



A new empirical model of the total ionospheric current - performance on different time scales

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We present a new empirical model of the global ionospheric current system, based on magnetic field measurements at low Earth orbit, from the Swarm and CHAMP satellites. The model provides ionospheric current values at any coordinate as continuous functions of solar wind speed, interplanetary magnetic field (IMF), dipole tilt angle, and the F10.7 index. The model is the first of its kind to include the total horizontal ionospheric current system, and not only the field-aligned or horizontal divergence-free components. The inclusion of the divergence-free part of the horizontal current means that we can estimate corresponding ground magnetic field perturbations, even though no data from ground is included in the model derivation. Comparing model AL index estimates to measurements, we find that the correspondence is very good on hourly time scales, but not on short time scales. We interpret this behaviour in terms of dayside and nightside reconnection, which are strongly correlated processes on long time scales, but not on shorter time scales.