

## Overview of OMIX project “Ocean mixing processes: impact on biogeochemistry, climate and ecosystems”

\*Ichiro Yasuda<sup>1</sup>

1. Atmosphere and Ocean Research Institute, The University of Tokyo

Overview is presented for the project ‘Ocean mixing processes: impact on biogeochemistry, climate and ecosystem (OMIX) from July 2015 to Mar. 2020’. A new turbulence observing system using fast response thermistors (attached to CTD etc.) was developed and contributed to widen microstructure measurements which showed basin-scale surface-bottom turbulence distribution in the western North Pacific. New data, theories and mixing data-assimilation system helped to revise the model turbulence fields of OGCM which reproduced radiocarbon distribution and deep circulation in the North Pacific. Large numbers of in-situ mixing and biogeochemical observations and modelling lead to findings such that enhanced tide-induced turbulence in the subarctic north Pacific especially in the Kuril and Aleutian passes lift up nutrients such as silicate and iron from deep to intermediate waters strengthens biological production with the iron input from the Okhotsk Sea. This silicate- and iron-rich North Pacific Intermediate Water (NPIW) is transported to subtropical waters and to the Kuroshio where several turbulence hot-spots were found in the Kuroshio which flows through the straits and islands (Tokara Str., Taiwan Str. and Izu-ridge) with also enhanced tide-induced turbulence. These turbulent nutrient supply from NPIW changes the Kuroshio view from oligotrophic to productive area where turbulent nutrient flux sustains various kinds of fish in spawning and nursery grounds. Life history of *chub mackerel*, one of the Kuroshio spawning fish, is elucidated by newly developed microscale otolith stable isotope analysis; better growing juvenile tend to migrate cool and food-abundant Oyashio water. The possibility of tide-induced 18.6-year period ocean and climate variability was examined by new mixing scheme and high-resolution models. Such newly spawning mixing science will be discussed.

Keywords: ocean, biogeochemistry, vertical mixing, ocean circulation, climate, ecosystem