HIGH PRECISION RADIO ISOTOPIC AGE CONSTRAINTS ON THE LATE EOCENE – EARLY OLIGOCENE GEOMAGNETIC POLARITY TIME SCALE

SAHY, Diana¹, FISCHER, Anne², CONDON, Daniel¹, TERRY, Dennis O. Jr³, HIESS, Joe¹, ABELS, Hemmo⁴, HUESING, Silja K.⁴, and KUIPER, Klaudia², (1) NERC Isotope Geosciences Laboratory, British Geological Survey, Keyworth, Nottingham, NG12 5GG, United Kingdom, dihy@bgs.ac.uk, (2) Faculty of Earth and Life Sciences, Vrije Universiteit, 1085 De Boelelaan, Amsterdam, 1081 HV, Netherlands, (3) Earth and Environmental Science, Temple University, Philadelphia, PA 19122, (4) Department of Earth Sciences, Utrecht University, Budapestlaan 17, Utrecht, 3584 CD, Netherlands

An accurately and precisely dated geomagnetic polarity time scale (GPTS) is an essential tool for the global and regional correlation and integration of disparate stratigraphic records. For the late Eocene-Early Oligocene interval, both marine magnetic anomaly profile and astronomical tuning derived GPTSs are available, however the uncertainties associated with the ages of individual reversals are, in both cases, difficult to quantify and likely to be considerable. Additionally, while the two time scales are generally in good agreement, some discrepancies do occur. With its multiple volcanic tuffs and relatively high sedimentation rates the terrestrial White River Group of North America is an ideal target for a study to develop an integrated, accurate and highly-resolved geochronologic framework and associated magnetostratigraphic record. Earlier studies have demonstrated the feasibility of both geochronologic and palaeomagnetic studies in this area (Swisher and Prothero, 1990; Prothero and Swisher, 1992)

We have sampled two overlapping White River sections, at Flagstaff Rim (Wyoming) and Toadstool Geologic Park (Nebraska). Together, these two sections yield a somewhat continuous record spanning ~ 5 Myr, from magnetochron C16n.2n to C12n. The geochronology of our White River record is based on 238U-206Pb ID-TIMS and 40Ar/39Ar ages, obtained on zircon and sanidine respectively, from 16 primary air-fall tuffs. These U-Pb ages are consistently younger than previously published 40Ar/39Ar data (renormalized to 28.201 for FCs) by as much as 0.8 Myr. 700 orientated cores were collected from Toadstool Park and Flagstaff Rim at an average resolution of 50 cm. 210 of these samples have so far been analyzed using a combination of thermal and AF demagnetization techniques. With the exception of an additional normal polarity zone interpreted as C16n.1n in the lower part of the Flagstaff Rim section, our preliminary magnetostratigraphic record is in relatively good agreement with previously published data. The combination of high resolution magnetostratigraphy and high precision geochronology will yield well constrained, accurate and precise ages for the Late Eocene-Early Oligocene part of the GPTS, leading to an improvement in the integration of marine and terrestrial records of the E/O transition.

2011 GSA Annual Meeting in Minneapolis (9–12 October 2011)

General Information for this Meeting

Session No. 237
EARTHTIME Geochronology: Improving Age Interpretations through Integration and Intercalibration
Minneapolis Convention Center: Room 102D-F
8:00 AM-12:00 PM, Wednesday, 12 October 2011