

Remote Sensing: Observing the Spatial from Space

Dr Becky Collins

School of Geographical Sciences

University of BRISTOL

Outline

01 Observing Earth from space

02 Tracking environmental change from orbit

03 Remote sensing in the Geography classroom

04 Questions



01

Observing Earth from Space

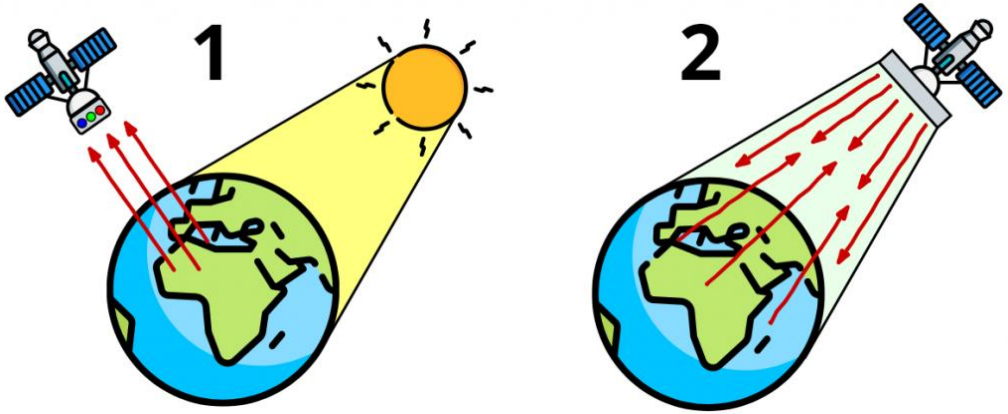
What is remote sensing?

‘the process of collecting data about an object or area from a distance without making physical contact’ (USGS, 2026)



Sensor Types

Passive and Active sensors



Passive sensors (1) receive reflected solar radiation. These can include:

Accelerometers

Radiometers

Spectrometers

Sounders

Active sensors (2) emit energy and detect that energy being reflected back. These can include:

LiDAR

RADAR

Scatterometers

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Earth observation missions

There are over 50 different earth observation missions currently active.

Programme	Agency	Active Since
Landsat	NASA/USGS	1972
MODIS	NASA	1999
VIIRS	NASA/NOAA	2011
Copernicus Sentinel	ESA/EU	2014
ICESat-2	NASA	2018
SWOT	NASA/CNES	2022

Why remote sensing?

