From Crack to Stack!

Hayley Briggs reports on how a hands-on approach to learning about coastal landforms brings fun and creativity to key stage 3, 4 and 5 geography

Coastal processes and landforms is a topic frequently taught in geography at a variety of key stages. Students are expected to understand the process of erosion, how it can change our coastline and what impact that has upon human activity. For example, they should appreciate how a headland erodes and recognise this as a continuous process which creates a variety of landforms such as cracks, caves, arches, stacks and stumps. I normally teach this by using video clips of the Green Bridge of Wales or Durdle Door, overhead transparencies and pictures from textbooks, encouraging the students to predict what will happen next. Most students grasp the concepts fairly quickly and can sketch pictures of the stages with annotations.

However, a fun way to consolidate the students' understanding of the erosion of a headland is by using play dough!

Play dough at key stage 3 and even 4!

Once I had taught the students the basics behind the erosion of headlands I explained to them that next we would be using play dough. For key stage 3 I gave out one pot per two students to build their social skills, encourage discussion and teamwork, while with key stage 4 I gave one pot to each student making it easier for me to assess them. They had to create a series of models representing how a headland along a stretch of coastline erodes and consequently changes over time. I basically left it up to them but emphasised the fact that the models had to be as accurate as possible and would need displaying for me to assess in the

Model Number	What did each model show?
One	Most students chose to show the natural arch in this model. Some were detailed enough to show a crack and cave further back in the headland.
Two	Most students chose to show the arch and stack in this model. Some included the formation of a new crack, cave or small pieces of play dough to act as rockfall.
Three	Most students chose to show the arch, stack and stump together in this model. To show that the process is continuous, some pupils had once again created a new crack and cave. Rockfall was evident on most of the final models.

Figure 1: Recording what the students showed in their models.

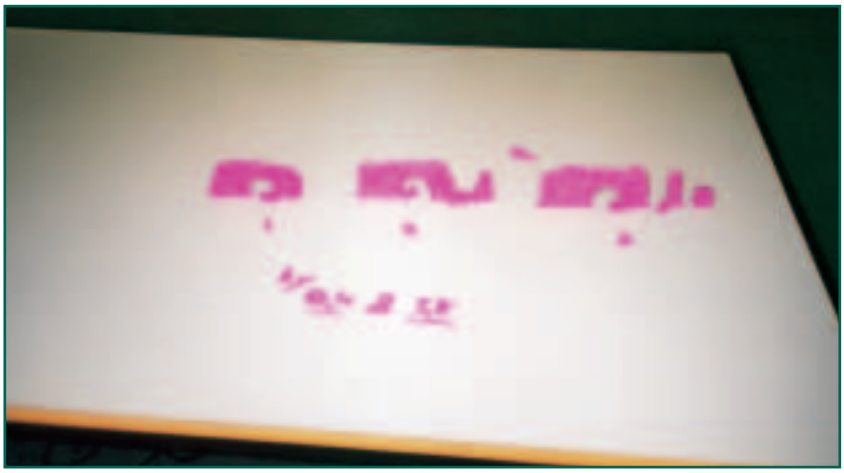

Figure 2: Some students added their initials. Photos © Hayley Briggs.

Figure 3: Modelling the erosion of a headland.

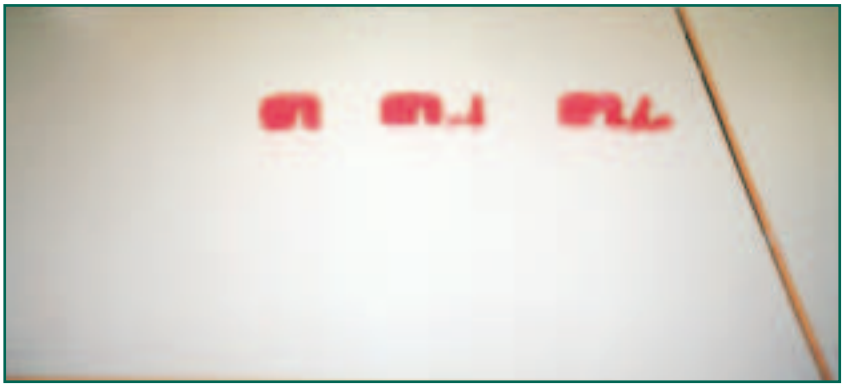

Figure 4: Other students attempted to recreate a rock-like texture.

Key stage 3 terminology	Key stage 4 terminology
Erosion	Erosion
Headland	Hydraulic power
Crack	Corrasion
Cave	Corrosion
Arch	Attrition
Stack	Weathering
Stump	Weakness
Unsupported	Crack
Rockfall	Cave
Starts over again	Arch
After thousands of years	Stack
	Stump
	Unsupported
	Rockfall
	Continuous process
	After thousands of years
	Durdle Door
	Old Harry's Rocks

Figure 5: The differences in geographical terminology between key stage 3 and 4.

