

On the recent activities of the IDS Associate Analysis Center at DGFI-TUM

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Implementation of new models into POD software DOGS

- new ITRS realizations
 - **ITRF2020** (Altamimi et al., 2023) + **respective metadata**
 - **DTRF2020** (Seitz et al., 2023) + **respective metadata**
 - **JTRF2020** (Abbondanza et al., 2023)
 - **DPOD2020** (v1.0; Moreaux et al., 2023)
- new **IERS 20 C04** (Bizouard et al., 2023) + **sub-daily EOP model** (Desai and Sibois, 2019)
- new Earth gravity field models
 - **CNES_GRGS.RL05MF_combined_GRACE_SLR_DORIS** (J.-M. Lemoine et al., 2023; see slides by S. Rudenko)
 - **IAG COST-G fitted signal model** (Peter et al., 2022)
- new ocean tidal models
 - **EOT20** (Hart-Davis et al., 2021),
 - **FES2014** (Lyard et al., 2021)
- handling and smoothing of **observed geomagnetic storm and solar flux indices** provided by the German Research Center for Geosciences (GFZ)

Study on radial orbit errors of contemporary altimetry satellites

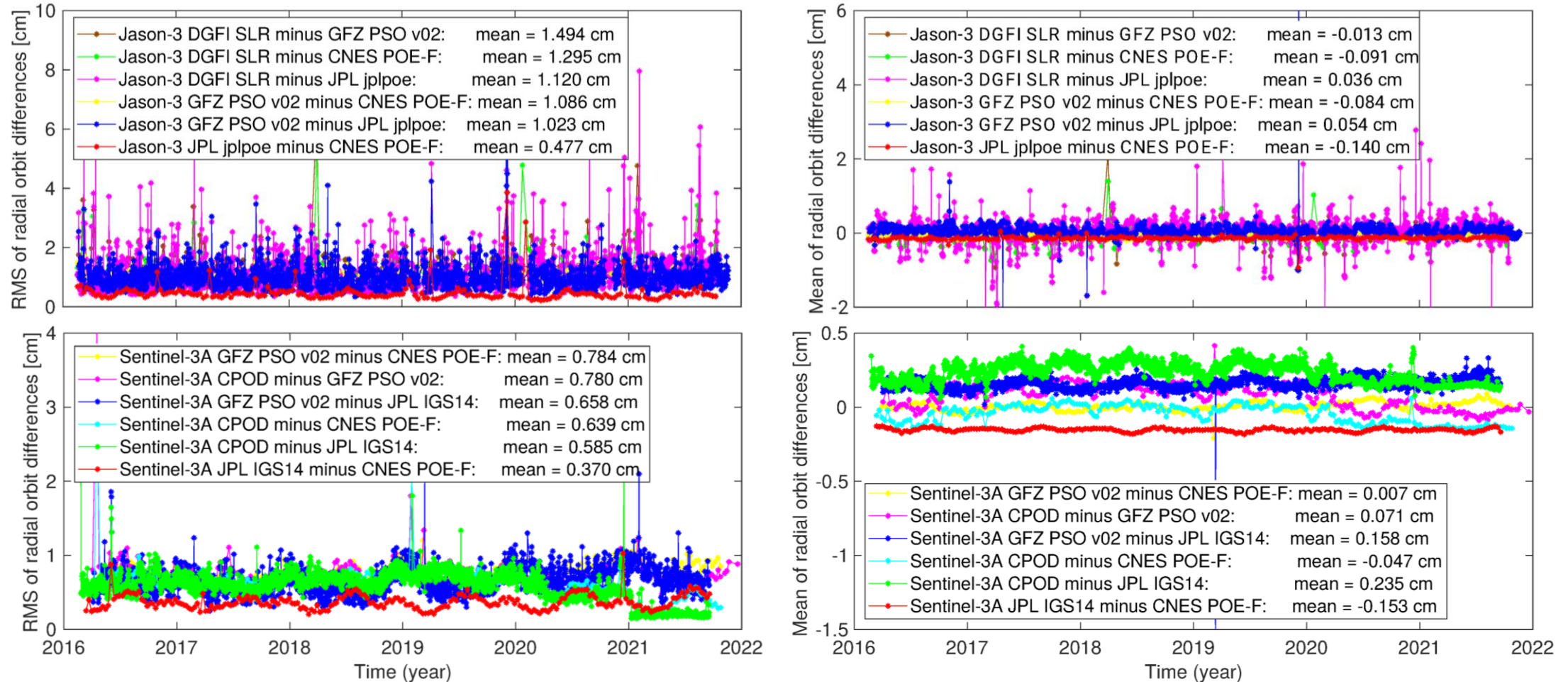
- review of main POD improvements of altimetry satellites in the last 30 years (Rudenko et al. 2023a)
 - study covers **7 satellites from 6 institutions**
 - main findings:
 - **Jason and Sentinel-3** orbits derived using DORIS and GPS agree in radial direction at **0.4–1.0 cm RMS**,
 - **TOPEX/Poseidon: 1.9 cm RMS**
- DGFI-TUM DSO1 orbits of Jason-1/-2/-3 and TOPEX/Poseidon (**SLR-only**; Rudenko et al. 2023b)
 - larger differences in radial direction compared to orbits based on DORIS and GPS observations
 - **Jason RMS values: 1.2–1.8 cm, TOPEX/Poseidon RMS values: 1.6–2.2 cm**

Rudenko S., Dettmering D., Zeitlhöfler J., Alkahal R., Upadhyay D., Bloßfeld M. (2023a): Radial orbit errors of contemporary altimetry satellite orbits. *Surv Geophys*, DOI: 10.1007/s10712-022-09758-5.

