

SARA's Contributions to Space Weather

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The Society:

The Society of Amateur Radio Astronomers (SARA) was founded in 1981 and has about 350 members worldwide. SARA is governed by an elected board of directors and officers. One of its missions is to educate people interested in pursuing amateur radio astronomy, and it has a number of educational outreach activities related to this mission. In addition, SARA members are involved in many projects related to space weather, both through their society and on their own initiative: <http://radio-astronomy.org/>.



Space weather:

SARA members contribute to knowledge of space weather by direct observations and by encouraging inquiry and sparking interest among people of all ages. SARA and its members actively participate in a number of programs, described below, directly related to solar radio observations and space weather. As an international organization SARA helps bridge gaps between the public and government agencies.

Mentors, technical help and conferences:

SARA provides mentors for members new to radio astronomy, and it provides technical assistance through its email list and forum (<https://groups.google.com/forum/?fromgroups#!forum/sara-list>) and website. It is quite possible that an experienced SARA member is nearby who can personally answer questions about projects that challenge the average high school, middle school or University educator. SARA holds conferences each year, in which members and professional researchers discuss their projects and tour professional radio astronomy facilities.

Some SARA programs and projects related to space weather are:

SuperSID: SARA is a partner with the Stanford Solar Center at Stanford University in California on the SuperSID program. This is an education project to build and distribute inexpensive ionospheric monitors around the world to encourage the study of space weather. SuperSID itself is an inexpensive VLF monitor and loop antenna that is used to detect sudden ionospheric disturbances (SID) resulting from solar flares. Many SARA members upload data to Stanford's SuperSID database where it can be freely accessed. Stanford and SARA have shipped almost 600 SID/SuperSID units worldwide with units on every continent (even Antarctica). SARA provides SuperSIDs through grants to teachers and students. The SuperSID also may be purchased from SARA ready-built:

<http://solar-center.stanford.edu/SID/>. Photo courtesy of SARA



e-CALLISTO: e-CALLISTO is one of the fifteen worldwide instrument projects that are part of ISWI. The e-CALLISTO is a frequency agile solar radio spectrometer that operates in the VHF and UHF frequency bands with frequency expansion easily accomplished through up- and down-converters. Several SARA members around the world participate in the e-CALLISTO network and upload radio flare data to ETH-Zurich for dissemination to anyone interested. The e-CALLISTO Receiver may be purchased as a kit or ready-built:

<http://www.e-callisto.org/>. Photo courtesy of W. Reeve



NASA Radio Jove: Many SARA members participate in the Radio Jove Project in which students and amateur radio scientists observe and analyze natural radio emissions from Jupiter, the Sun, and our galaxy. Observations are made primarily in the HF band around 20 MHz using a receiver (top) and simple dipole antennas (dual-dipole shown bottom). Radio Jove observers upload their observations and data to a NASA sponsored database where it can be freely accessed. SARA grants Radio Jove receivers and antennas to students and teachers around the world. The Radio Jove receiver and antenna also can be purchased as a kit or ready-built:

<http://radiojove.gsfc.nasa.gov/>. Photos courtesy of Jim Thieman, NASA/Goddard



SAM-III: The SAM-III, or Simple Aurora Monitor, is a 3-axis magnetometer used throughout the world by amateur radio astronomers to measure geomagnetic disturbances from coronal mass ejections and changes in the solar wind. The SAM-III includes a signal processor and up to three sensors located at a magnetically quiet location. Users can participate in the SAM Magnetometer Project, which is a worldwide network of instruments and has a goal of placing a SAM on every continent. The SAM-III may be purchased as a kit or ready-built:

<http://www.sam-magnetometer.net/>. Photo courtesy of W. Reeve



The INSPIRE Project: SARA members participate in the NASA INSPIRE Project (Interactive NASA Space Physics Ionosphere Radio Experiments). INSPIRE uses a VLF-3 receiver and a whip or loop antenna for reception of natural radio phenomena in the ELF and VLF frequency bands below 10 kHz. These include lightning-produced whistlers, sferics and tweeks, which are influenced by Earth's magnetosphere and the solar wind. The VLF-3 receiver may be purchased as a kit:

<http://theinspireproject.org/>. Photo courtesy of The Inspire Project



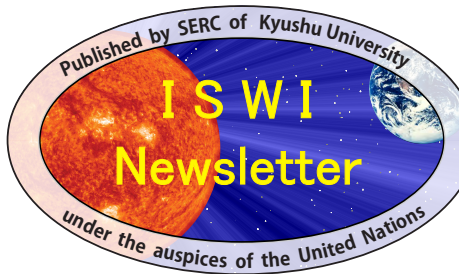
AAVSO: Several members contribute data on solar flares to the AAVSO (American Association of Variable Star Observers) and a SARA member is one of the two solar coordinators for this group: <http://www.aavso.org/>

Publications:

The SARA journal, *Radio Astronomy*, is published and electronically distributed to members six times per year. A sample journal may be downloaded here: http://www.radio-astronomy.org/pdf/2012_may_hi_res.pdf. Also, SARA members write articles in various other journals and magazines including QEX, the Classroom Astronomer, and Astronomical Society of the Pacific.

Membership:

Membership in SARA costs only US\$20/year (students US\$5): <http://radio-astronomy.org/membership>



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