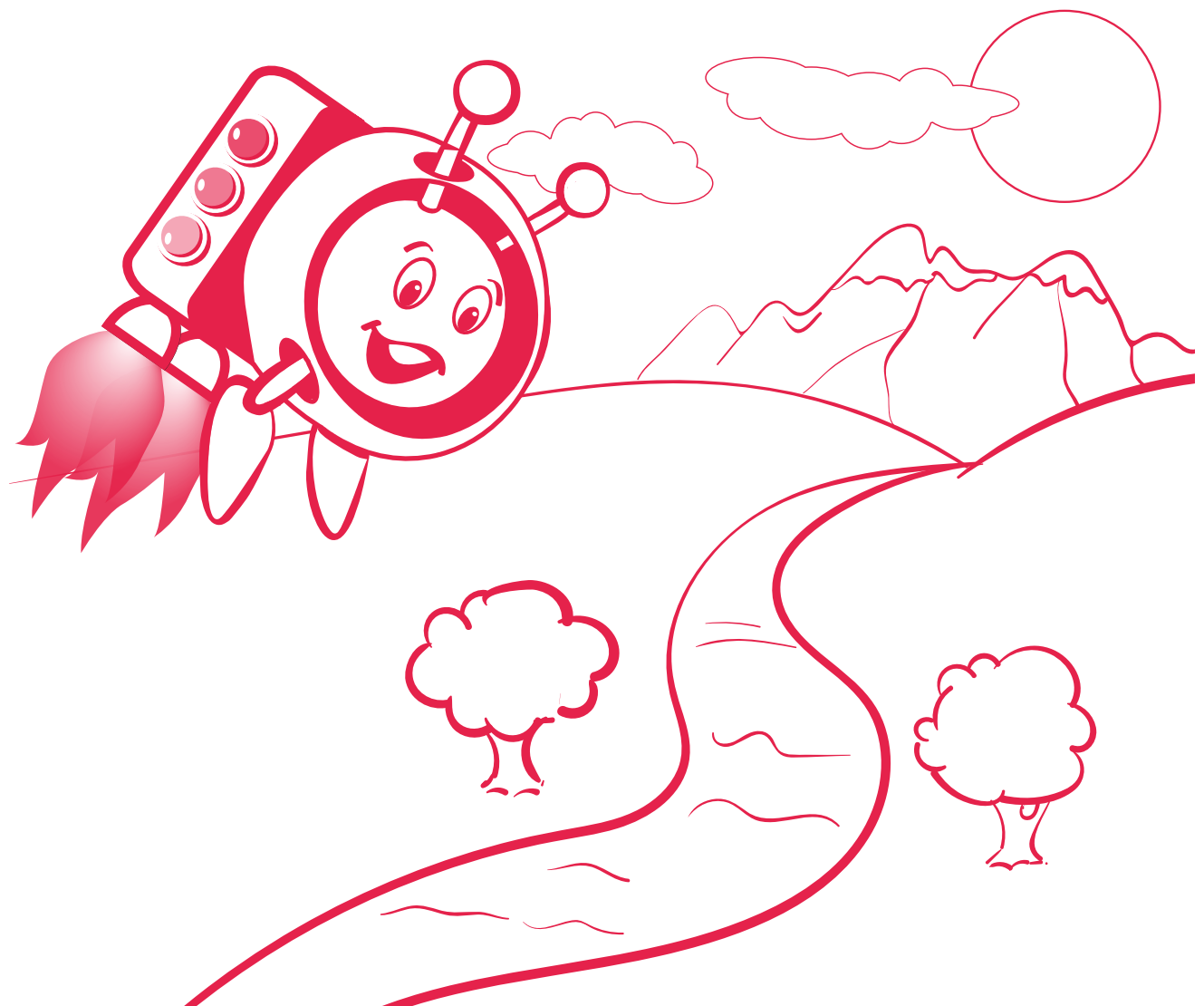


teach with space

→ FROM THE GROUND AND FROM THE SKY

Analysing and understanding images of planet Earth taken from space





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→ FROM THE GROUND AND FROM THE SKY

Analysing and understanding images of planet Earth taken from space

FAST FACTS

Age range: 8-12 years old

Type: Pupil activity

Complexity: Easy

Teacher preparation time: 15 minutes

Lesson time required: 45 minutes

Cost per class: €0-€5

Location: Indoors

Includes the use of: Pupil activity sheet, computer, projector and screen

Outline

In this activity, pupils are introduced to the idea of remote observation of the Earth from space. They are asked to match photographs of different landscapes (mountains, lakes, rivers, cities, islands, and deserts) taken from the ground with photos of the same places taken by astronauts onboard the International Space Station, and also with photos taken by Earth Observation satellites. In particular, this resource uses photos from Sentinel-1 and Sentinel-2, missions that have been developed by ESA as part of the Copernicus programme.

