



INTRODUCTION OF DUNHUANG SITE AUTOMATIC OBSERVATION RADIOMETRIC CALIBRATION OPERATIONAL SYSTEM (DARCOS)

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SUN, YAFENG ZHAO**



National Satellite Meteorological Center (NSMC)
China Meteorological Administration (CMA)

TARGET

Surface Reflection Radiance

Sky Diffusion And Total Irradiance

Total Sky Cloud Volume

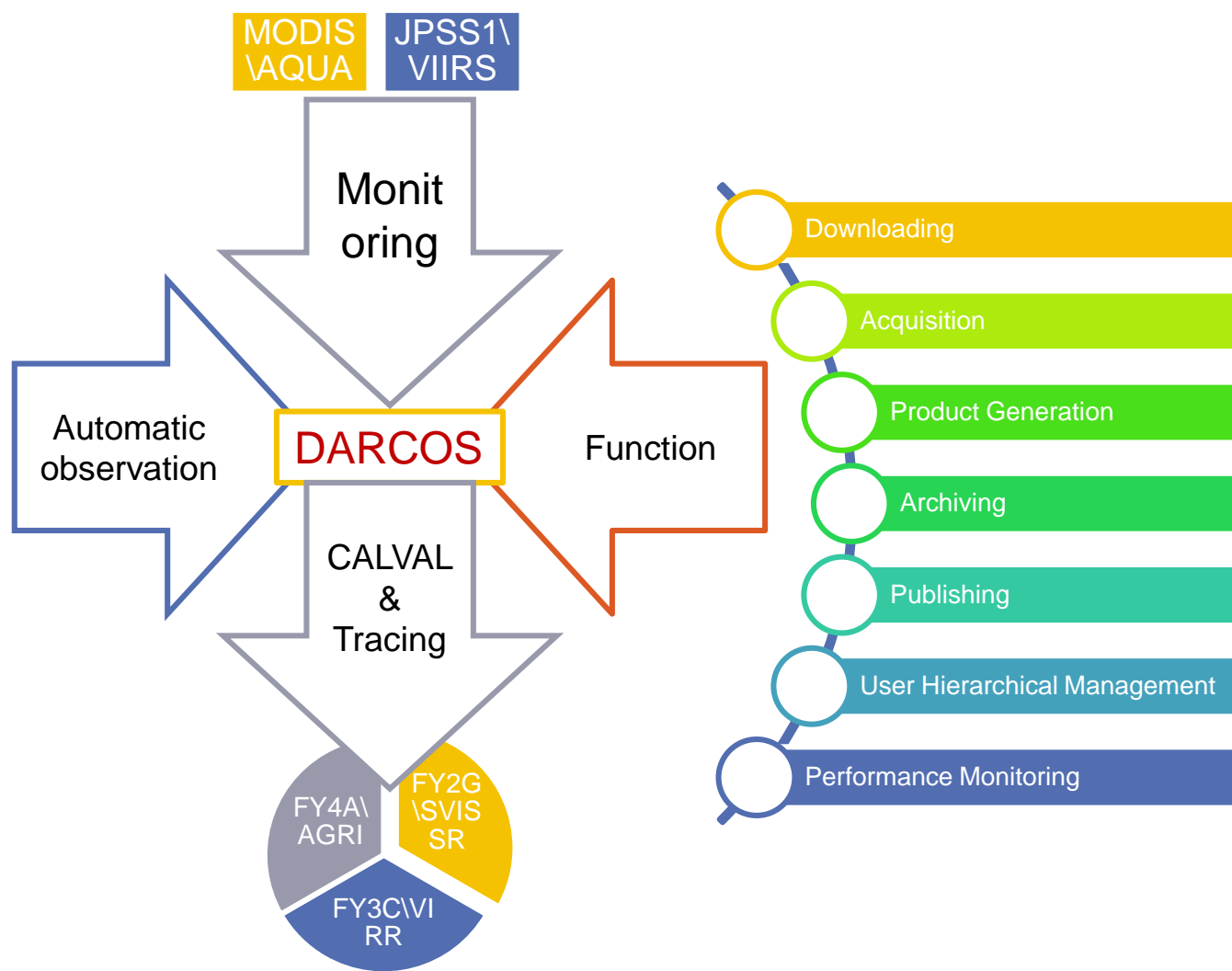
Total Water Vapor Volume

BRDF

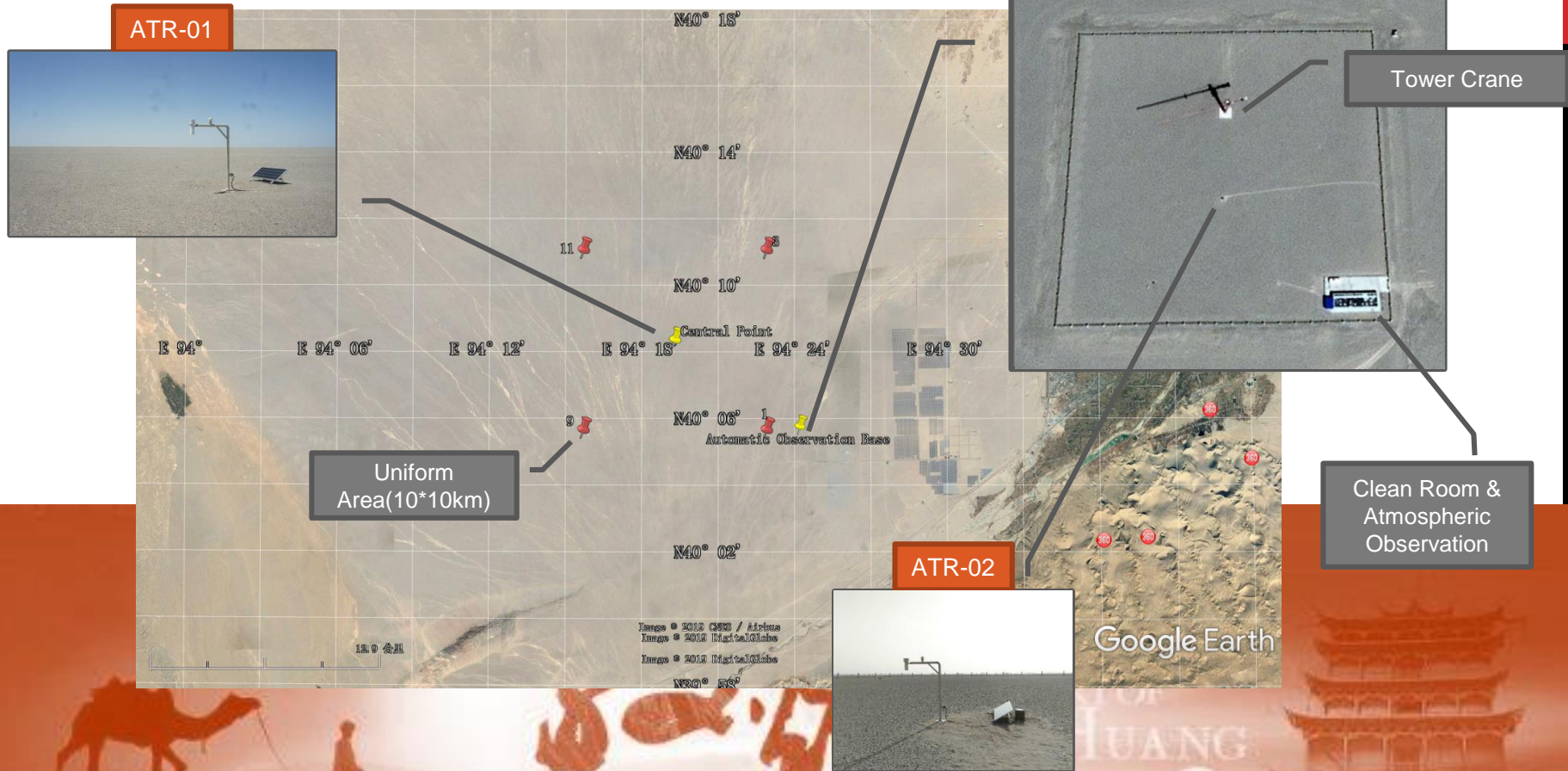
Optical Thickness

Atmospheric Trace Gas

Surface Emission



SITE LOCATION AND LAYOUT

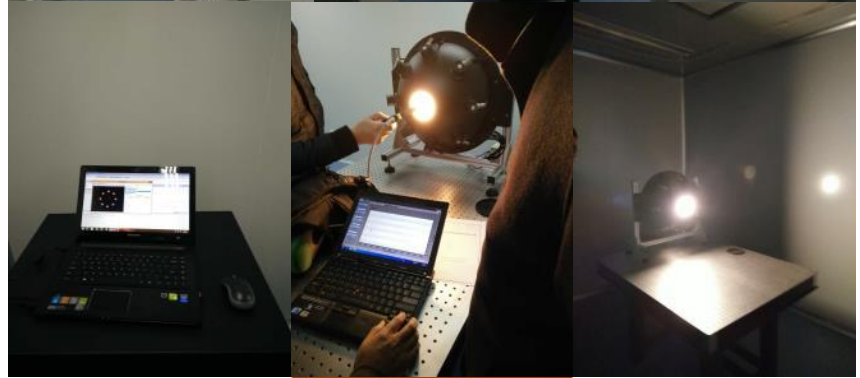


CLEAN ROOM & ATMOSPHERIC OBSERVATION ROOF

- 100,000-Level
- Municipal power supply
- High speed internet
- 10 level winds & 8 level earthquakes resistance



