

3.58 Temperature Data Record File (TDR)

Created By : SDRP

Used By : User

Format : Binary, direct access

Description : This file contains earth-located sets of antenna temperatures that have been surface tagged, calibrated, and averaged. Calibration means that the counts have been converted to temperatures using asymmetric flight software averaged cold and warm calibration counts. The calibration counts are an average of four measurements per scan and eight scans for a total of 32 measurements. A given scan therefore receives values averaged for the current and previous seven scans—thus asymmetric. There are no further adjustments to the antenna temperatures. The averaging that has been done to the antenna temperatures has been done in the flight software along scan and not in the direction of the ground track. Thus, there are antenna temperatures for every channel for every good scan.

3.58.1 Data Elements

3.58.1.1 Revolution Header

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
File Info Word	File information for internal use [First 2 Bytes contain Software Rev #: 42 for Rev 4B (for example) 3 rd Byte contains Endian type— 1=Big/0=Little 4 th Byte contains File ID of 2—for TDR]	N/A	None	1	0 to 2147483647	N/A	Integer
Revolution number	Revolution number (full)	N/A	None	1	0 to 2147483647	1 orbit	Integer
Year	Starting Year	N/A	Year	1	0 to 9999	1 year	Integer
Julian Day	Starting Julian day	N/A	Days	1	1 to 366	1 day	Integer
Hour	Starting hour	N/A	Hours	1	0 to 23	1 hour	Integer
Minute	Starting minute	N/A	Minutes	1	0 to 59	1 minute	Integer
Satellite ID	Satellite ID 1=1st Sensor =S/N#2 2=unassigned 3=unassigned	N/A	None	1	1 to 3	N/A	Integer
Number of scans	Number of scan headers in file	N/A	N/A	1	0 to 32767	N/A	Integer
Constants File ID	3 Characters to identify the constants file used in processing	N/A	N/A	N/A	0-255	N/A	Integer (ASCII Code)
Constants File Checksum	Code unique to the contents of the constants file-any file changes whatsoever will modify the value	N/A	N/A	1	65535	N/A	Integer
Processing Status Flags	0 or 1 indicator for various processing options	N/A	N/A	N/A	0 to 1	N/A	bit

	bit 0::warm load bias bit 1::residual Doppler bit 2::scan non-uniform bit 3::cross pol / APC bit 4::resampling bit 5::cal re-averaging bit 6::Moon intrusion bit 7::spike removal						
Processing Status Flags 2	indicator for various processing options bits0-2::Sun intrusion bits3-15::spare	N/A	N/A	N/A	0 to 5 [6] for sun intrusion	N/A	Bit(s)
Spare	Spare fields for future growth	N/A	N/A	N/A	N/A	N/A	Integer

3.58.1.2 Scan Header

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Year	Scan Year	N/A	Year	1	0 to 9999	1 year	Integer
Julian Day	Scan Julian day	N/A	Days	1	1 to 366	1 day	Integer
Hour	Scan hour	N/A	Hours	1	0 to 23	1 hour	Integer
Minute	Scan minute	N/A	Minutes	1	0 to 59	1 minute	Integer
Scan number	Scan number of first scan in 24 scan buffer	N/A	None	1	0 to 2147483647	N/A	Integer
Scan times	Milliseconds since midnight for 0..28 scans	N/A	msec	1	0 to 86400000	1 msec	Integer
Spare	Spare fields for future growth	N/A	N/A	N/A	N/A	N/A	Integer

3.58.1.3 Ephemeris Record

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Latitude	Scene latitude (+ north)	N/A	degrees *10000	1	-900000 to 900000	10000th deg	Integer
Longitude	Scene longitude (+ east)	N/A	degrees *10000	1	-1800000 to 1800000	10000th deg	Integer
Altitude	Altitude	N/A	Kilometers *10000	1	8000000 to 9000000	10th meter	Integer
Julian Day	Scan Julian Day	N/A	Days	1	1 to 366	1 day	Integer
Time	Time	N/A	Msecs	1	1 to 86400000	1 msec	Integer

3.58.1.4 Imager Scene Data

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Ch 8-11 Latitude	Scene latitude (+ north)	N/A	degrees *100	1	-9000 to 9000	100th deg	Integer
Ch 8-11 Longitude	Scene longitude (+ east)	N/A	degrees *100	1	-18000 to 18000	100th deg	Integer
Ch 17 & 18 Latitude	Scene latitude (+ north)	N/A	degrees *100	1	-9000 to 9000	100th deg	Integer
Ch 17 & 18 Longitude	Scene longitude (+ east)	N/A	degrees *100	1	-18000 to 18000	100th deg	Integer

