# Draft Information of Seismic Activity in Peru

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The seismic activity in Peru is mainly due to two important factors (Ocola, 1989):

- The interaction between the Nasca and the South American tectonic plates.
- Adjustments in the crust as a consequence of this interaction and the morphology represented by the Andes Mountain Range.

For these reasons, the seismic activity is focused along the coast and part of the highlands of the country – as a result of the subduction process of the Nasca plate beneath the South American plate – and certain in-land zones in which earthquakes are associated to superficial geological faults. Therefore, in the analysis of seismic hazard, special attention should be paid to the source of the earthquake.

## Evaluation of Seismic Hazard.

Seismic hazard can be assessed by both probabilistic and deterministic approaches.

The deterministic approaches analyze the seismicity of each seismic-genetic source that affects the site whose hazard is being assessed, in order to obtain the potential maximum earthquake that may be expected. This earthquake is the unique considered in the analysis and is regarded to be going to repeat in the future. Then it is located on the nearer place from the seismic-genetic source to the site. By an attenuation law, the earthquake is transformed in terms of a representative parameter of the effect of the earthquake (i.e., ground peak acceleration, ground peak velocity, ground peak displacement, etc.).

The probabilistic approaches regard knowledge of past seismicity to determine statistical laws that regulate future seismic activity. With this analysis, the probability of excedence different levels of ground movement in a period of time is calculated. The main result is a curve of annual probability of excedence of the representative parameter of the effect of the earthquake. From this curve, according to the use time of the structure, the probability is obtained.

In a rapid evaluation of earthquake vulnerability of buildings, some criteria adopted in deterministic approaches would be used in the assessment of the seismic hazard of the site. A representative parameter of the effect of the earthquake would be the peak ground acceleration (PGA), which will be used to define the earthquake demand. In order to achieve the main objective, it is needed to establish the attenuation laws to be utilized. For subduction Peruvian earthquakes, Casaverde and Vargas (1981) proposed an attenuation law. This law is the following:

$$a_{MAX} = \frac{68{,}7\, e^{0{,}8\, M_S}}{R + 25} \quad (cm/s^2)$$

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$$v_{MAX} = \frac{13{,}0\, e^{1{,}0\, M_S}}{(R+25)^{1{,}5}} \quad (cm/s)$$

$$d_{MAX} = \frac{0{,}4\, e^{1{,}2\, M_S}}{(R+25)^{1{,}3}} \quad (cm)$$

In these expressions, R is in km and the maximum values of a, v and d correspond to rock base, so that they should be multiplied by a factor to consider the effect of the soil strata. The necessity of this factor should be evaluated in order to establish different values according to the different levels of ground motion in rock, i.e., the values proposed by Warld *et al.* (1999), which are presented by Kuroiwa (2002).

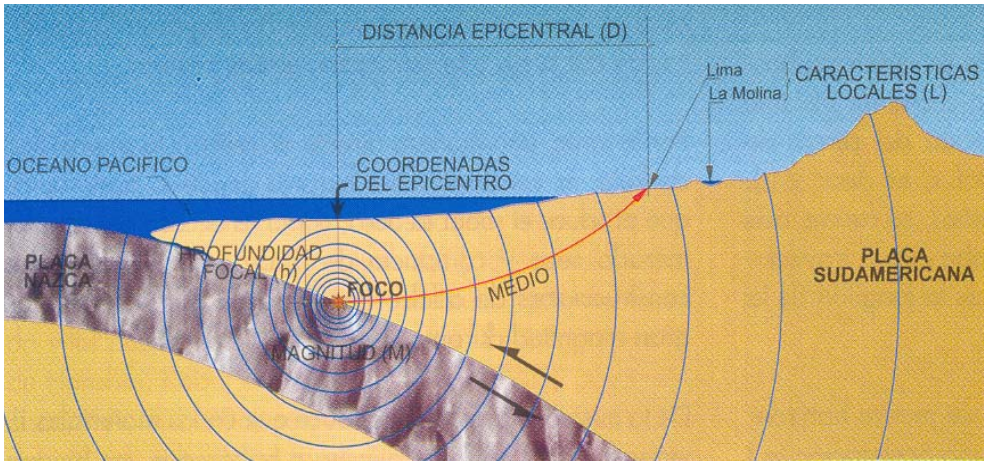


Figure. Factors that affects the ground motion. (Kuroiwa, 2002)

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