Rosetta Lander Preliminary Calibrated MAG Data Review Comments

rl-cal-romap-3-pdcs-mag-v1.0
rl-cal-romap-3-phc-mag-v1.0
rl-c-romap-3-fss-mag-v1.0
rl-c-romap-3-rbd-mag-v1.0
rl-c-romap-3-sdl-mag-v1.0
rl-cal-romap-5-pdcs-mag-v1.0
rl-c-romap-5-fss-mag-v1.0

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Overview

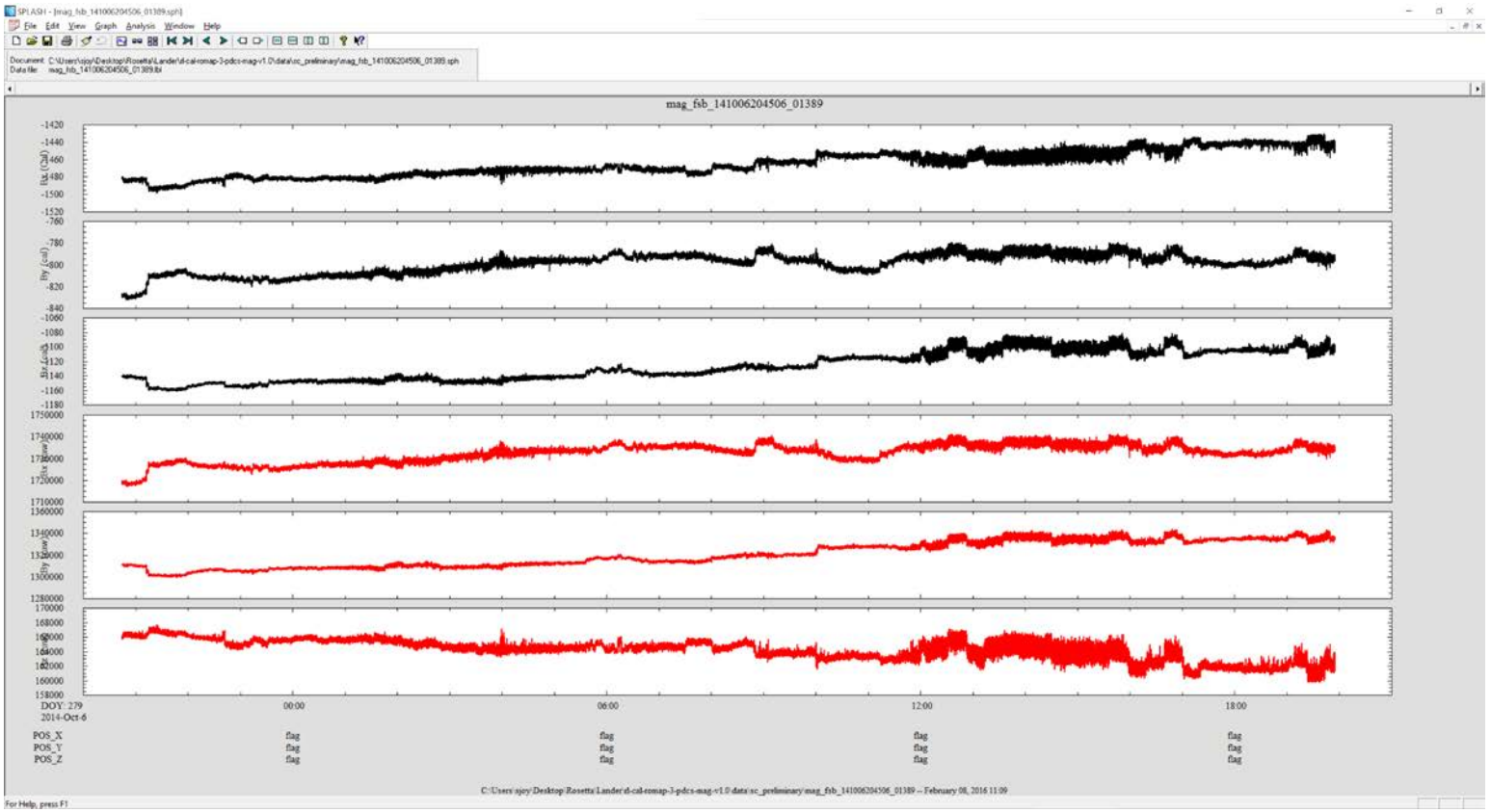
- All of the rl-XXX-romap-3-XXX-mag-v1.0 and rl-XXX-romap-5-XXX-mag-v1.0 review volumes share a large number of common files:
  catalog files, documents, required files (Xxinfo.TXT), etc.
  rather than repeating comments on those files in this presentation, those comments were provided in Rosetta_Lander_common.pptx
  - For the rl-XXX-romap-5-XXX-mag-v1.0 data sets, it is unclear how these qualify as derived rather than merely level 3 with a better calibration.
- Furthermore, the format files for all of the raw lander mag data are identical so I will discuss them only once
- Dataset catalog files
  - All of these files are extremely sparse, with their only really useful information being the start/stop time and citation descriptions
    - RID: Error in RL-C-ROMAP-3-FSS-MAG-V1.0 terse description: "This data set contains raw data referred to FSS Mission Phase“
    - RID: The L3 dataset.cat files do not explain to the user that most of the data contain significant contamination and are not really suitable for scientific analysis. The data should be refrred to as “partially calibrated”.
    - The L5 dataset.cat does not explain what it means to be derived. These appear to be full resolution data with most of the artifacts removed. If the process is reversible, than these are not derived data. The data appear to be “fully calibrated” even though some artifacts remain at low levels.

Data sets

- ✓ rl-cal-romap-3-pdcs-mag-v1.0 (data and labels appear to be valid)
- ✓ rl-cal-romap-3-phc-mag-v1.0 (data and labels appear to be valid)
- ✓ rl-c-romap-3-fss-mag-v1.0 (data appear to be valid, labels have error)
- ✓ rl-c-romap-3-rbd-mag-v1.0 (data and labels appear to be valid)
- ✓ rl-c-romap-3-sdl-mag-v1.0 (data and labels appear to be valid)
- ✓ rl-cal-romap-5-pdcs-mag-v1.0 (data and labels appear to be valid)
- ✓ rl-c-romap-5-fss-mag-v1.0 (data appear to be valid

Each data set contains preliminary calibration of the magnetic field data (sc_preliminary) and the associated housekeeping data (HSK). Sample plots of each data set follow.

