

Tectonic Evolution of Late Archaean Divergent and Convergent Continental Margins

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The Pilbara and Kaapvaal Cratons contain examples of Late Archaean rift and passive-margin environments. Both functioned as stable continental lithosphere by 2.88 Ga. In the Pilbara ~2.77-2.74Ga continental tholeiites and clastic sedimentary rocks were deposited in an intracontinental rift basin on older crust. Overlying 2.725-2.715Ga flood basalts were deposited in a superposed rift basin. Submarine facies developed in the south with a marine transgression by 2.68Ga. Successful rifting of the southern margin of the craton followed emplacement of sills and pillowed tholeiites. Overlying ~2.6 Ga shales and iron formations represent a sediment-starved passive margin basin. The Kaapvaal Craton records a parallel history.

Late-Archaean granite-greenstone terranes record a convergent margin tectonic cycle. Most start with ~2.77Ga submarine arc and back-arc basin volcanism, with a major pulse of calc-alkaline, tholeiitic and komatiitic volcanism between 2.72 and 2.69Ga. Basin closure and terrane accretion started at about 2.69Ga in the Abitibi Belt, but with development of 2.69-2.65Ga submarine extensional back-arc basins in the Yilgarn, Slave and Zimbabwe Cratons. In the eastern Yilgarn regional granitoids were emplaced during this period rather than during subsequent compressive deformation. Closure of basins resulted in remnant ocean flysch and molasse sedimentation and compressive and strike-slip deformation by 2.63Ga. Comparison of coeval divergent and convergent continental margins indicates that Archaean and younger tectonic cycles did not differ significantly in either style or duration.