

SSM/I FCDR File

File Format Specification

Release V1

June 19, 2013

1 Introduction

SSM/I FCDR files are in netCDF version 4.0 format. The filename has the form:

CSU_SSMI_FCDR_VVRRR_FNN_DYYYYMMDD_SHHMM_EHHMM_RGGGGG.nc

where:

| | | |
|-----------|---|----------------------------------|
| VVV | - | Algorithm version (e.g. V01) |
| RRR | - | Revision (e.g. R01) |
| FNN | - | Satellite Designation (e.g. F15) |
| DYYYYMMDD | - | Date as year month day |
| SHHMM | - | Start time as hour minute |
| EHHMM | - | End time as hour minute |
| RGGGGG | - | Granule number |

An example filename is:

CSU_SSMI_FCDR_V01R00j_F15_D20060701_S0122_E0303_R33847.nc

2 Summary of Data Fields

Dimension definitions:

| Name | Size | Description |
|--------------|------|-------------------------------------|
| npixel_lores | 64 | Number of low res pixels in a scan |
| npixel_hires | 128 | Number of high res pixels in a scan |
| nscan_lores | 1607 | Number of low res scans |
| nscan_hires | 3214 | Number of high res scans |
| ntest | 9 | Number of quality control tests |
| numchar | 23 | Length of formatted datetime string |

Variable definitions:

| Name | Type | Dimensions |
|----------------------|--------|-----------------------------|
| orbit_lores | double | nscan_lores |
| scan_time_lores | double | nscan_lores |
| scan_datetime_lores | char | (nscan_lores, numchar) |
| spacecraft_lat_lores | float | nscan_lores |
| spacecraft_lon_lores | float | nscan_lores |
| spacecraft_alt_lores | float | nscan_lores |
| lat_lores | float | (nscan_lores, npixel_lores) |
| lon_lores | float | (nscan_lores, npixel_lores) |
| fcd_r_tb19v | float | (nscan_lores, npixel_lores) |
| fcd_r_tb19h | float | (nscan_lores, npixel_lores) |
| fcd_r_tb22v | float | (nscan_lores, npixel_lores) |
| fcd_r_tb37v | float | (nscan_lores, npixel_lores) |
| fcd_r_tb37h | float | (nscan_lores, npixel_lores) |

| | | |
|-------------------------|--------|-----------------------------|
| eia_lores | float | (nscan_lores, npixel_lores) |
| sun_glint_lores | byte | (nscan_lores, npixel_lores) |
| quality_lores | byte | (nscan_lores, npixel_lores) |
| orbit_hires | double | nscan_hires |
| scan_time_hires | double | nscan_hires |
| scan_datetime_hires | | (nscan_hires, numchar) |
| spacecraft_lat_hires | float | nscan_hires |
| spacecraft_lon_hires | float | nscan_hires |
| spacecraft_alt_hires | float | nscan_hires |
| lat_hires | float | (nscan_hires, npixel_hires) |
| lon_hires | float | (nscan_hires, npixel_hires) |
| fcd_r_tb85v | float | (nscan_hires, npixel_hires) |
| fcd_r_tb85h | float | (nscan_hires, npixel_hires) |
| eia_hires | float | (nscan_hires, npixel_hires) |
| sun_glint_hires | byte | (nscan_hires, npixel_hires) |
| quality_hires | byte | (nscan_hires, npixel_hires) |
| quality_tests | int | nscan_hires |
| nominal_elevation_angle | float | 1 |
| delta_elevation_angle | float | 1 |
| spacecraft_roll | float | 1 |
| spacecraft_pitch | float | 1 |
| spacecraft_yaw | float | 1 |

3 Description of Data Fields

- orbit_lores** : Fractional orbit number (low res).
Missing data value is: -9999.9
- scan_time_lores** : Scan start time (UTC) for low res scans.
Missing data value is: -9999.9
- scan_datetime_lores** : Date/time at start of scan (low res) in format YYYY-MM-DDTHH-MM-SS.SSZ.
Missing data value is: 0
- spacecraft_lat_lores** : Spacecraft latitude at scan_time_lores, in degrees.
Missing data value is: -9999.9f
- spacecraft_lon_lores** : Spacecraft longitude at scan_time_lores, in degrees.
Missing data value is: -9999.9f
- spacecraft_alt_lores** : Spacecraft altitude at scan_time_lores, in km.
Missing data value is: -9999.9f
- lat_lores** : Latitude (low res) in degrees.
Missing data value is: -9999.9f

lon_lores : Longitude (low res) in degrees.
Missing data value is: -9999.9f

fcd_r_tb19v : NOAA FCDR 19.35 GHz V-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f

fcd_r_tb19h : NOAA FCDR 19.35 GHz H-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f

fcd_r_tb22v : NOAA FCDR 22.235 GHz V-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f

fcd_r_tb37v : NOAA FCDR 37.0 GHz V-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f

fcd_r_tb37h : NOAA FCDR 37.0 GHz H-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f

eia_lores : Earth Incidence Angle (low res) in degrees.
Missing data value is: -9999.9f

sun_glint_lores : Sun Glint Angle (low res) in degrees.
Missing data value is: -99b

quality_lores : Quality Flag (low res): 0=Good data, 1-99=Minor issues, 100-255: Major issues. All quality flag values are listed in the Appendix.

