

Tsunamis in French West Indies



Narcisse Zahibo

University of Antilles Guyane, Guadeloupe (F.W.I.)

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Guadeloupe**

Tsunamis Catalogue : 1690 - 2008

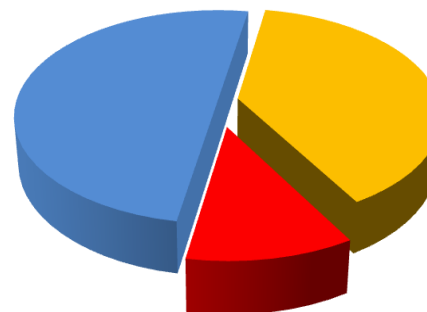
7 Volcanic Tsunamis

Date	Volcano	Runup Location	Runup height, m
1 1902, May 5	Mt. Pelée	St Pierre, the bay in the Blanche River, Martinique	3
2 1902, May 8	Mt. Pelée	St Pierre, Martinique	3
3 1902, May 18-20	Mt. Pelée	Le Préheur, Basse Pointe, Le Carbet, Saint-Pierre, Martinique	
4 1902, August 30	Mt. Pelée	Fort-de-France, Martinique	1
5 1997, December 26	Soufrière Hills	Northern Guadeloupe	2-3 (modeled)
6 2003, 12-13 July	Soufrière Hills	Plage de la Perle and Deshaies, Guadeloupe	0.5-1
7 2006 20 May	Soufrière Hills	Deshaies, Guadeloupe	1

10 Tectonic Tsunamis

Date	Epicenter characteristics			Runup characteristics		
	Location, Coordinates	M	Maximum height, m	Runup location		
				Island	Coordinates	
1 1690 04 06	17.5°N 61.5°W	~8		Guadeloupe, Martinique	16.25°N 61.583°W	
2 1767 04 24	14.4°N 61°W	7	0.5	Martinique	14.5°N 61°W	
3 1823 11 30	14.4°N 61.1°W		1	Martinique	14.73°N 61.18°W	
4 1827 11 30	14.5°N 61°W	~6.5		Martinique		
5 1839 01 11	14.4°N 61°W	7.8		Guadeloupe		
6 1842 05 07	19.75°N 72.2°W	8.1	18.3 (20?)	Guadeloupe	16.33°N 61.7°W	
			0.8-0.9		16.3°N 61.58°W	
					16°N 61.73°W	
7 1843 02 08	16.5°N 62.2°W	8.3	0.5	1.2	Guadeloupe	16.25°N 61.58°W
8 1867 11 18	18.4°N 64.3°W	7.5			St. Martin	18.08°N 63.08°W
			1		St. Barthelemy	17.9°N 62.83°W
			1		Les Saintes	15.8°N 61.5°W
				2	Guadeloupe	16°N 61.72°W
						17.9°N 62.83°W
			10			16.33°N 61.7°W
			18.3 (10?)			16.3°N 61.78°W
					Martinique	14.67°N 61°W
9 1985 03 16	17.013°N 62.448°W	6.3		0.10 - 0.12	Guadeloupe	16°N 61.72°W
10 2004 11 21	15.677°N 61.65°W	6.3	0.5		Guadeloupe	15.58084°N 61.38695°W
			0.8		Les Saintes, Island of Terre-de-Bas	15.51260°N 61.36968°W
			0.7			15.51547°N 61.37476°W
			0.5		Les Saintes, Island of Terre-de-Haut	

