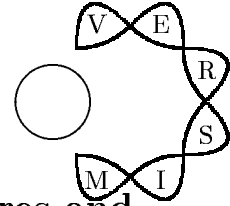


IAGA/URSI
Joint Working Group on



VLF/ELF Remote Sensing of Ionospheres and Magnetospheres

Editor: A J Smith

Newsletter

No. 12 — March 1998

Dear colleagues,

Because of other pressing matters, it has been longer than I would have liked since the last *VERSIM Newsletter* — No. 11 circulated in July 1997. It contains a rather delayed report of our meetings at the 8th Scientific Assembly of IAGA (International Association of Geomagnetism and Aeronomy), one of the working group's two parent bodies, in Uppsala, Sweden, last August. Because of the two-year and three-year cycles of IAGA and URSI General Assemblies, 1998 will be a quiet year with neither taking place. Next year, however, both will be held. This newsletter contains some information about these meetings. More details can be found on the *VERSIM* Web page given at the end of this newsletter, or from the IAGA and URSI Web sites which are linked from there.

URSI, Toronto, 1999

The 26th URSI General Assembly will be held in Toronto, Canada, 13–21 August 1999. For more details contact the URSI GA'99 Secretariat, National Research Council Canada, M-19, Montreal Road, Ottawa, Ontario K1A 0R6, Canada; Tel: (613) 993-7271; Fax: (613) 993-7250; email: ursi99@nrc.ca; or see the WWW page: <http://www.nrc.ca/confserv/ursi99/>. The *First Announcement and Call for Papers* will be issued around 30 June 1998.

Pitch-angle scattering (and acceleration) of trapped particles by waves in magnetospheres

This *VERSIM*-sponsored session (Session H3) which is a follow-up to the successful “waves and the radiation belts” session at Lille, broadened to include waves other than whistler mode and radiation belts other than Earth's is being convened by **A.J. Smith**, **J. Lemaire** and **U.S. Inan**.

Draft Call for papers: It is known that waves propagating through the magnetosphere can interact strongly with trapped particles which can cause a number of important effects including acceleration, pitch-angle scattering, and precipitation into the ionosphere. A particular example is that of whistler-mode waves which undergo transverse cyclotron resonance with energetic electrons trapped in the radiation belts. The waves involved may either be naturally generated in space (e.g. hiss) or may come from powerful ground sources (e.g. transmitters, power lines or lightning). It is still not clear how important wave-particle interactions are as a loss mechanism for trapped populations, compared with other possible loss processes. It is particularly important to quantify the effect of lightning in view of a possible increase in global lightning activity associated with global warming. Papers reporting experimental and theoretical results on these and related topics are invited. We also welcome contributions on comparable processes in planetary magnetospheres other than Earth's.

Other sessions for Toronto

Other sessions schedule for URSI'99 which may be of particular interest to the VERSIM group include:

H1: Active experiments involving space plasmas Convener: W.J. Raitt

H2: Wave-particle interactions: quantitative comparison between observations, theory and simulations Conveners: R.R. Anderson, I. Nagano and D. Nunn

HG1: Theory and simulations of nonlinear kinetic processes in space plasmas Conveners: Y. Omura, M.A. Abdalla and S. Ossakow

HG3: Wave propagation: observations and data analysis Conveners: F. Lefeuvre, K. Hashimoto and K. Mahajan.

GH1: Electromagnetic coupling including seismic activity between the ground and the upper ionosphere and magnetosphere Conveners: S. Pulinets, M. Parrot and O. Molchanov.

GH2: Lightning-Ionosphere interaction Conveners: U.S. Inan and D. Nunn.

IUGG, Birmingham, 1999

The 22nd General Assembly of the International Union of Geodesy and Geophysics, which encompasses IAGA, will be held at the University of Birmingham, UK, 19–30 July 1999. The programme of symposia, and information on how to register for the assembly and submit an abstract, will be given in the *Second Circular* to be published in May 1998. The deadline for abstracts will be **15 January 1999**. More details may be found on the Web site: <http://www.bham.ac.uk/IUGG99/>, or contact the organising committee at email: IUGG99@bham.ac.uk or fax: +44 121 414 4942.

IAGA, 2001

The 9th Scientific Assembly of IAGA will be held in Hanoi, Vietnam.

IAGA, Uppsala, 1997

The 8th Scientific Assembly of IAGA was held in Uppsala, Sweden, 4–15 August 1997.

Localised ionospheric perturbations related to lightning and VLF transmitters

This half-day session (Session 2.14) held on Monday 11 August 1997 was sponsored by VERSIM and convened by D. Nunn and A.J. Smith. It was a good session, attended by about 40 scientists. Although it was a little sparse, owing to a number of papers being withdrawn, this did allow time for some good discussions. The session began with a presentation by **A.R.W. Hughes** on *whistler ghosts*; these were faint whistler traces of the same dispersion as the main whistler components but delayed. For 11 events observed during one 2.5-hour interval at Marion Island ($L = 2.6$), this delay was consistently close to 600 ms. An interpretation was given in terms of the triggering of lightning through the precipitation, caused by the leading whistler, of electrons into the ionosphere above a northern hemisphere thunderstorm. An invited paper by **M.A. Clilverd** dealt with a *sharp decline in Trimpi activity with increasing latitude*, which had been observed between Faraday and Rothera stations, Antarctica, located at $L = 2.3$ and $L = 2.8$, respectively. Trimpi activity observed on nearly parallel paths from the NPM VLF transmitter in Hawaii, dropped off by about 90% between Faraday and Rothera. **D. Nunn** discussed *numerical modelling of VLF Trimpis on the path NWC (Australia)–Dunedin (New Zealand)*. Two numerical models were compared: the first due to Nunn was a weak scattering model, rigorous within the Born limit, whilst the second due to Baba and Hayakawa used a finite element approach. **R.F. Yeo** described *modelling the VLF Trimpi Effect with multiple point scatterers*.

