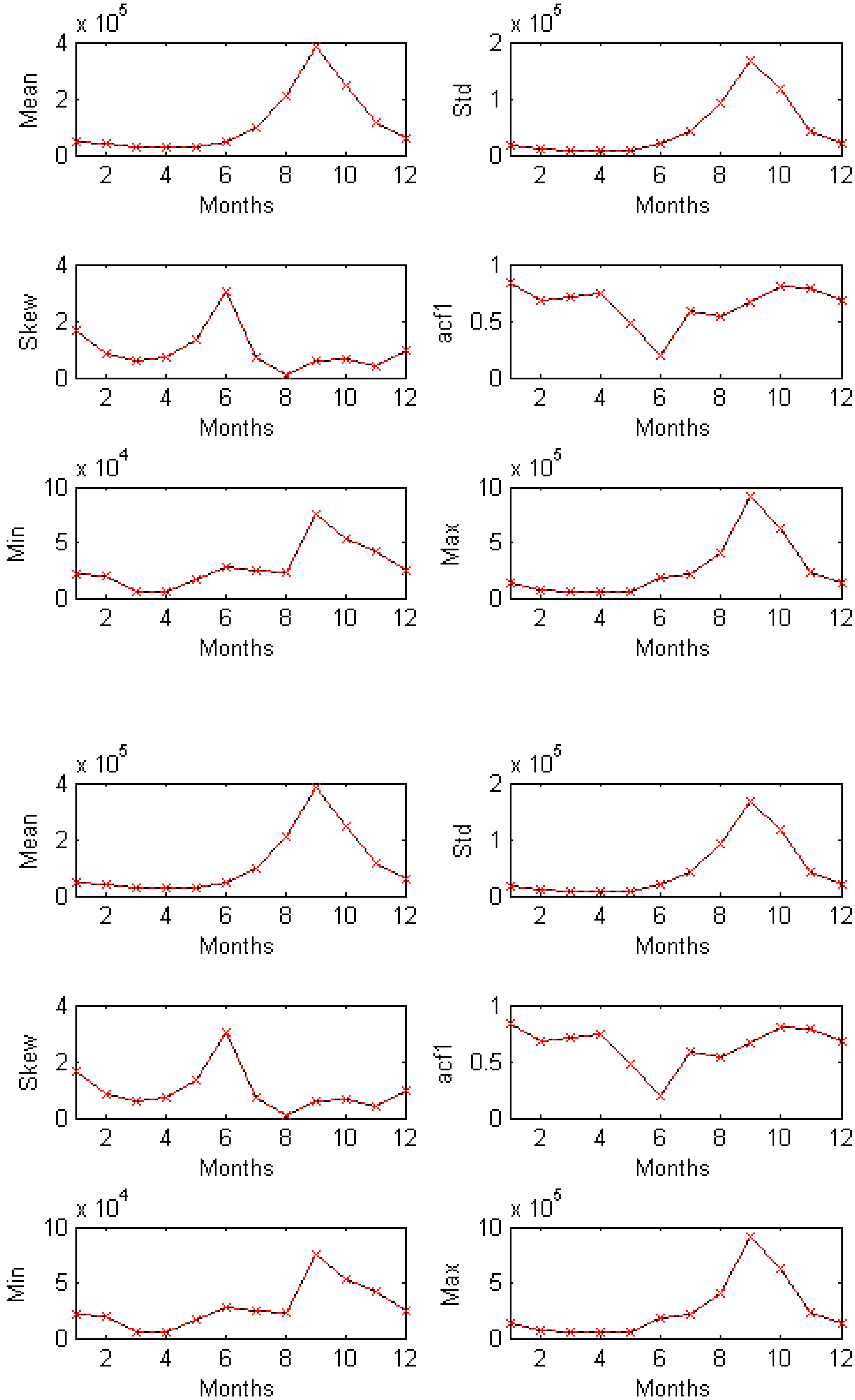


Figure D9 Monthly key statistics of the accumulated and intervening flows for site 9 (--x : whole, —:hist)

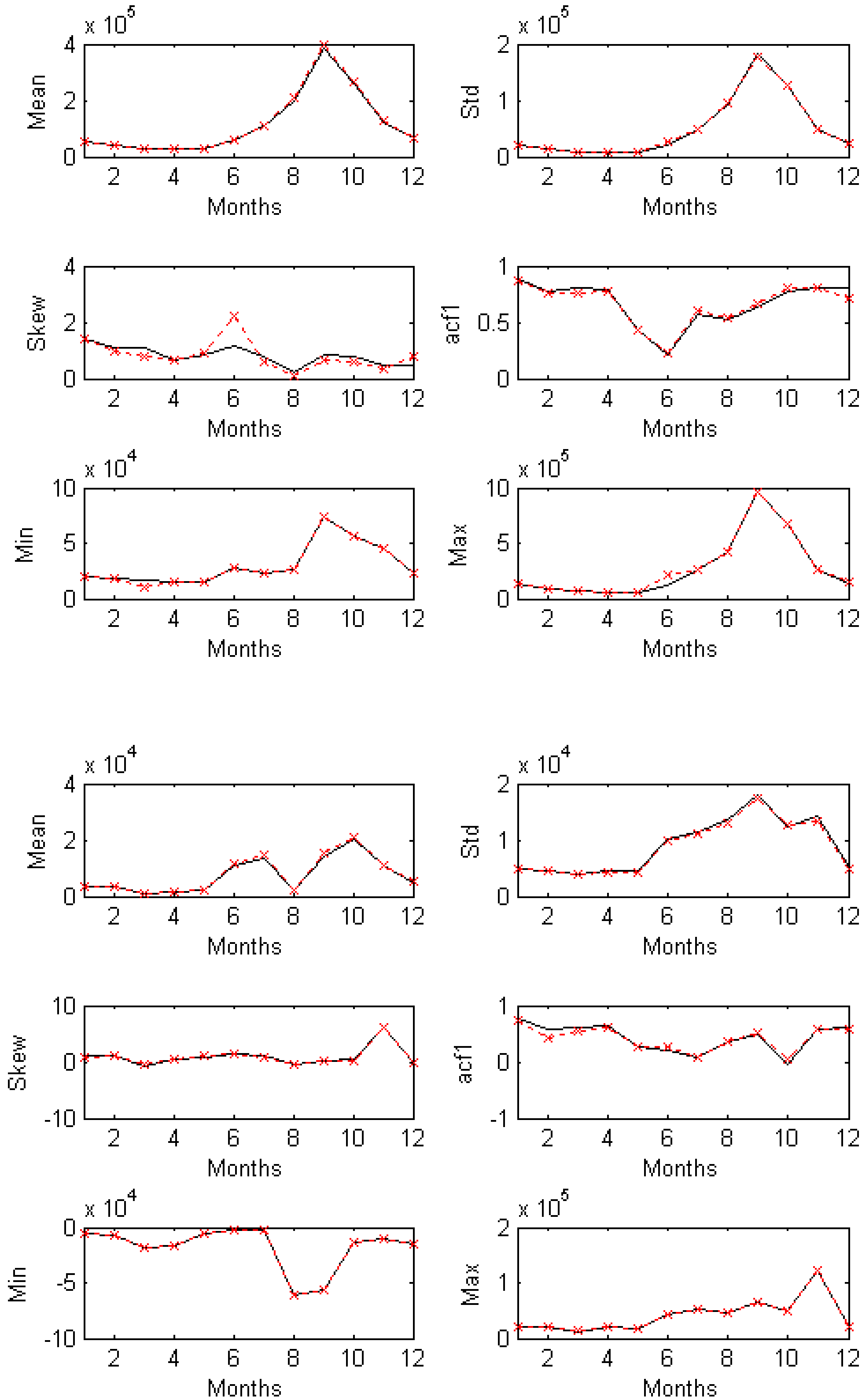
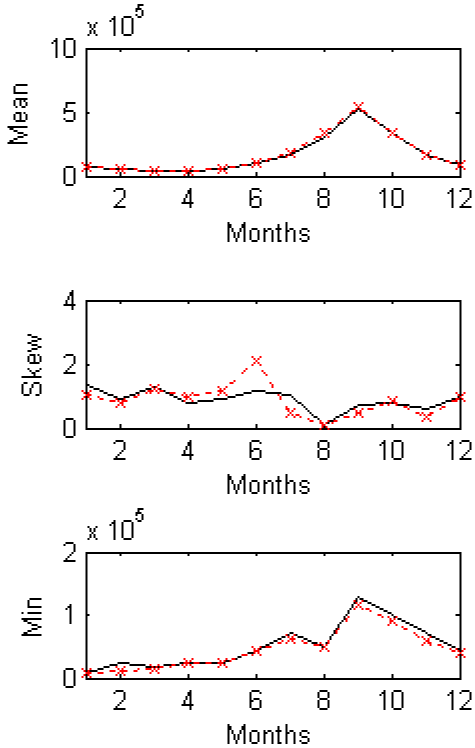


Figure D10 Monthly key statistics of the accumulated and intervening flows for site 10 (--x : whole, —:hist)



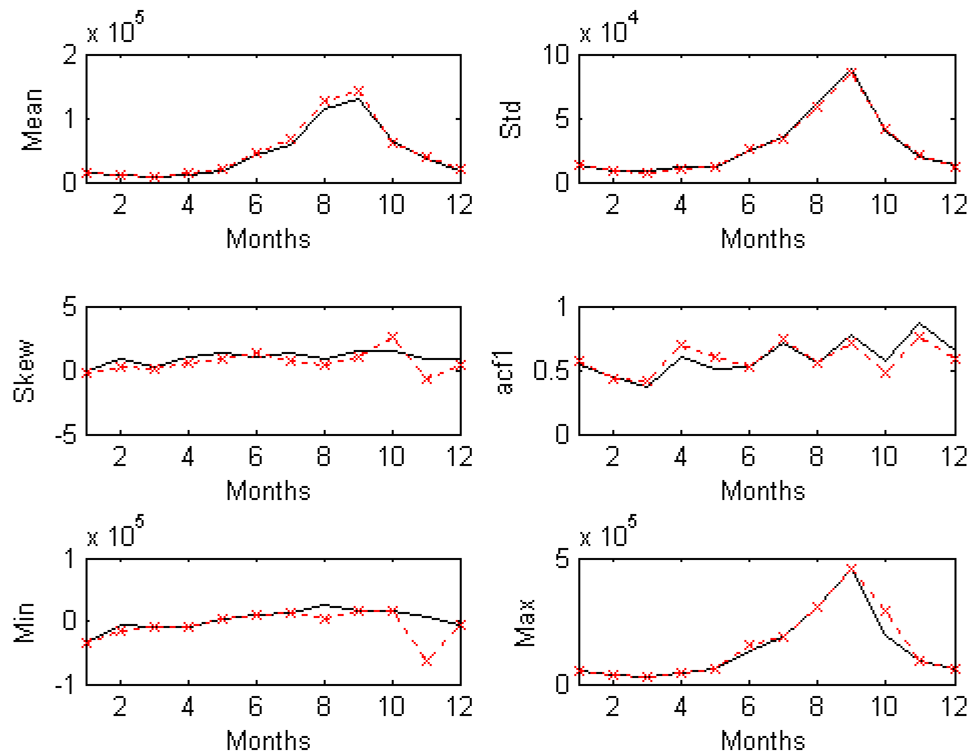


Figure D11 Monthly key statistics of the accumulated and intervening flows for site 11(--x : whole, —:hist)

