

# 15<sup>th</sup> International Ionospheric Effects Symposium



## IES 2017

*Bridging the gap between applications  
and research involving ionospheric and  
space weather disciplines*

**09-11 May 2017**  
**Crowne Plaza Hotel**  
**Old Town, Alexandria, VA**

# Ionospheric Effects Symposium

## 2017



Dear Colleagues,

On behalf of the organizing committee it gives me great pleasure to welcome you to the 15<sup>th</sup> International Ionospheric Effects Symposium (IES) held 9-11 May 2017 in Alexandria, Virginia. This year we return to the usual schedule for the meeting coinciding with the URSI General Assembly. The goal is to remove any conflict with the URSI meetings held in May which we strongly support and encourage community participation. This meeting also marks the second time the team from the Boston College Institute of Scientific Research has organized the IES since John Goodman stepped down. In my opinion we learned a lot of lessons from the first Symposium, though I forgot perhaps one of the most important—start the process at least one year before the meeting date! Thanks to our team and the responsive enthusiasm of the IES community, I believe we are on track for another excellent and productive exchange of ideas, information and technology this week.

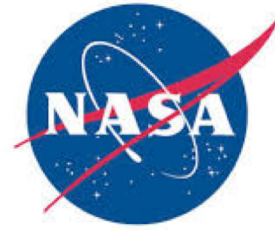
The world has changed a good deal since we gathered in 2015. And while most of us expected change, perhaps there are changes we did not expect, and the future of the planet may seem less clear now than it did then. Yet intellectual pursuit seems to move forward regardless and there are signs for optimism throughout the ionospheric effects community. Exciting new space-based missions such as ICON, GOLD and COSMIC-2 are just months from flying, a US National Space Weather Action Plan continues to progress, there are significant new projects and plans under discussion and international collaborations seem stronger than ever despite uncertainties in the global political environment. The unity and resolve of the scientific community, as evidenced by the recent March for Science, has only grown, and I believe that cohesiveness will serve us well as we face the challenges of the future.

Of course, even in this sea of change, some things are exactly the same as they were in 2015. For example, the IES is once again being held in the Crowne Plaza Hotel in Alexandria, VA, home to numerous fine and familiar eateries and social venues. The New England Patriots are still the champions of the NFL, no doubt a steady source of comfort and assurance to many (tongue firmly in cheek here; well sort of). Judging by the abstracts contributed to this year's meeting, it appears that IES2017 participants strive to bring that same level of commitment, consistency and excellence to their work. Yes, there are indeed reasons to be optimistic about the future, because the skills, talents and intellect of the ionospheric research community show no signs of wanting or waning. I look forward to a very positive and productive meeting ahead.

With warm regards,

Keith Groves  
Chair, IES2017

# Sponsors



# Scientific Advisory Committee

Anna Belehaki, National Observatory of Athens  
Gary Bust, Johns Hopkins University Applied Physics Laboratory  
Ronald Caton, Air Force Research Laboratory  
Anthea Coster, MIT Haystack Observatory  
Dwight Decker, Boston College  
Patricia Doherty, Boston College  
Savely Grach, Lobachevsky State University  
Cathryn Mitchell, University of Bath, UK  
Todd Parris, Air Force Research Laboratory  
Vadym Paznukhov, Boston College  
Bodo Reinisch, Lowell Digisonde International, LLC  
Charles Rino, Boston College  
Rodney Viereck, Space Weather Prediction Center, NOAA  
Endawoke Yizengaw, Boston College

# Organizing Committee

Keith M. Groves, Patricia Doherty, Matt Magoun,  
Daneille Berzinis, Andrea Murphy, Sean O'Connell and Susan Delay  
Boston College, Institute for Scientific Research



# Logistics

## REGISTRATION DESK

Please pick up your registration materials at the desk in the Washington Foyer

Registration desk will be open at the following times:

Monday May 8th from 6 – 8PM

Tuesday through Thursday May 9-11 from 7:30AM to 4PM

## CONTINENTAL BREAKFAST

A light continental breakfast will be served in the Washington Foyer beginning at 7:30 each morning

Posters will be exhibited Tuesday - Thursday

(Papers can be accessed via the website:

<https://ies2017.bc.edu>)



