

International Laser Ranging Service (ILRS) Data Formats and Procedures Working Group (DFPWG)

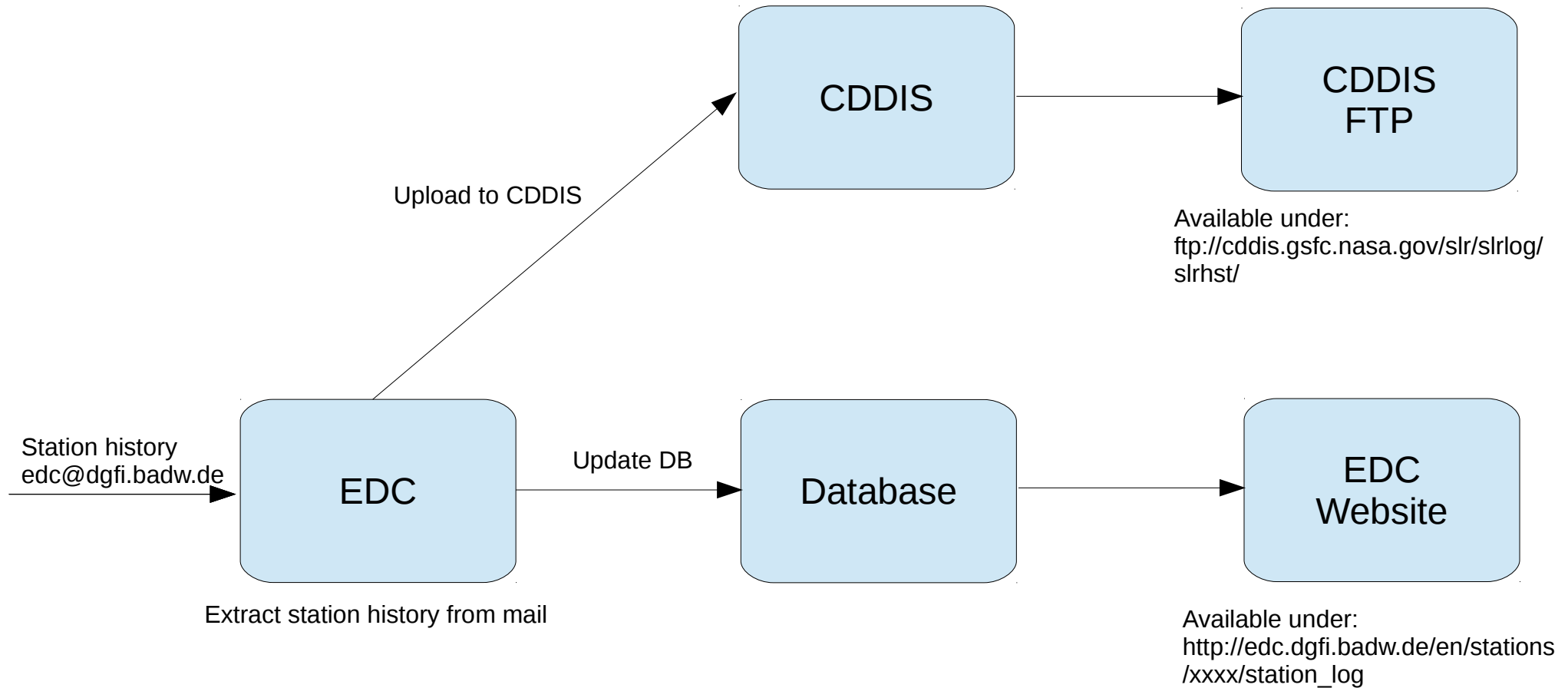
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New station change logs

Data flow of station history change logs



New station change logs

Current status of station history log files in new one line format

Validated stations:

1824, 1868, 1873, 1879, 1886, 1887, 1888, 1889, 1890, 1893, 7045,
7080, **7090**, **7105**, **7110**, **7119**, 7124, 7237, 7249, 7359, **7403**, 7406,
7407, 7501, **7810**, 7821, 7825, 7828, 7829, 7838, **7839**, **7840**, 7841,
7845, **7941**, 8834

Quarantine stations:

1831, 1863, 1864, 1874, **1884**, 1891, 7231, 7308, 7358, 7806, 7811,
7820, 7824, 7824, **7827**, 7831, 7832

New station history logs for 13 of 53 stations available

(last update 2014-10-25)

CRD issues

T2L2: Data are not CRD conform! / Handling of T2L2 data at DCs?

