



## Seismic hazard status and mitigation actions in Guadeloupe and Martinique, French West Indies

Jean-Christophe Audru, Myriam Belvaux, Mendy Gwladys Bengoubou-Valerius, Didier Bertil, Jean-Marc Mompelat, Agathe Roulle

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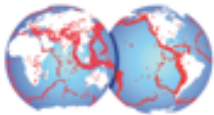
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# Seismic hazard status and mitigation actions in Guadeloupe and Martinique, French West Indies

*J.C. Audru (spk), M. Belvaux, M. Bengoubou-Valerius, D. Bertil, J.M. Mompelat, and A. Roullé*



**GEM**  
GLOBAL EARTHQUAKE MODEL

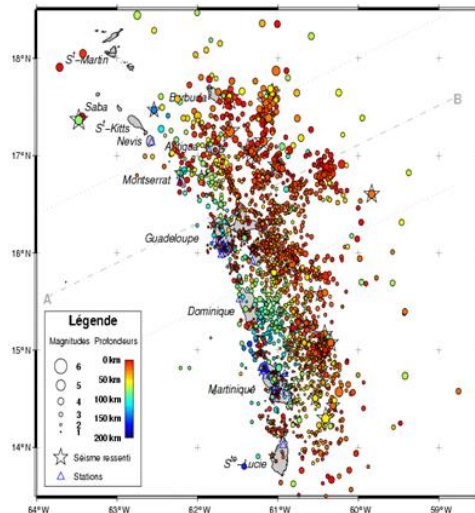
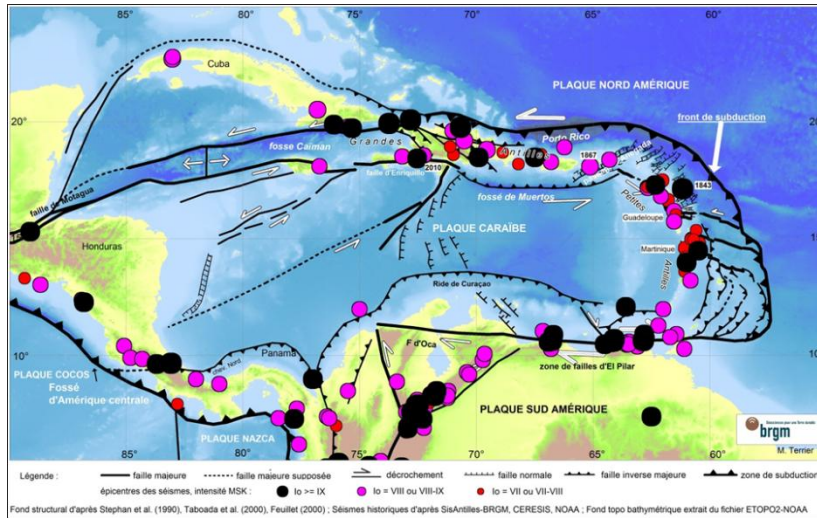
**CDEMA**  
Caribbean Disaster Emergency  
Management Agency



