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Does Tibet represent a future-craton?

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Cratons consist of Archean and Proterozoic rocks on their surface. Although they are underlain by thick lithosphere their top surfaces are usually near sea level. Some recent models argue that craton formation results from crustal thickening caused by shortening and subsequent removal of the upper crust by erosion. This process would expose a high-grade metamorphic crust. However, the data we compiled from the world's cratons show that the greenschist-grade metamorphics and even supracrustal sedimentary rocks are preserved and with few exceptions surfaces of cratons that formed during the cratonization do not expose high-grade rocks everywhere, most not even in the largest part of their surfaces. Some of them are dominated by low-grade to non-metamorphic rocks and they are not even distributed in only one part of the craton but occur in widely dispersed areas from north to south and east to west.

In North America, the Superior Province, in India, the Singhbhum and Raj Mahal cratonic pieces, in North China, in the Baltic, Tanzanian, Congo, North African and Arabian, Guyana, São Francisco, Pilbara and in Yilgarn cratons, not only greenschist-facies metamorphic rocks but also undeformed sedimentary rocks are displayed at their surface. Wholesale underthrusting of the Indian plate beneath the Tibet plateau creates a persistent buoyancy which will cause erosion of the crust and when it stabilized it will reveal only high-grade rocks. In this respect, none of these cratons show a uniform Tibet-like environment for their formation. Instead, the distribution of the rock assemblages and the structural relationship between them indicate that they were formed by the amalgamation of magmatic arcs and associated subduction-accretion complexes that were eventually involved in a final continental collision. This leads us to the conclusion that craton formation does not require total removal of upper crust. Instead, the granulitization of the roots of arcs may have been responsible for weighing them down. The best candidate of a craton forming event is seen in the Altaids, a Palaeozoic superorogenic system which has not been deformed since the early Cretaceous.