Different approaches how to deal with the South Atlantic Anomaly effect on the SPOT-5 DORIS measurement

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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 observations is well known and documented. However, the significant effect of SAA on the SPOT-5 DORIS observations has been observed as well by recent DORIS data analyses. The SAA affects the frequency of onboard oscillator and consequently estimated values of the parameters as the beacon frequency offset, the station height and the troposphere zenithal delay. The SAA effects mainly the SPOT-5 observations of the three stations in South America, i.e. Cachoeira Paulista (Brasil), Arequipa (Peru) and Santiago (Chile). The offset of the estimated station height achieves 27 cm for the SPOT-5 individual solution and the most biased station Cachoeira Paulista. Since the general quality of the SPOT-5 measurements is very good, the complete exclusion of the satellite from the combination is not kind of a rational approach. One possibility how to handle the problem is to exclude the regional stations from the solutions. There are two different ways, total elimination or using these data for orbit determination but not for the multi-satellite coordinate estimation. Another possibility is based on the application of the data corrective model. A simple empirical data corrective model has been developed, based on statistical analyses of the post-fit residuals.