Holocene and Late Pleistocene rockmagnetic record from Pacific side of Tsugaru Strait, Japan

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A sediment core of 44.67m long (MD012409) was recovered during IMAGES VII cruise in 2001. The coring site is located on the slope east of Tsugaru strait (water depth 975 m; Lat. 41.5608 deg; Lon. 141.8688 deg) connecting to Japan Sea on the west, which is expected to respond to the opening of Tsugaru strait by sea level fluctuation, and hence indirectly to the Tsushima warm current entering into Japan Sea. The site also offers a monitoring of change in the flow pattern of Oyashio cold current and North Pacific Intermediate Water. Sediment consists mainly of silty clay rich in terrigenous materials intercalated by some volcanic ash layers. Three packets of laminations were recognized at 700-860 cm, 965-1015 cm, and 1035-1025 cm. Due to the disturbance of core, sediments from top to 19 m was used for analysis. Preliminary analysis of 14C age for shells provided age model extending 25 ka at around 19 m, which gives average sedimentation rate of about 76 cm/kyr.

Rockmagnetic measurements were made on paleomagnetic cube samples taken at intervals of 2.3cm from the core, which corresponds to ~30 yr intervals. Magnetic susceptibility (k), anhysteretic remanent magnetization (ARM), saturation remanent magnetization (SIRM), and back field magnetization (IRM-0.3T) are measured. From these measurements, several rockmagnetic proxies were also calculated, such as S-0.3T (ratio of lower coercivity mineral) and kARM/SIRM (grain size parameter). The distinctive feature recovered from these rockmagnetic parameters is that the magnetic spikes caused by volcanic ash, in which magnetic susceptibility increases abruptly about ten to hundred times as large as the average of the rest portion, were seen in six strata. Several important features other than the magnetic spikes were recovered, which is comparable to the records of ice core and the sediments from Santa Barbara basin (e.g. Hendy et al., 2002). (1) Abrupt increases in concentration of magnetic minerals (k, SIRM, and ARM) and grain size at ~23.5 ka may correspond to 'Interstadial 2'. (2) Onset of warming during last glacial maximum was recognized at around 21ka as sharp increases in the magnetic concentration, grain size, and higher coercivity mineral. (3) During the warm period of 19.5-16.5ka, grain-size fluctuates at a period of 400-500 yr. (4) A sharp increase in grain size at ~13 ka may correspond to the beginning of Younger Dryas event. (5) Fluctuations of magnetic concentration at 8.5-7 ka and 3-4 ka may correspond to the onset and termination of climatic optimum period. These rockmagnetic signatures might be associated with the change in the sediment transport due to sea level change and vegetation or diagenetic conditions, although the mixing of unrecognized volcanic ash cannot be ruled out.