

# Now Broadcasting from Radio Jupiter

By [News Staff](#) | August 27th 2012 01:20 PM

A project that investigated the planetary radio-frequency emissions of the Earth and Saturn also discovered a strange radio emission from the planet Jupiter.

The Earth is loud. As in "radio-loud", which is how objects causing measurable radio emissions are described in astronomy. The Earth's magnet field influences charged particles (electrons, protons, and ions) in a way that causes radio emissions. Other planets such as Saturn or Jupiter cause these emissions as well and measuring them allows us to draw conclusions about planetary magnetic fields.

The new analysis discovered a new modulation in terrestrial radio emissions along with analysis of particular components of Saturn's radio emissions.

A team headed by Prof. Helmut O. Rucker, Deputy Director and Research Director in Graz at the Space Research Institute (IWF) of the Austrian Academy of Sciences, wanted to analyze specific radio emissions of the Earth and Saturn. They got radio data from NASA's space probes Stereo-A and Stereo-B and were successful but discovered that a "jamming signal" had been broadcasting into their work. Rucker said, "In the course of the analysis, my colleague, Dr. Mykhaylo Panchenko, discovered a strange radio emission that originated from Jupiter - one which actually would not have been part of our project. That this emission remained undiscovered, despite 50 years of observing Jovian radio emissions, was reason enough for us to get to the bottom of it."

The striking thing about the emission in the decameter region (wavelengths of about 10 meters) was especially its periodicity, that is, the change in its intensity. Up to now, there were two known periods for the decameter emission of Jupiter: one that resulted from the rotation of Jupiter running at 9 hours, 55 minutes, 29.7 seconds (System III), as well as a one further that can be traced back to the influence of Jupiter's moon Io on the magnetic field (42.46 hours). The newly discovered component in the radio emissions, with a period of about 10.07 hours, lay approx. 1.5 percent higher than the one produced by Jupiter's rotation.

Panchenko said, "Our further analyses suggest that the source of this new radio-frequency component co-rotates with Jupiter. We suspect that the source of the emission lies in the vicinity of the plasma torus fed by Jupiter's moon Io."

That 'toroid' is a donut-shaped region around Jupiter that lies at the elevation of Io's orbital plane and has been formed by volcanic material from this moon interacting with Jupiter's magnetic field. This hypothesis about the source and questions about how the radio impulses are created now need to be clarified in future projects.

A distinct diurnal modulation was established through analysis of the Stereo-A and Stereo-B data for auroral radio emissions of Earth in the kilometer wavelength. In addition, in-flight calibration of the stereo antenna system based on mathematical techniques proved successful and facilitated an exact characterization of the reception behavior of this system. Additionally, accurate analyses of the modulations for Saturn's kilometer-wavelength radio emissions were completed.

Rucker was excited about that extension of the project: "Basic research lives from the unexpected. Thanks to the flexibility of the FWF, it was possible for us to meet scientific surprise with solid data analysis."

Reference: M. Panchenko, H. O. Rucker, M. L. Kaiser, O. C. St. Cyr, J.-L. Bougeret, K. Goetz and S. D. Bale, 'New periodicity in Jovian decametric radio emission', *Geophysical Research Letters*, VOL. 37, L05106, DOI: 10. 1029/2010GL042488, 2010