2 Tele tsunamis :
-1755 Lisbon Tsunami
- 1929 Grand Banks, Canada



Analysis and Statistics

Geographic distribution of events in French West Indies

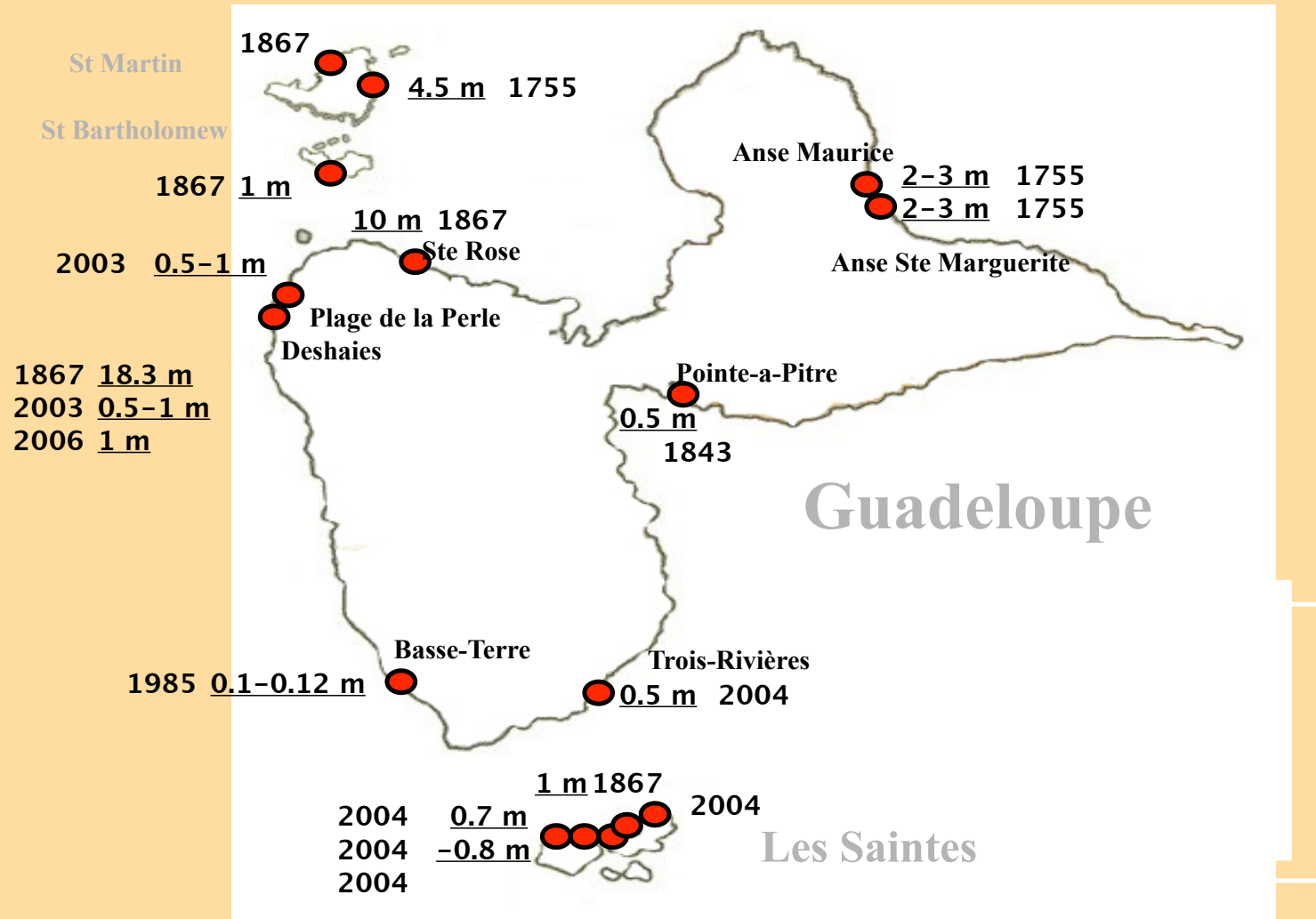
20%

40%

40%

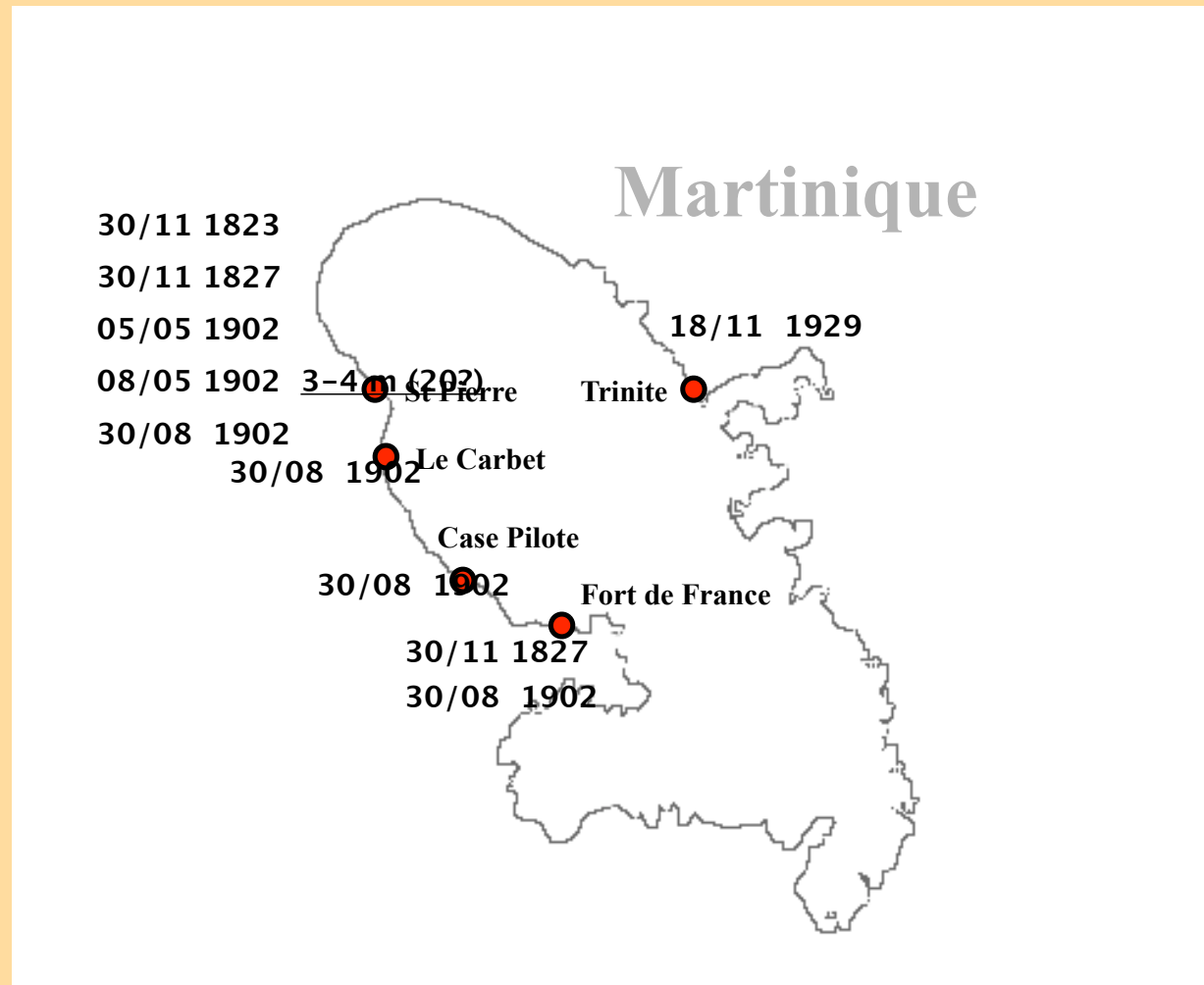
Analysis and Statistics

Run up location in Guadeloupe



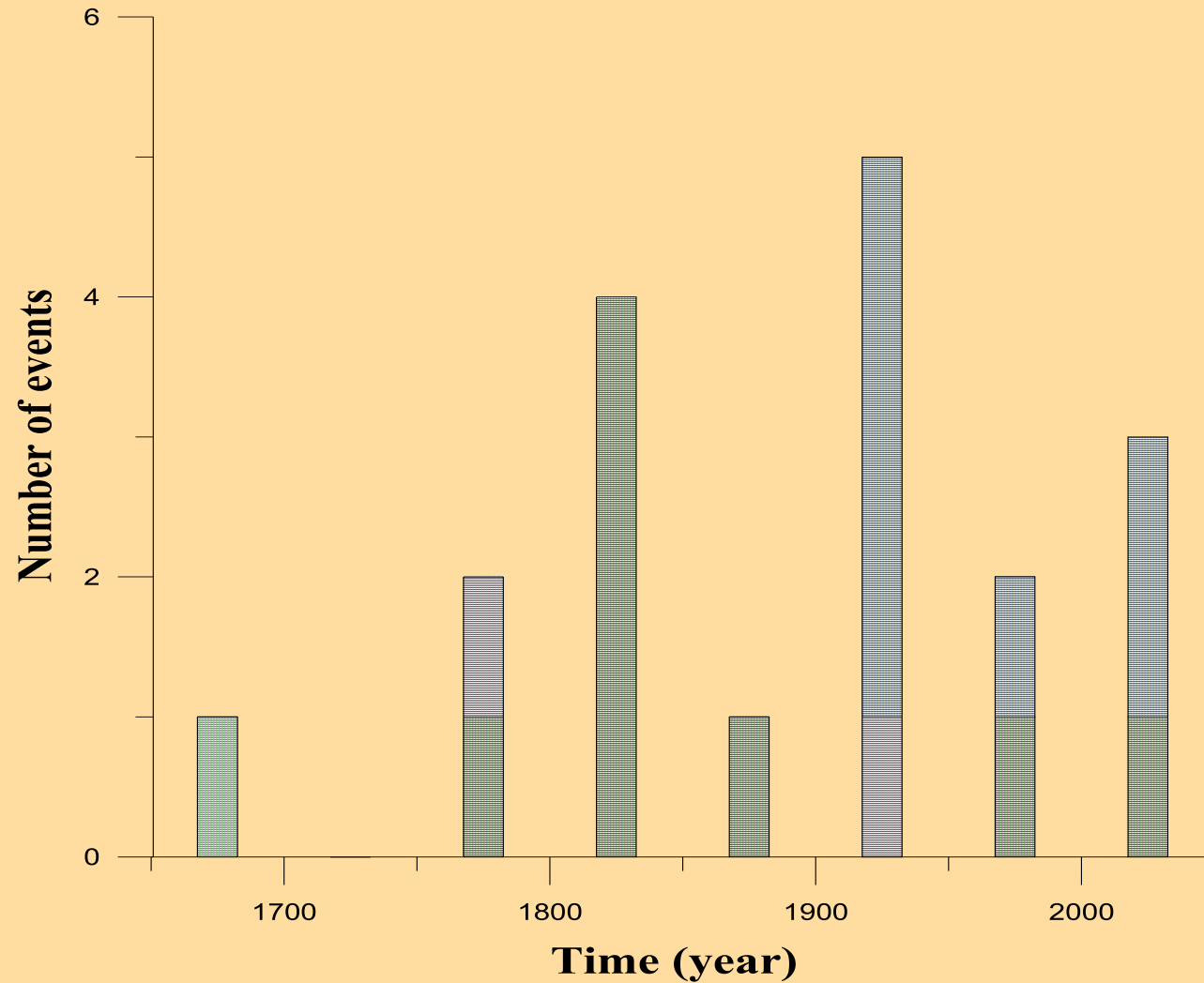
Analysis and Statistics

Run up location in Martinique



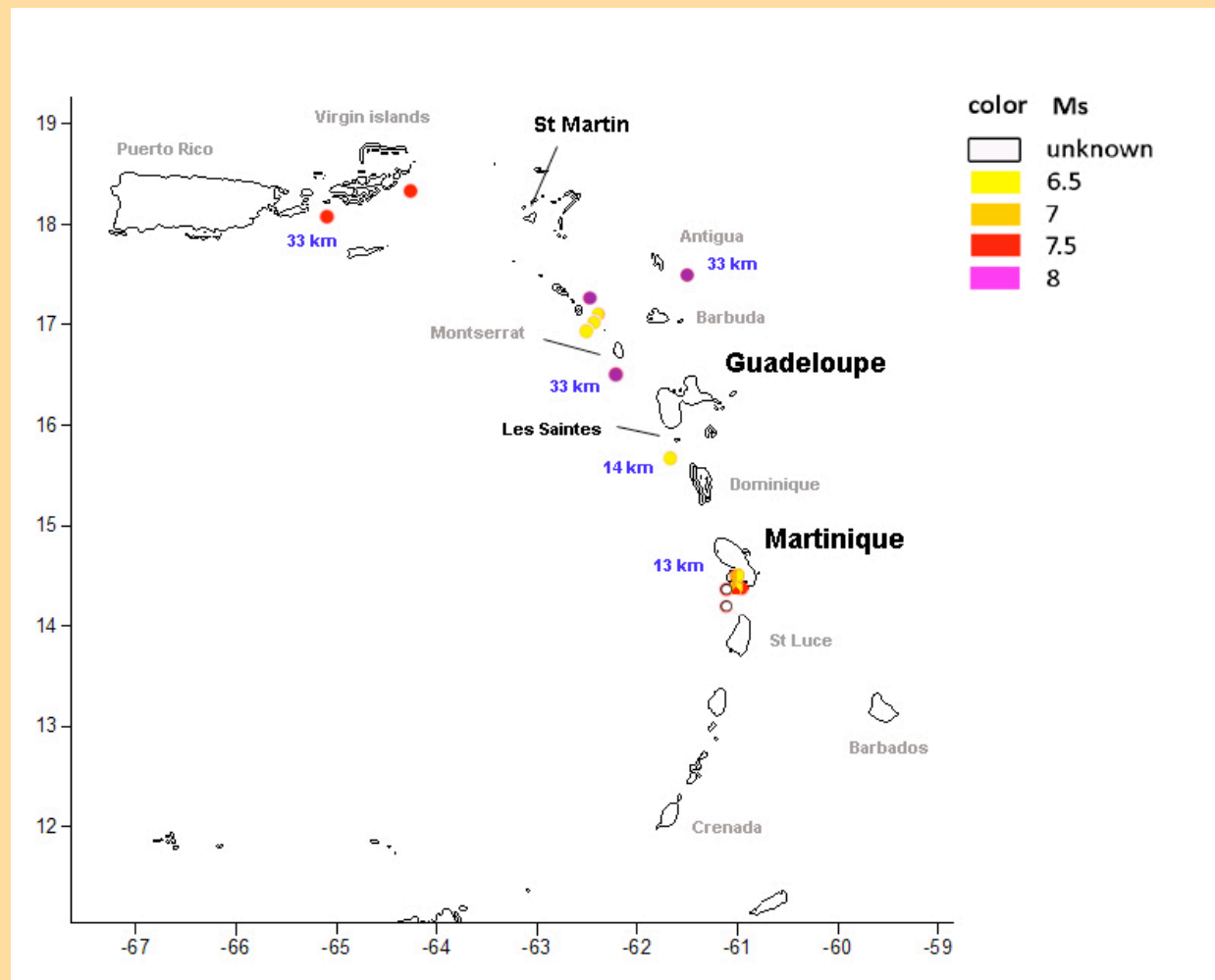
Analysis and Statistics

The Variability of the number of tsunamis



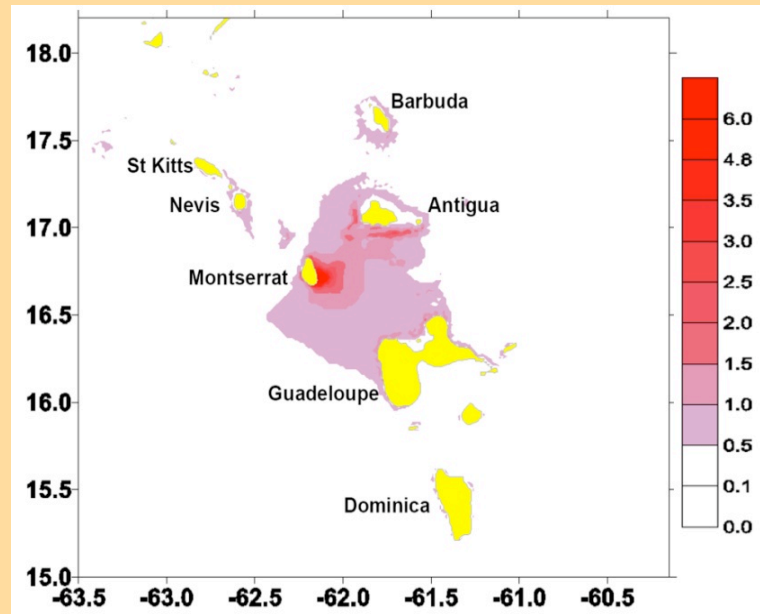
Analysis and Statistics

Tectonic Sources Location



