Data User Guide

TRMM Tropical Cyclone Precipitation Feature (TCPF) Database - Level 1

Introduction

The TRMM Tropical Cyclone Precipitation Feature – Level 1 dataset is composed of tropical cyclone (TC) features identified from 12 years of TRMM observations by using TC best-track data from the National Hurricane Center and the U.S. Navy's Joint Typhoon Warning Center. The TRMM data used to generate the TCPF dataset are collected from the University of Utah (UU)'s TRMM Precipitation Feature database (UU TRMM PF). The UU TRMM PF database includes data from four of the sensors aboard the TRMM satellite: the Precipitation Radar (PR), the TRMM Microwave Imager (TMI), the Visible Infrared Scanner (VIRS), and the Lightning Imaging Sensor (LIS). The UU TRMM PF data is subsetted by cutting a 20 degree longitude by 20 degree latitude centered boxed around the tropical cyclone to then create the TCPF dataset. More information on processing can be found in the 'Data Description' and 'References' sections below.

The TCPF – Level 1 dataset was developed as a collaborative effort between Florida International University (FIU) and the University of Utah (UU). The TCPF dataset was developed to assist in improving the prediction of tropical cyclone intensification and the forecasting of tropical cyclone rainfall.

Data Citation

Jiang, H., C. Liu , E. J. Zipser, D. J. Cecil. 2015. TRMM Tropical Cyclone Precipitation Feature (TCPF) Database - Level 1 [indicate subset used]. Dataset available online [https://ghrc.nsstc.nasa.gov/pub/tcpf/tcpf-L1/data/] from the NASA EOSDIS Global Hydrology Resource Center Distributed Active Archive Center, Huntsville, Alabama, U.S.A. doi: http://dx.doi.org/10.5067/TRMM/TCPF-L1/DATA201

Keywords

Tropical cyclones, hurricanes, lightning, tropical cyclone tracks, tropical cyclone environment, tropical cyclone intensity, tropical cyclone precipitation

Mission

The Tropical Rainfall Measuring Mission (TRMM) was a joint mission between NASA and the Japan Aerospace Exploration Agency (JAXA) designed to monitor and study tropical rainfall and the associated release of energy that helps to power the global atmospheric circulation shaping both weather and climate around the globe. The [TRMM Observatory](#) was active from December 1997 through April 2015, and carried five instruments: the first space-borne Precipitation Radar (PR), the TRMM Microwave Imager (TMI), a Visible and Infrared Scanner (VIRS), a Cloud and Earth Radiant Energy System (CERES), Lightning Imaging Sensor (LIS).

The Tropical Rainfall Measuring Mission marks the first time that TCs in all ocean basins can be viewed by high resolution down-looking precipitation radar. TRMM measurements, along with other NASA satellite measurements such as QuikSCAT and numerical model-based reanalysis, have provided invaluable sources of TC data for the study of TC intensification, rainfall, and environment.

File Naming Convention

The TRMM Tropical Cyclone Precipitation Feature (TCPF) Database -Level 1 dataset files are named with the following convention:

BAS_yyyyID_####.HDF

Where

BAS = six tropical cyclone prone ocean basins which includes:

      ATL = Atlantic Ocean
      EPA = eastern and central Pacific Ocean
      NWP = northwestern Pacific Ocean
      NIO = northern Indian Ocean
      SIO = southern Indian Ocean
      SPA = south Pacific Ocean

yyyy = 4 digit year ID

ID = storm ID number. Storm ID numbers are created each season by the National Hurricane Center for the Atlantic and eastern and central Pacific basins. The U.S.

Navy's Joint Typhoon Warning Center assigns ID numbers for all other basins. Tropical cyclone storm ID numbers can be found here: http://tcpf.fiu.edu/tc_storms.html

= TRMM orbit number. TRMM orbit numbers can also be found here http://tcpf.fiu.edu/tc_storms.html by clicking on the basin and year and then selecting the appropriate storm.

Data Description

The TRMM TCPF Level 1 product is an aggregation of storm-centered spatial subsets of the NASA TRMM standard product suite. As such, the quality and accuracy of those standard products is reflected in the TCPF database. TRMM data products used to create the UU TRMM PF and TRMM TCPF datasets include:

> 2A23 (precipitation radar)
> 2A25 (precipitation radar)
> 1B11 (TRMM microwave imager)
> 2A12 (TRMM microwave imager)
> 1B01 (Visible and Infrared Scanner (VIRS)
> LIS flash counts

More information on these data products can be found in the following locations:
- UU TRMM database page: http://trmm.chpc.utah.edu/data.html#structure
- Goddard Earth Sciences Data and Information Services Center (GES DISC) page: http://mirador.gsfc.nasa.gov/cgi-bin/mirador/presentNavigation.pl?tree=project&project=TRMM
- Jiang, H., C. Liu, and E. Zipser, 2011: A TRMM-Based Tropical Cyclone Cloud and Precipitation Feature Database. *J. Appl. Meteor. Climatol.,* 50, 1255 – 1274.

To subset these TRMM data products to center on a tropical cyclone, "best-track data are linearly interpolated into TRMM observation times of each feature with at least four precipitation radar pixels for PR (TMI) swath features. If the distance between PF center and TC center at the time of TRMM observation is less than 500 km, this PF is defined as a TCPF" (Jiang et al., 2011). Note that due to swath width differences between the TMI and the PR, not all TRMM TC overpasses captured the entire storm. The TRMM TCPF Level 1 dataset is then sub-setted by cutting a 20 degree longitude by 20 degree latitude tropical cyclone centered box.

Though this dataset represents Level 1 of TCPF processing, it is an aggregation of

TRMM observations at NASA processing levels 1 and 2. More information about NASA data processing levels can be found at http://science.nasa.gov/earthscience/earth-science-data/data-processing-levels-for-eosdis-data-products/.

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