AGU: Geophysical Research Letters

Keywords

particle precipitation

space weather

Index Terms

Space Weather: Magnetic storms

Magnetospheric Physics: Energetic particles: precipitating

Magnetospheric Physics: Radiation belts

Magnetospheric Physics: Instruments and techniques

Abstract

Remote sensing space weather events: Antarctic-Arctic Radiation-belt (Dynamic) Deposition-VLF Atmospheric Research Konsortium network

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The Antarctic-Arctic Radiation-belt (Dynamic) Deposition-VLF Atmospheric Research Konsortium (AARDDVARK) provides a network of continuous long-range observations of the lower ionosphere in the polar regions. Our ultimate aim is to develop the network of sensors to detect changes in ionization levels from ~30–90 km altitude, globally, continuously, and with high time resolution, with the goal of increasing the understanding of energy coupling between the Earth's atmosphere, the Sun, and space. This science area impacts our knowledge of space weather processes, global atmospheric change, communications, and navigation. The joint New Zealand-United Kingdom AARDDVARK is a new extension of a well-established experimental technique, allowing long-range probing of ionization changes at comparatively low altitudes. Most other instruments which can probe the same altitudes are limited to essentially overhead measurements. At this stage AARDDVARK is essentially unique, as similar systems are only deployed at a regional level. The AARDDVARK network has contributed to the scientific understanding of a growing list of space weather science topics including solar proton events, the descent of NO_x into the middle atmosphere, substorms, precipitation of energetic electrons by plasmaspheric hiss and electromagnetic ion cyclotron waves, the impact of coronal mass ejections upon the radiation belts, and relativistic electron microbursts. Future additions to the receiver network will increase the science potential and provide global coverage of space weather event signatures.

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