Japanese URSI Commission H (Waves in Plasmas)
Activity Report
July 2014 - November 2014

[1] Status of projects related with plasma wave observation

1. The ERG project
   http://ergsc.stelab.nagoya-u.ac.jp/index.shtml.en
2. BepiColombo/MMO
   http://www.stp.isas.jaxa.jp/mercury/p_mmo.html
3. STEL VLF/ELF observations are carried out in Canada and Japan.
   Details of the data are available at
   http://stdb2.stelab.nagoya-u.ac.jp/vlf/index.html
4. Conjugate campaign observation between Syowa and Iceland, September, 2014.
5. NICT Science Cloud
   NICT Science Cloud has been developed for space plasma studies. We have begun to develop a Web application for plasma wave data and other satellite observation data, which is named “STARStouch”. This Web application is based on a technique of asynchronous data transfer of graphic files for several types of data plots.
   We implemented new functions on the STARStouch: data plot information exchange system. Figure 1 shows the function of information exchange. User who takes a look of data saves “data plot information” described in a URL format. Another user reproduces exact same plot on his/her terminal by the URL.

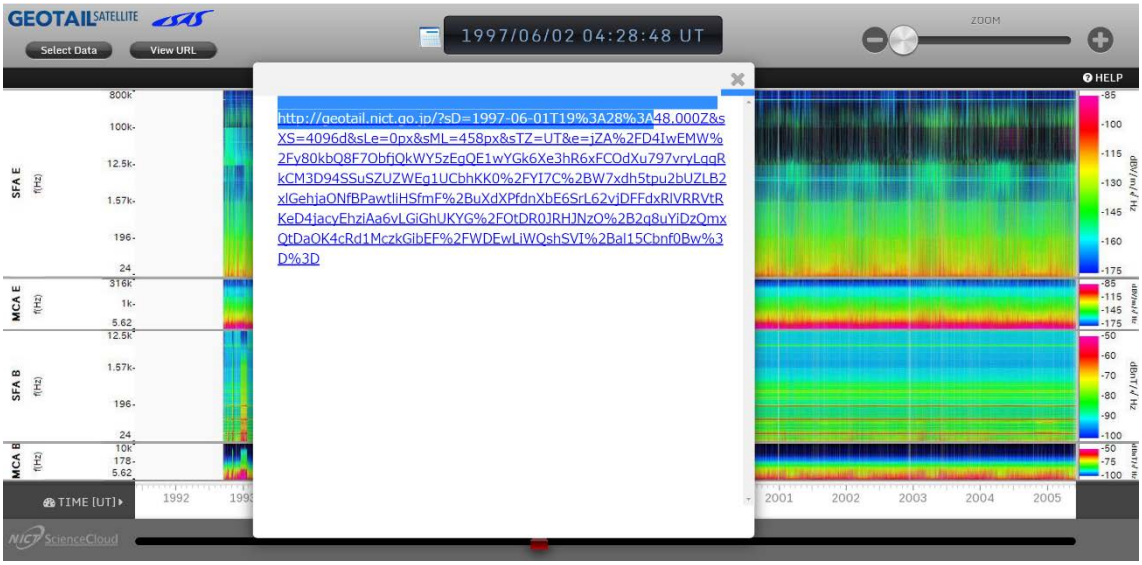

Figure 1: STARStouch GEOTAIL version: http://geotail.nict.go.jp

[2] Recent Meetings

1. 6th Alfven Conference, “Plasma Interactions with Solar System Objects”, London, UK, 7-11 July, 2014.
2. Asia Oceania Geosciences Society (AOGS) 11th Annual Meeting, Sapporo, Japan, 28 July - 1 August, 2014.
3. The 40th COSPAR Scientific Assembly, Moscow, Russia, 2-10 August, 2014.
4. The 31st URSI GASS, Beijing, China, 16-23 August, 2014.
5. AGU Chapman Conference on “Low Frequency Waves in Space Plasmas”, Jeju, Korea, 31 August - 5 September, 2014.
6. European Planetary Science Congress 2014, Estoril, Portugal, 7-12 September, 2014.
7. URSI-JRSM 2014, Tokyo, Japan, 8 September, 2014.
8. Geospace revisited: a Cluster / MAARBLE / Van Allen Probes Conference, Rhodes, Greece, 15-20 September, 2014.
9. Taiwan-Japan Workshop 2014: Laboratory astrophysics with ultra intense lasers, Taoyuan, Taiwan, 14-15 October, 2014.
10. SGEPSS fall meeting 2014, Matsumoto, Japan, 31 October - 3 November, 2014.
11. The 12th International Conference on Substorms (ICS-12), Ise, Japan, 10-14 November, 2014.
12. Plasma conference 2014, Niigata, Japan, 18-21 November, 2014.
13. High energy astrophysics 2014, Fukuoka, Japan, 23-25 November, 2014.

[3] Future Meetings

1. Meeting on waves in plasmas 2014, Kyoto, Japan, 5 December, 2014.
2. The Fifth Symposium on Polar Science, Tokyo, Japan, 2-5 December, 2014.
