Global Hydrology Resource Center

Data User Guide

IPHEx Cloud Radar System (CRS)

Introduction

The IPHEx Cloud Radar System (CRS) data were collected in support of The GPM Integrated Precipitation and Hydrology Experiment (IPHEx) which was held in North Carolina during the months of April-June 2014. The goal of IPHEx was to characterize warm season orographic precipitation regimes and the relationship between precipitation regimes and hydrologic processes in regions of complex terrain. The CRS provides high-resolution profiles of reflectivity and Doppler velocity in clouds at aircraft nadir along the flight track.

Citation

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Keywords:

NASA, GHRC, MSFC; IPHEx, CRS; North Carolina; aircraft observations, ER-2; cloud radar system, W-Band Doppler radar, polarimetric; reflectivity, Doppler velocity;

Campaign

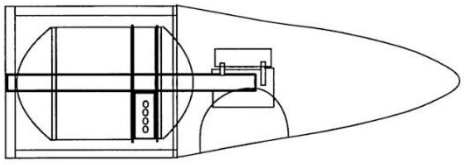
The Global Precipitation Measurement (GPM) mission Ground Validation (GV) campaign used a variety of methods for validation of GPM satellite constellation measurements prior to launch of the GPM Core Satellite, which launched on February 27th, 2014. The validation effort included numerous GPM-specific and joint-agency/international external field campaigns, using state of the art cloud and precipitation observational infrastructure (polarimetric radars, profilers, rain gauges, disdrometers). Surface rainfall was measured by very dense rain gauge and disdrometer networks at various field campaign sites. These field campaigns accounted for the majority of the effort and resources expended by Global

Precipitation Measurement (GPM) mission Ground Validation (GV). More information about the GPM mission is available at http://pmm.nasa.gov/GPM.

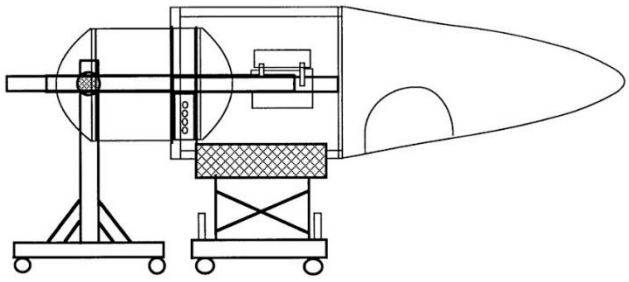
The GPM Integrated Precipitation and Hydrology Experiment (IPHEx) was held in North Carolina during the months of April-June 2014. The goal of IPHEx was to characterize warm season orographic precipitation regimes and the relationship between precipitation regimes and hydrologic processes in regions of complex terrain. The IPHEx campaign was part of the development, evaluation, and improvement of remote-sensing precipitation algorithms in support of the GPM mission through NASA GPM GV field campaign (IPHEX_GVFC) and the evaluation of Quantitative Precipitation Estimation (QPE) products for hydrologic forecasting and water resource applications in the Upper Tennessee, Catawba-Santee, Yadkin-Pee Dee, and Savannah river basins (IPHEX-HAP, H4SE). NOAA Hydrometeorology Testbed (HTM) has synergy with this project. More information about IPHEx is available at http://gpm.nsstc.nasa.gov/iphex/.

Instrument Description

The CRS is a 94 GHz (W-band; 3 mm wavelength) Doppler radar developed for autonomous operation in the NASA ER-2 high-altitude aircraft and for ground-based operation. It provides high-resolution profiles of reflectivity and Doppler velocity in clouds and it has important applications to atmospheric remote sensing studies. The CRS was designed to fly with the Cloud Lidar System (CLS), in the tail cone of an ER-2 superpod. There are two basic modes of operation of the CRS: 1) ER-2 mode, with reflectivity, Doppler, and linear-depolarization measurements, and 2) ground-based mode, with full polarimetric capability. The ER-2 mode was used during the IPHEx mission.



The Cloud Radar installed in the tail cone of the ER-2 superpod



Trolly being used to install the radar into the tail cone

The CRS, upgraded from 2012 to 2014, includes a new solid-state transceiver with pulse compression, data system, digital receiver, antenna, and power supply. More detailed information about the Cloud Radar System, including system specifications, may be found at the CRS Home Page.

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File Naming Convention

The IPHEx Cloud Radar System (CRS) dataset files are named with the following convention:

IPHEX_CRS_L1B_YYYYMMDD-HHMMSS-YYYYMDD-HHMMSS_dist_v02.nc

Where,

IPHEX_CRS = campaign and instrument
L1B = processing level
YYYYMMDD-HHMMSS-YYYYMDD-HHMMSS = start and stop time (year, month, day)
v02 = version 2
.nc = netCDF file type

Data Format Description

The Cloud Radar System (CRS) data is available in NetCDF format with a data processing level of 1B. More information about NASA Data Processing Levels can be found at http://science.nasa.gov/earth-science/earth-science-data/data-processing-levels-for-eosdis-data-products/.

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