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Two-silicate crystal approach to paleomagnetism and inner core growth

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The time of onset of growth of the inner core remains an outstanding issue, with proposed ages spanning some 2 billion years, from 500 Ma to older than 2500 Ma. Heretofore, few paleointensity data are available for the youngest proposed ages of inner core formation, which would also correspond to high values of core thermal conductivity. Single silicate crystal paleomagnetism from intrusive rocks can be used to fill this gap. Advantages include the potential to isolate magnetic carriers meeting the true physical requirements for paleointensity recording (single domain, non-interacting), isolation from natural alteration and time-averaging of the geomagnetic field. Here we apply a two-silicate crystal approach (Tarduno et al., 2007) to the study of plagioclase and pyroxene from the ca. 565 Ma Sept Iles Intrusive Suite of northern Quebec, Canada. Preliminary total thermal remanent magnetization and Thellier-Coe paleointensity data from clinopyroxenes yield extraordinarily low paleofield estimates ($<$1 x 10^{22} A m^2), more than 10 times smaller than the strength of the present-day field, and consistent with previous values from plagioclase feldspars (Bono et al., 2017). The consistency of these values further supports preservation of a thermoremanent magnetization. These data record the lowest time-averaged field yet reported. Together with data sets indicating high reversal rates and field instability, these paleointensities point toward a young onset of inner core growth.