

Sources for further information on Amateur Radio Astronomy

Natural Radio

Natural VLF Radio Phenomena

"The (very beautiful) Music of the Magnetosphere and Space Weather"

<http://www.auroralchorus.com/>

Altair - Natural Radio

Natural Radio is any electromagnetic energy which occurs in Nature. Such phenomena have been around since before we had the technology to detect them. Here are some examples: Sferics - snap, crackle and pop of lightning all over the earth. Tweeks - lightning sferic with dispersion, is 'smeared out' in time. Whistlers - sferic dispersed to a descending tone. associated with 'upward lightning'. Chorus - can sound like whispers, distant sing

<http://www.altair.org/natradio.html>

RADIO WAVES below 22 kHz -Exploring ULF-ELF and VLF radio band

Reception Techniques, Theory, ELF and VLF Frequency Guide, A Minimal ELF Loop Receiver, RDF Earth Monitoring, VLF Antenna, Electromagnetic Precursors of Earthquakes

<http://www.vlf.it/>

VLF – ELF in North East of Holland

A study of sounds in the Atmosphere, magnetometers, auroral detectors

<http://www.da4e.nl/elfspecial.html>

Fringe Dwellers

A group in NSW used two Radio Jove kits and two aerials as an interferometer to detect and analyse a X class solar flares.

The November 4, 2003 flare was the most powerful ever recorded. X-rays from the flare overwhelmed the detectors on the National Oceanic and Atmospheric Administration's GOES-12 satellite, so scientists had to estimate how strong it was. They settled on a preliminary X28 rating, equivalent to billions of one-megaton nuclear bombs.

“After looking at our data, we realized it was more likely an X40 flare,” said David Brodrick of the Commonwealth Scientific and Industrial Research Organization (CSIRO) Australia Telescope National Facility, Narrabri, Australia.

“This is 70 percent more powerful than the original estimate ...”

<http://fringes.org/>

Radio-Sky Publishing

Radio-Sky Publishing was established to help make the fascinating world of radio astronomy accessible to a wide audience of students, teachers and amateur scientists.

<http://www.radiosky.com/>

Sudden Ionospheric Disturbances

SID-GRB@home

This web page records my attempts to build a simple VLF receiver that can detect Sudden Ionospheric Disturbances (SID) and that are caused by x-rays from the sun (solar flares) and by x-rays from Gamma Ray Bursts (GRB) from the edges of the universe.

<http://www.infiltec.com/SID-GRB@home/>

American Association of Variable Star Observers

SIDs - Sudden Ionospheric Disturbances

The AAVSO Solar Committee also includes the work of a smaller group of electronic observers who monitor very low frequency radio stations for sudden enhancements of their signals (Sudden Ionospheric Disturbances), and thus detect solar flares indirectly.

The Sudden Ionospheric Disturbances page includes general SID information and links to SID event reports, how to make SID hardware, and the SID Database

<http://www.aavso.org/observing/programs/solar/sid.shtml>

RADIOASTRO 77

A French site covering many aspects of high and low frequency radio astronomy with some pages in English

<http://astrosurf.com/radioastro93/Radioastro93.htm>

Articles in Scientific American; Amateur Scientist

Electric Field Disturbance Meter with magnetometer; Am Scientist Feb 1968

An Automated Precision Magnetometer ; Am Scientist March 2000

Detecting Natural Electromagnetic Waves by Shawn Carlson; Am Scientist May, 1996

About Two a Radio Telescopes That Were Made By Amateurs by C. L. Stong; Am Scientist February, 1962

How a Group of Amateurs Detected Flares on the Sun with Long-Wave Radio Receivers C. L. Stong; Am Scientist September, 1960

Receivers

INSPIRE Project

INSPIRE is a non-profit scientific, educational corporation whose objective is to bring the excitement of observing natural and manmade radio waves in the audio region to high school students.

The site has the INSPIRE VLF-3 Receiver Kit schematic and assembly Instructions as well as a list and description of PC and Mac software that is useful for INSPIRE such as software for recording data, filtering it and making spectral analyses.

