

Archaean Gneiss Terranes and Plate Tectonics: How Far Back?

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Understanding how Archaean gneiss complexes were constructed is critical to the understanding of the processes of formation and evolution of Archaean continental crust. An important question is how far back in Earth's history can evidence of a mechanism akin to plate tectonics be recognised. Evidence from West Greenland has allowed working models to be formulated at two scales despite intense polyphase metamorphism and tectonism that has invariably obliterated much of the data required.

First, on a cratonic scale, the best understood part of the craton comprises four terranes dominated by TTG lithologies and separated by tectonic contacts. To the north, gneisses which have undergone a granulite facies event at c. 2740 Ma were juxtaposed against those containing c. 3000 Ma granulite facies rocks. However, the contact appears to have been obliterated during metamorphism at c. 2500 Ma. To the south, the crust can be divided into at least three blocks each displaying varying metamorphic histories and separated by tectonic contacts. The ages of the TTG components and later granitoids indicate assembly in the late Archaean.

Second, within a terrane comprised of early Archaean rocks it appears to have been assembled from several discrete parts, each composed of different TTG components associated with a supracrustal sequence. The configuration of these suites of different ages suggests that they may have been swept together by a form of terrane tectonics.