

Discovering Plate Tectonics: Magnetic Stripes on the Sea-floor **(1) 50 min. period**

Materials:

Bar Magnet(s) & Iron filings
Lecture slides
GPTS activity details sheet
GPTS activity materials (see the details sheet)
Internet connection for web animations
GPTS plotting exercise handout

Context: This lesson plan is meant to help students grasp the meaning of the 'magnetic stripes on the seafloor' which were a crucial piece of evidence for plate tectonics. From the lecture, students will understand (1) The Earth has a magnetic field, which is similar to a dipole field from a bar magnet (2) The Earth's magnetic field changes (specifically, reverses polarity), it is not always the same as it is today (3) Rocks are magnetized by the Earth's field, and 'record' what the ancient magnetic field was like. These 3 key concepts are then used in an activity where students as a class reproduce the Geomagnetic Polarity Time Scale (GPTS) - the sequence of magnetic field 'flips' in Earth's past. A web animation shows how this sequence of reversals gets recorded as 'stripes' on the sea-floor in the context of sea-floor spreading and plate tectonics.

Lesson Plan:

1. Warm up by introducing the concept of a Magnetic field with a bar magnet and iron filings. If a document camera is available, simply demonstrate under the doc. camera. Place a bar magnet in view, and then place an 8.5 x 11 white paper over it (it helps to place books or other materials around the magnet which are the same height as the bar magnet - to keep the paper level). Sprinkle Iron filings all around the paper, and the dipole field pattern should appear. Explain that filings far away line up in a pattern - they feel a force from the magnet even though they are not touching the magnet, and there is a specific pattern. Dump filings back into container and place the white paper back over the magnet. Allow a couple students to try. NOTE: Dipole magnets will have to be bought if the classroom/school does not already have some from Physics activities, but often one can get iron filings free from auto. shops - especially those which fit brake pads. A local Sears gave us more filings than we needed.
2. Lecture from the slides provided (see slides for lecture notes).
3. Lead students in GPTS activity (see GPTS activity instructions).
4. Wrap up by relating the black/white pattern of reversals to the rocks getting magnetized at a sea-floor spreading center. There is one lecture slide provided, and a link to a useful web animation.
5. (Optional) Worksheet provided for students to plot the data points used in the activity.