

Validation of new generation of NRCan's Final GPS orbit, clock and ERP products

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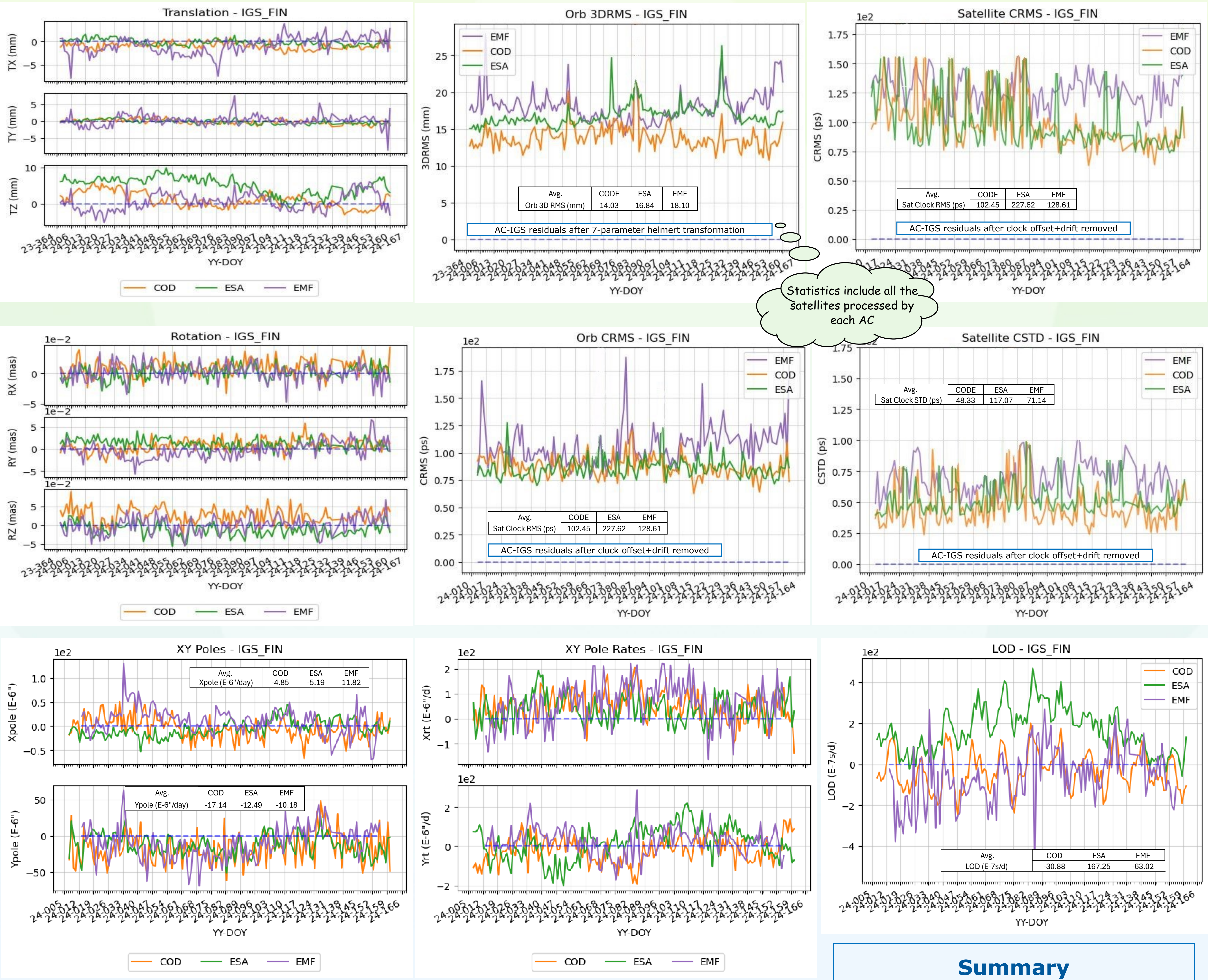
NRCan Final GNSS products

NRCan Final GPS products (EMF=EMR_FIN) consist of: precise orbits, station/satellite clocks, Earth Rotation parameters (ERPs) and stations' positions and velocities (SINEX). These products:

- Help define, maintain and improve the Canadian Spatial Reference System (CSRS)
 - Improve Canadian geospatial positioning
- Support the realization of the International Terrestrial Reference Frame (ITRF)
 - Contribute to a better understanding of Earth's rotation and deformation

Final products' strategy used

- GipsyX v2.1 (JPL) + in-house software
- Validated global station RINEX data files
- Reference Frame: ITRF2020/IGS20 (according to IGS recommendations)
 - No-net-rotation orbits. No-net-translation clocks
 - 30h arc for the orbits and 24h arc for the clocks
 - Resumed submitting to IGS since w2290 (Dec.2023)
- Orbits, ERPs and SNX currently included in IGS combination



Avg.	CODE	ESA	GFZ	MIT	GRG	EMR_FIN
tX (mm)	-0.88	-0.19	-0.18	0.21	1.78	-0.84
tY (mm)	-0.14	-0.19	-0.63	0.58	-1.59	0.30
tZ (mm)	1.00	5.09	1.43	2.52	1.43	0.54
rX (mas)	0.009	0.001	0.049	-0.010	0.011	0.002
rY (mas)	0.008	0.013	0.021	-0.003	0.013	-0.003
rZ (mas)	0.026	-0.011	-0.025	0.002	-0.011	0.001

The metric used for the validation of the NRCan GPS orbit, clock and ERP products were the orbit translations & rotations, orbit RMS, sat. clock RMS & STD among the ACs: CODE, ESA and GFZ against the IGS Final combined products. **Translation offsets:** relatively small comparable to other ACs; Offsets within few mm. **Rotation offsets:** minimal, similar to other ACs; Values close to zero. **Orbit 3d RMS:** on avg. 18mm; reasonably good orbit precision. **Orbit/Sat Clock RMS/STD:** higher than best ACs but latest RINEX3 results show improvement. Overall EMF demonstrates good performance in terms of Orbits metrics though Clocks will benefit from the transition to RINEX3 and multi-signal processing.

Summary