Atmospheric observation roof



Clean Room

DARCOS INSTRUMENT PARAMETER

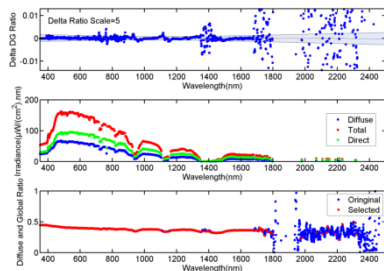
NAME	SN	MEASURING PHYSICAL ITEM	PARAMETER	LOCATION	PERIOD	INTERVAL
ATR01	ATR01	Surface Reflection Radiance	8 Channel: 400, 450, 500, 600, 675, 810, 1000, 1550 nm, Nadir	BASE	20180416 to present, sunrise - sunset	3 minutes
ATR02	ATR02	Surface Reflection Radiance	8 Channel: 400, 450, 500, 600, 675, 810, 1000, 1550 nm, Nadir	CENTER POINT	20180416 to present, sunrise - sunset	3 minutes
HIM	HIM01	Sky Diffusion and Total Irradiance	400-2400nm, FWHM: 4nm@400-950nm, 15nm@950-1700nm, 20nm@1700-2400nm.	BASE	20180806 to present, sunrise - sunset	10 minutes
ASC	ASC01	Full Sky Cloud	VIS Single Channel	BASE	20180824 to present, sunrise - sunset	About 2 minutes
CE318_BRDF	CIM01	Sky Diffuse Radiance, Lunar Radiance, Aerosol Optical Thickness, Surface Bidirectional Reflection Radiance	9 Channel: 380, 440, 550, 675, 740, 870, 937, 1020, 1640 nm	BASE	Expected to arrive in mid-2019	To be determined
GNSS	GPS01	Water Vapor Content, Temperature, Humidity, Pressure	Trimble Netr9	BASE	20181211 to present, all day	1 hour

TOTAL SKY CLOUD VOLUME

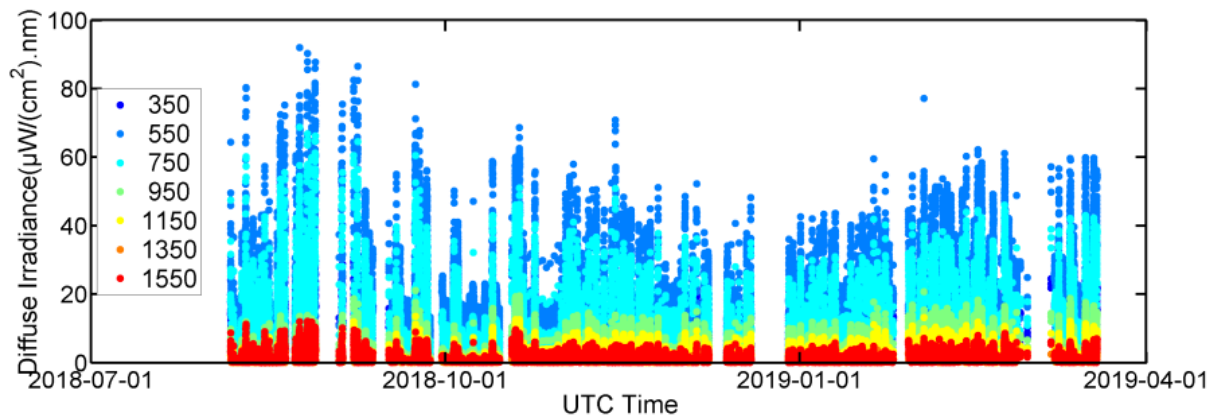
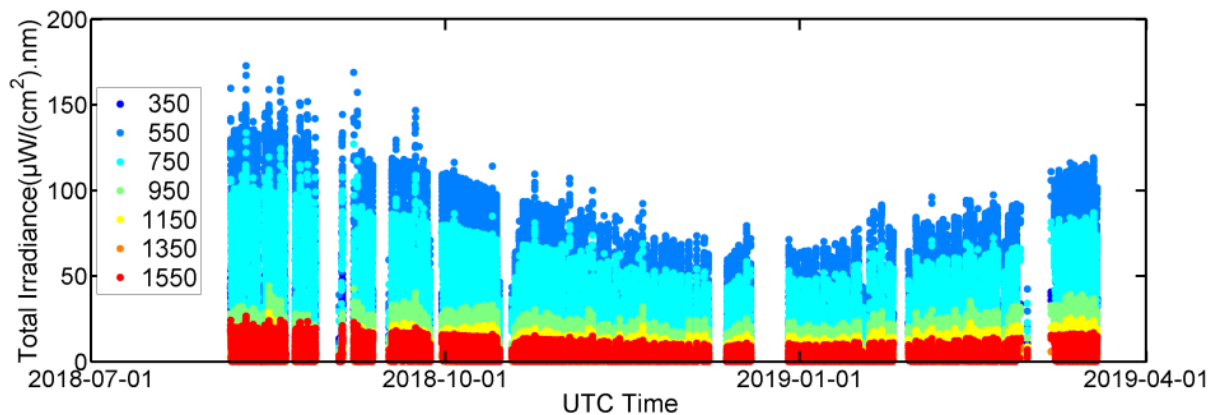


Manufactured by AIOFM/CAS

HIM SKY DIFFUSION AND TOTAL IRRADIANCE



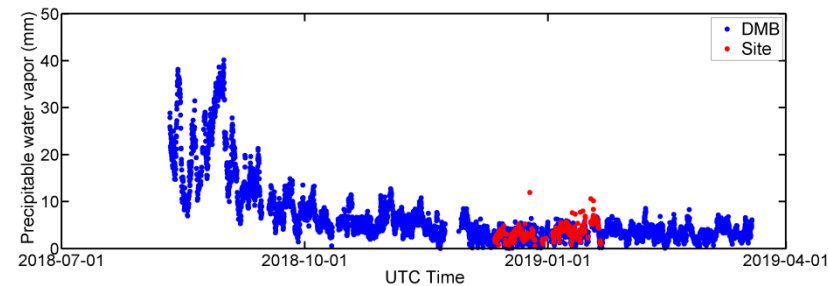
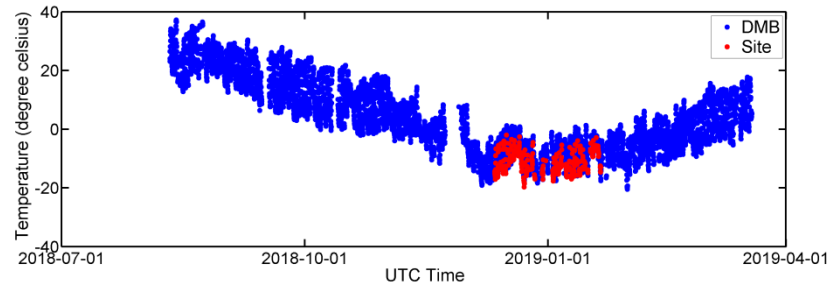
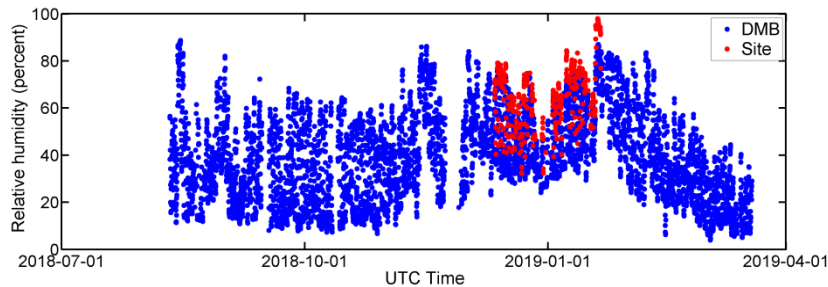
Manufactured by AIOFM/CAS



