

T21E-07: The CASEIS project: toward a better understanding of the seismic cycle and paleoseismology of the Lesser Antilles megathrust

Tuesday, 12 December 2017

09:30 - 09:45

📍 *New Orleans Ernest N. Morial Convention Center - 211-213*

The Lesser Antilles arc results from the subduction of the Caribbean and North American plates at rate of 2cm/yr. Although this area is the site of multiple natural hazards, the seismic potential of this subduction zone remains poorly constrained. The historical catalog of earthquakes is short, and any very large earthquakes that may have occurred, were prior to modern times. Consequently this subduction system has often been assumed to be aseismic. Since the occurrence of three M9-class earthquakes in the recent years, many questions have arisen concerning the behavior and seismic history of megathrusts. We cannot exclude any subduction zone from producing such large events, and it becomes urgent to re-evaluate the seismic potential of the Lesser Antilles subduction zone. To this goal, we conducted the CASEIS cruise (doi 10.17600/16001800) aboard the French R/V Pourquoi Pas ? between May 27 and July 5 2016. We collected 42 giant piston cores up to 30 m-long in isolated slope basins, slope canyons, at the subduction trench, in turbidite channels and levee systems, above the plate interface, to address long-term earthquake recurrence by using the turbidite paleoseismology method.

Petrophysical data including gamma density, P-wave velocity, magnetic susceptibility, resistivity, color reflectivity, and color imagery were systematically acquired aboard on the 500 m of sediment cores we collected. Later analysis included XRF profiles, CT-scanning, laser microgranulometry, anisotropy of magnetic susceptibility, isotopic stratigraphy, and ¹⁴C dating on several cores. We documented and established the chronology of several sedimentary facies including turbidites and homogenites interbedded with hemipelagites and tephra in numerous cores. Analysis of chirp data shows that some events can be correlated between multiple core sites over a large distance and may have been triggered by large earthquakes on the plate interface. Several cores offshore Guadeloupe, in the area struck by the 1843 earthquakes show four alternations of several meters-thick turbidites (Tu) and/or homogenites (Hm) and hemipelagites. Such Hm or Tu deposits have been documented elsewhere and may have emplaced during megathrust events and tsunamis repeating at intervals of several tens of millennia.

Plain Language Summary

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