



'Physical impact – sudden or slow?'

Conference Workshop – Manchester 2015

Exploring approaches that tackle the tricky idea of how timescales affect landscapes and environments plus approaches to looking for evidence of the short and long term impact of physical processes. These key concepts/skills are fundamental to students' appreciation of effective decision-making in issues linked to physical environments.

Activity 2: *Taking time to understand time.*

Two activities help demonstrate the concept of time in regards to Earth history. The first uses a presentation (adapted from Pyle, 2007) to condense the history of the Earth into minutes. The second encourages students to arrange the past into an order.

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Scale is sacred for all geographers mainly stemming from distances in the maps that we use (Meentemeyer, 1989). We often remind students 'to not forget the scale.' Scale however stretches beyond that of spatial study. The role it plays in time and specifically physical processes is crucial for understanding the world that we live in.

Understanding the concept of time is not easy. As individuals our time on Earth is finite and our life spans are merely hairline paint strokes on the picture of the Earth's history. The figures involved are vast making the concept even more challenging along with the expectation to count backwards from the present*. Activities in the classroom need to be carefully chosen to guide students in understanding the idea of 4.6 billion years; all of which helps to explain why the world is the way it is today.

Aims:

- to appreciate the scale of Earth history using seconds and minutes as a more understandable time unit
- to aid comprehension of counting backwards in geological time scales

Resources

- Earth history events PowerPoint (automatic timings)
- Geological time cards (eras, periods and events)
- String- three washing lines (parallel to each other) should be set up across the room
- Pegs

Method

- Start by using the Earth history events PowerPoint. Explain that 1 second will equal 10 million years in the history of the Earth (see figure 1). It should be noted that the presentation is just less than 8.5 minutes in total.
- At key points/ changes it is prudent to stop the group to draw their attention to the change points for the first four events and then to watch the final 500 million years.
- During the longer slide segments (4.6 billion years ago to 500 million years ago) the second activity can be started by the group.
- Each group member should be issued a card (an era, period or event).
- Three 'washing lines' should be available. One for each of the card categories (era, period and event).
- Explain that one end of the washing lines represents today and it then extends backwards through time. The first washing line is for events, the second shows the periods (stretches of time) and the third shows multiple groups of time (eras).
- The group is to peg the cards in order and on the right line.

Event	Years ago	Seconds
Earth begins	4.6 billion	80
First single-celled life	3.8 billion	60
First large fossils	3.2 billion	270
Many life forms appear	500 million	4
First land plants	460 million	6
First ferns and sharks	400 million	5
Coal starts to form	350 million	4
Winged insects	310 million	4
Beetles appear	270 million	4
First dinosaurs	230 million	3
First mammals	200 million	5
First birds	150 million	1
First flowers	140 million	5
<i>Tyrannosaurus rex</i> appears	90 million	2.5
Extinction of the dinosaurs	65 million	1.5
Himalayas start to form	50 million	3
First apes	20 million	1.4
First hominids	6 million	0.36
The ice ages begin	2.4 million	0.24
End of last ice age	10,000	0.001
Today	0	

Figure 1: (Pyle, 2007) Some key dates in Earth history. Timings use the scale: 1 second = 10 million years.

*Present- Define as before 1950

8. Aid the group where needed to help understand what their card shows. If group members feel they have finished their part they can be encourage to check and help others.
9. Discuss as a group how they have created a time line going backwards from the present* with periods and eras. This is then given context with the events taking place.

Teaching Points

- Check students as they work out the time line. Guide them to look at the card as a single point in time, a period of time or multiple points of time to work out which line they fit on
- Take time to discuss the idea of 'present day' being 1950 as a measurement point and that we are constantly moving forward but also counting backwards
- The activity can be developed further for students with the use of a scale along the string to space the time correctly on the line
- Encourage students to describe what happened in the PowerPoint presentation to unpick the slower and rapid changes taking place in Earth history

Application

- This activity makes for a great introduction to looking at geological timescales

References/ Further Reading

Meentemeyer, V. 1989. Geographical perspectives of space, time, and scale. *Landscape Ecology*,(3/3), 163-173.

Pyle, C. 2007. Teaching the Time: Physical geography in four dimensions. *Teaching Geography*, Autumn 2007, 121-123.