

TITLE OF REPORT : Visit to Japan for public lectures and ongoing discussion on impacts of Fukushima Dai-ichi on the ocean

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I undertook a one month long JSPS Bridge Fellowship from March 15 to April 14, 2019. My host for the visit was Dr. Hiroaki Saito at the University of Tokyo. I have known Dr. Saito for more than 10 years, predating my more recent involvement with many groups in Japan studying the consequences of the Fukushima Dai-ichi nuclear power plant releases for the oceans in 2011. This was my second JSPS sponsored visit (first was in spring 2014).

The main goal for the visit was to give presentations geared to public audiences about the release of radioactivity from the nuclear power plants at Fukushima Dai-ichi. The lectures covered 1) the basics of radioactivity and what natural and human sources were in the environment prior to 2011, 2) the consequences and fate of radioactivity in seawater, marine biota and seafloor sediments after 2011 and 3) what does the future hold for the fate of the contaminants and impacts on fisheries and levels in the ocean. The talk was given in English, though the content of each slide was in Japanese with a short 3-fold hand-out (How Radioactive is our Ocean), in Japanese to assist the audience in understanding the lecture content. Preparing these slides and handout took considerably more effort in advance, requiring the hiring of a professional science translator, and seeking assistance from Dr. Saito and other Japanese colleagues in the proofing of these materials. In the end, I feel this effort was well worthwhile since the level of English in the audience varied, and at least with materials in Japanese it was easier to follow. Q&A followed each talk with assistance of the local organizers to translate questions from the Japanese audience in to English, and replies back in to Japanese.

By all measures in terms of audience attendance (30-75 at each talk), and positive feedback these were well appreciated and a success. The audiences included the general public, local students and Japanese scientists. The list of 9 talks and schedule is shown below along with the abstract used in advertising these talks. Some of the talk were expanded to include more recent scientific results when presented on the campuses of Hirosaki Univ. and to the AORI group at U. Tokyo. The venues ranged from public spaces on University campuses to perhaps the most interesting, a public aquarium "Aquamarine" in Onahama, where I was part of a panel of experts speaking to the public, followed by demonstrations of how to measure radioactivity in seafood, and then a sampling of local seafood for the public. It was quite a day (photos below).

The lecture schedule was set up by myself and my host well in advance, to allow for local promotion. With advice from local hosts, I set up most all of the hotel and travel arrangements (all by train except for one leg), as the travel took me in and out of Tokyo several times and as far south as Hiroshima and as far north at Sapporo, and points as west as Kanazawa with stops in between (see lecture schedule table).

Date	Day	where	start time	host	contact	lecture address
19-Mar	Tues	Temple University Tokyo	1900-2100	Kyle Cleveland	kylecl@tuj.temple.edu	Temple University, Japan Campus, Azabu Hall, 1F Parliament
20-Mar	Wed	Hiroshima Peace Institute	1800-2000	Robert "Bo" Jacobs	jacobs@hiroshima-cu.ac.jp	Seminar Room, Satellite Campus of Hiroshima City Univ., 9F Otemachi-Heiwa-building, 4-1-1, Otemachi, Naka-ku, Hiroshima City
24-Mar	Sun	Safecast Tokyo	1500-1800	Azby Brown	azby@me.com	Loftwork Multipurpose Space, 10F, Dogenzaka Pia Bldg. 1-22-7 Dogenzaka, Shibuya-ku, Tokyo-to
26-Mar	Tues	Sapporo	1500-1615	Takeshi YOSHIMURA	yoshimura-t@fish.hokudai.ac.jp	Auditorium D201 in the Graduate School of Environmental Science
27-Mar	Wed	Hirosaki University	1800-1920	Hirofumi TAZOE	tazoe@hirosaki-u.ac.jp	50th Anniversary Auditorium in Bunkyo-cho campus
29-Mar	Fri	Tokyo University	1500-1615	Hiroaki Saito	hsaito@aori.u-tokyo.ac.jp	Yayoi Campus 15-16
30-Mar	Sat	Aquamarine Onahama	1300-1530	Seiya Nagao	seiya-nagao@se.kanazawa-u.ac.jp	Aquamarine Fukushima, Onahama, Fukushima
2-Apr	Tues	Kanazawa University	1330-1500	Seiya Nagao	seiya-nagao@se.kanazawa-u.ac.jp	Kanazawa University
10-Apr	Wed	Tokyo University AORI	1600-1700	Hiroaki Saito	hsaito@aori.u-tokyo.ac.jp	U. Tokyo, AORI, Graduate School of Agriculture and Life Sciences

Abstract of “Fukushima Dai-ichi- a view from the ocean.

