Exploring the Ocean Floor: Seeing plate tectonics below the waves

Pete Loader | Pane Perunovski | Dragos Tararu |

(EGU – Geoscience Education Field Officers - GEFO)

& Gina P. Correia

(EGU Education Committee)

Geoscience Information for Teachers | Vienna 28th April 2025

European Geosciences Union

Meetings | Publications | Outreach | www.egu.eu

EGU and the birth of the GEFO Programme

- Among the different STEM subjects, **geosciences are probably the most neglected**, both in school curricula and in the teaching practices of many countries.

- 2019 - **EGU** launched a programme with the objective to promote geoscience education in Europe and beyond, creating a first group of teacher trainers - the **Geoscience Education Field Officers (GEFO)**

1st GEFO's trainee (Vienna, 2019)

The expansion of the GEFO Programme

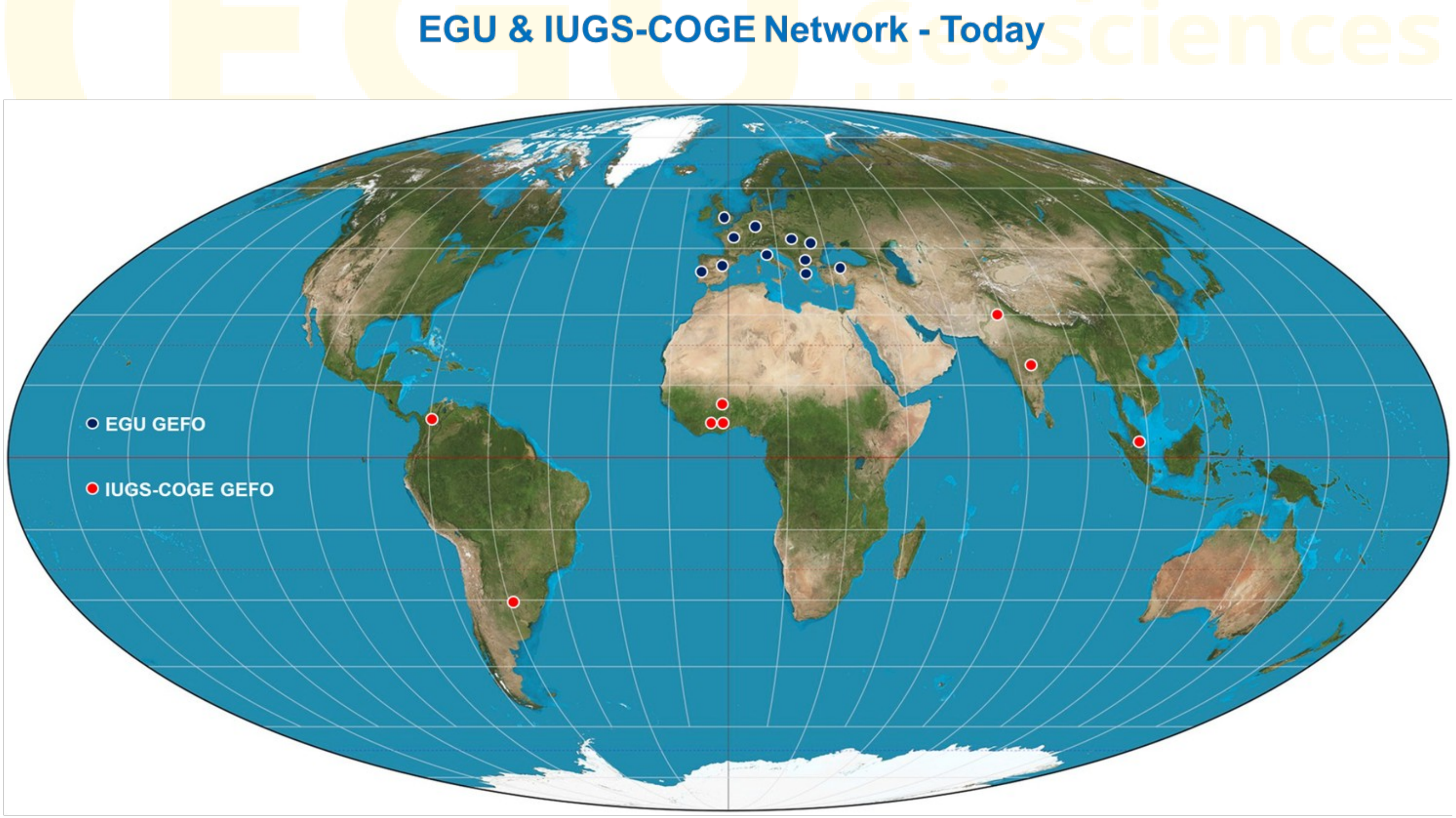
Vienna, 2019

Barcelona, 2022

Barcelona, 2024

Geoscience Education Field Officers in the world

France
Germany
Greece
Hungary
Italy
North Macedonia
Romenia
Portugal
Spain
Turkey
UK
Burkina Faso
Colombia
Ghana
India
Malaysia
Paraguay
Paskistan
Togo



EGU Geoscience Education Field Officers

Goal:

providing professional development for school teachers and future teachers, from primary to secondary schools, in teaching the elements of geoscience appropriate for their teaching curriculum, through interactive workshops.

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https://www.egu.eu/education/field-officers/

EGU Geoscience Education Field Officers

- GEFO offers face to face and online workshops at national and international level.

Images: Candan Kafali, Fotios Danaskos, Gina P. Correia, Giulia Realdon, Pete Loader

EGU Geoscience Education Field Officers

Workshops:

- Interactive and dynamic
- Hands-on
- Activities: practical, simple, requiring max. one teaching time
- Materials: inexpensive, easy to obtain/build and/or readily available in normal school classrooms and science labs.

Topics:

Plate tectonics | Rock cycle | Seismology | Time Scale and history of Earth | Volcanology | Hydrology and oceanography | Earth in space | Natural hazards | Geopark training courses

Images: examples of workshop materials, Chris King, ESEU

EGU Geoscience Education Field Officers

- GEFO promote geosciences teaching by presenting GEFO programme in National and international Conferences and magazines.

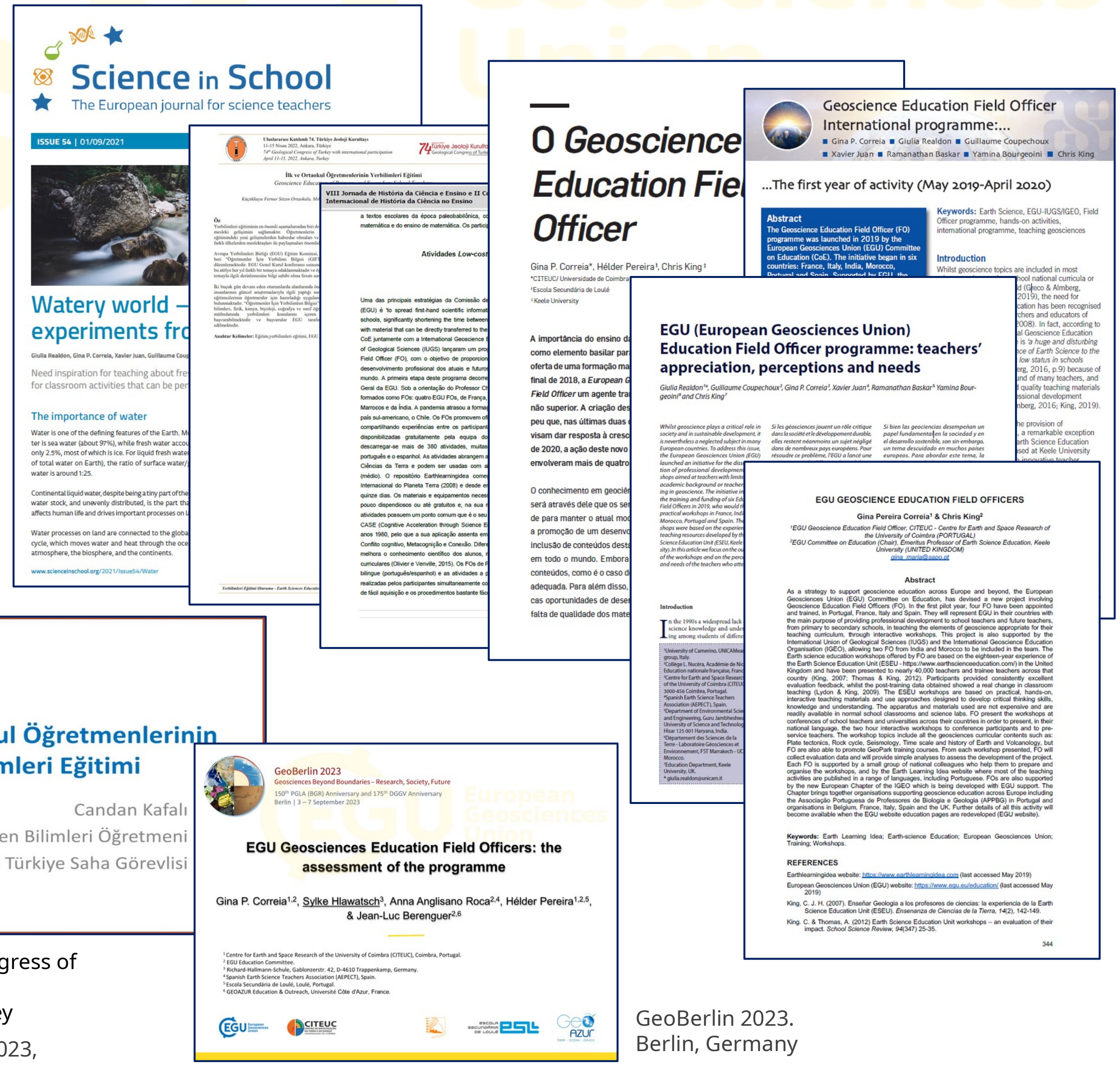
Since 2019 - 2024

- 233 WS;
- ≈ 4500 participants;
- 9 papers + 23 abstracts;
- 46 conferences/webinars.

Le Geoscienze a Scuola. 2019, Parma, Italy

EGU CoE Webinar, 2020

Geology National Congress. 2023, Coimbra, Portugal



74th Geological Congress of Turkey. 2022, Ankara, Turkey

GeoBerlin 2023. Berlin, Germany

Geoscience Education Field Officers: the activities repository

Earth Learning Idea

Supporting Earth Science in Upper Secondary Education

The ELI team - Chris King, Elizabeth Devon, Peter Kennett, Pete Loader

The EARTHLEARNINGIDEA ("ELI") concept was born in 2007 to present Earth science teaching ideas to teachers.

- Each activity presents an Earth science topic using an interactive, inquiry-based approach to educate and motivate pupils, whilst developing their thinking and investigative skills.
- ELIs, in English, are currently being published at one per month and have been downloaded more than 7.2 million times
- Translated into other languages, they have been used as the basis for teacher training education workshops in many countries by a team of **EGU Geoscience Education Field Officers (GEFO)**

Climate change: the evidence

- **EGU Geoscience Education Field Officers (GEFO)** are a team of geoscience teachers and researchers who provide professional development to schoolteachers with elements of geoscience in their teaching curricula, through interactive hands-on workshops.
- The team is supported by the European Geosciences Union Education Committee and is active in thirteen countries around Europe.

Mining & the Green Revolution

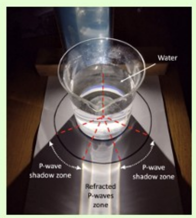
Innovative, Earth-related teaching ideas website

SCAN ME

www.earthlearningidea.com

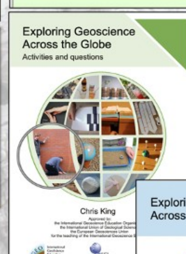
Earth Learning Idea

Innovative, Earth-related teaching ideas



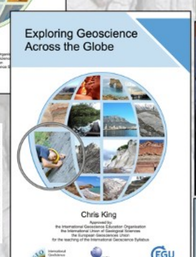
Simplifying complex models

Active workshop participation to promote thinking skills



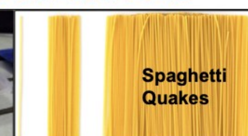
Free open-source IGEO textbooks

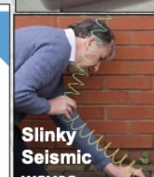
SCAN ME



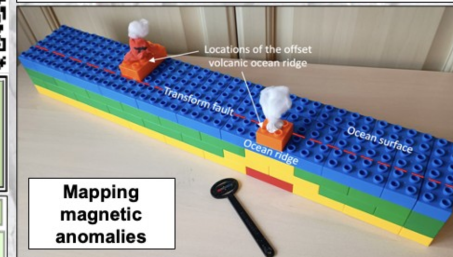
Our website now includes **videos** of many of our **activities in action**

Natural Hazard ELIs





Recent ELI activities



Mapping magnetic anomalies

There are now over 450 activities, many with accompanying teaching videos (based on the CASE model), and extension ideas. All are FREE to download with a new topic published every month. Originally aimed at teachers and teacher trainers in developing countries the activities use simple apparatus that might be available in classrooms with few resources, whilst focusing on simple ideas. They are designed mainly to cover the geoscience curricula in Upper Secondary education but also include some activities for Primary level.

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Geoscience Education Field Officers: the activities repository

www.earthlearningidea.com

Earth Learning Idea

Innovative, Earth-related teaching ideas

ESTA Earth Science Teachers' Association

EGU Education

ELI PAGES CHILDREN'S FUN | RESOURCES | TRANSLATIONS ELI IN THE WORLD

Teaching Resources

- Topics & Teaching strategies
- Teaching videos & workshops ages 5-11
- Teaching videos & workshops ages 11-18
- Geography teaching videos & workshops ages 11-14
- Mining and the Green Revolution, ages 14-18
- ELI Virtual Rock Kit
- Geoscience textbooks

ELI Translations

- Castellano Proyecto Internacional de Investigación
- Català Projecte Internacional de Recerca
- Norsk
- Italiano
- Czech
- Deutsch
- Português brasileiro
- Polski
- Japanese
- South Korean
- Tamil

http://www.earthlearningidea.com

- > 450 available activities
- Explanatory videos
- Translated into different languages
- 2008 to 2025 ⟹ over 7.2 million downloads

TOPICS / TEACHING STRATEGIES

- Adaptation to environment
- Atmosphere
- Carbon cycle
- Catastrophic processes
- Climate change - general
- Climate change - 'net zero' emissions target
- Dating the Earth
- Deep time - visualising deep time
- Deformation - folding & faulting
- Dinosaurs
- Earth - seasons, day & night, orbital cycles . . .
- Earth's Moon
- Earth's structure
- Earthquakes
- Eclipses - solar and lunar
- Engineering & industrial geology
- Environment
- Evolution of life
- Fieldwork
- Floods
- Forensic geology
- Fossils (mostly invertebrates)
- Geomorphology
- Geophysics
- Great scientists
- Igneous processes
- Isostasy
- Landslides
- Local hazards
- Magnetism
- Mapwork
- Maths in ELIs
- Metamorphic processes
- Minerals / Elements
- Mining and the Green Revolution
- Nitrogen cycle
- Oceanography
- Planets
- Plate tectonics
- Power sources
- Resources
- Rock cycle
- Rocks
- Sedimentary processes
- Sedimentary structures
- Sink holes
- Soils
- Stratigraphy & sequences
- Tsunamis
- Volcanoes
- Water cycle

CROSS-CATEGORY ELIs

- Cross-curricular ELIs
- ELI Early years
- UK Examinations
- Visual Impairment
- Holiday geology

Geoscience Education Field Officers: the activities repository

ESTA Earth Science Teachers' Association earth-science-teachers.uk

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EGU Education

Laser Quest 1 – below the waves
Seeing evidence for plate tectonics beneath the oceans - using echo sounding.

