BEAM PATTERN CALIBRATION OF THE HALLEY (76S, 27W) IMAGING RIOMETER

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An imaging riometer measures the absorption of cosmic radio noise in the ionosphere, caused by electron density enhancements, by using a narrow beam antenna array to spatially sample the region of interest. The 49-beam array located at Halley (76S, 27W) observes over a region 200km by 200km at 90 km altitude, in the D-region of the ionosphere. Imaging riometers are traditionally used for studying energetic electron precipitation in the D-region, and as such the location and shape of their beam pattern projected onto the ionosphere is important. Currently the beam patterns of imaging riometers are determined theoretically and tested by comparison with cosmic radio maps of low spatial resolution or by calibration overflights. Here we demonstrate a wavelet-based approach to accurately determine the azimuth and zenith angle of each beam from quiet day observations alone, and show how the beam pattern of the Halley imaging riometer has changed over time.

Imaging riometer, precipitation, calibration

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