

## SEISMOLOGY GLOSSARY

**Acceleration** – a force with the units of gravity that denotes the rate of change in time of the movement of the ground during an earthquake.

**Accelerogram** – refers to a seismic record from an accelerometer, a device in recording the time history of ground acceleration at a site. Peak acceleration is the largest value of acceleration on the record and typically used in design criteria. Ground velocity and displacement time histories can be derived analytically from an accelerogram.

**Acceptable risk** – probability of occurrence of physical, social, or economic consequences of an earthquake that is considered by authorities to be sufficiently low compared to significant effects.

**Artificial** – type of an earthquake that is produced when explosive devices are detonated.

**Attenuation** – a decrease in the strength of seismic waves and seismic energy with distance from the source.

**Azimuth** – angle made by the longitude of the epicenter and the line joining the epicenter and recording station measured in a clockwise manner.

**Built Environment** – defines the temporal and spatial distribution of buildings and lifeline system exposed to hazards.

**Body-wave Magnitude** – when the magnitude value is determined from the body-waves.

**Depth of focus** – vertical distance between focus and epicenter.

**Disaster** – occurrence of a hazardous event which adversely affects a community to such a degree that essential social service and functions of physical structures are disrupted.

**Duration** – length of time between the onset and departure of a natural hazard.

**Duration Magnitude** – when the magnitude value is evaluated from seismic trace duration of a recorded earthquake event.

**Earthquake** - transient vibrations of the earth's crust due to the release of the stored strain energy in a focal volume. The energy is transmitted in all directions by means of the generated seismic waves. There are three classifications of earthquakes. These are classified as tectonic, volcanic, and artificial.

**Earthquake Hazards** – the primary and secondary physical effects generated by an earthquake such as ground shaking, differential ground movements, landslides, tsunami, and etc).

**Elements at Risk** – the people, ecosystem, environment, natural structures and man-made buildings that are exposed to natural and technological hazard.

**Epicenter** – is the location of an earthquake on the surface of the earth. It is directly above the focus. It is represented as a point that is defined by its geographical coordinates.

**Epicentral Distance** – distance between epicenter and a seismic recording station.

**Exceedance probability** – probability that an earthquake will generate a level of ground motion that exceeds a specified reference level during a given exposure time.

**Exposure Time** – the period of time that a structure or community is exposed to potential earthquake and other natural hazards.

**Fault** – a fracture or a zone of fractures in the earth which displacement of the two sides relative to one another has occurred as a consequence of compression, tension, or shearing stress. A blind fault is the term used to describe a fault system that is not visible at the surface of the ground. An active fault is one that exhibits physical characteristics such as historic earthquake activity, surface fault rupture, geologically recent displacement of stratigraphy or topography, or physical association with another fault system judged to be active.

**Ground Failure** – term referring to the permanent, inelastic deformation of the ground triggered by ground shaking.

**Ground Shaking** – refers to the dynamic , elastic, vibratory movement of the ground in response to the arrival of the different seismic waves.

**Hazard** – potential threat to humans and their welfare. The threat could be due to natural and technological origin.

**Hazard Assessment** – an estimate of the range of the threat such as the magnitude, frequency of occurrence, and duration of the natural and technological hazard to humans and their welfare.

**Hazard Environment** – defines the physical characteristics of the source, path, and site effects.

**Hypocenter/Focus** – a point in the earth where the earthquake originates. The hypocenter is a simple representation of the focal volume of an earthquake where strain energy is stored. The focal point can be assumed to be where the first break of rupture happens when an earthquake occurs.

**Hypocentral Distance** – distance between focus and a seismic recording station.

**i or e** – prefix to the international symbols used in the identification of the different seismic phases. i and e means an impulsive/sharp and emergent/gradual beginning of the initial onset of a recorded seismic phase on a seismogram respectively.

**Intensity** – a measure of the local ground motion effects on man and its environment, to all types of building structures, and on free nature. There are different intensity scales used in the seismological community. The scales are named after their respective founders or country of origin. Intensity scales are composed of grades/degrees expressed in the Roman numerals. Each grade described the limitation/extent of the observable effects to man and its environment, to building structures, and to free nature.

**Landslide** – refers to the falls, topples, flows of rocks from unstable slopes.

**Local Magnitude** – when based from Richter magnitude scale.

**Love (LQ)** – a wave that moves on a horizontal plane perpendicular to the direction of motion. It is prominently recorded in the horizontal components of a LP seismograph.

**Liquefaction** – refers to loss of soil bearing strength that occurs mainly in young, shallow, loosely compacted, water saturated sand and gravel deposits when subjected to ground shaking.

**Magnitude** – an instrumental measure of the relative size of an earthquake. It is a dimensionless number, and it is related to energy release during an earthquake occurrence. There are different magnitude scales used in determining the magnitude value of an earthquake. The scales are named after the particular recorded seismic waves or parameter from which the measurement is taken. These are body-wave magnitude, surface-wave magnitude, moment magnitude, local magnitude, and duration magnitude.

**Mitigation** – range of policies, legislative acts, professional practices, and social adjustments that are designed to minimize the effects of earthquakes and other natural hazards on a community.

