EGU2020-8223
https://doi.org/10.5194/egusphere-egu2020-8223
EGU General Assembly 2020

Reconstructing a Snake River Plain 'super-eruption' via compositional fingerprinting and high-precision U/Pb zircon geochronology

Ben Ellis[1] and Mark Schmitz[2]
[1]ETH Zurich, Zurich, Switzerland (ben.ellis@erdw.ethz.ch)
[2]Department of Geosciences, Boise State University, 1910 University Drive, Boise, ID 83725, USA

Despite the largest explosive eruptions posing significant potential hazards, the recurrence rate of these so called 'super-eruptions' remains poorly constrained. The younger portion of the Yellowstone-Snake River Plain province is well-known for large-scale explosive volcanism; however, the older history within the Snake River Plain remains poorly-known and partially obscured by later basaltic volcanism. To address this, we characterised the mineral cargo of four widely spaced rhyolitic ignimbrites found at the margins of the Snake River Plain that reveal a strong compositional similarity in bulk geochemistry, major crystal phases (e.g. pyroxene and ilmenite), and radiogenic isotopes. To test whether these four compositionally similar units may have had a common origin we used a tandem in-situ and isotope dilution method for U/Pb geochronology of zircon crystals. The youngest populations of zircons from all four samples are equivalent in age, and together define a pooled weighted mean $^{238}U/^{206}Pb$ age of 11.030 ± 0.006 (MSWD = 1.44, n=24). These results reveal an event with a conservatively estimated erupted volume ~1,470 km^3, of similar magnitude to the largest Yellowstone eruptions. Numerous widely dispersed tephra deposits found across the western portions of North America with geochemical affinities to the Snake River Plain province hint at the existence of other such voluminous ignimbrites. The improved ability to correlate deposits of an individual eruption shown by this and other recent studies implies that 'super' eruptive events are more common than previously thought.