Public lecture by Dr. Ken Buesseler, Senior Scientist, Woods Hole Oceanographic Institution, USA

The triple disaster of the March 11, 2011 earthquake, tsunami, and subsequent radiation releases at Fukushima Dai-ichi were unprecedented events for the ocean and society. This public lecture will provide an overview and 8 year update regarding the radioactive contaminants released from the Fukushima Daiichi Nuclear Power Plants. The talk will consider the radioactive world we live in and address the specific fate of Fukushima radionuclides in the ocean, with an eye to the future ocean. The emphasis is on the radioactive forms of cesium, though other radionuclides are also considered. Topics include: sources from atmospheric and ocean discharges in 2011; a Pacific Ocean time-series that tracks the transport of contaminants across the ocean; an extended time-series in marine fish that examines species specific variability in radionuclide content; and a discussion of the burial of particle associated contaminants on the seafloor. The look to the future includes estimates of ongoing releases from groundwater associated with beach sands in comparison to other land sources, such as rivers and operations during decommissioning. We end by considering the long term trends in radioactivity levels in marine biota and sediments, with comparisons to other sites in the world, and open discussion on key issues that have yet to be resolved, such as the fate of contaminated water in the storage tanks and discovery of cesium microparticles.

In addition to these public talks, I visited with his Japanese collaborators to discuss prior field results, including our most recent sampling in the fall of 2018, and to discuss plans for additional

field work in 2020. Discussions were initiated about events in 2021 around the 10th anniversary of the 2011 disaster, that will be focused on the consequences of radioactivity releases to the environment. Initial contact with the US National Academies of Sciences prior to the visit to Japan was positive, with the hopes and intention of partnering with Japanese academic and other groups, like JSPS, to jointly organize such events in both Japan and USA. No single plan emerged, but the discussion and planning has been initiated with this visit.

Outside of the public talks and visits to the host laboratories, I also had one interview with a reporter from the Reuters, Tokyo office (Malcolm Foster) on the status of radioactivity levels at Fukushima Dai-ichi. I also accepted an invitation to meet with representatives from TEPCO, who provided me with more detail on the status of decommissioning efforts and ongoing contamination at the nuclear power plants. This meeting included a delegation of 5 from TEPCO led by Kazuhito Takeda, Manager of International Relations and Strategy group. This was essentially an exchange of information, where they also acknowledged the importance of my work and coming to Japan for the lectures, and asked for my feedback on what I had heard from them. I briefed them on my feelings that before any intentional releases occur (related to stored radioactive waters on site), they should engage independent scientists to evaluate the radioactivity levels and isotopes in each storage tank, as well as details for their plan for release, and they should have in place a careful ocean and seafood monitoring plan. Exactly what will happen remains uncertain, but this is one of the biggest issues for the public and certainly local fisheries groups who are very concerned about even the perception of new contamination reaching the oceans and the impact on the fisheries market in the Fukushima prefecture.

Overall, visiting Japan during the spring and cherry blossom season was special for me, and all of my local hosts and Dr. Saito were generous with their time and energy to make my visits enjoyable as well as productive. As mentioned above, with the 10th anniversary of the 2011 triple disaster coming within a couple of years, I plan to remain active on this topic, both organizing joint events around 3/11/21, and continue to work on samples we have collected in the past off Japan in collaboration with several Japanese colleagues, and hopefully will sample again on the Japanese research vessel Shinsei Maru in the autumn of 2020 (Dr. Shige Otosaka, U. Tokyo lead scientist).

Some images from the visit are shown below to give a flavor of the public lectures.

Lecture room at Aquamarine in Onahama and photo at Aquamarine next to Happy Oceans poster of Dr. Buessler (left) and Dr. S. Nagao (Kanasawa Univ. right) on March 30th

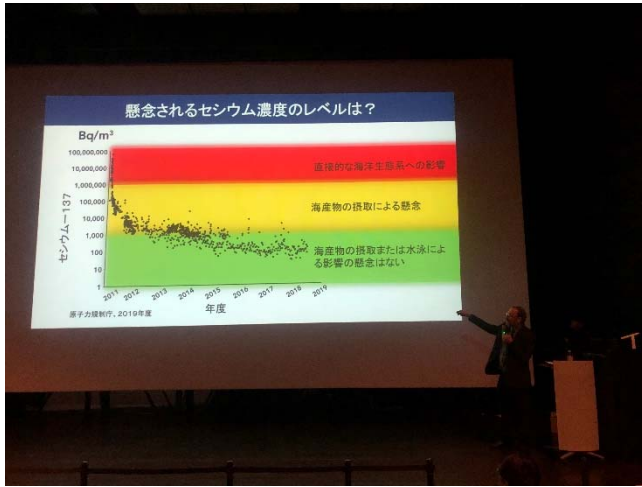


Photo from lecture in Sapporo (left) and Hiroshima (right)

