

Evaluation of NOAA's Reprocessed AMSR2 Environmental Data Records

Patrick Meyers, James Beauchamp, Ralph Ferraro, Paul Chang, Zorana Jelenak, Letitia Soulliard

Abstract

The Advanced Microwave Scanning Radiometer 2 (AMSR2) was launched in 2012 to monitor components of the hydrological cycle as part of the A-Train satellite constellation. NOAA routinely produces AMSR2 Environmental Data Records (EDRs) for rain rates, soil moisture, sea ice and snow water equivalent, total precipitable water, cloud liquid water, ocean wind speed, and sea surface temperatures. The AMSR2 product suite has been reprocessed to incorporate algorithm improvements for several EDRs. Monthly averages of the various EDRs reveal that AMSR2 effectively captures the predominant inter-annual variability of the Earth system.

Specific focus is given to the rain rate EDR and its enhanced quality control procedures to improve the identification of rain in cold regimes. Daily snow cover observations replaced a climatological snow screening procedure that often incorrectly diagnosed snow in transitional regions. Additionally, a cloud detection scheme was implemented to reduce false detection of precipitation over cold semi-arid surfaces. The quality flagging routine was refined so that more observations are valid and users have a better understanding of why data were flagged. Testing of the NASA GPROF2017 algorithm developed for the Global Precipitation Measurement (GPM) mission reveals that introducing additional information about the surface classification and environmental conditions can greatly improve the detectability of rain in colder climates. The introduction of surface information constrains the Bayesian search for precipitating profiles to drastically improve precipitation identification across seasons and environments.