(NEO)TECTONICS IN THE CUBAN-BAHAMAS FORELAND BASIN

Deniz Kula, Anna H. Ling, Gregor P. Eberli, Thomas Lüdman[1], and Christian Betzler[1]

[1)] *University of Hamburg, Germany*

PROJECT OBJECTIVES

- Use multibeam bathymetry and single channel seismic data to delineate the sea-floor displacement that indicates neotectonic activity in the outer fringes of the Cuban fold and thrust belt.
- Reconstruct the tectono-stratigraphic history of Cay Sal Bank and the Santaren Channel from core and seismic data and relate it to the evolution of the Cuban fold and thrust belt.

PROJECT RATIONALE

The Cuban fold and thrust belt formed during the collision of the Cuban arch with the southern tip of the North American continent. The collision decreased dramatically in the late Eocene and with the opening of the Cayman Trough in the Miocene, the Cuban island arc detached from the Caribbean plate (Masaferro et al, 1999). Today Cuba lies within the North American plate and is bounded by the Bahamas Platform and Florida Straits to the north and the North America-Caribbean plate boundary to the south. However, reactivated reverse faults and growth anticlines in the Cuban fold and thrust belt indicate that continuous shortening occurred throughout the Neogene (Masaferro et al., 1999). Despite this shortening the Cuban fold and thrust belt is seismically very quiet and few earthquakes have been reported in the last 50 years.

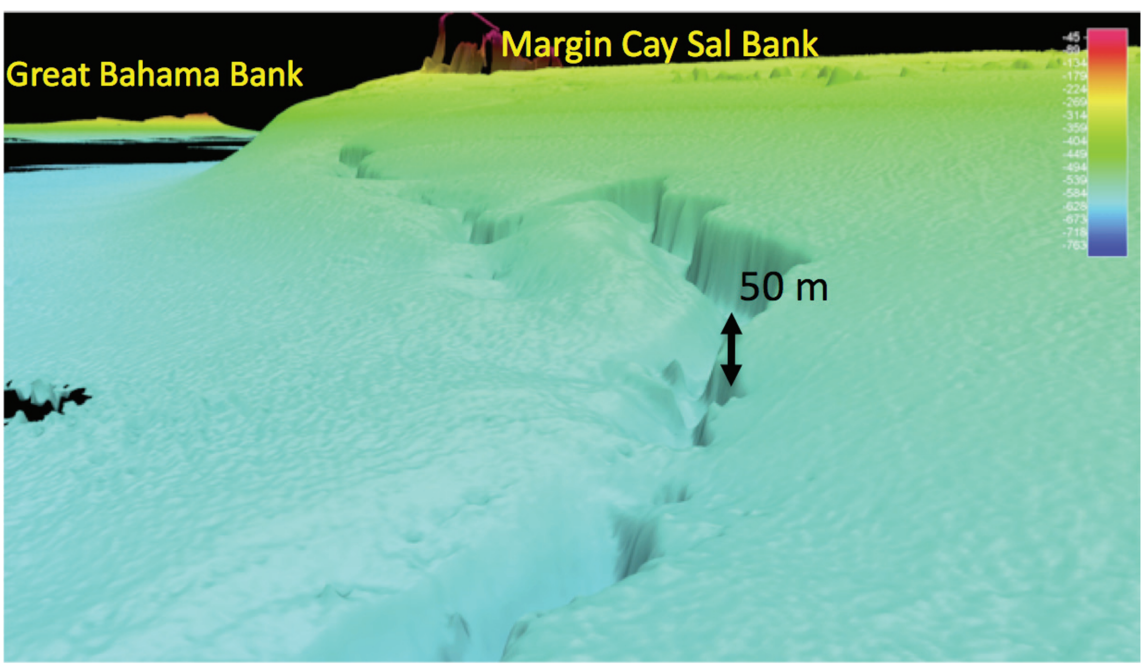

Figure 1. Multibeam bathymetry north of Cay Sal Bank where the sea floor is displaced by up to 50 m along a fault, documenting neotectonic activity in the northern edge of the Cuban fold and thrust belt.

