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# CARIBSAT GIS AND GEO-INDICATORS OF NATURAL RISKS IN THE CARIBBEAN BASIN

## TOOLS FOR COMPARATIVE DIAGNOSTICS AND PREVENTIVE INFORMATION AT REGIONAL SCALE

Frédéric LEONE<sup>(1)</sup>, Julien DEYMIER<sup>(1)</sup>, Jean-Raphaël GROS-DESORMEAUX<sup>(2)</sup>, Marc MORELL<sup>(2)</sup>

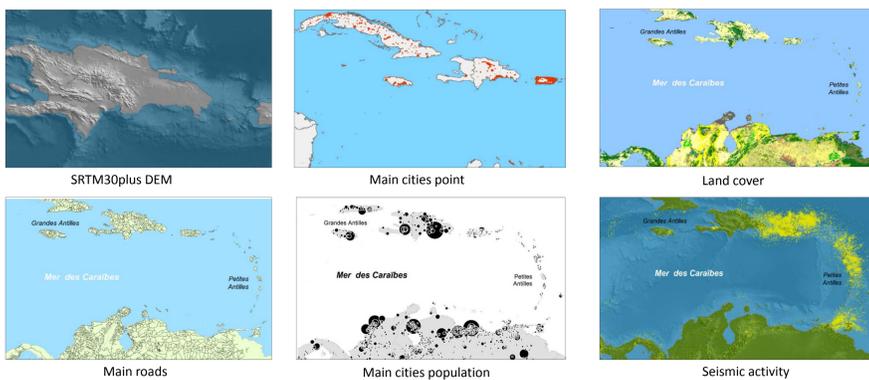
<sup>(1)</sup> Université Montpellier 3 & IRD (UMR GRED), France – Frederic.Leone@univ-montp3.fr

<sup>(2)</sup> Institut de Recherche pour le Développement (IRD), Martinique, France



### 1. The CARIBSAT GIS: A MULTI DATA INTEGRATION PROJECT

The Caribbean basin is exposed to many natural disasters. It concentrates several natural hazards (seismicity, volcanism, hurricanes, floods, tsunamis, landslides, etc.) and important human and strategic stakes. For these reasons it's an area of interest to assess the risk by integrating and mapping its multiple components: hazards, vulnerabilities and socio-economic stakes. This assessment is being carried out by the research laboratory GRED (University of Montpellier, France) and the IRD agency (Institute of Research for Development, Martinique) in the framework of the Interreg CARIBSAT Project. It takes the form of a multi-natural hazards GIS (CARIBSAT GIS), a first attempt of its kind for the whole Caribbean area. This international georeferenced database harmonizes multiple sources of historical, scientific and geographical information structured in the same digital format.



Sampled maps produced from CARIBSAT GIS dataset (multi-sources)

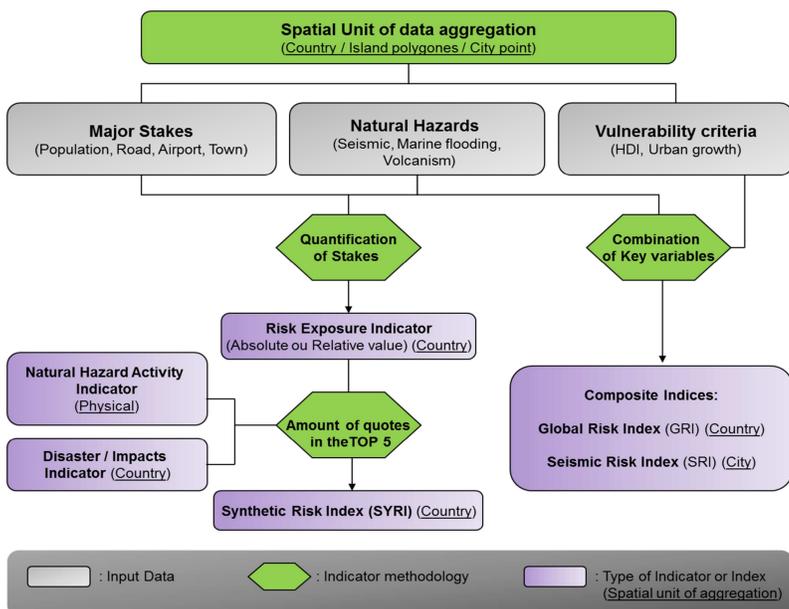
### 2. IMPLEMENTATION OF GEO-RISKS INDICATORS

#### 2.1. Several types of indicators

The CARIBSAT GIS makes it possible to lead many applications in the field of geographical risk studies, disaster prevention and decision support. It's useful to develop several families of geo-risk and natural disasters indicators for several phenomena: natural hazards activity, disasters impacts, risk exposure, synthetic or composites risk indices.

