The Zimbabwe Craton: horizontal accretion, granite emplacement and diachronous late-Archean crustal growth

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Models explaining volcanogenic, intrusive, structural-metamorphic and metallogenic patterns require an understanding of the tectono-magmatic processes that resulted in the formation and accretion of crustal segments. Over the past 25 years, the evolution of the Zimbabwe craton has been explained using a concept referred to as the 'Belingwe Model'. The model recognizes a non-repetitive, autochtonous stratigraphy that has been correlated across much of the craton. However, recent studies show that tectonic stacking of the stratigraphy has played an important role in the evolution of the greenstone sequences. The presence of glide surfaces in the Archean stratigraphy means that the concept of a craton-wide stratigraphy is incomplete, that stratigraphic thicknesses are incorrect and that some greenstone sequences are at least in part allochtonous.

High precision zircon age dating has revealed that stratigraphic correlations across some major shear zones can not be substantiated. In selected shear zone bounded tectonic domains, volcanism, sedimentation, deformation and plutonism occured over limited periods of time of between 10-30 Ma. Late Archean crustal growth was diachronous across the craton and was oldest in the west (ca. 2.70-2.67 Ga) and youngest in the northeast (ca. 2.61-2.58 Ga), culminating in an oblique, E-W directed orogenic event (Zambezi Belt). Crustal evolution evolved in two stages. The first stage involved horizontal accretion of oceanic sequences, volcanic arcs and microcontinents. Structural and kinematic data show that the accretion was westward, which is supported by the geochronological data. The second stage involved large-scale crustal melting and generation of granites, and led to cooling and stabilization of the craton.