

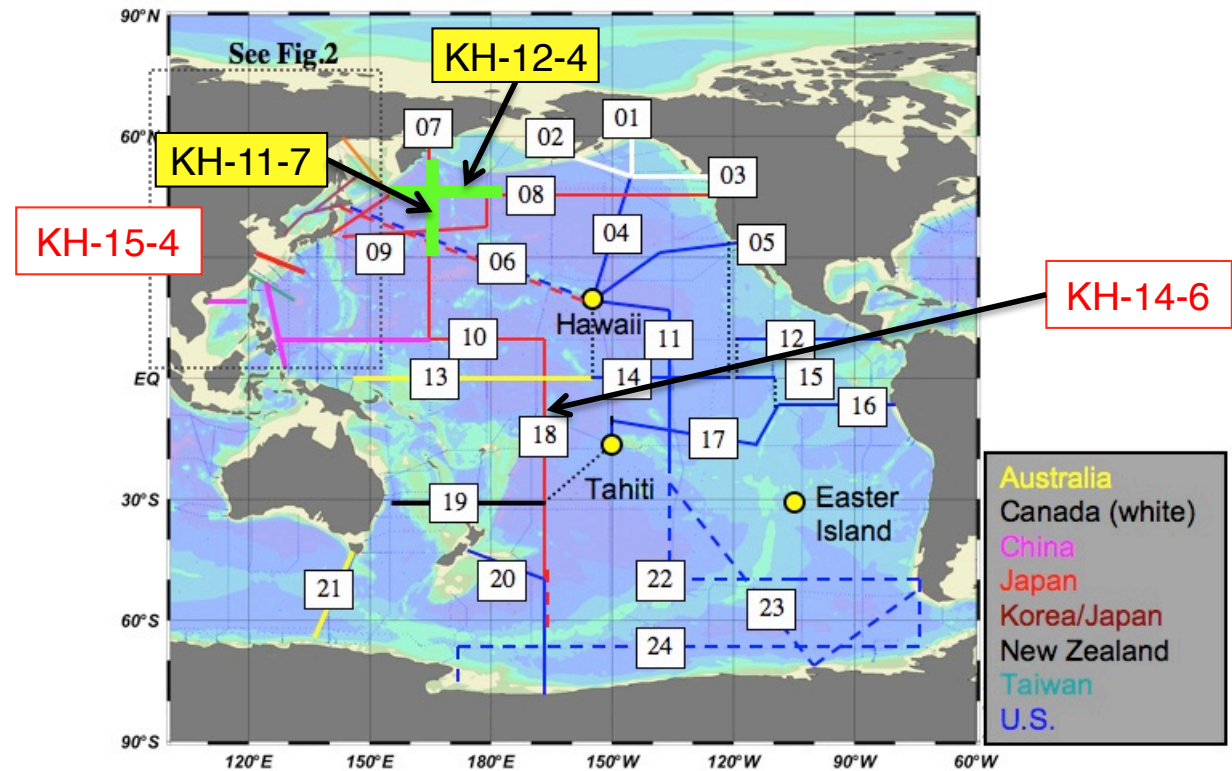
# Japan GEOTRACES National Report 2014

Yoshiki Sohrin

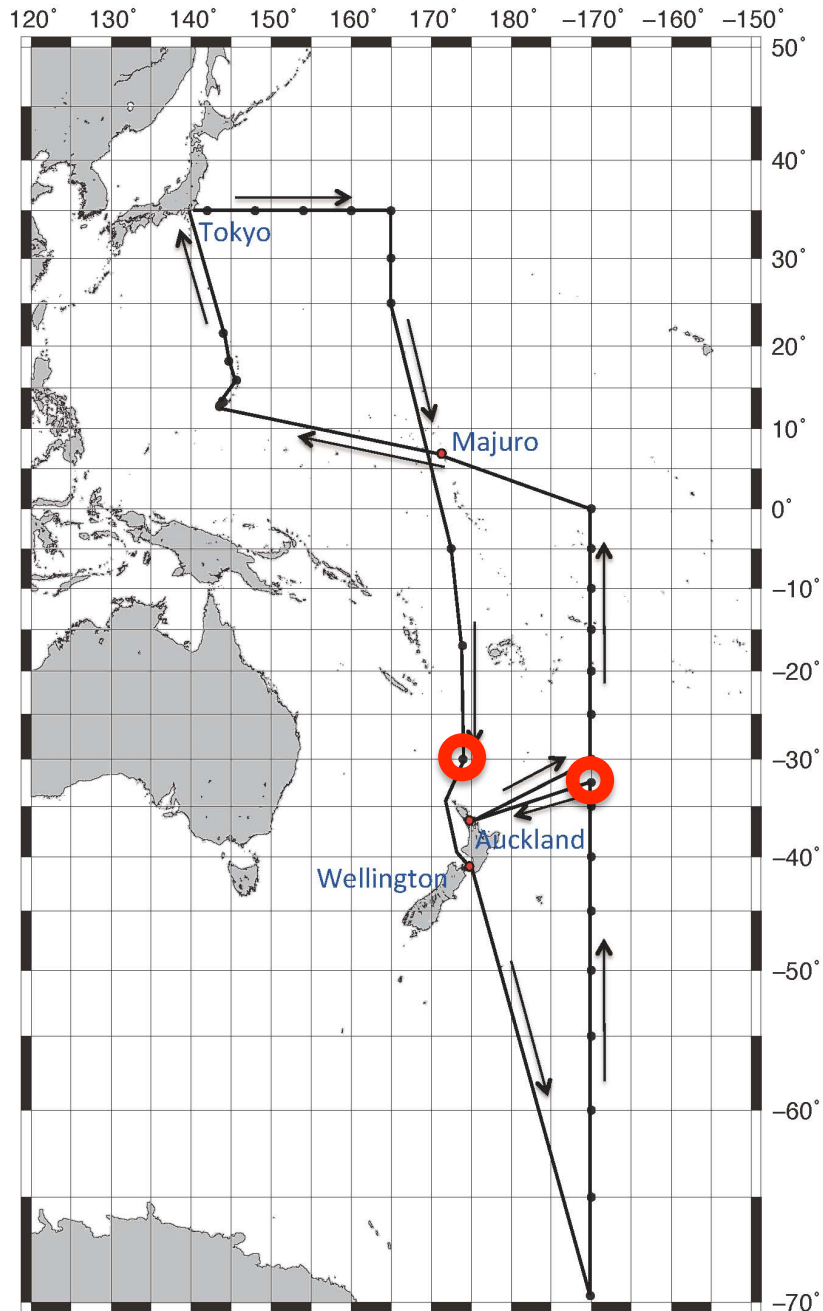
# Scientific Meetings

- 2014 Asia Oceania Geosciences Society Annual Meeting (AOGS2014), 28 Jul-1 Aug, Sapporo
  - Distinguished lecture: Reiner Schlitzer
  - GEOTRACES session
    - Invited: Andrew Bowie and Hajime Obata
    - 13 oral and 9 poster presentations
- AORI research symposium, 13-14 Mar, Univ. Tokyo, Kashiwa
  - Special lecture: Ken Buesseler (WHOI)
  - 18 oral presentations
- Annual Meeting of GSJ 2014, 16 Sep, Toyama
