

**Japanese URSI Commission H (Waves in Plasmas)**  
**Activity Report**  
**July 2015 - December 2015**

**[1] Symposium on Waves in Space Plasma**

(The 301st Symposium in Sustainable Humanosphere), Unazuki, Toyama, 28-29 Nov. 2015.

“Symposium on wave in space plasma” was held as “the 301st Symposium in Sustainable Humanosphere” in cooperation with Japanese URSI-H commission and subcommittee on plasma wave in SGEPPSS(Society of Geomagnetism and Earth, Planetary and Space Sciences) at Unazuki, Toyama. The meeting had been composed of 3 tutorial lectures, 6 invited presentations and 22 poster presentations. Total number of participants was 47 including 31 students.

<http://www.rish.kyoto-u.ac.jp/events/symposium-0301/>

**[2] Status of projects related with plasma wave observation**

1. BepiColombo/MMO

<http://global.jaxa.jp/projects/sat/bepi/>

[http://www.stp.isas.jaxa.jp/mercury/p\\_mmo.html](http://www.stp.isas.jaxa.jp/mercury/p_mmo.html)

BepiColombo is a Mercury exploration project jointly planned by JAXA and the European Space Agency (ESA). It consists of two orbiters: the Mercury Planetary Orbiter (MPO) and the Mercury Magnetosphere Orbiter (MMO). JAXA is responsible for development of the MMO.

MMO is at ESA/ESTEC (European Space Research and Technology Centre, Netherlands) from April 2015. For the plasma wave, Plasma Wave Investigation (PI: Y. Kasaba [Tohoku Univ.]) is aboard this spacecraft. The recent activation was done in Nov. 30 – Dec. 1 and its good health was confirmed. PWI Science Team is now shifting to prepare the telemetry data pipelines and operation planning for the real science execution which will be realized in 2020s.

2. JUICE

<http://sci.esa.int/juice/>

JUICE (JUperiter ICy moons Explorer) is the large-class mission of ESA, planned for launch in 2022 and arrival at Jupiter in 2030. It will spend at least three years making detailed observations of the Jovian system including Ganymede, Callisto and Europa, and finally be on the orbit around Ganymede. For the plasma wave,

Radio and Plasma Wave Investigation (PI: J.-E. Wahlund [IRF Uppsala, Sweden]) is aboard this spacecraft and covers the information of the exospheres, surfaces, and conducting subsurface oceans of icy satellites and their interactions with surrounding Jovian magnetosphere.

From Japan, High Frequency part (Preamp and Receiver) will be supplied (Co-PI: Y. Kasaba [Tohoku Univ.]), and provide the highly resolved information of Jovian radiation emitted from Ganymede and Jupiter including lightning by the first 3-axis E-field measurement. For the access to the subsurface ocean, RPWI will first observe cold plasma and electric fields and provide the global conductivity and current of icy satellite ionospheres, which characterizes the conductive subsurface oceans below. And as a byproduct, reflected Jovian radio emission can be expected from the boundary of crust (ice) and subsurface ocean (conductive water).

### 3. The ERG project

<http://ergsc.stelab.nagoya-u.ac.jp/index.shtml.en>

The ERG (Exploration of energization and Radiation in Geospace) project is a mission to study acceleration and loss mechanisms of relativistic electrons around the Earth. To achieve comprehensive observations of plasma/particles, fields, and waves, the Plasma Wave Experiment (PWE) is installed onboard the ERG satellite to measure electric field in the frequency range from DC to 10 MHz, and magnetic field in the frequency range from a few Hz to 100 kHz. Replacement of the PI of PWE from Y. Kasaba [Tohoku Univ.] to Y. Kasahara [Kanazawa Univ.] was approved in the last ERG design meeting on Nov. 26, 2015. Besides the PWE, the Software-Wave Particle Interaction Analyzer (SWPIA) (PI: H. Kojima, [Kyoto Univ.]) is equipped onboard the ERG to realize direct measurements of interactions between energetic electrons and whistler-mode chorus in the Earth's inner magnetosphere. Flight model of the mission instruments aboard ERG including PWE and SWPIA are now undergoing their functions at ISAS/JAXA.

### 4. GEOTAIL

GEOTAIL spacecraft has been operated since 1992. The Plasma Wave Instrument (PWI) is continuously collecting the high resolution waveform data as well as the spectrum data. The color plots of the observed wave spectrum data have been opened in the PWI web site <http://www.rish.kyoto-u.ac.jp/gtlpwi>, and <http://www.stp.isas.jaxa.jp/geotail>. Furthermore, one can easily also make the color spectrum plots in flexible time scales in the NICT web page <http://geotail.nict.go.jp/>.

Geotail is presently under review for extending its operation for 3 more years in JAXA.

5. Measurements of ELF/VLF waves at Athabasca, Canada

Routine measurements of ELF/VLF waves at Athabasca, Canada has been continued since September 2012. The sampling rate is reduced from 100 kHz to 40 kHz on November 12, 2015. Quick-look spectra are available at <http://stdb2.stelab.nagoya-u.ac.jp/vlf/index.html>.

6. Study of Jovian auroral radio waves by ground-based radio observation

<http://ariel.gp.tohoku.ac.jp/~jupiter/>

In order to develop integrated data archive with data from Nancay Decametric Array and Radio Jove stations, a repository server for Virtual Observatory (VO) was set up at Tohoku University with the support of Paris Observatory team.

