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Support for the Astronomically Calibrated 40Ar/39Ar Age of Fish Canyon Sanidine: Evidence from the Quaternary

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Fish Canyon sanidine (FCs) is the neutron fluence monitor most widely used in Cenozoic argon geochronology. Recommend published ages for FCs have been determined through various intercalibration techniques, but have varied by up to 2% over the last three decades. The robust quality of the astronomical timescale, with precision better than 0.1% for the last 10 million years for directly tuned sections, suggests intercalibration with K-bearing minerals intercalated in astronomically tuned stratigraphic sections as the best way to proceed with addressing the true age of FCs. Recently, Kuiper, et al. (2008) determined an astronomically calibrated 40Ar/39Ar age of 28.201 $\pm$ 0.046 Ma (2σ), relative to the indirect astronomically tuned Moroccan Melilla Basin Messâdit section. Here, we provide independent verification for the Kuiper, et al. (2008) FCs age using sanidines extracted from the A1 tephra intercalated in the direct astronomically tuned Faneromeni section on Crete. The tuning of this section was achieved through correlations to long (400kyr) and short (100kyr) eccentricity cycles, followed by tuning of sedimentary cycles to precession and summer insolation by applying the La2004(1,1) orbital solution (Laskar, et al., 2004). 40Ar/39Ar analyses of the < 1 Ma Bishop Tuff relative to our proposed astronomically calibrated 40Ar/39Ar age for FCs yield an age that is indistinguishable from existing U-Pb zircon (0.7671 $\pm$ 0.0009 Ma; Crowley, et al. (2007)) and independent astronomical ages of this unit. Thus, the astronomically calibrated 40Ar/39Ar age for FCs provides concordant ages for a Quaternary tuff across multiple dating techniques.
Single and multi-crystal 40Ar/39Ar experiments were conducted on a Nu Instruments Noblesse multi-collector noble gas mass spectrometer. The use of the multi-collector instrument allowed us to obtain high precision analyses with fully propagated external errors for FCs near the 0.1% goal of EARTHTIME.

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