3. Inner magnetosphere coupling III, UCLA, March 23-27, 2015.
4. ISAR-4, Toyama, Japan, 27-30 April, 2015.
5. Japan Geoscience Union Meeting 2015, Chiba, Japan, 24-28 April, 2015.
6. The 26th General Assembly of the International Union of Geodesy and Geophysics (IUGG) , Prague, Czech Republic, 22 June - 2 July, 2015.
7. The 12th International School/Symposium for Space Simulations (ISSS-12), Prague, Czech Republic, July 3-10, 2015.
8. Asia Oceania Geosciences Society (AOGS) 12th Annual Meeting, Singapore, 2-7 August, 2015.

[4] Recently Published Papers (July 2014 – November 2014)

1. **K. Shiokawa, Y. Yokoyama, A. Ieda, Y. Miyoshi, R. Nomura, S. Lee, N. Sunagawa, Y. Miyashita, M. Ozaki, K. Ishizaka, S. Yagitani, R. Kataoka, F. Tsuchiya, I. Schofield, and M. Connors, Ground-based ELF/VLF chorus observations at subauroral latitudes - VLF-CHAIN Campaign, J. Geophys. Res., 119, doi:10.1029/2014JA020161, 2014. (published online Aug.27, 2014).**

   This is a report of observations of ELF/VLF chorus waves taken during the VLF/ELF Campaign observation with High-resolution Aurora Imaging Network (VLF-CHAIN) of 17-25 February, 2012, at subauroral latitudes at Athabasca (L=4.3), Canada. ELF/VLF waves were measured continuously with a sampling rate of 100 kHz to monitor daily variations in VLF/ELF emissions and derive their detailed structures. We found quasi-periodic (QP) emissions whose repetition period changes rapidly within a period of 1 h without corresponding magnetic pulsations.

   QP emissions showed positive correlation between amplitude and frequency sweep rate, similarly to rising-tone elements. We found an event of nearly simultaneous enhancements of QP emissions and Pc1/EMIC wave intensities, suggesting that the temperature anisotropy of electrons and ions developed simultaneously at the equatorial plane of the magnetosphere. We also found QP emissions whose intensity suddenly increased in association with storm sudden commencement without changing their frequency. Falling-tone ELF/VLF emissions were observed with their rate of frequency change varying from 0.7 to 0.05 kHz/s over 10 min. Bursty-patch emissions in the lower and upper frequency bands are often observed during magnetically disturbed periods. Clear systematic correlation between these various ELF/VLF emissions and cosmic noise absorption was not obtained throughout the campaign period. These observations indicate several previously unknown features of ELF/VLF emissions in subauroral latitudes and demonstrate the importance of continuous measurements for monitoring temporal variations in these emissions.

