

EARTHQUAKE RISK IN BANGLADESH

PASSAGE TWO

Collecting Data

To study earthquake risk in Bangladesh, scientists are investigating the region's geography and tectonic activity. Here are some of the methods they're using.

Outcrops: Looking into the past

Earthquakes occur along faults, so scientists are studying the active faults in and around Bangladesh. To find the faults, Seeber and his team of structural geologists look for rocks that are bent, folded, or broken. "We usually have faults beneath folds," explains Ellie Ferguson, a Columbia University graduate student on the project.

But finding exposed rock, or outcrops, isn't always easy in this tropical environment where farms, plants, and sediment cover much of the landscape. The team must drive and hike many miles to find outcrops, such as cliffs along rivers and roads.

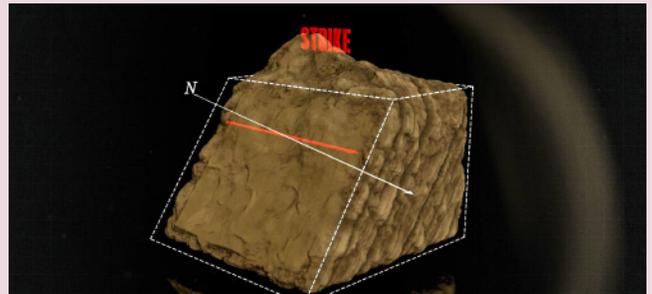
Another challenge is that many faults in the region are "blind," or buried under miles of rock and sediment. So geologists look for signs of faults like anticlines – places where rocks have folded up into an arch.

When geologists find an outcrop, they look for tilted or folded rock layers. Rock layers form in flat, horizontal layers, so deformed rock is a sign that tectonic forces are at work. Next, the team measures the rock to see how much it's tilted (dip) and what direction it moved (strike).

Finally, the team maps this information to get a bigger picture of how the faults are moving. "Ideally you have a number

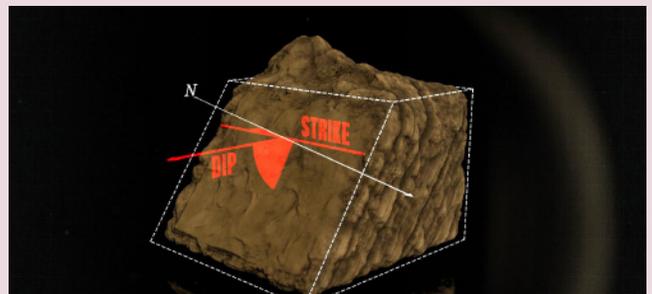
DESCRIBING FAULTS AND FOLDS

To understand tectonic forces, scientists study faults, or breaks in rock layers, as well as folds, where rock layers are deformed. Here are some ways that scientists measure and describe faults and folds:



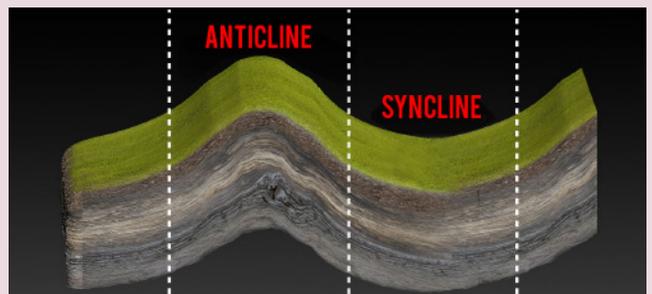
Strike

The direction of the horizontal break in Earth's crust. Measured as a compass direction (such as "northeast") or as an angle clockwise from north (from 0° to 360°).



Dip

The angle between the fault, or rock layers, and the horizontal surface. Measured between 0° to 90°.



Anticlines and Synclines

Tectonic forces can cause rock layers to bend or fold. In an anticline, rock layers are folded upwards in an arch. In a syncline, the rock layers fold downwards.

CONTINUED

Collecting Data

of minor faults exposed that you can measure,” says Ferguson. “And that can tell you something about the sense of motion on the big fault as well.”

Seismometers and GPS: Recording Ground Motion

While outcrops reveal past tectonic activity, seismometers and GPS help scientists investigate current activity.

Seismometers detect and measure sudden ground motion, from large earthquakes to small tremors far below the Earth’s surface.

Currently there are 17 seismometer stations around the country. These stations are typically placed near active faults, such as the Dauki Fault. Seismologists use the data to make accurate maps of the faults.

To study the slow movement of the crust, seismologists have installed 25 GPS (global positioning system) devices around the country. Similar to the GPS in your phone or car, these devices use satellites to identify any location on Earth. But this equipment is even more accurate, so it can measure a position within a few millimeters. Over time, GPS can detect tiny movements in the crust — an important sign of an active fault. It also detects both horizontal and vertical movement. This gives scientists a three-dimensional look at the crust’s motion.

Over time, points along active faults may get closer together or farther apart. This data tells scientists how faults are moving. It also helps them measure the strain — or energy building up — along faults. For example, a GPS station adjacent to the Shillong Plateau is tracking the plateau’s slow movement south along the Dauki Fault.

**STRIKE AND DIP**

Scientists measure strike and dip at an exposed outcrop. ©AMNH

CONTINUED

Collecting Data

“We’re trying to find out how fast [the plateau] is moving to help assess the earthquake risk from this fault,” says Michael Steckler. “The GPS is accurate enough to see the strain that’s building up around the fault.”

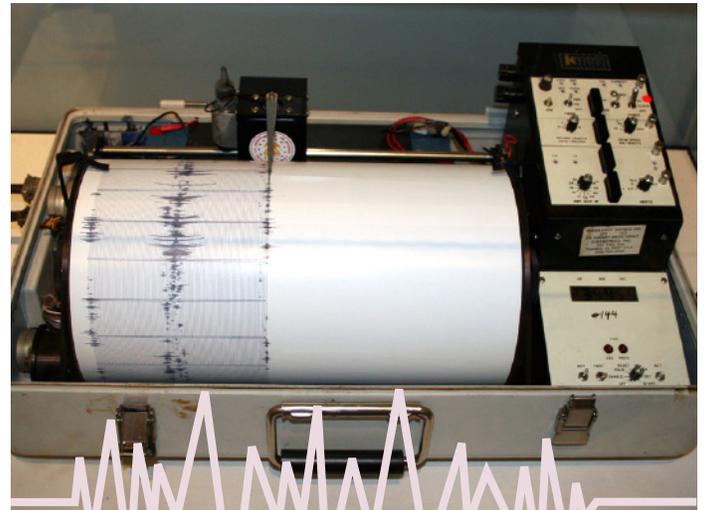
STOP AND THINK

BASED ON THE TEXT:

1. What kinds of data are the scientists collecting? How does this compare to your answer from Passage 1?
2. What methods are scientists using to collect their data?
3. Which science practices were used by the scientists?

LOOKING AHEAD:

4. What questions do you think the scientists are trying to answer with this data?



RUMBLE RUMBLE...

A seismometer is an instrument that measures vibrations in the Earth. A simple seismometer might use a spring, a weight, and a pen to record how much the ground moves up and down. Today’s seismometers use electronic sensors and computers to record earth’s motion in all directions (both side to side and up and down).