

# Zircon U-Pb and U-series dating of Quaternary tephra beds in eastern Beringia

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Tephrochronology has emerged as an important tool for correlating Quaternary deposits across large distances, but it can be challenging to obtain direct dates on Quaternary tephra beds, particularly beyond the limit of radiocarbon dating. Zircon U-Pb and U-series dating by LA-ICP-MS is an important technique for dating young tephra (<350 ka). We demonstrate that LA-ICP-MS zircon dating can produce reliable ages for key tephra beds found in Yukon and Alaska. Here we present U-Pb and/or U-series ages for Woodchopper, PAL, and Biederman tephra — three important tephra beds in the region.

Our results show that data processing and associated corrections must be treated with caution to find the youngest zircon crystals within a population to estimate the timing of crystallization. For Pleistocene tephra, corrections for  $^{230}\text{Th}$  and, in some cases,  $^{231}\text{Pa}$  can have a substantial influence on the zircon U-Pb age calculation, as do corrections for the common-Pb. Similarly, LA-ICP-MS U-series zircon data needs to be corrected for: (1) polyatomic zirconium oxides interference generated during ablation on  $^{230}\text{Th}$ , (2) the abundance sensitivity effect (peak tail) of  $^{232}\text{Th}$  on  $^{230}\text{Th}$  and (3) the Th, U relative sensitivity. Furthermore, we compare several practical approaches to these corrections. We also discuss several strategies for optimizing the likelihood of calculating tephra maximum deposition ages (MDA) from heterotemporal populations of U-Pb and U-series ages that yield results closest to the true deposition age.

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