

Newly Released TRMM Version 7 Products, Other Precipitation Datasets and Data Services at NASA GES DISC

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ABSTRACT

The NASA Goddard Earth Sciences Data and Information Services Center (GES DISC) is home of global precipitation product archives, in particular, the Tropical Rainfall Measuring Mission (TRMM) products. TRMM is a joint U.S.-Japan satellite mission to monitor tropical and subtropical (40° S - 40° N) precipitation and to estimate its associated latent heating. The TRMM satellite provides the first detailed and comprehensive dataset on the four dimensional distribution of rainfall and latent heating over vastly undersampled tropical and subtropical oceans and continents. The TRMM satellite was launched on November 27, 1997. TRMM data products are archived at and distributed by GES DISC.

The newly released TRMM Version 7 consists of several changes including new parameters, new products, meta data, data structures, etc. For example, hydrometeor profiles in 2A12 now have 28 layers (14 in V6). New parameters have been added to several popular Level-3 products, such as, 3B42, 3B43.

Version 2.2 of the Global Precipitation Climatology Project (GPCP) dataset has been added to the TRMM Online Visualization and Analysis System (TOVAS); URL: <http://disc2.nascom.nasa.gov/Giovanni/tovas/>, allowing online analysis and visualization without downloading data and software. The GPCP dataset extends back to 1979.

Version 3 of the Global Precipitation Climatology Centre (GPCC) monitoring product has been updated in TOVAS as well. The product provides global gauge-based monthly rainfall along with number of gauges per grid. The dataset begins in January 1986.

To facilitate data and information access and support precipitation research and applications, we have developed a Precipitation Data and Information Services Center (PDISC); URL: <http://disc.gsfc.nasa.gov/precipitation/>. In addition to TRMM, PDISC provides current and past observational precipitation data. Users can access precipitation data archives consisting of both remote sensing and in-situ observations. Users can use these data products to conduct a wide variety of activities, including case studies, model evaluation, uncertainty investigation, etc. To support Earth science applications, PDISC provides users near-real-time precipitation products over the Internet. At PDISC, users can access tools and software. Documentation, FAQ and assistance are also available.

Other capabilities include: 1) Mirador (<http://mirador.gsfc.nasa.gov/>), a simplified interface for searching, browsing, and ordering Earth science data at NASA Goddard Earth Sciences Data and Information Services Center (GES DISC). Mirador is designed to be fast and easy to learn; 2) TOVAS; 3) NetCDF data download for the GIS community; 4) Data via OPeNDAP (<http://disc.sci.gsfc.nasa.gov/services/pendap/>). The OPeNDAP provides remote access to individual variables within datasets in a form usable by many tools, such as IDV, McIDAS-V, Panoply, Ferret and GrADS; 5) The Open Geospatial Consortium (OGC) Web Map Service (WMS) (http://disc.sci.gsfc.nasa.gov/services/wxs_ogc.shtml). The WMS is an interface that allows the use of data and enables clients to build customized maps with data coming from a different network.

ALG	V6 -> V7 CHANGES
Metadata	Complete redesign. Metadata elements are grouped; usually a group does not appear in all products. (In V6 all elements were in all products.) Number of scans written in SwathHeader group to allow multiswath products.
L1, L2	Scan Status changes.
L1, L2	Geolocation changed to Latitude, Longitude
LH	New products: 2 TRAIN, 3 SLH, 3 CSH.
1B01	Many variables changed to floats (from scaled integers in V6).
2A12	Complete redesign. Added surface precipitation. New quality flags. Hydrometeor profiles have 28 layers (14 in V6). Profiles are not written per pixel. Instead indexes are written per pixel and used to retrieve a profile from an array.
2A21	Added alternate PIA. Reliability Flag simpler. Many variables changed to floats (from scaled integers in V6).
2A25	Many variables changed to floats (from scaled integers in V6).
2B31	Added surface precipitation, snow profile, graupel profile.
3A12	Added surface precipitation.
3B31	Redesign. Profiles have 28 layers (14 in V6). Grid 0.5° (5° in V6). Added surface precipitation.
3B42	Added gaugeRelativeWeighting
3B43	Added source information, HQ precipitation, IR precipitation