Global Problems

Global Solutions

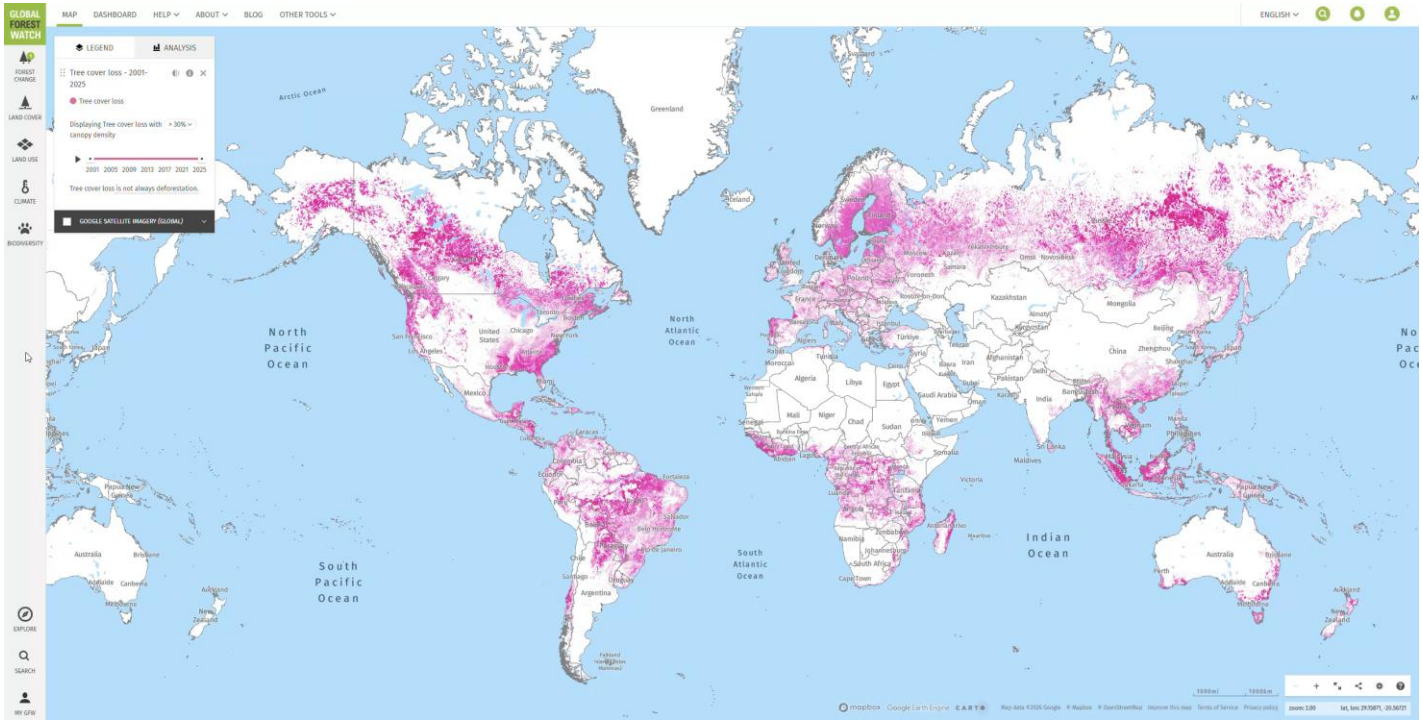
Global Data



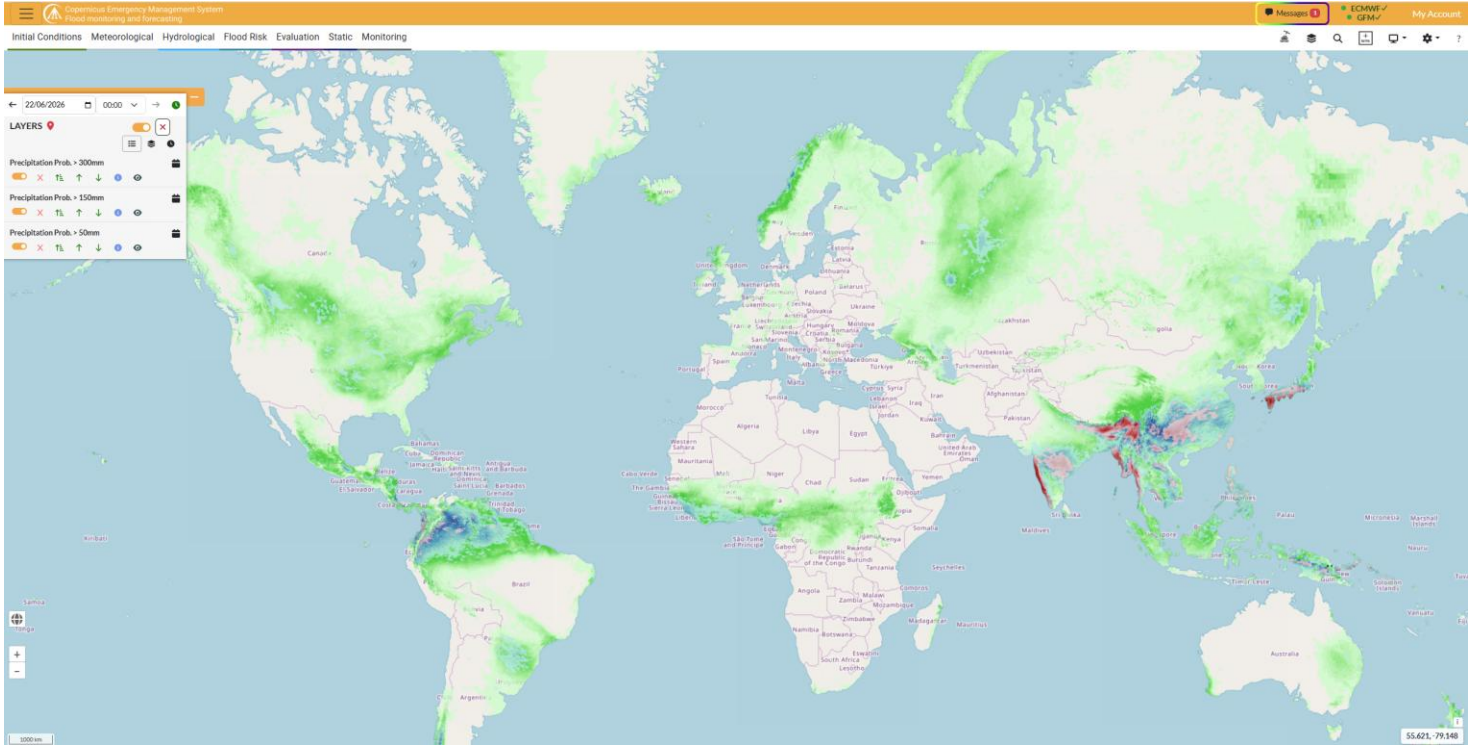
02

Tracking environmental change from orbit