# IES 2017

**PLENARY SESSION  
IES 2017  
Tuesday, May 9, 2017**

<b>Washington Ballroom</b>	
7:30	Light Continental Breakfast
8:10	Welcome and Introduction Dr. Keith Groves and Patricia Doherty, Boston College
8:20	Keynote Presentation: Space Weather: DOD Requirements and Future Needs, Ralph Stoffler, U.S. Air Force
Agency Presentations: AFOSR, FAA, NASA, NOAA, NSF	
8:45	Basic Research in Space Science at AFOSR, Dr. Julie Moses, AFOSR
9:00	Ionospheric Effects on FAA Systems WAAS and GBAS, Jason Burns, FAA
9:15	Ionospheric Science at NASA, Dr. Douglas Rowland, NASA
9:30	Ionospheric Products and Services at the NOAA SWPC, Dr. Rodney Viereck, NOAA
9:45	Geospace Sciences at the National Science Foundation, Dr. John Meriwether, NSF
10:00	Update on Space Weather Phenomena During the Weak Solar Cycle 24, Dr. Nat Gopalswamy, NASA

**10:20 – 10:40 AM Break – Washington Foyer**



**IES 2017**

## Sessions A and B - Tuesday May 9, 2017

Time	A Sessions - Washington Ballroom	B Sessions - Kennedy Ballroom
	Session 1A: HF Modeling, TIDs and Geolocation I	Sessions 1B: Space Weather Applications & Services I
	Chairs: A. Belehaki/B. Reinisch	Chairs: R. Viereck/P. Doherty
10:40	Method and Validation for Determining Hooke TID Parameters from GNSS Data, J. Schofield	Do countries under the Equatorial Electrojet belt should worry about Geomagnetically Induced Currents?, E. Yizengaw
11:00	Real-time identification of travelling ionospheric disturbances based on high frequency reflected radio pulses, A. Belehaki	Ionospheric specification services delivered by the National Observatory of Athens for the European Space Agency. I. Tsagouri
11:20	Characterization of HF Perturbations and Drift Velocity with GPS, K. Groves	The Impact of the Ionosphere on WAAS at Low Latitude, L. Sparks
11:40	Identification of travelling ionospheric disturbances in the ionosphere using GPS with independent verification, C. Mitchell	3D electron density specification to support LEO and MEO satellite applications, P. Marinov (A. Belehaki)
<b>12:00 - 13:20 Lunch on your own</b>		
	Session 2A: HF Modeling, TIDs and Geolocation II	Sessions 2B: Space Weather Applications & Services II
	Chairs: A. Belehaki/B. Reinisch	Chairs: R. Viereck/P. Doherty
13:20	Stratospheric Gravity Waves as the Seeds for E-F Coupling, J. Helmboldt	The Scintillation Prediction Observations Research Task (SPORT): An International Science Mission Using a CubeSat, J. Spann, G. Fry
13:40	Characterizing traveling ionospheric disturbances using passive HF observations from lightning sources, G. Bust	Low-latitude Ionospheric Research using the CIRCE Mission, K. Dymond, A.C. Nicholas
14:00	Ocean Remote Sensing by Oblique Incidence Sounding of the Ionosphere, P. Bernhardt	Real Time Ionosphere, Any time, Any where, S. Ganguly
14:20	Assimilation of HF Measurements of Unknown Sources for Improved HF Geolocation in the Presence of Traveling Ionospheric Disturbances, S. Fridman	Vacant
14:40	Realistic ionospheric specifications in support of a TID warning system, I. Galkin	Vacant
15:00	A Regional Optimum Assimilative Model for Improved HF Geolocation Accuracy, C. Carrano	Vacant

## Sessions A and B - Tuesday May 9, 2017 continued

15:20 - 15:40 Break		
<b>Time</b>	<b>Session 3A: HF Modeling, TIDs and Geolocation III</b>	<b>Sessions 3B: Storm Effects I</b>
	Chairs: A. Belehaki/B. Reinisch	Chair: A. Coster
15:40	The use of an HF data assimilative optimization of a physics based model of TIDS to predict time-delay versus frequency from an oblique ionospheric sounder, G. Bust	<b>Session Cancelled</b>
16:00	Ionospheric tilt measurements: climatology and applications for HF Geolocation, V. Paznukhov	
16:20	A Joint Estimation Approach for the Geolocation of Ground HF Transmitters in the Presence of Ionosphere Perturbations, C. Rago	
16:40	Adjourn	Adjourn

