JPL's IGS20 Reprocessing Campaign
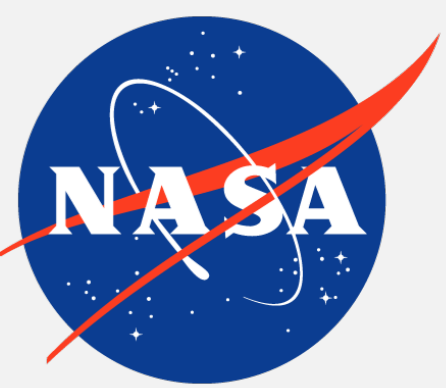
Komanduru, A.,[1,a] Peidou, A.,[1] Ries, P.,[1] Bertiger, W.,[1] Heflin, M.,[1] Hemberger, D.,[1] Sibthorpe, A.,[1] Murphy, D.,[1]

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REPROCESSING CAMPAIGN

In order to maintain a consistent set of orbit and clock products for our users, JPL reprocesses orbit and clock products in the IGS20 reference frame before switching Final products (currently in IGS14) to IGS20 (realization of ITRF20). We present the results from our orbit and clock product reprocessing of 2002-2023. JPL's reprocessed products, along with the finals products are in the Center of Mass (CM) frame.

POD PROCESS

Steps

1. Free network solution.
2. Free solution with ambiguity resolution.
3. Ambiguity-resolved solution with "no net rotation" (NNR) constraints applied to IGS20 frame sites.
4. Ambiguity-resolved solution with "no net rotation, translation and scale" (NNRTS) constraints applied to IGS20 frame sites.
5. Ambiguity-resolved solution with NNRTS constraints applied to JPL Terrestrial Reference Frame (JTRF) 2020.

Improvements

- Number of stations used increased to 120 from 80
- Optimized data weighting scheme
- Improved tropospheric modeling
- Updated software to support RINEX3
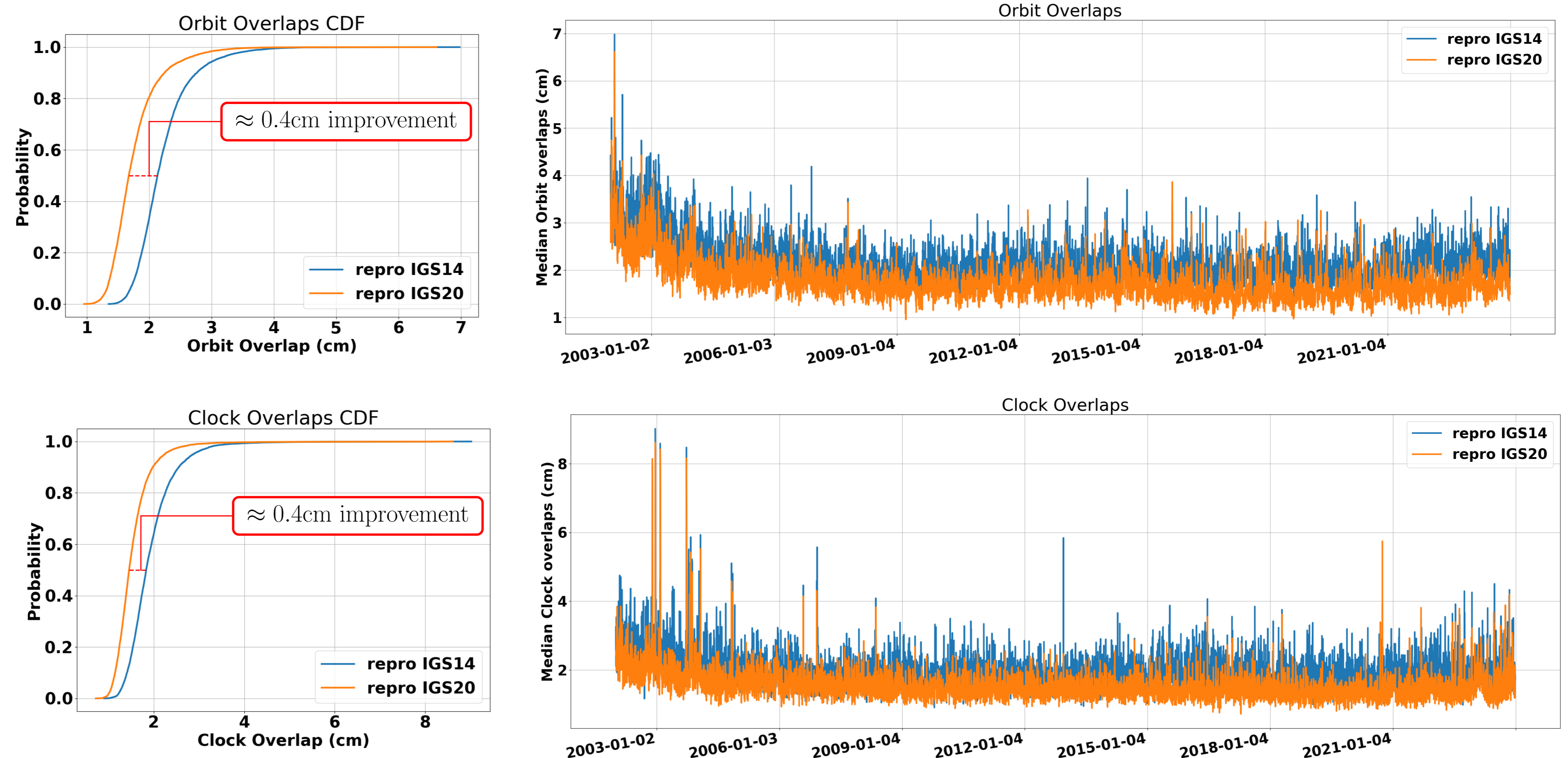- Inclusion of site-specific seasonals

