Session 1

Issues with Satellite Predictions

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2017 ILRS Technical Workshop
Riga, October 2-5, 2017

- Predictions are an essential part of SLR operation
- Stations need good predictions to do their job
- Poor predictions can have an impact on station and network performance
- No quality checks for prediction accuracy

- General data flow
  - Predictions are generated by prediction providers in CPF format
  - Files are uploaded to ILRS data centers or provided via stand-alone FTP
  - Stations download all files or selective by provider/target
  - Prediction files are used until new predictions are available

What can go wrong?

What can go wrong?

- No data available to stations
  - Prediction provider is down or not producing
    - Not enough data for orbit determination (e.g. Kompsat-5, TechnoSat)
    - Takes time for station to notice
  - CPFs are inconsistent
    - Filenames don't match content (e.g. problems with Glonass-135 CPFs)
  - Data distribution is not working
    - Many small problems after CDDIS transfer to new platform

- Poor Quality
  - Acceptable quality is station dependent
    - Problem for smaller stations with limited FOV
  - Increases time to find target if at all
    - Acquisition time per NP increases which may be better spend on other targets
  - Frustrating for observers
    - Manual observer may not try at all after some time
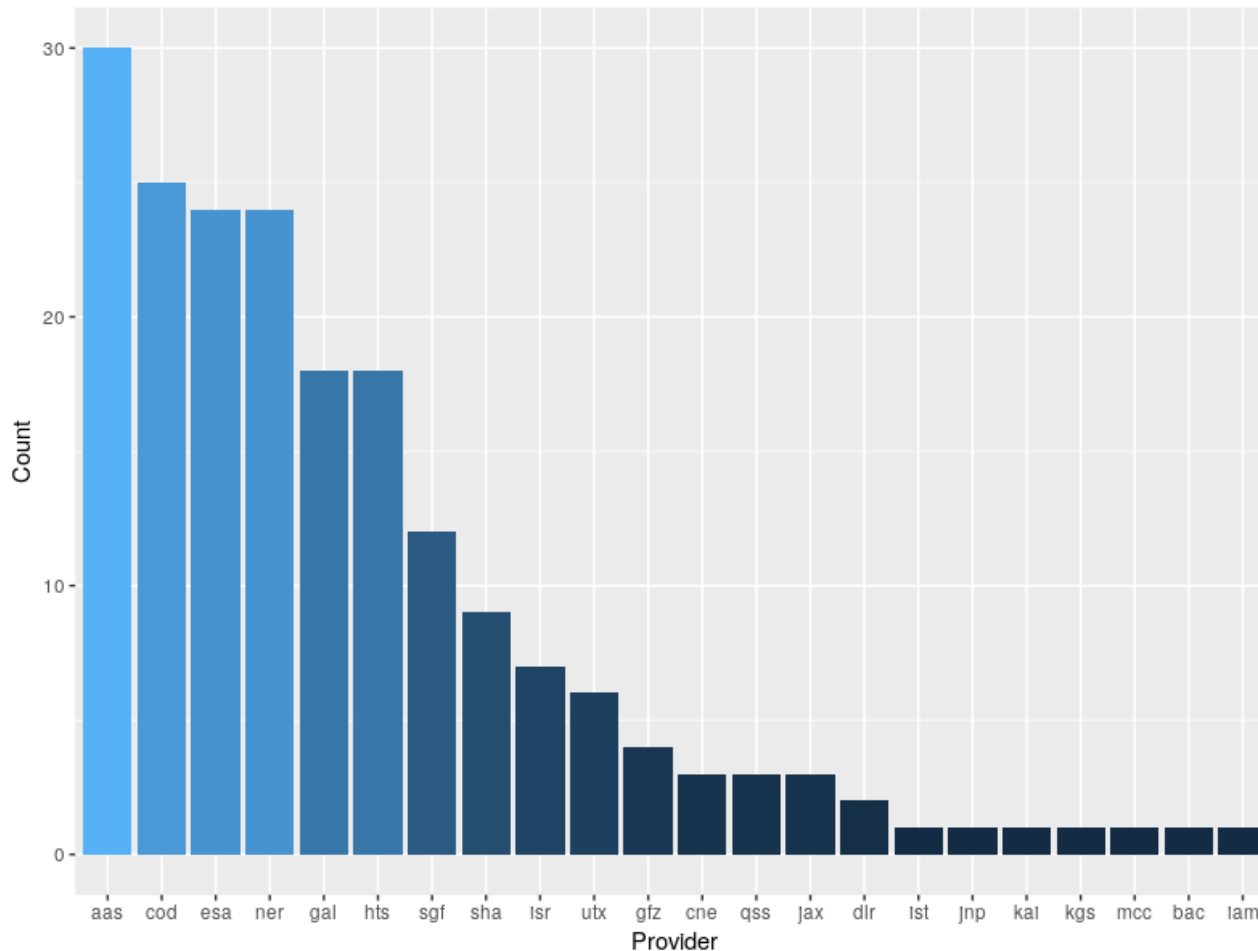
- We have 22 active provider (over last 6 month)
- Most of them produce predictions for more than one target

