

CalMagNet - An Array of Search Coil Magnetometers Monitoring ULF Activity in California

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The California Magnetometer Network (CalMagNet) is a large-scale network of seventy triaxial search-coil magnetometer systems measuring Ultra Low Frequency (ULF) electromagnetic wave activity in California. The primary purpose of CalMagNet is to provide data for a systematic, long-term study of ULF signals in active earthquake fault regions in California, as well as providing comprehensive multi-point measurements of specific wave events in the Pc1-Pc5 range at mid-latitudes. Typical wave events include geomagnetic micropulsations and spectral resonant structures associated with the ionospheric Alfvén resonator. A baseline of the long-term ULF signal environment is being developed, parameterized by geomagnetic activity, season, frequency band, and time of day. The network is composed of ten reference stations and sixty local monitoring stations. At the reference stations, the primary instruments are three orthogonal induction coil magnetometers measuring frequencies from 1 mHz to 12 Hz. A geophone sensor monitors local site vibration. The systems are designed for future sensor expansion and include resources for monitoring four additional channels. Currently, we are participating in a study to deploy experimental electric field dipoles at five of the CMN sites. Data is sampled at 32 samples per second with a 24-bit converter and time tagged with a GPS-based timing system. This presentation will provide a technical overview of the CalMagNet sensors and data processing systems. Several examples of representative wave events and signals as measured by the array are given.