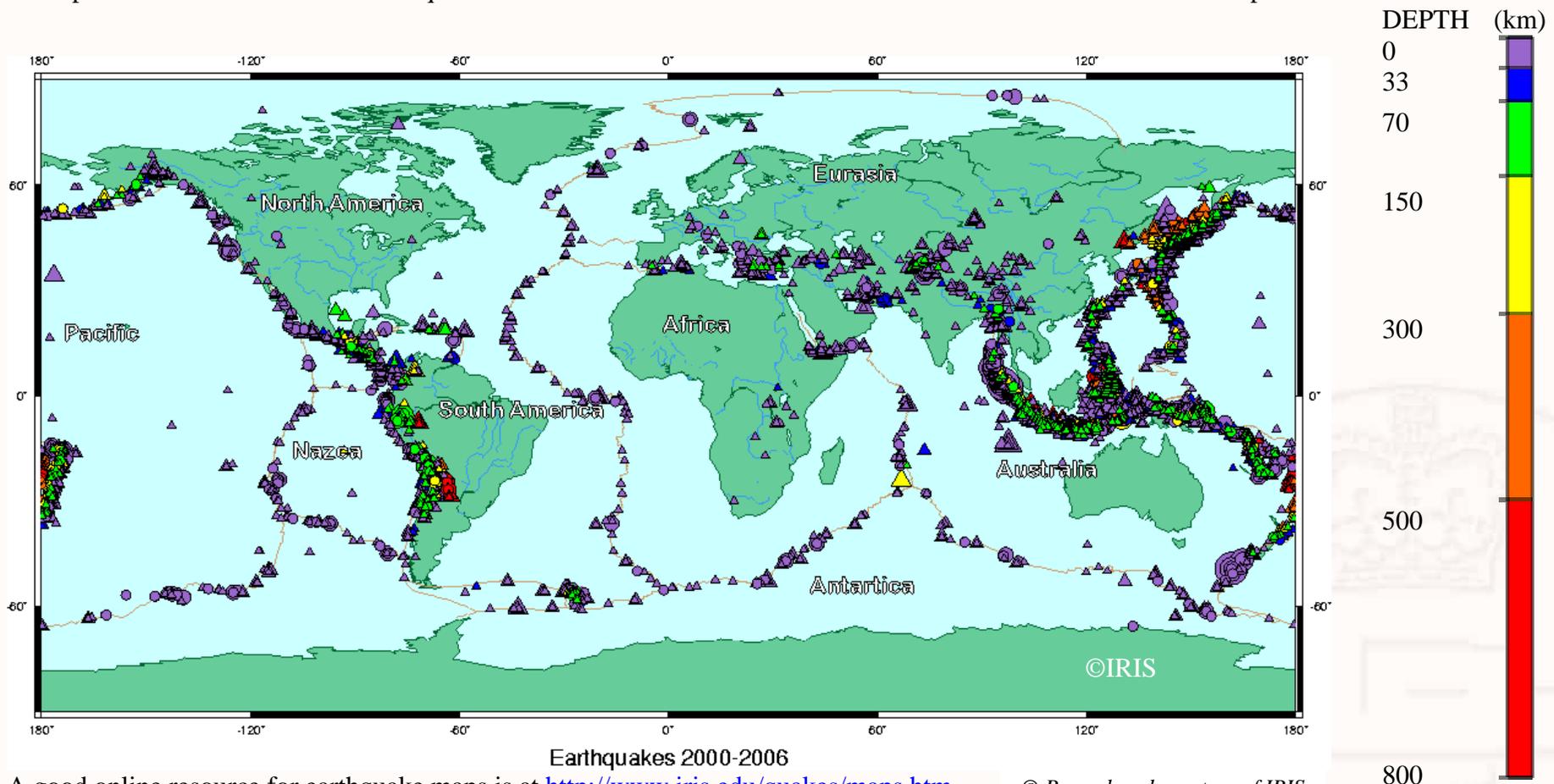




## Where do earthquakes happen ?

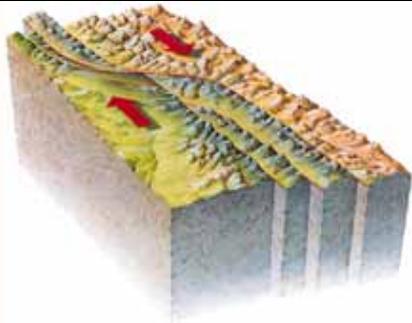
Although the frequency and timing of earthquakes when considered on a global scale can be treated as random their location certainly cannot. A simple look at the locations of earthquakes indicates that most events occur at or near the boundaries of tectonic plates.



