North American Monsoon (NAME) Verification Dataset Documentation

Contact information

For all the questions regarding the NAME Verification precipitation estimates of the 9 zones of any products, please contact Wei.Shi@noaa.gov or John.Janowiak@noaa.gov of NCEP/CPC. For general questions regarding the details of each "estimator" such as model parameterization, etc., please contact the person whose name is listed under each product below.

Description of the North American Monsoon (NAME) Verification Dataset

The NAME verification dataset contains a suite of gauge, satellite, radar, model and multi-sensor estimates of precipitation for 9 zones in the SW U.S. and NW Mexico.
(http://catalog.eol.ucar.edu/cgi-bin/catalog/name/report/index)

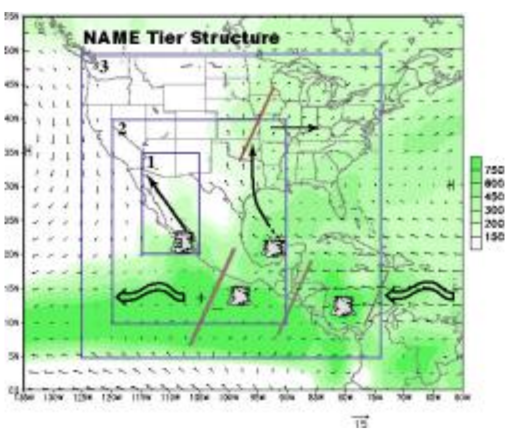
Nine (9) products are currently collected at CPC each day. For each product, area means are computed for each zone by applying zone masks:
(ref. http://www.eol.ucar.edu/projects/name/verify/name_protocols.html)

The 9 products are either gauge, satellite, or of model forecast type and those are described in the sections below which include links and descriptions of the products.

This dataset is related to the NAME field project that is described in the section below.

Description of the NAME Project (https://www.eol.ucar.edu/field_projects/name)

Time Period: June 1, 2004 to September 30, 2004
Project Location: North America



The **North American Monsoon Experiment (NAME)** is an internationally coordinated, joint CLIVAR-GEWEX process study aimed at determining the sources and limits of predictability of warm season precipitation over North America, with emphasis on time scales ranging from seasonal-to-interannual. It focuses on observing and understanding the key components of the North American monsoon system and their variability within the context of the evolving land surface-atmosphere-ocean annual cycle. It seeks to improve understanding of the key physical processes that must be parameterized for improved simulation with dynamical models.

NAME employed a multi-scale (tiered) approach with focused monitoring, diagnostic and modeling activities in the core monsoon region, on the regional-scale and on the continental-scale.

NAME Verification Product Descriptions

Gauge

–**CPC merged US and Mexico daily precipitation analysis**
(was http://www.cpc.ncep.noaa.gov/products/precip/realtime/US_MEX/index.html now found at https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/gl_obs.shtml)

E-mail Contact: Wei Shi Wei.Shi@noaa.gov

Satellite

–**CPC Morphing Technique ("CMORPH")**
(http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html)
E-mail Contact: John Janowiak John.Janowiak@noaa.gov

NOAA CPC Morphing Technique ("CMORPH") Description

Grid Resolution: 0.07277 degrees lat/lon (8 km at the equator)
Temporal Resolution: 30 minutes
Domain: Global (60N - 60S)
Period of Record: December 3, 2002 to present

Reference: Joyce, R. J., J. E. Janowiak, P. A. Arkin, and P. Xie, 2004: CMORPH: A method that produces global precipitation estimates from passive microwave and infrared data at high spatial and temporal resolution.. J. Hydromet., 5, 487-503.

CMORPH (CPC MORPHing technique) produces global precipitation analyses at very high spatial and temporal resolution. This technique uses precipitation estimates that have been derived from low orbiter satellite microwave observations *exclusively*, and whose features are transported via spatial propagation information that is obtained entirely from geostationary satellite IR data. At present we incorporate precipitation estimates derived from the passive microwaves aboard the DMSP 13, 14 & 15 (SSM/I), the NOAA-15, 16, 17 & 18 (AMSU-B), and AMSR-E and TMI aboard NASA's Aqua and TRMM spacecraft, respectively. These estimates are generated by algorithms of Ferraro (1997) for SSM/I, Ferraro et al. (2000) for AMSU-B and Kummerow et al. (2001) for TMI. Note that this technique is not a precipitation estimation algorithm but a means by which estimates from existing microwave rainfall algorithms can be combined. Therefore, this method is extremely flexible such that any precipitation estimates from any microwave satellite source can be incorporated.