Tsunami Modeling : Recent Results

2003 Montserrat Tsunami (TUNAMI N2, NLSW, ETOPO 1)



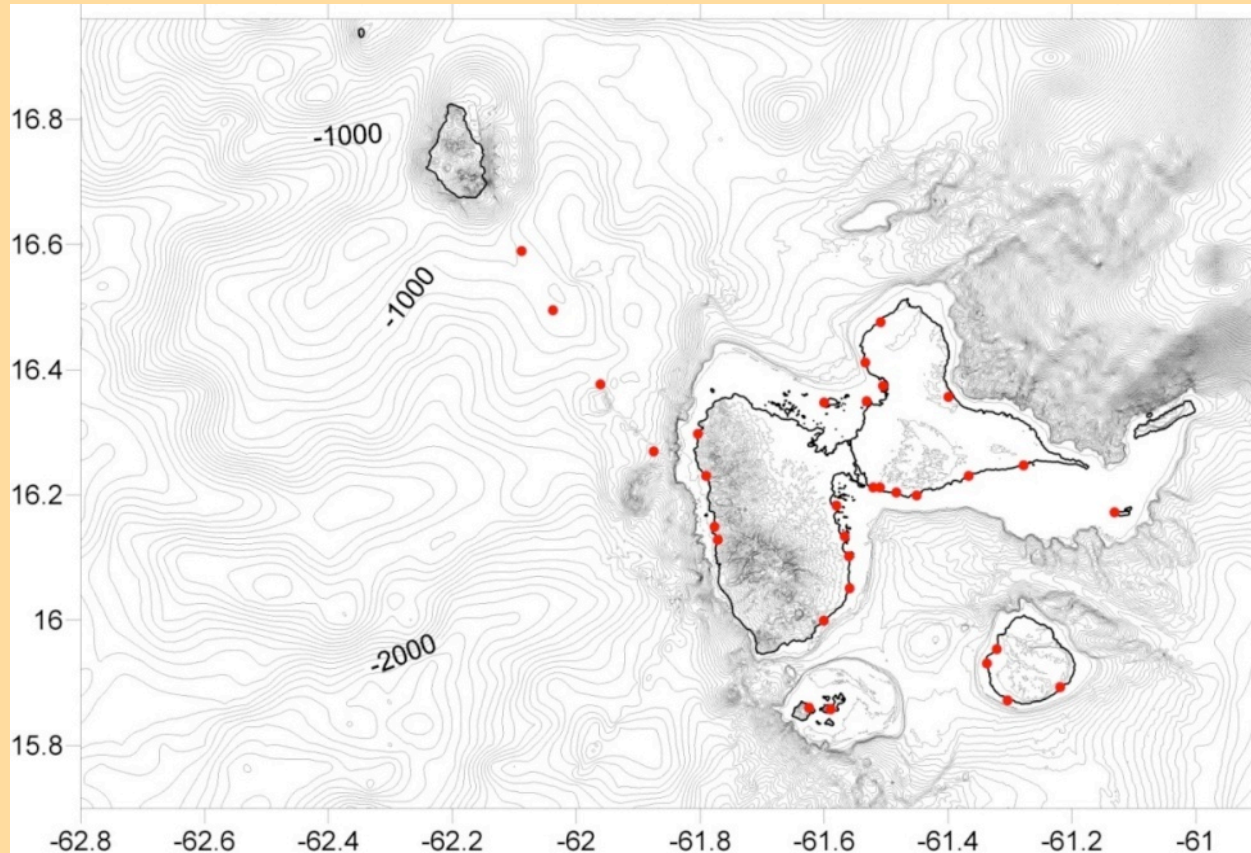
Directional Diagram



Distribution of relative waves height

2003 Montserrat Tsunami (FUNWAVE, Boussinesq)

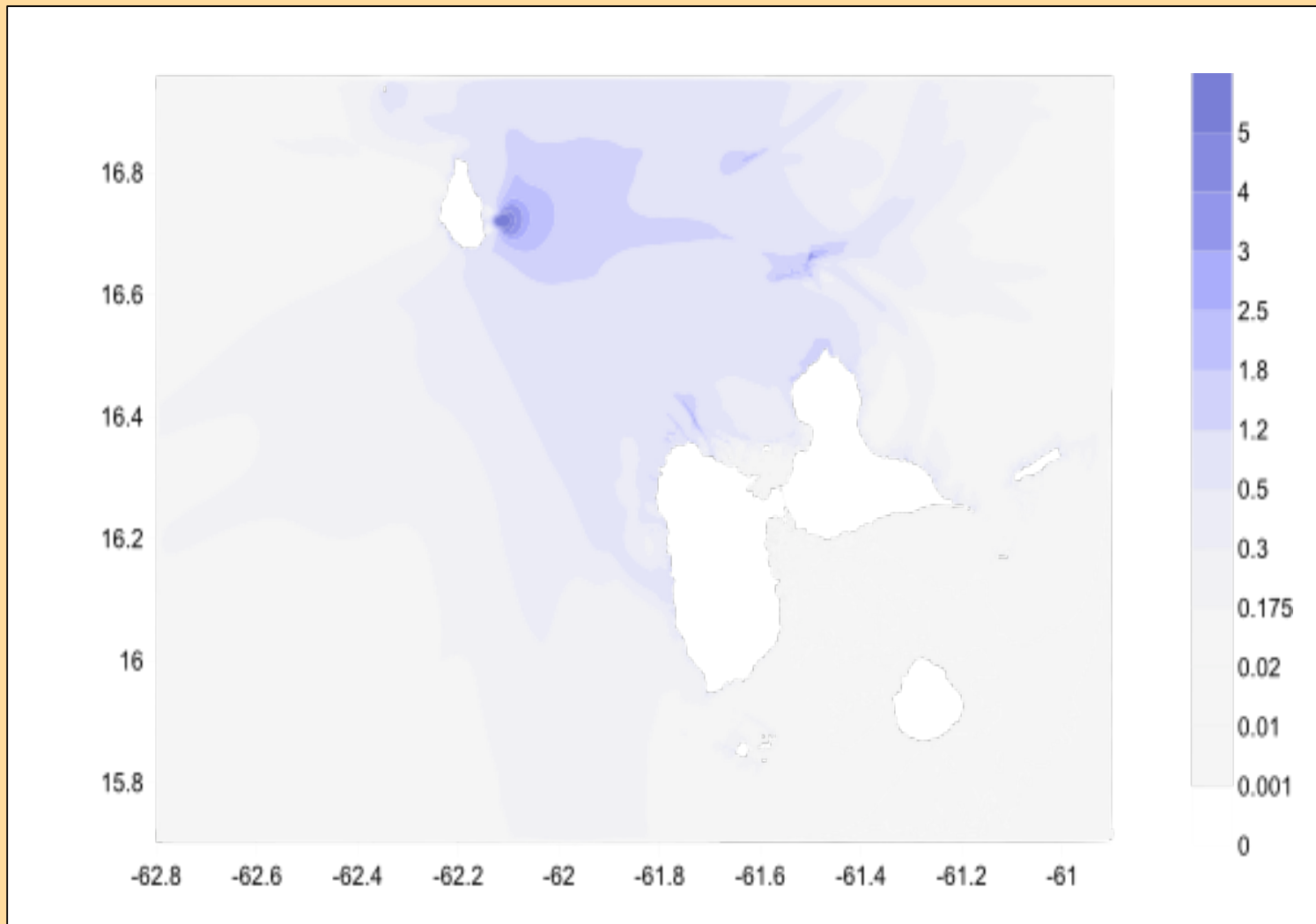
- Dispersive model with Boussinesq
- Non Dispersive model with NLSW



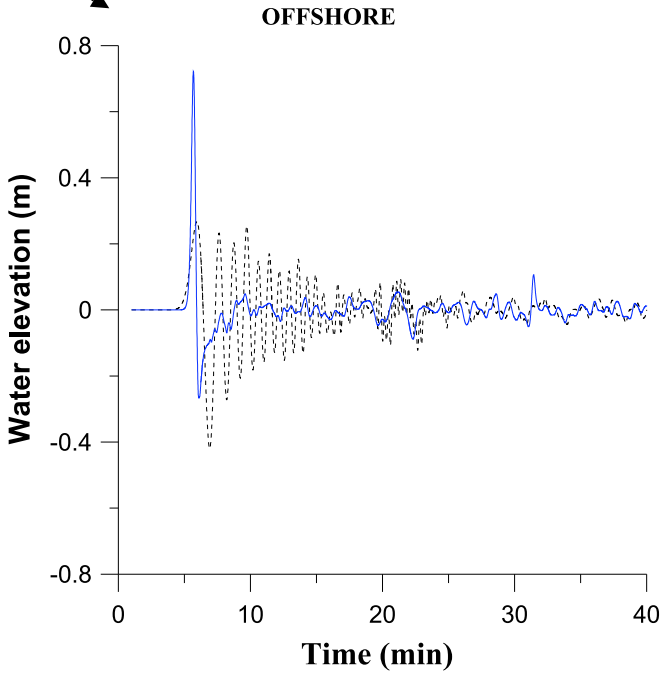
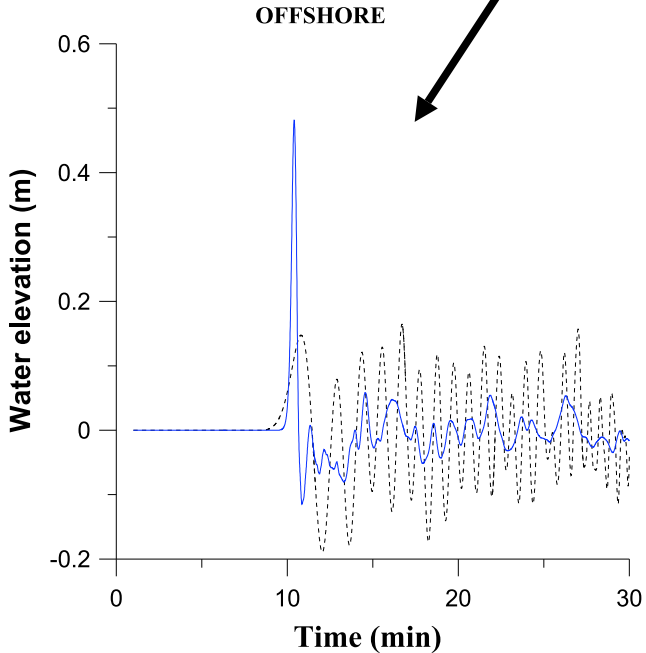
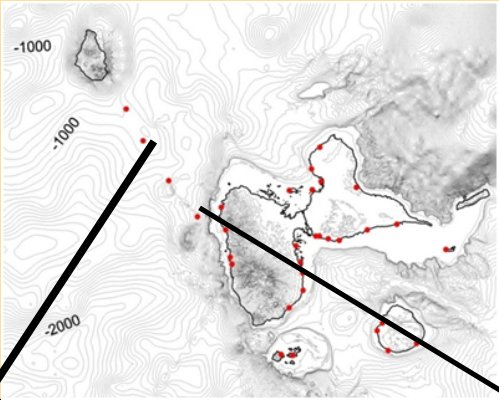
100 m constructed bathymetry file with tide gauge distribution

Distribution of maximum elevation (non-dispersive model)