GNSS/MET TOTAL WATER VAPOR VOLUME



Trimble



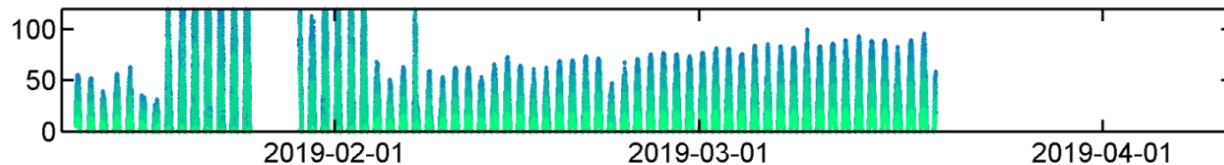
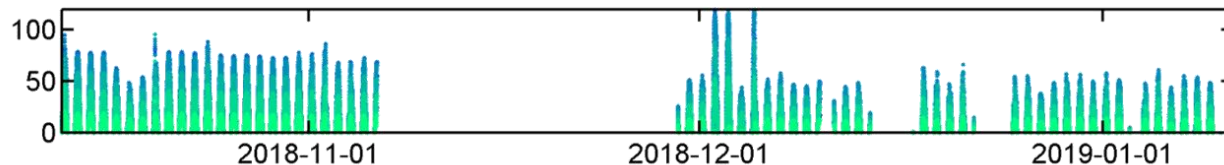
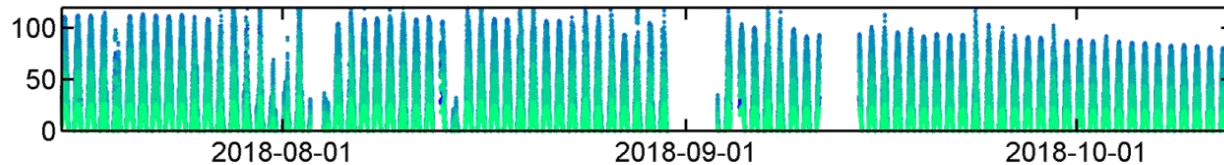
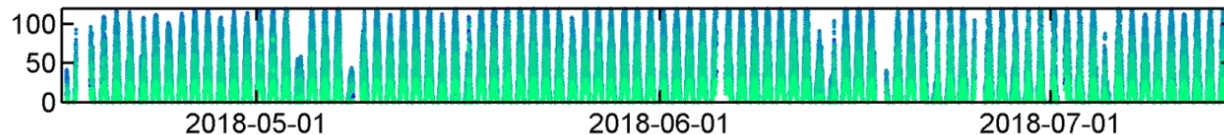
ATR_1 SURFACE RADIOMETER



Manufactured by AIOFM/CAS

- 0.4um
- 0.45um
- 0.5um
- 0.6um
- 0.675um
- 0.81um
- 1um
- 1.55um

ATR01 Radiance(W/m2.um.sr)



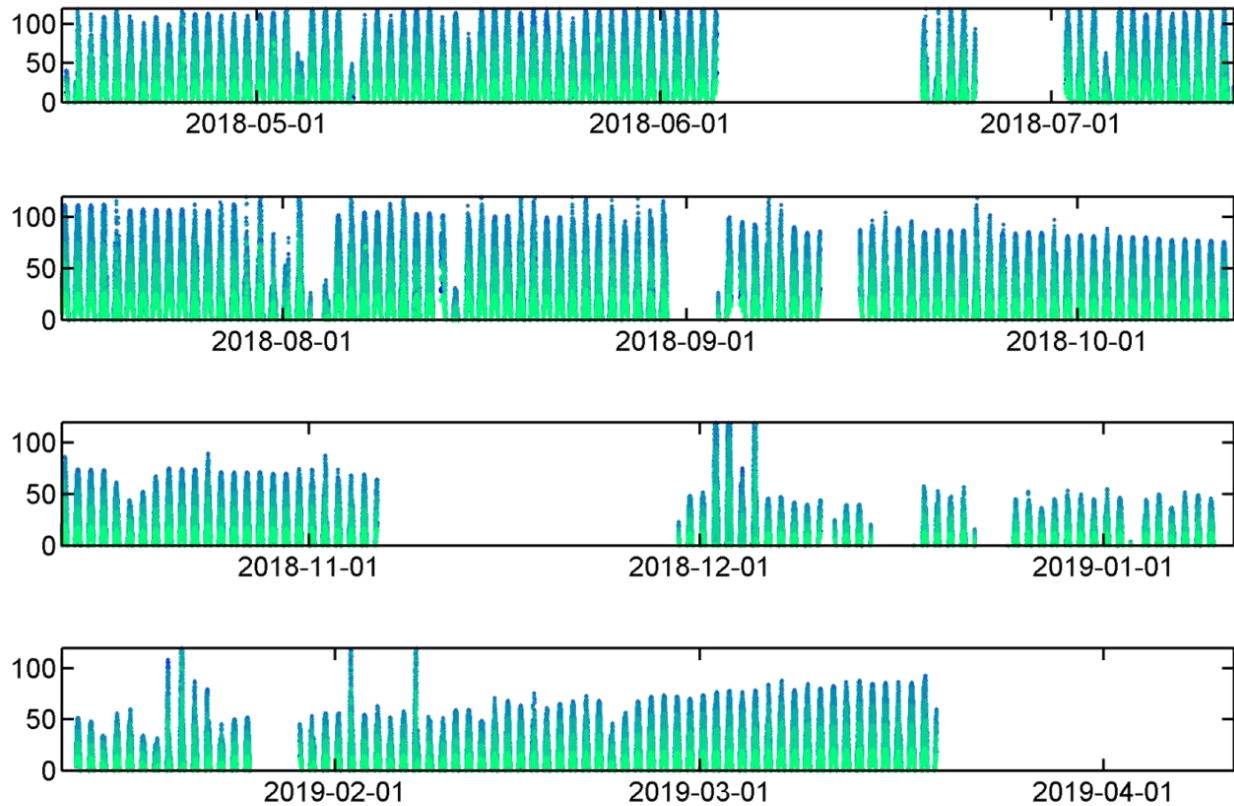
ATR_2 SURFACE RADIOMETER



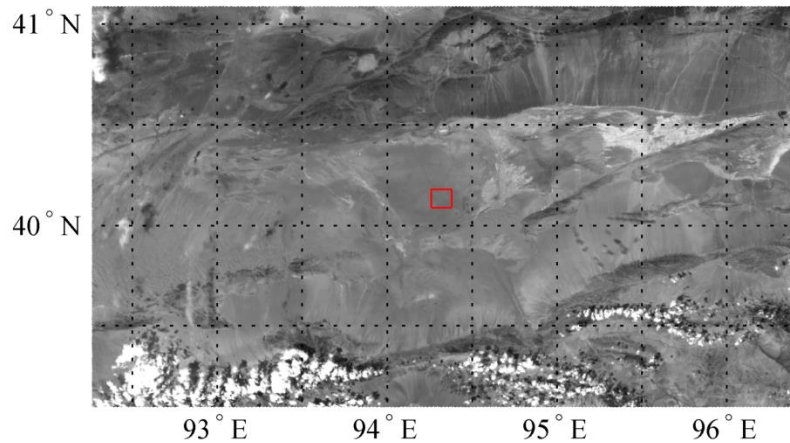
Manufactured by AIOFM/CAS

- 0.4um
- 0.45um
- 0.5um
- 0.6um
- 0.675um
- 0.81um
- 1um
- 1.55um

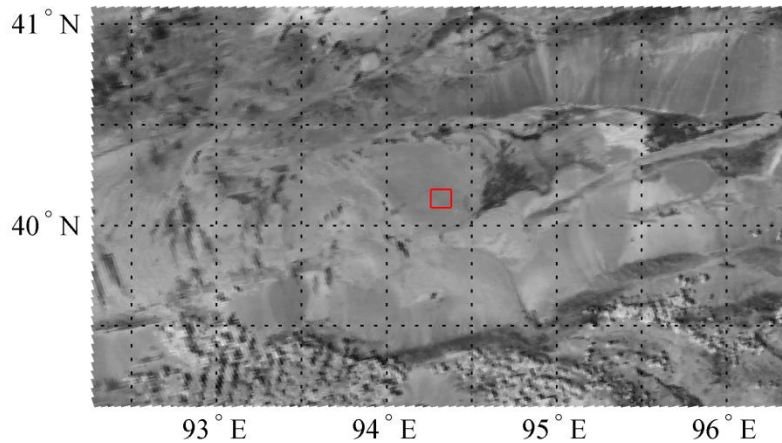
ATR02 Radiance(W/m2.um.sr)



