

## CORRECTION ON AMSR-E AND WINDSAT SST FOR LONG TERM TREND

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### Abstract

At the present, two passive microwave radiometers are providing the sea surface temperature (SST) in global oceans in near ten years; one is the Advanced Microwave Scanning Radiometer for EOS (AMSR-E) since June 2002, and the other is the WindSat since February 2003. Though those two radiometers adopted similar external methods for the hotload calibration, both AMSR-E and WindSat SSTs show slight trends during near ten years, which was confirmed by comparing those SSTs with ocean buoys SST. AMSR-E and WindSat SSTs are retrieved mainly from the channel of 6GHz vertical polarization, and these trends should indicate the brightness temperature ( $T_b$ ) trend of both radiometers. Amplitude of the long term trend is an order of 0.1 to 0.2 K per near ten years, but its quantity is enough large to be detected by comparisons with buoys SST.

Causes of long term trends may be different between the two radiometers. In the AMSR-E case, the physical temperature distribution of the hotload may have changed due to a thermal degeneration of the hotload material. For the AMSR-E hotload, eight thermistors are attached on either the outside surface or inside surface. In estimating the hotload temperature, a weighting function is applied for the eight thermistors, and these coefficients of weighting are fixed during all the period. So, to estimate an accurate hotload temperature, weighting functions should be varied in years. In the WindSat case, a local observation time has been shifted from 6am/pm in the year 2003 to 7am/pm in recent years. The shift of local observation time may induce a change of a hotload thermal condition. Calibration of the hotload target for both sensors is still incomplete,

and making corrections are necessary, whose amplitudes vary along latitudes and in months. In WindSat case, those corrections should change due to the thermal condition change induced by the local observation time shift.

For both sensors, the long-term trends of 6GHz vertical Tb can be corrected by comparing AMSR-E or WindSat SSTs with ocean buoys SST, but an error with the order 0.05K may still remain corresponding to the SST error 0.1°C. Those corrections should be continued until sensors would work. In future, much accurate calibration system for the hotload target is very desirable.

#### Bibliography

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1980 - Nagasaki Marine Observatory

engaged in operational ship-borne marine observation

1983 - Meteorological Research Institute

research in oceanography by passive microwave radiometers and altimeters

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engaged in algorithm developments of retrieving SST and sea surface wind speed for AMSR/AMSR-E