Implementing the new CRD data format

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Motivation

- CRD format to replace all previously used formats by 2010
- Stations need certification of their CRD data before switching off their standard deliveries (AWG is part of this process)
- The ILRS Analysis Working Group (AWG) is part of this process
- AWG actions and concerns
  - ILRS ACs must be prepared to switch to CRD seamlessly
  - Need for s/w to interface CRD data and our analysis packages
  - Understand the additional info/precision in CRD, and
  - Give feedback to design group for possible improvements

Tests performed

- Test data provided by MLRS in CRD and ILRS NP format for the months of May to August 2008.
- In a first step, we generated s/w that converted the CRD data back to ILRS FR format, which is directly readable by our analysis s/w (GEODYN), we also used provided s/w from DF&P WG
  - All quantities were converted using the IFRF precision
  - We "extended" the IFRF to allow the same precision as CRD
- Both data formats used in reductions (together and separately) and residuals of individual ranges examined pass-by-pass

RMS of fit for MLRS May '07

	NO.WTD	WTD-MEAN	WTD-RMS	TYPE	CONFIGURATION STATION	SATELLITE	ARC
L1	17	-0.0000	0.0069	CRD	MLRS7080	7603901	070506
	17	0.0000	0.0069	NP	MLRS7080	7603901	
	47	-0.0000	0.0106	CRD	MLRS7080	7603901	070513
	47	0.0000	0.0107	NP	MLRS7080	7603901	
	19	0.0000	0.0079	CRD	MLRS7080	7603901	070520
	20	-0.0000	0.0084	NP	MLRS7080	7603901	
	57	-0.0000	0.0117	CRD	MLRS7080	7603901	070527
	57	0.0000	0.0117	NP	MLRS7080	7603901	
L2	34	0.0000	0.0121	CRD	MLRS7080	9207002	070506
	34	-0.0000	0.0119	NP	MLRS7080	9207002	
	37	-0.0000	0.0102	CRD	MLRS7080	9207002	070513
	37	-0.0000	0.0100	NP	MLRS7080	9207002	
	2	0.0199	0.0305	CRD	MLRS7080	9207002	070520
	2	0.0195	0.0301	NP	MLRS7080	9207002	
	14	0.0000	0.0056	CRD	MLRS7080	9207002	070527
	16	0.0000	0.0060	NP	MLRS7080	9207002	
E1	9	-0.0000	0.0064	CRD	MLRS7080	8900103	070520
	9	-0.0000	0.0066	NP	MLRS7080	8900103	
E2	6	-0.0000	0.0038	CRD	MLRS7080	8903903	070506
	6	0.0000	0.0038	NP	MLRS7080	8903903	

ILRS NP to ILRS FR

```
NP for the same data
99999
760390107131708024195320-000083200000000597465200940431
860234566670045600077126000009308031296203200220000043
860904854911044884749423000011008031296403200890000069
863381920594042824226300000008508031296003200990000056
000715494069042137743997000008408031296403200470000062
001311750487041934327877000004708031296203200020000041
```

```
MERIT from NP file:
760390107131860234566670708024190456000771260000093532008031296203200220000043
760390107131860904854911708024190448847494230000110532008031296403200890000069
760390107131863381920594708024190428242263000000085532008031296003200990000056
760390107132000715494069708024190421377439970000084532008031296403200470000062
760390107132001311750487708024190419343278770000047532008031296203200020000041
```

CRD to ILRS FR (MERIT2)

