



Integration, validation and interpretation of Disaster Information

– The January 12, 2010 Haiti Earthquake Case –

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Workshop on Geocoding Disaster Loss Data – Munich, February 25-26, 2010

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Earthquake Details



Magnitude

7.0

- Tuesday, January 12, 2010 at 21:53:09 UTC
- Tuesday, January 12, 2010 at 04:53:09 PM at epicenter
- [Time of Earthquake in other Time Zones](#)

Date-Time

Location

18.451°N, 72.445°W

Depth

10 km (6.2 miles) set by location program

Region

HAITI REGION

15 km (10 miles) SW of PORT-AU-PRINCE, Haiti

140 km (90 miles) E of Les Cayes, Haiti

145 km (90 miles) WNW of Barahona, Dominican Republic

1140 km (710 miles) SE of Miami, Florida

Distances

horizontal +/- 8.3 km (5.2 miles); depth fixed by location program

Location Uncertainty

NST=103, Nph=103, Dmin=365.7 km, Rmss=1.14 sec, Gp= 94°, M-type=teleseismic moment magnitude (Mw), Version=7

Parameters

- USGS NEIC (WDCS-D)

Source

us2010rja6

Event ID

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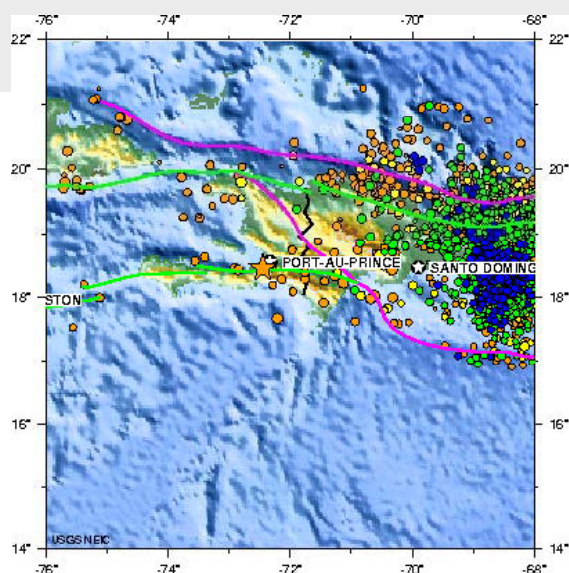
Source	Year	Month	Day	Time	Latitude	Longitude	Depth	M	Tidal waves	Dead	Injured	Damage	Remark
R	1564	-	-	-	-	-	-	-	-	-	-	seve	Haiti:Conception de la Vega
RG	1691	-	-	-	18.3	-70.4	-	-	-	-	-	seve	Haiti/Dominica:Azua,St.Domingo
G	1701	11	9	-	18.3	-72.4	-	-	-	-	-	mode	Haiti:Leogane,Petit Goave
REG	1751	11	21	1250U	18.3	-72.2	-	-	-	-	-	seve	Haiti:Port-au-Prince,St.Domingo,Leogane,St.Marc
RETG	1770	6	4	0030L	19.5	-73.2	-	-	T	-	-	seve	Haiti:Port-au-Prince,St.Domingo
G	1775	-	-	-	19	-72.3	-	-	T	-	-	seve	Haiti
REG	1784	7	29	1410U	18.3	-72.5	-	-	-	-	-	seve	Dominica/Haiti:St.Domingo,Port-au-Prince,Goave
G	1793	4	12	-	19	-72.3	-	-	-	-	-	mode	Haiti:Santo Domingo
R	1835	2	26	-	-	-	-	-	-	-	-	seve	Colombia/Venezuela/Haiti
GRT	1842	5	7	2100U	19.7	-72.8	-	-	T	4500	-	seve	Dominica:St.Domingo,Santiago/Haiti D=200/3000
RTG	1860	4	8	1100U	19.8	-73.4	-	-	T	-	-	some	Haiti:Port-au-Prince,Cayes,Acquin,Anse-a-Veau
RG	1864	5	19	-	18.1	-72.3	-	-	-	-	-	some	Haiti:Jacmel
R	1887	9	23	0700L	-	-	-	-	-	-	-	seve	Bahamas/Haiti:Port de Paix (910U or 24-26/9)
R	1887	10	16	-	-	-	-	-	-	-	-	some	Haiti
E	1924	5	27	-	-	-	-	-	-	-	-	some	Haiti:Port-de-Paix
M	1952	10	18	0429U	18.3	-73.3	-	6	-	-	-	many mode	Haiti:Anse de Veau
G	1952	10	28	0429U	18.5	-73.5	24	5.9	-	6	50	limi	Haiti
GM	1953	1	25	1947U	18.4	-73.4	-	5.7	-	2	-	mode	Haiti
M	1962	4	20	0547U	20.5	-72.1	-	6.7	-	0	13	limi	Haiti
S	1994	3	2	0338U	19.8	-72.8	59	5	-	4	-	limi	Haiti:St. Luis du Nord 5.4W