2. **Minoru Tsutsui, Behaviors of Electromagnetic Waves Directly Excited by Earthquakes, IEEE Geoscience and Remote Sensing LETTERS, Vol. 11, No. 11, pp.1961-1965, doi:10.1109/LGRS.2014.2315208, November, 2014.**

   We detected electromagnetic (EM) waves directly excited by earthquakes in a deep borehole and confirmed them by simultaneous capturing of their waveforms and of seismic waves measured at the same observation site. Furthermore, the excitation

mechanism of the EM pulse was confirmed as the piezoelectric effect by a laboratory experiment, in which a seismic P-wave was readily generated by a small stress impact, and the EM wave was simultaneously excited basically by the P-wave. Here, we show behaviors of seismic waves and of their excited EM waves when small and large earthquakes occurred. We also found that the EM waves excited by seismic waves have leaked out of the ground surface.

3. **Y. Omura, Theory and simulations of nonlinear wave-particle interactions in planetary radiation belts, Radio Science Bulletin, 349, 52-58, 2014.**

   We give a brief account of the nonlinear theory of the generation mechanism of chorus emissions, which has been revealed by the simulations and observations. We describe the nonlinear dynamics of resonant electrons, and the formation of the electromagnetic electron "hole" that results in resonant currents generating rising-tone emissions. In contrast, falling-tone emissions are generated through the formation of electron "hills." We also describe the mechanism of nonlinear wave damping due to quasi-oblique propagation, which results in the formation of a gap at half the electron cyclotron frequency.

4. **K. H. Lee, Y. Omura, and L. C. Lee, Electron acceleration and diffusion of ring distribution by Z-mode and whistler-mode waves, Radio Science Bulletin, 349, 7-17, 2014.**

   We present a brief review of wave generation via the cyclotron maser instability by an electron ring distribution, and the associated electron acceleration by the excited Z-mode and whistler-mode waves. The electron ring distribution can excite X-mode waves mainly in the perpendicular direction, Z-mode waves in the perpendicular and parallel directions, and whistler-mode waves in the parallel direction.

5. **C. J. Rodger, M. A. Clilverd, W. Li, M. P. McCarthy, Y. Omura, and C. E. Weaver, Drivers, detection, and impacts of precipitation from the radiation belts, Radio Science Bulletin, 349, 60–67, 2014.**

   Particle precipitation into the atmosphere is believed to be one of the dominant mechanisms for the loss of energetic electrons from the Van Allen radiation belts. Wave-particle interactions involving ULF through to VLF waves are thought to be important drivers of these loss events. There is growing interest in energetic electron precipitation (EEP). Much of the renewed interest comes from NASA's recent Van Allen Probes mission, which has stimulated new experimental and

theoretical research and opened up new understanding into the fundamental physical processes of radiation-belt dynamics.

6. **B. Kakad, A. Kakad, and Y. Omura, Nonlinear evolution of ion acoustic solitary waves in space plasmas: Fluid and particle-in-cell simulations, J. Geophys. Res. Space Physics, 119, 5589-5599, doi:10.1002/2014JA019798, 2014.**

   We perform both fluid and particle-in-cell (PIC) simulations of ion acoustic solitary waves (IASWs) and estimate the quantitative differences in their characteristics like speed, amplitude, and width. We find that the number of trapped electrons in the wave potential is higher for the IASW, which are generated by large-amplitude initial density perturbation (IDP). The present fluid and PIC simulation results are in close agreement for small amplitude IDPs, whereas for large IDPs they show discrepancy in the amplitude, width, and speed of the IASW, which is attributed to negligence of kinetic effects in the former approach.

7. **D. Summers, Y. Omura, S. Nakamura, C. A. Kletzing, Fine structure of plasmaspheric hiss, J. Geophys. Res., Space Physics, doi: 10.1002/2014JA020437, 2014.**

   In this study, by examining burst-mode vector waveform data from the Electric and Magnetic Field Instrument Suite and Integrated Science instrument on the Van Allen Probes mission, we show that plasmaspheric hiss is a coherent emission with complex fine structure. Specifically, plasmaspheric hiss appears as discrete rising tone and falling tone elements.

