SSM/I Level 1C V06A Release Notes

The V06A update to the SSM/I Level 1C applies to all six SSM/I instruments. Note that V05A was only produced for the SSM/I sensors on board DMSP F11, F13, F14 and F15 for the period from December 1997 forward. The V06 update includes data from DMSP F08 and F10, starting with F08 data in July of 1987, as well as F11, F13 and F14 data prior to December of 1997.

Key Changes from V05A:

- Cross-track bias corrections now account for sensor mount offset effects in roll and pitch directions as well as for scene-temperature dependent variations in the edge-of-scan falloff. This provides more consistent results across the scan independent of the scene.
- The resulting geolocation corrections are much more consistent across the scan.
- The geolocation corrections are now static, and don't change over time as was the case previously. Small time-dependent changes still exist, but the associated uncertainty in the Earth incidence angle (EIA) is less than 0.05 degrees. This corresponds to a maximum calibration error of ~0.1 K.
- Note that the advantages of improved EIA is only realized if subsequent retrieval algorithms use the EIA values provided for each pixel.

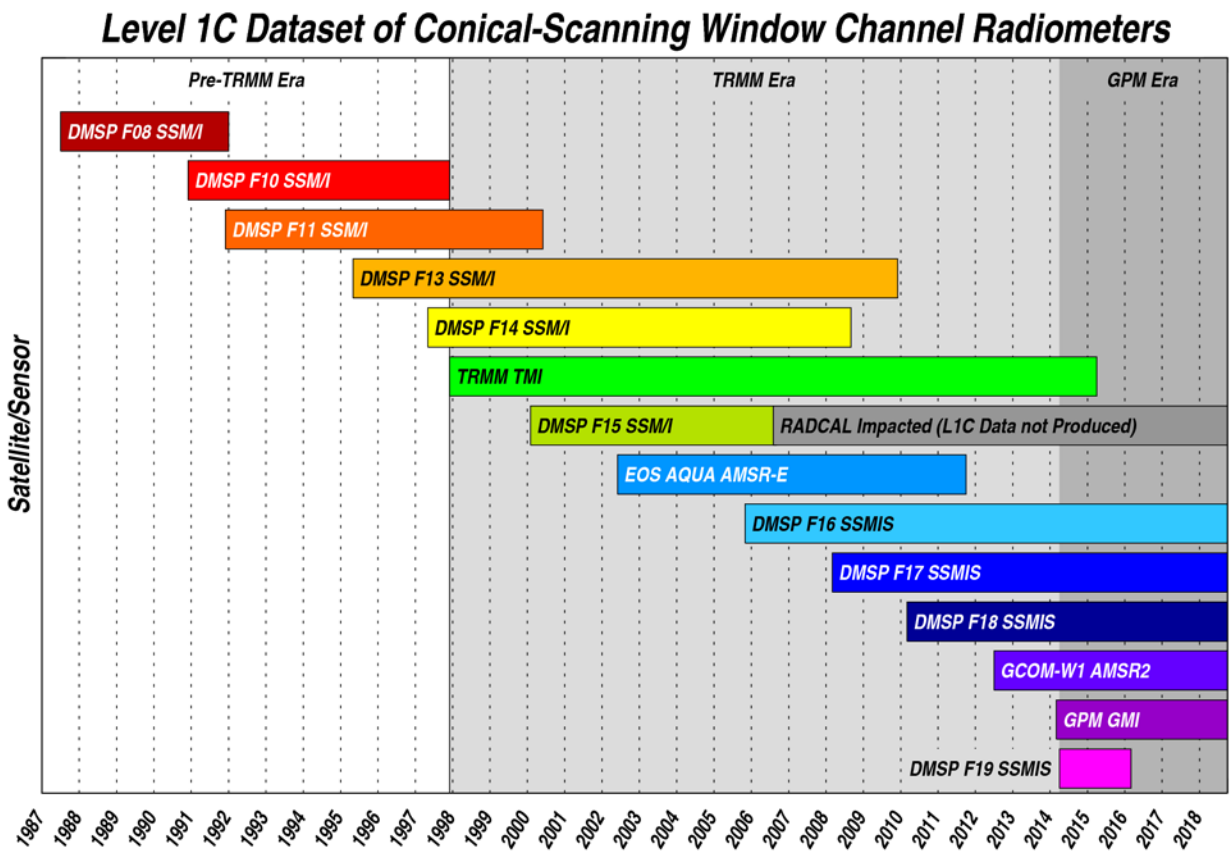
Specific improvements/updates implemented in V06A:

- Updated cross-track bias corrections. Roll and pitch offsets were derived based on associated slope and curvature over the center of the scan for observed minus simulated brightness temperatures as a function of scan position. Once accounted for, these impacts were removed and the residual falloff at the edge of scan was removed using both cold and warm scene estimates of the remaining cross-track bias. The result is very consistent observed minus simulated Tb across the scan regardless of scene temperature.
- Updates to sensor mount offset values. Estimates of roll and pitch offsets for each sensor were applied based on the cross-track bias analysis. A separate geolocation analysis was performed by comparing coastline shifts between ascending and descending scans to derive offsets in the yaw direction and ½ cone angle offsets. Unlike V05A, these offsets are fixed in time and used to compute updated pixel geolocation and view angle information. The updated geolocation results were checked for consistency across the scan and over time. Some small residual time-dependent errors remain, with maximum time-dependent impacts on EIA of ~0.1 degrees, which results in errors of less than 0.05 degrees.
- Updated intercalibration adjustments using GPM GMI V05A as the calibration reference. As done previously, the intercalibration correction is based on multiple independent estimates of calibration differences over both cold (i.e. ocean) and warm (i.e. vegetated land) scenes. While the results are mostly consistent between sensors, there are differences. Comparisons with Level 1C data from TRMM TMI were used to tie the calibration to GMI V05A. For the pre-TRMM satellites (i.e. F08 and F10), the results were

daisy-chained back in time used corresponding overlap years between the SSM/I instruments.

- Other corrections and quality control procedures remain unchanged from V05A, which used software and results developed for the original SSMI(S) Fundamental Climate Data Record.

More details on the V06A corrections and intercalibration adjustments along with details and references to the original V05A corrections are provided by Berg et al. (2018). With the extension of the SSM/I Level 1C data record back to F08 in July of 1987, intercalibrated Level 1C data is now available from a total of 14 conical-scanning window channel radiometers and extends over 31+ years.



The available Level 1C data record as of November 1, 2018. The V06A update for SSM/I includes the addition of SSM/I data for the pre-TRMM era (white background) and updates to the SSM/I data on board F11, F13, F14 and F15 during the TRMM era.

References:

Berg, W., R. Kroodsma, C. D. Kummerow, and D. S. McKague, 2018: Fundamental Climate Data Records of Microwave Brightness Temperatures, *Remote Sensing*, 10(8), 1306; https://doi.org/10.3390/rs10081306.