Damaging earthquakes

0

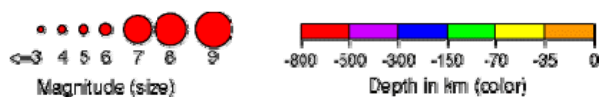
oweb.org, www.gripweb.org



HAITI REGION

2010 01 12 21:53:09 UTC 18.45N 72.45W Depth: 10.0 km, Magnitude: 7.0

Seismicity 1990 to Present

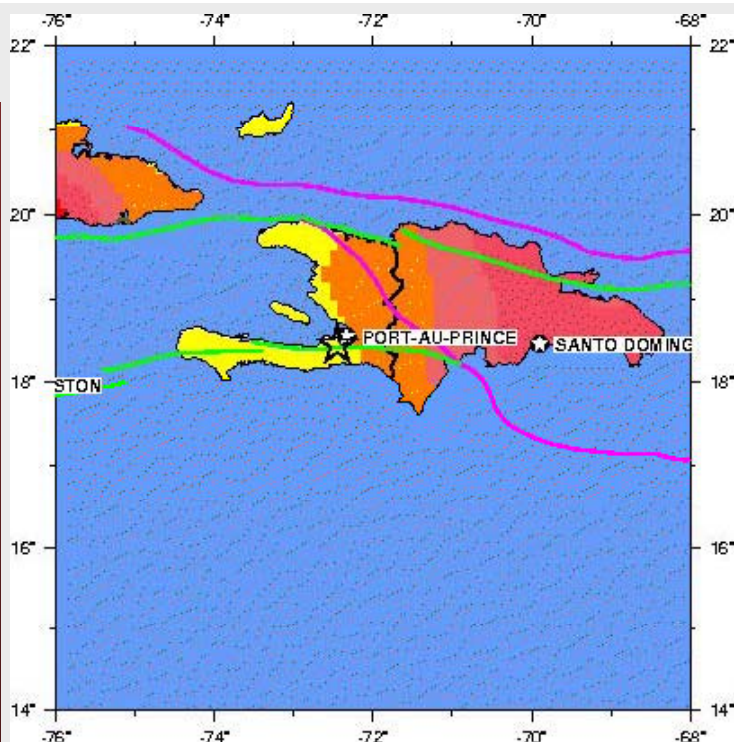


Major Tectonic Boundaries: Subduction Zones -purple, Ridges -red and Transform Faults -green

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Historical seismicity



HAITI REGION

2010 01 12 21:53:09 UTC 18.45N 72.45W Depth: 10.0 km, Magnitude: 7.0

Peak Ground Acceleration (m/s^2) with 10% Probability of Exceedance in 50 Years

Seismic hazard

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Intensity distribution

HAITI Earthquakes 12/01/2010 09:53:09 PM UTC



Legend

Built-up areas

Modified Mercalli Index

- 7 moderate damage
- 7.2
- 7.4
- 7.6
- 7.8
- 8
- 8.2
- 8.4 heavy damage



GDACS Situation Report

On 12/01/2010 09:53:10 PM UTC an earthquake of magnitude 7.0 and depth 10km has struck an very highly populated area in the Ouest Province (population: 2.2 million) in Haiti. GDACS estimates the likelihood for need of international humanitarian intervention to be high (Red alert).