  - 10 oral and 7 poster presentations

# Cruises



- KH-14-6: section GP18 (170°W), South Pacific
  - 2 Dec 2014-26 Feb 2015 (PI: T. Gamo)
- KH-15-4: East China Sea, process study
  - Nov, 2015 (PI: J. Zhang)
- Planning for 2016-2018
  - Eastern North Pacific, to complete section GP08 (47°N, PI: H. Obata)
  - Western North Pacific, process study (PI: J. Zhang)



# KH-14-6

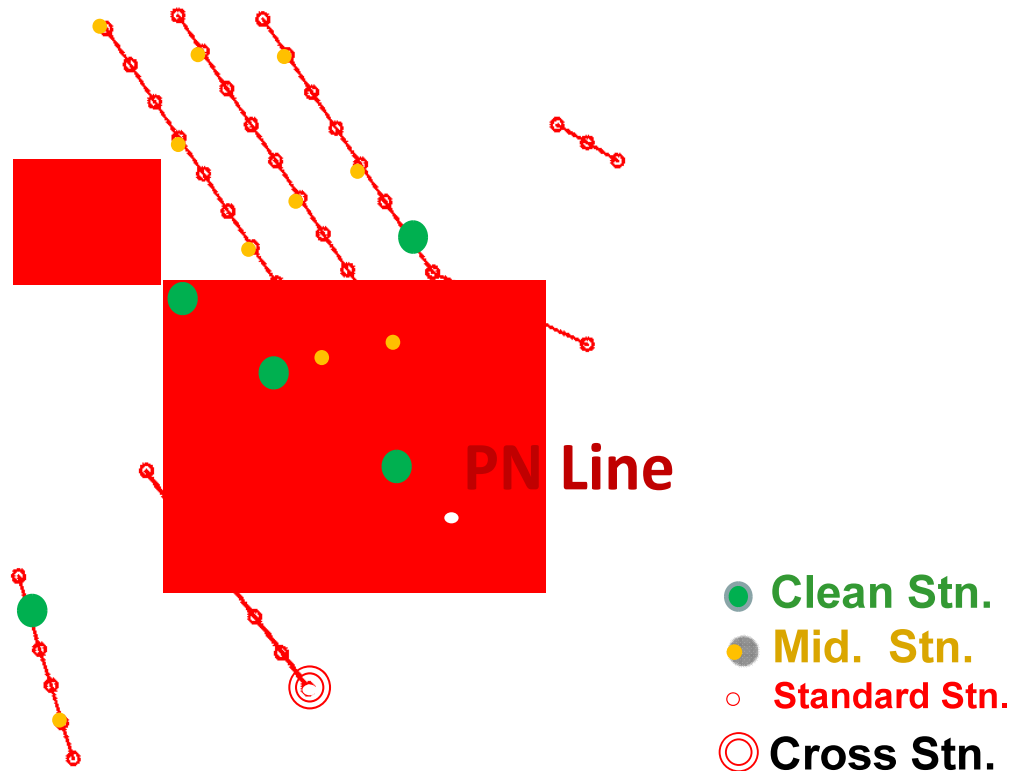
- 2 Dec 2014-26 Feb 2015 (PI: T. Gamo)
- Section GP18: 170°W, each 5 degree
- Crossover stations with Australia cruises
  - St. 9 30°00'S, 174°00'E
  - St. 18 32°30'S, 170°00'W