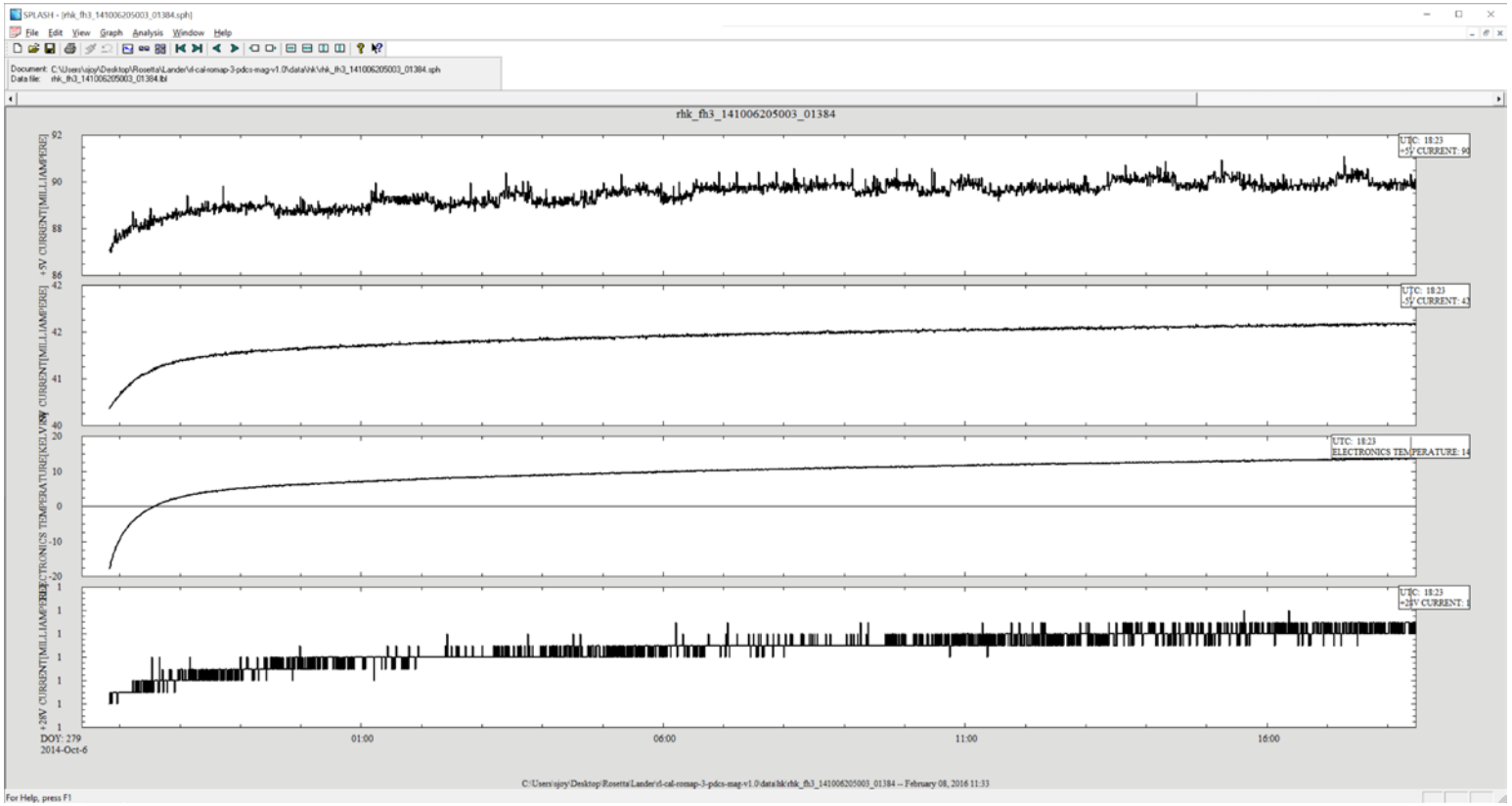
SC Data: RL-CAL-ROMAP-3-PDCS-MAG-V1.0



Plot generated from data file by reading label mag_fsb_141006204506_01389.lbl and format file romap_mag_calscb.fmt (labels valid). Black traces are calibrated data, red traces are the raw data for the same time period. Trajectory columns are all missing data flags in all data files.

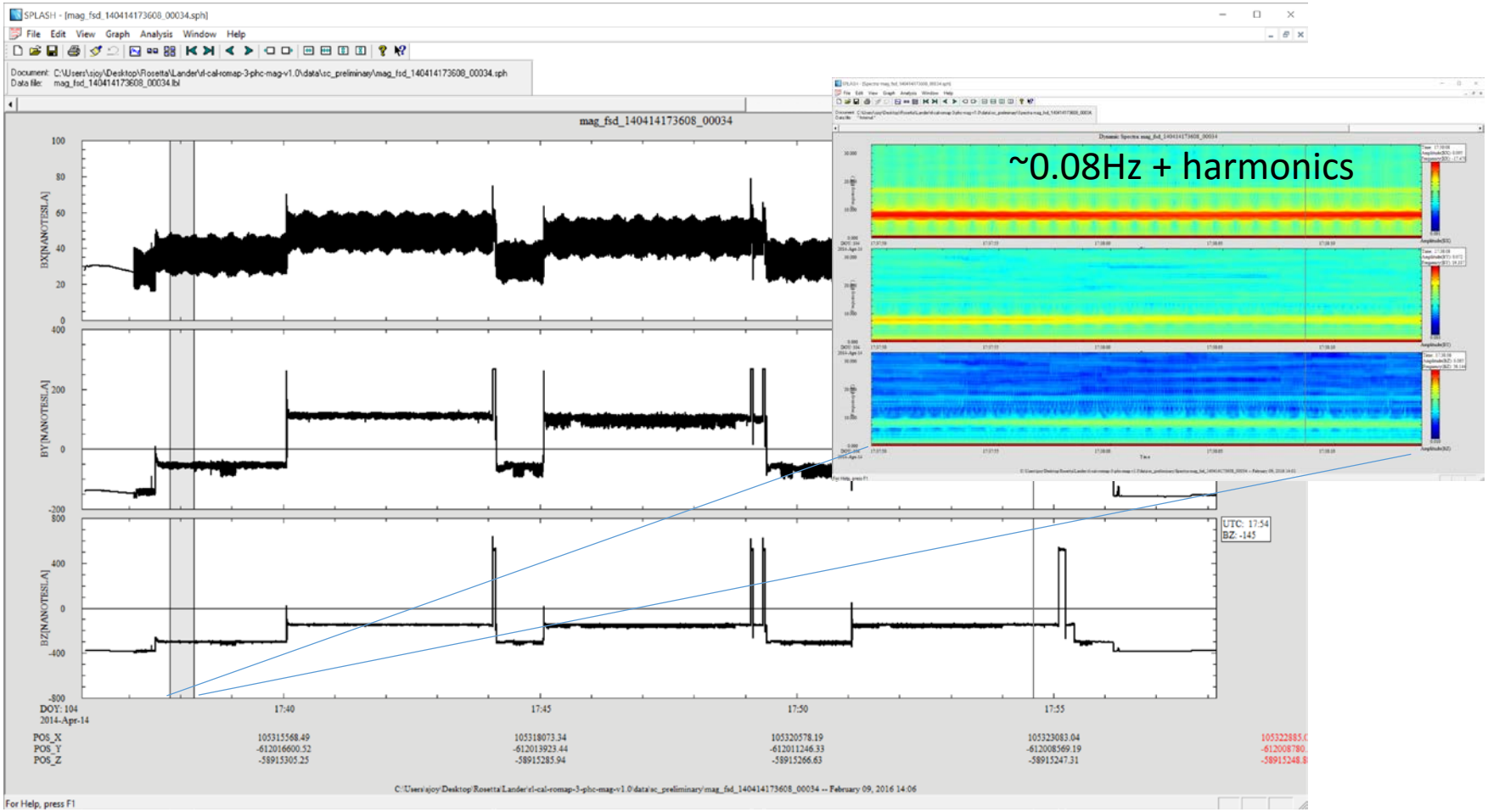
Data appear to be poorly calibrated, events that appear to be s/c related remain, IMF field is orders of magnitude smaller than these data indicate.