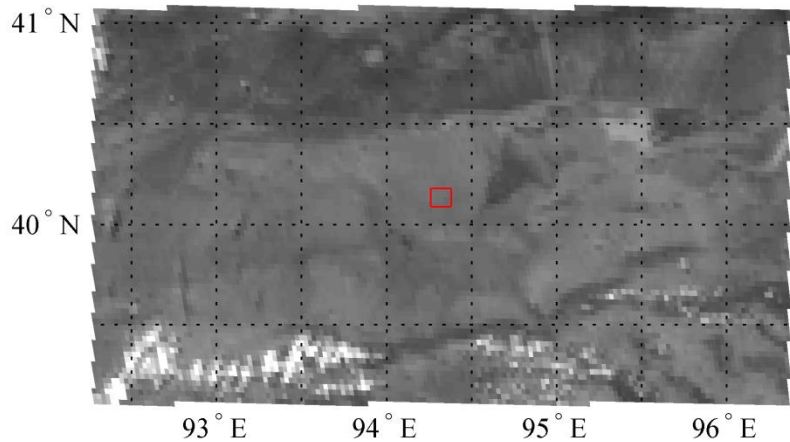
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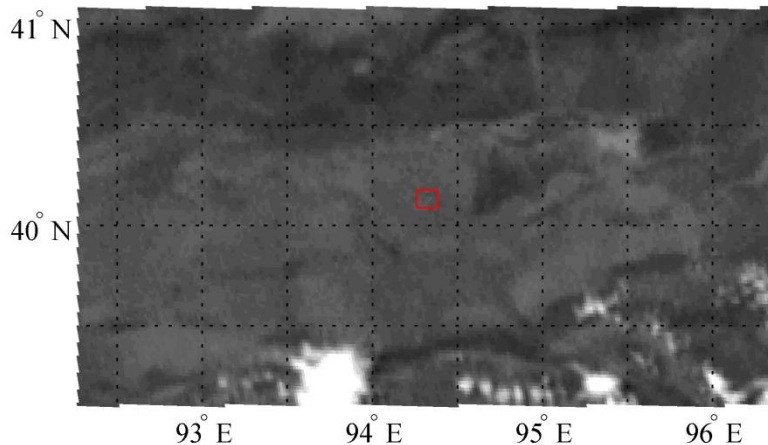
AQUA/MODIS/BAND7/REF/DH/20180813/063649



FY-4A/AGRI/BAND2/REF/DH/20180813/054632



FY2G/VISSR/VIS/REF/DH/20180807/080506



PERFORMANCE MONITORING INTERFACE

敦煌场地定标监控信息

监测时间 2019-03-27 14:26:25

仪器监控→

文件系统使用率

敦煌磁盘空间使用率为 8.38%

Z:\dunhuang (fy4a emcnas)使用率为 39.49%

GlassFish

主机名 LIYUAN1	状态 正常
IP 10.24.237.47	
主机名 LIYUAN2	状态 正常
IP 10.24.237.48	

MySQL

主机名 LIYUAN1	状态 正常
IP 10.24.237.47	
主机名 LIYUAN2	状态 正常
IP 10.24.237.48	

FTP

主机名 S9000	状态 正常
IP s9000.dmz.nsmc.org.cn	



敦煌FTP



数据采集

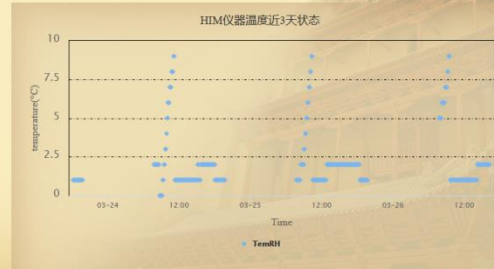
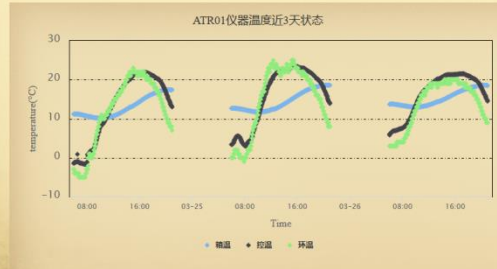
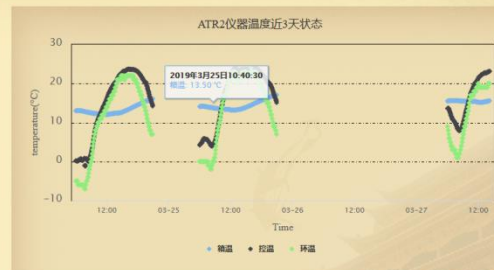
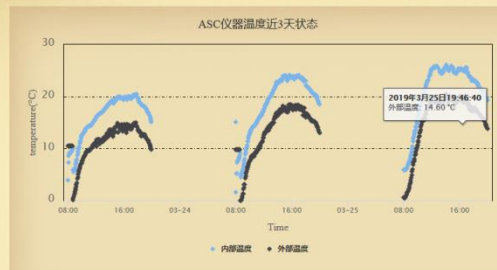


