

LOWER PERMIAN (WOLFCAMPIAN) ABO RED BEDS OF CENTRAL NEW MEXICO (USA) AND THEIR RELATIONSHIP TO THE ANCESTRAL ROCKY MOUNTAIN OROGENY

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The Lower Permian (Wolfcampian) of central New Mexico is represented by red beds of the Abo Formation, which, at the type locality in the southern Manzano Mountains is about 300 m thick. Sedimentation occurred under mainly arid climatic conditions, sediment transport direction was mainly towards the south (Orogrande Basin).

Towards the N (Chama Basin), the Abo Formation interfingers with red beds of the Cutler Group, towards the S (Orogrande Basin) with shallow marine limestones of the Hueco Group. The Abo Formation is divided into the lower Scholle Member, overlain by the Cañon de Espinosa Member. In the Jemez region the lower member is dominated by shale with thin intercalations of sandstone and conglomerate, and two caliche horizons. The upper member is dominated by sandstone and conglomerate with minor shale intercalations.

The thin sandstone and conglomerate intercalations in the lower member occur as single beds or display stacking patterns and are interpreted as minor channel fills and sheetflood deposits on overbank floodplains. The thicker sandstone and conglomerate sheets of considerable lateral extent in the upper member are mainly composed of stacked channels separated by erosional surfaces of different order. These sheet sandstone and conglomerate facies (architectural element CH-channel) are interpreted to represent broad shallow channel fill complexes of a braided stream system.

Towards the S, grain size within the Abo Formation decreases. At the type section and in the Joyita Hills the lower member consists of thick shale intervals with thin intercalated conglomerate and sandstone beds (architectural element CH). In the upper part coarse-grained siltstone and fine-grained sandstone units commonly displaying different types of ripple lamination are intercalated, representing the architectural elements SB (sandy bedforms) and subordinate LS (laminated sand). These

thicker siltstone-sandstone units form sheet bodies that are exposed as prominent ledges extending laterally over hundreds of meters. These silt- and sandsheet bodies were deposited in broad, shallow channels of a braided stream system during periods of high influx of silt and fine sand. Random fluctuations in flow velocity and deposition rate caused compound crossbedding. Coarse sandstone and conglomerate consist of reworked intraclasts (caliche and siltstone clasts); sand- or pebble-sized extraclasts such as quartz, feldspar and rock fragments are absent. This may indicate intrabasinal tectonic movements causing reworking of intrabasinal sediments.

In southern New Mexico (Robledo Mountains, Doña Ana Mountains and the southern San Andres Mountains) the Abo Formation interfingers with the platform carbonates of the Hueco Group. Abo red beds thus occur as "tongues" within the Hueco Group.

Unlike the nonmarine Abo red beds, the underlying Bursum Formation contains beds of marine limestone and calcareous shale. Thus, the Bursum is transitional between dominantly shallow marine carbonate facies of the Pennsylvanian and the continental red bed facies of the Lower Permian.

Regional synsedimentary tectonic movements of the Ancestral Rocky Mountain orogeny strongly influenced Bursum and Abo sedimentation, resulting in conspicuous lateral variations in lithofacies and thickness. The onset of Abo red bed sedimentation marks a significant tectonic pulse of the Ancestral Rocky Mountain orogeny. Precambrian basement uplifts were rejuvenated and acted as source of siliciclastic sediment that was transported mainly towards the south into the Orogrande basin, subordinately into the Paradox Basin towards the NW and into the Taos trough in NE New Mexico. During Abo sedimentation, tectonic activity ceased and the uplifts were almost completely truncated by upper Abo red beds.