Taking pictures of Earth from the International Space Station

An interview with astronaut Tim Peake

Teacher guide

National Centre for Earth Observation
NATURAL ENVIRONMENT RESEARCH COUNCIL
Earth Observation science for a changing planet

Principia
EO Detective

Introduction

During his mission to the International Space Station (ISS), Tim Peake shared many spectacular photographs of the Earth. A few months after his return, we were given the opportunity to interview him and create a video that would support the EO Detective teaching resources, which you can download from the **NCEO website** or the **STEM Learning EO detective page**.

Our activities aim to demonstrate how a vantage point in space, such as the ISS, provides a unique perspective from which people can monitor environmental processes and change.

We therefore had a host of questions for Tim, which means that the full interview is 20 minutes long. This guide should help you find the segment or sections that are most relevant to what you are doing.

We have also created a presentation that includes many of the images used in the video. While, for reasons of space, the versions in the presentation are low resolution, the notes for each slide include a link to the original image.

If you have any questions or feedback, please contact **EODetective@NCEO.ac.uk**.

We would love to hear about how you have used them and see what your students have produced!

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The questions

The numbers at the start of each question refer to the time from the start of the video where:

- the question is asked
- the answer begins
- the answer ends.

Introduction

1. 00:28–0:40–01:16
   We all enjoyed your tweets and pictures and now enjoying the book. Some astronauts don't take (or at least don't use social media to share) their photographs. Why did you choose to do so?

Practicalities

2. 01:16–01:34–2:10
   Some of these cameras have very long lenses, but no longer than you might see on a sports reporter's camera. Are they modified in any way for taking pictures of the Earth from Space?
   flickr.com/photos/timpeake/26721236693
3. 02:10–02:18–02:53
   What about the settings you use?
   flickr.com/photos/timpeake/24608274142
4. 02:53–03:32–04:15
   When we ask visitors to our stand at events what they think might make it difficult to take a picture of the Earth from space difficult, they nearly always say 'no gravity.' What are the actual problems?
   esa.int/ESA_Multimedia/Images/2018/09/Tim_Peake_on_the_ISS
5. 04:15–04:30–05:06
   Obviously cloud cover affects the photos you can take – although they make spectacular images in their own right – but what other things can make it difficult to get a photograph of a particular target?
   flickr.com/photos/timpeake/27282110722
6. 05:06–05:16–05:45
   If there's something you particularly want to photograph, can you sneak away from work to do it – or get it built into your timetable in some way? Or do you just have to hope that you have some free time that corresponds to a good pass?
   flickr.com/photos/timpeake/25766177983

7. 05:45–05:49–06:09
   Which of your photographs of the Earth is your favourite? Why?
   flickr.com/photos/timpeake/26003241950

ISS EO programme

8. 06:09–06:30–06:50
   We tend to think about EO in terms of satellites, like the ESA Copernicus Sentinels and American Landsat, but there is an ISS EO program too – it's how we were able to submit the requests of our competition winners. When/why do scientists want ISS pictures rather than or as well as satellite images?
   esa.int/ESA_Multimedia/Images/2016/01/Feeling_the_heat
9. 06:50–06:56–07:26
   How is taking these pictures different to taking those you take for fun?
   flickr.com/photos/timpeake/26308188144
10. 07:26–07:41–08:22
    What support do you get from the ground when taking these?
    flickr.com/photos/timpeake/25876212454
11. 08:22–08:48–09:25
    Your internet connection is rather slow, I believe. How are all of the images on the Gateway to Astronaut Photography of Earth, or a sequence used for time-lapse, sent back? Is there a separate channel? Do they have to go overnight?
    flickr.com/photos/timpeake/27225801116