NEW! TRMM Version 7 Products

Mirador
Data Access Made Simple

Data Group	Description	Date Range
Ancillary	TRMM Ancillary data products	2002-02-07 to 2010-11-30
Gridded	Gridded data products from VRS, TM, and PR, at a range of spatial and temporal resolutions	1997-12-01 to 2010-11-01
Ground-based Instrument	Ground-based instrument data products	1995-01-03 to 2010-10-31
Orbital	Orbital data products from VRS, TM, and PR, at the sensor's resolution	1997-12-07 to 2010-11-30
Subset	Parameter, gridded, regional gridded, and coincidence subset data derived from TRMM standard data products	1993-01-01 to 2010-11-30

Precipitation datasets (left):

- Standard TRMM products
- Ancillary products (e.g., merged IR)
- Ground based instruments
- Other precipitation products in TOVAS (e.g., Willmott-Matsuura, GPCP, GPCC)



Other data products:

- Other remote sensing products from different missions (e.g., AIRS, A-Train)
- Modeling products (e.g., MERRA, GLDAS)

Above left: Precipitation products in Mirador (<http://mirador.gsfc.nasa.gov/>). **Above right:** TRMM orbital data products.

TRMM Data Services and Applications

KDD - Support System

Data Request -> Data Files -> Products

Distributed Archiving -> Ingest

GES DISC

Value-added Products and Services: Ensuring the unimpeded data flow is directed at actual user needs, helping to solve user problems.

Outreach As Service and Collaborations

Our purpose is not to just push data to users, but to make available potential solutions to users' problems.

Example Applications (Agriculture):

United Nations World Food Programme
USDA Foreign Agricultural Service

Agriculture Information System (AIS)

Current Conditions Maps

NEW! GPCP Version 2.2 Precipitation Dataset in TOVAS Now

The Global Precipitation Climatology Project (GPCP) has released its latest version, 2.2.

Temporal Coverage:
• Monthly precipitation: Jan. 1979 - Dec. 2010
• Long term monthly means, derived from the monthly data

Spatial Coverage:
• 2.5 degree latitude x 2.5 degree longitude global grid
• 88.75° N - 88.75° S, 1.25° E - 358.75° E

Monthly Global Precipitation (GPCP)

The Global Precipitation Climatology Project (GPCP) provides a global merged rainfall analysis for research and applications. This interface is designed for visualization and analysis of the GPCP's Global Precipitation Version 2.2 dataset.

Users can generate plots of ASCII Output for area average (Lat-Lon Map), time series (Time Series), and Histogram. The ASCII Output is available for ASCII Map. Selecting the Help buttons will open a new window with detailed help. <http://disc2.nascom.nasa.gov/Giovanni/tovas/>

Alert: A new window may be opened when a link or a button is selected below.

Click and drag to select area; or input latitudes (-90, 90) and longitudes (-180 - 180) or click on the map and input coordinates.

More information on supported browsers and platforms

Monthly GPCP (Accumulated Rainfall [mm])

Plot Type: Lat-Lon Map

Begin Year: 2010 | Begin Month: December | (Data Begin: 1979/01)

End Year: 2010 | End Month: December | (Data End: 2010/12)

