The Earthquake Unit

Operates:

- *12 telemetered seismic stations,*
- *8 digital accelerographs,*
- *1 digital broadband seismograph,*
- *2 permanent global positioning systems,*
- *1 portable GPS system for about 30 sites in Jamaican territory,*
- *6 digital portable short-period seismographs,*
- *1 24-bit seismic recorder available for research projects.*
- *Maintains archives of earthquakes recorded by the Jamaica Seismograph Network and information on felt earthquakes.*
- *Conducts research on local seismicity, tectonics, seismic hazard, site response and vibration analysis.*
- *Welcomes visits from school and community groups.*

Earthquake damage - June 12, 2005,.

References

Boore, Joyner & Fumal, 1997. Equations for estimating horizontal response spectra and peak acceleration from western North America Earthquakes: A summary of recent work, Seis. Res. Lett. 68:128-253.

Ordaz, M., 1999. CRISIS99 & User's Manual.

Havskov & Ottemoller, SEISAN:The Earthquake Analysis Software.

Wiggins-Grandison, M., 2001. Preliminary results from the New JSN, Seis. Res. Lett. 72:525-537.

Wells & Coppersmith, 1994. New empirical relationships among magnitude, rupture length, rupture width, rupture area, and surface displacement, Bull. Seis. Soc. Amer. 84:974-1002.

Data Sources

Harvard Centroid Moment Tensor (HCMT)

International Seismological Centre (ISC)

Jamaica Seismograph Network (JSN/JAM)

Middle America Digital Seismograph Consortium (MIDAS)

National Earthquake Information Centre (NEIC)

Pan-American Institute of Geography & History (PAIGH)

Tomblin & Robson, 1977. A catalogue of felt earthquakes for Jamaica, with reference to other islands in the Greater Antilles, 1564-1971, Jamaica Ministry of Mining & Natural Resources, Mines & Geology Division Sp. Pub. No. 2, 243 pp.

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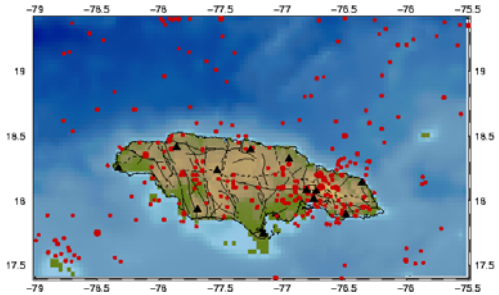
Monitoring earthquakes in and around Jamaica for community awareness & hazard mitigation

Jamaica Spectral Seismic Hazard Maps

This brochure presents a new generation of seismic hazard maps for Jamaica along with a brief description of inputs to and limitations of the resulting product. The maps were created to the specifications of the International Building Code (IBC) which are as follows:

- The hazard is expressed in terms of spectral response acceleration (SA) and not, as was done in the past, peak ground acceleration (PGA);
- Separate maps are prepared for spectral responses at 0.2 and 1.0 second;
- Values given reflect a more conservative Probability of Exceedance (PE) of 2% in 50 years in contrast to former maps that used a PE of 10% in 50 years;
- These maps apply to the specific site class stated, in this case *average rock*.
- SA values are expressed as a percentage of gravity.