Scene count	Imager scene #	N/A	None	1	1 to 180	N/A	Integer
Surface tag	Static surface tag -1 = Unknown 0 = Land 1 = Spare 2 = Near coast 3 = Ice 4 = Possible ice 5 = Ocean 6 = Coast 7 = Spare	N/A	None	1	-1 to 7	N/A	Integer
Rain flag	Rain flag 1 -1 = indeterminate 0 = no rain 1 = rain	N/A	None	1	-1 to 1	N/A	Integer
Channel antenna temperatures	Channel 8-11, 17,18 (1x1) antenna temperatures	N/A	Celsius *100	1	-19500 to 6000	100th deg	Integer

3.58.1.5 Environmental Scene Data

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Latitude	Ch 12-14 Scene latitude (+ north)	N/A	degrees*100	1	-9000 to 9000	100th deg	Integer
Longitude	Ch 12-14 Scene longitude (+ east)	N/A	degrees*100	1	-18000 to 18000	100th deg	Integer
Scene count	Environmental scene #	N/A	None	1	1 to 90	N/A	Integer
Surface tag	Static surface tag -1 = Unknown 0 = Land 1 = Spare 2 = Near coast 3 = Ice 4 = Possible ice 5 = Ocean 6 = Coast 7 = Spare	N/A	None	1	-1 to 7	N/A	Integer
Latitude	Ch 15-16 Scene latitude (+ north)	N/A	degrees*100	1	-9000 to 9000	100th deg	Integer
Longitude	Ch 15-16 Scene longitude (+ east)	N/A	degrees*100	1	-18000 to 18000	100th deg	Integer
Channel antenna temperatures	Channel 12-16 (1x2) antenna temperatures	N/A	Celsius *100	1	-19500 to 6000	100th deg	Integer

3.58.1.6 Lower Air Sounding Scene Data

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Latitude	Scene latitude @ 11km (+ north)	N/A	degs *100	1	-9000 to 9000	100th deg	Integer
Longitude	Scene longitude @ 11 km (+ east)	N/A	degs *100	1	-18000 to 18000	100th deg	Integer
Scene count	LAS scene #	N/A	None	1	1 to 60	N/A	Integer
Surface tag	Static surface tag -1 = Unknown	N/A	None	1	-1 to 7	N/A	Integer

	0 = Land 1 = Spare 2 = Near coast 3 = Ice 4 = Possible ice 5 = Ocean 6 = Coast 7 = Spare						
Channel antenna temperatures	Channel 1-7 (3x3), 24 (3x3) antenna temperatures	N/A	Celsius *100	1	-19500 to 6000	100th deg	Integer

3.58.1.7 Upper Air Sounding Scene Data

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
Latitude	Scene latitude @ 60Km (+ north)	N/A	degrees *100	1	-9000 to 9000	100th deg	Integer
Longitude	Scene longitude @ 60Km (+ east)	N/A	degrees *100	1	-18000 to 18000	100th deg	Integer
Scene number	UAS Scene #	N/A	None	1	1 to 30	N/A	Integer
Channel antenna temperatures	Channel 19-23 (6X6) antenna temperatures	N/A	Celsius *100	1	-19500 to 6000	100th deg	Integer

3.58.1.8 Auxiliary data

Data Element	Description	Validity Check	Unit of Measure	Precision	Limit/Range	Accuracy	Data Type
WL Cal	Warm Load Calibration by channel 1-24	N/A	Counts	1	0 to 65535	N/A	Integer
Cold Cal	Cold Calibration by channel 1-24	N/A	Counts	1	0 to 65535	N/A	Integer
WLT	Warm load temperatures 1-3	N/A	Celsius*100	1	-9000 to 10000	100 th deg	Integer
Subframe ID	Subframe ID number	N/A	None	1	0 to 7	N/A	Integer
MUX Housekeeping	MUX housekeeping values 1-4	N/A	Celsius*100	1	-19500 to 6000	N/A	Integer
Base PT Latitude	K-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	K-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	K-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Azimuth	K-band Base Point Azimuth # 1-28	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT Latitude	UV-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	UV-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	UV-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT	UV-band Base Point	N/A	Degrees*100	1	-18000 to	100 th deg	Integer