Color: Dynamic

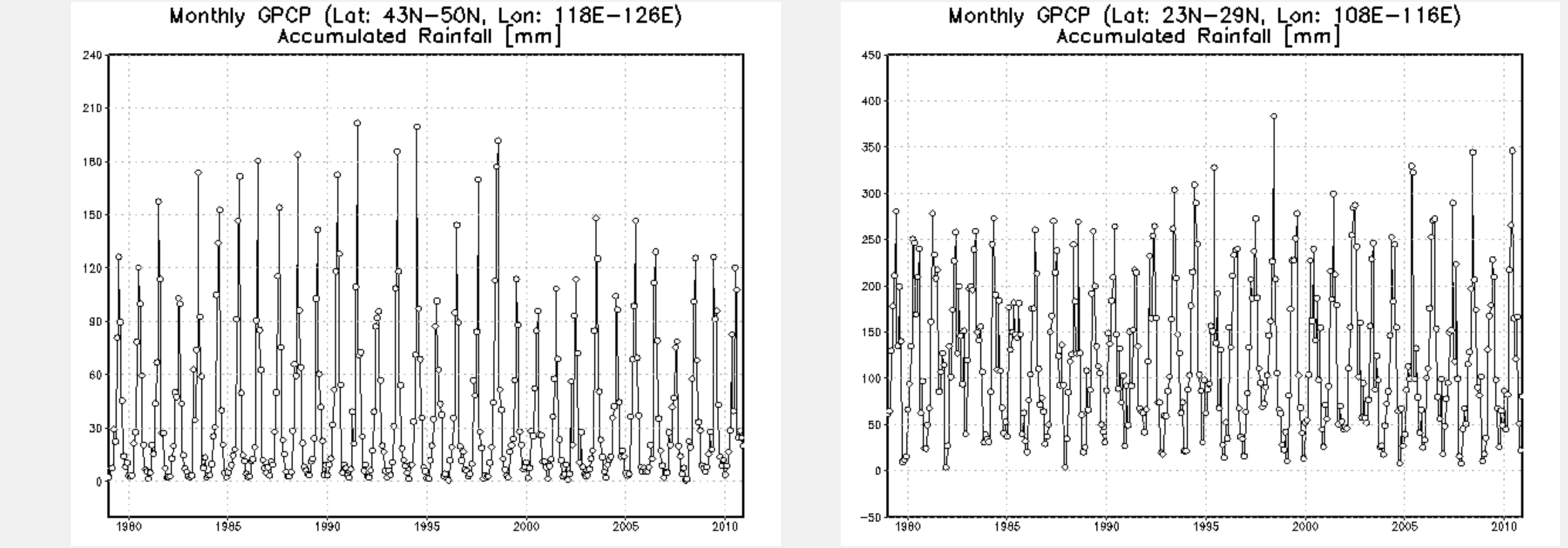