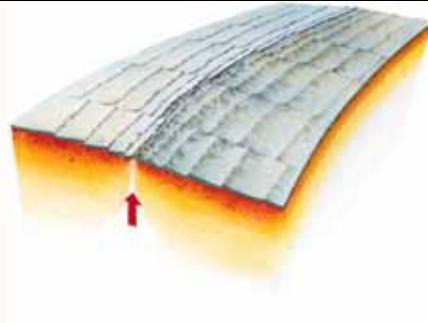


## Earthquake distribution along plate boundaries is not uniform

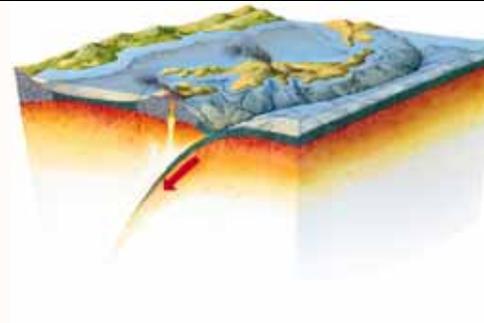
By plotting only earthquakes of certain magnitudes or depths we can distinguish between different types of tectonic plate boundary.



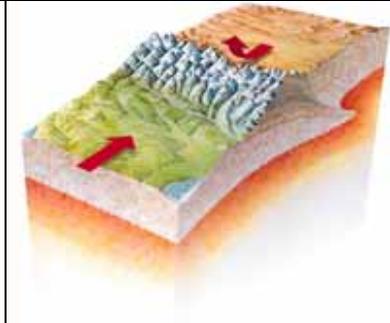
Transform boundary  
e.g. California



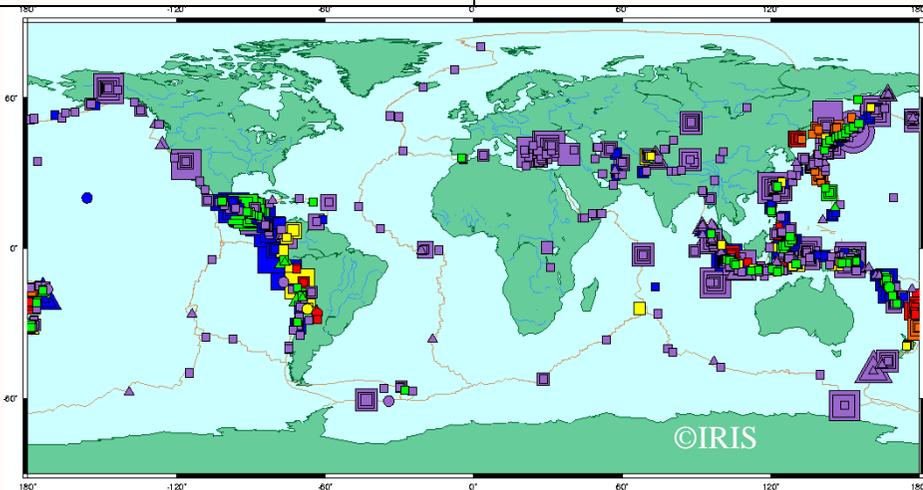
Divergent boundary  
e.g. mid-ocean ridges



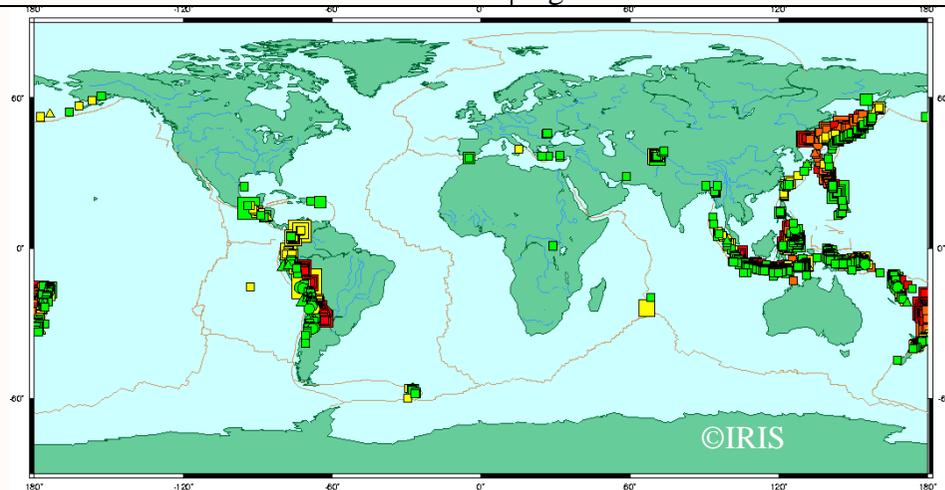
Convergent (subduction) boundary  
e.g. Sumatra and Chile



