Propagation “over the horizon” of Saturn’s radio lightning studied by three-dimensional ray tracing

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Saturn Electrostatic Discharges (SED) are radio signature of lightning flashes originating from Saturn’s cloud systems. Observations of SED show that the radio horizon is larger than the visible one, especially when Cassini is in Saturn’s morning side (“over the horizon” effect). Moreover, both apparition and disappearance of bursts appear to be frequency-dependent.

We built a 3D ray tracing code, which computes the path propagation of radio waves through a realistic model of Saturn’s ionosphere, where electron density varies with local time, and were able to reproduce the typical dynamic spectrum of observed “over the horizon” events.

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