# Commission G Report

September 30, 2020

1. Meeting report

- **MU radar /Equatorial Atmosphere Radar Symposium** This is the annual symposium for the cooperative use of MU radar and Equatorial Atmosphere Radar. Commission G of Japanese URSI co-sponsors this symposium. Two times of this event occurred on September 9-10, 2019 (No. 13) and on September 14-15, 2020 (No. 14) at RISH, Kyoto University. We had the meeting in 2020 over the internet by using zoom.

2. Awards

There were awards given to the URSI Japan Commission G members.

Yuichi Otsuka (Nagoya Univ.), Tanakadate Prize by Society of Geomagnetism and Earth, Planetary and Space Sciences, Study on middle- and low-latitude ionospheric disturbance by means of GPS and radar, May 29, 2019.

Hitoshi Fujiwara, Tanakadate Prize by Society of Geomagnetism and Earth, Planetary and Space Sciences, Study on thermosphere-ionosphere variability by means of global numerical model, May 29, 2019.

Huixin Liu (Kyushu Univ.), Nishida Prize by Japan Geoscience Union, Research on the vertical coupling between the atmosphere and ionosphere using high-precision satellite observations and whole atmosphere models, May 2019.

3. Masterplan 2020 / Roadmap 2020

Research Institute for Sustainable Humanosphere (RISH), Kyoto University, National Institute of Polar Research (NIPR), Institute for Space-Earth Environmental Research (ISEE), Nagoya University, and International Center for Space Weather Science and Education (ICSWSE), Kyushu University proposed the research project “Coupling process in the solar-terrestrial system” to Masterplan 2020 of Science Council of Japan. Japanese URSI kindly showed support to this project. In this project, we study the solar energy inputs into the Earth and the response of Geospace (magnetosphere, ionosphere, and atmosphere) to the energy input, which follows the success of the same project in Masterplan 2014/2017. We plan to install large atmospheric radars with an active phased array antenna at the equator and the Arctic regions. One is Equatorial MU (EMU) radar by RISH in Sumatera Island, Indonesia, and the other is EISCAT_3D by NIPR in northern Scandinavia under international collaborations. We develop the global observation network that is jointly conducted by ISEE and ICSWSE.

In January 2020, the project was selected as one of 31 highest-priority large projects in Masterplan 2020. The researcher group then proposed the project for Roadmap 2020 by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). The official result of the Roadmap 2020 selection has not yet been announced. But its preliminary report was recently disclosed online for the call-for of public comments. This project was unfortunately not included in the report for Roadmap 2020.

4. Research Report

4.1. Report from National Institute for Polar Research (NIPR)
(Yasunobu Ogawa, NIPR)

=== Recent papers related to PANSY ===

Kohma, M., K. Sato, K. Nishimura, M. Tsutsumi, and T. Sato (2020), A statistical analysis of the energy dissipation rate estimated from the PMWE spectral width in the Antarctic. J. Geophys. Res. Atmos., 125, e2020JD032745. doi:10.1029/2020JD032745.

Minamihara, Y., K. Sato, and M. Tsutsumi (2020), Intermittency of gravity waves in the Antarctic troposphere and lower stratosphere revealed by the PANSY radar observation. J. Geophys. Res. Atmos., 125, e2020JD032543. doi:10.1029/2020JD032543.

Nishimura, K., M. Kohma, K. Sato, and T. Sato (2019), Spectral Observation Theory and Beam De-Broadening Algorithm for Atmospheric Radar. IEEE Transactions on Geoscience and Remote Sensing, doi:10.1109/TGRS.2020.2970200.

Tanaka, Y.-M., T. Nishiyama, A. Kadokura, M. Ozaki, Y. Miyoshi, K. Shiokawa, S.-I. Oyama, R. Kataoka, M. Tsutsumi, K. Nishimura, K. Sato, Y. Kasahara, A. Kumamoto, F. Tsuchiya, M. Fukizawa, M. Hikishima, S. Matsuda, A. Matsuoka, I. Shinohara, M. Nosé, T. Nagatsuma, M. Shinohara, A. Fujimoto, M. Teramoto, R. Nomura, A. Sessai Yukimatu, K. Hosokawa, M. Shoji, and R. Latteck (2019), Direct comparison between magnetospheric plasma waves and polar mesosphere winter echoes in both hemispheres. J. Geophys. Res. Space Phys., 124. doi:10.1029/2019JA026891.

