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

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General reply to the three referees to

"Tsunami deposits in Martinique related to the 1755 Lisbon earthquake" by Valérie Clouard, Jean Roger, and Emmanuel Moizan

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 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 #3.

Reply to anonymous referee #3 :

P. C1 : "Tsunami run up was reported from many Caribbean Islands, such as Sint Maarten (4.5 m), Antigua (3.6 m), Saba (7 m) – just to name a few (Lander et al., 2002)."

We report the historical records and the deposits related to 1755 tsunami in the table 1 of the electronic supplement. We don't know if referee #3 had an access to this supplementary material. Figure 1 is a snapshot of the Caribbean part of Table 1.

P. C1 : Reports for Martinique state that 'At Martinique, the water was reported to have withdrawn 1.6 km and returned to inundate the upper floors of houses'.

We deliberately don't cite this information. We know this sentence from Lander (p.16, 1996) and also in Lander et al. (2002). Among the various references which appear in his articles, none refers to this observation, and we were not able to go back to the source of the initial information.

Conversely, when looking at NOAA database (Figure 2), it appears information for Martinique but none about any withdrawn. The last line in the NOAA databse extract is the only inundation information. The coordinates are those of St Pierre with a 1.8m wave height and a 1500m inundation distance. It is also the only place where one house was damaged. When looking at Roger et al (2011), one of us, it appears for Martinique the information of Figure 3 (with the references included)

Finally, we never found any information about this important withdraw, and we prefer not to include it.

As supplementary material is not always read, we propose to reviewer #3 to include our table in the paper.

P. C2, first §: “monthly or annual rainfall” :

We’ll add this information, as well as a better geomorphic description of the area.

P. C2, first §: “Second, speaking about preservation potential, there are a number of studies that address this topic, e.g., McAdoo et al., 2008; Nichol and Kench, 2008; Szczucinski, 2011.; Spiske et al., 2013; Andrade et al., 2014. But only the study of Bahlburg & Spiske (2015) is cited here.”

McAdoo et al’s (2008) report an interesting testimony on Solomon Islands earthquake and tsunami, where the geologists arrived in the affected area 1 month after the event. In their conclusion, they said “however, the longer-term ecologic and economic impacts remain to be seen.” Why would we have to cite this report?

Nichol and Kench’s (2008) paper also stated that “the preservation potential of these tsunami deposits is low to moderate” in the Maldives archipelago, composed of atolls and visited 2 years after the 2004 Indian ocean tsunami. They compare deposits in several atolls for which the distance to the source is ca 2500 km with 1.5 to 2.5-m wave height, to compare with the 5600 km between Lisbon and Martinique and our historical observation of 1-m height in Fort-de-France, 260 years ago. We could add this reference to our paragraph on the difficulty to get preserved deposits in tropical elevated island, although all the parameters are not comparable.

Spiske et al.’s (2013) went in Peru to study specifically the preservation of tsunami in arid coasts. We are not sure that their results are relevant in our Caribbean context of wet tropical islands.

Szczucinski’s (2011) paper describe the evolution of the Indian Ocean 2004 tsunami deposit during the 5 years following the flooding under conditions of tropical climate

with high seasonal rainfall. He concludes by: “tsunami deposits that are thinner than 10 cm have little preservation potential. Consequently, the sedimentary record of tsunamis with a run-up smaller than 3 m is not likely to be preserved at all” and “Any modelling of paleotsunamis from their deposits must take into account post-depositional changes.” We’ll add this reference in our discussion, to highlight the positive effect of human settlement to preserve a deposit layer due to a less than 3-m tsunami, and the results than could be obtained if archaeological excavations close to the shore were systematically analyzed in terms of tsunami deposits.

Through the observation of 2004 tsunami, Andrade et al. (2014) try to identify conducive coastal environments to tsunami deposit preservation, in areas also subject to storms. We can include this reference in our introduction, along with the other papers more specifically related to the Caribbean context and already cited on this topic: Spiske et al., 2008, Atwater et al., 2012; Buckley et al., 2012, Scheffers et al., 2005. . .

P. C2, first §: “The same is true for the statement that ‘few deposits can be attributed’ to the 1755 tsunami (p. 2, lines 14-15). This statement is not correct, as there is a number of publications that document both sand and boulders deposited by the 1755 tsunami. Most sites are in Portugal and Spain (e.g., Dawson et al., 1995; Font et al., 2010; Rodríguez-Vidal et al., 2011), and some more in Morocco and even in the Caribbean (e.g. Atwater et al., 2017).”

