Description of TCSP HAMSR 2-km HDF data files

Filename: 'tcsp_hamsr_yyyymmdd __nnnn.hdf'
'yyyymmdd': date of beginning of data set
'nnnn': number of data records (see 'dim3' below)

Format
Standard HDF

Content

Header (single record)

1. Year }
2. Day of year }
3. Hour } Time of first data record
4. Minute }
5. Second }
6. No. of items per record (nominally 390)
7. Record length in bytes (nominally 780)
8. dim1: first dimension - no. of channels (nominally 25)
9. dim2: second dimension - no. of cross-track samples (nominally 15)
10. dim3: third dimension - no. of along-track records (varies)

Time+Nav (repeats until EOF, for a total of 'dim3' records)

1. Record no. (starting at 1)
2. Year
3. Day of year
4. Hour
5. Minute
6. Second
7. Nav-time – HAMSR-time in seconds
8. Latitude (deg*100)
9. Longitude (deg*100)
10. Altitude (m)
11. Heading (deg*100)
12. Pitch (deg*100)
13. Roll (deg*100)
14. Ground speed (m/s*100)
15. Air temperature (°C*100)

Tb (repeats until EOF, for a total of 'dim3' records)
dim1*dim2 array (K*10)
Note: A value of 0 indicates invalid data

Instrument characteristics

Channels

1. 50.3 GHz (BW = 0.340 GHz)
2. 51.76 GHz (BW = 0.400 GHz)
3. 52.8 GHz (BW = 0.400 GHz)
4. 53.481 & 53.711 GHz (BW = 2x0.170 GHz)
5. 54.4 GHz (BW = 0.400 GHz)
6. 54.94 GHz (BW = 0.400 GHz)

7. 55.5 GHz (BW = 0.330 GHz)
8. 56.02 & 56.67 GHz (BW = 0.270 & 0.330 GHz)
9. 113.25 GHz (BW = 1.0 GHz)
10. 115.25 GHz (BW = 1.0 GHz)
11. 116.20 GHz (BW = 0.500 GHz)
12. 116.70 GHz (BW = 0.500 GHz)
13. 117.15 GHz (BW = 0.400 GHz)
14. 117.55 GHz (BW = 0.400 GHz)
15. 118.75 ± 0.800 GHz (BW = 2x0.400 GHz)
16. 118.75 ± 0.450 GHz (BW = 2x0.300 GHz)
17. 118.75 ± 0.235 GHz (BW = 2x0.130 GHz)
18. 118.75 ± 0.120 GHz (BW = 2x0.100 GHz)
19. 166.0 GHz (2x2.0 GHz)
20. 183.31 ± 10 GHz (2x3.0 GHz)
21. 183.31 ± 7.0 GHz (2x2.0 GHz)
22. 183.31 ± 4.5 GHz (2x2.0 GHz)
23. 183.31 ± 3.0 GHz (2x1.0 GHz)
24. 183.31 ± 1.8 GHz (2x1.0 GHz)
25. 183.31 ± 1.0 GHz (2x0.5 GHz)

Scanning

Scan plane: perpendicular to flight direction
Scan direction: right to left, through nadir (i.e. scan axis points in the flight direction)
Swath is approximately symmetric around nadir

Sampling

Beam width: approximately 6° (FWHM) – corresponds to 2 km at nadir (from 20 km)
Raw sampling:
Cross-track: approximately every 3° - corresponds to 1 km at nadir
Along-track: approximately every 1.3 sec – corresponds to .27 km (at .21 km/sec)
Integration time: 11 ms

Polarization

All channels detect a single linear polarization. At nadir, the polarization direction corresponds to V polarization (i.e. the polarization vector lies in the plane of incidence). As the beam scans away from nadir, the polarization vector rotates out of the plane of incidence. This results in a mix of V and H polarizations. With V corresponding to a polarization angle of 90° and H to 0°, the polarization angle for a scan angle φ is 90° - φ.

2-km data characteristics

Channels: Full set of 25
Swath: 15 cross-track samples - subset of raw data
Approximately centered around nadir (nadir ≈ center sample, no. 8 of 15)
Approximate swath width: ± 42° between sample centers; ±46° between 3-dB edges
Sampling: Each sample is average of 2 cross-track x 8 along-track raw samples, except for the swath-edge samples #1 and #15 – which consist of 1x8 averages to minimize edge effects
Cross-track increment: approximately 6° - 2 km on the ground at nadir (3° and 1 km, respectively, for samples 1 and 15)
Along-track increment: 10.4 sec – corresponds to 2.2 km (at .21 km/sec)

Corresponding equivalent integration time: 178 ms
In the 183-GHz band the 166-GHz channel and the rest of the channels, respectively, are sampled during alternate scans, and averaging corresponds to 2 cross-track x 4 along-track raw samples. Effective integration time is 89 ms.

Navigation: Subset of raw nav data
5^{th} of every 8 samples
Corresponds to near-center of averaged sample cell
Header data copied from first nav data record

Contact information

Bjorn Lambrigtsen; lambrigtsen@jpl.nasa.gov; (818)354-8932