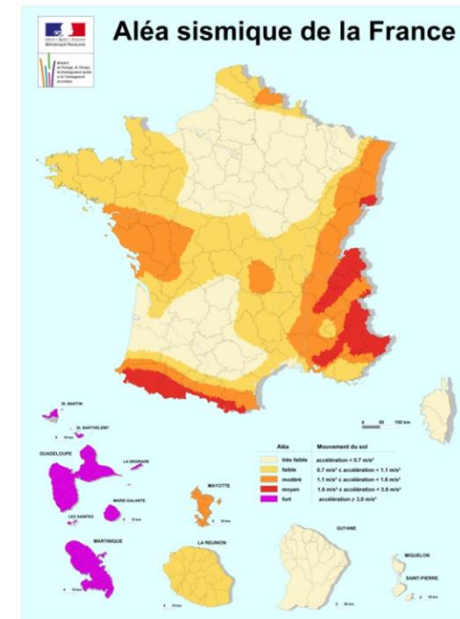
Géosciences pour une Terre durable

**brgm**

# The FWI tectonic framework

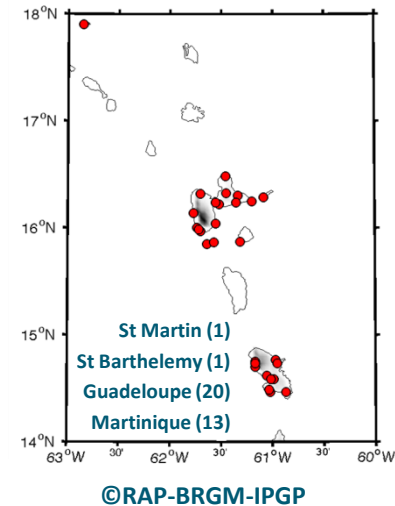
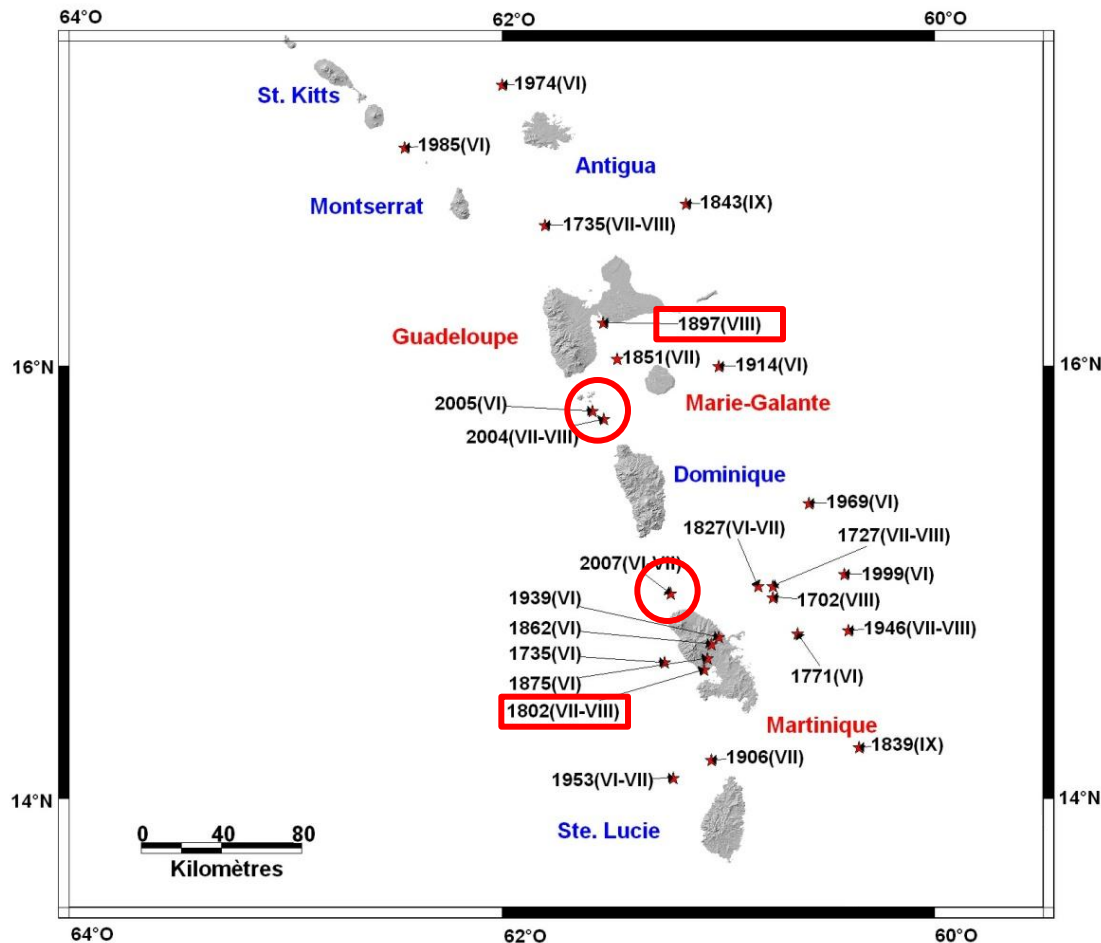


