



Ionospheric magnetic signals during conjunctions between ground based and Swarm satellite observations

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High-precision magnetic measurements collected by satellites such as Swarm or CHAMP, flying at altitudes between 300 and 800km, allow for improved geomagnetic field modelling. An accurate description of the internal (core and crust) field must account for contributions from other sources, such as the ionosphere and magnetosphere. However, the description of the rapidly changing external field contributions, particularly during the quiet times from which the data are selected, constitutes a major challenge of the construction of such models. Our study attempts to obtain improved knowledge on ionospheric field contributions during quiet times conditions, in particular during night local times. We use two different datasets: ground magnetic observatories time series (obtained below the ionospheric E-layer currents), and Swarm satellites measurements acquired above these currents. First, we remove from the data estimates of the core, lithospheric and large-scale magnetospheric magnetic contributions as given by the CHAOS-6 model, to obtain corrected time series. Then, we focus on the differences of the corrected time series: for a pair of ground magnetic observatories, we determine the time series of the difference, and similarly we determine time series differences at satellite altitude, given by the difference between the Swarm Alpha and Charlie satellites taken in the vicinity of the ground observatory locations. The obtained differences time series are analysed regarding their temporal and spatial scales variations, with emphasis on measurements during night local times.