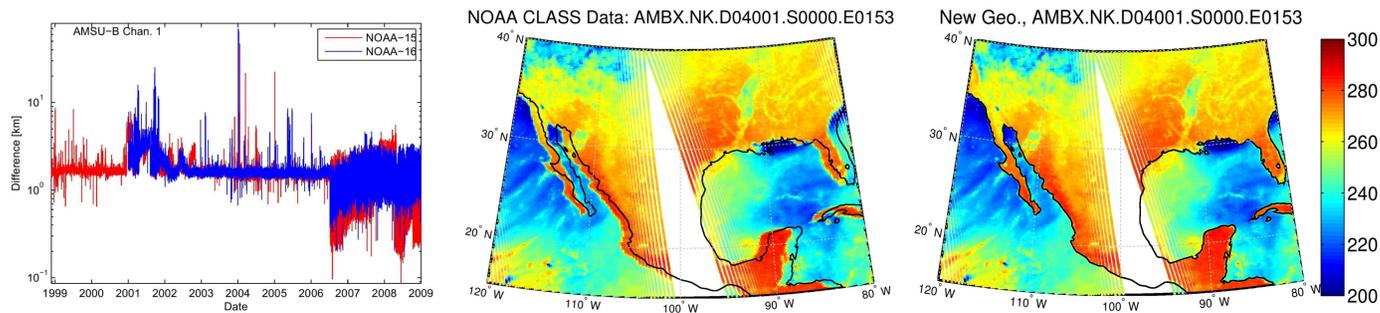


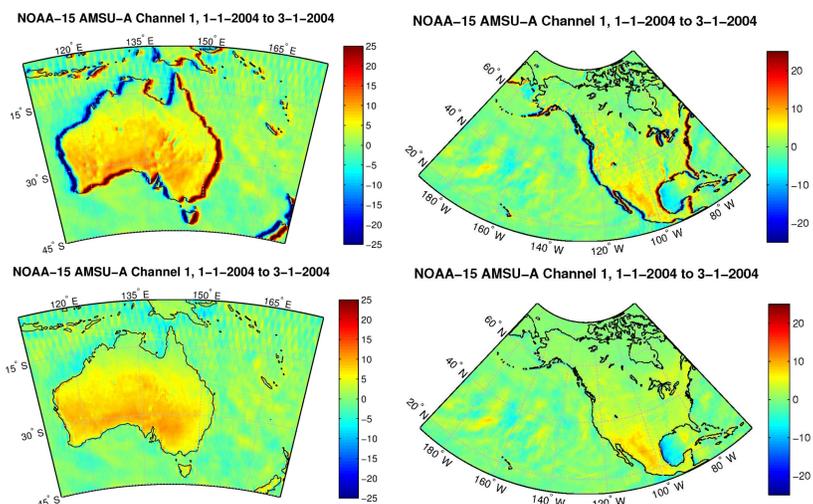
Abstract

In this study, we investigated and corrected different biases, including geolocation, scan asymmetry, and calibration errors, in AMSU-A, AMSU-B, and MHS observations in order to develop long-term climate data records. The geolocation errors were identified using the differences between the ascending and descending brightness temperatures. The results show that NOAA-15 AMSU-A2 sensor is mounted about half a pixel (1.2 degrees) negative along track. Other satellite-sensor pairs also show some geolocation errors. The scan asymmetry was calculated as the difference between the left and right sides of the scan averaged over tropical region. The results show a large scan asymmetry for NOAA-15 and NOAA-16 that drift in time and also a large asymmetry for MetOp-A.

