Achieved

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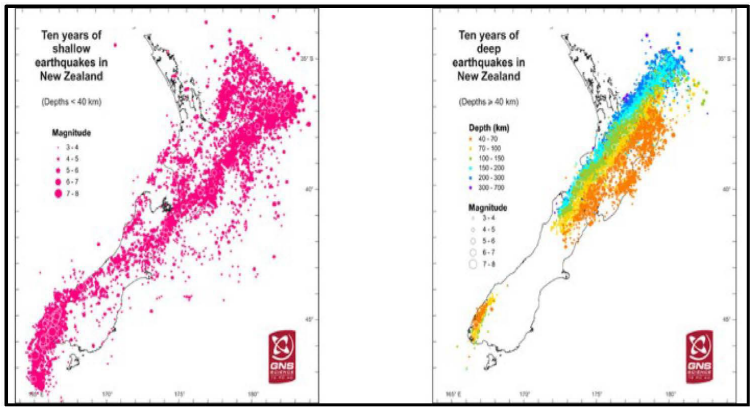
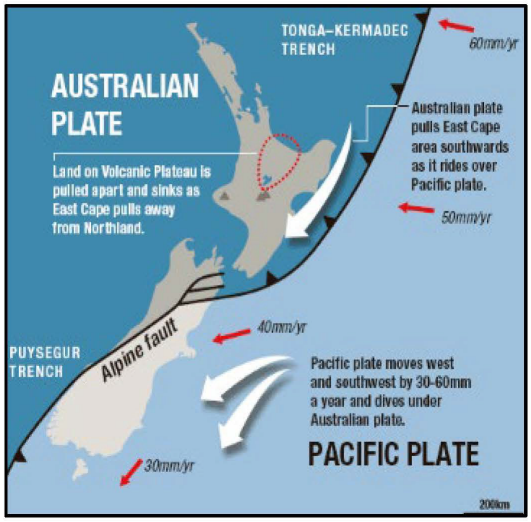


The spatial distribution refers to how things are arranged or spread out across a given area. In New Zealand, earthquakes follow a specific linear pattern along the boundaries of the Australian and Pacific plates. These boundaries, like subduction zones and transform boundaries, accumulate stress over time, leading to seismic activity. Notable areas include the Hikurangi subduction zone and the Alpine Fault rangers from North Island to South Island. Source of image AF8 (Alpine Fault Magnitude 8)

The geographical location of New Zealand is a primary natural factor influencing the linear, clustered, and occasionally dispersed arrangement of earthquakes. Situated within the Pacific Ring of Fire, New Zealand rests on a region with fault lines, primarily contributing to this seismic activity.

In the picture on the left, helps identify another type of spatial distribution which is a clustered and dispersed pattern. Clustered earthquakes occur when the strongest is concentrated around specific regions, such as the top of the North Island like Tonga-Kermadec Trench, or the southern tip of the South Island in the Puysegur Trench, specifically Milford Sound. Dispersed earthquakes in New Zealand are seen on the eastern coast of the South Island like Dunedin and the western coast of the North Island like New Plymouth. These are some of the few that experience fewer earthquakes in New Zealand.



It shows a visual representation of the tectonic processes and features contributing to the spatial distribution, particularly the linear pattern of the earthquakes in New Zealand. The presence of the Australian and Pacific plates, shown with arrows indicating their movement, highlights the fundamental tectonic setting of the region. The Alpine Fault, clearly outlined on the diagram, is a major fault line where the Transform plate, which is two plates, slides past each other horizontally, contributing significantly to the linear pattern of seismic activity observed in New Zealand. The black triangle on the Alpine fault represents the rate of movement, with the top first red arrow indicating 60mm per year. Additionally, arrows pointing to Christchurch and past Invercargill illustrate the direction and rate of movement along the fault, with 40mm per year and 30mm per year. Furthermore, the Tonga-Kermadec Trench and the Puysegur Trench indicated in the image, represent subduction zones where one tectonic plate is forced beneath another, generating powerful earthquakes. These geological features and tectonic processes collectively shape the spatial distribution of earthquakes, creating the distinct linear pattern observed across New Zealand.