8. **H. S. Fu, J. B. Cao, Z. Zhima, Y. V. Khotyaintsev, V. Angelopoulos, O. Santolík, Y. Omura, U. Taubenschuss, L. Chen, S. Y. Huang, First observation of rising-tone magnetosonic waves, Geophy. Res. Lett., DOI: 10.1002/2014GL061867,**

   Magnetosonic (MS) waves are linear-polarized emissions confined near the magnetic equator with wave normal angle near 90° and frequency below the lower hybrid frequency. Such waves, also termed equatorial noise (EN), were traditionally known to be “temporally continuous” in their time-frequency spectrogram. Here we show for the first time that MS waves actually have discrete wave elements with rising-tone features in their spectrogram. The frequency sweep rate of MS waves, ~1 Hz/s, is between that of chorus and EMIC waves.

9. **Nosé, M., K. Takahashi, K. Keika, L. M. Kistler, K. Koga, H. Koshiishi, H.**

Matsumoto, M. Shoji, Y. Miyashita, and R. Nomura, Magnetic fluctuations embedded in dipolarization inside geosynchronous orbit and their associated selective acceleration of O+ ions, J. Geophys. Res., 119, doi:10.1002/2014JA019806, 2014.

We study magnetic fluctuations embedded in dipolarizations in the inner magnetosphere (a geocentric distance of ≤6.6 RE) and their associated ion flux changes, using the Engineering Test Satellite VIII and Active Magnetospheric Particle Tracer Explorers/CCE satellites. We select seven events of dipolarization that occur during the main phase of magnetic storms having a minimum value of the Dst index less than −40 nT. It is found that (1) all of the dipolarization events are accompanied by strong magnetic fluctuations with the major frequency close to the local O+ gyrofrequency; (2) the magnetic fluctuations appear with significant amplitude in the component nearly parallel to the local magnetic field; (3) the strong flux enhancement is seen in the energy range of 1–10 keV only for O+ ions. In terms of frequency and dominant components of the magnetic fluctuations, they are considered to be excited by the drift-driven electromagnetic ion cyclotron (EMIC) instability that is recently identified with the linear theory. We perform particle tracing for H+ and O+ ions in the electromagnetic fields modeled by the linear dispersion relation of the drift-driven EMIC instability. Results show that the O+ ions are accelerated to the energy range of 0.5–5 keV and undergo a significant modification of the spectral shape, while the H+ ions have no clear change of spectral shape, being consistent with the observations. We therefore suggest that the electromagnetic fluctuations associated with the dipolarizations can accelerate O+ ions locally and nonadiabatically in the inner magnetosphere. This selective acceleration of O+ ions may play a role in enhancing the O+ energy density in the storm time ring current.

10. **Katoh, Y., A simulation study of the propagation of whistler-mode chorus in the Earth's inner magnetosphere, Earth, Planets Space, 66:6, doi:10.1186/1880-5981-66-6, 2014.**

Katoh [2014] studied the propagation of whistler-mode chorus in the magnetosphere by a spatially two-dimensional simulation code in the dipole coordinates. He set the simulation system so as to assume the outside of the plasmapause, corresponding to the radial distance from 3.9 to 4.1 RE in the equatorial plane and the latitudinal range from −15° to +15°, where R E is the Earth's radius. He assumed a model chorus element propagating northward from

the magnetic equator of the field line at L=4 with a rising tone from 0.2 to 0.7 Ωe0 in the time scale of 5,000 , where Ωe0 is the electron gyrofrequency at the magnetic equator. For the initial density distribution of cold electrons, he assumed three types of initial conditions in the outside of the plasmapause: without a duct (run 1), a density enhancement duct (run 2), and a density decrease duct (run 3). In run 1, the simulation result reveals that whistler-mode waves of the different wave frequencies propagate in the different ray path in the region away from the magnetic equator. In runs 2 and 3, the model chorus element propagates inside the assumed duct with changing wave normal angle. The simulation results show the different propagation properties of the chorus element in runs 2 and 3 and reveal that resultant wave spectra observed along the field line are different between the density enhancement and density decrease duct cases. The spectral modification of chorus by the propagation effect should play a significant role in the interactions between chorus and energetic electrons in the magnetosphere, particularly in the region away from the equator. The present study clarifies that the variation of propagation properties of chorus should be taken into account for the thorough understanding of resonant interactions of chorus with energetic electrons in the inner magnetosphere.

