The magmatic and tectonic construction of Archaean continental crust and why it accelerated

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My previous work (e.g. IGC'92, IUGG99) has shown that two major subduction-related processes, STE and PSM, are widely evident in the Phanerozoic. STE (subduction tectonic erosion) shallowly and rapidly undercuts the upper plate for hundreds of kilometres. The process is confined to young subducting plates, implying thermal buoyancy provided by some of their low velocity zone (LVZ) being integral with the plate. When subduction stops, LVZ heat thermally expunges the 'slab', melts the interface crustal material and produces widespread silicic/granitoid PSM (post-subduction magmatism) in the upper plate.

STE and PSM seem to have dominated the construction of mid and late Archaean continental crust. Greenstone belts are seen as the forearcs of intra-oceanic subduction zones, undercut (thinned) and greatly enlarged by STE. Interruptions in subduction then resulted in wide belts of quasi-coeval TTG-granitoid intrusion. Komatiite compositions (and spinifex textures?), occurrence of komatiite tuff and felsic differentiates imply, not a subduction relationship, but that the early Earth had a wet mantle, inherited from a new mode of core formation, briefly outlined.

The wet mantle's very low viscosity made convection more than able to keep up with the declining heat supply, evident as deepening MOR crests, onset of craton erosion and more frequent interruptions in subduction. PSM advects to the surface mantle LVZ heat that would otherwise return to the mantle heat budget, so interruptions and crustal additions became more frequent. Finally this led to a 2.45-2.22Ga heat budget crisis during which MOR and subduction activity ceased (no greenstone or TTG dates).