CONSTRAINING THE AGE OF THE MATUYAMA-BRUNHES REVERSAL USING INTERCALIBRATED 40AR/39AR AND ASTRONOMICAL AGES OF THE BISHOP TUFF AND AUSTRALASIAN TEKTITE

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Recent high-resolution δ18O records from North Atlantic (I)ODP cores, with reliable paleomagnetic signals, have placed the mean age of the Matuyama-Brunhes (MB) geomagnetic polarity reversal ca. 8 ka younger than previous estimates when correlated to ice-volume age models (Channell et al., 2010). However, this age offset is not synchronous with a new astronomically intercalibrated 40Ar/39Ar age for the normal-polarity Quaternary Bishop Tuff, stratigraphically above the MB boundary by approximately 15 ka. In order to best constrain the age of the boundary, an astronomically calibrated radio-isotopic age is needed on a datable unit from the reversed-polarity side of the MB boundary. The Australasian tektite is a suitable unit from the Matuyama chron for dating the MB boundary because the positions of microtektite layers relative to the MB boundary have been documented in (I)ODP and other drill cores. Previous analyses of the drill cores have estimated the duration between the tektite layer and the MB boundary between 8 and 12 ka, and an astronomical age has been assigned to this unit (Horng et al., 2002). Using a Nu Instruments Noblesse multi-collector noble gas mass spectrometer, we present 40Ar/39Ar step-heating and fusion age data, relative to the astronomically calibrated Fish Canyon sanidine, on the Australasian tektite, and have updated the tuning model for this layer using the La2004 orbital solutions. Using 40Ar/39Ar ages for these two units that bracket the boundary along with sedimentation rates determined through drill core analysis, we approach the MB boundary from both sides to arrive at a boundary age that is consistent with independent astronomical ages proposed for the polarity transition. This novel approach provides a best-fit age for the MB boundary that incorporates radio-isotopic dating, astrochronologies, and sedimentation rates.

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