<b>POSTERS - DISPLAYED TUESDAY THROUGH THURSDAY IN REGISTRATION AREA</b>
Climatology of Ionospheric Scintillations in the Northern-African Crest of the Equatorial Region over Egypt, A. Mahrous
Radio sounding of large-scale artificial ionospheric irregularities caused by the injection of chemical reagents from aboard geophysical rockets in the experiments 1988 - 1991, I. Nasyrov
Comparative Morphology of Mg <sup>+</sup> and O <sup>+</sup> Ions Made by the HIRAAS Experiment, K. F. Dymond
The IGS's ROTIPOLARMAP product: Introduction, Performance and Applications, I. Cherniak
Storm-time development of the ionospheric plasma bubbles over Europe and then impact on EGNOS performance, I Cherniak
Application of the Space-borne GPS measurements for Investigation of the Topside Ionospheric Irregularities, I Zakharenkova
GPS&GLONASS Observations of the Large Scale Traveling Ionospheric Disturbances during Severe Geomagnetic Storms, I Zakharenkova

## Sessions A and B – Wednesday May 10, 2017

Time	A Sessions - Washington Ballroom	B Sessions - Kennedy Ballroom
	Session 4A: GNSS Scintillation & Propagation I	Session 4B: Active Experiments I
	Chairs: R. Caton/C. Rino	Chairs: S. Grach/V. Paznukhov
8:20	Real-world ionospheric events in a Spirent Simulator, C. Mitchell	The International Heating Experiments (HEX) Campaign at Arecibo, P. Bernhardt
8:40	Ionospheric Effects on a Wide Bandwidth Chirp Radar Signal, D. Knepp	Preliminary results from a small scale travelling ionospheric disturbance (TID) network deployed near Arecibo as part of the Heating EXperiment (HEX), N. Jackson-Booth
9:00	Simulation Study of GPS Phase Scintillation, C. Rino	Arecibo HF Ionospheric Results Using the e-POP Radio Receiver Instrument, S. Briczinski
9:20	Maximum Likelihood Estimation of Phase Screen Parameters from Ionospheric Scintillation Spectra, C. Carrano	HF, Scintillation and TEC Measurements using CASSIOPE/ePOP Overpasses above HAARP, C. Siefring
9:40	Automated quality control algorithms for ionospheric scintillation measurements, T. Pedersen	Spatiotemporal dynamics of HF-induced ionospheric turbulence revealed by diagnostic stimulated electromagnetic emission and test radio waves at HAARP, E. Sergeev
<b>10:00 - 10:20 Break</b>		
	Session 5A: GNSS Scintillation & Propagation II	Session 5B: Topside and Plasmasphere I
	Chairs: R. Caton/C. Rino	Chair: E. Yizengaw
10:20	Investigation of Multi-constellation GNSS Scintillation Caused by Mid-Latitude Ionospheric Irregularities: TEC Measurements in Conjunction with SuperDARN Observations, Y. Peng	Status of and scientific results from the ISIS-I Topside Digital Ionogram Data Enhancement Project, R. Benson
10:40	Statistical characterization of GNSS signal carrier Doppler frequency deviations during ionospheric scintillation, I. Collett	Ensemble Inversion Method for ISIS II Topside Ionograms, D. Rice
11:00	Multi-Constellation GNSS Scintillation at Mid-Latitudes, M. Jean	Extending measured bottomside EDPs to the topside ionosphere and plasmasphere, M. Osman
11:20	A Multi-Constellation Analysis of Global Navigation Satellite System (GNSS) Signals in the Equatorial Region, J. Conroy	A high latitude topside electron density representation for the Empirical Canadian High Arctic Ionospheric Model (E-CHAIM), D. Themens
11:40	Vacant	Ionosphere/Plasmapause Variations During the 17 March 2013 Identified by Ground-based and Space-based GPS Signals, R. Bishop



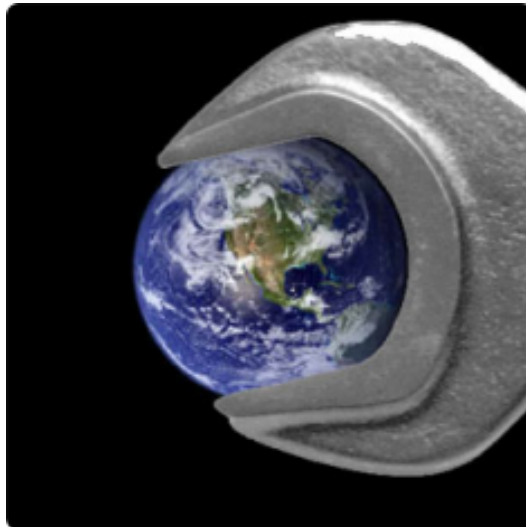


## **AWARDS BANQUET**

*Best Paper Recognition Award – one paper will be selected from the full papers submitted to IES 2017*

