



Report on the 4th Japanese-American-German Frontiers of Science (JAGFOS) Symposium

Planning Group Member (PGM) Co-chair

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A hearty *hello* to all who will read this report. I wonder whether you are reading it to reflect on your experiences in this [Japanese-American-German Frontiers of Science](#) (JAGFOS) Symposium, or maybe on your participation in past JAGFOS or FoS symposia, or you may be a person who is interested in FoS symposia because you'd heard about their original, unconventional format for planning and interaction. In any case, I hope this report will convey or reflect the unique experience offered to participants in the [Frontiers of Science \(FoS\) symposium](#). As a note, each of these symposia is held by Japan and one or more of its partner countries, as indicated in the symposium titles. If you are a young researcher who has not yet participated in a FoS symposium (there are some prerequisites for participation, which I will explain later), I would like to say that if you do, your journey as a researcher will be enhanced in enjoyable ways!

This JAGFOS symposium was held at the [Penck Hotel Dresden](#) in the picturesque city of [Dresden](#), Germany (less than an hour by plane from Frankfurt) from 5-8 October 2023.

My first experience attending a JAGFOS symposium was as a general participant of the 2nd symposium (held in 2019; Kyoto, Japan). Then, I participated as a Planning Group Member (PGM) in the 3rd JAGFOS symposium (held in 2022; Irvine, California, USA), the holding of which had been postponed due to the COVID-19 pandemic. This time, I participated in the 4th JAGFOS symposium as the Japanese PGM Co-chair.

I will briefly describe the FoS symposium, its participants, and PGMs. For more information on past JAGFOS, I would be happy if you could read the reports written by the Japanese Co-chairs of the other three JAGFOS symposia: [Dr. Wakamiya's report for the first symposium](#), [Dr. Minejima's for the second symposium](#), and [Prof. Osaka's for the third symposium](#).

So then, what is a FoS symposium? Borrowing from the [FoS website](#), the Frontiers of Science (FoS) Symposium is defined as "JSPS supports Frontiers of Science (FoS) symposia that provide a platform for talented young researchers (up to 45 years of age) to engage in cross-disciplinary discussions on leading edge scientific topics. The symposia aim to contribute to the development of new academic disciplines and the fostering of future generations of leaders. The participants lodge together over the 3-day period and attend all of the sessions." That is, these symposia provide a platform for excellent young researchers from Japan and the participating countries to gather, spend quality time together with peers



in their own and other fields, and build enduring networks across nationalities and research disciplines.

The agencies in three countries that organize JAGFOS symposia are the Japan Society for the Promotion of Science (JSPS) in Japan, the National Academy of Sciences (NAS) in the U.S., and the Alexander von Humboldt Foundation (AvH) in Germany. AvH took the lead in holding this JAGFOS symposium held in Germany. The symposium's discussions focused on six diverse research areas: Biology/Life Sciences, Chemistry/Materials Science, Earth Science/Geosciences/Environmental Sciences, (Applied) Mathematics/Computer Science/Engineering, Physics/Astrophysics, and Social Sciences. Each of these topics covered a wide range of scientific fields, giving the participants a unique opportunity to learn about and delve into cutting-edge research that differs from their fields but has the potential to intersect them.

The number of participants in this symposium is 72 in total, 24 from each country, and they were selected in various ways. The general participants in FoS symposia attend most of all enjoy the informative experience. As to the structure of the symposium, each of the sessions in the six research areas has an introductory speaker who introduces an overview of the state-of-the-art research and two speakers who provide more specialized descriptions of their research in the subject field. The PGMs assigned to each session are responsible for selecting the topic and facilitating the discussion in each session. The PGM Co-chairs (I was the one from Japan this time) are in charge of coordinating the symposium with all of the PGMs. One unique feature of FoS symposia is that the order in which their sessions are held is revealed to the participants on the actual day of the event.

This year's JAGFOS symposium had already started with the previous year's symposium (3rd JAGFOS symposium). That is, its PGMs were selected by the JSPS FoS Symposium Advisory Board held during the previous year, and PGM meetings were held on the first and last day of the previous year. So, this year's PGMs had participated in some capacity or another role in the previous year's JAGFOS symposium. This allows them to sustain their year-on-year connections with participants of the prior symposium.

Thus, this year's PGMs began their roles as PGMs by participating in the PGM meeting held during the previous year's symposium. At that meeting, they proposed topics for this year's sessions. They decided on which to choose via presentations, spirited discussions, and voting by all the PGMs of the participating countries. The result of this process yielded the [six aforementioned session topics for this 4th JAGFOS symposium.](#)



PGM meeting for JAGFOS 2023 held last year at JAGFOS 2022 (Irvine, CA, USA)

The FoS Advisory Board makes the final decision on who from Japan would participate. In Japan, there are two ways to be nominated: one is for a researcher to apply via an open call issued by JSPS to universities and research institutions; the other is for a PGM to nominate several researchers from among whom the participants are selected. The first time I was selected as a general participant, I

had been nominated by one of the PGMs. As I recall, I had attended a meeting of the [Japan Geoscience Union](#) (JpGU), the largest earth and planetary science conference in Japan, where I crossed paths with Dr. Minejima Chika, the PGM Co-chair of the 2nd JAGFOS symposium. I remember her asking me if I was interested in JAGFOS symposia. Hearing her explanation of what they are, I replied, “Sounds interesting! Count me in!”. One day, I suddenly received a suspicious email from JSPS (apologies to those who sent it (lol)), informing me that they had received a strong recommendation for me to participate in the 2nd JAGFOS symposium. Asking who had recommended me, I was told that it was Dr. Minejima. I thought, “Oh, so this is what she was talking about back then!” understanding the relevance between the story then and this recommendation now. To decide upon each session’s speakers (including the introductory speaker), the PGM of that session discusses the candidates with the PGMs of the other two countries. The selected candidates are, then, contacted and asked to accept the speaker roles. The final selections are made upon confirming that they meet the participation requirements.