Ask students to zoom onto any part of the ocean floor using Google Earth. Here they will find bands or tracks of high-resolution data, criss-crossing the ocean floor, that pick out details of the ocean floor landscape (mountains, ridges, and valleys) whilst on either side of the tracks much of the ocean floor is much less clear. These bands represent the tracks followed by ships where high resolution echo sounding data of the ocean floor have been collected. However, only 25% of the ocean floor has been mapped in this way, with the rest having been estimated from satellite observations (Fig 1).

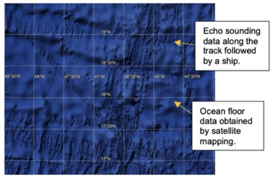


Fig 1: Mid-Atlantic ridge system showing higher resolution echo sounding mapping along ship tracks with satellite data interpretation between. *(Google Earth: Data SIO, NOAA, U.S. Navy, NGA, GEBCOData LDEO-Columbia, NS, NOAALandsat/Copernicus)*

This Earthlearningidea is an attempt to simulate the echo-sounding data collection method that allows scientists to map the ocean floor and interpret its plate tectonic formation. *('Laser Quest 2 – above the waves'* in this series shows the satellite method - table on page 2).

How deep is the ocean?
Echo sounding is a technique in which a type of sonar uses sound waves to determine the water depth (bathymetry) and therefore the shape of the ocean floor surface (topography). Sound waves are beamed from an instrument on a ship (a transducer) and the time taken for the waves to be reflected from the ocean floor (two-way time) is measured and converted into an ocean depth. This gives a resolution of about 100 metres in the deep water of the abyssal plains.

The echo sounding method can be simulated in the classroom by using a D.I.Y. laser measure (or laser rangefinder) – a hand-held measuring device that records the distance between two points by sending a laser beam of light from the device to a target and measuring the time it takes for the reflection to return. This provides a practical demonstration of the principle involved. (It also complements the Earthlearningidea *'Modelling seafloor mapping'* referenced in the table on page 2)

The simulation
- Take a cardboard box or lid and cut a 1 cm wide slit along the top to allow the beam from the laser measure to penetrate the box and for its reflection to be received back to the meter. This will represent one survey track of a ship across the ocean.
- Mark 1 cm intervals along the slit to assist with a systematic data collection survey.
- Using Lego™ bricks (or equivalent), create an ocean floor within the box showing sufficient topographic variation. You may choose to represent any ocean floor features - trench, seamount, mid-ocean ridge, continental shelf, abyssal plain - along the line of survey below the ship.
- Explain the two-way measuring principle of the laser measuring meter. Move the meter across the top (ocean) surface of the box over the slit and vertically measure the depth to the 'ocean floor' every centimetre. (It is more engaging if the model is enclosed and students can't initially see the topography). (Fig 2).

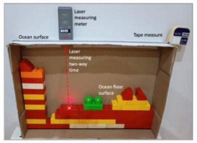


Fig 2: A laser distance meter measuring tool in operation to record the depth to a simulated ocean topography section – with box side removed to show the principle. *(Pete Loader)*

- Prepare a spreadsheet file (Excel or similar) to convert the raw data (in cm) collected to appropriate depths (km) - abyssal plain (~4km), ocean ridge (~2km), trench (>7km) - and use the graphing facilities (or graph paper) to draw the profile. (Fig 3).

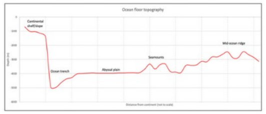
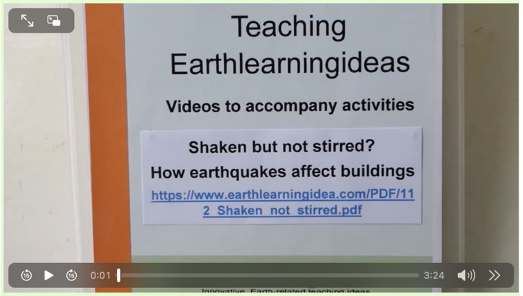


Fig 3: A simulated topographic profile of data collected from the model above with annotation. *(Pete Loader)*

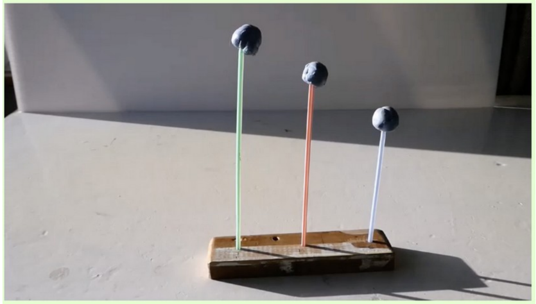
- Ask students to annotate their graph and discuss the ocean floor features they can identify in terms of plate tectonics.



Shaken but not stirred? How earthquakes affect buildings

ELI activity: Shaken but not stirred? How earthquakes affect buildings

Video demonstrations



Shaken but not stirred? How earthquakes affect buildings

ELI activity: Shaken but not stirred? How earthquakes affect buildings

The back up

Title: Laser Quest 1 – below the waves

Subtitle: Seeing evidence for plate tectonics beneath the oceans - using echo sounding.

Topic: A simulation to demonstrate the principle behind the echo sounding method of mapping the ocean floor topography.

Age range of pupils: 10 – 16+ years

Time needed to complete activity: 20 minutes.

Pupil learning outcomes: Pupils can:
- understand that different methods are used to measure the depth of the ocean floor (echo sounding and satellites);
- understand the principle of the two-way time echo sounding method of ocean floor mapping;
- use an analogue model to map a simulated ocean floor topography;
- draw a 2D graph of the model ocean floor using spreadsheet software or by hand;
- verbally describe the characteristics of their depth profile to other pupils;
- relate the topographic profile identified to plate tectonic theory.

Context: This is the latest in a series of activities involving mapping the ocean floor that leads to the relationship between the topographic features and plate tectonic theory. The other activities are shown in the table on page 2.

Following up the activity: This activity is designed to precede Earthlearningidea 'Laser Quest 2 – above the waves' and may be used alongside other associated Earthlearningidea activities listed in the table below.

Underlying principles:
- Echo sounding is a technique in which a type of sonar uses sound waves to determine the water depth (bathymetry).
- Water depth is measured by the time it takes for a sound wave to travel from an echo sounding transducer, mounted on a ship, to the ocean floor and back; **two-way time**.
- By knowing two-way time and the speed of soundwaves in water, the depth of water beneath the ship can be calculated.
- Modern multi-beam swath bathymetry allows us to scan the ocean floor in strips and to reconstruct its topography at a resolution of just 100 metres.

Thinking skill development: Measuring and looking for patterns in the depth data is a construction activity, with possible cognitive conflict arising when unexpected values are calculated. Discussion among the class involves metacognition and relating the data and graph to plate tectonic models uses bridging skills.

Resource list:
- laser distance meter measuring tool (simple battery-operated device)
- box/box lid
- suitable materials for constructing an ocean floor profile (e.g. Lego™)
- Spreadsheet software/graph paper.

Useful links: See the NOAA web pages on seafloor mapping: https://oceanexplorer.noaa.gov/world-oceans-day2015/mapping-the-seafloor-one-ping-at-atime.html

Source: Activity written by Pete Loader of the ELI Team for the EGU General Assembly 2025 GIFT Workshop.

The Earthlearningidea ocean floor mapping activities	
Measuring the depths of seas and oceans: How is it done? A simple demonstration of how we measure sea floor depths and relief	https://www.earthlearningidea.com/PDF/350_Sea_floor_mapping1.pdf
Modelling seafloor mapping: How to simulate an echo sounder study of seafloor topography	https://www.earthlearningidea.com/PDF/351_Sea_floor_mapping2.pdf
Sounding the Pacific Ocean: An echo sounder traverse of the eastern Pacific	https://www.earthlearningidea.com/PDF/352_Sea_floor_mapping3.pdf
Marie Tharp: 'The valley will be coming up soon'. Bruce Heezen: 'What valley?' A woman scientist in a man's world – what was it like?	https://www.earthlearningidea.com/PDF/353_Sea_floor_mapping4.pdf
Laser Quest 1 – below the waves. Seeing evidence for plate tectonics beneath the oceans using echo sounding	https://www.earthlearningidea.com/PDF/454_Laser_quest1.pdf
Laser Quest 2 – above the waves. Seeing evidence for plate tectonics above the oceans using satellites	https://www.earthlearningidea.com/PDF/456_Laser_quest2.pdf

http://www.earthlearningidea.com

Geoscience Education Field Officers: the weekly activities support

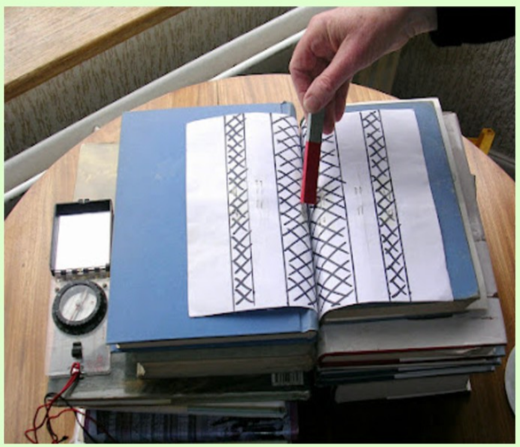
Earth Learning Idea

Innovative, Earth-related teaching ideas

MONDAY, 24 MARCH 2025

How to model the symmetrical magnetic pattern of the rocks of the sea floor

The ELI today is **'Magnetic stripes; modelling the symmetrical magnetic pattern of the rocks of the sea floor.'**



This ELI demonstrates the origin of the symmetrical magnetic anomalies which occur at oceanic spreading centres.

Many more activities can be found in our ***Plate tectonics*** section of Earth energy / processes category.

Posted by Earth Learning Idea at 07:36

Labels: Earth energy / processes

0 comments

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ABOUT EARTH LEARNING IDEA

ELI is publishing FREE Earth-related teaching ideas, designed to be practical resources for teachers and teacher-trainers all over the world.
We publish new Earth Learning Ideas every two weeks. Some of these activities require the use of some basic school laboratory equipment and some include abstract ideas. We label these activities ELI+.
Each activity is designed to create pupil participation for maximum learning.
All activities are free to download and most require minimal cost and equipment. Best of all, they are fun!

FIND OUT MORE

The Activities

www.earthlearningidea.com

eli-team@earthlearningidea.com

BLOG ARCHIVE

▼ 2025 (11)

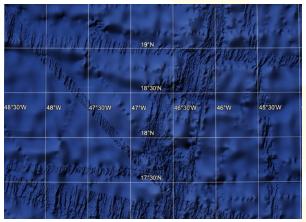
▼ March (3)

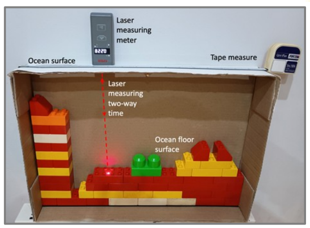
- a new Blog update every Monday
- a new activity posted every 2 weeks
- New videos uploaded all the time.

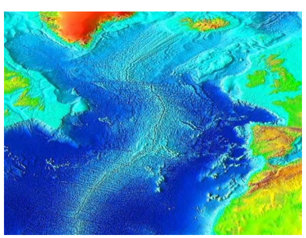
http://earthlearningidea.blogspot.com/

Exploring the Ocean Floor: Seeing plate tectonics below the waves

The workshop we are presenting today address:







'Laser Quest' (How to simulate echo-sounding and satellite altimetry to map ocean floor topography)

'Modelling seafloor mapping' (Addressing resolution and sampling challenges using 3D-printed models of the ocean floor)

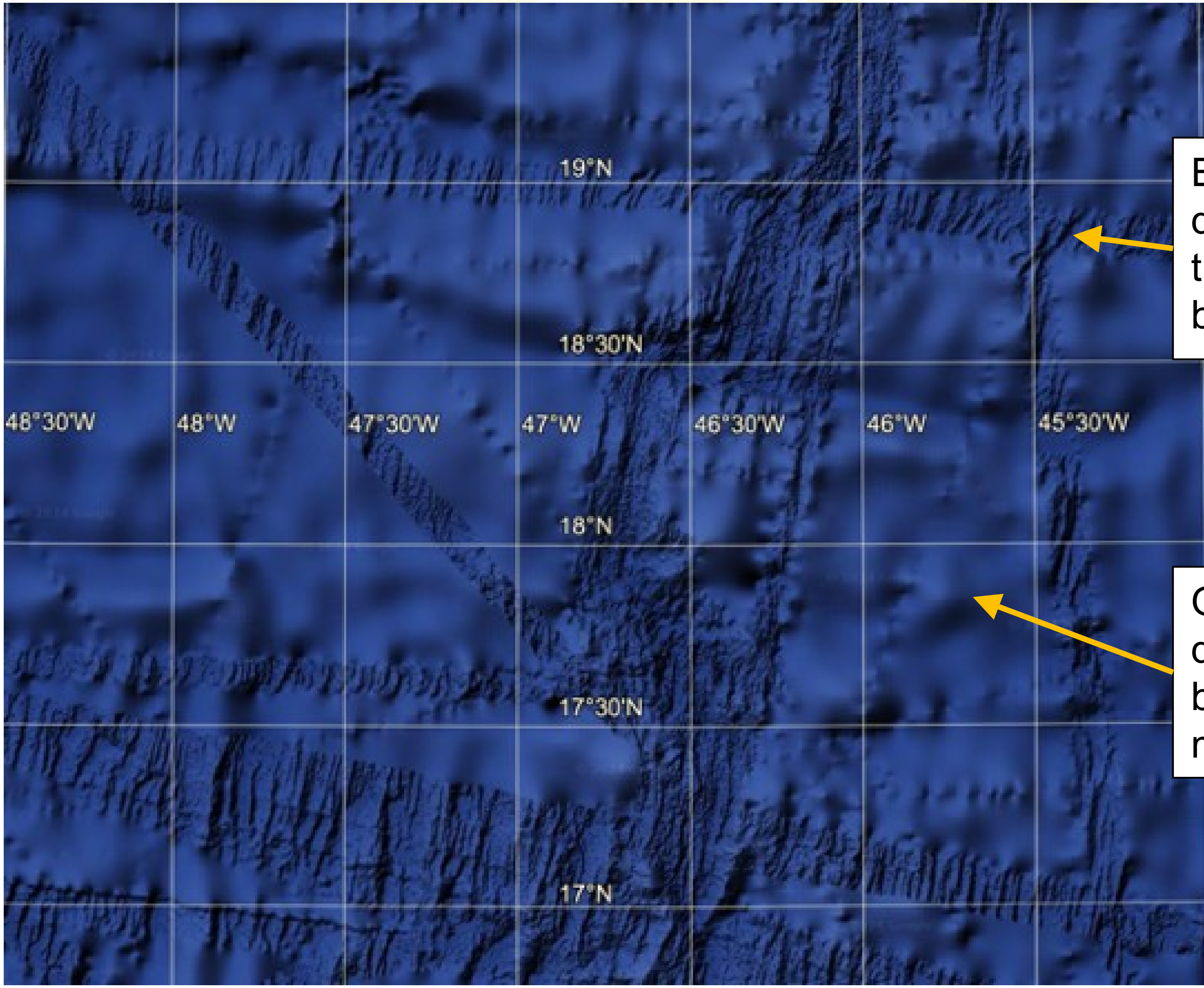
'Human magnets!' (Modelling ancient and modern magnetic fields using your students)

'Mapping Magnetic Anomalies' (A simulation of an ocean magnetic survey)

'Remote sensing geophysics in the classroom' (Using classroom models of professional geophysical tools)