Hashimoto, T., A. Saito, K. Nishimura, M. Tsutsumi, K. Sato, and T. Sato (2019), First incoherent scatter measurements and adaptive suppression of field-aligned irregularities by the PANSY radar at Syowa Station, Antarctic. J. Atmos. Oceanic Technol., 36, 1881–1888, doi:10.1175/JTECH-D-18-0175.1.

=== Recent papers related to EISCAT ===

Taguchi, S., K. Hosokawa, Y. Ogawa (2019), Plasma flow in the north-south aligned auroral region equatorward of the dayside auroral oval, J. Geophys. Res., doi:10.1029/2019JA026895.

Kozlovsky, A., S. Shalimov, S. Oyama, K. Hosokawa, M. Lester, Y. Ogawa, and C. Hall (2019), Ground Echoes Observed by the Meteor Radar and High-Speed Auroral Observations in the Substorm Growth Phase, J. Geophys. Res., doi: 10.1029/2019JA026829.

Hosokawa, K., Kullen, A., Milan, S., et al. (2020), Aurora in the Polar Cap: A Review, Space Sci Rev 216, 15, https://doi.org/10.1007/s11214-020-0637-3.

Hosokawa, K., Y. Miyoshi, M. Ozaki, S. Oyama, Y. Ogawa, S. Kurita, Y. Kasahara, Y. Kasaba, S. Yagitani, S. Matsuda, F. Tsuchiya, A. Kumamoto, R. Kataoka, K. Shiokawa, T. Raita, E. Turunen, T. Takashima, I. Shinohara, and R. Fujii (2020), Multiple time-scale beats in aurora: precise orchestration via magnetospheric chorus waves, Nature Scientific Reports, SREP-19-35427A.

Ogawa, Y., Y. Tanaka, A. Kadokura, K. Hosokawa, Y. Ebihara, T. Motoba, B. Gustavsson, U. Brandstrom, Y. Sato, S. Oyama, M. Ozaki, T. Raita, F. Sigernes, S. Nozawa, K. Shiokawa, M. Kosch, K. Kauristie, C. Hall, S. Suzuki, Y. Miyoshi, A. Gerrard, H. Miyaoka, R. Fujii (2020), Development of low-cost multi-wavelength imager system for studies of aurora and airglow, Polar Science, doi:10.1016/j.polar.2019.100501.

Kawamura, Y., K. Hosokawa, S. Nozawa, Y. Ogawa, T. Kawabata, S. Oyama, Y. Miyoshi, S. Kurita, R. Fuji (2020), Estimation of the emission altitude of pulsating aurora by using the five-wavelength photometer, Earth, Planets and Space, 72, 96.

Billett, D. D., K. Hosokawa, A. Grocott, J. A. Wild, A. L. Aruliah, Y. Ogawa, S. Taguchi (2020), Multi-instrument Observations of Ion-Neutral Coupling in the Dayside Cusp, Geophysical Research Letters, doi:10.1029/2019GL085590.

4.2. Report from Institute for Space-Earth Environmental Research (ISEE), Nagoya University
(Satonori Nozawa, Nagoya University)

== Recent papers ===

Imajo, S., M. Nosé, M. Aida, N. Higashio, H. Matsumoto, K. Koga, C. Smith, R. J. MacDowall, and A. Yoshikawa, Evolution of field-aligned current in the meridional plane during substorm: Multipoint observations from satellites and ground stations, Earth, Planets and Space, 72:58, doi:10.1186/s40623-020-01182-6, 2020.

Hashimoto, K. K., T. Kikuchi, I. Tomizawa, K. Hosokawa, J. Chum, D. Buresova, M. Nosé, and K. Koga, Penetration electric fields observed at middle and low latitudes during the 22 June 2015 geomagnetic storm, Earth, Planets and Space, 72:71, doi:10.1186/s40623-020-01196-0, 2020.

Shiokawa, K., Y. Otsuka, and M. Connors, Statistical study of auroral/resonant-scattering 427.8-nm emission observed at subauroral latitudes over 14 years, J. Geophys. Res., 124, doi: 10.1029/2019JA026704, 2019.

