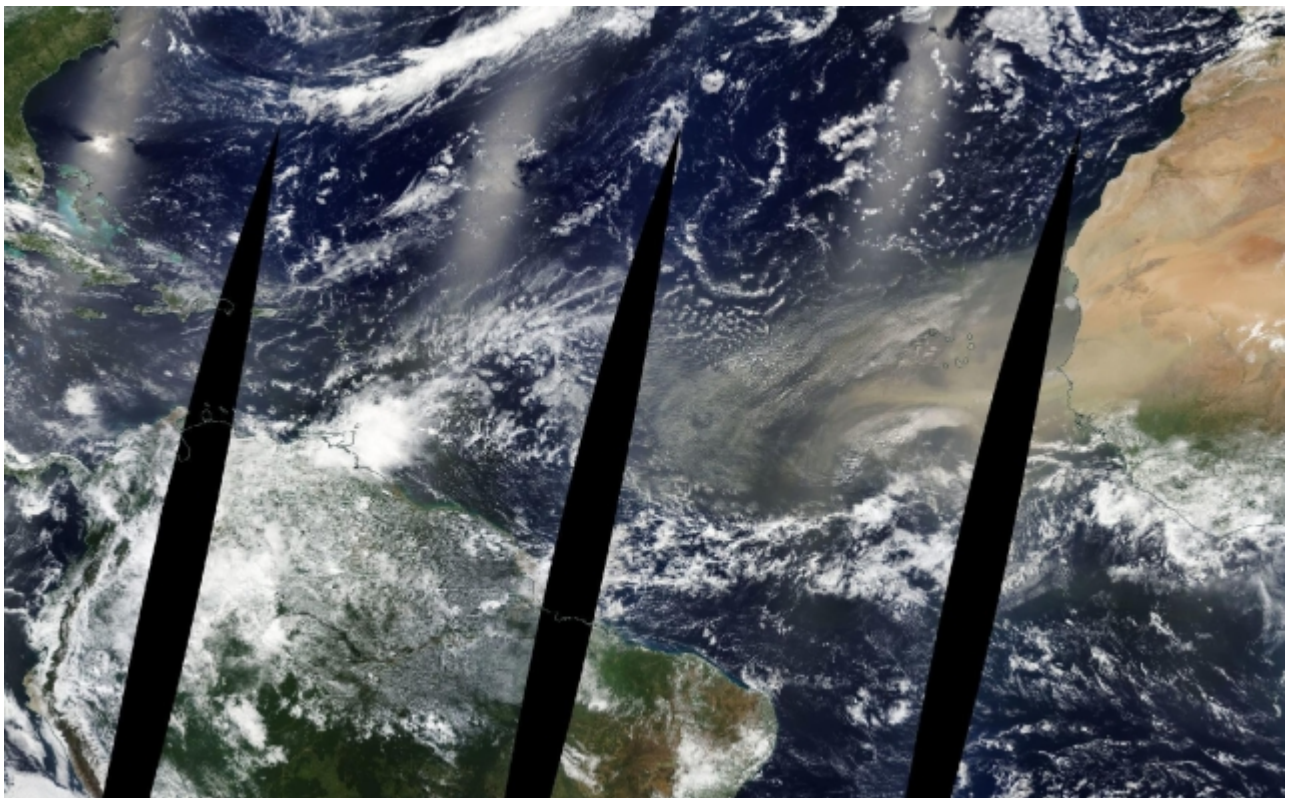


SECARIBE: INVESTIGATING THE CONECTIONS BETWEEN CARIBBEAN DROUGHTS AND THE SAHARAN DUST ^[1]

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Imagen de satélite compuesta mostrando el desplazamiento del polvo del Sahara a la región del Caribe para Junio 15 de 2015. Imagen cortesía de NASA Worldview.

In 2015, 75 out of the 78 municipalities of Puerto Rico were significantly affected by a drought that caused severe shortages and rationing in potable water supplies. According to the US Drought

Monitor, this has been the longest drought in these islands since 2000, when formal recording of these events began. This drought lasted about 80 weeks both in Puerto Rico and other islands of the Caribbean.

