

Using sedimentary fabric characterized by X-ray tomography to highlight tsunami and hurricane deposits within the same archive, Scrub Island (Anguilla)

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The Lesser Antilles are a densely populated and very touristic region exposed to many short-term hazards such as hurricanes and tsunamis. However, the historical catalog of these events is too short to allow risk assessment and return period estimations, and it needs to be completed with long-term geological records. Two sediment cores were sampled in March 2018 (in the framework of ANR CARQUAKES) in a small coastal lagoon on Scrub Island (North Eastern Caribbean). In a previous work, we presented sedimentological, geochemical, microfaunal and chronological analyses that enabled us to identify 25 sandy layers resulting from high-energy marine floods. Two of those layers were interpreted as tsunami deposits. The most recent is associated with the transatlantic tsunami triggered by the 1755 Lisbon earthquake. The older is the thickest sandy layer recorded in the lagoon and is dated at 1415 cal. CE (1364-1469 cal. CE). The 23 remaining sandy layers were interpreted as resulting from hurricanes. Here, we present new sedimentological results obtained with X-ray tomography on 2 previously identified hurricane and the 2 tsunami deposits (Biguenet et al., 2021). The use of X-ray tomography enables to highlight the sedimentary grain fabric even in discrete sedimentary layers (5 mm thick). These sedimentary fabrics reveal differences between hurricanes and tsunamis deposits. This method and these sedimentary criteria provide important insights into distinguishing sedimentary deposits generated by hurricanes, near-field and far-field tsunamis.

Keywords : tsunamis, hurricanes, Lesser Antilles, lagoons, X-ray tomography

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