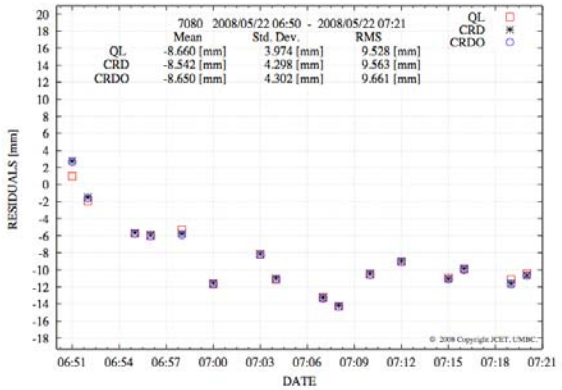
MERIT from QL

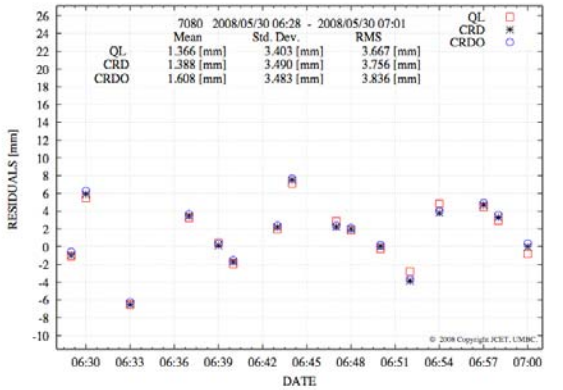
```
760390108151233635623984708024190516697578770000079532008009292904 2
760390108151234293907088708024190509355295320000091532008009292904 2
760390108151236286764986708024190489977299680000103532008009292904 2
760390108151236499856612708024190488181122190000082532008009292904 2
760390108151238485707949708024190474291208770000075532008009292904 2
```

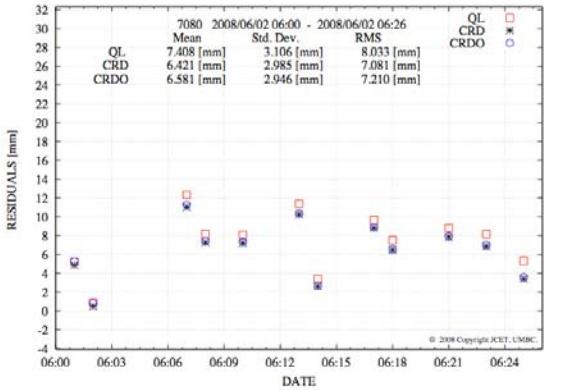
MERIT from CRDX

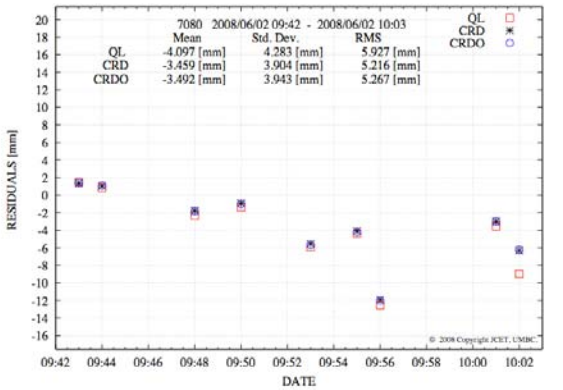
```
760390108151023363562398359369000000802419000000000000005166975787700000008000532000080088292952
760390108151023429390708769046000000802419000000000000005093552953400000008000532000080088292952
760390108151023628676498628894000000802419000000000000004899772996700000008000532000080088292952
760390108151023649985661170464000000802419000000000000004881811221800000008000532000080088292952
760390108151023848570794909108000000802419000000000000004742912087700000008000532000080088292952
```

Residual Comparisons (1)

