Japanese URSI Commission H (Waves in Plasmas)
Activity Report
June 2016 - October 2016

[1] 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

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.

After the ESA manufacturing of MPO and Cruise units, the final FM test including the MMO will be reactivated from January 2017. 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.

<Meeting> MMO Science Working Group Meeting (ISAS, Sep. 2016)

2. JUICE

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

JUICE (JUpiter ICy moons Explorer) is the L-class mission of ESA, planned for launch in 2022 and arrival at Jupiter in 2030s. 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 Jupiter and Ganymede by the first 3-axis E-field measurement. For the access to the conductive subsurface ocean, RPWI will first observe cold plasma and electric fields, in order to separate the global conductivity and current from the ionospheres. As a byproduct, reflected Jovian radio emission can be expected from the boundary of crust (ice) and subsurface ocean (conductive water).

From May 2016, Instrument Preliminary Development Review was executed. After this review, RPWI EM2 (EM) will be developed.

3. The ERG project

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

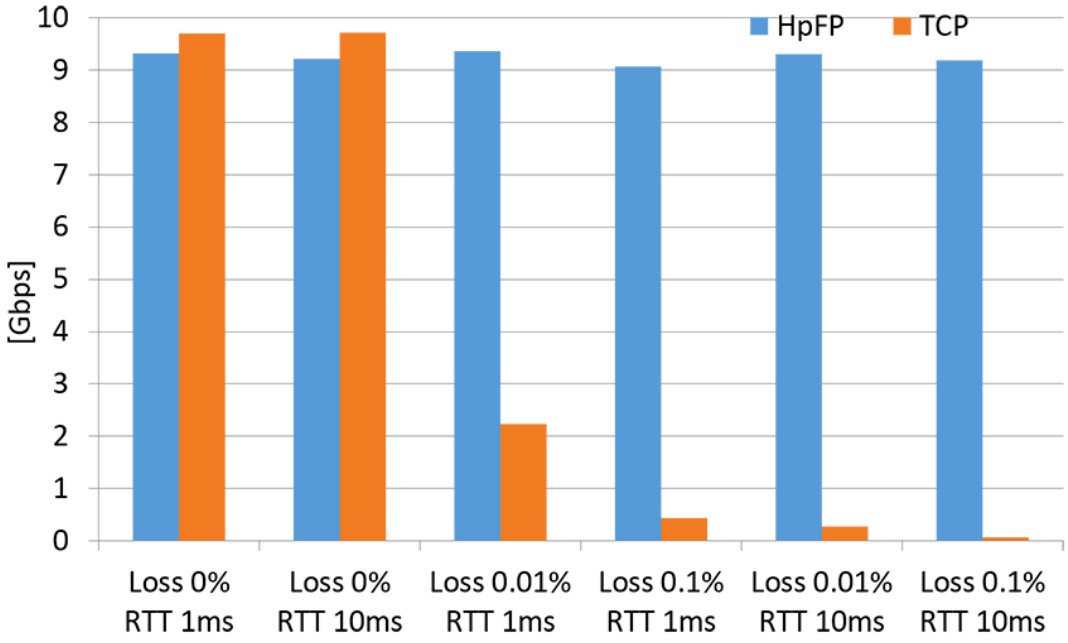
The ERG (Exploration of energization and Radiation in Geospace) project is a mission to study acceleration and loss mechanisms of relativistic electrons around the Earth. To achieve comprehensive observations of plasma/particles, fields, and waves, the Plasma Wave Experiment (PWE, PI: Y. Kasahara [Kanazawa Univ.]) 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. 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.

Manufacturing and all function tests of the ERG satellite at Sagamihara campus in ISAS has finished in September, and the satellite was shipped to the launch site at Uchinoura Space Center, Kagoshima in the beginning of October, 2016.

4. HpFP protocol

http://hpfp.nict.go.jp/

With the tremendous development of plasma wave observation technologies, large-scale data sets are collected from environmental detectors and sensors. We need a technology to transfer the data on the networks. We have developed a novel data transfer protocol, namely HpFP (High-performance and Flexible Protocol), that is designed on the top of UDP. The HpFP is compatible with TCP, thus users are able to replace the TCP library with that of HpFP to get high throughput on long fat networks (LFNs). For example, on the LFN with RTT 10msec and packet loss ratio 0.1%, TCP achieves less than 100 Mbps but HpFP more than 9 Gbps.



