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Memory effects of the Auroral Electrojet index

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The solar wind magnetosphere system exhibits a highly nonlinear behavior. In this context, several studies have recently investigated the statistical properties of the Auroral Electrojet index (AE) as an output of the system to improve our understanding of its physical state. In particular, the relevance of (forced or self-organized) criticality and phase transition have been addressed. Scaling properties of the AE fluctuations, as well as that of the AE burst and AE burst lifetime indicate the existence of long-range correlations in the system. These scaling properties are similar to those observed in the Solar wind and are observed until a time break of a few hours. Here, we investigate directly the long range correlation of the AE index by use of conditional probabilities. This allow us to study in details the memory effects in and between bursts. We find that memory effects seem to be relevant over several days, much more than the time range for the observed scale invariance. Implications about the physical state of the magnetosphere and in the context of Space Weather are discussed.