

Interactive comment on “Ionospheric assimilation of radio occultation and ground-based GPS data using non-stationary background model error covariance” by C. Y. Lin et al.

Anonymous Referee #1

Received and published: 14 May 2014

The paper lacks for enough new information to justify its publication. It is basically the modification of an already developed and published algorithm, to deal with a new type of observations (i.e. electron densities derived from ionospheric radio occultation, instead of slant total electron content derived from ground-based GPS). The algorithm is based on a Kalman filter, but the paper only explores the update stage of the filter, but not the forecast stage. Therefore, the filter is used to estimate a set of model parameters (i.e. the coefficients of a linear combination of empirical orthogonal functions) in order to fit, as good as possible, the measured electron densities. Several works published in the last years presented different methods to solve that problem (e.g. Tsai LC,

C927

Liu CH, Hsiao TY, Huang JY (2009) A near real-time phenomenological model of ionospheric electron density based on GPS radio occultation data. *Radio Science*, Vol. 44, RS5002, doi:10.1029/2009RS004154), but the authors of the present paper do not discuss how their approach compares to other approaches described in the literature. The covariance matrix for the Kalman filter is not empirically estimated from the measurements, but from an ensemble of values generated with a model (i.e. the International Reference Ionosphere). Hence, this covariance can only represent the ionospheric variability at monthly median scale. The results obtained with the method are validated with measurements provided by the Millstone Hill incoherent scatter radar, but only for a short period of time. This validation shows that the results worsen when the measurements used to estimate the model parameters are far from the radar location. This reveals some problems in the model approach (may be the covariance function), but these problems cannot be studied with only one day of measurements.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 2631, 2014.

C928