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Supporting Evidence for the Astronomically Calibrated Age of Fish Canyon Sanidine

The relative nature of the $^{40}Ar/^{39}Ar$ radio-isotopic dating technique requires that the age and error of the monitor mineral be accurately known. The most widely accepted monitor for Cenozoic geochronology is the Fish Canyon sanidine (FCs), whose recommended published ages have varied by up to 2% over the past two decades. To reconcile the discrepancy among recommended ages, researchers have turned to the use of (i) intercalibration experiments with primary argon standards, (ii) cross-calibration with U-Pb ages, and (iii) cross-calibration with sanidine-hosted tephras present in astronomically tuned stratigraphic sections. The increasingly robust quality of the astronomical timescale, with precision better than 0.1% for the last 10 million years, suggests this method of intercalibration as the best way to proceed with addressing the true age of FCs. Recently, Kuiper, et al. (2008) determined an astronomically calibrated age of 28.201 ± 0.046 Ma (2σ), based upon the Moroccan Melilla Basin Messâdit section. Here, we provide independent verification for the Kuiper, et al. (2008) FCs age using sanidines extracted from a tephra intercalated in another Mediterranean-based astronomically tuned section. The direct tuning of this section was achieved through correlation to long (~400-kyr) and short (~100-kyr) eccentricity, followed by tuning - of basic sedimentary cycles - to precession and summer insolation, using the $La2004_{(1,1)}$ astronomical solution (Laskar, et al., 2004).

We employed a Nu Instruments Noblesse multi-collector noble gas mass spectrometer for the $^{40}Ar/^{39}Ar$ experiments, analyzing single crystals of FCs relative to sanidines from the astronomically dated tephra. The use of the multi-collector instrument allowed us to obtain high precision analyses with a level of precision for fully propagated external errors for FCs below the 0.1% goal of EARTHTIME.

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