

AMSR-E Rainfall Validation Data

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1 AMSR-E VALIDATION OVERVIEW

The AMSR-E validation effort addressed data quality through several comprehensive calibration and validation programs. These programs characterized and documented the accuracy and precision of AMSR-E observations and their derived products.

Pre-launch activities demonstrated the stability of the instrument software and began to demonstrate the validity of the retrieved products with in-situ ground truth data. Post-launch efforts concentrated on validating the retrieved products using in situ data.

The validation effort produced three types of products: cryospheric data, including snow, ice, and sea ice; rainfall data; and soil moisture data.

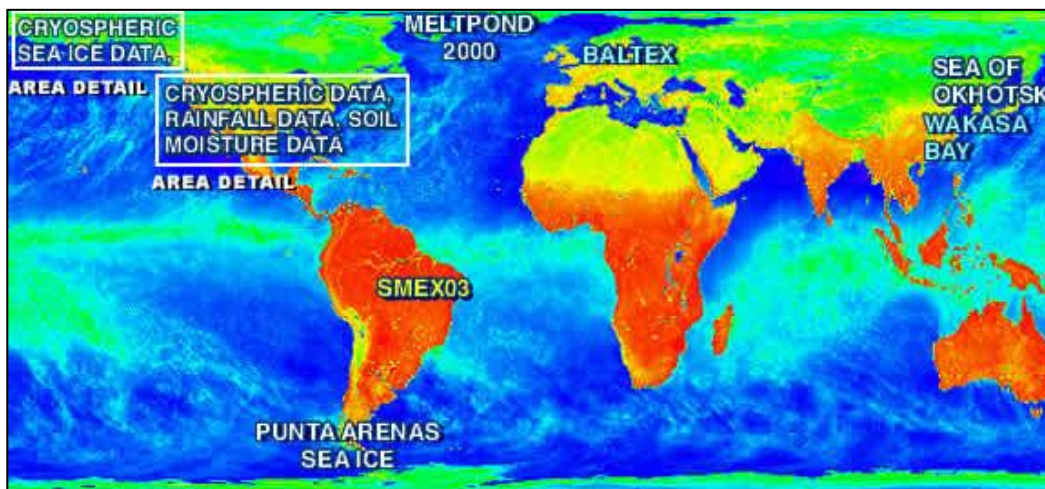


Figure 1. Global map depicting the locations of the 2002-4 AMSR-E validation campaigns, including area detail for regional study areas in North America.

1.1 Rainfall Data

The AMSR-E rainfall validation effort consisted of gauge-based and radar validation of AMSR-E global rain rate products. Gauge-based studies investigated instantaneous rain rate, stratiform/convective rain type, and daily and monthly rain accumulation. The radar studies investigated water vapor profiles and cloud information such as vertical cloud structure, radar backscatter, and radiative properties of different cloud types.

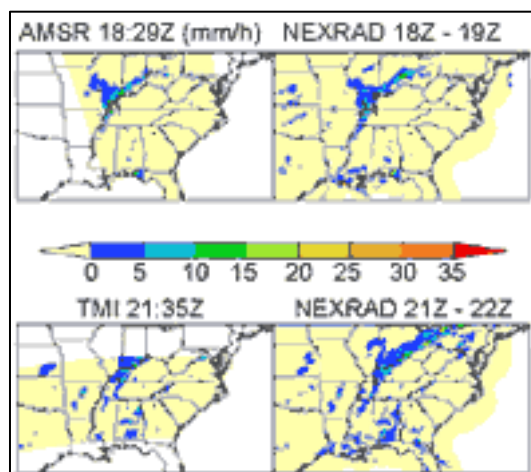


Figure 2. Rainfall estimates from the National Space Development Agency of Japan's AMSR-E instrument on Aqua and the Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI) for a rainfall event over the eastern U.S. on 5 June 2002. Image courtesy of Jeff McCollum of the University of Maryland and Ralph Ferraro of NOAA, members of the AMSR-E Science Team.

1.2 Rainfall Data Temporal Coverage

- Eureka, CA: October 2002 - September 2004
- Iowa City, IA: October 2002 - September 2004
- BALTEX: October 1999 - February 2002
- Wakasa Bay: January/February 2001 & 03 January – 14 February 2003

2 EUREKA, CA, USA NEXRAD/GAUGE SITE

A Next Generation Radar/Weather Surveillance Radar-88 Doppler (NEXRAD/WSR-88D) and a small rain gauge network in Eureka, California USA provided ground validation data for AMSR-E Rainfall Validation efforts. Gauges were installed 24-28 August 2000 in clusters of varying density to determine a best estimate of a true rain rate through measurement redundancy. The WSR-88D radar has a measurement range radius of 150-200 km. It measures instantaneous rain rate, stratiform/convective rain type, five-day, and monthly rain accumulation, in addition to radar reflectivity, with a 2 km resolution for most products.