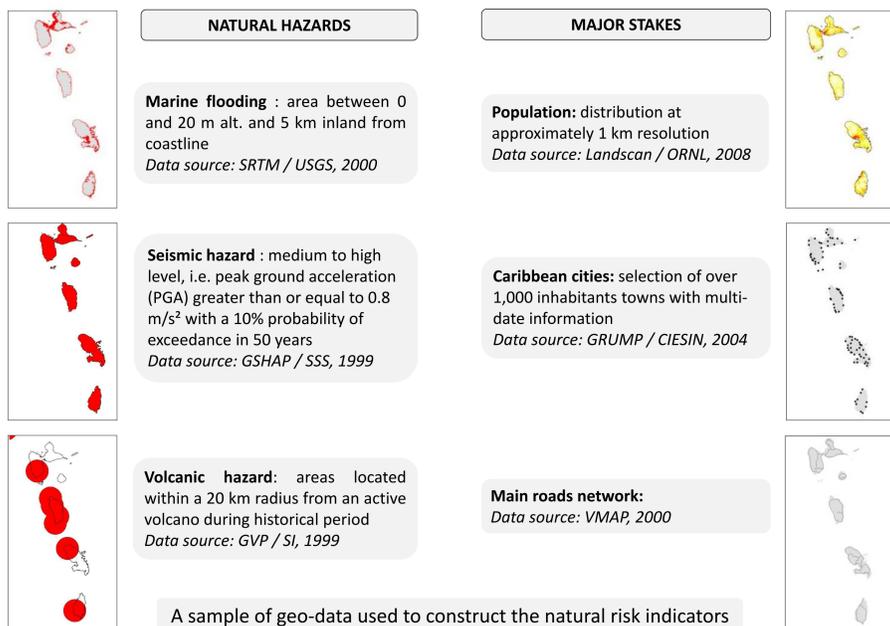
Natural phenomena	Indicator type				
	Impact	Activity	Hazard	Exposure	Risk
Seismic	X	X	X	X	X
Volcanic	X	X	X	X	X
Marine flooding	X	X	X	X	X
River flooding	X	X	X	X	X
Hurricane and storm	X	X	X	X	X
Extreme temperature	X	X	X	X	X
Wild fire	X	X	X	X	X
Landslides	X	X	X	X	X
Drought	X	X	X	X	X

