[JJ] Evening Poster | S (Solid Earth Sciences) | S-GL Geology

[S-GL30]Geochronology and Isotope Geology

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Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Reliable reconstruction of geohistory is of primary importance to better envision the present and future of the Earth. Geochronology and isotope geology play major roles in the reconstruction. This session offers an opportunity to present the results of fundamental studies, including the developments / improvements of analytical methods and age calibration, as well as applications to the Earth and planetary materials. We particularly focus on: (1) radiometric dating, bio-stratigraphy, magneto-stratigraphy and stable isotopic time series that provide the age information, (2) radioisotopes and stable isotopes widely employed for analyzing the Earth and planetary systems and (3) hypothesis and numerical modeling that utilize / assimilate the age and isotopic data. We also welcome contributions that integrate a variety of relevant disciplines.

[SGL30-P03]Trace element composition and U-Pb age of travertine from Balochistan, Pakistan: possible reference material for U-Pb geochronology of calcite.

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Keywords:travertine, U-Pb dating, calcite

U-Pb dating of calcite can be widely apply to understand the timing of vein-type mineralization, fault, and other geological formations if those contain calcite, which are difficult to be dated by other methods. Reference materials for U-Pb dating of calcite, such as WC-1 (254.4 ± 6.4 Ma, Roberts et al., 2017) and ASH-15D (3.001 ± 0.012 Ma, Mason et al., 2013; Vaks et al., 2013), are available from several laboratories.

In this study, we present the geochemical characteristic of travertine from Chagai, Balochistan, Pakistan and the suitability of travertine for use as a U-Pb dating reference material. The Plio-Peistocene Koh-e-Sultan volcanic rocks occur in the Chagai volcanic arc in the western part of Pakistan. These are represented by andesite to dacite lava flow and volcanoclastics including agglomerate, tuff, lapilli tuff, volcanic conglomerate and volcanic breccia (Siddiqui et al., 2009). The travertine occurs in the Koh-e-Sultan volcanic province, and is commonly known as onyx marble. Travertine shows layered structure with different color from white, green to brown. Green and brown parts consist of calcite. White color consists of calcite and aragonite. In general, travertine is formed by a precipitation of carbonate minerals from hot spring. Sr isotopic compositions of the travertines are same as those of dacites of the Kohe-e-Sultan.

High initial $^{238}U/^{204}Pb$ (μ) content is requirement for precise U-Pb dating (Rasbury &Cole, 2009), because calcite generally contains significant amount of common Pb. U/Pb ratio of the travertines range from 0.8 to 773. Uranium contents of the travertines range from 0.7 to 38 μg/g. The green colored travertines contain relatively high U concentrations. We analyzed travertines with relatively high U/Pb ratio and U contents for U-Pb dating. U-Pb dating was attempted with the solution ICP-MS as well as the LA-ICP-MS utilize a New Wave Research 193UC excimer laser ablation system, coupled to a Nu Instruments Nu Plasma II multi-collector ICP-MS or Agilent 7700 quadru-pole ICP-MS. The result shows age of c.a. 1.5 Ma. The travertine with high Pb/U ratio and U content can be a suitable reference material for the dating of Quaternary age.

[Reference]
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