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# Paleomagnetic constraints on late Archaean continental drift of the Pilbara craton (NW Australia) and comparison with apparent polar wander of the Kaapvaal craton

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Palaeomagnetic studies of late Archaean terrains can play a crucial role in describing early Earth geodynamic processes. The amount of late Archaean terrain is limited and there is an even greater paucity of low metamorphosed terrain, required for the survival of primary natural remanent magnetisation (NRM). The ca. 2775 – 2715 Ma Nullagine and Mount Jope Supersequences of the Pilbara Craton, Western Australia, constitute one of the few late Archaean successions that have been preserved in very good conditions.

Our palaeomagnetic studies and positive field and laboratory tests prove that primary NRM is still present in the (mainly) flood basalts of the Pilbara. In addition, our results are consistent between different basins.

The geomagnetic field is shown to have reversed at least four times during the formation of the studied succession, which compared to the Phanerozoic is still a low reversal frequency. We find a palaeolatitude shift of 14.4˚ across a boundary that also marks a major geochemical change. The average speed of this shift is 4.8˚ / Myr or ca. 50 cm/yr. We suggest that this shift represents a rapid phase of horizontal movement (rifting), possibly in combination with true polar wander, a fundamental observation for late Archaean geodynamic processes.

We compare the australian results with new and published data for the Kaapvaal craton

(South Africa), providing an estimate of apparent polar wander between 3200 – 1900 Ma. A major part of the Kaapvaal craton has been affected by remagnetisation during emplacement of the Karoo igneous province. The general lack of age constraints and positive field testst of the NRM imply that existing paleomagnetic data cannot convincing determine drift rates for the Kaapvaal craton, and does not provide robust support for the *Vaalbara* hypothesis, the connection between Kaap*vaal* and Pil*bara* cratons.