

Cross-phase gradients in ULF magnetometer data from a small square array in Antarctica

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Magnetometer data from Davis, Antarctica (74.49° S, 100.03° E CGM) often exhibit spectral characteristics which can be interpreted as field line resonance (FLRs) signatures of the last closed field-lines in the dayside magnetosphere. In particular, cross-phase measurements in the Pc5 band (1-10 mHz) show spatial gradients which, after allowing for mapped propagation from the equatorial magnetopause, can provide information on field-line topology via small variations in the resonance frequency. We present here examples of diurnal cross-phase data from two pairs of closely spaced (~110 km), azimuthally separated stations in a square array including Davis, and define a new index - Φ_5 as averaged cross-phase between 2 and 4 mHz. We have constructed a model based on the T01 geomagnetic field, and a simple power law plasma density model which allows us to determine the time of flight of Alfvén waves along closed field lines, and thence resonance frequency gradients. For quiet to moderate conditions we find this model shows good functional agreement with the data. During disturbed conditions we find propagation signatures suggestive of reconnection replace/mask the FLR phase pattern.