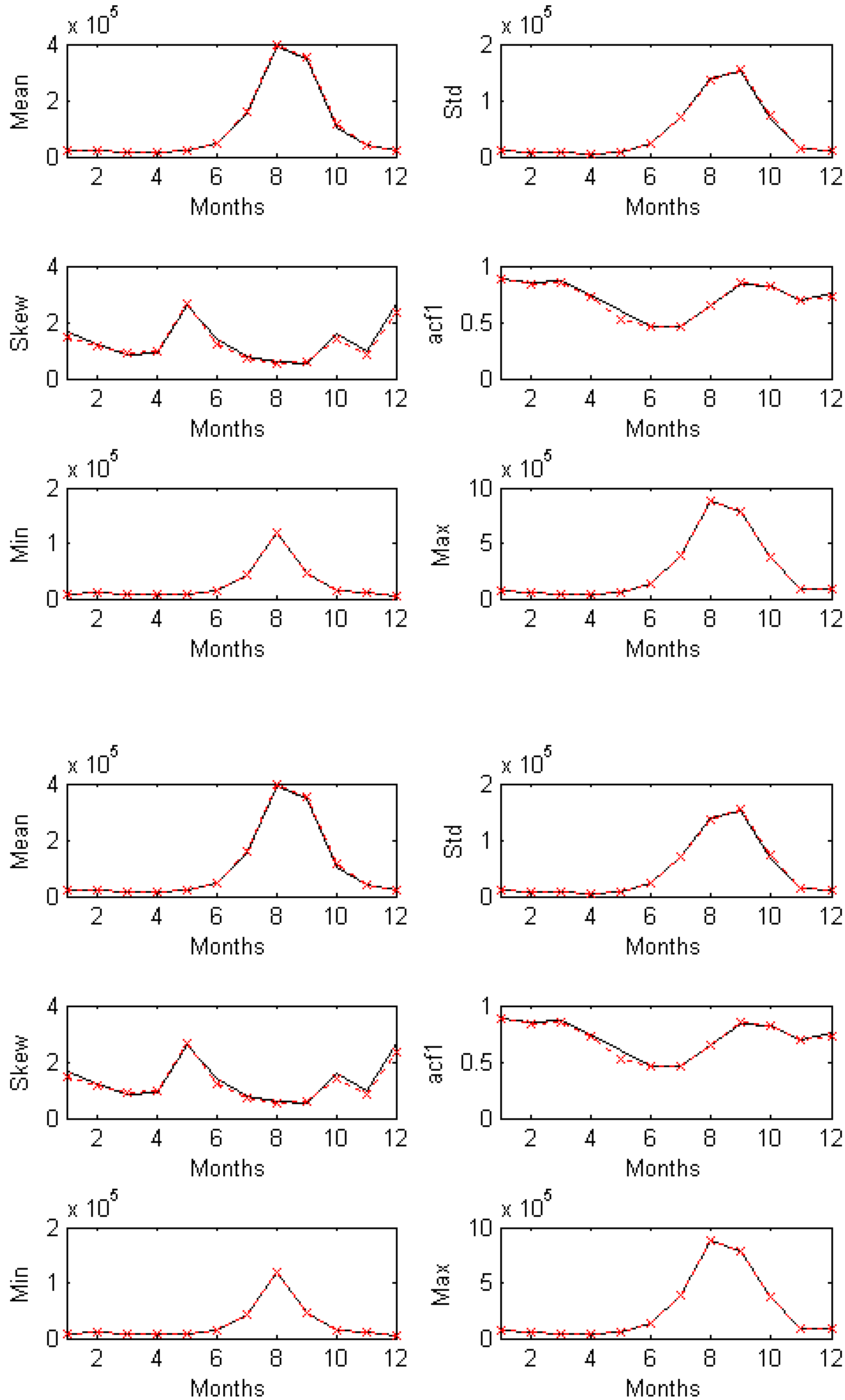


Figure D12 Monthly key statistics of the accumulated and intervening flows for site 12 (--x : whole, —:hist)

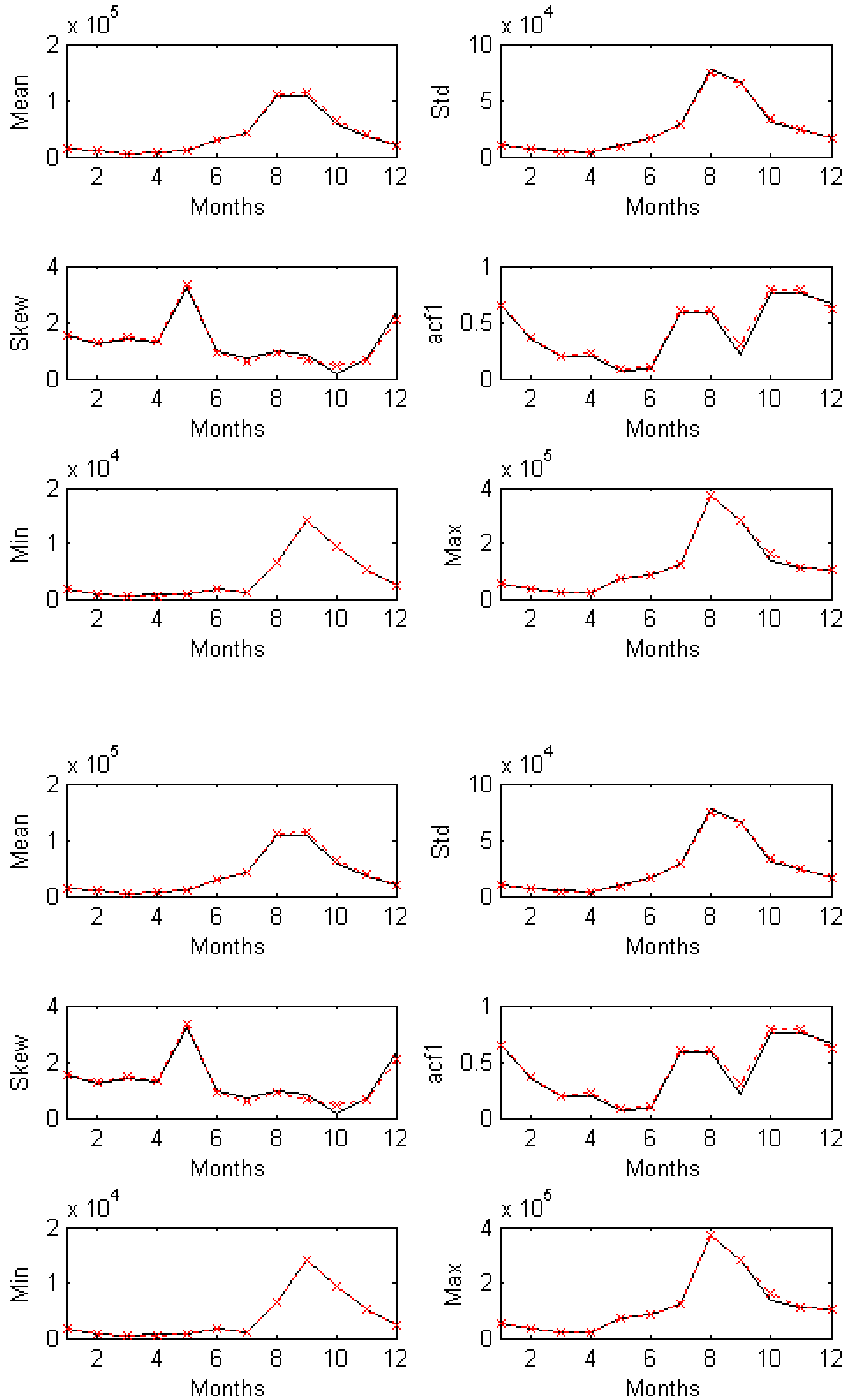


Figure D13 Monthly key statistics of the accumulated and intervening flows for site 13 (--x : whole, —:hist)