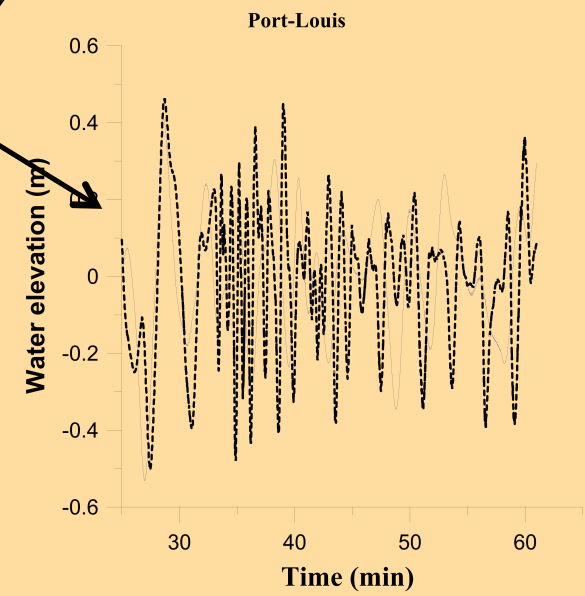
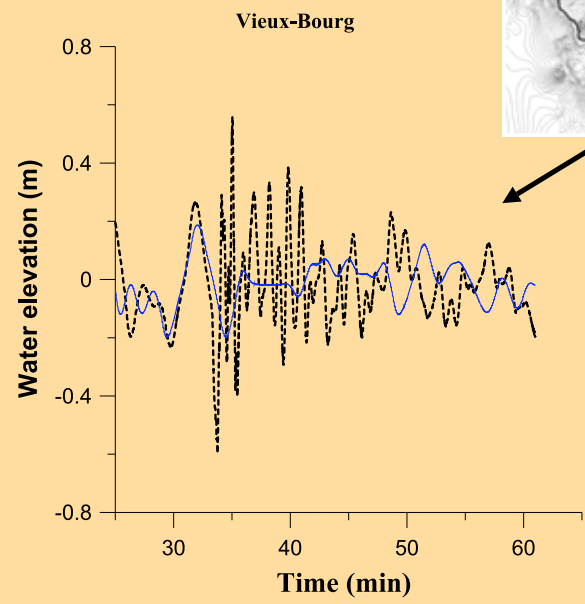
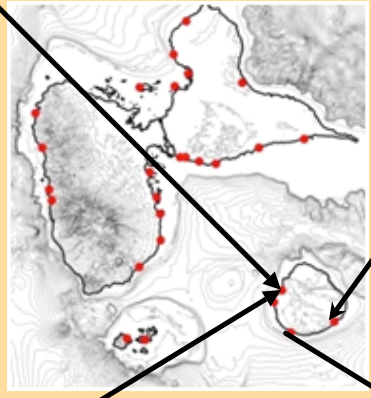
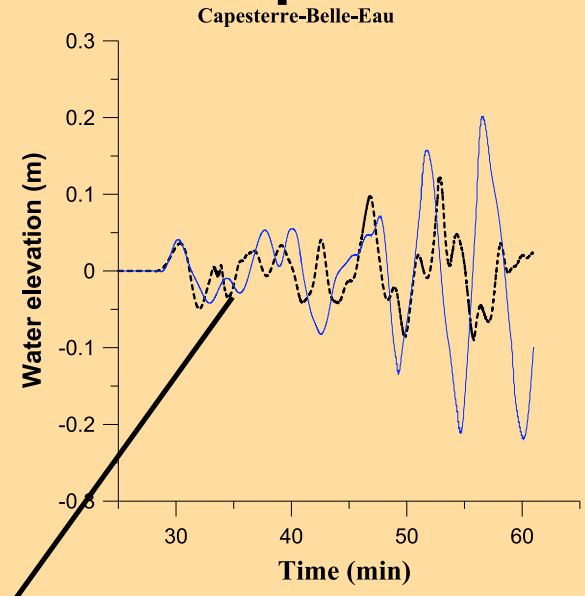
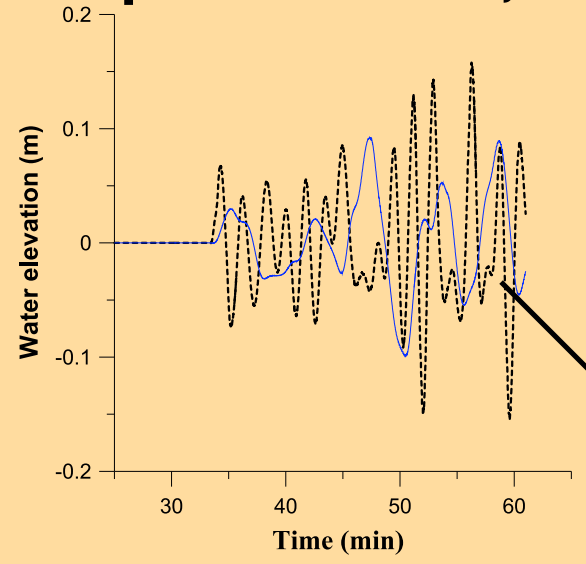
6 m near the source



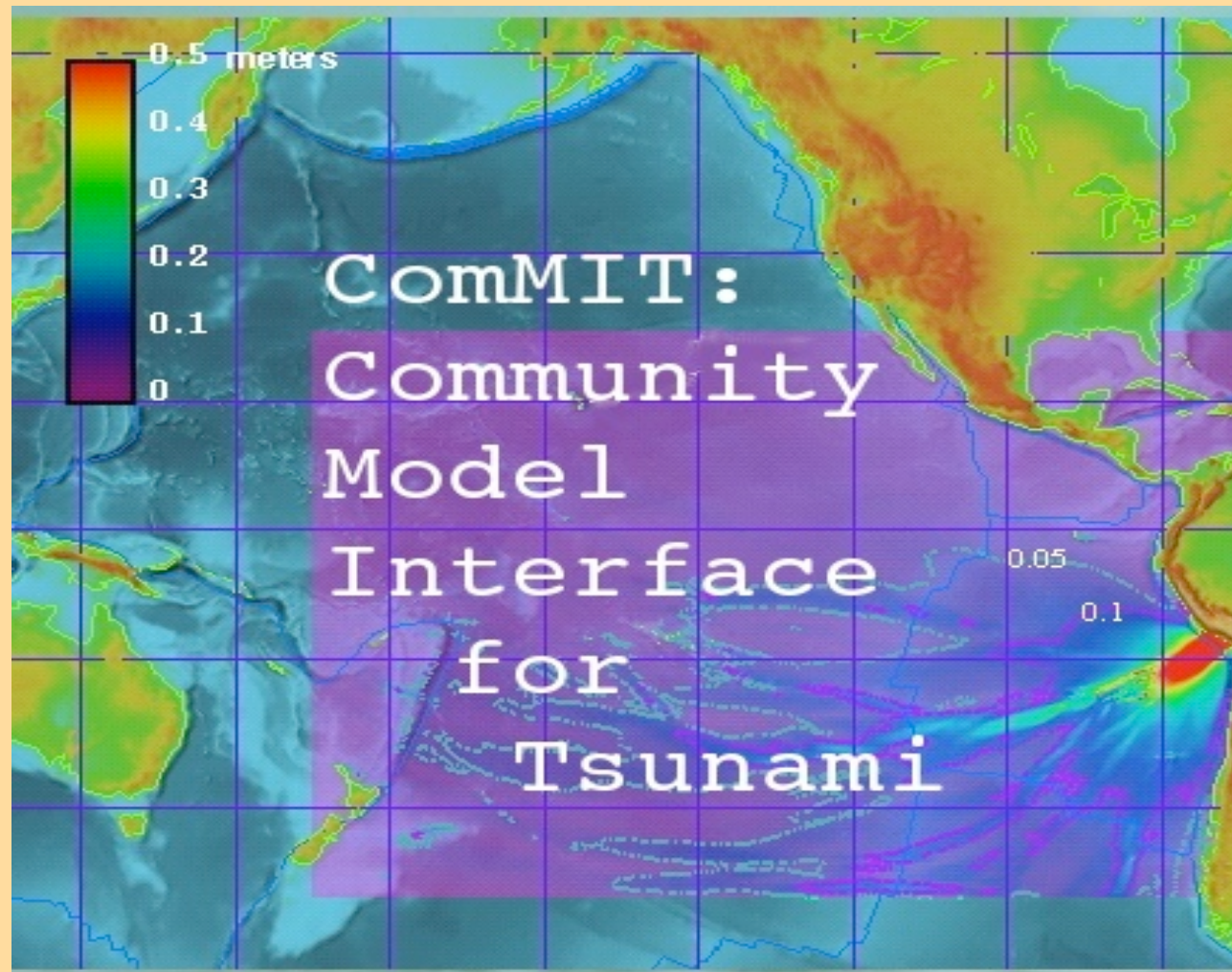
Numerical tide records (blue solid line - non-dispersive flow, black dotted line - dispersive flow)



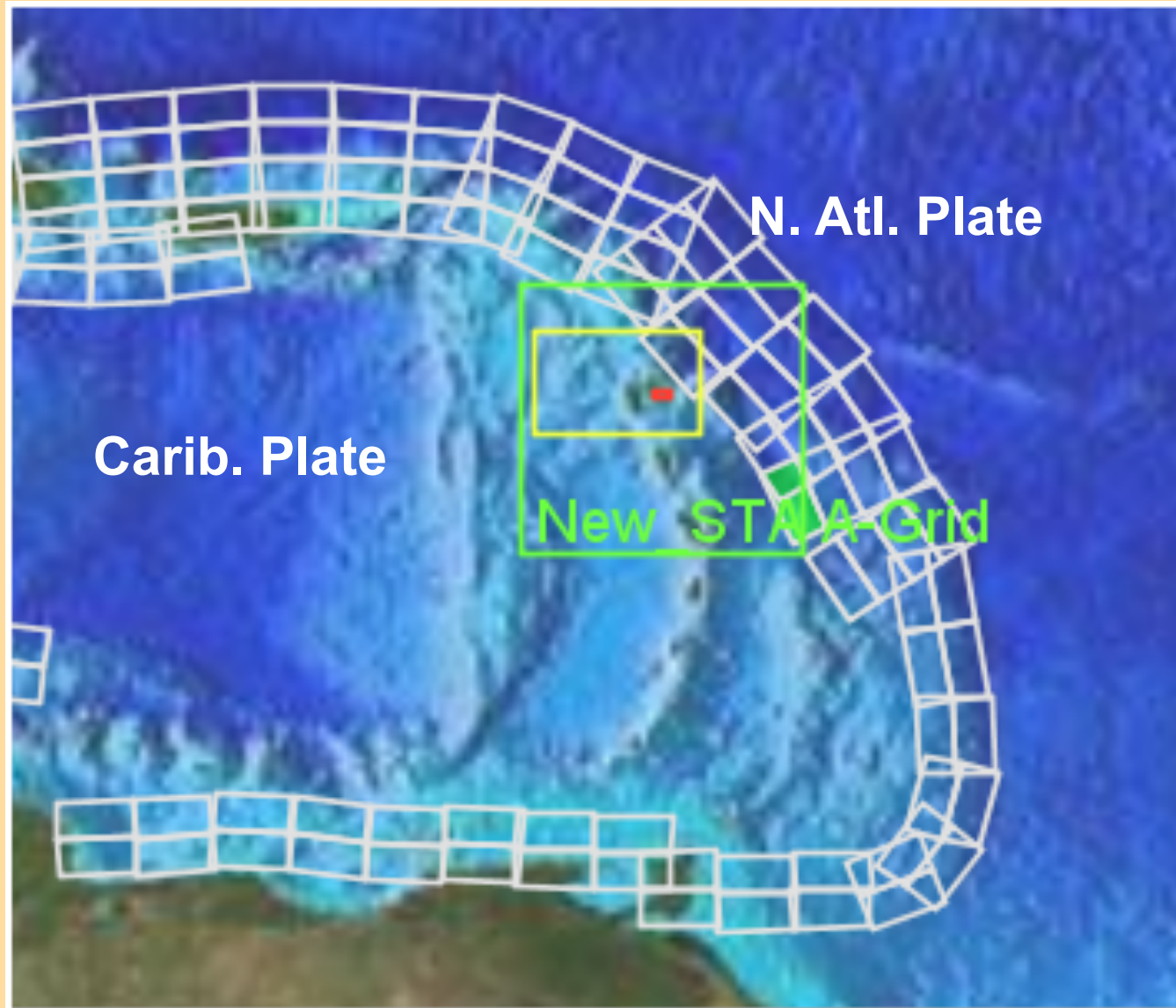
Numerical tide records (blue solid line - non-dispersive flow, black dotted line - dispersive flow)