Pupils will learn

- About the different viewpoints from which you can observe an object
- The difference between photos taken from the ground (on Earth) and images taken from space
- What lakes, mountains, rivers, islands, deserts, and cities look like from space
- The advantages and importance of taking images from space
- That Earth observation satellites exist and why they are useful

Pupils will improve

- Their ability to analyse images and extract relevant information
- Their understanding of new perspectives
- Their ability to associate different objects based on a set of criteria
- Their ability to work together and share conclusions



→ ACTIVITY I: THE EARTH SEEN FROM THE ISS

In this activity, pupils are introduced to photos taken by ESA astronauts onboard the International Space Station (ISS). The objective is to demonstrate how a vantage point from space, such as the ISS, can provide a unique perspective from which we can monitor environmental processes and change.

Equipment

- Computer/laptop
- Internet connection

Exercise

Discuss looking at the Earth from a viewpoint located in space, such as the ISS. Ask pupils whether they have seen any photos taken from space by astronauts. What do they think about these photos?

Show your pupils photos of the Earth taken by astronauts on the ISS. Astronauts Thomas Pesquet, Tim Peake, Samantha Cristoforetti, Alexander Gerst, and Luca Parmitano have taken beautiful photos of our planet from the ISS. You can browse through them with your students by visiting their Flickr accounts:

Thomas: https://www.flickr.com/photos/thom_astro/

Tim: <https://www.flickr.com/search/?text=tim%2opeake>

Samantha: <https://www.flickr.com/search/?text=samantha%2ocristoforetti>

Alexander: <https://www.flickr.com/search/?text=alexander%2ogerst>

Luca: <https://www.flickr.com/search/?text=luca%2oparmitano>

→ ACTIVITY 2: MATCH THE PHOTOS

In this activity, pupils look at photos of various landscapes. They match and compare images taken from the ground and from the ISS, improving their ability to analyse images and to see the Earth from a new perspective.

Exercise

1. Discuss **Photos 1** and **A** provided in the pupil activity sheets. How do we know they are both of mountains? What things are similar? What things are different? Discuss detail, clouds, sharp edges, vegetation, etc..
2. Choose whether to print the images in the appendix of this document (you could even laminate them!), or ask pupils to look at the smaller images on their activity sheets. Ask pupils to complete table A1 using the rest of these photographs. They could do this either individually, or you could show the pictures in sequence and they can work in teams to decide where to put the letter/ number in a copy of the table.
3. Compare and check answers (Table 1). Discuss with your pupils which were difficult.

Answers

Table 1		
Place	Photo taken on Earth	Photo taken by an astronaut on the ISS
Mountains	1	A
A desert	5	C
An island	4	B
A city	2	F
A lake	6	E
A river	3	D

↑ Answers to question 4 on the pupil activity sheet.

Photos 1 and A = Himalayas
Photos 2 and F = London, UK

Photos 5 and C = Sahara desert
Photos 6 and E = Como Lake

Photos 4 and B = Easter Island
Photos 3 and D = Colorado River

4. Ask pupils to work in groups to compare the pair of photographs on their activity sheet. Both photos are of Rome. One was taken from the ground, and the other was taken by an astronaut on the ISS.



→ ACTIVITY 3: HIGHER UP!

This activity presents pupils with photos of our planet's landscape taken from the ground, as well as images taken by Earth observation satellites. Earth observation satellites are located at various orbits: some are lower than the International Space Station, others are as far as 36 000 km above the surface of the Earth! Pupils observe the photos and match the photos of mountains, lakes, rivers, cities, islands, and deserts taken from the ground with those taken by satellites in space.

Exercise

1. Discuss Photos 1 and A provided in the pupil activity sheets. How do we know they are both of mountains? What things are similar? What things are different? (Discuss detail, clouds, sharp edges, vegetation, etc.)
2. Choose whether to print the images in the appendix of this document (you could even laminate them!), or ask pupils to look at the smaller images on their activity sheets. Ask pupils to complete the table using the rest of the photographs they have been provided with. They could do this either individually using their activity sheets, or you could show the pictures in sequence and they can work in teams to decide where to put the letter/number in a copy of the table.
3. Compare and check answers (Table 2). Discuss with your pupils which were difficult.

