

## TRIASSIC PALEO GEOGRAPHIC AND TECTONIC EVOLUTION OF SOUTHWESTERN LAURENTIA THROUGH JURASSIC TECTONIC OVERPRINT

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The undeformed to broadly folded Triassic and Jurassic stratigraphy of the Great Plains and Laramide broken foreland of the western North American craton belie the increasingly complex task of reassembling the Triassic paleogeography and tectonic evolution of the Cordilleran margin. Indeed, the location and configuration of the western margin of the Triassic North American craton remain obscure. From the leading eastern edge of the Cretaceous Sevier fold and thrust belt westward, the reassembly of Triassic paleogeography and tectonic evolution becomes increasingly clouded by Cenozoic extension and volcanism, Cretaceous contraction and plutonism, and poorly understood Jurassic contraction, extension, and large-scale translation. Across much of the Basin and Range, outcrops of Triassic and Jurassic rocks decrease in number and become widely separated. The Early Mesozoic Marine Province of west-central Nevada and adjacent parts of California is a collage of structurally bounded stratigraphic assemblages of lower Mesozoic rocks, each displaying different stratigraphic successions and tectonic histories. Spatial relations of these terranes among each other and to the craton prior to arriving in their present configuration, and the timing of their accretion to the North American craton remain controversial. The site of origin, timing and magnitude of displacement, and time of accretion of suspect terranes, which lie within or west of the batholithic belt, become increasingly obscure.

A first approximation of pre-Cretaceous geology is obtained by:

1) removing the relatively small amount of Cenozoic extensional deformation north of the Great Basin and Snake River Plain (western Montana and Idaho) and east of the Idaho Batholith; 2) balancing cross sections to restore the Idaho batholith to its pre-Cretaceous site of origin; and 3) aligning the Sierra Nevada and Coast Range batholiths with the restored site of origin of the Idaho batholith. The pre-Cretaceous distribution of Triassic rocks in the Basin and Range, extending from northern Nevada to Sonora, Mexico, is, in the main, controlled by: 1) the distribution of middle Early Jurassic normal faults; 2) obduction of island arc and cratonal margin rocks onto the craton in the late Early to early Middle Jurassic; and 3) 1,000 to 1,500 km of left-lateral displacement of North America relative to Triassic rocks of southwestern Laurentia.

Removal of the Jurassic tectonic overprint reveals a Triassic paleogeography with a prominent reentrant centering on western Wyoming and southeastern Idaho. Two nearly right-angle bends turned the margin westward across what is now northern and west-central Nevada and central California. The westward extent of the southwestern margin of Laurentia is unknown. This reentrant in the cratonal margin served as a prominent sediment sink throughout the Middle and Late Triassic. The prominent unconformity separating the Permian and Triassic systems does not appear to be related to a tectonic event but resulted from the latest Permian to Permo-Triassic drawdown in global sea level. The tectonic framework in which the Triassic System of the Cordillera was deposited was established with the Mid-Permian depositional overlap of the Early Permian Sonoman orogeny. Within this framework, the Triassic System of southwestern North America is divisible into five tectonosequences, the Lower Triassic Moenkopi; lower Middle Triassic Holbrook; the upper Middle to lower Upper Triassic Panther Canyon; the Upper Triassic Chinle; and the Upper Triassic to Lower Jurassic Dinosaur Canyon. These tectonosequences provide a high resolution record of five paleogeographic time slices, which document Triassic tectonic evolution of southwestern Laurentia.

1.) Lowest Moenkopi tectonosequence deposition was restricted

to the extensional reentrant in the Triassic Cordilleran cratonal margin. The reconstructed Moenkopi tectonosequence displays a passive-margin-like stratigraphic architecture, which overlaps extensional structures. Recovery from Panthalassan anoxia is recorded within the Moenkopi tectonosequence.

2.) The Holbrook tectonosequence records a dramatic change in paleoslope from east to west in the Moenkopi tectonosequence to south to northwest in the Holbrook tectonosequence. The change in paleoslope evidences creation of a cryptic active margin across southern Laurentia.

3.) Within the collage of terranes in the Early Mesozoic Marine Province, the Panther Canyon tectonosequence or younger rocks rest on thick successions of upper Paleozoic and lower Mesozoic rocks dominated by thick accumulations of volcanic rocks and boulder conglomerates, with lesser thicknesses of sedimentary rocks that contrast markedly with overlying unconformity-bounded sequences of marine-shelf facies correlative and lithofacies having affinities with the Panther Canyon, Chinle, Dinosaur Canyon, and Jurassic Glen Canyon tectonosequences. These relationships document Ladinian south to southeastward accretion to the craton and depositional overlap of the allochthonous terranes during deposition of the Panther Canyon tectonosequence. The pre-accretion location of allochthonous terranes is unknown.

East and southeast of the Early Mesozoic Marine Province, pre-Chinle tectonosequence erosion removed all but the lowest part of the Middle Triassic Series – lower Holbrook tectonosequence – from the western craton.

4.) The voluminous volcanogenic sediment in the Chinle tectonosequence was transported northwestward and northward from a volcanic source, which exposed crystalline basement. The volcanic source extended from at least eastern Chihuahua, Mexico to the present Gulf of California. Absence of evidence of a western source of volcanic rocks precludes the Upper Triassic volcanic Koip Group from having occupied a location along the present Sierra Nevada crest during the Late Triassic. Rather, the Koip arc appears to have been accreted to the craton during late Early to early Middle Jurassic obduction.

The active-margin source of sediment which lay along the southern boundary of Laurentia from initiation of the Holbrook tectonosequence to the close of the Chinle tectonosequence has not been identified. It appears to have been rifted from the southern margin of Laurentia at the close of the Triassic.

5.) The Dinosaur Canyon tectonosequence, which contains the Triassic–Jurassic boundary, was deposited during a magmatic null marking the major plate rearrangement from the configuration that dominated Middle and Late Triassic time to the continental-margin-arc configuration that has persisted from the Early Jurassic to the present.

The preceding overview begs the following speculations on the site of origin, timing of translation, and final accretion of Wrangellia and related terranes. The interpreted paleolatitude and collective Triassic stratigraphy of these terranes is compatible with the stratigraphy envisioned for the missing Middle to Late Triassic source terranes of the Holbrook and Chinle tectonosequences along the cryptic active margin of southwestern Laurentia. Pre-Jurassic rifting of these terranes from the Laurentian craton during Dinosaur Canyon plate rearrangement preserves the Triassic stratigraphy intact. Unfortunately, the paleobiogeography implies one or more pre-rifting, trans-Pangean Tethyan connections. Limited paleobiogeographic and paleomagnetic evidence suggest displacement during the large-scale, middle Early Jurassic right-

lateral translation and contemporaneous transtensional(?) normal faults. rassic obduction event prior to large-scale, left-lateral translation.  
Accretion coincided with the postulated late Early to early Middle Ju-