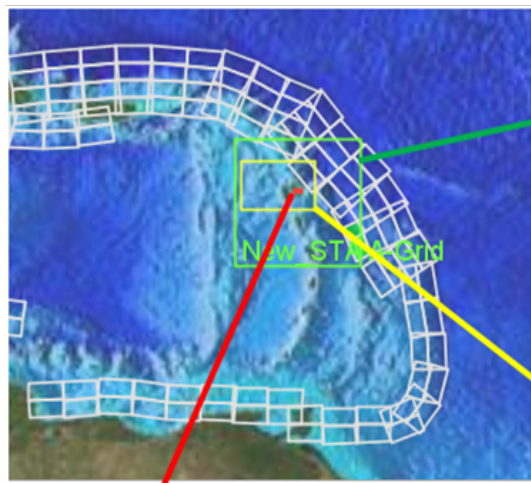
Potential Tsunamis in Guadeloupe from the subduction zone



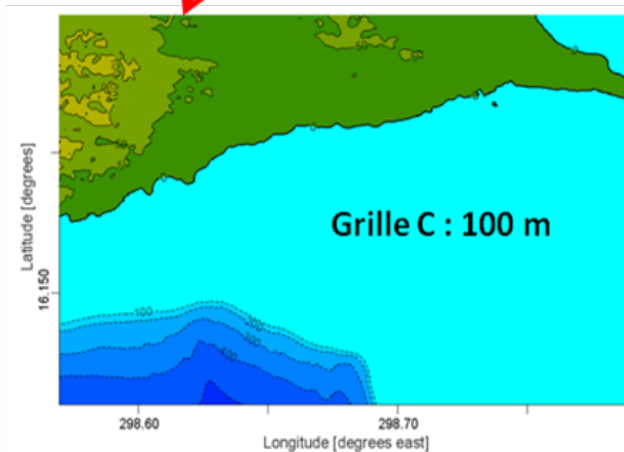
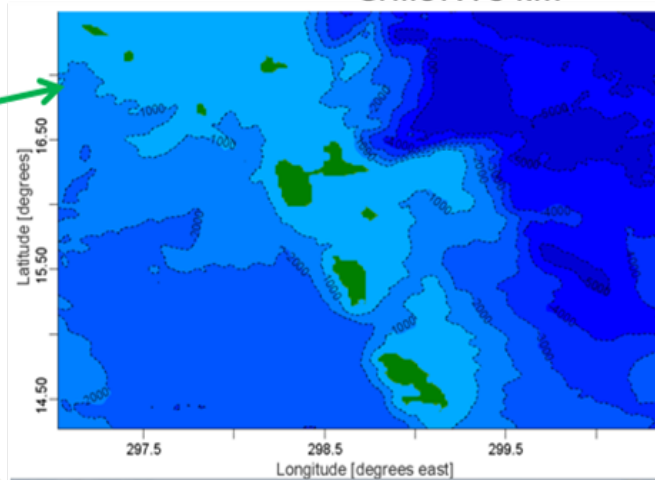
Subduction zone characterized par set of blocks precomputed



