
Mountain Building

Audience: Years 6-11 Earth Science, Geography

Time Required: 15 minutes

Activity: This activity illustrates how global mountain ranges are formed related to plate motions

Standards: Some possible links to NZ Curriculum in this inquiry
Science Level 5

- Investigate the composition, structure, and features of the geosphere, hydrosphere, and atmosphere.

Geography

AS91013 Describe aspects of a geographic topic at a global scale

Learning Outcomes: Students will:

- describe forces at work in mountain building.
-

Map URL: <http://arcg.is/DfKWT>

Engage

Does the North or South Island have the highest mountain range?

- Click the map URL link above to start the map.
- With the Details pane visible, click the button, show Contents of Map.
- Click the button, Bookmarks.
- Select the South Island bookmark, and then click the North Island bookmark for closer examination. You may need to zoom in further.
- ? Compare and contrast the mountains of the North and South Island. [*Similar – tend NE-SW*
- *Contrast: A volcano Mt Ruapehu (2753m) is highest point in North Island, North island ranges are generally lower (around 1300-1500m) than South Island Mountains . Highest point in South Island is Mt Aoraki (Cook) 3676m. Several other peaks are over 2000m]*

Explore

Where do mountains form?

- With the Details pane visible, click the button, Show Contents of Map.
- Turn on the layer, Tectonic Boundaries. Click the title and click on the legend symbol
- Convergent boundaries are where two plates are colliding, Divergence boundaries are where plates are moving apart. Transform boundaries are where plates are sliding passed each other
- ? What type of boundaries do we have in New Zealand [*convergent in the North Island and Southern South Island, transform in central South Island*]
- Click the button, Bookmarks. Select the bookmark, All Mountains.
- Turn on the layer, World Mountain Ranges,
- Mountains are “built up” through pressures on the earth’s crust when plates collide.
- ? Where do mountain ranges occur in relationship to tectonic plates? [*Most form at the plate boundary edges because of collisions.*]

Explain

Do some plate boundaries produce mountains better?

- ? Count the number of mountains that occur near each boundary type. Based on this information, from which type of boundary are mountains more likely to occur? *[Convergent produces about 25, divergent produces about 6, and transform produces about 8.]*
- ? Why would this plate boundary type be better at creating mountains? *[The greater relative velocity of converging plate crashes provides more energy for piling up mountains.]*

Elaborate

Are there exceptions to this rule?

- Turn off the layer, World Mountain Ranges.
- Turn on the layer, Ranges Away From Boundaries.
- Search for mountain chains that do not appear to be located near plate boundaries.
- Look at the Great Dividing Range in Australia.
- ? From what you are learning about how mountains form, which plate would Australia have had to collide with to form these mountains? *[Pacific.]*
- ? Is there evidence in New Zealand of this collision? Which range is it? *[The Southern Alps were formed at the same time as the Great Dividing Range Australia.]*
- ? Why do some mountain ranges appear not to be located near plate boundaries? *[Many of these ranges formed from old plate boundaries that are no longer active.]*

Evaluate

What influences the height of the mountains?

- Turn on the layer, Plate Motions (mm/year).
- Consider how mountain heights might compare to the speeds of the colliding plates.
- ? With this in mind, rank which mountains you think are higher: Himalayas, Ural Mountains, and Rocky Mountains. *[Himalayas = 8839m, Rocky Mountains = 4389m, Ural Mountains = 1890m.]*
- ? What is the relationship between the speed of plates and height of mountain ranges? *[The faster the plates are moving, the higher the mountain ranges.]*

Key Skills

Measure

- Click the button, Measure.
- Click the Distance button. Select units of measurement.
- Click once on the map to start the measurement; click again to change direction and double click to stop measuring.

Bookmark

- Click the button, Bookmarks.
- Choose the desired bookmark.
- The map will change location and scale.

Next Steps

DID YOU KNOW?: ArcGIS Online is a mapping platform freely available to New Zealand public and private schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at <http://www.eagle.co.nz/gis-schools>.

THEN TRY THIS...

- Log in to your ArcGIS organization account and perform analysis on World Mountain Ranges.
- Use the Find Location tool to manually find mountain ranges located within 100kms of any plate boundary.
- Create an expression to find World Mountain Ranges **Within a Distance of 150 Kms** From Tectonic Boundaries.

Text References

- Motion of tectonic plates <http://arcg.is/2n7rMO8>
- Anderson, Lois. Nature's Fury Pearson NZ (2012)
- Peat, Justin, Lockyear. Geography on the Edge Level 1 Year 11 Geography (second edition) Cenage (2012)
- Science NCEA Level One (NZ Pathfinder Series), George Hook, New House Publishers Ltd, 2004
- Science Book B, George Hook, Nelson Cengage Learning, 2008
- Science Year 10 (NZ Pathfinder Series)George Hook, New Houses Publishers Ltd, 2005
- New Directions in Science NCEA Level 1, Anne Wignall and Terry Wales, Pearson Education NZ, 2006

NEW ZEALAND GEOINQUIRIES

<http://arcg.is/1GPDXe>