# GEOTRACES process studies (GP06): Biogeochemical Studies in the East China Sea and Western Pacific R/V Hakuho-Maru KH-15-04 Cruise Plan (tentative)

Date:

Oct 14 – Nov 02, 2015

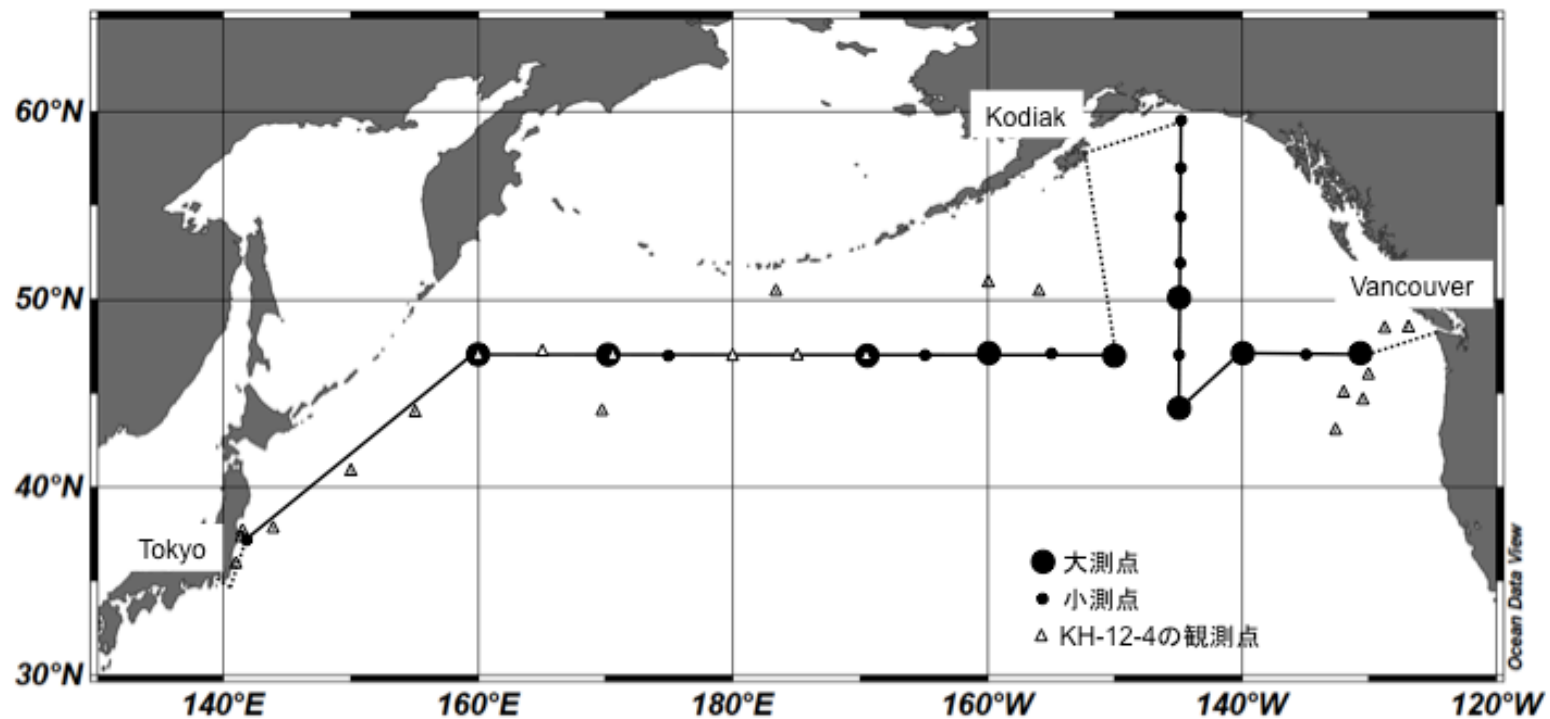
Chief Scientist: J. Zhang



## Two uncertainties:

- Titanium armored cable on Hakuho-Maru (solution: borrow from new Shinsei-maru; need to fix during the next ship dock, Jan-Feb 2015)
- Joint cruise by Dongfanghong-2, OUC  
Needs: clean rosette/van