11. **Kalaee, M. J., and Y. Katoh, A simulation study on the mode conversion process from slow Z-mode to LO mode by the tunneling effect and variations of beaming angle, Adv. Space Res., 54(11), 2218-2223, doi:10.1016/j.asr.2014.08.025, 2014.**

Kalaee and Katoh [2014] investigated the effect of the spatial scale of the density gradient on the mode conversion efficiency in an inhomogeneous plasma where the mode conversion can occur only by the tunneling effect. For a particular angle of incidence wave, it is possible for a slow Z-mode wave incident on an inhomogeneous plasma slab to be converted into an LO mode wave. But for another wave normal angle of the incident wave, it has been considered impossible, since an evanescence region exists between two mode branches. In this case they expected that the mode conversion takes place through the tunneling effect. They used the computer simulation solving Maxwell's equations and the motion of a cold electron fluid. By considering the steepness of the density gradient, the simulation results show the efficient mode conversion could be expected even in the case that the mismatch of the refractive indexes prevents the close coupling of plasma waves. Also, they showed for these cases the beaming angle does not correspond to Jones' formula. This effect leads to the angles larger and smaller than the angle estimated by the

formula. This type of mode conversion process becomes important in a case where the different plasmas form a discontinuity at their contact boundary.

12. **Tsugawa, Y., Y. Katoh, N. Terada, T. Ono, H. Tsunakawa, F. Takahashi, H. Shibuya, H. Shimizu, and M. Matsushima, Group-standing of whistler-mode waves near the Moon, J. Geophys. Res. Space Physics, 119, 2634-2648, doi:10.1002/2013JA019585, 2014.**

Narrowband whistler mode waves with frequencies near 1 Hz have been observed near the Moon. Tsugawa et al [2014] revealed that the narrowband spectra, the frequency concentration near 1 Hz, and the relations between the wave vector, magnetic field vector, and sunward directions can be explained by a condition in which the group velocity vector is almost canceled by the solar wind velocity vector in the spacecraft frame. Hereafter, they referred to this condition as the group-standing condition. The spectral density is modified and has a peak at the frequency satisfying the group-standing condition because of the difference of the frequency width between the solar wind plasma frame and the spacecraft frame. In addition, if the waves were decelerated to be group-standing, the conservation of the energy flux results in the intensification of the wave amplitude at that frequency. They also derived the analytical expression of the amount of the modifications, which depend on the group velocity. These effects can explain the narrowband spectra near 1 Hz and support the relations between the wave vector, magnetic field vector, and sunward directions. The estimated frequency which satisfies the group-standing condition is in good agreement with the observed frequency within error bars of the estimation. Considering the group-standing condition, they suggested that the narrowband waves observed in the spacecraft frame are originated from oblique whistler mode waves in the frequencies near the lower hybrid frequency, which are possibly generated by reflected ions from the lunar magnetic anomalies.

13. **Morioka, A., Y. Miyoshi, Y. Kasaba, N. Sato, A. Kadokura, H. Misawa, Y. Miyashita, and I. Mann, Substorm onset process: Ignition of auroral acceleration and related substorm phases, J. Geophys. Res. Space Physics, 119(2), 1044-1059, doi:10.1002/2013JA019442, 2014.**

