

Temporal change of the sources of aeolian dust delivered to Japan

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Change of atmospheric circulation system in the past is an important issue for studies of paleoclimate. Bulk chemical compositions, trace elements, isotopic ratios have been used as proxies to investigate such material transportation on the surface of the earth. However, chemical processes such as weathering may affect such proxies. Utilizing the feature that the oxygen vacancies in quartz correlate with ages of host rocks in the range up to 1 Ga, Toyoda and Naruse (2002) found that the origin of aeolian dust accumulated in Japan are different between in MIS 1 and 2. Nagashima et al. (2007) found that the origin of Japan Sea sediments changed with time from the oxygen vacancies and the crystallinity indexes.

In the present study, the temporal variation of possible origin of aeolian dust accumulated in Japan in the recent past is investigated. Dust samples representing atmospheric deposition were collected in a 1.5 m² plastic open surface collector installed in the observation field of observatories at Akita for one month. Finer grain size fractions in 1969 and in 1971 showed higher value of oxygen vacancies, which are estimated from the intensity of the E₁' center in quartz. This may be due to the fact that finer fraction came from China as aeolian dust while coarser fractions are local.

The value of oxygen vacancies in finer fractions decreases with time between 1960 and 1988 while crystallinity indexes are constant. These results indicate that aeolian dust originated from China has changed its origin in the recent past. This may correspond to the previous observation that ⁹⁰Sr/¹³⁷Cs in the deposition decreases with time (Igarashi et al., 2009).