内网资源池

敦煌场地定标监控信息

监测时间 2019-03-27 14:26:44

系统监控→

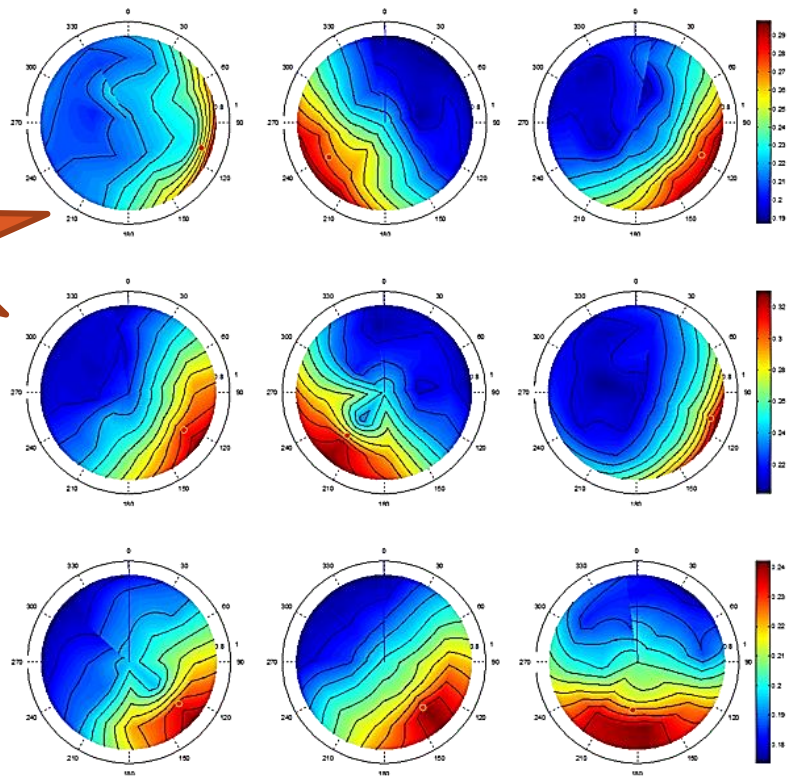


MICRO-FACE COSINE KERNEL DRIVEN(MICOKE) BRDF MODEL

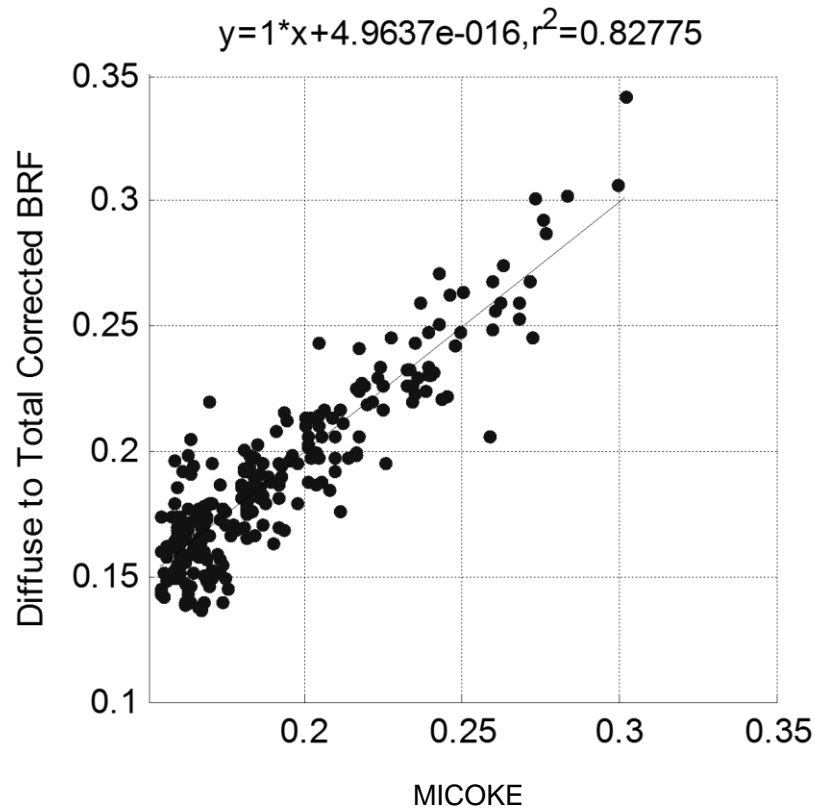
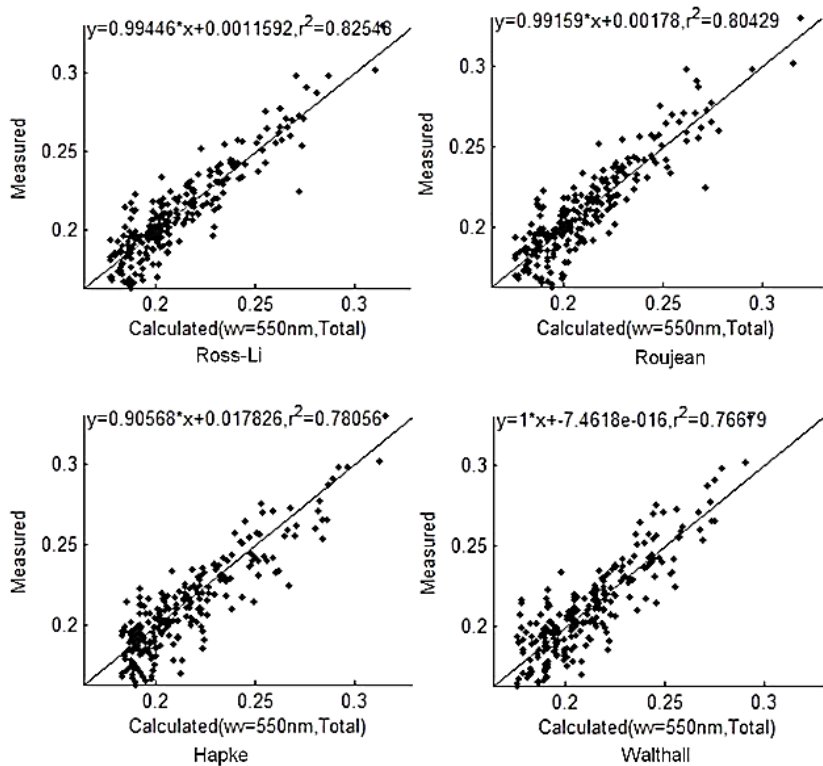
■ Build a new BRDF model:

- Micro-face COsine KErnel driven(MICOKE) BRDF model
- $BRF = a_1 + a_2 * \cos(M_i) * (1 + \cos(M_z)) + a_3 * \cos(M_z) * \cos(M_z) + a_4 * \cos(M_i) * \cos(M_i)$
- M_z is the zenith angle of micro-face
- M_i is the incident angle relative to the micro-face
- $a_{(1-4)}$ is a multiple linear regression coefficient.

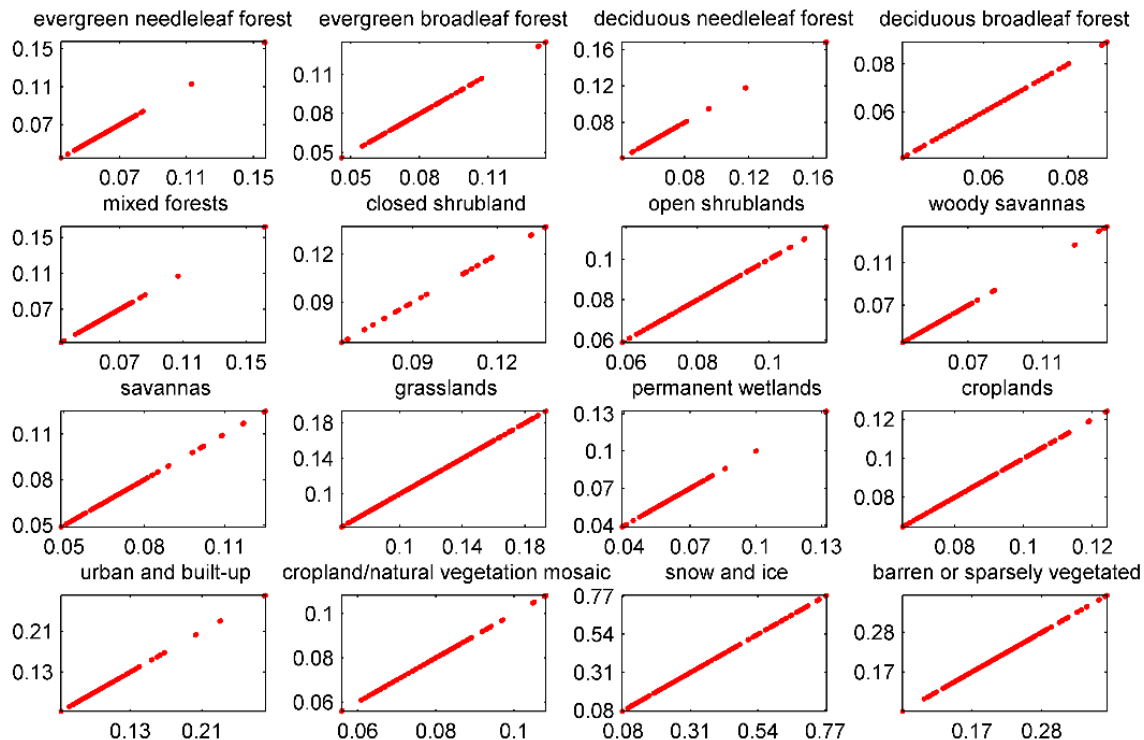
Sparse
Obser
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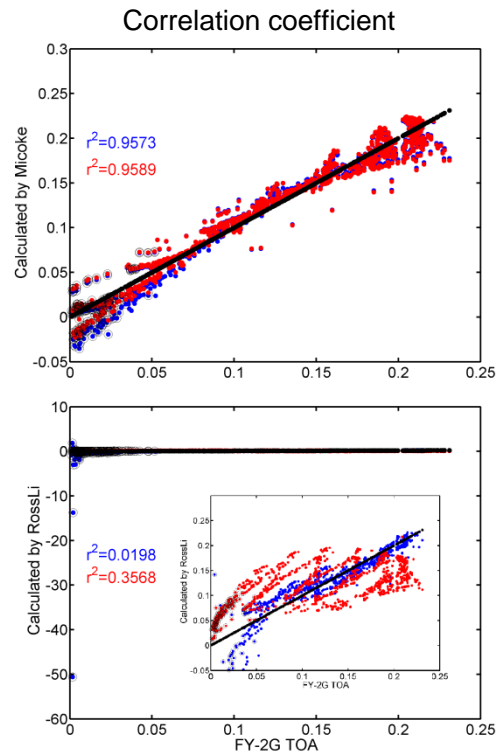
MICOKE BRDF ACCURACY VALIDATION



