



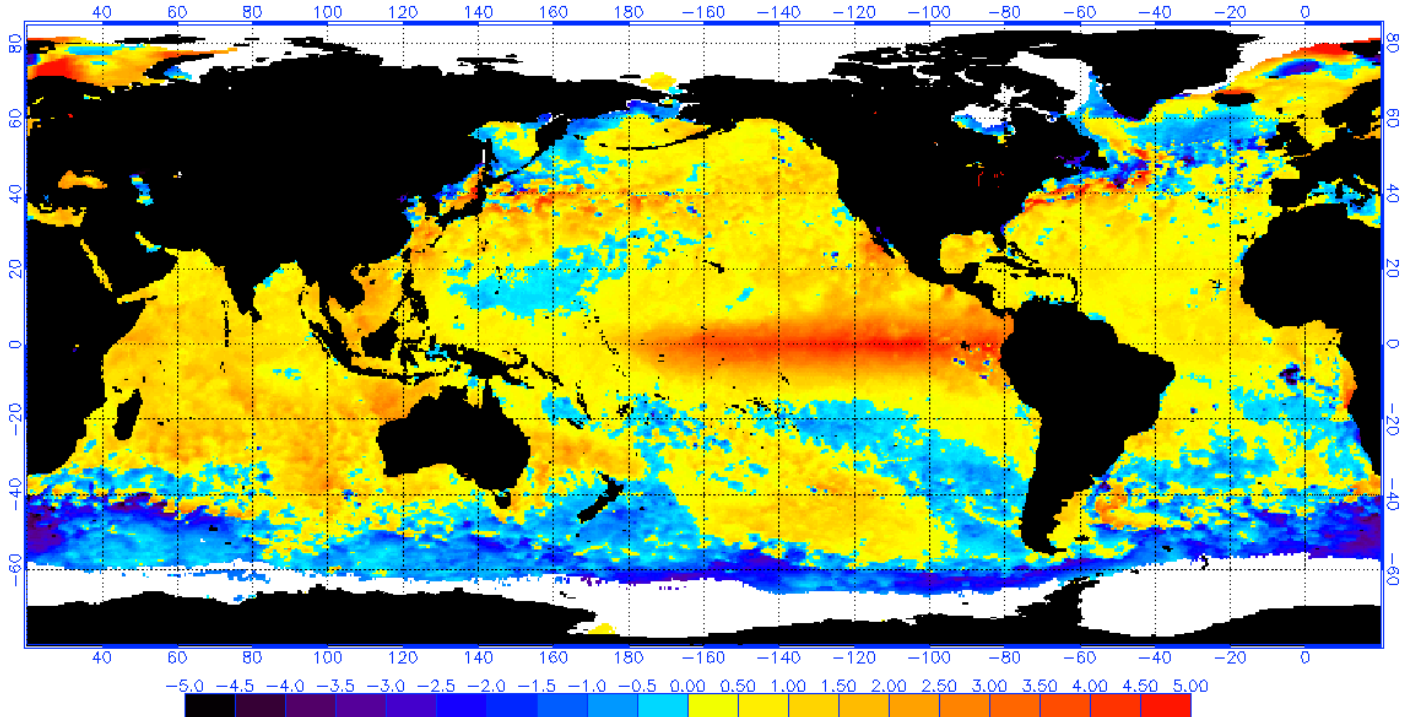
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**Extreme Events
Institute**

FLORIDA INTERNATIONAL UNIVERSITY

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 11/30/2015
(white regions indicate sea-ice)



El Niño Southern Oscillation (ENSO) 2015–16

Latin American and Caribbean Region

Disaster Risk Reduction Program
Extreme Events Institute
Florida International University
FIU-DRR Report no. 3 (January 2016)

