**COMMISSION H**

**H01 : Celebrating the legacy of Richard Thorne: plasma waves, wave-particle Interactions, and their multifold effects on planetary radiation belts dynamics**

**Conveners**

Richard Horne (British Antarctic Survey, UK), rh@bas.ac.uk

Jacob Bortnik (UCLA, USA), jbortnik@gmail.com

**Session Description**

Wave particle interactions are among the most important processes in space plasma physics at the Earth and planets. They play a major role in the acceleration of electrons to relativistic energies that form the radiation belts and simultaneously contribute to electron losses into the atmosphere over a wide range of energies, spatial and temporal scales. They are also responsible for proton loss from the ring current and for heating of low energy electrons and ions. Satellite missions such as Van Allen Probes, THEMIS, ARASE and DEMETER provide a wealth of observational data, and missions such as DSX provide data to test basic physical processes. Here we invite papers on all aspects of wave-particle interactions, including observations, modelling and their wider role in planetary magnetospheres. Wave-particle interactions with ULF through to VLF (or even higher frequency) waves are thought to be important drivers of these loss-events. This session is focused on current research that highlights the legacy of the late Professor Richard Thorne, who made seminal contributions for the duration of his career in all areas of wave excitation, propagation, and wave particle interactions with electrons and protons spanning a wide range of energies. Ground-based, satellite experimental observations, as well as theoretical investigations of waves and wave-particle interactions in the radiation belts and ring current are welcome.

**H02 : Recent advances in geospace research from multi-point observations**

**Conveners**

Yoshiya Kasahara (Kanazawa Univ., Japan), kasahara@is.t.kanazawa-u.ac.jp

Jean-Francois Ripoll (CEA, France), jeanfrancoisripoll@gmail.com

Jyrki Manninen (Sodankylä Geophysical Observatory, Finland), jyrki.manninen@oulu.fi

**Session Description**

Coordinated multi-point observations combining satellites and ground-based observatories can clarify geospace plasma dynamics. Such observations improve our understanding the various energy-dependent physical processes and their coupling at stake, often related to wave-particle interactions. Coordinated measurements provide an approach to determining global descriptions of the particle distributions or of the wave environment and, ultimately, an improved representation of the radiation environment. This session solicits recent findings and advances in geospace research combining the datasets from various satellites missions (e.g. Arase, Van Allen Probes, MMS, Cluster, DSX and LEO satellites) as well as ground-based networks. Results from related studies linking these observations with computer simulations, data assimilation, and modeling leading to a better understanding of the geospace environment are also welcome.

**H03 : Radio Diagnostics of Space Weather Plasma Processes**

**Conveners**

Mauro Messerotti (University of Trieste, Italy), mauro.messerotti@inaf.it

Tomoko Nakagawa (Tohoku Institute of Technology, Japan), nakagawa@tohtech.ac.jp

Yasuhide Hobara (UEC Tokyo, Japan), hobara@ee.uec.ac.jp

David R. Themens (University of New Brunswick, Canada), david.themens@unb.ca

**Session description**

Plasma processes underpinning Space Weather perturbations originate a wealth of radio emissions in domains which range from the Sun and Heliosphere to planetary environments including moons and small bodies. These radio emissions are fundamental diagnostics about the plasma sources, the propagation media, and the interactions they undergo. This session is open to contributions relevant to theoretical models, e.g. of solar radio bursts and ionospheric emissions, radio signatures’ interpretation, and observation techniques, in the framework of both Space Weather science and Space Weather operations, capable to provide a step forward in Space Weather physics knowledge and Research-To- Operations (R2O) transition.

