How to set an Earthcache – by Elizabeth Devon, with extra notes by Chris King

1. Read the Guidelines http://community.geosociety.org/earthcache/guidelines/guidelines2

2. Read through 'Getting started'

3. Go to https://www.geocaching.com/play
Log in to the site

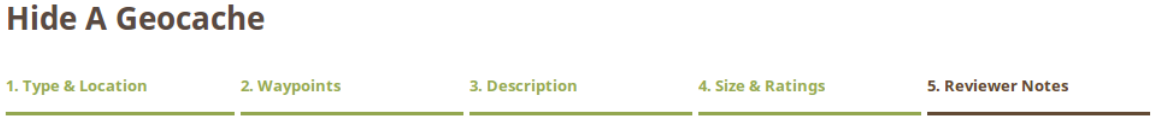
4. Go to 'Play' - 'Hide a Geocache'

5. Lots to read through here. Proceed to 'Create a new Geocache' at the bottom

6. Read the information here.
When ready to proceed, click 'Continue'

7. Finally, you can set your cache.
Under 'Traditional Geocache' is a clickable link to 'Show more geocache types'
Choose Earthcache

8. Follow all the instructions until you have completed each stage:-



Then send it for review.
Problems? *Contact Elizabeth - elizabeth@earthlearningidea.com*

Notes from Chris King – with an example Earthcache given at the end:

- Give your Earthcache a catchy title – to draw people in.

- Try to make your Earthcache as succinct and accessible as possible – since many of those that have been published seem rather long and dauntingly wordy.
- Try to include questions that:
  - include some observation or measurement that is relevant and will show that the participant has visited the site, e.g. measuring the diameter of a fossil tree to try to estimate its height, observing whether a gastropod fossil spirals downwards clockwise or anticlockwise; note that the public may find observations more accessible than measurements.
  - ask a 'what's the point' question – that highlights why this particular feature is worth studying, what it tells us about the planet and its value, why people have been inspired by this feature or this location or why it is important scientifically.
  - if possible, ask a question to build scientific imagination on the observations made, that may prompt further questions, e.g. How might the feature change in the future? What might the area have been like in the past? How could you test these ideas?
- Try to use language as simple and jargon-free as possible.
- If you do use sizes, such as grain or crystal sizes, refer to a commonly available coin, e.g. a 1 p piece, since members of the public may not be experienced in estimating sizes.
- The notes below are based on my experience:
  - You will need to give GPS coordinates of the site. You can do this by downloading an app to your phone (e.g. https://play.google.com/store/apps/details?id=com.woozilli.gpscoordinates&hl=en – or similar) and finding them out on site, with your phone
  - If you want to add a photo, this will need to be uploaded to a website somewhere and then linked to the website. If you can't do this yourself, contact Elizabeth Devon (elizabeth@earthlearningidea.com) who has offered to put the photo on the ELI website and send you the link.
  - I had to re-size the photo – but this was easy, with Elizabeth's help
  - My idea was generally approved, but needed an understanding of moving plates. I was reminded that some members of the public would probably know nothing about plate tectonics, so I needed to add a short explanation to help them.
  - I was reminded that we usually don't know exact dates, so shouldn't write, 'these rocks are 165 million years old' – I had to add 'around' to give 'these rocks are around 165 million years old'.
  - The final result is below. The 'Answers' at the end are for reference by the reviewer, and are not included in the submission.

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Earthcache: Stone wall between The Old Deanery entrance and Wells and Mendip Museum Cathedral Close, Wells, Somerset

Coordinates in different forms:
51.210612, -2.645224
N 51 21.0600 W 2 64.5259
N 51° 12'636" W 2° 38'716"

Title:
From sorting out the sizes to revealing the story

Short Description:
Spot the four different rock types in this wall and prove you've found them by getting the sizes of their largest grains right. Then use them to summarise the moving story of the UK over the past 420 million years.

Long Description:
Find the stone wall between the Old Deanery entrance and the Wells and Mendip Museum on Cathedral Close, opposite the cathedral in Wells. The wall is around 4m high and has crenulations (battlements). The building stones of this wall have four different geological ages, but all are found in the Wells area.

