DORIS Systematic Errors and Biases

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In order to realize the goals of GGOS of a 1 mm reference frame that is stable at the level of 0.1 mm/yr, it is imperative that all the geodetic techniques study carefully their most recent results and attempt to mitigate or eliminate the systematic errors that are intrinsic to their techniques. For ITRF2014, the International DORIS Service (IDS) processed data from 1993 to 2015, including data to eleven DORIS satellites. The analyses associated with ITRF2014 as well as subsequent work have demonstrated that the DORIS products contain signals at distinct tidal, TOPEX/Jason-draconitic, semi-annual, and annual periods. These signals point to potential problems in force and measurement modeling, potentially associated with the tidal EOP modelling and with the modeling of non-conservative forces on some satellites. Analysis of the DORIS data using the Jason T2L2 experiment, as well as other studies on other satellites, has revealed that all the DORIS satellites experience perturbations at some level of their onboard Ultra-Stable Oscillator (USO) associated with passage through the South Atlantic Anomaly. It has been demonstrated in work associated with both ITRF2008 and now in ITRF2014 that the scale of the DORIS network shows discontinuities associated with the introduction of new satellites. In this presentation, we review the sources of systematic error, and discuss recent progress in characterizing, mitigating and reducing their impact on the derivation of the geodetic products.