Wednesday May 10  
12:00 – 13:30  
JEFFERSON BALLROOM

**Banquet Speaker: Dr. Simon Nicholson**  
Director of the Global Environmental Politics Program  
School of International Service  
American University



**Climate Engineering: A New Frontier for Climate Action?**

## Sessions A and B - Wednesday May 10, 2017 continued

Time	Session 6A: Storm Effects II	Session 6B: Active Experiments II
		Chair: A. Coster
13:40	Ionosphere-thermosphere global time response to geomagnetic storms, D. Oliveira	Stimulated electromagnetic emission and plasma line during pump wave frequency stepping near 4th electron gyro-harmonic at HAARP, S. Grach
14:00	Quantifying the Effects of Geomagnetic Storms on foF2 and TEC, J.S. Shim	How ULF/ELF waves generated in upper ionosphere by HAARP can propagate over long distance, D. Kotik
14:20	A new short-term forecasting model for the total electron content storm time disturbances, I. Tsagouri	Resonance of electromagnetic ion cyclotron waves in diverging magnetic field, G. Milikh
14:40	Ionosphere/plasmasphere response to the 22-23 June 2015 geomagnetic storm: comparison of observations and SAMI3/RCM model results, E. Astafyeva	Properties of VLF waves in ionospheric plasma, D. Kotik
<b>15:00 - 15:20 Break</b>		
Time	Session 7A: HF Propagation & Systems	Session 7B: Topside & Plasmasphere II
		Chairs: A. Belehaki/B. Reinisch
15:20	Monitoring Shortwave Fadeout (SWF) Across North America using SuperDARN HF Radar Observations, S. Chakraborty	The influence of the ionospheric dynamo on the shape of the plasmasphere, J. Krall
15:40	Virtual SATCOM, Skywave High-Frequency Communications at SATCOM Speeds Without Satellite Vulnerabilities, D. Watson	Imaging of Ionospheric Irregularities via Observations of their Impact on the Plasmasphere, J. Helmboldt
16:00	Observations of HF radio propagation at high latitudes and predictions using data-driven simulations, M. Warrington	Vacant
16:20	Vacant	Vacant
16:40	Adjourn	Adjourn

## Session A and B – Thursday May 11, 2017

Time	A Sessions - Washington Ballroom	B Sessions - Kennedy Ballroom
	Session 8A: Equatorial Dynamics & Drivers	Session 8B: Natural & Artificial Anomalous Events
	Chair: T. Parris	Chairs: A. Coster
8:20	Longitudinal, Seasonal and Solar Cycle Variation of Lunar Tide Influence on Equatorial Electrodynamics, E. Yizengaw	On the use of solar eclipses to study the ionosphere, W. Liles
8:40	Three-peak ionospheric equatorial ionization anomaly: development, drivers, statistics, E. Astafyeva	Simulation of Ionospheric Effects from Acoustic Waves Produced by Explosive Events at Ground Surface, S. Fridman
9:00	Longitudinal Variability of Nightside Equatorial Electrodynamics, E. Yizengaw	Real-Time TEC-Based Tsunami Detection with VARION Algorithm and Stand-Alone GNSS Receivers, G. Savastano
9:20	Filling the gap between physical ionosphere models and scintillation models in equatorial region, S. Rougerie	Use of ionospheric GNSS measurements for detection of volcano eruptions, E. Astafyeva
9:40	The dependence of Nighttime Plasma Irregularities on Daytime Low-Latitude Electrodynamics during Solar Maxima, S. Khadka	SAMI3 Prediction of the Impact of the August 21, 2017 Total Solar Eclipse on the Ionosphere/Plasmasphere System, J. Huba
10:00	Vacant	Vacant
<b>10:20 - 10:40 Break</b>		
	Session 9A: Radio Occultations & Tomography	Session 9B: Assimilative and Coupled Models I
	Chair: D. Decker	Chair, C. Mitchell
10:40	Novel Techniques for the use of GNSS Radio Occultation for Specification of the Ionospheric Scintillation Environment, R. Caton	Transitioning a Coupling Whole Atmosphere (WAM) and Ionosphere-Plasmasphere-Electrodynamics (IPE) Model into Operations at NOAA, T. Fuller-Rowell
11:00	A Parameter Constraint Algorithm for the Generation of "All Clear" Forecasts of Equatorial Scintillation using Radio Occultation Data, W. McNeil	IDA2017 – A Next-Generation Coupled Modeling and Data Assimilation Package, A. Chartier
11:20	Localization of Structure on Extended RO Propagation Geometries, C. Rino	Selection of an Atmospheric Reference Model and Branching Ratios for Numerical Modeling of Gravity Wave-Airglow Interactions, Y. Amaro-Rivera
11:40	Ionospheric imaging by finite-element tomography, R. Penney	Preliminary results for the assimilation of forward oblique ionosonde data into the Electron Density Assimilative Model, M. Poppy