GLIDE No. EQ-2010-000009-HTI

Map Information

The map overlays the 12 January 2010 earthquake in Haiti with data on built-up areas, derived from Quickbird data using the JRC IANTEX algorithm. Colours represent earthquake intensity zones (Modified Mercalli Index).
All the data belong to the Digital Map Archive repository (www.dma.gri.it)
Spatial Reference: GCS-WGS 1984
Map Scale: 1:50 000
Time Reference: 12th of January 2010
Background Data: Digital Map Archive



A joint initiative of the United Nations and the European Commission

The Global Disaster Alert and Coordination System provides near real time alerts about natural disasters around the world and tools to facilitate response coordination, including media monitoring, map strategies and Virtual On Site Operations Coordination Centre.

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Damage to structures



RC Buildings



Historic Buildings



Informal settlements



UN building

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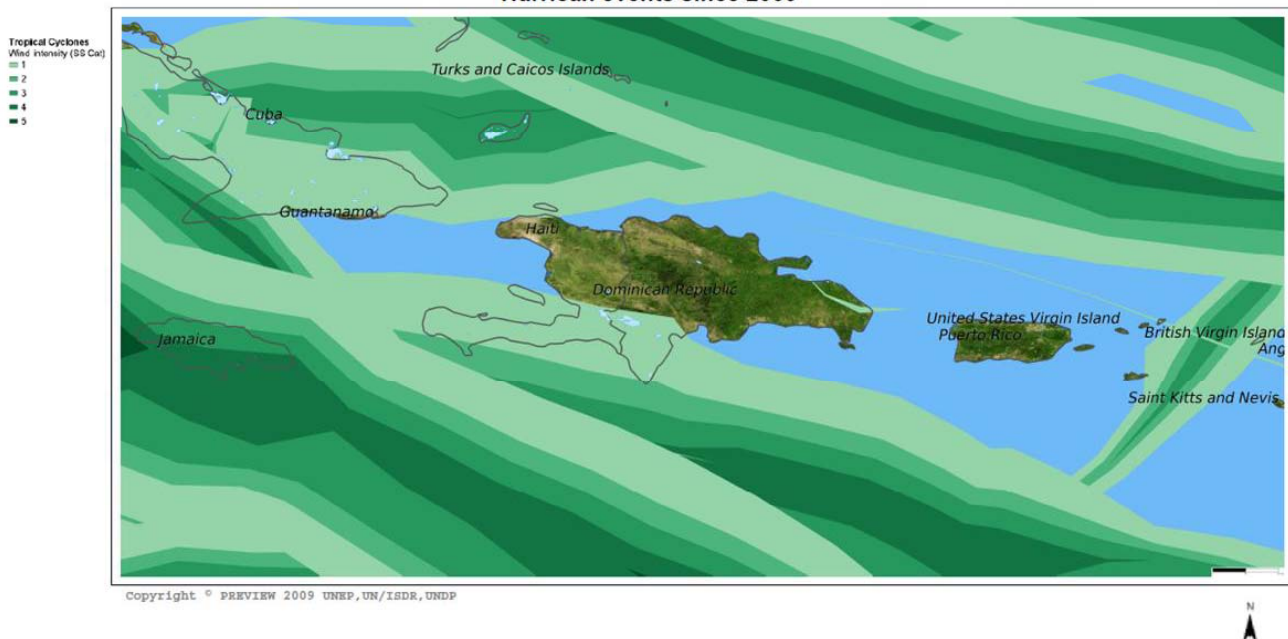
Hurricane history