7. Ground based observations of VLF/LF narrow band radio transmitter

Ground based observations of VLF/LF narrow band radio transmitter to detect ionization phenomena in the lower ionosphere are operating at 9 stations (three stations in Japan, three in Southeast Asia, two in North America, and one in Northern Europe). The observation data was used to identify energetic electron precipitation from radiation belt (Miyoshi et al. 2015) and ionization phenomena in D-region ionosphere which are caused by lightning discharge, atmospheric gravity wave, earthquake and solar flare. Part of the observed data is available through IUGONET metadata database (<http://www.iugonet.org/en/index.html>).

8. Measurements of VHF to UHF radio waves by using the Iitate Planetary Radio Telescope (IPRT)

Measurements of VHF to UHF radio waves have been made by using the Iitate Planetary Radio Telescope (IPRT) in Fukushima, Japan by Tohoku University. IPRT has dual rectangular parabolas with the total aperture area of about 1000 square meters, and is mainly dedicated to the investigations of fine structures of solar radio bursts and variations of Jupiter's radiation belt by the synchrotron radio emission. Details of the data of solar radio emissions are available at <http://pparc.gp.tohoku.ac.jp/data/iprt/index.html>

**[3] Recent Meetings**

1. American Geophysical Union Fall Meeting, San Francisco, 14-18 December, 2015.  
<http://fallmeeting.agu.org/2015/>
2. Workshop on high-energy astrophysics, Numazu, Shizuoka, 25-27, November, 2015.  
<http://www.icrr.u-tokyo.ac.jp/hea/conference151125.html>
3. Workshop on computer simulation ~Looking toward Exascale Computing~, Kyoto, 28-30, September, 2015.  
<http://center.stelab.nagoya-u.ac.jp/simulation/meeting2015/>
4. 5th East-Asia School and Workshop on Laboratory, Space, Astrophysical Plasmas, Pohang, Korea, 17-22, August, 2015.  
<https://apctp.org/plan.php/eastplasma2015>
5. International Conference on Laser Energetics: CLE2015, Yokohama, 22-24, April, 2015  
<http://opic-opic.sakura.ne.jp/opic2015/conferences/cle2015>
6. The 14th Annual International Astrophysics Conference, Tampa Bay, Florida, USA, 20-24, April, 2015.  
<https://www.icensmeetings.com/conference/14thannual/index.html>
7. Institute of Laser Engineering Symposium, Osaka, 8-9, April, 2015.  
<http://www.ile.osaka-u.ac.jp/jp/collab/ilesymposium.html>

**[4] Future Meetings**

1. Symposium on Planetary Science 2016, Sendai, 22-24 Feb, 2016  
The symposium will cover the following topics: atmospheres and magnetospheres on terrestrial and Jovian planets and their satellites studied by observations and numerical analyses, and development of new observational and computational approaches. In addition, special sessions will be held for expected sciences in upcoming planetary explorations by Akatsuki, BepiColombo, Juno etc. and also for future planetary and satellite missions. In this symposium, cosponsored sessions will be also held by SGEPPSS subcommittees on computer simulations for solar, terrestrial and planetary sciences and on environment of airless bodies, moons, and

spacecraft, and 'Joint seminar of DCs and PDs on solar-terrestrial and planetary sciences'.

2. International GEMSIS and ASINACTR-G2602 Workshop, 22-25 March, 2016  
This workshop focuses on the dynamical behavior of the space environment from the Sun to the Earth including various kinds of plasma waves in the solar atmosphere and geospace.
3. European Geosciences Union (EGU) General Assembly 2016, Vienna, Austria, 17-22 April, 2016.  
<http://www.egu2016.eu/>
4. Japan Geoscience Union Meeting 2016, Chiba, Japan, 22-26 May, 2016.  
[http://www.jpгу.org/meeting\\_e2016/](http://www.jpгу.org/meeting_e2016/)
5. The 18th International Congress on Plasma Physics (ICPP 2016), Taiwan, 27 June – 1 July, 2016  
<http://www.isaps.ncku.edu.tw/ICPP2016/>
6. Asia Oceania Geosciences Society (AOGS) 13th Annual Meeting, Beijing, China, 31 July – 5 Aug., 2016.

Sessions related to plasma waves:

ST11 Wave-particle Interactions In The Inner Magnetosphere

\*Dr. Xin Tao (University of Science & Technology of China, China)

Dr. Yuto Katoh (Tohoku University, Japan)

Dr. Lei Dai (State Key Lab. of Space Weather, Center for Space Science & Applied Research, Chinese Academy of Sciences, China)

Dr. Kyung-Chan Kim (Korea Astronomy & Space Science Inst., Korea, South)

ST28 Observation, Theory and Modeling of ULF, ELF and VLF Waves in Geospace

\*Dr. Masahito Nose (Kyoto University, Japan)

Dr. Yonghua Liu (Polar Research Institute of China, China)

Prof. Frederick Menk (The University of Newcastle, Australia)

Dr. Kazue Takahashi (The Johns Hopkins Univ. Applied Physics Lab., U. S.)

7. 7th workshop of the VLF/ELF Remote Sensing of Ionospheres and Magnetospheres (VERSIM) working group, Hermanus, South Africa, 19-23 September, 2016.