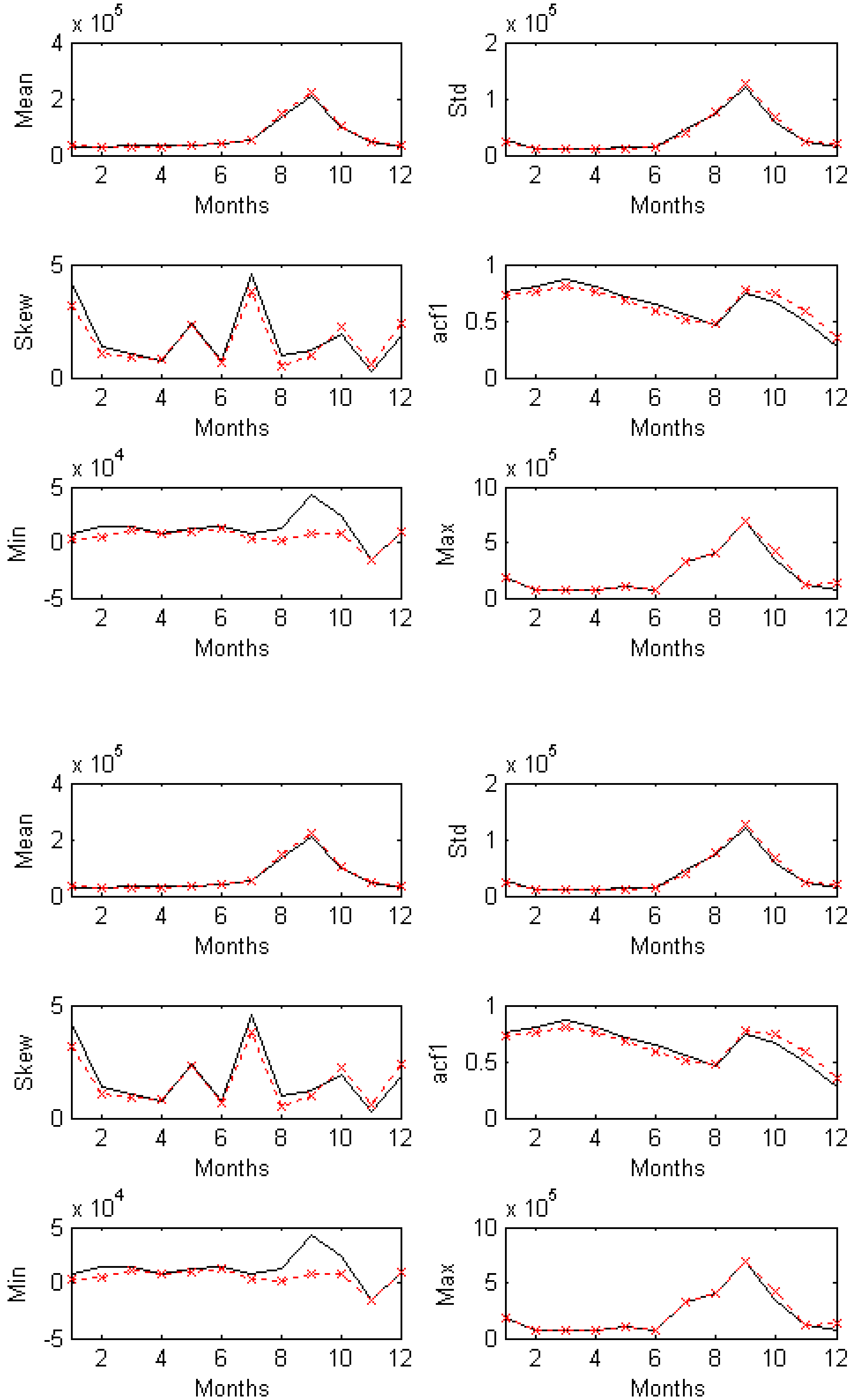


Figure D14 Monthly key statistics of the accumulated and intervening flows for site 14 (--x : whole, —:hist)

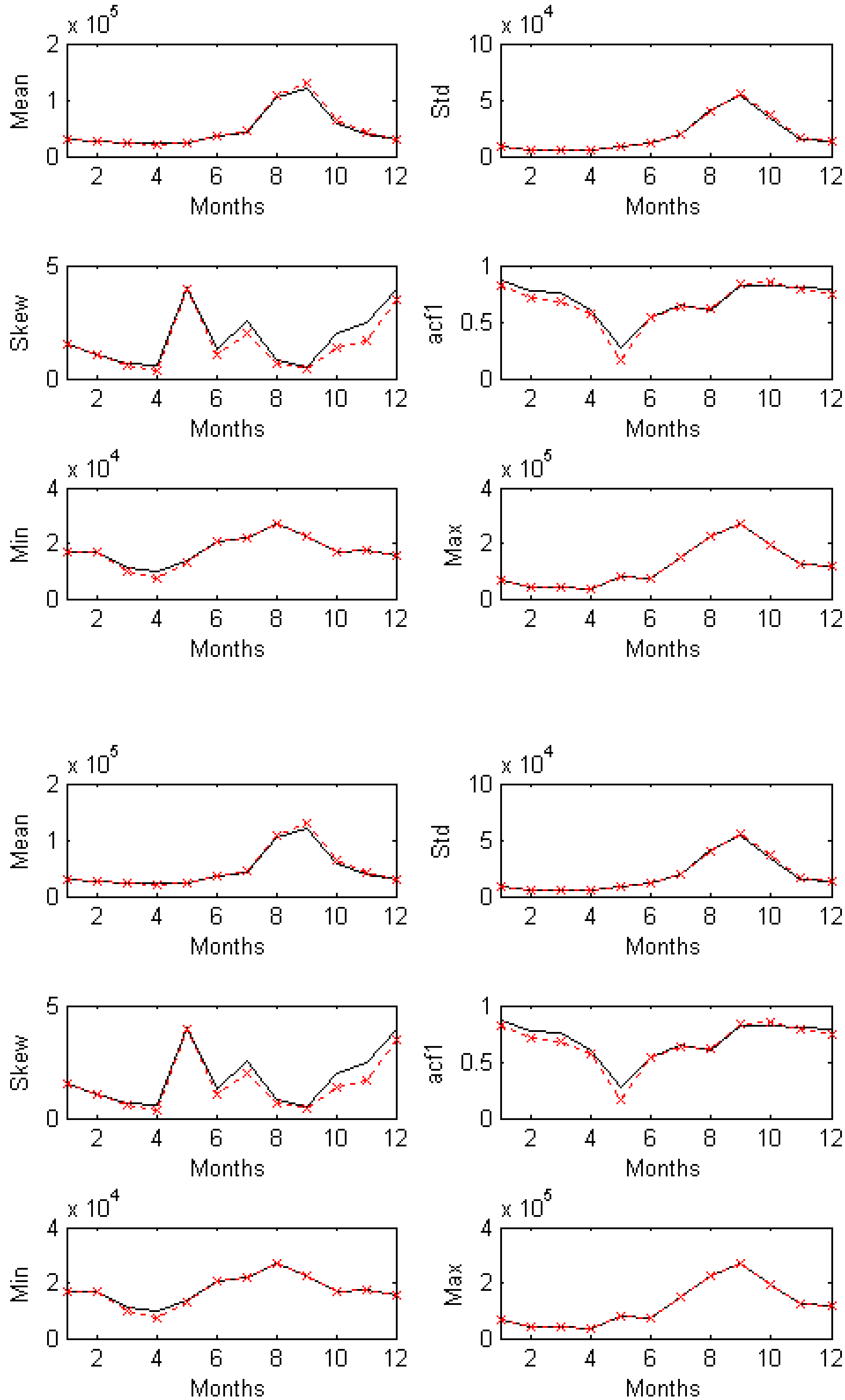


Figure D15 Monthly key statistics of the accumulated and intervening flows for site 15 (--x : whole, —:hist)

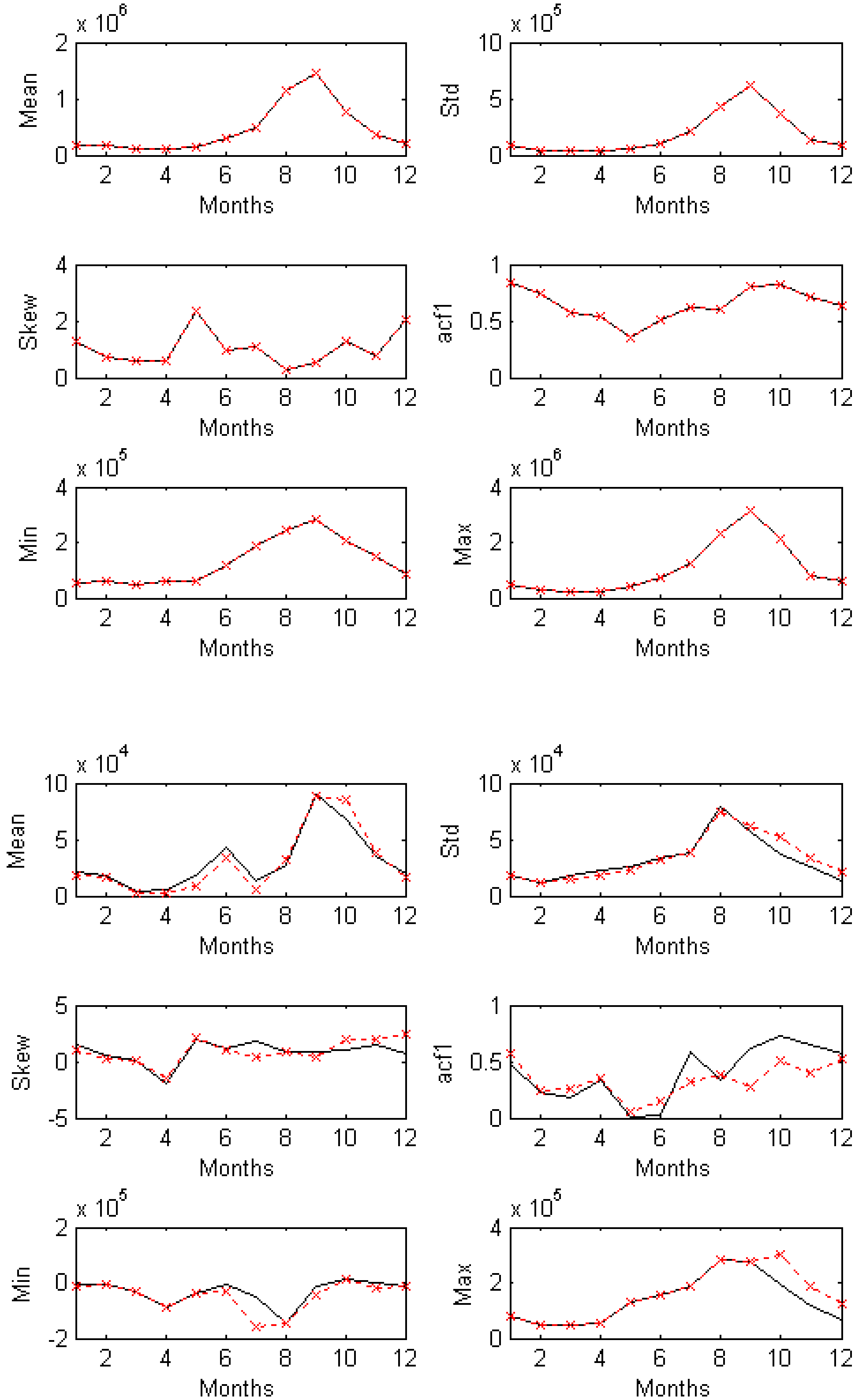


Figure D16 Monthly key statistics of the accumulated and intervening flows for site 16 (--x : whole, —:hist)

