What happened in the pelagic environments of Archean?

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Two types of basalt/chert sequences occurred in the pelagic environments during the Archean period. One is the tholeiitic basalt/thick ferruginous chert sequence. The source of the ferruginous chert was mostly a high-T hydrothermal solution enriched in iron and silica at a MOR. The ferruginous chert deposited as in situ hydrothermal precipitates on Fe-rich, low-K tholeiites of MORB origin. The tholeiite units are pervasively subject to seafloor hydrothermal carbonatization that played an important role as a sink of atmospheric and oceanic CO_2 in the Archean. Massive silica veins that were originally hydrothermal feeders in normal fault zones in the spreading center occur in the tholeiite units. Intense and widespread hydrothermal activity at a MOR probably produced well-developed thick chert sections on oceanic crust. The other is the komatiitic basalt/thin chert sequence. The geochemical signatures of thin chert sections suggest that they were most likely formed by low-T, weak hydrothermal activity that may have been associated with hot-spot volcanism. This study shows Archean cherts were deposited in a variety of environments ranging from a mid-oceanic spreading center to a convergent plate boundary via a hot-spot. This variation was most likely due to horizontal plate motions which accordingly support the operation of plate tectonics in the Early Archean.