JAGFOS 2023 pre-conference meeting for Japanese participants, held in Tokyo in June

Each country is required to provide one introductory speaker or speaker for each session.

[According to JSPS](#), the eligibility for participants, including not only as general participants but also as speakers and PGMs, can be briefly summarized as follows: Excellent achievements (e.g., papers), interest in a wide range of fields, ability to participate in discussions in English, having leadership skills, and being age 45 or younger at the time the symposium is held or having received a Ph.D. within 15 years of the year the symposium is held.

Having participated in three JAGFOS symposia, what I've found to be particularly important from the viewpoint of these requirements is that the participants have a wide range of interests in fields other than their own and can actively discuss (enjoy discussing) things in English. Those who possess these attributes can enjoy FoS symposia to the fullest. It's not overstated to say that *active participation in discussions* is at the very heart of FoS symposia, as I will explain.

However, some might think that discussing something outside of one's field, especially in English, would be a big hurdle to jump—that you would be unable to keep up with the conversation even in your field if the specialization was slightly different from yours. If this is you, please do not worry. On the Japan side, an opportunity is provided for participants to assemble in Tokyo prior to the symposium for a pre-conference meeting, where they can listen to the Japanese PGMs', introductory speakers', and speakers' talks in Japanese about the topics of each session, ask questions, and deepen their understanding of the topics. Furthermore, this meeting provides an excellent opportunity for the Japanese participants to interact and get to know each other in advance. In short, this year's pre-conference meeting held in June paved the way for facilitating the symposium's main event to be held in the fall. It should be mentioned that such a pre-conference meeting is unique to Japan; they are not currently held in other countries.

So far, I've explained what FoS symposia are all about, the preparations made before the event, and how the participants are selected. Now, I will move to the actual operation of the 4th JAGFOS symposium.

October 5 (Thursday) Session Coordination Meeting and Welcome Reception

The first event to take place on the afternoon of arrival at the venue was the aforementioned PGM meeting, followed by a Session Coordination Meeting to synchronize the main sessions starting the next day.

I did not attend the PGM meeting for next year's JAGFOS symposium as this would be my last year as a FoS symposium participant. Next year's PGMs met to decide the topic for that year.

In the Session Coordination Meeting, the PGMs, introductory speakers, and speakers from

each country gathered for their final meeting before the sessions, starting from the next day. During the meeting, for about an hour, final adjustments were made to ensure that the participants from other fields could understand the slides, and discussions were held to coordinate the sessions' proceedings. Now, everybody was ready to proceed to the next day's sessions.



At the session coordination meeting

After these meetings, a welcome reception was held on the eve of the symposium's first day. At it, all the participants gathered for the first time and interacted with each other over a meal and drinks. I felt that they could relax and enjoy getting acquainted while readying themselves for the vibrant discussions awaiting them the next day. The event was held in Germany, and I could enjoy drinking authentic German beer, which relaxed my tired body after the long trip from Japan to Germany. (There were various tasty beers, such as wheat *weizen* and lemon-flavored beer, as one would expect in Germany!)

Each country's PGM Co-chairs had a role to play. Dr. Sarah E. Cowie (Social Sciences session; an archeologist), the PGM Co-chair from the U.S., gave a greeting after another greeting from AvH Deputy Secretary General Dr. Thomas Hesse. As the participants' representative, Sarah gave a talk to light the atmosphere. After that, JSPS executive director Dr. Tetsuya Mizumoto proposed the toast. In this way, about 70 up-and-coming young researchers from the three countries, who had never met before, got to know each other on the eve of the symposium, preparing them to start the next day's sessions in a relaxed mood. It's been my impression in attending FoS symposia that the flow from the evening reception to the sessions works as an excellent lubricant every time.



Welcome reception held of eve of the symposium

Friday, October 6, the first day of JAGFOS2023

Before the finally getting main sessions underway, opening remarks were given by Mr. Edward Patte (Director of the Kavli Frontiers of Science Symposium Series at NAS) and Dr. Emily Lines (Director of the Frontiers of Research Program at AvH). As a PGM Co-chair, one of my main tasks was explaining to the participants what the FoS and JAGFOS symposiums are all about. In my opening remarks, I introduced the FoS features and aspects in a way that would uplift the event's atmosphere.

Before the meeting, I had discussed my slides with Dr. W. Florian Fricke, German PGM Co-chair, and Dr. Sarah E. Cowie, U.S. PGM Co-chair. Researchers who participated in the FoS meeting approached the research topics, having not only scientific curiosity but also other aspects of life they enjoy. My slide said, “Frontiers of Science (FoS) always needs something fun! We, PGM Co-chairs, tackle FoS as scientists but also have other faces for producing more fun.” To demonstrate this, after introducing their research fields, I introduced three PGM Co-chairs’ fun sides of ourselves with pictures: Sarah as a roller-coaster enthusiast, me as [both a researcher and a powerlifter](#), and Florian as a person who enjoys the fun of taking power-naps, perhaps in juxtaposition to me as a powerlifter (but, I'm not sure as I haven't asked him). This succeeded in eliciting laughter and instantly giving the venue a good vibe. After all, an exciting opening is essential to ignite the audience's attention.