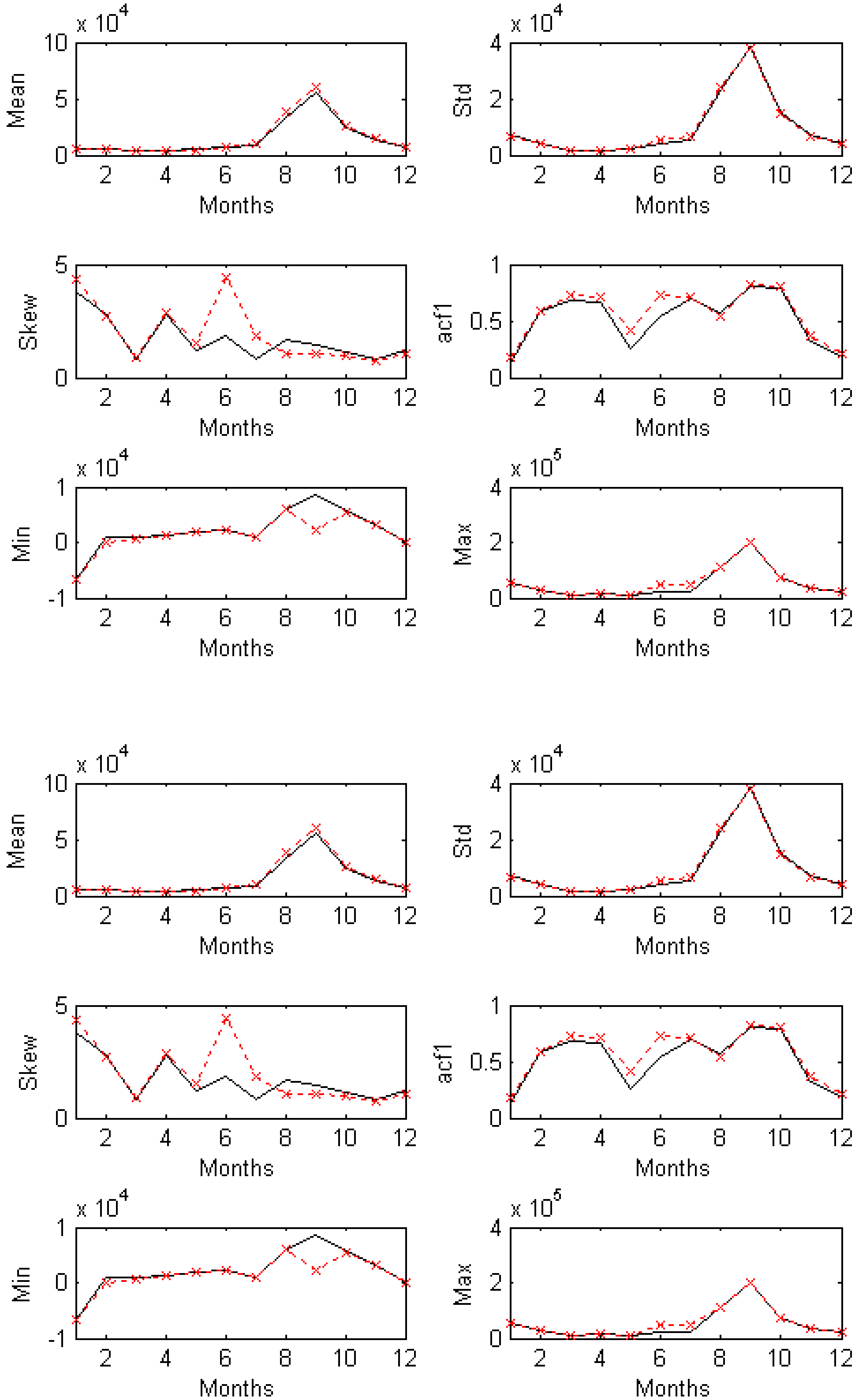


Figure D17 Monthly key statistics of the accumulated and intervening flows for site 17 (--x : whole, —:hist)

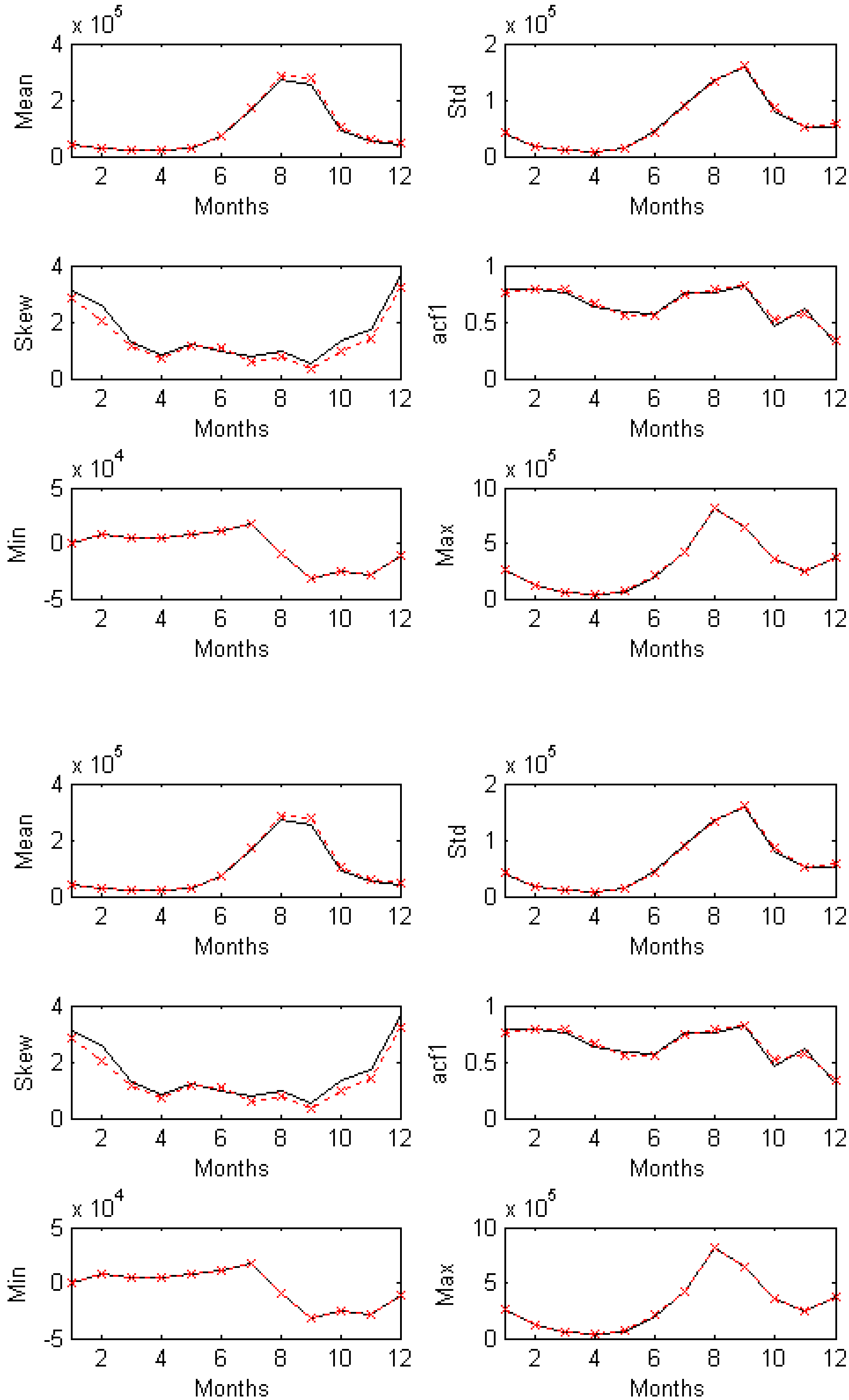


Figure D18 Monthly key statistics of the accumulated and intervening flows for site 18(--x : whole, —:hist)

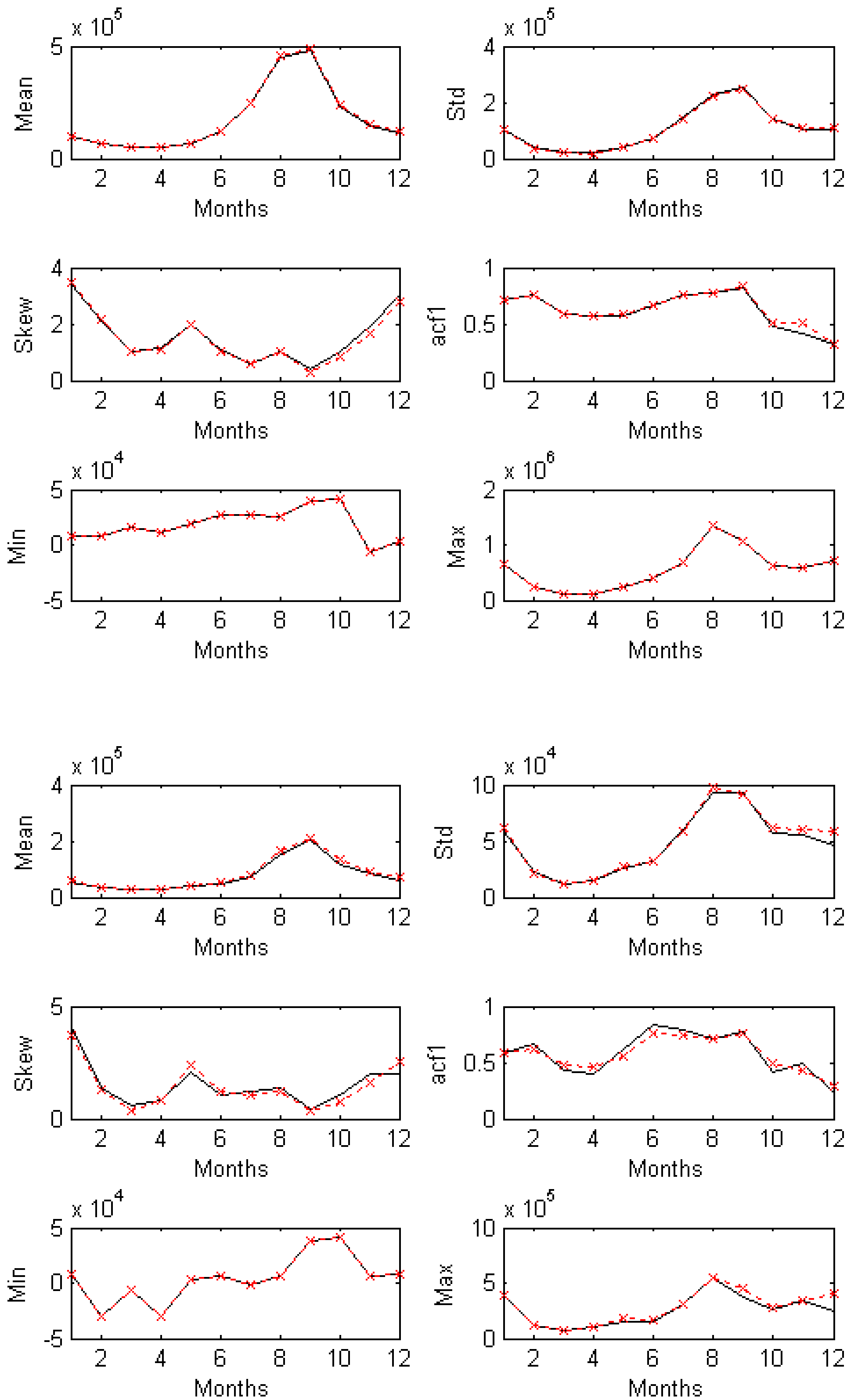


Figure D19 Monthly key statistics of the accumulated and intervening flows for site 19 (--x : whole, —:hist)

