

Mon. Jul 13, 2020

[E] Oral | U (Union) : Union

2:15 PM - 3:45 PM JST | 5:15 AM - 6:45 AM UTC | Ch.2

[U-13] Open Colloquium-NASA/JAXA: Our advance and future load in Heliophysics

convener:Yusuke Iida(Niigata University), Mariko Teramoto(Kyushu Institute of Technology), Chun Ming Mark Cheung(Lockheed Martin Advanced Technology Center), Chairperson:Yusuke Iida(Niigata University), Mariko Teramoto(Kyushu Institute of Technology), Chun Ming Mark Cheung(Lockheed Martin Advanced Technology Center)

2:15 PM - 2:40 PM JST | 5:15 AM - 5:40 AM UTC

[U13-01] Geospace Explorations: Toward cycle 25

★Invited Papers

*Yoshizumi Miyoshi¹ (1.Institute for Space-Earth Environmental Research, Nagoya University)

2:40 PM - 3:05 PM JST | 5:40 AM - 6:05 AM UTC

[U13-02] **The State and Vision for the Future of Heliophysics at NASA**

★Invited Papers

*James F Spann¹ (1.NASA Headquarters)

3:05 PM - 3:30 PM JST | 6:05 AM - 6:30 AM UTC

[U13-03] The Solar-C_EUVST Mission and Solar Observations in 2020s

★Invited Papers

*Toshifumi Shimizu¹ (1.Institute of Space and Astronautical Science, JAXA)

[E] Oral | U (Union) : Union

2:15 PM - 3:45 PM JST | 5:15 AM - 6:45 AM UTC | Ch.3

[U-21] Frontiers of Antarctic Environmental Research

convener:Kenji Kawamura(National Institute of Polar Research, Research Organization of Information and Systems), Carol Finn(USGS), Osamu Seki(Institute of Low Temperature Science, Hokkaido University), Yusuke Suganuma(National institute of Polar Research), Chairperson:Kenji Kawamura(National Institute of Polar Research, Research Organization of Information and Systems), Carol Finn(USGS), Osamu Seki(Institute of Low Temperature Science, Hokkaido University), Yusuke Suganuma(National institute of Polar Research)

2:17 PM - 2:39 PM JST | 5:17 AM - 5:39 AM UTC

[U21-01] Oceanographic and geophysical observation campaign off Sabrina Coast, East Antarctica, in 2019/2020

★Invited Papers

*Shigeru Aoki¹, Takeshi Tamura², Yoshihiro Nakayama¹, Kazuya Ono¹, Pat Wongpan¹, Kaihe Yamazaki¹, Takuya Itaki³, Yuki Tokuda⁴, Satoshi Sasaki⁵, Daisuke Hirano¹, Yuichi Aoyama² (1.Hokkaido University, 2.NIPR, 3.AIST, 4.Tottori University of Environmental Studies, 5.Shimane University)

2:39 PM - 3:01 PM JST | 5:39 AM - 6:01 AM UTC

[U21-02] Hot-water drilling for exploring subglacial environment of the Antarctic ice sheet

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*Shin Sugiyama¹, Masahiro Minowa² (1.Institute of Low Temperature Science, Hokkaido University, 2.Instituto de Ciencias Físicas y Matemáticas, Universidad Austral de Chile)

3:01 PM - 3:23 PM JST | 6:01 AM - 6:23 AM UTC

[U21-03] **Modelling the Stability of Antarctic ice sheet in the past interglacials and its implication on future projection.**

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*Ayako Abe-Ouchi¹, Takashi Obase¹, Ralf Greve⁴, Sam Sheriff-Tadano¹, Fuyuki SAITO², Kenji Kawamura³ (1.Atmosphere and Ocean Research Institute, The University of Tokyo, 2.JAMSTEC, 3.NIPR, 4.Hokkaido University)

3:23 PM - 3:45 PM JST | 6:23 AM - 6:45 AM UTC

[U21-04] **Looking to the Future Collaborative Antarctic Science with Global Impacts**

★Invited Papers

*Robin Elizabeth Bell¹, Terry Wilson² (1.Lamont Doherty Earth Observatory, 2.Ohio State University, Columbus ,OH, USA)

[E] Oral | U (Union) : Union

9:00 AM - 10:30 AM JST | 12:00 AM - 1:30 AM UTC | Ch.1

[U-22] Environmental drivers and impacts of the evolving COVID-19 pandemic

convener:Benjamin F Zaitchik(Johns Hopkins University), Teppei J Yasunari(Arctic Research Center, Hokkaido University), Chairperson:Teppei J Yasunari(Arctic Research Center, Hokkaido University), Chairperson:Benjamin F Zaitchik(Johns Hopkins University)

9:00 AM - 9:20 AM JST | 12:00 AM - 12:20 AM UTC

[U22-01] Lessons learned from emission fluctuation of greenhouse gases and air pollutants due to restrictions associated with the COVID-19 pandemic

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*Toshihiko Takemura¹ (1.Research Institute for Applied Mechanics, Kyushu University)

9:20 AM - 9:40 AM JST | 12:20 AM - 12:40 AM UTC

[U22-02] **Satellite Observations of Aerosols during COVID-19 Pandemic**

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*Pawan Gupta^{1,2}, Robert C. Levy³ (1.Universities Space Research Association Greenbelt, 2.MSFC, 3.GSFC)

9:40 AM - 10:00 AM JST | 12:40 AM - 1:00 AM UTC

[U22-03] Seasonal sensitivity of COVID-19: perspectives from viral-host interactions

★Invited Papers

*Miyu Moriyama¹, Akiko Iwasaki¹ (1.Yale University)

10:00 AM - 10:20 AM JST | 1:00 AM - 1:20 AM UTC

[U22-04] Air pollution, COVID-19, and public health: What we know and don't know

★Invited Papers

*Susan Anenberg¹ (1.George Washington University)