As a result of this, words associated with “power” (power-words) began appearing on various occasions at this JAGFOS. The trend originated in the [2nd JAGFOS symposium when Dr. Scott Kominers from Harvard repeatedly uttered the word “Awesome!” during the poster flash talks](#), leaving a lasting impression. Personally, having wanted to start a similar trend, I couldn't help laughing to myself when “power this or that” words caught momentum after this event.



Opening remarks by “powerlifting” researcher

The first session of the symposium was on *Biology/Life Sciences*. Its topic was *Animal Linguistics: Origins and Evolution of Language*. The session addressed state-of-the-art research on animal linguistics. For example, humans speak language as a matter of course, but how do animals develop language skills and communicate with each other?

The speaker was the much-talked-about [Dr. Toshitaka Suzuki](#) (The University of Tokyo). The presentation on language by Dr. Suzuki, [who understands the language of the titmouse](#), was rich in sounds and moving images, helping the audience to learn about this science with all five senses.

It seemed easy for the participants to get comfortable with the session’s ambiance (though this may have been because it was the first in the order of sessions to be held). Perhaps due to this comfortableness, it was impressive to see many participants quickly lining up to ask questions. The session was led by PGM [Dr. Masato Yamamichi](#) (National Institute of Genetics), who commented, “What impressed me most about my session was the enthusiastic, multifaceted appeal evoked by the field of animal linguistics. This session sparked many questions and lively discussions on the intriguing natural histories of individual organisms such as whales, naked mole rats, and crested mynas, and the fieldwork involved in understanding them. Its discussion on comparing abilities between humans and other animals and the evolution of these abilities also evoked many questions. Given its animated atmosphere, I felt this first session served as a good icebreaker.”



PGM Dr. Yamamichi explaining the brief overview of the session and the following discussion at *Animal Linguistics* session (photo provided by Dr. Yamamichi)



Participants lining up to ask questions

After the first session, all the symposium participants assembled to take a commemorative photo (see the photo on the right side). It's always a great experience to see all the participants lining up together for a photoshoot. As a side note, the T-shirt I wore that day was inscribed [BURST LIMIT](#), the name of the powerlifting gym in Sapporo where I am a member. I wonder if other participants had noticed that I had secreted nuances of *fun* and *power* in this T-shirt. (lol)

On the first day of the main event, poster sessions were held before and after the second, afternoon

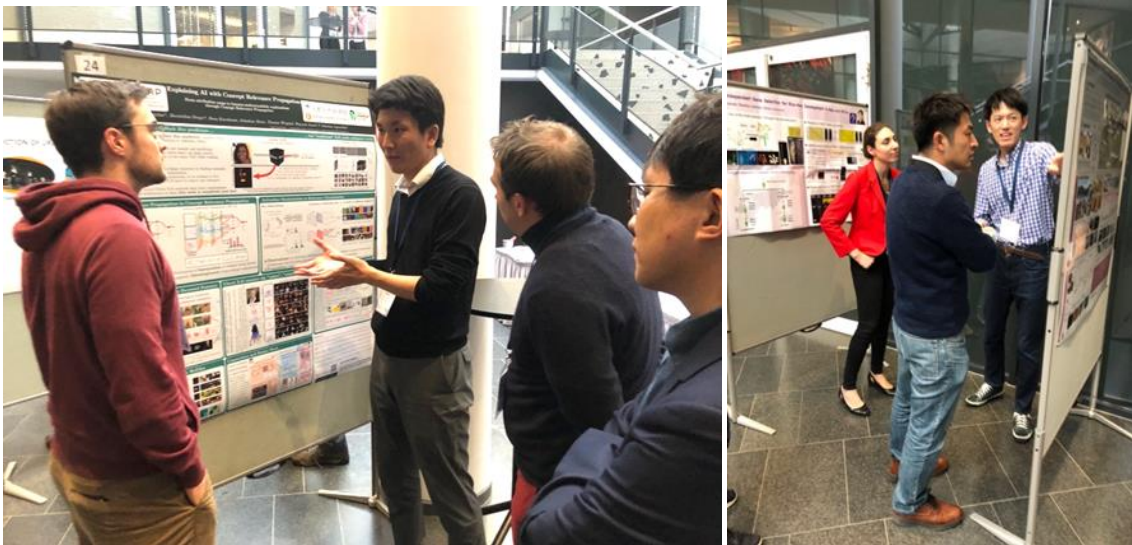


Commemorative photo of all JAGFOS 2023 participants

session, in which the participants were divided by odd and even numbers. Poster sessions are one of the most exhilarating components of JAGFOS symposia, as they provide each participant a unique opportunity to introduce their own FoS research to other participants from various fields. Before starting the poster sessions, the presenters are given one minute to deliver a flash talk, giving an overview of their posters using, at most, a few slides. Then, a one-hour poster presentation is held, during which the participants can go around and choose the posters of most interest to them and chat with their presenters in a relaxed atmosphere. This interaction gives the participants an excellent chance to learn about each other's research work, in addition to the speaker's presentations about their research during the sessions.