Azimuth	Azimuth # 1-28				18000		
Base PT Latitude	W-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	W-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	W-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Azimuth	W-band Base Point Azimuth # 1-28	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT Latitude	G-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	G-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	G-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Azimuth	G-band Base Point Azimuth # 1-28	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT Latitude	LV-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	LV-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	LV-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Azimuth	LV-band Base Point Azimuth # 1-28	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT Latitude	KA-band Base Point latitude # 1-28 (+ north)	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Longitude	KA-band Base Point longitude # 1-28 (+ east)	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer
Base PT EIA	KA-band Base Point EIA # 1-28	N/A	Degrees*100	1	-9000 to 9000	100 th deg	Integer
Base PT Azimuth	KA-band Base Point Azimuth # 1-28	N/A	Degrees*100	1	-18000 to 18000	100 th deg	Integer

3.58.2 File Format

This file contains 8 distinct types of records: 1) Revolution Header, 2) Scan Header, 3) Ephemeris Data, 4) Imager Scene, 5) Environmental Scene 6) Lower Air Sounding Scene, 7) Upper Air Sounding Scene, and 8) Auxiliary Data. The records are physically structured in the file in the following manner:

Revolution Header Record
Scan Header 1
Ephemeris Data (3 records)
Imager scene 1
Imager scene 2
Imager scene 3
:
:
Imager scene 180 (imager scan 1)

Environmental scene record 1
Environmental scene record 2
Environmental scene record 3
⋮
Environmental scene record 90
LAS scene 1
LAS scene 2
⋮
LAS scene 60
UAS scene 1
UAS scene 2
UAS scene 3
⋮
UAS scene 30
Auxiliary Data
Scan Header 2
Ephemeris Data (3 records)
Imager scene 1
Imager scene 2
Imager scene 3
⋮
Imager scene 180
Environmental scene record 1
⋮

The Revolution Header specifies the number of Scan Headers in the file. Each Scan Header is followed by ephemeris data, imager data, environmental data, lower sounding data, upper sounding data, and auxiliary data.

3.58.2.1 Revolution Header

	1	32-bits		
Byte#	-----			
1-4	File Info Word			
	Software Rev #	Endian Status	File ID (=2)	

5-8	Revolution number			

9-12	Year			

13-16	Julian day	Hour	Minute	

17-20	Satellite id	Number of scans		

21-24	ASCII Constants File Identifier		Proc.stat.flags★	

25-28	Constants File Checksum	Processing Status Flags 2★★		

29-40	Spare (3)			

★ Processing Status Flags, also described as the processing option flags) describe the processing state for key algorithms used to generate the SDRs. On the SUN machine those options are ordered as follows: The first bit represents warm load bias processing status (0=off/1=on). The second bit represents the residual Doppler processing status (0=off/1=on). The third bit represents the scan non-uniformity processing status (0=off/1=on). The fourth bit represents the cross polarization & spillover correction if the value is (0), but if the value is (1) it represents the antenna pattern correction (1). The fifth bit represents the Backus-Gilbert re-sampling of channels 12-14 to the channel 15-16 grid (0=off/1=on). The sixth bit represents the calibration data averaging [re-averaging if one considers the initial averaging done by the flight software aboard the sensor] (0=off/1=on). The seventh bit represents the Moon Intrusion repair (0=off/1=on). The eighth bit represents the calibration data spike repair (0=off/1=on).

★★ Processing Status Flags 2 is a continuation of the above processing status flags. The Sun Intrusion is processing status is defined in the first through third bits. The combination of the three bits is used to define the processing option which may be 0 through 5. The remaining 13 bits are spares.

3.58.2.2 Scan Header

Byte#	1	32-bits
1-4	Year	
5-8	Julian day	Hour Minute
9-12	Spare	Scan number
13-16	Scan Time	
17-36	Spare (5)	

3.58.2.3 Ephemeris Data

Byte#	1	32-bits
1-4	Latitude	
5-8	Longitude	
9-12	Altitude	
13-16	Julian Day	
17-20	Time	

Repeat for 3 sets of ephemeris total.

