A Fundamental Climate Data Record of SSM/I, SSMIS and Future Microwave Imagers

Documentation/Discussion

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FCDR Documentation Goals

1) Preserve existing record of satellite/sensor characteristics, known issues, cal/val activities etc. (This is critical before information on early SSM/Is is lost!)
2) Provide sufficient documentation for transfer of FCDR processing to NCDC and for adapting processing code and techniques to future sensors (e.g. MIS).
3) Allow for future developments/improvements to FCDR processing through the use of well documented modular procedures.

FCDR Documentation Plan

1) Collect and digitize any available documentation on the sensor characteristics, dataset formats, cal/val activities, software etc. (Current plan is to create tar file which will be stored with data).
2) Develop code to go from base files to FCDR files as documentation of process (clean, modular, and well commented).
3) Fully document the QC, TA->TB, cross-track bias corrections, geolocation adjustments, intercalibration, etc. along with how all of the coefficients used in the processing code were derived (in PDF form kept with processing code).

SSM/I Documentation

Dataset documentation and Calibration/Validation:

- DMSP SSM/I Calibration/Validation (Naval Research Laboratory, 1989)
- DMSP Processing Guide (Author/publisher unknown, 1992)
- SSM/I Data Requirements Document (Hughes, 1991)
- SSM/I User's Interpretation Guide (Raytheon, 2000)
- SSM/I TDR Dataset Guide (Author/publisher unknow, 1997)
- SPP SSM/I TDR File Documentation (Johnase?, 2004)
- SSMI Processing guide (Raytheon, 1998)
- Intersensor calibration of DMSP SSM/I's: F8 to F-14, 1987-1997 (Colton and Poe, 1999)

RSS reports/tech memos:

- Users manual: SSMI Antenna Temperature Tapes (Wentz, 1988)
- SSMI Antenna Temperature Tapes: revision 1 (Wentz, 1991)
- SSMI Antenna Temperature Tapes: revision 2 (Wentz, 1993)
- Final report: Production of SSMI data sets (Wentz, 1992)
- Deriving Earth Science Products from SSMI (Wentz, 1995)
- SSM/I TDR Dataset Guide (Hilburn, 2009)

Other:

- CLASS SSMI Processing Change in 1997 (Semunegus, 2006)
- CSU/CIRA SSMI Rescue (Forsythe, 2006)
- Proceedings of the Shared Processing Network DMSP SSMI Algorithm Symposium (1993)

Software:

- ssmitdrlatlon.c
- ssmitdrta.c
- ssmitdrtb.f

SSMIS Documentation

Dataset documentation and Calibration/Validation:

- Tracking the Tempests: the creation of the SSMIS (Fote, 1999)
- Algorithm and Data User Manual (ADUM) for the SSMIS (Northrup Gruman, 2002)
- Ground Processing Software Changes from Rev3a to Rev8c (Unknown)
- SSMIS Ground Processing Software Rev6 Release notes (George Vana – Northrup Gruman, 2005)
- Interface Design Document for the SSMIS Ground Processing Software (Northrup Gruman, 2005)
- DMSP SSMIS F16 Calibration/Validation Final Report (SSMIS Cal/Val Team, 2005)
- A Preprocessor for SSMIS Radiances, Technical Description (Bell, 2006)
- A Preprocessor for SSMIS Radiances, Scientific Description (Bell, 2006)
- NOAA/STAR SSMIS TDR Calibration and Validation User Manual (NOAA/NESDIS, 2007)

Software:

- SSMIS pre-processor
- ssmis_edr2tdf.c
- ssmis_sdr2tdf.c

Discussion

Discussion Topics:

1. Are there other instrument issues that need to be examined?
2. Are the approaches planned for the SDS project technically sound?
3. Can consensus approaches be established for related calibration and bias correction issues?
4. Are there others that we need to engage in this process?

Specific Issues:

1. Content/Format of Base and FCDR files
2. Quality control procedures
3. Intercalibration techniques/approach
4. Documentation plan
5. SSMIS sounder channels

Proposed FCDR Specification

Dimensions:
nscan_lores
nscan_hires
pixel_lores
pixel_hires

MetaData:
Filename:
Satellite:
Sensor:
Granule (i.e. orbit) number
Table of quality flag codes
Date Created
Start Date/Time
End Date/Time
Missing Data Value
Software processing version
Contact Info

int*2	Time[nscan_lores][7]	Year, Month, Day, Hour, Min, Sec, Msec
float	FracOrbit[nscan]	Fractional orbit number
float	SCLat[nscan_lores]	Spacecraft Latitude
float	SCLon[nscan_lores]	Spacecraft Longitude
float	SCAlt[nscan_lores]	Spacecraft Altitude
int*1	QualityFlag_lores[nscan_lores][pixel_lores]	Pixel quality flag lores
Int*1	QualityFlag_hires[nscan_hires][pixel_hires]	Pixel quality flag hires
float	EIA_lores[nscan_lores][pixel_lores]	Earth incidence angle (degrees) lores
float	EIA_hires[nscan_hires][pixel_hires]	Earth incidence angle (degrees) hires
float	Lat_lores[nscan_lores][pixel_lores]	Pixel Latitude_lores
float	Lon_lores[nscan_lores][pixel_lores]	Pixel Longitude_lores
float	Lat_hires[nscan_hires][pixel_hires]	Pixel Latitude_hires
float	Lon_hires[nscan_hires][pixel_hires]	Pixel Longitude_hires
float	TB_lores[nscan_lores][pixel_lores]	Low frequency channel TBs structure
float	TB_hires[nscan_hires][pixel_hires]	High frequency channel TBs structure

Global Attributes:

QualityFlag_Comments: 0=Good Data, 1-99=minor issues, 100-255=major issues
QualityFlag_lores=0, Good data
QualityFlag_lores=1, Sun_Glint
QualityFlag_hires=100, 85V Nonphysical Values,