HK Data: RL-CAL-ROMAP-2-PDCS-MAG-V1.0



Plot generated from data file by reading label rhk_fh3_141006205003_01384.lbl and format file romap_calhk.fmt (labels valid)

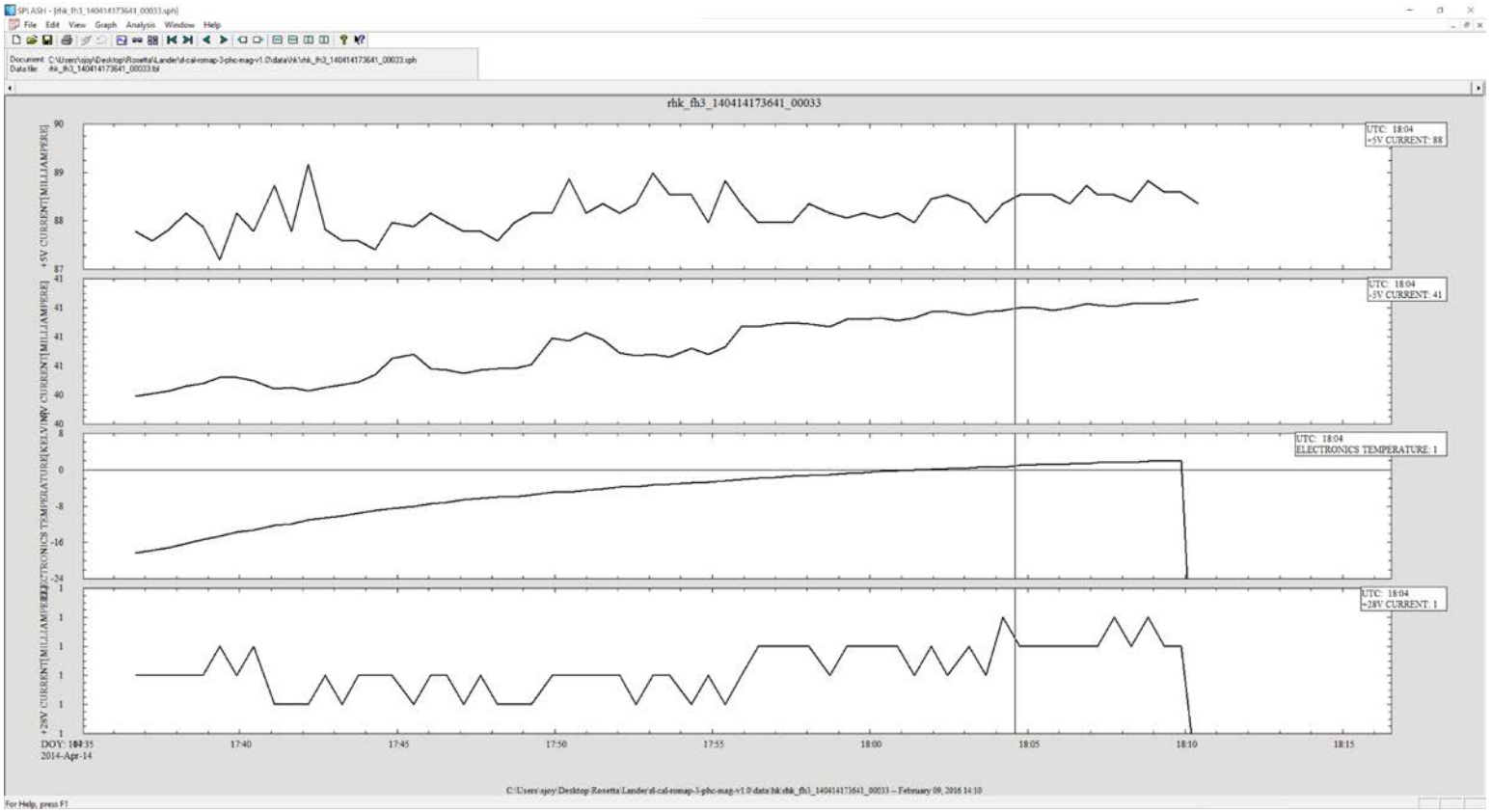
SC Data: rl-cal-romap-3-phc-mag-v1.0



Plot generated from data file by reading label mag_fsd_140414173608_00034.lbl.lbl and format file romap_mag_calscd.fmt (labels valid – verified that format files a-d have identical structure differing only by the coordinate systems of the values.)