[E] Oral | U (Union) : Union

10:45 AM - 12:15 PM JST | 1:45 AM - 3:15 AM UTC | Ch.1

[U-23] New challenges to diversity, equality and inclusion under COVID-19

convener:Chiaki T. Oguchi(Institute for Environmental Science and Technology, Graduate School of Science and Engineering, Saitama University), Rie Hori, S.(Department of Earth Science, Faculty of Science, Ehime University), Claudia Jesus-Rydin(European Research Council), Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo), Chairperson:Chiaki T. Oguchi(Institute for Environmental Science and Technology, Graduate School of Science and Engineering, Saitama University)

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[U23-01] Large-scale survey of work and life in scientific and technological profession in Japan under Emergency Declaration caused due to COVID-19 and requests to Japanese government

★Invited Papers

*Noriko Hirata-Kohno¹, Misa Shimuta^{2,3} (1.Nihon University, 2.EPMEWSE, 3.The Jikei University School of Medicine)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[U23-02] The impacts of COVID-19 and how racism is hindering our diversity and inclusion efforts

★Invited Papers

*Robin E Bell^{1,2} (1.American Geophysical Union, 2.Lamont-Doherty Earth Observatory)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[U23-03] New challenges and opportunities for equality, diversity and inclusivity under COVID-19 and beyond

★Invited Papers

*Alberto Montanari¹ (1.University of Bologna)

[E] Oral | U (Union) : Union

4:00 PM - 5:30 PM JST | 7:00 AM - 8:30 AM UTC | Ch.1

[U-25] Special session for a Borderless World of Geoscience after COVID-19 (Challenges for the future)

convener:Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo), Robin Elizabeth Bell(Lamont Doherty Earth Observatory), Alberto Montanari(University of Bologna), David Laurence Higgitt(Lancaster University College at Beijing Jiaotong University, Weihai, China), Chairperson:Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo)

4:03 PM - 4:20 PM JST | 7:03 AM - 7:20 AM UTC

[U25-01] Collaborative, Inclusive, Connected Earth and Space Science for our Future

★Invited Papers

*Robin E Bell¹ (1.American Geophysical Union)

4:20 PM - 4:37 PM JST | 7:20 AM - 7:37 AM UTC

[U25-02] A new mission for the geosciences in an age of pandemics and beyond

★Invited Papers

*Alberto Montanari¹, Helen Graves² (1.University of Bologna, 2.British Geological Survey, Environmental Science Centre)

4:37 PM - 4:54 PM JST | 7:37 AM - 7:54 AM UTC

[U25-03] A Borderless World of Geoscience in Asia after COVID-19... for Asia and the World

★Invited Papers

*David Laurence Higgitt¹ (1.Lancaster University College at Beijing Jiaotong University, Weihai, China)

4:54 PM - 5:09 PM JST | 7:54 AM - 8:09 AM UTC

[U25-04] Borderless World of Geoscience after COVID-19 (Challenges for the future)

★Invited Papers

*Yue-Gau Chen¹ (1.Research Center for Environmental Changes, Academia Sinica)

5:09 PM - 5:24 PM JST | 8:09 AM - 8:24 AM UTC

[U25-05] Contribution by JpGU to the future global development of Earth and Planetary Science – by overcoming COVID-19 -

*Hodaka Kawahata¹ (1.Atmosphere Ocean Research Institute, the University of Tokyo)

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The connection between the Sun and the earth is becoming a more critical issue in the modern era of space use. Recent advances in the satellite observation have brought breakthroughs in our understanding of the solar-terrestrial system and also the solar activity itself. In this session, the researchers who played a central role in the NASA and JAXA heliophysics missions introduce their achievements to the Geoscience community members and discuss the future payload of the heliophysics missions. We have discussion time not only in each talk but also at the end of the session. Open discussions are very welcomed from both space science and other fields.

2:15 PM - 2:40 PM JST | 5:15 AM - 5:40 AM UTC

[U13-01] Geospace Explorations: Toward cycle 25

★Invited Papers

*Yoshizumi Miyoshi¹ (1.Institute for Space-Earth Environmental Research, Nagoya University)

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[U13-02] The State and Vision for the Future of Heliophysics at NASA

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[U13-03] The Solar-C_EUVST Mission and Solar Observations in 2020s

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*Toshifumi Shimizu¹ (1.Institute of Space and Astronautical Science, JAXA)

3:30 PM - 3:35 PM JST | 6:30 AM - 6:35 AM UTC

Discussion

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Discussion

3:40 PM - 3:45 PM JST | 6:40 AM - 6:45 AM UTC

Discussion

Geospace Explorations: Toward cycle 25

*Yoshizumi Miyoshi¹

1. Institute for Space-Earth Environmental Research, Nagoya University

In this presentation, we will show current research activities and future perspectives of geospace, mainly focusing on magnetosphere and ionosphere. During solar cycle 24, new satellites NASA/THEMIS, Van Allen Probes, MMS and JAXA/Arase are operated and provide many new findings about geospace. Besides these in-situ observations, ground-based observations such as SuperDARN, EISCAT, global magnetometer etc provide global view of geospace phenomena, convection, global current, plasma wave distributions. Coordinated observations between in-situ satellite measurements and ground-observations are very useful to understand cause and consequence occurred in different regions. For solar cycle 25, new missions for geospace imaging are planned, which provides new view of geospace.

Keywords: Geospace, Cycle 24 and 25

The State and Vision for the Future of Heliophysics at NASA

*James F Spann¹

1. NASA Headquarters

NASA is a mission driven agency whose science mission is focused on discovering the secrets of the universe, looking for life elsewhere, and safeguarding and improving life on Earth. Heliophysics plays a key role in every aspect of the NASA science mission and focuses on increasing our knowledge of the dynamic nature of our star, and its impact on Earth, and throughout the Solar System to the boundary of interstellar space. This includes advancing our understanding of drivers of and enabling the prediction of space weather. Heliophysics has an established research program that motivates and funds solar and space physics, which is the essence and foundation of space weather research. This talk will provide an overview of the Heliophysics Program and how the science investigations through missions, technology, and R&A address all aspects of solar and space physics, and its relation to space weather.