Deposits related to 1755 tsunami are listed in the electronic supplement (Table 1 of the article). We don’t know if referee #3 had an access to this supplementary material (see Figure 3). Atwater et al. (2017) is indicated for Anegada. However, it can be noted that Atwater et al. (2017) present their results in a very conservative way: “ (for the 1650–1800 event,) This reasoning leaves either a tsunami of nearby origin or an unusual storm that produced tsunami-like bores as the cause of the 1200–1480 catastrophe.” Furthermore, this result is not included in the NOAA database. It is probably not our duty to conclude that their observations do correspond to 1755 tsunami if the authors do not write it.

Dawson et al (1995) and Hinson et al (1996) are indicated for Portugal, Boca do Rio, Algarve deposit. Font et al, in 2010, resampled the same Algarve deposit and used numerical modeling and rock magnetism techniques to confirm the results from Dawson et al. (1995) and Hinson et al (1996). As the main goal of Font et al.'s paper was to propose a new method to characterize on-land deposits related to strong overwash events and to relate them to tsunami because the mixture with underlying layers indicate a high energy phenomena, we have considered that it was not useful to add this reference in our table 1. We'll add an entry in our table 1 for Gibraltar deposit described in Rodríguez-Vidal et al., 2011. We apologize for not including this reference in our table 1.

P C2: "Proposed tsunami unit: The outcrop is several meters long, but only a section which is a few tens of centimeters wide is described. You need to use the full extent of the outcrop, as otherwise you will not get any information on spatial trends."

The full extent of the outcrop is drawn in our paper on Fig 2. In grey is represented the horizontal extension of the deposits in the whole area. As it can be seen Figure 4, the archaeological excavation did not reach the deposit layer everywhere.

The first reason is that this was an archaeological site, where the main goal was to better understand the first colonial settlement in Fort-de-France, not to characterize tsunami deposit and the site was dug only to the anthropogenic layers, which were above the deposit layer. At some places, deeper excavation was done only to test the possibility of pre-colombian remains.

The second reason is the depth of the deposit layer corresponds to the groundwater level (Figure 5). Figure 6 shows the water pumps working at site 2. Thus, it was not possible to dig everywhere at this depth.

P C2: "Proposed tsunami unit: The unit is up to 8 cm thick (p. 2. line 11 gives 8 cm, line 12 gives 6-9 cm).

No, we have written " In direct contact with the archaeological levels associated with this new construction, an 8 cm-thick sandy layer is present. It consists of a 1 cm-thick rich shelly lighter-colored layer at its base and an upper 6-9 cm-thick black layer". Small variations obviously exist in the thickness (see Figure 7).

We'll add the term "average" thickness in the first part of our sentence. Thank you for noting.

P C2: The authors state that this is an unusual thickness. I do not understand why. I would say it is an average thickness. As the thickness is not uncommon there is no need to try to explain why it is unusually thick. "

We'll try to better explain why this average thickness of 8 cm is not common for a teletsunami of 1 meter. The thickness of the deposit depends on many factors such as the quantity of available material, the topography (including in our case the geometry and orientation of the construction), the inundation processes (wave speed and number of waves), the occurrence or not of backflow (not in our case), and the height of the waves.

p. C3, §1: "Sediment sources: p. 4, line 3 states that there is a 'distinct origin' of the material of which the sand unit is composed. However no analyses were conducted to prove the marine origin of the white sand and the fluvial origin of the black layer. An inserted small photo (Fig. 4) with terrible resolution is not enough for a comparison. Any potential source needs to be analyzed the same way (components, grain size) as the proposed event unit. Âż

We'll add the sediment analysis and better photos, like Figure 7 and Figure 8.

P C3: p. 4, line 21 'The thin lightly-colored layer at the basement of the deposit can be attributed to the bottom of Fort-de-France's Bay, which presently exhibits the same kind of materials.' What is the water depth from which the material is supposed to have been eroded? If you know that the seafloor has the same sediments, I assume that you had a look and took samples. These samples need to be analyzed and documented as references samples.

