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Electromagnetic Waves Observed on a Flight over a Venus Electrical Storm

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Abstract

The observations of electromagnetic signals from 0 to 64 Hz using the two fluxgate magnetometers on Venus Express have been enabled by new, improved cleaning algorithms. These data reveal two types of signals that are associated with electrical activity in Venus' atmosphere. The first signals occur below about 20 Hz, where signals can propagate perpendicular to the magnetic field. These signals consist of waves arriving from different directions across the field just as expected from discharges occurring in different places within the clouds beneath the spacecraft. The other type of signal occurs both at high (>20 Hz) and low (<20 Hz) frequencies and represent connection along the magnetic field to a more distant storm. The signals are right-hand circularly polarized and propagate parallel to the magnetic field. The former event was on the dayside and the latter event on the night side. These events appear to require magnetic fields that dip into the atmosphere away from their usual horizontal orientation. We continue to survey the Venus Express data for more search intervals.