

MLT and seasonal dependence of auroral electrojets: IMAGE magnetometer network observations
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Total eastward and westward electrojet currents (EEJ and WEJ) and their central latitudes derived from the IMAGE network magnetic measurements are analyzed for the combined MLT and seasonal dependence during the period 1995-2009. EEJ shows a strong MLT variation with significant dependence on season. During summer months the maxima occur around 1600-1800 MLT, whereas during winter months the maxima occur at a later local time sector around 1800-2000 MLT. Moreover, the summer maxima are much larger than the winter maxima, and appear at higher latitudes. The summer maxima are mainly associated with the solar EUV conductivity effect, while the winter maxima are mainly due to the contribution of northward convective electric field. EEJ exhibits a dominant annual variation with maximum in summer and minimum in winter. WEJ also exhibits a strong MLT variation with significant dependence on season. The maxima occur around 0200-0400 MLT during summer months, around 0000-0200 MLT during winter months, and around 0000-0400 MLT during equinoctial months. Moreover, the equinoctial maxima are much larger than the summer and winter maxima, and appear at relatively lower latitudes. The seasonal variations in WEJ are the combinations of annual variations and semiannual variations. Both annual and semiannual variations show significant dependence on MLT. These results increase our knowledge on what factors contribute to the auroral electrojets as well as their magnetic signatures, and hence help us better understand the limitations of global auroral electrojet indices, such as the AE and SME indices.