

The comparison of Red Thermoluminescence dating and Radiocarbon dating

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A widespread tephra layer is often used as a "time marker bed" in geology and geography. They can be dated by radiocarbon method on organic materials to determine the timing of volcanic events occurred up to ca.50 ka. However, lacking of suitable material (e.g. burial wood) for radiocarbon dating is often become an obstacle to directly estimate the timing. Alternative option is using the K-Ar method, yet considerable uncertainties for dating of younger samples (< 100 ka) and limit of the dating materials, namely the requirements of high K contents minerals, also prevent from the methods ubiquitously be applicable for tephra dating. Although the period between 50 to 100 ka is very important for various studies such as Paleoclimatology and Archaeology, the chronological "gap" has been existed.

A trapped radiation charge dating technique will potentially solve these problems. We focused on development of the Red Thermoluminescence (RTL) dating for tephra since we observed that it captures stable and high intensity RTL signal. We established the dating protocol to deal with tephra to conduct RTL dating. Comparing with ages of tephra dated by radiocarbon and K-Ar agreed very well with RTL dates showing reliability of our newly developed experimental protocol. Uncertainties of the RTL ages were much reduced and they were comparable to the radiometric dating results.

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