VIII: Sea level and coastal stability

Neotectonics and Plio-Pleistocene sea level

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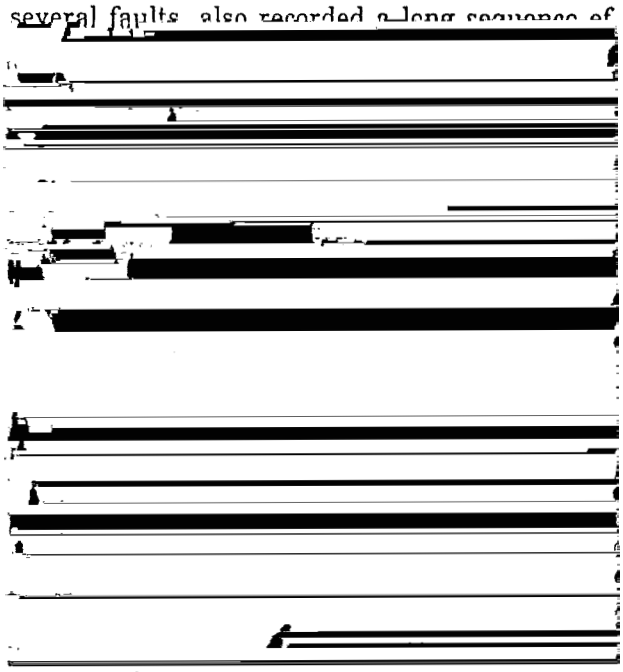
The relationships between the subduction of the Nazca plate under the South American subcontinent and the recent vertical movements, registered along the Peruvian coast, are not yet well understood. During the Quaternary, a northern segment of the Peru coast has been emerging, a central segment has been apparently subsident, and the southern coast has been emerging, locally at very high rates. In this activity report on a cooperative work, associating several "old" members of the INQUA Neotectonics

From lat 14°S southwards, the coastal region experienced Plio-Pleistocene uplift motions which are evidenced by staircased sequences of marine terraces. The spatial and geometrical distribution of these remnants of late Cenozoic high sea stands reflects altogether regional crustal movements and local deformations. Current correlation studies between well-developed series of terraces at Ilo (17°30'S), Chala (16°S) and San Juan Marcona (15°30'S) are aimed to characterize these regional and local tectonic controls.

In spite of various intents of age determination on marine shells, the chronostratigraphy of the lower terraces is still debated. Isotopic stage 5e age assignments have been successively proposed for: the +148 m terrace (Hsu & Blom, 1985; Osmond, 1987), the +110 m terrace (Hsu & Wehmiller, 1987), the +90 m terrace (Macharé, 1987), and the +65 m terrace (Hsu, 1988; Hsu et al., 1989). Accordingly, the mean uplift rate estimates for a particular transect vary between1140 and 470 mm/10^{-3}y. Additional dating of the lower terraces is presently under way (at Geotop lab., UQAM, Montreal) and will hopefully yield determinant results.

The strong, and apparently continuous, vertical motions registered at San Juan Marcona are closely related to the subduction of the aseismic Nazca Ridge (Macharé et al., 1986; Macharé, 1987; Hsu, 1988; Macharé & Ortlieb, 1990). Deformations of the terraces around San Juan Marcona depict some recent faulting activity, reactivation of old faults, and block tilting. A detailed tectonic map of this key area, registering the most rapid and complete sequence of Plio-Pleistocene high sea stands of South America, is presently being prepared.

At Chala, a favorable embayment, controlled by several faults, also recorded a long sequence of



distinguished). In this case, the Pleistocene (and latest Pliocene ?) interglacial sea stands are registered as wave-cut surfaces on which lay marine deposits that were partially covered by alluvial fan

deformations. If the major cycles correspond to interglacial periods, and the smaller sea level fluctuations to interstages, it may be inferred that the isotopic stage 5e high sea stand would be registered at +64 m in the Chala embayment.

The highest part of the sequence (above +250 m) is obliterated by thick sheets of alluvium. The highest observed marine sediments, lying on abrasion surfaces in Chala region (at +240 m), might be of earliest Pleistocene age, since they overlie Pliocene foreshored beds outcropping (at about +200 m) immediately north of the bay of Chala.

In spite of a strong tectonic control of the morphology of the Chala embayment, there is no evidence of major displacements of the marine terraces after their formation. The main local tectonic activity, that is attributed to slight readjustments of former fracture zones, is limited to landslides on the walls of the principal canyon

not interpreted that a true subsident regime was installed at the end of the Middle Pleistocene (as suggested by Hsu, 1988). At the mouth of Rio Locumba, south of Ilo, a relatively important Middle and Late Quaternary tectonic activity is evidenced by deformations of marine terraces and alluvial fans.

References

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Though, immediately southeast of Chala, the

(Ottawa, 1987), Abstr. vol., p. 235.