Analysis of Antenna Sensitivity at Extremely Low Frequencies for Future Planetary Lightening Experiments

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Abstract:

Venera 11 to 14 landers detected electromagnetic signals below ionosphere while descending. These electromagnetic signals detected by all four Venera landers were understood to give hint of lightening generation in Venusian environment. Pioneer Venus could sense weak electromagnetic signals during its final few orbits above ionosphere peak. The Galileo could detect high frequencies; these detected radio waves were interpreted as signals due to lightening. The spectrometer observations of Venera 9 were inferred to be occurrence lightning storm. The Pioneer Venus plasma wave instrument has detected waves below the electron gyrofrequency which may be due to lightning and low altitude signals above the electron gyrofrequency indicative of near field lightning. These experiments noticed Very Low Frequencies which suggest intra-cloud phenomenon of Venus lightning. This paper presents the sensitivity analysis of antennas modelled through electromagnetic solver for signal detection at Extremely Low and Very Low Frequency spectrum, possibly incurred due to lightening.

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