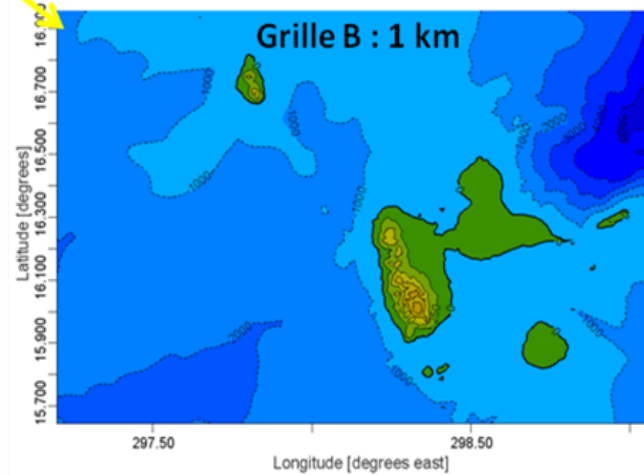
Nested grids : A, B, C



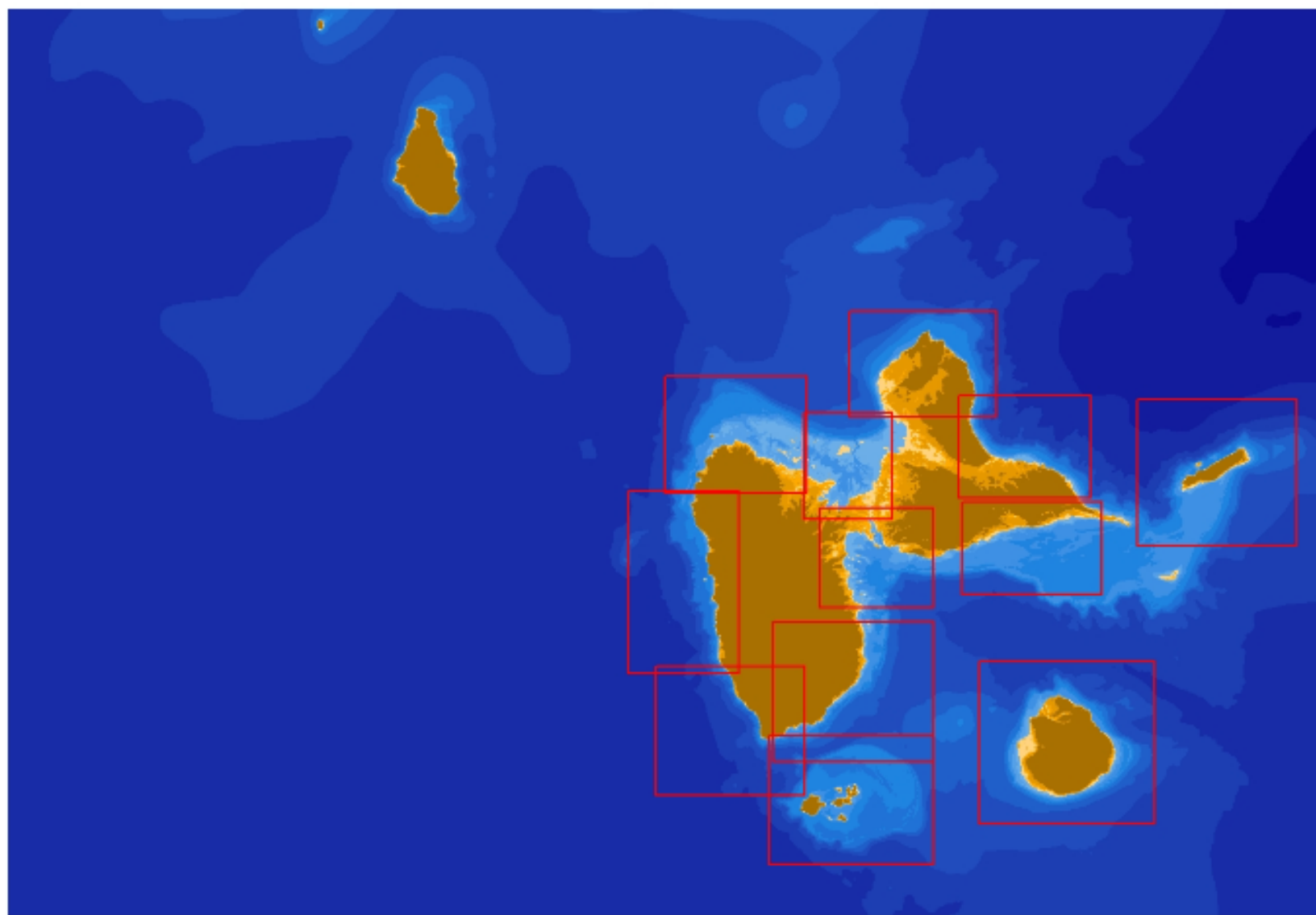
Grille A : 3 km



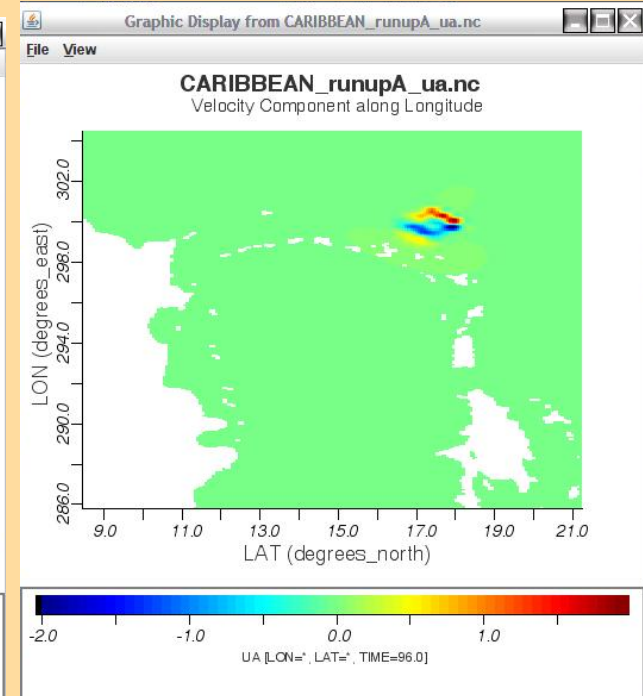
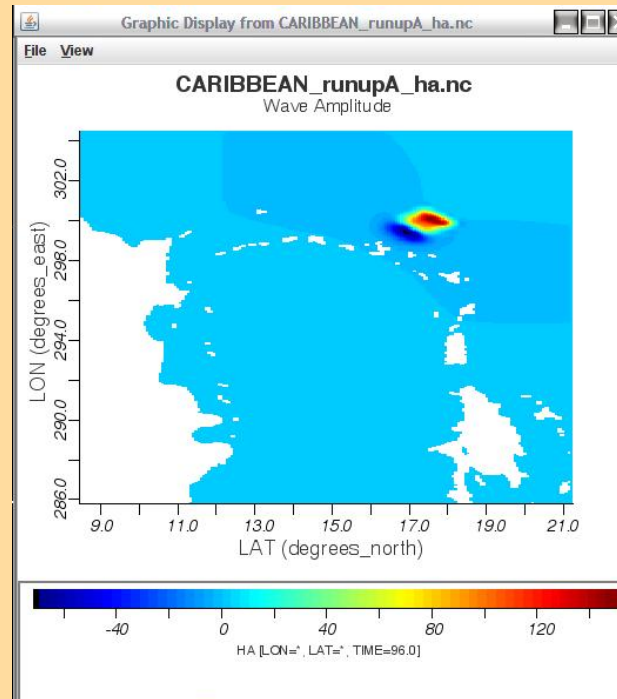
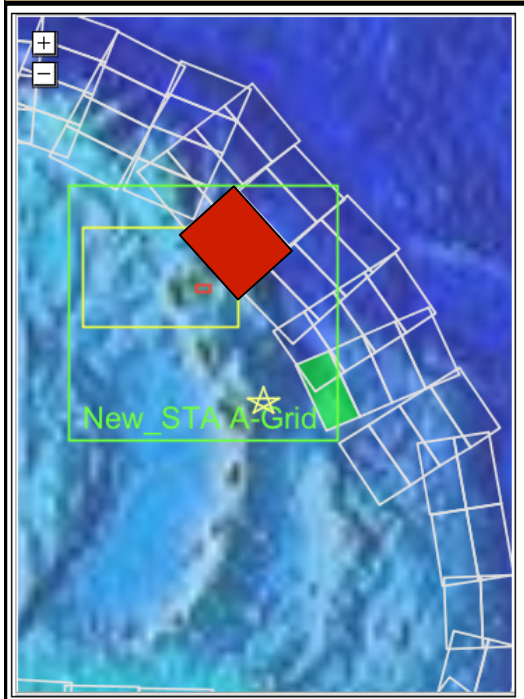
Grille B : 1 km



12 C grids around Guadeloupe



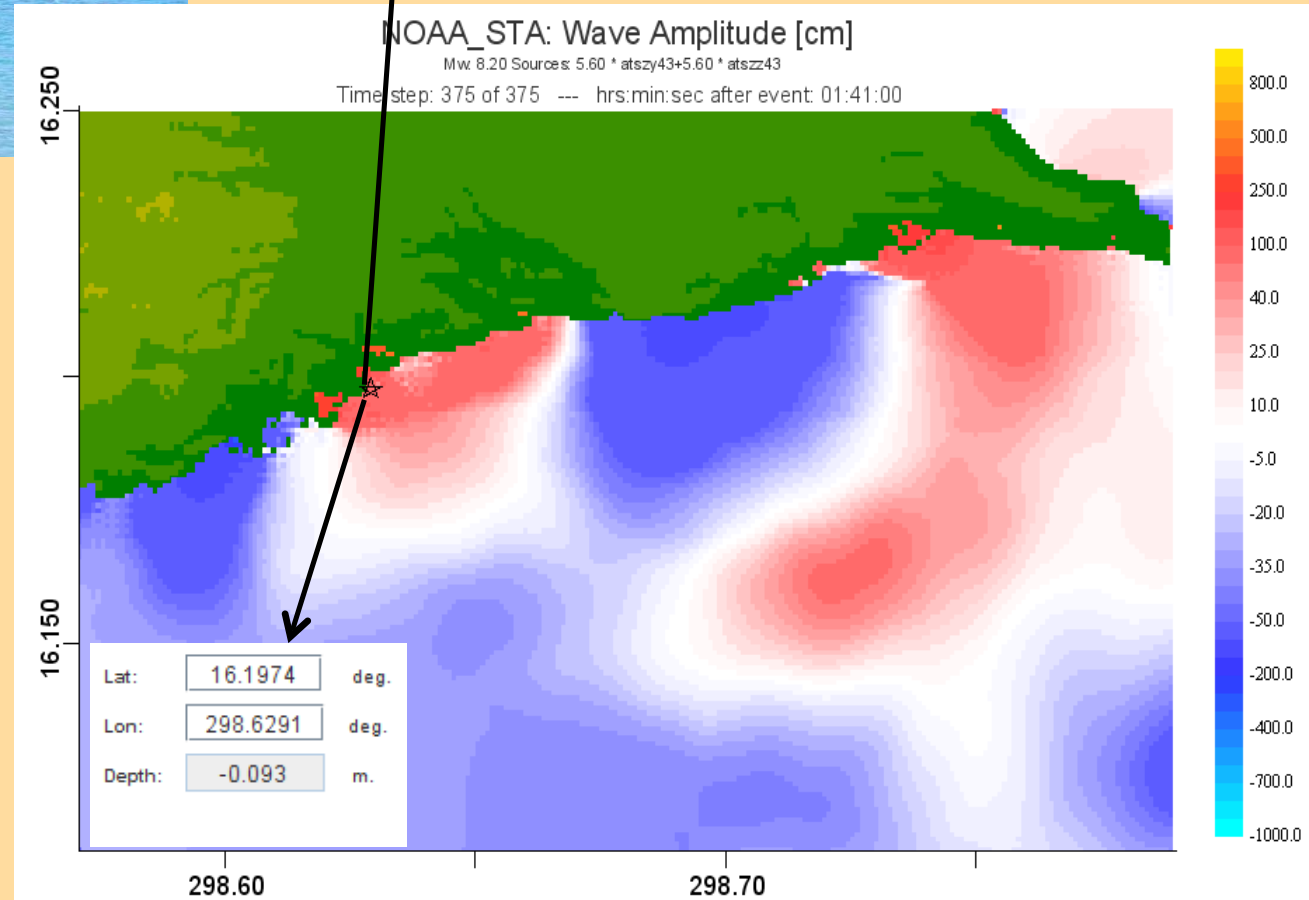
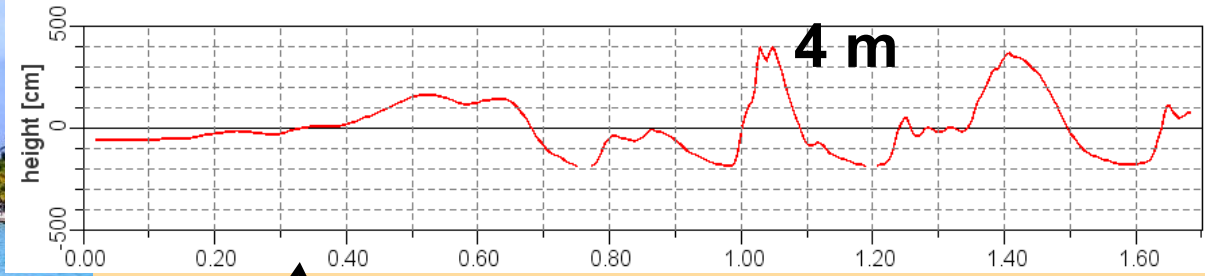
Source characteristics





**Beach of
Sainte Anne**

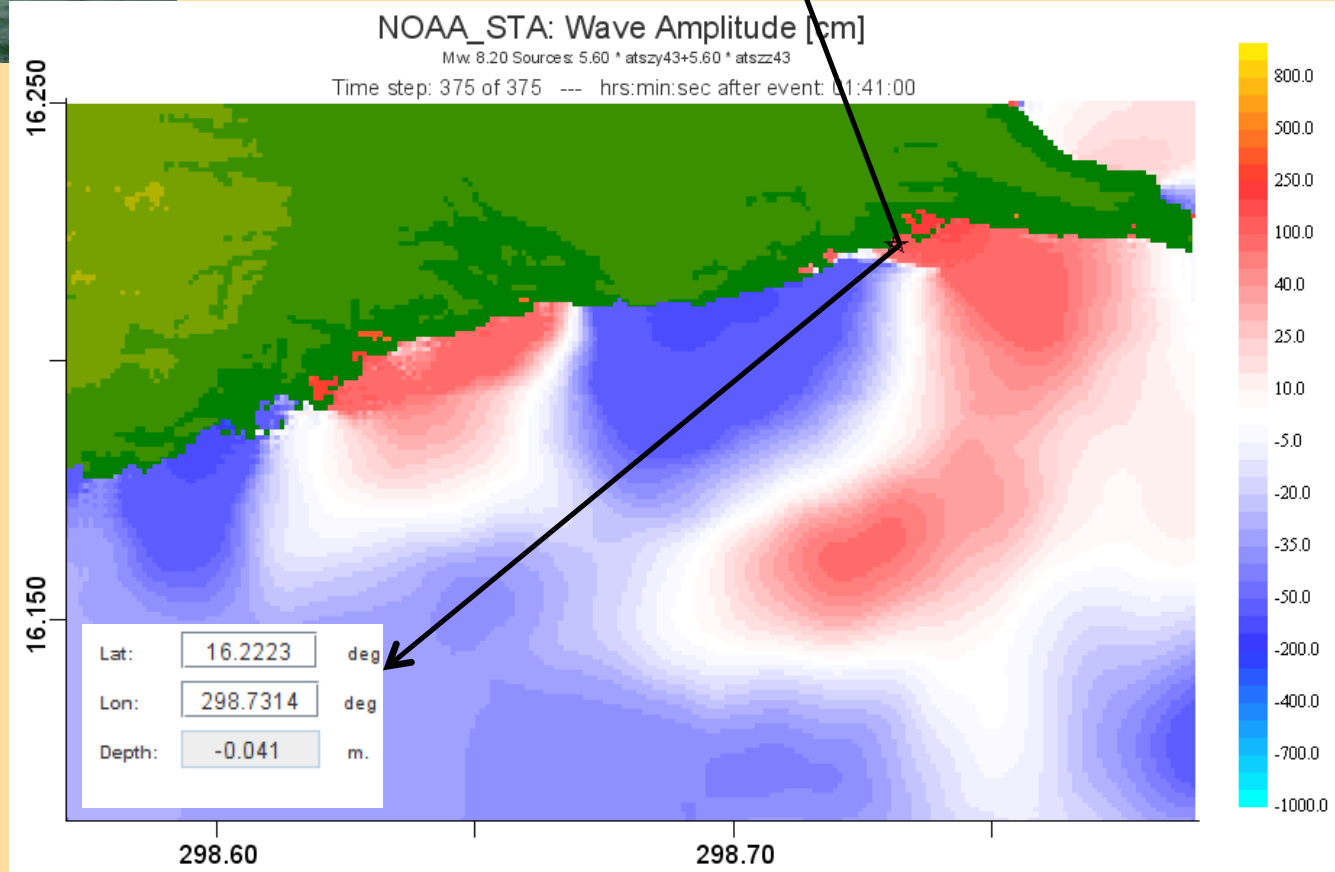
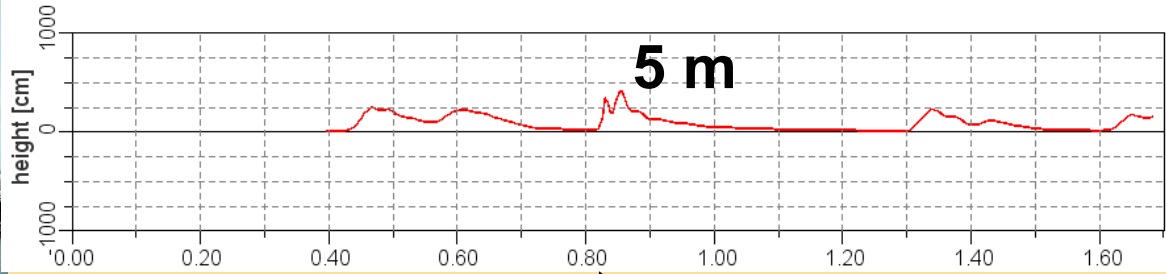
**Arrival time
25 mn**