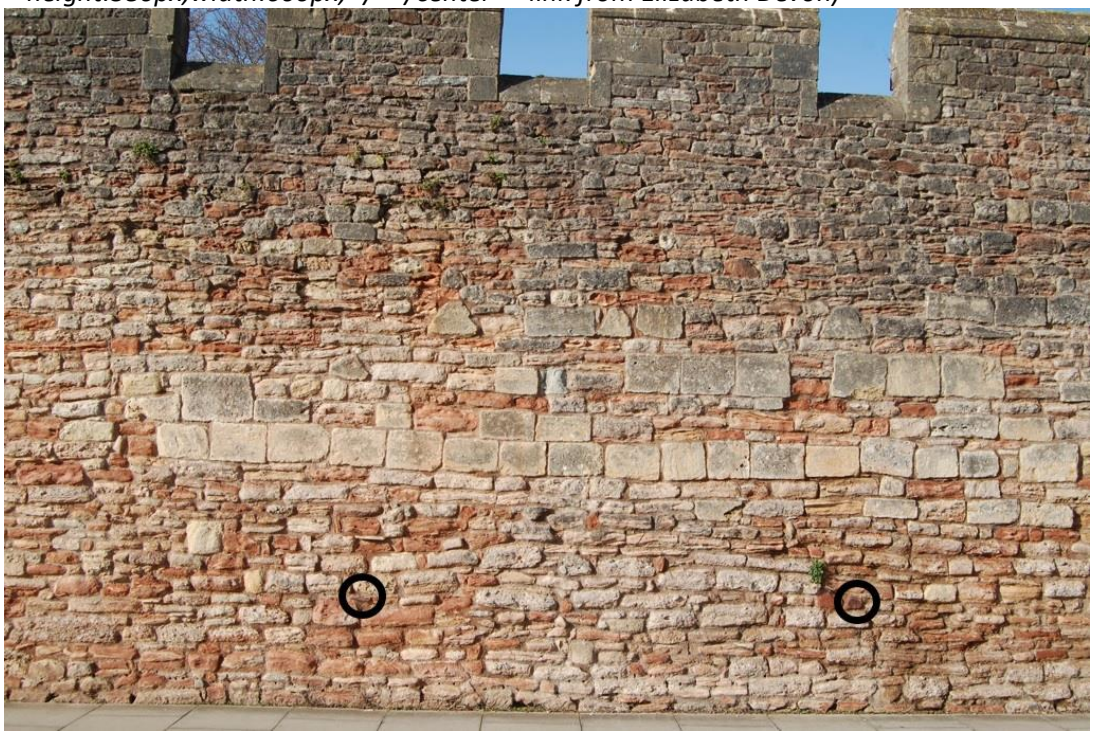
The most common stone is the Triassic rock around 240 million years old; this is usually rusty red and contains lots of broken fragments of other rock. About 240 million years ago, the area was a desert; when there were desert storms, floods picked up the rock fragments and sands from the desert floor and dumped them when the water currents slowed down.

The next most common stone is the yellow ochre-coloured Jurassic limestone, of around 165 million years old, often in rectangular blocks. The rock was laid down when this area was a shallow sub-tropical sea, around 165 million years ago, where lots of shelly animals lived. When they died, they were broken up by waves and currents and laid down as layers of lime sand, which later became limestone. The same stone is the main building stone of the cathedral opposite.

Carboniferous limestone of about 340 million years old is the next most common rock. It is a pale to dark grey rock that can be found as one or two separate stones, but is the most common type of rock fragment in the Triassic rock. This also contains fossil fragments and was deposited in an equatorial shallow sea, in much the same way as the Jurassic limestone.

The wall contains one or two stones that are of Devonian age, about 420 million years old (circled on the photograph). This rock, sometimes called Old Red Sandstone, is usually a deep reddish-brown colour. It was laid down by rivers when the area was a desert around 420 million years ago; desert sands are commonly red in colour from their high iron oxide content.

(- link from Elizabeth Devon)



To answer question 5 below, you will need to know that the Earth today, and in the geological past when these sedimentary rocks were laid down, has/had these climatic zones:

- Polar – near the North pole
- Cool temperate
- Warm temperate – Britain today
- Sub-tropical
- Hot desert
- Equatorial – across the Equator
- Hot desert
- Sub-tropical
- Temperate
- Cool temperate
- Polar – near the South pole

To answer question 5 you also need to know about the plate tectonics. This shows that the outer part of the Earth is made of huge plates that move. In some parts of the Earth new plate material is being added and in other areas, plates are taken down into the deep Earth. Plates move across the surface from where the new plate is being formed to where it goes back into the Earth. As plates move, they carry continents with them; sometimes this can cause continents to collide, producing great mountain ranges like the Himalayas.

The four different rocks in questions 1 – 4 contain sands and fragments of different sizes. The largest fragments found in the rocks are:

- less than 2 mm across (less than the size of a letter in one of the words on the front of a 1p (one penny) coin);
- between 2 and 10 mm across (between the size of a letter in one of the words and the size of the Queen's head on the front of a 1p coin);
- between 10 and 20 mm across (between the size of the Queen's head on a 1p coin and the size of the coin itself):
- more than 20 mm across (bigger than the size of a 1p coin).

What to do
Of the sizes given above, what is the size of the largest sand/grain or fragment of rock or fossil you can find in the:

1. rusty red Triassic rock?
2. yellow ochre-coloured Jurassic limestone?
3. grey Carboniferous limestone?
4. reddish-brown Devonian rock?

5. How is it possible that, while the climate in Britain today is temperate, the evidence of these local rocks shows that:

- around 165 million years ago, the Jurassic climate here was sub-tropical
- about 240 million years ago, in Triassic times, the area had a desert climate
- around 340 million years ago, in the Carboniferous, the climate was equatorial
- about 420 million years ago, during Devonian times, this area had a desert climate

Please send your answers your answers to me, chris@earthlearningidea.com or through the Message Centre.

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Answers – *for the reviewer – not included in the Earthcache*:

1. rusty red Triassic rock – largest fragment more than 20 mm across
2. yellow ochre-coloured Jurassic limestone – largest fossil fragment 2-10 mm across
3. grey Carboniferous limestone – largest fossil fragment 2-10 mm across
4. reddish-brown Devonian rock – largest sand grain less than 2mm across
5. the local rocks record the plate movement (continental drift) of the area from south of the equator in Devonian times to our position today

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