URSI AT-RASC
Commission G Sessions

P. Doherty
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G.8 Special sessions

S-G1 – Atmospheric impact on remote sensing: challenges and opportunities

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The ionosphere and the troposphere can significantly affect radio waves based studies such as for Earth science dedicated to observations of surface deformation, cryosphere dynamics, etc. This is the case for example for the INSAR, LOFAR, and GNSS single-frequency applications.

To pose a solid bridge between the atmospheric and impacted scientific communities, this session solicits contributions to facilitate exchange of information on their respective states of the art as well as on their future needs.

Contributions are welcome on ionosphere and troposphere research at low, mid and high latitudes from GNSS and satellites in situ data dealing with ionospheric irregularities, scintillation, total electron content (TEC) gradients, travelling ionospheric disturbances (TID) as well as water vapour measurements. Papers dealing with the assessment and mitigation of "atmosphere" impacts on different applications are highly encouraged. Papers focusing on data processing to support models development are also welcome, as are those based on a multi- instrument approach. Finally, contributions highlighting differences and similarities at high and low latitudes are also appreciated.

S-G2 – Progress in ionospheric modeling and data assimilation

Organizers: Dieter Bilitza (dieter.bilitza-1@nasa.gov)
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Since the advent of the IRI and NeQuick electron density models, new empirical models of the ionosphere have come to light. The approaches used by these models range from regional to global models of vertical electron density profile characteristics, such as NmF2 and hmF2, as well as models of total electron content. This session invites presentations regarding the following topics:

1) New empirical models of ionospheric characteristics and structure.
2) New techniques for regional or global empirical modeling.
3) Adapting/updating traditional empirical models to accommodate new datasets or recently discovered phenomena.

S-G3 – Advances and challenges in the use of GNSS in ionospheric monitoring

Organizers: Charles Rino (Charles.rino@bc.edu), Antony McCaffrey (a.mccaffrey@unb.ca)

GNSS monitoring technologies have seen a significant expansion in their capacity to monitor the ionosphere. New technologies and constellation deployments now allow for new approaches to ionospheric monitoring. This session will accept proposals for presentations regarding the following topics:

1) The use and advantages provided through high sampling rate GNSS observations for ionospheric monitoring.
2) The use of multi-constellation observations in monitoring ionospheric conditions.
3) Studies regarding new opportunities for and uses of multi-frequency GPS observations for the study of scintillation and total electron content.

S-G4 – Advances in spaceborne GNSS receiver techniques for monitoring the topside ionosphere

Organizers: Richard Langley (lang@unb.edu)
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With the increasing popularity of cube satellites and advances in GNSS data processing techniques, there is a surge in GNSS instrument deployments as satellite payloads. While radio occultation has become an increasingly popular topic, new techniques and an abundance of new spaceborne GNSS receivers has resulted in a gowth in the use of topside and line-of-sight GNSS observations of the ionosphere. This session invites presentation proposals regarding the following topics:

1) New GNSS deployments/missions on board satellites.
2) New instrumentation and techniques for monitoring the ionosphere with spaceborne GNSS receivers.
3) The integration of spaceborne GNSS data products into data assimilation models.
4) New studies on the topside ionosphere based on data from spaceborne GNSS receivers.

S-G5 – Ionospheric response to the solar eclipse of 2017

Organizers: Norbert Jakowski (Norbert.Jakowski@dlr.de)
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On 21 August 2017, during daytime hours (16:00-20:00 UTC), a total solar eclipse with a narrow ~160 km wide umbral shadow that moved at supersonic speeds through the Earth’s atmosphere was observed across the continental US. A solar eclipse generates dramatic changes throughout the Earth's geospace due to the fast reduction and recovery of solar EUV irradiation Solar eclipse effects on the ionosphere have been studied for more than 50 years, as they offer a naturally occurring 'active' experiment with opportunities to study the effect of solar radiation on the ionosphere-thermosphere-mesosphere (ITM) system. The 21 August 2017 solar eclipse provided an unprecedented opportunity to study eclipse effects because of the large amount of multi-sensoral observations obtained. Recent major advances in sensitivity, spatial/temporal resolution, and global coverage of measurements, as well as the development of sophisticated geospace modeling tools, have benefited eclipse research. This session solicits papers focused on solar eclipse studies, with a particular focus on the August 2017 eclipse.

