

Deep Sea Dives in the Chiclayo Canyon Northern Peru :
Tectonic Regime of the Andean Convergent Margin

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During the Nautipere cruise (March-April 1991), three dives with the Nautilus were conducted in the Chiclayo Canyon. The main result is the discovery of Paleozoic Andean Basement which crops out in the middle and upper slope areas at depth ranging from 4700 to 2400 m. Two units were identified:

1) from 4700 to 4000 m water depth, dusky yellow siltstones which contains pieces of floated wood crops out along a prominent scarp. A dense network of vertical fractures trending N-S and N 130°E characterized this lower unit;

2) from 4000 to 2400 m water depth the continental basement crops out on either of the valley-sides of the canyon. It is the upper unit that consists of black schist and quartzite which are much alike lithologically the Paleozoic rocks cropping out both in the Amotape Massif and the Lobos de Tierra Island, respectively located 200 km to the North and 60 km to the Northeast. At 2400 m water depth gray mudstones unconformably overlie the metamorphic basement and contains a well preserved Diatoms assemblage of Early Pliocene age (5.3 to 5.1 Ma).

At 4000 m water depth, a steep scarp bounded seaward by a flat step breaks the slope at the boundary between the lower and upper units. The toe of the scarp is underlined by clams colonies and bacterian veils associated with fluids flowing from a schistosity plane. Some hydrothermal sulphides and carbonates deposits are localized all around the fluid vents. In this area, black schists exhibit a horizontal schistosity plane. At some meters above, a tectonic breccia exhibits blocks of quartzite and black schist. These morphological and structural features associated with flowed venting suggest that a major reverse fault separates the upper unit from the lower.

The complexity of the subsurface structure known from oil well data in the Talara area to the North (Shepperd and Moberly, 1981, Seranne, 1987) is thought to extend southward to the Chiclayo Canyon area. However, compressional tectonic features were never described to the North in the Talara area.