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Magmatism : A Crustal and Tectonics Perspective

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ABSTRACT - The Earth's continental crust constitutes a major interface between the inner and outer envelops of the planet, controlling the differentiation of magmas produced in the mantle and their transfer to the surface. This close link facilitates the use of different chemical proxies to qualitatively unravel the crustal thickness related to fossil magmatic systems based on the message carried by magmas. This paper aims to bridge different results of statistical petrology, recently obtained at different scales of observation, in a global geodynamic model. Statistical analyses applied to a large multidimensional database of magmatic rocks show that crustal thickness could actually exert a first-order control on the composition of magmas, which become more calc-alkaline and comparatively less tholeiitic with increasing crustal thickness. Using this correlation, we document the progressive build-up of a thick (> 40 km) Jurassic to Cretaceous accretionary belt along the Circum-Pacific Orogenic Belts (CPOB) that bounded the Panthalassa Ocean. The destruction of this thick belt started at ca. 125 Ma and was initially recorded by the thinnest magmatic systems hosting amphibole-bearing magma. Thinning of the CPOB became widespread in the northern regions of western America and in