

# Evolution of central Asian aridity since the middle Miocene: evidence from sediment grain size record at IODP Site U1430 from the Japan Sea

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236 samples from Integrated Ocean Drilling Program (IODP) Site U1430 of Expedition 346 in the Japan Sea were analyzed for grain size distributions using end-member modeling algorithm (EMMA) in order to investigate the Asian aridity history since about 15 Ma. Three independent grain-size end members (EM1, EM2 and EM3) were identified with modal grain size of 2  $\mu\text{m}$ , 12  $\mu\text{m}$  and 50  $\mu\text{m}$ , respectively. The proportion of end-member EM1 (finest) varies between 5% and 48% with an average of 27%. The EM2 (medium) content ranges from 14% to 84% with an average of 56%, whereas the EM3 (coarsest) has an average of 17%. EM1 was interpreted as the mixture of eolian dust from central Asia transported by westerly and suspended sediment from the Japan Arcs by rivers and ocean currents. EM2 was mainly derived from eolian dust of central Asia by the near surface East Asian winter monsoon rather than the westerly over 5000 m. The coarsest end member EM3 can be considered as mixture of volcanic clastic and biogenic silica (i.e., diatom). We apply the ratio of EM2/EM1 as the proxy of intensity of the aridity of central Asia. The variation of EM2/EM1 ratio implies the long-term and stepwise drying of central since the Middle Miocene, especially at 11.8 Ma, 8.6 Ma, and since about 3.6 Ma. The phased uplift of Tibetan Plateau and global cooling may have played a significant role in strengthening the Asian aridity since the middle Miocene.

Keywords: Japan Sea, grain size, central Asian aridity, middle Miocene