IODP proposal for re-drilling in the East China Sea to understand the millennial-scale variability of the Asian monsoon during the Quaternary

*Yoshimi Kubota[1], Ken Ikehara[2], Kenji Matsuzaki[3], Saki Ishino[2], Ayanori Misawa[2], Makoto Otsubo[2], Masataka Kinoshita[4], Katsura Kameo[3], Chiori Tamura[3], Ryuta Arai[5], Tomohiro Toki[6], Yuki Mitsutome[6], Zhirong Cai[7], Keiko Takehara[8], Kato Koudai[8], Daisuke Kuwano[9], Koshiro Matsuo[10], Keita Suzuki[11], Misaki Horiuchi[11], Yohei Katayama[12], Satoshi Okumura[13], Ryuji Tada[14], Tomohisa Irino[15], Kohsaku Arai[2], Takahiko Inoue[2], Takuya Sagawa[16], Minoru Ikehara[8], Yusuke Okazaki[10], Keiji Horikawa[17]

1. National Museum of Nature and Science, 2. National Institute of Advanced Industrial Science and Technology, 3. Atmosphere and Ocean Research Institute, The university of Tokyo, 4. Earthquake Research Institute, University of Tokyo, 5. Japan Agency for Marine-Earth Science and Technology, 6. University of the Ryukyus, 7. Kyoto University, 8. Kochi University, 9. China University, 10. Kyusyu University, 11. Nippon Marine Enterprises, Ltd., 12. Marine Works Japan, Ltd., 13. MOL Marine Co., Ltd., 14. Hokkaido University, 15. Graduate School of Science, The Univeristy of Tokyo, 16. Kanazawa University, 17. Toyama University

Understanding and predicting how monsoons respond to global climate change is a critical scientific and societal issue since monsoonal rainfall provides the water supply for more than half of the world's population and sometimes leads to natural catastrophes such as floods and droughts. The East China Sea (ECS) is a marginal basin located on the rim of the western North Pacific, receiving massive runoff from the Yangtze (Changjiang) River; the discharge accounts for ~90% of the total river discharge to the ECS, making surface salinity well-correlated with basin-wide summer precipitation in southern China. IODP Expedition 346 was held in 2013 to understand the long-term millennial-scale variability of the East Asian monsoon during the Quaternary. During IODP Expedition 346, we drilled the proposed sites to ~200 mbsf at Site U1429 in the northern ECS. Site U1429 recovered a continuous record of hemipelagic sediments for the last 400 ky with a high sedimentation rate of 30–70 cm/ky. The advantage of using the marine core is the oxygen isotope ($\delta^{18}O$) of calcite from planktic foraminifers preserved in nearshore marine sediments can be quantitatively partitioned into sea surface temperature and $\delta^{18}O$ of seawater ($\delta^{18}O_w$), a function of sea surface salinity (a proxy of the monsoonal rainfall), using well-established methods of paired Mg/Ca and $\delta^{18}O$. Results from Site U1429 show that the $\delta^{18}O_w$ marks the detectable millennial-scale variability, which correlates to the Chinese speleothem $\delta^{18}O$ for the last 400 ky. The remarkable correlation between the ECS and the Chinese speleothem demonstrates that the ECS is a great candidate of a benchmark for the Asian monsoon record, especially for the early part of the Quaternary.
Here we propose to extend this excellent sediment archive through the last 1.5 Ma to reveal the underlying mechanism of the millennial-scale monsoon variability. In this presentation, we also report our recent progress on the site survey (KH-21-3) for re-drilling in the northern ECS.

Keywords: Asian monsoon, IODP, East China Sea, Quaternary, Millennial-scale, Speleothem

