

Validation of AMSR-E SST in Arctic Ocean

Akira Shibata

Meteorological Research Institute (MRI)

Nagamine 1-1, Tuskuba-shi, Japan

ashibata@mri-jma.go.jp

Abstract

The Advanced Microwave Scanning Radiometer aboard EOS-Aqua (AMSR-E) has been providing the sea surface temperature (SST) in global oceans since June 2002. The availability of the 6.9 GHz channel of the sensor enables us to obtain SST continuously under day/night and almost all weather conditions. The spatial resolution of the AMSR-E SST is low (about 50km) and may not provide the spatial detail needed to study some mesoscale processes but it is good enough for monitoring larger scale spatial changes. The AMSR-E SST is also obtained only in ocean regions located 100km away from lands and sea ice because of possible contamination of observed microwave signal by emissions from land, sea ice or both. The AMSR-E provides the temperature of the top few millimeters of the ocean surface.

The Arctic Ocean is one of hottest areas for satellite observations, because satellite observed declines in the sea ice cover since the beginning of the year 1979. In the summer of 2007, the sea ice cover recorded the minimum value during the 30 years satellite observations. With more open water and less ice, more solar energy gets into the Arctic Ocean causing a warming of the upper layer of the ocean which in turn would cause further decline in the sea ice cover. Satellite observations of both the sea ice cover and SST are correlated works.

The accuracy of AMSR-E SST was estimated by comparing the data with SSTs measured by ocean buoys deployed around the world and collected through the Global Telecommunication System (GTS). Using collocated data in the year of 2003, the bias of AMSR-E SST when compared with buoy data was estimated to be 0.12, 0.16, 0.09, 0.02, 0.03, -0.01, and -0.02°C for SSTs of about 0, 5, 10, 15, 20, 25, and 30°C,

respectively. The RMS error is 0.57°C . Though efforts of validating the AMSR-E SST have been made intensely, validations in the Arctic Ocean are not yet finished yet, since ocean buoys deployed in the Arctic Ocean were very poor.

In this paper, SST retrieval algorithm for AMSR-E will be examined in the Arctic Ocean by evaluating following two points.

- (a) Impacts of ocean surface salinity on measuring the microwave SST.
- (b) Removal of sea ice contamination by several methods.

Then, the AMSR-E SST will be validated by available collocated data sets from the GTS in the Barents Sea, and also by CTD observations by ships in the two years of 2002 and 2004. The AMSR-E SST will be also intercompared with another satellite SSTs including Windsat and MODIS. Windsat is a AMSR-E like microwave radiometer operated by US Naval Research Laboratory, and MODIS is an a visible and infrared radiometer aboard the EOS-Aqua. The intercomparison of two microwave SSTs between AMSR-E and Windsat will make similar results, but those between the microwave (AMSR-E) and the infrared (MODIS) may make different results. Causes of different SSTs (AMSR-E and MODIS) will be investigated, considering different sensing depths of ocean surface between two sensors.