

# ***Tectonic evolution of the eastern Llano uplift, central Texas: A record of Grenville orogenesis along the southern Laurentian margin***

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## **ABSTRACT**

Mesoproterozoic metamorphic rocks exposed in the eastern Llano uplift, central Texas, were involved in a ca. 1150–1116-Ma Grenville-age orogenic event along the southern margin of Laurentia. Collision of the exotic Coal Creek arc and a southerly continental block with Laurentia tectonically telescoped and stacked three distinct lithotectonic domains. A major ductile shear zone forms the contact between the Coal Creek ensimatic arc terrane, the southwesternmost domain, and rocks with Laurentian affinities to the north. Directly north of the arc boundary, supracrustal rocks of the Packsaddle domain represent basinal sedimentary and volcanic rocks deposited along the southern Laurentian margin. Farther north, granitic gneisses of the Valley Spring domain, which consist of both plutonic and supracrustal rocks, represent a Laurentian continental-margin arc emplaced beneath the Packsaddle domain along a shear zone.

Recent mapping in the northeastern uplift shows that the Valley Spring domain records a polyphase deformational history equivalent to that observed in the Packsaddle domain of the southeastern uplift. Early deformation occurred under uppermost amphibolite-facies metamorphic conditions and was accompanied by partial melting and formation of foliation-parallel leucosomes, consistent with deformation deeper in the orogenic pile. Mylonitic rocks in the shear zone separating these two domains show thrusting to the northeast, similar to that shown by the shear zone separating the Coal Creek arc from the Packsaddle domain. The Valley Spring domain igneous complex adjacent to the shear zone is highly attenuated into thin sheets in this zone.

The Grenville event in the eastern uplift is characterized by polyphase ductile deformation synchronous with upper amphibolite-facies dynamothermal metamorphism. Deformation progressed from northeast-directed ductile thrusting and folding

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**(D<sub>1</sub>, D<sub>2</sub>), which accommodated collision-related crustal thickening and contraction, to polyphase regional-scale folding (D<sub>3</sub>, D<sub>4</sub>, D<sub>5</sub>), which accommodated continued collision-related north- to northeast-directed contraction. The kinematics of the deformation in the eastern uplift are consistent with the northeastward collision of an exotic arc terrane and a southern continental block with the generally east-trending Laurentian margin. No evidence of transcurrent motion along the margin has been observed.**

**Keywords:** Grenville, Llano Uplift, Rodinia collision, Mesoproterozoic