**12:00 – 13:20 Lunch – on your own**

## Session A and B – Thursday May 11, 2017 continued

	<b>Session 10A: Equatorial Irregularities</b>	<b>Session 10B: High Latitude Structure &amp; Irregularities</b>
	Chair: T. Parris	Chair: C. Rino
13:20	Characteristics and Onset Conditions of Spread F Inferred from a Long-Term Transequatorial HF Radio Experiment, E. Miller	Investigations of Polar Cap Ionosphere Structures using the Greenland Network (GNET), C. Valladares
13:40	Unseasonal equatorial F-region irregularities in Southeast Asian sector, B. Carter	Analysis of Ionospheric Patches Based on Swarm Langmuir Probe and TEC Data, A. Chartier
14:00	The occurrence of plasma bubble and its relation to the vertical drift using ROCSAT-1/IPEI Data, C. Yanhong	GNSS Observations from Venetie, Alaska during ISINGLASS sounding rocket mission, A. Coster
14:20	A comparison of space and ground-based observations of electron density irregularities and implications for Spread F dynamics, D. Joshi	Spectral Characteristics of Auroral Region Scintillation Using 100 Hz Sampling, A. McCaffrey
14:40	Characterization of the ionosphere in the Seychelles, B. Curtis	Comparative study of GNSS phase scintillation and high latitude electrodynamic ionospheric properties derived from AMPERE, R. Robinson
15:00	All-sky Tracking of Sporadic-E Irregularities as a Novel Probe of Thermospheric Winds, J. Helmboldt	A Comparative Study of Time-Domain and Time-Frequency-Domain Methods for Ionospheric Irregularity Drift Velocity Estimation from a GNSS Receiver Array during High Latitude Ionospheric Scintillation, J. Wang
<b>15:20 - 15:40 Break</b>		
<b>Time</b>	<b>Session 11A: Optical Remote Sensing</b>	<b>Session 11B: Assimilative and Coupled Models II</b>
	Chair: G. Bust	Chair: C. Mitchell
15:40	Simulations of the Earth's Ultraviolet Airglow from a Geosynchronous Platform: Implications for Daytime Ionospheric Specification, K. Dymond	Modeling Weather in the Ionosphere using the Navy's Highly Integrated Thermosphere and Ionosphere Demonstration System (Navy-HITIDES), S. McDonald
16:00	Early results and ionospheric observations from LITES on the ISS, A. Stephan	Modeling Ionospheric Daily Variability with SAMI3/WACCM-X, K. Zawdie
16:20	Early Results and Ionospheric Observations from GROUP-C on the ISS, S. Budzien	Ionospheric TEC Assimilation and Now-casting System over China and adjacent areas, E. Aa
16:40	Tomographic Inversion of the 135.6 nm Emission: The Importance of Radiation Transport in the Nighttime and Terminator Regions, K. Dymond	The Empirical Canadian High Arctic Ionospheric Model (E-CHAIM): Peak Density, D. Themens
17:00	Adjourn	Adjourn

**Thank you for attending the  
15<sup>th</sup> International Ionospheric Effects Symposium**



**IES 2017**

**May 9-11, 2017  
Crowne Plaza Hotel  
Old Town, Alexandria, VA**

**Hope you will join us for IES 2020!**

**Please join our mailing list and watch our  
website for future announcements.**

**<http://ies2017.bc.edu>**

