Geophysical Research Abstracts, Vol. 7, 05986, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05986

1 Paleo-geomorphology of Carbonate Systems: Unraveling Sedimentary Geobodies and Facies from Karst Overprint

Dr. Paul Crevello(1) and Dr. Henry Posamentier(2)

(1)Petrex Asia Group, 7-15-2 Kirana, #7 Jalan Pinang, Kuala Lumpur 50450, Malaysia, crevello_paul@hotmail.com, (2)Anadarko Canada Corporation, 425 1st Street SW, Calgary Alberta T20 4V4, Canada henry_posamentier@anadarko.com

Seismic 3D geomorphology visualization of carbonate systems is providing a high-frequency level of investigation that has only recently gained application to petroleum studies. In carbonate platform systems, various geomorphologic features are observed, including well-defined sedimentary geobodies and stratal patterns, diffusely imaged facies belts, and post-depositional overprint by subaerial exposure karst. Successive time slices of carbonate platform systems provide imaging of platform facies and sequence development (growth history), including platform breakup and coalescence, pinnacle isolation and smothering by clastics.

Sedimentary carbonates, like marine terrigeneous clastics, respond to local hydrodynamic processes producing well-defined sedimentary 'geobodies'. Unlike clastics, carbonate sedimentary systems typically undergo early diagenetic modification at near surface or very shallow burial, overprinting the carbonate sediments and possibly masking geobody shapes and lateral facies boundaries. Karst is the most likely overprint to mask or obliterate carbonate sedimentary geobodies, although circular patch reef systems may yield similar expressions. Seismic reflectivity data are required to QC geomorphology interpretations. Seismic waveform modeling facilitates definition of carbonate facies and porosity architecture within genetic depositional sequences, especially where there is low variance in carbonate seismic-rock properties (density, sonic and porosity).

Carbonate paleo-geomorphology studies achieve best results from marine data shot over Tertiary carbonates systems. In these cases, seismic acquisition is optimized and perhaps, importantly, post-depositional diagenetic processes have yet to adversely affect the rock properties. 3D seismic imaging of carbonate geobodies is degraded in older rock systems (pre-Tertiary) possilby by burial diagenetic processes. In many older carbonate systems, 3D seismic geomorphology imaging best resolves geobodies of depositional or combination diagenetic bodies embedded in tight facies, karst, faults or gas-charged reservoirs. Resolving sedimentary geobodies and depositional patterns from karst will continue to challenge 3D seismic paleo-geomorphology studies of carbonate systems.