

International Symposium “Ocean Mixing Processes: Impact on Biogeochemistry, Climate and Ecosystem”

Date: March 16 and 17, 2017

Venue: Sanjo Conference Hall, The University of Tokyo (Hongo Campus)

Access map: <http://www.u-tokyo.ac.jp/content/400020133.pdf>

Campus map: <http://www.u-tokyo.ac.jp/content/400020145.pdf> (building #2)

Background:

Ocean diapycnal mixing is a fundamental physical process that regulates ocean vertical circulations of water, nutrients, carbon and heat; however, its distribution and generation mechanisms have not been known because of the difficulties of observations. In order to tackle this problem, a five-year project “Ocean Mixing Processes: Impact on Biogeochemistry, Climate and Ecosystem (OMIX)” was launched in Japan on 2015 under the funding framework of MEXT (Ministry of Education, Culture, Sports, Science and Technology, Japan) Grant-in-Aid for Scientific Research in Innovative Areas. This research project will develop efficient observing system of ocean diapycnal mixing and next-generation numerical models, those of which are able to quantify the maintenance mechanism of deep and bio-geochemical circulations and to reproduce observed bi-decadal ocean and climate variability. This new interdisciplinary study on ocean mixing opens the integrated sciences from physical, chemical, biological oceanography to climate and fisheries sciences.

Purpose:

In this two-day symposium, the PIs of 8 core research themes of OMIX are to report their progress over the first two years. Leading scientists are invited from overseas to present related research activities and comment on the progress and future direction of OMIX. Posters are also to be presented by OMIX members on individual research topics. Find more about OMIX at <http://omix.aori.u-tokyo.ac.jp/en/>

Program

March 16 (Thu.)

9:00—9:30 Registration and coffee

9:30—10:00 Opening

Hiroyasu Hasumi (The University of Tokyo): Welcome and logistics

Ichiro Yasuda (The University of Tokyo): Introduction to the OMIX project

10:00—11:40 Session 1 (Chair: Toshiyuki Hibiya)

Michael Gregg (University of Washington): Turbulence observations: past, present and future

Ichiro Yasuda (The University of Tokyo): Development of methods and systems for vertical mixing and observations: overview of A01-1 results in 2015-2016

Chuanyu Liu (Chinese Academy of Science): Deep-reaching thermocline mixing in the equatorial Pacific cold tongue

Shuhei Masuda (Japan Agency for Marine-Earth Science and Technology): Pacific Ocean state estimation and clarification of mechanism of ocean circulation by data synthesis of global observations

11:40—13:00 Lunch

13:00—14:00 Poster (with coffee)

14:00—15:40 Session 2 (Chair: Shuhei Masuda)

Robert Pinkel (Scripps Institution of Oceanography): Deep ocean mixing by breaking internal tides

Toshiyuki Hibiya (The University of Tokyo): Revisiting fine-scale parameterizations for enhanced tidal mixing over a rough ocean bottom

Andy Hogg (The Australian National University): Lee waves, spontaneous generation and ocean mixing

Hiroyasu Hasumi (The University of Tokyo): Model development and impact assessment for ocean circulation, marine material cycles and climate by incorporating the effect of oceanic vertical mixing

15:40—16:10 Break and Poster (with coffee)

16:10—17:50 Session 3 (Chair: Shin-ichi Ito)

Kelvin Richards (University of Hawaii): Shear-driven turbulence in the natural environment

Sen Jan (National Taiwan University): Interleaving, internal tides, and instability waves

in the Kuroshio east of Taiwan

Xinyu Guo (Ehime University): Mixing processes, nutrient transport, fundamental structure of ecosystem in the Kuroshio and its origin area

Naomi Harada (Japan Agency for Marine-Earth Science and Technology): Study on the change in lower trophic ecosystem and its complex mechanism in the North Pacific

18:30—20:30 Reception (at Hotel Forest Hongo)

March 17 (Fri.)

9:30—10:00 Coffee

10:00—11:40 Session 4 (Chair: Naomi Harada)

Tony Koslow (Scripps Institution of Oceanography): Patterns of change in fish communities of the California Current and relationship with ocean forcing

Shin-ichi Ito (The University of Tokyo): Challenges on elucidation of climate variability impacts on living marine resources

Alessandro Tagliabue (University of Liverpool): The integral role of iron in ocean biogeochemistry

Jun Nishioka (Hokkaido University): Macro- and micro-nutrient cycles in the western north Pacific –Importance of marginal seas and North Pacific Intermediate Water–

11:40—12:30 Closing (Chair: Ichiro Yasuda)

Discussion

Comments from the invited speakers (~10 min.)

Comments from the advisory board of the OMIX project (~10 min.)

Posters

(Only the first authors are listed. Presenting authors might be different.)