**H04 : Machine learning techniques and their application to plasma waves**

**Conveners**

Drew Turner (Aerospace, USA), drew.lawson.turner@gmail.com

Richard Boynton (University of Sheffield, UK), r.boynton@sheffield.ac.uk

Christopher Crabtree (Naval Research Laboratory, USA), chris.crabtree@nrl.navy.mil

**Session description**

Plasma waves and their interaction with particles are among one of the most widely debated topics in space physics. Wave-particle interactions result in particle acceleration throughout the heliosphere and beyond. Plasma waves play a crucial role in the dynamics of many space weather phenomena, such as the radiation belts through the acceleration, transport and loss of energetic particles. Many aspects of space weather are notoriously difficult to model from a first principles approach, however, with the wealth of data from past and present missions, machine learning is contributing to the modelling and prediction of space weather, including plasma waves. This session will focus on applications of machine learning techniques to space weather through the analysis of observational data, large-scale simulation data, or the fusion of observational and simulation data. Contributions that employ any machine learning techniques applied to space weather are welcome, including techniques complimentary to machine learning such as those from system science.

**H05 : Commission H open session**

**Conveners**

Jyrki Manninen (Sodankylä Geophysical Observatory, Finland), jyrki.manninen@oulu.fi

Craig J. Rodger (University of Otago, New Zealand), craig.rodger@otago.ac.nz

**Session description**

This session solicits papers on all aspects of waves in space and laboratory plasmas that do not easily fit into the other sessions within Commission H for this URSI meeting. Examples of appropriate paper topics include solar, planetary, and interplanetary plasmas, spacecraft-plasma interactions, applications to space weather, the use of space as a laboratory, spacecraft and laboratory instrumentation, and latest results from recently launched spacecraft missions and laboratory experiments.

**HGE : Meet the HGE Experts (Commissions HGE) (Only for invited authors !!)**

**Conveners**

Claudia Martinez-Calderon (Nagoya University, Japan), claudia@isee.nagoya-u.ac.jp (Commission H)

Evgenii Shirokov (Institute of Applied Physics of the Russian Academy of Sciences, Russia), evshirok@gmail.com (Commission H)

Bruce Fritz (U.S. Naval Research Laboratory, USA), bruce.fritz@nrl.navy.mil (Commission G)
Chaouki Kasmi (Technology Innovation Institute, UAE), chaouki.kasmi@tii.ae (Commission E)

**Session description**

The fields of plasma waves, space weather, ionosphere, and planetary emissions have developed greatly in the past decades. As new topics start to develop, early-career scientists can find it hard to identify new interesting questions to investigate and new ways to innovate in the field. In this session, we invite a panel of renowned researchers to give their opinions on how the research field has evolved since they started their careers, and what are key questions for the future of space physics. They will also discuss their personal experiences, accomplishments, and disappointments in order to enable early-career scientists better appreciate the difficulties of scientific research. This is an excellent opportunity for early-career scientists to meet with experts and discuss the present, future, and challenges within our fields within a friendly environment.

**HE(G) : Atmospheric, Ionospheric, Magnetospheric, and High Energy Effects of Lightning Discharges**

**Conveners**

Ivana Kolmašová (Charles University, Czech Republic), iko@ufa.cas.cz

Martin Fullekrug (University of Bath, UK), M.Fullekrug@bath.ac.uk

Ninguy Liu (University of New Hampshire, USA), Ningyu.Liu@unh.edu

**Session description**

This joint session aims at presenting contributions that advance knowledge in the areas of the global atmospheric electric circuit, lightning physics, transient luminous events, energetic radiation, relativistic particles, and their impact on the Earth's atmosphere, ionosphere and magnetosphere. One key focus of the session will be novel satellite observations, related ground based observations and their modeling.

**HJ : Computer simulations in space plasmas**

**Conveners:**

Yohei Miyake (Kobe University, Japan), y-miyake@eagle.kobe-u.ac.jp (Commission H)

Esa Kallio (Aalto University, Finland), esa.kallio@aalto.fi (Commission H)

Takaaki Yokoyama (Kyoto University, Japan), yokoyama@kwasan.kyoto-u.ac.jp (Commission J)

**Session description**

Computer simulations have been an essential tool to understand complex physical systems involved in space plasmas. This session solicits state-of-the-art simulation advances and results related to space plasma physics. Topical areas of interest include: simulations and modelling of wave-particle interactions, magnetic reconnection, shocks and boundaries, solar phenomena, moon and planetary environment, space weather, and spacecraft-plasma interactions. Papers presenting advanced numerical algorithms and high performance computing techniques are also welcome.