Goodwin, L. V., Y. Nishimura, Y. Zou, K. Shiokawa, and P. T. Jayachandran., Mesoscale Convection Structures Associated with Airglow Patches Characterized using Cluster-Imager Conjunctions, J. Geophys. Res., 124, doi: 10.1029/2019JA026611, 2019.

Xu, H. K. Shiokawa, S. Oyama, and Y. Otsuka, Thermospheric wind variations observed by a Fabry-Perot interferometer at Tromso, Norway, at substorm onsets, Earth Planets, and Space, 71:93, https://doi.org/10.1186/s40623-019-1072-0, 2019.

Tsuchiya, S., K. Shiokawa. H. Fujinami, Y. Otsuka, T. Nakamura, M. Connors, I. Schofield, B. Shevtsov, and I. Poddelsky, Three-dimensional Fourier analysis of the phase velocity distributions of mesospheric and ionospheric waves based on airglow images collected over 10 years: Comparison of Magadan, Russia, and Athabasca, Canada, J. Geophys. Res., 124, doi: 10.1029/2019JA026783, 2019.

Balan, N., Qing-He Zhang, Zanyang Xing, R. Skoug, K. Shiokawa, H. Luhr, S. Tulasi Ram, Y. Otsuka, and Lingxin Zhao, Capability of Geomagnetic Storm Parameters to Identify Severe Space Weather, Astrophysical Journal, 887:51, https://doi.org/10.3847/1538-4357/ab5113, 2019.

Xu H., K. Shiokawa, S. Oyama, and S. Nozawa, High-latitude thermospheric wind study using a Fabry-Perot interferometer at Tromsoe in Norway: averages and variations during quiet times, Earth Planets Space, 71:110, 10.1186/s40623-019-1093-8, 2019.

Tulasi Ram, S., B. Nilam, N. Balan, Q. Zhang, K. Shiokawa, D. Chakrabarty, Z. Xing, K. Venkatesh, B. Veenadhari and A. Yoshikawa, Three different episodes of prompt equatorial electric field perturbations under steady southward IMF Bz during St. Patrick's day storm, J. Geophys. Res., 124, doi: 10.1029/2019JA027069, 2019.

Okoh, D., G. Seemala, B. Rabiu, J. B. Habarulema, S. Jin, K. Shiokawa, Y. Otsuka, M. Aggarwal, J. Uwamahoro, P. Mungufeni, B. Segun, R. Obafaye, N. Ellahony, C. Okonkwo, M. Tshisaphungo, D. Shetti, A Neural Network based Ionospheric Model over Africa from COSMIC and Ground GPS Observations, J. Geophys. Res., 124, doi: 10.1029/2019JA027065, 2019.

Tsuchiya S., K. Shiokawa, Y. Otsuka, T. Nakamura, M. Yamamoto, M. Connors, I. Schofield, B. Schevtsov, and I. Poddelskiy, Wavenumber spectra of atmospheric gravity waves and medium-scale traveling ionospheric disturbances based on more than 10-year airglow images in Japan, Russia, and Canada, J. Geophys. Res., 125, doi: 10.1029/2019JA026807, 2020.

Yadav S., K. Shiokawa, S. Oyama, and Y. Otsuka, Multi-event analysis of oscillatory motion of medium-scale traveling ionospheric disturbances observed by a 630-nm airglow imager over Tromsoe, Journal of Geophysical Research: Space Physics, 125, e2019JA027598. https://doi.org/10.1029/2019JA027598, 2020.

Sarudin I., N. S. A. Hamid, M. Abdullah, S. M. Buhari, K. Shiokawa, Y. Otsuka, and C. Y. Yatini, Equatorial plasma bubble zonal drift velocity variations in response to season, local time, and solar activity across Southeast Asia, J. Geophys. Res., 125, doi: 10.1029/2019JA027521, 2020.

Hosokawa K., K. Takami, Su. Saito, Y. Ogawa, Y. Otsuka, K. Shiokawa, C.-H. Chen and C.-H. Lin, Observations of equatorial plasma bubbles using a low cost 630.0 nm all sky imager in Ishigaki Island, Japan, Earth, Planets and Space, 72:56, https://doi.org/10.1186/s40623-020-01187-1, 2020.

