

IDS Workshop

SPOT-5 AND SOUTH ATLANTIC ANOMALY

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The South Atlantic Anomaly (SAA) refers to the area where the Earth's inner Van Allen radiation belt comes closest to the Earth's surface, leading to increased levels of cosmic radiation at lower altitudes than elsewhere over the surface. A strong effect of the SAA on the quality of Jason-1 DORIS (Doppler Orbitography and Radiopositioning Integrated by Satellite) observations is well known and several relevant analyses has been published. However, the significant effect of SAA on the other DORIS satellites has not been known for a long time. Current analyses developed at the Geodetical Observatory Pecny (GOP) found a possible relation between SPOT-5 data bias and the SAA. The resulted zenithal total delay (ZTD), oscillator frequency offset and station coordinates, estimated using single-satellite data processing, are presented and discussed. A DORIS-GNSS ZTD comparison is done in addition. A significant bias was detected when processing SPOT-5 data for South American stations Santiago in Chile, Cachoeira Paulista in Brasil and Arequipa in Peru. The behavior of the time-series of the estimated master beacon frequency offset corresponds to the SAA effect as well. Even if the detected bias is much lower than in case of Jason-1 and doesn't degrade the DORIS observation so strongly, possible future approach of the SPOT-5 SAA effect elimination (model of oscillator behavior or exclusion of the most corrupted observations) could improve the DORIS solutions. A comparable level of SAA-related effect was not detected within a similar study for any other of the analyzed satellites.