Prediction provider per target
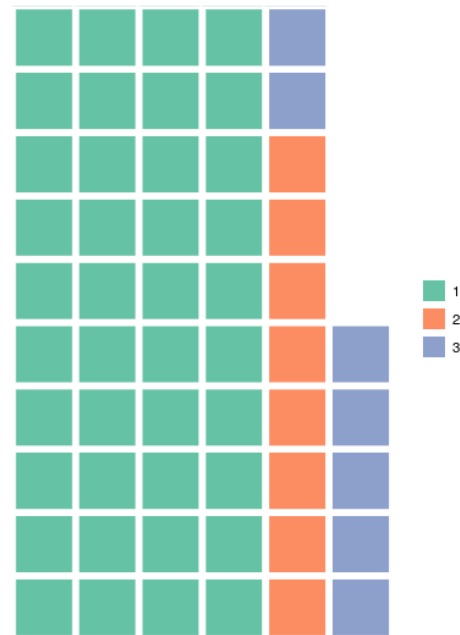
Prediction provider per target
(Excluding GNSS)

Possible Quality Checks

- Comparing prediction from different providers
  - Comparison of each component X, Y and Z
  - Requires at least two providers per target
  - Requires three provider for voting
  - Implemented by SGF: http://sgf.rgo.ac.uk/qualityc/cpf_qc_resids.html

- Comparing prediction with real measurements
  - Comparing can be done after first NP arrive at the DCs
  - Estimation of time and range bias
  - Can also be used for extrapolation
  - Details in Session3 presentation of Sven Bauer

Lageos1 CPF Comparison Residuals
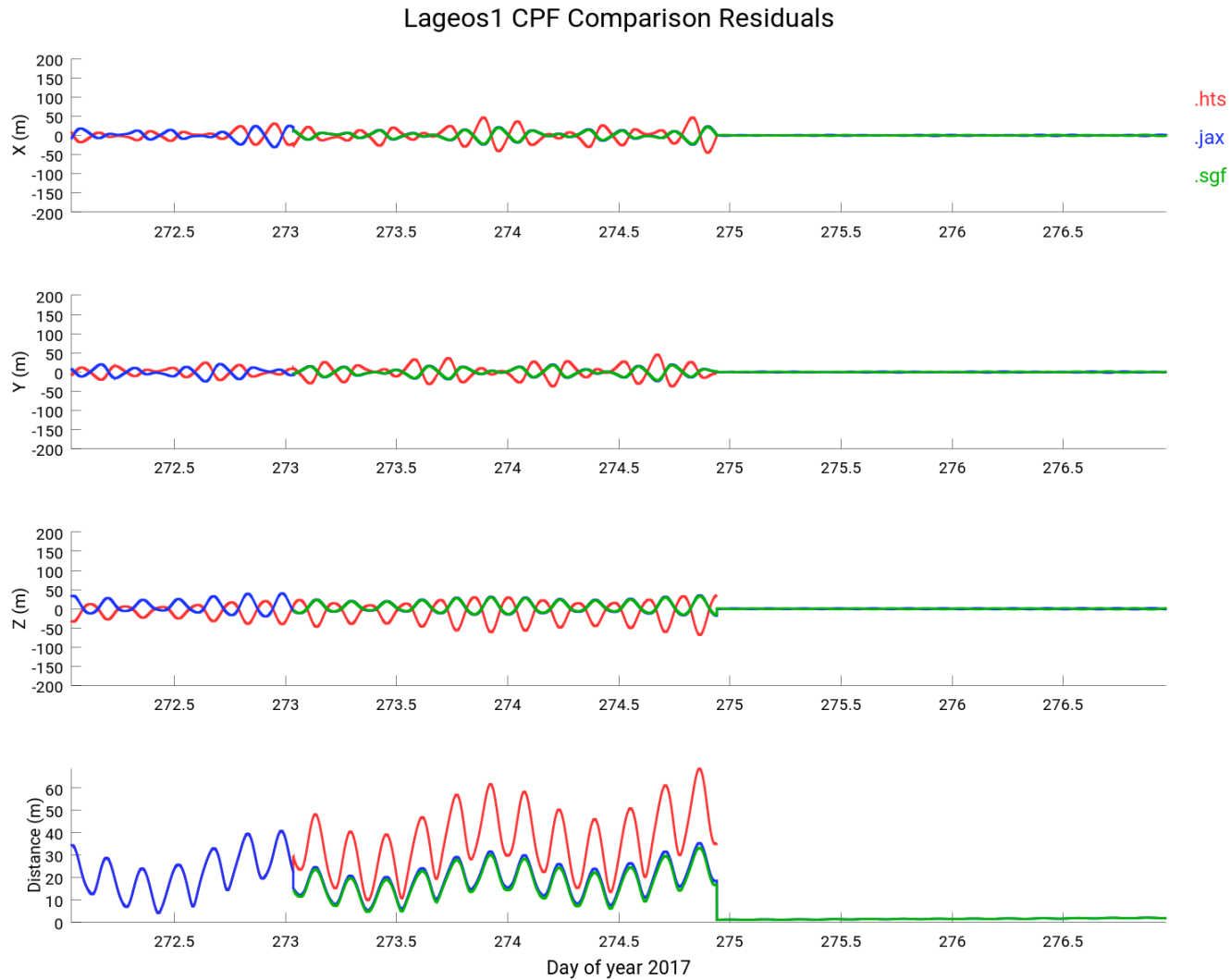
- Last HTS update on September 27