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- France is divided into 5 zones for building codes
- The highest French level is attributed to the FWI
- The  $PGA \geq 0,3g$  for a 475 yr-return period

# Hazard mapping in the FWI: main events & French accelerometric network



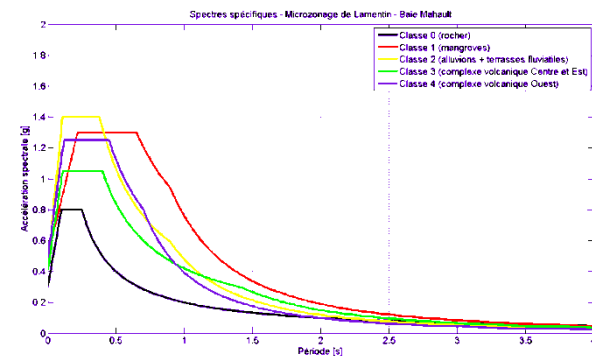
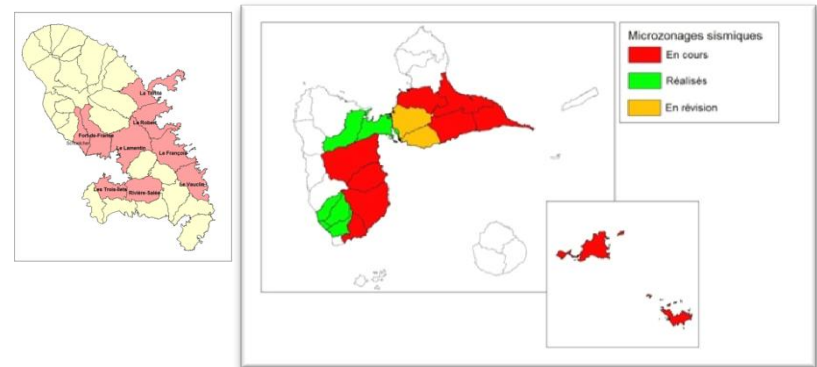
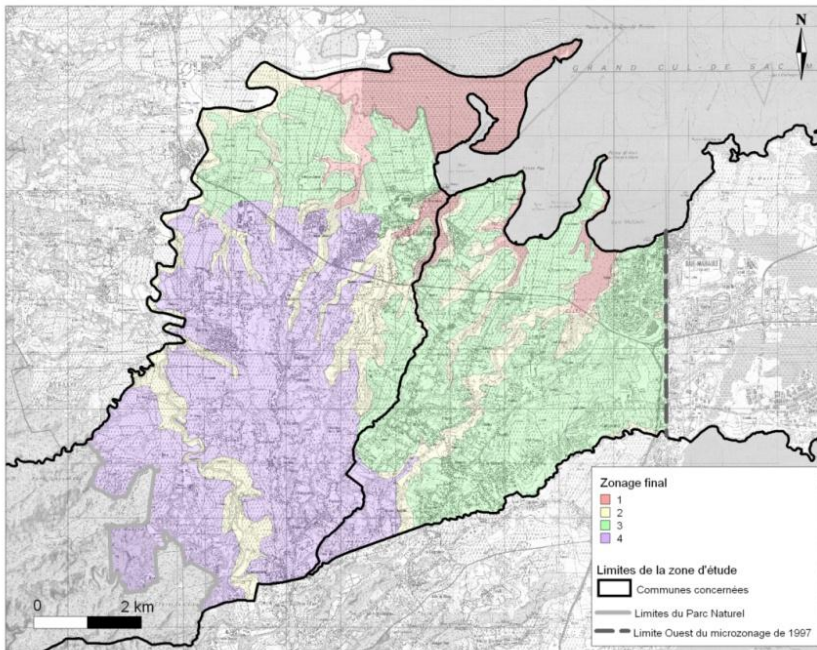
- > 35 accelerometers
- > 35 sismometers

