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The first continental geomagnetic record of an elusive Porcupine?

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The Porcupine geomagnetic excursion was firstly described at the IODP Site U1308 (North Atlantic). It is a reverse polarity record defined near the top of the Gauss chron (within C2An.1n) and chronostratigraphically constrained between the Kaena and the base of Matuyama reversed chrons. So far, it has been only reported in two different core sections from that site (U1308C-20H-5 and U1308F-20H-2; Channell et al., Q Sci. Rev. 2016). The Porcupine excursion displays a mean age of 2.737 Ma (with an undefined duration) and corresponds to MIS G6 and G7.

The almost 100 m-thick sedimentary infill of the Villarroya Basin (NE Spain), covers part of the Pliocene-Pleistocene period, from about 3.2 Ma to 2.6 Ma. It has been chronologically constrained by means of biostratigraphic and magnetostratigraphic analysis from the middle-upper part of Gauss (chron C2An.2n between Kaena and Mammoth reversed subchrons) to the lower-middle part of Matuyama chron (above the Feni normal event, formerly Réunion). In that work, a short reversal was identified in the upper part of the normal interval N2 of the local magnetostratigraphic sequence attributed to the top of the Gauss chron (C2An.1n around meter 17, figure 7 in Pueyo et al. IJES, 2016), which could possibly represent the first continental record of the Porcupine excursion (ca 2.7 Ma). Such identification was made possible by the occurrence of an outstanding lithological record; annually varved millimetric-scale lacustrine deposits at the base of the basin displaying unusually high sedimentation rates, which may have enabled the detection of such short magnetic excursion.

Given these encouraging results, these deposits were specifically targeted for a subsequent high-resolution palaeomagnetic study focused on ca. 6 m thick subsection where 55 new stratigraphic levels (mean spacing of 10 cm) were studied in detail. In total, more than 120 new specimens were analyzed. Both, stepwise AF and TH demagnetizations of samples were carried out in the paleomagnetic laboratories of the University of Burgos and the National Research Centre on

Human Evolution (CENIEH) using 2-G cryogenic superconducting magnetometers. ChRM directions unblocking temperatures between 250-550°C yield the best results and document a complex reverse polarity record. A preliminary and cautious estimation of the time span of this excursion based on the number of annually varved sediments gives a duration of less than 0.5 ka if the sedimentation rate is assumed to be constant and significant sedimentary hiatuses are ruled out.

Channell, J. E. T., Hodell, D. A., & Curtis, J. H. (2016). Relative paleointensity (RPI) and oxygen isotope stratigraphy at IODP Site U1308: North Atlantic RPI stack for 1.2–2.2 Ma (NARPI-2200) and age of the Olduvai Subchron. *Quaternary Science Reviews*, 131, 1-19.

Pueyo, E. L., Muñoz, A., Laplana, C., & Parés, J. M. (2016). The last appearance datum of Hipparion in Western Europe: magnetostratigraphy along the Pliocene–Pleistocene boundary in the Villarroja basin (Northern Spain). *International Journal of Earth Sciences*, 105, 2203-2220.