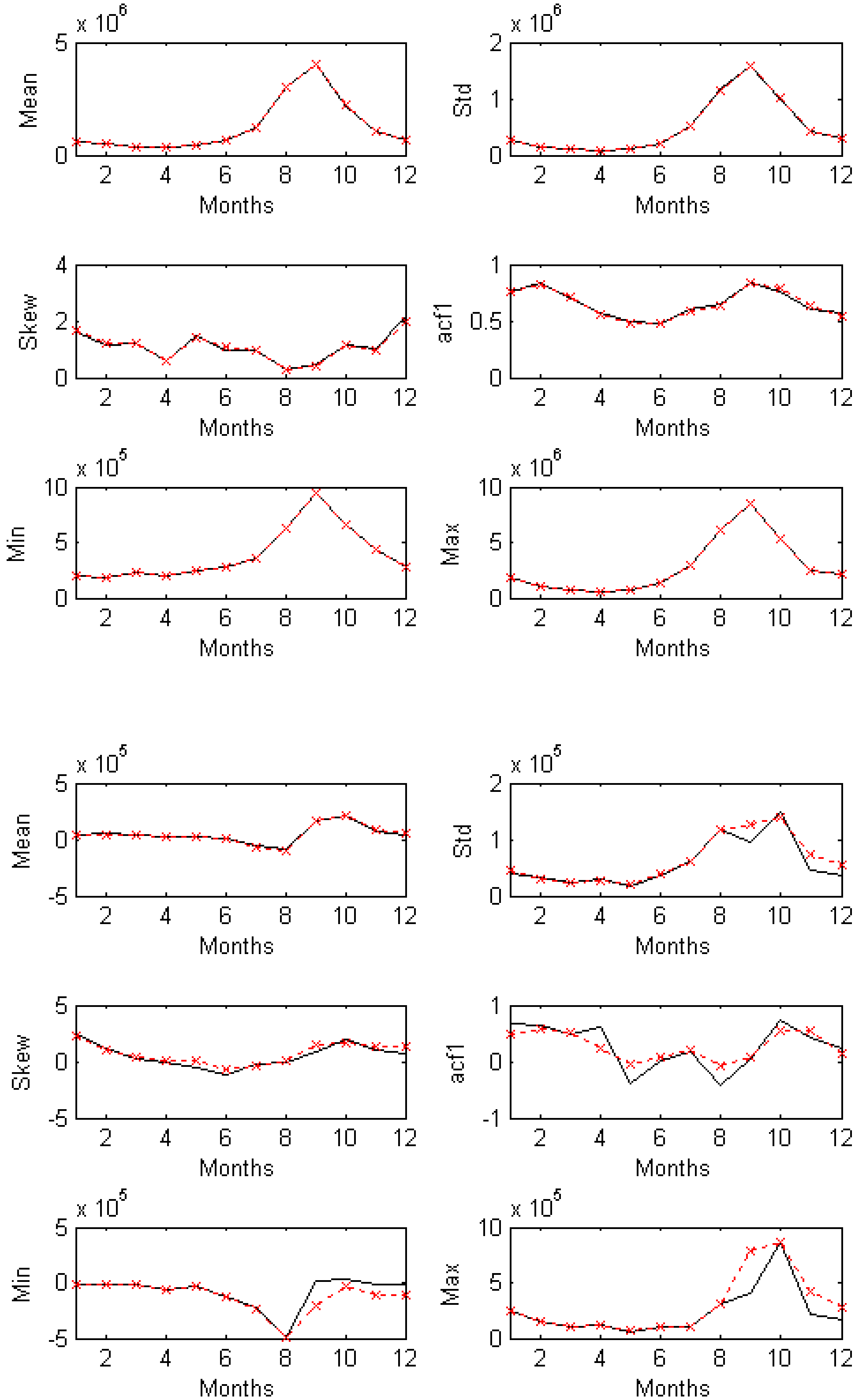


Figure D20 Monthly key statistics of the accumulated and intervening flows for site 20(--x : whole, —:hist)

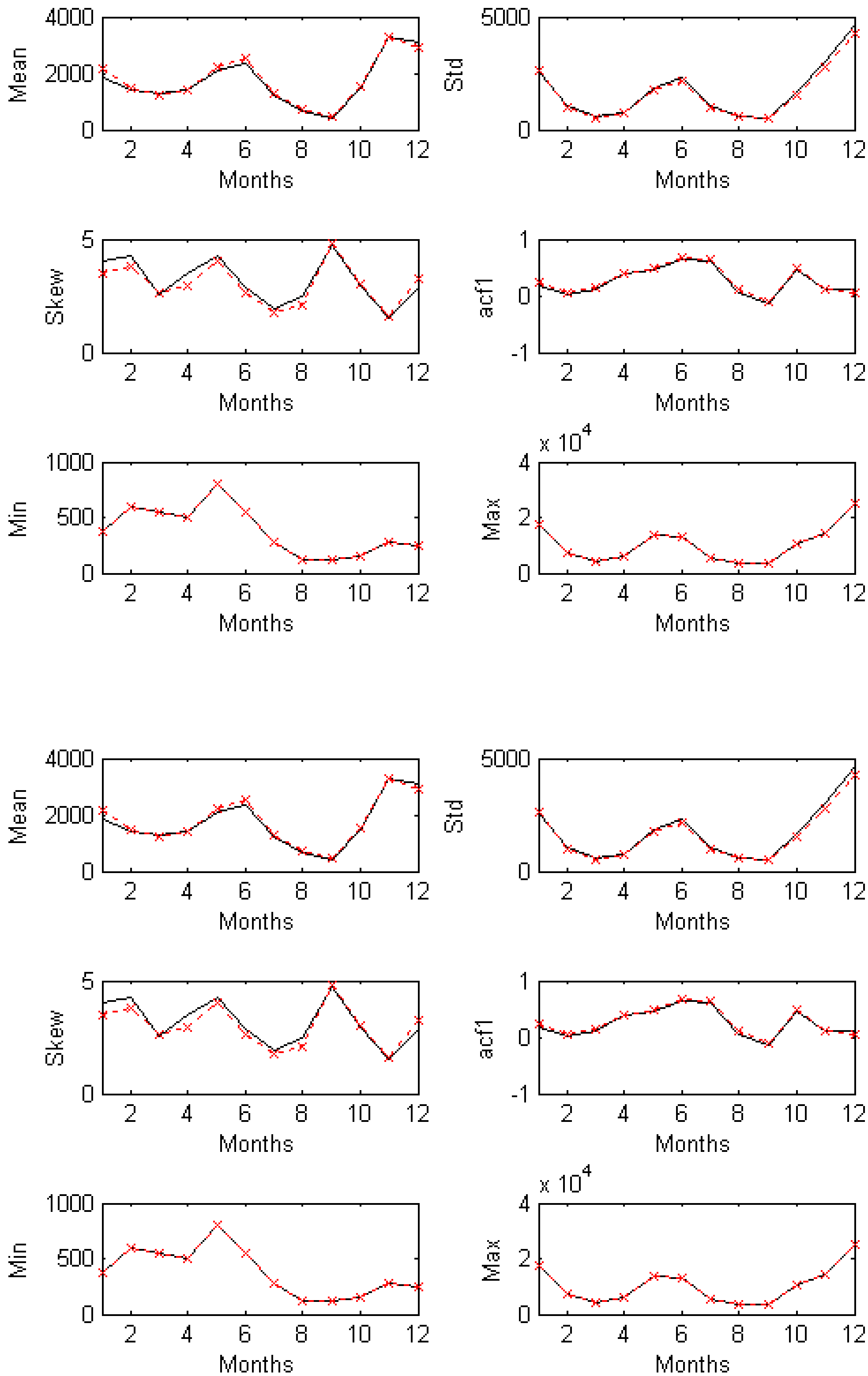


Figure D21 Monthly key statistics of the accumulated and intervening flows for site 21 (--x : whole, —:hist)

