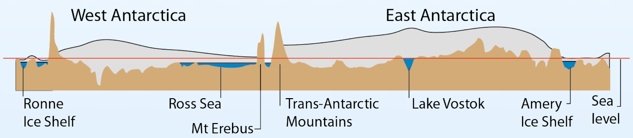
West versus East Antarctica

The Antarctic continent is made up of two distinct geographic regions, separated by one of the largest mountain ranges on Earth, the *Transantarctic Mountains* (TAM). This impressive mountain chain cuts across Antarctica, being over 3500 km in length, 100-200 km wide and reaching heights of 4500 m.

By aligning a map of Antarctica so the Greenwich Meridian (zero longitude) is at the top, these very different regions on either side of the TAM, can be compared.



West Antarctica

- much younger geological history
- rocks are mainly less than 500 million years old.
- a large part is below sea level
- composed of islands, archipelagos and small land masses
- connected by the West Antarctic Ice Sheet (WAIS)
- WAIS sits on land that is mostly below sea level
- mountainous and spectacular throughout

East Antarctica

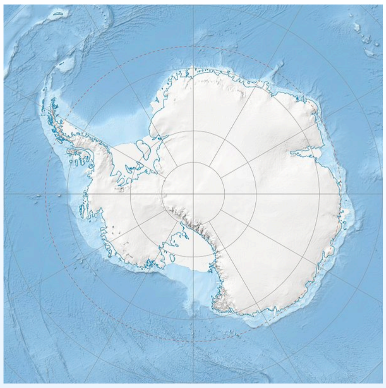
- extremely ancient geologically history
- oldest known Antarctic rocks at 4000 million years old
- mainly above sea level
- composed of a large mass of ancient rock
- covered by the thick East Antarctic ice sheet (EAIS)
- EAIS flows outwards over ancient bedrock
- mainly flat except for the buried Gamburtsev Mountains

The Transantarctic Mountains

The uplift of the Transantarctic Mountains was caused by the same process which split Gondwana apart. After Gondwana disintegrated, Antarctica continued to be stretched (rifted) and pulled apart. This stretching caused East and west Antarctica to drift apart and the Transantarctic Mountains to be uplifted on the edge of the rift.

As the surface stretched some crustal blocks sank, creating large scale features which remain to this day, namely:

- the steep eastern faces of the Transantarctic Mountains.
- the large areas of West Antarctic that lie below sea level.



West Antarctica forms the hook to the left, East Antarctica forms the rest of the continent.

Practical Task
Introduction

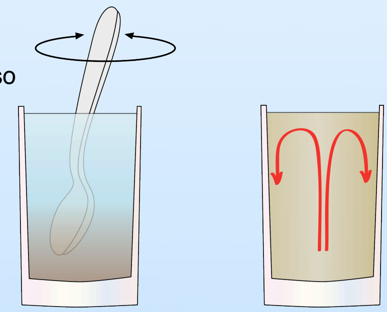
Convection is the movement of a liquid or gas, due to differences in it's density.

Temperature differences cause density differences.

What to do

1. Stir a teaspoon of Miso soup paste into a glass or cup of hot water

2. Allow to stand and watch for convection currents.



How it works

Within the glass the movement is caused by the hotter parts of the Miso soup being less dense and rising, likewise the colder liquid tends to sink. Since heat is lost from the outer surfaces a central column of rising soup is formed. Even small temperature differences are sufficient to keep this process occurring.

Note that it is not the actual temperature of the soup which drives the convection current but rather differences in soup temperature, which explains why the current continues as the soup cools.

Convection currents like this occur in all hot liquids (and gases) but are made more visible here because of the soy paste within the soup.

Relevance

- Convection currents in the Earths mantle contribute to the movement of continents (e.g.Antarctica).
- Convection currents in the ocean caused by differences in water temperature (and salinity) drive ocean currents. These currents control Earths food chains, weather and climate.

Adapted from material by *Bryan Storey, University of Canterbury* by *Donald Reid, iMatters.co.nz* in association with *Gateway Antarctica, University of Canterbury.*
Curricula: Science L4 - 8, Social Studies L3 - 4, Geography L6 - 8.
Images: *Donald Reid, Alexrk2, Wikicommons*

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