orbit_hires : Fractional orbit number (high res).
Missing data value is: -9999.9

scan_time_hires : Scan start time (UTC) for high res scans.
Missing data value is: -9999.9

scan_datetime_hires : Date/time at start of scan (high res) in format YYYY-MM-DDTHH-MM-SS.SSZ.
Missing data value is: 0

spacecraft_lat_hires : Spacecraft latitude at scan_time_hires, in degrees.
Missing data value is: -9999.9f

spacecraft_lon_hires : Spacecraft longitude at scan_time_hires, in degrees.
Missing data value is: -9999.9f

spacecraft_alt_hires : Spacecraft altitude at scan_time_hires, in km.
Missing data value is: -9999.9f

lat_hires : Latitude (high res) in degrees.
Missing data value is: -9999.9f

- lon_hires** : Longitude (high res) in degrees.
Missing data value is: -9999.9f
- fcd_r_tb85v** : NOAA FCDR 85.5 GHz V-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f
- fcd_r_tb85h** : NOAA FCDR 85.5 GHz H-Pol brightness temperature in kelvin.
Missing data value is: -9999.9f
- eia_hires** : Earth Incidence Angle (high res) in degrees.
Missing data value is: -9999.9f
- sun_glint_hires** : Sun Glint Angle (high res) in degrees.
Missing data value is: -99b
- quality_hires** : Quality Flag (high res): 0=Good data, 1-99=Minor issues, 100-255: Major issues. All quality flag values are listed in the Appendix.
- quality_tests** : Results from quality control tests.
Descriptions of each of the 9 tests are listed in the Appendix.
- nominal_elevation_angle** : Nominal sensor elevation angle in degrees.
- delta_elevation_angle** : Offset in the sensor elevation angle from nominal, in degrees.
- spacecraft_roll** : Spacecraft roll angle offset from nominal, in degrees.
- spacecraft_pitch** : Spacecraft pitch angle offset from nominal, in degrees.
- spacecraft_yaw** : Spacecraft yaw angle offset from nominal, in degrees.

4 Appendix

Definition of Quality Flag Values for SSM/I FCDR Data

| Category | Value | Description |
|--|-------|---|
| Good Data | 0 | |
| Warning Flags (use data with caution) | 1 | Possible sun glint |
| | 2 | Climatology check warning (19V Channel) |
| | 3 | Climatology check warning (19H Channel) |
| | 4 | Climatology check warning (22V Channel) |
| | 5 | Climatology check warning (37V Channel) |
| | 6 | Climatology check warning (37H Channel) |
| | 7 | Climatology check warning (85V Channel) |

| | | |
|---|-----|---|
| | 8 | Climatology check warning (85H Channel) |
| | 9 | Climatology check warning (Multiple low-res channels) |
| | 10 | Climatology check warning (Multiple high-res channels) |
| | 11 | Warning adjacent/cross-pol pixel flagged as bad |
| | 12 | Warning of increased noise in 85V channel on DMSP F08 |
| | 13 | RADCAL correction applied to TB22V (do not use for climate) |
| | 14 | TA correction for spikes in warm/cold loads |
| Catastrophic Errors (data is set to missing) | 100 | Data is missing from file or unreadable |
| | 101 | Geolocation check flagged scan as bad in input BASE file |
| | 102 | Climatology check flagged scan as bad in input BASE file |
| | 103 | Climatology check failed (19V Channel) |
| | 104 | Climatology check failed (19H Channel) |
| | 105 | Climatology check failed (22V Channel) |
| | 106 | Climatology check failed (37V Channel) |
| | 107 | Climatology check failed (37H Channel) |
| | 108 | Climatology check failed (85V Channel) |
| | 109 | Climatology check failed (85H Channel) |
| | 110 | Climatology check failed (Multiple low-res channels) |
| | 111 | Climatology check failed (Multiple high-res channels) |
| | 112 | Distance between pixels is nonphysical |
| | 113 | Antenna temperatures are < 50 or > 350 |
| | 114 | Lat/Lon values are out of range |
| | 115 | Failure of 85V channel on DMSP F08 |
| | 116 | Failure of 85V and increased noise in 85H on DMSP F08 |
| | 117 | Failure of both 85V and 85H channels on DMSP F08 |
| | 118 | Invalid scan time |
| | 119 | TA set to missing due to bad calibration data |
| | 120 | All data set to missing |

Descriptions of the quality control tests whose results are reported in quality_tests

| Test | Description |
|--------|---|
| Test 1 | Number of nonphysical or bad pixel values |
| Test 2 | Number of pixels with bad geolocation |
| Test 3 | Number of scans with geolocation error in input BASE file |
| Test 4 | Number of scans with climatology error in input BASE file |
| Test 5 | Number of scans corrected for calibration/temperature spike |
| Test 6 | Number of scans flagged missing due to calibration/temperature spike |
| Test 7 | Number of scans with errors in geolocation |
| Test 8 | Number of scans with sensor errors |
| Test 9 | Number of scans exceeding specified variance from climatological values |