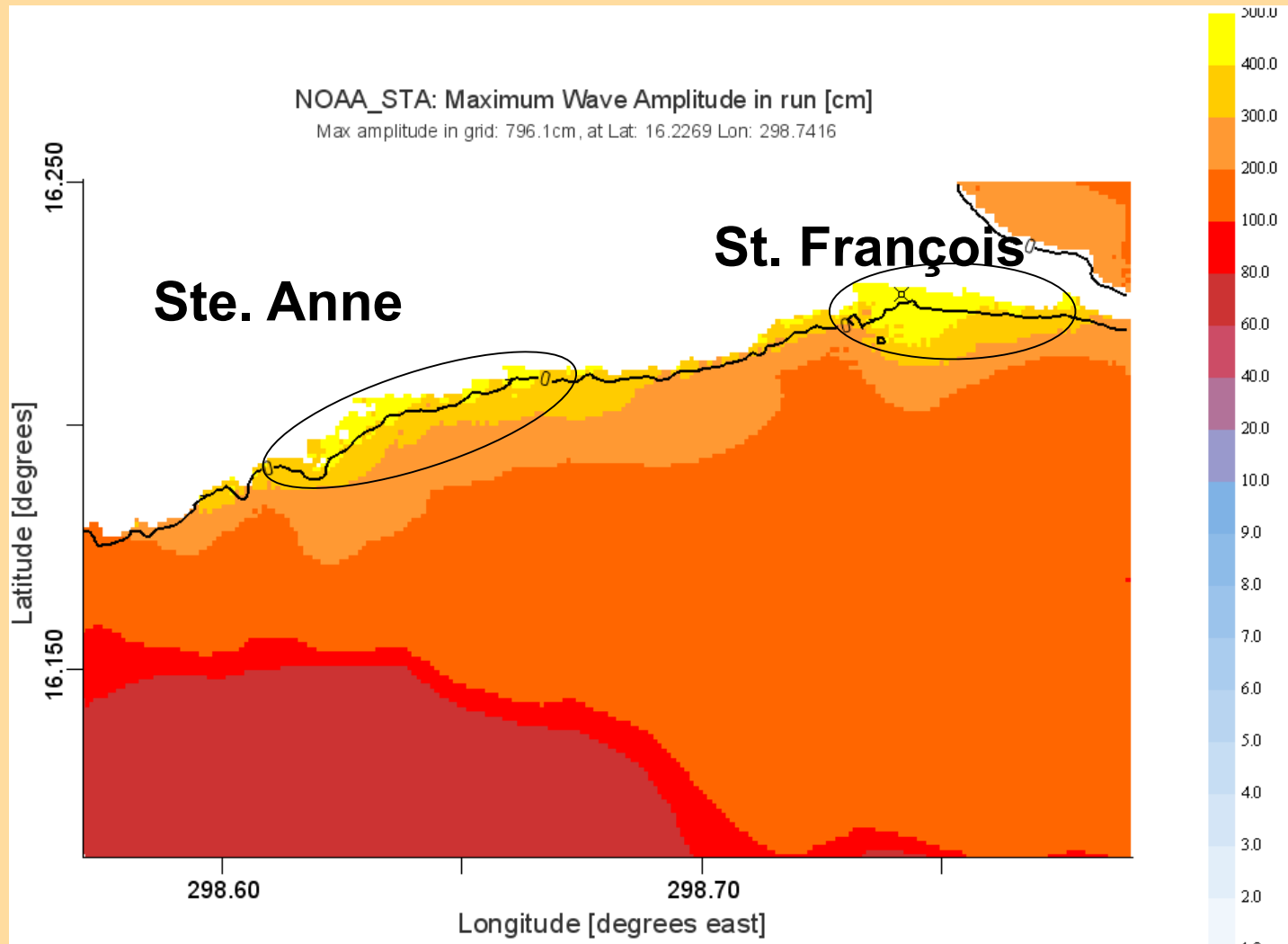


Marina of St. François

**Arrival time
25 mn**

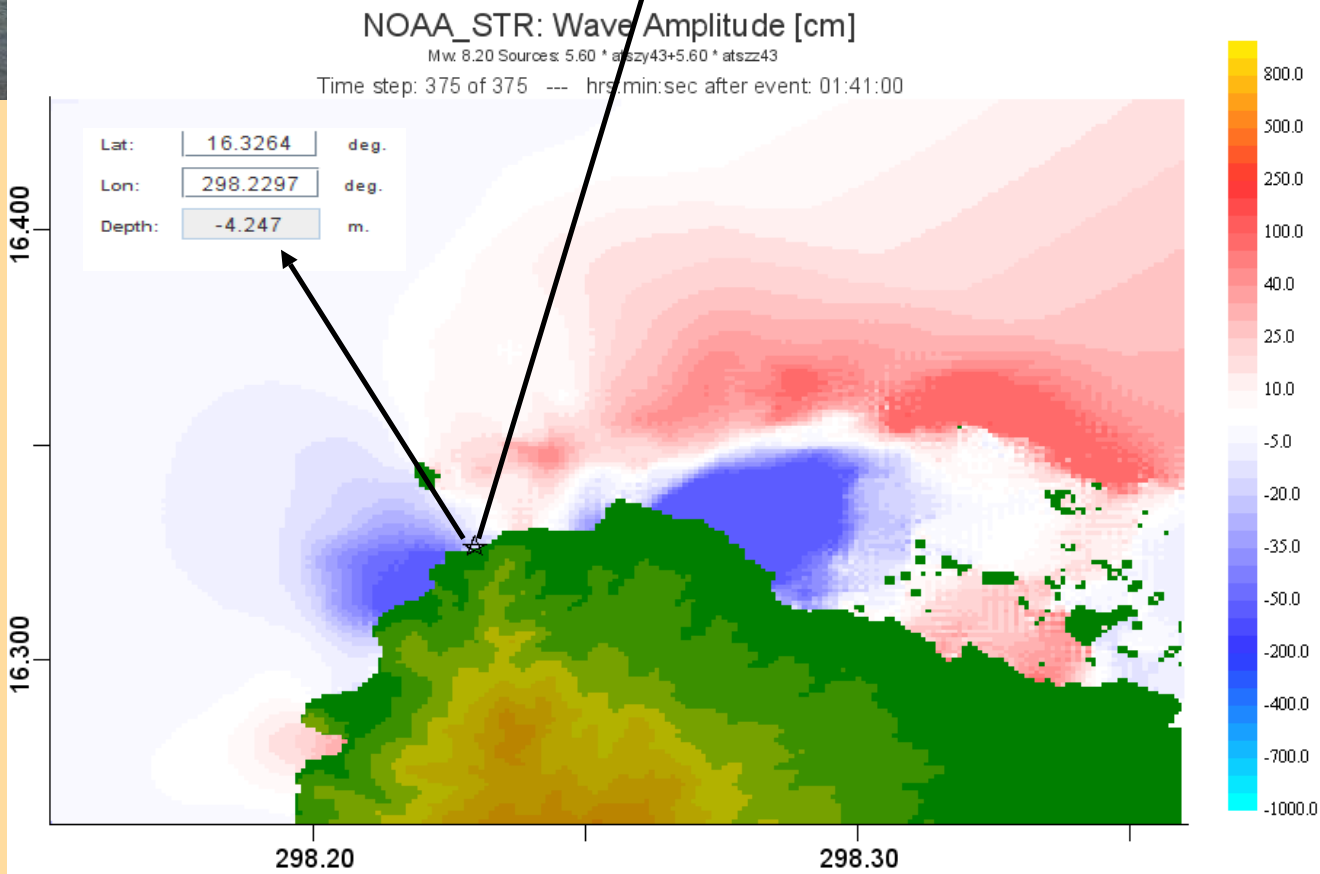
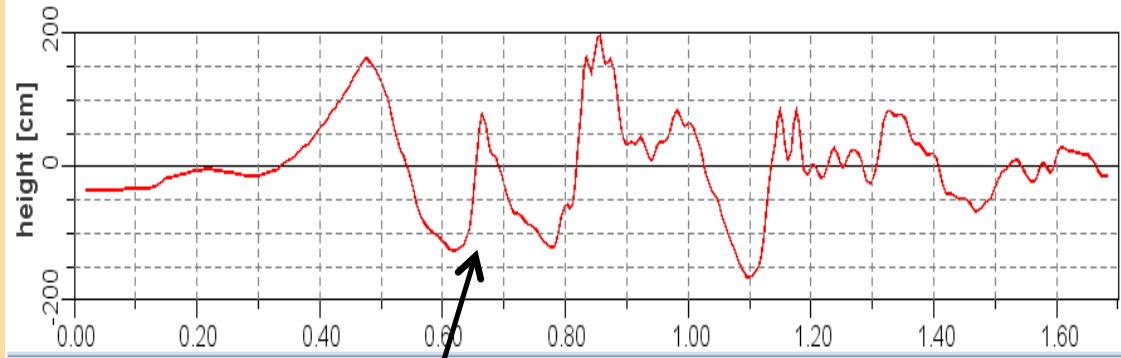