# GP08 in 2016-2018



- Eastern North Pacific, to complete section GP08 (47°N, PI: H. Obata)

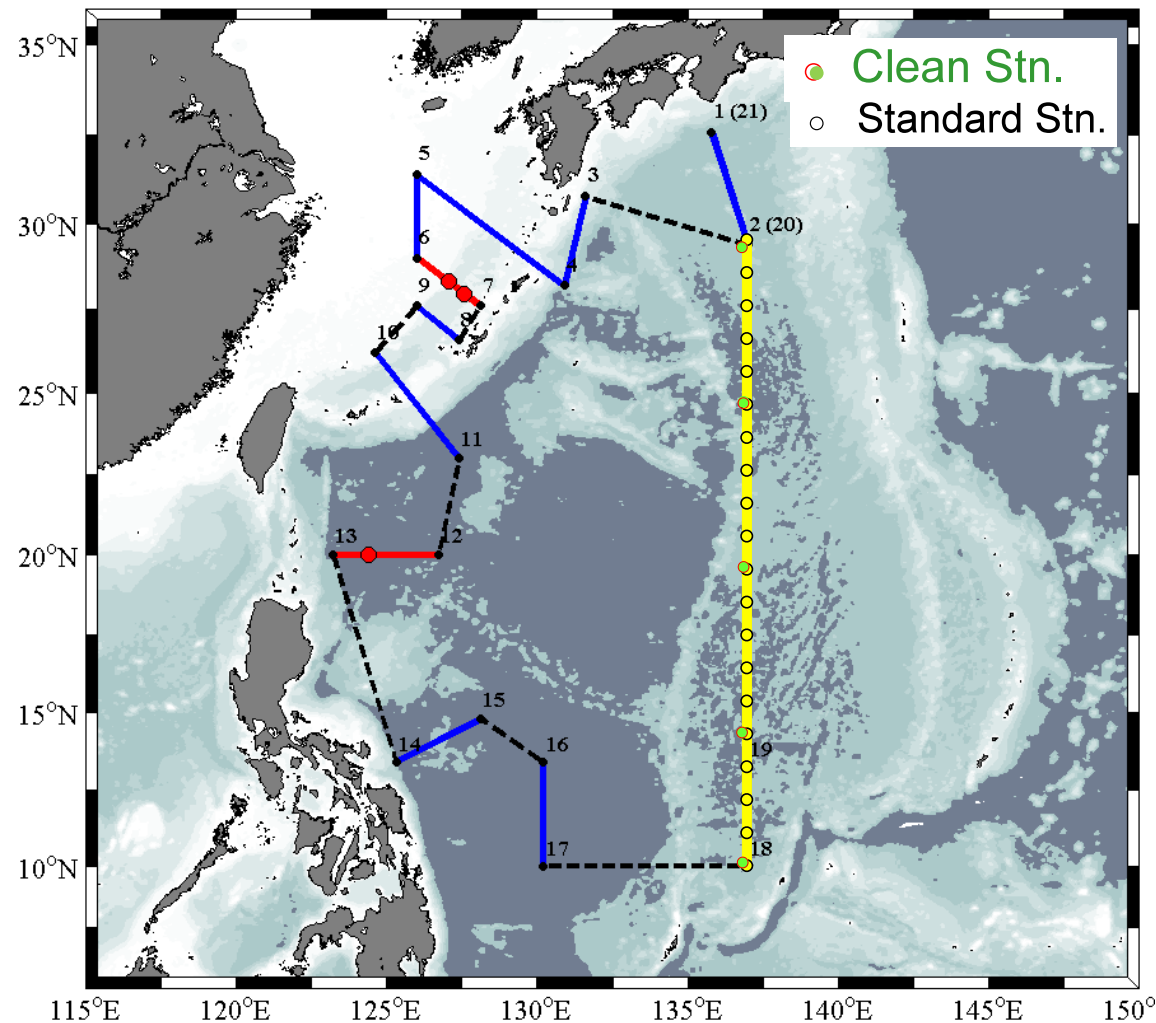
# GEOTRACES process study:

(proposal: FY 2016 -2018)

-Material exchanges between the marginal seas and the subtropical western Pacific, and transport via the Kuroshio (PI: Jing ZHANG)

-Interdisciplinary study on boundary mixing processes and material transport between basins in the western Pacific subtropical gyre.

(PI: T. MATSUNO, Research Institute for Applied Mechanics, Kyushu University)



## Ship time proposal for Hakuho-Maru

### Key issues:

- GEOTRACES studies,
- Basin exchanges,
- Kuroshio transport/changes
- Nutrients/micro nutrients
- Atmospheric input ...