POD EVALUATION

Figure 1: Orbit and clock overlap Cumulative Distribution Functions (CDFs) and time series of NNRTS products from IGS14 and IGS20 repros.
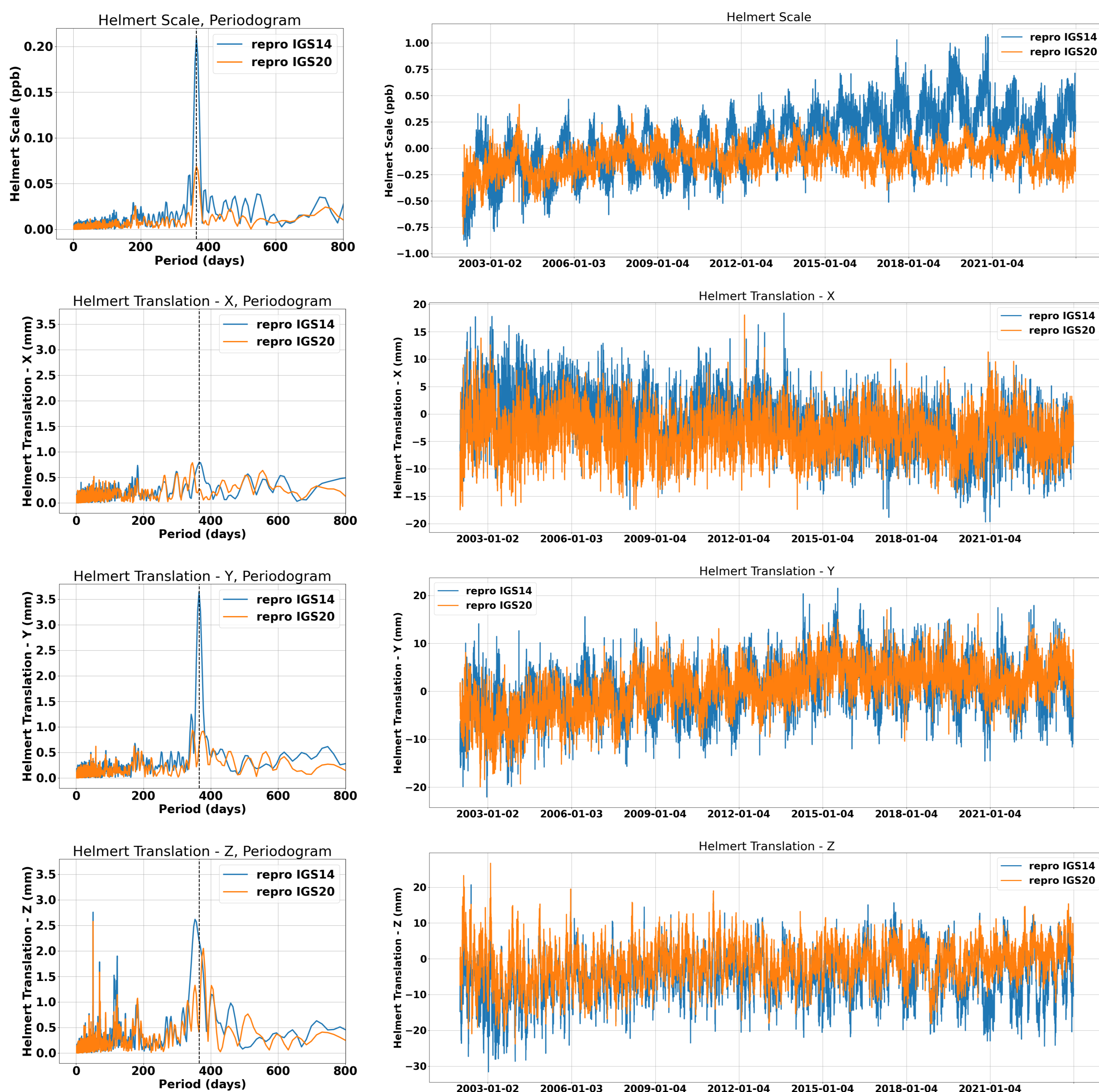
NETWORK TRANSFORMATION PARAMETERS

Figure 2: Helmert scale and translation parameter estimates and periodograms of free network products from repro IGS14 and repro IGS20 with respect to their corresponding frames. The vertical red line in the periodogram represents a period corresponding to an annual signal.