We have sampled Fort-de-France bay in shallow waters (200m from the shore, 5m depth) and the sand of the beach, which is rougher and contains more shells than the sand of the bay. However, we will not try to convince anyone that 21th century environmental conditions are the same than those of the mid-XVIII century for this bay and beach in the nowadays devastated, bare and contaminated bay of Fort-de-France. In addition, historical nautical charts indicate a now disappeared fringing reef, just in front offshore our site.

However, sediment analysis of the bay and beach of Fort-de-France samples will be included in our revised manuscript, with the grain size distribution (Figure 9) 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_2, MgO, Al_2O_3, P_2O_5, K_2O, CaO, TiO_2, MnO, Fe_2O_3, U, Th, Hg, Sc, Cs, Te. We'll report it in our paper.

P C3: Methods: This work is highly incomplete and far from a scientific study. You can easily tell with by the fact that there is no methods-chapter. There is an utmost need to include grain size analysis, microorganisms, sediment composition and other suitable methods.

The fact is that our method is not a sedimentary method. We found a thick layer of sandy sediments whose source could be any type of strong and energetic overwash event, like a hurricane or a tsunami. The excavation took place downtown and lasted only 3 weeks (in November, ie, during the rainy season). We began our investigation when the deepest layers were reached, a couple of days before the trenches was filled, and as mentioned previously it was not possible to keep them out of water all the

time. In this initial version of our paper, we argue that archaeological analysis, which indicates that the deposits took place between 1726 and 1770, and the determination of the origin of the sand in the mouth river are sufficient to attribute this deposit to 1755 Lisbon event. However, thanks to the observations of the reviewers, we understand that sedimentary data have to be published within this article, as they can be useful for the tsunami community.

Detailed investigations with all the suitable methods will be conducted when the next excavation will occur in Fort-de-France (in addition with sites 1, in 2012, and 2, in 2015, there has been only 2 archaeological excavations in Fort-de-France, in 1998 and 2003, during all the history of the town).

P C3 §5 "The material is siliciclastic and therefore you could check its age using OSL-dating."

We join to this reply an OSL (optically stimulated luminescence) dating report (Guerin, 2016, pers. comm. from M. Laforge) for a sample from Hotel de Police (site 2): no result was obtained (Figure 10).

P C3: It is ridiculous that you state (p. 6, lines 18-20) 'Our results indicate that the use of all available geological methodologies and collaborative studies with historians and archeologists might enable us to improve our historical tsunami catalogs in the future, thus helping the preparedness of tsunami hazard plans for coastal communities' as you have not applied any of the available geological methods!

We'll change the beginning of the sentence.

P C4: There is no information on the height above sea level of the excavation site and the event unit. How far is the site from the former coastline?

The height above sea-level is shown Fig. 2, d) in our paper and also indicated in the caption. As seen in Fig. 4 of the paper, the present-day distance to the shore is around 250-300m, and was of the same during the XVIII century. We'll add a mention of that in the text.

P C4: Fig. 4 seems to show that the site is actually within one of the channels – is that true?

On 1726 map, there is indeed a channel arriving from a pound to the north-east, it then bypasses our parcel by the south, continues southwestward through the city (Figure 11). On 1766 map (Figure 12), there is no more channel. However, even when these maps exist, we cannot totally rely on them, 1) because everything is not drawn (for example, the pink parcels only refers to private owner and not to a building, whereas the constructions should be drawn when it is a public property, but it is not always the case) 2) sometimes there are not fully updated (for example, if it is a map done for specific purpose, like a representation of the fort), and 3) sometimes the maps describe a project not yet realized and it is not always specified. We think that the channels exist in 1726, as they do not look like a project. The time when they disappeared is not sure.

P C4: p. 6, line 6 and 15 'paleotsunami' – this is not the correct term. Paleotsunami units are lithified. Thus historical tsunami deposit would be the correct term.

Referee #3 is right, this is an historical event, we'll change it.

P C4: p. 4, lines 1-2 'and the sand particles sub-horizontal lamination (Fig. 3c) shows that the water enters the site and the sediments deposit slowly, and that there is no contribution from upper backflow.' This hardy makes sense. If the sediment particles slowly settle from the flow, normal (suspension) grading will be produced. Lamination is not a sedimentary structure that represents slow deposition! Instead lamination is caused by changes in the supply of sediment, most of all in terms of grain size and grain density.