Participants lining up for flash talks (left) and giving poster sessions (right)



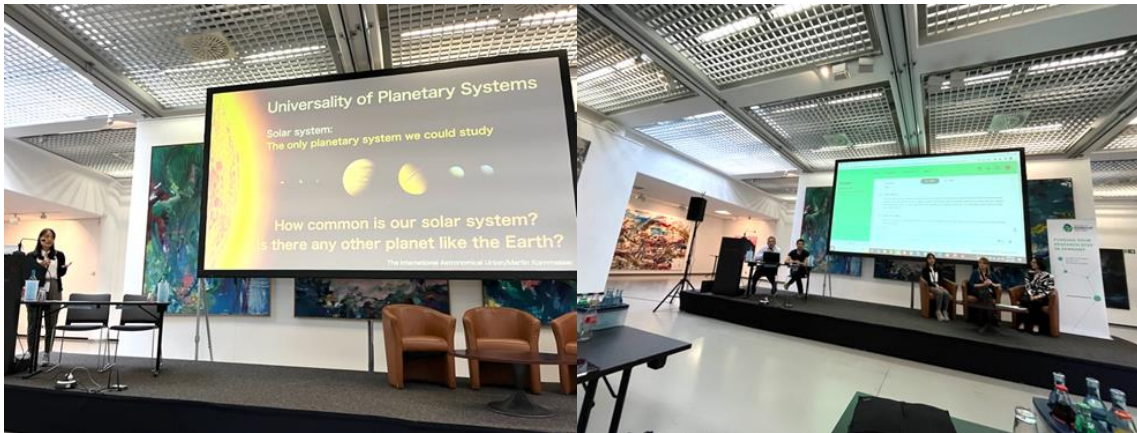
Spirited discussions during poster sessions

The second session of the afternoon was on the topic *Explainable and Robust Machine Learning* in the area of *(Applied) Mathematics/Computer Science/Engineering*. Machine learning is now a recognized and widely used research tool in all fields. However, in machine learning, such as deep learning, situations exist where there is only low *explainability* as to why machine-learning models produce the results they do, known as black-box situations. This session aimed to introduce trends in concepts and methods as Frontiers of Science within the AI domain to improve explainability. In my daily work, I use machine learning as a tool. The presentation by [Dr. Satoshi Hara](#) of Osaka University, especially on the concept of *multiplicity of explanations*, provided valuable insights for people like me who casually employ the interpretations of machine learning in their research. PGM [Dr. Taiji Suzuki](#) of The University of Tokyo, who led this session, mentioned that the theme of the *(Applied) Mathematics/Computer Science/Engineering* session had been structured around the concept of explainability in machine learning. He said he was impressed by the broad research inter-connectivity of this topic, evoking at various levels engaging discussions and opinion exchanges among the speakers and participants, including those attending from other sessions. In addition, “It was decided in a workshop that volunteers would write a paper. We are still having meetings about once every two weeks in preparation for writing the paper. In this way, we are pleased that a substantial collaborative endeavor has emerged from the symposium.”, he said. I will write more about the workshop later, but for now, I am very happy to report that a new collaboration was born from it. Wonderful!



Speaker Dr. Hara talked about the *multiplicity of explanation* during the discussion in *Explainable and Robust Machine Learning* session.

Saturday, October 7, Day 2 of JAGFOS 2023

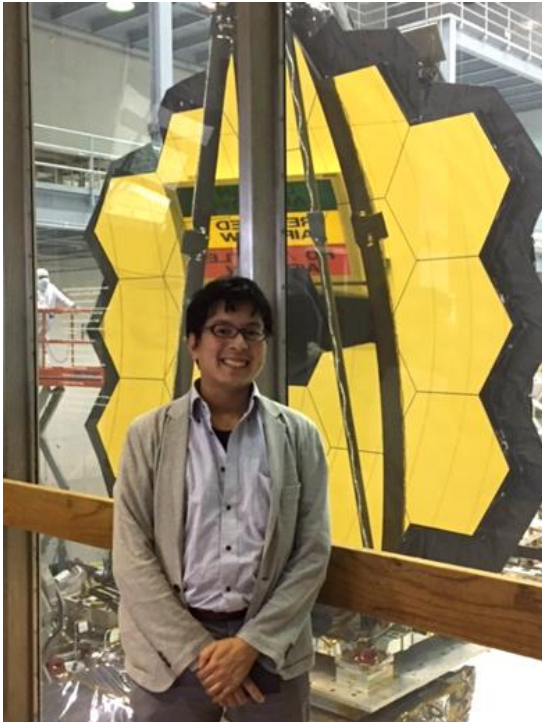


Speaker Dr. Kawashima in *JWST* session and the following discussion

Having enjoyed the atmosphere of the discussion and poster sessions on the first day, the participants were ready to take on the second day, which, after the two sessions, would feature a workshop and a cultural tour in the afternoon. The workshop was a new initiative to strengthen networking. This was an attempt for the first time during this JAGFOS symposium.

The first morning session of the second day started with the topic, *The James Webb Space Telescope: from Exoplanets to Dark Energy and the Expanding Universe*, in the field of *Physics/Astrophysics*. [The James Webb Space Telescope](#) (JWST) is a large space telescope developed mainly by NASA and launched on December 25, 2021 (Christmas Day!). Its main mirror consists of 18 hexagonal mirrors, which resemble a futuristic spacecraft when spread out in space. According to speaker [Dr. Yui Kawashima](#) (JAXA), the launch of this space telescope has provided better accuracy and wavelength range than previous telescopes and will contribute greatly to the search for habitable planets by revealing the atmospheric composition of planets that couldn't be observed before. Embodying the spirit of inquiry, the JSWT mission is truly visionary. It will greatly advance the exploration of the universe's origins and mysteries in elucidating what has not been known up to now.

