

EARTHQUAKES: Fault of Nature, or Fault of Man?

By Dr Steve Howrie

At 7.45 am on Monday the 21st of October, 2002, the ground shook. 15 minutes later, it shook again - and again, and again. Over the next four weeks, one hundred earthquakes were recorded in the vicinity - and not just as aftershocks. This was an 'earthquake swarm', the term given by seismologists to a sequence of earth tremors of varying intensity, clustered in a small area over a short period of time.

One person said: "I heard a big bang and the whole building shook. Followed up shortly with another bang and more shaking." Another claimed: "I could feel the ground shaking below my feet. Desks in the classroom were vibrating as well."

These reports are not from Japan or California - places renowned for regular earthquake activity - they were from the people of *Manchester* who were experiencing at first hand what it feels like to be near the centre of an earthquake.

The occurrence of such recent earthquakes in Britain - there were also sizeable tremors in Leicestershire in 2001 and Warwickshire in 2000 - has now made some people ask the question: are these a fault of Nature - or the fault of Man?

The Manchester quakes measured up to 3.9 on the 'Richter Scale'. This is an internationally accept standard of measurement of earthquake activity named after Dr Charles Richter, a US Physicist who developed the scale in 1935. The measurement is 'logarithmic', such that each unit of measurement, or 'magnitude', is thirty times stronger than the previous one. For example, a 6.0 earthquake is 900 times stronger than a 4.0 magnitude quake.

Richter magnitudes are often related to the equivalent in tons of TNT. For instance, the largest Manchester earthquake was equivalent to 1,000 tons of TNT. Other measurements of earthquakes - such as the European Macroseismic scale - describe the amount of surface damage done by an earthquake. On this 12 point scale, Magnitude 1 can only be felt by scientific instruments, whilst magnitude 12 is 'Catastrophic' - almost total destruction.

The largest recorded earthquake occurred in Chile in 1960. It was measured as magnitude 9.5 on the Richter scale and caused over 5,000 deaths (the highest possible magnitude on this scale is 10). The most deaths resulting from an earthquake was reportedly 830,000, after a quake in the Shanxi province of China in 1556. The Chinese earthquake has been allocated a magnitude of 8.0 by the British Geological Survey (though how this is possible for an earthquake that occurred 379 years before the scale was invented, only they know).

Seismologists often claim that if they could predict earthquakes ahead of their time, they could save many lives. However, the best methods they have at present are: (a) studying seismic data for patterns associated with earthquakes (which is rather like studying a horse's form before placing a bet on a race); and (b) studying how animals react before a quake. It should be noted that animals do not need to study seismic data.

Around the world there are between 18,000 and 20,000 earthquakes each year of magnitude 2.5 or greater - that's an average of 50 quakes per day. There are many more of lower magnitudes which can only be detected by seismic instruments. But what is more interesting than the frequency of earthquakes, is what actually *causes them* to happen.

According to scientists, they are mainly the result of vibrations in the Earth's outer crust. These vibrations are caused by the slipping of underground rocks - particularly 'tectonic plates' which border each other at certain locations around the globe. Other earthquakes are caused by volcanic activity, which can trigger earthquakes in that area.

But many earthquakes are caused directly by Man.

In Denver, Colorado, in 1962, the town began experiencing earthquakes for the first time in its history. Officials finally realised that the quakes began at the same time that the city began pumping waste water into deep man-made wells on the city's eastern side. As soon as the pumping ceased, so did the earthquakes.

Closer to home, according to the British Geological Survey, the Manchester and Salford area straddles part of the South Lancashire coalfield. This area has been extensively mined from numerous collieries in the North Manchester city area right up to the late 1970's. The coals that were removed formed part of a fault block, bounded to the north and east by the Bradford fault. The resulting underground caverns filled with water or collapsed, causing a movement of rocks in the area, and consequently the recent earthquakes.

Then there is drilling for oil. In 1977, an earthquake of magnitude 5.6, the largest offshore quake in British waters in recent times, hit the North Sea. Eight years later, in June 1985, another North Sea earthquake stopped oil production when the affects were felt on the Gorm/Tyra platforms. Again, removing oil creates vast caverns in the seabed, which then fill with water and collapse.

There are many other instances where Man has caused earthquakes to occur. It is well-known that dynamite and atomic explosions release large amounts of energy which can bring about a rearrangement of rock in the earth's crust - in turn triggering earthquakes. Not so many years ago the French, British and others experimented with underground atomic explosions at several pacific islands. It

may still be going on secretly today. Earthquakes occurring in those areas cannot be divorced from the actions of the experimenters.

So isn't it time we listened to the Earth as it groans about the way it's being treated? Although most earthquakes are not Man's fault, many are. Perhaps the recent earth tremors around Britain will serve to remind people in this country that we are only visitors to this planet, and like all well-behaved visitors we should always leave a place in good order.

In fact, we could all do with being 'Friends of the Earth': after all, your friends don't plunder or trash your garden when you leave them to take care of it for the weekend.

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