Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

STT58-03 Room:106 Time:May 24 16:00-16:15

The age of Matuyama/Brunhes polarity reversal: Paleomagnetic records, astronomical tuning and radiometric dating

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Channell et al. (2010) suggested that the midpoint of the M-B boundary lies at 773.1 ka, ?7 kyr younger than the presently accepted astrochronological age for this polarity reversal (780-781 ka). Their results are based on the five high-resolution Matuyama-Brunhes polarity transition records from the North Atlantic placed on isotope age models produced by correlation of the d18O record to an ice volume model. According to this results, they further inferred that the 40Ar/39Ar Fish Canyon sanidine (FCs) standard age that best fits the astrochronological ages is 27.93 Ma, which is younger than the two recently proposed FCs ages of 28.201 +- 0.046 Ma (Kuiper et al., 2008) and 28.305 +- 0.036 Ma (Rene et al., 2010). However, recent study by Ganerod et al. (2011) suggested an age of 28.393+-0.194 Ma for FCs based on paired 40Ar/39Ar and 206Pb?238U radiometric dating supporting the calibrations of Kuiper et al. (2008) and Renne et al. (2010). Furthermore, recent study by Rivera et al. (2011) suggested an age of 28.172+-0.028 Ma for FCs based on cross-calibration with an astronomically tuned age of A1 tephra sanidines in the studied sequence of Faneromeni section in Crete. The discrepancy is significant that needs to be investigated carefully in terms of every aspects of the whole system involved. We therefore review the literatures related to the topic including the solar system dynamics, geomagnetic reversal morphologies, climate system responses, calibration procedures of radiometric dating and the recording mechanisms of each parameters to the sediments involved.

Keywords: Matumaya/Brunhes polarity reversal, radiometric dating, paleomagnetic records, astronomical tuning, reliability of polarity transition age, Fish Canyon sanidines