**Transport of radiocaesium in the North Pacific Ocean related with climate change**

**Yayoi Inomata,1,\* Katsumi Hirose,2 and Daisuke Tsumune3**

*1Kanazawa University, 920-1156 Kanazawa, Japan*

*2Laboratory for Environmental Research at Mount Fuji, 169 0072 Tokyo, Japan*

3*University of Tsukuba, 305 8572 Tsukuba, Japan*

\* *e-mail: yinomata@se.kanazawa-u.ac.jp corresponding/presenting author*

Radionuclides have been released into the environment as a result of large-scale nuclear testing between the 1950s and 1960s, the Chernobyl Nuclear Power Plant (NPP) accident in 1986, the Fukushima NPP accident in 2011, direct releases from reprocessing NPPs, and dumping of nuclear materials. In the marine environment, radionuclides with long half-lives are considered to be useful tracers for the study of marine transport processes. With the recent acceleration of global warming, the marine environment is experiencing major changes in the global meridional circulation, biogeochemical processes, and surface ocean acidification. These changes associated with climate change are expected to affect the temporal variability and spatial distribution of radionuclides in the marine environment, including long-lived radionuclides such as 137Cs, 90Sr, 3H, 14C, 129I, 236U, 237Np and Pu isotopes. They are useful tracers for detecting changes in marine processes in the marine environment.

This study focuses on the spatial and temporal distribution of 137Cs in the North Pacific Ocean. Radiocesium has historically been one of the most widely measured and monitored nuclides in the world's oceans. In particular, the number of 137Cs data observed in the North Pacific Ocean is the largest in the world. The main sources of 137Cs in the North Pacific Ocean are global fallout (GF-137Cs), which occurred in the 1950s and 1960s, and 137Cs released from the 2011 Fukushima Daiichi nuclear power plant accident (F1NP-137Cs). The GF-137Cs were released by precipitation associated with stratospheric-tropospheric air mass exchange in the region 30-50°N, 140-160°E; GF-137Cs were transported eastwards and reached their maximum in the late 1960s off California. These GF-137Cs migrated southwards while sinking into the subsurface. The subducting GF-137Cs were transported westwards through the sub-surface and entered the Indian Ocean by Indonesian through-flows.

On the other hand, the F1NP-137Cs) were deposited in the area between 30-50°N and 140-160°E by precipitation during March and April 2011. Radiocaesium released directly around the Fukushima NPP was the largest point source in the North Pacific; some of the F1NP-137Cs was deposited in the subtropical mode water (STMW) forming region and transported in the subsurface layer, and transported into the Sea of Japan. The North Pacific STMW is an important water mass characterized by its homogeneous nature within the main pycnocline; the STMW is mainly formed in the Kuroshio extension region, where active mesoscale eddies strongly interact with the atmosphere. This interaction increases the release of oceanic latent heat due to increased wind speeds in the forming region, which facilitates the formation of STMWs. This plays an important role in ocean oxygen utilization, carbon sequestration and climate regulation. Another part of the F1NP-137Cs reached offshore Canada and was transported northwards into the Bering Sea, eventually entering the Arctic Ocean.

Measurements of 137Cs in the North Pacific Ocean are very limited, but these GF-137Cs and F1NPS-137Cs were transported via different pathways. Ocean current in the North Pacific is sensitive to changes in the global meridional circulation. These changes may be reflected in changes in the apparent half-life residence time of 137Cs. Long-term measurements of 137Cs and other radionuclides analyses may be important for detecting changes in atmospheric and oceanic circulation and other related processes.

This paper presents instructions for preparing abstracts for the 8th International Conference on Environmental Radioactivity, which will held from September 14 to 19, 2025, in Kraków, Poland.

The authors are encouraged to submit an abstract (A4-size with 25 mm margins on all sides) in a pdf format by **April 30th, 2025**. The title should be placed at the top, followed by the author(s) name(s), affiliation(s) and address(es), and email address of the contact person if available. Use “Calibri” font. If you have to utilize other fonts, all the fonts must be embedded in the file. The font size should be 14 point for the title, and 11 point for the main text. The font size in figure and table (including captions) should be at least 10.5 point. The abstract must not exceed one page and may include figures, tables, and references, if necessary.

All abstracts must be submitted via Indico for which you will need to create an account. Abstracts are submitted online through the Indico submission system:

<https://indico.ifj.edu.pl/event/1258/abstracts/>

Abstracts submitted via email or other means will not be considered. Filenames should follow the style of ‘*surname*\_*forename*\_ENVIRA2025\_*contribution*.pdf’. Names should be written with standard Latin characters, while contribution indicates the preferred presentation format: oral or poster. The example of a correct file name is ‘Lem\_Stanislaw\_ENVIRA2025\_oral.pdf”.By submitting an abstract, you agree to its publication in the official program of the Conference. All accepted and published abstracts must have registered presenting authors. Authors will be notified of acceptance of their abstract by email no later than the **15th of May 2025**.

For any questions or further information on abstract submission, please contact envira2025@ifj.edu.pl.