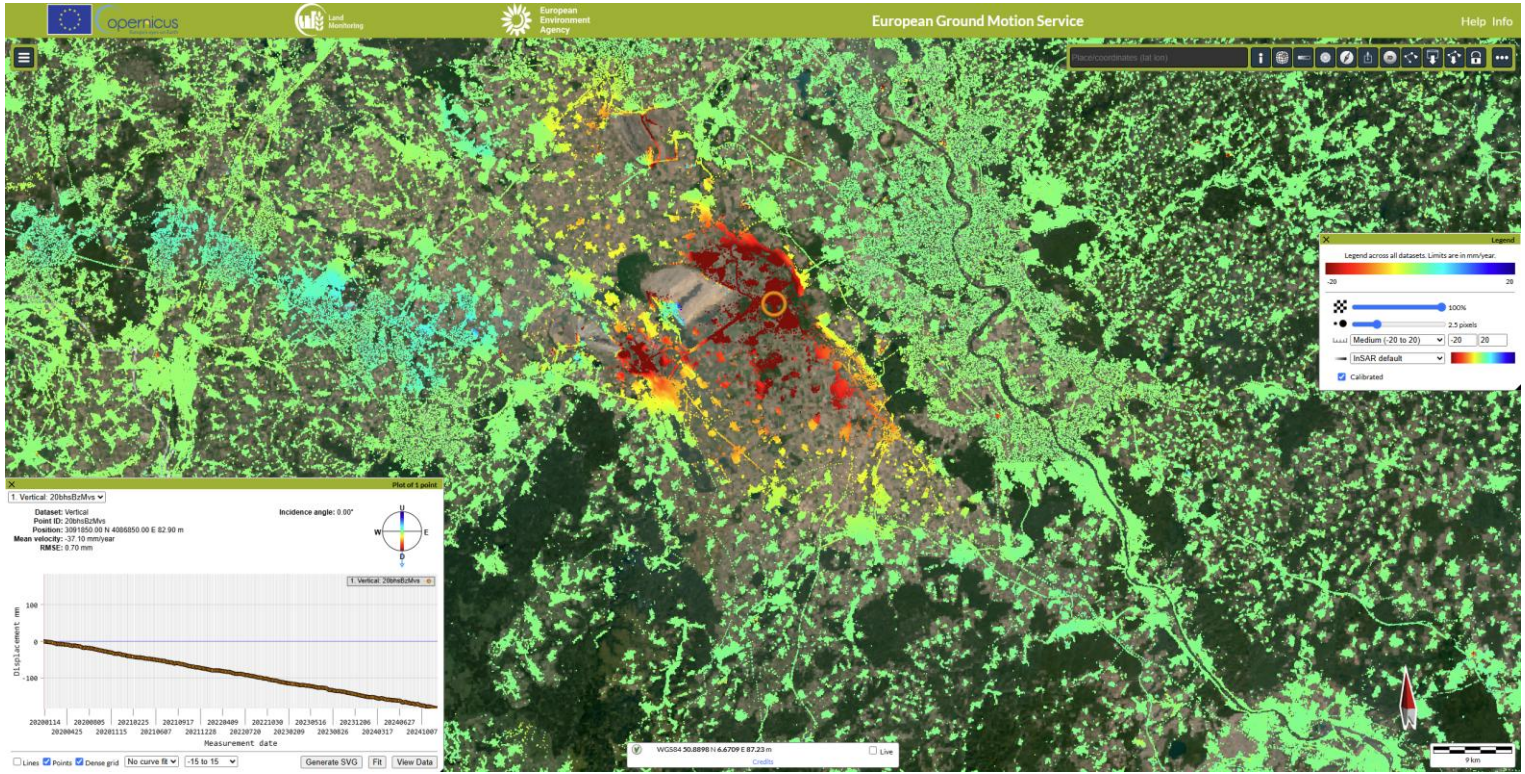
Tree Cover and Deforestation



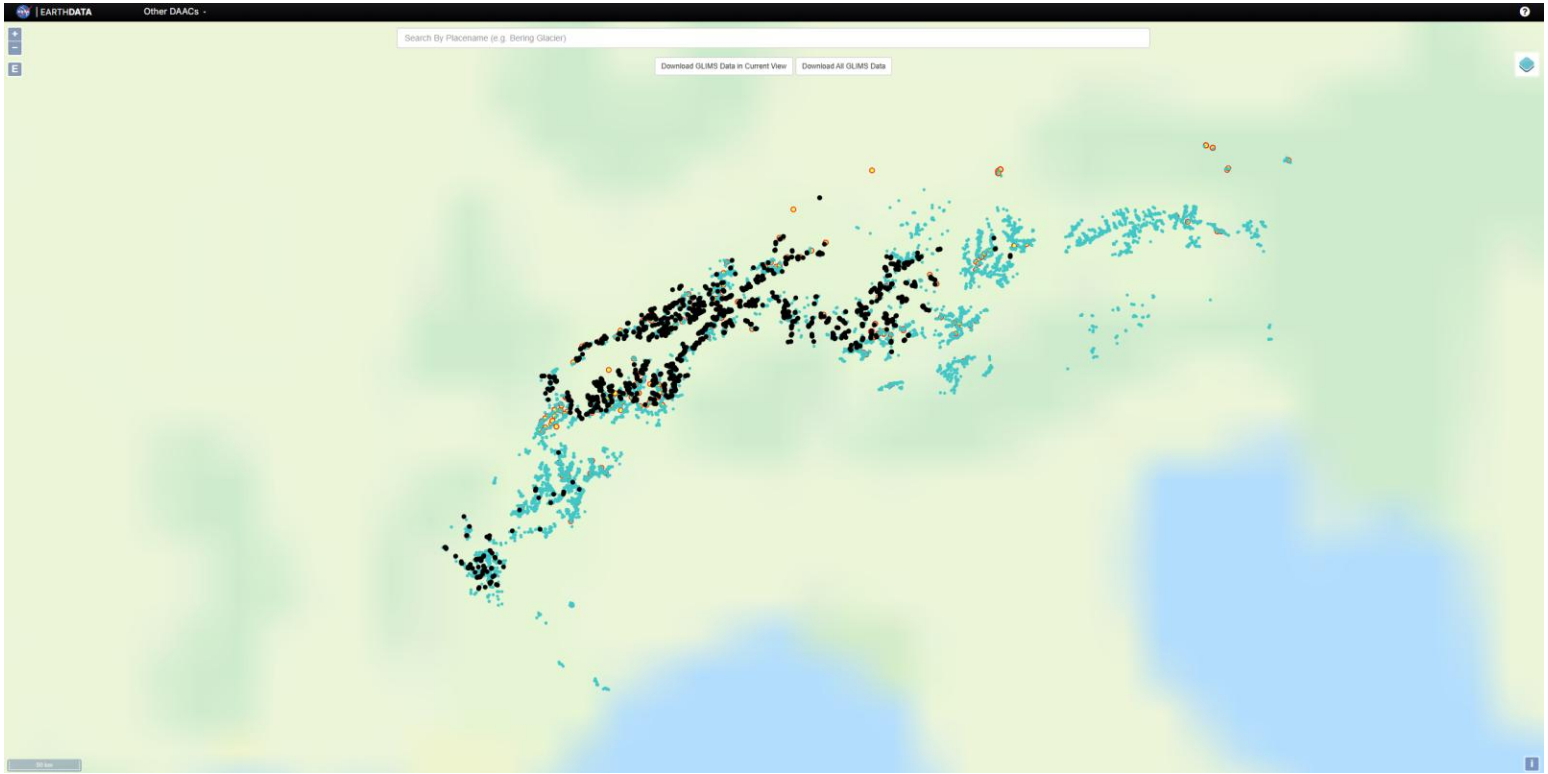
Flood Forecasting



Land Surface Change



Glacier Monitoring



03

Remote sensing in the geography classroom

Urban Expansion

A google timelapse practical showing the expansion of urban areas in Delian, China and Las Vegas, USA