Inundation Zone in Ste. Anne – St. François

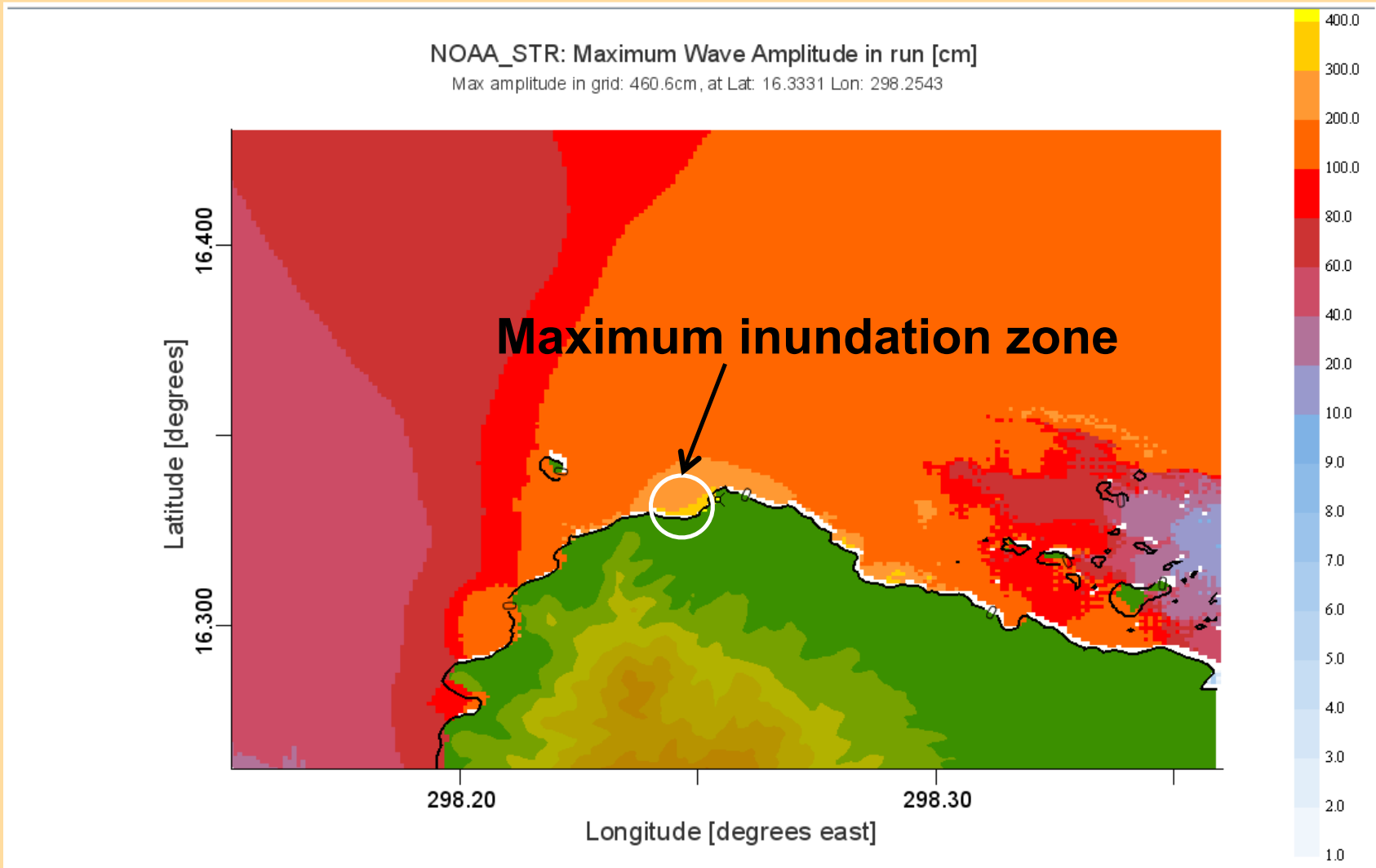




Deshaies (West coast)

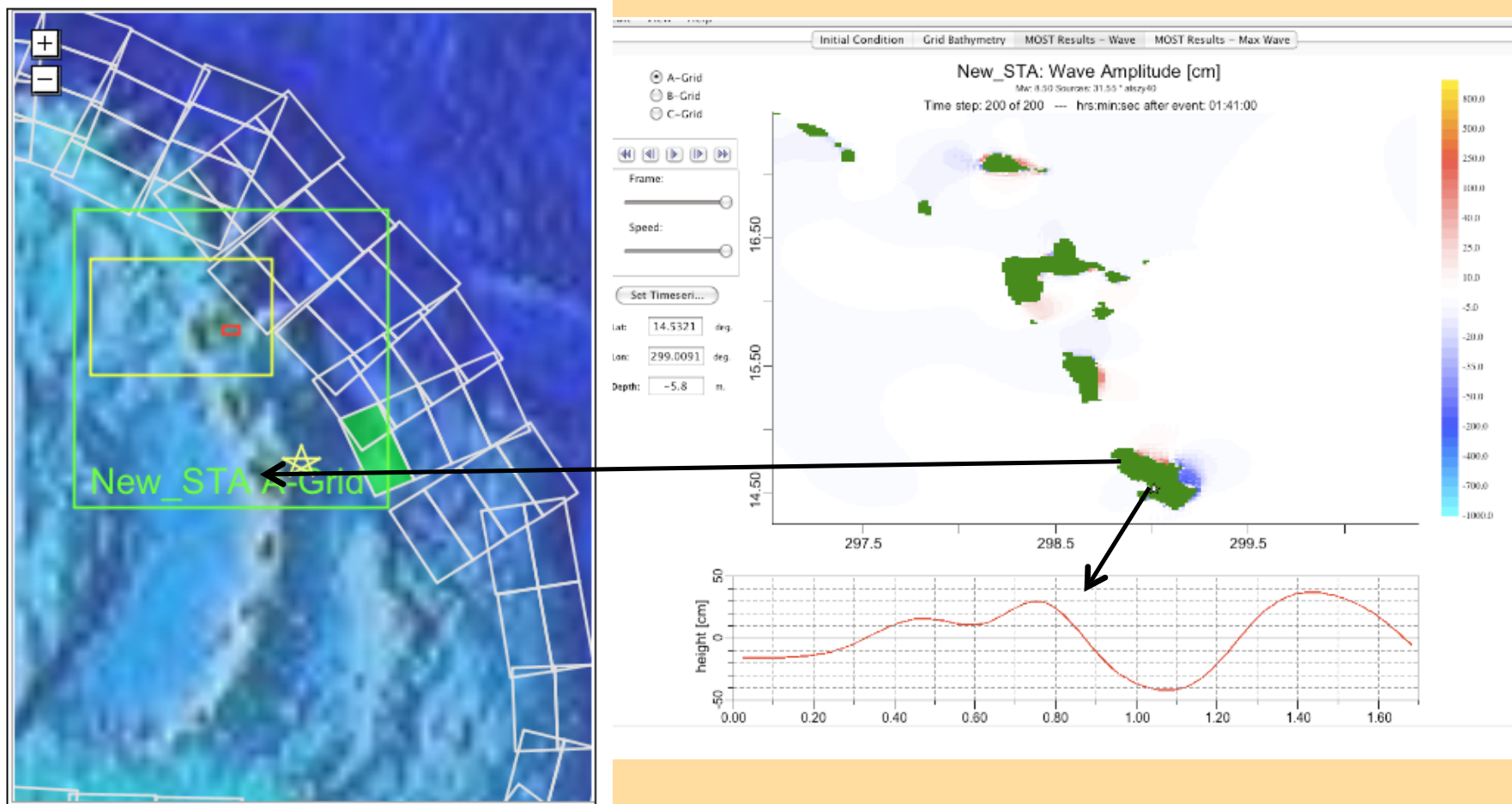


Inundation Zone in Deshaies

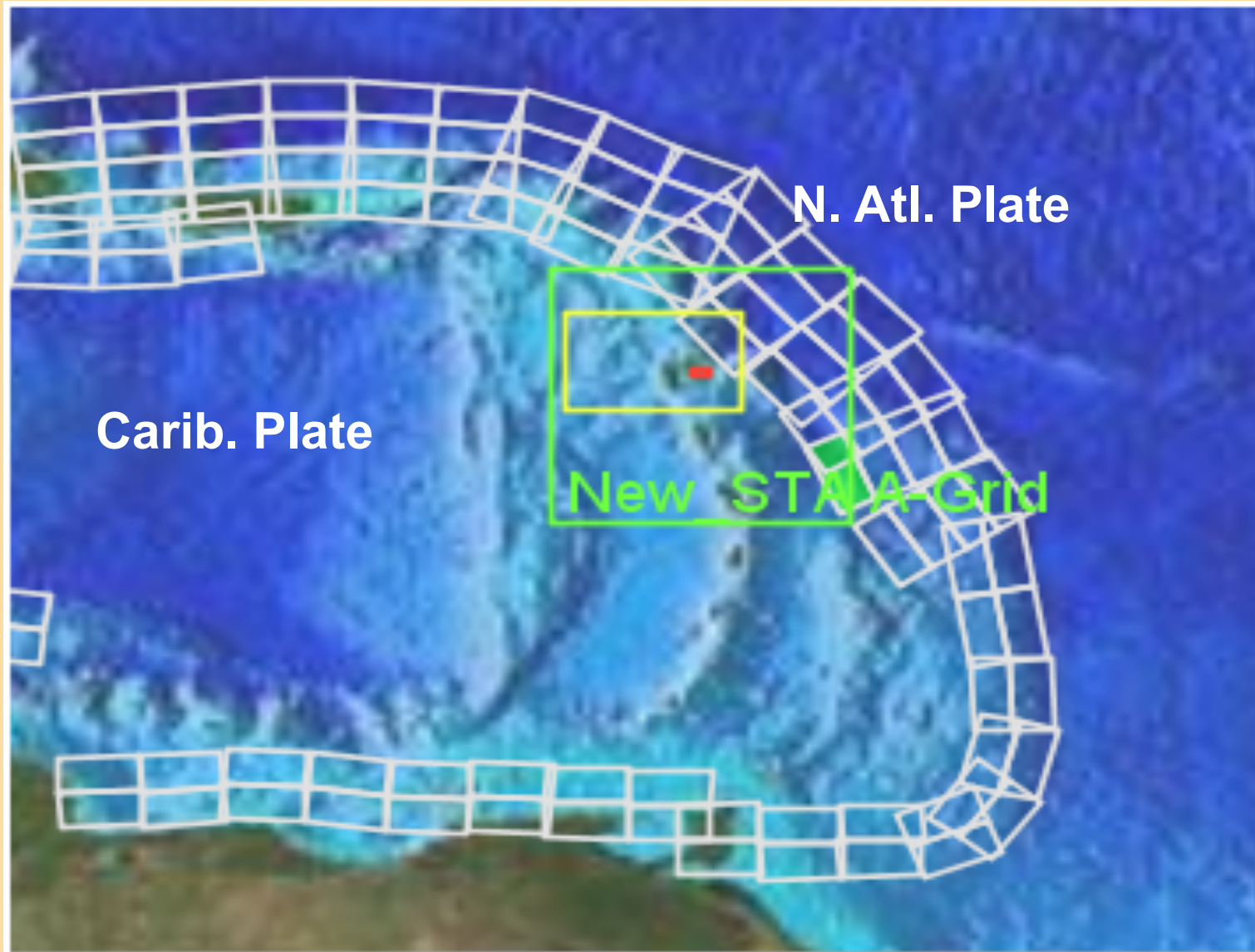


Waves amplitude in Martinique, Ford-de-France

Inside A grid



Building a bank of scenarios for all the blocks : in progress



THANK YOU FOR YOUR ATTENTION