SLR evaluation of ITRF2014/DTRF2014 by NSGF AC
Preliminary results

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Residual analysis of LAGEOS-1 and LAGEOS-2 orbits

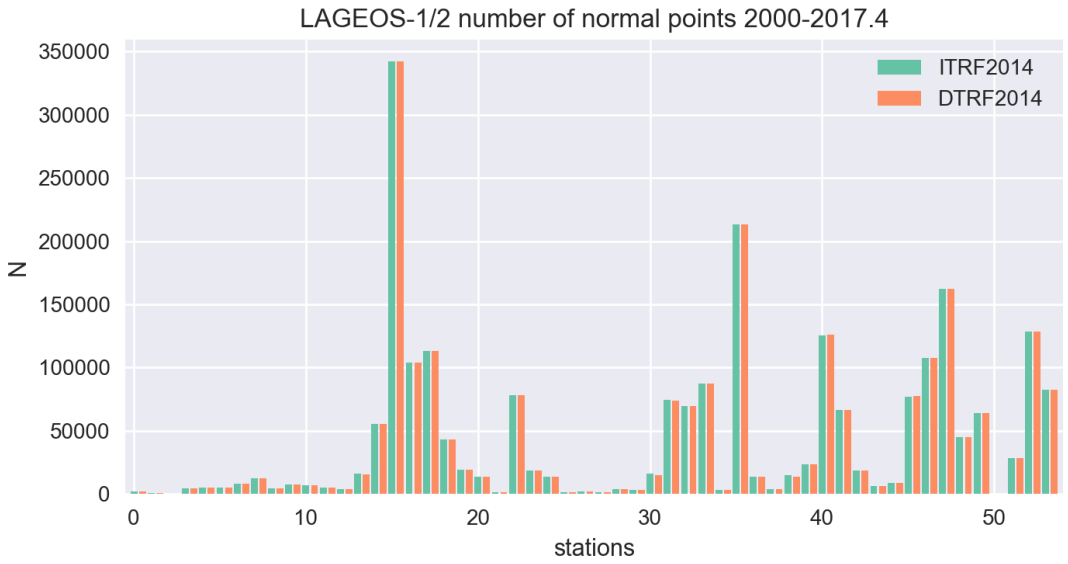
Station coordinates and EOPs fixed

Two solutions: with and without estimating range errors

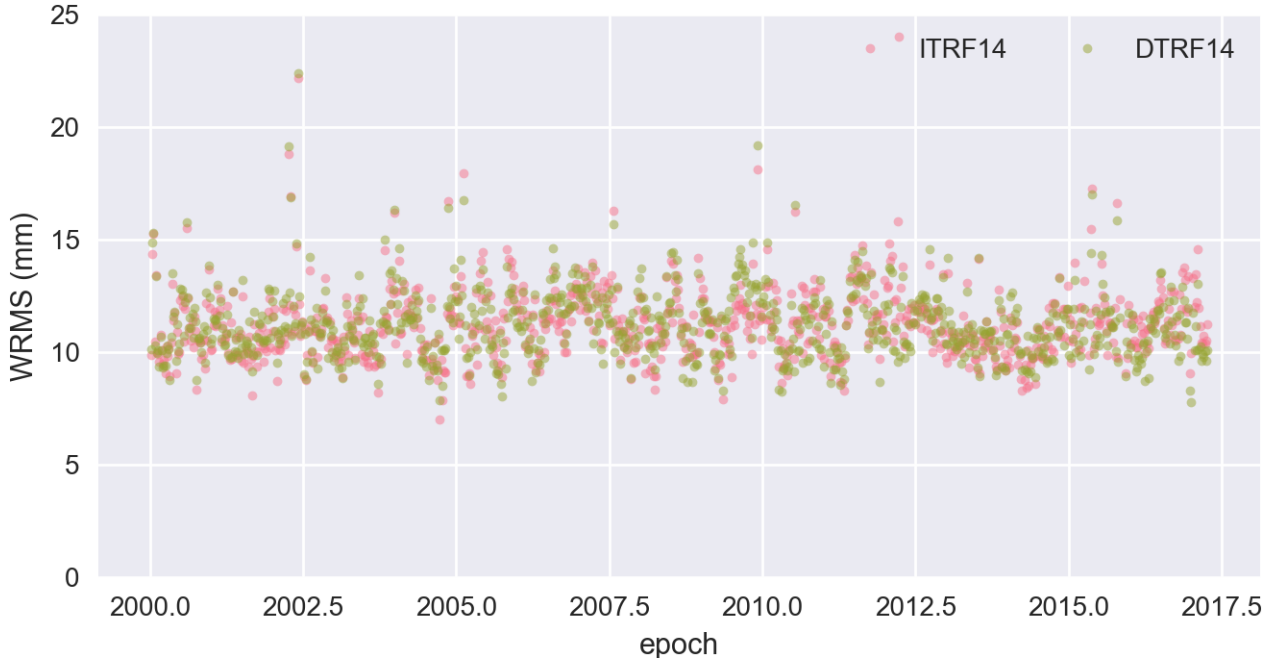
Period: 2000 – 2017.3

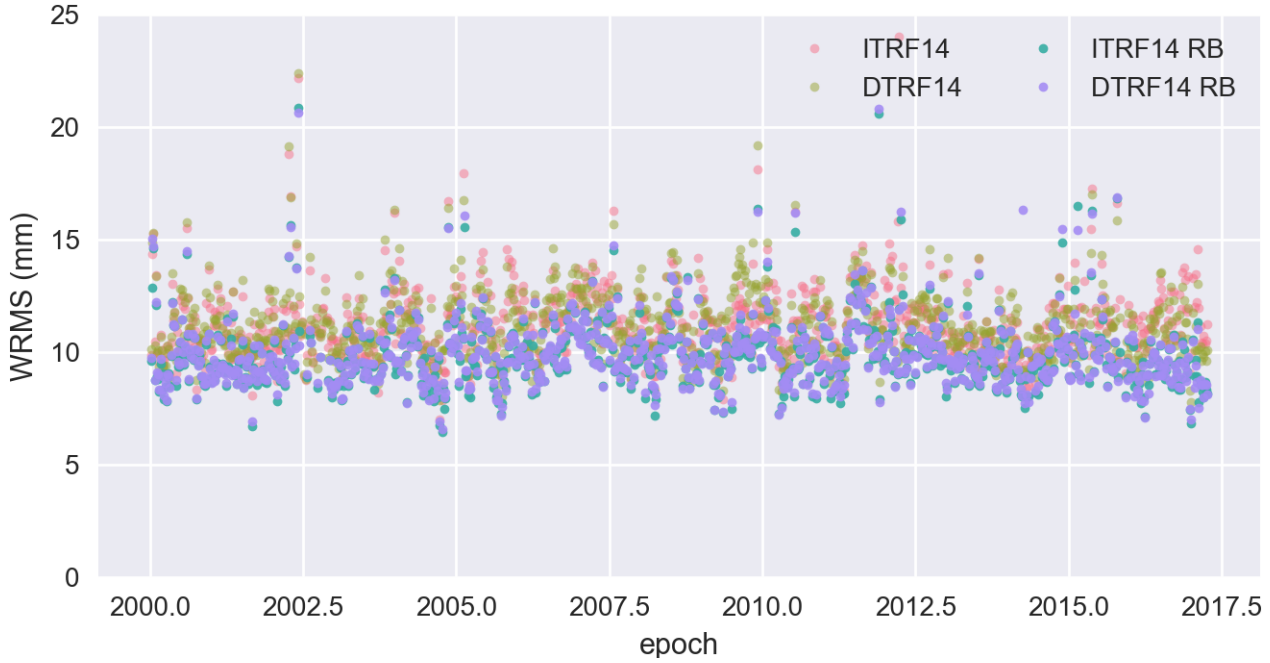
