

PERMIAN BASIN DEVELOPMENT IN THE NORTHERN CENTRAL ANDES: TRANSTENSION ASSOCIATED WITH GONDWANA BREAK-UP.

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The Permian sedimentary record in the northern Central Andes of Peru (Tarma-Copacabana and Mitu groups) and Bolivia (Titicaca Group) consists of heterolithic marine and continental successions deposited under warm and semiarid conditions at low latitudes. A transtensional regime is inferred for the overall Permian sedimentary and tectonic evolution of the region. A large and elongated basin (mixed carbonate-siliciclastic homoclinal ramp) developed in the Late Carboniferous-Early Permian, including synchronous magmatism and evaporite deposits. This initial phase is interpreted as a result of partial rifting and crustal thinning resulting from extensional overlap between transtensional fault systems. Increased strike-slip movement in the Late Permian-Early Triassic, in conjunction with fault trace variations, originated positive reliefs due to local compression and uplift, as well as narrow, elongated and strongly-subsiding basins with anoxic conditions and deposition of hypersaline organic-rich marine shales (Ene Fm.). Active magmatism continued during this phase, characterized by lava flows, pyroclastic and epiclastic volcanic deposits (Mitu Group). Individual sub-basin sags resemble half-grabens, with a master normal fault along one side, and oblique normal faults within the sag dying out away from the master fault. Permian faults (transcurrent and listric) were reactivated and reversed during Mesozoic and Cenozoic deformation, and may themselves be inherited from pre-Carboniferous evolution. The Abancay deflection represents a major transcurrent zone influencing both tectonics and sedimentation in the region. We interpret the overall Permian basin development in the northern Central Andes as a result of transtension related with the initial phases of Gondwana break-up.