Automatic Recognition of Coronal Type II Radio Bursts: The ARBIS 2 Method and First Observations

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Major space weather events such as solar flares and coronal mass ejections are usually accompanied by solar radio bursts, which can potentially be used for real-time space weather forecasts. Type II radio bursts are produced near the local plasma frequency and its harmonic by fast electrons accelerated by a shock wave moving through the corona and solar wind with a typical speed of 1000 km s^{-1}. The coronal bursts have dynamic spectra with frequency gradually falling with time and durations of several minutes. We present a new method developed to detect type II coronal radio bursts automatically and describe its implementation in an extended Automated Radio Burst Identification System (ARBIS 2). Preliminary tests of the method with spectra obtained in 2002 show that the performance of the current implementation is quite high, ~80%, while the probability of false positives is reasonably low, with one false positive per 100-200 hr for high solar activity and less than one false event per 10000 hr for low solar activity periods. The first automatically detected coronal type II radio bursts are also presented. ARBIS 2 is now operational with IPS Radio and Space Services, providing email alerts and event lists internationally.

Keywords: Solar type II radio bursts; automated recognition; data analysis; image processing.