The Jamaica Seismograph Network & earthquakes Mw≥3.5

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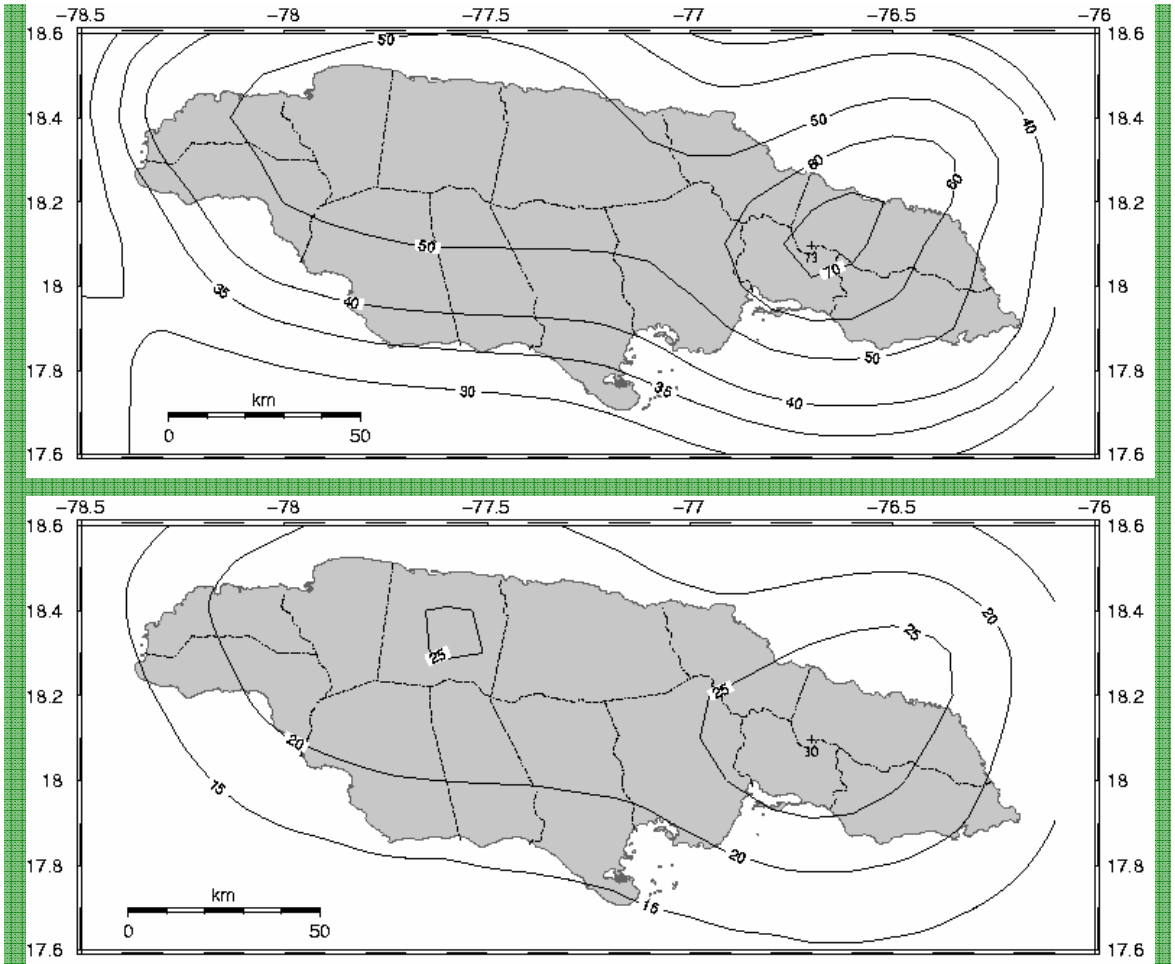

IBC based seismic hazard maps for Jamaica for site class average rock with 2,475-year Return Period for Spectral Response Acceleration of 0.2 second (top) and 1.0 second (bottom) expressed as a percentage of gravity.

Decisions

1. Should the Seismic Hazard Assessment be Deterministic or Probabilistic?
2. Should the source zones be represented by points, faults or area polygons?
3. How is the seismicity - maximum magnitude, sense of faulting, recurrence model - characterized?
4. Which attenuation relation should be used?

Choices

1. Probabilistic to account for all likely sources.
2. Area sources because fault sources and focal points of our largest earthquakes are not well known.
3. Based on unified catalogue of earthquakes from 1687 to 2004 standardized in moment magnitude.
4. Joyner, Boore, Fumal 1997 was used. A Jamaica model should be developed.

Caveats

- These maps show ground motion as a function of earthquake magnitude, distance, path effects and frequency based on a borrowed attenuation relation.
- The Boore, Joyner & Fumal (1997) attenuation relation defines the site class *average rock* as having an average shear wave velocity of 620 metres/second in the upper 30 metres, and accounts for source distances of up to 80 kilometres.
- Six source zones in this distance range were selected to define Jamaican seismicity. The effects of more distant sources are expected to be less.
- Values given do not account for direct throw on a fault, site or secondary effects.
- A disadvantage of probabilistic seismic hazard is that it is not obvious what sources contribute most to the hazard in any given area.
- The sense of faulting on Jamaica is taken to be predominantly lateral or strike-slip although some earthquakes have varying amounts of reverse or normal slip. Ground motions are typically larger for reverse events than normal or strike-slip events in the same magnitude range.
- The maximum earthquake for the sources are in the range Mw 7.1 to 7.6, based on magnitude-fault length relations of Wells & Coppersmith (1994).

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