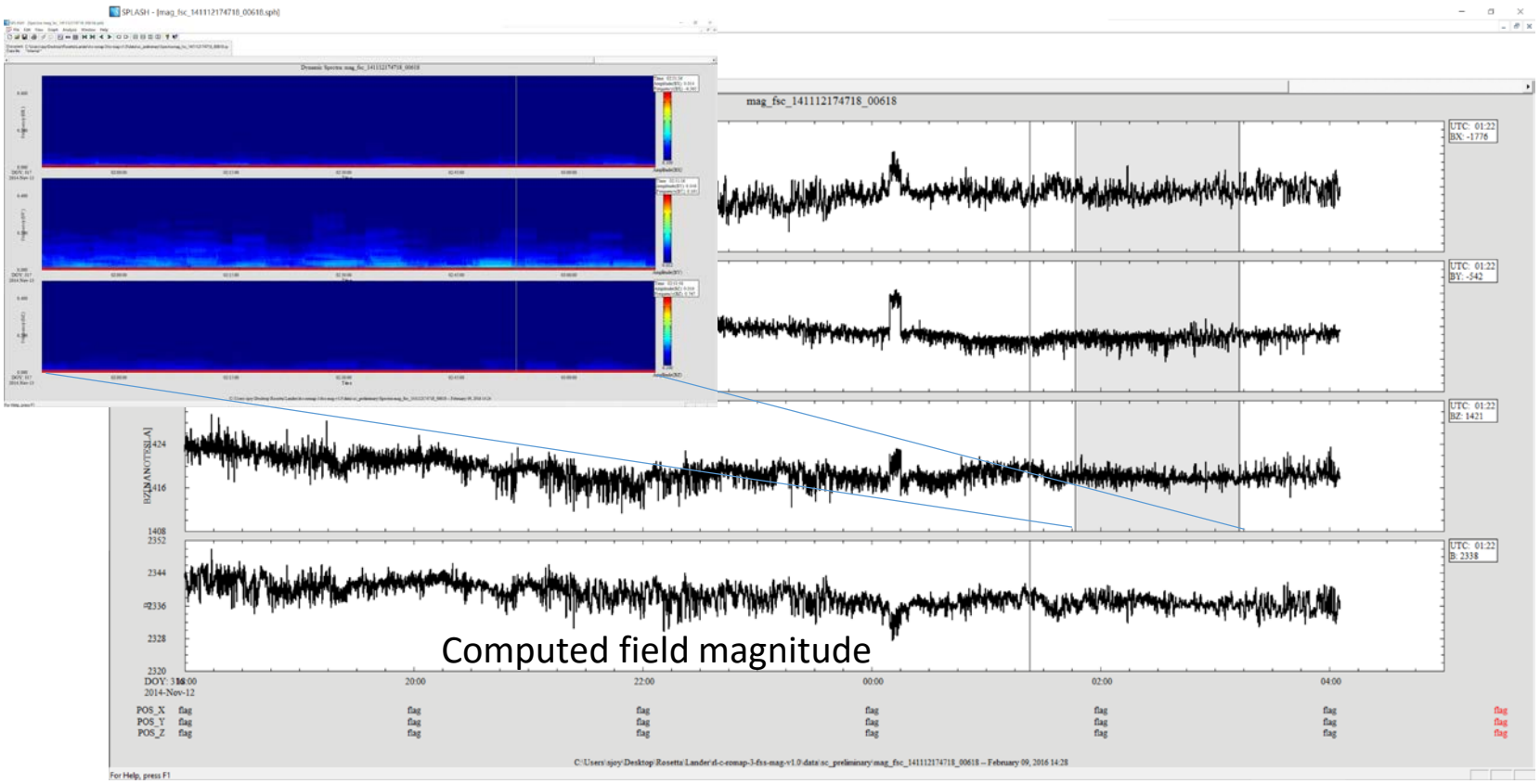
Calibration has not removed non-physical phenomenon.

HK Data: rl-cal-romap-3-phc-mag-v1.0



Plot generated from data file by reading label rhk_fh3_140414173641_00033.lbl and format file romap_calhk.fmt (labels valid)

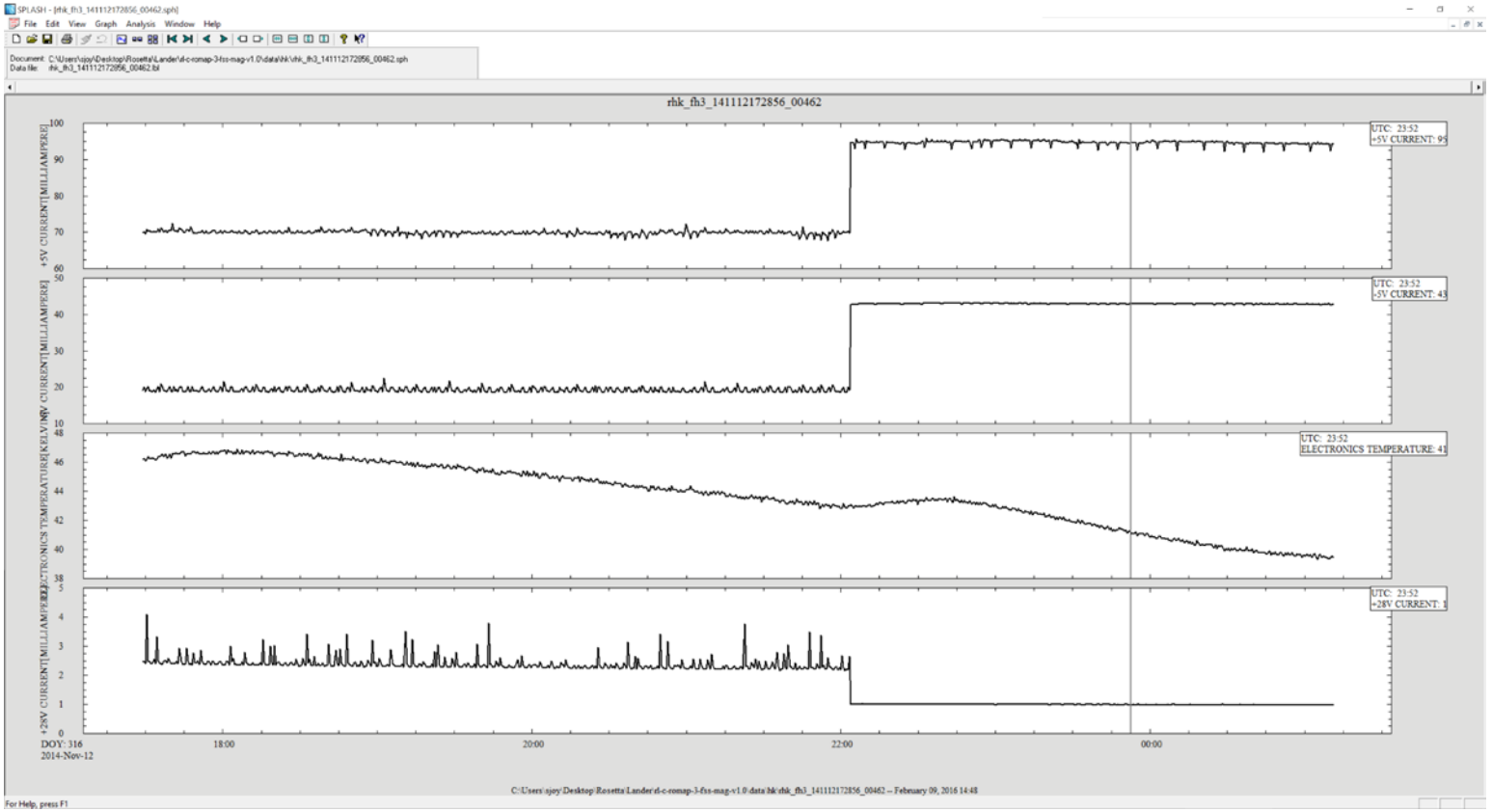
SC Data: rl-c-romap-3-fss-mag-v1.0



Plot generated from data file by reading label mag_fs2_141112174718_00618.lbl and format file romap_mag_rawsc.fmt (labels valid)

Data appear nominal, most of the noise present before separation is gone, field is still much stronger than expected.