Uses of EO

12. 09:30–09:44–10:36
    You shared shots of some spectacular images of natural formations. Was there any natural feature or environment that took you by surprise?
    flickr.com/photos/timpeake/26194524890
13. 10:37–10:47–11:42
    You mentioned being able to tell spring was coming. What sort of signs were there of that?
    flickr.com/photos/timpeake/26817438581
14. 11:43–11:48–12:22
    Apart from fields of rapeseed in the spring, were there any other crops or types of agriculture that you were able to recognise?
    flickr.com/photos/timpeake/26719983336
15. 12:22–12:29–12:58
    What about other human impacts on the environment? Were there any that particularly shocked or surprised you – either by how visible or invisible they were?
    flickr.com/photos/timpeake/24115852989
16. 12:58–13:22–13:35
    Now we have over 30 years of more or less continuous satellite imagery of the earth & it is very helpful for monitoring change. You were only there for a short period of time, but did you see any evidence of changes – natural or man-made – that stood out?
    flickr.com/photos/timpeake/25330501814
17. 13:35–13:44–14:24
    What about weather systems? Were you able to watch those develop?
    esa.int/ESA_Multimedia/Images/2017/03/Cyclone_Debbie
18. 14:24–14:48–15:25
    EO is used for disaster prevention and response: flood management or monitoring fires for example. You shared pictures of floods in the North of England and a huge fire in Canada, as well as Etna. How does it feel watching something like that unfold from space rather than reading about it or seeing it on the news?
    flickr.com/photos/timpeake/26804235402
19. 15:34–15:47–16:23
    Which of the photos you took do you think is the most revealing/useful/important? Why?
    flickr.com/photos/timpeake/25129234634

Particular pictures

20. 16:24–16:35–17:15
    Tell us about the iceberg. Were you expecting to see it again?
    flickr.com/photos/timpeake/26935119663 and
    flickr.com/photos/timpeake/26017552382
21. 17:15–17:26–17:50
    Thomas Pesquet joked about his #pyramidfail. Is there anywhere you hoped to see/snap that you didn't catch?
    flickr.com/photos/timpeake/25920283704
22. 17:51–17:58–18:40
    You've said Patagonia is a place you enjoyed photographing – why?
    flickr.com/photos/timpeake/25445400054
23. 18:41–18:45-19:23
    Is there anything else you would like to tell us about seeing the Earth from space?
    flickr.com/photos/timpeake/24812578293
24. 19:23–19:25–19:29
    And has your geography improved?
    flickr.com/photos/timpeake/24994663143

Doing more with pictures of Earth

Run a competition

If your students have enjoyed looking at these photographs, why not ask them what they would like to see from space? The EO Detective 'Where would you photograph?' resources (with versions for ages **7–11**, **11–14** and **14–16**) provide a lesson you can use to introduce students to what is possible before setting a writing challenge asking them to explain their choices. You could run a class, year or school competition offering a prize of a large high-quality print of a photograph or satellite image (from Copernicus Browser) of the appropriate place as a prize. The packs also include certificates you can print for runners up or all entrants.

Try out one of these education packs

More teaching materials related to Earth observation can be downloaded from the **NCEO website**, **EO Detective on STEM Learning** and **ESA Education Teach with Earth**. Many of these include curriculum links so you can use them to support your teaching of core concepts in science, maths, geography or computing.

Browse astronaut photographs

Tim Peake's photographs are available on flickr as are those of other ESA astronauts such as **Thomas Pesquet** and **Alexander Gerst**.

Tweeted astronaut photographs – and some untweeted ones – are mapped by students of Dave MacLean at COGS/NSCC in Canada. At the time of writing, this was the **latest version** and includes links to earlier ones. Many of the pins are also linked to a higher resolution version of the image as well as the original tweet.

The primary source for astronaut photographs of Earth is **NASA's Gateway to Astronaut Photographs of Earth**. These photographs can be used for educational purposes free of charge.

Explore satellite images

ESA and **NASA Earth Observatory** regularly publish interesting, and often spectacular, images of Earth that are free to download and use for educational purposes. Most have commentaries explaining what the images show or/and giving more detail about how they were produced. Some of the ESA images also have related videos. **ESA Earth Online** has images that tend to be more technical.

Data from Landsat satellites has been publicly available for a long time from two US Geological survey websites: **EarthExplorer** and **GloVis**. The latter is, perhaps, more intuitive but can be rather slow to load. Images & data from both can be used for educational purposes, but you do need to register.

Higher-resolution data (therefore covering smaller areas) is available through the **Copernicus Browser**. You can download **a teacher guide** to using it from the ESA Climate Detectives resources page. Once again, you are free to use images created using this app for educational purposes, but you should acknowledge the source e.g. 'Contains modified Copernicus Sentinel [number] data [year]'.

Find out how images like these are used

The **About EO** page in the education section of the **NCEO website**, gives an overview aimed at teachers and older pupils. Other pages give more detail about specific areas.