Convergent (diffuse) boundary  
e.g. Tibet and Pakistan



Large events (>M6.5) are rare on divergent boundaries



Deep events (>100 km) only occur on subducting plates

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British Geological Survey

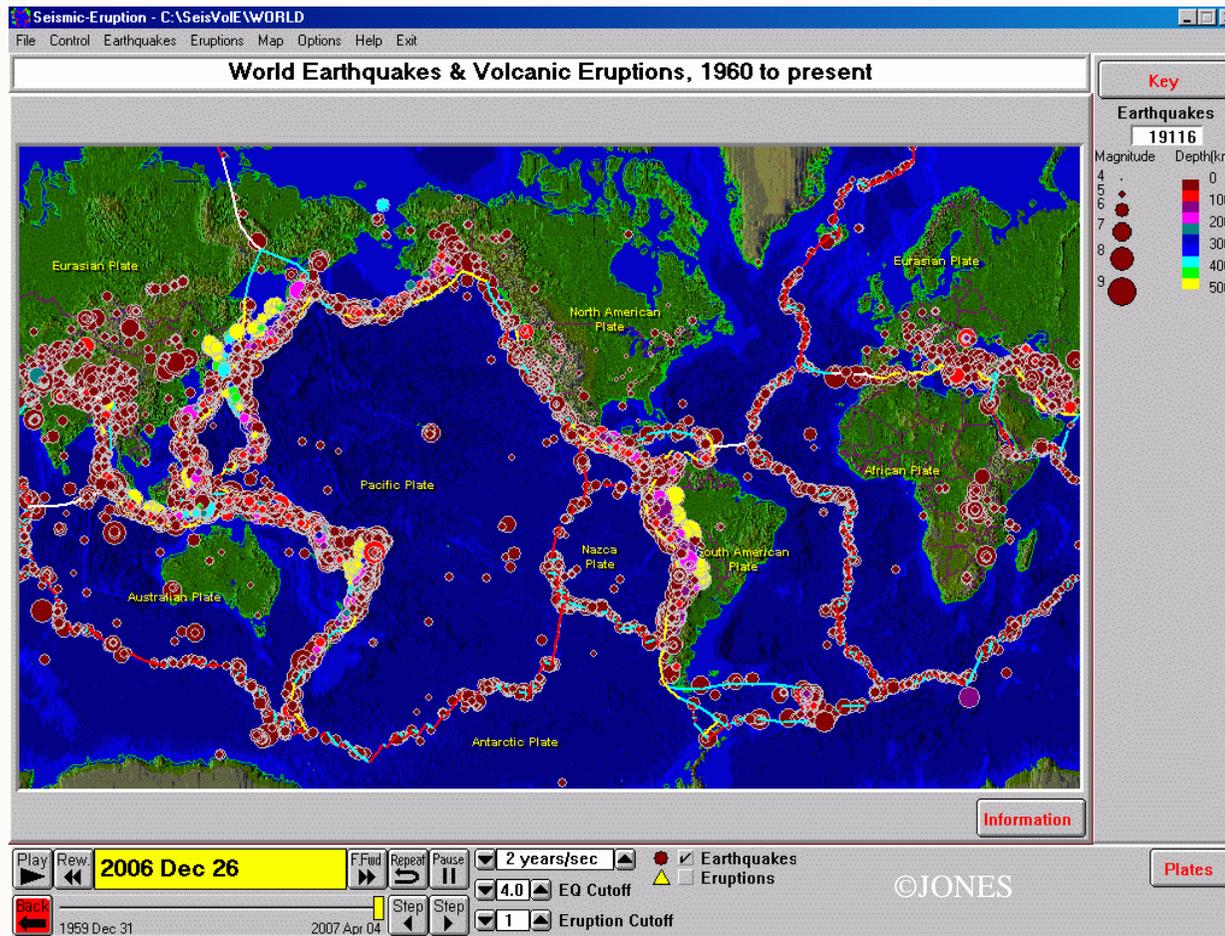
NATURAL ENVIRONMENT RESEARCH COUNCIL



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### SeismicEruption

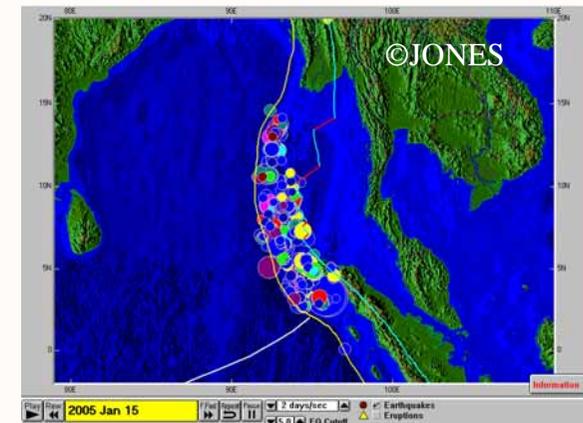
A free program written by Alan Jones to download and run on your own PC called SeismicEruption allows you to playback sequences of earthquakes and volcanic eruptions plotted on a map.