VERSIM business meeting

This was held on Wednesday 6 August 1997. The following were present: Andy Smith (UK) in the chair, Marina Goncharova (Russia),

Arthur Hughes (South Africa), Umran Inan (USA), Wladislav Lyatsky (Russia), Jyrki Manninen (Finland), Alexander Sukhorukov (Germany), Keyun Tang (China), Pavel Tríska (Czech Republic). The chairman reported on VERSIM activities in the preceding two years, including VERSIM meetings and symposia, Newsletters circulated, and additions to the VERSIM WWW site, including a VERSIM bibliography and an email directory. Several of those present gave a brief report.

Maninnen described two recent VLF recording campaigns in Finland, one in winter to study auroral phenomena, and one in summer in connection with the Tromsø ionospheric heater. In the latter, effects were observed 400 km away from the heater. He also described the development of a new digital VLF broadband receiver system capable of measuring the azimuth and polarisation of incoming signals. Current collaborations were with Barr (ionospheric heater), Parrot (Freja satellite), and an INTAS collaboration with Nunn, Rycroft and Russian colleagues.

Inan described current activities by the Stanford VLF group. There were now 6 AGOs (Automatic Geophysical Observatories) deployed in Antarctica. The VLF receiver comprised 3 hiss channels (1–2, 2–4, and 30–40 kHz) together with narrowband transmitter channels. Additional hiss channels were being added in the frequency range 0.5–40 kHz. At Palmer station, Antarctica, broadband (300 Hz to 20 kHz) and narrowband Trimpi recordings were made daily during 00–10 UT, whilst at South Pole two 3-h long recordings were made each day in the frequency range 0.3–20 kHz. In the USA there was a holographic array (HAIL) located in Colorado and Arkansas to study sprites and lightning. The data were now available on the Web, and high schools were involved in this project.

Hughes talked about the VLF direction-finding observations currently in progress by the University of Natal group at Sanae, Antarctica, and also the Trimpi event recordings being made using “OmniPal” receivers. He also discussed the whistler ghost events observed at Marion Island (see preceding report of Session 2.14).

Tang reported that VLF observations were continuing at Zhongshan station, Antarctica

($L \sim 14$) but had ceased at Great Wall station. There were also two temporary stations operating in Chain itself for special events e.g. solar eclipses. A new project was the development and deployment of a new whistler receiver.

Tríska noted that ground-based VLF measurements in the Czech Republic, which had been in progress since the International Geophysical Year, had now ceased. However, his group was actively researching on interesting wave data from the receiver on MAGION-4, the subsatellite of Interball, which was still working well two years after launch. He showed some interesting data on magnetospherically reflected (MR) whistlers observed in the L -range 2.4–2.8, and presented evidence for whistler ducts about 1000 km in width at $L \sim 3$).

Smith described current VERSIM activities of the British Antarctic Survey group, including the operation of a variety of different broadband and narrowband VLF receivers at the manned station of Halley, and the British AGOs located to the south.

It was agreed not to propose a VERSIM session for the 1999 IUGG Assembly in Birmingham, because of overlap with the URSI Assembly to be held the same year. However, it perhaps would be appropriate to propose one for the following IAGA Assembly in Vietnam in 2001. The chairman undertook to canvas suggestions from the group about this prior to the Birmingham meeting.

George Tarcsai, 1943-1998

It is sad to record that György Tarcsai, better known to his friends and colleagues in the West as ‘George’, died on 7 February 1998. He was a member of the Space Research Group of Eötvös University, Budapest, Hungary. Although he began his research career studying the solar limb and corona by means of Doppler shifts in occulted radio sources, he spent most of his scientific life working in the VERSIM field. An important contribution in 1975 was the development of a curve-fitting procedure for whistler spectra, still widely used today. He then applied this technique to large numbers of whistlers recorded in Hungary, to deduce the characteristics of plasma-

spheric electron densities and plasmasphere-ionosphere coupling fluxes in the middle magnetosphere. Later, with Dániel Hamar and others, he worked on the digital matched filtering of whistler data, and, in collaboration with the BAS VLF group, applied this to whistlers recorded digitally in Antarctica; this revealed unexpected fine structure in the whistler spectra and propagation characteristics. Most recently he was involved in setting up narrow-band receivers to record Trimpfi events in Hungary. George published about 30 research papers (see <http://gis.elte.hu/eng41a.html> for a list) and participated in several URSI meetings, most recently at Lille in 1996. He was an active member of the VERSIM working group for many years, and will be greatly missed by the community, especially those who knew him personally and valued his friendship.

VERSIM Bibliography

The *VERSIM on-line bibliography* has now been updated to include papers published in 1997. It may be found on the VERSIM Web site at <http://www.nerc-bas.ac.uk/public/uasd/versim.html#bib>. Only papers in peer-reviewed journals, listed by on-line services, have been included. Many thanks to our URSI co-chairman, Dr Michel Parrot, for maintaining this list. If one of your papers has been omitted, please send the details by email to mparrot@cnrs-orleans.fr.

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 later the scope became 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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