'Modelling plate tectonics in the classroom' (Classroom activities using 'working' plate tectonic models)

Laser Quest 1 – below the waves

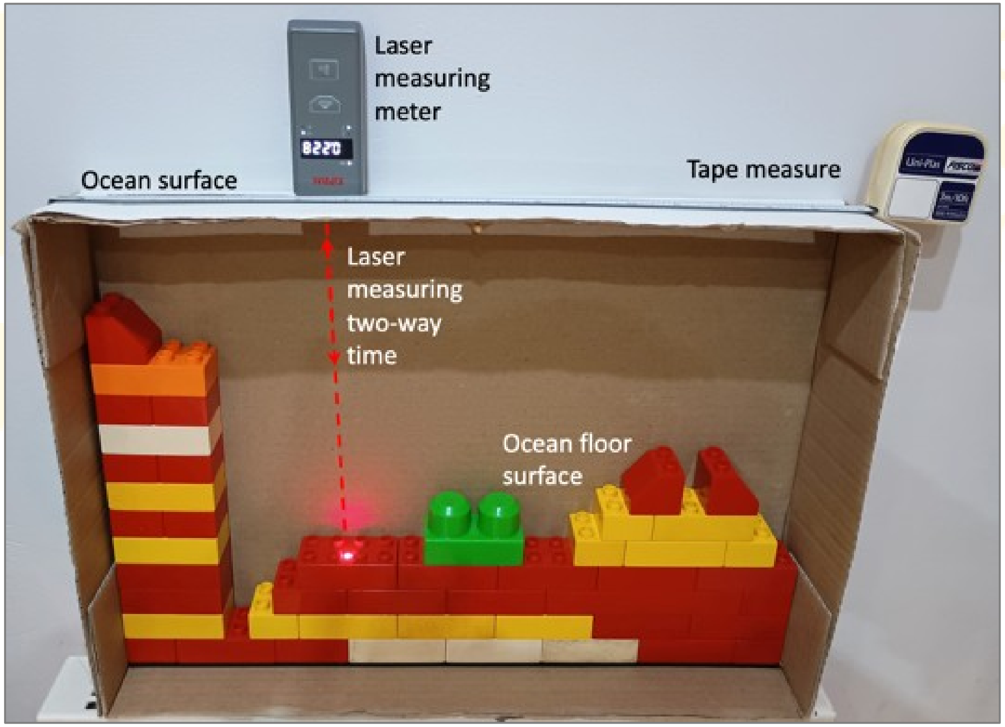


Echo sounding data along the track followed by a ship.

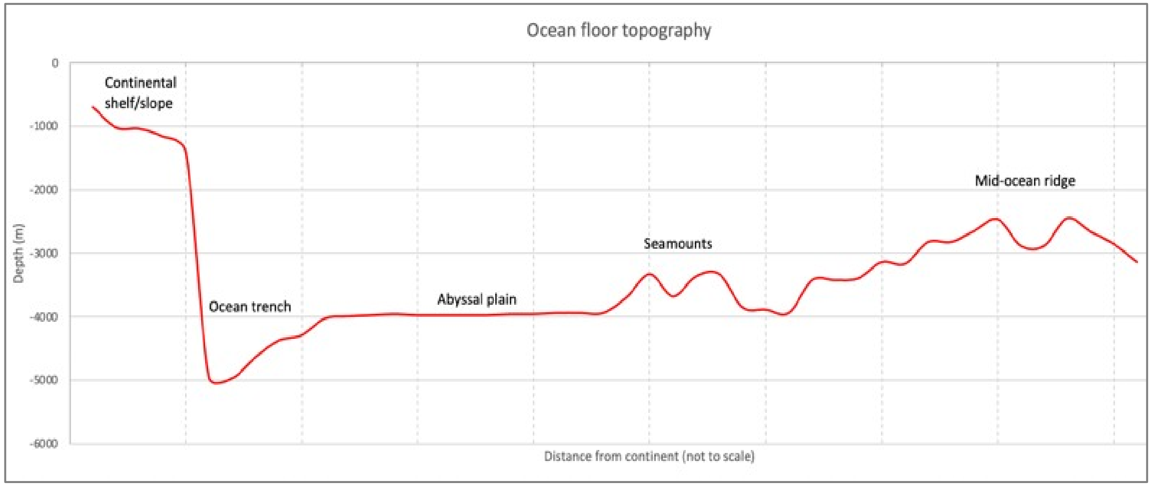
Ocean floor data obtained by satellite mapping.

Image: (*Google Earth: Data SIO, NOAA, U.S. Navy, NGA, GEBCOData LDEO-Columbia, NS, NOAALandsat/Copernicus*)

Laser Quest 1 – below the waves (using echo sounding)

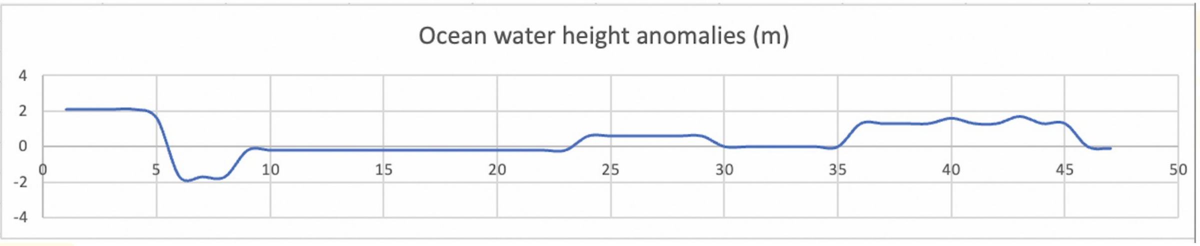


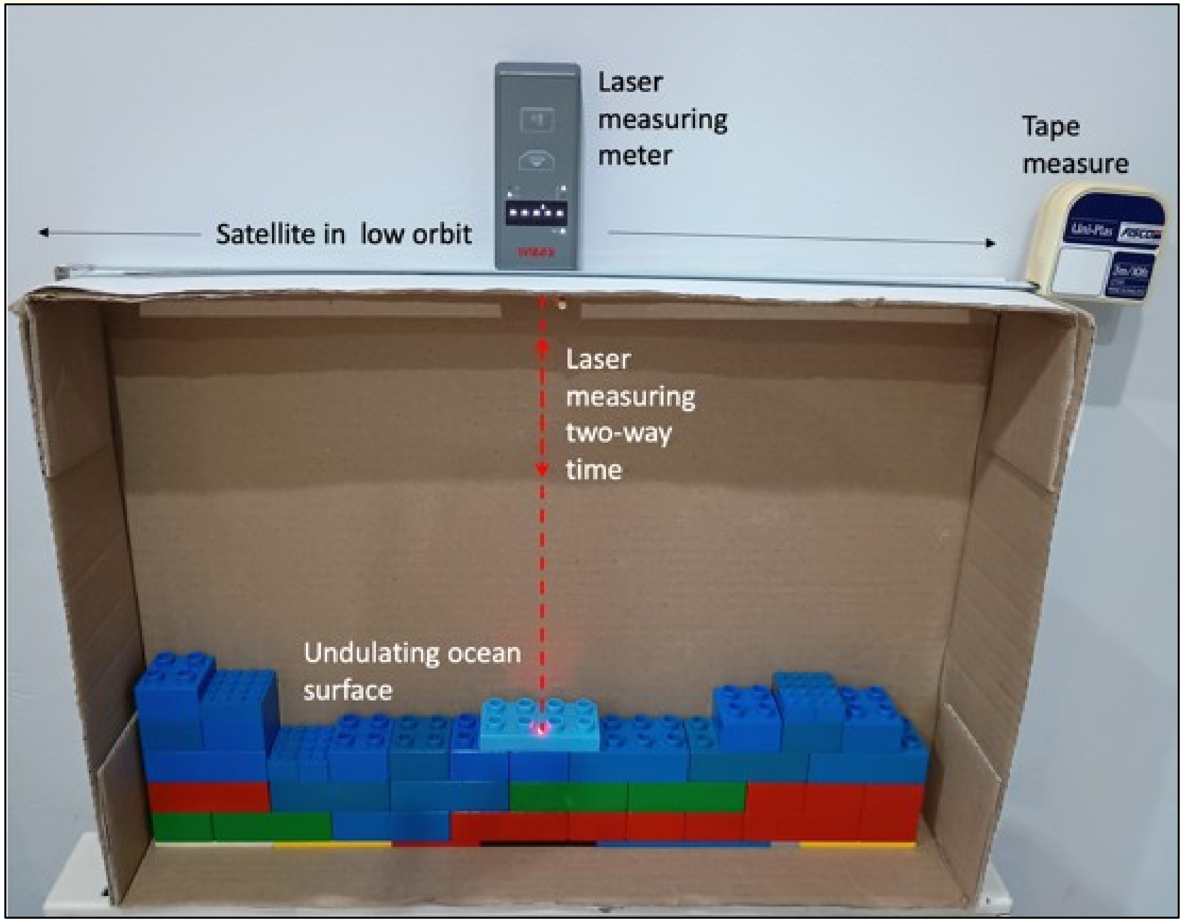
https://www.earthlearningidea.com/PDF/454_Laser_quest1.pdf



Images: Pete Loader

Laser Quest 2 – above the waves (using satellites)

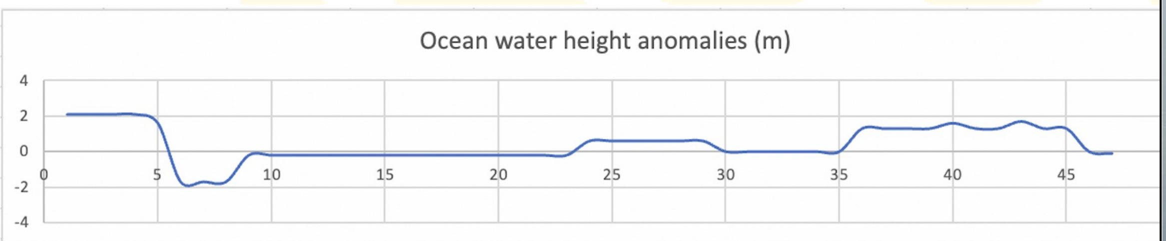


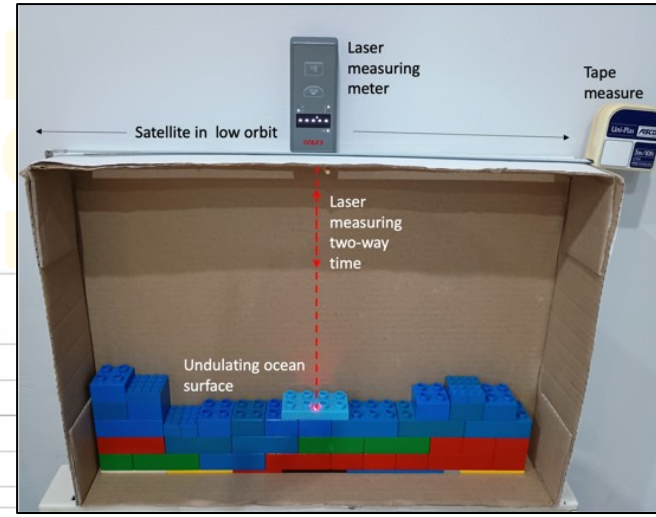


https://www.earthlearningidea.com/PDF/456_Laser_quest2.pdf

Images: Pete Loader

Laser Quest 1 & 2 – Exploring the ocean floor topography





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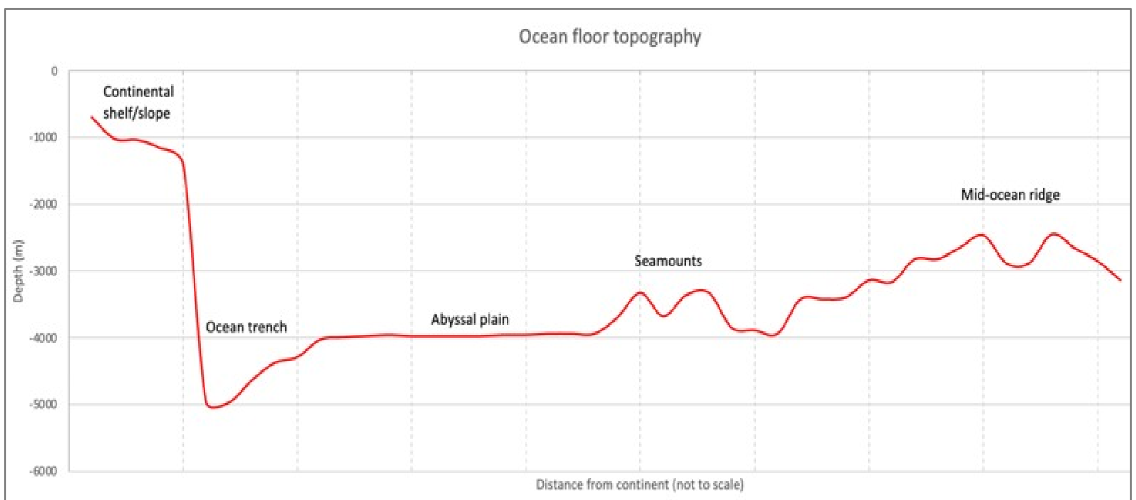
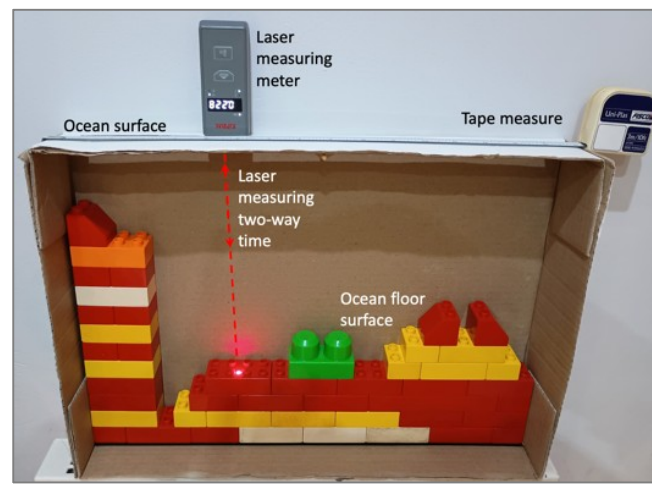
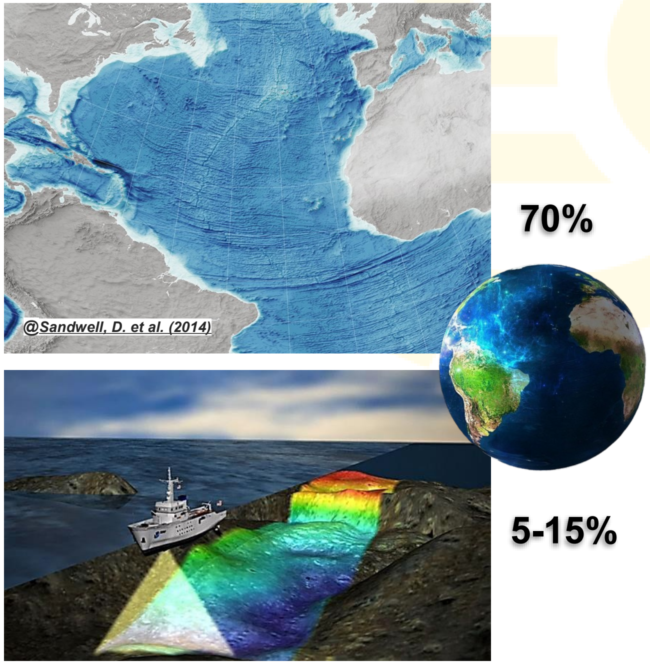




https://www.earthlearningidea.com/PDF/454_Laser_quest1.pdf

Images: Pete Loader

Modelling seafloor mapping – Resolution and Sampling in Action

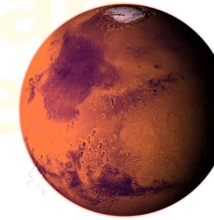


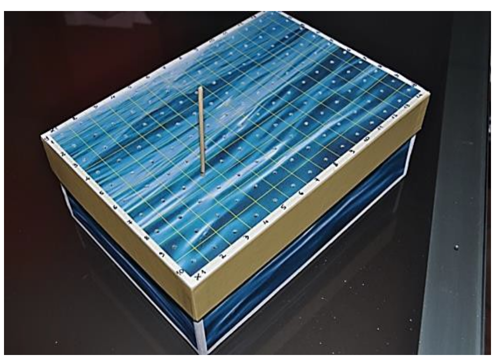
What do all these images have in common?

