Refraction Working Group

1) A new 2-color formulation was derived as part of a recent PhD (Dudy Wijaya);

   - the delta-range accuracy requirement (~10-20 μm) is prohibitive at the moment though

2) Concepcion is the only 2-color site, with lots of data on Starlette & Stella;

   - SOS-W at Wettzell will also be used in a similar setup once operational;

   - there is apparently some 2-color work in Australia, Ben Greene will report on that

CRD Report

R. Ricklefs
UT / CSR

CRD status

- Currently station statistics
  - 30 stations validated
  - 5 awaiting validation (some in upgrade)
  - 7 have not been heard from
  - Web site now shows only those not validated
- All AWG ACs are able to ingest CRD data
- ILRS CB is tracking day-to-day implementation issues
- Final transition date has been bumped several times due to lack of stations and transitions at OCs. Currently, it is TBD.
- Concern about shortcuts

Stations to be Validated

Stations Working Towards CRD Implementation

(as of Wednesday, May 04, 2011)

The CRD format is a major update in station and data center operations. Changes in the precision and record type sequence, inclusion of new fields, and flexibility in format implementation requires the creation of a formal validation process (PNG | PDF) that compares data in the existing format with data in CRD prior to acceptance of CRD as the operational data prduct for a particular station. Most stations in the network (Arequipa, Beijing, Changchun, Concepcion, Golosiiv, Grasse, Graz, Greenbelt, Haleakala, Hartebeesthoek, Herstmonceux, Katsively, Koganei, Matera, McDonald, Monument Peak, Mt. Stromlo, Potsdam, Riga, San Fernando, San Juan, Shanghai, Simeiz, Simosato Tahiti, Tanegashima, Wettzell, Yarragadee, Zimmerwald) have completed the conversion process. The table below lists the status of those stations still in the process of converting their systems to output data in CRD format.

Site	ID	Code	Coding	Testing	OC Validated	AC Validated	Operational
Lviv	1831	LVIV	X	X	P		
Maidanak 1	1863	MAID					
Maidanak 2	1864	MAIL					
Komsomolsk	1868	KOML	X	X	P		
Mendeleevo	1870	MDVL					
Altay	1879	ALTL	X	X	P		
Wuhan	7231	WUHL					
Metsahovi2	7806	METL					
Borowiec	7811	BORL	X	X	X	P	
Kunming	7820	KUNL	X	X	P		
Helwan	7831	HLWL					
Riyadh	7832	RIYL					
FTLRS	--	--	X				
TROS	--	--					

Notes:		
Codes:	X	Completed
	P	In process
Ftp archives:		
	CDDIS	ftp://cddis.gsfc.nasa.gov/pub/slr/data/npt_crd ftp://cddis.gsfc.nasa.gov/pub/slr/data/fr_crd
	EDC	ftp://edc.dgfi.badw.de/slr/data/npt_crd ftp://edc.dgfi.badw.de/slr/data/frd_crd

Format Issues - Satellite Names

- Some stations are not using standard names required for CPF and CRD files
- Causes problems with sorting statistics
- Sample crd_chk program modified to check satellite name/SIC/ILRS ID/NORAD ID against a data base.
- Stations are being notified and data corrected at EDC

Format Issues - Station Names

- Some stations not using official 4 character names as required in the CRD manual
- Some names are right rather than left justified
- Fixed format name in header allows 10 characters, but official list name is 4 characters (list was found after format was in late stages of development)
- Is enforcing the official list important? Requires fixing old data. Extra 6 fields in format could be “spares.”

Format Issues - Configuration ID

- Using SCI + SCH, one can create single ID for a station configuration that can be used as an index in a data base (e.g. EDF)
- How can an index be created from 4 CRD configuration (“C”) records?
  - Use SCI & SCH from compatibility record (#60)? But the desire was to move away from these.
  - 4 configuration record's IDs are unique within the pass file; make them unique for the station?
  - Create a “hash” from C1-C5 records themselves.

Format Issues - Lunar mods

- Normal point record (“11”) contains return rate for SLR and S:N for LLR in the same field
  - APOLLO wants to report # of fires, which can be recovered from the fire rate
  - Add new field for S:N and leave old field for return rate?
  - Adds a new field to record -> compatibility issues
- 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”

Format Issues - Software Versions

- Capturing software versions could help analysts and stations isolate data anomalies 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

Format Issues - Conclusion

- Need to enforce the format, and can repair old data
- Need to augment format for issues that have come up, but want to keep backward compatibility for as long as possible

Data Flow

- Web site diagram shows general flow
- Have added CRD test directories for non-validated data at EDC and CDDIS
- Have added old format and CRD quarantine directories at EDC and CDDIS

Data Quarantine Procedure

- Station notifies ILRS CB that a change has occurred
- Data is quarantined at EDC and CDDIS (DC/OC)
- (EDC and CDDIS directories are synchronized)
- ILRS web site “Station Change Status” page is updated
- AWG is notified
- AWG responds when data is verified as OK
- ILRS web site “Station Change Status” page is updated
- Station is notified
- Quarantined data is released for general distribution by OCs
- This is similar to CRD validation.