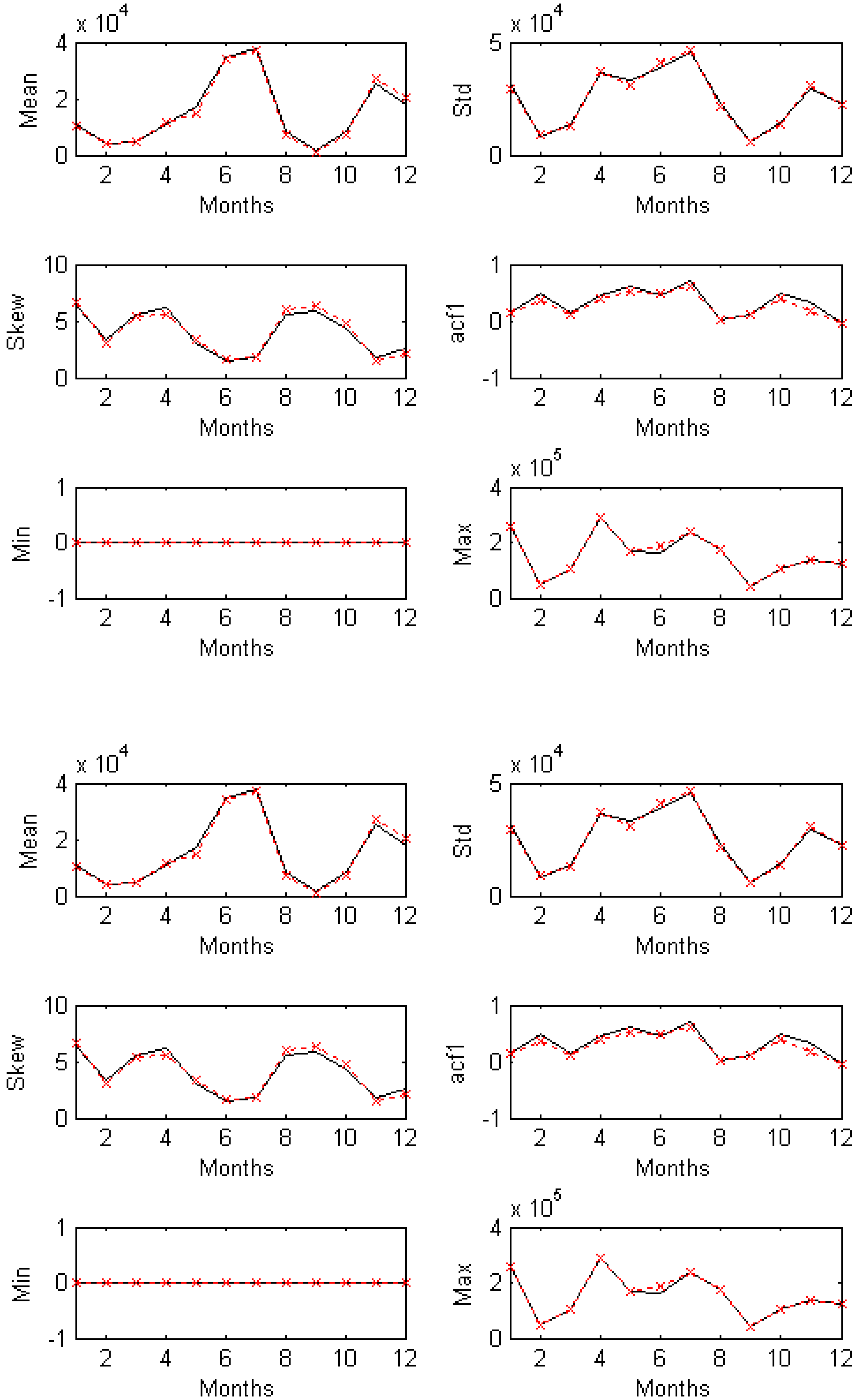


Figure D22 Monthly key statistics of the accumulated and intervening flows for site 22 (--x : whole, —:hist)

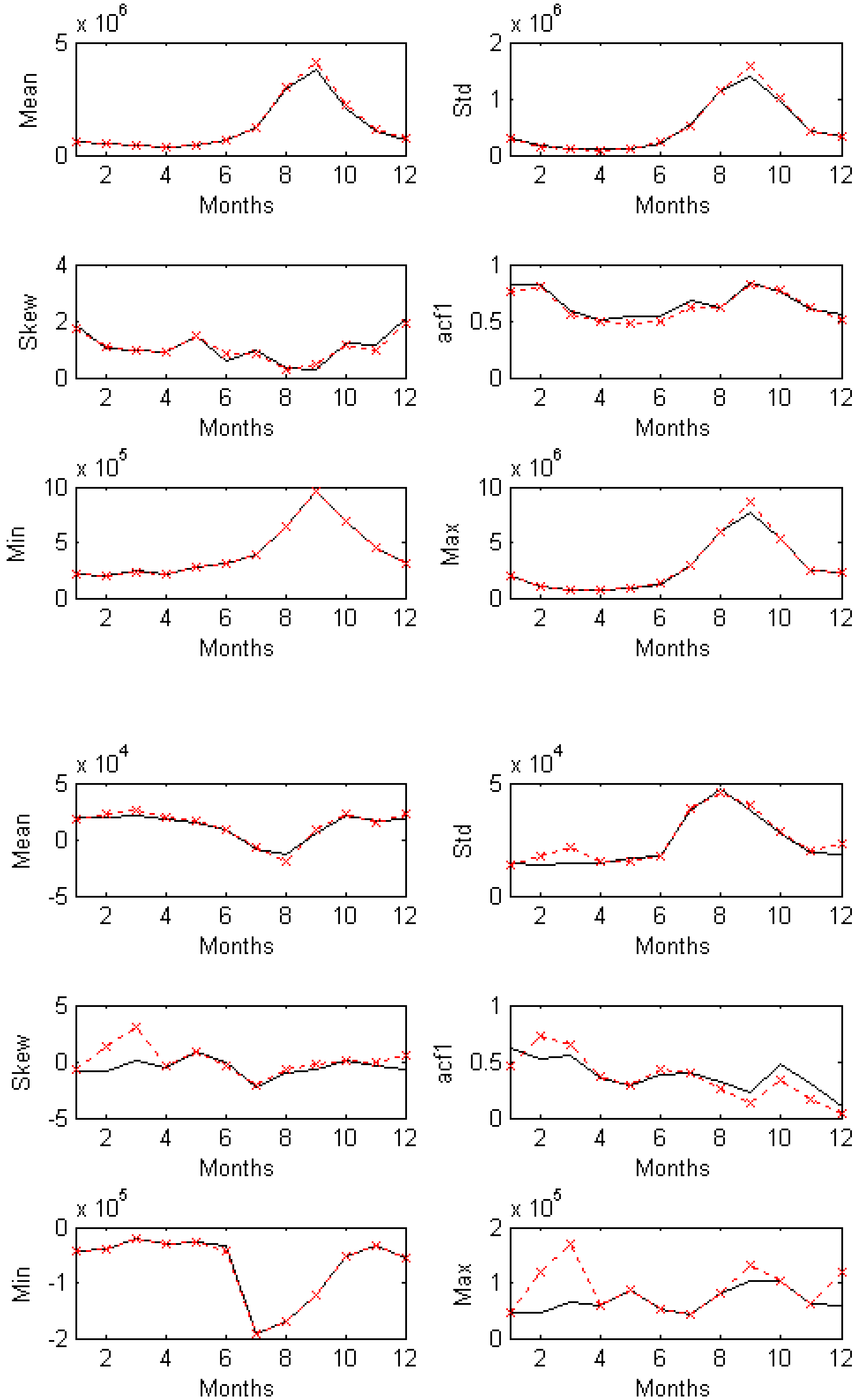


Figure D23 Monthly key statistics of the accumulated and intervening flows for site 23(--x : whole, —:hist)

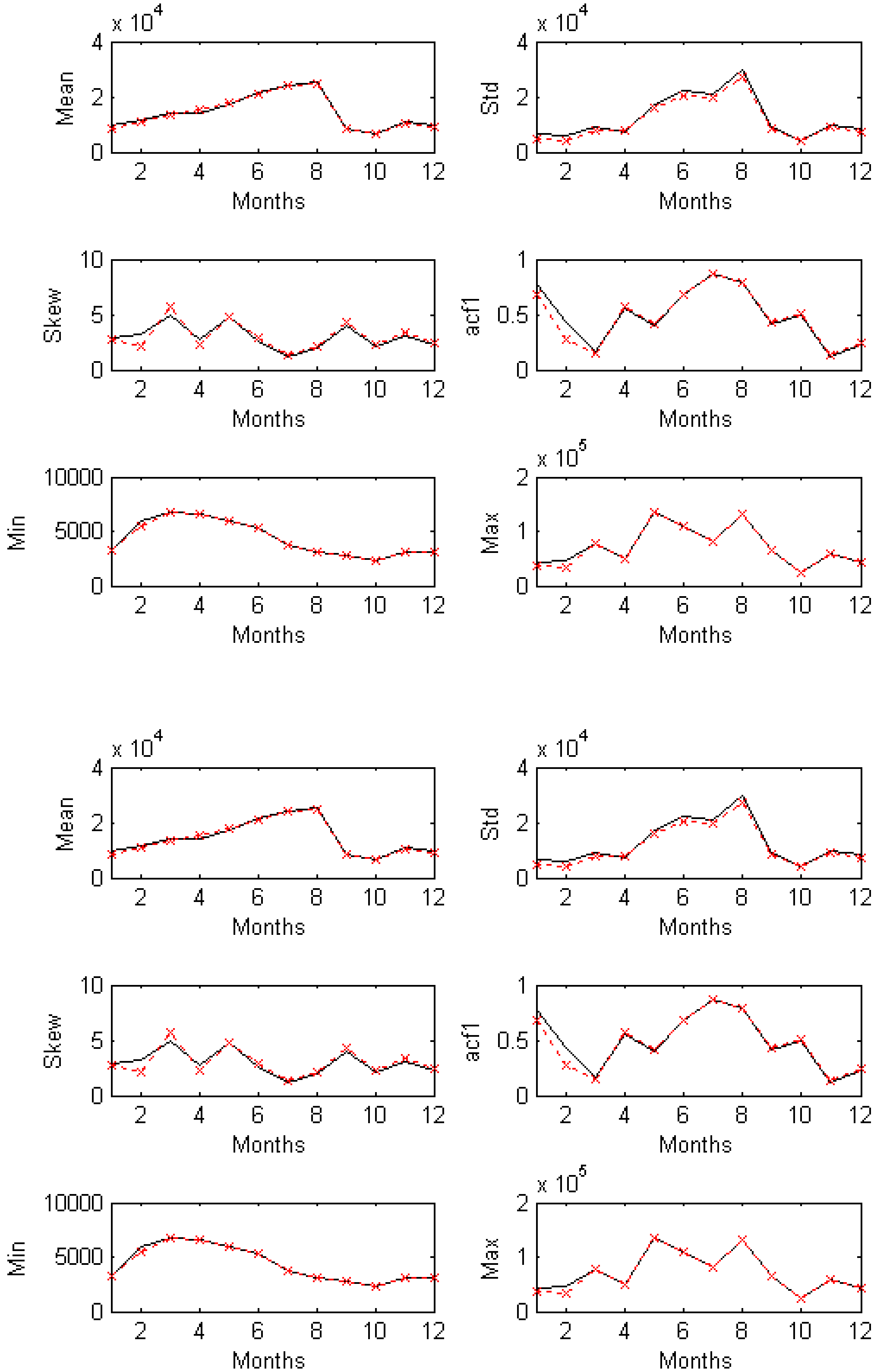


Figure D24 Monthly key statistics of the accumulated and intervening flows for site 24(--x : whole, —:hist)