Tulasi Ram S., K. K. Ajith, T. Yokoyama, M. Yamamoto, K. Hozumi, K. Shiokawa, Y. Otsuka and G. Li, Dilatory and downward development of 3-meter scale irregularities in the Funnel-like region of Equatorial Plasma Bubble, Geophys. Res. Lett., 47, doi:10.1029/2020GL087256, 2020.

Kim, H., K. Shiokawa, J. Park, Y. Miyoshi, Y. Miyashita, C. Stolle, K.-H. Kim, J. Matzka, S. Buchert, T. Fromm and J. Hwang, Ionospheric plasma density oscillation related to EMIC Pc1 waves, Geophys. Res. Lett., 47, https://doi.org/10.1029/2020GL089000, 2020.

Nilam B., S. Tulasi Ram, K. Shiokawa, N. Balan, and Q. Zhang, The solar wind density control on the Prompt Penetration Electric Field and Equatorial Electrojet, J. Geophys. Res., 125, https://doi.org/10.1029/2020JA027869, 2020.

Inaba Y., K. Shiokawa, S. Oyama, Y. Otsuka, A. Oksanen, A. Shinbori, A. Yu. Gololobov, Y. Miyoshi, Y. Kazama, S.-Y. Wang, S. W. Y. Tam, T.-F. Chang, B.-J. Wang, S. Yokota, S. Kasahara, K. Keika, T. Hori, A. Matsuoka, Y. Kasahara, A. Kumamoto, Y. Kasaba, M. Shoji, I. Shinohara, and C. Stolle, Plasma and field observations in the magnetospheric source region of a stable auroral red (SAR) arc by the Arase satellite on 28 March 2017, J. Geophys. Res., 125, https://doi.org/10.1029/2020JA028068, 2020.

Takahashi, H., C. M. Wrasse, C. A. O. B. Figueiredo, D. Barros, I. Paulino, P. Essien, M. A. Abdu, Y. Otsuka and K. Shiokawa, Equatorial plasma bubble occurrence under propagation of MSTID and MLT gravity waves, J. Geophys. Res., 125, https://doi.org/10.1029/2019JA027566, 2020.

Li, G., B. Ning, Y. Otsuka, M. A. Abdu, P. Abadi, Z. Liu, L. Spogli, and W. Wan, Challenges to Equatorial Plasma Bubble and Ionospheric Scintillation Short-Term Forecasting and Future Aspects in East and Southeast Asia. Surv Geophys, https://doi.org/10.1007/s10712-020-09613-5, 2020.

Ghosh, P., Y. Otsuka, S. Mani, H. Shinagawa, Day-to-day variation of pre-reversal enhancement in the equatorial ionosphere based on GAIA model simulations. Earth Planets Space 72, 93, https://doi.org/10.1186/s40623-020-01228-9, 2020.

Sivavaraprasad, G, D.V. Ratnam, and Y. Otsuka, Multicomponent Analysis of Ionospheric Scintillation Effects Using the Synchrosqueezing Technique for Monitoring and Mitigating their Impact on GNSS Signals, Journal of Navigation, 72, 669-684, doi: 10.1017/S0373463318000929, 2019.

Ratnam, DV, Y. Otsuka, G. Sivavaraprasad, and JRKK. Dabbakuti, Development of multivariate ionospheric TEC forecasting algorithm using linear time series model and ARMA over low-latitude GNSS station, Adv. Space Res., 63, 2848-2856, doi: 10.1016/j.asr.2018.03.024, 2019.

Obana, Y., N. Maruyama, A. Shinbori, K. K. Hashimoto, M. Fedrizzi, M. Nose, Y. Otsuka, N. Nishitani, T. Hori, A. Kumamoto, F. Tsuchiya, S. Matsuda, A. Matsuoka, Y. Kasahara, A. Yoshikawa, Y. Miyoshi, and I. Shinohara (2019) Response of theionosphere-plasmasphere coupling tothe September 2017 storm: What erodesthe plasmasphere so severely?, SpaceWeather,17, 861-876. https://doi.org/10.1029/2019SW002168

Panasenko, S.V., Y. Otsuka, M. Kamp, L.F. Chernogor, A. Shinbori, T. Tsugawa, and M. Nishioka, Observation and characterization of traveling ionospheric disturbances induced by solar eclipse of 20 March 2015 using incoherent scatter radars and GPS networks, J. Atmos. Sol.-Terr. Phys., 191, 2019,105051, ISSN 1364-6826, https://doi.org/10.1016/j.jastp.2019.05.015, 2019.

