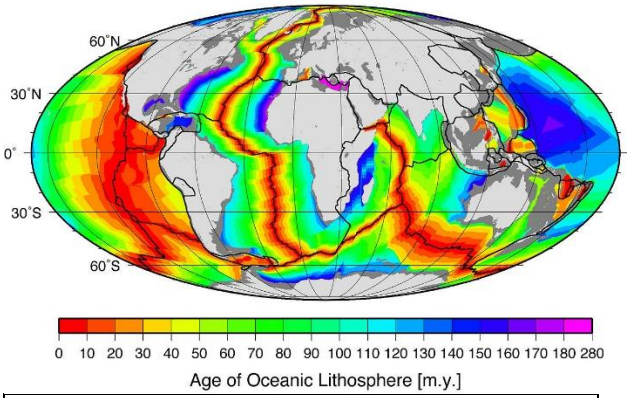
# Which is the fastest spreading oceanic ridge?
## A map-based activity to find the most active oceanic spreading ridge

Ask your class to study the ocean floors on the geological map of the world, like this one, but shown at a larger size on page 2.




*From: http://www.ngdc.noaa.gov/mgg/ocean_age/ocean_age_2008.html; National Geophysical Data Center, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, http://www.ngdc.noaa.gov and licensed under the Creative Commons Attribution-Share Alike 3.0 Unported license.*

Explain that the ocean floors are growing, as molten rock comes up from below and solidifies beneath the oceanic ridges. The colours represent the ages of the rocks. We can use the widths of the bands of rocks to calculate how fast each ocean floor is growing.

Ask: 'In which parts of the Atlantic Ocean (the ocean between Africa and America) do the youngest rocks occur?' (*A. In the centre of the ocean, at the Mid-Atlantic ridge*).

Ask three people to use the map together, working on the red/dark orange areas at a latitude of 20° south of the Equator at these three different places:

1. the area west of South America in the Pacific Ocean called the East Pacific Rise;
2. the area in the middle of the Atlantic Ocean;
3. the area east of Africa in the Indian Ocean called the Carlsberg Ridge.

For each place, they should measure the width of the orange and red bands together, at right angles to the ridge. Then they should compare their measurement with the linear scale (near the lower left hand corner of the map), to work out the distance from one side to the other of the dark orange band, in kilometres.

The dark orange and red bands together represent rocks up to 30 million years in age. Using this information, they should:

- calculate the average rate at which the oceans have grown at each of the three locations, in kilometres per million years (*A. Width in km./30Ma*)
- recalculate the rate in millimetres per year (*A. Width in km. x 1000 x 1000/30Ma x 1000000; i.e. the width in km per million years has the same answer as the width in millimetres per year*).

They can then use the information they have calculated to answer these questions:

- How much faster is the East Pacific Rise growing, compared to the Mid-Atlantic Ridge? *(A. The East Pacific rise is about 3.3 times faster)*.
- If we know the widening rate of an oceanic ridge, how can we calculate the rate that the plates on either side are growing? (*A. Each plate is growing at half the spreading rate*).
- Ivy can grow at metres per year. Your fingernails can grow at centimetres per year. The trunk of a tree can grow outwards at millimetres per year. Which of these is closest to the growth rate of the oceans? (*A. The rate your fingernails grow*).

……

## The back up

**Title:** Which is the fastest spreading oceanic ridge?

**Subtitle:** A map-based activity to find the most active oceanic spreading ridge.

**Topic:** A measurement and calculation activity to work out which of the oceanic ridges is spreading fastest, based on map data of the ages of the ocean floors.

