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

Zhong Liu[1,4], D. Ostrenga[2,4], W.L. Teng[3,4], Bhagirath Trivedi[2,4], and S. Kempler[4]

Email: Zhong.Liu@nasa.gov

[1]George Mason University, [2]ADNET Systems, Inc., [3]Wyle Information Systems LLC, [4]NASA/GSFC, NASA Goddard Earth Sciences Data & Information Services Center (GES DISC), Code 610.2, NASA/GSFC, Maryland 20771, USA

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/opendap/). 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.

NEW! TRMM Version 7 Products

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 multiscan 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

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

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)

TRMM Data Services and Applications

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

Acknowledgement: "Integrating NASA Earth Science Enterprise Data into Global Agricultural Decision Support Systems." This project is part of the Earth Science Research, Education, and Applications Solutions Network (REASoN CAN-02-OES-01).

Simple Subset Wizard (SSW) http://disc.gsfc.nasa.gov/SSW/

NEW

Simple Subset Wizard (SSW) provides a valuable service to precipitation data users. It allows spatial and parameter subsetting, and the output format is either NetCDF or gzipped NetCDF.

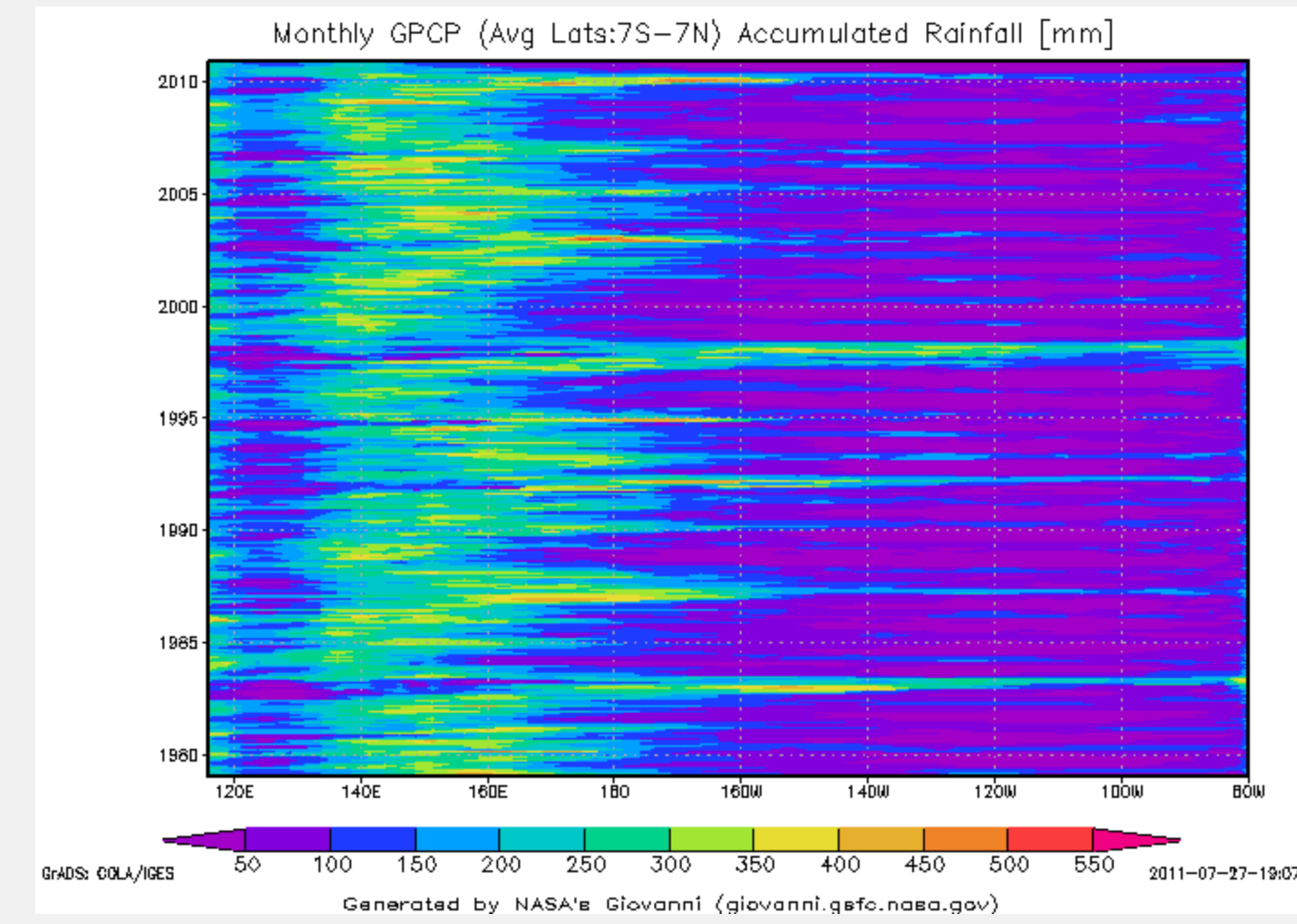## NEW! GPCP Version 2.2 Precipitation Dataset in TOVAS Now

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

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

3A25 V6

3A25 V7

3A25 (V6 - V7)

3A25 (V6 - V7)

NEW

Acknowledgement: "Integrate IPWG Validation Algorithms into TRMM Online Visualization and Analysis System (TOVAS)." This project is part of NNH10ZDA001N-ESDRERR, "Earth System Data Records Uncertainty Analysis."

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).

Wet

Dry

Annual

NEW

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

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)**