

Ediacaran ultra-low geomagnetic field intensity: Evidence for a young inner core

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The age of Earth's solid inner core represents a fundamental question in the evolution of the planet. Proposed ages for the onset of inner core nucleation (ICN) span some 2 billion years, from 500 Ma to older than 2500 Ma. Time-averaged paleomagnetic data are required to gain insight into the ancient geodynamo. Previously there have been no time-averaged paleointensity data corresponding to the youngest proposed ages of ICN. Young ICN onset ages imply a relatively high value for core thermal conductivity. Here, we discuss new paleointensity data from single silicate crystals, hosting magnetic inclusions, that fill this data gap. Plagioclase feldspar (Bono et al., 2017) and clinopyroxene data from an Ediacaran-age (ca. 565 Ma) layered mafic intrusion (Quebec, Canada) record extraordinarily low paleofield strengths, lower than any other known time-averaged value and more than 10 times smaller than the strength of the present-day field. This ultra-low field is accompanied by evidence for a hyper-reversal frequency and non-dipolar fields. We interpret these paleomagnetic observations as recording the near collapse of the geodynamo, coincident with ICN, approximately 565 million-years ago.

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