

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

Filename: 'HAMSR_2km_yymmdd_m_nnnn.bin'

'yyymmdd': date of beginning of data set

'm': data set number (starting with 1)

'nnnn': number of data records (see 'dim3' below)

Format

All data items (listed below) are stored as 'big-endian' 2-byte integers. To read them on Intel-based machines, the byte order must be reversed.

Content

Header

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)

Data record (repeats until EOF, for a total of 'dim3' records)

- 1) Record no. (starting at 1)
- 2) Navigation
 1. Year
 2. Day of year
 3. Hour
 4. Minute
 5. Second
 6. Nav-time – HAMSR-time in seconds
 7. Latitude (deg*100)
 8. Longitude (deg*100)
 9. Altitude (m)
 10. Heading (deg*100)
 11. Pitch (deg*100)
 12. Roll (deg*100)
 13. Ground speed (m/s*100)
 14. Air temperature (°C*100)
- 3) Brightness temperature array: dim1 (channels) x dim2 (scan positions)
 1. Scan pos. 1 ('dim1' Tb*10)
 2. Scan pos. 2 ('dim1' Tb*10)
 3.

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 $90^\circ - \phi$.

2-km data characteristics

Channels: Full set of 15

Swath: 15 cross-track samples - subset of raw data

Approximately centered around nadir (nadir \approx center sample, no. 8 of 15)

Approximate swath width: $\pm 42^\circ$ between sample centers; $\pm 46^\circ$ 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

Contact information

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