Millennial-scale variations in grain size and provenance of eolian dust in Japan Sea sediments

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] Dept. Earth & Space Sci., Osaka Univ.; [5] Earth and Planetary Sci., Tokyo Univ

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 the Taklimakan desert-Loess Plateau. So, it receives significant amount of eolian dust derived from these arid areas. In this sense, the provenance and grain size changes of eolian dust in the Japan Sea are expected to record variations in the intensity of Asian winter monsoon and the position/intensity of westerly jet.

Provenance and grain size of eolian dust in the hemipelagic sediments of the Japan Sea were examined using sediment cores MD01-2407 and DGC-6 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 eolian dust (Nagashima et al., 2007), the silt fraction was used for the analyses. Here we focused on the millennial-scale variations in the provenance and grain size of the silt fraction, and discuss the Asian winter monsoon and westerly jet changes during the last glacial period and the Holocene.

The Gobi desert in Mongolia (Mongolian Gobi), Taklimakan desert, and the Badain Juran and Tengger deserts (BJ-Ten deserts) in northern China are were estimated as possible source areas of eolian dust in the sediments of the Japan Sea based on the Electron Spin Resonance (ESR) signal intensity and crystallinity of quartz. The provenance and grain size of eolian dust in Japan sea sediments show millennial-scale changes in association with Dansgaard-Oeschger Cycles (D-O Cycles) during the last glacial period. Namely, grain size was larger (smaller) with dominant provenance of Mongolian Gobi (the Taklimakan desert) during stadials (interstadials). Based on the multiple-regression analysis between grain size and provenance of eolian dust, provenance variations in association with D-O Cycles are considered to represent southward (northward) shifts of the westerly jet axis during stadials (interstadials).

During the Holocene, the contribution of eolian dust from the Mongolian Gobi (the Taklimakan desert) to Japan Sea sediments tends to be smaller (larger) compared to the last glacial period, but the contribution from the Mongolian Gobi increased several times, which are around 0.5 ka, 2.8 ka, 4.2 ka, 6.0 ka, 8.0 ka, and 9.0 ka. In the presentation, we will show the grain size variation during the Holocene and discuss the cause of provenance and grain size variations during this period.