SA33B-3143 - Validation of Swarm ion drift measurements using an incoherent-scatter radar empirical high-latitude convection model

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13:40 - 18:00

Moscone South - Poster Hall

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Abstract

Recent studies have revealed that Swarm electric field instrument cross-track ion drift measurements statistically reproduce expected ionospheric convection patterns at high latitudes under all geomagnetic conditions examined (Lomidze et al., 2019). In general, ion drifts are larger than those modeled by the Weimer 2005 empirical electric field model (Lomidze et al., 2019) and those estimated from SuperDARN echoes (Koustov et al., 2019). The available Swarm data spanned approximately one and a half years in 2015-2017, and included only horizontal and vertical ion drifts in directions perpendicular to the satellite velocity vector (cross-track ion drifts). The Swarm cross-track ion drift dataset has recently been updated with a new processing approach, and it has expanded to cover the entire Swarm mission from 2013 to 2019. This dataset includes cross-track drifts for scientific studies, and also preliminary estimates of ion drift in the direction parallel to the satellite velocity vector (along-track) for calibration/validation studies. The new dataset includes measurements obtained at Swarm altitudes (450 km and 510 km) spanning magnetic latitudes poleward of 50 degrees and covering all magnetic local times. In this study we compare the cross-track and along-track horizontal ion drifts with the empirical high-latitude incoherent scatter radar convection model based on Millstone Hill and Sondrestrom radar measurements (Zhang et al., 2007). Seasonal variations are examined in terms of frequency distributions of ion drift velocity and differences between measurements and the model. Indirect comparisons are made between Swarm and DMSP F15 ion drifts using the high-latitude convection model as a proxy.

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