# The concentration and migration of iodine-129 in the ocean released from the accident of the Fukushima Daiichi Nuclear Power Plant

Takashi Suzuki [a,b], Shigeyoshi Otosaka [c], and Jun Kuwabara [b]

[a] Nuclear Science and Engineering Center, Japan Atomic Energy Agency
[b] Aomori Research and Development Center, Japan Atomic Energy Agency
[c] Atmosphere and Ocean Research Institute, the University of Tokyo

## Introduction

Iodine-129 ($T_{1/2}$=1.57x10$^7$ years) is natural occurring radionuclide and have been released by the atmospheric weapon testing and the operation of spent nuclear fuel reprocessing plants.

To evaluate the influence of $^{129}$I by the accident of Fukushima Daiichi Nuclear Power Plant (1F), it is necessary to understand the level of $^{129}$I before the accident. Since the level of $^{129}$I in the western North Pacific Ocean were reported, we discuss the released $^{129}$I by the accident based on the situation before the accident.

## Accident-derived $^{129}$I in surface seawater

The concentrations of $^{129}$I after the accident were reported [1-5]. The result of surface seawater reported by Suzuki et al., 2013 [1] are introduced. The concentrations at almost all the stations shown in Fig 2 are higher than that before the accident shown in Fig 1. These results indicate that $^{129}$I was released by this accident.

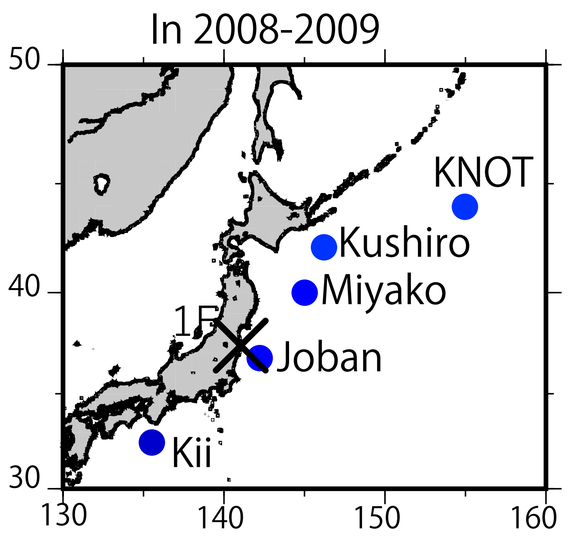


Fig. 1 $^{129}$I before the accident

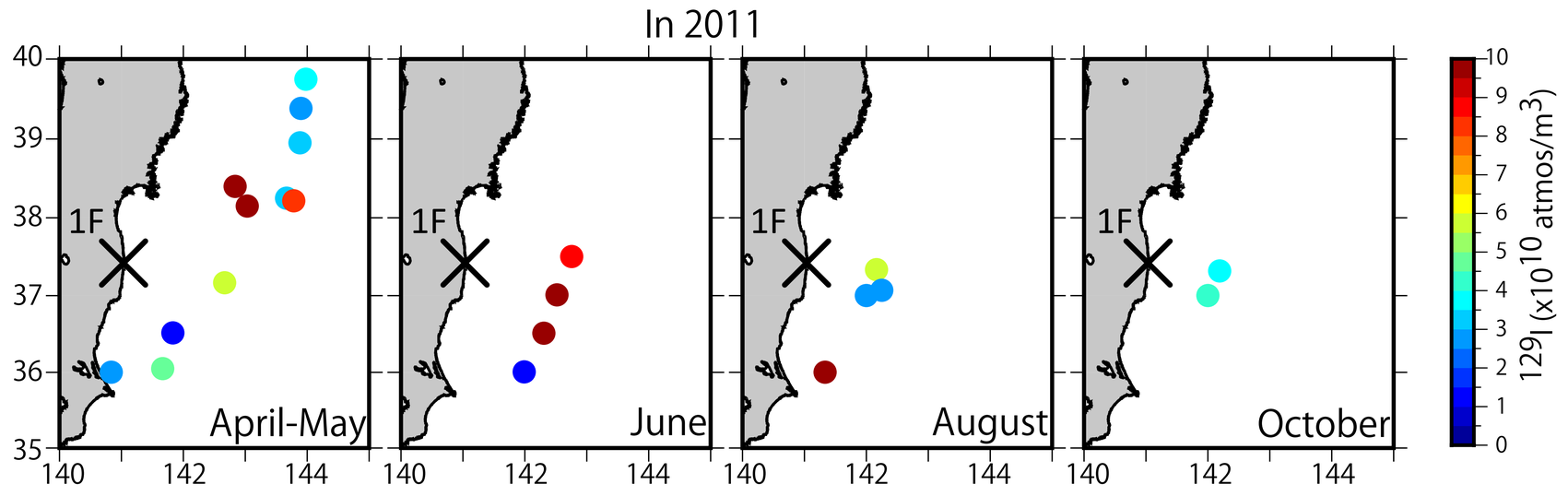


Fig. 2 Time evolution of $^{129}$I in surface seawater after the accident

## Accident-derived $^{129}$I in deep layer

The depth profiles of $^{129}$I after the accident were reported [1-6]. The result of depth profiles reported by Suzuki et al., 2018 [6] are introduced. The concentration of $^{129}$I had increased in surface mixing layer at Oyashio and Transition area. At Kuroshio area, $^{129}$I rich layer was found around 400 - 500 m water depth. the Kuroshio Extension was meandering when the seawater sampling shown in Fig 5. A southern current from transition area occurred by the influence of the meander and it was subducted under the sweater of the Kuroshio current area.