The Solar-C_EUVST Mission and Solar Observations in 2020s

*Toshifumi Shimizu¹

1. Institute of Space and Astronautical Science, JAXA

High resolution observations with advanced techniques of the Sun have been improving our knowledge on fundamental physics working in solar dynamical atmosphere, which is full of MHD processes including waves, magnetic reconnection, magneto-convection, and instability. The Solar-C_EUVST mission is a JAXA competitive M-class mission to be developed with participations from NASA and European space agencies. The mission will carry EUV High-Throughput Spectroscopic Telescope, which is an EUV imaging spectrometer with slit-jaw imaging system that will simultaneously observe the solar atmosphere from the photosphere/chromosphere up to the corona with seamless temperature coverage, high spatial resolution, and high throughput for the first time. The mission is designed to comprehensively understand how mass and energy are transferred throughout the solar atmosphere, which would provide an answer to the most fundamental questions in solar physics: how fundamental processes lead to the formation of the solar atmosphere and the solar wind, and how the solar atmosphere becomes unstable, releasing the energy that drives solar flares and eruptions. This is a fundamental step towards answering how the plasma universe is created and evolves, and how the Sun influences the Earth and other planets in the heliosphere. In 2020s, we will acquire new observations from a large variety of new instruments, such as DKIST for high-spatial solar surface observations, Indian and Chinese satellites, Parker Solar Probe to reach less than 10 solar radius, Solar Orbiter in an inclined orbit, PUNCH for polarimetric observations of the outer corona. The Solar-C_EUVST will provide spectroscopic measurements to fill a gap from the solar surface to the outer corona and the heliosphere.

Keywords: The Sun, New space mission

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[U-21] Frontiers of Antarctic Environmental Research

convener:Kenji Kawamura(National Institute of Polar Research, Research Organization of Information and Systems), Carol Finn(USGS), Osamu Seki(Institute of Low Temperature Science, Hokkaido University), Yusuke Suganuma(National Institute of Polar Research), Chairperson:Kenji Kawamura(National Institute of Polar Research, Research Organization of Information and Systems), Carol Finn(USGS), Osamu Seki(Institute of Low Temperature Science, Hokkaido University), Yusuke Suganuma(National Institute of Polar Research)

Antarctica and the Southern Ocean play important roles in the global climate system, with their crucial influences on, e.g., sea level, ocean circulation and heat/carbon storage. They are also the least known components because the precise understanding of the processes requires observations of various interactions, such as those between ocean, ice shelf and ice sheet, in the harshest conditions on the Earth's surface. Recent advancements in direct and satellite observations and data analyses have suggested significant changes in the Antarctic. However, as the spatial and temporal scales of the changes are diverse (from sub-annual to over millennial), significant challenges remain in their understanding and modeling.

This session will invite several presentations that address the Antarctic environmental changes in the past, present and potential future, and the importance of interdisciplinary and international observations and modeling for better understanding and projection of the Antarctic and their influences on the global environments.

2:15 PM - 2:17 PM JST | 5:15 AM - 5:17 AM UTC

Introduction

2:17 PM - 2:39 PM JST | 5:17 AM - 5:39 AM UTC

[U21-01] Oceanographic and geophysical observation campaign off Sabrina Coast, East Antarctica, in 2019/2020

★Invited Papers

*Shigeru Aoki¹, Takeshi Tamura², Yoshihiro Nakayama¹, Kazuya Ono¹, Pat Wongpan¹, Kaihe Yamazaki¹, Takuya Itaki³, Yuki Tokuda⁴, Satoshi Sasaki⁵, Daisuke Hirano¹, Yuichi Aoyama² (1.Hokkaido University, 2.NIPR, 3.AIST, 4.Tottori University of Environmental Studies, 5.Shimane University)

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[U21-02] Hot-water drilling for exploring subglacial environment of the Antarctic ice sheet

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*Shin Sugiyama¹, Masahiro Minowa² (1.Institute of Low Temperature Science, Hokkaido University, 2.Instituto de Ciencias Físicas y Matemáticas, Universidad Austral de Chile)

3:01 PM - 3:23 PM JST | 6:01 AM - 6:23 AM UTC

[U21-03] Modelling the Stability of Antarctic ice sheet in the past interglacials and its implication on future projection.

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*Ayako Abe-Ouchi¹, Takashi Obase¹, Ralf Greve⁴, Sam Sheriff-Tadano¹, Fuyuki SAITO², Kenji Kawamura³ (1.Atmosphere and Ocean Research Institute, The University of Tokyo, 2.JAMSTEC, 3.NIPR, 4.Hokkaido University)

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[U21-04] Looking to the Future Collaborative Antarctic Science with Global Impacts

★Invited Papers

*Robin Elizabeth Bell¹, Terry Wilson² (1.Lamont Doherty Earth Observatory, 2.Ohio State University, Columbus ,OH, USA)

Oceanographic and geophysical observation campaign off Sabrina Coast, East Antarctica, in 2019/2020

*Shigeru Aoki¹, Takeshi Tamura², Yoshihiro Nakayama¹, Kazuya Ono¹, Pat Wongpan¹, Kaihe Yamazaki¹, Takuya Itaki³, Yuki Tokuda⁴, Satoshi Sasaki⁵, Daisuke Hirano¹, Yuichi Aoyama²

1. Hokkaido University, 2. NIPR, 3. AIST, 4. Tottori University of Environmental Studies, 5. Shimane University

Totten Glacier is one of the fastest-flowing glaciers in East Antarctica. The glacier's drainage system as a whole has a potential of 3.5m rise of global sea level. Recent various researches have revealed Totten Glacier and nearby glaciers are changing, which has some similarity with the situation in West Antarctica. Totten Glacier is now losing its ice mass and has a potential of contributing to a significant sea level rise in the future. Warm water of the ocean off Sabrina Coast, flowing through a deep channel under the glacier, is considered as the major driver of the rapid ice melting, but yet little is known about the oceanic role in melting the ice. Although this region has been attracting growing attention, in-situ observational understandings are still inadequate because of its heavy sea ice cover.