Some relevant questions:

- solution description (number of sites/NPs)
- overall performance
- significant differences?
- earthquake sites performance
- performance post period of input data

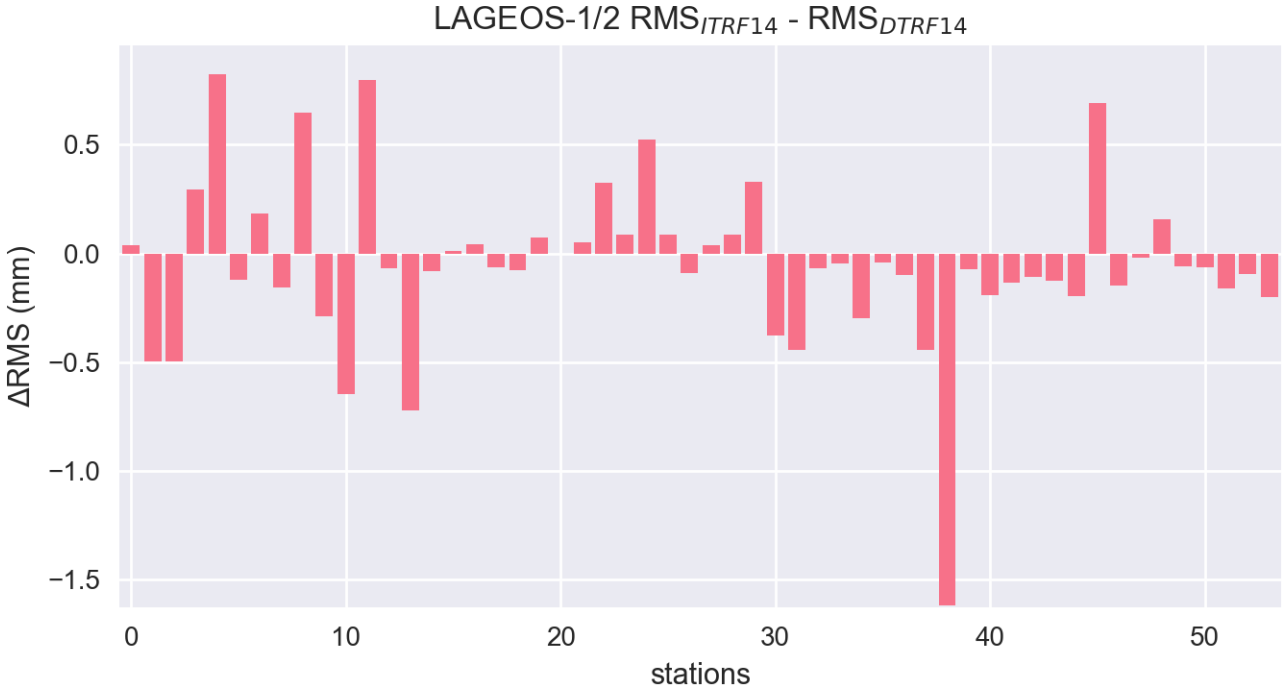


	ITRF2014		DTRF2014	
	std	RB	std	RB
# stations	65	68	57	57
NP LG1	1233487	1213610	1229843	1204914
NP LG2	1113661	1093846	1109035	1085914





