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# Regional and Temporal Variations of $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ Ratios in the North Pacific Sediments and their Significance on Paleoclimatic Variation in the Asian Continent

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The Sr and Nd isotopic compositions of detrital sediments are valuable indicators of source-region material because the isotope ratios are not greatly altered by the processes of weathering, transportation and deposition. We found that the areal distributions of Sr and Nd isotopic compositions are controlled by the flux of aeolian material from the Asian continent with a high $^{87}Sr/^{86}Sr$ ratio (0.724-0.726) and a low $\varepsilon_{Nd}$ value (<-8) relative to volcanic material with a low $^{87}Sr/^{86}Sr$ ratio (0.703-0.705) and a high $\varepsilon_{Nd}$ value (>0) from the Izu-Ogasawara-Mariana arc and oceanic islands such as Hawaiian Islands (Asahara et al., 1995, 1999). In particular, the $^{87}Sr/^{86}Sr$ ratio is high and the $\varepsilon_{Nd}$ value low in the north central Pacific sediment. The high Sr ratio and the low $\varepsilon_{Nd}$ value reflect the signature of the Asian continental material, loess, which is carried by middle-latitude westerlies. The vertical variation in the isotopic composition of core samples is then expected to reveal paleoclimates in the Asian continent such as aridity, glaciation and atmospheric circulation of the Northern Hemisphere. Therefore, temporal variations of Sr isotopic compositions in the detrital component of north Pacific sediments have been precisely examined in three core samples (Asahara, 1999). Assuming that the volcanic flux is constant, the temporal variation in Sr isotopic ratio reflects the amount of aeolian input from the continent. The major characteristics of the temporal variations and the interpretation of them are summarized as follows. (1) The $^{87}Sr/^{86}Sr$ records show cyclic fluctuations of 400 ky and 100 ky periodicities which are associated with the eccentricity of the earth's orbit (Milankovitch cycle). This reflects a fluctuation of the eolian flux corresponding to the aridity in the Asian continent. (2) Between 3 and 0.8 Ma, the $^{87}Sr/^{86}Sr$ ratio in the north central Pacific sediment increases gradually. This reflects an increased eolian input from the arid region in east Asia. The increase must be related to aridification of the Asian continent. (3) The decreased $^{87}Sr/^{86}Sr$ ratio during the past 0.8 my implies a decreased eolian input. The age of 0.8 Ma may relate to the climatic event known as the Middle Pleistocene shift. All of these phenomena reflect a fluctuation of the eolian flux corresponding to the paleoclimatic cycle of aridity in the Asian continent. The Sr isotopic composition of pelagic sediment in the north Pacific is sensitive to changes in the eolian input reflecting to the aridity of the Asian continent. Precise and sequential analyses of radiogenic isotopes for pelagic and hemi-pelagic sediments may reveal changes of the aridity of source regions in the Asian continent, volcanic supply and atmospheric circulation. Part of this work represents a Northwest Pacific Carbon Cycle (NOPACC) study assigned to the Kansai Environmental Engineering Center (KEEC) by the New Energy and Industrial Technology Development Organization (NEDO) and special program of the Ministry of International Trade and Industry (MITI) for studying element cycles in the ocean.

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