Answers

Table 2

Place	Photo taken on Earth	Satellite image
Mountains	1	A
A desert	5	B
An island	4	E
A city	2	C
A lake	6	F
A river	3	D

↑ Answers to question 4 on the pupil activity sheet.

Photos 1 and A = Himalayas

Photos 5 and B = Sahara desert

Photos 4 and E = Easter Island

Photos 2 and C = London, UK

Photos 6 and F = Como Lake

Photos 3 and D = Colorado River



4. Ask pupils from each group to report back. Write down a list of keywords based on their comments.
5. Ask students to use this list to help them write down why and when photos of the Earth taken from space are helpful. You could use the sentence starters below.

Sentence starters

Below are the sentence starters that are provided on the pupil activity sheet, as well as some ideas for points that you could discuss with pupils.

Photos of the Earth taken by Earth Observation satellites show us ...

- How the Earth looks from space
- A different perspective of the Earth
- The 'big picture'
- The atmosphere as well as the ground, e.g. clouds

A photo taken from the ground is better if you want to ...

- See only one building
- See something in a lot of detail
- See how a place looks at eye level
- See a place from a perspective that we are used to

But a photo taken from space is better if you want to ...

- See an entire city/river/desert etc. at the same time
- See a place from a new perspective
- See the overall picture
- Monitor an area over a number of weeks/months/years
- Make predictions about the weather



→ APPENDIX



↑ Photo 2 (from the ground)

teach with space – from the ground and from the sky | PR10a





↑ Photo 3 (from the ground)



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↑ Photo 4 (from the ground)



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↑ Photo 5 (from the ground)



teach with space – from the ground and from the sky | PR10a



↑ Photo 6 (from the ground)

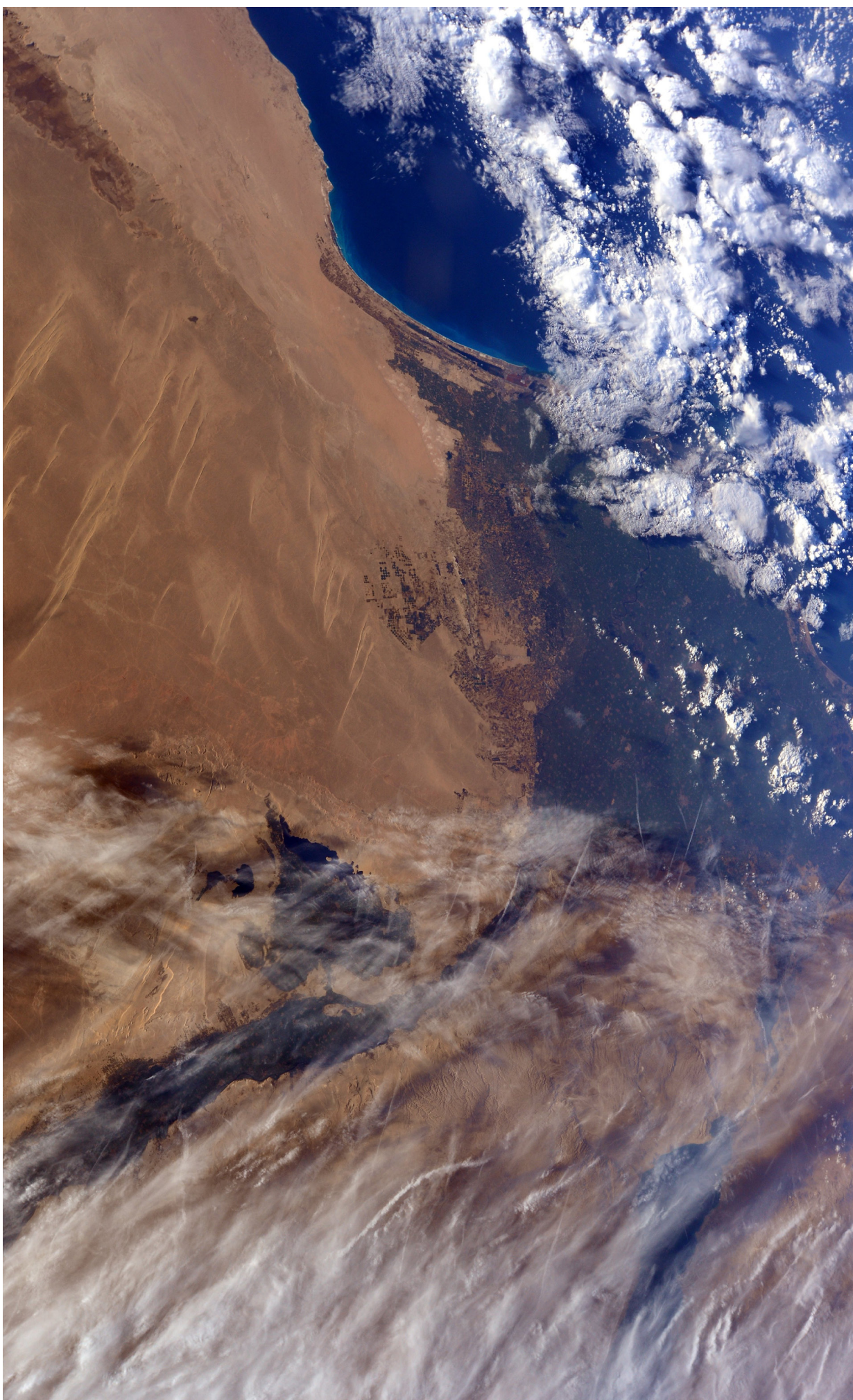
teach with space – from the ground and from the sky | PR10a





