The modeling of the 1755 tsunami propagation in the Atlantics and its effect on the French West Indies

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The strongest earthquake occurred on November 1, 1755 near the Portuguese coast induced the catastrophic tsunami that affected many European countries on the coast of the Atlantic Ocean. This tsunami propagated through the Atlantic Ocean ad reached the Lesser Antilles. In particular, "in St. Martin, the sea retired so far that a sloop, riding at anchor in 15 feet [4.6 m] of water, was laid dry on her broadside. In Martinique and most of the French Islands, it overflowed the low land, and returned quickly to its former boundaries. This extraordinary motion of the waters was observed 6 hours after the first shock was felt at Lisbon. In Martinique, in that remarkable flux and reflux of the sea, some places were left dry on about a mile [1.5 km]". Near Fort-de-France, Martinique "sea withdrew 1.6 km and returned to inundate the upper floors of houses". The source of the 1755 event is not well reconstructed. Three variants of earthquake source are chosen for numerical simulation, and tsunami source is calculated using the Okada's solution. Tsunami wave propagation is analyzed in the framework of shallow-water theory. Distribution of the computed tsunami wave amplitudes along the coast of Guadeloupe and Martinique is obtained. Characteristic wave amplitudes vary in range of 0.5-1.5 m.