Sori, T., A. Shinbori, Y. Otsuka, T. Tsugawa, and M. Nishioka, Characteristics of GNSS total electroncontent enhancements over the midlatitudes during a geomagneticstorm on 7 and 8 November 2004, J. Geophys. Res.Space Physics, 124, https://doi.org/10.1029/2019JA026713, 2019

Shinbori, A., Y. Otsuka, T. Sori, T. Tsugawa, and M. Nishioka, Temporal and spatial variations of total electron content enhancements during a geomagnetic storm on 27 and 28 September 2017, J. Geophys. Res., 125, e2019JA026873, doi:10.1029/2019JA026873, 2020.

Koval, A., Y. Chen, T. Tsugawa, Y. Otsuka, A. Shinbori, M. Nishioka, A. Brazhenko, A. Stanislavsky, A. Konovalenko, Q.-H. Zhang, C. Monstein, and R. Gorgutsa, Direct observations of traveling ionospheric disturbances as focusers of solar radiation: Spectral caustics, Ap. J., 877, doi: 10.3847/1538-4357/ab1b52, 2019.

4.3. Report from Electronic Navigation Research Institute (ENRI)
(Susumu Saito, ENRI)

=== Research activities ===

Characteristics of the spatial gradient in ionospheric total electron content, which are slope, width, depth, and velocity (including direction) for ionospheric threat mitigation in GBAS (GNSS ground-based augmentation system) have been studied by using data from a GNSS network (Nakamura et al., 2019). Similar observations and analyses have been conducted in Southeast Asia for future GBAS implementation. Possible use of a VHF radar for mitigation of ionospheric threats caused by plasma bubbles on GBAS has been studied to show improved vertical position accuracy (Supriadi and Saito,

2019). Validation of the concept is planned to be done by using a VHF radar at Chumphon, Thailand. Characteristics of the sporadic E (Es) layer has been studied by observing aeronautical radio navigation aid signals (Hosokawa et al., 2020) and observations by a GNSS network (Saito et al., 2020). Two-dimensional distribution of the sporadic E can be monitored in a wide area. By using observations by GNSS network, a method to derive parameters of the Es layer structures such as location, propagation direction, and velocity. Impacts on the aeronautical navigation aid systems by the anomalous propagation of VHF radio waves by the Es layer has also been studied (Sakai et al., 2020). The results have been reported to the International Civil Aviation Organization for their consideration to include their manuals.

=== Recent papers===

M. Nakamura, S. Saito, and T. Yoshihara, Characteristics of ionospheric gradients in the transition region from magnetic low to mid-latitudes for GBAS implementation, 827-834, Proceedings of the Institute of Navigation 2019 Pacific PNT Meeting, 2020. (Peer-reviewed)

S. Supriadi, and S. Saito, Simulation study of mitigation of plasma bubble effects on GBAS using a VHF radar, NAVIGATION, 66, 845-855, 2019, doi:10.1002/navi.330

S. Saito, K. Hosokawa, J. Sakai, and I. Tomizawa, Study of structures of the sporadic E layer by using dense GNSS network observations, Proceedings of the 33rd International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2020), in press. (Peer-reviewed)

4.4. Report from the University of Electro-Communications
(Keisuke Hosokawa, UEC)

=== Recent papers===

Sakai, J., Saito, S., Hosokawa, K., and Tomizawa, I., Anomalous propagation of radio waves from distant ILS localizers due to ionospheric sporadic‐E, Space Weather, 18, e2020SW002517, 2020

Kawamura, Y., K. Hosokawa, S. Nozawa, Y. Ogawa, T. Kawabata, S.-I. Oyama, Y. Miyoshi, S. Kurita and R. Fujii, Estimation of the emission altitude of pulsating aurora using the five-wavelength photometer, Earth, Planets and Space, 72, 96, 2020

Hosokawa, K., J. Sakai, I. Tomizawa, S. Saito, T. Tsugawa, M. Nishioka and M. Ishii, A monitoring network for anomalous propagation of aeronautical VHF radio waves due to sporadic E in Japan, Earth, Planets and Space, 72:88, 2020