[www.geol.binghamton.edu/faculty/jones/](http://www.geol.binghamton.edu/faculty/jones/)

The program comes with a database of events from 1960 to present (updateable via the internet).

You can select which events to plot and zoom in on different world regions

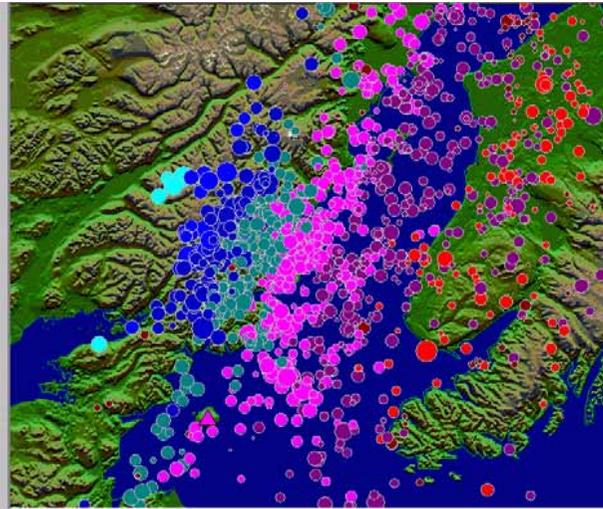


Some 20 days of aftershocks define the fault plane of the Mw9.3 event in Sumatra.

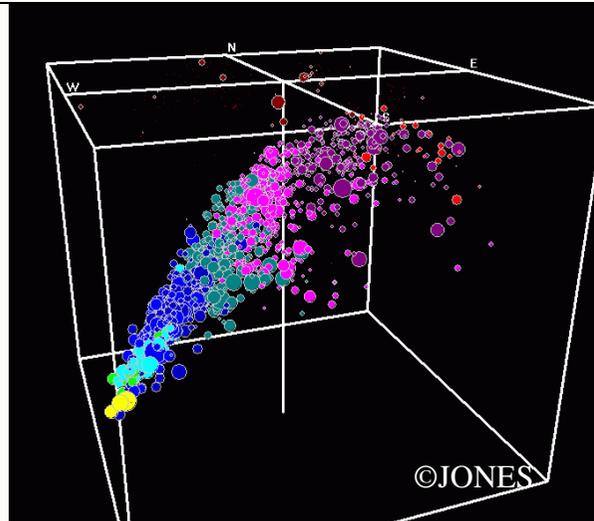
© Reproduced courtesy of Alan Jones



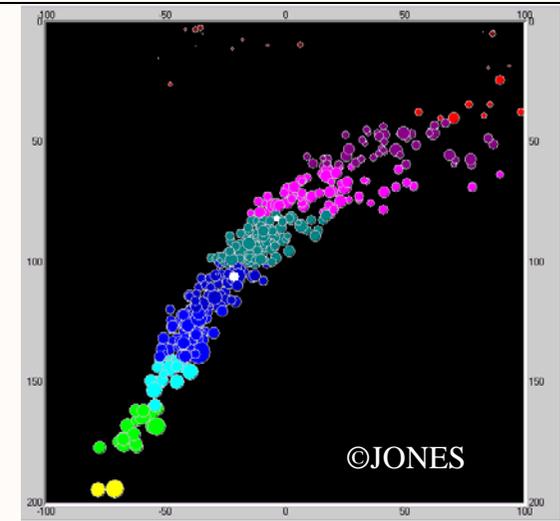
The program has a feature which allows you to plot 3D wire-frame images and cross-sectional views of earthquakes.



