We have embarked on a project to build high-performance spectrometers to address the need for high-quality broadband dynamic spectroscopy in western longitudes: The Green Bank Solar Radio Burst Spectrometer. The project also serves as a development platform for wideband systems needed for the Frequency Agile Solar Radiotelescope (FASR), a project in the planning stages. The work is supported by an MRI grant from the NSF/ATM division.

The Solar Radio Burst Spectrometer is located at the National Radio Astronomy Observatory (NRAO) site in Green Bank, West Virginia. The Green Bank site (38° 26' N, 79° 49.5' W) is located in the National Radio Quiet Zone (NRQZ), a land area of approximately 33,000 km² established by the Federal Communications Commission in 1958 to minimize interfering radiation at radio frequencies. All frequency assignments for transmitters in the NRQZ are carefully coordinated and power density thresholds imposed. The Green Bank site therefore offers a benign site for broadband radio spectroscopy from decimeter to decameter wavelengths.

1 Introduction

Time-resolved radio spectroscopy of solar radio bursts – dynamic spectroscopy – has played an important role in identifying, studying, and understanding physical processes in the solar corona for more than fifty years. A resurgence of interest in radio spectroscopy has occurred in recent years as a result of its relevance to, and utility for, space weather studies, especially when used in combination with the wealth of space based instrumentation now available (e.g., SOHO, TRACE, RHESSI, WIND, ACE, and Ulysses), as well as those that soon will be (e.g., STEREO).

Spectroscopic radio observations are used to study radio precursors of coronal mass ejections (CMEs), the coronal and interplanetary shocks produced by blast waves, ejecta, and/or CMEs, particle acceleration in flares and CMEs; and energy release in flares. These studies rely on the availability of broadband spectroscopic records during times of interest. Surprisingly, support of ground based solar radio spectroscopy in western longitudes is sparse (Fig. 1). Available coverage is confined to swept-frequency radio spectrometers by the USAF/RSTN network operating between 25-180 MHz. These data are used for event reporting, but are generally unavailable for analysis.