> Download center:  
[www-rap.obs.ujf-grenoble.fr](http://www-rap.obs.ujf-grenoble.fr)



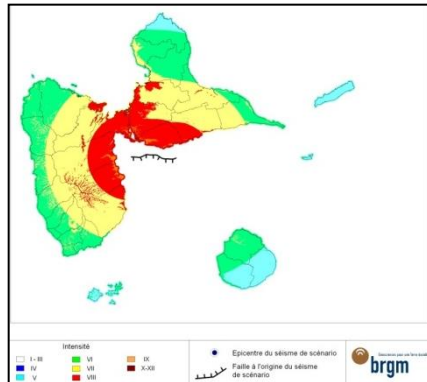
# Hazard mapping in the FWI: seismic microzonation

- > Geophysical investigations (SASW and H/V), cross-sections, boreholes, geotechnical synthesis, Eurocodes transcription, site effects → microzonation

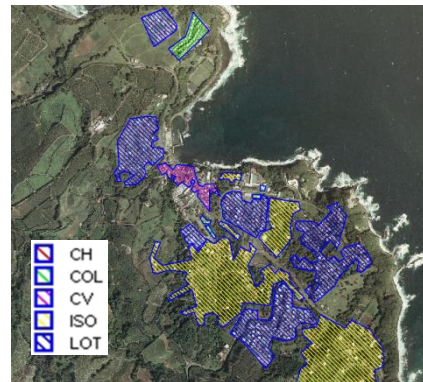


# Risk mapping in the FWI: damage scenarios

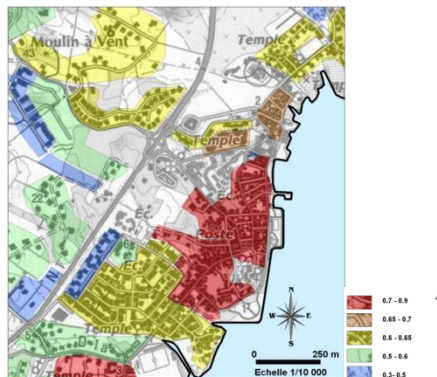
- > numerical simulation of the earthquake induced damage in a specific territory