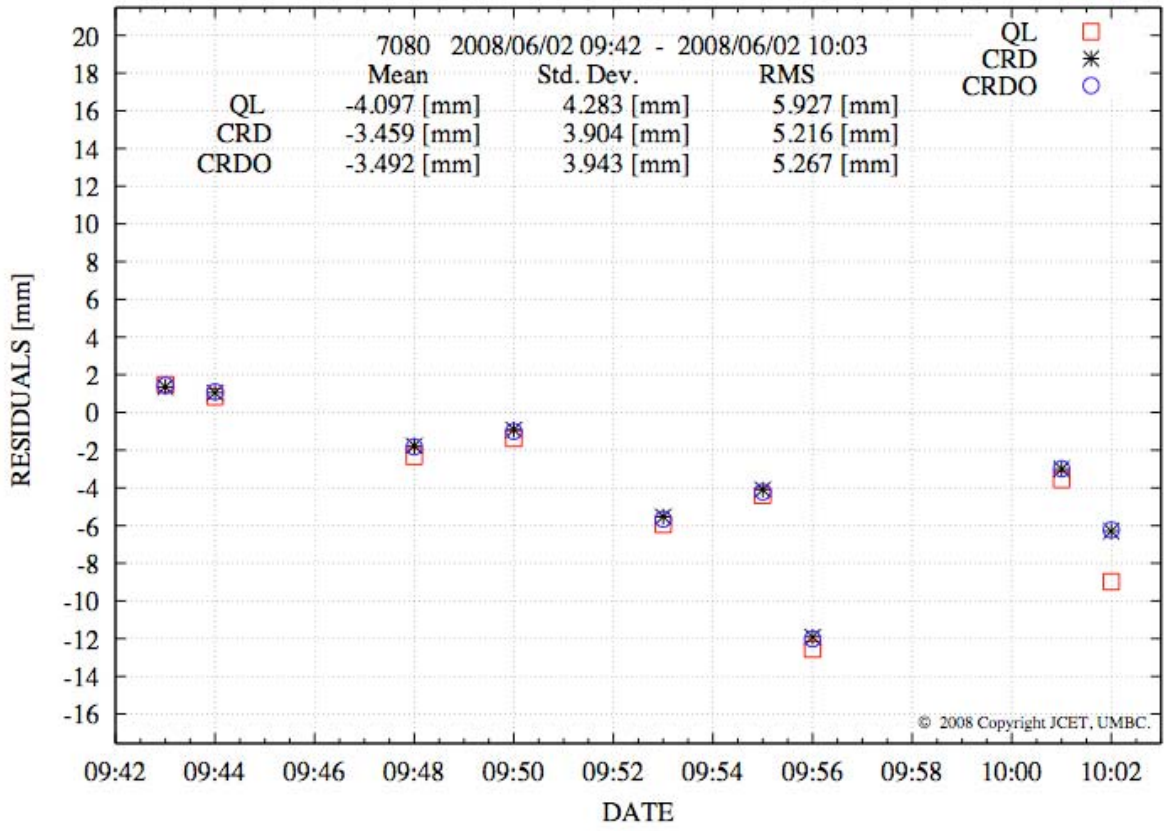




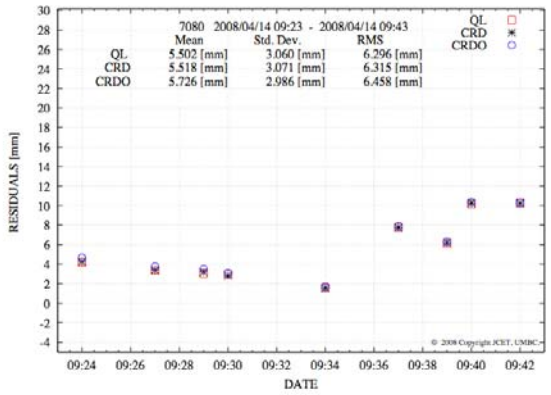


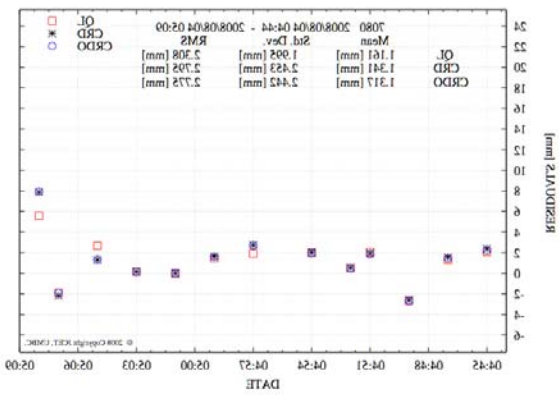


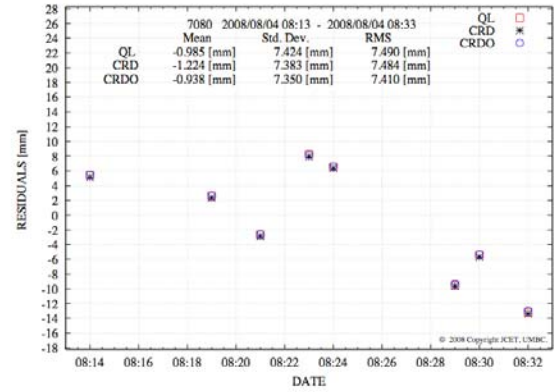
Residual Comparisons (1)

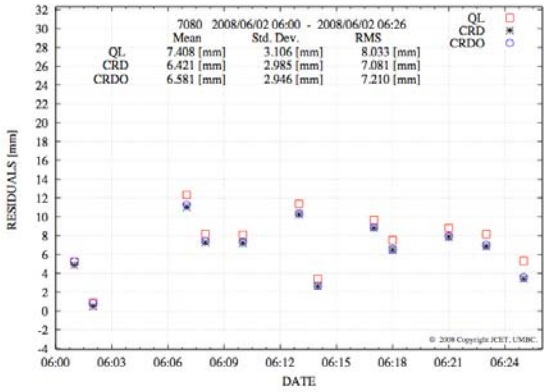


Residual Comparisons (2)