MICOKE BRDF ACCURACY VALIDATION



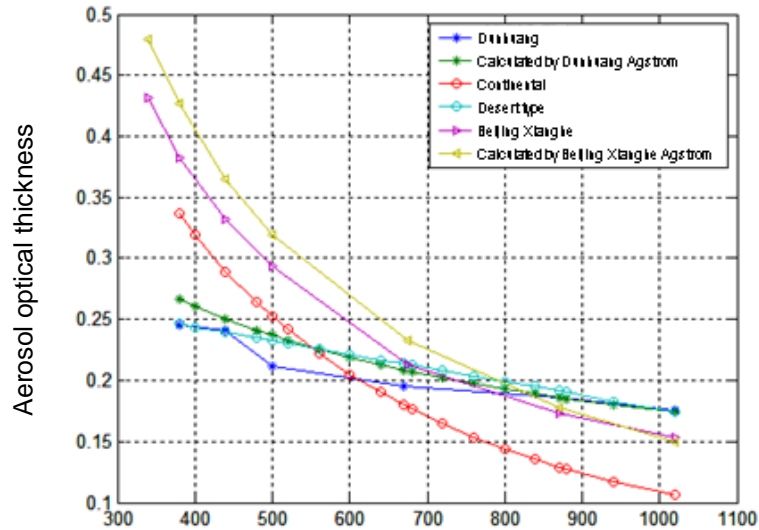
Little Angle Accuracy under different surface types (Using MODIS MCD43 products)



Large Angle Accuracy for HCRF

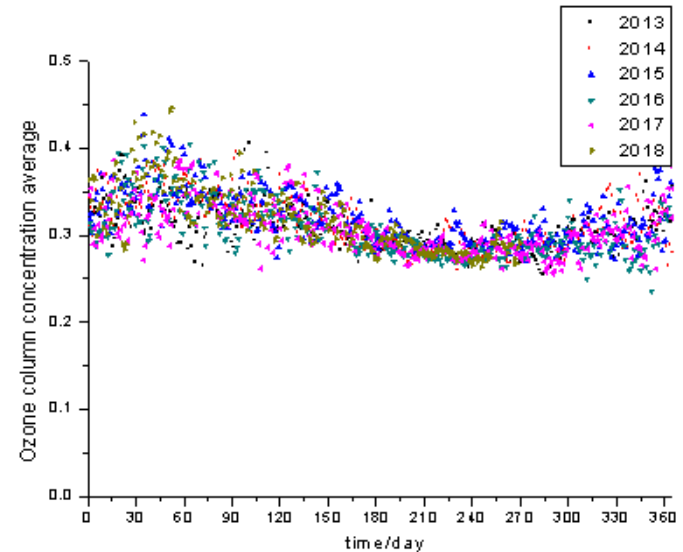
AEROSOL & OZONE

AEROSOL TYPE :DESERT



Aerosol measurement results and simulation comparison

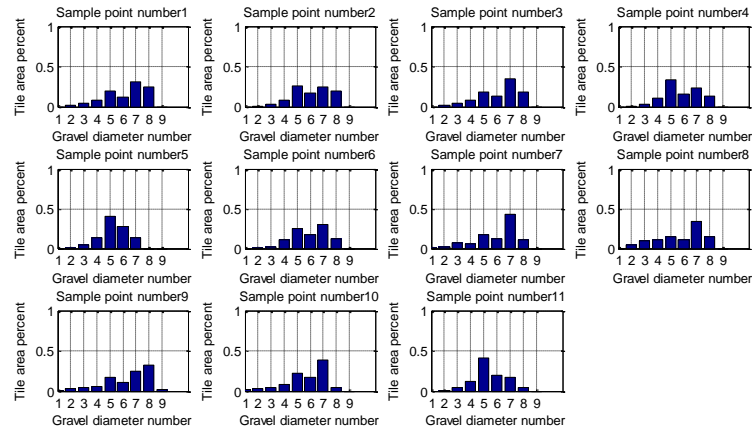
OZONE CLIMATE MODEL BY OMI



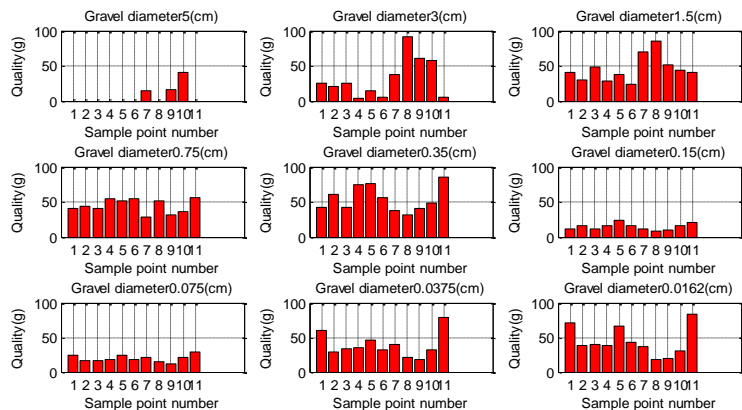
GRANULE SIZE DISTRIBUTION



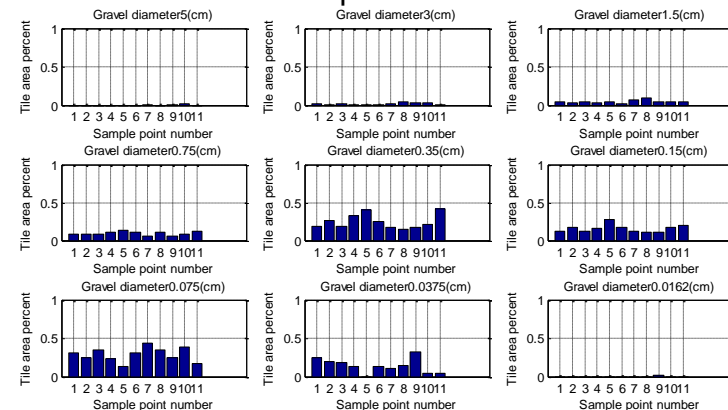
Samples in different sizes



Granule size distribution by sampling points

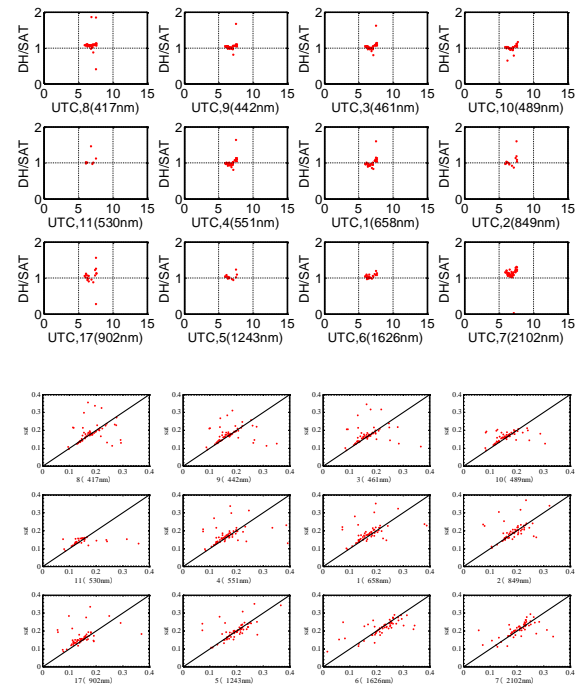
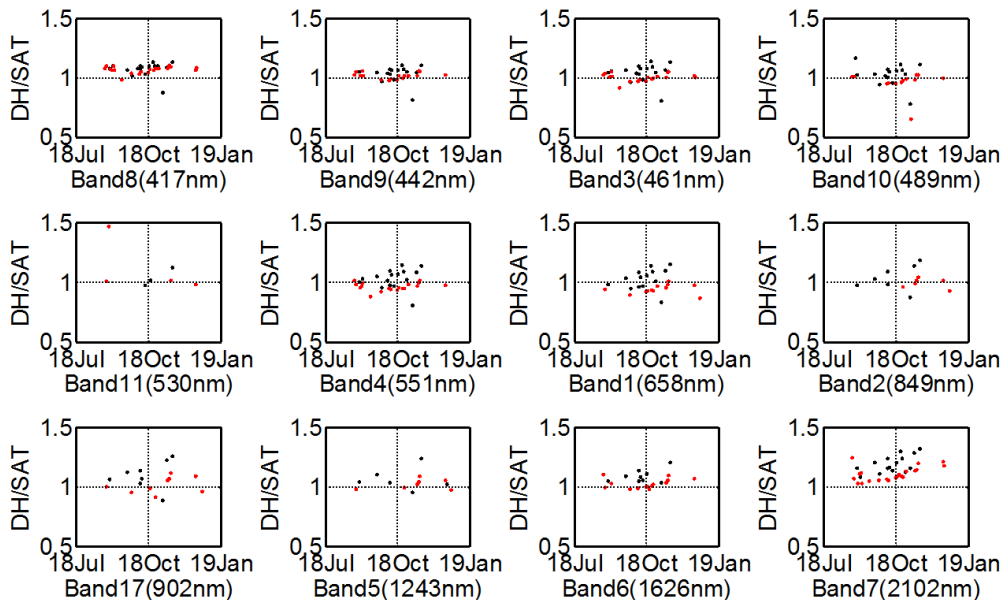


