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Seasonal variations of the auroral electrojet activity for different levels of solar activity

H. Gleisner and J. Watermann
Danish Meteorological Institute (hgl@dmi.dk/Phone: 0045-39157484)

The geomagnetic AU and AL indices exhibit distinct seasonal variation patterns where the AU index maximizes during summer whereas the AL index maximizes near the equinoxes. In this presentation we show that the AU and AL indices also exhibit solar-cycle modulations that are less well known, including a strong modulation of the seasonal variation patterns. As expected, the AU index is larger during solar maximum compared to solar minimum with a single peak during summer. The occurrence frequency of rapid AU fluctuations also shows a single peak during summer, but only over a part of the solar cycle. Near solar minimum, the single-peaked seasonal variation of rapid AU fluctuations changes into a semi-annual pattern with maxima near the equinoxes. Unlike AU, the occurrence frequency of rapid AL fluctuations has the same variation pattern throughout the solar cycle but is, somewhat surprisingly, larger during solar minimum than solar maximum. We here present preliminary results from a study of the inter-relations between seasonal and solar-cycle modulations, with a focus on the occurrence frequencies of rapid fluctuations, using geomagnetic AE indices, data from the Greenland magnetometer chain, and solar UV proxy data.