NOAA Level 1b Geolocation Problems

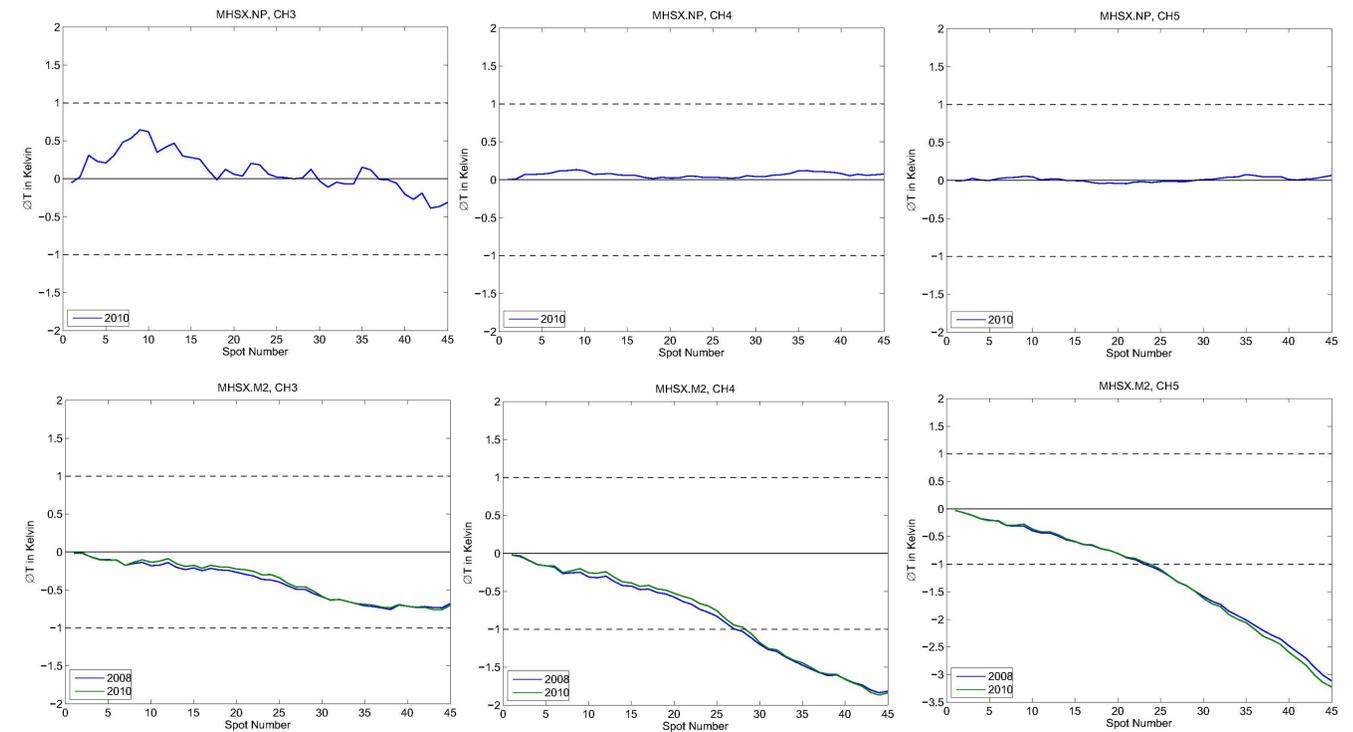


The left figure shows the difference between new geolocation data and level-1b geolocation. During 2001-2002 many scanlines are not geolocated but are filled with zero for both latitude and longitude. In the beginning of 2004 the software failed to calculate Greenwich hour angle and the longitude is about one degree wrong. The middle plot shows the level-1b geolocation for 01/01/2004 and the right figure shows the new geolocation data. It is obvious that the level-1b data are shifted from the coastlines.



Sample difference maps before and after corrections. The cold and warm edges along the coastlines show the geolocation error. Top: before correction, bottom: after correcting satellite attitude and sensor pointing errors.

Scan Asymmetry



Difference between the brightness temperatures from the left and right sides of the scans averaged over the tropical region known as scan asymmetry. Some satellites such as NOAA-15 show a drift in the scan asymmetry and some others show a large scan asymmetry since the launch time.

Summary

- A) NOAA AMSU/MHS geolocation is subject to inaccuracy that can be up to 70 km in some cases.
- B) The accuracy of geolocation is affected by both the sensor mounting error and satellite attitudes offset
- C) The quality of AMSU/MHS products is highly affected by the geolocation errors. The effect of any inaccuracy is especially important along the coastlines
- D) A new geolocation dataset was developed for AMSU-A, AMSU-B, and MHS.
- E) Other biases such as scan asymmetry in the satellite data need to be permanently monitored and corrected

References:

Moradi et al., 2013. Correcting Geolocation Errors for Microwave Instruments Aboard NOAA Satellites. IEEE Transactions on Geoscience and Remote Sensing, doi: 10.1109/TGRS.2012.2225840