

The national catastrophe in Haiti calls for an immediate response from the geoscience community. Urgent field research includes offshore areas of Haiti where some of the active and seismogenic structures associated with the broad plate boundary have their expressions and a tsunami was generated. We are undertaking a research cruise on the R/V Endeavor to obtain critical data on the faults and related structures associated with the January 12 earthquake. Our multidisciplinary team will survey the offshore portion of the main rupture (see Fig.1, map area 1) and some of the secondary structures associated with it (areas 2 and 3 on map). We will make shallow water (<300 m) multibeam bathymetric maps of the field areas, collect sidescan images of the sea floor, collect chirp subbottom profiles (0.5-12 kHz) and do spot coring of the sediments. The aim is to map ephemeral structures related to the earthquake before they are erased by time and storms. The survey will concentrate along the Baie de Port au Prince and along the southern coast of the Canal de Sud.

The main rupture was along the Enriquillo-Plantain Garden fault zone (EPGF), an E-W set of faults that follow the core of the southern peninsula. Several large historic earthquakes are associated with the EPGF. There are also a number of NW-SE faults that intersect it. Some of these offshore branches of the fault, such as a possible one in the Baie de Port au Prince are poorly mapped. Improved models of strain accumulation and seismogenic release along the EPGF are urgently needed. They require improved maps of the EPGF in the rupture area and its termini, determining whether the rupture reached the surface, characterizing the rupture pathway offshore and onshore, determining what secondary faults manifested by the aftershocks may be involved, and how they interact with the jog in the EPGF at the end of the rupture. Offshore structures must be integrated with the efforts that are underway onshore. Interferograms of the earthquake show that considerable motion was offshore in our proposed area 1 (Fig. 2). Coastal subsidence and a small tsunami clearly occurred near Grand Goâve in that same area. Our rapid-response marine geophysical data acquisition in Haitian waters will contribute to the growing multinational scientific response to the disastrous earthquake.

The marine survey is urgent because the survey needs to capture detailed features related to sea-floor rupture and mass wasting. They include scarps, offset sedimentary or erosional features, such as channels, gas-escape and related bacterial mats. Terrestrial sediments from the earthquake can be identified with ⁷Be (half-life 53 days). All these features are ephemeral in the energetic shallow-water environment of the shelf and the rainy season is approaching. We will attempt to map fault strands, whether or not they ruptured, and seismogenic motions of the sea floor. These features will be important in investigating the nature of the localized tsunami near Grand Goâve. It may have originated from vertical coseismic motion at the EPGF, or may mark a submarine slump triggered by shaking.

We will undertake the research cruise aboard the NSF-owned R/V Endeavor. The Endeavor will depart from Port Everglades, Fla., on Feb. 24 and work off Port-au-Prince and points west from Feb. 27-March 12, returning to Florida on March 15. Before starting the survey, the ship plans to deliver 50 large tents that can be used as classrooms, donated by the children's charity Plan USA, which were loaded at the ship's home port at the University of Rhode Island.

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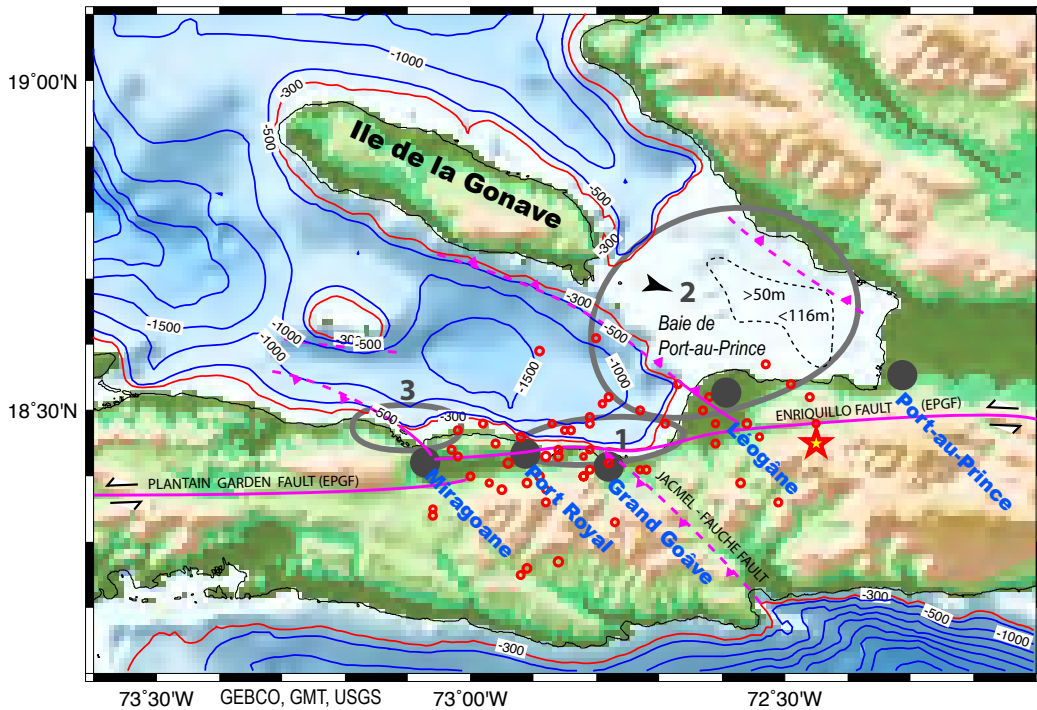