S-G6 – New Advances in Scintillation Monitoring

Organizers: Jade Morton (jade.morton@colorado.edu)
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New Advances in Scintillation Monitoring

Ionospheric scintillation effects on radio waves propagating through the space environment are a major concern for space-based navigation and communication systems. However, these effects have also played a critical role in monitoring space weather and internal ionospheric activities. This session focuses on contributions on the latest technology development, monitoring networks establishment, and scientific discoveries related to scintillation monitoring. Both ground and space-based radio systems as well as coordinated studies with other instruments are of interests. We also welcome submission on scintillation effects, patterns, and mechanisms in high, low, and mid-latitudes.

S-G7 – Sensor networks for ionospheric weather nowcast

Organizers: Ivan Galkin (ivan_galkin@uml.edu)
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Accurate ionospheric nowcast is in demand after users from several disciplines have admitted, ever so reluctantly, severe impact of the ionospheric anomalies on their systems. Radio instrumentation in these existing and emerging disciplines is sensitive to even minor deviations of the ionospherically propagating signals from expected trajectory, rendering such systems unusable in space weather. Dubbed a "major operational nuisance", traveling ionospheric disturbance (TID) is one example of such aberration responsible for unacceptable loss of accuracy for High Frequency Geolocation (HFGeo) and Precise Point Positioning (PPP) with GNSS. Correspondingly, academia is tasked to produce new level of understanding the transient ionospheric phenomena and provide new means of their real-time monitoring and short-term forecast. Remarkably, very few reliable providers of sensor data are currently available to deliver an accurate specification of the ionospheric plasma state in time for the mitigation measures to take effect, at typical latency below several minutes. The session will concentrate on sensor networks and associated computational and modeling techniques for prompt and detailed diagnostics of the ionosphere. We will also welcome contributions on susceptibility of the radio systems to ionospheric phenomena and corresponding mitigation approaches.

S-GH – Meteors, collisional EMPs, and other highly-transient space plasma events

Organizers: Asta Pellinen-Wannberg (asta.pellinen-wannberg@umu.se)
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Meteors, Collisional EMPs and Other Highly-Transient Space Plasma Events

In this session we welcome papers on general studies regarding meteors, dust and their dynamics in the Solar System with an emphasis on the implications regarding the radio science and plasma physics processes involved. Interesting topics include (micro)meteoroid processes such as sputtering, fragmentation and ablation in the upper atmosphere and how they can bias the estimates of the total meteoroid mass flux into Earth. Also studies on how the processes can be observed in radio emissions, through radar signatures, and through comparisons with optical signatures that are important for improved mass flux estimates and enhanced understanding of the underlying processes. Additionally, papers on related highly-transient impact phenomena including meteoroid impact EMP generation on satellite, lunar, and planetary surfaces are welcome.

S-GE –Global Electric Circuit and the Ionosphere

Organizers: Sergey Pulinets (pulse1549@gmail.com), Evgeny Mareev (evgeny.mareev@gmail.com)

The state of the Global Electric Circuit (GEC) is usually controlled by the so-called Ionospheric Potential (IP). Strong variations of IP magnitude were revealed during the nuclear weapons tests in the atmosphere in the 1960s through the 1970s. These tests essentially modified the atmosphere conductivity such as dust and sand storms, strong volcano eruptions, earthquake preparation processes and nuclear power plant emergencies (such as Chernobyl).

Taking into account that potential differences between the ionosphere and ground is created by the global thunderstorm activity, the Climate Global Change, including the intensity of thunderstorm activity may cause effects on the global ionosphere.

This session will concentrate on several issues:

1) Long-term, global variations in GEC-ionosphere coupling processes (Global change problem)
2) Regional variability of the GEC-ionophere coupling caused by natural and anthropogenic disasters
3) Daily GEC variability effects on the ionosphere
4) GEC-ionosphere coupling modeling