

The use of quartz OSL for the study of provenance of sediments from the Japan Sea

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The optically stimulated luminescence (OSL) signals from quartz are now widely utilised for dating Quaternary sediments. It is known that these signals are composed of several components with different optical sensitivities (detrapping rates). The difference in the composition of the OSL components in quartz probably indicates differences in source (e.g. host rock type and/or age). For instance, quartz in Chinese loess has dominant fast and medium components, whereas Japanese loess has an additional (medium-slow) component, which matches the typical component in young volcanic quartz. Hence Chinese and Japanese loess can be clearly distinguished by their OSL curve shapes. In the present study, we compared the quartz OSL components from Chinese loess and various types of quartz host rocks in Japan with those from two sediment cores from the Japan Sea (KT95-15-PC5, and PC-9) to test whether the OSL signals can be used as indicators of the provenance of the quartz.

The quartz OSL signals from five granites from Japan with different ages were all very weak except for the youngest Kofu Granite, and no fast or medium component was observed in any of these samples. The OSL signals from quartz in core KT94-15-PC9(39N, 139E, 807 m) were also weak. In contrast, the quartz in KT94-15-PC5(40N, 138E, 2885 m) gave much stronger signals, and the combination of the OSL components in KT94-15-PC5 was similar to those from Chinese loess. This suggests that the quartz in KT94-15-PC9 is mainly derived from Honshu Island and that from KT94-15-PC5 is dominated by aeolian dusts from Asian continent, consistent with the results from earlier work. Moreover, it is found that the relative intensity of fast and medium components varied among the 18 samples from KT94-15-PC5 deposited over the last 110ka. This variation may reflect changes in the provenance of the source material during the Late Quaternary.