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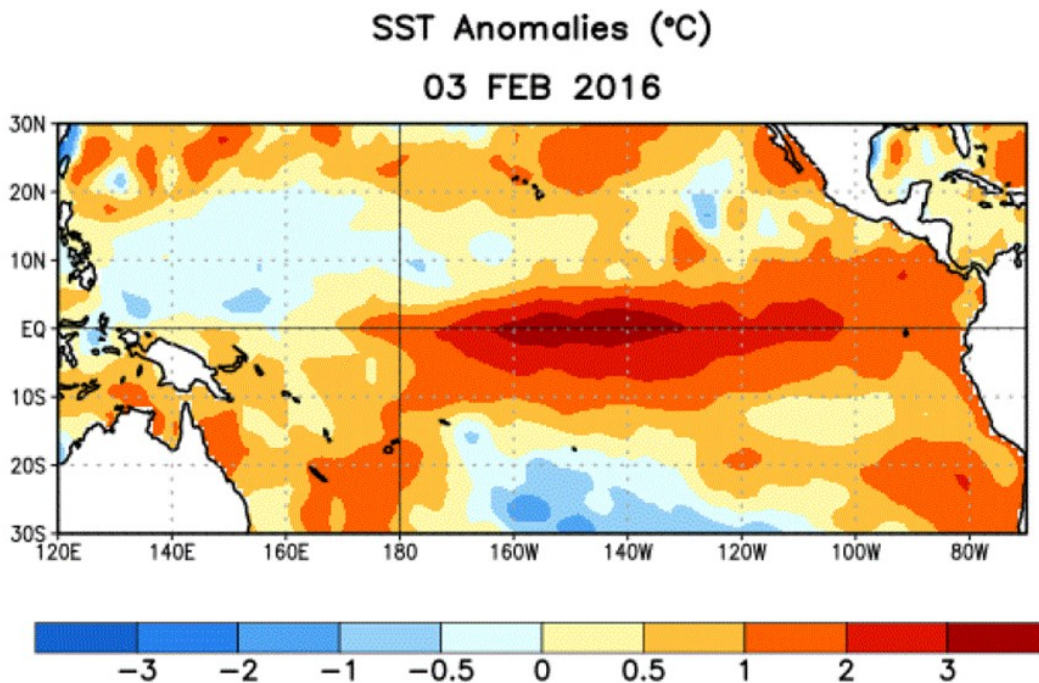
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INTRODUCTION

Compared to December 2015, El Niño showed some weakening in January 2016. However, the surface waters of the east-central tropical Pacific remained warm, and wind and rainfall disruptions continued across the entire basin. Based on model predictions, El Niño will shift to neutral by late Northern Hemisphere spring or early



Average sea surface temperature (SST) anomalies (°C) for the week centered on 3 February 2016. Anomalies are computed with respect to the 1981-2010 base period weekly means.

summer 2016, with a possible transformation to La Niña in the fall [1] [2].

The strength of El Niño was indicated by the sea surface temperature anomalies that exceeded 2°C in the east-central Pacific Ocean during January 2016. The Niño indices in the eastern Pacific declined, while Niño-3.4 and Niño-4 were unchanged [2].

Precipitation

In the Americas, drought conditions are likely to persist in Central America, the Caribbean and parts of South America. Meanwhile, wetter conditions are forecast for southern Brazil, Ecuador, Paraguay and Peru [3]. From September to December 2015, El Niño predictably brought in high rainfall in Uruguay, southern Brazil and Paraguay,



and dryness in northern South America. In fact, the effects of El Niño range from beneficial rains to floods and drought in South America. Routine weather patterns are also affected in the Americas which affect agriculture and way of life.

The warmer than average waters off the Peruvian coast disturb the marine food chain, negatively affecting the fishing industry [4].

The southern Andes are likely to experience heavy snow while some rain could ease the dry spell for drought stricken regions of Chile. The much needed rainfall could provide some relief to the 10 year drought in Chile [4].



Below-average rainfall is forecast for the central region in Brazil, southeastern Mexico and the Caribbean through March 2016. This may lead to drought conditions or worsening of dry conditions [4].

Meanwhile, as a shaft of moisture from the Pacific progresses across Mexico and into the United States, wet weather will likely expand southeastward from Mexico to parts of Central America too. The rain will, however, taper off toward Nicaragua and Cuba. This rainfall will have effect until March.

During the period of December through March, dry weather will persist in much of Colombia to central Brazil. Most of Ecuador and northern Peru will experience rainfall. The near average rainfall region will expand southward, while southern Chile and southern Argentina will stay wet [4].

