



Simulations of geodetic absolute seafloor positioning, helping seismic and tsunami hazard evaluation in the Lesser Antilles

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More than 70% of the Earth surface is covered by seas and oceans. Several tectonic phenomena, among the most devastating, take place in ocean environment. In many cases, usual space geodesy methods cannot discriminate between a blocked or aseismic behavior, because the instruments are located too far from the area potentially deformed by the tectonic process. Thus, it is necessary to develop new techniques to extend conventional observation networks offshore and to map the deformation in the entire area.

We are exploring opportunities offered by GNSS/Acoustic technique. It consists of acoustic interrogations from a precisely GNSS positioned surface platform to permanently installed seafloor transponders. The objective is to get transponder absolute coordinates in a global reference frame, such as on-shore GNSS.

We developed a processing strategy based on a least squares inversion combining kinematic positions provided by GNSS and travel times provided by acoustic ranging both between surface & seafloor and between seafloor transponders couple. We also designed an observation simulator, taking into account the variable nature of the ocean. We present results of different experiment scenarios for the Lesser Antilles subduction, where this kind of experiment is highly desirable.