

Potential of optically-stimulated luminescence (OSL) dating to improve Quaternary geology in Japan

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The optically-stimulated luminescence (OSL) dating has become a versatile and common method for determining depositional ages of Late Quaternary sediments worldwide over the last 15 years like the radiocarbon dating. The major advantage of this method, compared to the radiocarbon dating, is its applicability to ubiquitous minerals including quartz and feldspar in a wider age range, from several decades to a million years. Its disadvantage in contrast is problems in accuracy and reliability that are derived from uncertainties in the dose rate during burial and from regional variations in luminescence properties of mineral grains. The OSL dating is therefore regarded as an alternative, but still very effective, method where the radiocarbon dating does not work for some reasons. On the contrary to the recent expansion worldwide, the application of the OSL dating to sediments in Japan has been limited yet. The main reasons for this include unfavorable luminescence properties of quartz, especially of volcanic origin, and less importance of the OSL dating due to well-established Late Quaternary tephrochronology in Japan. However, some modified or even standard protocols of the OSL dating, especially those using K-feldspar, have been proved to effective for Japanese sediments, and there are still many cases in which the OSL dating is expected to have a critical role. We review the recent application of the OSL dating to Japanese coastal sediments, including in coastal dunes, beach ridges, tsunami deposits, raised marine terraces, and alternations of loess and tephra, and summarize their achievements and problems.

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