Original:

```
h1 crd 0 2009 1 6 16
h2 ZIML 7810 68 1 4
h3 jason2 803201 1025 0 0 1
h4 0 2009 1 4 20 18 29 -1 -1 -1 -1 -1 -1 0 0 0 0 1 0 2 0
c0 0 532.100 sys1 frq1 spad tim1
c1 0 frq1 Nd-YAG 1064.20 100.00 10.00 60.0 10.00 0
c2 0 spad SPAD 532.100 -1.00 -1.0 -1.0 60.0 0.10 90.0 10.00
c3 0 tim1 TrueTime_XL-DC BVA_8600 A032ET 3203 0.0
40 73108.887783321552 0 sys1 -1 1210 658.711 108260.5 0.0 39.0 -1.000 -1.000 -1.0 2 0
50 sys1 59.2 0.000 0.000 0.0 0
10 73108.887752619994 0.017280332765 sys1 2 2 0 0 0
20 73108.888 911.62 265.94 99. 1
10 73109.547752629602 0.017263020147 sys1 2 2 0 0 0
10 73109.677752661606 0.017259613239 sys1 2 2 0 0 0
10 73109.947752661596 0.017252540426 sys1 2 2 0 0 0
...
```

New T2L2 data:

```
h1 CRD 1 2014 8 11 14
h2 ZIML 7810 68 1 4
h3 jason2 0803201 1025 33105 2 4
h4 0 2009 1 4 20 18 28 2009 1 4 20 27 13 0 0 0 0 1 1 4 0
c0 0 532.100 sys1 frq1 spad tim1 t2l2
c4 0 t2l2 0.232 0.00 73110055238400.000 -23992965.6 16696087.0 0 0 1 20 73108.887752619994 911.62 265.94 99. 0
10 73110.097752652000 0.017248613139 sys1 2 2 0 0 0
10 0.051138529200 0.008624310272 t2l2 3 2 0 0 345
10 73110.247752642405 0.017244687062 sys1 2 2 0 0 0
10 0.201136574957 0.008622347259 t2l2 3 2 0 0 397
...
```

CRD issues

New T2L2 data are modified existing full-rate data

T2L2 do not fit into the data stream of DCs

T2L2 data would be rejected due to existing data holding at the EDC

Original data from should not be changed or replaced.

Same issue will also occur in future with the ELT data

Possible solutions:

- adding new „fake“ satellite id (e.g. t2l2:0000500, elt:0000501, etc.)
(see moon targets)
- adding new satellite t2l2 with jason2 id
- other suggestions?

CRD issues

Conversion of old format to CRD

- First successful tests of conversion were made for Lageos-1/2
- But “similar” normal point data in CSTG and MERIT-II format available between 1992 and 1994.
- Which data source should be used for conversion?

Examples:

	Sat	Station	Start date	End date	V	Source
MERIT_v2	9105001	78403501	1992-08-31 22:09:11	1992-08-31 22:11:52	A	ers1b_npt.9208
CSTG	9105001	78403501	1992-08-31 22:09:11	1992-08-31 22:11:52	00	ers1.9208
MERIT_v2	9105001	79394101	1992-08-31 20:23:12	1992-08-31 20:29:48	A	ers1b_npt.9208
CSTG	9105001	79394101	1992-08-31 20:23:16	1992-08-31 20:29:44	00	ers1.9208
MERIT_v2	9105001	78403501	1992-08-30 20:59:38	1992-08-30 21:02:31	A	ers1b_npt.9208
CSTG	9105001	78403501	1992-08-30 20:59:37	1992-08-30 21:02:54	00	ers1.9208

Different number of normal points (13 Merit/ 14 CSTG)

- How to handle station codes of stations before CRD era?
(necessary for quality check)

CRD issues

Handling of old existing corrupt CRD data

Reason:

Correction of format error (non-ascii character) in all (2010-2014) CRD data of Golosiv (1824).

Problem:

All daily/monthly files have to be updated again on FTP at EDC.

Each updated daily/monthly file runs through the quality check again.

The improved quality check leads to a rejection of the **majority** of CRD data.

Solution:

Correction of simple format errors leads to a strong decrease of rejection of data (see next slide)

CRD issues

Handling of old existing corrupt CRD data

Applied corrections:

EDC-Error Code	Old value	New value	Affected datasets
EH2021	Zimmerwald	ZIML	23173
	GUTS	GMSL	1226
	ML04	MONL	10931
	ML05	YARL	47949
	TL04	H4AT	4452
	ML06	HARL	6993
	ML08	THTL	1478
	TL03	AREL	4634
	GRAZ	GRZL	6782
	GLSV	GLSL	53
	ML07	GODL	11473
EH3021	CRYSAT-2	cryosat2	44
E11041		correct system id	48
E40041		correct system id	3358
E50021		correct system id	45273
E60021		correct system id	45276

Data harmonization

Handling of old existing corrupt CRD data

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Data harmonization

Differences in **daily** files between EDC (start of measurement) and CDDIS (incoming date) still remain due to philosophy