As an aside, assembly works on the JSWT telescope have been going on at Goddard since I was a researcher working at NASA Goddard Space Flight Center in Maryland in 2009-2015. I had wondered when this telescope would be launched into space, so I was very interested in it and looking forward to this JWST session. [Dr. Teruaki Enoto](#) (Kyoto University, also a friend of mine from that time), who was at Goddard while I was there, had taken a photo with the JWST (upper left photo). During the session, introductory speaker [Dr. Katherine E. Whitaker](#) (who was also at Goddard at the time; now at the University of Massachusetts Amherst) showed a slide of Dr. Enoto's photo, saying how she was envious. (Like Dr. Whitaker, I had not taken any photos with JSWT either, so I envied him!) At any rate, the



JWST at NASA Goddard Space Flight Center (photo taken 5 October 2016, provided by Dr. ENOTO, a general participant)

planetary atmospheres of a smaller scale, making it a very diverse session, which is typical of FoS symposia.”

The second session of the second day was on the theme, *Social Sciences*, with a topic of *Environmental Humanities*, examining how various global and local issues (from climate change to local community issues) are complexly intertwined within the human environment. [Dr. Sandra Kurfürst](#) (University of Cologne), the German PGM of this session, explained how this topic is relevant to a FoS symposium. I was impressed when she mentioned the need for a holistic approach to studying climate change and other global shifts.

While it was regrettable that introductory speaker [Dr. Mihoko Wakamatsu](#) (Tokyo University of Marine Science and Technology) could not participate, PGM [Dr. Jun Goto](#) (National Graduate Institute for Policy Studies, GRIPS) displayed impressive teamwork in coordinating the session. He seamlessly adapted to the situation by modifying his and Dr. Wakamatsu’s presentations into one joint slide, taking on both the roles of PGM and introductory speaker. The content of the session involving economic perspectives in the humanities and social sciences was very impressive, as were the spirited discussions on critical

JWST launch was a success, and even though it has been less than two years since then, I am happy to see that many unknowns about the universe and planets are becoming scientifically clarified.

[Prof. Yuichiro Sekiguchi](#) (Toho University), the session’s PGM, commented on what he found impressive: “In symposia with a strong interdisciplinary flavor, physics/astronomy sessions are often left out, but thanks to the subject of JWST and Katherine’s nice introduction, we were able to have a lively discussion on topics other than astrophysics, such as the possibility of extraterrestrial life and the merits of investing huge amounts of money in space missions. As for astrophysics itself, topics ranged from the discussion of Dr. Sherry Suyu (Technical University of Munich) on the entire universe to Yui’s discussion on

questions: How much can one care about others? (*altruism*, an English word I learned for the first time in this session). How much risk can one take? (*risk-taking*), and how much can one endure for future benefits? (*time preference*). Following that discussion, [Dr. Katharina Gröne](#) (Wuppertal Institute for Climate, Environment, Energy) talked from a more local perspective about urban agriculture and inequality in Cape Town, South Africa, where climate change is causing droughts and water shortages. [Dr. Jessica Hernandez](#) (Landesa) talked about the issues involving indigenous peoples and land rights in the Global South, which is also being affected by climate change.

Dr. Goto said that he was particularly impressed by the constructive discussions advanced in the session, even in the midst of it encompassing a wide range of social science fields, including sociology, anthropology, economics, and political science, which have different foundational concepts when it comes to understanding the dynamics of society in terms of human behavior and human interaction.

He found the discussion under the theme, *Environmental Humanities*, on how to address



Sandra explaining how a topic is FoS (left); Dr. Goto, session's PGM, talking about three perspectives of *Humanitas in Economics* (right)

climate change by utilizing the merits of various perspectives to be very compelling.

In the afternoon of the second day, after announcements by the JSPS and AvH about post-symposium follow-up program opportunities, there was a break, followed by a workshop, the first of its kind at a JAGFOS symposium. On this first day of the workshop (for 50 minutes), participants were divided into groups of similar fields (they could change the field if they wished) and briefly introduced themselves and their research interests. They, then, queried each other about their research interests looking for overlaps in activities. On the second day of the workshop, which was held on Day 3, the participants would talk leisurely (for one hour) to the researchers with whom they wished to collaborate. Basically, the participants were

divided into close groups coinciding with the symposium's six scientific fields. I'd heard earlier from Dr. Suzuki, PGM in the field of (*Applied Mathematics/Computer Science/Engineering*), that the workshop had already spawned collaborations. This is an excellent example.



First day of the workshop (discussion group in *Earth Science/Geoscience/Environmental Sciences*)

As a comment: while pleased with this fruitful outcome, my frank

impression was that while it's good to have time to get to know each other in closely related fields via FoS symposia, the researchers who participated in the second-day workshop did not necessarily have sufficient time to get to know the persons who they might want to collaborate with. During the second-day workshop, the researchers I talked with were not necessarily the same researchers who were in the group the day before. In my case, I was exchanging opinions with a researcher in another field; in other cases, people were working alone. Perhaps this was because there was not enough time allotted to get to know others during the workshop on the first day, but it could also be because there were cases where researchers in the same field already knew each other. Some of them may have wanted to interact with researchers in other fields. (I myself can, of course, interact with researchers in my field, but I would rather have more time to exchange ideas with researchers in other fields.) This was our first attempt at holding such a workshop, and we were not used to it.