We'll clarify this sentence. What we wanted to say was that the U-shape geometry of the building implies that there was not retreat wave(s) coming from the upper areas. However, we were no able to evidence grading: in the dark grey layer, the sand is very

homogeneous and the depth of the rounded tile pebbles does not indicate grading, and in the light grey layer is too thin to show grading.

In "Identification of tsunami deposits in the geologic record; developing criteria using recent tsunami deposits" by Peters and Jaffe, there is a paragraph on grading indicating that "Normal grading was common in tsunami deposits. ... Massive (ungraded) tsunami deposits were also common. Massive or normally graded sections may only be locally present."

P C4: p. 3, line 32 'The black layer globally follows the light grey layer, indicating a coeval deposition.' The deposition is not coeval, but successive otherwise one layer would not lie on top of the other.

We used coeval with the meaning of during the same event, and the fact that this was two successive deposits was implied. We'll change this formulation.

P C4: Attribution to the 1755 event: It is stated that the event unit was deposited in between 1726 and 1783 and thus I may resemble evidence of the 1755 tsunami. However, there was another tsunami in 1767 (see chapter 3). The 1767 tsunami was a regional event and thus could have had an even greater impact than the 1755 far field tsunami.

We have chosen between 1755 and 1767 events following the reasoning indicated in the paper: "In Martinique, numerous historical records –of 1755 event– report 1 to 3-m height waves in all the coastal areas, including Fort-de-France (Roger et al., 2011). Respectively, the Barbados earthquake of April 24th, 1767 generated a local tsunami (O'Loughlin and Lander, 2003; Lander et al., 2003) and 3-feet waves were observed only on the eastern coast of Martinique (see a newspaper extract in http://tsunamis.brgm.fr). It is doubtful that the impact of this latter event, which occurred only 12 years after the notable 1755 tsunami, would not have been reported in Fort-de-France." Being more precise, we should also mention the 1761 tsunami, but we ruled it out as it was not observed in Martinique. However, we'll add this 1761 event in our discussion.

P C4: In addition, a storm event is excluded, even though large storms/hurricanes are frequently hitting the region. There was a severe hurricane in 1780 which killed thousands of people on Martinique and I do not see any argument why the described event unit could not be likewise related to this event.

We do not ignore the major hurricane of 1780, which devastated all the Lesser Antilles and a part of the Greater Antilles, from St Vincent to Jamaica. The analysis of historical report from the construction indicate that the Court of Appeal and the Police Station were built before 1770.

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, M. Daux's goods are seized by the king and his residence in Fort-Royal is transformed in Courthouse with no indication of specific construction.

Results from site 2 analysis (Naveta et al., 2016) indicate that the embankment began after 1761 and not later than 70. In site 2, when reached, the deposit layer is everywhere above the mangrove and just below the first embankment.

We will scrupulously reproduce the historical information in the revised version of our article to clearly exclude 1780 hurricane.

P C5: Fig. 4: if the site is in or close to one of the historical channels, the settling needs to be interpreted differently. Backwash will use preexisting channels or topographic lows and you need to discuss the deposition of the unit in terms of this setting.

The historical center of Fort-de-France was built over a mangrove swamp and is flat. The mean altitude is 1-1.5m asl. There is no topographic lows nor highs. Because the

sandy layer is similar to the sand of the river mouth, we suspect a tsunami induced bore to carry the major part of the deposits. According to the urbanization indicated on the XVIII century maps and to the topography, we are not sure that the fact that these channels exists or not at the moment of the flooding would notably change the propagation of the incoming flow from the large Madam River (on the left of Fig 11). For the backflow, the most logical paths should be direct access to the sea or eventually by the channels.

We'll add a figure with the present-day topography, and will also include an historical map, in the geomorphic and climatic description of the area. We thank all the referees who all noted the lack of detailed description of the studied area.

P C5 Thickness and event magnitude (p- 4. Lines 16-19): The thickness of a tsunami deposit is directly related to the amount and grain size of available material, in addition to the topography (thicker units in topographic lows). There is no way to relate the magnitude of inundation or even of the event to sediment thickness!

We'll add a discussion on the parameters influencing the thickness of the deposit.