HK Data: rl-c-romap-3-fss-mag-v1.0

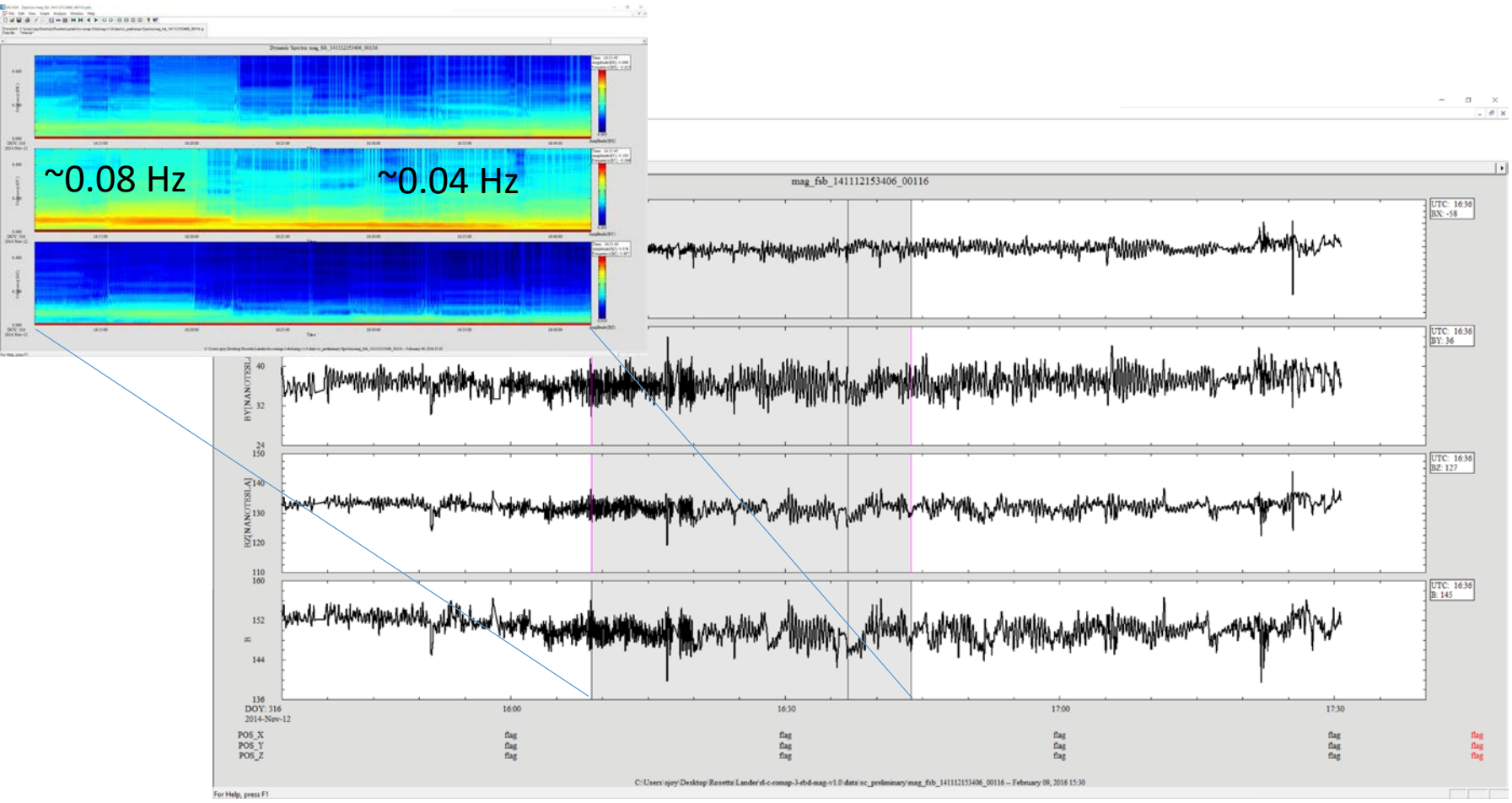


Plot generated from data file by reading EDITED label rhk_fh3_141112172856_00462.lbl and format file romap_calhk.fmt (labels valid)

RID: All data label files have incorrect record length (165 -> 168)

