

## ***Interactive comment on* “Tsunami deposits in Martinique related to the 1755 Lisbon earthquake” by Valérie Clouard et al.**

**Valérie Clouard et al.**

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General reply to the three referees

The reviews from the three referees share a common approach of what must be the data associated with the presentation of a new tsunami deposit. In our mind, our paper was the description of an important overwash deposit in Martinique, FWI, that we managed to relate to a tsunami event thanks to archaeological and geomorphic analysis: our goal was not to lead a sedimentary study of this deposit. However, we understand that our result would be more useful to the tsunami community with sedimentary data. The sedimentary analysis is now under process and some results are shown below. If possible, we could add our colleague sedimentologist as a co-author. We have also

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noticed that, in general, our archaeological and geomorphic analysis should be refined, in addition with a detailed description of Martinique climate and Fort-de-France topography.

We report below in detail the responses to the remarks of referee #2.

Reply to anonymous referee #2 :

- Do a comprehensive description of the deposit: geometry, grain size, composition – presence of organic material, shells, foraminifera, diatoms, etc.. see e.g 2010-1239 open file report to see what is needed for tsunami identification

When we received this review, we sent for analyzing samples from our excavation site (Court of Appeal) and from the river mouth to get sedimentary information. Later, we sent sample from Fort-de-france Bay and our colleagues in charge of excavation site 2, the Police building, sent samples to the same laboratory. The laboratory had time to make the analyzes of the first samples, and they will do those from site 2 and from Fort-de-france Bay for the end of February. We now have the grain size distribution (Figure 1) and other parameters (mean and median size, variance, skewness, kurtosis, etc). We'll add this information in our paper.

These analyses also include compositional data with: Ba, Sb, Sn, Cd, Pd, Ag, Mo, Zr, Sr, Rb, As, Se, Au, Pb, W, Zn, Cu, Ni, Co, Fe, Mn, Cr, V, Ti, Ca, K, Al, P, Si, Cl, S, Mg, SiO<sub>2</sub>, MgO, Al<sub>2</sub>O<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, CaO, TiO<sub>2</sub>, MnO, Fe<sub>2</sub>O<sub>3</sub>, U, Th, Hg, Sc, Cs, Te. We'll report it in our paper.

- Try to better exclude the occurrence of a storm or hurricane

Chronology at site 1: The analysis of historical reports from the construction indicates that the Court of Appeal was built before 1774. We found this information in Marion (2000): in 1763, M. Daux, the owner of the building, is nominated tax collector by the king. The extension of the building is done around 1770. It is during this construction period that the overwash occurred. In 1774, following troubles with the law, his goods

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are seized by the king and his residence in Fort-Royal is transformed in Courthouse. Chronology at site 2 : the archaeological report from site 2 is now available (Navetat, Nadeau et al, 2016): The construction of the Police Station building began after 1761 and not later than 1770. In site 2, the deposit layer is everywhere above the mangrove and just below the first embankments. It is one more evidence to say that the deposit predates 1770 and even 1761.

Concerning the occurrence of hurricane, we used the review from Romer (1932). He gives a detailed list of the historical stormy events in Martinique between 1635 and 1932. Between 1726 and 1782, there is 11 storms or cyclonic phenomena: 1/10/1753 (correctly described: damages on small boats); 12/09/1756 (correctly described: damage in the East and South of the island); 12/09/1758 (poorly described, just: wind gusts); 7/11/1760 (shortly described: 12 boats to the coast in St Pierre); 09/1965 (poorly described, just: hurricane in Martinique, Guadeloupe and St Christophe); 13/08/1766 (devastating hurricane over Martinique, 410 casualties, 80 boats lost); 1775: hurricanes the 30th of July and the 25th of August (no description); 5/09/1776 (shortly described: 22 boats to the coast); 3/10/1779 (shortly described: strong gale, the only damages occurred on-land); and 12/10/1780 (correctly described). 1780 major hurricane devastated all the Lesser Antilles and a part of the Greater Antilles, from St Vincent to Jamaica. In Martinique, a tidal surge threw the boats to the coast, and in Fort-Royal, the cathedral and 140 houses were overturned, there was 7000 casualties.