Figure 1. Proposed survey areas 1, 2, 3 (in order of priority) are within the gray ellipses. We plan to survey areas as shallow as we can safely reach to about 300m contour (red). 1 contains the submarine portion of the EPGF where coseismic rupture could have reached the sea floor. 2 is a large shallow area of the Gonave Gulf that contains an isolated basin, which is likely to be maintained by subsidence and active structure(s) given the abundant sediment supply. 3 is the intersection of a NW-striking thrust(?) fault and a segment boundary of the EPGF. The star and small red circles are the mainshock and aftershock epicenters (USGS).

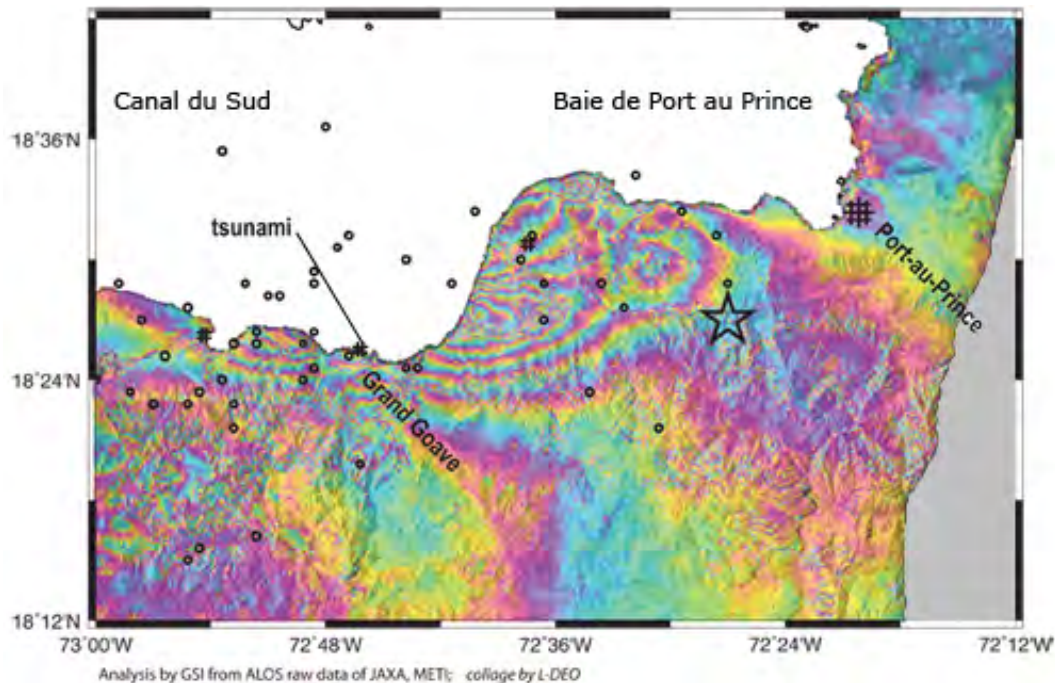


Figure 2. PALSAR interferogram calculated by the Geographic Survey Institute of Japan from radar imagery acquired before and after the 12 January 2010 earthquake. Each full cycle through the color spectrum represents 11.8 cm of deformation in the direction of the satellite line-of-sight (WNW-ESE in this case). Closely-spaced colored fringes indicate areas of enhanced ground deformation. Center of vertical motion lies on coastline to the west of the January 12th epicenter demonstrating significant motion must have occurred offshore where the EPGF is thought to trend into the southern Canal du Sud.
http://vldb.gsi.go.jp/sokuchi/sar/result/sar_data/urgent/20100112_haiti-e.html