

An objective method for determining the existence of a feature or change in scientific data

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Abstract. A re-occurring problem in science involves the detection of a feature or change in data which is constantly fluctuating due to multiple drivers, non-stationarity, or the presence of interference or random noise. The identification of a genuine feature in angular, spatial, or temporal data may be crucial to the interpretation or validity of a theory. Here we present a simple, independent method for objectively determining if, and when, a significant change has occurred in measurements. We explain the method by applying it to SuperDARN radar data recorded on 24 November, 1996 (see Ruohoniemi and Greenwald, 1998), thereby confirming a coherent large-scale convection change occurred nearly “instantaneously” (2–4 min) over at least 11 hours of local time in the polar cap ionosphere. The analysis contributes towards resolution of an outstanding problem, namely whether the high-latitude ionosphere responds gradually (~10 min) or “instantaneously” (<2 min), or both, to changes in the coupling between the solar wind and magnetosphere.

J. M. Ruohoniemi and R. A. Greenwald: The response of the high-latitude convection to a sudden southward IMF turning,” *Geophys. Res. Lett.*, **25**, 2913–2916, 1998.