

PIANOFORTE travel grant activity report

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Activity report

Thanks to the PIANOFORTE travel grant as part of the PIANOFORTE Mobility Program for early career researchers, I was able to give two oral presentations at the 7th the International Conference on Environmental Radioactivity (ENVIRA2023) in Seville (Spain). The first topic titled “The role of soil weathering on radiocaesium (¹³⁷Cs) soil-plant transfer: a pot trial study with soil toposequences” was on how soil weathering affects the bioavailability of radiocaesium in soils which were sampled on transects in Kenya and the Philippines. The second topic titled “Predicting radiocaesium soil-plant transfer on a global scale: a meta-analysis study” was on the world maps to compare radiocaesium plant-uptake risks where the map was created using our database of radiocaesium plant and soil data; data-driven models; and global soil information. The latter work was awarded the prize of best oral performance by doctoral students on the last day of the conference.

I received questions on my presentations about the importance of the plant available K content in soil and the plant type. I addressed these questions by explaining that the K level in soils is the most important factor that explains the radiocaesium bioavailability in soils; and that the type of plant can give rise to a factor 100 variability for the same substrate while the type of soil can give rise to a factor 1000 variability for the same K exchangeable content in soils.

During the ENVIRA2023 conference I learned about the broader field of mass spectrometry and radiometrics. I learned about the challenges measuring of radionuclides at trace concentrations, the use of secular equilibria in the calculations of decay chains, and the challenges to correct for background radiation. I learned from the presentation of Sheldon Landsberger that Neutron Activation Analysis can be useful for predicting radiocaesium transfer from soils to plants by activating the stable Cs-133 and measuring activated radiocaesium concentrations by gamma counting. An important side note is that this prediction would be for the long-term radiocaesium behaviour because the ageing of radiocaesium in the soil alters its bioavailability. I learned from the presentation of Ole Christian Lind that the ERICA tool underestimated the dose rate of external exposure of reindeer to fallout contamination due to the tool's assumption of an average soil contamination concentration. This was validated by giving reindeers in a Chernobyl fallout affected mountainous area in Norway a dosimeter over five months. An important side note is that only 3 reindeers (N=3) were fully dissected to validate the internal exposure. It was suggested that the ERICA tool should be more cautious with its wildlife exposure prediction by increasing the error of its predicted values. I learned from the presentation of George Steinhauser about the current state of the Zaporizhzhia nuclear power plant. Since the original

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cooling system of the power plant is damaged by the breakdown of the water dam, drilling wells are created to access ground water to ensure cooling of the reactor. Several units are gradually cooled and shut down. There is no risk for the release of short-lived radionuclides such as I-131, because they have already decayed. However, there is still risk of the release of longer-lived radionuclides such as Sr-90 and Cs-137, which may be of concern if spills occur.

There were social events: welcome reception on Sunday evening; a visit to Alcazar of Seville on Tuesday, a visit to the Tabaco factory (now building of the university) on Wednesday which both ended in a cocktail reception; a gala (walking)dinner on Thursday; and an award ceremony on Friday at noon. During the conference, I got to know other students and early-career researchers which were very inspiring encounters. Since I am a member of the European Alliance's Young Research Forum, this was a good opportunity to further expand this network.