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Development of a novel adaptive model to represent global ionosphere information from combining space geodetic measurement systems

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This project focuses on the development of a novel near real-time data adaptive filtering framework for global modeling of the vertical total electron content (VTEC). Ionospheric data can be acquired from various space geodetic observation techniques such as GNSS, altimetry, DORIS and radio occultation. The project aims to model the temporal and spatial variations of the ionosphere by a combination of these techniques in an adaptive data assimilation framework, which utilizes appropriate basis functions to represent the VTEC. The measurements naturally have inhomogeneous data distribution both in time and space. Therefore, integrating the aforementioned observation techniques into data adaptive basis selection methods (e.g. Multivariate Adaptive Regression B-Splines) with recursive filtering (e.g. Kalman filtering) to model the daily global ionosphere may deliver important improvements over classical estimation methods. Since ionospheric inverse problems are ill-posed, a suitable regularization procedure might stabilize the solution.

In this contribution we present first results related to the selected evaluation procedure. Comparisons made with respect to applicability, efficiency, accuracy, and numerical efforts.