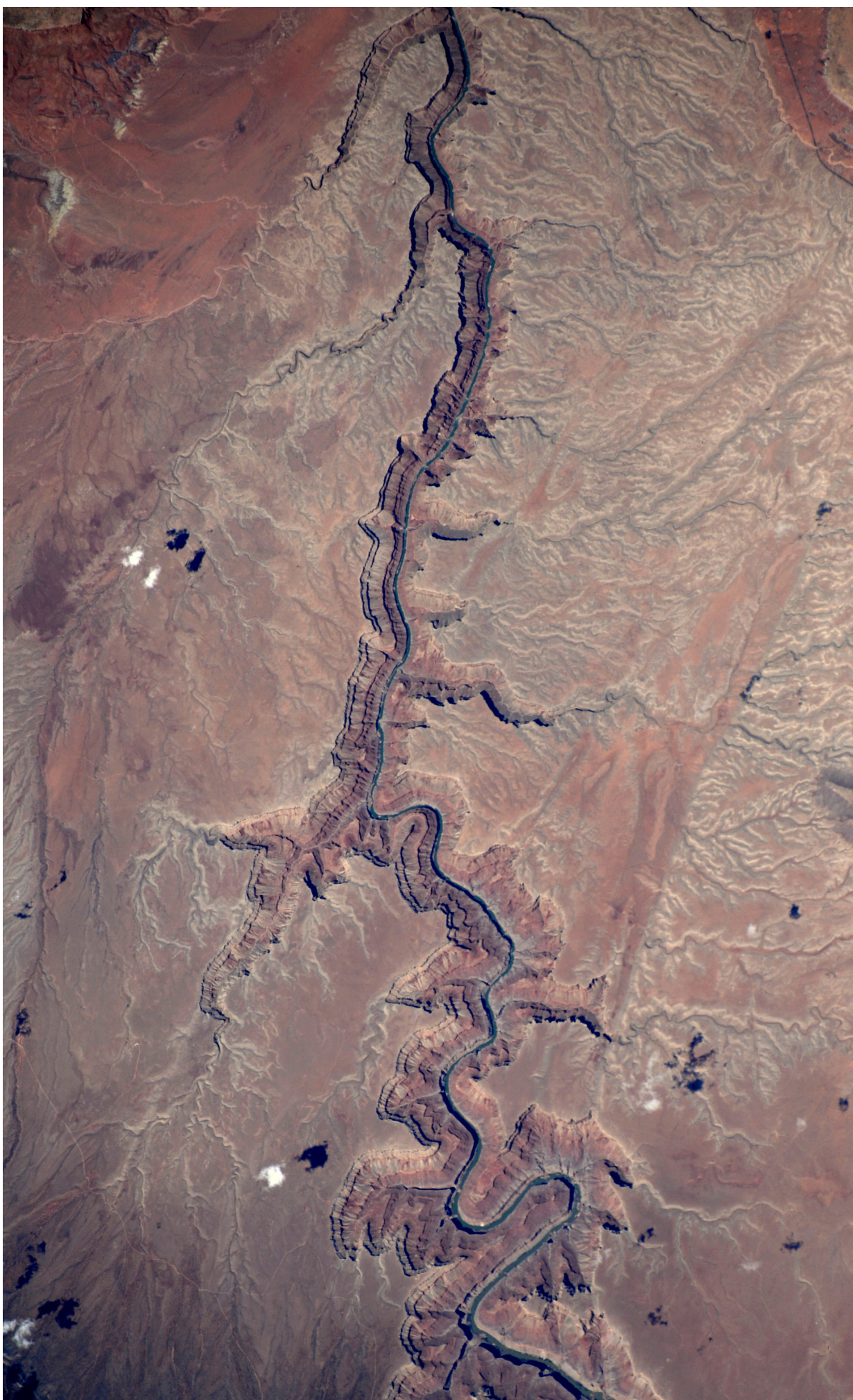
↑ Photo B (from the ISS)