	ITRF2014		DTRF2014	
	std	RB	std	RB
median RMS (mm)	11.12	9.66	11.11	9.71



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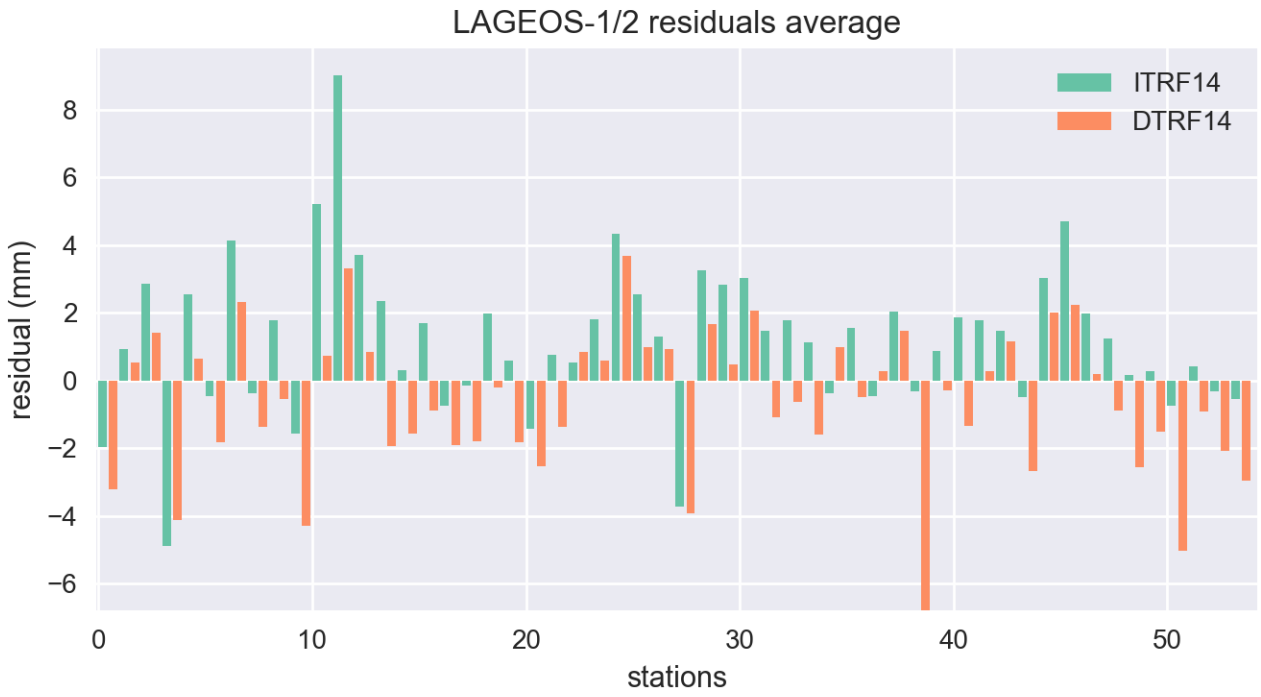