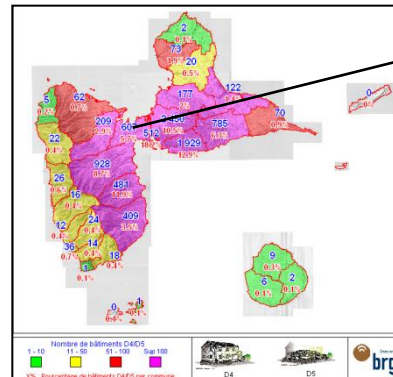
Regional & local hazard



Building inventory

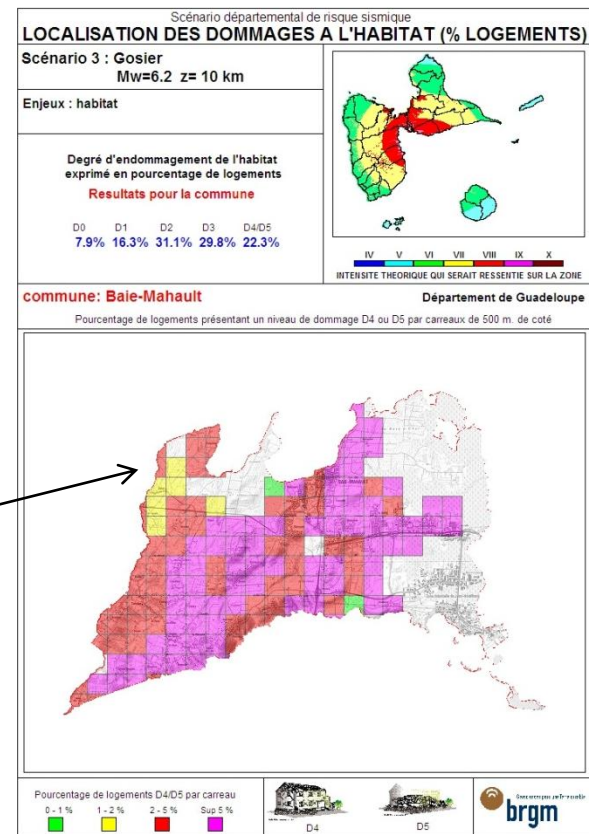


Vulnerability index



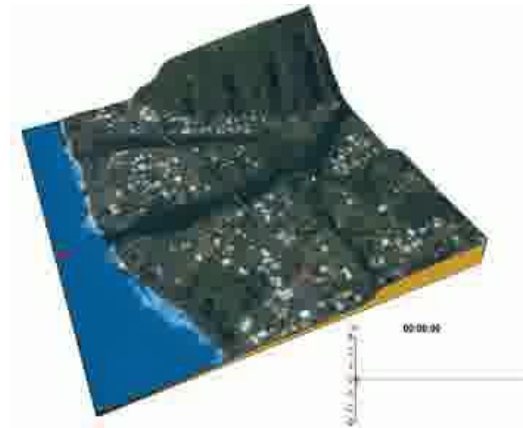
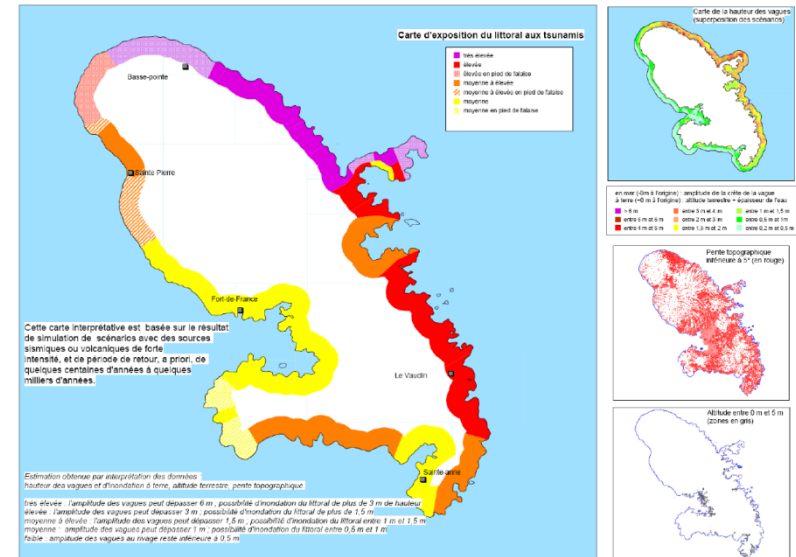
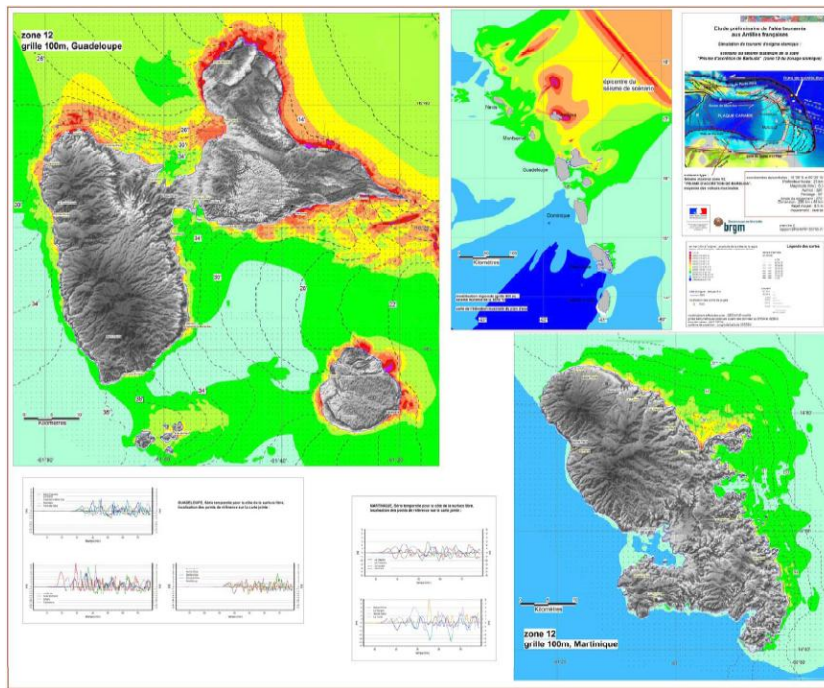
Damage simulation

