



## October | Activity of the Month

### Science to understand our land: terranes, tectonic plates and how BC came to be

#### What's it about

Look outside the window! We live in an amazing and diverse province, filled with mountains, lakes, powerful rivers, valleys, glaciers, deserts, plains, plateaux and an intricate coastline. BC has some of the best parks and landscapes in the world. Our land has many resources. It's a great place to call home.

But BC has not always been this way. A long time ago, 180 million years to be exact, the edge of North America was close to what is now the BC Alberta border. Our land did not exist. Join **Stephen Johnston**, a scientist at the University of Victoria, who researches how BC formed, in making a model to show how the land we call BC came to be.

The science is about tectonic plates and pieces of land from elsewhere, called **terranes**, being pasted onto the edge of North America during violent collisions. Stephen calls it the great 'terrane wreck'.

#### What you need

- 2 blue camping foamies (to represent the Pacific Plate and the Juan de Fuca Plate)
- 1 piece of mattress foam (to represent the North American Plate)
- 3 cut out arrows, and plate labels
- Masking tape
- Some random objects: paper cones, plasticene volcanoes, small boxes etc (to simulate bits of continents and volcanoes)



## What to do

1. Put two chairs back to back and drape the two blue foamies over the chairs so that one end of each foamy hangs onto the floor. Pull the plates apart slowly by the ends hanging over the chair seats (see picture and diagram below). Stick a label and an arrow on each foamy in the direction you are pulling. This is called a Divergent margin, and this is how the Pacific Plate and the Juan de Fuca Plate move. The part in the centre where the plates separate is called the Juan de Fuca Ridge – it's located about 150 km offshore of Vancouver Island.
2. Now, let's add the North American Plate (the piece of mattress foam). It is next to the Juan de Fuca Plate and moves towards the West (or towards the Pacific Plate). What do you think happens when a thin plate meets a thicker plate? Right, the thinner one goes below the thick one. This is called **subduction**. You now have a model of how the tectonic plates interact in the western part of North America and offshore.
3. But how did the bits of land that now make up BC get added to North America? Plates can act like conveyor belts. Take some of your random objects and place them on the Juan de Fuca Plate. 180 million years ago this plate was much larger. The objects represent volcanic islands and bits of continent. As the ocean plate spreads away from the Pacific plate it carries the pieces towards North America. Notice what happens to the objects when they reach the edge of the plate? They get scraped off the subducting Juan de Fuca Plate and are added to North America. You have just modeled how most of BC was built – by what scientists call terrane **accretion!**

What else you can do: Go to [gsc.nrcan.gc.ca/cordgeo/terrane\\_e.php](http://gsc.nrcan.gc.ca/cordgeo/terrane_e.php) and on the colour map of 'Cordilleran Terranes', find out which BC terrane you live on.

**Q.** What do you think happened every time a terrane got added to North America? Imagine what it would have been like to be there! Would there have been earthquakes?

**Q.** Look at a map of the ocean floor off BC. Are there any features that might get added to our land in the future?

## What's going on

One hundred and eighty million years ago, the edge of the North American continent was close to the current location of the BC Alberta border. To the west was a shallow tropical ocean. All the land that is now BC has been added to the original continental edge due to the forces of **plate tectonics**. When the North America plate started to move westward, the ocean plate it converged with subducted beneath the continental edge. While this was happening volcanic islands, ocean sediments, displaced fragments of continents, and even parts of the ocean floor itself were scraped off and plastered onto North America. These terranes, which make up most of British Columbia, can be very different from each other and are usually separated by large faults.

**Terranes:** fragments of crust originating somewhere else, and added to continents

**Subduction:** ocean crust descending below continental crust when they converge

**Accretion:** the process of addition of new exotic land or terranes

**Plate tectonics:** movements and interactions of the outer 100kms of the Earth which is broken into what we call plates

Activity modified from CBC 'Geologic Journey' Teacher Guide [www.cbc.ca/geologic/teacher.html](http://www.cbc.ca/geologic/teacher.html)



## Did you know?

In the last 150 million years an amount of ocean floor equal in length to one third of the Earth's circumference has been subducted below the North American plate.

Divergent margins are where all ocean plates are formed. These margins have underwater mountain chains that rise 3 kms above the surrounding ocean floor.

Diagram from [geoscape.nrcan.gc.ca/vancouver/earth\\_e.php](http://geoscape.nrcan.gc.ca/vancouver/earth_e.php)

