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Science Goals and Drivers for Future Exoplanet, Space Astronomy, Physics, and Outer Solar System Science Missions (2)

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DETECTION OF SOLAR AND JOVIAN RADIO EMISSIONS AT 20.1 MHZ WITH A DECAMETRIC RADIO TELESCOPE ARRAY

Abstract

In recent years, dipole antennas were considered as major elements in building the next generation of low-frequency radio telescopes, fueled by technological advances and the growing interest to study radio-astronomy related phenomena. However, performing high-resolution low-frequency astronomy using a dipole antenna remains a significant concern. In this regard, arrays of dipole antenna have shown to be

promising in enhancing low-frequency radio observations. This work proposes a dipole array configuration intended for monitoring the Sun and Jupiter. Analysis of the signals provides useful information about different types of activities that occur such as Io storms in Jupiter, Sun spots or solar bursts from the Sun. Built principally from inexpensive components, the array of antenna incorporates four dipole systems operating at 20.1 MHz frequency and spanning over an area of approximately 390 meters square. In this paper, insight is given on how the array configuration was systematically designed and constructed. Simulated and measured beam pattern empirical parameters are presented. The results obtained validate that higher directional gain and sensitivity are achieved with additional dipole units connected to the array system; thus, demonstrating the application prospect of this system configuration in enhancing the quality of data received over previously built conventional single dipole systems.