Global Risk Data Platform



Hurricane events since 2000



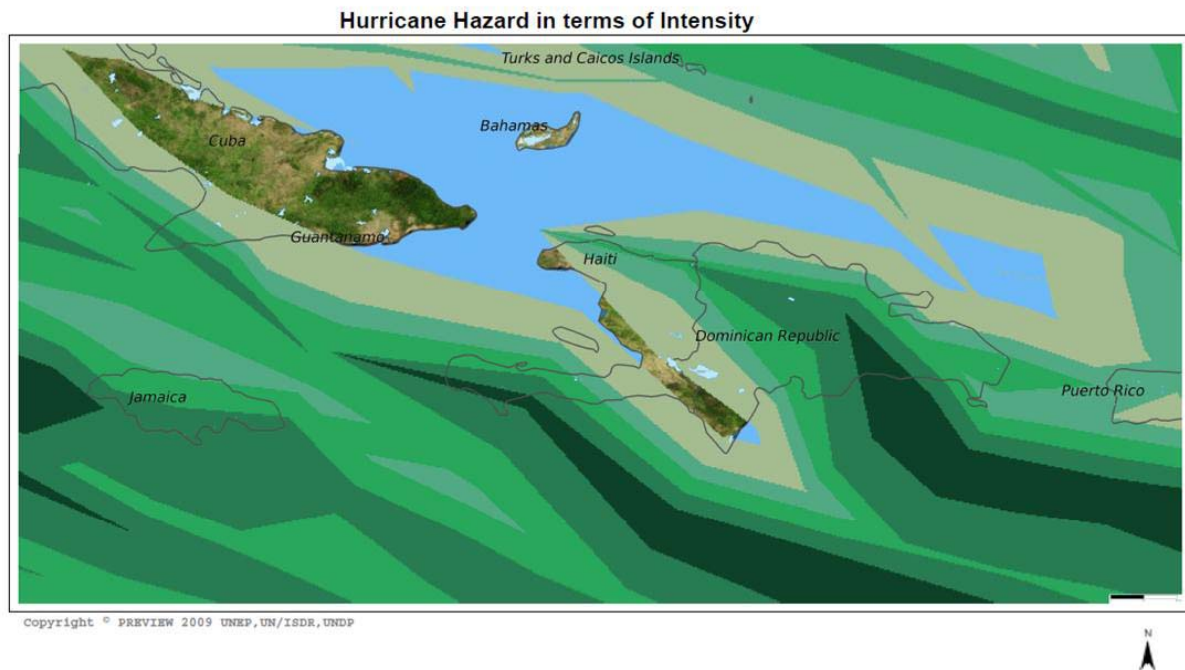
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Hurricane hazard



Global Risk Data Platform



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Remarks and recommendations



- Haiti is on a region of low seismicity but high risk due to high physical, social and economic vulnerability
- The January 12, 2010 earthquake, although strong, was shallow – quick attenuation and geographically localized effects (no damage reports from Dominican Republic)
- The timing was relatively good. Shall the earthquake have happened few months earlier or later, its effects would have been compounded by the impacts of the hurricane season (June to November)

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Remarks and recommendations



- While the damage is severe over a broad area, more severe damage should be expected on the western part of Port Au Prince, closer to the epicenter. There are several communities and villages closer to the epicenter
- Heavier damage is expected on the low areas of the city, where the soils are worse (sediments and sands) and the ground shaking is amplified. On the hilly areas, better soil conditions account for smaller ground shaking
- Due to poor construction quality (recently, the Mayor had recognized that more than 60% are unsafe), all types of constructions were affected. Bad concrete (heavy) construction is a bigger killer than informal light (due to climatic conditions) construction

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Remarks and recommendations



- Critical facilities, that should never fail, collapsed. Hospitals and schools collapsed. The Presidential Palace's failure could have killed the President creating a power vacuum in an already politically unstable society
- Reconstruction should consider proper urban planning (soil and topographical conditions), construction quality control, multi-hazard risk, strengthening of existing critical structures and lifelines