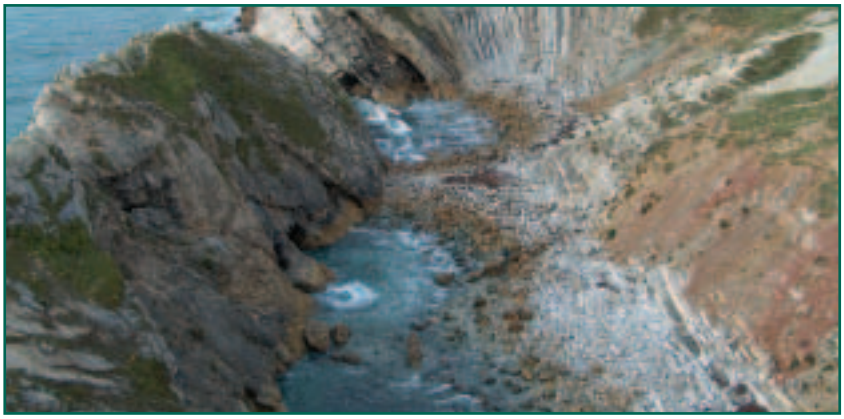

Figure 6: Stairhole, Dorset coast.

Figure 7: Stairhole, Dorset coast.

correct order. They were also told that I wanted them to explain each model to me as I studied them. Most students created three small models showing the headland changing (Figure 1) as can be seen from the photographs (Figures 2-4).

If students had spare time at the end, they started to be quite creative with their models using the remaining play dough to:

- give their models a title
- write their names or initials
- create some fish or whales
- make a person standing on the headland
- give their headland texture to make it more 'rock-like'

As the students finished their models (after about 20 minutes) I approached each set of models and asked the students to explain their models. The terminology I was expecting to hear from key stage 3 and 4 students was obviously different (Figure 5) and students who tended to gain the higher marks were those who used the correct geographical terminology.

There is clearly a cross-curricular link with art and design technology which are subjects I think most students tend to enjoy, making this exercise a real success. Some students were quite upset to have to roll up their models and put the play dough back into the pots! I think this exercise works particularly well with visual and kinaesthetic learners as it is very 'hands on' and they can actually see the headland changing before them which reinforces their understanding. The task will probably be quite memorable too, meaning that students may be able to recall it in an exam. This assignment may also be good for those with learning difficulties or visual impairment as play dough comes in a variety of bright colours.

Play dough at key stage 5

In order to challenge my year 13 students slightly more I asked them to use the play dough to re-create Stairhole (Figures 6 and 7) and Lulworth Cove (Figure 8) on the Dorset coast.

Instead of giving them one pot of the same colour dough, I asked them to use the different coloured play dough to represent the geology along the Dorset coast. The students decided what colours would correspond to each rock type between themselves which I then wrote on the board to save confusion (Figure 9).

There are two important controls on the development of the coastal landforms along this stretch of coast:

1. The rocks run broadly parallel to the coast (concordant coastline).
2. The rocks vary greatly in their resistance to erosion.

When the students explained their models to me, I was listening for the correct geographical terminology as well as recognition of the above controls; which most of them grasped. For those who didn't emphasise the controls enough, I used their models to help with my explanation. In order to access the higher grades at A2, year 13 students really must understand these two controls and this modelling exercise deepened their understanding in addition to being fun (Figure 10). As it is so different to any other geography lesson they will hopefully remember it for their exam.

I really would encourage you to have a go with this exercise. You could do it as a treat in the last week of term or as a reward if a class have done particularly well. You will need to emphasise to lower age groups that such an exercise can only be carried out if the students are sensible and that the lesson will be stopped if they are silly. You can also encourage them to work really hard on their models by offering a credit/merit to the best set of models (which I did) or you could give certificates for the best three models. Good luck!

Reference

Ross, S., Morgan, J. and Heelas, R. (2000) *Essential AS Geography*. Cheltenham: Stanley Thornes Ltd.

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Figure 8: Lulworth Cove, Dorset.

Red	Portland Stone	(massive, highly-resistant limestone used in building, e.g. St Paul's Cathedral, London)
Yellow	Purbeck Beds	(clays, shales and limestones with varying resistances to erosion)
Purple	Wealden Clay	(mostly weak and easily-eroded clays and sands)
Green	Greensand	(relatively weak sandstone)
Orange	Chalk	(relatively resistant rock forming towering cliffs)
Blue	The Sea	

Figure 9: Geology of the Lulworth Cove area. After Ross, Morgan and Heelas, 2000.

'This is really helpful because I had an idea before but doing this brings the process to life allowing me to visualise exactly how it works'

'At first, I thought this would be really easy but it's actually quite hard, you really have to think about what we have learnt and how soft/hard the rock is to work out how it will erode'

'I have even shown wave refraction in my Lulworth Cove, my waves are the best!'

'This is the best geography lesson ever!'

Figure 10: Feedback on the lesson from some students.