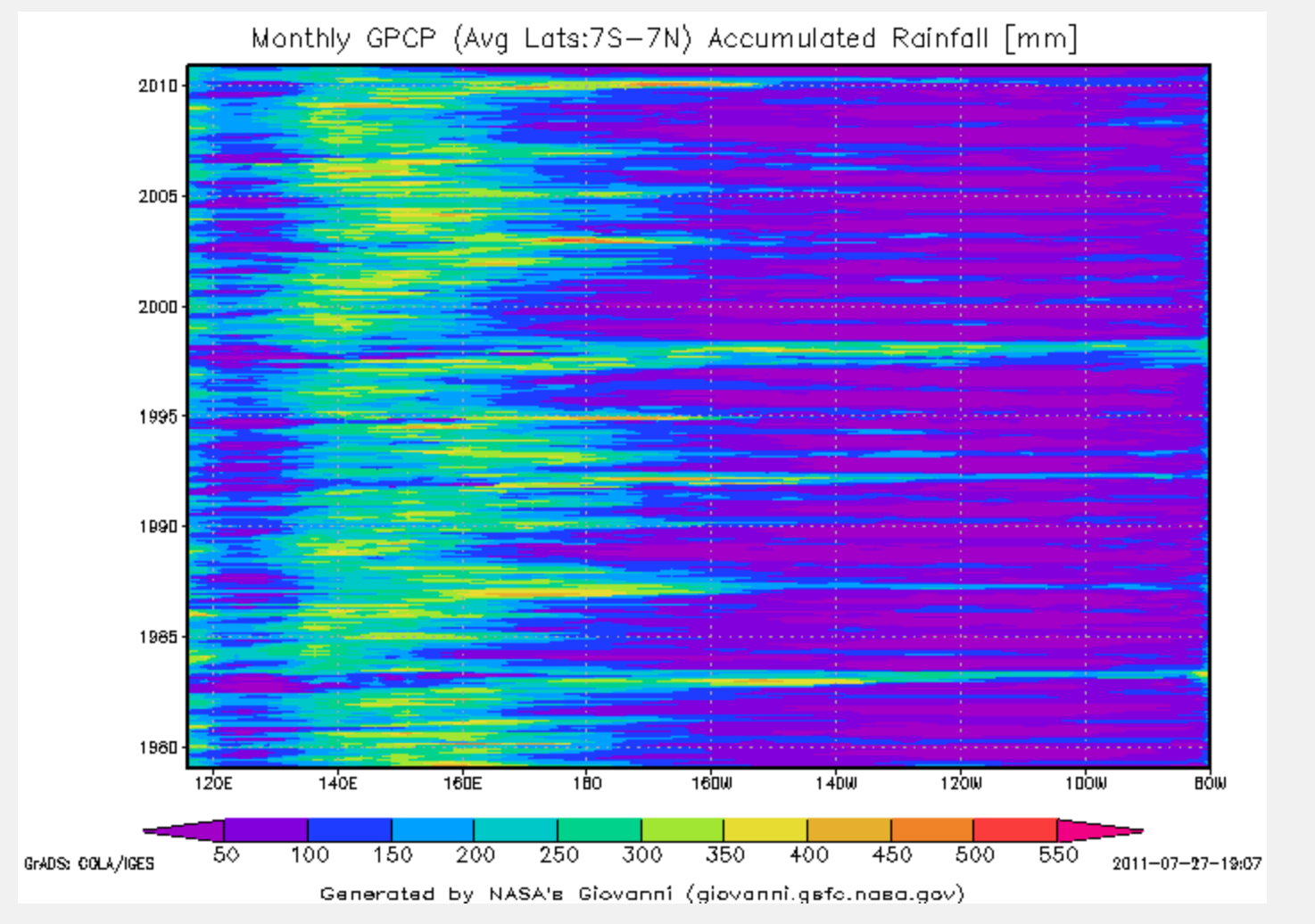
Time Series Plot: Dynamic

