**What is the inside of the Earth *like*? A workshop aimed at KS3 (ages 11-14) ~30 students (one class) at a time.**

**Objectives:**

Students should understand the rheology and dynamic nature of the mantle. Students should understand how geoscientists use seismic tomography to make images of the inside of the Earth. Students should be aware of the diversity of disciplines and people in geosciences. Students should appreciate how interdisciplinary work is required to answer geoscience questions.

**Curriculum links:**

Structure of the Earth, Composition of the Earth, Sound production and detection, Speed of sound in solids, Changes with temperature in motion of particles, Interpreting observations and data, Making predictions using scientific knowledge and understanding,

**Resources:**

*General*: Large outdoor space or indoor hall, Overhead projector, Big whiteboard and pens, Plain paper

*For experiments (see set up instructions for more details*): Silly putty, Sloping board set-up, Convection tank set-up with food colouring, 60m rope, 10 coloured cones, 2 differently coloured mats, 8 stopwatches, 8 mini whiteboards and whiteboard pens, 30-60 identical objects (e.g. foam bricks, books, cardboard boxes), Peridotite hand specimen(s)

*From this pack:* Documents 3.1 – 3.6 printed out onto plain paper. For documents 3.1 – 3.4 and 3.6 print one per student (plus extras for 3.2 because of risk of burning some). Document 3.5 needs to be taped together. Document 3.3 is only needed if you don't have a peridotite hand specimen.

**Total time:**

1hr 30 – 2hrs if all activities are used. This can be done with 2-3 classes in one day.

**What's in the pack?**

* 1. – *Workshop summary*
  2. *– Workshop script*
  3. *– Experiment instructions*
  4. *– Speeds for timeline*
  5. – *Power point presentation*
  6. – *Tomography handout*
  7. *– Hotspot track handout*
  8. *– Peridotite handout*
  9. *– Timeline handout*
  10. *– Timeline large tiled*
  11. *– Take-home sheet*

**Summary**

**Silly Putty**

EXPERIMENT 1 – Silly Putty: the material properties of silly putty, solid and fluid behaviour on different timescales

**Geosciences and scientists in the public sphere**

Hello, and introduction to workshop. Ground rules

Open discussion - What is a geoscientist like?

What does media tell us about the Deep Earth?

**Convection**

EXPERIMENT 2 – Convection: convection tank, the reasons for convection and the patterns it produces

**Looking inside the Earth**

Structure of Earth's interior

Guess how deep we've drilled down to

How do we look inside the Earth?

Earthquakes as x-rays

EXPERIMENT 3 – Seismic Tomography: Making an image of the Earth using delay times by running around

EXPERIMENT 4 – Seismic Wave Speed and Temperature: Speed of sound through people

Tomography and temperature and speed of sound in the solids (and gases) – overview of outdoor experiments

**What is going on in the Mantle?**

Convection in tomographic images

Plate tectonics and subduction as part of convection cycle

Impacts of convection at the surface of Earth

Peridotite, kimberlite pipes and depth of drilling. The SOLID mantle.

Solid mantle can nonetheless flow

**Creep**

Creep as addition of tiny movements over time

EXPERIMENT 5 – Creep

Creep in other contexts, how to spot creep

Ice flow models for dating climate records

But how slow?

**Overview**

Why is this knowledge about the mantle useful?

Overview of what we learned

What is a geoscientist like? (second run)

Q&A at end.