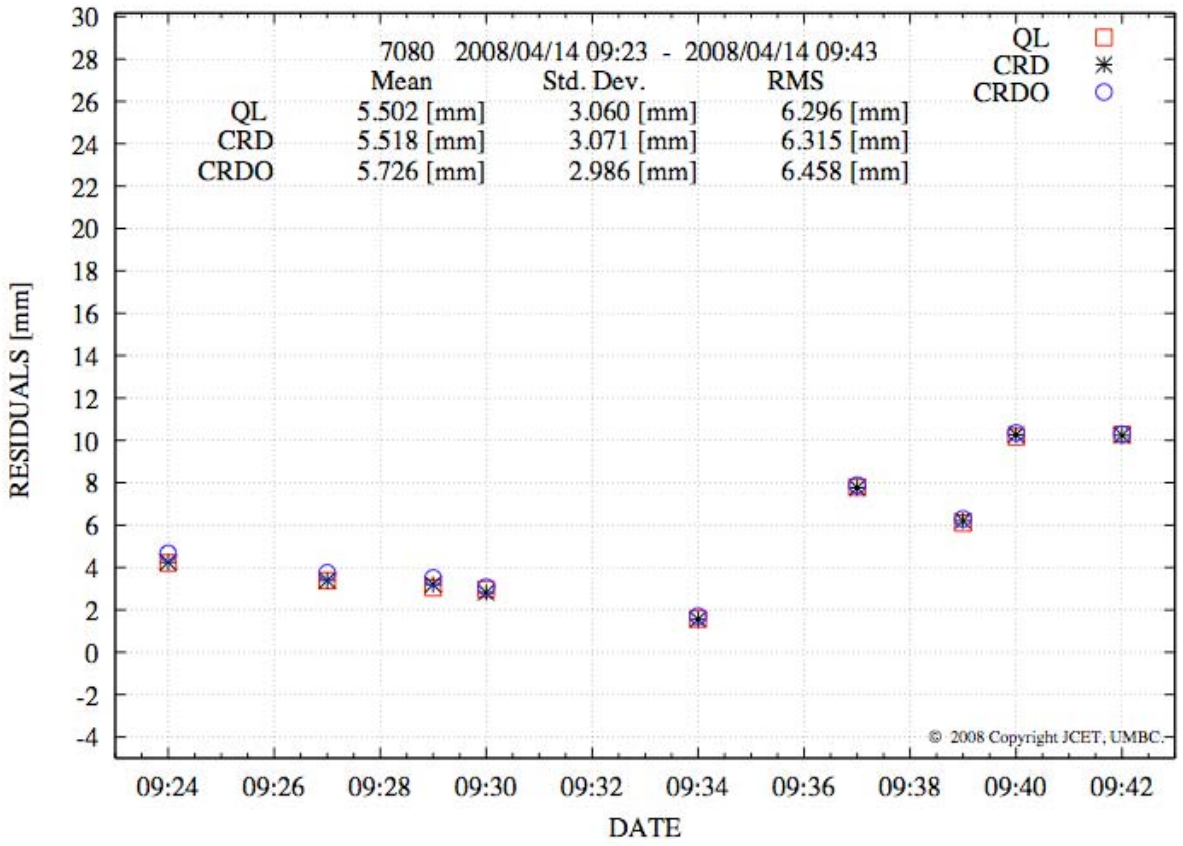




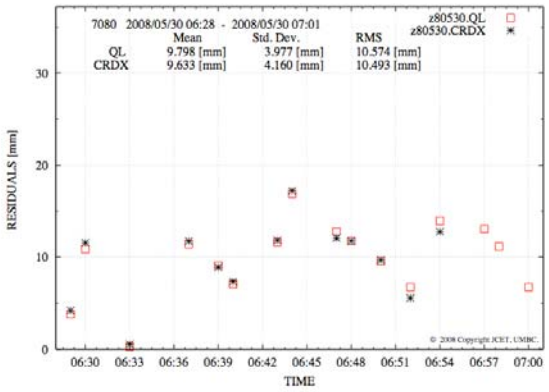


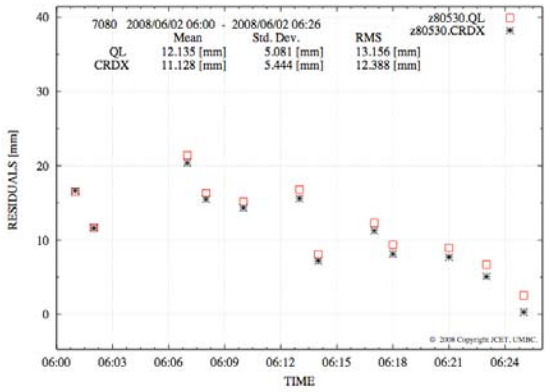