Aral Sea Reduction

A practical using landsat data covering 40 years showing the reduction in the area of the Aral Sea

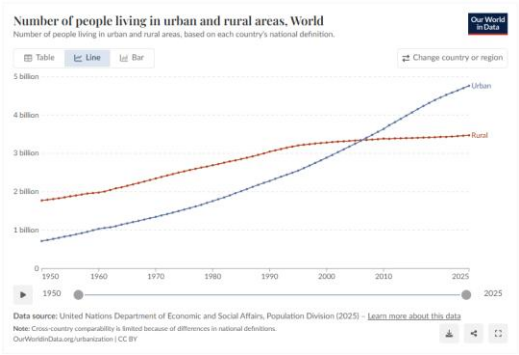
Wildfires, Jasper, Canada 2024

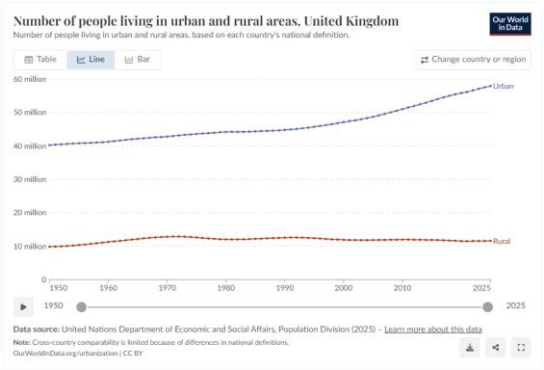
A practical using sentinel data that looks at the burn area for the Jasper Wildfires, Canada, in 2024

Urban Expansion

- In 1950 only 30% of the global population lived in cities
- That number is now 55% and projected to rise to ~70% by 2050
- What are the implications of rapid urban expansion? Consider the environmental, social and political.



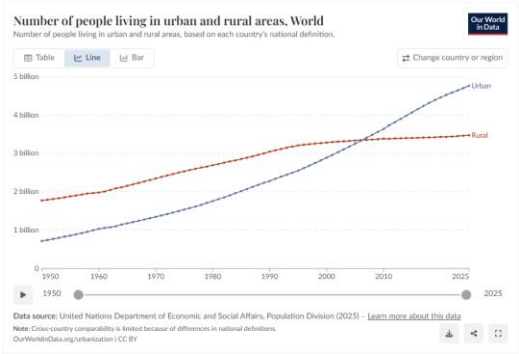


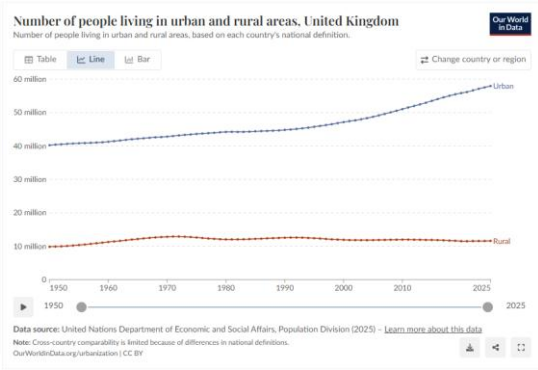


Urban Expansion

- Observe the change in urban coverage in Las Vegas, USA and Dalian, China since 1984
- Discuss the causes and implications of urban growth
- Use Our World in Data to show trends in urbanisation globally and for different nations
- Evaluate the usefulness of RS to observe these changes

