

IODP Exp. 346(Asian Monsoon): Return of JR to the Japan Sea and a new visit to East China Sea

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In the summer of 1989, during the phase of DSDP cruises Leg 127/128 were organized to drill the Japan Sea. It was a memorial in the respect that the cruises were led by two Japanese co-chiefs and 10 Japanese scientists in total participated. One of unexpected findings of the cruises was the occurrence of dark and light layers that were alternated throughout the Quaternary. These dark and light layers are correlatable basin-wide and deposited synchronously. The dark layers are org-C rich, partly laminated, and somehow resemble sapropels of Mediterranean. However, their sedimentary rhythm is more complicated than that of Mediterranean sapropels the latter basically reflect orbital cycles. The origin of the rhythm of the dark and light layers was mystery for some time until Tada et al. (1995, 1999) found that the rhythm resembles that of $\delta^{18}O$ variations of Greenland ice cores in millennium time scale, so-called Dansgaard-Oeschger Cycles [DOC]. Subsequent studies on piston cores suggested that deposition of the dark and light layers reflects changes in properties of water influx through the Tsushima Strait due to the changes in contribution of the East China Sea coastal water relative to Kuroshio-derived water. Tada et al. (1999) hypothesized that changes in the relative contribution of the East China Sea coastal water reflected changes in discharge of Yangtze River which, in turn, reflected changes in EASM precipitation over the Yangtze River drainage. Recent provenance study of eolian dust in the cores from the Japan Sea further suggests that westerly jet axis over the Japan Sea oscillates in association with DOC (Nagashima et al., 2011). Because the westerly jet is bounding the northern limit of EASM front, it is likely that N-S oscillation of the westerly jet axis caused N-S movement of the northern limit of EASM front that resulted in the changes in EASM precipitation over the Yangtze River drainage in association with DOC. Thus, we further hypothesized that oscillation in westerly jet paths played a role of tele-connecting climatic changes in north Atlantic with changes in EASM intensity.

Expedition 346 is aimed to test these hypotheses. In addition, the expedition aims to specify the timing of onset of DOC type millennial-scale variability of EASM, its mode of evolution, and changes in mode, frequency, and amplitude of variability of EASM in association with glacial-interglacial cycles. The relation between East Asian summer and winter monsoons and its changes through time will be another interesting objective of the expedition. The paleoceanographic condition of the Japan Sea has been very sensitive to the nature (e.g., salinity, temperature, nutrients, and etc.) and the amount of the influx to the sea as well as sea level and climate in the surrounding region, and drastically changed in various time scales throughout its history. Consequently, there will be many interesting topics other than the major objectives of the expedition. IODP cruise will provide a rare opportunity to work with international community who share similar scientific interests. Participation of young generation with innovative ideas is welcome.

Keywords: IODP, Exp. 346, Asian Monsoon, Japan Sea, East China Sea, Abrupt climate change