

MESOPROTEROZOIC ACCRETION ALONG THE SOUTHERN LAURENTIAN MARGIN - LLANO UPLIFT, CENTRAL TEXAS

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During the Mesoproterozoic, an exotic ensimatic arc terrane (Coal Creek terrane) accreted to the southern margin of Laurentia and is preserved in the Llano Uplift of central Texas. Accretion occurred prior to, or essentially synchronous with, continent-continent collision at ~1150-1120 Ma and after formation of a Laurentian continental margin arc at ~1288-1232 Ma. The Coal Creek terrane represents a long-lived, 1326-1275 Ma, dominantly tonalitic to dioritic plutonic complex, tectonically interleaved with serpentinitized harzburgite. The complex, located in the southeastern uplift, has an intrusive, deformational, and metamorphic history unique from the rest of the uplift. Moreover, rocks yield distinctly different geochemical and Nd and Pb isotopic signatures, indicating that they evolved separately. The Coal Creek terrane was thrust northeastward over a supracrustal sequence and a predominately granitic, ~1288-1232 Ma, plutonic complex, interpreted to be an active continental margin and arc complex. Late syn- to post-tectonic granites form stitching plutons, constraining accretion timing to before 1119-1070 Ma. In the western uplift, where the Coal Creek terrane is not present, medium-T eclogitic rocks record burial to depths 50 km, indicating collision of a southern continent. These deep-seated rocks record a complex metamorphic and partial melting history at granulite to eclogite facies conditions, tectonic transport to the north, and metamorphism at 1147-1115 Ma, suggesting ongoing collisional orogenesis during this time. Thus, Mesoproterozoic accretion along the southern Laurentian margin included collision of an exotic arc terrane and southern continental block, remnants of which most likely remain, plus formation of new crust by subduction-related magmatism.