

Improving the quality and extending the availability of SSMI data

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Abstract

The National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) serves as the archive of Special Sensor Microwave Imager (SSMI) data, which are produced by Navy's Fleet Numerical Meteorological and Oceanic Center. SSMI data measurements have been used extensively to generate climate data sets (including rain, snow, ice, cloud liquid water, and total precipitable water) in support of both national and international programs. This paper discusses the efforts that have been undertaken to improve the quality of SSMI data through the use of quality flags, conversion of all SSMI original data to network Common Data Form (netCDF) and extension of the period of record of SSMI data to August 1993.

Applying data quality flags

When observing the period of record of SSMI Temperature Data Record (TDR) and Sensor Data Record (SDR) data, there were major errors found, especially for data before February 4, 1997 (Figure 1-top half). Quality flags were developed to address the errors in the geolocation, temperature and time scans. Application of these quality flags showed a vast improvement in the quality of the data, as can be shown in the bottom half of Figure 1.

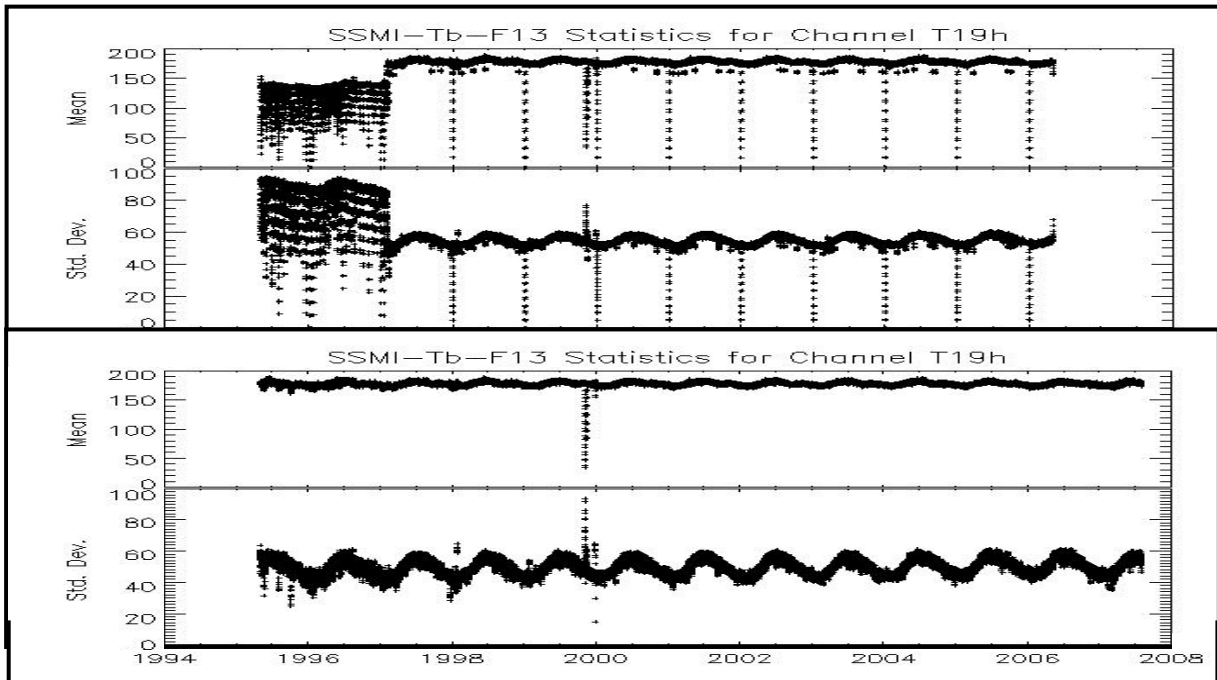


Figure 1: All data points are brightness temperatures (SDR) for the F-13 platform, channel T19v. The top graph illustrates the data errors in SSMI data, especially before February 4, 1997. The bottom graph shows the elimination of most of the errors through the application of quality flags. Data processing errors can be seen at the end of 1999.

Reformatting to netCDF

While reading earlier SSMI data before February 4, 1997, it was observed that corrupted data scans existed in the SSMI data structure. Many of these corrupted scans would cause read routines to fail and incomplete orbital data would be collected. Exception code was written to make sure all good data were read and then converted to netCDF so that users would have access to only good scans in a self-describing format. Another reason for converting SSMI data to netCDF is because of the fairly easy way that netCDF data structure would be able to hold quality flags. As a side note, the newer Special Sensor Microwave Imager/Sounder (SSMIS) data have also been converted to netCDF without any quality flags.

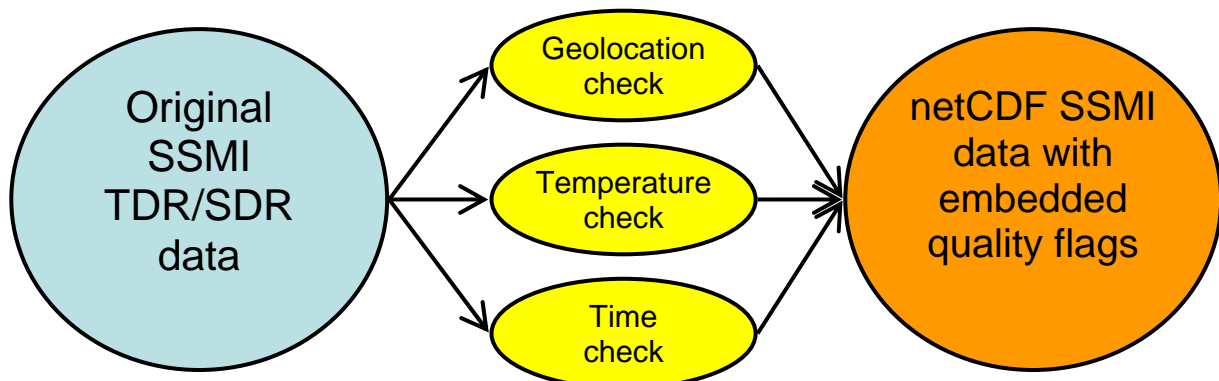


Figure 2: Diagram illustrates quality flag application and reformatting of original SSMI data

Extending period of record of SSMI data available

NOAA's Comprehensive Large-Array Stewardship System (CLASS) only serves original SSMI data starting in February 1997. CLASS does not serve data before February 1997 because of the corrupted scans found in the data. The netCDF SSMI orbit files with embedded quality flags extend the data available to users to August 1993. NetCDF SSMI data is projected to become available in CLASS by February 2008. It is already available by request at NCDC (look at endnotes).

Results and Future Work

NetCDF SSMI TDR/SDR data with embedded quality flags preserves original data while enhancing its scientific value. Customers can now access earlier SSMI data as the period of record has been extended to August 1993. Climatology checks will be added in the future as a quality flag. Other future work include further extending the period of record of SSMI data back to 1987 and the intercalibration of SSMI data.

1. Email Hilawe.Semunegus@noaa.gov for data access or questions
2. SSMI NCDC website: <http://www.ncdc.noaa.gov/oa/rsad/ssmi/ssmi.html>
3. Extensive SSMI/SSMIS documentation can also be found at this website