Research Item A01 (microstructure measurement and synthesis)

- 01 Yasutaka Goto (The University of Tokyo): Development of CTD-attached microstructure measurements and observations in the western North Pacific
- 02 Ryuichiro Inoue (Japan Agency for Marine-Earth Science and Technology): Variability of wind-induced mixing in the western North Pacific inferred from Argo floats and turbulence measurements under storms by micro-EM-APEX floats
- 03 Ryuichiro Inoue (Japan Agency for Marine-Earth Science and Technology): Preliminary report on microstructure and mooring observations in the Kerama Gap
- 04 Takahiro Tanaka (The University of Tokyo): Preliminary report on the observations of turbulence and vertical nitrate flux in the Kuroshio through the Tokara Strait and Izu Ridge
- 05 Takahiro Tanaka (The University of Tokyo): Turbulence and current observations in the Kuril Straits with underwater glider and moorings
- 06 Daigo Yanagimoto (The University of Tokyo): Mooring and turbulence observations around the Emperor seamounts and gaps
- 07 Masaaki Kikuchi (The University of Tokyo): Development of deep profiling floats with turbulence sensors
- 08 Daisuke Hasegawa (Tohoku National Fisheries Research Institute): Direct measurement of vertical turbulent nitrate flux
- 09 Satoshi Osafune (Japan Agency for Marine-Earth Science and Technology): On-going development of a global ocean state estimation system using tidal mixing parameterizations
- 10 Yusuke Kawaguchi (Japan Agency for Marine-Earth Science and Technology): Double-diffusion and energetic internal waves observed in Arctic Ocean vortices
- 11 Shinya Kouketsu (Japan Agency for Marine-Earth Science and Technology): An application of tracer inverse methods on neutral density surfaces in the North Pacific, and the impacts of mixing on the decadal property changes
- 12 Daisuke Sasano (Japan Meteorological Agency): Decline and bidecadal oscillation of dissolved oxygen in the Oyashio region and their propagation to the western North Pacific

Research Item A02 (Kuroshio, Oyashio and their source regions)

- 13 Takuya Hara (The University of Tokyo): Neodymium isotopic composition and rare earth elements in surface water of the North Pacific Ocean, the Bering Sea and the Chukchi Sea
- 14 Naoto Kudo (Kagoshima University): Seasonal change in vertical mixing inferred from water-mass modification along PN repeat hydrographic section in East China

Sea

- 15 Eisuke Tsutsumi (Kyushu University): Turbulent mixing within Kuroshio in Tokara Strait
- 16 Jing Zhang (University of Toyama): What can we learn from rare earth elements and Nd isotope: material transport and interaction between the East China Sea and the western North Pacific
- 17 Hiromichi Ueno (Hokkaido University): Influence of mesoscale eddies on biogeochemical cycle and lower trophic ecosystem in the western subarctic North Pacific
- 18 Toshikazu Tatematsu (Hokkaido University): Structure of surface mixed layer analyzed by temporal change of vertical distribution of photodegradable organic iodine gases
- 19 Yoshio Kondo (Nagasaki University): Dissolved Fe speciation in the western North Pacific
- 20 Akira Oka (The University of Tokyo): A modelling study on global distribution of rare earth elements in the ocean
- 21 Kazuhiro Misumi (Central Research Institute of Electric Power Industry): Roles of ocean mixing and iron cycling on climate and marine ecosystem variations in the western North Pacific
- 22 Humio Mitsudera (Hokkaido University): Modeling of iron circulation in the western North Pacific
- 23 Takeyoshi Nagai (Tokyo University of Marine Science and Technology): Observations of submesoscale bands of turbulence associated with high wavenumber internal wave shear below the Kuroshio origin using the tow-yo microstructure profiler

Research Item A03 (ecosystem and fisheries)

- 24 Megumi O. Chikamoto (Utah State University): Marine ecosystem variability under the ocean dynamical constrain
- 25 Kotaro Shirai (The University of Tokyo): Decadal climate variability recorded in shell growth pattern of long-lived bivalve *Mercenaria stimpsoni*
- 26 Tomihiko Higuchi (The University of Tokyo): Stable isotope analysis of otolith in chub mackerel (*Scomber japonicus*) juvenile
- 27 Takaaki Yokoi (The University of Tokyo): Development of a physical-biogeochemical-fish coupled model for the western North Pacific
- 28 Toyoho Ishimura (National Institute of Technology, Ibaraki College): Stable carbon and oxygen isotopic analysis of microscale fish otolith: applications to archived larval *Scomber japonicas*
- 29 Akira Kuwata (Tohoku National Fisheries Research Institute): Mechanism and long-term change of massive spring bloom of diatoms in the Oyashio region

Research Item A04 (numerical model development and mixing effect assessment)

- 30 Yuki Tanaka (The University of Tokyo): Downward lee wave radiation from tropical instability waves in the central equatorial Pacific Ocean: a possible energy pathway to turbulent mixing
- 31 Anne Takahashi (The University of Tokyo): Assessment of fine-scale parameterizations of deep ocean mixing in the presence of geostrophic current shear –From the results of microstructure measurements in the Antarctic Circumpolar Current region–
- 32 Takashi Ijichi (The University of Tokyo): Estimating mixing efficiency in the deep ocean through microstructure measurements
- 33 Yoshihiro Niwa (the University of Tokyo): Generation of baroclinic tide energy in a global three-dimensional numerical model with different spatial grid resolution
- 34 Yusuke Ushijima (Kyoto University): Diurnal cycle effects of surface heat flux on the ocean mixed layer depth and sea surface temperature
- 35 Taira Nagai (The University of Tokyo): The impacts of tidal mixing and sub-mesoscale eddies on the water-mass transformation of the Indonesian Throughflow
- 36 Takao Kawasaki (The University of Tokyo): High resolution modeling on deep Pacific Ocean circulation
- 37 Kaoru Ito (Hokkaido University): Interaction of a vortex and internal gravity waves: classification by a non-dimensional parameter
- 38 Tomoki Tozuka (The University of Tokyo): Climate variability simulated by a coupled climate model with the 18.6-year modulation of tidal mixing