If a sedimentary bed were laid down outside now – what would it be like?
A discussion of beds and catastrophic processes

Ask your pupils the deep question of, *'If a sedimentary bed were laid down outside now – what would it be like?*' either in class or outside during fieldwork. This will develop understanding of what the term 'bed' means, how the features of beds can be used to work out how they formed, and the different ways in which beds can be formed catastrophically.

If the area outside is:

- on a hill or slope, the most likely process to deposit a bed is a nearby asteroid impact;
- at the foot of a slope, a landslide deposit could overwhelm the area;
- a flat or lowland area, a flood deposit is most likely;
- near the coast or a lake, a tsunami might lay down sediment by flooding the shore of any lake, sea or ocean; tsunamis can be triggered by earthquakes, volcanic eruptions, submarine slides or asteroid impacts;
- in a volcanic area, the bed could be of volcanic ash, volcanic blocks or bombs, or a mixture of these fall deposits, or a lahar flow deposit;
- downwind of a volcanic area, a layer of volcanic ash could be laid down.

Each of these deposits would be laid down as a bed, since a bed is a layer of materials laid down by a single event. Beds can be very thick or very thin; mostly the thickness does not change very much but some can have very variable thicknesses. Many beds contain structures like cross bedding that help us to work out how the bed formed. They can also contain other rocks or fossils which give important clues to how they formed.

Possible bed deposits

Asteroid impact: Deposit of smashed rock fragments – these deposits can also contain shocked quartz (quartz crystals with signs of being impacted) or small glass beads called tektites.

Breccia of broken rock – Odessa Impact Crater, Texas, USA.

Landslide deposit: boulders, sand, mud or a mixture of these.

Landslide, Kumba, Freetown, Sierra Leone, 2017.

Flood deposit: layers of mud, sand or pebbles – the pebbles can be rounded or angular.

A flood deposit in Laplae, Uttaradit, Thailand, 2006.

Tsunami deposit: a mixture of mud, sand and other debris.

Tohoko tsunami deposit in Tanohata Village, Japan 2011.

Volcanic fall deposit: layers of volcanic ash, or, if near the volcano, mixtures of ash with angular volcanic blocks (solid rock blown out of a volcano) or rounded volcanic bombs (blown out as liquid lava that hardened as it fell).

Volcanic ash layer on a school yard 30km away from the eruption of Pinatubo in the Philippines, 1991.

Source: http://vulcan.wr.usgs.gov/Volcanoes/Philippines/Pinatubo/images.html and in the public domain.

Post-eruption lahar flow deposit: volcanic debris redeposited as a water-based slurry below the volcano; mostly ash with some blocks.

Lahar deposit, Armero, Colombia, 1985.

Source: http://volcanoes.usgs.gov/Imgs/Jpg/Ruiz/30410135_070_caption.html and in the public domain.

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The back up

Title: If a sedimentary bed were laid down outside now – what would it be like?

Subtitle: A discussion of beds and catastrophic processes

Topic: A class discussion to develop the idea of a 'bed' of rock and how beds might be deposited catastrophically.

Age range of pupils: 7 years upwards

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:
- describe what a bed of rock is;
- explain different ways in which a bed of rock could be deposited in the local area.

Context:
The type of bed that could be deposited very much depends on the altitude and character of the area. More likely scenarios are described above, less likely scenarios are below.

On the margin of a desert areas, dust storms could leave deposits.

Dust storm, Djelfa, Algeria, 2015.

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Near volcanoes, lava flows could be laid down, or nuée ardentes (glowing clouds) could deposit hot ash that welds together into ignimbrites.

Lava flow on top of ignimbrite, Tabounte, Morocco.

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Following up the activity:
Consider the different ways in which a bed could be deposited in different areas, such as in a desert.

Underlying principles:
- A bed is a deposit laid down by a single event.
- Beds can vary greatly in extent, thickness and internal characteristics, such as grain size, the mixture of grain sizes (sorting) the shapes of the grains, the types of grains (e.g. mainly quartz, calcite or volcanic ash) the structures they form (e.g. cross bedding) and what they contain, such as fossils.
- A single bed can be laid down by a variety of processes.
- Thick beds are usually laid down by catastrophic events.

Thinking skill development:
Class members have to construct their own ideas of what a bed is and how it forms – and then bridge this idea to the outside environment.

Discussion of the processes that might be involved and their results can involve metacognition and cognitive conflict.

Resource list:

- none

Useful links:
See the discussion of beds and bedding planes at: http://www.sepmstrata.org/terminology.aspx?id=bed

Source: Chris King of the Earthlearningidea Team.