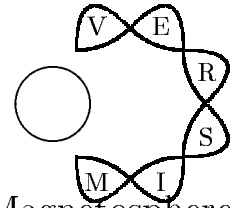


IAGA/URSI  
Joint Working Group on



## VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere

Editor: A J Smith

Newsletter

No. 7 — November 1994

Dear colleagues,

Next July the 21st General Assembly of the International Union of Geodesy and Geophysics will be held in Boulder, Colorado. The Union includes IAGA (International Association of Geomagnetism and Aeronomy), one of our two parent bodies. This issue of the *VERSIM Newsletter* contains some information about the Assembly and a call for papers (note the deadline for submission of abstracts is **1 February 1995!**). I hope to see many of you in Boulder. Thanks to those who have contributed news to this issue.

### XXI General Assembly of IUGG

The Assembly will be held in Boulder, Colorado, USA, 2–14 July 1995. Details about the Assembly were published in *IAGA News* No. 33 (July 1994). More information may be obtained from: IUGG XXI General Assembly, c/o American Geophysical Union, 2000 Florida Avenue NW, Washington DC 20009, USA (email: [iugg\\_xxiga@kosmos.agu.org](mailto:iugg_xxiga@kosmos.agu.org)).

#### Session S312—Call for Papers

A VERSIM half-day session on *Whistler-Mode Waves and Particle Precipitation* (conveners A.J. Smith and U.S. Inan) will be held on the afternoon (1330–1800) of Saturday 8 July 1995. In this session the focus will be on the precipitation into the ionosphere of energetic electrons by whistler mode waves, both nat-

ural and artificial. Papers on the observations of whistler-mode waves and associated wave-induced precipitation effects, as well as on theoretical and computer-based modelling of the interactions and the associated ionospheric effects, are invited.

The abstract deadline is: **1 February 1995**. Abstract submission instructions were published in *IAGA News* No. 33 (July 1994) and are reproduced here. Abstracts should be sent to AGU with a copy to me.

#### VERSIM meeting

A meeting of the VERSIM working group will be held during the IUGG Assembly at Boulder. This is provisionally scheduled for Saturday 8 July 1995 at 1900. Venue and agenda will be confirmed later. If you have any VERSIM matters you would like to raise, please let me know. The General Assembly marks the end of my current 4-year term of office as IAGA co-chairman of the VERSIM group. I am prepared to serve for a further 4-year term but if there are any other nominations, I would be happy to receive them.

#### Forthcoming meetings

##### URSI, Lille, 1996

The next URSI General Assembly will be held in Lille, France, in 1996. Some of the proposed sessions for this Assembly, of relevance to VERSIM, are:

H4 *Nonlinear theory and computer simula-*

*tion on waves and particles in geospace plasma* (convenors: Matsumoto, Abdalla)

HG2 *Effects of lightning and VLF waves on the ionosphere* (convenors: Rycroft, Nunn)

H1 *Whistler-mode waves at high latitudes* (convenors: Smith, Inan)

HEG1 *Electromagnetic coupling between the ground (including seismic activity) the upper ionosphere and magnetosphere* (convenors: Molchanov, Parrot, Fraser-Smith)

## IAGA, Uppsala, 1997

The 8th Scientific Assembly of IAGA will be held in Uppsala, Sweden. The proposed dates are 3–15 August 1997.

## News from the VERSIM Community

### South Africa

From: A.R.W. Hughes, University of Natal, Durban.

From 8th to 18th of November we will be running a campaign which is primarily aimed at seeing whether absorption events observed by an imaging riometer produce any noticeable amplitude and phase changes on transmitter signals propagating in the earth-ionosphere waveguide. The campaign is designed to coincide with periods of high thunderstorm activity in Southern Africa.

The signal paths to Durban from NAA and NSS pass close to an imaging riometer operated by Potchefstroom University (Stoker and Matthews). We will be making simultaneous observations at Potch and in Durban. In addition lightning information (flash time and location) will be obtained from a time of arrival detection network operated by Eskom (Redelinguys and van der Merwe).

OMNIPALs and VLF receivers will be operated at 2 locations in Natal, and in the conjugate region by Eötvös University (Tarscai

and Lichtenberger). It is hoped that interesting results may be obtained from the Hungarian whistler recordings from a knowledge of the precise location and time of the causative lightning stroke.

A VLF receiver was operated in Natal during the solar eclipse on 3rd November. No increase in VLF noise was recorded. The eclipse was total about 1500 km to the south of Durban and 80.9% at the receiving site.

### British Antarctic Survey

(A.J. Smith and M.A. Clilverd)

#### Rothera (67.6°S 68.1°W)

VLF observations at Rothera ceased on 25 October 1994 after operating continuously since March 1994. Broadband (0.1–10 kHz) and narrowband (OMSK) recordings will hopefully resume on a campaign basis during the austral winter 1995. At present it is anticipated that the recordings will be undertaken in April and May. The broadband recordings will be run on a 1-in-5 minute sampling schedule, 16 hours a day starting at 23 UT. The narrowband OMSK recordings will be made during the same period and at 0.4 s time resolution in phase and amplitude.

#### Faraday (65.3°S 64.3°W)

The 2 narrow-band experiments (OMSK and DOPPLER) have run almost without break throughout 1994. Similar schedules are planned for 1995, although 2 out of the 4 Doppler receivers will be transferred to Halley in December 1994. This will allow triangulation of whistler mode signal exit regions on a regular basis, with the added interest of receiving signals from European transmitters. The VLF broadband recordings will continue throughout 1995, operating synoptically on a 1-in-15 minute schedule for the majority of the period.