Hashimoto K. K., T. Kikuchi, I. Tomizawa, K. Hosokawa, J. Chum, D. Buresova, M. Nose and K. Koga, Penetration electric fields observed at middle and low latitudes during the 22 June 2015 geomagnetic storm, Earth, Planets and Space, 72, 71, 2020

Hosokawa, K., K. Takami, S. Saito, Y. Ogawa, Y. Otsuka, K. Shiokawa, C.-H. Chen and C.-H. Lin, Observations of equatorial plasma bubbles using a low-cost 630.0-nm all-sky imager in Ishigaki Island, Japan, Earth, Planets and Space, 72, 56, 2020

Nanjo, S., Y. Hozumi, K. Hosokawa, R. Kataoka, Y. Miyoshi, S. Oyama, M. Ozaki, K. Shiokawa and S. Kurita, Fine-scale visualization of aurora in a wide area using color digital camera images from the International Space Station, Journal of Geophysical Research: Space Physics, 125, https://doi.org/10.1029/2019JA027729, 2020

Hosokawa, K., Y. Miyoshi, M. Ozaki, S.-I. Oyama, Y. Ogawa, S. Kurita, Y. Kasahara, Y. Kasaba, S. Yagitani, S. Matsuda, F. Tsuchiya, A. Kumamoto, R. Kataoka, K. Shiokawa, T. Raita, E. Turunen, T. Takashima, I. Shinohara and R. Fujii, Multiple time-scale beats in aurora: precise orchestration via magnetospheric chorus waves, Scientific Reports, 10, 3380, 2020

Hosokawa, K., A. Kullen, S. E. Milan, J. Reidy, Y. Zou, H. U. Frey, R. Maggiolo, and R. C. Fear, Aurora in the polar cap: a review, Space Science Review, 216, 15, 2020

Hosokawa, Y. Zou, and Y. Nishimura, Airglow patches in the polar cap region: a review, Space Sci. Rev., 215, 53, https://doi.org/10.1007/s11214-019-0616-8, 2019

Hosokawa, K., Y. Ogawa, and S. Taguchi, Imaging of polar cap patches with a low-cost airglow camera: Pilot observations in Svalbard, Norway, Earth, Planets and Space, 71, 115, 2019

4.5. Report from Research Institute for Sustainable Humanosphere (RISH), Kyoto University
(Mamoru Yamamoto, RISH)

=== Recent papers===

<Atmospheric studies>

N. A. M. Aris, H. Hashiguchi, and M. Yamamoto, Development of Software-Defined Multichannel Receiver for EAR, Radio Sci., 54, 671-679, doi:10.1029/2019RS006817, 2019.

A. Adachi and H. Hashiguchi, Application of Parametric Speakers to Radio Acoustic Sounding System, Atmos. Meas. Tech., 12, 5699-5715, doi:10.5194/amt-12-5699-2019, 2019.

P.-M. Wu, D. Ardiansyah, S. Mori, and K. Yoneyama, The effect of an active phase of the Madden-Julian oscillation on surface winds over the western coast of Sumatra Island, IOP Conf. Series: Earth Env. Sci., 303, 012009. doi:10.1088/1755-1315/303/1/012009, 2019.

S. Yokoi, S. Mori, F. Syamsudin, U. Haryoko, and B. Geng, Environmental conditions for nighttime offshore migration of precipitation area as revealed by in situ observation off Sumatra Island, Mon. Wea. Rev., 147, 3391-3407. doi:10.1175/MWR-D-18-0412.1, 2019.

Jayalakshmi Janapati, Balaji Kumar Seela, Pay-Liam Lin, Pao. K. Wang, Chie-Huei Tseng, K. Krishna Reddy, Hiroyuki Hashiguchi, Lei Feng, Subrata Kumar Das, and C. K. Unnikrishnan, Raindrop size distribution characteristics of Indian and Pacific Ocean tropical cyclones observed at India and Taiwan sites, J. Meteor. Soc. Japan, 98, 2, 2020/02

H. Luce, L. Kantha, H. Hashiguchi, D. Lawrence, Estimation of Turbulence Parameters in the Lower Troposphere from ShUREX (2016-2017) UAV Data, Atmosphere, 10, 384, doi:10.3390/atmos10070384, 2019/04.