Station Upgrade Status

Status of ILRS Stations Engineering/Testing

(as of Wednesday, 02-Feb-2011 17:01:37 EST)

This table summarizes the status of upgrades, repairs, and testing of stations in the ILRS network.

Site Name	Sta. No.	ILRS Code	Upgrade		SOD Update	Description	Quarantine Start	Data Released
			Start	End				
Lviv	1831	LVIV	Dec-2009			Laser repair		
Greenbelt	7105	GODL	Apr-2010	04-Dec-2010	No update	System down for operational issues	04-Dec-2010	20-Jan-2011
Haleakala, HI	7119	HA4T	19-Jun-2010	12-Jul-2010	No update	Laser upgrades	20-Jul-2010	07-Oct-2010
Beijing	7249	BEIL		15-Aug-2010	No update	Telescope servo and kHz laser upgrade; data taken from 09-Nov-2010 onward released	15-Aug-2010	02-Feb-2011
Koganei	7308	KOGC		15-May-2010	No update	Telescope repairs	15-May-2010	10-Aug-2010
Koganei	7328	KOGL	15-Jun-2010	31-Aug-2010	No update	Restart of operations	31-Aug-2010	20-Jan-2011
Tanegashima	7358	GMSL	02-Apr-2010	28-Jul-2010	No update	Telescope repairs	28-Jul-2010	20-Sep-2010
Arequipa	7403	AREL	05-Aug-2010	01-Oct-2010	74031306	Repair of mount tachometer	22-Sep-2010	12-Nov-2010
Borowiec	7811	BORL	25-Mar-2010			Laser repair		
Kunming	7820	KUNL		06-Apr-2010	No update	kHz laser upgrade	06-Apr-2010	

Red text indicates sites which are currently undergoing an upgrade, repair, or testing activity.

Data Flow Questions

- Who moves data to CRD val or quarantine directories?
    - Each OC? Each DC? How is other DC data sync-ed?
- Who copies data from CRD val or quarantine directories to distribution directories?
    - Each OC? Each DC? How is other DC data sync-ed?

DF&P WG Charter

1. AIMS

Standardize procedures affecting data up to generation of full-rate and normal point data

Maximize the efficiency of the process of generating the laser data, by ensuring that accurate predictions are available and that standardized software procedures are available to produce a uniform quality data product

Ensure that the data product contains all the information needed by the analyst, and that the data and related information are available for the analyst in a convenient form

Charter - II

2.1 PREDICTIONS - Document and maintain standards for:

- Force model and reference frame of IRV integrator. ***(CPF)***
- Format of IRV state vectors. ***(CPF, instead)***
- Standard methods to correct IRVs for unmodelled forces. ***(CPF, unneeded?)***
- Standard format for time bias functions, drag functions, satellite maneuvers, etc.. ***(CPF, unneeded or keep?)***
- Standard software packages for generating predictions from IRVs.***(CPF)***

The Working Group will endeavor to ensure that there are several groups within the network with the capability of generating IRVs and time bias corrections, and that there are efficient and rapid means of distribution. ***(CPF; strike time bias corrections?)***

IRVs are obsolete. Replace references with CPF.

Need to add tracking restrictions here?

Charter - III

2.2 DATA PROCESSING

Document and maintain the standard algorithm for formation of normal points.

Endeavor to maintain standard software packages for fitting a trend function to pass residuals, for analyzing the distribution of pass residuals, and calculating various reference points (mean, peak, etc). ***(Normal Point package, too.)***

Charter - IV

2.3 STATION INFORMATION- Document and maintain formats for recording station information, such as:

- Eccentricity vectors
- Site occupancy details
- Changes to systems (e.g., SCH log files)
- Alternative operational configurations of stations (e.g., SCI log files)

With CRD, wanted to replace SCH/SCI with Cn records

What about ILRS web site "Station Change Status?"

Charter - V

2.4 FINAL DATA PRODUCT FORMATS AND TRANSMISSION STANDARDS

Maintain documentation of formats for the final data products, full-rate data (FR) and normal points (NP).

Coordinate continuing review of formats, and if necessary revise.

Document standards for transmission, including file naming conventions.

Mostly done, especially with CRD format.