Description of CAMEX-4 HAMSR 2-km HDF data files

Filename: ‘HAMSR_2km_yymmdd_m_nnnn.hdf’
‘yymmdd’: date of beginning of data set
‘m’: data set number (starting with 1)
‘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 240)
7. Record length in bytes (nominally 480)
8. dim1: first dimension - no. of channels (nominally 15)
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. 166.0 GHz (2x2.0 GHz)
10. 183.31 ± 10 GHz (2x3.0 GHz)
11. 183.31 ± 7.0 GHz (2x2.0 GHz)
12. 183.31 ± 4.5 GHz (2x2.0 GHz)
13. 183.31 ± 3.0 GHz (2x1.0 GHz)
14. 183.31 ± 1.8 GHz (2x1.0 GHz)
15. 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 15
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
  Cross-track increment: approximately 6° - 2 km at nadir
  Along-track increment: 10.4 sec – corresponds to 2.2 km (at .21 km/sec)
  Corresponding equivalent integration time: 178 ms
Navigation: Subset of raw nav data
  5th of every 8 samples
  Corresponds to near-center of averaged sample cell
  Header data copied from first nav data record

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