Format file and TABLE object (row_bytes) are correct

SC Data: rl-c-romap-3-rbd-mag-v1.0

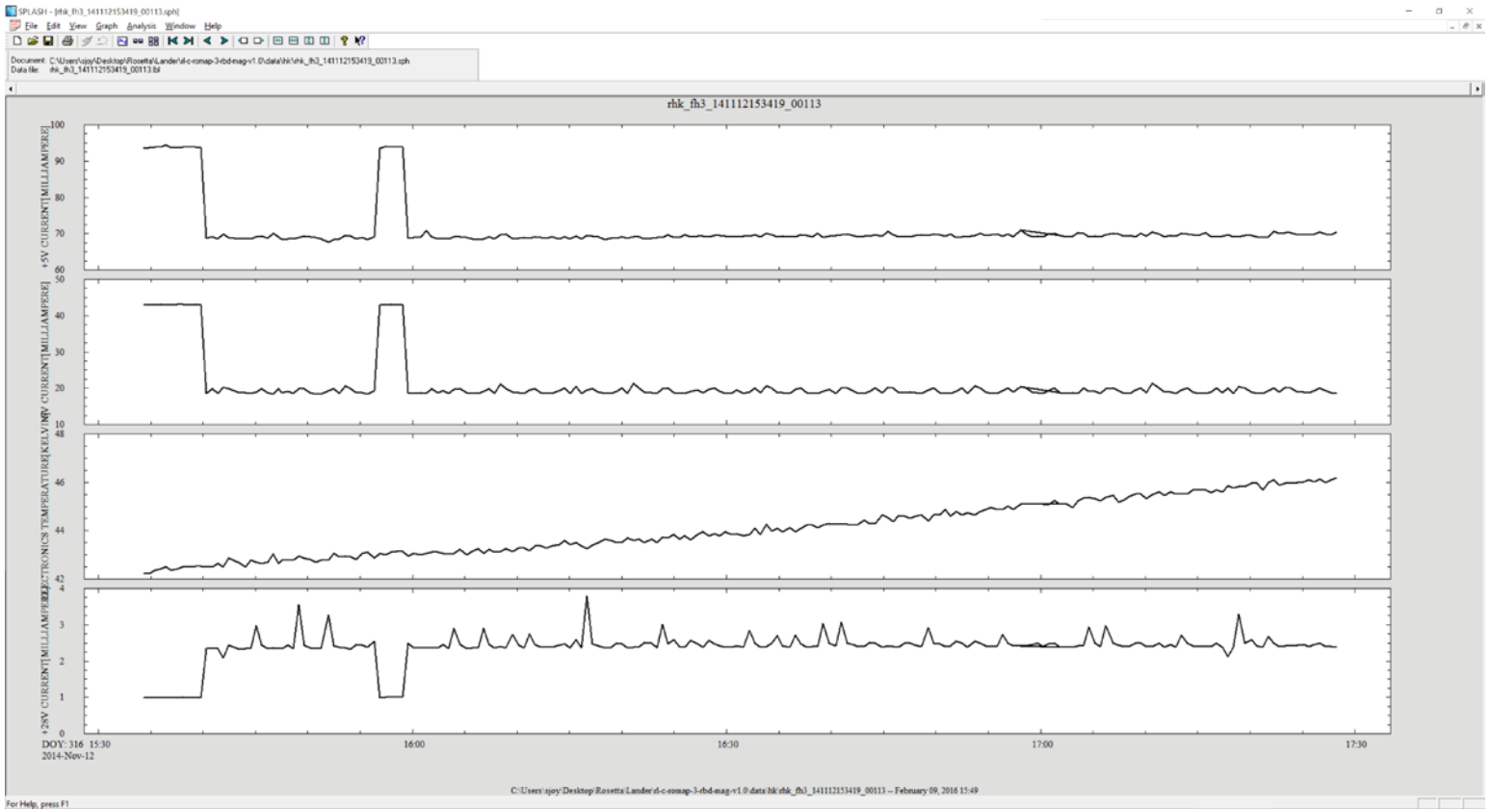


Plot generated from data file by reading label mag_fsb_141112153406_00116.lbl and format file romap_mag_calscb.fmt (labels valid)

Data appear nominal, noise frequency changes at ~16:20

No “c” or “d” data files to match format files provided

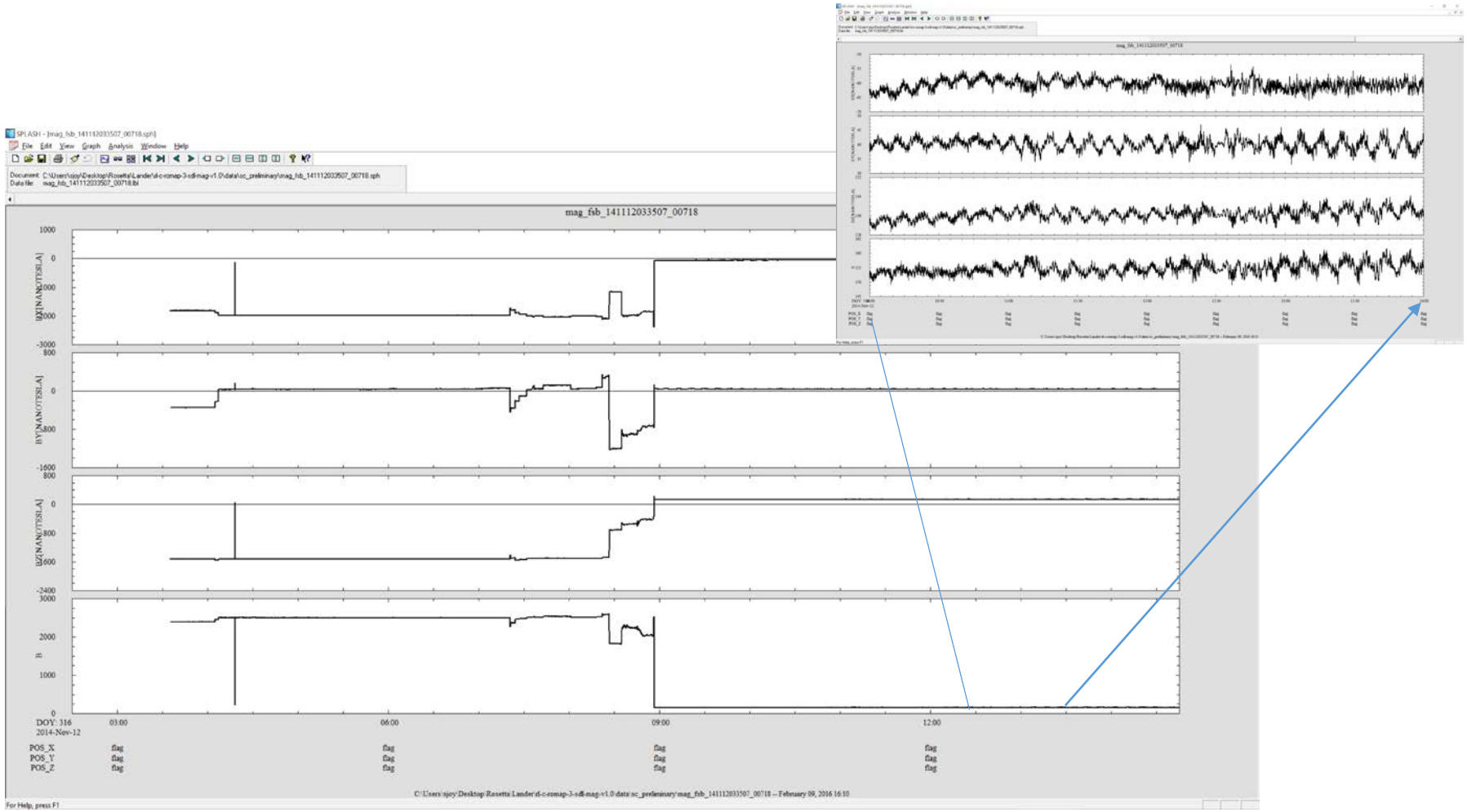
HK Data: rl-c-romap-3-rbd-mag-v1.0



Plot generated from data file by reading label rhk_fh3_141112153419_00113.lbl and format file romap_calhk.fmt (labels valid)

Variation in reference voltages NOT associated with change of frequency content.