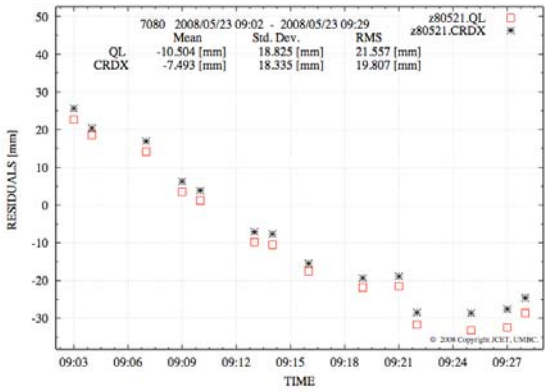
Residual Comparisons (2)

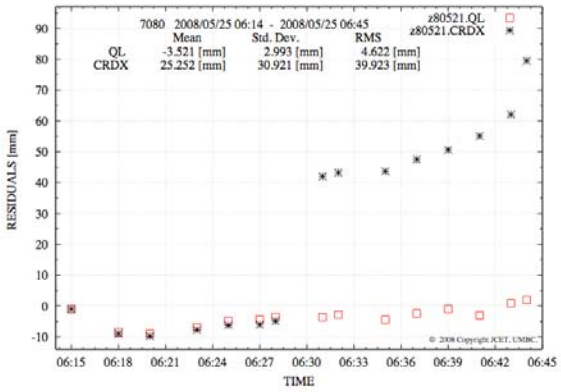


Residual Comparisons (3)