Overview of Impact and Response in Latin America and the Caribbean

<http://www.unocha.org/el-nino-latin-america-caribbean>

As noted above, the insufficient and erratic rainfall experienced in Central America, the Caribbean and highland areas in South America since March 2015 has resulted in drought conditions and deepening food insecurity. In Central America, El Niño conditions have led to a second consecutive year of drought. It is one of the most severe droughts in the region's history.

Some 17 countries in Latin America and the Caribbean reported cases of Zika by January 2016. The dry conditions in the drought areas reduce the previously flowing waterways to still pools lead to growth of mosquito breeding sites.

Increasing rains that are expected in Peru, Ecuador, Paraguay, Uruguay, Argentina and southern Brazil, will increase the risk of vector-borne diseases, respiratory infections and damage to health facilities. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reports that the severe rains caused by El Niño have affected close to 51,000 people (10,186 families) in 14 provinces across Argentina. In Bolivia, 7 municipalities in the department of La Paz have declared a state of emergency due to rainfall that has led to rivers overflowing.

The chronic drought for the past three years in Northern Central America countries has led to crop failures. Approximately 3.5 million people in the dry corridor of Central America (Guatemala, Nicaragua, Honduras and El Salvador) having serious difficulties in accessing food. The poor in these communities are expected to be severely

food insecure with increased acute and severe malnutrition, until the next harvest in August 2016. The complexities created by extreme poverty, inequality and underdevelopment have inflicted significant damage on the most vulnerable people. In Colombia, high temperatures and drought are still severely affecting the country. More than 150 municipalities remain on red alert and public calamity for the risk of forest fires and shortage of water.

El Salvador is facing one of the worst droughts caused by El Niño that has led to irreversible damage to the agricultural production for thousands of subsistence farmers. Harvest losses resulted in the depletion of food reserves, which increased acute and severe malnutrition cases and food insecurity levels. About 700,000 people (11 per cent of the population) are food insecure and in need of humanitarian assistance.

In **Guatemala**, 1.5 million people (10 per cent of the population) are affected by the El Niño-induced drought and are in need of humanitarian assistance. Some 500,000 people will experience critical consequences, including moderate-to-severe food insecurity, with the next harvest expected only in August 2016.

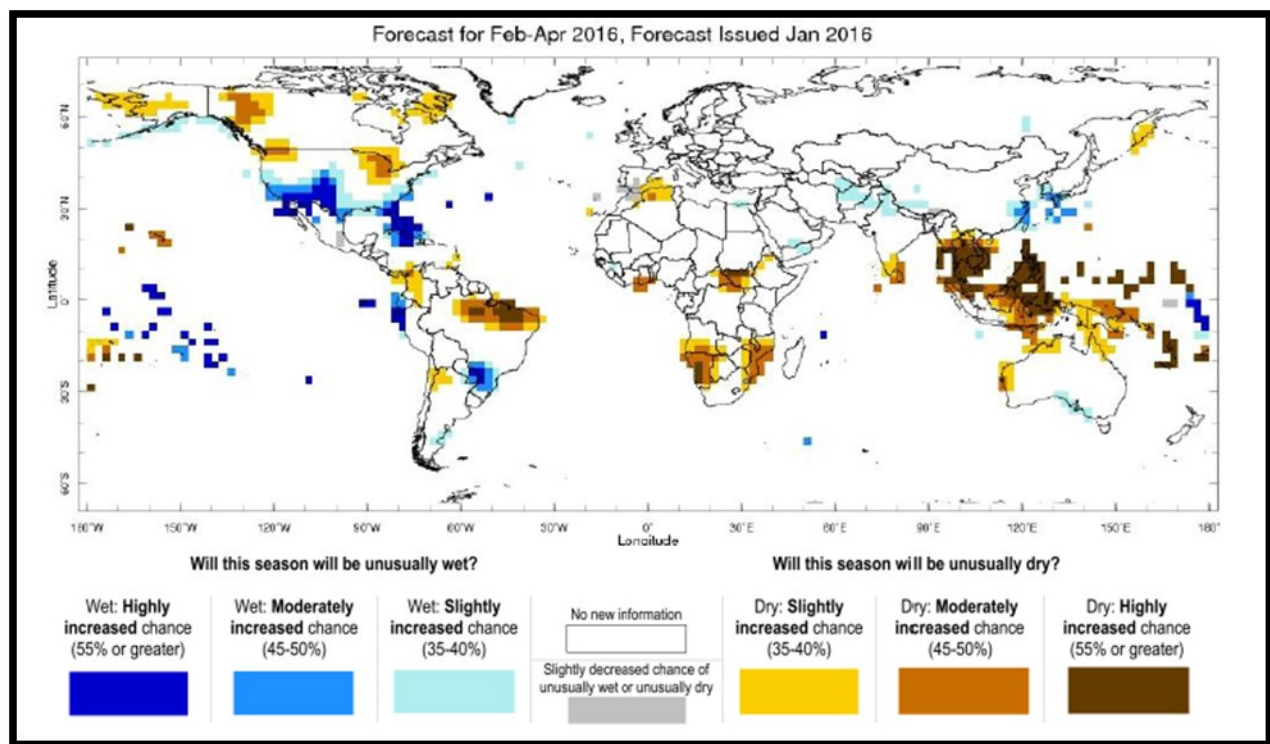
Honduras is facing one of its most severe droughts in history, affecting more than 1.3 million people (15 per cent of the population). Over 250,000 people are reported to be in immediate need of food assistance.