An earthquake sequence from Alaska plotted with events colour coded by depth.



The same sequence plotted as a 3D wireframe shows the events occurring on a plane, dipping surface



A cross-sectional view of the sequence

© Reproduced courtesy of Alan Jones

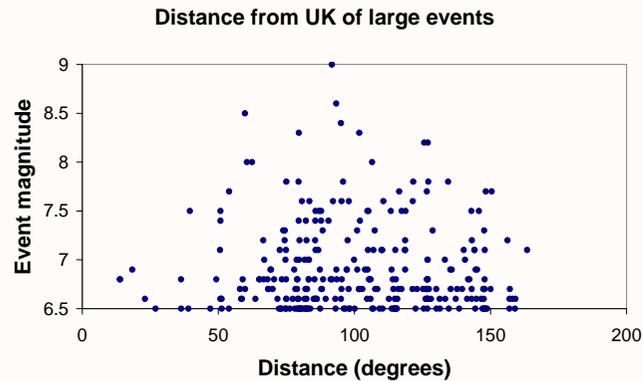
Earthquakes in Cook Inlet, Alaska, occur on a subducting plate. By looking at the location of the events in 3D and as a cross-sectional view it is possible to visualise the geometry of the descending slab.



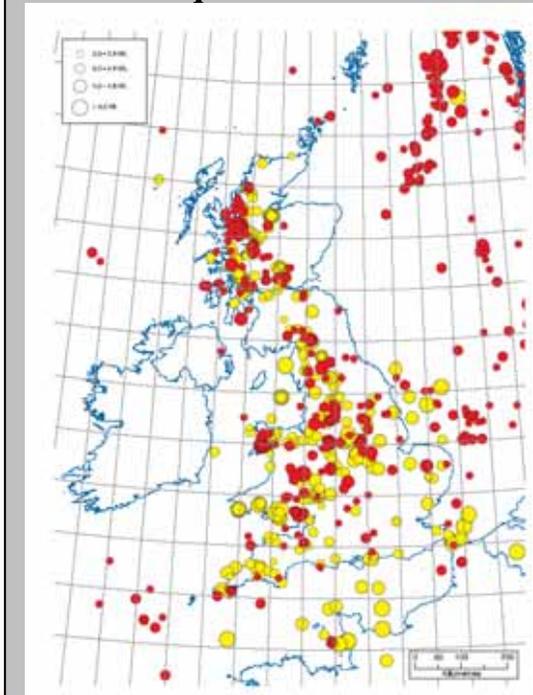
## Recording earthquakes in the UK

Over 80% of large earthquakes occur around the edges of the Pacific ocean, the ‘Ring of Fire’ where the Pacific plate is being subducted beneath the surrounding plates.

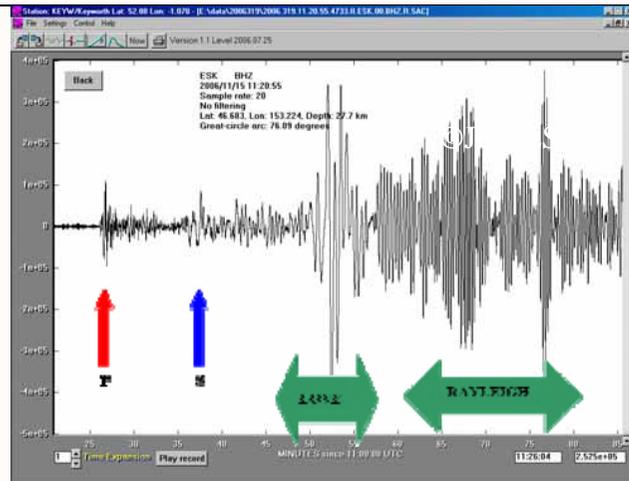
If we select all earthquakes with magnitudes greater than 6.5 from 2000–2006 and see where they occur relative to the UK we find that only about 2% occur within 30 degrees of the UK (about 3000km)



## UK Earthquakes



About 200 earthquakes a year are recorded by BGS in the UK. However on average only a few of these are strong enough to be felt by people and damaging events (>M5.0) occur less than once per decade.



The signals from distant large earthquakes, or ‘teleseismic’ events, can be clearly recorded in the UK with simple seismometers.

A typical signal recorded in the UK from north of Japan (M8.3, 76 degrees (8400 km) distance).

For this event both the P wave and S wave arrivals are visible. P waves show up more clearly on vertical seismometers and the S waves more clearly on horizontal seismometers.

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