3.58.2.4 Imager Scene

Byte#	1	32-bits
1-4	Ch 8-11 Latitude	Ch 8-11 Longitude
5-8	Scene number	Surface Tag Rain Flag
9-12	Channel 8 1x1	Channel 9 1x1
13-16	Channel 10 1x1	Channel 11 1x1
17-20	Ch 17, 18 Latitude	Ch 17, 18 Longitude
21-24	Channel 17 1x1	Channel 18 1x1

Repeat for 180 scenes per scan

3.58.2.5 Environmental Scene

Byte#	1	32-bits
1-4	Latitude Ch 12-14	Longitude Ch 12-14
5-8	Scene count Surface tag	Channel 12
9-12	Channel 13	Channel 14
13-16	Latitude Ch 15-16	Longitude Ch 15-16
17-20	Channel 15	Channel 16

Repeat for 90 scenes per scan

3.58.2.6 LAS Scene

Byte#	1	32-bits
1-4	Latitude	Longitude
5-8	Scene number	Surface tag
9-12	Channel 1	Channel 2
13-16	Channel 3	Channel 4
17-20	Channel 5	Channel 6
21-24	Channel 7	Channel 24

Repeat for 60 scenes per scan

3.58.2.7 UAS Scene

Byte#	1	32-bits
1-4	Latitude	Longitude
5-8	Scene Count	Channel 19 6x6
9-12	Channel 20 6x6	Channel 21 6x6
13-16	Channel 22 6x6	Channel 23 6x6

Repeat for 30 scenes per scan

3.58.2.8 Auxiliary Data Scene

Byte#	1	32-bits
1-4	Warm calibration channel 1	Warm calibration channel 2
5-8	Warm calibration channel 3	Warm calibration channel 4
9-12	Warm calibration channel 5	Warm calibration channel 6
13-16	Warm calibration channel 7	Warm calibration channel 8
17-20	Warm calibration channel 9	Warm calibration channel 10
21-24	Warm calibration channel 11	Warm calibration channel 12

25-28	Warm calibration channel 13	Warm calibration channel 14
29-32	Warm calibration channel 15	Warm calibration channel 16
33-36	Warm calibration channel 17	Warm calibration channel 18
37-40	Warm calibration channel 19	Warm calibration channel 20
41-44	Warm calibration channel 21	Warm calibration channel 22
45-48	Warm calibration channel 23	Warm calibration channel 24
49-52	Cold calibration channel 1	Cold calibration channel 2
53-56	Cold calibration channel 3	Cold calibration channel 4
57-60	Cold calibration channel 5	Cold calibration channel 6
61-64	Cold calibration channel 7	Cold calibration channel 8
65-68	Cold calibration channel 9	Cold calibration channel 10
69-72	Cold calibration channel 11	Cold calibration channel 12
73-76	Cold calibration channel 13	Cold calibration channel 14
77-80	Cold calibration channel 15	Cold calibration channel 16
81-84	Cold calibration channel 17	Cold calibration channel 18
85-88	Cold calibration channel 19	Cold calibration channel 20
89-92	Cold calibration channel 21	Cold calibration channel 22
93-96	Cold calibration channel 23	Cold calibration channel 24
97-100	Warm Load Temp 1	Warm Load Temp 2
101-104	Warm Load Temp 3	MUX Subframe ID
105-108	MUX Housekeeping 1	MUX Housekeeping 2
109-112	MUX Housekeeping 3	MUX Housekeeping 4
113-116	K BAND Base Point Latitude 1	K BAND Base Point Latitude 2
	...	
161-164	K BAND Base Point Latitude 27	K BAND Base Point Latitude 28
169-168	K BAND Base Point Longitude 1	K BAND Base Point Longitude 2
	...	
221-224	K BAND Base Point Longitude 27	K BAND Base Point Longitude 28
225-228	K BAND Base Point EIA 1	K BAND Base Point EIA 2
	...	
277-280	K BAND Base Point EIA 27	K BAND Base Point EIA 28
281-284	K BAND Base Point Azimuth 1	K BAND Base Point Azimuth 2
	...	

333-336		K BAND Base Point Azimuth 27		K BAND Base Point Azimuth 28	
337-340		U-V BAND Base Point Latitude 1		U-V BAND Base Point Latitude 2	
		...			
557-560		U-V BAND Base Point Azimuth 27		U-V BAND Base Point Azimuth 28	
561-564		W BAND Base Point Latitude 1		W BAND Base Point Latitude 2	
		...			
781-784		W BAND Base Point Azimuth 27		W BAND Base Point Azimuth 28	
785-788		G BAND Base Point Latitude 1		G BAND Base Point Latitude 2	
		...			
1005-1008		G BAND Base Point Azimuth 27		G BAND Base Point Azimuth 28	
1009-1112		L-V BAND Base Point Latitude 1		L-V BAND Base Point Latitude 2	
		...			
1229-1232		L-V BAND Base Point Azimuth 27		L-V BAND Base Point Azimuth 28	
1233-1236		KA BAND Base Point Latitude 1		KA BAND Base Point Latitude 2	
		...			
1453-1456		KA BAND Base Point Azimuth 27		KA BAND Base Point Azimuth 28	