For more information on NEXRAD, visit the [NOAA Radar Operations Center](#) website.

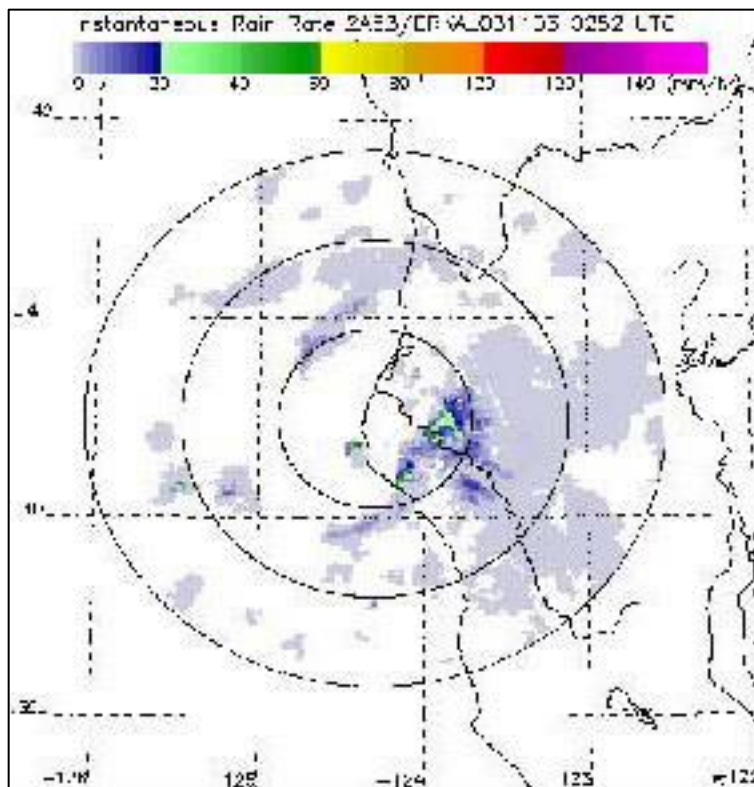


Figure 3. Rainfall rate taken by the WSR-88D radar in Eureka. Image courtesy of David Wolff of Goddard Space Flight Center and the AMSR-E Science Team.

3 IOWA CITY, IA GAUGE CLUSTER SITE

In 2002, the Department of Meteorology at the University of Maryland developed a prototype rain gauge-based ground validation site for Level 2 (instantaneous) satellite rainfall products. Aptly termed the Iowa City Airport Piconet, the site consisted of a network of gauge sites, centered on the Iowa City, Iowa USA airport grounds. The sites were spaced on a 5 km square grid, which is approximately the size and spacing of the 89 GHz AMSR-E footprints for the rainfall estimates. The University of Iowa provided a support infrastructure for this site, and IIHR-Hydroscience and Engineering (formerly the Iowa Institute of Hydraulic Research) staff and students maintained the site.

4 BALTEX GAUGE/RADAR EXPERIMENT

The Baltic Sea Experiment's (BALTEX) Radar Data Centre (BRDC), now [Baltic Earth](#), operated by the Swedish Meteorological and Hydrological Institute (SMHI), collected data from as many radars around the Baltic region as possible. During the Main Observational Phase (October 1999 through February 2002), 25 radars from six countries covered the Baltic region every 15 minutes. High-latitude data were recorded from 50 to 70 degrees North, complementing efforts in the mid-

latitudes and tropics. BALTEX data sets were used for validation of AMSR-E data, as well as AMSU/HSB Level 1 brightness temperatures and Level 2 cloud and precipitation parameters.

5 AMSR/AMSR-E WAKASA BAY FIELD CAMPAIGN 2003

The AMSR/AMSR-E Wakasa Bay Field Campaign was conducted over Wakasa Bay, Japan, in January and February, 2003. The campaign was designed to validate both AMSR and AMSR-E shallow rainfall and snowfall retrieval capabilities, extend the database of rainfall properties needed to implement a comprehensive physical validation scheme, and extend understanding of rainfall structures through new remote sensing technology.

The experiment included the NASA P-3 aircraft carrying the sensors listed in the Wakasa Bay Rainfall Data section below, an array of ground-based radars, and in situ ground and airborne hydrometer observations provided by Japan's Core Research for Evolutional Science and Technology (CREST) program.