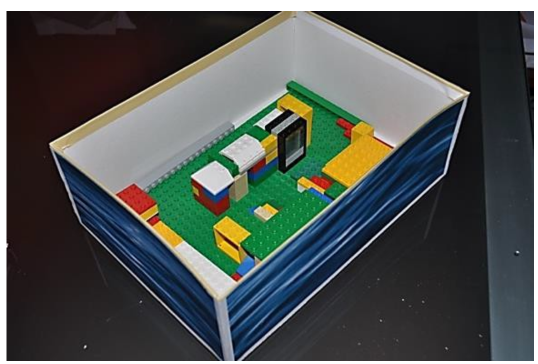
Have you ever wondered how these stunning planetary and seafloor images are made?

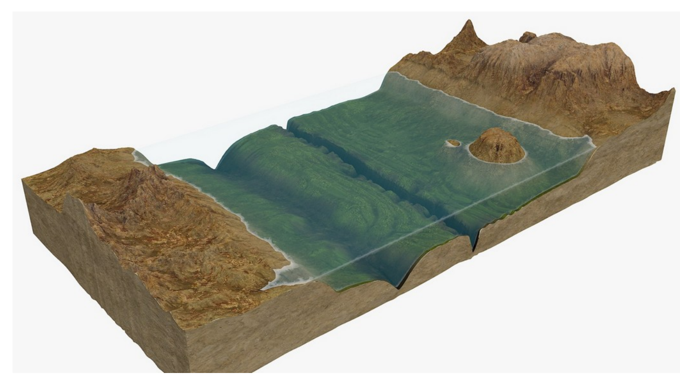
Can we build our own models of the seafloor?

And can we design a method to test how accurate and precise our models are?



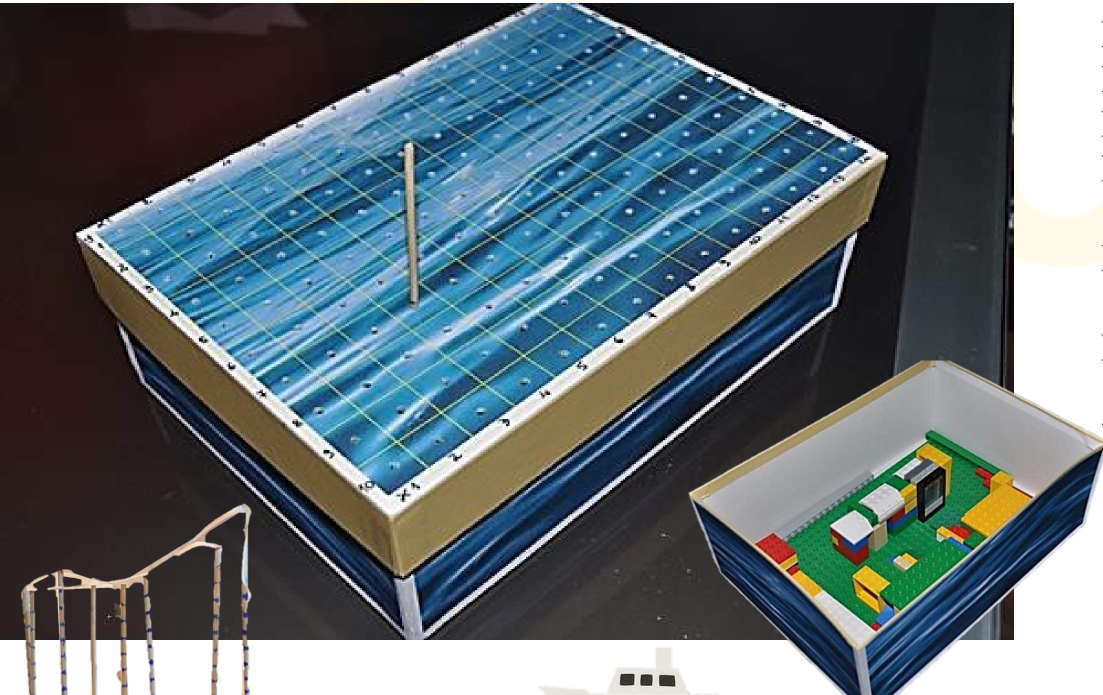




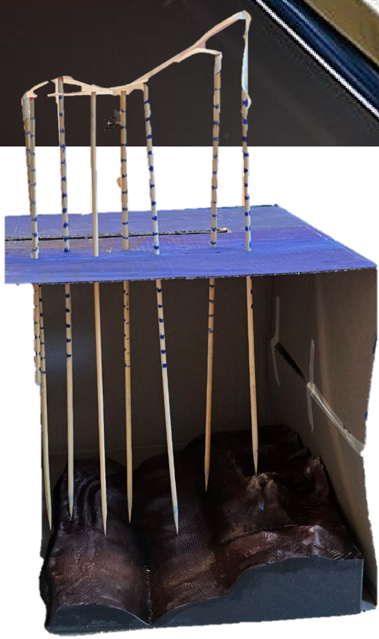


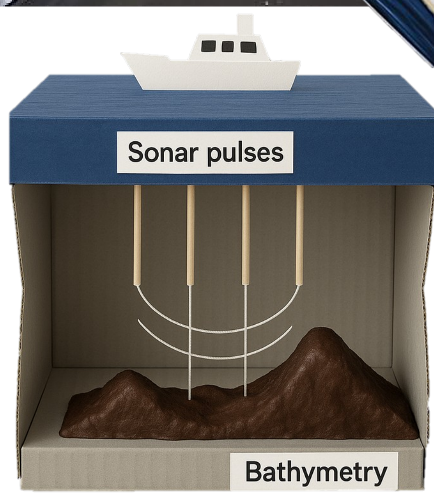
[ELI_Sea_floor_mapping]

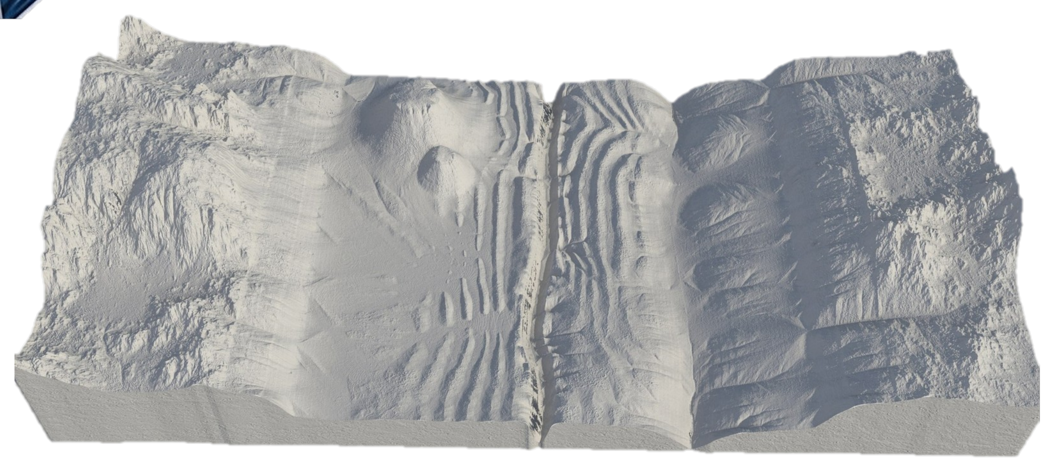
Modelling seafloor mapping – Resolution and Sampling in Action



- cardboard shoe box
- printed grid for the box lid
- steel skewer to make holes in the box lids
- 2 x 20 cm wooden skewers (remember to cut off the pointed tip)
- a marker to mark 1 cm segments on the wooden skewers
- a printed table to record the measurements
- computers with spreadsheet software prepare the data table and the relief table (to be completed by the pupils)





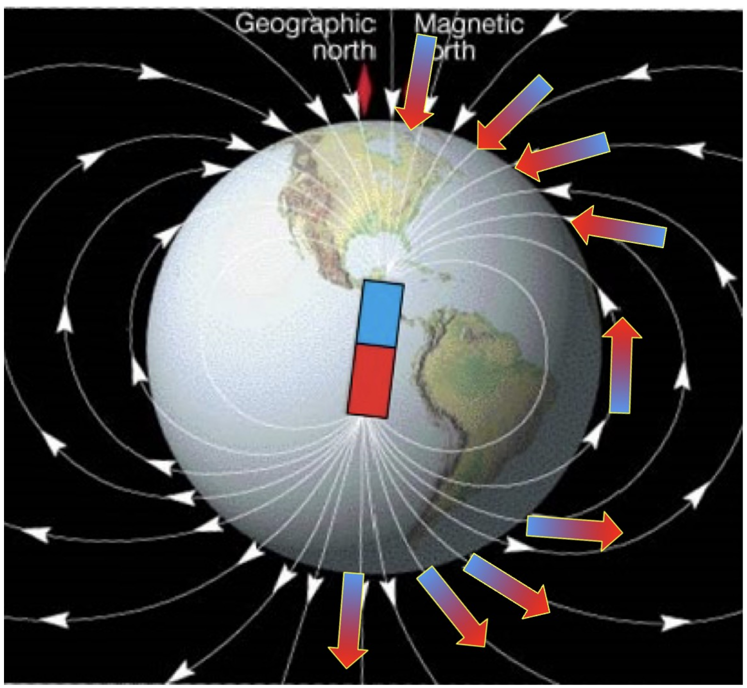


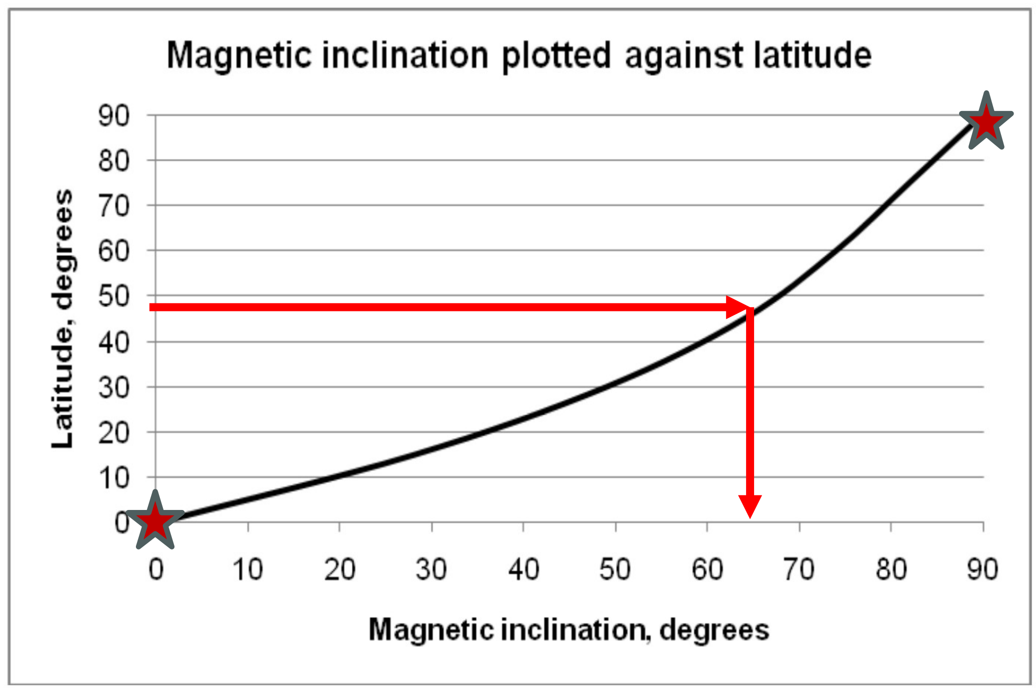
ELI_Sea_floor_mapping

Palaeomagnetic mapping of the ocean floor

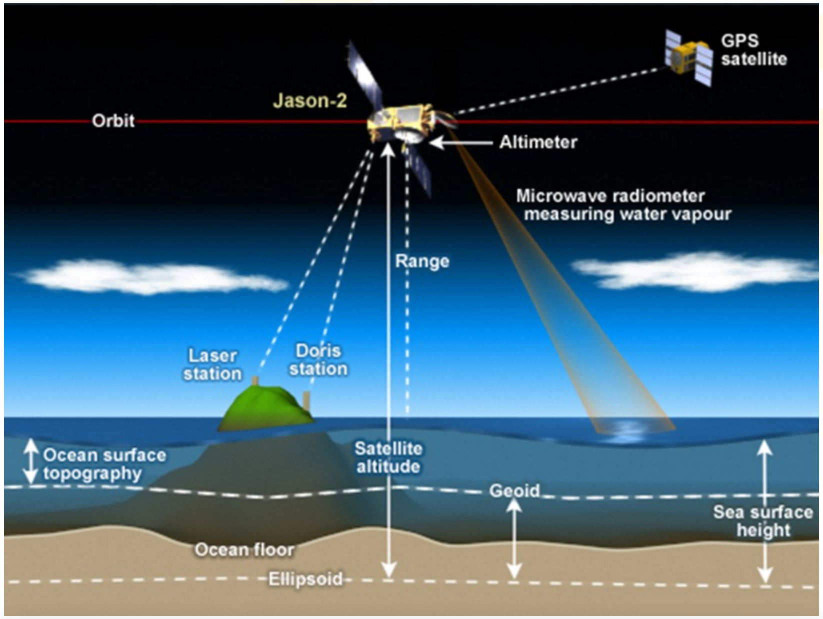
Human Magnets

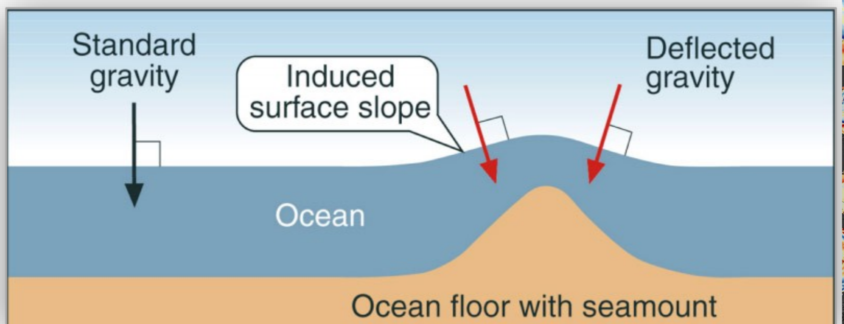
https://www.earthlearningidea.com/PDF/209_Human_magnets.pdf





Modelling remote sensing geophysics in the classroom

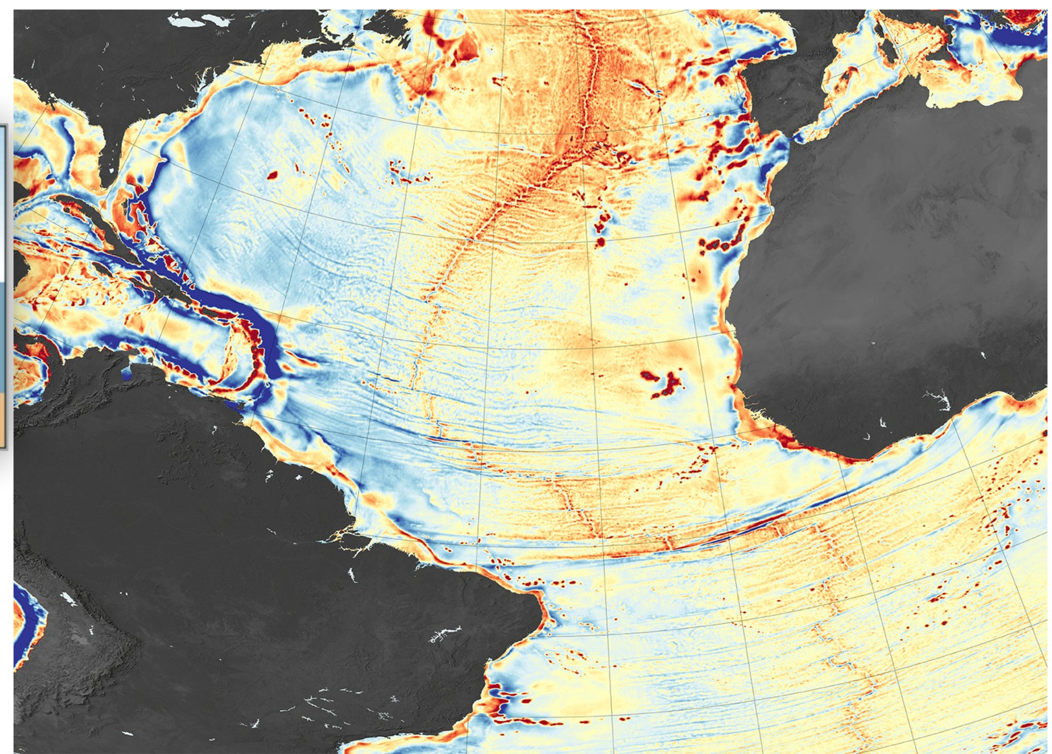




How can we visualize what lies beneath the ocean floor without direct access?

