

Classification of SuperDARN Radar Doppler Spectra : Application to the Determination of Scintillation Regions

C. Hanuise and T. Dudok de Wit,

LPCE/CNRS, 3A av. De la Recherche Scientifique, 45071 Orléans Cedex 2, France

SuperDARN radar Doppler spectra have been classified according to the values of some of their parameters (e.g. spectral width, standard deviation of phase error and of amplitude error). Each class of spectra coincides with the ionospheric footprint of a specific magnetospheric region (e.g. cusp, neutral sheet, low-latitude boundary layer). We have developed a method, based on multivariate analysis, to deduce the radar classes, and therefore the boundaries and their location, only from the statistical properties of the data, i.e. without needing any a priori information on the data.

Regions of strong scintillations are associated with strong ionospheric turbulence. Even if SuperDARN observations are based on the detection of 10m-wavelength irregularities, i.e. much smaller than those responsible for scintillations, they are nevertheless due to similar mechanisms and might be directly related through cascading from larger to smaller wavelengths. The regions of high radar spectral width (e.g. cusp) might therefore be collocated with regions of strong scintillations.

We present here the first results of the radar spectra classification for a statistical database. The method will be applied to individual events in order to study the relationship between the regions of high spectral width and the regions of strong scintillations. This cross-calibration might lead to a real-time determination of the scintillation regions.