P C5: The authors state (p. 6, lines 14-15) 'This indicates that the tsunami deposit thickness used in tsunami modeling is a parameter that must be carefully checked in order to avoid overestimation of paleo-tsunamis and to correctly assess the tsunami hazard.' This is no new finding, but was already stated in several publications (e.g. Spiske et al., 2013). I do not see why the authors start the discussion of sediment thickness and inverse modelling because they did not do any inverse modelling. Roger et al. (2011) did forward modelling, but these results would only support the results of an inverse modelling approach.

This sentence appears in the conclusion, following the description of the type of sediment transport, mainly related to a tsunami bore. We might have been more explicit in the discussion and in the conclusion: in inverse modeling, if the 8-cm thickness found in Fort-de-France in used as input while the sediment transport in the river is not computed, the results might not be correct, whereas if 1cm is used, the results will be better. In forward model, if the river effect is not integrated, the observed 8-cm thickness will not be reproduced.

P C5: p. 6, lines 13-14: What exactly, in your opinion, is the difference of the tsunami wave front and a tsunami-induced bore? Explain what the differences in flow are and how they influence the mode of transport and deposition. What about the role of successive waves of the tsunami wave train?

We'll add some explanation regarding the capacity of a tsunami bore to transport higher volume of sediments, when compare to a direct wave. However, our goal was just to recall that a river in low lying area increases the risk: it is already known, but in risk assessment in Martinique and probably in other tropical islands, this is not taken into account, in particular as the Madam River is not considered as an important river, which is correct most of the time, but what should be wrong during the wet season (and 1755 event took place the 1rst of November, during the rainy season).

P C5: p. 6, lines 3-4 '1755 tsunami deposits can also be found in locations in eastern coastal American cities' – where should that be? Do you think that for example the US east coast was hit by the 1755 tsunami?

In 2014, exercise CaribeWave/Lantex was based on the Lisbon scenario, with a M8.5 earthquake. Although the parameters of the 1755 seismic source are still a matter of debate, with the source used during the exercise CaribeWave/Lantex 2014, the eastern coasts of Northern America and the north-eastern coasts of South America were impacted (Figure 13).

P C5-C6: Language: "The language is in many parts very poor. . ."

We apologize for that. 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.

P C6: Fig. 1: runup height is given only as a number without unit. Add 'meters'

Will be done.

P C6: Fig. 2: add arrows that indicate the direction of the sea and the river.

Will be done.

P C6: Fig. 3: add arrows that indicate the direction of the sea and the river. Sediment photo needs to be much larger and resolution needs to be much higher. Lamination is described in the text and you need to prove this in the photo!

Will be done.

P C6: Fig. 4: 4a has no scale! 4a and 4b need to be much larger.

Scale appears on Fig 4b and is the same for 4a. We'll add a scale on both pictures and enlarge them.

P C6: Fig. 4: Again, just a visual comparison is worth nothing. Add more photos of the white layer and the proposed marine source material. Add lines for the topography. Otherwise the course of the inundation limit is hard to understand.

Will be done.

P C6: Tab. 1: What means 'H'? 'obs.' means 'observed'? Add explanation of the abbreviations to the captions.

Will be done.

References:

Exercise Caribe Wave/Lantex 14: A Caribbean and Northwestern Atlantic Tsunami Warning Exercise, Portugal Scenario, 26 March 2014, volume 1: Participant handbook [IOC/2013/TS/109VOL.1] Marion, G. G. (2000) : Administration des finances en Martinique : 1679-1790, L'Harmattan Ed. Navetat M., Nadeau A., J. Anctil, V. Bellavia, P. Butaud, A. Diederichs, F. Dieulafait, M. Laforge, F. Larre, C. Loiseau, S. Marchand,

L. Serra, S. Thomas and N. Tomadini, Fort-de-France (972), Nouvel Hôtel de Police, Rapport final d’opération archéologique (fouille préventive), Éveha – Études et valorisations archéologiques (Limoges, F), Hadès, 3 vol., SRA Martinique, 2016.

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-38	-4	Brazil	H	Ruffman (2006)
-63.23	17.63	Saba	H	Lander et al. (2002)
-61.80	17.02	Antigua	H	Lander et al. (2002); O’Loughlin and Lander (2003)
-61.28	15.55	Dominica	H	Lander et al. (2002)
-60.96	14.74	Martinique	H	Roger et al. (2011)
-61.06	14.60	Martinique	H	Roger et al. (2011)
-61.38	16.22	Guadeloupe	H	Accary and Roger (2010)
-59.55	13.25	Barbados	H	Baptista et al. (1998); Lander et al. (2002)
-63.05	18.05	St Martin	H	Lander et al. (2002)
-74.5	20.01	Cuba, Santiago	H	Rubio (1982); Lander et al. (2002)
-64.95	32.30	Bermuda	H	Ruffman (2006)
-69.38	19.16	Rep. Dominican, Samana Bay	H	Lander et al. (2002)

Fig. 1. List of 1755 tsunami observation. H stands for historical.