<http://image.gsfc.nasa.gov/poetry/inspire/index.html>

Radio Jove

Radio JOVE students and amateur scientists observe and analyse natural radio emissions of Jupiter and the Sun. The Radio Jove kits were developed for radio astronomy education from funding initially provided by NASA's Goddard Space Flight Center, Greenbelt, Md. The kit includes a radio receiver and an antenna, and sells for \$US155 plus shipping.

<http://radiojove.gsfc.nasa.gov/>

Stanford Solar Center, The SID Monitor

Technical Descriptions, **SID Manual**, Schematics and Photos, Antennas, **Building a SID Antenna, Requirements**

<http://solar-center.stanford.edu/SID/sidmonitor/>

VLF Up converter

a simple up converter which I used in conjunction with a short-wave receiver to quite successfully to monitor solar flare activity

<http://www.radiosky.com/upconv.html>

VLF Radio Equipment

Illustrations of different types of Antennas, Recorders, Receivers, Transmitters

<http://www.home.pon.net/785/equipment/>

Gyrator II VLF Receiver

<http://www.qsl.net/SARA/projects/vlfrx.htm>

Using a PC with soundcard as a VLF receiver

This article describes how to use your PC as a receiver for *narrow-band* signals in the VLF radio spectrum.

http://www.qsl.net/dl4yhf/specclab/vlf_rcvr.htm#principle

Using Spectrum Lab for the reception of natural radio

-describes how to use Spectrum Lab to improve the quality of your natural radio reception *by software*.

<http://www.qsl.net/dl4yhf/specclab/natradio.htm>

Meteor Observing

Meteor Scatter observations with a VHF Radio & a Computer

This page contains material related to the technical issues on taking meteor counts thus monitoring the meteor influx using VHF radio receivers.

<http://www.kolumbus.fi/oh5iy/>

Jordanian Astronomical Society -Observing Meteors by Radio

How it Works, Results & Examples of Meteors, FAQ on Observing Meteors by Radio

<http://www.jas.org.jo/radio.html>

Radio Detection of Meteors

Background, Meteor Scatter, Meteor Trails, Signal Duration, Amplitude, Categories of Meteors, Receiving Meteors, Short Course in Astronomy, Frequencies

<http://www.odxa.on.ca/meteor2.html>

Radio meteor reflections observed in Appingedam

On this page you'll find the meteor activity observed in Appingedam in the North / East part of The Netherlands. The antenna used is a simple half wave wire dipole. It hangs vertical at about. 5 meter from the ground. The receiver is an Alinco DX70 which is tuned into 53.739 540 MHz USB. The receiver audio is fed into the soundcard of a Pentium 166 PC with a Win98 operating system. The short piano pings & pongs that you hear in both recordings is the radio signal reflection from TV Broadcast station in Italy at 1200 KM distance.

<http://members.home.nl/peter-knol/meteors/home.htm>

Radio Astronomy projects at higher frequencies

Small Radio Telescope (SRT)

Haystack Observatory has developed a small radio telescope capable of continuum and spectral line observations in the L-band (1.42 GHz). This inexpensive radio astronomy kit provides everything needed to introduce students and amateur astronomers to the field of radio astronomy.

<http://web.haystack.mit.edu/SRT/index.html>

5.2 Meter Radio Astronomy Project for 1420 MHz

-a description of my 1420 MHz radio telescope project for observing the natural radio emissions of neutral hydrogen atoms found throughout space. Specifically, the study of the radio spectra of these emissions is used to determine the distribution and dynamics of hydrogen throughout our galaxy. <http://www.signalone.com/radioastronomy/telescope/>

Society of Amateur Radio Astronomers

-an international society of dedicated enthusiasts who teach, learn, trade technical information, and do their own observations of the radio sky. This organization is a scientific, non-profit group founded for the sole purpose of supporting amateur radio astronomy.

