Increasing Understanding of Tropical Clouds on Climate.

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Global Monitoring Division - **ESRL-GMD**
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The tropics provide the major "pump" for the heat balance of the earth's atmosphere. The coupling of clouds and climate in the tropical troposphere is not well understood. Identifying the key processes in this region is essential for progress on important issues such as global climate change, stratospheric ozone depletion, and global tropospheric chemistry. NOAA/ESRL and Cooperative Institute for Research in Environmental Science (CIRES), University of Colorado (CU) scientists are conducting atmospheric observations from high altitude aircraft and balloon platforms in the NASA Tropical Composition, Cloud and Climate Coupling Experiment (TC4). The experiment will be based out of San Jose International Airport, Costa Rica, July 14 - August 12 during the rainy season in the tropical eastern Pacific Ocean. Test flights of NOAA instruments flying of the NASA WB-57F aircraft begin in Houston, Texas, July 2.

Background: Besides improving our understanding of the tropical atmosphere, another major goal of the TC4 program is to validate measurements from NASA A-train satellites. To do so, high altitude aircraft (NASA ER-2 and WB-57F) will collect tropopause data, while medium altitude aircraft (Univ. of North Dakota DC-8) will provide profiles and structure measurements of the tropical upper troposphere. NOAA/ESRL scientists will operate instruments that measure nitrous oxide, sulfur hexafluoride, chlorofluorocarbons, hydrochlorofluorocarbons, hydrogen, carbon monoxide, methane, PAN, carbonyl sulfide, carbon disulfide, methyl chloride, methyl bromide, methyl iodide, and water vapor. CU Cryogenic Frostpoint Hygrometers (CFHs) will be carried aloft on high altitude balloons launched by Costa Rican students and scientists at Alajuela, Costa Rica, and by staff of INAMHI (Ecuador's Weather Service) at San Cristobal, Galapagos. CIRES/ESRL and Russian scientists will also launch several Lyman-alpha hygrometers on high altitude balloons to help resolve uncertainties of stratospheric water vapor measurements. Other scientists within NOAA/ESRL will measure UV radiation (actinic flux), soot (black carbon), high frequency ozone and water vapor on the WB-57F aircraft.

Significance: This TC4 collaborative work, which is conducted by NOAA and CIRES scientists and funded by NASA, addresses research problems in two of NOAA's four major goals: climate, and weather and water. The Costa Rican scientists and institutions involved in the TC4 program have highlighted the mission at the recent 32nd International Symposium on Remote Sensing of Environment as an example of the value of international cooperation in Global Earth Observations System of Systems (GEOSS), where NOAA and NASA are key US participants (see http://www.noaa.gov/eos.html).

More information: http://www.espo.nasa.gov/tc4/

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