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Earthquake risk mitigation measures

Boren Fang*

Institute of Geophysics, China Earthquake Administration, Beijing, China.

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DESCRIPTION

An abrupt release of energy in the Earth's lithosphere that results in seismic waves causes an earthquake, which is the shaking of the planet's surface. Earthquakes can range in strength from those that are so small that no one can feel them to those that are so powerful that they upend entire cities and send people and objects flying. The number, kind, and size of earthquakes that occur over a specific time period are considered an area's seismicity, or seismic activity. Earthquakes cause the ground to shake, move, or otherwise be disturbed at the Earth's surface. The bottom may be sufficiently moved to generate a tsunami when a big earthquake's epicenter is offshore. Landslides and, sporadically, volcanic eruptions can be brought on by earthquakes.

CAUSE OF AN EARTHQUAKE

Major earthquakes on earth mostly happen in belts that are located along tectonic plate borders. This has been clear for a while from early lists of felt earthquakes, and it is even more obvious from contemporary seismology maps that display instrumentally determined epicenters. The Circum-Pacific Belt, which impacts a number of populous coastal areas surrounding the Pacific Ocean, including those of New Zealand, New Guinea, Japan, the Aleutian Islands, Alaska, and the western coasts of North and South America, is the most significant earthquake belt. According to estimates, earthquakes with epicenters in this region produce 80% of the energy now released in earthquakes. The belt's seismic activity is by means homogeneous, with several branches occurring at various locations. The Circum-Pacific Belt known as "Pacific Ring of Fire" because it frequently coincides with volcanic activity.

The Alpide Belt is a second belt that extends from the Mediterranean region *via* Asia and the East Indies to the Circum-Pacific Belt. About 15% of the total global earthquake energy is released in earthquakes from this region. Additionally, there are notable associated seismic activity belts, primarily along oceanic ridges such as those in the Arctic Ocean, the Atlantic Ocean, the western Indian Ocean, and along the rift valleys of East Africa. The best way to comprehend this worldwide seismic distribution is in the context of its plate tectonic setting.

RISK MITIGATION MEASURES

The typical goal of earthquake mitigation methods is to lower the number of fatalities and property damage in future quakes. The following are typical earthquake mitigation strategies:

- Structural measures to increase a building's ability to withstand seismic forces. Structural measures include strengthening the foundations, columns, load-bearing walls, floor diaphragms, roof diaphragms, and the connections between these structural elements. These elements support a building and resist lateral stresses from winds and earthquakes.
- Non-structural mitigation strategies to constrain, brace, anchor, or otherwise increase the seismic resistance of non-structural building elements like parapets, chimneys, non-load bearing walls, fire sprinkler systems, HVAC systems, suspended ceilings and lights, windows, water heaters, furnaces, air conditioners, and backup generators.

- Non-structural mitigating strategies to constrain, brace, or anchor building contents, particularly tall and/or heavy objects that represent a risk to human life if they fall, such as bookshelves, file cabinets, storage shelves, computers, monitors, televisions, and other items.
- Constructing a new structure that complies with modern building codes to replace an older one with significant seismic flaws. In general, replacement is more expensive than retrofit, but it may be necessary if retrofit costs are high, particularly if the existing building is in general poor condition, needs non-seismic repairs, is close to the end of its useful life, is functionally obsolete, or has other flaws like not being energy efficient.
- Designing and building a new facility to higher seismic requirements than those mandated by building laws, particularly for structures that could be used as emergency shelters.

- Using drop, hold, and cover drills on structures with significant structural seismic inadequacies that could collapse during big earthquakes, which may lessen injuries from falling objects but are not a replacement for other mitigating measures.