*		MARTINIQUE (FRENCH TERRITORY)		EPINETTE RIVER	14.73500	-60.96000	5588											1														
*		MARTINIQUE (FRENCH TERRITORY)		FORT-DE-FRANCE	14.60000	-61.08300	5608											1														
*		MARTINIQUE (FRENCH TERRITORY)		LA TRINITE	14.73700	-60.96300	5588									**1.20**	66.00	1														1
*		MARTINIQUE (FRENCH TERRITORY)		LAMENTIN RIVER	14.60000	-61.01000	5601									**.90**		1														
*		MARTINIQUE (FRENCH TERRITORY)		LE FRANCOIS (SAINT-FRANCOIS)	14.61900	-60.89000	5590											1														
*		MARTINIQUE (FRENCH TERRITORY)		LE GALION	14.72000	-60.93000	5587											1														
*		MARTINIQUE (FRENCH TERRITORY)		MARTINIQUE	14.74000	-61.18000	5607									**1.80**	1500.00	1	1	F								1				

Fig. 2. From NOAA database (https://www.ngdc.noaa.gov/nndc/struts/form?t=101650&s=70&d=7).

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Table 1

Historical observed tsunami data in the Lesser Antilles for 1 November 1755 event

Place	Lon. (°W)	Lat. (°N)	Run-up (m)	Maximum inundation distance (MID) (m)	Withdrawal depth (m)	Withdrawal distance (MWD) (m)	Source
Martinique							
La Trinité	60.96	14.74	0.6 (3), 0.9 (2), 1.2[a] (4, 5), 9.0 (1)	66 (2)	9.0 (1)	6[b] (2), 66 (4, 5)	(1) Anonymous (1755), (2) Leyrée (1755), (3) Daney (1846), (4) Brunet (1850), (5) Ballet (1896)
Le Galion	60.92	14.73	Minor effects				Brunet (1850), Ballet (1896)
Le Robert	*60.94*	*14.68*	*Nothing observed*				*Brunet (1850), Ballet (1896)*
Sainte-Marie	*60.99*	*14.78*					*Brunet (1850), Ballet (1896)*
Saint-François (actual Le François)	60.89	14.62	Just mentioned				Anonymous (1755)
Lamentin's river	61.01	14.60	The sea rise up in the rivers circa 0.9 m more than normal				Brunet (1850), Ballet (1896)
Fort Royal's river (actual Fort-de-France)	61.06	14.60					Brunet (1850), Ballet (1896)
Epinette's river	60.96	14.735					Daney (1846), Brunet (1850), Ballet (1896)
Martinique	61.00	14.60	Just mentioned				Affleck (1756)

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Fig. 3. From Roger et al. (2011) : Historical observation of 1755 tsunami in the Lesser Antilles

Fig. 4. View of site 1, the Court of Appeal, at the end of the excavation

Fig. 5. The deposit layer is the dark layer just at water level

Fig. 6. The water pumps working at site 2, so that we could study the deposit.