A sub-regional Humanitarian Response Plan for \$101.8 million has been launched for Guatemala and Honduras to ensure the delivery of coordinated and integrated life-saving assistance to drought-affected people, and building stronger resilience to shocks.

El Niño continues to seriously impact the food security situation in **Haiti**. On 22 January, the Haitian Prime Minister expressed his concern about the drought affecting agricultural areas in the country. He declared that more than 3.5 million people are

food insecure and that Haitians in 40 communes are affected by the drought.

WFP is currently finalizing an Emergency Food Security Assessment (EFSA) in partnership with FAO. The EFSA will collect essential information to better evaluate the impact of the drought on households' food security and livelihoods, estimate the number of moderately and severely food insecure households and evaluate the evolution



Source: International Research Institute (IRI)

of the situation in the next 3-6 months. Results are tentatively scheduled for release on 28 January and will be included in the Humanitarian Needs Overview [3].

References:

[1] <https://www.climate.gov/enso>

[2] http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html

[3] http://reliefweb.int/sites/reliefweb.int/files/resources/160129_EI%20Ni%C3%B1o%20Overview_FINAL.pdf

[4] <http://www.accuweather.com/en/weather-news/el-nino-mexico-caribbean-south-america-ease-chile-drought-brazil-argentina-flooding/50290282>

REGIONAL OUTLOOK BY COUNTRY

Introduction

The February 2016 Report from the International Center for the Research of El Niño Phenomenon (CIIFEN) indicates that ENSO 2015-2016 remains strengthened. During the first two weeks of January, wind anomalies of the west generated a new Kelvin wave, which is transporting heat to South American coastlines as well as increasing superficial heat in the Central-east Pacific.

The consensus on the global predictive models suggests that El Niño phenomenon will remain strong during the first trimester of 2016 to later decline over the subsequent months.

The regional climate predictions estimate for February-March-April 2016 indicate a greater probability of precipitations over normal levels in Mexico, north and center of the Caribbean sea, coast of Ecuador, north and north-west of Peru, central-east region of Paraguay, southeast of Brazil, Uruguay, and north of Argentina. It is also predicted a greater probability of precipitations under normal averages in Costa Rica, Panama, north of Venezuela, north of Colombia, northeast and east of Brazil, lowlands of Bolivia and north of Chile.

Source: http://www.ciifen.org/index.php?option=com_content&view=article&id=1354&catid=78&Itemid=95&lang=en

Bolivia – SENAMHI - <http://www.senamhi.gob.bo/>

The Meteorological and Hydrological National Service of Bolivia indicates that El Niño conditions are still present in region 3.4. The superficial sea temperature (TSM) has positive thermic anomalies in most of the Pacific Ocean, which is why El Niño is expected to remain in the ‘strong’ category during the summer (December/2015 to March/2016), with a transition to ‘neutral’ conditions, by the end of autumn of 2016

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In addition, the majority of statistical and dynamic prediction models of superficial temperature in the Pacific Ocean show El Niño with thermal anomalies in region 3.4. The averages of the temperature models indicate that El Niño in region 3.4 will be ‘strong’ during the months from January to March 2016, weakening in autumn (March to June) of the same year.

