DART LICIACube Radio Science Data Set Review

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Executive Summary

The DART LICIACube radio science bundle (urn:nasa:pds:liciacube) was reviewed. The contents include DSN tracking files (TRK-2-34) and supporting documentation. Maneuver vector, aka Small Force Historical (SFH), files are included in the document folder.

The files are readable and well documented. The main items that should be addressed are as follows:

1. Ionosphere files are mentioned in the SIS but not included in the archive
2. More information about the radio comm system should be included
3. Check correspondence between SFH file and example in the SIS
4. Minor editorial corrections to the SIS

Documentation

Ionosphere files are mentioned in section 4.1 but are not included in the archive.

Please include the turnaround ratio and, if possible, the transponder delay.

Minor editorial corrections to lcc_rs_sis.pdf:

1. Title “Radio Science Data Data Product Software Interface Specification” has the word *data* twice in a row
2. 4.1 par 1, convert → converting
3. 4.1 p3, The LICIACube NAIF Ck kernel provide → provides

Data

Coverage is complete and consistent with documentation. Tracking data and SFH files are consistent in coverage. The SFH files occur intermittently.

	TRK-2-34	SFH
Start	2022-09-08	2022-09-20
End	2022-10-24	2022-10-15

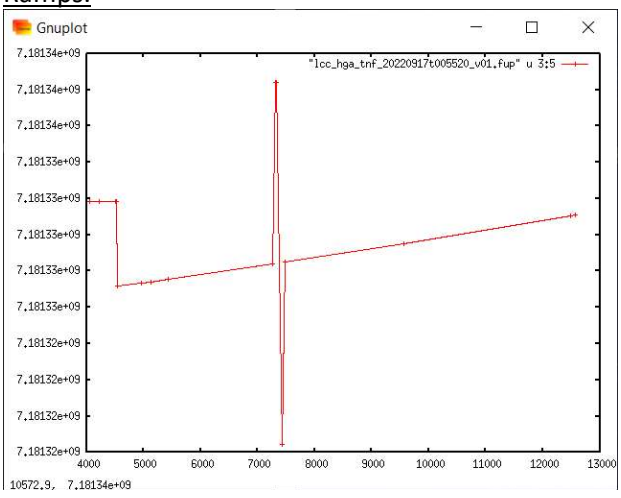
Data_trk234:
Using the PRRSG’s software tools, summary information and data (uplink ramps and sky frequency) were extracted from a sample file as follows:

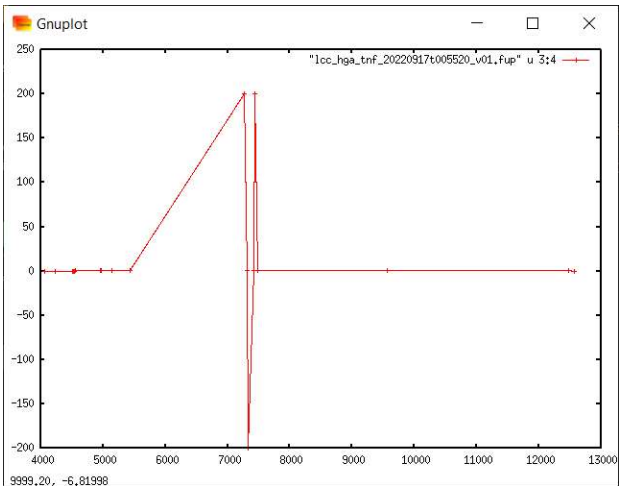
```
[kahan@chiron data_tnf]$ trk234_info2 -p -m lcc_hga_tnf_20220917t005520_v01.dat
    0%                100%
    ****************************
```

Report for File: lcc_hga_tnf_20220917t005520_v01.dat
Generation Date: 2023-250T21:56:00
Start Time: 2022-260T00:55:20
End Time: 2022-260T03:55:03
Spacecraft ID: 210
Downlink DSS ID: 63
Downlink Bands: X
Doppler Count Time: 1.0
Uplink DSS ID: 63
Uplink Bands: X
Tracking Mode: None, 2W
Number of Records: 31313
Data Description IDs: C123, C124, C125
Available Data Types: 0, 1, 2, 3, 7, 9, 11, 16, 17
00: Uplink Carrier Phase - 10778
01: Downlink Carrier Phase - 5142
02: Uplink Sequential Ranging Phase - 4982
03: Downlink Sequential Ranging Phase - 36
07: Sequential Ranging - 36
09: Ramps - 23
11: DRVID - 36
16: Carrier Observable - 5140
17: Total Phase Observable - 5140

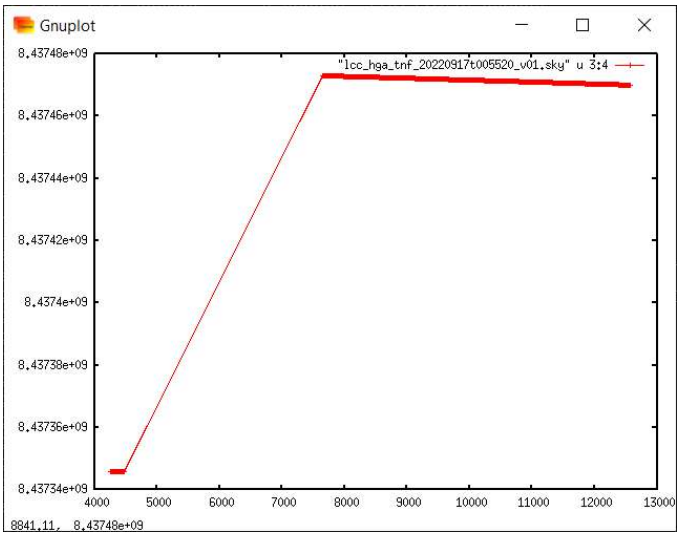
DSS-63 X-band Downlink:
2W @ 2022-260T02:07:24 - 2022-260T03:29:28 (Final Loop BW = 20.0 Hz)

Ramps:





Sky Frequency:



SFH

The header contains <stage>Final</stage>, which is not shown in the SIS example

Label Validation:

There is a label for every product. I ran the pds4.tranform tool on the TNF data and was able to verify correspondence between the major fields and the output of transform.

Results from 'validate' tool:

SFH:

overview_data_maf.xml – passed
collection_data_maf.xml - passed except context products
dart_rs_2021_328_2021_328_maf_01.xml – passed except context products

data_tnf:

overview_data_tnf.xml – passed
collection_data_tnf.xml – passed except context products
lcc_hga_tnf_20220917t005520_v01.xml – passed except context products

document_rs:

collection_document.xml – passed except context products and
ERROR [error.label.filesize_mismatch] Generated filesize '500' does not match supplied filesize '137' in the product label for 'file:/home/kahan/DART/LICIA/collection_document.csv'
lcc_rs_sis.xml – passed