Towards a Continuous Record of Earth Magnetic Field Reversals by Secondary Pyrrhotite pTRMs

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Partial Thermoremanent Magnetisations (pTRMs) by secondary pyrrhotite, recorded during fast cooling in contact metamorphic limestone, were used for the first time to test the ability of recording Earth Magnetic Field (EMF) Reversals within a single sample. For this propose, samples from marly limestones were taken in the vicinity of intrusions from the Tethyan Himalaya (Manaslu), Elba Island, Toscany and the Isle of Skye. For each location pyrrhotite was identified by the unblocking spectra of the NRM and the thermal demagnetisation of IRM. Thellier-Thellier-tests of a laboratory TRMs incl. MD checks have proven that pyrrhotite particles are predominantly in the SD range and, therefore, are able to record independent pTRMs. Additionally FORC analysis have shown that the magnetic particles do not interact. In selected sites from Elba Island thermal demagnetisation of the NRM reveals a reversed low temperature (150 (ãC-250 (ãC) and a normal high temperature (290 (ãC-320 (ãC) component. The two components include an angle of ~150 (ã and are linked by a gradual transition over an average temperature range of ~40 (ãC. Positive fold tests on the low (k = 10.2 ; |Á95 = 11.0) and the high temperature component

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(k = 20.4 ; |Á95= 8.4) evidence that the NRM is a TRM. A scenario where the low temperature component is caused by a second heating event is unlikely due to the gradual transition of the NRM and the lack of evidence for a multiple intrusion. An estimation of the time enveloped in the transitional temperature range retrieved by thermal modelling of the contact metamorphism lies at 10000 yr. This time span is comparable with an average value for EMF reversals.