In regard to SENAMHI’s predictions of precipitations for January 2016, the behavior of precipitations will have the following characteristics: 1) **Probability of precipitation deficit** (under normal averages) in: *Department of La Paz* (province José Manuel Pando and south-west of province Pacajes); *Department of Oruro* (provinces Sajama, Sabaya, Carangas, Litoral and Mejillones, and the western part of provinces Saucari, Ladislao Cabrera and South Caranagas; *Department of Potosí* (provinces Sur Lipez and Daniel Campos, south of

province Enrique Baldiviezo); 2) **Probability of excess of precipitation** (over normal averages) in: *Department of La Paz* (provinces Abel Iturralde, Murillo, Camacho, Muñecas Larecaja, Franz Tamayo, Loayza, Sur Yungas, north of province Aroma, Los Andes, Bautista Saavedra, Manco Kapac and Caranavi, northeast of province Ingavi and center-north of province Inquisivi); *Department of Potosí* (provinces General Bernardino Bilbao, Charcas, Alonzo de Ibáñez, Rafael Bustillo, Chayanta, Cornelio Saavedra, José María Linares, most of province Tomás Frías; north of province Modesto Omiste, east of provinces Sur Chichas and Nor Chichas, *Department of La Chuquisaca* (Provinces Oropeza, Azurduy, Zudáñez, Tomina, Hernando Siles, Yamparaez, Nor Cinti, Belisario Boeto, Sur Cinti and western part of province Luis Calvo); *Department of Cochabamba* (provinces Cercado, Campero, Ayopaya, Esteban Arce, arani, Capinota, German Jordan, Quillacollo, Chapare, Carrasco, Misque, Tiraque; *Department of Tarija* (provinces Cercado, Arce, Aviles, Méndez, Burnet O'Connor and western part of province Gran Chaco); *Department of Santa Cruz* (provinces Andrés Ibáñez, Warnes, Ichilo, Chiquitos, Sara, Valle Grande, Florida, Obispo Santiesteban, Manuel M. Caballero, German Busch and Guarayos; west/southwest of province Velasco; most part of province Ñuflo de Chávez and south of province Angel Sandoval); *Department of Beni* (provinces Cercado, Vaca Diez, General José Ballivian, Yacuma, Moxos, Marban).

Source: <http://www.senamhi.gob.bo/>

COLOMBIA – IDEAM - <http://www.ideam.gov.co/>

The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) identifies in the analysis of El Niño phenomenon, four phases: beginning, development, maturity, and weakening.

The IDEAM has been monitoring over the last months that the strong effects of the current phenomenon, in regard to precipitation and temperature patterns in Colombia will occur in the beginning of 2016. The report mentions that during the last months, the country experienced the consequences of El Niño phenomenon with a substantial decrease in precipitations and high temperatures in the Andean, Caribbean, and Pacific regions. It is worth

noting the El Niño phenomenon does not imply total drought, and does not suppress precipitation season. The month of January, historically represents the beginning of the first dry season of the year in several regions of the country, with decreasing precipitation in comparison to December levels in the Caribbean and Orinoquia regions, areas of Río Sogamoso, Altiplano Cundiboyacense, Medio Cauca, Alto Nechi, medio Magdalena and Piedemonte Llanero. On the contrary, for this month higher levels of precipitation are expected for the Pacific region and the Amazonian Southeast. The report estimates for the month of January, that temperature levels will be higher than normal averages in most of the Colombian territory, some regions as the north of the Caribbean region, west of Orinoquia and center-south of the Andean region.