Envisat CPF Comparison Residuals
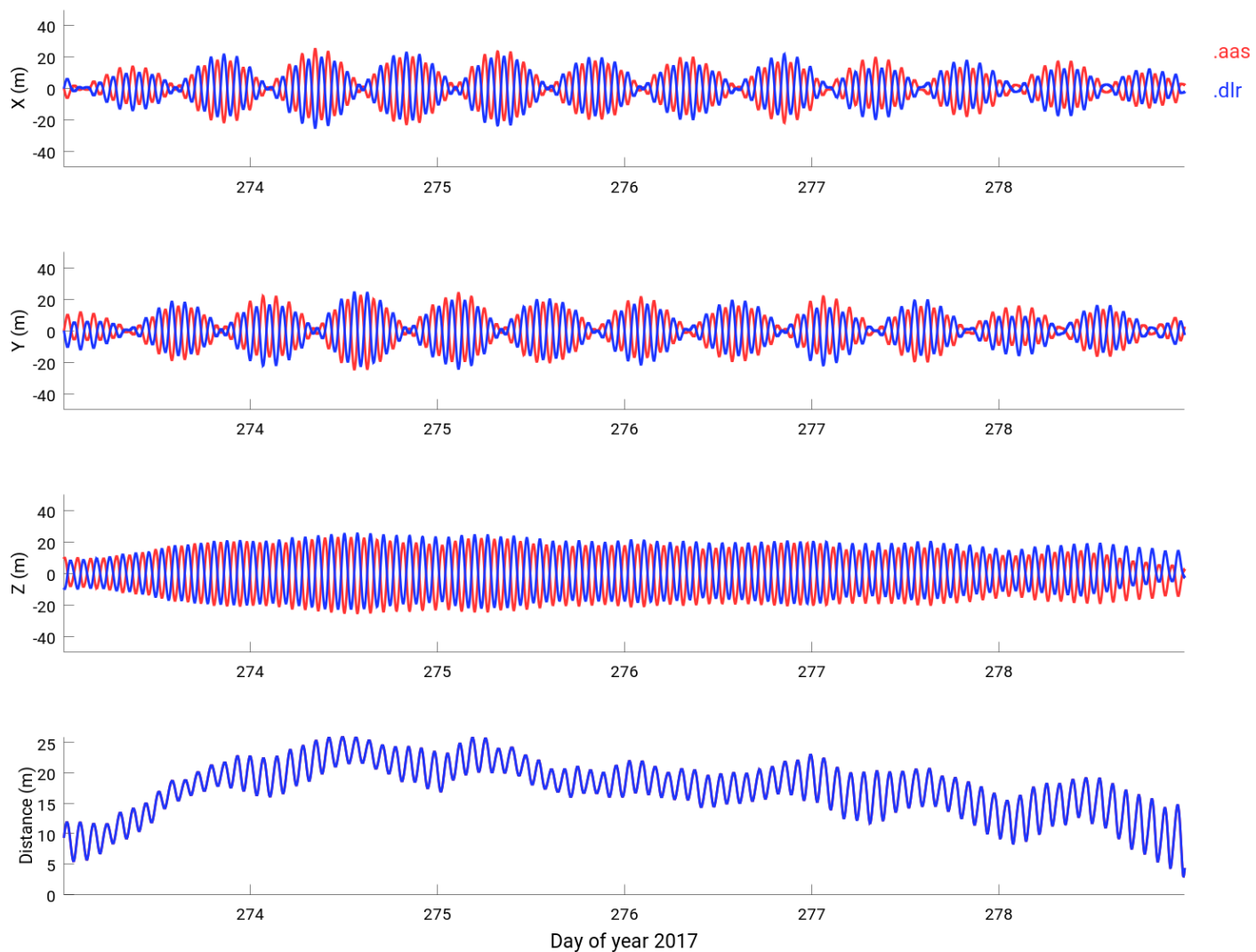
		SGF7741	SGF7731	SGF7721
beaconc	SGF	2.0 (0.0 / # 13)	5.6 (0.1 / # 34)	8.6 (0.1 / # 66)
		ESA7741	ESA7731	ESA7721
cryosat2	ESA	-1.0 (NaN / # 2)	-6.3 (0.2 / # 11)	-16.1 (0.3 / # 28)
		AAS7731	AAS7721	AAS7711
envisat	AAS	-2.0 (NaN / # 2)	2.0 (0.3 / # 10)	-0.5 (0.7 / # 14)
		DLR7731	DLR7721	DLR7711
envisat	DLR	-6.9 (NaN / # 2)	-16.1 (0.5 / # 10)	-68.1 (1.0 / # 14)
		GFZ7742	GFZ7741	GFZ7734
gracea	GFZ	1.0 (NaN / # 1)	-39.2 (NaN / # 1)	-41.3 (NaN / # 1)
		SHA7741	SHA7731	SHA7721
hy2a	SHA	2.2 (NaN / # 1)	22.2 (0.1 / # 7)	7.7 (0.0 / # 20)
		CNE7741	CNE7731	CNE7721
jason2	CNE	0.4 (NaN / # 1)	2.2 (0.1 / # 10)	9.3 (0.1 / # 22)
		CNE7741	CNE7731	CNE7721
jason3	CNE	-0.1 (0.0 / # 4)	-1.5 (0.0 / # 28)	0.0 (0.1 / # 64)
		SGF7741	SGF7731	SGF7721
jason3	SGF	0.4 (0.0 / # 28)	-0.3 (0.1 / # 64)	0.3 (0.1 / # 80)
		KGS7741		
kompsat5	KGS	-24.0 (NaN / # 2)		