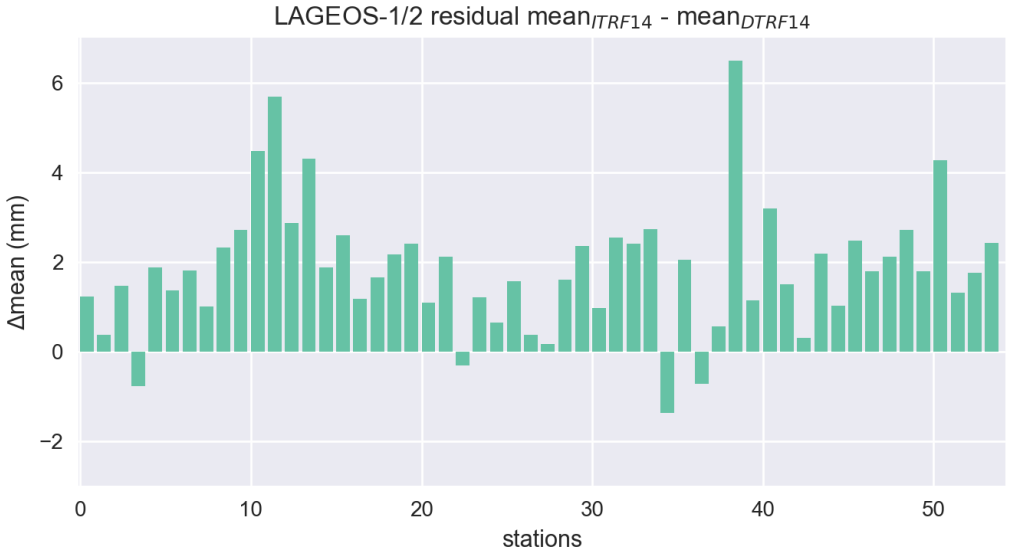
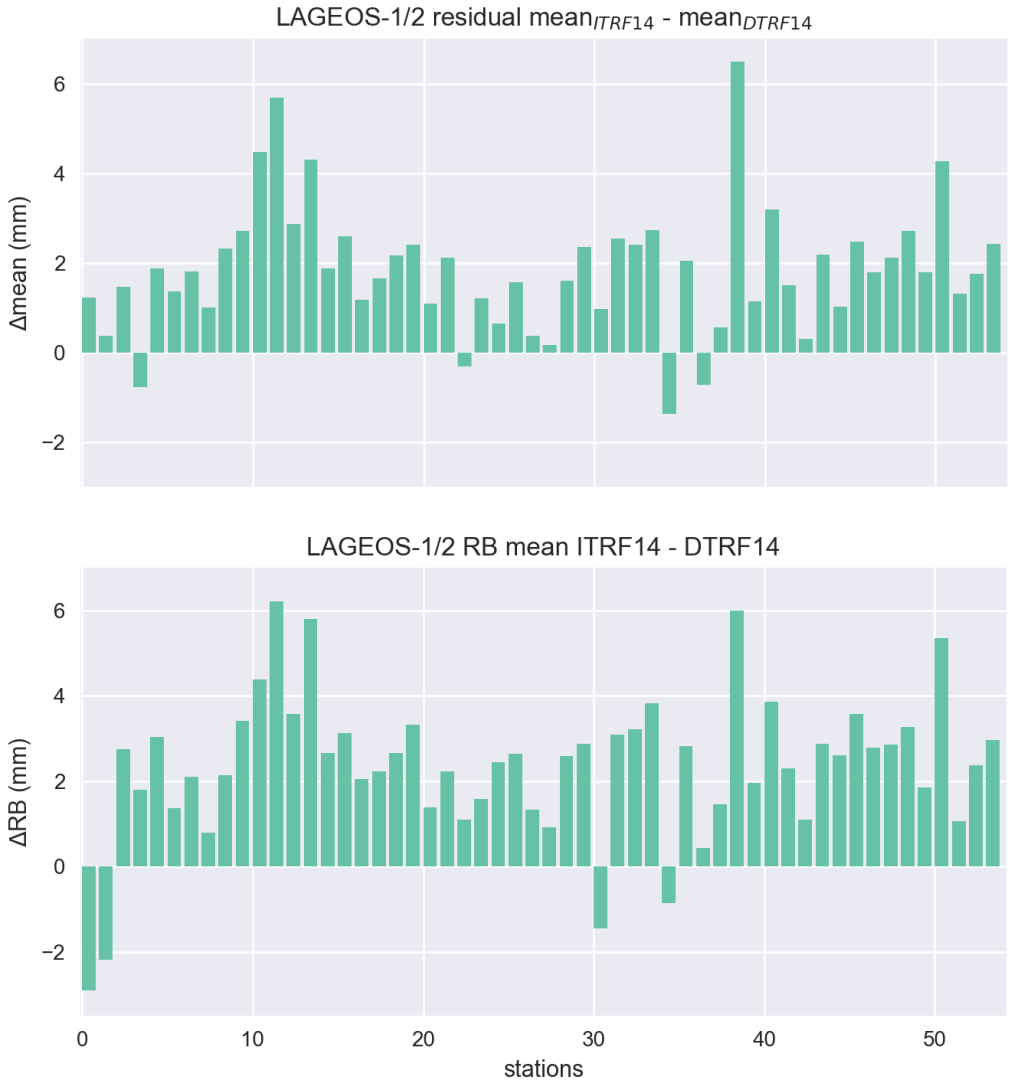
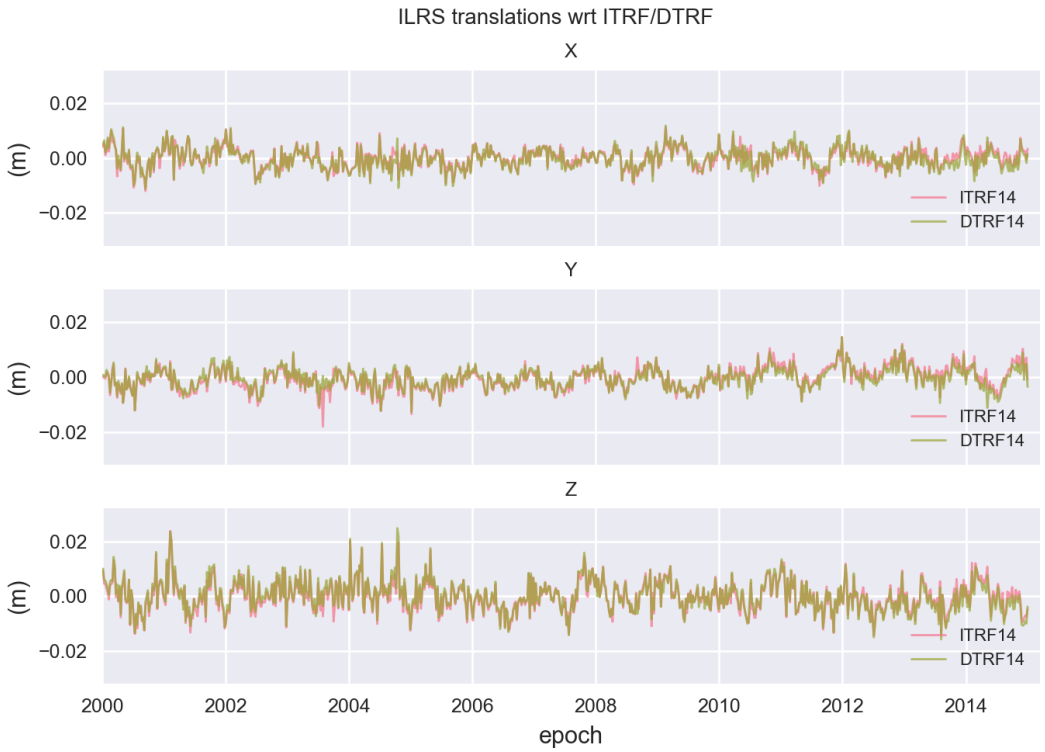
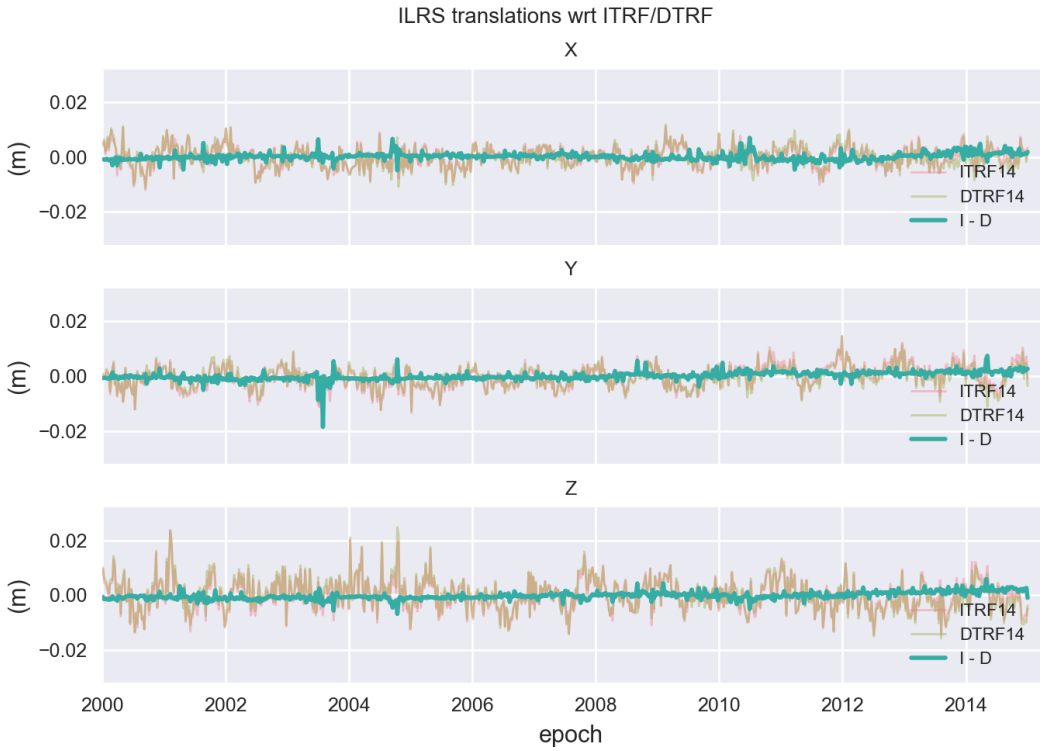