How accurate are these maps, and what data and techniques are used to create them?

Mountains and other seafloor features exert a gravitational pull on the water above and around them. This causes water to pile up in small but measurable bumps on the sea surface



NASA Earth Observatory maps by Joshua Stevens, using data from Sandwell, D. et al. (2014). Caption by Mike Carlowicz.

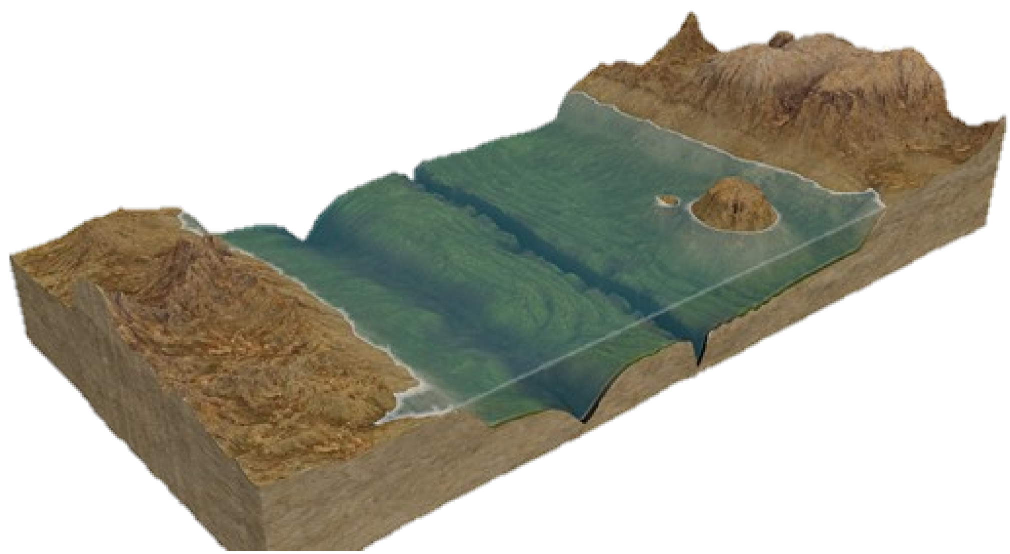
ELI_Remote_sensing

Modelling remote sensing geophysics in the classroom

⚖ Can we use a simple mock gravimeter to demonstrate how geophysicists detect buried structures by measuring gravity variations?

A gravimeter works like a mass suspended on a spring balance. When this set up is above a large amount of dense material, the local gravitational effect pulls the mass down more than the average

- ‘homemade’ mock gravimeter, using a cardboard tube, something that looks like a mass, a spring (e.g. from an old ball-point pen) and string
- a Magnaprobe™ or a magnetised needle on a thread
- a magnet
- sticky tape
- a specimen of dense dark-coloured rock
- sand in a tray/3D model / a map



Mapping Magnetic Anomalies

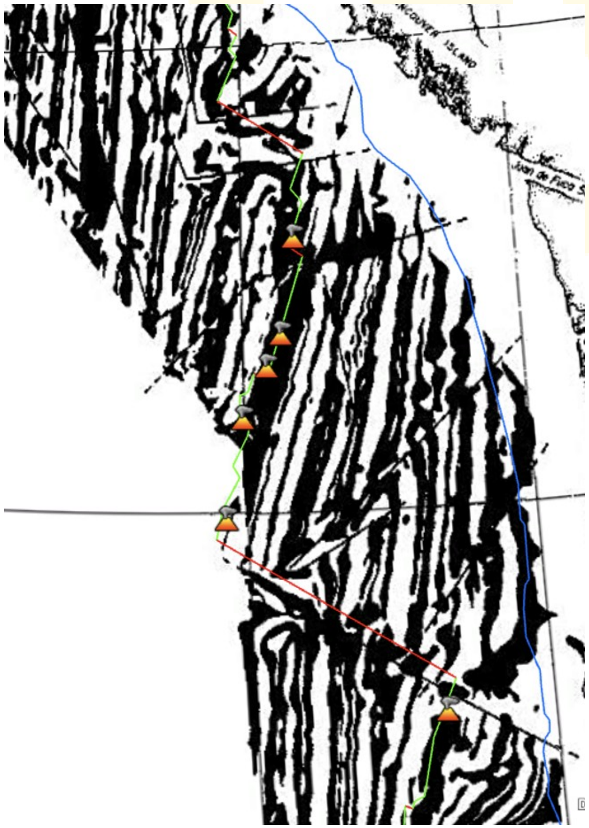


Image: USGS

1961 by Raff and Mason

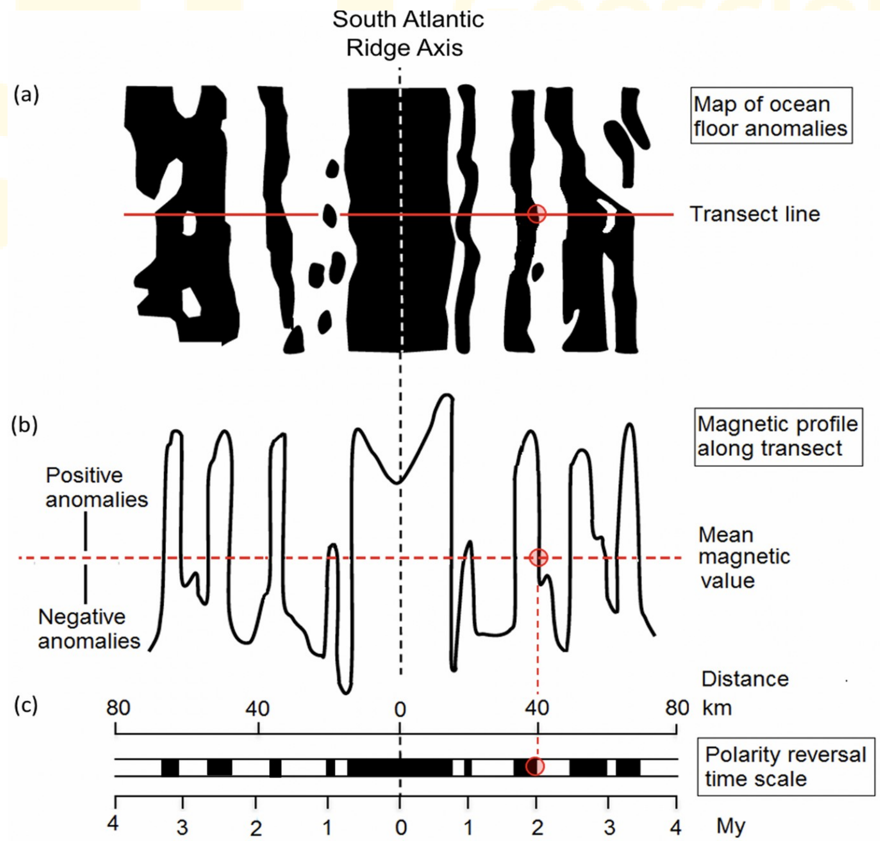
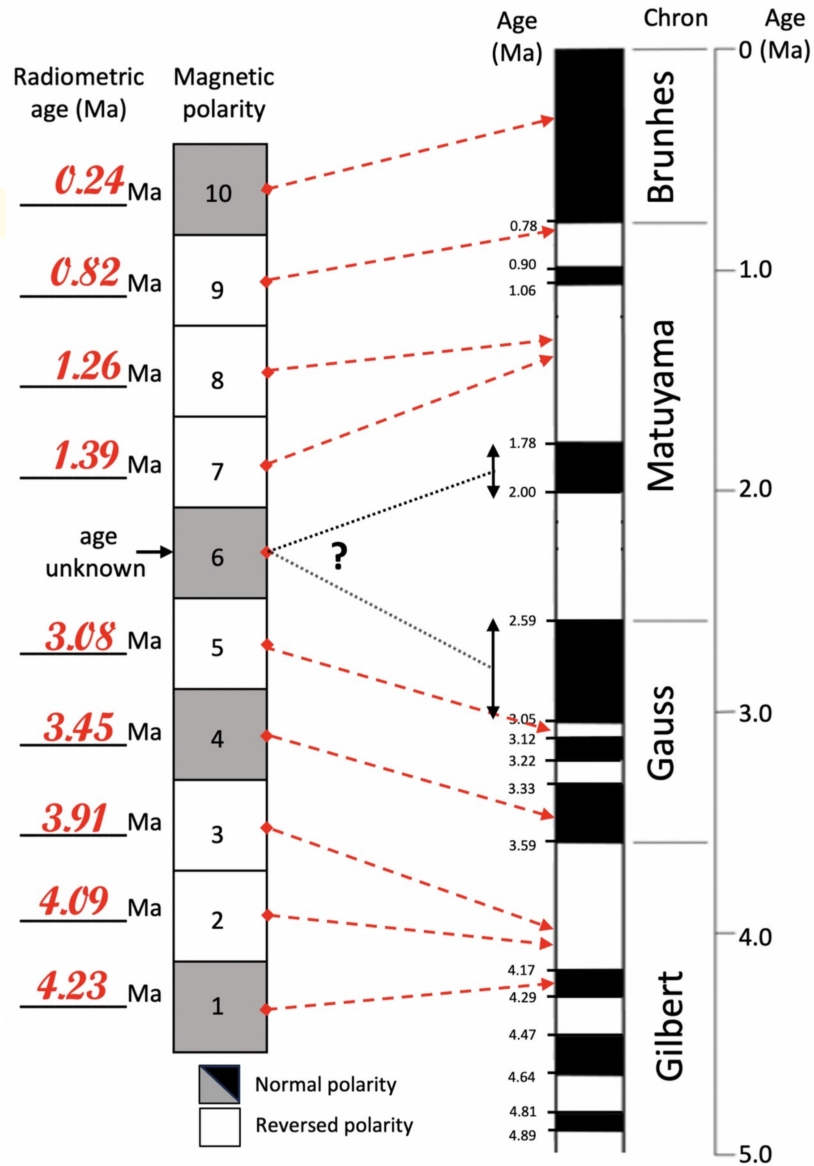


Image: Pete Loader

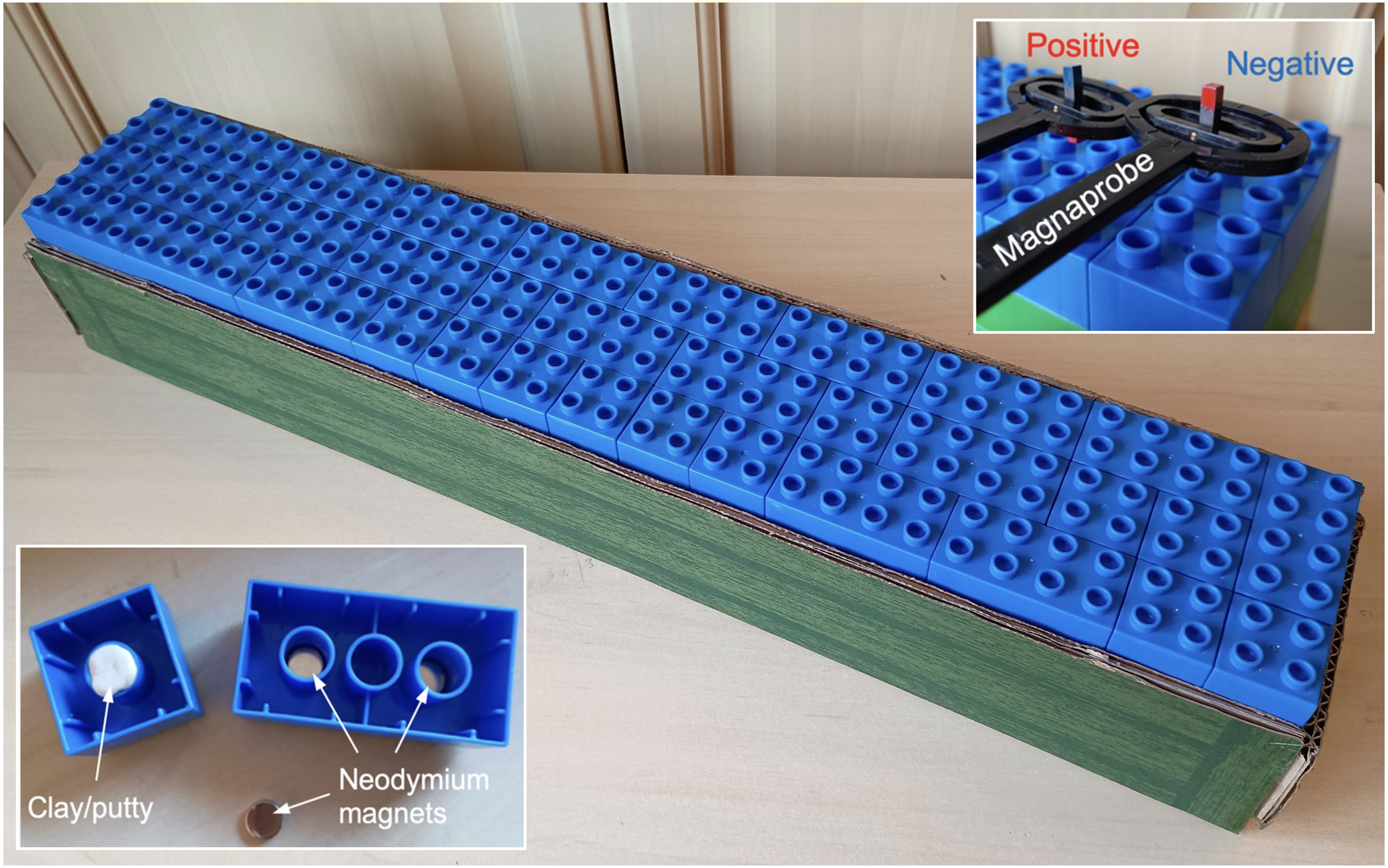
When did the Poles flip? : Simulating the Geomagnetic Polarity Time Scale



