Stream function of global ionospheric plasma velocity distributions estimated from SuperDARN data

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Dynamics of ions in the inner-magnetosphere are highly controlled by electric field in the magnetosphere-ionosphere system. The SuperDARN provides valuable information on the ionospheric plasma drift velocity distribution which can readily be converted into the electric field distribution. However, there are some wide gaps in the spatial coverage of the SuperDARN, although the field of SuperDARN has been gradually expanding by the deployment of new radars. In addition, each radar give only the line-of-sight component of drift velocity and the data are frequently missing. We propose a new approach for estimating the global distribution of drift velocity by combining an empirical global model and the SuperDARN data. The gaps in the spatial coverage of the SuperDARN are filled with the empirical model. In addition, the divergence free condition is used as a constraint for the estimation. If plasma drift velocity is assumed to be divergence-free, we can consider a stream function yielding the plasma velocity distribution. We express the stream function by a linear combination of kernel functions, and obtain the drift velocity distribution by estimating this stream function from the SuperDARN data. We will demonstrate a preliminary results obtained by our proposed method.