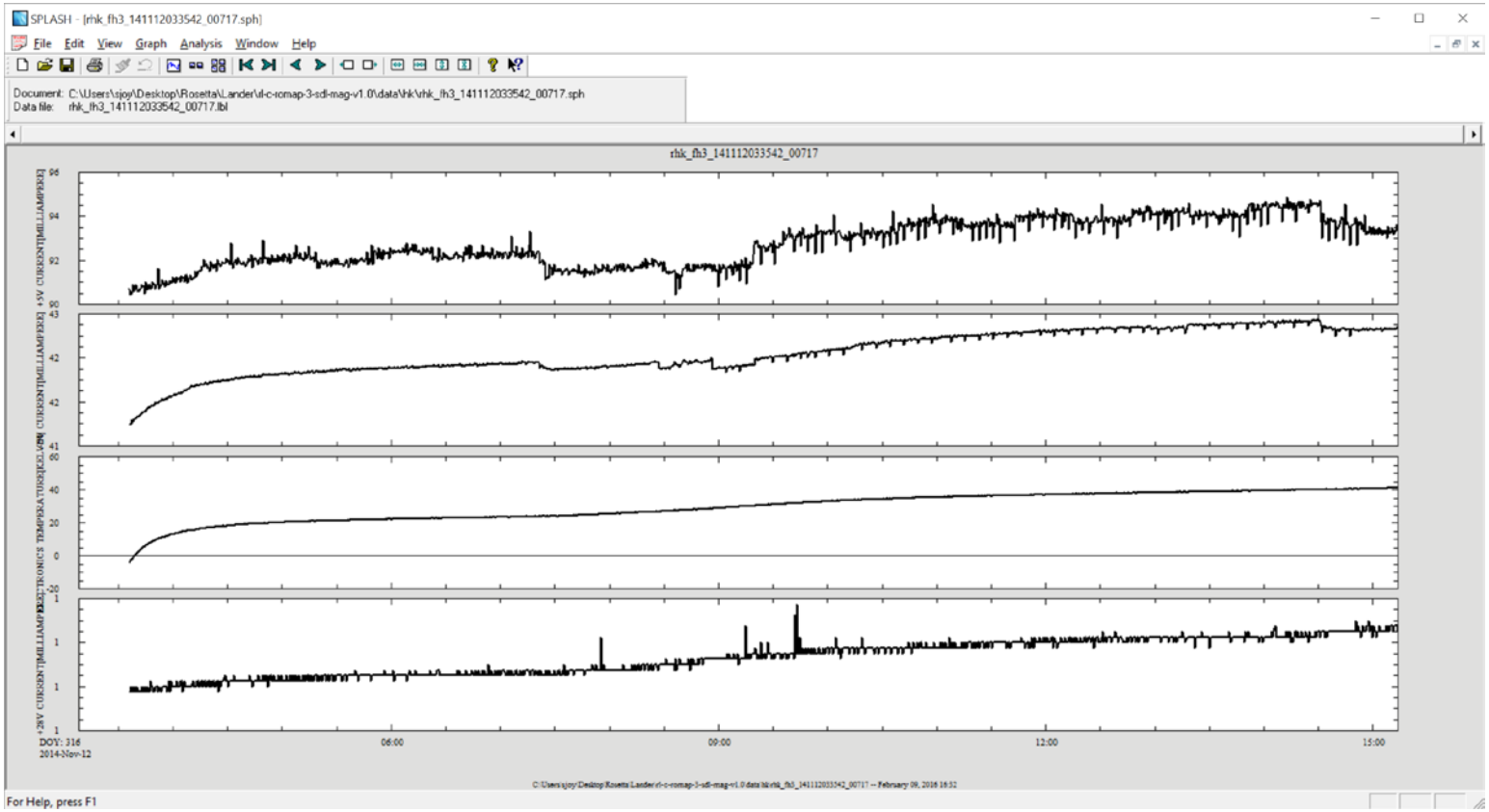
SC Data: rl-c-romap-3-sdl-mag-v1.0



Plot generated from data file by reading label mag_fsb_141112033507_00718.lbl and format file romap_mag_calscb.fmt (labels valid)

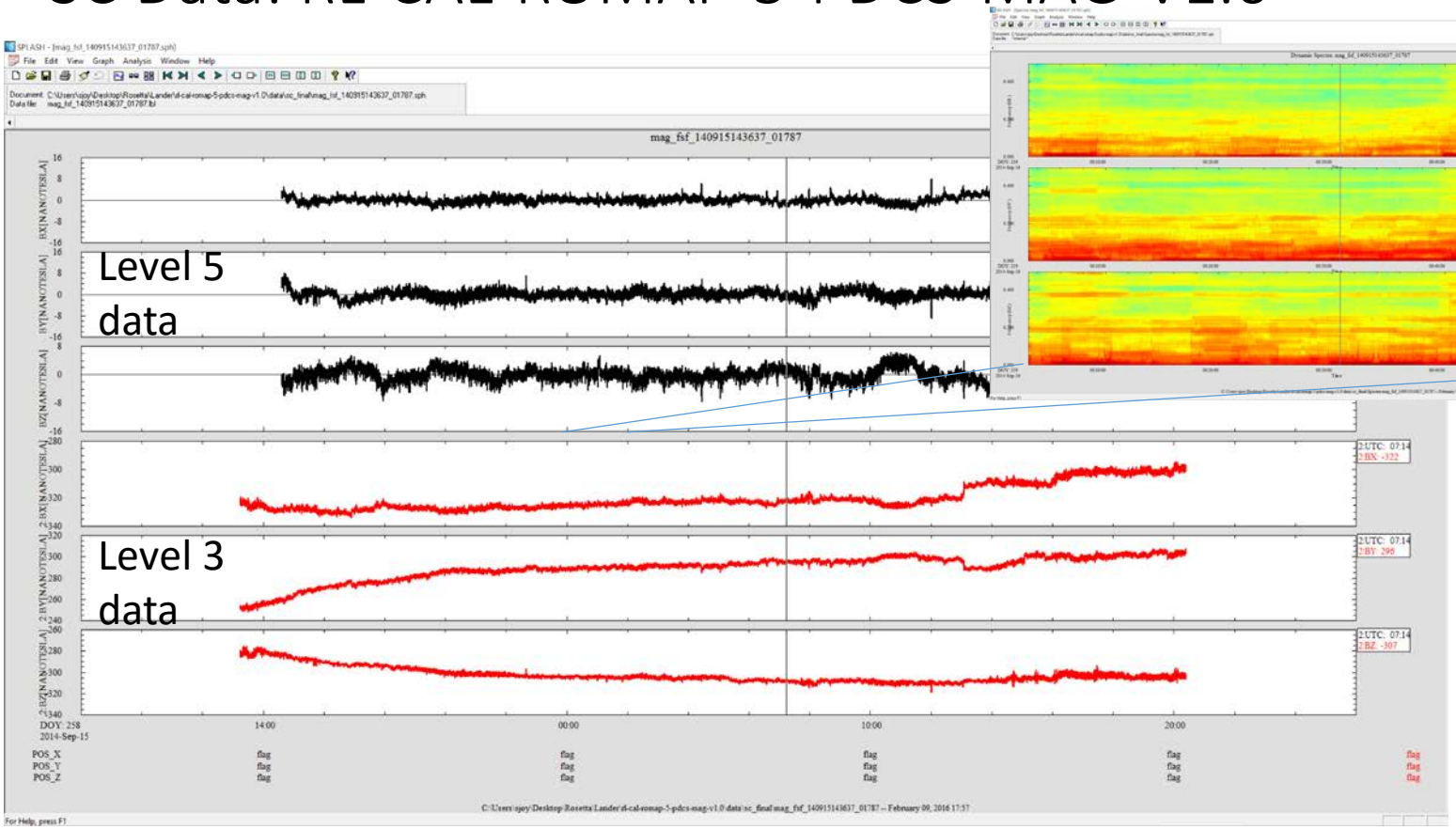
Data show large unexplained variations over the full time interval superimposed on the small scale nearly sinusoidal variations.