El Niño phenomenon continues its phase of major intensity, as a strong event. According to NOAA, the anomaly of superficial temperature of the sea (TSM) in the Pacific Ocean basin in December was 2.3°C over historical averages registered in the ONI (El Niño Oceanic Index). According to studies by IDEAM, based on agencies such as NOAA, IRI, and CIIFEN, it is estimated that the phenomenon will maintain a strong intensity during the first trimester of 2016 and the weakening phase will last until the month of June. Lastly, the registered temperatures will be between 2°C and 5°C over historical averages.

Source: <http://www.ideam.gov.co/>

PERU-SENAMHI-OCTUBRE 2015 - <http://www.senamhi.gob.pe/>

The multisectorial committee in charge of the National Study of El Niño Phenomenon (ENFEN) maintains the alert warning. The committee met to analyze and update meteorological, oceanographic, biological-fishing, and hydrological conditions corresponding to the month of January 2016 and its perspectives. The warm phase of El Niño is expected to continue.

In the central equatorial Pacific region (Niño 3.4) the superficial temperature of the sea (TSM) presents warm and strong anomalies, even greater than those observed in 1998 and 1983. While in the east equatorial Pacific (Niño 1+2) the TSM anomaly has decreased, it still

has values over +1,0 C. During the month of January, west winds anomalies have been observed over Peruvian territory, which is a typical El Niño effect in the central Pacific and which had maintained the low levels of observed precipitations, particularly in the Andean region. In the coast, however, during the last days of January, strong episodes of rainfall were observed in Piura, as a consequence of warm waters and winds coming from the east in mid and high levels.

It is worth noting that during the month of January, the average for mid-level sea anomalies was reduced in comparison to December. In the north coast, the anomaly was +6cm, while in the center and south coastline was +4 y +7cm, respectively. For the TSM, the average of anomalies was reduced in comparison to December levels to +1,8C in the north coast, but increased to +3,0C y +2,1C in the center and south coastline, respectively. Lastly, there were deficiencies in rainfall for the Andean region, particularly in the north and south, and consistent with expected impacts of El Niño in the Central Pacific.

Source: <http://www.senamhi.gob.pe/>

PANAMA – HIDROMET - <http://www.hidromet.com.pa/index.php>

According to the Report from the Center of Climate Predictions/NCEP/NWS and the International Institute of Research for Climate and Society, dated on January 14, 2016, it is expected that strong El Niño will gradually weaken by mid-2016 and transition to a neutral ENSO event during the end of Spring or beginning of Summer 2016. The report does not rule out the chance of sporadic precipitations as a result of a cold front that could affect the country. In addition, due to the warming in superficial waters of the Caribbean sea, unstable conditions could remain in the atmosphere, favoring the formation of precipitation. The forecast of precipitation anomalies for the month of January indicates deficit of precipitation in the whole country, from -1 to -6mm per day, indicating dryer conditions than normal averages, particularly in the provinces of Los Santos, Herrera, Panamá Colón and part of Kuna Yala. The results of the first trimester models for Panama indicate a significant increase in temperatures, with a range between 1° y 2°C over historic averages for the same period.

Median temperatures show an increase between 1-2°C over the historic median in the country for the first trimester of the year.

Source: <http://www.hidromet.com.pa/index.php>

ECUADOR – ERFEN - <http://www.inocar.mil.ec/erfen/>

The ERFEN indicates that depending of the state of the atmosphere in the east Pacific, there would be an increase in precipitation, both in intensity and frequency, estimating their maximum values of precipitation for the months of February and March 2016. Due to the climate variability, the possibility of having a decrease of precipitation during rainy season is not ruled out. For the first trimester of the year, there are significant probabilities of precipitation over normal averages in the north region and center of continental Ecuador, Gulf of Guayaquil, and coastal areas and center of Manabí; as well as for the insular region and the rest of the coastal region, normal averages of precipitation are expected. The dynamic and statistical models of el Niño region 1+2 (90° -80°0 y 0-10°S) indicate that the anomalies in temperature for the region have a tendency to considerably decrease during the next 4 months. For the second semester of the year, normal conditions are expected. For El Niño region 3.4, as well as region 3, the anomalies in temperature show a decrease in the following months; which have been around 2.7 C for the last two months, and are expected to decrease to 1.6 C during the first trimester of 2016.

Source: <http://www.inocar.mil.ec/erfen/>