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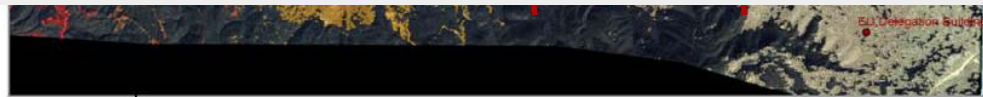
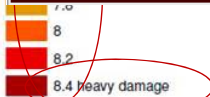
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Quality control

HAITI Earthquakes 12/01/2010 09:53:09 PM UTC



I. Instrumental	Not felt by many people unless in favourable conditions.
II. Feeble	Felt only by a few people at best, especially on the upper floors of buildings. Delicately suspended objects may swing.
III. Slight	Felt quite noticeably by people indoors, especially on the upper floors of buildings. Many do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV. Moderate	Felt indoors by many people, outdoors by few people during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably. Dishes and windows rattle alarmingly.
V. Rather Strong	Felt outside by most, may not be felt by some outside in non-favourable conditions. Dishes and windows may break and large bells will ring. Vibrations like large train passing close to house.
VI. Strong	Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy furniture moved or overturned; a few instances of fallen plaster. Damage slight.
VII. Very Strong	Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.
VIII. Destructive	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.
IX. Ruinous	General panic; damage considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X. Disastrous	Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundation. Rails bent.
XI. Very Disastrous	Few, if any masonry structures remain standing. Bridges destroyed. Rails bent greatly.
XII. Catastrophic	Total damage - Everything is destroyed. Total destruction. Lines of sight and level distorted. Objects thrown into the air. The ground moves in waves or ripples. Large amounts of rock move position.



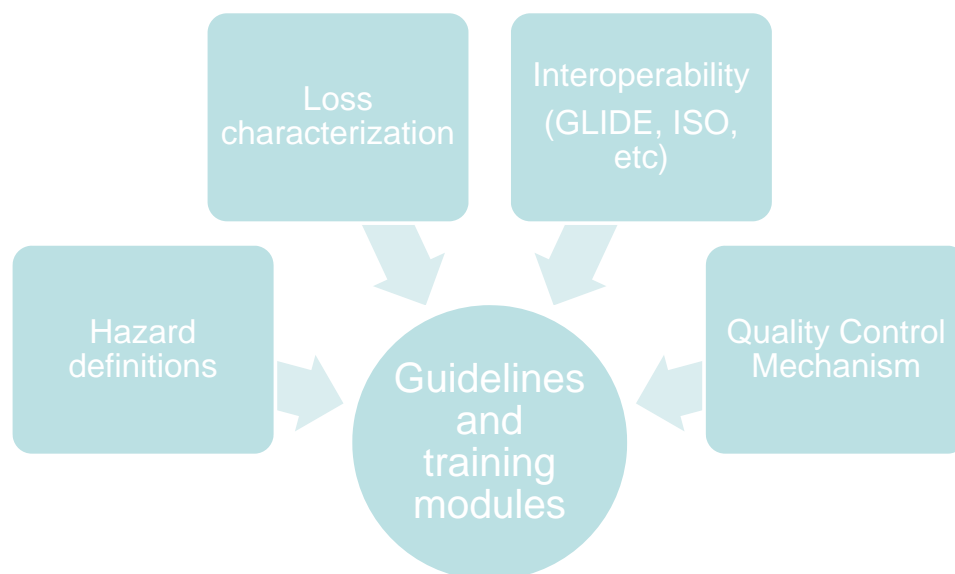
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www.gdacs.org
Contact: GDACS - gdacs@un.org / gdacs@ec.europa.eu

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Standards and guidelines



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- Development and field testing of guidelines and training materials
- Establishment of new National Databases
- Application of Disaster Data to DRR strategies and actions

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Main outputs

- Guidelines and training modules
 - ToT and regular training
 - Trained experts roster
 - On-line availability
- Pilot core database
 - 5-7 pilot countries
 - Accessible on-line
 - Sustainable and automatically updated
- Compatibility with Global DB
 - National aggregation reproduces global databases
 - Backward normalization: ID procedures, loss characterization

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Thank you!!

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