HK Data: rl-c-romap-3-sdl-mag-v1.0



Plot generated from data file by reading label rhk_fh3_141112033542_00717.lbl and format file romap_calhk.fmt (labels valid)

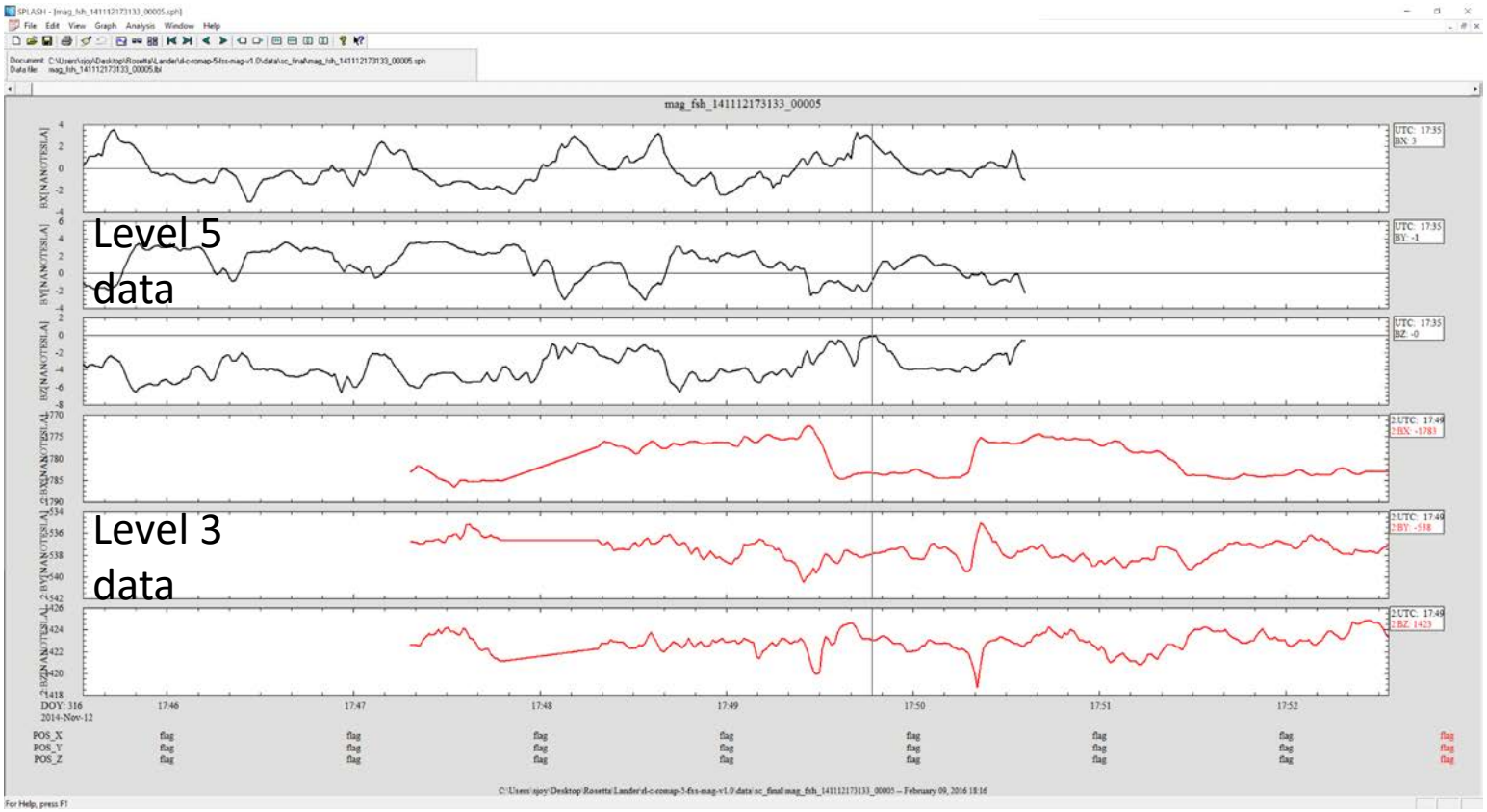
SC Data: RL-CAL-ROMAP-5-PDCS-MAG-V1.0



Plot generated from data file by reading label mag_fsf_140915143637_01787.lbl and format file romap_mag_calscf.fmt (labels valid). Black traces are derived data, red traces are the preliminary data for the same time period. Trajectory columns are all missing data flags in all data files.

Derived data appear to be moderately well calibrated, events that appear to be s/c related in the preliminary calibration are removed and the IMF field is physically possible. Some artifacts remain.

SC Data: RL-C-ROMAP-5-FSS-MAG-V1.0



Plot generated from data file by reading label mag_fsh_141112173133_00005.lbl and format file romap_mag_calsch.fmt (labels valid). Black traces are derived data, red traces are the preliminary data for the same time period. **Trajectory columns are all missing data flags in the data file.**

Derived data appear to be well calibrated, events that appear to be s/c related in the preliminary calibration are removed and the IMF field is physically possible.

Summary – Lander Calibrated (-3-) MAG data sets

- In general, the preliminary calibrations that have been applied to these data do not remove all of the instrumental/spacecraft contamination
  - The field magnitude is commonly off by orders of magnitude
  - There are numerous quasi-periodic noise sources with periods between 10-30 seconds
  - While it is understood that the calibration is preliminary, the data set catalog descriptions could/should(?) be updated to describe the noise sources and if any further attempt will be made to remove them
- RIDs
  1. All: dataset.cat file descriptions do not make it clear to a user that most of these data should not be used for science. For mission phases before separation, users should be directed to preferentially use the orbiter magnetometer data. For the remainder, users should be pointed to L5 data. Data confidence notes should state that significant magnetic contamination persists in these data.
  2. RL-C-ROMAP-3-FSS-MAG-V1.0 - Error in dataset.cat terse description: "This data set contains raw data referred to FSS Mission Phase“
  3. RL-C-ROMAP-3-FSS-MAG-V1.0 - Error in the record_length (165 -> 168) in all data labels

Summary – Lander Calibrated (-5-) MAG data sets

- In general, the final calibrations that have been applied to these data remove most of the instrumental/spacecraft contamination
  - The field magnitude is plausible (<10 nT)
  - There are numerous quasi-periodic noise sources in the pre-delivery data set
  - Level-5 data are provided for only a small subset of the total time period. Since these are the only data that are readily usable for science, it would be good to have a complete data set.
- These data are generally in good shape!
- RIDs
  1. The dataset.cat file descriptions should indicate how these data were derived – they appear to be calibrated with a better model of the various sources on magnetic interference. Derived indicates irreversible data processing.
  2. The data appear to be incomplete (fewer data than in the L2 or L3 data sets for the FSS phase and none for the SDL phase). Since these appear to be the only truly useful data it would be good to have a complete set of these data.