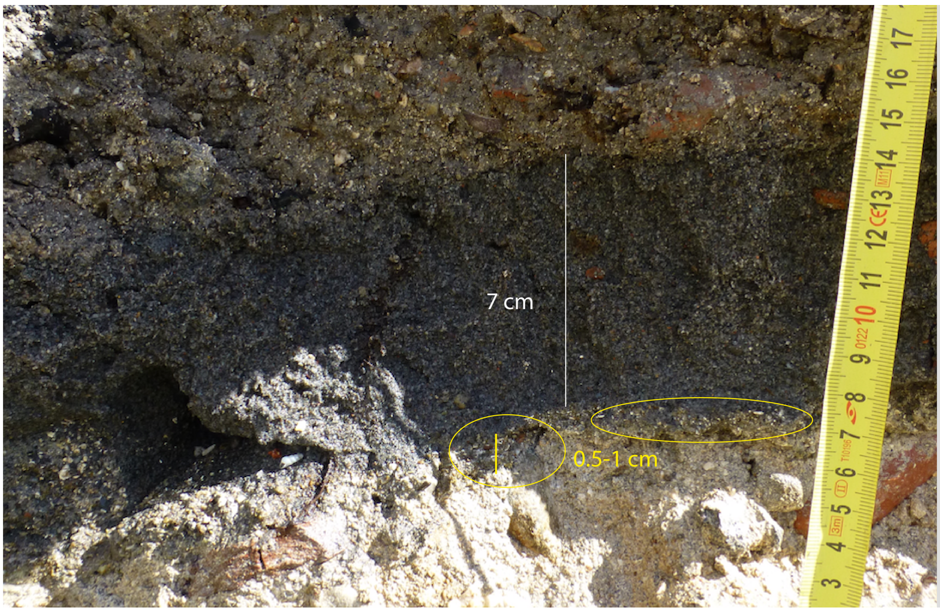

Fig. 7. View of the deposit. The yellow ellipses round the light grey deposit.

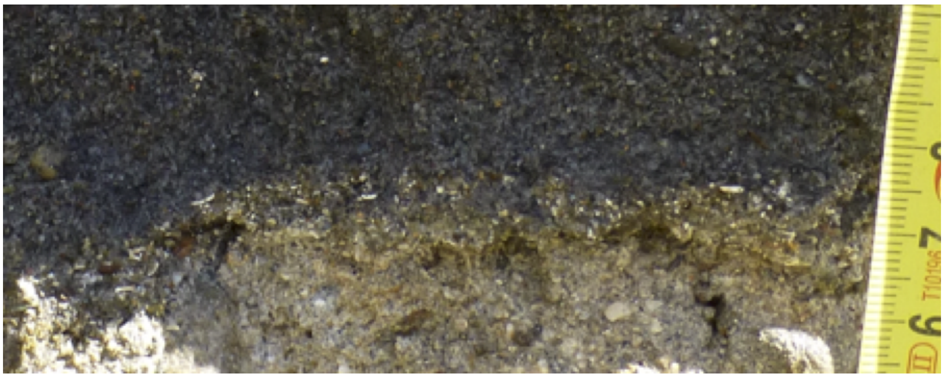

Fig. 8. : Uninterpreted zoom of Figure 7 where the light grey shelly layer at the bottom of the dark grey layer is visible.