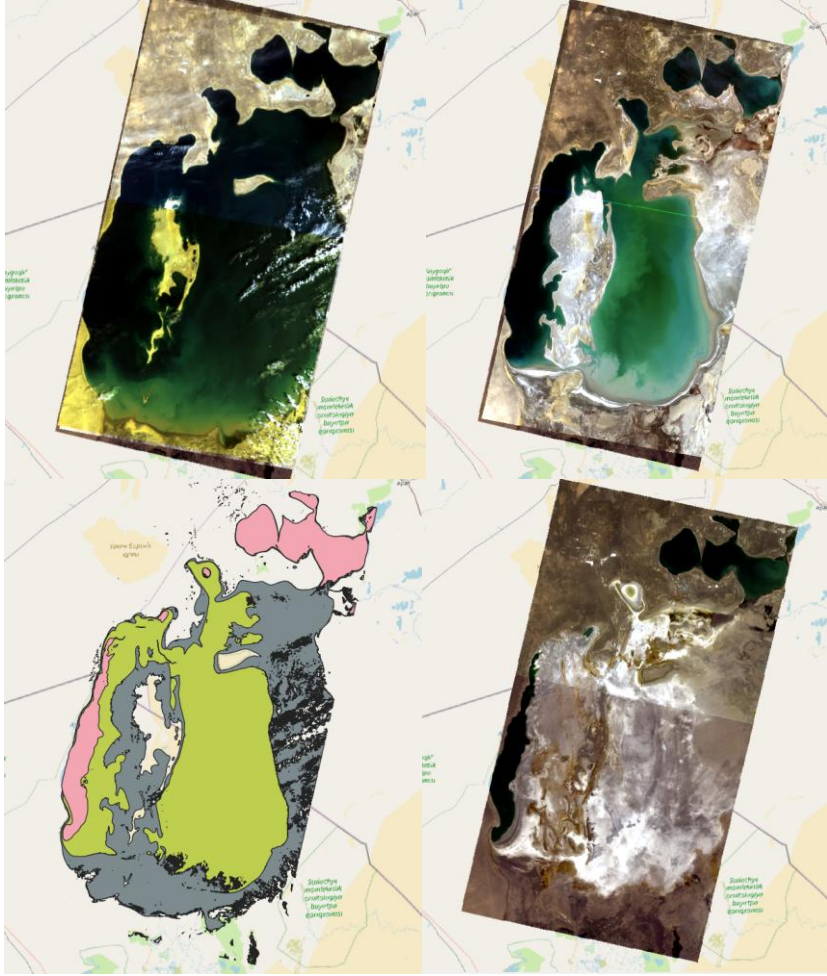






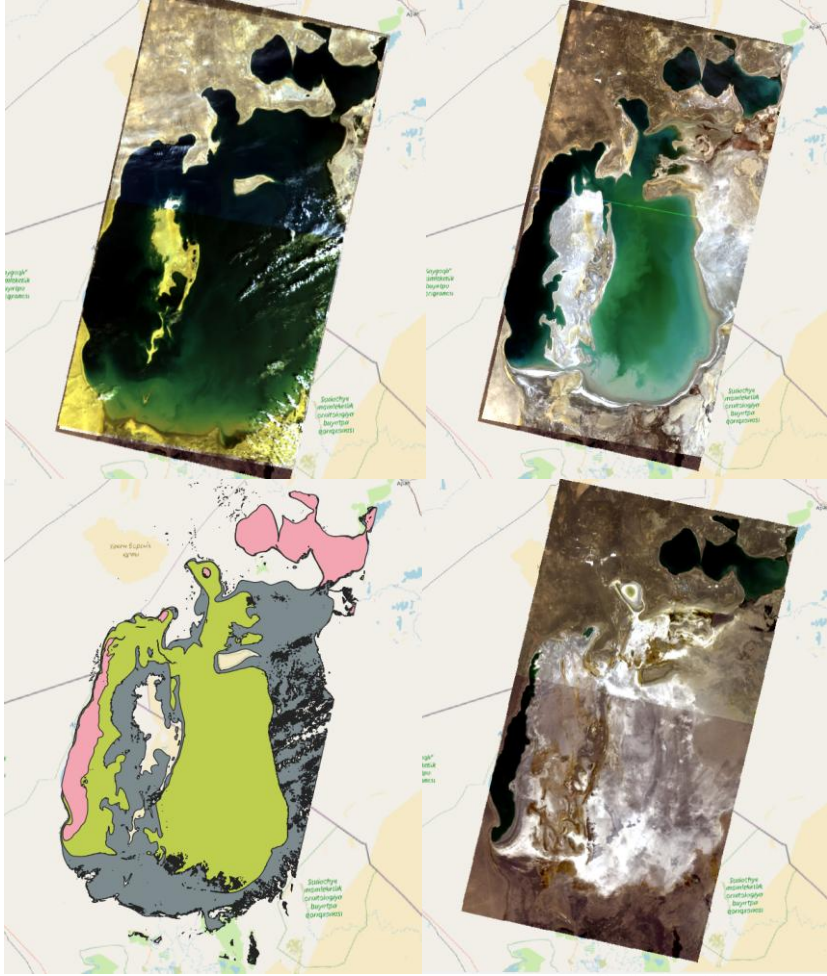
The Aral Sea

- The Aral sea was one of the largest inland bodies of water in the world
- In the 1960s the two source rivers, Amu Darya and Syr Darya were diverted to be used for irrigation.



