Finding Faults: Identifying Earthquake Hazards Around the World

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Many earthquakes occur on faults that have not ruptured for hundreds, or even thousands, of years. As a result, earthquakes sometimes seem unexpected, causing massive devastation in areas that are not adequately prepared. How can we identify active faults before they slip and evaluate their earthquake hazard, and why is earthquake prediction so difficult? Judith Hubbard, from Harvard University, will discuss how earth scientists use cutting-edge techniques, such as 3-D visualization, geophysical modeling and remote sensing, to better understand and forecast earthquakes in areas ranging from the Los Angeles basin in California to the Sichuan basin in China, where the M7.9 Wenchuan earthquake occurred last year.

In the Los Angeles basin, residents are very aware of earthquake hazards. However, many faults are hidden, either because they never reached the surface or because they have been buried by sediment. As a result, identifying these faults and determining their hazard can be difficult. In many cases, however, the sediments above the fault record evidence of previous earthquakes. Scientists can therefore establish an earthquake history using seismic data to image the structure of the earth below the ground surface.

The Wenchuan earthquake was striking, because it ruptured multiple faults along a mountain front rather than a single fault. Because fault area is correlated to earthquake magnitude, this caused the earthquake to be very large. Understanding how earthquakes can rupture multiple faults is very important if scientists are to estimate earthquake hazards. In addition, before the Wenchuan earthquake occurred last May, many scientists believed that earthquakes in the area were likely to be small and rare. Ms. Hubbard will discuss why this is the case and how the M7.9 earthquake changed earth scientists' understanding of the area.