Suborbital-scale climate change in East Asia deduced from provenance study of aeolian dust in the Japan Sea

Kana Nagashima[1]; Ryuji Tada[2]; Shin Toyoda[3]; Atsushi Tani[4]; Youbin Sun[5]; Yuko Isozaki[5]

[1] JAMSTEC; [2] DEPS, Univ. Tokyo; [3] Dept. Appl. Phys., Okayama Univ. Sci.; [4] Earth and Space Sci., Osaka Univ.; [5] Earth and Planetary Sci., Tokyo Univ

Suborbital-scale variations in Asian summer monsoon and its probable association with Dansgaard-Oeschger (D-O) Cycles have been demonstrated by previous studies (e.g. Wang et al., 2001). However, the origin and nature of such variations are poorly understood. The Japan Sea is located in the leeside of Asian winter monsoon from Siberia-Northeast China areas and also located under the westerly jet coming from Taklimakan Desert-Loess Plateau. So, it receives significant amount of aeolian dust derived from these arid areas. In this sense, the provenance change of aeolian dust in the Japan Sea are expected to record the variations in the intensity of Asian winter monsoon and position of westerly jet axis.

Provenance of aeolian dust in the hemipelagic sediments in the Japan Sea was examined using a sediment core MD01-2407 obtained from southern parts of the sea. Since the silt fraction of the detrital materials in hemipelagic sediments of the Japan Sea is composed dominantly of aeolian dust, the provenance of the silt fraction was examined. The Taklimakan Desert-Loess Plateau and Siberia-Northeast China areas were identified as possible source areas of aeolian dust in the sediments of the Japan Sea based on the Electron Spin Resonance (ESR) signal intensity and crystallinity of quartz. In our previous study, provenance of aeolian dust show suborbital-scale variations in addition to orbital-scale variations in harmony with the insolation change at 30 degree north in June. These results suggest suborbital- and orbital-scale changes in the frequency of dust storms in the Taklimakan Desert-Loess Plateau and Siberia-Northeast China areas possibly due to the southward (northward) shifts of the westerly jet axis together with intensified (weakened) winter monsoon during periods of smaller (larger) insolation in June and stadials (interstadials). However, time resolution of our previous study was not high enough to test the possibility of provenance changes in eolian dust provenance in association with the D-O Cycles.

Here we will present the recent result of high-resolution analyses of ESR signal intensity and crystallinity of quartz in the Japan Sea sediment during the last glacial period to test the possibility that intensity of Asian winter monsoon and position of westerly jet axis varied in association with D-O Cycles.