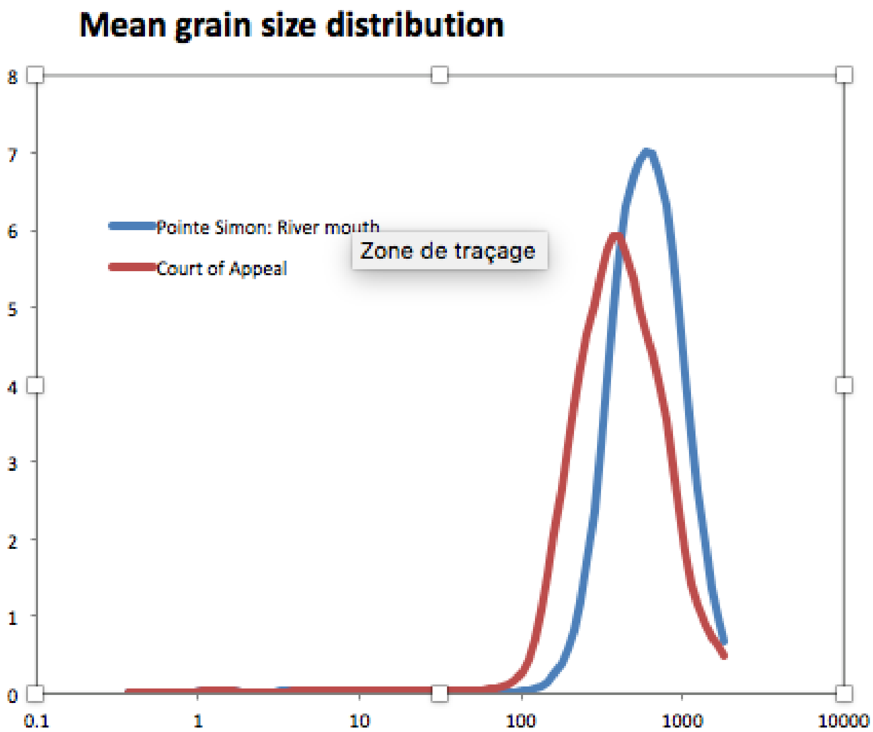

Fig. 9. Mean grain-size (μm) distributions of the samples

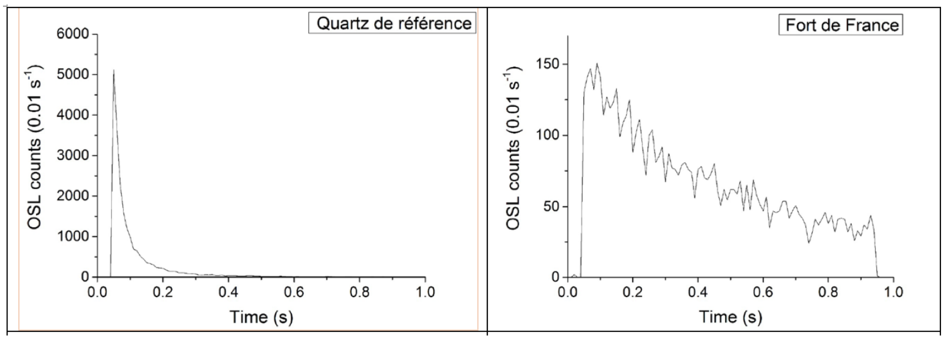

Fig. 10. OSL dating results from Guerin, 2016 (Navetat, Nadeau et al., 2016). Left: Right: OSL decay from site 2 sand.

Fig. 11. Extract from the 1726 map. . Site 1 is surrounded with an ellipse. A complete map can be found at url: (http://anom.archivesnationales.culture.gouv.fr/ulysse/osd?id=FR_ANOM_13DFC140A&q=carte&cov

Fig. 12. 1766 map with no more channel. Site 1 is surrounded with an ellipse. (http://anom.archivesnationales.culture.gouv.fr/ulysse/osd?id=FR_ANOM_13DFC291A&q=carte&cov

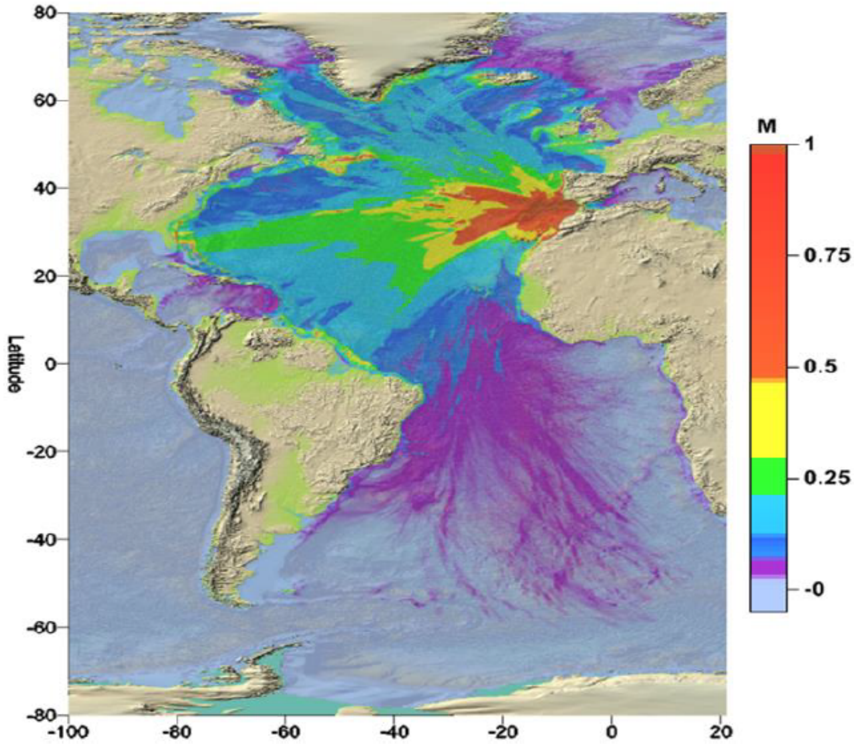

Fig. 13. ATFM (Alaska Tsunami Forecast Model) maximum amplitude map for the Atlantic basin (from Exercise Caribe Wave/Lantex 14 handbook).