With regard to spatial resolution, although the preciptation estimates are available on a grid with a spacing of 8 km (at the equator), the resolution of the individual satellite-derived estimates is coarser than that - more on the order of 12 x 15 km or so. The finer "resolution" is obtained via interpolation.

In effect, IR data are used as a means to transport the microwave-derived precipitation features during periods when microwave data are not available at a location. Propagation vector matrices are produced by computing spatial lag correlations on successive images of geostationary satellite IR which are then used to propagate the microwave derived precipitation estimates. This process governs the movement of the precipitation features only. At a given location, the shape and intensity of the precipitation features in the intervening half hour periods between microwave scans are determined by performing a time-weighting interpolation between microwave-derived features that have been propagated forward in time from the previous microwave observation and those that have been propagated backward in time from the following microwave scan. We refer to this latter step as "morphing" of the features.

–Naval Research Laboratory/GEO
(http://www.nrlmry.navy.mil/sat_bin/rain.cgi or http://www.nrlmry.navy.mil)
E-mail Contact: Joe Turk turk@nrlmry.navy.mil

–UC-Irvine/PERSIANN
(Formerly U. of Arizona group; new web address not yet available at this time)
E-mail Contact: Kuolin Hsu kuolinh@uci.edu

–NASA/GSFC/3B42RT
(http://www.cpc.ncep.noaa.gov/products/janowiak/3b42rt_description.html)
E-mail Contact: George Huffman huffman@agnes.gsfc.nasa.gov

NASA "3B42RT" Product Description

Grid Resolution: 0.25 degrees lat/lon
Domain: Global (60N - 60S)
Temporal Resolution 3 hours

3B42RT (Merger of HQ and VAR)

This algorithm provides a combination of the TRMM real-time merged passive microwave (HQ; 3B40RT) and microwave-calibrated IR (VAR; 3B41RT). The current scheme is simple replacement - for each gridbox the HQ value is used if available, and otherwise the VAR value is used.

References:

Huffman, G.J., R.F. Adler, S. Curtis, D.T. Bolvin, and E.J. Nelkin, 2005: Global Rainfall Analyses at Monthly and 3-Hr Time Scales. Chapter 4 of Measuring Precipitation from Space: EURAINSAT and the Future, V. Levizzani, P. Bauer, and J. Turk, Ed., Springer Verlag (Kluwer Academic Pub. B.V.), Dordrecht, The Netherlands, accepted. [Invited paper]

Huffman, G.J., R.F. Adler, E.F. Stocker, D.T. Bolvin, and E.J. Nelkin, 2003: Analysis of TRMM 3-Hourly Multi-Satellite Precipitation Estimates Computed in Both Real and Post-Real Time. Combined Preprints CD-ROM, 83rd AMS Annual Meeting, Poster P4.11 in: 12th Conf. on Sat. Meteor. and Oceanog., 9-13 February 2003, Long Beach, CA, 6 pp.

–NESDIS/Merged AMSU-B Estimates
(http://www.cpc.ncep.noaa.gov/products/janowiak/amsub_description.html)
E-mail Contact: Ralph Ferraro ralph.ferraro@noaa.gov

NESDIS Merged AMSU-B Estimates Description

Grid Resolution: 0.25 degrees lat/lon
Domain: Global

These estimates are daily composites of all available passive microwave precipitation estimates from the AMSU-B instrument. Currently, AMSU-B is aboard three NOAA polar orbiters (NOAA-15, -16 & -17) which have approximate observing times (at the equator) of 0700/1900, 0200/1400, and 1000/2200 LST, respectively. These estimates are generated by NOAA/NESDIS using the following published algorithm:

Ferraro, R.R., F. Weng, N. Grody, L. Zhao, H. Meng, C. Kongoli, P. Pellegrino, S. Qiu and C. Dean, 2005: NOAA operational hydrological products derived from the AMSU. IEEE Trans. Geo. Rem. Sens., 43, 1036 1049

–NESDIS/”Hydro-Estimator” Estimates
(http://www.cpc.ncep.noaa.gov/products/janowiak/hydroe_description.html)
E-mail Contact: Bob Kuligowski bob.kuligowski@noaa.gov