Based on Icebreaker Shirase, we conducted oceanographic and geophysical observations off Sabrina Coast, East Antarctica, during Dec. 2019 and Feb.-Mar. 2020 as a program of 61st Japanese Antarctic Research Expedition (JARE61). Hydrographic measurements, including CTD (Conductivity-Temperature Depth profiler)/MS (Multi-water Sampler) and XCTD (eXpendable CTD), revealed the ubiquitous presence of deep warm water in this region, which is the source of the large thermal forcing. Air-borne XCTD and XBT(eXpendable BathyThermograph) helped enhance the spatial sampling in difficult access area, and largely expand the distribution of water mass property. At the same time, sediments and their cores were taken for the first time in this region. Bathymetric survey with multi-narrow beam was effective and describes new and detailed topographic features in the least explored area. Sea ice research including wave motion measurements were conducted at the marginal ice zone off Dolton Polynya. International cooperation was effective in filling gaps of our observational systems. Further analysis of these data enables us to decipher a detailed pathway of warm water and meltwater discharge to and from the Totten Glacier Ice Shelf and its historical evolution.

Keywords: Totten Glacier, Japanese Antarctic Research Expedition, Modified Circumpolar Deep Water, Sealevel rise

Hot-water drilling for exploring subglacial environment of the Antarctic ice sheet

*Shin Sugiyama¹, Masahiro Minowa²

1. Institute of Low Temperature Science, Hokkaido University, 2. Instituto de Ciencias Físicas y Matemáticas, Universidad Austral de Chile

Subglacial environment of the Antarctic ice sheet is one of the least investigated areas on the Earth. Base of the ice sheet forms an important boundary, which controls ice dynamics and thermal conditions. Existence of subglacial channels and lakes poses important questions about basal hydrology and microbial ecosystem under several-kilometer-thick ice. Recent mass loss of the ice sheet is driven by the melting of ice shelves, which occurs at the basal boundary of floating ice. Sensing physical properties beneath the ice is possible by using seismic and electromagnetic waves, but in-situ measurements and sampling are required to answer many of the questions. Hot-water drilling is a powerful tool to provide an access to the bed of glaciers and ice sheets. In this contribution, I introduce recent progress in our understanding of subglacial environment of the Antarctic ice sheet based on direct observations through boreholes, including our project in Langhovde Glacier in East Antarctica.

Langhovde Glacier is a 3-km wide outlet glacier located 20 km south of the Japanese Syowa Station in East Antarctica. Lower 2–3 km of the glacier forms a floating tongue, which feeds into the Lützow-holm bay. To study basal melting and subshelf ocean environment, we drilled four boreholes in January 2018 using a hot-water drilling system. The boreholes were utilized to measure spatial variations of temperature, salinity and current under the ice. Two of the boreholes were equipped with a temperature and CTD/current sensors for year-round observations. Potential temperature of the seawater underneath the ice was between -1.4 and -1.1°C , approximately 1°C warmer than the freezing temperature. Water temperature within several hundred meters from the grounding line was -1.2°C in January 2018. Temperature dropped to -1.6°C from January to May, which was followed by gradual warming to -1.55°C in December. The temperature in January 2018 (-1.2°C) was significantly warmer than that in the summer 2019 (-1.55°C), as well as temperature measured at the same location in 2012 and 2013 (-1.55°C). A possible interpretation of the unusually warm water in 2018 was break-up of land-fast sea ice in the Lützow-holm bay in 2016. Presumably, open water near the glacier front facilitated transport of heat to the grounding line. Our subshelf observations implied significant amount of basal melting occurs under the entire ice shelf of Langhovde Glacier, and thermal conditions near the grounding line is susceptible to changes in the ocean.

Modelling the Stability of Antarctic ice sheet in the past interglacials and its implication on future projection.

*Ayako Abe-Ouchi¹, Takashi Obase¹, Ralf Greve⁴, Sam Sheriff-Tadano¹, Fuyuki SAITO², Kenji Kawamura³

1. Atmosphere and Ocean Research Institute, The University of Tokyo, 2. JAMSTEC, 3. NIPR, 4. Hokkaido University

Ice sheet volume changes are the largest potential source of sea level change in the past and future. Projection of the ice sheet in future has been challenging and requires different approach from other components of climate system for model validation because of two main reasons. One is its millennial-scale long response time to external forcing which leads to its long commitment. The other is the existence of threshold or tipping point in the system which characterizes the irreversible behavior under climate changes. It can make a large difference in Antarctica ice sheet volume even under a small change in forcing. Here we show the case studies of the last interglacial climate and Antarctic ice sheet compared to the present interglacial. Multiple lines of evidence show that the sea level was higher at the last interglacial than today and the Antarctica ice sheet mass loss may have contributed substantially to it. One study using NCAR CCSM3 climate model and another one using MIROC 4m both simulate the climate change from the penultimate glacial maximum to the last interglacial and are compared with ice core studies and paleoceanography studies. Several ice sheet modelling studies show a mass loss of Antarctica ice sheet at the last interglacials under a few degree warmer conditions than our current interglacial. It is shown in many models that subsurface ocean warming and the marine ice sheet instability are the key processes. There are still many steps needed to link the lessons from modelling the interglacials to the model validation for future projection through both domestic and international collaboration.

