

THE BRUNY ISLAND RADIO SPECTROMETER

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Abstract

The Bruny Island Radio Spectrometer (BIRS) is a solar radio spectrometer designed to obtain sensitive spectra of solar radio bursts down to the lowest frequency that can propagate through the ionosphere to the receptor. For daytime observations this ionospheric cutoff is usually 6 to 9 MHz. However, below ≈ 30 MHz the radio spectrum is always crowded with terrestrial signals that interfere with radio astronomical observations. Observations by other solar spectrometers in this range are compromised by these interfering signals. The BIRS system was designed to avoid interference by being an adaptive system that automatically chooses any spaces between narrow-band interference for its observations. The remaining interference that could not be avoided (such as wide-band, impulsive signals) is excised off-line. Using these techniques, solar bursts are observed almost interference-free from the ionospheric cut-off up to 62.5 MHz.

BIRS observations fill the gap in frequency that has previously existed between space-borne systems that observe down to the local interplanetary plasma frequency and ground-based systems. By combining BIRS data with those from the WAVES experiment on the Wind spacecraft and with data from the Culgoora Radiospectrograph, complete solar spectra from 20 kHz to 1.8 GHz have been produced. This work has led to a number of new insights into solar and heliospheric physics. The BIRS system has been duplicated in Greece at the Athens Observatory and in the USA at the Goddard Space Flight Center and at the National Radio Astronomy Observatory. BIRS data are available on the web each day at [/fourier.phys.utas.edu.au/BIRS/](http://fourier.phys.utas.edu.au/BIRS/).

BIRS observations began in 1995 employing a large log-periodic dipole array that operates from 3 MHz to 62.5 MHz (originally only to 37 MHz). More recently, active dipole development for LOFAR has been undertaken on Bruny Island and an active dipole has also been designed for the BIRS system. Solar observations with this active dipole in the 5 MHz to 62.5 MHz range began in 2002 and it is now the primary antenna in use. The BIRS project is supported by grant ATM-0207221 from the Space Weather Program of the US National Science Foundation.