Multibeam and seismic data collected during Meteor cruise M95 along Cay Sal Bank, however, reveal displacement on the sea floor (Figure 1) and deep rooted faults that are still active (Figure 2). The locations of these faults and folds east of Cay Sal Bank indicate that Cay Sal Bank is part of the Cuban fold and thrust belt and therefore in a different tectonic setting than the adjacent Great Bahama Bank. This offers the opportunity to map the extent of the fold and thrust belt and reconstruct the tectonic stratigraphic history of Cay Sal Bank.

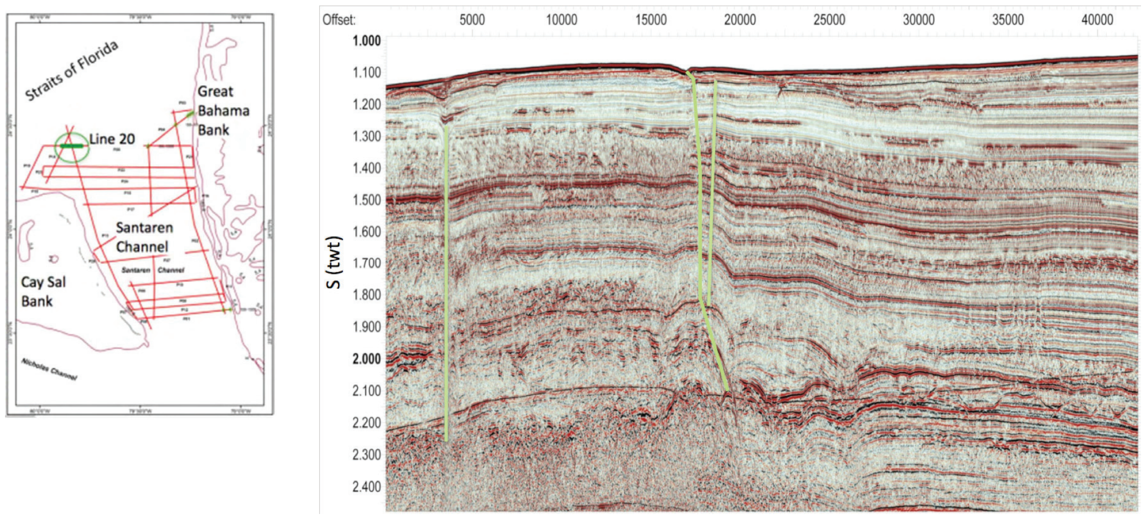

Figure 2. Seismic line 20 north of Cay Sal, imaging a fold dissected by a fault that breaks the sea floor and other faults that terminate in Pleistocene strata.

Data Sets

The project relies primarily on the data collected during M95 that consists of the multibeam bathymery data, high-resolution single channel seismic data and high-quality multichannel seismic data. A second data set consists of regional seismic lines that were collected in the eighties by the industry as 'spec lines' in the Florida-Bahamas region. Stratigraphic control is given by the cores of ODP Leg 166.

Project Description

The seismic data set is tied to the borehole information for ODP Leg 166 for precise age information of the Neogene reflections, older horizons are brought in along regional seismic lines that tie to the Great Isaac well in the north. The structural analysis is placed within this stratigraphic framework to establish the chronology of tectonic events. Mapping and projecting the faults and fold axis to the surface will delineate the boundary of the tectonically active portions and, thus, the outline of the Cuban fold and thrust belt in the Santaren Channel.

Bathymetry maps and single channel seismic data are used to document the youngest fault movements. In addition, they will shed light on the tectonic events which modify the slope architecture, in particular slope canyons, along Cay Sal Bank.

References

Masaferro, J. L., Poblet, J., Bulnes, M., Eberli, G. P., Dixon, T. H., and McClay, K., 1999, Palaeogene-Neogene/present day(?) growth folding in the Bahamian foreland of the Cuban fold and thrust belt: Journal of Geological Society, London., v. 156, p. 617-631.