## Focus on a damaged area



# Hazard mapping in the FWI: regional tsunami evaluation

- > Compilation of several simulations and scenarios, based on earthquakes and huge aerial landslides that have occurred throughout the region





# Hazard mapping in the FWI: diagnosis of schools

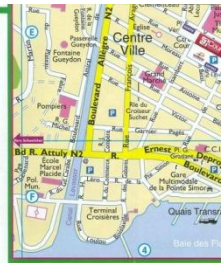
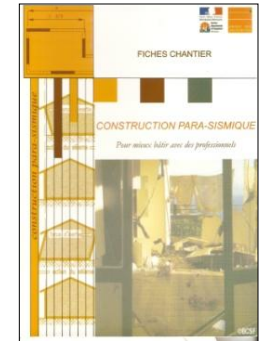
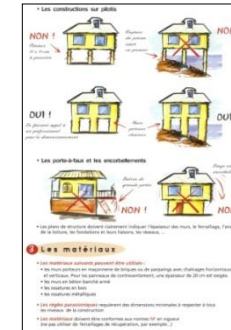
- > With partners, seismic diagnosis of all primary schools and kindergartens (schools belong to municipalities in France)
- > A classification into 3 groups:
  - G1: Earthquake resistant, possibly with some minor work to be performed
  - G2 : The retrofit/strengthening is fiscally sustainable
  - G3 : Reconstruction fiscally better than retrofit/strengthening
- > With partners, current diagnosis of private schools/highschools
- > Goal: reinforcement and retrofit/destruction





# Public information and preparedness in the FWI:

- > Group of partners: annual information and preparedness campaign (all year + November)
- > Targets residents (adults, pupils), employees, construction professionals, tourists
- > Several original actions, symposiums

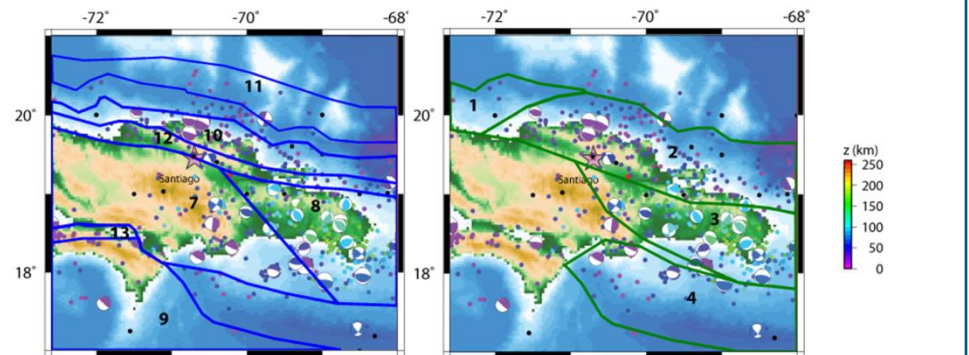
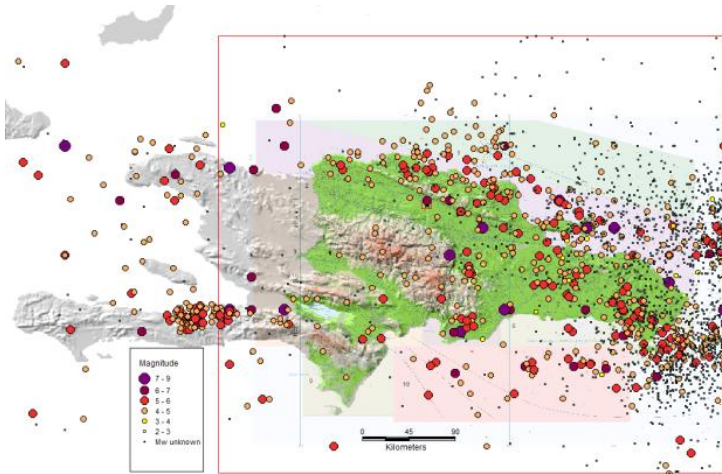


