

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN JAPAN

April 1st, 2018 to March 31st, 2019

New scientific results

We reported helium-3 plumes in the central Indian Ocean (GI04). The vertical distribution of $\delta^3\text{He}$ showed a similar trend with dissolved iron and manganese distributions in the hydrothermal plume. Lateral $\delta^3\text{He}$ distribution at mid-depth suggests that the helium-3 plume in the central Indian Ocean derived from the Central Indian Ridge around 20°S (Takahata et al., *Terrestrial, Atmospheric and Oceanic Sciences*, 2018).

New GEOTRACES publications (published or in press)

Fifteen papers have been published as shown below:

- Inomata, Y., M. Aoyama, T. Tsubono, D. Tsumune, Y. Kumamoto, H. Nagai, T. Yamagata, M. Kajino, T. Tanaka, T. Sekiyama, E. Oka and M. Yamada (2018): Estimate of Fukushima-derived radiocaesium in the North Pacific Ocean in summer 2012. *Journal of Radioanalytical and Nuclear Chemistry*, 318, 1587-1596.
- Li, L., F. M. Li, Z. W. Wang, M. X. Zhao, J. Zhang and J. L. Ren (2018): Factors influencing the use of dissolved aluminum as a source tracer in the East China Sea and adjacent waters. *Marine Chemistry*, 204, 133-143.
- Lutfi Firdaus, M., A. S. Mashio, T. Kim, R. Muhammad, J. A. McAlister, H. Obata, T. Gamo, and R. Khaydarov (2018): Simultaneous determination of picomolar zirconium, hafnium, niobium and tantalum in seawater using commercially available chelating resin and subsequent ICP-MS determination. *Geochemical Journal*, 52, 427-431.
- Lutfi Firdaus, M., A. S. Mashio, H. Obata, J. A. McAlister and K. J. Orians (2018): Distribution of zirconium, hafnium, niobium and tantalum in the North Atlantic Ocean, northeastern Indian Ocean and its adjacent seas. *Deep-Sea Research-I*, 140, 128-135.
- Sakata, K., M. Kurisu, H. Tanimoto, A. Sakaguchi, M. Uematsu, C. Miyamoto and Y. Takahashi (2018): Custom-made PTFE filters for ultra-clean size-fractionated aerosol sampling for trace metals. *Marine Chemistry*, 206, 100-108.
- Takahata, N., K. Shirai, K. Ohmori, H. Obata, T. Gamo, and Y. Sano (2018): Distribution of helium-3 plumes and deep-sea circulation in the central Indian Ocean. *Terrestrial, Atmospheric and Oceanic Sciences*, 29, 331-340.
- Yang, S.-C., J. Zhang, Y. Sohrin, T.-Y. Ho (2018): Cadmium cycling in the water column of the Kuroshio-Oyashio Extension region: Insights from dissolved and particulate isotopic composition. *Geochimica et Cosmochimica Acta*, 233, 66-80.
- Evans, L. K. and J. Nishioka (2018): Accumulation processes of trace metals into Arctic sea ice: distribution of Fe, Mn and Cd associated with ice structure, *Marine Chemistry*, 209, 36-47.
- Kanna, N., Y. Sibano, T. Toyota, J. Nishioka (2018): Winter iron supply processes fueling spring phytoplankton growth in a sub-polar marginal sea, the Sea of Okhotsk: Importance of sea ice and the East Sakhalin Current. *Marine Chemistry*, 206, 109-120.

- Kawagucci, S., A. Makabe, T. Kodama, Y. Matsui, C. Yoshikawa, E. Ono, M. Wakita, T. Nunoura, H. Uchida and T. Yokokawa (2018): Hadal water biogeochemistry over the Izu-Ogasawara Trench observed with a full-depth CTD-CMS. *Ocean Science*, 14, 575–588.
- Kozaka, Y., K. Horikawa, Y. Asahara, H. Amakawa, and Y. Okazaki (2018): Late Miocene–mid-Pliocene tectonically induced formation of the semiclosed Japan Sea, inferred from seawater Nd isotopes. *Geology*, 46, 903-906.
- Kumamoto, Y., M. Yamada, M. Aoyama, Y. Hamajima, H. Kaeriyama, H. Nagai, T. Yamagata, A. Murata and Y. Masumoto (2018): Radiocesium in North Pacific coastal and offshore areas of Japan within several months. *Journal of Environmental Radioactivity*, 198, 79-88.
- Otosaka, S., Y. Satoh, T. Suzuki, J. Kuwabara and T. Nakanishi (2018): Distribution and fate of I-129 in the seabed sediment off Fukushima. *Journal of Environmental Radioactivity*, 192, 208-218.
- Wong, K. H., H. Obata, T. Kim, A. S. Mashio, H. Fukuda, and H. Ogawa (2018): Organic complexation of copper in estuarine waters: An assessment of the multi-detection window approach. *Marine Chemistry*, 204, 144 - 151.
- Zhang, J., Q. Liu, L. L. Bai and T. Matsuno (2018): Water mass analysis and contribution estimation using heavy rare earth elements: Significance of Kuroshio intermediate water to Central East China Sea shelf water. *Marine Chemistry*, 204, 93-102.

