



Estimating the Hall and Pedersen conductance ratio from ground and satellite magnetic data

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Statistical estimates for the Hall to Pedersen conductance ratio are determined as a function of the ionospheric equivalent current density. The conductance ratio is attained from magnetic satellite data using the 1D Spherical Elementary Current Systems (SECS). The ionospheric equivalent current density can either be computed from ground magnetic data, or from the satellite magnetic data as well. In a 1D case as required here, these two approaches are shown to be equal, which leads to the advantage that our statistics are not limited to areas with ground data coverage. Unlike other methods, using magnetic satellite data to determine the conductance ratio ensures reliable data over long time sequences. Our statistical study, comprising over 6000 passes between 55 and 77 degrees of magnetic latitude during 2001 and 2002, is carried out employing data from the CHAMP satellite. The data are binned according to activity and season. In agreement with earlier studies, values between one and three are typically found for the conductance ratio. For one overpass, the conductance ratio attained from CHAMP data is compared with an EISCAT measurement, and good compatibility is found. Our results allow to estimate this ratio from ground magnetic data alone. Using the same input data, statistics of ionospheric and field-aligned current densities as a function of geomagnetic latitude and MLT are included. These are binned with respect to activity, season and the IMF north-south direction. For the first time, all three current density components are simultaneously studied this way on a comparable spatial scale.