Keywords: Climate model, ice sheet, Antarctica ice sheet, deglaciation

Looking to the Future Collaborative Antarctic Science with Global Impacts

*Robin Elizabeth Bell¹, Terry Wilson²

1. Lamont Doherty Earth Observatory, 2. Ohio State University, Columbus ,OH, USA

Antarctica is stunning in its vast whiteness. It remains a continent encased in ice and long just an empty space on maps. Filling in this blank space has been a collaborative international effort. Over sixty years ago in 1958 nations came together as international collaboration blossomed in the International Geophysical Year (IGY). Two lasting impacts of the IGY are the discovery that the Antarctic ice sheet was over two miles thick and the concept that Antarctica should be a continent dedicated to science. The Scientific Committee for Antarctic Research became the hub for fostering collaboration in the challenging Antarctic environment where collaboration is essential.

In 2002, just as Larsen B ice shelf broke up catastrophically, the international community recognized the essential need to address the emerging evidence for change in the polar regions using the framework of collaboration fostered by the IGY. A small group of scientists launched the concept of the International Polar Year 2007-9 (IPY). Over 65,000 scientists collaborated and succeeded in reaching places that had not been visited for over 50 years. Using new technologies and leveraging shared logistical assets, scientists discovered everything from subglacial water networks that run uphill to glacial isostatic uplift at rates over 40 mm/year. These discoveries were only possible due to the collaborative framework of the IPY.

The Antarctic Ice Sheet is changing at rates greater than IGY scientists could have imagined. The rapidly changing ice has pushed the driving motivation for Antarctic science beyond simple awe and discovery to science that is critical for coastal residents around the globe. Suddenly change in Antarctica matters. The challenge for SCAR and the global science community will be to build truly inclusive teams to improve our understanding of how fast the ice sheet will change and how much sea level will rise. Antarctic science has an opportunity to move beyond the image of the frosty bearded explorer to embracing international teams where data is openly shared and leaders reflect the diverse population of the cities that will be impacted by the future Antarctic change.

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9:00 AM - 9:20 AM JST | 12:00 AM - 12:20 AM UTC

[U22-01] Lessons learned from emission fluctuation of greenhouse gases and air pollutants due to restrictions associated with the COVID-19 pandemic

★ Invited Papers

*Toshihiko Takemura¹ (1. Research Institute for Applied Mechanics, Kyushu University)

9:20 AM - 9:40 AM JST | 12:20 AM - 12:40 AM UTC

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[U22-03] Seasonal sensitivity of COVID-19: perspectives from viral-host interactions

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[U22-04] Air pollution, COVID-19, and public health: What we know and don't know

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Discussion

Lessons learned from emission fluctuation of greenhouse gases and air pollutants due to restrictions associated with the COVID-19 pandemic

*Toshihiko Takemura¹

1. Research Institute for Applied Mechanics, Kyushu University

The decrease in the concentration of air pollutants due to the limitation of socio-economic activities associated with the COVID-19 pandemic has been detected by ground-based and satellite observations. Since most of the air pollutants originate from fossil fuels, it is thought that the emission of carbon dioxide, which is a greenhouse gas, has also been reduced. However, as behavior restrictions have been lifted, air pollutant concentrations have returned to their original levels. Although it was a very short period of time, it is a fact that there was a rapid global reduction in their emissions that could not have been normal situations. What should we learn from this experience toward mitigating future climate change and air pollution? I will provide a few perspectives based on my public articles posted to Yahoo Japan News (sorry, but only in Japanese) (<https://news.yahoo.co.jp/byline/takemuratoshihiko/>) for discussion.

<Mitigating global warming by reducing carbon dioxide vs. Accelerating global warming by reducing air pollutants>

Both carbon dioxide and air pollutant emissions were reduced globally in the first few months of this year. Carbon dioxide reduction works to mitigate global warming, of course. On the other hand, climate change caused by aerosols is quantitatively large among the air pollutants, and its reduction brings about positive radiative forcing, and therefore accelerates global warming. Most of the air pollutants have short lifetimes in the atmosphere, then as soon as the amount of emission changes, the concentration also changes significantly. In the case of carbon dioxide, even if the amount of emission changes temporarily, the concentration in the atmosphere does not immediately change. Therefore, temporary reductions in fossil fuel consumption may have resulted in temperature increases of the order of months in some regions. An international project with climate models is underway to analyze how the climate change caused by the COVID-19 pandemic was. Regarding the long-term relationship between air pollution and climate change, developed countries that have continued to increase greenhouse gas emissions by only reducing particulate matter that cools the atmosphere to mitigate air pollution have accelerated global warming. Air pollution control and global warming mitigation had to proceed simultaneously.

<Sustainable behavior change is effective in mitigating global warming>

Improving the atmospheric environment and reducing carbon dioxide emissions associated with the COVID-19 pandemic is only temporary. Although it was only temporary, we were able to experience that if the consumption of fossil fuels is reduced, the carbon dioxide emissions will decrease and the atmospheric environment will improve. It was analyzed that the largest reduction in carbon dioxide emissions due to this behavior change was in the transportation sector. It was proved that individual commuting by foot or bicycle, and reduction of going to office and business trips by remote work were effective. We tend to have the impression that we have to put up with something to mitigating global

warming (especially Japanese people). “Patience” of behavior restriction does not become an essential solution to global warming and air pollution, but we have experienced that sustainable behavioral change by each person is effective in achieving a decarbonized society. I think that what we have done is of great significance.

