**Plate tectonics 2: evolution of a theory**

**Levels:** 5-6  
**NoS achievement aims:** Understanding about science   
**Contextual strands:** Planet Earth and beyond   
**Topic:** Earth science

**Rationale**

Plate tectonic theory suggests that the Earth's surface consists of huge plates of crustal rock that are forming, moving, and colliding.

By working in research groups investigating different but related ideas, students will experience the value of sharing results, and recognise the ways that scientists develop increasing confidence in a common unifying theory.

**What you need**

* Plate tectonic jigsaw puzzle (pre-cut).
* Plate tectonic map.
* Research field templates: vulcanology , seismology , oceanography.

**Focus**

* How big are these tectonic plates that scientists suggest we live on? How could we know if the plates are moving? What might happen if they collide?
* Where on the earth do most earthquakes occur? Is there any pattern to where earthquakes happen?
* Is the sea floor flat? How do you know that? What technology has been used to map the sea floor?
* How are volcanoes formed? Where on the Earth are most volcanoes located?

**Exploration**

1. Issue pairs of students with the plate tectonic jigsaw (pre-cut and jumbled) and ask students to reassemble the jigsaw. Consider how well it fits. Notice that the boundaries are not all at the edge of land. Ask if this could be coincidence.
2. Display the list of the three specialist research fields: oceanography, vulcanology, and seismology.
3. Explain that scientists often work in collaborative groups taking different approaches to a common idea.
4. Form students into specialist research groups (up to six groups). Each group will be given a research field template, containing information about the research evidence from their specialty that relates to plate tectonic theory, and a copy of the blank plate tectonic jigsaw puzzle.
5. Each group transfers across to their plate tectonic map the research evidence from their specialist research group: that is, oceanographers mark underwater mountains and trenches, seismologists mark major earthquakes, and vulcanologists mark locations of volcanoes.
6. Each group presents its findings to the class.
7. The class combines all the information from each specialty to see how the research evidence is explained by plate tectonic theory.

**Reflection**

* What evidence is there to suggest that tectonic plates are formed?
* What evidence is there that tectonic plates collide?
* Can plate tectonic theory explain *all* of the different pieces of evidence we investigated?
* What prevented all of these lines of research being explored when ‘continental drift’ was suggested in 1858 by Antonio Snider-Pellegrini, or in 1912 by Alfred Wegener?
* Why do you think scientists form collaborative teams instead of working alone?
* If many different observations can all be explained by the same theory, does that make it true? Does it make it more likely?
* How confident do you feel that plate tectonic theory is correct? What evidence would you use to support your opinion?

**Activity resources**

* A jigsaw of the Earth’s crust, divided into tectonic plates with names. To be photocopied and cut up for teams to reassemble.
* A map of the Earth’s crust, divided into tectonic plates with names. To be photocopied and given uncut to each team. Students can transfer research evidence from their specialist research field on to this map.
* Information about key vulcanology research evidence on plate tectonic theory. Provide to the vulcanology specialist group(s).
* Information about key seismology research evidence on plate tectonic theory. Provide to the seismology specialist group(s).
* Information about key oceanography research evidence on plate tectonic theory. Provide to the oceanography specialist group(s).