

UNCERTAINTY IN MAGNETIC ACTIVITY INDICES

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Magnetic activity indices are widely used in theoretical studies of solar-terrestrial coupling and space weather prediction. However, the indices suffer from various uncertainties, which limit their application, and even mislead to incorrect conclusion. In this paper we analyze three most popular indices, Kp, AE, and Dst. Three categories of uncertainties in magnetic indices are discussed: “data uncertainty” originating from inadequate data processing, “station uncertainty” caused by incomplete station covering, and “physical uncertainty” stemming from unclear physical mechanism. A comparison between magnetic disturbances and related indices indicate that the residual Sq will cause an uncertainty of 1-2 in K measurement, the uncertainty in saturated AE is as much as 50%, and the uncertainty in Dst index caused by the partial ring currents is about a half of the partial ring current.

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