Puglia 2003 - Final Conference
Project IGCP 437

Coastal Environmental Change
During Sea-Level Highstands:
A Global Synthesis with implications
for management of future coastal change

Otranto / Taranto - Puglia (Italy) 22-28 September 2003
Quaternary coastal morphology and sea level changes

Project 437

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Holocene sea-level changes and mangrove response to in Southwest Bohol, Philippines

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Keywords: *Holocene sea level, mangroves, Philippines, southwest Bohol, parasequences*

Abstract

Sediment-core, tidal-notch and ^{14}C data establish Holocene relative sea-level changes and the response of mangroves in the lower reaches of the Abatan River, southwest Bohol. Sedimentology, foraminifera and total organic contents of seven cores 4.5 to 17.2 m long define eight lithofacies and the corresponding depositional environments of the Holocene sediments. The lithofacies units are lagoonal clay; subtidal organic-rich clay; low marsh clayey peat; mangrove peat; supratidal organic-rich clay; fluvial mud and gravelly sand; floodplain clay; and beachface silt and sand. Their vertical and lateral distributions and clustering of ^{14}C age dates define three parasequences (Fig. 1).

Parasequence A, composed of the lagoonal clay, low marsh clayey peat and organic-rich clays, and the lower section of the fluvial mud and gravelly sand was deposited after a rapid sea level rise from 12 to 2 m below present mean sea level (pmsl) approximately 8000 to 6000 yBP. Subsequently and until 4500 yBP, mangroves developed while sea level rose slowly from 2 to 1 m below pmsl. From ca. 4500 to 4300 yBP sea level again rose rapidly, from 1 m below pmsl to 0.7 m above pmsl, translating the shoreline landward and drowning the mangroves.

Then a relative stillstand lasted until ca. 2500 yBP depositing beachface silt and sand, which comprise parasequence B. At ca. 2500 yBP, sea level started to fall to the present sea level, allowing the deposition of the prograding units of parasequence C, which is composed of peat, fluvial mud and gravelly sand, and floodplain clay. The thick and extensive peats were deposited in the favorable environment provided by a broad, shallow basin that formed during this period. Relative sea level was reconstructed from the notch and core data with no correction for compaction. Hence, estimated sea-level positions are at minimum.

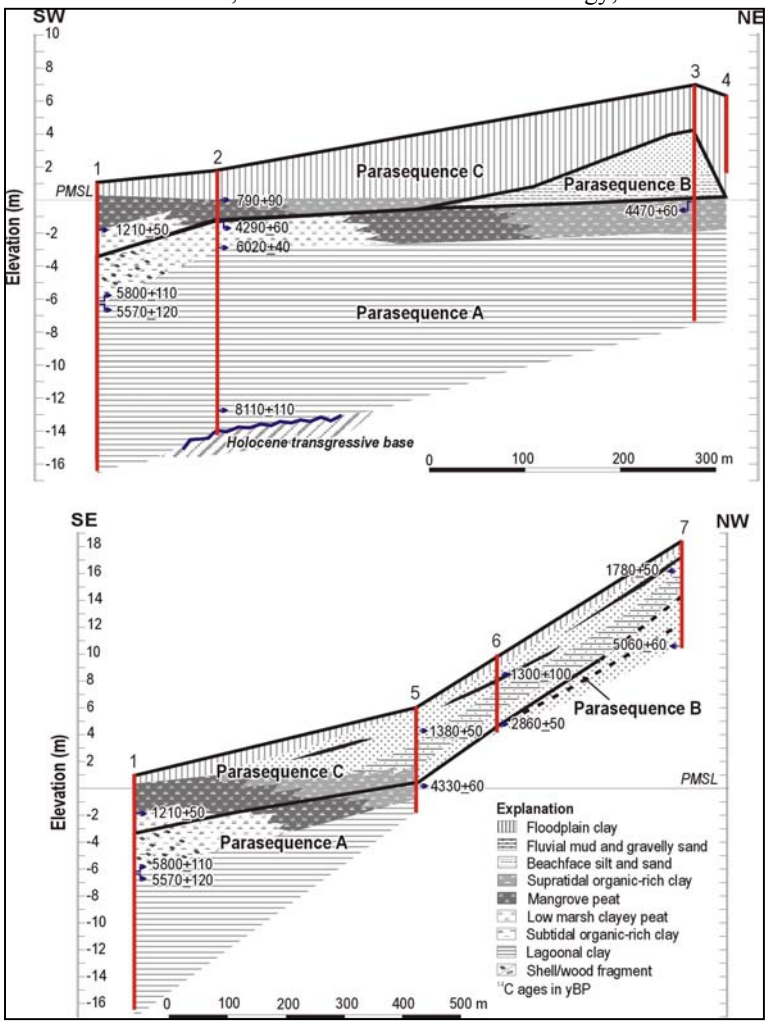

Figure 1. Lithofacies and parasequences distribution along a NE-SW and a NW-SE transect in southwest Bohol.

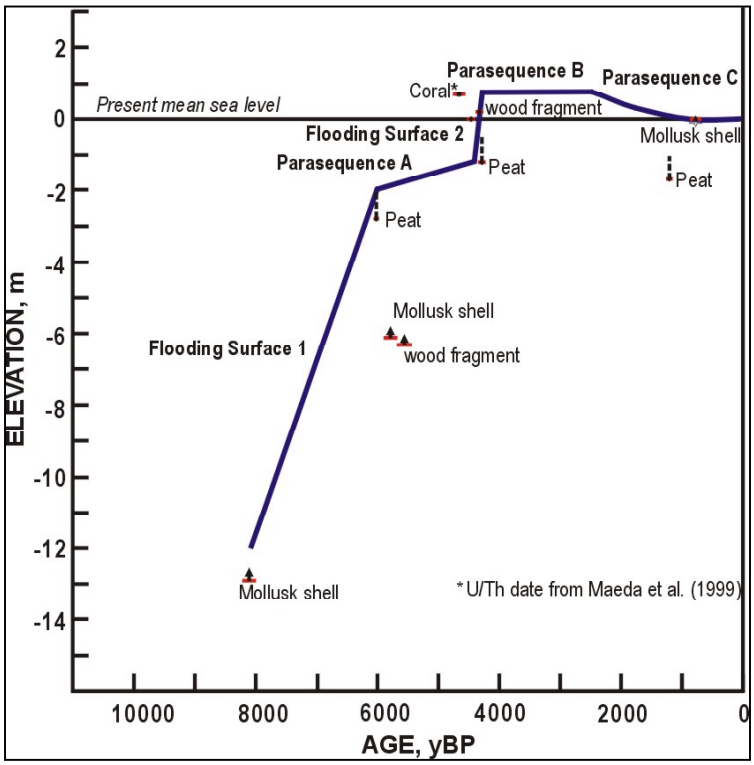

Figure 1. Reconstructed sea-level curve for southwest Bohol.

The trend of the reconstructed sea level generally follows sea-level behavior derived for far-field sites (Pirazzoli, 1991): a rapid rise followed by a relative stillstand and a subsequent fall to the present (Fig. 2). A mid-Holocene higher-than-present sea level that characterizes areas in far-field sites is also evident in an emerged tidal notch.

References

Pirazzoli P.A. (1991). *World Atlas of Holocene Sea Level Changes*. Elsevier Oceanographic Series, 58, 300 pp.