5. Iceland - Syowa conjugate observation

A new VLF instrument has been installed at Husafell observatory in Iceland in September, 2016. Unique conjugate observations of auroral phenomena including the measurements of ULF and VLF waves have been carried out between Iceland and Syowa Station, Antarctica since 1983 by the National Institute of Polar Research in Japan in collaboration with University of Iceland.

6. Hisaki spacecraft

http://global.jaxa.jp/projects/sat/sprint_a/

Hisaki satellite with the EUV spectrometer (Extreme Ultraviolet Spectroscope for Exospheric Dynamics: EXCEED) is the UV/EUV space telescope dedicated to planetary sciences.

Hisaki has provided continuous observations of Jovian system in UV aurora total flux and EUV Io torus plasma distributions and plasma diagnostics, which connected the solar wind information and ground-based radio (Decameter [aurora] - VHF [radiation belt]) and IR (aurora and airglows) observations.

7. 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/.

[2] Recent Meetings

1. The 18th International Congress on Plasma Physics (ICPP 2016), Taiwan, 27 June – 1 July, 2016
   http://www.isaps.ncku.edu.tw/ICPP2016/
2. Asia Oceania Geosciences Society (AOGS) 13th Annual Meeting, Beijing, China, 31 July – 5 Aug., 2016.
   http://www.asiaoceania.org/aogs2016/
   Sessions related to plasma waves:
   ST11-28 ULF, ELF, and VLF waves and their effects on particles in the inner magnetosphere
   Conveners:
   Dr. Xin Tao (Univ. of Science & Technology of China, China) xtao@ustc.edu.cn
   Dr. Yuto Katoh (Tohoku University, Japan) yuto@stpp.gp.tohoku.ac.jp
   Prof. Lei Dai (Chinese Academy of Sciences, China) ldai@spaceweather.ac.cn
   Prof. Kyung-Chan Kim (Daegu University, Korea, South) kckim@daegu.ac.kr
   Dr. Masahito Nose (Kyoto University, Japan) nose@kugi.kyoto-u.ac.jp
3. 7th workshop of the VLF/ELF Remote Sensing of Ionospheres and Magnetospheres (VERSIM) working group, Hermanus, South Africa, 19-23 September, 2016.
4. Europa-Enceladus Plumes Workshop, Caltech, U.S.A., 15 October, 2016.
   http://goo.gl/forms/hLSvt10pCe
5. 48th Division of Planetary Sciences (DPS)/ 11th European Planetary Science Congress (EPSC), Pasadena, U.S.A., 16-21 October, 2016.
   https://aas.org/meetings/dps48
6. Asia Oceania Space Weather Alliance (AOSWA) Workshop, Jeju, Korea, 24-27, October, 2016.
   http://aoswa4.spaceweather.org/
7. Planetary radio emissions conference (PRE 8), Graz, Austria, 25-27 October, 2016.
   http://pre8.oeaw.ac.at/
8. Europa-Enceladus Plumes Workshop, Caltech, U.S.A., 15 October, 2016.

[3] Future Meetings

1. BepiColombo Hermean Environment Working Group Meeting & BepiColombo Science Working Team Meeting, Tokyo, Japan, 7-10 November, 2016.
2. SGEPSS Fall Meeting, Fukuoka, Japan, 20-23 November, 2016.
   http://www.icswse.kyushu-u.ac.jp/sgepss2016/
3. **Symposium on Waves in Space Plasma** (The 332nd Symposium in Sustainable Humanosphere), Uji, Kyoto, 2-3 December, 2016.
   The symposium will be held in cooperation with Japanese URSI-H commission and subcommittee on plasma wave in SGEPSS (Society of Geomagnetism and Earth, Planetary and Space Sciences).
4. American Geophysical Union Fall Meeting, San Francisco, 12-16 December, 2016.
   http://fallmeeting.agu.org/2016/
5. Symposium on Planetary Science 2017, Sendai, Japan, 20-22 February, 2017.
6. European Geosciences Union (EGU) General Assembly 2017, Vienna, Austria, 23-28 April, 2017.
   http://www.egu2017.eu/
7. Japan Geoscience Union - American Geophysical Union Joint Meeting 2017, Chiba, Japan, 20-25 May, 2016.
   http://www.jpgu.org/meeting_e2016/