
Do the geological records correlate with the supercontinent assemblies?

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Résumé

The supercontinent cycle is a complete paradigm in plate tectonics' evolution. Four different cyclicities are currently published and explain the assemblies and dispersals of all major landmasses at different times (Sc 500 Myr, Sc 600 Myr, Sc 800 Myr and Sc Acc). Six possible supercontinents are recovered in Earth's history called Kenorland, Columbia, Rodinia, Gondwana, Pangea and maybe Eurasia. The acceleration of the supercontinent cycle recovers the assemblies of these supercontinents at -2000, -1000, -540, -260 and -40 Myr. The Sc Acc excludes Kenorland but includes all other supercontinents. However, the Sc 600 and Sc 800 exclude Gondwana and Eurasia as supercontinents. The Sc 500 includes almost all supercontinents besides the recent speculative Eurasia. Therefore, the geological outcomes to these supercontinent cycles need to be assessed. Whether the supercontinent cycle is the major driver in plate tectonics' evolution has not been investigated yet. If true, this outcome would result in increased geological records formed at each supercontinent. In this research, the correlations between the geological records and supercontinent assemblies are investigated by statistical analyses. The carbonatite, kimberlite, metamorphic, zircon, monazite and hafnium records are analyzed using Spearman correlation to investigate common relationships. This investigation reveals that most geological archives have strong interlinks and relationships (0.660.89). Moreover, hafnium, metamorphism, zircon and monazite are the most correlated geological archives. Thereafter, the geological archives are correlated against the different supercontinent cyclicities. It is thus showed, that the Sc Acc moderately fits with the geological records (ρ s average correlation=0.41). On the other hand, constant cyclicities (Sc 500, Sc 600, Sc 800) reveal weaker correlations with the geological records (average correlation ρ s < 0.23). A discussion on supercontinent cyclicities is thus proposed which highlights the geological differences between the accelerated and the constant cyclicities. This discussion concludes that only the Sc Acc could support the cycle as the major driver in plate tectonics.

Mots-Clés: supercontinent cycle, geological records, Spearman correlation, Gondwana, Eurasia

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