Scientists discover new ways to predict possible earthquakes

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A recent research provides new means for replicating how earth ruptures develop and possibly enabling prediction of future earthquakes. Researchers at the Hebrew University of Jerusalem, who have been examining what happens in a "model earthquake" in their laboratory, have discovered that basic assumptions about friction that have been accepted for hundreds of years are just wrong.

"The findings have a wide variety of implications for materials science and engineering and could help researchers understand how earthquakes occur and how severely they may develop along a fault line," said Jay Fineberg, the Max Born Professor of Natural Philosophy at the Racah Institute of Physics at the Hebrew University.

For centuries, physicists have thought that the amount of force needed to push an object in order to make it slide across a surface is determined by a number called the coefficient of friction, which is the ratio between the forces pushing sideways and pushing down (basically, how much the object weighs).

In carefully controlled lab experiments, Ben-David found that points along the contact surface could sustain up to five times as much sideways force as the coefficient of friction predicted, and the object still wouldn't budge.

Furthermore, the contacts don't all break at the same time. They, instead rupture one after another in a cadence that sets the rupture speed. These rapidly moving ruptures are close cousins of earthquakes, Fineberg said.

"An earthquake is the same system as in the Hebrew University experiments, just scaled up by factors of thousands. We can watch how these things unfold in the lab and measure all of the variables that might be actually relevant in a way that you could never observe under the earth," noted Fineberg.

This new understanding has the potential to provide unprecedented predictive power, estimating both the rupture mode and extent of a future earthquake.

The study has been published in an article in Science magazine.