The Wakasa Bay Field Campaign included joint research observations by the Japan Aerospace Exploration Agency (JAXA), the AMSR precipitation validation team, and the NASA AMSR-E team.

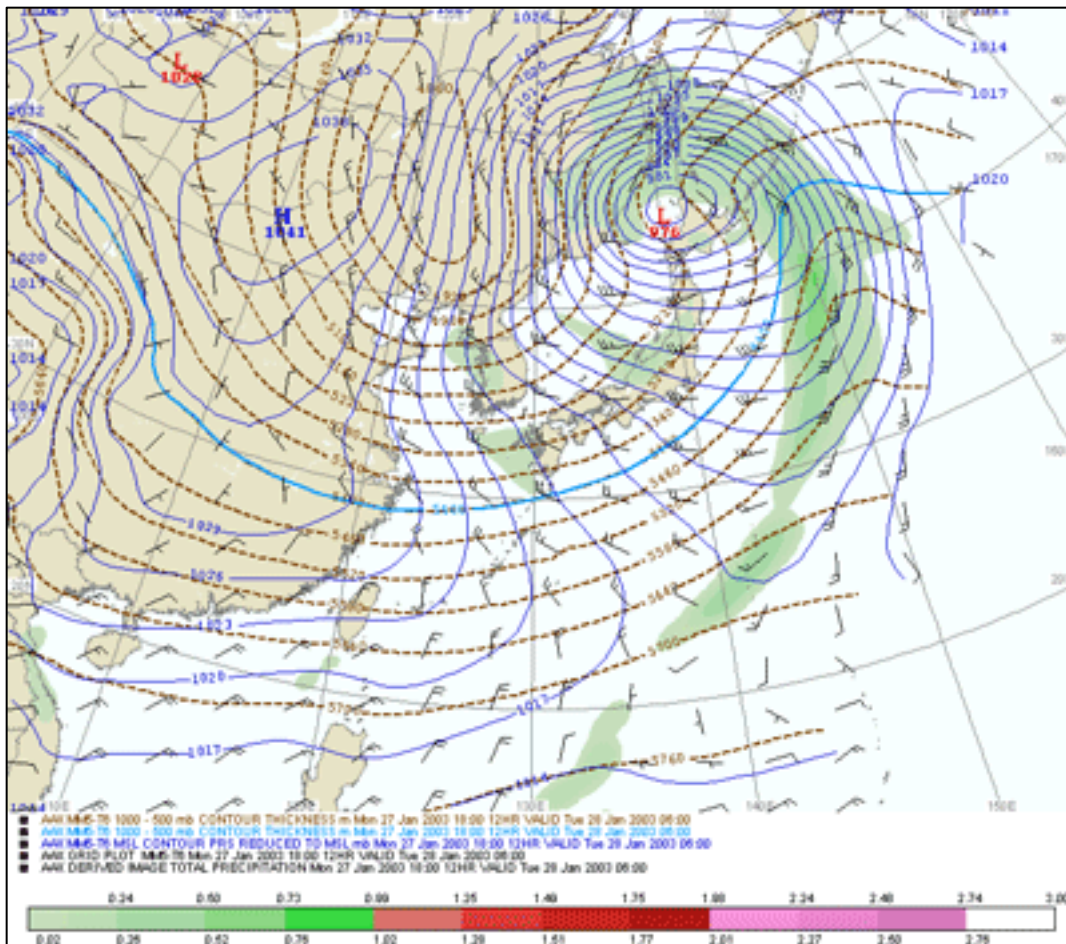


Figure 4. Weather forecast map of Wakasa Bay, Japan showing precipitation on 28 January 2003. Image courtesy of NSIDC.

6 RELATED WEBSITE

- [AMSR-E Project at NSIDC](#)
- [AMSR/ADEOS-II Data at NSIDC](#)
- [TRMM Satellite Validation Office](#)
- [NOAA Radar Operations Center](#)
- [BALTEX | The Baltic Sea Experiment](#)
- [Airborne Cloud Radar \(ACR\) Reflectivity, Wakasa Bay, Japan](#)
- [AMSR/AMSR-E Home Page at JAXA](#)

7 RELATED PUBLICATIONS

Ferraro, R.R., and J.R. McCollum. 2003. *Rainfall Over Land from the AMSR-E*. DOI: 10.1109/IGARSS.2003.1293876.

Lobl, et al. 2007. Wakasa Bay: An AMSR Precipitation Validation Campaign. *Bulletin of the American Meteorological Society* DOI: 10.1175/BAMS-88-4-551.

8 DOCUMENT INFORMATION

8.1 Publication Date

03 March 2015

8.2 Date Last Updated

02 March 2021