Granule mass distribution by sizes

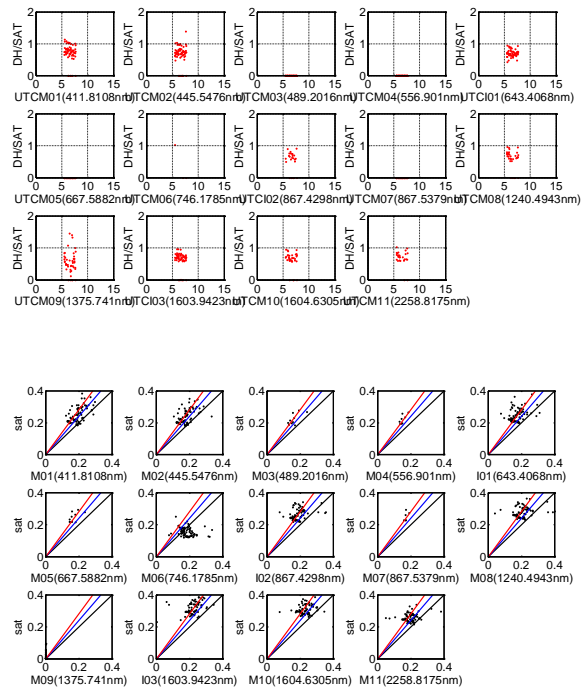
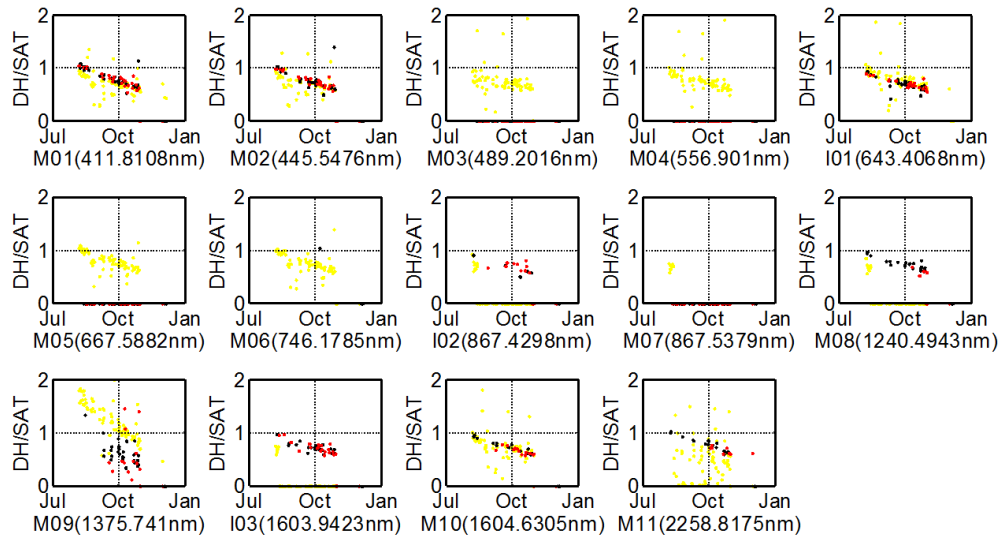


Granule size distribution by diameter

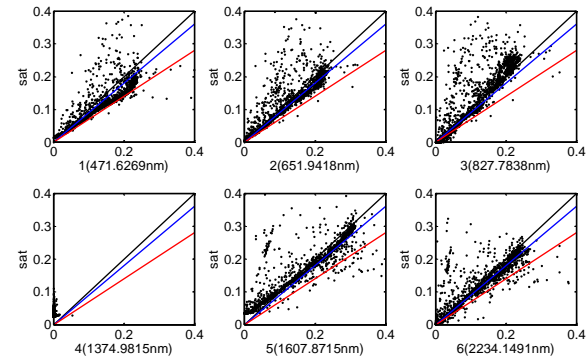
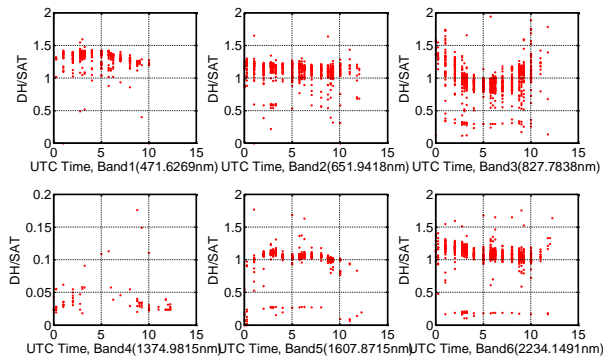
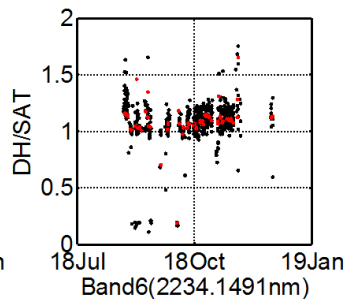
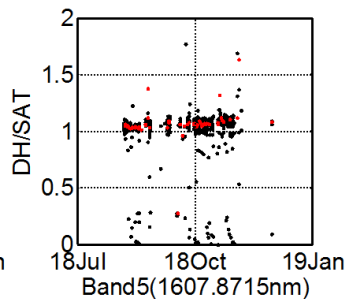
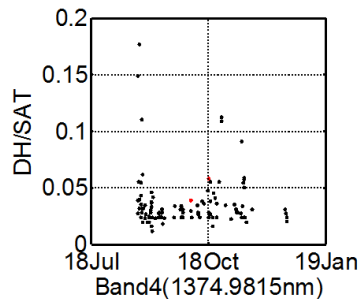
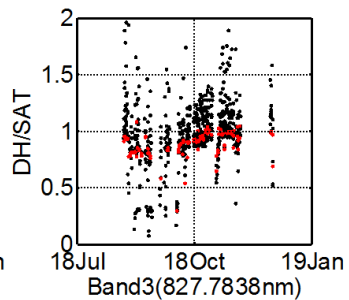
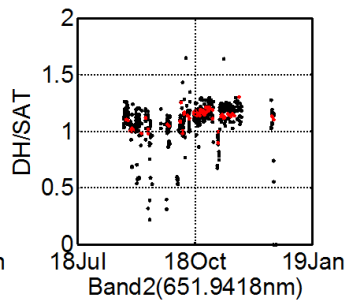
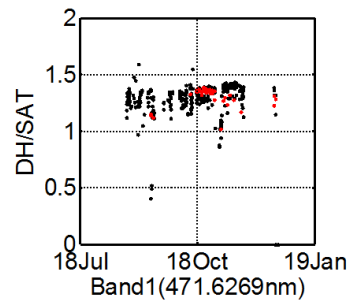
MODIS/AQUA