#### Halley (75.6°S 27.3°W)

VLF broadband (recording to DAT tape), OMSK narrowband, and VELOX (filterbank)

data have been taken during 1994 and this will continue through 1995. In addition, as mentioned above, VLF Doppler receivers will be operated for the first time. Until now the broadband recordings have been made using a goniometer technique. It is planned from the beginning of 1995 to record the north-south and east-west components of the horizontal wave magnetic field on to separate channels of the DAT recorder. The time code will be multiplexed up to the top of the frequency band where there are few signals of interest.

### **AGO A80 (80.7°S 20.4°W)**

During the 1994–95 Antarctic summer season, it is planned to deploy the third of the BAS AGOs (Automatic Geophysical Observatories) at site A80 on the Recovery Glacier south of Halley. As well as a magnetometer and riometer, the instrument complement will include an ELF/VLF receiver similar to the VELOX at Halley except that, because of data storage limitations, there are only 5 frequency bands instead of 8 (centre frequencies 0.5, 1, 2, 3, 6 kHz; bandwidths 0.5, 1, 1, 1, 2 kHz respectively) and the time resolution is lower (10 s for all parameters except the mean log power which still has 1 s resolution. In addition there is a “snapshot mode” which records a 2 s long 0–6 kHz spectrogram every 15 minutes.

### **New Zealand**

(N.R. Thomson, University of Otago, Dunedin) VLF Doppler recordings continue to be made at Dunedin in collaboration with the British Antarctic Survey facility at Faraday. Recordings are routinely made of whistler mode signals from NLK/NPM/NAA/NSS with 125 minute resolution, although 1 second data are logged on a campaign basis.

## **Signal processing for whistlers and other VLF signals**

The latest issue of *The RadioScientist* (Vol. 5, No. 3, September 1994) contains three related articles about technical developments

which may be of interest to those analysing whistlers and other VLF signals. A paper by Smith, Hughes and Bullough (pp. 120–123) describes a DSP-based system, developed by High Greave Associates, Sheffield, and currently in use at several sites around the world, which may be programmed to provide a real-time spectral analysis facility (AVDAS) a producer of Quicklook summary plots, or a VELOX receiver. Brundell and Molteno (pp. 124–125) describe a DSP system for the Macintosh computer developed at Otago University, New Zealand; an analysis programme GRAFT (Graphical Radio Analysis by Fourier Transform) to run on this hardware is described by Connor, Brundell, Thomson and Molteno (pp. 125–126).

## **URSI News**

This (free) electronic newsletter is published by Prof. R.L. Dowden in New Zealand. If you do not already receive it and wish to do so, please send “ADD ME” to [ursi@physics.otago.ac.nz](mailto:ursi@physics.otago.ac.nz).

## **Obituary: Ken Bullough, 1927-1994**

It is with regret that we report the death earlier this year of Ken Bullough, aged 66; Ken made many significant contributions to VER-SIM studies. After graduating in physics at Manchester University, and spending 4 years on meteor radar studies at Jodrell Bank, he went to Paris and worked at the École Normale Supérieure, constructing a radar for auroral studies which he then operated during the International Geophysical Year at the French Antarctic station in Terre Adélie. Having by now become fluent in French, he was able to write and defend his doctoral thesis on the results of the Terre Adélie work “Étude de l'aurore radioélectrique en Terre Adélie”, and he duly became a “Docteur de l'Université de Paris” in 1963. By this time he had crossed the Pennines from his native Lancashire to become a founder member of the Sheffield University Space Physics Group, under Professor Tom Kaiser—his erstwhile colleague at Jodrell Bank.

At Sheffield he studied the generation and propagation of natural VLF waves in geospace using data from receivers he designed to be launched on rockets, as well as those on the Ariel-3 and 4 satellites and in Antarctica, and he was the author (with colleagues Arthur Hughes and Tom Kaiser) of some important papers describing the statistical distribution of hiss and chorus in the magnetosphere. Ken also became interested in the effects of artificial sources, i.e. VLF transmitters and power line harmonics. With his student Adrian Tatnall he discovered a zone of permanent VLF emission activity over North America and its conjugate region and, controversially, ascribed this to high harmonics of 60 Hz radiated from power transmission lines. The subject of Power Line Harmonic Radiation subsequently become less fashionable but Ken continued to work on it, and claimed to have detected hot-spots of VLF emission activity in the Ariel data associated with industrial point-sources such as cement works in Canada, and proposed a link between secular changes in the weather—specifically an increase in thunderstorm activity—and VLF radio emissions stimulated by increased electrical power usage.

## The role of the VERSIM Working Group

The working group serves as a forum for workers studying the behaviour of the magnetosphere and ionosphere by means of ELF and VLF radio waves, both naturally and artificially generated. Originally the emphasis was on probing of the magnetosphere by whistlers, but recently the scope has become somewhat broader. The group aims to promote research in this field by facilitating the exchange of ideas, information and experience between active research workers and other interested scientists. This is done through regular meetings at IAGA and URSI Assemblies, and via the circulation of a newsletter. The group has also been active in sponsoring scientific symposia at IAGA and URSI Assemblies, in areas relevant to its field of interest, and in coordinating observational campaigns. There are currently 100 scientists from 22 different countries (Australia, Austria, Belgium, Brazil, China, Czech Republic, Denmark, Finland,

France, Germany, Hungary, India, Japan, New Zealand, Norway, Russia, South Africa, Sweden, Ukraine, UK, USA, and Yugoslavia) on the VERSIM mailing list.

Please send any information of interest to other members of the working group, for publication in the next newsletter, to the editor, **A J Smith**, at the address given below; electronic mail preferred, otherwise mail or fax.

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