GEOTRACES workshops and meetings organised

- We had a workshop, entitled "BioGEOTRACES-Japan begins" on September 19-21, 2018 at Nagasaki University, Nagasaki to evaluate the potentials of biological studies related to trace elements and their isotopes (TEI) in the ocean, and to find the future directions of these studies in Japan. For three days, 15 registered Japanese scientists took part in the workshop. We invited Drs. Maria Maldonado and Tung-Yuan Ho as guest speakers. The workshop consisted of 3 invited talks, 3 keynote talks and 11 research topics related to GEOTRACES & BioGEOTRACES. During the workshop, we discussed recent scientific findings, and possible future collaborations among TEI chemists, biologists and modelers.
- Domestic GEOTRACES session was held during annual meeting of Geochemical Society of Japan 2018 in September 11-13, 2018, for pursuing scientific discussion on recent Japanese GEOTRACES studies (30 papers were presented). This annual meeting was held at Ryukyu University, Okinawa.
- We had a national GEOTRACES symposium in February 21-22, 2019, for promoting scientific discussion on recent Japanese GEOTRACES studies (29 papers were presented). We also had a business meeting as a GEOTRACES sub-committee meeting under the national SCOR committee (Science Council of Japan) on February 22, 2019. These symposium and meeting were held at the Atmosphere and Ocean Research Institute, the University of Tokyo.

GEOTRACES presentations in international conferences

- During Goldschmidt Conference 2018, several GEOTRACES-related sessions were held. More than 8 papers were presented by Japanese scientists during the Goldschmidt Conference 2018 as listed below.

- Escobar, M. T., N. Takahata, H. Obata and Y. Sano. Distribution of Helium Isotopes along 47°N of the Subarctic North Pacific. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Kim, T., H. Obata, A. S. Mashio, T. Gamo and S. Takeda. Trace metals and zinc complexing ligands in seawaters at a shallow hydrothermally active area in Japan. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Kurisu, M., K. Sakata, M. Uematsu and Y. Takahashi. Investigation of Isotope Fractionation of Fe in Anthropogenic Aerosols to Determine its Contribution to the Surface Ocean. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Norisuye, K., H. Obata, T. Gamo, J.-M. Lee and E. A. Boyle. Dissolved Pb stable isotopes in the Bay of Bengal. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Maruyama, K., K. Norisuye, H. Obata, H. Minami, Y. Nakaguchi, H. Tazoe and T. Gamo. Distributions of total particulate trace elements in the subarctic North Pacific. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Tanaka, Y., M. Tsujisaka, L. Zheng, S. Takano and Y. Sohrin. An Advanced Method for Preconcentration and Determination of Zr, Hf, Nb, and Ta in Seawater. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Wong, K. H., H. Obata, T. Kim and R. Muhammad. Distribution of copper and its speciation in the subarctic North Pacific. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.
- Zheng, L., T. Minami, S. Takano and Y. Sohrin. Distribution of Recycled-Type Trace Metals (Ni, Cu, Zn, and Cd) in Dissolved and Labile Particulate Fractions in the North Pacific Ocean. Goldschmidt Conference 2018, Boston (USA), 13-17, 2018.

There were more presentations in the Oceanographic Society of Japan, Japan Geoscience Union etc.

Other GEOTRACES activities

The 2nd workshop of WESTPAC WG06 “A framework for cooperative studies in the Western Pacific Marginal Seas: Energy and materials exchange between land and open ocean” (PI, Jing Zhang; 2017-2020), was held in Qingdao, China, on 17 and 18 December 2018, where 28 experts from 6 countries in the East and Southeast Asia gathered along with one participant from US. During a half day sub-session, TEI including GEOTRACES parameters, such as 1) Fe, Al, Mn; 2) REEs, Nd isotope; 3) Ra, Rn; 4) Hg; 5) paleo proxies etc. especially in the East China Sea and West Pacific Ocean, were discussed.

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