- Kompsat5 no data for days 773 and 772 and CPFs only contain 3 days
- AAS envisat predictions better than DLR

		KAI7741	KAI7731	KAI7721
stsat2c	KAI	4.4 (NaN / # 1)	1109.3 (NaN / # 1)	673.4 (NaN / # 1)
		ESA7741	ESA7731	ESA7721
swarma	ESA	0.1 (NaN / # 2)	14.6 (0.4 / # 10)	-273.8 (0.9 / # 17)
		ESA7741	ESA7731	ESA7721
swarmb	ESA	0.9 (NaN / # 2)	9.7 (0.2 / # 10)	-76.8 (0.2 / # 15)
		ESA7741	ESA7731	ESA7721
swarmc	ESA	-0.2 (NaN / # 1)	12.5 (0.1 / # 10)	-248.9 (0.4 / # 17)
		GFZ7742	GFZ7741	GFZ7734
tandemx	GFZ	3.5 (0.0 / # 4)	-0.5 (0.0 / # 4)	6.8 (0.2 / # 12)
		AAS7721	AAS7711	
technosat	AAS	-26.1 (0.0 / # 5)	136.5 (0.1 / # 8)	
		DLR7731	DLR7721	DLR7711
technosat	DLR	6.3 (NaN / # 1)	284.8 (2.4 / # 5)	338.5 (0.6 / # 8)

- Do you have problems with predictions?
- Do you use both data centers?
- Can you easily switch between providers?

- Other ideas for quality checks we missed?
- Is there interest for a time bias prediction service?