Various indicators developed from the GIS data

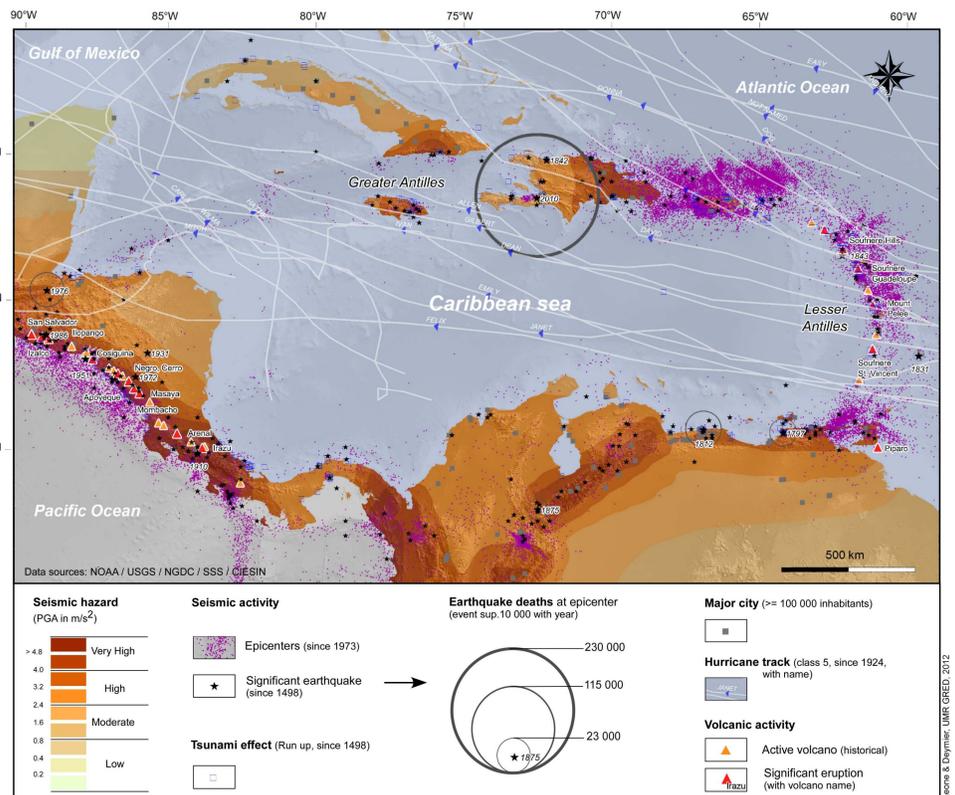


Construction patterns of various geo-indicators produced with the CARIBSAT GIS

#### 2.2. Natural hazards and major stakes mapping



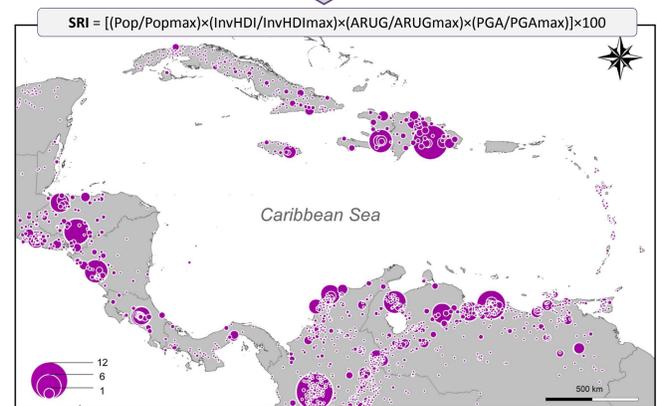
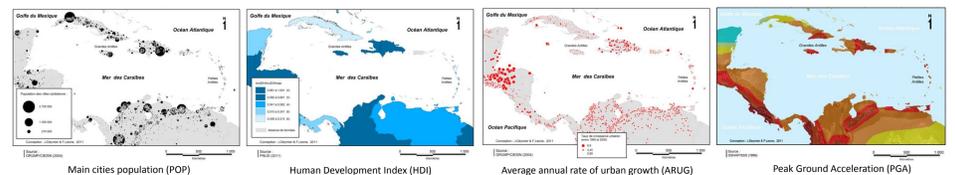
A sample of geo-data used to construct the natural risk indicators



An overview of natural hazards and disasters in the Caribbean: multiple data sources from CARIBSAT GIS

### 3. AN EXAMPLE OF SEISMIC RISK INDEX CONSTRUCTION

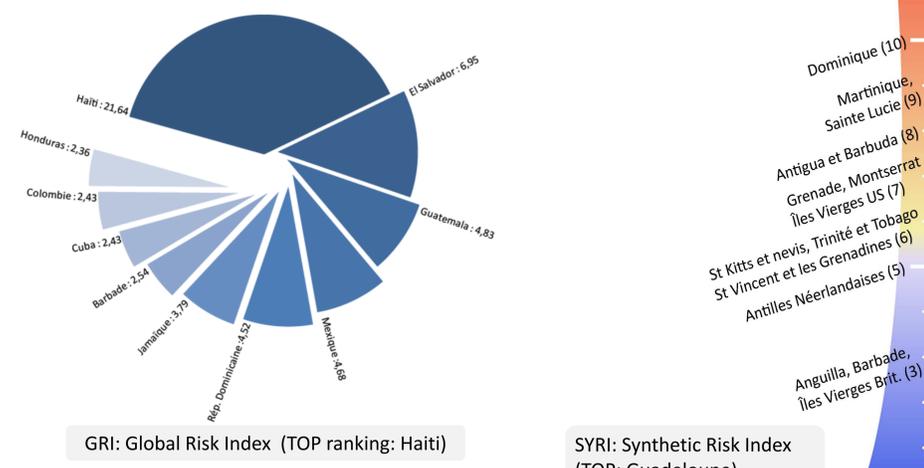
This experimental Seismic Risk Index (SRI) introduced more specific criteria to seismic risk, particularly in defining the hazard characterization and vulnerability (city here). It combines four variables obtained for 1850 cities over 1,000 inhabitants: the average annual rate of urban growth, the human development index, the urban population at last census, and the level of seismic hazard.



IRS: Seismic Risk Index - applied to cities over 1,000 inhabitants except for Puerto Rico, BVI and USVI, Cayman Islands and Netherlands Antilles (no data). TOP3 ranking: Medellin, Caracas, Santo Domingo

### 4. SOME USEFUL RESULTS FOR A COMPARATIVE ANALYSIS

These geo-indicators support territorial diagnosis and comparative risk analysis at international or regional scales. This long term project contributes more significantly to understand the risks on the Caribbean and Antilles. The two following composite indices (GRI and SYRI) are used to rank some Caribbean countries in terms of their propensity to natural disasters. These indices will be updated in the future to monitor risk evolution.



GRI: Global Risk Index (TOP ranking: Haiti)

SYRI: Synthetic Risk Index (TOP: Guadeloupe)