Morioka et al. [2014] studied the substorm onset process on the basis of the vertical evolution of auroral acceleration regions derived from auroral kilometric radiation (AKR) spectra and Pi pulsations on the ground. The field-aligned auroral

acceleration at substorm onset demonstrated two distinct phases. Low-altitude acceleration (h~3000–5000 km), which accompanied auroral initial brightening, prebreakup Pi2, and direct current of ultralow frequency (DC-ULF) pulsation were first activated and played an important role (precondition) in the subsequent substorm expansion phase onset. Prebreakup Pi2 is suggestive of the ballooning mode wave generation, and negative decrease in DC-ULF suggests increasing field-aligned current (FAC). They called this stage the substorm initial phase. A few minutes after this initial phase onset, high-altitude acceleration, which accompanied auroral breakup and poleward expansion with breakup Pi1 and Pi2 pulsations, suddenly broke out in an altitude range from 8000 to 16,000 km. Thus, substorm expansion onset originated in the magnetosphere-ionosphere (M-I) coupling region, i.e., substorm ignition in the M-I coupling region. Statistical investigations revealed that about 65% of earthward flow bursts observed in the plasma sheet were accompanied by enhanced low-altitude AKR, suggesting that flow braking of bursts causes FAC and resulting low-altitude field-aligned acceleration in the M-I coupling region. On the basis of these observations, they propose a substorm onset scenario in which FAC that originated from the braking of plasma flow bursts first enhances low-altitude acceleration (substorm initial phase onset) and then the increasing FAC induces current-driven instability in the M-I coupling region, which leads to high-altitude acceleration and resulting substorm expansion phase onset.

14. **Kurita, S., Y. Miyoshi, C. M. Cully, V. Angelopoulos, O. Le Contel, M. Hikishima, and H. Misawa, Observational evidence of electron pitch angle scattering driven by ECH waves, Geophys. Res. Lett., doi:2014GL061927R, in print, 2014.**

Using the plasma wave and electron data obtained from THEMIS, Kurita et al. showed a signature of electron pitch angle scattering driven by Electrostatic Cyclotron Harmonic (ECH) waves in the velocity distribution function (VDF). The diffusion curve of whistler-mode waves is used as a proxy to identify changes in VDFs due to wave-particle interactions. They confirmed that the shape of the VDF well agrees with the diffusion curve of whistler-mode waves when whistler mode chorus alone is active. On the other hand, they found that the shape of the VDF deviates from the diffusion curves at low pitch angles when ECH waves are active following the inactivation of chorus waves. The result is observational support for electron pitch angle scattering caused by ECH waves and suggests that ECH waves can contribute to generation of diffuse auroras.

15. **Y. Oike, Y. Kasahara, and Y. Goto, Spatial Distribution and Temporal Variations of Occurrence Frequency of Lightning whistlers Observed by VLF/WBA onboard Akebono, Radio Science, doi:10.1002/2014RS005523, 49, 2014.**

They statistically analyzed lightning whistlers detected from the analog waveform data below 15 kHz observed by the VLF instruments onboard Akebono. Large amount of data obtained at Uchinoura Space Center in Japan for 22 years from 1989 to 2010 were used for the study. It was found that the lightning whistlers were mainly observed inside the L shell region below 2. Seasonal dependence of the occurrence frequency of lightning whistlers has two peaks around July to August and December to January. As lightning is most active in summer, in general, these two peaks correspond to summer in the Northern and Southern Hemispheres, respectively. Diurnal variation of the occurrence frequency showed that lightning whistlers begin to increase in the early evening and remain at a high-occurrence level through the night with a peak around 21 in magnetic local time (MLT). This peak shifts toward nightside compared with lightning activity, which begins to rise around noon and peaks in the late afternoon. This trend is supposed to be caused by attenuation of VLF wave in the ionosphere in the daytime. Comparison study with the ground-based observation revealed consistent results, except that the peak of the ground-based observation appeared after midnight while our measurements obtained by Akebono was around 21 in MLT. This difference is explained qualitatively in terms that lightning whistlers measured at the ground station passed through the ionosphere twice above both source region and the ground station. These facts provide an important clue to evaluate quantitatively the absorption effect of lightning whistler in the ionosphere.

