SATELLITE-BASED EARTHQUAKE DETECTION MOOTED

Speed read

- A low-altitude satellite detected sounds from the Tohoku earthquake in 2011
- Satellites could one day be used to detect earthquakes in remote areas
- But with a time lag of 30 minutes, they are unlikely to replace ground-based seismometers

We may one day be able to detect earthquakes in remote areas of the Earth from space, say scientists who used a satellite to pick up low-frequency sounds from the earthquake that hit Tohoku, Japan, in March 2011.

The researchers report that the satellite is the "first seismometer in orbit".

During an earthquake the Earth's surface "moves like that of a drum", creating a low-frequency sound in the atmosphere that cannot be heard by humans, says Raphaël Garcia, a researcher at the University of Toulouse, France, and the lead author of the study.

Garcia and colleagues were able to trace these acoustic waves — known as 'infrasounds' — from the Tohoku earthquake to the Gravity Field and Steady-State Ocean Circulation Explorer (GOCE) satellite. It is the first time that infrasounds have been detected in space, they say.

The European Space Agency launched the satellite in 2009 to measure the Earth's gravity field. It orbits the earth at a relatively low altitude of about 270 kilometres — an ideal height for detecting infrasounds, which fade at higher altitudes. It is because of this fading that researchers had previously failed to find infrasounds, despite searching for a number of years.

Now they suggest a standard altitude of about 300 km for satellite detection of infrasounds.

Other gravity-measuring satellites that have failed to detect such signals include the Challenging Minisatellite Payload (CHAMP), which orbits at 320 km, and the Gravity Recovery and Climate Experiment (GRACE), which orbits at 480 km.

GOCE was not designed to be a seismometer. "We have been interested in using data from GOCE for studying the atmosphere," says study co-author Eelco Doornbos of Delft University of Technology in the Netherlands. "Detection of earthquakes is a spin-off of the application of the satellite."

But it is unlikely that satellites will be able to act as real-time detectors for earthquakes on land as there was a lag of 27 minutes between the earthquake and GOCE detecting the first infrasound wave.

"An advantage of having seismometers in space would be to detect the signals from earthquakes that happen in the middle of an ocean," says Doornbos. "But I don't think they will replace ground-based seismometers."

He says that more than one satellite would be necessary to detect earthquakes from space, a prospect too expensive to see in the next ten years. But as instruments become smaller and cheaper it may "be feasible to launch a few inexpensive satellites at the same time, which might be used to help in pinpointing earthquakes".

Doornbos adds: "At some point, the space agencies may decide that it might be a good idea to [install seismometers] on older satellites."

Ramesh P. Singh, a geophysicist at Chapman University, United States, says that, when an earthquake occurs, ground-based seismometers provide information on the event within a few minutes. By the time GOCE detected the first signal from the Tohoku earthquake, almost half an hour later, it was already known that the earthquake had occurred.

Source : http://www.scidev.net/global/earth-science/news/satellite-based-earthquake-detection-mooted-1.html