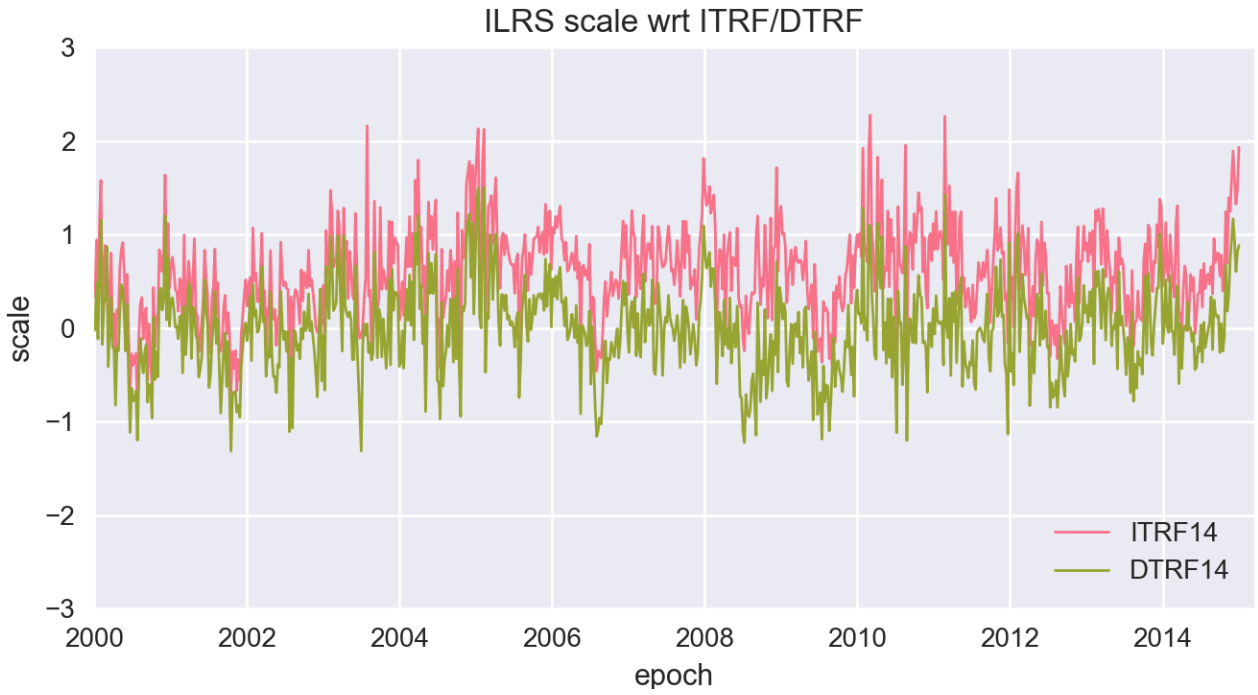
- Orbit differences between solutions insignificant in the radial direction
- Differences in the underlying frame translate to mean residuals ≠ 0
- Residuals absorbed if estimating RB