↑ Photo C (from the ISS)





↑ Photo D (from the ISS)





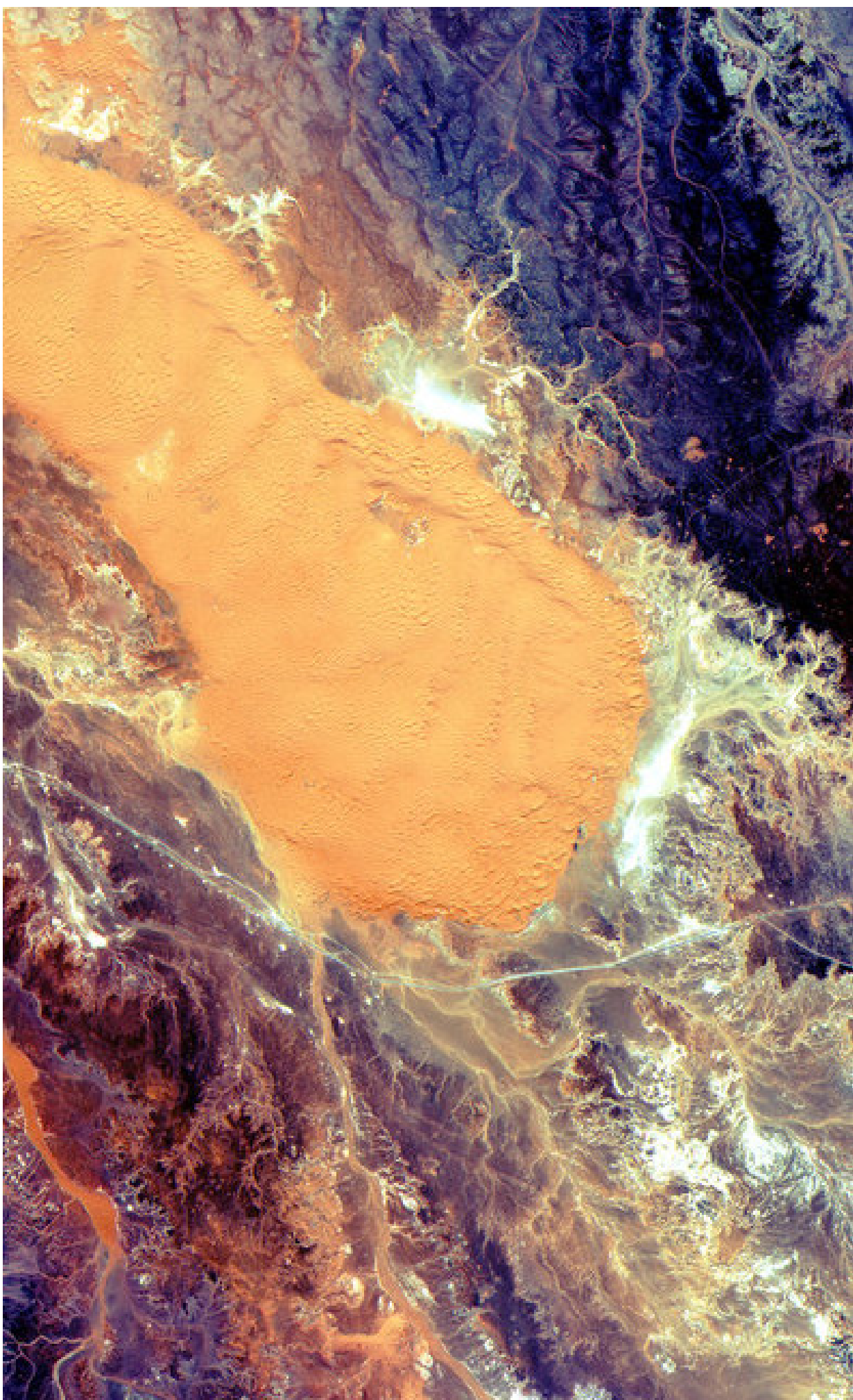
↑ Photo E (from the ISS)