**Age range of pupils:** 13 years upwards

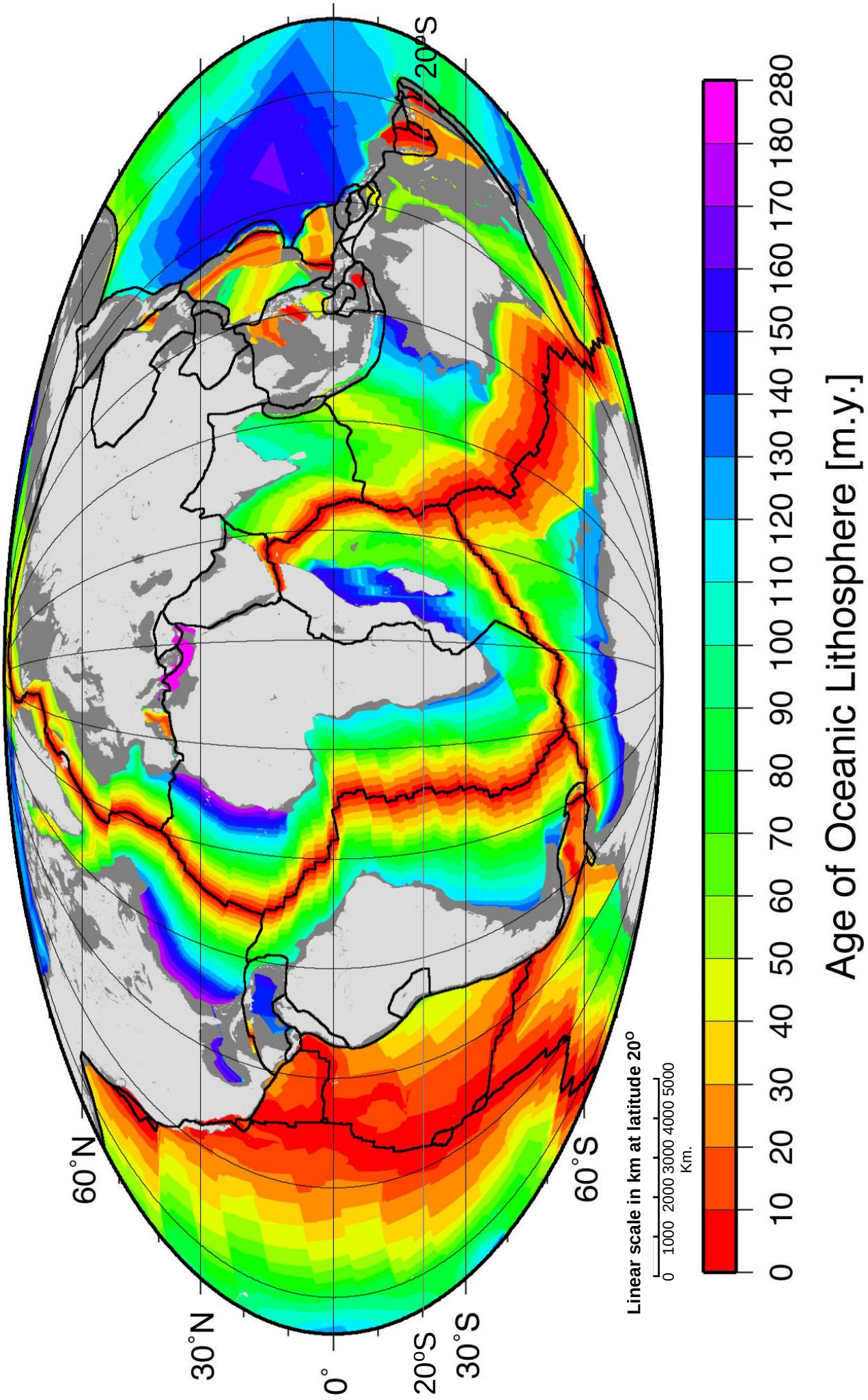
**Time needed to complete activity**: 10 – 15 minutes

**Pupil learning outcomes:** Pupils can:

- make careful measurements on a map;
- carry out calculations, based on the measurements;
- explain how their result links to plate tectonic movements over geological time.

**Context:**
This activity provides the opportunity to investigate relationships of distance, time and speed in a novel, geological context. It also allows pupils to use a linear scale and become familiar with large numbers.

If larger scale maps (e.g. wall poster size), are used for the activity, the results will be more accurate.


60°N
30°N
0°
20°S
30°S
60°S
20°S
Linear scale in km at latitude 20°
0 1000 2000 3000 4000 5000
Km.
Age of Oceanic Lithosphere [m.y.]
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 280

**Following up the activity:**
Following their calculation work, pupils can use the map to estimate ridge-spreading rates in other areas of the globe.

**Underlying principles:**
- Since the late 1950s we have been able to date the rocks which form the ocean floor.
- These dates show that the oceanic ridges at the centres of three major oceans are spreading at different rates
- The rates can be measured and calculated from a map showing ages of ocean floor rocks.
- Some rates are three times faster than others, but all are growing at the approximate rate at which fingernails grow.

**Thinking skill development:**
Understanding that the ages of ocean floor rocks can be used to show spreading rates involves pattern-seeking and construction. Measurement and calculation skills are also involved.

**Resource list:**
For each group of three pupils:
- a print out of the world map (or a larger version of a world map showing the ages of ocean floor rocks)
- ruler measuring in mm
- calculator

**Useful links:**
The history of the discovery of oceanic ridges and their spreading is described at: https://www.youtube.com/watch?v=GyMLlLxbfa4.

See the other Earthlearningideas linked to plate tectonics at: https://www.earthlearningidea.com/home/Teaching_strategies.html#platetectonics

**Source:** Earth Science Education Unit booklet: '*Sensing the Earth, teaching key stage 4 physics'* with permission.