The Cretaceous Normal Superchron: records from the Pacific, Indian and Atlantic oceanic crust

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The Cretaceous Normal Superchron (CNS) is a ~40 Myr-long period extending between Chrons M0 and 34 (~120-83 Ma) during which the geomagnetic field polarity remained normal, although the possibility of some short reversed-polarity events cannot be ruled out. Systematic variations of the geomagnetic paleointensity have been suggested based on a deep-tow magnetic profile acquired in the Central Atlantic Ocean and selected sea-surface magnetic profiles worldwide crossing the whole CNS (Granot et al., *Nat. Geo.*, 2012). According to these authors, three sub-periods separated by two ubiquitous markers, Q1 and Q2, show successively moderate (M0-Q2), very dynamic (Q2-Q1) and very smooth (Q1-C34) geomagnetic paleointensity fluctuations. Here, we extend this study by using two additional data sets: a deep-tow magnetic profile acquired across the central, most dynamic part of the CNS in the South-Western Indian Ocean, and a set of sea-surface magnetic anomalies collected across two parts of the CNS in the Northern Pacific Ocean. These data sets are complementary. The high resolution of the deep-tow profiles is hampered by their uniqueness, with the risk to interpret spurious local effects as paleointensity variations. To alleviate this risk, we try to assess the two-dimensional character of the magnetized sources by analyzing vector magnetic data acquired during the South-Western Indian Ocean deep-tow survey. The advantage of the sea-surface Northern Pacific Ocean survey is the multiple profiles that can be compared and eventually stacked for a better signal/noise ratio. Unfortunately, the oceanic crust created during the CNS in the Northern Pacific Ocean displays a lot of anomalous volcanic seamounts. Again, we assess the two-dimensional character of the magnetized sources by analyzing vector magnetic data to avoid the effect of these seamounts. Only sea-surface magnetic profiles in the Northern Pacific Ocean have been collected ~5 km above the magnetic basement that results in much lower spatial resolution to compare to the ~1 km of the deep-tow profiles in the other area. But, the half-spreading rate there is 60-70 km/Myr, whereas it is ~30 km/Myr in the South-Western Indian Ocean and ~20 km/Myr in the Central Atlantic Ocean. This means that the time resolution of the deep-tow profiles becomes only about twice better than that of these sea-surface profiles in the Northern Pacific Ocean. We combine these data to evaluate the previous hypothesis of three sub-periods with distinct paleointensity signature within the CNS, assess the existence of the Q1 and Q2 markers, and tentatively build a more reliable geomagnetic paleointensity variation of the CNS.

Keywords: Cretaceous Normal Superchron, Geomagnetic paleointensity variation, Marine geomagnetic anomalies, Oceanic crust

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