Barbados measuring station up and running

Within four strength-sapping weeks MPI-M’s working group „Observations and Process Studies”, based in the department “The Atmosphere in the Earth System”, set-up, and began operating a cloud measuring station on the Caribbean island of Barbados. Under a blazing sun and very high humidities Dr. Lutz Hirsch, Friedhelm Jansen, Dr. Ilya Serikov und Karsten Mohr – with support from the local authorities and representatives of the Caribbean Institute for Meteorology and Hydrology (CIMH), MPI-M’s scientific cooperating partner on Barbados – cleared all logistical hurdles, took care of the necessary infrastructure set-up and began operating the measuring instruments.

Fig. 1: View onto Deebles Point

This set-up phase was the official kick-off for the two-year field study by the Max Planck Institute for Meteorology which focuses on the interplay between aerosols, clouds, precipitation and climate. Through the present day, it is still poorly understood how clouds might change with their changing environment. Therefore they remain the “largest source of uncertainty“ in model based projections of our future climate (more background information on the field study can be found here: http://www.mpimet.mpg.de/en/aktuelles/presse/pressemitteilungen/aerosole-wolken-niederschlag-und-klima-messkampagne-auf-barbados-geplant.html

From mid-March to mid-April, MPI-M’s staff installed the measuring station at “Deebles Point”, a stark area at the most Eastern coast of Barbados within sight of the measuring station of the University of Miami (“Ragged Point”). MPI-M’s remote sensing container station endeavors to investigate clouds in the trade winds. In order to arrange for the power supply and the internet connection, the utility company had to establish utility poles and run cables to the remote measuring site. The containers that had been shipped in Hamburg in the middle of February, finally reached Deebles Point with some delay in mid-April.

Fig. 2 and 3: Supplying electricity
Fig. 4: Unloading the measuring containers

The station itself presently consists of two containers and a mobile cloud radar. On top of one of these containers, more devices have been set up: a micro rain radar (MRR), a ceilometer determining the cloud height and an all-sky imager. The second container accommodates a lidar to record backscatter signals of aerosols and an externally mounted pole with a thermometer, hygrometer (for measuring humidity) and an air safety radar. The latter is needed to shut-down the laser beam when aircraft cross the measuring station. Furthermore, a ban on air traffic over the station was obtained. The mobile cloud radar is a loan provided by the Karlsruhe Institute of Technology (KIT) and will be replaced at a later point in time by MPI-M’s own device which is currently being built.

Fig. 5: The measuring station at Deebles Point

All instruments work 24/7. Only the lidar closes its window that is integrated into its roof under rainy conditions. If it is dry, its green beam of 8 cm of width measures 10 times per second. The measurements are controlled via internet connection from Hamburg. On site employees of the CIMH provide critical support: Once a week they check on the measuring station, wash off the salty water to minimize rust, and help solve technical problems with respect to the instruments, their power supply or internet connection. The measurements are stored on a local server in the containers. Later the processed data will be sent via internet to Hamburg and the cooperating partners.

What exactly is being measured? Cloud height (ceilometer), liquid water content (MRR), reflectivity, Doppler velocity and depolarization ratio (cloud radar), concentration and characteristics of aerosols as well as vertical water vapor profiles by studying the backscatter signals (LIDAR), temperature profiles and extinction (of certain wavelengths).

Fig. 6: Lidar in the evening
What comes next? By November/December 2010 MPI-M’s own cloud radar should be ready for use and will be shipped to the Caribbean. Moreover, the Institute’s water vapor DIAL (Differential Absorption Lidar) is to be set up at “Deebles Point” to continuously provide water vapor profiles during both day and night time. In the same period of time a joint measuring campaign with scientists from Leibniz Institute for Tropospheric Research will take place in which a helipod (helicopter towed sled containing measuring instruments) will conduct in-situ measurements of air and clouds. The data gained will then be compared with the data produced at Deebles Point.

(all photos by Friedhelm Jansen, MPI-M)

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