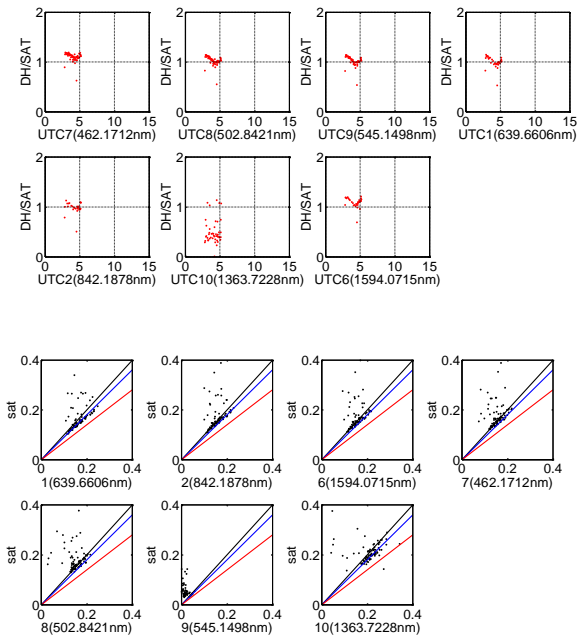
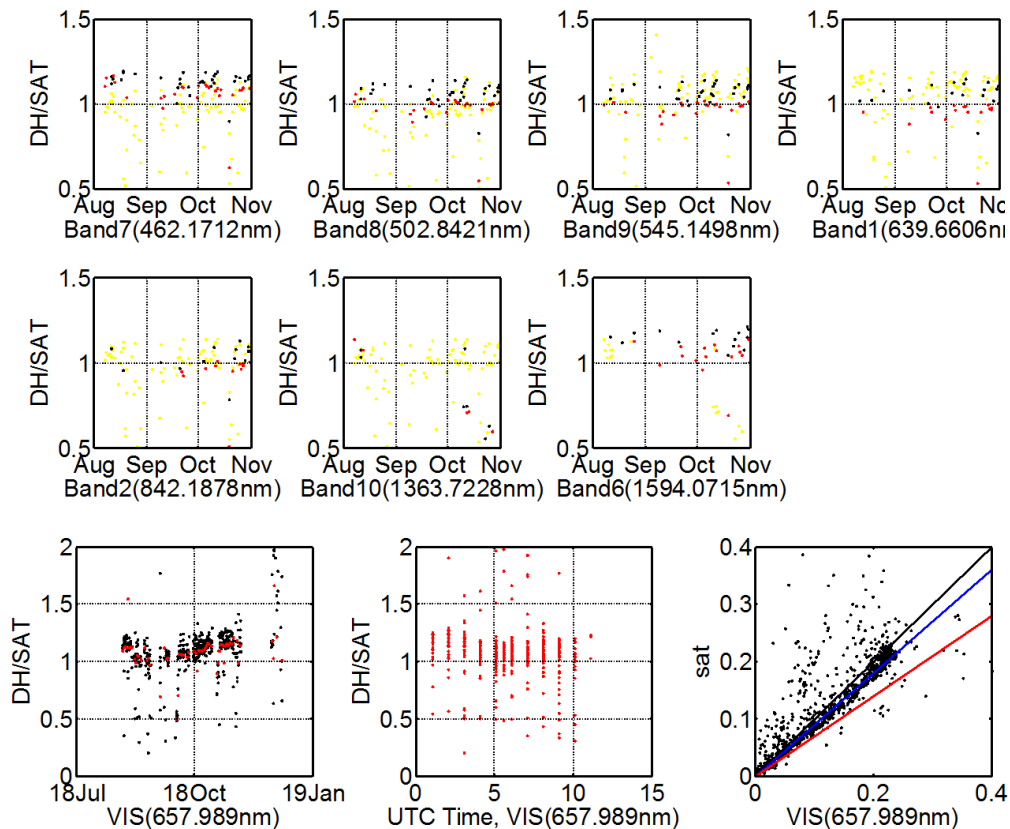
NOAA-20/VIIRS



FY-4A/AGRI



FY-3C/VIRR & FY-2G/VISSR



DATA PRODUCT LIST

仪器名称	产品名称	产品文件命名规则
HIM (照度计)	照度计漫总比产品	HIM01_DGR_DH_YYYYMMDD_hhmmss_YYYYMMD D.txt HIM01_DGR_DH_20180811_000420_20180914.txt
ATR01 (6号点)	地表观测产品	ATR01_DN- _DH_YYYYMMDD_hhmmss_YYYYMMDD.txt ATR01_DN- DH_20180416_235300_20190103.txt
	地表反射比产品	ATR01_RAD_DH_YYYYMMDD_hhmmss_YYYYMMD D.txt ATR01_RAD_DH_20180416_114100_20190103.txt
ATR02 (基地场)	地表观测产品	ATR02_DN- _DH_YYYYMMDD_hhmmss_YYYYMMDD.txt ATR02_DN- DH_20180421_000200_20190103.txt
	地表反射比产品	ATR02_RAD_DH_YYYYMMDD_hhmmss_YYYYMMD D.txt ATR02_RAD_DH_20180421_023200_20190103.txt
ASC (全天空成像仪)	全天空成像仪影像产品	ASC01_PHO_DH_YYYYMMDD_hhmmss_YYYYMM DD.jpg ASC01_PHO_DH_20180814_073529_20190103.jpg ASC01_PHV_DH_YYYYMMDD_YYYYMMDD.gif ASC01_PHV_DH_20180814_20190103.gif
	全天空成像仪云量产品	ASC01_CLO_DH_YYYYMMDD_hhmmss_YYYYMMD D.txt ASC01_CLO_DH_20180814_005259_20190103.txt ASC01_CLO_DH_YYYYMMDD_hhmmss_YYYYMMD D.jpg
	全天空成像仪云产品分类产品	ASC01_CLO_DH_20180814_000110_20190103.jpg ASC01_CLV_DH_YYYYMMDD_YYYYMMDD.gif ASC01_CLV_DH_20180814_20190103.gif
GPSMET (GPS水汽)	大气水汽总量产品	GPS01_MET_DH_YYYYMMDD_hhmmss_YYYYMM DD.txt GPS01_MET_DH_20180814_000000_20190103.txt

仪器名称	数据名称	数据文件命名规则
HIM (照度计)	照度计状态发布数据	HIM01_STA_DH_YYYYMMDD_hhmmss_YYYYM MDD.txt HIM01_STA_DH_20180811_055820_20180914.txt
ASC (全天空成像仪)	全天空成像仪状态发布数据	ASC01_STA_DH_YYYYMMDD_hhmmss_YYYYM MDD.txt ASC01_STA_DH_20180814_020711_20190103.txt
ATR01 (6号点)	地表观测仪器状态发布数据	ATR01_STA_DH_YYYYMMDD_hhmmss_YYYYM MDD.txt ATR01_STA_DH_20180416_235900_20190103.txt
ATR02 (基地场)	地表观测仪器状态发布数据	ATR02_STA_DH_YYYYMMDD_hhmmss_YYYYM MDD.txt ATR02_STA_DH_20180421_062600_20190103.txt

卫星仪器	产品名称	产品文件命名规则
JPSS-1/ VIIRS	VIIRS图像与反射比产品	JPS1_VIIRS_XNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.tif JPS1_VIIRS_XNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt JPS1_VIIRS_I01_REF_DH_20180813_055849_20190103.txt JPS1_VIIRS_M03_REF_DH_20180813_055849_20190103.txt
	VIIRS定标产品	JPS1_VIIRS_XNN_CAL_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt JPS1_VIIRS_M06_CAL_DH_20180813_055849_20190103.txt
AQUA/ MODIS	MODIS图像与反射比产品	AQUA_MODIS_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.tif AQUA_MODIS_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt AQUA_MODIS_001_REF_DH_20180813_063649_20190103.txt
	MODIS定标产品	AQUA_MODIS_NNN_CAL_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt AQUA_MODIS_14H_CAL_DH_20180813_063649_20190103.txt
FY-3C/ VIRR	VIRR图像与反射比产品	FY3C_VIRR-_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.tif FY3C_VIRR-_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY3C_VIRR-_007_REF_DH_20180813_043916_20190103.txt
	VIRR定标产品	FY3C_VIRR-_NNN_CAL_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY3C_VIRR-_001_CAL_DH_20180813_043916_20190103.txt
FY-2G/ VISSR	VISSR图像与反射比产品	FY2G_VISSR_VIS_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.tif FY2G_VISSR_VIS_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY2G_VISSR_VIS_REF_DH_20180416_000453_20180914.txt
	VISSR定标产品	FY2G_VISSR_VIS_CAL_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY2G_VISSR_VIS_CAL_DH_20181219_100450_20180103.txt
FY-4A/ AGRI	AGRI图像与反射比产品	FY4A_AGRI-_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.tif FY4A_AGRI-_NNN_REF_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY4A_AGRI-_001_REF_DH_20180416_000132_20190103.txt
	AGRI定标产品	FY4A_AGRI-_NNN_CAL_DH_YYYYMMDD_hhmmss_YYYYMMDD.txt FY4A_AGRI-_006_CAL_DH_20180813_090132_20190103.txt

FUTURE WORK

- Uncertainty analysis
- Threshold improvement
- Product ATBD
- Spatial scale conversion
- Daily update BRDF
- Algorithm improvement
- Product format improvement



Thank you for the attention!

Email: liyuan@cma.gov.cn