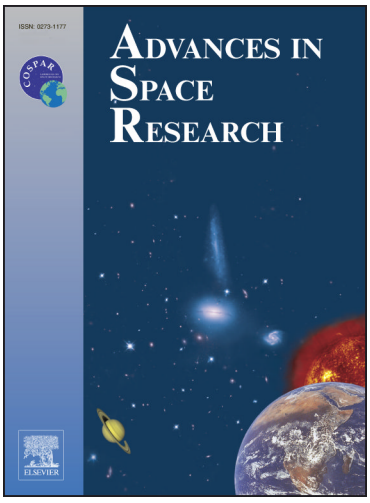

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Vertical and oblique HF sounding with a network of synchronized ionosondes

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Abstract

A network of ionosondes in Europe has been established to monitor travelling ionospheric disturbances (TIDs) by simultaneously making vertical and oblique incidence HF sounding measurements. This network is the outcome of the Net-TIDE project, a collaboration between European Digisonde operators that have synchronized the sounding schedules of the Digisondes in order to record vertical and oblique ionogram traces simultaneously, and have added Digisonde-to-Digisonde (D2D) fixed frequency oblique-incidence measurements to the measurement schedule. The distances between the observatories involved in the project range from 500 km to over 2000 km. The technical feasibility of this network approach is explored. The challenge for the fixed-frequency D2D skymap measurements is the automatic selection of the sounding frequencies depending on the geometry of the sounding paths, the diurnal and seasonal ionospheric changes, and space weather induced events.

1. Introduction

Travelling Ionospheric Disturbances (TIDs) are the transient signatures in the ionosphere of propagating gravity waves, originating from various sources [*Hines*, 1974; *Balthazor and Moffett* , 1997; *Hunsucker*, 1982; *Hocke and Schlegel*, 1996; *Astafyeva and Afraimovich*, 2004]. TIDs can significantly affect the operation of, for example, high-frequency (HF) communication links, radio wave direction finding services, GNSS systems, and satellite communication by causing variations in the maximal usable frequency (*MUF*) and total electron content (*TEC*). Large scale TIDs