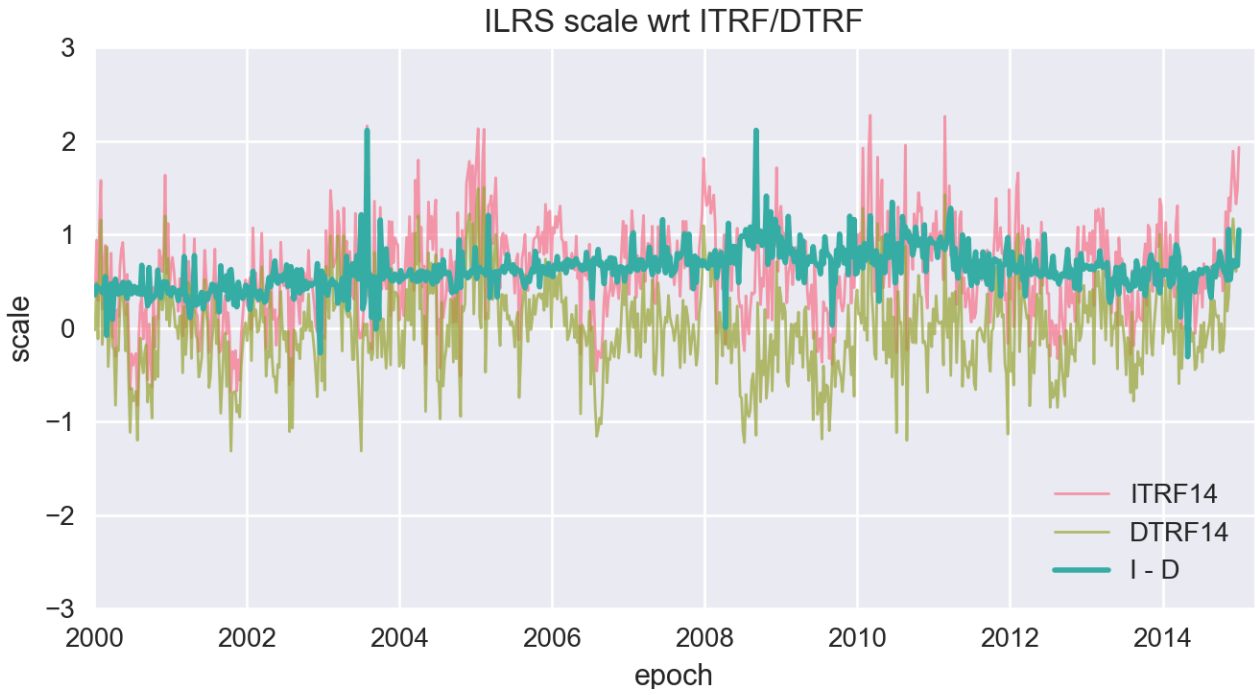




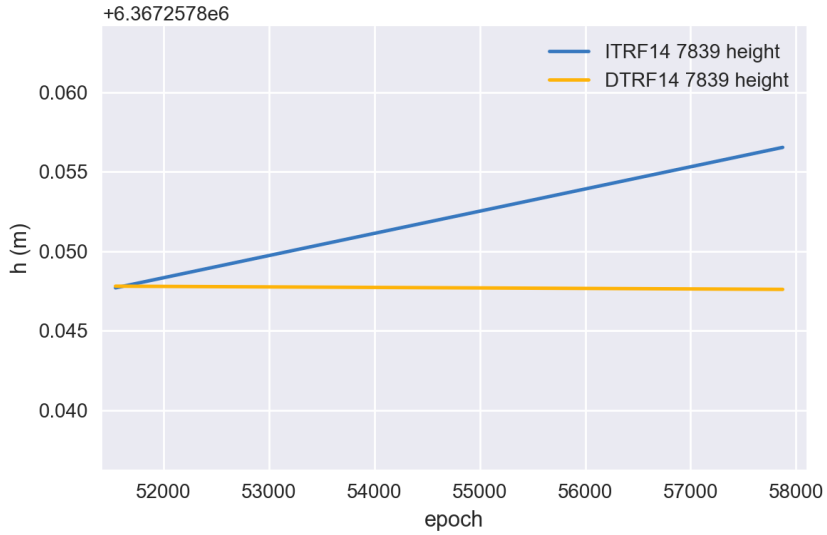




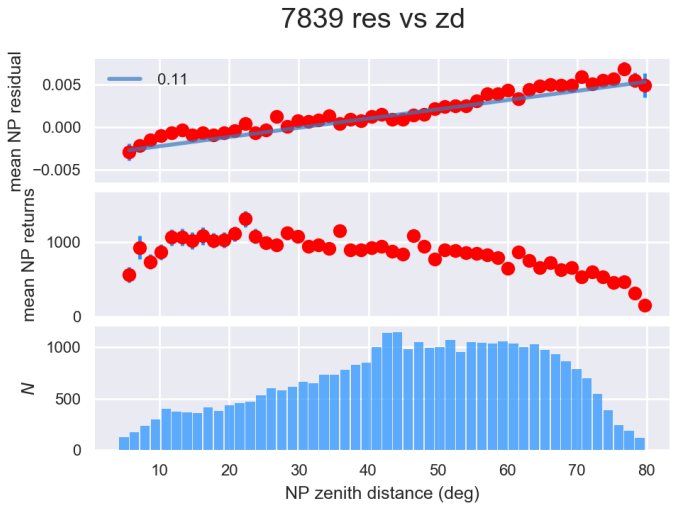




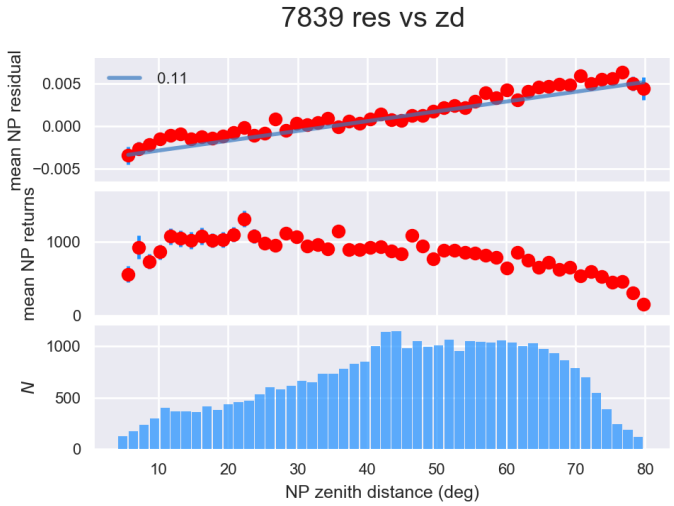
- ILRS-A combined solution (ASI CC) shows no scale difference relative to DTRF2014 (s = -0.02 ppb)
- Relative to ITRF2014, s = 0.6 ppb
- This implies that DTRF2014 station coordinates for laser stations are unchanged relative to input series (?)
- We know ITRF2014 scale is the mean of SLR and VLBI (Δs = 1.37 ppb)



- Analysis of residuals can reveal inaccuracies in station positions and velocities
- Trends in residuals with elevation telltale sign of problems with TRF, RB, or both
- Observation geometry dictates upwards slopes with ZD for insuficient station height (and viceversa)