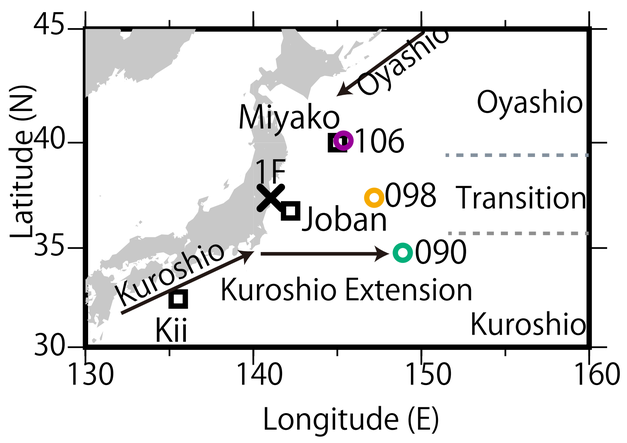


Fig. 3 Map of sampling station. Post (○) and pre (□) accident.

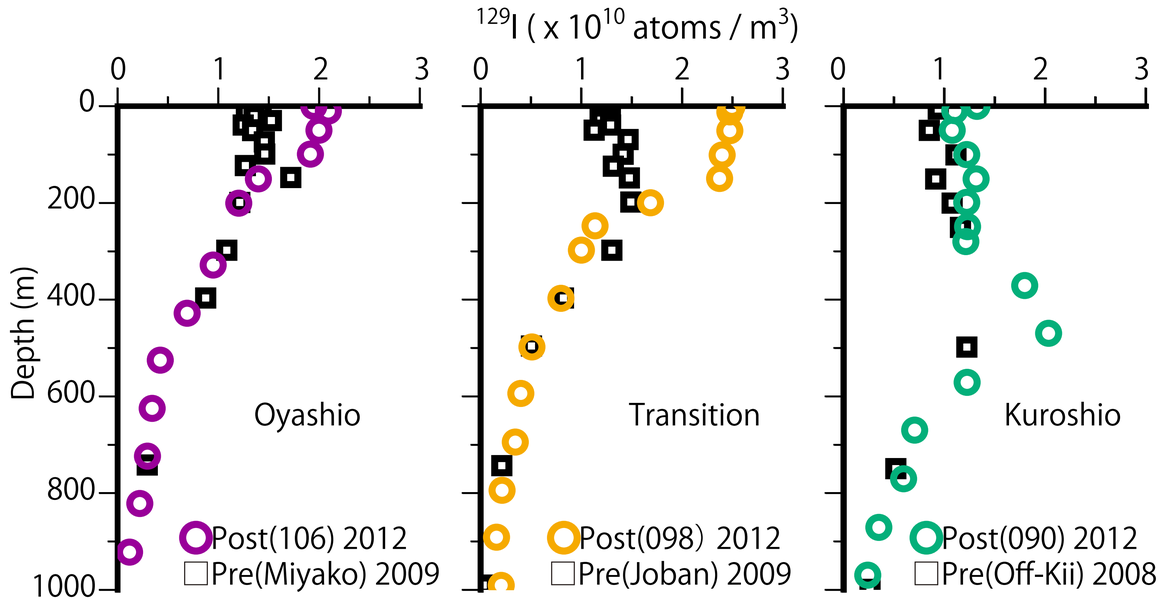


Fig.4 Depth profiles of $^{129}$I. Post (○) and pre (□)

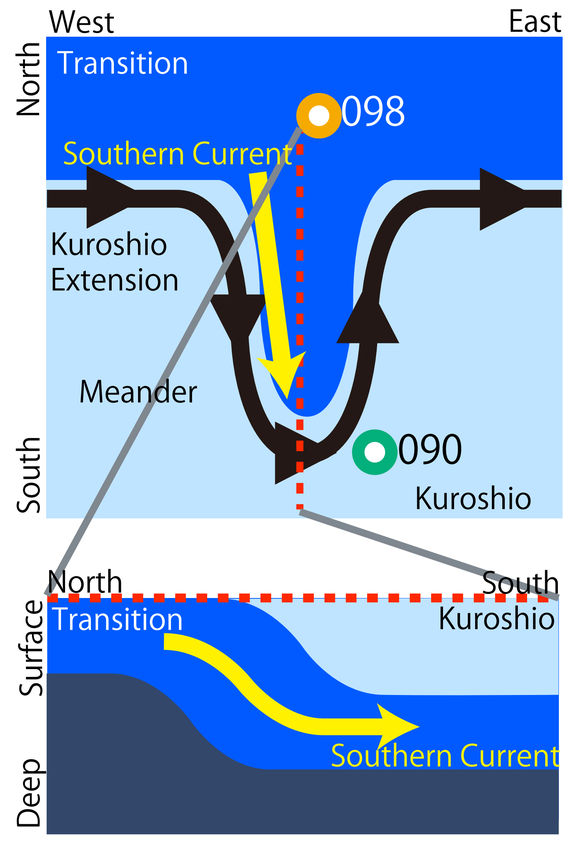


Fig.5 A conceptual diagram

## Conclusion

The accident-derived radionuclide is useful for not only understanding the movement of radionuclides but also investigating the seawater mixing in oceanographic studies.

## References

1. Suzuki, T. et al, Biogeosciences 10, 3839-3847, (2013).
2. Hou, X. et al. Environ. Sci. Technol. 47, 3091-3098, (2013).
3. Povinec, P. P. et al. Biogeosciences 10, 5481-5496, (2013).
4. Tumey, S. J. et al, J. Radioanal. Nucl. Chem. 296, 957-962, (2013).
5. Casacuberta, N. et al. Environ. Sci. Technol. 51, (2017).
6. Suzuki, T. et al,, Mar. Chem. 204, 163-171, (2018).