

Seismotectonics of Bolivian Orocline

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Central Andes seismicity recorded by the Bolivian network has been located with the use of a non-linear method and a heterogeneous 3D velocity model. In addition to the seismicity associated subduction zone, important seismic activity located along the Cordillera Occidental is related to the present volcanic arc. Also, there is evidence of fairly uniform seismicity beneath the northern Altiplano. The shallow seismicity of the central region of Bolivia shows an elongated zone in direction NE-SW, corresponding to a major dextral shear zone composed of enechelon fault planes with the fault plans in direction approximately N-S. This shear zone is related to accumulated differential shortening observed between the northern and southern branches of the Bolivian orocline.

The subduction zone beneath the forearc is subjected to a tectonic regime of triaxial compression. The high Andes of northern Peru are under a tectonic regime of NE-SW triaxial extension, and those of the southern Peru are under a shearing regime with the minimum stress in the direction approximately N-S. The foreland is under a tectonic regime of compression. The stress in the foreland is controlled by the Bolivian orocline with a maximum stress perpendicular to the trend of the Cordillera Oriental. Except for the deepest part, the oceanic plate under the Central Andes is subjected to a tectonic regime of extension. The minimum stress is oriented in the direction of descent of the oceanic plate. Deeper than a depth of 500 km, the slab is under compression with the maximum stress in the direction of its descent.