As, for example, there was the topic of machine learning, it could be possible to match up several researchers who may like to interact by using the machine-learning methods in their abstracts and poster presentations or their research keywords. In this way, a workshop or similar format might work more effectively. I think this trial was good in its own right. Now, I hope that consideration will be given to various ways that the workshop can be made into a better platform for triggering exchanges in the future.

In the afternoon of the second day, the time had come for the cultural tour everybody had been waiting for. As this is a lodge-style symposium, the participants are almost always pent up in the hotel (last year, it was the hotel and the venue). No matter how enjoyable the



Participants enjoying the cultural tour in the city of Dresden (left); Commemorative photo in front of the opera house, Semperoper (right)

symposium is, the participants must work hard to understand and discuss the knowledge genres embedded in differing fields, which can exhaust one's brain even when having fun. So, the second day's afternoon was dedicated to giving the participants precious time to refresh and relax while walking around the city of the venue, getting to know its culture, and enjoying casual chats with each other before the evening dinner outside. It's very likely that walking and talking with other participants can also spawn some creative ideas. Strolling through the old town of Dresden, we headed for the historic opera house, [Semperoper](#), the destination of this cultural tour.

We learned about the history of Dresden listening to stories told by our tour guide (our group was lucky to be led by a very knowledgeable and friendly man). He explained the interior and told us about the history of the opera house (how it was destroyed by fire and air raids, then rebuilt). Whereas the opera hall is a very historic building, the stage is modern, equipped with state-of-the-art technologies, including lighting and elevators for performances. This experience gave me an opportunity to enjoy being in Dresden, a city in Germany that I do not often have a chance to visit.

Our dinner at the restaurant that evening was a highlight of the tour. It offered a special opportunity for the participants to get to know each other better. They were excited to enjoy authentic German beer to their heart's content, as, after all, we were in Germany. I noticed some 1-liter beer glasses, and it was impressive to see some of the participants strong enough to drink more than one. (I won't reveal who they were (lol)). After dinner, some people returned to the hotel, while others went on to the next place, spending the night in Dresden as they pleased. The time has flown by, and tomorrow is already the last day of the symposium.



Inside the opera hall (left) and its stage (right)



Second night's dinner at Dresden restaurant

Saturday, October 8, Day 3 of JAGFOS 2023

With refreshed spirits, we started with the first of the two remaining sessions on the third and final day. Between them, the second workshop I had already mentioned was held.

The first session was on *Quantum Science and Technology* in the field of *Chemistry/Materials Science*. Many people have heard of quantum science and technology, but researchers in other fields may not know what is being done on this domain's cutting edge. I was one of them. Then, introductory speaker [Dr. Uri Vool](#) (Max Planck Institute for Chemical Physics of Solids) told us about the [Schrödinger's cat](#), which is often used as a quantum mechanics analogy, where a cat exists in a superposition of being alive or dead until observed. Such quantum mechanics are expected to have various applications in materials and control fields. Other potential applications include communications (encryption), high-speed measurements, and high-speed computing. Recent advancements in this field are often referred to as *the second quantum revolution*. (Please see the photo to the lower left where PGM [Dr. Anna Schenk](#) (Physical Chemistry, University of Bayreuth) is explaining the Schrödinger's cat. Speaker [Dr. Ryan Hadt](#) (California Institute of Technology) is explaining Quantum Information Science (QIS) on the right.) Focusing on electron spins, he talked about developing a spectroscopic method to quantitatively evaluate the interactions involved in controlling quantum coherence, especially in high-temperature states.

[Dr. Kenji Sugisaki](#) (Keio University) talked about calculating atomic and molecular structures using quantum computers, which we have often heard about. In discussing this intriguing topic, he said that it appears quantum computers can calculate energy differences during chemical reactions without knowing the individual energies. (Just this fact alone might impress non-experts.) His slides contained a preview of what might be achievable with quantum physics by the year 2050. Previously, I had strongly associated quantum science with physical science. Now, along with many of the session participants, I gained new insights into

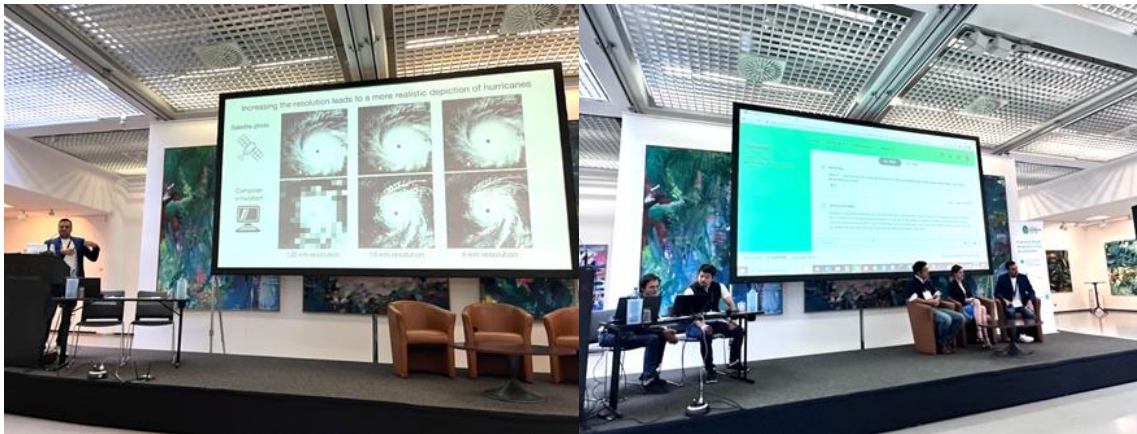


On the left, PGM Dr. Anna Schenk explaining quantum science and technology in a discussion format