According to the National Integrated Drought Information System from the National Oceanic and Atmospheric Administration (NOAA), a drought is defined as a deficiency of precipitation over an extended period of time resulting in a water shortage. Multiple factors operating individually or in synchrony can promote this type of phenomena, including climate change, variation in ocean temperatures, local landscape modification and changes in the “jet streams”, which are bands of strong wind in the upper levels of the atmosphere. There are also different types of droughts, such as the “agricultural drought” which is when crops become affected by drought. Categorizing droughts in different types help scientists in monitoring and forecasting efforts.

The role of the Saharan Dust

What it is less known is that the early arrival of hot, Saharan dust-rich air currents was an aggravating factor in the 2015 drought. These air currents usually originate over western Africa and mostly during summer, when they can reach the eastern parts of North America. These currents can alter the physical properties of the air layers that are responsible for cloud formation. Scientists have linked these changes to significant decreases in rainfall events.

Improving drought monitoring and forecasting

Recent research suggests that the arrival of these Saharan dust-rich currents is occurring increasingly earlier in the year. Scientists from SECARibe, a new collaborative effort to investigate Caribbean droughts, suspect that, similar to what happened in 2015, the early intrusion of these dust-rich air currents can lead to more frequent droughts in the region.

“SECARIBE’s main goal is to provide more accurate projections of the climatic conditions promoting droughts and to improve both short- and long-term monitoring of these events”, commented Dr. Thomas Mote, climatologist from the University of Georgia at Athens and principal investigator of the project. “These investigations are very important because they can support planning, management and mitigation efforts at the local level”, he added.

SECARIBE will use precipitation, temperature and humidity variables, drought indices and the analysis of climatic models, to better understand Caribbean droughts. The project emphasizes on rapid onset dry spells, or “flash droughts”, which are those that are characterized by high temperatures that cause accelerated increases in evapotranspiration rates and decreases in soil moisture.

SECARIBE will also evaluate anomalies in atmospheric pressure and circulation patterns for better understanding climatic mechanisms promoting these events. Two of these mechanisms are the El Niño Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO).

Another goal of SECARIBE is improving drought early detection. “SECARIBE’s efforts are important for Puerto Rico particularly because of the need to improve the tools we are using to monitor and predict droughts in the Caribbean”, commented Dr. Grizelle González, Director of the

International Institute of Tropical Forestry in Río Piedras, Puerto Rico, and coinvestigator of the project.

To accomplish their goals, SECARIBE will create alliances with governmental agencies and local organizations that lead research and monitoring efforts of these events. “These collaborations will be of mutual benefit since organizations will identify locally relevant drought data and SECARIBE will focus on developing more efficient modeling and forecasting tools”, she added.

Among the organizations with which SECARIBE is already collaborating is the Caribbean Drought Learning Network from the Caribbean Climate Hub (US Department of Agriculture), which is part of the International Institute of Tropical Forestry in Río Piedras.

“As a result of the 2015 drought, the agricultural sector from Puerto Rico had losses that exceeded \$12 million by early August. SECARIBE’s efforts will improve drought forecasting abilities, which we believe will result in economic benefits to the island”, Dr. Mote reiterated.

Two of the most important objectives of SECARIBE are training at the local level and guaranteeing that the data needed to understand and predict droughts are available in Puerto Rico and other islands in the region. With these objectives in mind, SECARIBE is organizing a workshop tailored to key personnel in agencies, universities, and other institutions, to provide training in the use of the monitoring and forecasting tools they are currently developing.

Additionally, many of the data and models being developed by SECARIBE will be made available in a database that will be accessible to the public via the internet. Altogether, these efforts will improve monitoring and forecasting at the local level which is also essential for mitigating the effects of climate change in our ecosystems.

For more information about SECARIBE’s efforts, their associated scientists, and local allies, they can be reached out through their Facebook (@SECARibe) and Twitter (@SE_Caribe) pages or through their email at: seq-caribe@gmail.com [5].

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