**Moment Magnitude** – measure of the size of an earthquake referred from the moment of the equivalent body force and the over-all source spectrum of an earthquake.

**Natural Hazard** – potential threat to humans and their welfare caused by slow and rapid onset events having natural origin (atmospheric, geologic, and hydrologic) on a global, regional, and local scales (typhoons and storms, earthquakes and volcanic eruptions, floods, and tsunami run up).

**Origin Time** – time of occurrence of an earthquake. It is expressed in hours, minutes, and seconds in the universal coordinated time (UTC) or Greenwich meridian time (GMT).

**Preparedness** – refers to using mitigation processes on a community to plan for emergency response, recovery, and rehabilitation after a disastrous earthquake.

**Primary Wave** – is the first wave to arrive at a recording seismic station. It is a longitudinal type of wave that moves in a push and pull manner along the direction of motion. There are different types of p-wave in accordance to the mode of travel. These are the Pg, P\*/Pb, Pn, and P.

**Pg** – a direct longitudinal wave in near epicentral distance.

**P\*/Pb** – a guided longitudinal head wave that travels along the Conrad discontinuity.

**Pn** – a guided longitudinal head wave that travels along the Mohorovicic discontinuity.

**Policy Environment** – defines the community's hazards risk management policies and practices.

**Rayleigh (LR)** – a wave that moves in an elliptical manner along the direction of motion. It is prominently recorded in the vertical component (Z) of a long period (LP) seismograph.

**Response Spectrum** – a graph of the output of a mathematical model which shows how an idealized ensemble of lightly damped, simple harmonic vibrating building responds to a particular ground motion. The source of ground motion is an accelerogram that is used to excite the model in the period range 0.05-10 seconds, a period range of interest to engineers. The concept of response spectrum is used in building codes and design of essential and critical structures.

**Risk** – probability of loss to the elements at risk from the occurrence of natural and technological hazard.

**Risk Assessment** – an objective scientific assessment of the chance of loss or adverse consequences when physical and social elements are exposed to potentially harmful natural and technological hazards. Risk assessment integrates hazard assessment with the vulnerability of the exposed elements at risk.

**Risk Management** – public process of implementing decisions that involves choices and actions designed to minimize potential losses when risk assessment indicates the risk.

**S\*/Sb** – a guided transversal head wave that travels along the Conrad discontinuity.

**Secondary Wave** – the second wave to arrive at a recording seismic station. It is a transversal type of wave that moves in an up and down manner perpendicular to the direction of motion. It is also known as a shear wave. There are different types of secondary wave in accordance to their mode of travel. These are the Sg, S\*/Sb, Sn, and S.

**Seismic Station** – a place or site where a seismograph is installed and operated, and maintained.

**Seismic Waves** – are motions of disturbance when an earthquake occurs. There are two kinds of seismic waves. These are the body and surface waves. The body wave moves through the body of the earth. The surface wave moves through the surface of discontinuities in layered media. The body wave is composed of two types. These are the primary (p) and secondary (s) waves. The surface wave/long wave (L) is also composed of two types that were named after their discoverer. These are the Rayleigh (LR) and the Love (LQ) waves.

**Seismic Zonation** – the division of a geographic region into smaller areas or zones based on an integrated assessment of the hazard, built and policy environments of a region. Zonation maps are the results of a process that integrates data, results of research, built and policy environments. The maps contribute to risk reduction and sustainability of the growth and the new developments.

**Seismogenic Structure** – a geologic structure such as an igneous pluton dike, or sill that has earthquake activity associated with it.

**Seismogram** – a seismic record from a seismograph.

**Seismograph** – an instrument that records the relative motion of the ground.

**Sg** – a direct transversal wave in near epicentral distanceSSS.

**Sn** – a guided transversal head wave that travels along the Mohorovicic discontinuity.

**Soil Amplification** – a period-dependent property of the soil to ground motion. It is a function of the relative density of the soil to the base rock.

**Soil/Structure Resonance** – a physical phenomenon that increases the potential for destructiveness when the input seismic waves caused the soil and structure to vibrate at the same period.

**Source Directivity** – a physical phenomenon that increases ground shaking at a site due to the directional aspect of the fault rupture that cause most of the energy to be released in a particular direction instead of in all direction.

**Surface-wave Magnitude** – when the magnitude value is computed from the surface waves.

**Surface Fault Rupture** – a physical phenomenon of the rupturing fault breaking the surface of the ground and releases more energy on the side of the fault that is moving, thereby increasing ground shaking at the moving part than at the stationary block.

**Tectonic** – type of an earthquake that is generated when relative motion occurs among large deformed body of rocks.

**Technological Hazard** – potential threat to humans and their welfare caused by technological factors (chemical release, nuclear accidents, dam failure).

**Volcanic** – type of an earthquake that is generated due to magmatic movements in a volcano.

**Vulnerability** – potential loss in value of each element at risk from the occurrence and consequences of natural and technological hazards. The factors that influence vulnerability include demography, built and policy environments, social differentiation and diversity, and political and economical strategies. Vulnerability is a result of flaws in planning, siting, design, and construction.