its potential applications in various fields, including materials and control, from a chemical perspective. I think that not only myself but also many other participants gained a lot of new perceptions from this discussion. This led PGM Dr. Nakada Akinobu (Kyoto University) to comment that what stood out to him most was the discussion in the chemistry segment, which, despite quantum being generally considered a specific topic, saw many lively discussions from other perspectives such as social sciences and environmental sciences. Dr. Nakada said, “In the 2nd JAGFOS symposium, I believe there was a session on quantum information in the field of physics. However, in this symposium, it was possible to advance a discussion from the perspective of *chemistry*, focusing on creation and function, which reflect the essence of chemistry. It addressed a range of subjects, from compounds that create quantum bits and materials’ design to applications in chemical reactions. (I feel that the presentations may have become a bit too specific, but as I mentioned, a wide-ranging discussion ensued, so all was well that ended well.)”

After holding the second workshop, the last session of this JAGFOS symposium was held on the theme of *High-resolution Global Modeling for Weather and Climate* in the field of *Earth Science/Geoscience/Environmental Sciences*. I also served as a PGM in this session. The reason why I proposed this topic was that, although we have benefited from the remarkable developments in computational power over recent years, it is still difficult for us to understand what can and cannot be done with recent state-of-the-art science in numerical modeling using high-resolution global models in the meteorological field, especially for weather and climate, which are familiar to many people.

Introductory speaker [Dr. Tomoki Miyakawa](#) (The University of Tokyo) is a leading researcher in this field in Japan and is working on research using [NICAM](#), a Japanese ultra-high resolution global model. He talked about his research using NICAM, including the FoS research he’s conducted on NICAM. His comprehensive presentation also covered the research activities of the other two speakers. One of the crucial points of Dr. Miyakawa's talk was that the ultra-high resolution global model eliminates the need for parameterization (various assumptions) required for cloud calculations in conventional models, allowing us to directly solve aspects related to cloud generation (called the cloud-resolving model). The next speaker, [Dr. Falko Judt](#) (National Center for Atmospheric Research), talked about the possibility of tropical hurricanes being reproduced more accurately by using this cloud-resolving model, and that with it, tropical weather forecasting can be done with higher accuracy in the future. Next, [Dr. Claudia Stephan](#) (Max Planck Institute for Meteorology), who specializes in meteorology, talked about cloud dynamics and water vapor transport and how this ultra-high-resolution global model can be used not only for weather forecasting but also for theoretical development in meteorology, as well as for water vapor transport.



Falko's talk on the reproducibility of hurricanes changes with higher horizontal resolution and the following discussion (photo on right provided by PGM Kim)

I was particularly impressed by the topic, *weather and climate*, which is related to everyday life regardless of the research field. So, I expected many participants to ask questions from various points of view; their volleys did not disappoint my expectations. As if he anticipated it, Dr. Miyakawa put together his slides, which, to my knowledge, were not prepared in advance; he probably did it just before his presentation. So, he spontaneously explained his thoughts on how ultra-high-resolution modeling is related to the other five scientific fields in this symposium. (Personally, the slide he added was a perfect choice for the last session of this FoS symposium!). It was an illuminating moment: I strongly felt that our choice of the symposium's topics had empowered the participants to think about their applications and connections to the topics from various vantage points, directly contributing to invigorating the discussions.



Dr. Miyakawa's slide showing connections with the symposium's other five scientific fields

As a side note, about a month after the symposium, [a paper was published in Science](#) revealing that Google's machine learning-based global weather forecasting model GraphCast can now provide more accurate forecasts than the conventional numerical forecasts of ECMWF (European Centre for Medium-Range Weather Forecasts). Unfortunately,

however, the timing didn't match our JAGFOS symposium. [This news](#) is definitely a breakthrough in the field of weather forecasting! The topics of *machine learning* and *global modeling* explored at the JAGFOS symposium and through FoS research in these fields became topics of conversation worldwide at precisely the right time. The FoS topics chosen for this symposium were indeed on the *frontiers of science*!

While, in essence, preparation for this JAGFOS symposium has been underway since a year ago, once it began, the event has passed in the blink of an eye. All six sessions were successfully concluded, and closing remarks for JAGFOS 2023 were given. After general remarks by Dr. Atsushi Iriki (RIKEN), Chair of the JSPS FoS Advisory Board, and an announcement by Dr. Emily Lines of AvH, closing remarks were delivered by Florian, the PGM Co-chair from Germany. In his speech, he leveraged the collaboration among the PGM Co-chairs, using the term “power conclusion.” He made sure to conclude the JAGFOS symposium firmly using “power-words” both within his speech and to end his speech. (Impressive! I thought to myself, chuckling.) This reflects the kind of collaboration that PGM Co-chairs are known for.