https://www.earthlearningidea.com/PDF/455_GPTS.pdf

Images: Pete Loader

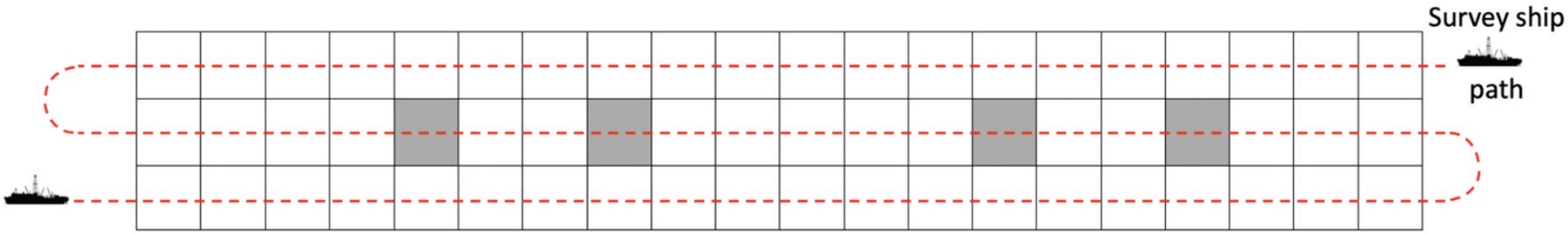
Mapping Magnetic Anomalies

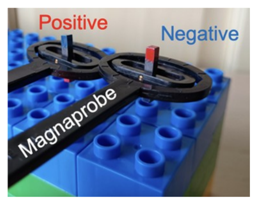


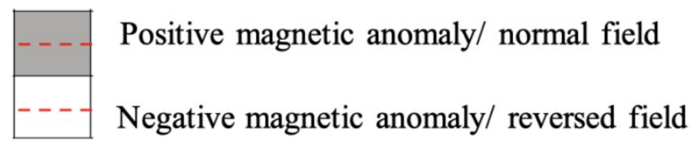
https://www.earthlearningidea.com/PDF/457_Magnetic_anomalies.pdf

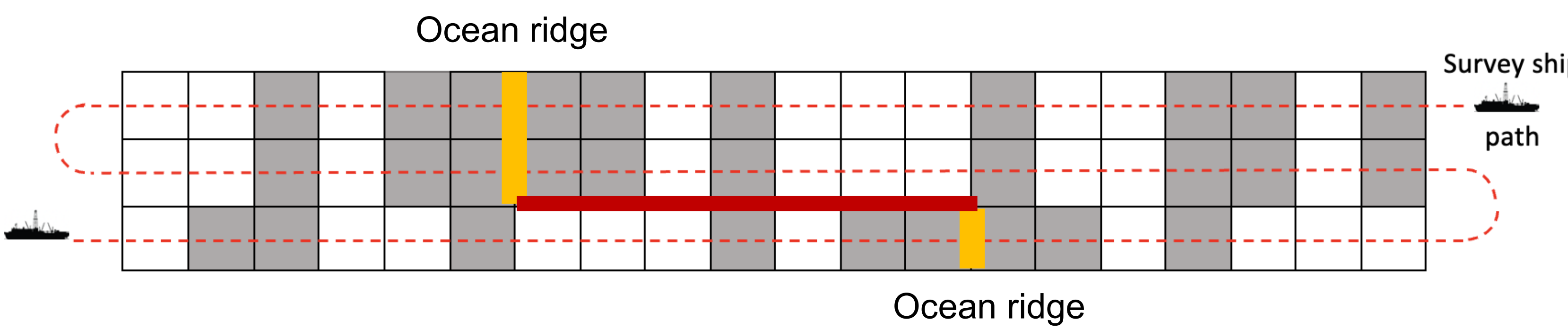
Images: Pete Loader

Mapping Magnetic Anomalies





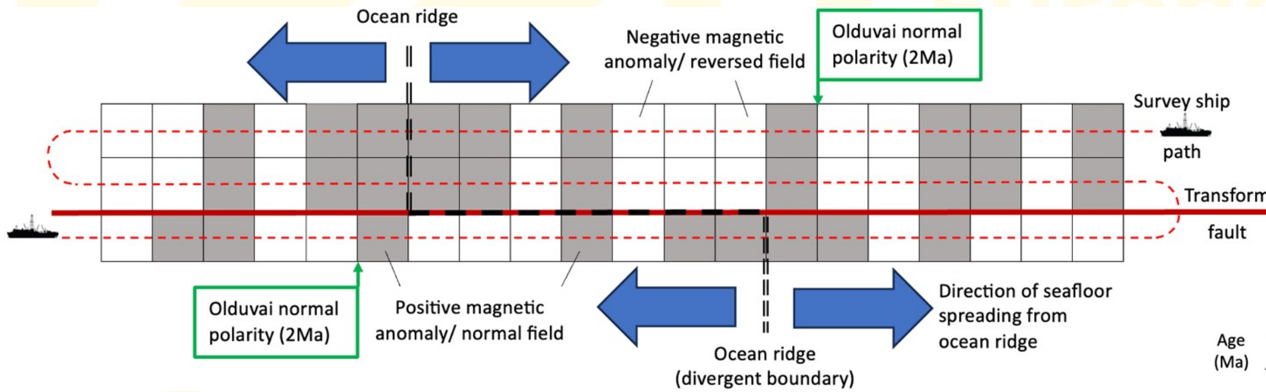


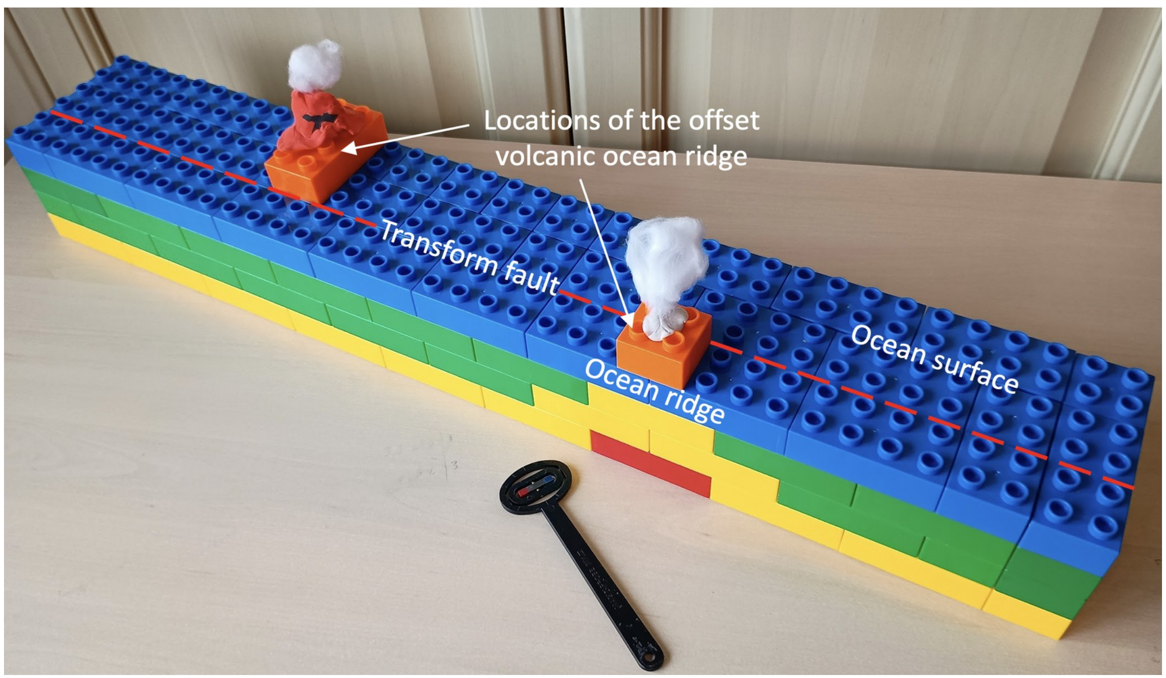


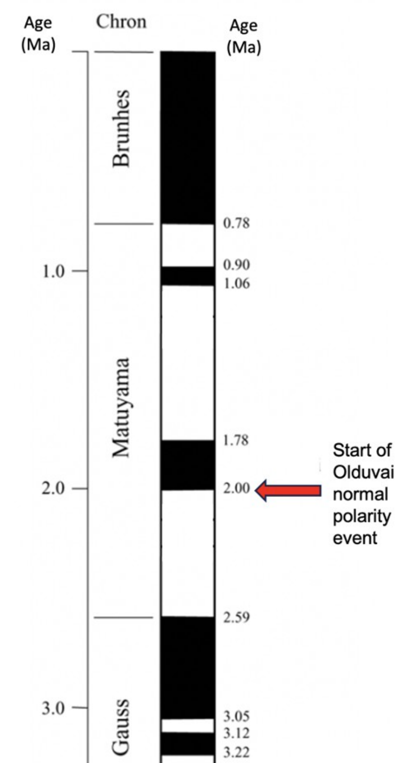
https://www.earthlearningidea.com/PDF/457_Magnetic_anomalies.pdf

Images: Pete Loader

Mapping Magnetic Anomalies







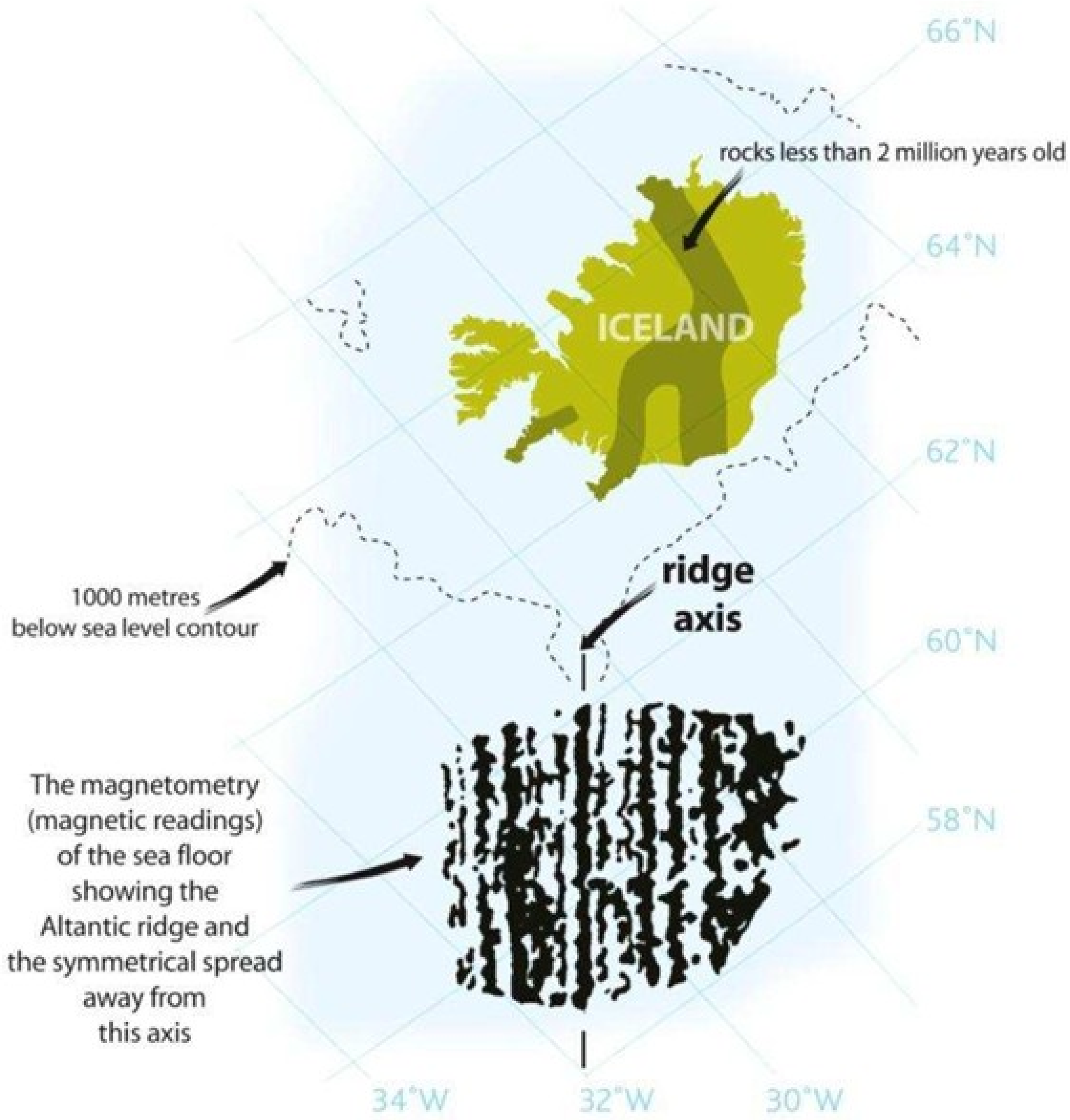
https://www.earthlearningidea.com/PDF/457_Magnetic_anomalies.pdf

