# OSL dating of Japanese and Chinese loess

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Loess is widely distributed by the prevailing westerlies throughout eastern Asia, from western China to Japan. Loess sequences contain records of climate change during the Quaternary, but the chronology of loess has not been well established. Most of the available ages have been estimated using polymineral IRSL or TL; the polymineral mixture consists mainly of silt-sized quartz and feldspar grains. There are only a few luminescence dating studies of loess sediments in Japan, although there are many well-known tephra layers with independent ages based on 14C and fission track data. These independent age controls provide an opportunity to test the reliability of loess luminescence ages.

For the purpose of comparison between the luminescence ages and the other independent ages, samples were collected from sedimentary sequences of volcanic tephra and loess on the fluvial terraces at Tunan-cho, in the Niigata prefecture in central Japan and at Kitsuregawa, in the Tochigi prefecture in eastern Japan. Samples were also taken from sequences of loess deposits located at Zhengjiang in the eastern-margin of China and Urumqi in western China. Equivalent doses (De) were estimated using both polymineral IR-OSL and (post IR) blue-OSL, and quartz blue-OSL. All OSL signals were measured using ultraviolet (U-340) filters, and dose rates were measured by high-resolution gamma spectrometry.

The blue-OSL and post IR blue-OSL ages of the Japanese samples are in good agreement with the independent ages of tephras up to 500 ka, after extracting the fast OSL component from the stimulation curve. Polymineral IR-OSL ages, on the other hand, underestimated the blue-OSL and post IR blue OSL ages. However, all the three ages agreed with each other, after fading correction was conducted for polymineral IR-OSL ages.

Unfortunately, independent age control is very rarely obtained in loess deposits in China. Quartz blue-OSL from Chinese sites is dominated by the fast OSL component. Even after the correction of laboratory fading, both polymineral IR-OSL and (post IR) blue-OSL ages underestimate the blue-OSL ages from quartz from the Chinese sites. One possible explanation of this underestimation is a relatively short mean lifetime for the feldspar signals of 145 ka (not including anomalous fading).

The reason of the different behavior between Japanese and Chinese samples is not clear, but it might be caused by the difference in the type of the feldspars.