Keywords: COVID-19 pandemic, Climate change, Air pollution, Carbon dioxide, Aerosols, Behavior change

Satellite Observations of Aerosols during COVID-19 Pandemic

*Pawan Gupta^{1,2}, Robert C. Levy³

1. Universities Space Research Association Greenbelt, 2. MSFC, 3. GSFC

As a result of an ongoing COVID-19 pandemic, global human activities have been limited or completely halted in many parts of the world. As a result of reduced anthropogenic emissions, this has created a natural experiment to observe the changes in atmospheric composition at different temporal and spatial scales. Some of these changes will be short-term, and some will last over a more prolonged period. Aerosols, however, are produced by not only human activities, but also natural sources such as dust, sea salt and biomass burning. As we now have a good-quality, stable, satellite-derived, global aerosol dataset from the past two decades, we can evaluate the recent COVID-19 impacts on aerosols. In this study, we will present results of satellite data analysis from around the world, focusing on urban centers as well as regions where significant changes were observed.

Keywords: Aerosols, Satellites, Lockdown, Emissions, Impacts

Seasonal sensitivity of COVID-19: perspectives from viral-host interactions

*Miyu Moriyama¹, Akiko Iwasaki¹

1. Yale University

Coronavirus disease 2019 (COVID-19) has emerged in December 2019 and continues to spread throughout over 200 countries and territories. To flatten the epidemic curve of COVID-19 cases, prolonged strict restriction of movement has been applied which has unfortunately led to severe economic crises in many countries. COVID-19 is caused by respiratory tract infection with a newly emerging coronavirus, severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV2). Other members of the coronaviruses are well known to cause the common cold, which has seasonality in winter. Therefore, whether the seasonal changes impact on COVID-19 outbreak is of great importance. In this presentation, we will discuss the seasonal sensitivity of COVID-19 by focusing on the key determinants of the seasonality of other respiratory viral infections. In particular, we will highlight the effects of seasonal changes in the environmental factors on the host antiviral immune responses. Further, we will discuss the latest studies on seasonal effects on the COVID-19 pandemics.

Air pollution, COVID-19, and public health: What we know and don't know

*Susan Anenberg¹

1. George Washington University

Air pollution, COVID-19, and public health intersect in several ways. Air pollution may contribute to both spread of SARS-CoV-2 and severity of COVID-19 infection. Rapid declines in personal vehicle activity during stay-at-home orders and physical distancing have also affected ambient air pollution levels. This talk will address what we know and don't know about how air pollution, COVID-19, and public health interact, drawing from the rapidly evolving body of research on these topics. Understanding these interactions can inform the public health response to COVID-19, as well as longer-term environmental policies.

Keywords: Environmental health, Air pollution, COVID-19

[E] Oral | U (Union) : Union

📅 Mon. Jul 13, 2020 10:45 AM - 12:15 PM JST | Mon. Jul 13, 2020 1:45 AM - 3:15 AM UTC | 🏠 Ch.1

[U-23] New challenges to diversity, equality and inclusion under COVID-19

convener:Chiaki T. Oguchi(Institute for Environmental Science and Technology, Graduate School of Science and Engineering, Saitama University), Rie Hori, S.(Department of Earth Science, Faculty of Science, Ehime University), Claudia Jesus-Rydin(European Research Council), Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo), Chairperson:Chiaki T. Oguchi(Institute for Environmental Science and Technology, Graduate School of Science and Engineering, Saitama University)

10:45 AM - 11:00 AM JST | 1:45 AM - 2:00 AM UTC

[U23-01] Large-scale survey of work and life in scientific and technological profession in Japan under Emergency Declaration caused due to COVID-19 and requests to Japanese government

★Invited Papers

*Noriko Hirata-Kohno¹, Misa Shimuta^{2,3} (1.Nihon University, 2.EPMEWSE, 3.The Jikei University School of Medicine)

11:00 AM - 11:15 AM JST | 2:00 AM - 2:15 AM UTC

[U23-02] The impacts of COVID-19 and how racism is hindering our diversity and inclusion efforts

★Invited Papers

*Robin E Bell^{1,2} (1.American Geophysical Union, 2.Lamont-Doherty Earth Observatory)

11:15 AM - 11:30 AM JST | 2:15 AM - 2:30 AM UTC

[U23-03] New challenges and opportunities for equality, diversity and inclusivity under COVID-19 and beyond

★Invited Papers

*Alberto Montanari¹ (1.University of Bologna)

11:30 AM - 12:15 PM JST | 2:30 AM - 3:15 AM UTC

Discussion

Large-scale survey of work and life in scientific and technological profession in Japan under Emergency Declaration caused due to COVID-19 and requests to Japanese government

*Noriko Hirata-Kohno¹, Misa Shimuta^{2,3}

1. Nihon University, 2. EPMEWSE, 3. The Jikei University School of Medicine

In Japan, since the ratio of female professionals in science, technology, engineering and mathematics (STEM) field is far behind other developed countries, "The Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE in short)" was established in 2002. Around 100 academic societies belong to the association and do working for gender equality.

As some JpGU member may already know, the major roll of EPMEWSE could be summarized as: 1) large Scale Survey for every five years to know the actual conditions of gender equality in STEM field in Japan, 2) proposals and requests to Japanese Government based on the survey results, 3) light survey the activities and female ratio of each member societies associated with EPMEWSE and 4) support STEM Programs for high school girls.

In this talk, we discuss our actual situation under Emergency Declaration caused due to COVID-19 based on our recent "Large-scale survey of work and life in scientific and technological profession" in Japan as well as related requests to Japanese government.

Keywords: EPMEWSE, STEM, Large scale survey, COVID-19, Requests to Japanese government

The impacts of COVID-19 and how racism is hindering our diversity and inclusion efforts

*Robin E Bell^{1,2}

1. American Geophysical Union, 2. Lamont-Doherty Earth Observatory

AGU has recently established an updated Strategic Plan which outlines three primary strategic goals to: (1) catalyze discovery and solutions to scientific and societal challenges; (2) promote and exemplify an inclusive scientific culture; and (3) partner broadly with other organizations and sectors to effectively address scientific and societal challenges. AGU has also adopted a diversity and inclusion strategic plan in 2018 and put in place a Diversity and Inclusion Advisory Committee to help assure progress towards our diversity equity and inclusion goals. Many new initiatives are underway across AGU programs and metrics are in development to help publicly track progress. The recent COVID-19 impacts and simultaneous major social protest in response to long-standing U.S. racial issues are now creating additional challenges for scientific societies' awareness and resolve to assure accomplishing our objectives across all programming, including for diversity and inclusion. This talk will highlight several of the impacts, challenges and opportunities, and will discuss strategies and action to help AGU and others move forward with intention and purpose towards achieving our diversity, equity and inclusion goals.