Earth's geomagnetic polarity timescale

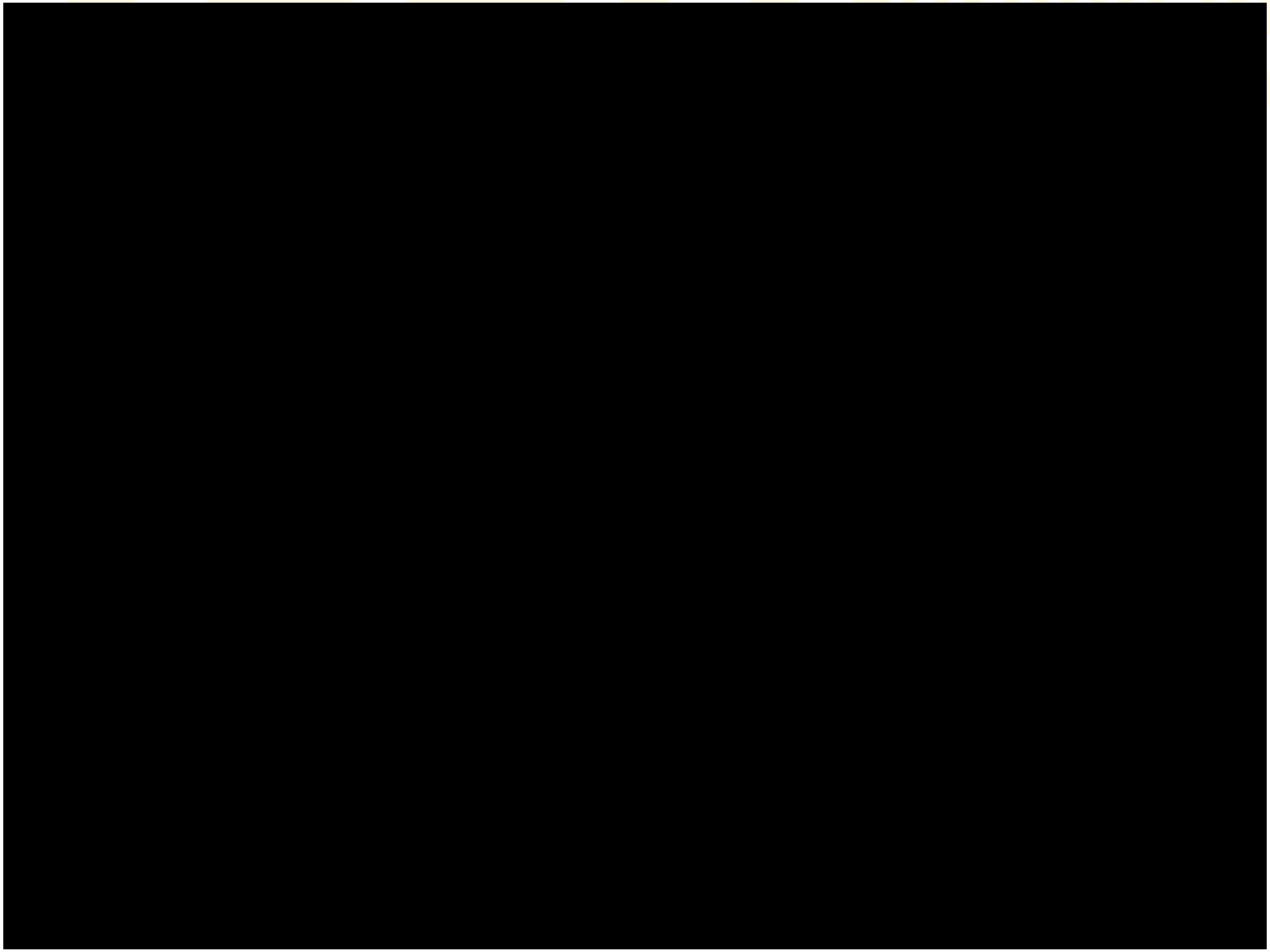
Images: Pete Loader

Magnetic stripes

Modelling the symmetrical magnetic pattern of the rocks of the sea floor



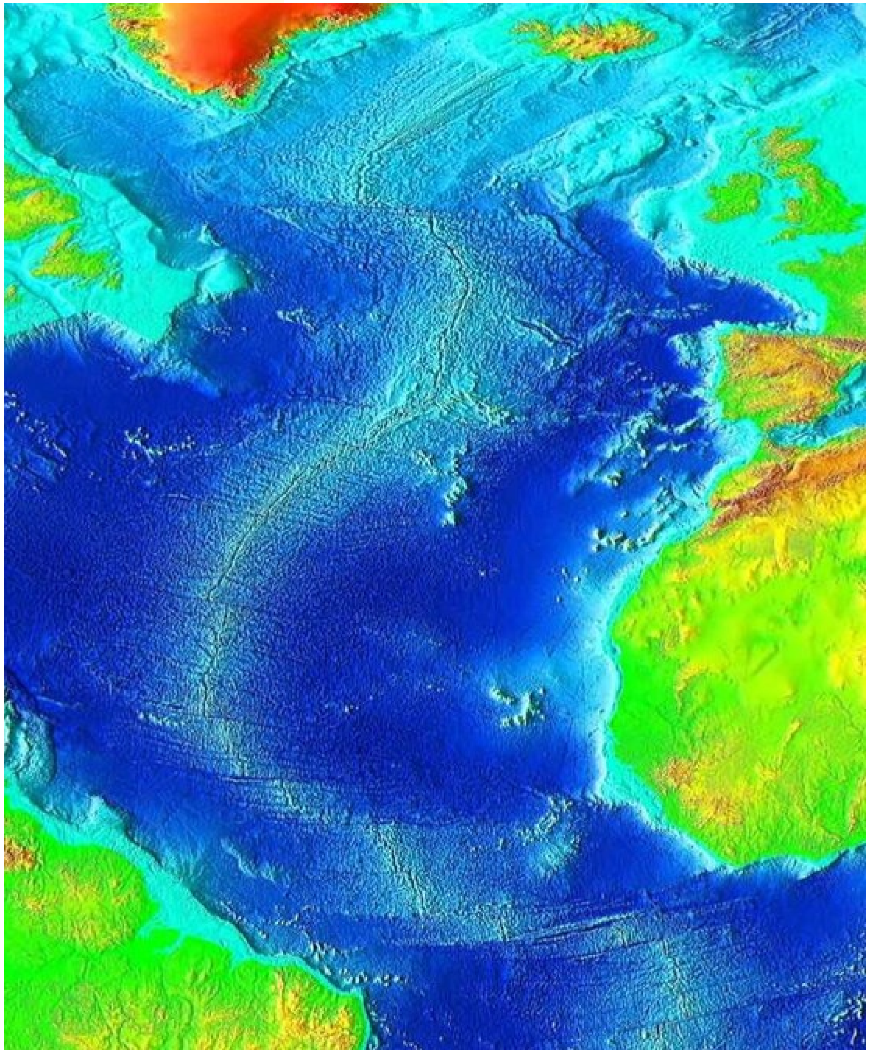
Magnetic stripes
Modelling the symmetrical magnetic pattern of the rocks of the sea floor

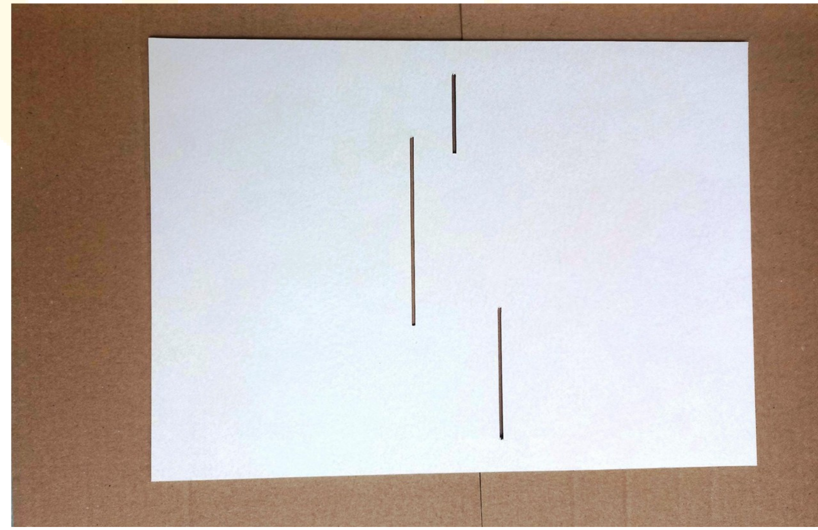


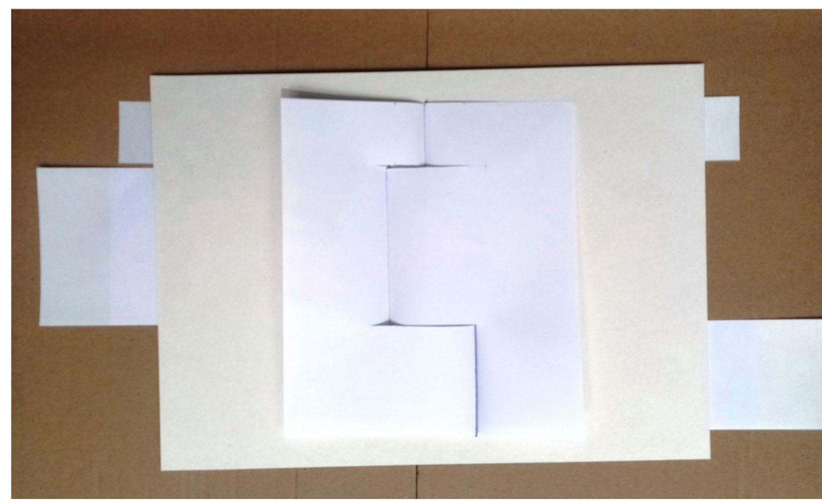
https://www.earthlearningidea.com/PDF/81_Magnetic_stripes.pdf

Images: Pete Loader

Modelling spreading ocean floor by transform faults

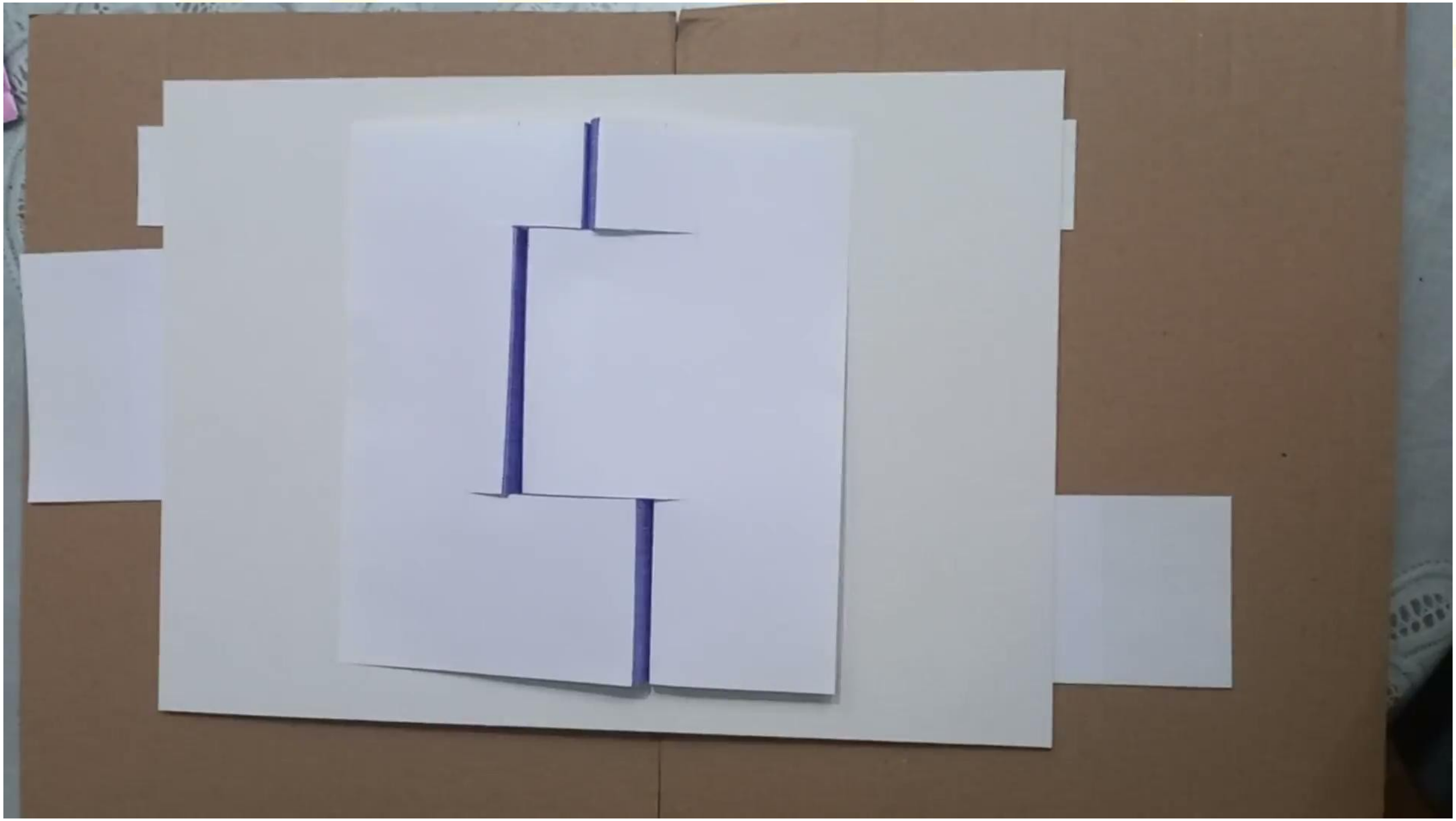






https://www.earthlearningidea.com/PDF/84_Transform_faults.pdf

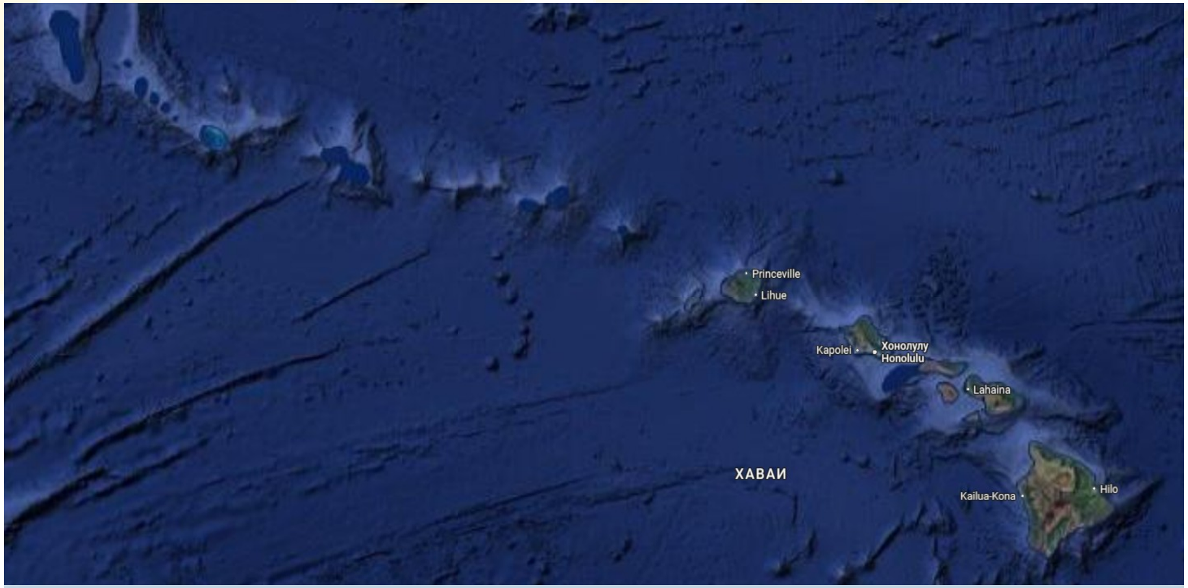
Modelling spreading ocean floor by transform faults