Rudenko S., Zeitlhöfler J., Bloßfeld M. (2023b): DGFI-TUM DSO1 orbits of altimetry satellites TOPEX/Poseidon, Jason-1, Jason-2 and Jason-3 derived from SLR data in the SLRF2014 reference frame (data). DGFI-TUM, Zenodo, DOI: 10.5281/zenodo.7441352.

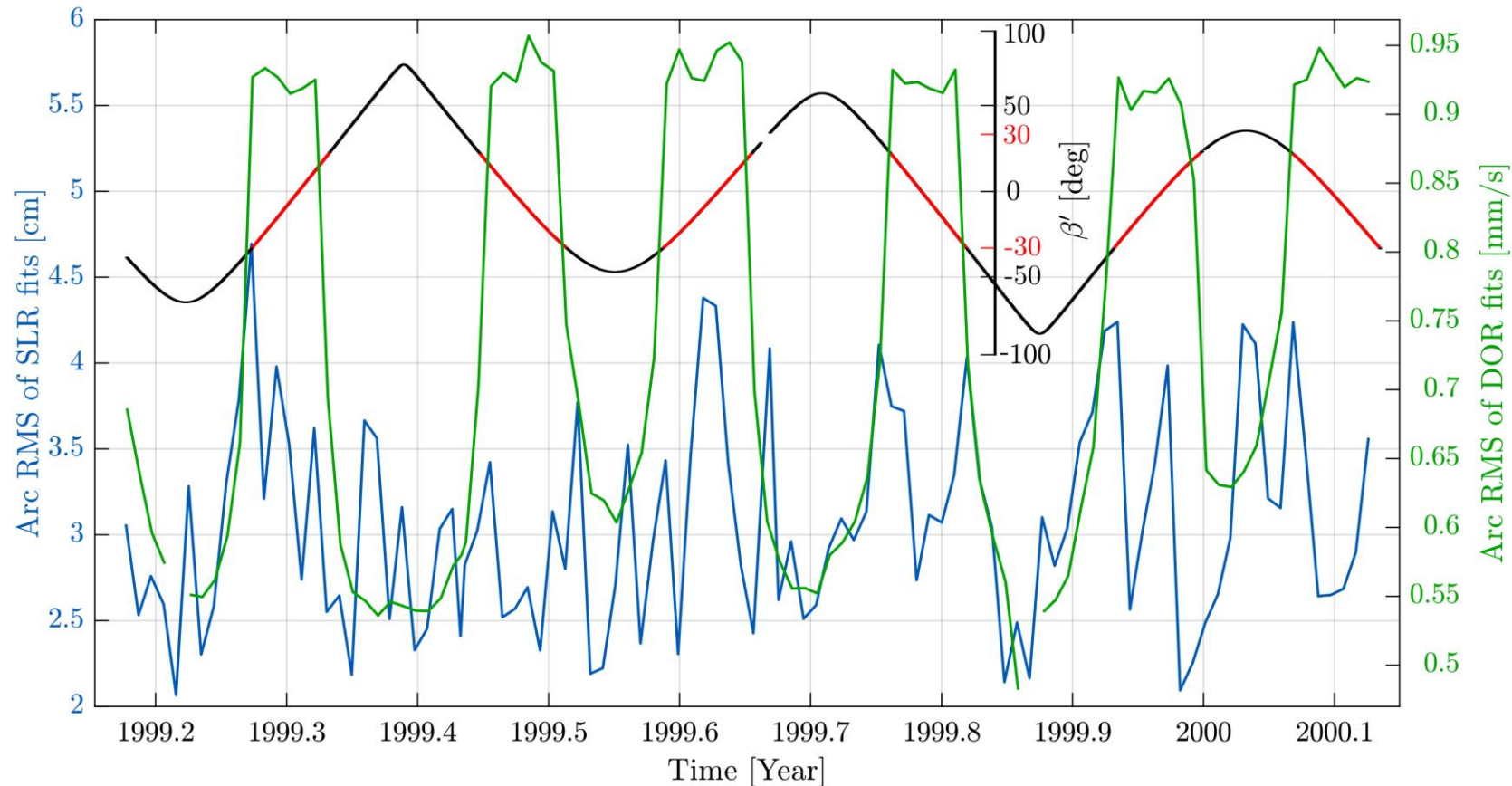
Study on radial orbit errors of contemporary altimetry satellites

- radial orbit differences of various orbit solutions of Jason-3 and Sentinel-3A
- outliers caused by **gaps in SLR observations** for the SLR-only orbit



POD problems with TOPEX/Poseidon and Jason satellites

- station-dependent SLR measurement correction model for TOPEX/Poseidon used in DOGS-OC (Zeithöfler et al., 2023)
- β' -dependent signal still visible in DORIS (and SLR) observation residuals (TOPEX and Jason-1/-2/-3 yaw-fixed regime)



Zeithöfler J., Bloßfeld M., Rudenko S., Dettmering D., Seitz F. (2023): Station-dependent satellite laser ranging measurement corrections for TOPEX/Poseidon. Adv Space Res 71(1), pp. 975-996, doi:10.1016/j.asr.2022.09.002.

Future plans at DGFI-TUM

Software development

- still problems in estimation of TRF and EOP using DORIS
- troposphere
 - implementation of up-to-date tropospheric delay models in DOGS POD library
 - ongoing activity: unification of DOGS-OC/-RI (VLBI software) treatment of troposphere
- implementation of other altimetry satellites (e.g., Sentinel-3a/b)
- implementation of DORIS RINEX format

Research/work plans

- focus on combined POD using SLR and DORIS observations
- estimation of geodetic parameters (TRF, EOP) using DORIS