- Annual signal in Helmert scale: $\approx 0.21 ppb \rightarrow \approx 0.06 ppb$
- Annual signal in Helmert Y-translation: $\approx 3.5 mm \rightarrow < 1 mm$

PPP RESULTS
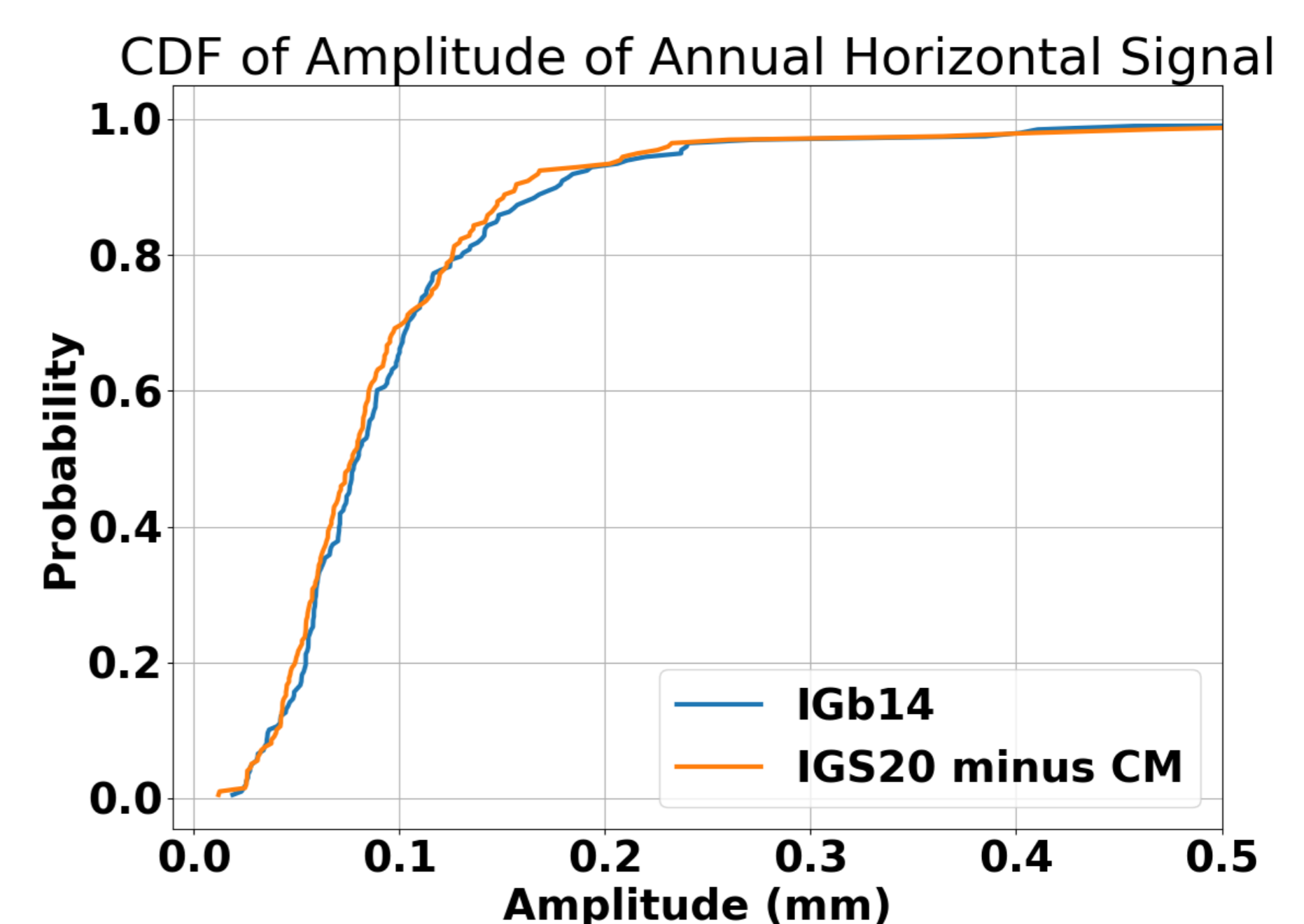
PPP in a CM frame — global CM signal is as good as PPP in a CF frame w.r.t. residual annual periodics!
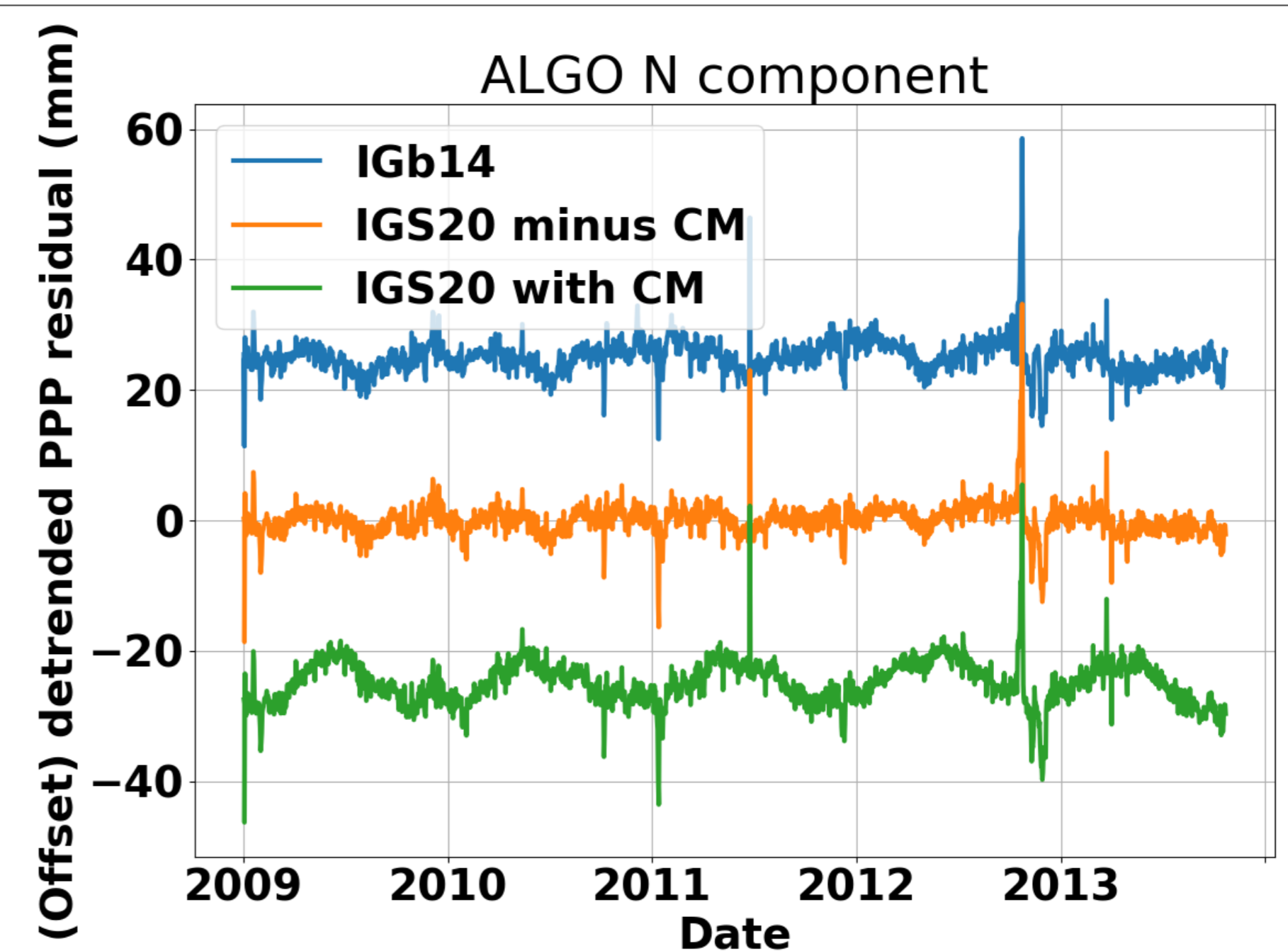
Figure 3: **Top:** CDF of amplitude of annual periodic signal along the local horizontal direction (East + North) for 198 stations PPP'd using (orange) IGS20 orbit and clock products + subsequent removal of global CM signal; and (blue) IGb14 orbit and clock products. **Bottom:** Example with detrended ALGO station position.

Products	E	N	V
IGb14	2.5	2.8	8.6
IGS20	2.1	2.2	7.2

Table 1: Inter Quartile Range (in mm) of each station-day of PPP of 198 common valid stations for IGb14 and IGS20 (CM) over 2009-01-01 to 2013-12-31 with respect to their respective frame positions.