Only small differences in **monthly** files between EDC and CDDIS

- after data replacements (EDC removes out of date data)
- station status changed to quarantine data (slipped through data remains at CDDIS)

Monthly comparisons are done by NASA OC

Data flow issues

Station delivering data to both operation centers

- still pending until **both OCs check data identically** and **data flow between stations and both OCs defined**

Data validation procedures

- both OCs have improved their data check procedures
- currently around 150 field are checked
- only few differences remain (different limits, error/warning handling)

Idea was to initiate a „**CRD and CPF specification working group**“ to update the current CRD specification (e.g. adding range of values for data fields)

The updated CRD specification should be the fundament for identical data checks at both OCs

DF&P WG

Station History Change Log

R. L. Ricklefs

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Summary

- The old SCH/SCI formats were confusing to some people; files were not being kept up; and the information was limited
- The history change log is similar to the SCI file, but includes
 - Header information to make it self documenting
 - Contains a field indicating the expected level of impact of each entry
 - Contains sub-system identification (from site-log)
 - Is intended to provide a one-line reference to each change so that additional information can be found on site if needed.
 - More types of information can be entered – If anything can affect the data (hardware change or earthquake) it should be added.
- Has been implemented – still educating stations

DF&PWG

Format Issues

CRD Format – Lunar Issues

- Normal point record (“11”) contains return rate for SLR and S:N for LLR in the same field
 - Should be separate fields
- Need a “processing version” for APOLLO station
 - All data is reprocessed every release, so processing version does not match release version
 - For now, can add free-format software configuration ID record such as: “00 Processing Version x shots fired x”

CRD Format – Software versions

- Capturing software versions could help analysts and stations isolate data anomalies due to software changes.
- Include: acquisition, calibration, filtering, normal pointing and related software. May differ from station to station.
- New configuration record “C5”?
- MLRS uses a comment record:
 - 00 Software Versions: 2.00Bm 2.00Cm 2.4a 1.7 2.2a GNP-CM-2.01a

CRD Format – Additional Configuration Information

- Could add other information that would end up in change history log files.
- Add meteorological equipment and serial numbers. Prime + backup? By measurement type (pressure, temperature, humidity, wind speed, wind direction, etc.)?
- Other??

CRD Format – Things to be fixed

- The “Epoch delay correction” on the “Timing System Configuration Record” (“C3”) is essentially the same as the “Estimated Station UTC Offset” in the “Transponder (Clock) Configuration Record” (“C4”) are essentially the same, but their units are different – microseconds vs nanoseconds. Is it sufficient to make these the same units? Or is this OK as is?

CPF Issues

- Various prediction centers handle start time and length of cpf files differently. Some start on the even day. Some start 5 records early, so that the fully accuracy of the 10 point interpolation will be available at the start of the day. Similarly, the manual requires the files to contain 5 days of predictions, but the last time I checked, this is not uniformly done.
- I'm not sure either of these is a real problem, but we should be aware of the differences.

Other CPF Issues

- The format allows for inertial vectors as well as the body fixed vectors everyone distributes. We convinced the LRO prediction providers years ago to give us body fixed vectors even though inertial was a format option. I doubt that many station have inertial vectors implemented. Maybe that option should be removed or the stations encouraged to implement it.
- Records could be added to allow precise one-way ranging to a lunar target.
- The manual could be re-written to show less reference to transition from the old TIVs.
- We should make sure stations and analysts are ready for the next leap second, whenever that is.

Comments/Conclusion

- Perhaps we should create a study group to handle these issues
- None of these changes is urgent, but should be dealt with.

ILRS Software Library

Software Library

- .Purpose

- .Poster

- .Software added:

 - .Eurostat (inter-station communications)

 - .Mount Model Fitting

- .Software to be added soon

 - .Normal point software

 - .Restricted tracking software

 - .Sun avoidance

Software Library - Continued

- .Meeting outcome

- .More software suggested to be added:

- .Another normal point program

- .LLR prediction and normal pointing programs

- .Configuration Management software

- .Copyright issues

- .More software

- .Software to plot analysis results (executables)

Backup Slides...

CRD Format – Time Stamps

- 1. Occasional problems with the header pass start date being the day prior to the seconds of day on first normal point ("11") or shot "10" record causes the pass to be rejected. Another type of record, e.g., calibration or met, could be time tagged with seconds of the start day..
- 2. Solve by letting seconds of day exceed 86400. People object to this, but I cannot find out the reason. This is the simplest fix.
- 3. Or add a "day since start of pass" indicator as a new field on "10", "11", or all records. This will be 0 for the current day and increments to 1 for the next UT day.
- 4. Or add MJD to all records before second of day. This is the most formal solution. Could make this the last field of every line for backwards compatibility.