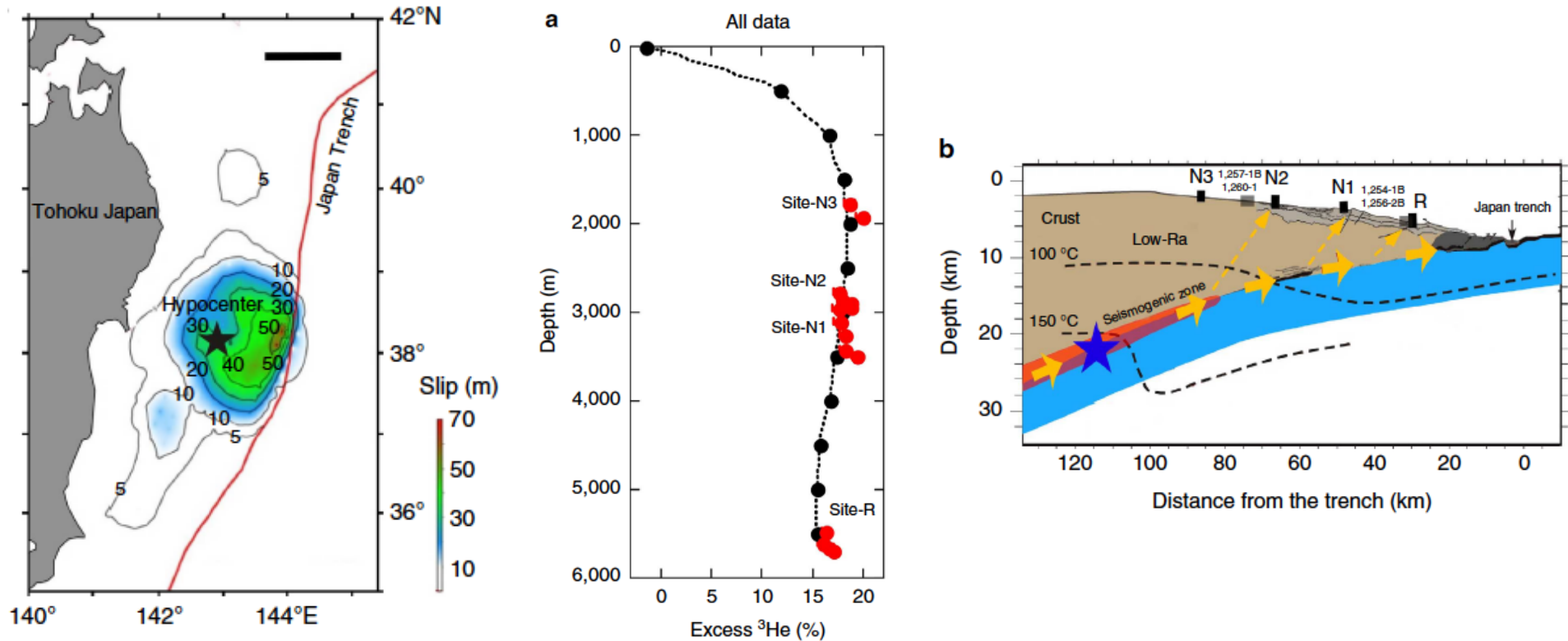
- Vertical mixing processes
- Internal waves
- Western boundary current

# Publications (27 in 2013-2014)

- Sano, Y. et al. Helium anomalies suggest a fluid pathway from mantle to trench during the 2011 Tohoku-Oki earthquake. *Nat. Commun.* 5, doi: 10.1038/ncomms4084 (2014).
- Otosaka, S. & Kato, Y. Radiocesium derived from the Fukushima Daiichi Nuclear Power Plant accident in seabed sediments: Initial deposition and inventories. *Environ. Sci.: Processes Impacts* 16, 978-990 (2014).
- Nishioka, J. et al. Quantitative evaluation of iron transport processes in the Sea of Okhotsk. *Prog. Oceanogr.* 126, 180-193 (2014).
- Nägler, T. F. et al. Proposal for an International Molybdenum Isotope Measurement Standard and Data Representation. *Geostandards and Geoanalytical Research* 38, 149-151 (2014).
- Matsuyama, H. et al. *Pseudoalteromonas shioyasakiensis* sp. nov., a marine polysaccharide-producing bacterium. *Int. J. Syst. Evol. Microbiol.* 64, 101-106 (2014).
- Kumamoto, Y. et al. Southward spreading of the Fukushima-derived radiocesium across the Kuroshio Extension in the North Pacific. *Sci. Rep.* 4, doi: 10.1038/srep04276 (2014).
- Kanna, N. et al. Iron and macro-nutrient concentrations in sea ice and their impact on the nutritional status of surface water in the southern Okhotsk Sea. *Prog. Oceanogr.* 126, 44-57 (2014).
- Gamo, T. et al. The Sea of Japan and Its Unique Chemistry Revealed by Time-Series Observations over the Last 30 Years. *Monogr. Environ. Earth Planets*, 2, 1-22 (2014).
- Gamo, T. Excess <sup>222</sup>Rn profiles in the bottom layer of the Japan Sea and their implication for bottom water dynamics. *Prog. Oceanogr.* 121, 94-97 (2014).
- Boyle, E. et al. Anthropogenic Lead Emissions in the Ocean: The Evolving Global Experiment. *Oceanography* 27, 69-75 (2014).