Keywords: COVID, Diversity, Inclusion, Pandemic, equity, society

New challenges and opportunities for equality, diversity and inclusivity under COVID-19 and beyond

*Alberto Montanari¹

1. University of Bologna

Diversity, equality and inclusivity are topical issues in science at large. While diversity is unanimously recognised to be an essential ingredient of science, it is still difficult to find a successful strategy to ensure diversity in the widest sense. Meanwhile, the tragedy of coronavirus, with more than 400,000 deaths to date, is going to broadly change our lifestyle, including research targets and avenues. While COVID-19 has been initially seen as an additional obstacle to diversity, it has been later observed that virtual networking may actually offer unexpected opportunities.

In particular, I believe that virtual connections may allow us to remove barriers to inclusivity therefore moving forward to an improved diversity. Furthermore, strategies and actions to support economic recovery of countries during COVID-19 and beyond may also contribute to improve equality in science. In fact, the current crisis has created a window of opportunity to change the way we organise scientific activities. In this talk we will discuss the conditions, strategies and attitude that may help geoscientists to improve equality, diversity and inclusivity under the current health emergency

[E] Oral | U (Union) : Union

📅 Mon. Jul 13, 2020 4:00 PM - 5:30 PM JST | Mon. Jul 13, 2020 7:00 AM - 8:30 AM UTC | 🏠 Ch.1

[U-25] Special session for a Borderless World of Geoscience after COVID-19 (Challenges for the future)

convener:Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo), Robin Elizabeth Bell(Lamont Doherty Earth Observatory), Alberto Montanari(University of Bologna), David Laurence Higgitt(Lancaster University College at Beijing Jiaotong University, Weihai, China),
Chairperson:Hodaka Kawahata(Atmosphere Ocean Research Institute, the University of Tokyo)

4:00 PM - 4:03 PM JST | 7:00 AM - 7:03 AM UTC

Introduction

4:03 PM - 4:20 PM JST | 7:03 AM - 7:20 AM UTC

[U25-01] Collaborative, Inclusive, Connected Earth and Space Science for our Future

★Invited Papers

*Robin E Bell¹ (1.American Geophysical Union)

4:20 PM - 4:37 PM JST | 7:20 AM - 7:37 AM UTC

[U25-02] A new mission for the geosciences in an age of pandemics and beyond

★Invited Papers

*Alberto Montanari¹, Helen Glaves² (1.University of Bologna, 2.British Geological Survey, Environmental Science Centre)

4:37 PM - 4:54 PM JST | 7:37 AM - 7:54 AM UTC

[U25-03] A Borderless World of Geoscience in Asia after COVID-19... for Asia and the World

★Invited Papers

*David Laurence Higgitt¹ (1.Lancaster University College at Beijing Jiaotong University, Weihai, China)

4:54 PM - 5:09 PM JST | 7:54 AM - 8:09 AM UTC

[U25-04] Borderless World of Geoscience after COVID-19 (Challenges for the future)

★Invited Papers

*Yue-Gau Chen¹ (1.Research Center for Environmental Changes, Academia Sinica)

5:09 PM - 5:24 PM JST | 8:09 AM - 8:24 AM UTC

[U25-05] Contribution by JpGU to the future global development of Earth and Planetary Science – by overcoming COVID-19 -

*Hodaka Kawahata¹ (1.Atmosphere Ocean Research Institute, the University of Tokyo)

5:24 PM - 5:30 PM JST | 8:24 AM - 8:30 AM UTC

Discussion

Collaborative, Inclusive, Connected Earth and Space Science for our Future

*Robin E Bell¹

1. American Geophysical Union

The COVID-19 pandemic has impacted lives and communities around the world, including upending much scientific research. But it has also served to reveal the underlying inequities and institutionalized racism inherent in our health care, economic and other systems.

Unfortunately, the global crisis of human-induced climate change continues unabated and will also have outsized effects on our most vulnerable populations.

In the face of these twin challenges, scientific societies must act, but how? We can foster both discovery-based and solutions-focused science to address massive societal problems. We can build meetings accessible on all seven continents so that we work truly globally to address these planet-wide issues.

We can support programs for STEM students and early career scientists and be more deliberate in fostering diversity and inclusion in the sciences, for we cannot hope to solve the problems of the 21st century without the skills, knowledge, and ideas of all of society. We can expand our partnerships with governments, non-governmental organizations, and companies and collaborate with communities to make our science not just useful but used. And we can act individually and collectively to reduce our contribution to climate change by decreasing our own carbon footprints.

In this time of uncertainty, it is the passionate, generous spirit of the Earth and space science community that will help keep us connected.

Keywords: solutions, community, diversity, society, global, partnerships

A new mission for the geosciences in an age of pandemics and beyond

*Alberto Montanari¹, Helen Glaves²

1. University of Bologna, 2. British Geological Survey, Environmental Science Centre

Geoscience aims to address key environmental challenges that are relevant to society. Some of these challenges, such as climate change, overexploitation of water resources and the water-food-energy nexus, have a global dimension. Recently science at large has been profoundly impacted by COVID-19. The tragedy of coronavirus, with more than 400,000 deaths to date, is going to broadly change our lifestyle, including research avenues and the way we organize and manage scientific activities. Science will also be pivotal to ensuring a prompt recovery from the pandemic and transforming this crisis into an opportunity. Working for a brighter future is the most appropriate way to honour the memory of those who lost their life. In particular, I believe the expertise of geoscientists can support a synergetic approach to mitigating the risk of global crises. Strategies and actions to support economic recovery of countries during COVID-19 and beyond may also contribute to reducing the hazard and impact of other global threats that geoscientists are currently investigating. To reach this goal, we have to look at our research targets and organize our scientific activities with a new vision. The current crisis has created a window of opportunity to increase public trust in science and improve wider interaction between scientists and policy makers in general. In this talk we will discuss the conditions, strategies and attitude that may help geoscientists to achieve this target.