<http://www.qsl.net/SARA/>

BAMBI Radio Telescope

The design, construction, and initial observational results of a 4 GHz amateur radio telescope are described in this first report from Project BAMBI (Bob And Mike's Big Investment). The system is now operating continuously. The planned extension of the BAMBI project to amateur SETI is also discussed.

<http://www.bambi.net/sara/bambi.htm>

The Association for Radio Astronomy in Education

FAQs Why Radio Astronomy?

Ideas for projects in radio astronomy

A Mobile Observatory for Radio Astronomy

<http://arae.ukaranet.org.uk/>

Classroom Radio Telescope

- makes use of readily available Ku-band (12 GHz) satellite TV equipment

The system can detect microwaves emitted by the Sun; most of the microwave flux will be a combination of thermal (blackbody) and nonthermal processes.

<http://www.ap.stmarys.ca/~lonc/radiotel.html>

Space Weather

SpaceWeather.com

- easy to understand. Good references to some of the key terms

<http://www.spaceweather.com/>

Solar Terrestrial Dispatch

- a great summary site. Rollover graphs for the past 24hrs.

<http://www.spacew.com/plots.html>

Today's Space Weather

The definitive site from the Space Environment Centre (where most of the other sites get their data)

<http://www.sec.noaa.gov/today.html>

Solar Conditions

From Australia's own IPS Radio and Space Services. Spectrographs and magnetograms (via 'Solar Images')

http://www.ips.gov.au/Space_Weather

Solar Maps

Nice Earthside and farside graphs from Raben Systems.

<http://raben.com/maps/>

Links

Interesting Radio Astronomy Related Web Sites

More links at http://www.bambi.net/sara/sites_list.html

Radio Astronomy Web Resources

<http://home.earthlink.net/~jcmannone/id3.html>

The world below 535 kHz

Lots more links <http://www.qsl.net/sv1xv/lw.htm>

Software

Meteor Analyser

To download MAnalyzer goto Ilka Yrjola (OH5IY) web site :

<http://www.kolumbus.fi/oh5iy/>

Colorgramme

If you are meteor observers using MAnalyzer software this Colorgramme version is useful for you. Colorgramme for MAnalyzer work only under Windows® 95-98-2000-XP

<http://radio.meteor.free.fr/us/>

R_Meteor

R_Meteor analyses radio signals received from a distant transmitter to extract the characteristic signature of radio energy scattered by meteor trails. Using Fast Fourier Transforms, *R_Meteor* shows you the signal produced by the plasma clouds from meteors, drifting in the upper wind, when they are illuminated by a powerful radio transmitter. You can detect meteors during the day as well as during the night and it works even if the sky is covered in cloud.

http://sapp.telepac.pt/coaa/r_meteor.htm

Spectrogram Ver 5.1

Spectrogram version 12 is a shareware dual channel audio spectrum analyzer for Windows 98/ME/NT/2000/XP which can provide either a scrolling time-frequency display or a spectrum analyzer scope display in real time for any sound source connected to your sound card. Spectrogram allows unlimited recording and playback of the sounds from the audio spectrum display and can provide very high resolution spectrum analysis of wave files with a wide choice of frequency bands and frequency resolution and either linear or logarithmic frequency scales. Spectrum data logging capability is also provided.

Dynamic spectra show the evolving intensity of a signal as function of time (horizontal axis) and frequency (vertical axis). The colourful ones on this page <http://www.spaceweather.com/glossary/inspire.html> show VLF signals lasting about 5 seconds in the frequency range 100 to 2400 Hz. False colours denote intensity.

Spectrogram is at

<http://www.visualizationsoftware.com/gram.html> or

http://psk31.com/Spectrum_DSP/spectrum_dsp.htm or

<http://members.lycos.nl/PI6ATV/software.htm>

Antenna Software

a compilation of URLs

e.g. **Quick Yagi** - yagi auto-design, auto-optimize, modeling software

e.g. **MMANA** (MM Antenna Analyzer)

<http://www.ac6v.com/antsoftware.htm>