To summarize, the historical and archaeological information does not enable to get a more precise construction time than before 1770. And before 1770, there is just one noticeable hurricane in 1766 probably not strong enough to devastate Fort-Royal, and three tsunamis, 1761, 1767 and 1755.

However, we note that our demonstration is poorly written. We'll make appear clearly in our reviewed paper that the observed deposits at site 1 and site 2 predate the 1780 hurricane, although the cartographic documents that we used give an age bracket between 1726 and 1782, which can be confusing.

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- Improve English writing

We apologize for our English. A preliminary version was reviewed by an English colleague, but later, a lot of modifications were done. We'll ask to a colleague whose mother tongue is English to review our final version.

References: Marion, G. G. (2000) : Administration des finances en Martinique : 1679-1790, L'Harmattan Ed. Romer, J.: Liste chronologique des cyclones à la Martinique (1635 à 1932), Tech. rep., Service Météorologique et de Physique du Globe, 1932.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2017-238>, 2017.

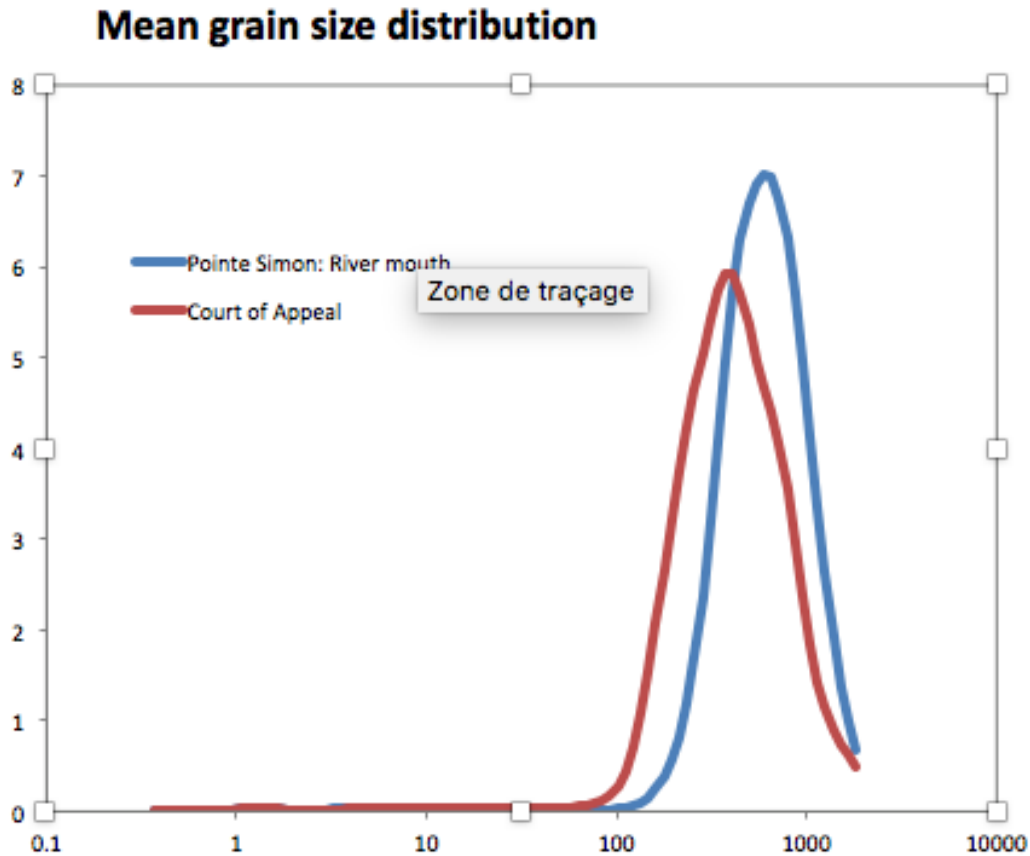


Fig. 1. Mean grain-size ( $\mu\text{m}$ ) distributions of the samples

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