Keywords: COVID-19, Virtual networking, Geosciences

A Borderless World of Geoscience in Asia after COVID-19... for Asia and the World

*David Laurence Higgitt¹

1. Lancaster University College at Beijing Jiaotong University, Weihai, China

Rapid economic growth, massive R&D spending, technological innovation, high participation in STEM postgraduate education and an emerging number of top-ranked universities are characteristic of many Asian countries. The lifetime of AOGS (founded in 2003) has witnessed the rapid expansion of geoscience research in many Asian countries, growing confidence and internationalisation as well as a burgeoning amount of science output. Will the impact of COVID-19 be a road bump in the continuing rise of Asian geosciences or fundamentally adjust the relationships between science and society? The principal mission of Asia Oceania Geosciences Society is to promote the application of geosciences for the benefit of humanity. Asia is a continent of diversity with uneven access to resources between and within countries. In a region where natural hazards are prevalent, sharing an understanding of risk management through scientific, social and technological means is vital. Constraints on fieldwork and travel because of COVID-19 hinder international cooperation but also provide an opportunity for reimagining digital technologies, remote monitoring and adjusted responsibilities in research teams. Coupled with flashpoints of racial inequality how can an inclusive diverse and sustainable geoscience emerge from COVID-19. And (using the tagline for AOGS) how can geoscience in Asia serve Asia and the World?

Keywords: AOGS, Natural Hazards, Inclusivity, Diversity

Borderless World of Geoscience after COVID-19 (Challenges for the future)

*Yue-Gau Chen¹

1. Research Center for Environmental Changes, Academia Sinica

Now we are facing the international travel restraint, hindered international exchange of field survey, promotion of non-contact, remote and/or automatic operation technology, open data policy on the submission of experimental data on COVID-19, and other many issues such as health, education, equality, environment and international cooperation related to the infection. After COVID-19, it is highly likely that a new world will emerge without returning to the previous world. The Earth and Planetary Science is essential to the well-being of the humankind and sustainable environments. Therefore the session would like to discuss what kind of the challenges we should do for the future after overcoming the infection

Contribution by JpGU to the future global development of Earth and Planetary Science –by overcoming COVID-19 -

*Hodaka Kawahata¹

1. Atmosphere Ocean Research Institute, the University of Tokyo

The origins of the JpGU trace back to joint meetings held by 5 societies concerned with Earth sciences in Japan in 1990, when the first Western Pacific Geophysics Meeting (WPGM) of AGU was held in Kanazawa, shortly after the Japanese Association of Earth and Planetary Science Societies (JAEPSS) was formed. Closer relationship started to develop between AGU and JAEPSS through participation in biennial WPGM meetings. The chemistry of crossing the disciplinary borderlands and national borders seems to have worked to gain support from the communities. We share common cause with AGU in promoting Earth and space science in fundamental ways. And then JpGU was established in the fall of 2005 as the organization to represent all the Societies within Earth and planetary sciences in response to the renovation of the Science Council of Japan. It started as a general juridical person, Japan Geoscience Union on December 1, 2009 and developed to be as a public corporation 2 years later in 2011. In 2017, JaGU and AGU held its first joint Meeting in Chiba. Currently 51 societies with the total member of 13,000 join JpGU and around 8,000 participants attend annual meeting of JpGU at Makuhari Messe, Chiba in May. We aim to promote research activities, provide a platform for communications among the members, coordinate internationally, and reach out to the public by representing earth planetary science societies in Japan. Especially JpGU supports international discussion and exchange that contributes to moving forwards the leading of science and will help invigorate the global Earth and planetary science community.

Investments in Earth and Planetary science research and education have greatly benefited the economic well-being of nations by understanding of distractive environmental hazards, sustainable use of resources, safer and healthier environment for a changing world. Scientists and their partners from many countries has worked together, share ideas and data, which has established the international network of a variety of cultures. This will be vital in confronting the challenges facing humanity and the Earth in the coming years and decades. In particular, Japan is a country prone to various geo-hazards and it is necessary for us to make vital contributions in understanding and overcoming these calamities.

JpGU has concluded MOU with AGU, EGU and AOGS to promote mutual collaboration and exchange in information and co-organization of scientific conferences and to foster mutual cooperation. In addition, policymakers can maximize the positive impacts of Earth and Planetary science for economies, health, sustainability and security around the globe by investing in scientific research. This time JpGU-AGU will have a joint meeting 2020 "For a Borderless World of Geoscience". We firmly believe that the advancement and dissemination of Earth and Planetary science will contribute to the well-being of the humankind and sustainable environments. We will make further global progress through open and transparent scientific collaboration and clear and timely science communication globally.

Due to the global spread of the Corona virus and outbreak of COVID-19, JpGU-AGU 2020 is held as a virtual format using the internet. Even if we overcome the corona infection, we will encounter a new world without getting back where we started from. We would like to highlight some of the science-influenced phenomena caused by COVID-19: the relationship of panedemic infection with science, global cooperation, open science, Society (Economic crises against long-term issues), and Dystopia. We hope that the new corona epidemic will be an opportunity for all human beings to understand that global

disruption poses a serious danger, as is clear from the case that everyone should cooperate in the development of vaccines.

The Corona virus problem may be a significant opportunity for us to think about current status of our world and future direction.