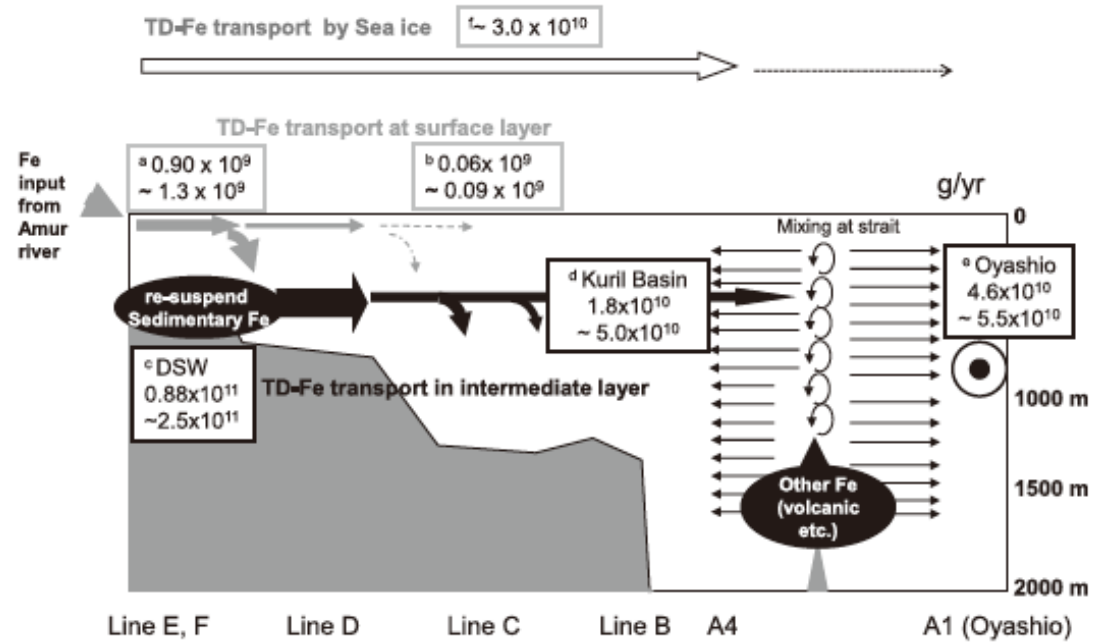
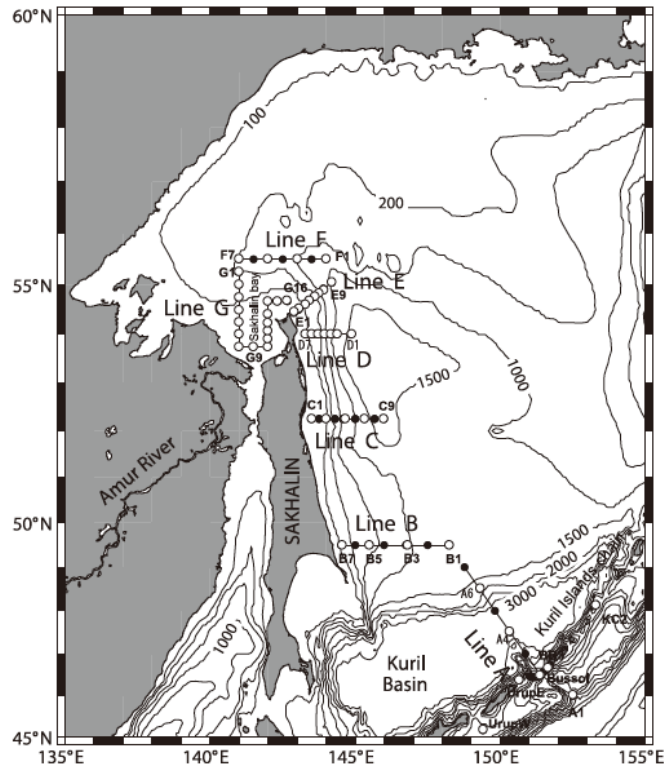


Sano, Y. et al. Helium anomalies suggest a fluid pathway from mantle to trench during the 2011 Tohoku-Oki earthquake. Nat. Commun. 5, doi: 10.1038/ncomms4084 (2014).



