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Scaling and intermittency of the geomagnetic indices and their dependence on the solar cycle.

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The bursty and intermittent character of the geomagnetic indices, on temporal scales shorter than that of substorms, may arise from turbulence intrinsic to the magnetosphere or may reflect solar wind-magnetosphere coupling. This leads to a generic problem of distinguishing between the features of the system and those of the driver. We quantify the scaling properties of short term (up to 1-2 hours) fluctuations in the geomagnetic indices AL and AU during solar minimum and maximum along with the parameter epsilon that is a measure of the solar wind driver. We find that self-similar statistics provide a good approximation for the observed scaling properties of fluctuations in the geomagnetic indices, regardless of the solar activity level, and in the epsilon parameter at solar maximum. This self-similarity persists for fluctuations on time scales at least up to about 1-2 hours. The scaling exponent of AU index fluctuations show dependence on the solar cycle and the trend follows that found in the scaling of fluctuations in epsilon. The values of their corresponding scaling exponents, however, are always distinct. Fluctuations in the AL index are insensitive to the solar cycle as well as being distinct from those in the epsilon parameter.