L. Kantha, H. Luce, H. Hashiguchi, A. Doddi, Atmospheric structures in the troposphere as revealed by high-resolution backscatter images from MU radar operating in range-imaging mode, Progress in Earth and Planetary Science, 6, 32, doi:10.1186/s40645-019-0274-1, 2019/03.

L. Kantha, H. Luce, H. Hashiguchi, Mid-level Cloud-base Turbulence: Radar Observations and Models, J. Geophys. Res.: Atmosphere, 124, 2019/03.

<Ionospheric studies>

M. Yamamoto, W.K. Hocking, S. Nozawa, J. Vierinen, H. Liu, and N. Nishitani, Special issue “Recent Advances in MST and EISCAT/Ionospheric Studies - Special Issue of the Joint MST15 and EISCAT18 Meetings, May 2017”, Earth Planets Space, 71, doi:10.1186/s40623-019-1070-2, 2019.

L.M. Joshi, L.-C. Tsai, S.-Y. Su, Y. Otsuka, T. Yokoyama, M. Yamamoto, S. Sarkhel, K. Hozumi, and C.-H. Lu, Investigation of Spatiotemporal Morphology of Plasma Bubbles Based on EAR Observations, Journal of Geophysical Research: Space Physics, 124, doi:10.1029/2019JA026839, 2019.

S. Tulasi Ram, K. K. Ajith, T. Yokoyama, M. Yamamoto, K. Hozumi, K. Shiokawa, Y. Otsuka, G. Li, Dilatory and Downward Development of 3-m Scale Irregularities in the Funnel-Like Region of a Rapidly Rising Equatorial Plasma Bubble Geophysical, Research Letters, 47, 13, 2020/07/16.

C. Martinis, T. Yokoyama, M. Nishioka, All-Sky Imaging Observations and Modeling of Bright 630 nm Airglow Structures Associated with MSTIDs, Journal of Geophysical Research: Space Physics, 124, 8, 7332-7340, 2019/08/26.

Afolayan Abimbola O, Singh Mandeep Jit, Abdullah Mardina, Buhari Suhaila M, Yokoyama Tatsuhiro, Supnithi Pornchai, Observation of seasonal asymmetry in the range spread F occurrence at different longitudes during low and moderate solar activity, ANNALES GEOPHYSICAE, 37, 4, 733-745, 2019/08/21.

Yokoyama Tatsuhiro, Jin Hidekatsu, Shinagawa Hiroyuki, Liu Huixin, Seeding of Equatorial Plasma Bubbles by Vertical Neutral Wind, GEOPHYSICAL RESEARCH LETTERS, 46, 13, 7088-7095, 2019/07/16.

4.6. Report from National Institute for Information and Communications Technology (NICT)
(Hidekatsu Jin, NICT)

=== Recent papers===

Chen, G., Y. Li, S. Zhang, B. Ning, W. Gong, A. Yoshikawa, K. Hozumi, T. Tsugawa, Z. Wang, Multi-Instrument Observations of the Atmospheric and Ionospheric Response to the 2013 Sudden Stratospheric Warming Over Eastern Asia Region, IEEE Transactions on Geoscience and Remote Sensing, vol. 58, no. 2, pp. 1232-1243, doi:10.1109/TGRS.2019.2944677, 2020.

Ghosh, P., Otsuka, Y., Mani, S., and Shinagawa, H. Day-to-day variation of pre-reversal enhancement in the equatorial ionosphere based on GAIA model simulations. Earth Planets Space 72, 93. https://doi.org/10.1186/s40623-020-01228-9, 2020

Joshi, L. M., L. C. Tsai, S. Y. Su, Y. Otsuka, T. Yokoyama, M. Yamamoto, S. Sarkhel, K. Hozumi, C. H. Lu, Investigation of spatio-temporal morphology of plasma bubbles based on EAR observations, J. Geophys. Res. Space Physics, Vol. 124, doi:10.1029/2019JA026839, 2019.

Liu, H., C. Tao, H. Jin, Y. Nakamozo, Circulation and Tides in a Cooler Upper Atmosphere: Dynamical Effects of CO2 Doubling, Geophys. Res. Lett., 47, e2020GL087413, doi.org:10.1029/2020GL087413, 2020

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