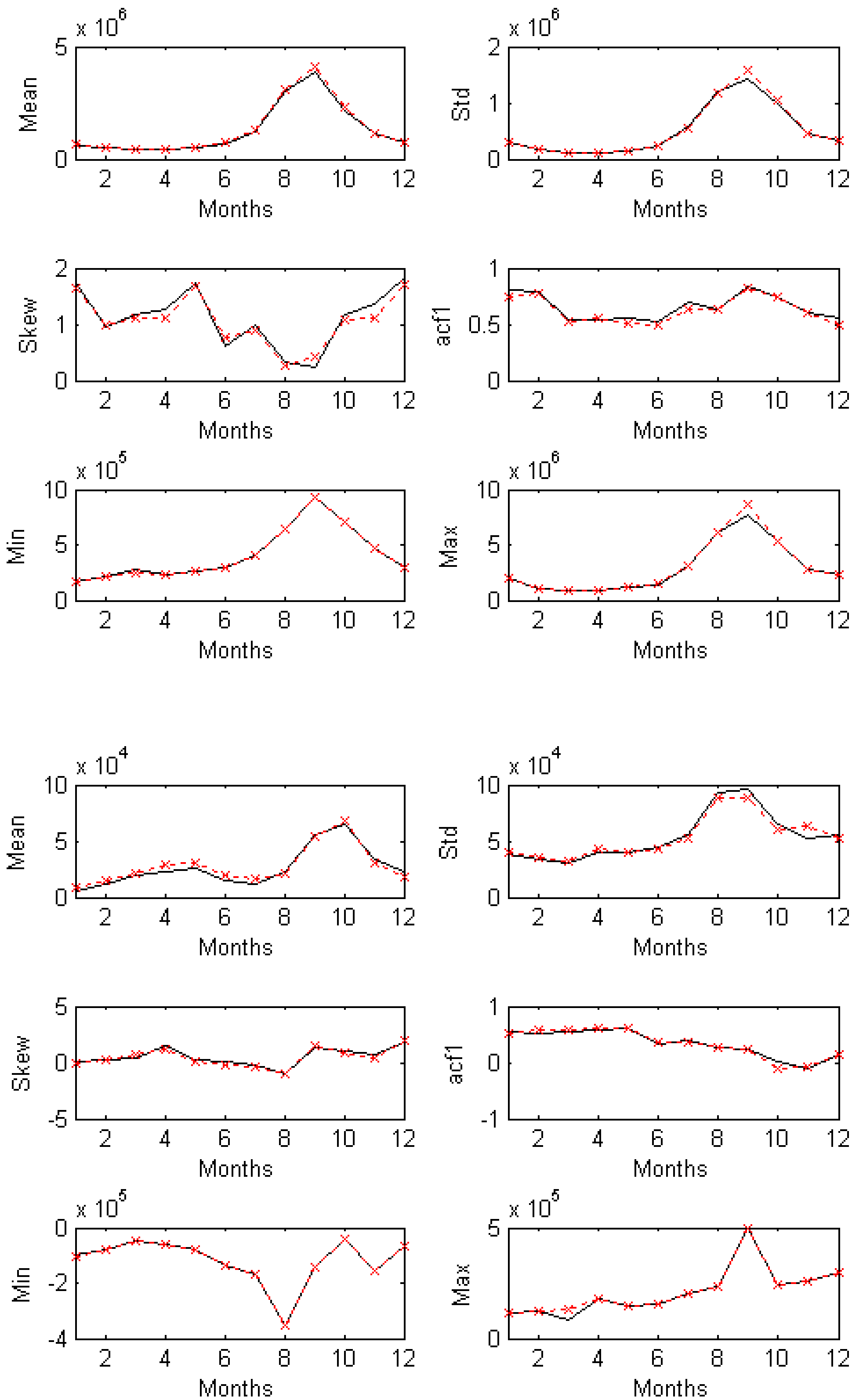


Figure D25 Monthly key statistics of the accumulated and intervening flows for site 25(--x : whole, —:hist)

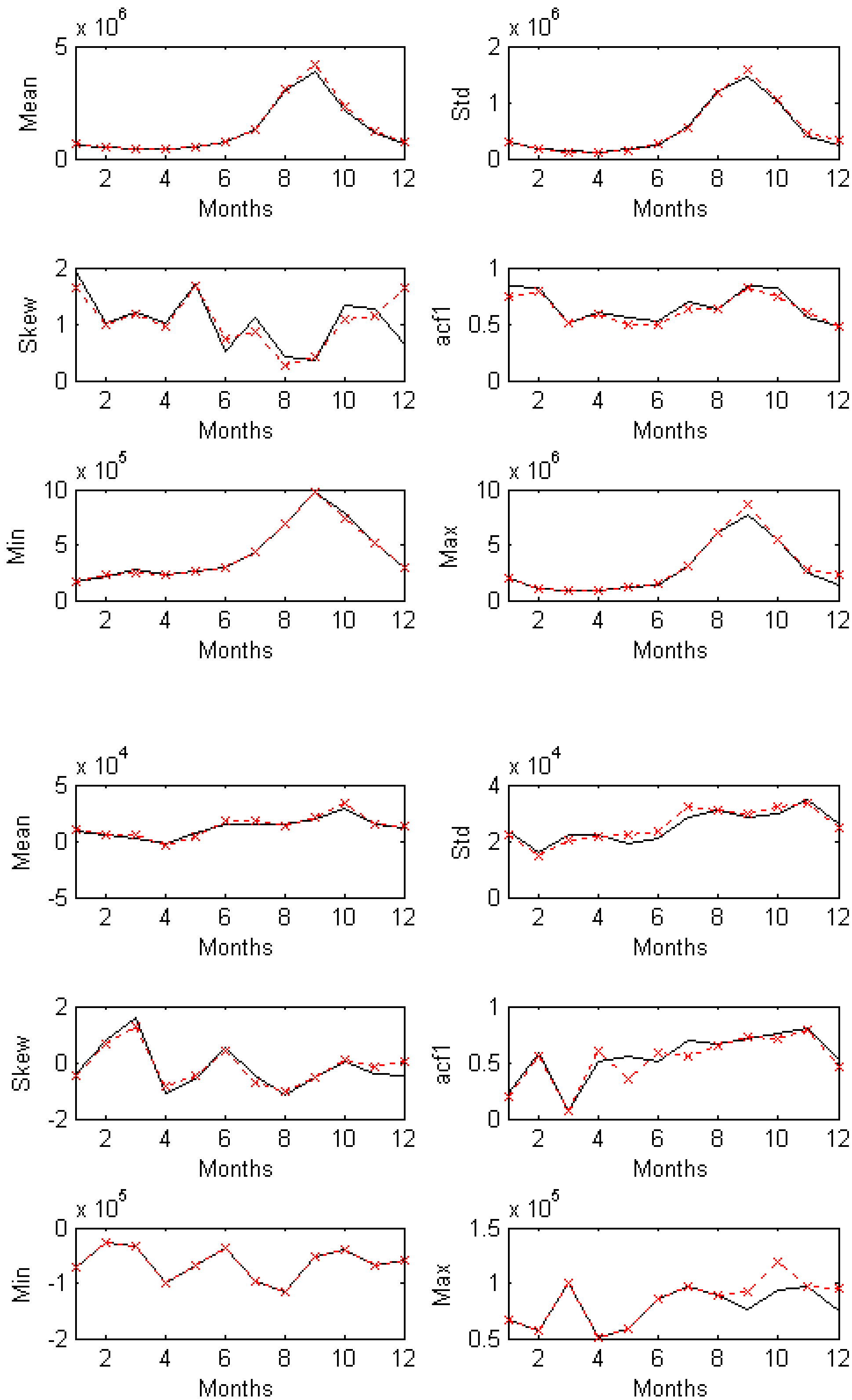
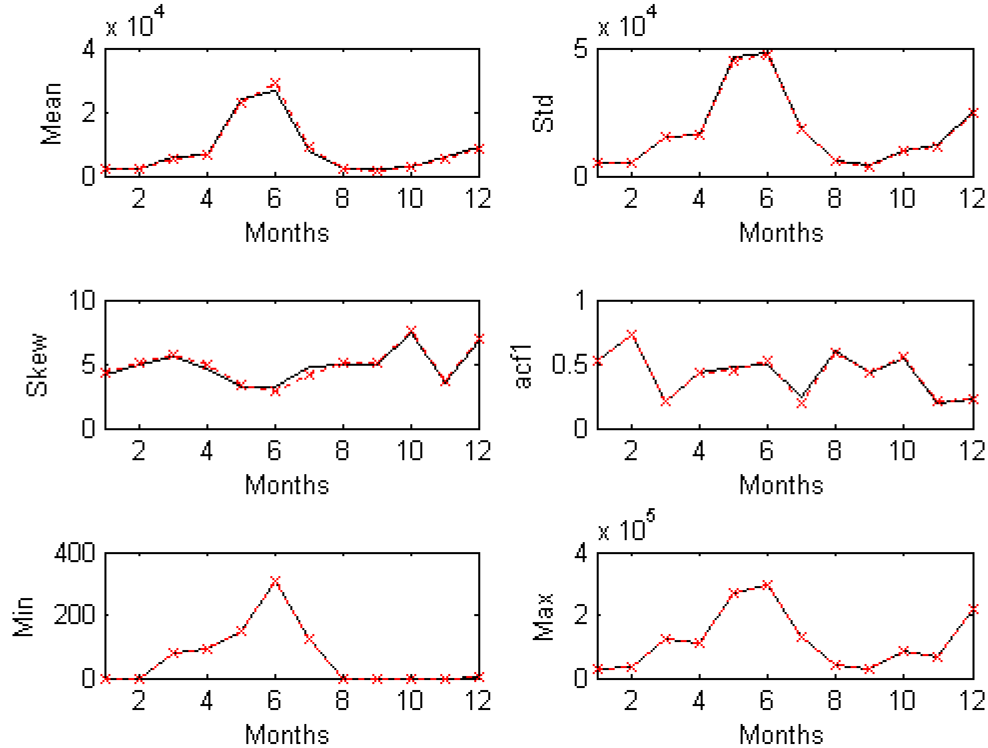


Figure D26 Monthly key statistics of the accumulated and intervening flows for site 26 (--x : whole, —:hist)