↑ Photo F (from the ISS)

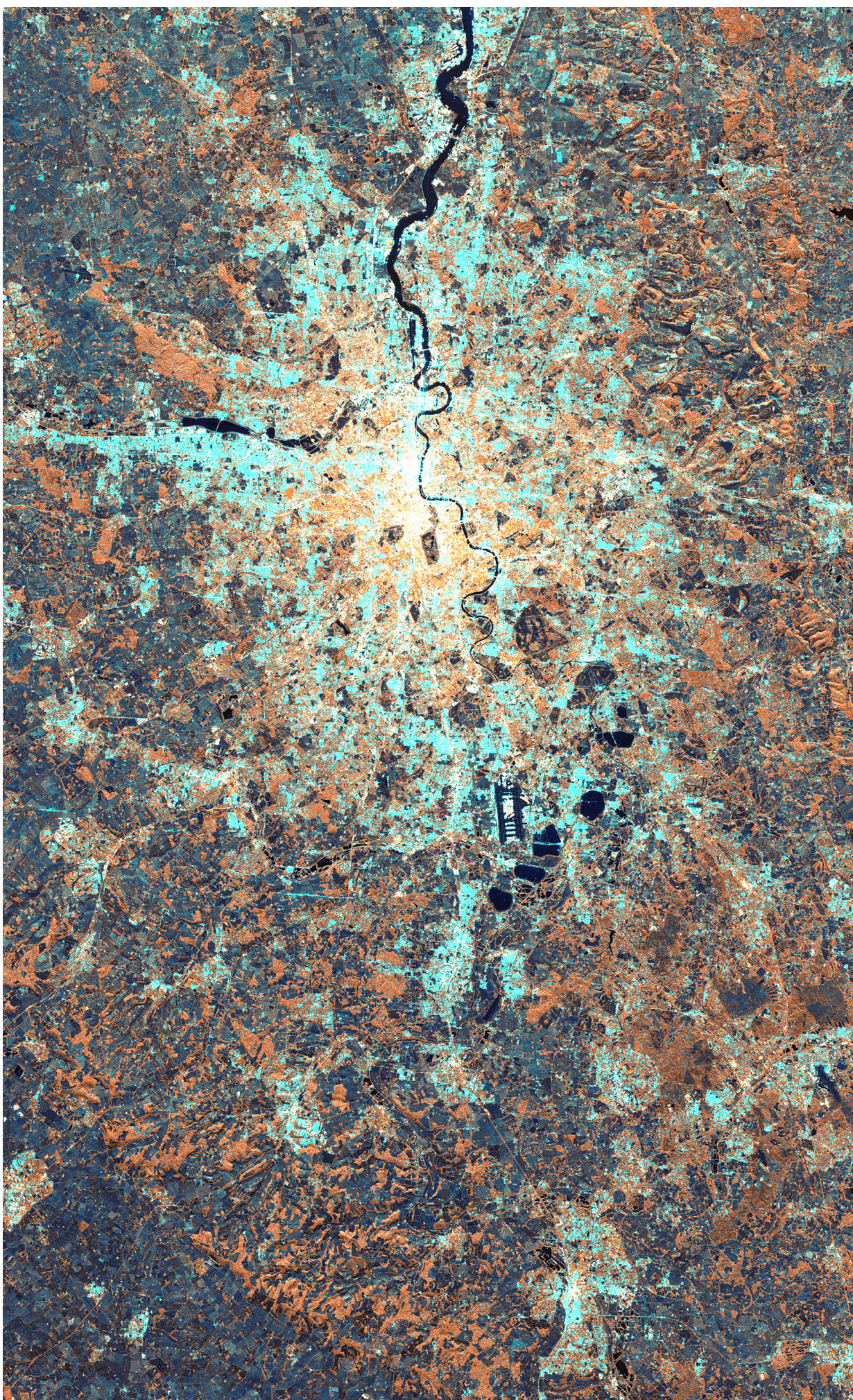




↑ Photo B (from the satellite Sentinel-2A)