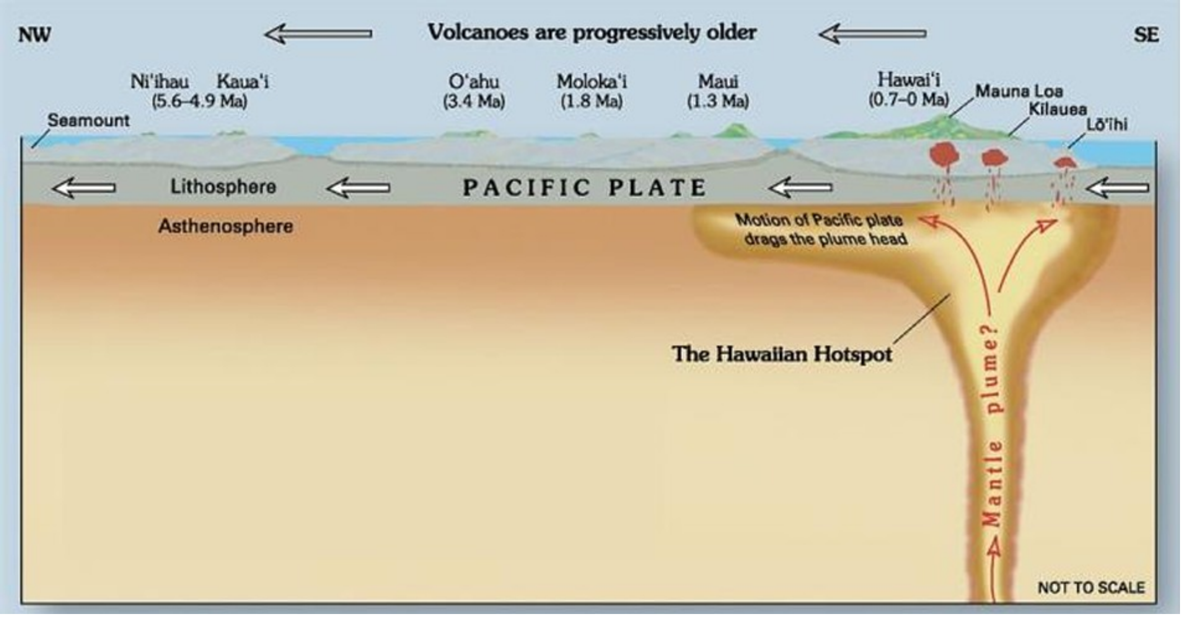


https://www.earthlearningidea.com/PDF/84_Transform_faults.pdf

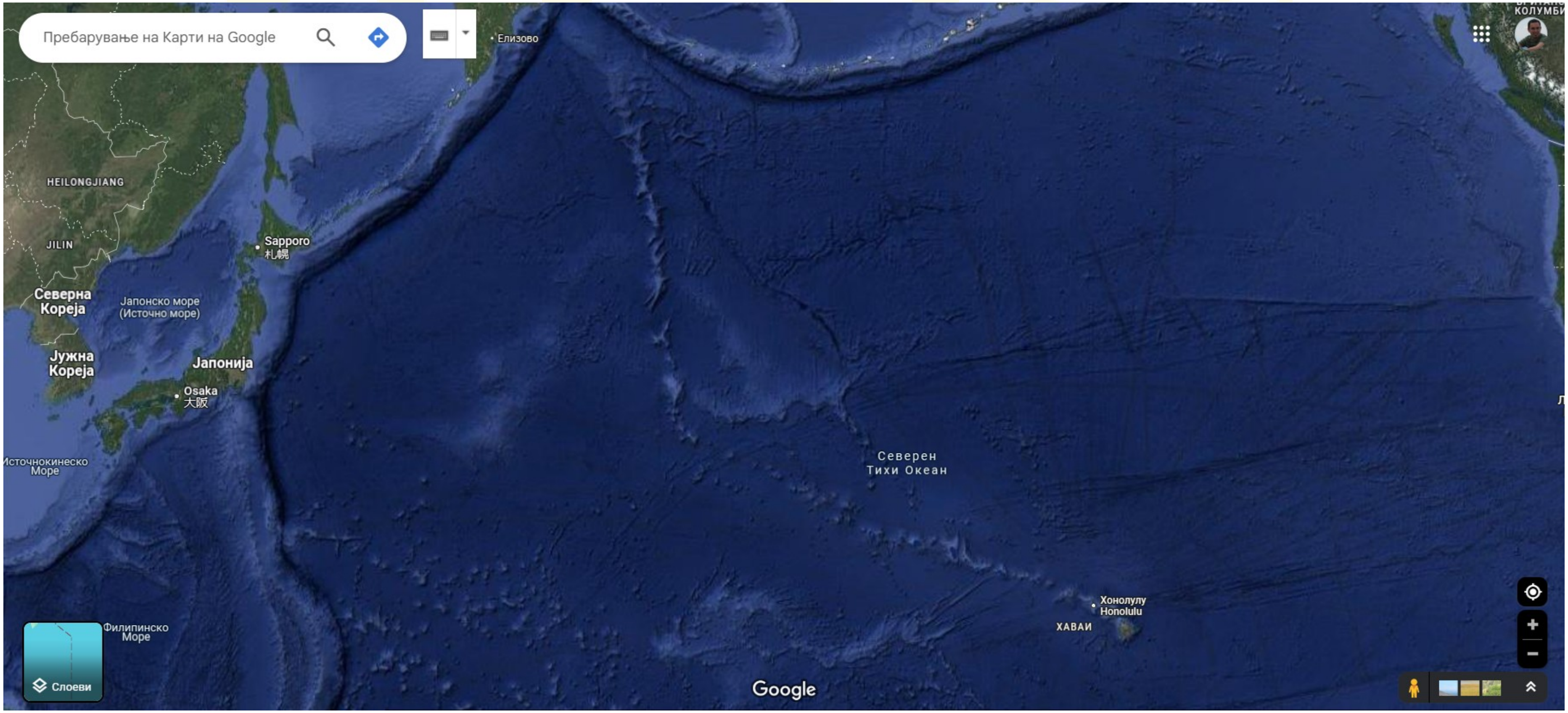
Images: Pane Perunovski

Hotspots
Modelling the movement of a plate across the globe

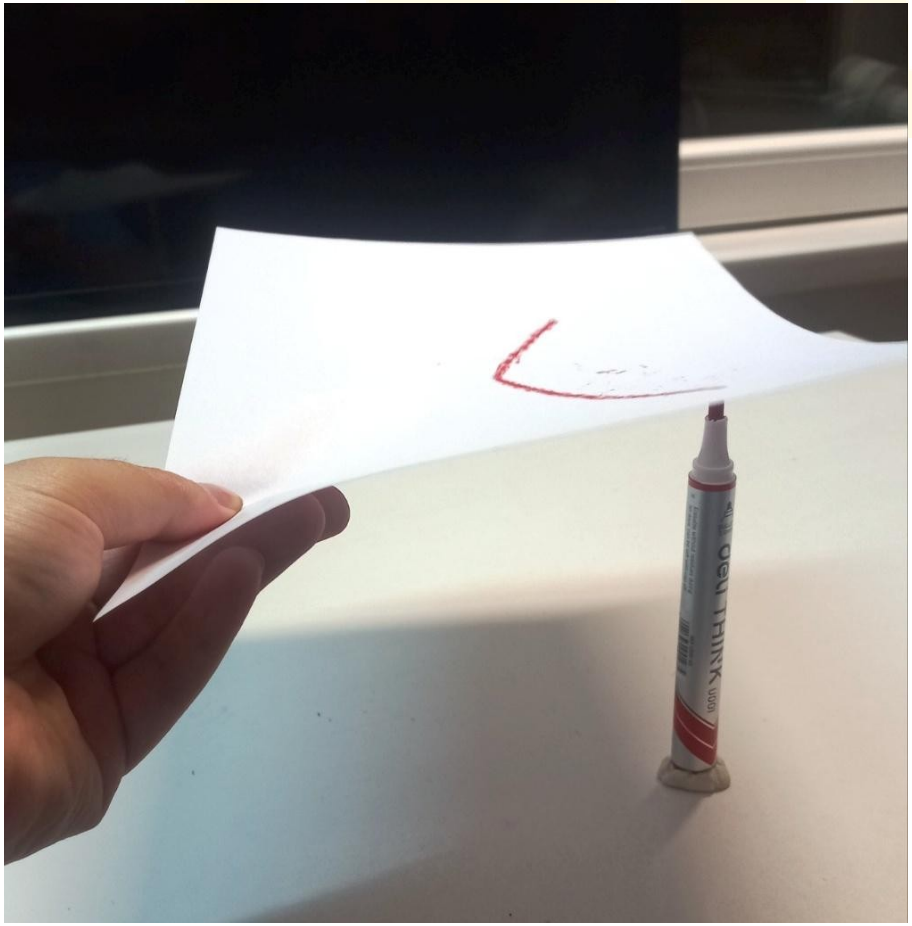


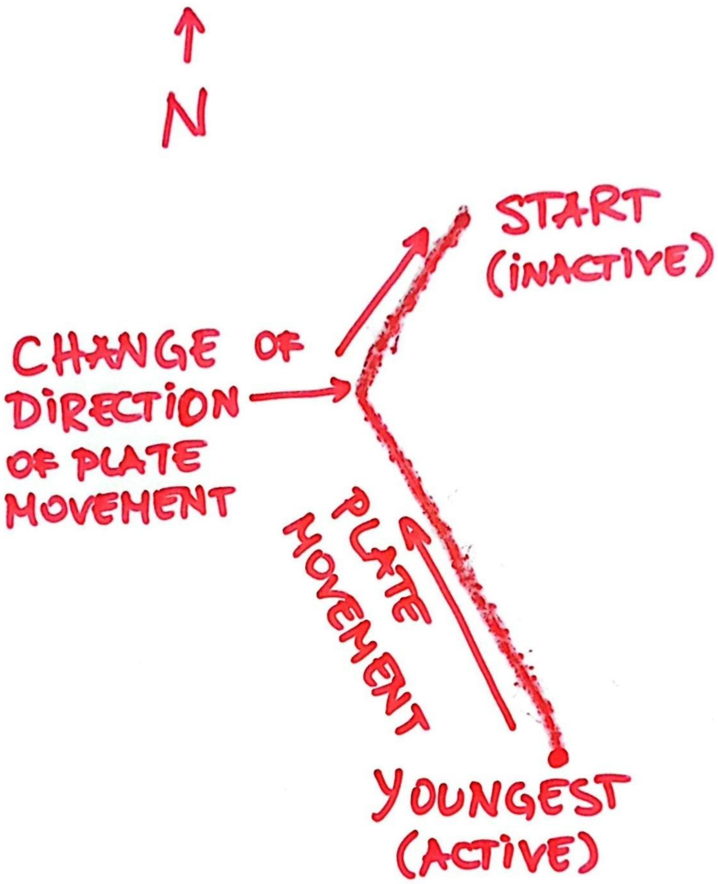


Hotspots
Modelling the movement of a plate across the globe



Hotspots
Modelling the movement of a plate across the globe





https://www.earthlearningidea.com/PDF/208_Hotspots.pdf

A tribute to Professor Chris King

(1949 – 2022)

GEFO run this workshop in the memory and honor of **Professor Chris King**.

He was a guide and an inspiration not only for us but for many generations of Geoscience teachers across the world.

Bring EGU workshops to your area!

Images: Pete .Loader

- This and **other workshops** are also available **free of charge** (funded, up to a certain number, by EGU) in your area
- **How?**

  Identify topics of interest and possible dates
- **Write to the GEFO in your country** (see next slide) to check availability
- Collect at least 10-15 registrations
- Provide a suitable classroom for the activity (projector, microphone, if needed, water, other depending on activity required)

Contacts to request EGU GEFO for teachers' workshops

Country	Name	e-mail
France	Carole Larose	carole.larose76@gmail.com
Germany	Sylke Hlawatsch	kontakt@sylke-hlawatsch.de
Greece	Fotios Danaskos	fdanas@yahoo.gr
Hungary	Anett Kádár	kdr.anett@gmail.com
Italy	Giulia Realdon	giuliarealdon@gmail.com
North Macedonia	Pane Perunovski	pane.perunovski@ahss.edu.mk
Portugal	Mª João Picado	marijotaj@gmail.com
Romania	Dragos Tataru	dragos@infp.ro
Spain	Xavier Juan	xjuan03@gmail.com
Turkey	Candan Kafali	candan26.ck@gmail.com
United Kingdom	Pete Loader	peteloader@earthlearningidea.com

Don’t forget to fill in the evaluation form

- Go to: https://forms.gle/MqWP6wgMFZdqqKdU7
- Or frame the QR code:

Image: Pete Loader

In memory of Chris King
1949 - 2022

Discovering the Ocean Floor: USING Earth Learning Idea

Pete Loader, Pane Perunovski and Dragos Tataru. (EGU Geoscience Education Field Officers)

- The EARTHLEARNINGIDEA ("ELI") concept was born in 2007 to present Earth science teaching ideas to teachers.
- Each activity presents an Earth science topic using an interactive, inquiry-based approach to educate and motivate pupils, whilst developing their thinking and investigative skills.
- ELIs, in English, are currently being published every month and translated into 10 other languages.
- They have been used as the basis for teacher training education workshops in many countries by GEFOs.

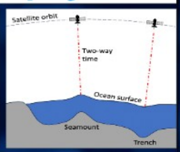
www.earthlearningidea.com

Earth Learning Idea

Innovative, Earth-related teaching ideas

- EGU Geoscience Education Field Officers (GEFO) are a team of geoscience teachers and researchers who provide professional development to schoolteachers with elements of geoscience in their teaching curricula, through interactive hands-on workshops.
- The team is supported by the European Geosciences Union Education Committee and is active in thirteen countries around Europe.

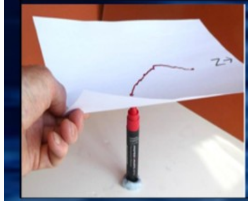
Remote Sensing Geophysics



SCAN ME

Students explore 'underground', using classroom models of professional geophysical tools! They simulate the work of geoscientists by flying mock gravimeters/magnetometers over buried objects to 'detect' changes in gravity and magnetism - just like in real airborne surveys!

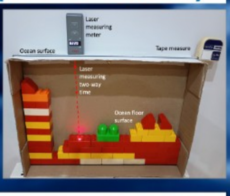
Modelling Hotspots



SCAN ME

Using a felt-tipped pen and paper to model evidence of plate movement over a fixed heat source in the Earth's mantle.

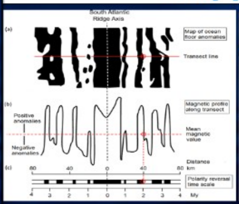
Mapping Sea-floor Topography (Laser Quest)

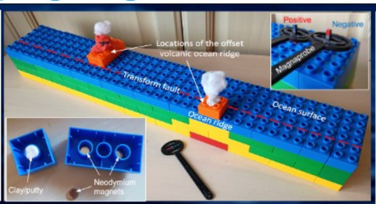


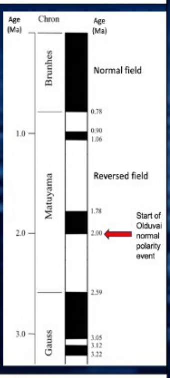
SCAN ME

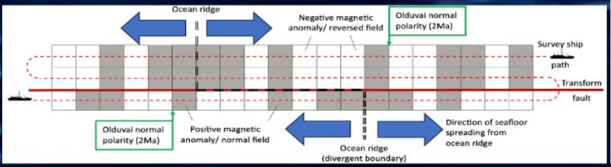
- A simulation of the echo-sounding technique in which sonar is used to determine water depth and therefore the ocean floor topography.
- Satellite altimetry uses radar to measure small variations in the distance to the ocean surface from low orbit satellites. Ocean surface undulations reflect changes in the ocean floor topography beneath at lower resolution.

Mapping Magnetic Anomalies









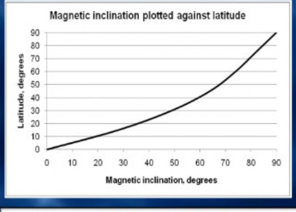
SCAN ME

Using Lego™ bricks and neodymium magnets, a simulation of an ocean magnetic survey to model the palaeomagnetic evidence for plate tectonics. Students map and record positive/negative anomalies with a Magnaprobe and explain the pattern that emerges in terms of an ocean ridge offset by a transform fault. The rate of spreading is calculated from the polarity timescale.

Human Magnets!

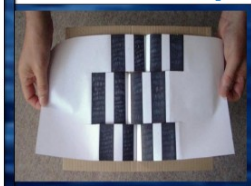
Pupils use their bodies to model the direction and inclination of:

- magnetic particles in the Earth's magnetic field with latitude.
- the remanent magnetism induced in cooling lava by the Earth's magnetic field.



SCAN ME

Modelling Sea-floor Spreading



Classroom activities showing working plate tectonic models to demonstrate how:

- magnetic stripes form a symmetric pattern either side of ocean ridges by recording the remanent magnetism of ocean crust;
- seafloor spreading offsets the ocean ridges and magnetic stripes at transform faults.

SCAN ME

Contact details

SCAN ME

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Exploring the Ocean Floor: Seeing plate tectonics below the waves

Pete Loader | Pane Perunovski | Dragos Tararu |

(EGU – Geoscience Education Field Officers - GEFO)

& Gina P. Correia

(EGU Education Committee)

Geoscience Information for Teachers | Vienna 28th April 2025

EGU European Geosciences Union