16. **Ken T. Murata, Kentaro Ukawa, Kazuya Muranaga, Yutaka Suzuki, Hidenobu Watanabe, Koji Zettsu, Kazunori Yamamoto, Iku Shinohara, Yoshiya Kasahara, Masaki Okada, Hirotsugu Kojima, Masahito Nose, Eizen Kimura, Osamu Tatebe and Masahiro Tanaka, A Web Application of Interdisciplinary Data Analysis Designed for ICSU World Data System, Journal of Japan Society of Information and Knowledge, Vol.24, No.3, pp.297-320, 2014.**

In 2008 International Council for Science (ICSU) has established World Data System (WDS). The WDS ensures the long-term stewardship and provision of quality-assessed data and data services to the international science community and other stakeholders. One of the objectives of the WDS is to support and make

progress of interdisciplinary studies in research fields. The NICT Science Cloud started to realize the concept of the WDS. In this study we propose a Web application for interdisciplinary researches working on the NICT Science Cloud. Based on our design of the Web with help of HTML5 and Ajax technologies, we implemented a Web using a couple of mission datasets. Data plots are previewed on the Web application with higher usability than traditional data plot tools.

17. **Ken T. Murata, Hidenobu Watanabe, Kentaro Ukawa, Kazuya Muranaga, Yutaka Suzuki, Kazunori Yamamoto and Eizen Kimura, A Report of the NICT Science Cloud in 2013, Journal of Japan Society of Information and Knowledge, Vol.24, No.3, pp.275-290, 2014.**

In many scientific fields, most data are digitized and handled on computers and networks. The data files are getting larger in size and numbers. Science clouds, which are equipped with both flexibility and specialty applicable for countless scientific studies, are believed to play important roles as an infrastructure of big-data sciences and inter-disciplinary studies. The NICT Science Cloud is designed to work with functions of data crawling and transfer, data preservation and management, and data processing and visualization. We have developed applications, tools, systems and services designed for these three functions (especially for Earth and space environmental sciences) installed on the NICT Science Cloud. By applying these functions to each science project, researchers are able to advance their studies. In this paper, we first introduce the NICT Science Cloud. We next report our 2-years operations of the cloud system based on several fact data. Finally, results of research works using the cloud system are discussed with focusing on how we effectively take advantage of a cloud system on research works in various fields.

18. **Hidenobu WATANABE, Sen UENO, Ken. T. MURATA, A Method for Cooperation with A Secure Web Application Development by The NICT Science Cloud, Journal of Japan Society of Information and Knowledge, Vol.24, No.3, pp.291-296, 2014.**

A web application is important technology as a user interface of open scientific data, but it is required to develop without vulnerability. NICT is also required to a framework which enables to develop a secure web application even if a client does not have enough development skills or specialized knowledge. This paper reports about the proposed method for cooperation with a secure web application development to a client in general competitive bidding.

19. **Watanabe, H., Ushiyama, S., Muto, Y., Iwama, T. and Murata, K. T., Improvement of The Integrity Verification Application using Timestamp Mechanism for Distributed File System, The 38th Annual International Computers, Software & Applications Conference 2014 (COMPSAC2014), Vasteras, Sweden, Jul. 21-25, 2014..**

The 3D phased array radar equipped in the Osaka University of Japan rotates in 30 seconds to capture a 3D structure of (strong) rain within 60km in radius and 15km in altitude. We have succeeded in developing a real-time 3D visualization system which enables to draw the 3D animation of rain structure (51MB/step) at a remote client computer of Tokyo within 70 seconds after every rotation. A key technology of this system is a parallel data processing by a Gfarm file system with 180 CPU cores and 32Gbps read I/O. Gfarm is a distributed file system made in Japan. Network between Osaka and Tokyo is 10Gbps Ethernet provided by JGN-X which is a research and education network of Japan. That is network performance is almost certain to be lower than disk performance. This system therefore also has a SDN control function by OpenFlow to avoid an overload network link between servers and a client computer as a possible. In SC14, we prepare two the same systems and configure SDN on global research and education networks between Japan and U.S.A (Pacific Wave and Internet2) by RISE which is a wide-area OpenFlow testbed of Japan. Our demo will show 3D drawing performance using observation data 70 seconds ago on a client computer screen at the NICT Booth (No.513) of New Orleans. In addition, we are going to compare two animations and show eectiveness depending on whether the SDN control is available or not when the network became overload.