teach with space – from the ground and from the sky | PRI0a

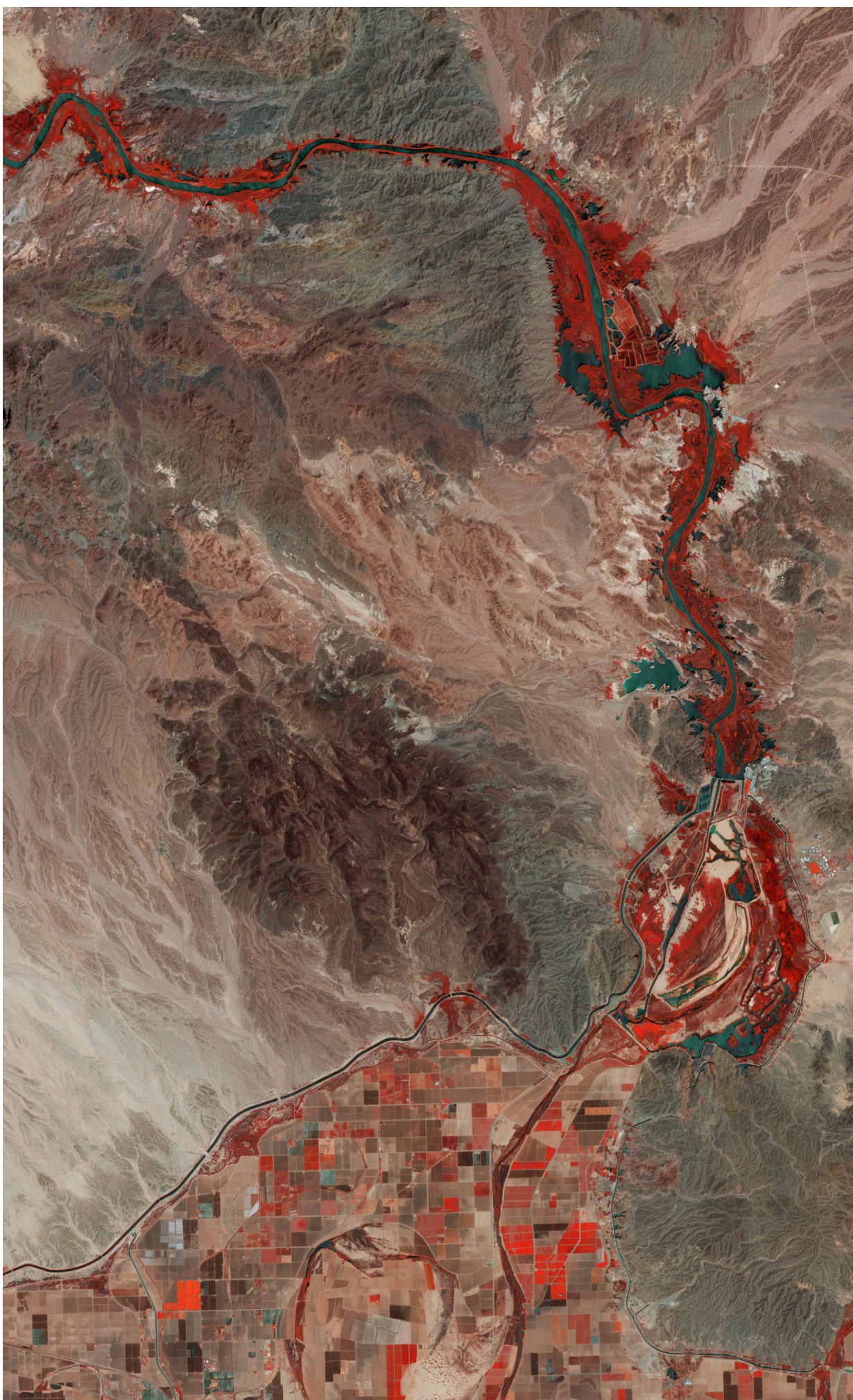




↑ Photo C (from the satellite Sentinel-1A)

teach with space – from the ground and from the sky | PR10a





↑ Photo D (from the satellite Sentinel-1A)

