The Continuously Operating Caribbean Observational Network (COCONet): Improved Observational Capacity in the Caribbean

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Introduction

The Continuously Operating Caribbean Observational Network (COCONet) is a geohazards (atmospheric and tectonic) project focused on infusing large-scale state-of-the-art observational infrastructure into the Caribbean and Latin America (Braun et al., 2012). COCONet is a collaborative project funded by the United States National Science Foundation. From an atmospheric perspective, it provides an opportunity to collect continuous measurements of total column precipitable water vapor (GPS-PWV), as well as surface measurements of temperature, relative humidity, pressure, horizontal winds and precipitation across the entire Caribbean basin.

COCONet will establish a network of 50 new continuous Global Positioning System (cGPS) and meteorology stations, refurbish an additional 15 stations, and archive data from 62 cGPS stations that are already or will soon be in operation (see Figures 1 and 2). Significant progress has been accomplished in the initial 16 months of the project. Engineers have performed site reconnaissance at 57 locations in 24 countries, are securing land use permits for 39 sites and currently have fourteen stations installed. The network is expected to be fully operational by the end of 2013.

Data Products and Availability

COCONet will provide raw GPS data, GPS-PWV, surface meteorology measurements, time series of daily positions, as well as a station velocity field to support a broad range of geoscience investigations. All the new and refurbished stations will have sub-daily data latency. A number of the sites will provide high rate and real-time data streams to support seismic and tsunami warning research. Atmospheric data products will be distributed to the researchers using both the Unidata Local Data Manager (LDM) and other web-Internet distribution systems. Geodetic data products will be available from the UNAVCO public data archive and potential regional data partners in the Caribbean. All of the participants in the project have committed to a free and open data policy.

COCONet Data Stream, http://www.unidata.ucar.edu/software/ldm, Primary name = GPS, Feedtype = FT18
http://www.unavco.org/crosscutting/cc-data.html

Acknowledgements

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References


Network Status

Figure 1: Network Status as of March 31, 2012

Figure 2: Expected Network Status on June 1, 2012

Example Data Products

Figure 3: Surface met observations taken at Grand Turk station in 2008.

Figure 4: GPS-PWV estimates overlaid upon GOES-IR image as Hurricane Dean (2007) moves through the Caribbean.

Figure 5: Time series of GPS-PWV (top), surface pressure (middle), and temperature (bottom) taken from a GPS station in Taiwan during Typhoon Kalmeagi. COCONet will provide similar data.

Capacity Building

One theme of the project is the need to build a bidirectional scientific partnership to nurture a new generation of researchers in the region. Knowledge flow from COCONet activities should work in multiple directions – from and among Caribbean nations as well as between all of the project’s international stakeholders. Mechanisms for promoting intellectual exchange include traditional opportunities such as bringing students from the Caribbean to North America for advanced training or graduate school as well as fostering the development of Caribbean training centers, bidirectional science exchanges, and field campaigns, which include partners from across the Americas. COSMIC/UCAR will be submitting a proposal to the National Science Foundation to conduct a short-course on atmospheric processes of Latin America and the Caribbean. This proposal will be submitted to the Pan-American Advanced Studies Institute (PASI) program, which is jointly sponsored by NSF and the Department of Energy. We are using this short course as a way to foster a community of scientists who are interested in regional atmospheric processes, and as a way of introducing these researchers to the Continuously Operating Caribbean Observation Network (COCONet). This two-week short course is tentatively scheduled for either May or June of 2013 in Cartagena, Colombia.

Instrumentation

Each COCONet station will be equipped with a high precision GPS system and a Vaisala WXT-520 surface meteorology instrument. Examples of COCONet installations are shown.

All COCONet stations will have sub-daily data latency. Typical data communications systems include direct access through a host institution’s computer network, a DSL line through from the local telephone company, cellular modems, or satellite communications. The sites have redundant power systems, including enough backup battery power to allow the system to collect multiple days of data before powering down.

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