Source of the image above: Structure geology

This image refers, further North, the Alpine Fault breaks up into a series of faults, which are named the Hope Fault, Kekerengu Fault, Clarence Fault, Wairau Fault, and Awatere Fault which are all known as the Marlborough Fault system.

Lateral and vertical movements are key in understanding geological events such as earthquakes. Sideways shifts from tectonic plate motion and vertical movements of the Earth's crust affect seismic activity. Al convergent boundaries, plate colliding may increase earthquake risk. These movements occur in the lithosphere, interacting with the upper mantle.

Source of image: Wikipedia

Earthquakes have profound long-term and short-term impacts on the environment, people (social), and the economy.

The Christchurch 2011 and Kaikoura 2016 earthquakes had significant economic impacts, causing widespread damage like disruption of businesses, and infrastructure, affecting tourism and trade in the affected regions.
The 2011 Christchurch earthquake had a big economic impact. II caused about $28 billion in damage and led to job losses. Repairing homes and businesses cost around NZ$13 billion. International aid of $6-7 million was given to help with recovery. Economists predicted ii could take up to 100 years for the economy to fully bounce back.
The 2016 Kaikoura earthquake had also caused about NZ$2 billion in damage. It disrupted vital infrastructure like State Highway 1, affecting industries such as tourism and fishing. The closure of the highway alone resulted in a loss of NZ$1.3 billion in economic activity. Overall, the earthquake had significant economic consequences for the region.

The earthquakes in Christchurch in 2011 and Kaikoura in 2016 earthquakes had big environmental impacts, including damage to ecosystems, water contamination, and changes in land levels.
The 2011 Christchurch earthquake resulted in environmental damage, including broken water and sewage pipes, leading to water contamination. Liquefaction, in areas like the Avon River, caused riverbank collapse, altering flow and damaging surrounding vegetation and ecosystems. This instability also led to lateral spread near waterways, and changes in land levels affecting drainage. Additionally, the earthquake triggered numerous rockfalls and landslides and impacted air and water quality with increased dust and pollutants.
The 2016 Kaikoura earthquake had a significant environmental impact, particularly on marine ecosystems. It caused a disturbance in coastal areas, leading to the loss of important marine species like brown and red algae, paua, and grazing snails. The earthquake also uplifted coastal platforms by around 1-6m. Additionally, there was a prolonged bloom of green algae (sea lettuce) along the coastline from Omihi to Cape Campbell, highlighting the vulnerability of marine ecosystems to seismic events. Continued efforts to address these impacts are essential for preserving coastal biodiversity.

The Christchurch 2011 and Kaikoura 2016 earthquakes had profound social impacts, including loss of life, injuries, displacement, and population shifts. The 2011 Christchurch earthquake, which caused 3,129 fatalities and left 6,800 with minor injuries, had a profound societal impact. 2,200 individuals had to find temporary housing, and nearly a quarter of the city's residents relocated afterward. These figures illustrate the extensive destruction, displacements, and population shifts resulting from the earthquake. It significantly damaged infrastructure, retail, and office buildings in the central business district, leading to financial difficulties for many.

The most significant social impact of the 2016 Kaikoura earthquake was the disruption of vital services, home, and temporary isolation, showcasing infrastructure vulnerability to natural hazards. Evidence reveals communities grappling with limited access to essential services and displacement due to damaged infrastructure, underlining the pressing need for resilient systems to withstand such disasters. Additionally, people weren't able to access their essential needs because of the road blockages.


State Highway 1 experienced significant liquefaction during the 7.8 magnitude earthquake in Kaikoura, New Zealand in November 14, 2016.
A collapsed building debris envelops a bus in downtown Christchurch on February 22nd 2011.
The landslide in the 2016 Kaikoura hit near Kaikoura town on New Zealand's South Island, damaging State Highway 1.
Collapsed buildings and damaged infrastructure mark the city's devastation. People navigate debris post a 6.3 magnitude earthquake in Christchurch, New Zealand, on February 22, 2011.