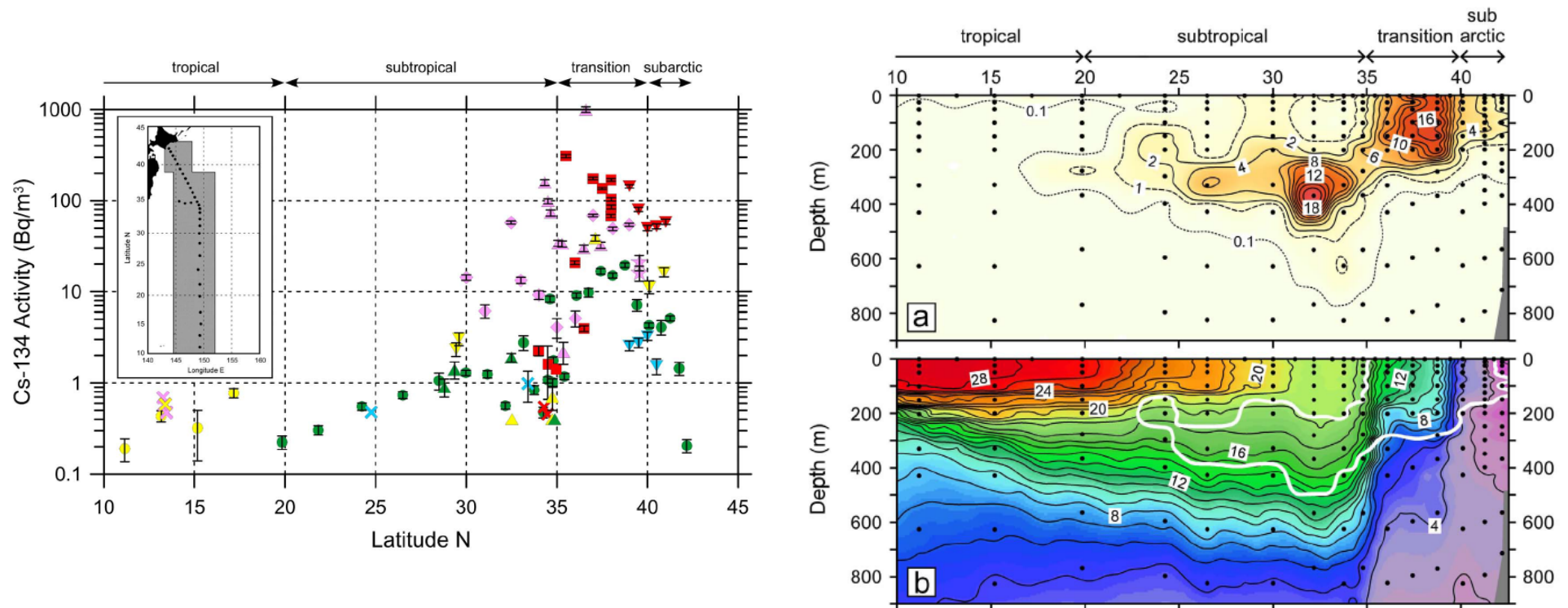
- A sharp increase in mantle derived helium in bottom seawater near the rupture zone 1 month after the earthquake
- The fluids were released from the mantle on the seafloor along the plate interface
- The movement of the fluids was rapid, with a velocity of  $\sim 4$  km per day
- This rate is much faster than what would be expected from pressure-gradient propagation, suggesting that over-pressurized fluid is discharged along the plate interface

Nishioka, J. et al. Quantitative evaluation of iron transport processes in the Sea of Okhotsk. Prog. Oceanogr. 126, 180-193 (2014).



- Comprehensive observations of the Fe distribution in the western Sea of Okhotsk were conducted and revealed the existence of two Fe transport processes
- One transport process is Fe loading from the Amur River and transport by the East Sakhalin Current (ESC), and the other is Fe transport by the intermediate water
- The intermediate water transports two orders of magnitude more Fe greater distance than surface water
- Intensive tidal mixing at the Kuril Straits influenced the vertical profiles of Fe

Kumamoto, Y. et al. Southward spreading of the Fukushima-derived radiocesium across the Kuroshio Extension in the North Pacific. *Sci. Rep.* 4, doi: 10.1038/srep04276 (2014).



