EGU2020-18527
https://doi.org/10.5194/egusphere-egu2020-18527
EGU General Assembly 2020

DORIS positioning from Sentinel-3A and Sentinel-3B data applying GPS onboard clock modeling

Petr Stepanek[1], Bingbing Duan[2], Urs Hugentobler[2], and Vratislav Filler[1]
[1]VUGTK, v.v.i., Geodetic Observatory Pecny, Ondrejov, Czechia (pste@centrum.cz)
[2]Institute for Astronomical and Physical Geodesy, Technical University of Munich, Germany

A unique architecture of Sentinel-3A and Sentinel-3B satellites includes the shared ultra stable oscillator (USO) by DORIS and GPS receiver. This concept enables to apply GPS estimates of onboard clocks in DORIS processing and to substitute DORIS polynomial clock model by GPS epochwise model. Such an approach is particularly profitable for the mitigation of South Atlantic Anomaly effect (SAA), affecting the short-term frequency stability of USO oscillator in South America and South Atlantic region. GPS clock modeling precisely maps the SAA effect and enables us to demonstrate a difference between Sentinel-3A and Sentinel-3B USO sensitivity to SAA. Moreover, we present an impact on 3Dpositioning, where SAA-related bias reaches in extreme cases a decimeter level. We also determine an effect of the precise clock modeling on the Earth rotation parameters estimation. Elimination of SAA effect also gives us an opportunity to get an SAA free DORIS solution of Sentinel-3A and Sentinel-3Bsatellites. Using this solution as a reference, we estimate an SAA effect on the DORIS positioning by satellites Jason-2, Jason-3, Sentinel, Cryosat-2 and Hy-2A and the efficiency of SAA mitigation strategies for these satellites.