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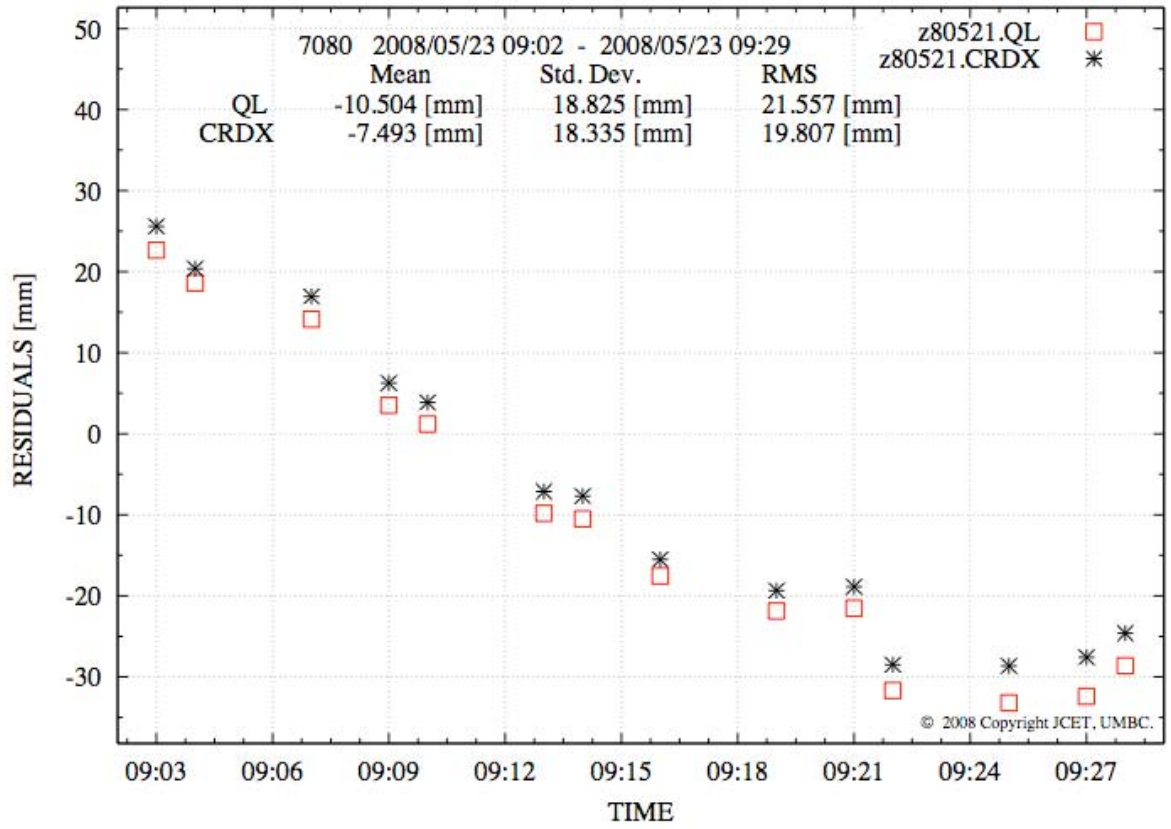

Summary

- By fall 2007 we had successfully used NP data in the new CRD format in GEODYN
- No major issues with the format, nearly identical results
- We had identified at the time that more tests are needed:
  - Use current test files to evaluate the effect of the higher precision available
- **We have now examined data from May to August 2008 from MLRS (only)**
- **Differences seen are consistent with additional precision (lower RMS generally)**
  - More data types in test files to examine FR, QL and engineering data
  - We need to examine what other quantities analysts would like to include to improve analysis of more accurate data expected from future stations & s/c