[www.miseismantilles.com](http://www.miseismantilles.com)



# Hazard mapping in Dominican Republic (Santiago): 1/data synthesis

- > Partnership: European Union Fund, Dom. Geological Survey, BRGM, IGME, INYPSA
- > Reworked/unified (Mag) seismological catalogue
- > Zonation model at the surface / at depth
- > PGA map of Santiago (0,33 to 0,43g, RT 475yr)

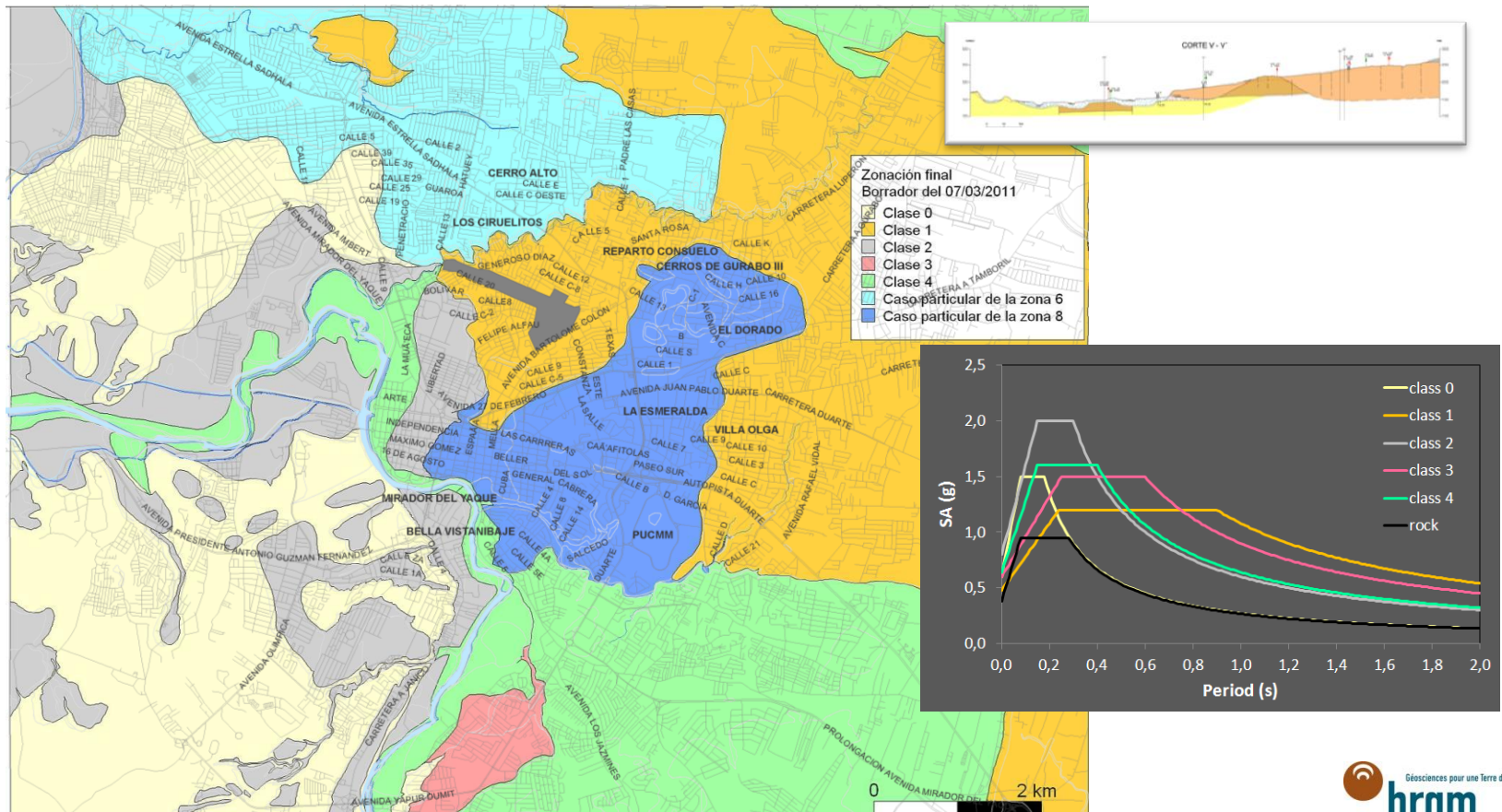




# Hazard mapping in Dominican Republic (Santiago):

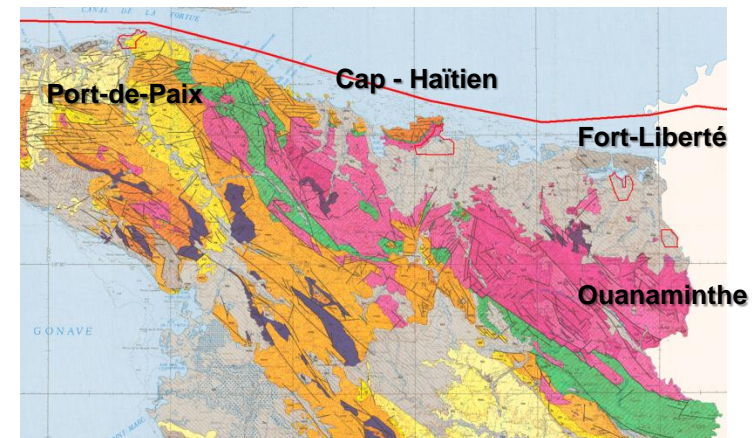
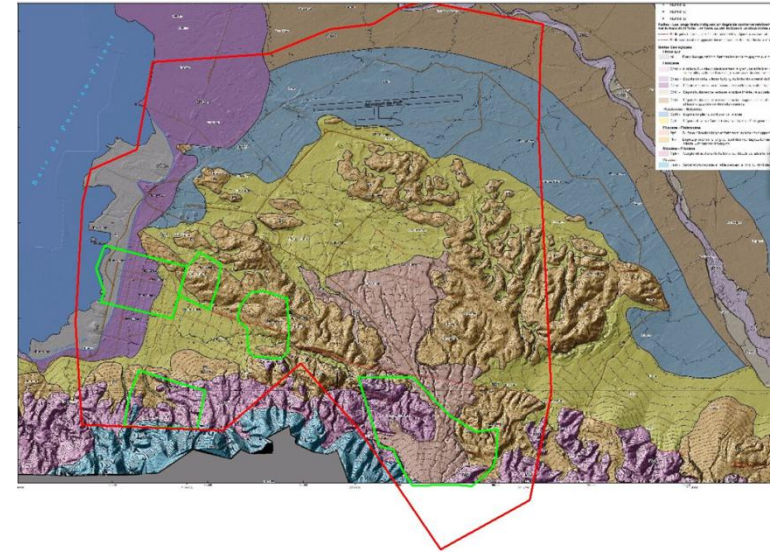
## 2/ microzonation map

- Geotechnical and geophysical synthesis, then microzonation and associated spectras



# Hazard mapping in Haiti: microzonation map

- > Partnership UNDP, BRGM, Laboratoire National du Bâtiment et des Travaux Publics and Bureau des Mines et de l'Énergie
- > Study area (80 km<sup>2</sup>, in red) and 5 high resolution sectors (in green) in Port-au-Prince
- > Use and refinement of macrozoning studies done by American teams in 2010 (cf. Earthquake Spectra, special issue, October 2011)
- > Microzonation of 4 more cities scheduled in 2012-2014





**Thank you for your invitation,  
for your attention and...  
*pa moli!***