The Aral Sea

- Observe the change in the Aral sea since 1985
- Calculate the reduction in water area since 1985
- Consider the environmental impacts of the water loss
- Consider the social impacts of the water loss



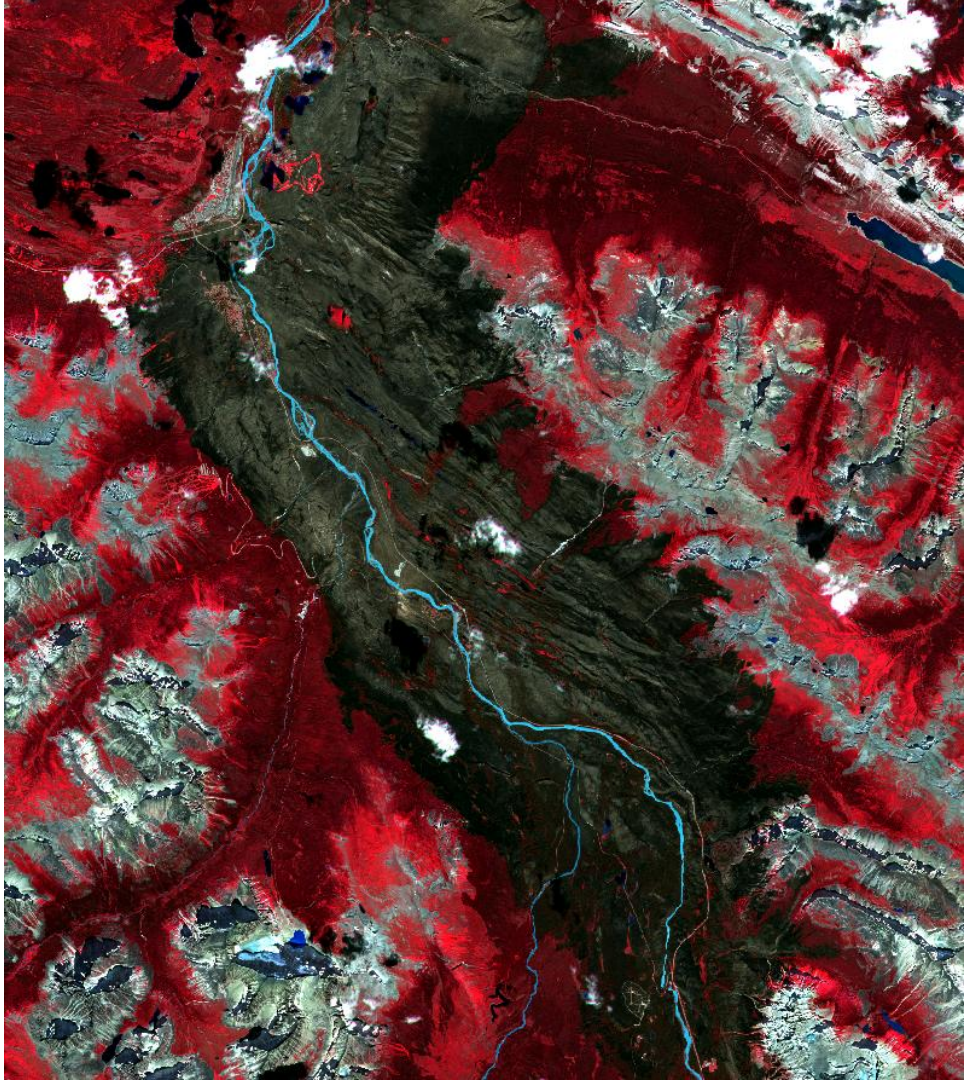
Wildfire Detection

- Wildfires are an increasing environmental threat born of more extreme hot and dry summers
- Wildfires often occur in areas that are not easily accessible
- Early detection of ‘hotspots’ can help reduce fires
- Better estimates of burn areas can help target recovery efforts



Wildfire Detection

- Observe the changes in Jasper, Canada from before the wildfires (June 2024) to after the wildfires (September 2024)
- Discuss the ways in which Remote Sensing specifically can help with understanding wildfires



04

Questions?

Thank you

Dr Becky Collins

Becky.collins@bristol.ac.uk

University of BRISTOL