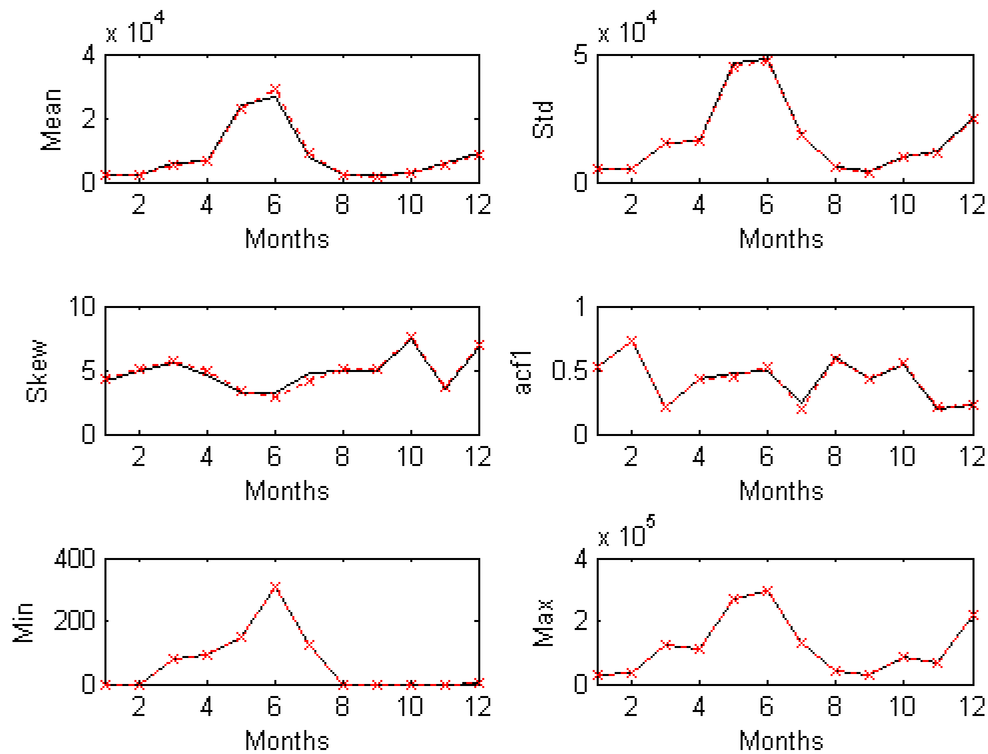


Figure D27 Monthly key statistics of the accumulated and intervening flows for site 27(--x : whole, —:hist)

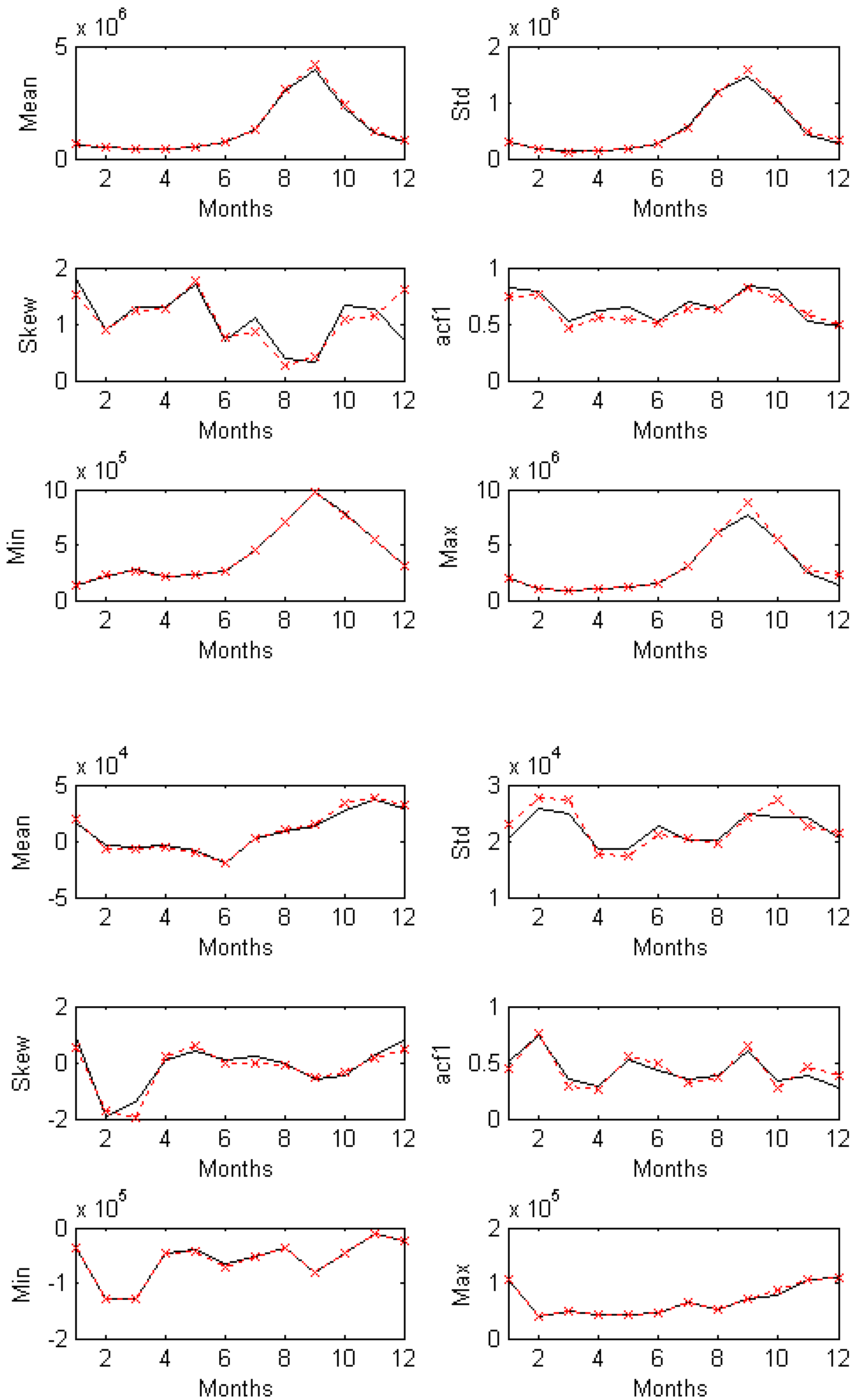


Figure D28 Monthly key statistics of the accumulated and intervening flows for site 28(--x : whole, —:hist)

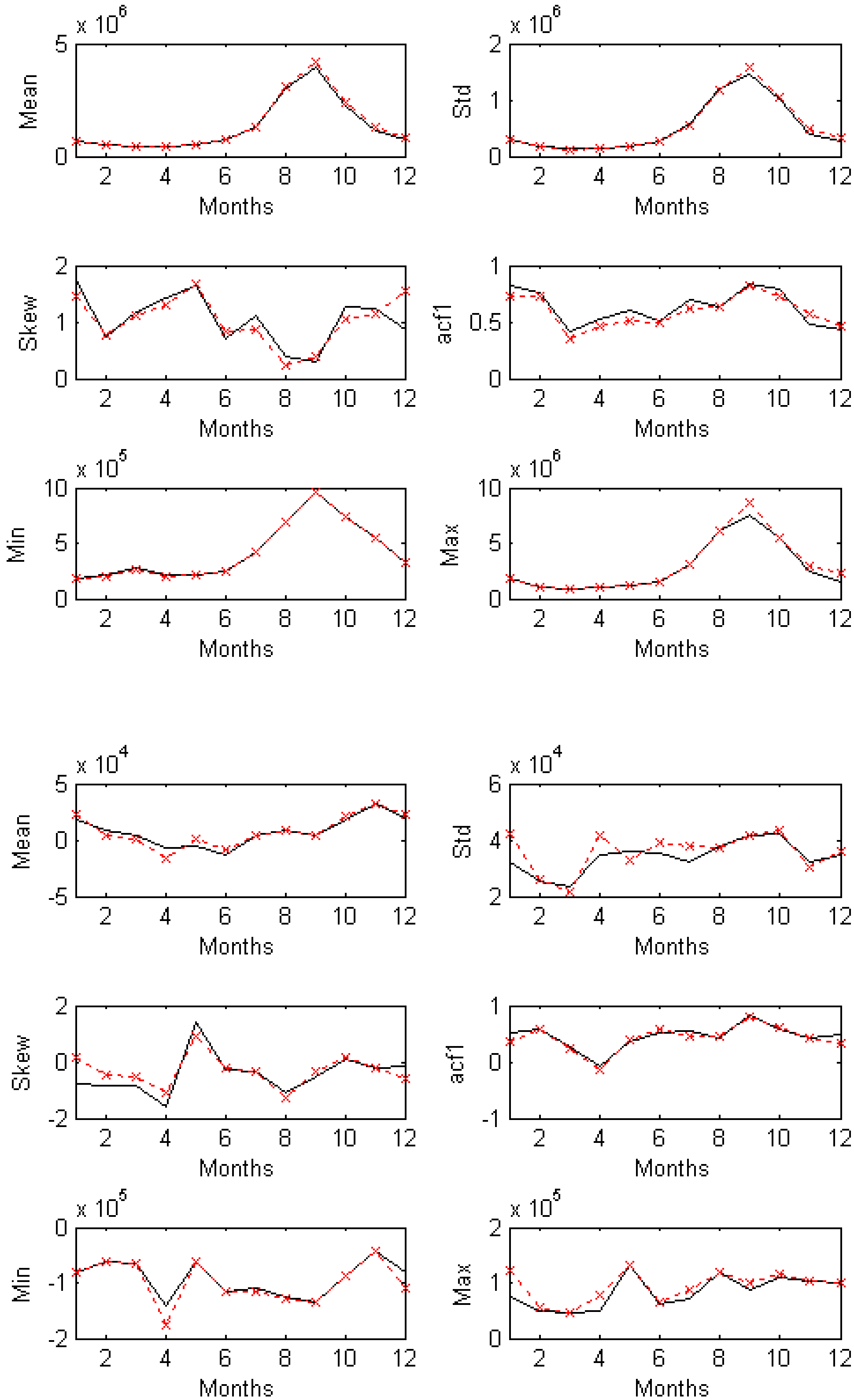


Figure D29 Monthly key statistics of the accumulated and intervening flows for site 29(--x : whole, —:hist)