As another side note, Florian and I hadn't met before the JAGFOS symposiums. However, we found that we were both in Maryland simultaneously in the past. Then, he was at the University of Maryland, and I was at NASA Goddard Space Flight Center. Discovering this connection, we reminisced about our time in Maryland in past years. FoS symposia can unveil various intriguing connections!

At the end of this symposium, all of the PGMs gathered and were thanked for their support with a commemorative gift.



“Power conclusion” being given by PGM co-chair Florian (left): All the PGMs being presented a commemorative gift (right)

Conclusion

Despite two postponements due to the COVID-19 pandemic since 2019, I was able to participate in three JAGFOS symposia as a participant, a PGM, and a PGM Co-chair. I am pleased to have had these experiences, which have enriched my journey as a researcher and allowed me to meet and connect with fantastic researchers whom I would never have met had it not been for my participation in the JAGFOS symposia. I'm sure that other participants and PGMs feel the same way. When, in the future, JAGFOS participants want to collaborate or interact in or across the six fields addressed in this symposium, it will be easy for them to contact and partner with each other. This ability gained by my participation in FoS symposia has become a great asset to me as a researcher.

Apologies for weaving “power-words” throughout this report, but [I'm proud to be promoted as a “muscular researcher”](#) in my university's PR publications (chuckles). On the [YouTube channel BURST LIMIT for the Sapporo powerlifting gym](#) to which I belong, it's often said, “To all the buddies who want to become *namara* strong at bench pressing.” using the Hokkaido dialectal word, *namara*. As *namara* means very, really, extremely, I'd like to invoke its power when saying to you, my colleagues, with all sincerity, “To all the buddies who *namara* want to explore FoS,” thank you for the enjoyable discussions, precious moments, and fantastic opportunities to connect. Let's continue enjoying the pursuit of powerful and fun endeavors whenever possible within the FoS world!

Now, I would like to offer one suggestion to the JSPS FoS Symposium Advisory Board members. JAGFOS has been held four times, and the number of past Japanese participants has grown accordingly. Unfortunately, however, they are not currently allowed to attend JAGFOS symposium events casually. Could consideration be given to allowing the past JAGFOS participants who may be working near the venue or able to drop into a symposium an opportunity to meet the participants, for example, as observers? (That's to say, in the same way as the Advisory Board members do.) Additionally, while there is a [FoS Club](#) for the overall alumnae and alumni, having a similar specific JAGFOS association might also be a good idea to consider.

Although voluntarily, Dr. Goto, a PGM in this year's meeting, has taken the initiative in setting up a Slack channel to connect Japanese participants after JAGFOS 2023, so opportunities are being created to continue exchanges among Japanese participants. However, I feel that it would be nice to have an official JAGFOS reunion where past participants could get together and sustain their relationships with each other. I broached this idea to Prof. Kazuhisa Makino (Kyoto University), a member of the Advisory Board, with whom I flew on the same outbound and inbound flights. I hope the Board will consider this suggestion.

Last but not least, I would like to thank the organizers of this JAGFOS symposium, namely,



AvH in the host country (Germany), JSPS (Japan), and NAS (USA), who have devoted a great deal of time and effort in preparing and supporting such a fantastic opportunity for us all. I would also like to thank Dr. Mizumoto (JSPS Executive Director) for coming to the venues and leading the JSPS activities on the Japanese side from the pre-conference meeting in Japan to the symposium in Germany, and also JSPS's Ms. Koma and Ms. Miyaura for providing overflowing support for this symposium's administration. I am genuinely grateful for the opportunity that the FoS symposium has given me to work with Dr. Iriki, Prof. Tajima (Osaka University), and Prof. Makino, who came to the venue to participate in the symposium as the Committee member. Although my in-person roles in FoS symposia have now come to an end, I would be happy if I could in any way be of assistance to the FoS symposium in the future.

I would also like to thank Sarah (PGM Co-chair, USA) and Florian (PGM Co-chair, Germany) for their strong and fun power-word flows that helped to make this JAGFOS symposium such an enjoyable and exciting experience. I would also like to express my sincere thanks to PGM Kim (USA) and PGM Kira (Germany) for their many correspondences, from the selection of topics for the *Earth Science/Geosciences/Environmental Sciences* session to the implementation of the session.

Finally, I would like to express my sincere gratitude to the PGMs in Japan: Prof. Sekiguchi, Dr. Yamamichi, Dr. Nakada, Dr. Goto, and Dr. Suzuki. Working with them in making this JAGFOS symposium an exciting and fruitful experience for the participants was a great pleasure. I thank them also for the photos and PGM comments they provided for the Japanese version of this report. It's my strong wish to be able to continue my exchanges and interactions not only with PGMs from Japan, the US, and Germany, but also with many of the other participants as well.

It's been hard to stop once I started writing about the alluring charm of JAGFOS and FoS symposia, resulting in what's become the longest symposium report ever written (lol). To you who have read this JAGFOS 2023 report, I hope you can resonate with my opening statement that participating in FoS symposia will undoubtedly enhance your research journey by making it even more enjoyable! I'm sure that past JAGFOS participants will nod their heads in agreement to that message, while those who have yet to participate will hopefully understand the emphasis, I placed on FoS symposia being fun. Having read this report, I hope you will consider participating in a future JAGFOS symposium via a nomination or application!



PGM co-chairs (myself, Sarah, and Florian) who have fun playing with “power-words”



PGMs in *Earth Science/Geoscience/Environmental Sciences* session (myself, Kira, Kim)