NESDIS "Hydro-Estimator" Estimates Description

Grid Resolution:~ 4 km
Domain: Global (60N-60S)

The Hydro-Estimator (H-E) is a highly modified adaption of the manual Interactive Flash Flood Analyzer (IFFA) that has been used by operational forecasters at the Satellite Applications Branch of NESDIS for 20 years. Like the IFFA, the H-E rainfall rates are based on 10.7-micron brightness temperature, and are modified according to moisture availability, convective equilibrium (to identify regions of warm-top convection) and orographic effects using Eta model parameters. However, unlike the IFFA, the H-E rainfall curve is a function not only of the temperature of the pixel of interest, but also of its surroundings--the colder the pixel is with relation to its surroundings, the higher the rainfall rate for a given brightness temperature value. Furthermore, pixels that are warmer than their surroundings are assumed to be inactive and producing no rainfall--a distinction that results in much better separation of raining and nonraining areas than a single threshold temperature value.

–NESDIS/GOES Multi-spectral Rainfall Algorithm (GMSRA)
(http://www.cpc.ncep.noaa.gov/products/janowiak/gmsra_description.html)
E-mail Contact: Mamadou Ba mba@atmos.umd.edu

NESDIS "GMSRA" Estimates Description

Grid Resolution: ~4 km
Domain: North America

Experimental GOES Multispectral Rainfall Algorithm (GMSRA) The GOES Multispectral Rainfall Algorithm (GMSRA) uses combined information from visible (0.65 m), near-infrared (3.9 m) and infrared (6.7 m, 11 m, and 12 m) GOES measurements. For daytime rainfall, the first step consists of identifying optically thick clouds having a visible reflectance greater than 0.40. Non-precipitating cirrus is screened empirically using a gradient temperature based on the 11 m channel and the effective radius of cloud particles near their tops is derived from the reflected solar irradiance at 3.9 m. Negative Brightness Temperature Difference (BTD) IR-WV(11 m - 6.7 m), which corresponds well with rainfall areas for very deep convective cores (Inoue, 1997), is also used for the identification of rain for cloud tops colder than 230K. The algorithm uses the effective radius to separate raining from non-raining warm clouds during daytime. The algorithm relies on IR and WV only during nighttime and rainfall is estimated for clouds having brightness temperatures colder than 240K. For each pixel classified as containing raining clouds, the associated instantaneous rain rate is computed using a pre-calibrated probability of rain and mean rain rate for cloud top brightness temperature (11 m) groups of 10K. The rain rate is obtained by the product of the probability of rain and the mean rain rate. A cloud growth rate, defined as the difference between the current and the previous images, and a correction factor accounting for the available moisture are used to adjust the rainfall estimates.

REFERENCE: Ba, M., and A. Gruber, 20001: GOES Multispectral Rainfall Algorithm (GMSRA). J. Appl. Meteor., 40, 1500-1514.

Model Forecast

–NCEP/Global Forecast System model ("GFS")
(http://www.cpc.ncep.noaa.gov/products/janowiak/gfs_description.html)
E-mail Contact: Peter Caplan Peter.Caplan@noaa.gov

NOAA/NWS/NCEP Global Forecast System model ("GFS") Description
These are the average of the 12-24h & 24-36h forecasts from the 00 UTC run of the GFS. The 1st 12 hours after model run time are avoided for model "spin-up" considerations. NCEP/Environmental Modeling Center web page

Notes

New products will be added to the archive as they become available (NAME SWG strongly encourages interested groups to contact us if they would like to participate).

For each product, three files are generated at NCEP/CPC on each day:

(1) A table (ASCII format) of area mean precipitation for each of the 9 zones from June 1, 2003 to September 30, 2004. The *date* in the table represents the *ending date* of the 24-hour precipitation accumulation period. The file naming convention is such that "zones1-9.table.asc." is followed by the product's name. For example, "zones1-9.table.asc.cpc-gauge" or "zones1-9.table.asc.amsu", etc.

(2) A binary file which contains time series of area mean precipitation in each of the 9 zones from June 1, 2003 to September 30, 2004. For example, "zones1-9.nrlgeo.b030601.e040930" or "zones1-9.cpc-gauge.b030601.e040930", etc.

(3) A GrADS .ctl file for each of the above binary file.

These files are updated daily at 2:00 PM EST with file names *UNCHANGED*.

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