

Calcite U-Pb dating of Paleozoic oceanic crust in the North Pamir, Central Asia

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A large part of Earth's surface is built up by mafic oceanic crust. Recent studies have enhanced our knowledge of the geochemical processes affecting the upper most, basaltic portion, that is infiltrated by sea water. Coogan and Gillis [1] compiled radiometric age data of multiple alteration mineral phases from present day oceanic crust (recent to Cretaceous age). They have shown that most alteration minerals, including calcite, are formed during the first 20 to 25 Ma after emplacement of the volcanic rocks. During that time span, ~85 % of heat has been extracted from the newly formed oceanic crust. Thus, infiltration and circulation of sea water is reduced.

Their findings imply, that the age of ocean floor alteration gives a sufficient minimum age estimate for oceanic crust of Paleozoic age or older. In our study, we emphasize the potential of U-Pb dating of basalt hosted calcite to solve regional geologic problems.

We dated four samples of vesicular pillow basalts and volcanic breccia from the Chinese North-East Pamir. They host different kinds of calcite. We obtained U-Pb ages between 353 and 323 Ma. They are in accordance with zircon U-Pb and hornblende ⁴⁰Ar/³⁹Ar ages derived from outcrops further west. Our age data is the first radiometric age data of volcanic rocks in the Chinese North-East Pamir.

We show that oceanic volcanic units in the North Pamir clearly post-date Cambro-Ordovician pillow lavas known from the Kudi valley in the West Kunlun. This challenges the hypothesis of a continuous, early Paleozoic Kunlun belt continuing from the West Kunlun into the North Pamir.

[1] Coogan and Gillis (2018), *Annu. Rev. Earth Planet. Sci.* 46, 21–45