

Dating of quaternary tephra by ESR, TL and OSL methods (1)

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Dating methods by ESR (electron spin resonance), TL (thermoluminescence), and OSL (optically stimulated luminescence) are based on the nature that unpaired electrons created by natural radiation are accumulated at traps in minerals and their amount increases with time through geological time scale. Each method quantifies the amount of electrons and holes in those traps to obtain accumulate natural radiation dose given to the mineral. The natural radiation dose is then divided by the natural radiation dose rate, measured separately, to deduce the age of the mineral. These three methods have the advantage that they can obtain ages beyond the limit of carbon 14 method in quaternary. Quartz is one of the minerals these methods can be applied, being one of the most abundant minerals on the earth's surface. Dating of quartz reveals the ages of tephra, fault movements, sediments and heated flints.

However, these method have not yet been considered to be established dating techniques because, in some cases, these methods have applied to samples in which bleaching mechanism (the event to erase the signals completely) is not established, being resulted in ages difficult to interpret, in other cases, the results gave ages inconsistent with stratigraphic sequence, and also, the examples are not enough where the ages are cross-checked with other dating techniques. In the present study, we apply these three methods to tephra, which the zeroing mechanism is clearest and best established, i. e., heating.

The dating results by these three methods of several quaternary tephra samples taken from Hokkaido and Tohoku region, Japan, will be reported.