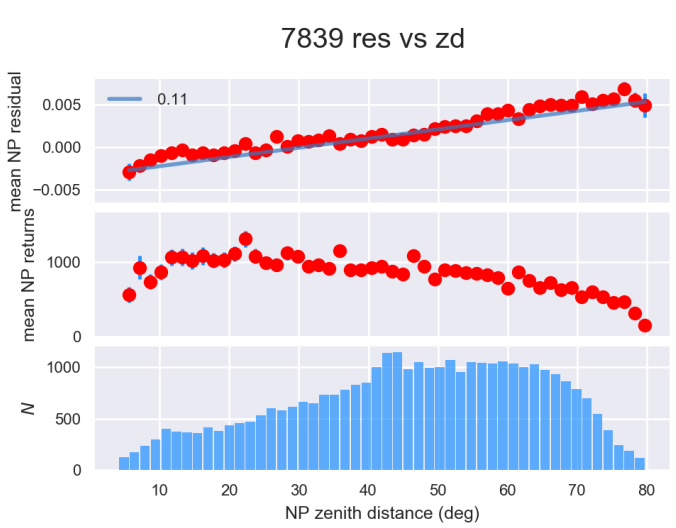
ITRF2014



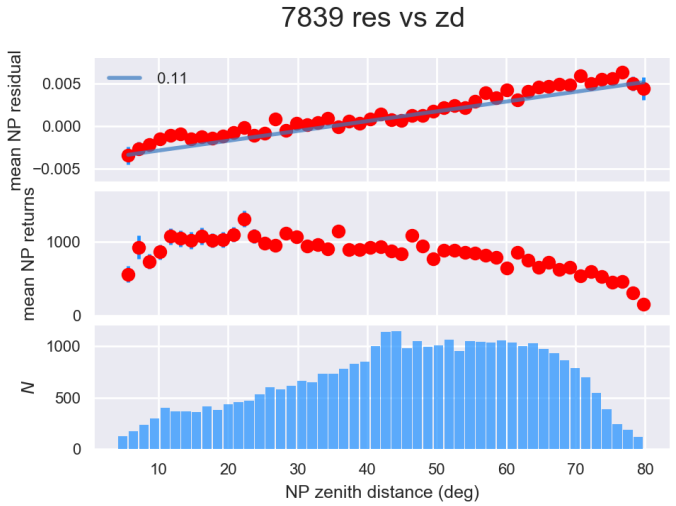
DTRF2014

2000 - 2004

2012 – 2017



ITRF2014



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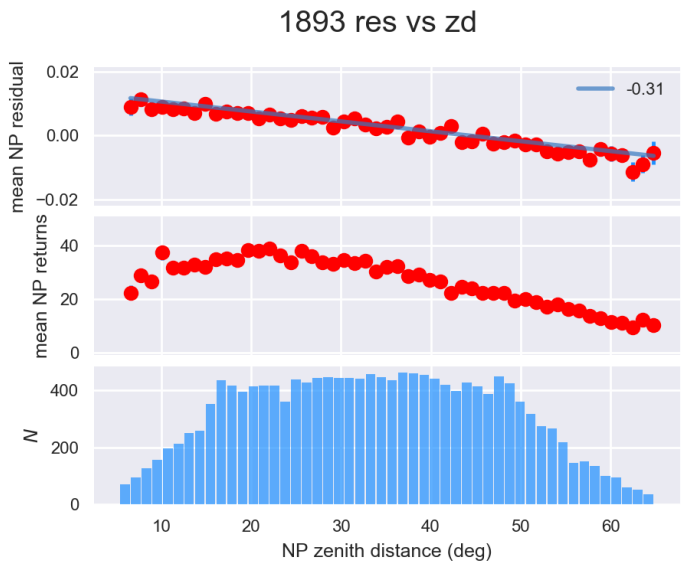
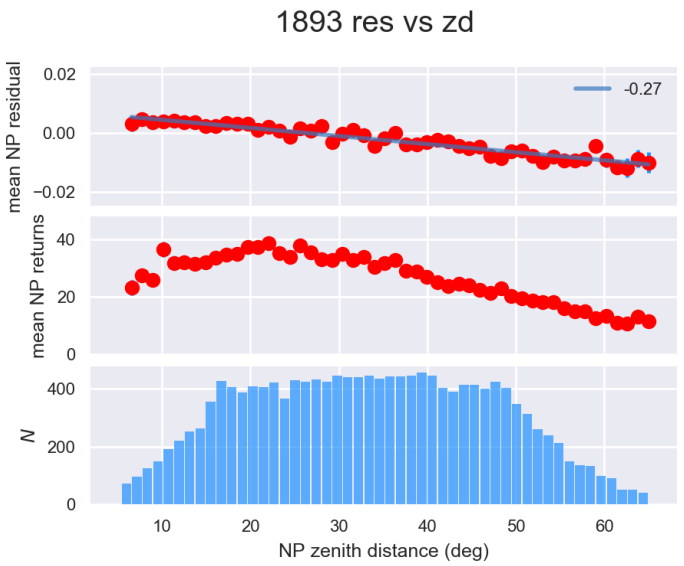
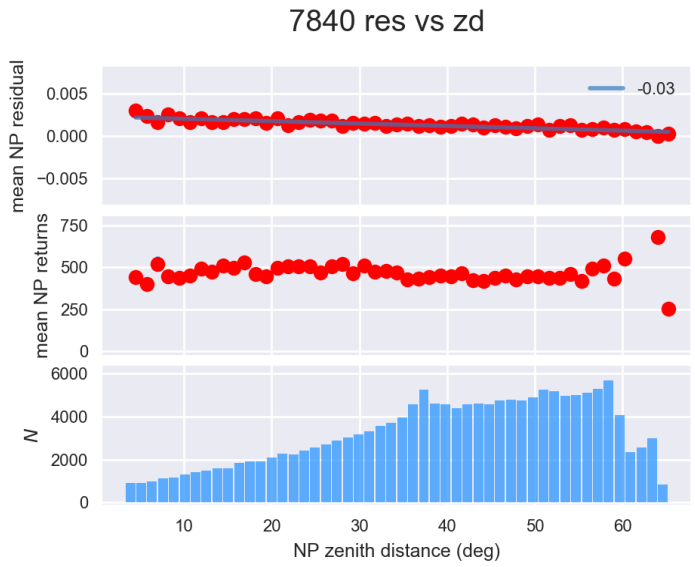


ITRF2014

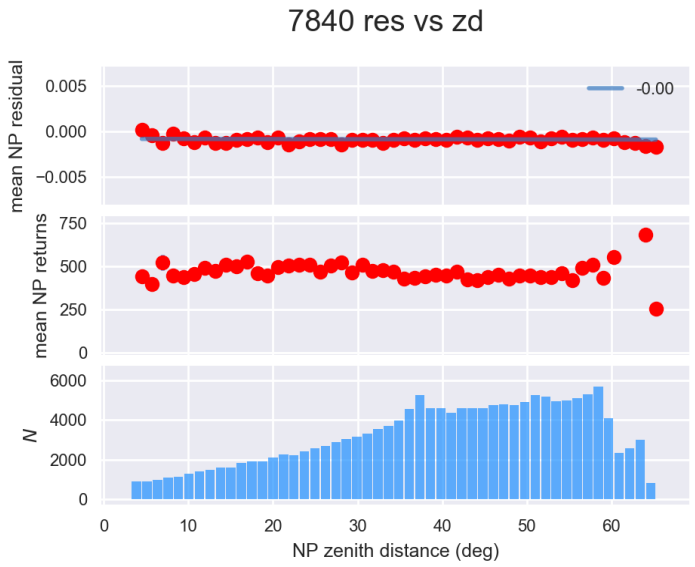


DTRF2014

- We estimated a negative RB for this station, but this was not done for ILRS-A
- Both ITRF2014 and DTRF2014 have absorbed the bias in the coordinates



ITRF2014



DTRF2014

- Absence of bias/coordinate problems leads to negligible trends with elevation in residuals

Performance for Earthquake sites

Performance for Earthquake sites

- Similar performance for ITRF2014 and DTRF2014 in terms of RMS of SLR residuals
- Greater number of stations available in ITRF2014, although small difference in number of normal points
- Differences in station positions between models a a few mm level, relevant for applications where coordinates are not estimated
- Differences in modelling of Earthquake sites (PSD functions in ITRF2014 and discontinuities in DTRF2014) may be significant (exhaustive exploration of this issue not done yet)
- Scale difference of 0.6 ppb between coordinates of laser stations in both frames. It is unclear what the reason for no scale difference between ILRS-A and DTRF2014 is
- Both frames affected by lacking of range error estimation in laser solutions

Thank you