Y-Axis: Dynamic

ASCII Output: ASCII Output | ASCII Output | ASCII Output

Generated by NASA's Giovanni (giovanni.gsfc.nasa.gov)

Above left: The landing page of GPCP 2.2 in TOVAS, allowing interactive analysis and visualization of the GPCP data. **Above right:** One year average precipitation map.



Hovmöller latitude versus time diagram of the tropical Pacific ocean, showing seasonal and interannual variability of precipitation 1979-2010. Precipitation in this region is strongly influenced by El Niño - Southern Oscillation (ENSO) events; the brighter "stripes" extending to the east indicate an El Niño event.

The 30 years of GPCP Version 2.2 data allow time-series analysis. **Top left:** A well-known phenomenon is decreasing precipitation in northeastern China. **Top right:** In contrast to northeastern China, the southern provinces of China are experiencing increased precipitati

New in TOVAS: Inter-comparison of V6 and V7 TRMM

TRMM V6 and V7 Inter-comparison

This tool to inter-compare TRMM data in each of monthly products.

3A25 V6

3A25 V7

3A25 (V6 - V7)

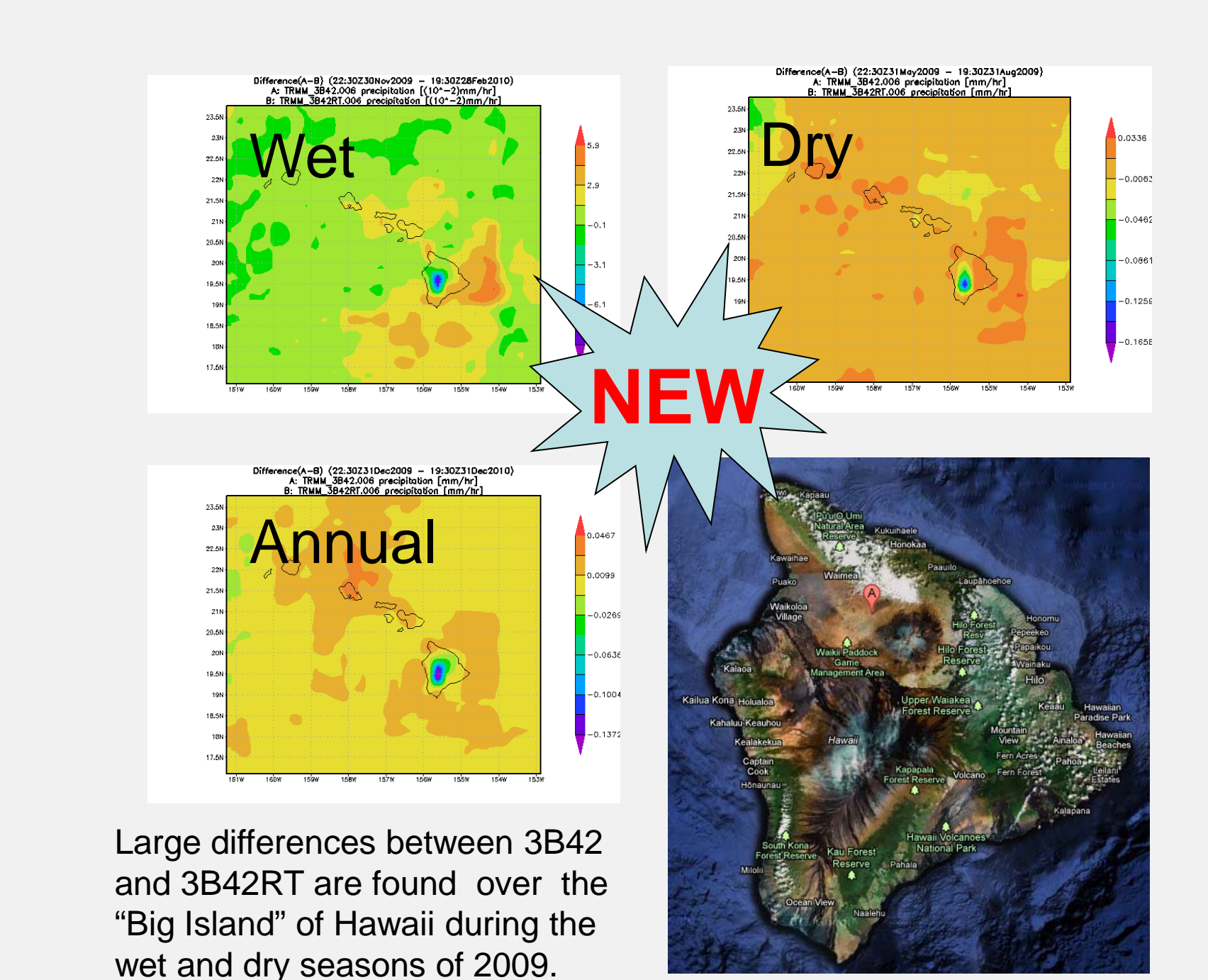
3A25 (V6 - V7)



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New in TOVAS: Inter-comparison of 3B42 and 3B42RT

Provides application users the ability to inter-compare near-real-time (3B42RT) and research quality (3B42) rainfall products for product adjustments (i.e., biases).



Large differences between 3B42 and 3B42RT are found over the "Big Island" of Hawaii during the wet and dry seasons of 2009.

TOVAS: <http://disc2.nascom.nasa.gov/Giovanni/tovas/>

- Mirador: <http://mirador.gsfc.nasa.gov/>
- GPCP 2.2 in TOVAS: <http://disc2.nascom.nasa.gov/Giovanni/tovas/rain.GPCP.shtml>
- PDISC Portal: <http://disc.sci.gsfc.nasa.gov/precipitation>
- Hurricane Data Analysis Tool: http://disc.sci.gsfc.nasa.gov/daac-bin/hurricane_data_analysis_tool.pl
- TRMM Near-real-time Product in USDA Crop Explorer: http://www.pecad.fas.usda.gov/cropeexplorer/mpa_maps.cfm
- Current Rainfall Conditions: http://disc.sci.gsfc.nasa.gov/agriculture/additional/tools/current_conditions.shtml

Ongoing: Integrate IPWG Validation Algorithms into TRMM Online Visualization and Analysis System (TOVAS):

- Intercomparison of V6 and V7 TRMM (beta versions)
- Intercomparison of daily rainfall products (to be released in 2012)
- Intercomparison of climatology products (to be released in 2013)

- Help Desk: gsfc-help-disc@lists.nasa.gov
- TRMM FAQ: http://disc.sci.gsfc.nasa.gov/additional/faq/precipitation_faq.shtml
- TRMM Project: <http://trmm.gsfc.nasa.gov/>