Combined K-Ar and 40Ar/39Ar dating of the upper Jaramillo reversal

Herve Guillou (1), Juan Carlos Carracedo (2), Catherine Kissel (1), Carlo Laj (1), Sebastien Nomade (1), Francisco Jose Perez Torrado (2), Alejandro Rodriguez Gonzalez (2), and Camille Wandres (1)

(1) LSCE-CEA-CNRS-UVSQ-IPSL, France, (2) Universidad de Las Palmas de Gran Canaria - Espana

The Jaramillo subchron was first evidenced in 1966 (Doell and Dalrymple) through the Rhyolotic domes of the Valles Caldera, New Mexico (USA). 40Ar/39Ar studies achieved by Spell et McDougall (1992), Spell et Harrison (1993), Izett and Obradovich (1994) and Singer et al. (1994) defined the base of this subchron at 1053 ± 6 ka, and the ceiling at 986 ± 5 ka. Channell et al. (2009) delimited the age of the Jaramillo subchron by astronomic calibration (base 1071 ka, top 990 ka).

To provide additional absolute ages on this geomagnetic period, which is critical to improve our knowledge of the earth magnetic field behaviour, we have carried out a study combining paleomagnetism and isotopic dating of a lava sequence from Tenerife island. This sequence of basaltic lava flows is some 500 m thick. The first 400 m present, based on field magnetometer measurements, normal polarity lavas, with dykes of normal and reverse polarity, passing at the top to reverse polarity lavas. Preliminary K-Ar ages bracketed this sequence between 1018 ± 18 ka and 978 ± 17 ka. Therefore, the upper Jaramillo reversal at least appeared to be potentially recorded in this sequence. A more detailed paleomagnetic study was then carried out to more precisely delimit the reversal itself (see Laj et al., session EMRP3.4). We have undertaken 40Ar/39Ar incremental heating and unspiked K-Ar experiments on groundmass from four transitionally magnetized flows. The first transitional flow is K-Ar dated at 993 ± 18 ka and 40Ar/39Ar dated at 991 ± 13 ka, the second at 981 ± 17 ka (K-Ar) and 1000 ± 13 ka (40Ar/39Ar), the third at 950 ± 17 ka (K-Ar) and 1000 ± 8 ka (40Ar/39Ar) and the fourth at 984 ± 17 ka (K-Ar) and 977 ± 12 (40Ar/39Ar). 40Ar/39Ar ages and K-Ar ages (relative to FCT 28.02 Ma) are indistinguishable at 2σ. The age of the upper boundary of the Jaramillo event calculated combining 40Ar/39Ar ages and K-Ar ages is 992 ± 6 ka, in agreement with previous estimates.