

GLOBAL WARMING COULD PUT AN END TO EARTHQUAKES

Since the beginning of the year, several massive earthquakes have shaken the globe while leveling buildings, moving cities, and even causing the Earth's axis to shift, shortening the length of a day. While the media may have you believe earthquakes are on the rise and getting stronger, when compared to previous years, and even centuries, global earthquake occurrences are still about average. However, this doesn't mean that you should just accept that at any given time your home could be demolished by the sadistic musings of a rogue earthquake. Currently, the best ways of predicting when and where earthquakes will occur is to understand how they are created.

Earthquakes are caused along the boundaries of tectonic plates, huge sections of the Earth's rigid lithosphere (crust and upper mantle) which are constantly smashing against, sliding past, and subducting beneath each other while "floating" atop the more plastic asthenosphere (middle and lower mantle). The driving force behind this motion is caused by convection cells created in the asthenosphere due to the immense heat in the Earth's core. In some locations heated rock of the asthenosphere rises, hits the underside of the plates, cools, and sinks back towards the core, spreading the plates apart at rift zones and mid-oceanic ridges. These are called divergent plate boundaries. The tectonic plates, therefore, begin to collide with each other in other locations, typically where more dense oceanic crust meets less dense continental crust. These are called convergent plate boundaries. Locations where plates are neither diverging or converging, but sliding past one another are called transform plate boundaries.

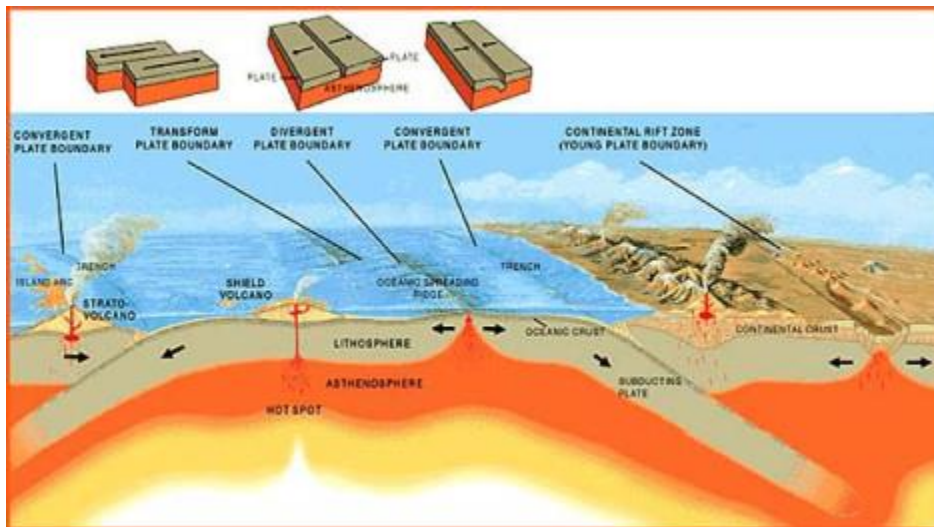


Plate Tectonics Cross Section (Courtesy of NOAA Ocean Explorer, 2002)

The process, although constant, is far from fluid. The immense amount of friction and potential energy build-up created between plates moving past one another creates the potential for earthquakes. When an earthquake does occur, sliding plates that have been locked up suddenly move, releasing all the built-up energy. That energy is what we use to calculate the magnitude and location of the earthquake and, in fact, is the cause of the earthquake itself. The greater the energy involved, the more destructive the earthquake. This is why it is actually better to live along fault planes/plate boundaries that are highly active (if you must live by one) because the less time spent in strain, the less energy build-up occurs and the less destructive the earthquake. As mentioned in previous posts, the United States Geological Survey(USGS) has excellent and easy to understand information on earthquake processes if you'd like to learn more.

Now we understand how and where earthquakes occur, but the ultimate goal is to predict when they will occur and discover if there is any way to control or minimize their effects. For decades we have known where the plate boundaries exist. However, accurate models of plate movements have not been attempted...until now. A 20-year project conducted by geoscientist Richard Gordon of Rice University along with collaborators from University of Wisconsin-Madison and NASA's Jet Propulsion Laboratory has been completed with a working, precise model of plate tectonic movements, the "mid-ocean velocities" model, or MORVEL. The occurrence and frequencies of earthquakes is highly dependent upon how the plates move and interact. According to the model's lead author, Chuck DeMets, "[MORVEL] can be used to predict the movement of one plate relative to any other plate on the Earth's surface." While intended to study many processes such as mountain-building, the precision of this model may prove it extremely useful in the prediction of future earthquakes.

Even if earthquakes may someday be predictable down to the day, week, or even month, what can we do? Already, safety nets such as building codes, disaster contingency plans, and public awareness provide some sense of comfort to those living in developed regions of the world (such as coastal California). Is there any way to minimize the amount of energy released during seismic events or even stop them all together? A 2008 study by Rice University associate professor of Earth science Adrian Lenardic suggests that we may have already begun working toward this goal. Our solution? Global warming. The study compares Earth with Venus, a planet similar with respect to its geology and size, but with a carbon-dioxide rich atmosphere which presents the perfect example of the greenhouse effect attributed to global warming. It is suggested that the extremely hot surface temperature of Venus may have shut down its once active plate tectonic cycle. Shutting down plate tectonics would not only put an end to earthquakes, but likely end volcanic eruptions and mountain-building processes as well.

An interesting new discovery was made by the European Space Agency (ESA) this year regarding Venus' surface processes. Despite the fact that Venus remains tectonically inactive, it is more clear now than ever that volcanism may still be highly active. The latest lava flow discovered by the ESA research occurred sometime

in the last 2.5 million years. While this may seem like a long time, it is fairly recent in geologic terms and suggests that if global warming were to shut down plate tectonics, we may still have to worry about volcanoes. By now, I'm hoping you've all realized that the amount of global warming required to actually cause Earth's tectonic plates to cease movement goes far beyond anything human-induced temperature rise could ever accomplish. Additionally, the immense rise in temperature (Venus averages around 850 °F) would likely cause the extinction of the human race. Truthfully, the above approach was, more or less, to get you thinking and so that I could throw more links in the post. For now, a practical "solution" to earthquakes remains a mystery. In fact, they are a necessary occurrence in a process vital to our existence. It seems that it is best to focus on additional methods of prediction, preparedness, and response than to attempt the virtually impossible feat of stopping it all-together.

Source : <http://adventuresingeology.com/2010/04/12/global-warming-could-put-an-end-to-earthquakes/>