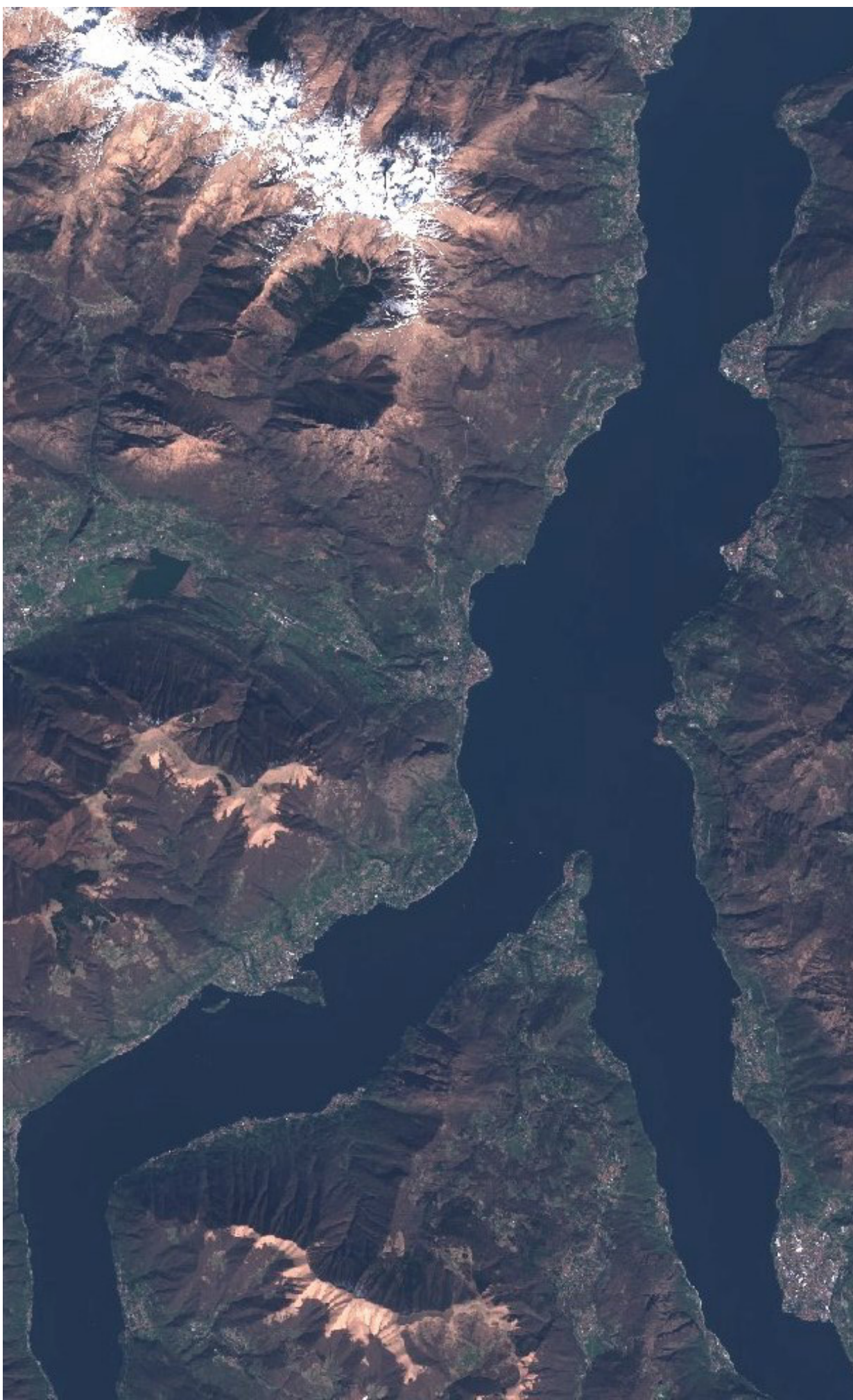




↑ Photo E (from the satellite Sentinel-2A)

teach with space – from the ground and from the sky | PR10a





↑ Photo F (from the satellite Sentinel-2A)

teach with space – from the ground and from the sky | PR10a



→ LINKS

ESA resources

ESA classroom resources:

www.esa.int/Education/Classroom_resources

ESA Kids homepage:

www.esa.int/esaKIDSen

Paxi Fun Book:

<https://esamultimedia.esa.int/docs/edu/PaxiFunBook.pdf>

ESA missions

Sentinel-1:

http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-1

Sentinel-2:

http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-2

Extra information

ESA Kids Climate Change website:

<https://www.esa.int/esaKIDSen/Climatechange.html>

ESA Climate Change Initiative:

<https://climate.esa.int/en/about-us-new/climate-change-initiative>

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www.esa.int/education

The ESA Education Office welcomes feedback and comments
teachers@esa.int

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