Multi sources of eolian dust from the Taklimakan desert and their temporal change

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It is suggested that the uplift of Himalaya-Tibetan Plateau [HTP] enhanced interior aridity and resulted in development of middle latitude gobi and sandy deserts. The Taklimakan desert is one of such examples and one of the major eolian dust sources in the present East Asia. Therefore, it is important to know the timing and formation process of the Taklimakan desert in order to reconstruct of paleoclimate evolution in the East Asia and its linkage with the uplift of HTP.

The Taklimakan desert is a sand desert formed in the Tarim Basin and surrounded by high altitude mountains (e.g. the Tian Shan Mountains, the Kunlun Mountains, and the Altyn Mountains). These mountains supply considerable amount of detrital materials to the alluvial fans that developed in the mountain front (Honda and Shimizu, 1998, Sun et al., 2007). According to Sun et al. (2007), the fine silt fraction in the northern area of the present Taklimakan desert is strongly influenced by detrital materials from the southern slope of the Tian Shan Mountains, while that in southern area is strongly influenced by detrital materials from the Kunlun Mountains based on the analysis of quartz in fine silt fraction using a combination of Electron Spin Resonance [ESR] signal intensity, which reflects its formation age of (Toyoda, 1992), and Crystallinity Index [CI], which reflects its formation temperature and crystallization speed (Murata and Norman, 1976). However they did not analyze ESR signal intensity and CI of river sediments from these mountains. Therefore it is necessary to confirm there mountains really contribute detrital materials to the present Taklimakan desert. It is also important to understand temporal change in the sources of fine silt fraction in Taklimakan desert in the past in order to evaluate past changes in contribution of the dust from the Taklimakan desert to the depositional areas such as the Chinese Loess Plateau and the Japan Sea.

Here, we analyzed ESR signal intensity and CI of quartz in fine fractions (0-16 micron) of 12 present river sediments derived from surrounding mountains to the Taklimakan desert, and 15 eolian sediment samples from the sedimentary sequence at Yecheng section on the southwestern margin of the Tarim Basin that covers the interval from 4.5 to 1.6 Ma (Zheng et al., 2006).

At first, we compared those 2 parameters with surface samples from the present Taklimakan desert (Sun et al., 2007) to examine which mountains contribute to the present Taklimakan desert. Then, we try to reconstruct temporal changes in source areas of the fine silt to the past Taklimakan desert.