- The accident of the Fukushima Dai-ichi nuclear power plant in March 2011 released a large amount of radiocesium into the North Pacific Ocean
- A subsurface radiocesium maximum at a depth of about 300 m in subtropical region along 149°E in winter 2012
- Atmospheric-deposited radiocesium had been transported not only eastward along with surface currents but also southward due to formation/subduction of subtropical mode waters
- The total amount of <sup>134</sup>Cs in the mode water was ~6 PBq corresponding to 10–60% of the total inventory of Fukushima-derived <sup>134</sup>Cs in the North Pacific Ocean

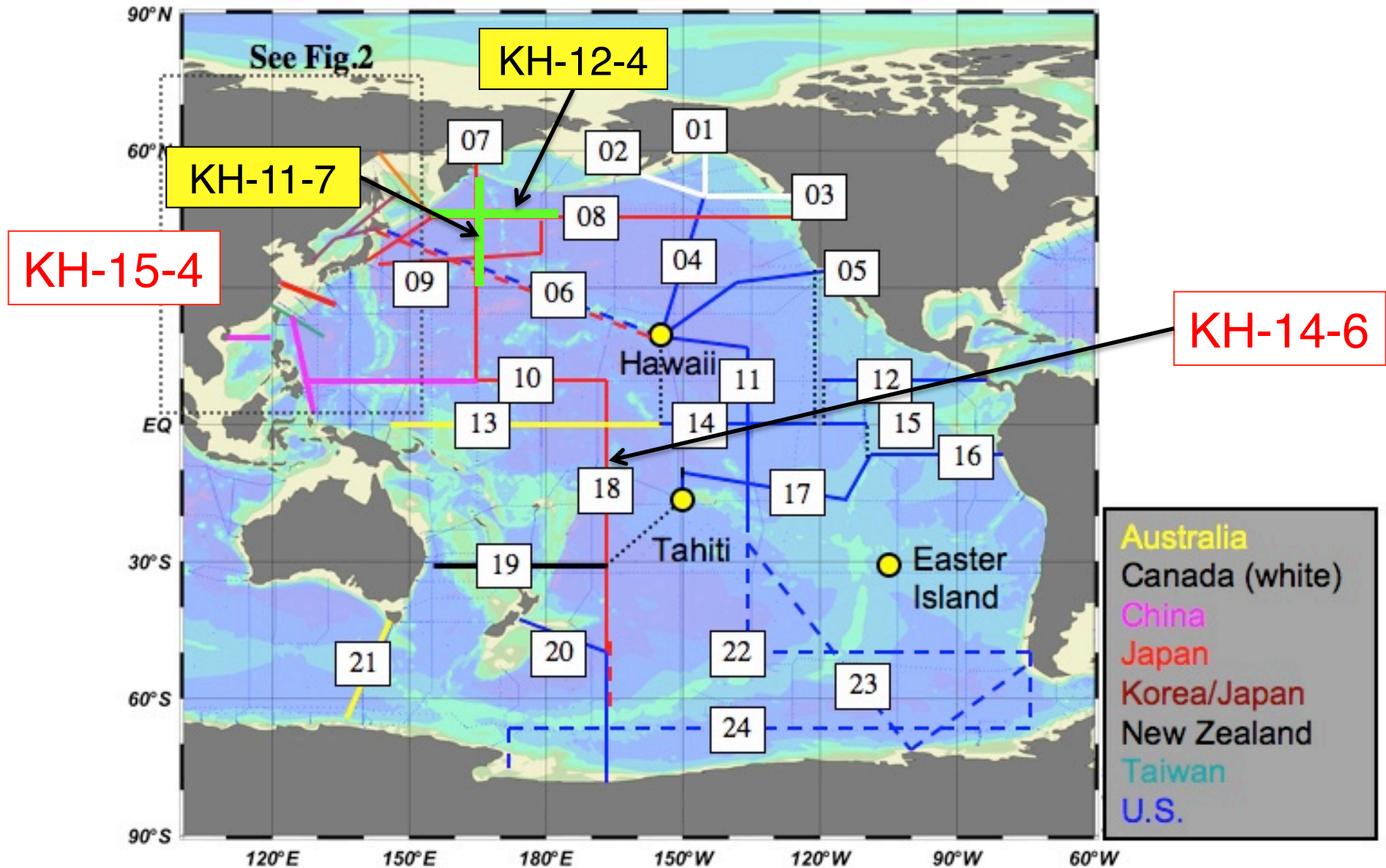
# Funding

- GEOTRACES Japan: Grant-in-aid for scientific research (A, overseas academic research), Japan Society for the Promotion of Science
  - From 2011 to 2015
  - For GEOTRACES studies and travel fees etc.
- Individual funds obtained by members

# Committee Meetings

- GEOTRACES sub-committee in the Science Council of Japan
  - 14 March 2013, AORI, Univ. Tokyo, Kashiwa
  - Discussed problems and future plans of GEOTRACES Japan

# GEOTRACES Pacific Sections



# Future Plans

- Cruises
  - KH-14-6: section GP18, South Pacific
    - 2 Dec 2014-26 Feb 2015 (PI: T. Gamo)
  - KH-15-4: East China Sea
    - Nov, 2015 (PI: J. Zhang)
  - Planning for 2016-2018
    - Eastern North Pacific, to complete section GP08 (PI: H. Obata)
- Scientific Meetings
  - Goldschmidt 2016
    - 26 Jun-1 Jul, Yokohama