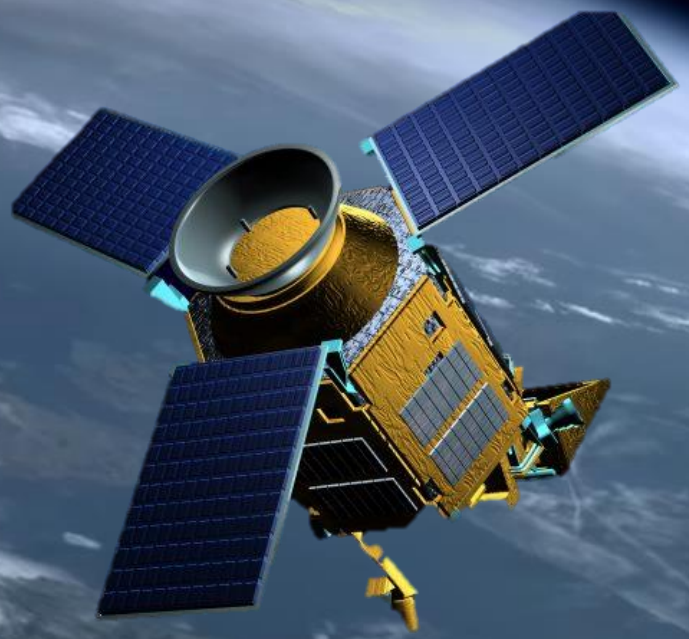


SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Using satellites to enhance environmental evidence in regulatory monitoring and decision making

Claire Neil, Senior Scientist & Earth Observation Lead

NERC UK Climate Resilience Workshop 05/05/2021

SEPA's role

Protect and maintain or improve the environment

Regulate and ensure compliance with environmental regulation

Warn the public in the event of environmental incident

We need timely, reliable and consistent monitoring data

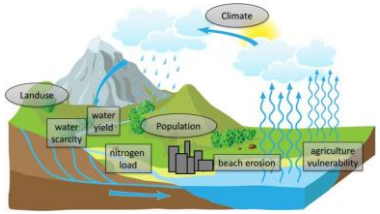
Old versus new(er) data approaches

Traditional methods produced datasets spanning 50+ years and are essential for understanding change.

Digital methods allow us to fill gaps in the past, optimise the present and predict the future.

i) Sampling

- Accepted standard in accuracy
- Long established processes.

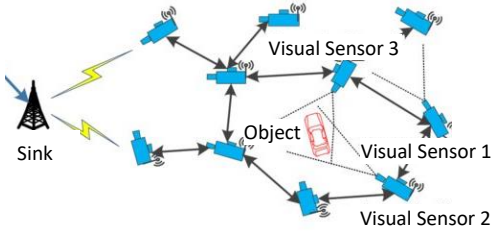


ii) Modelling

- Forecasting and scenario capabilities
- Cause and effect.

iii) Remote Sensing

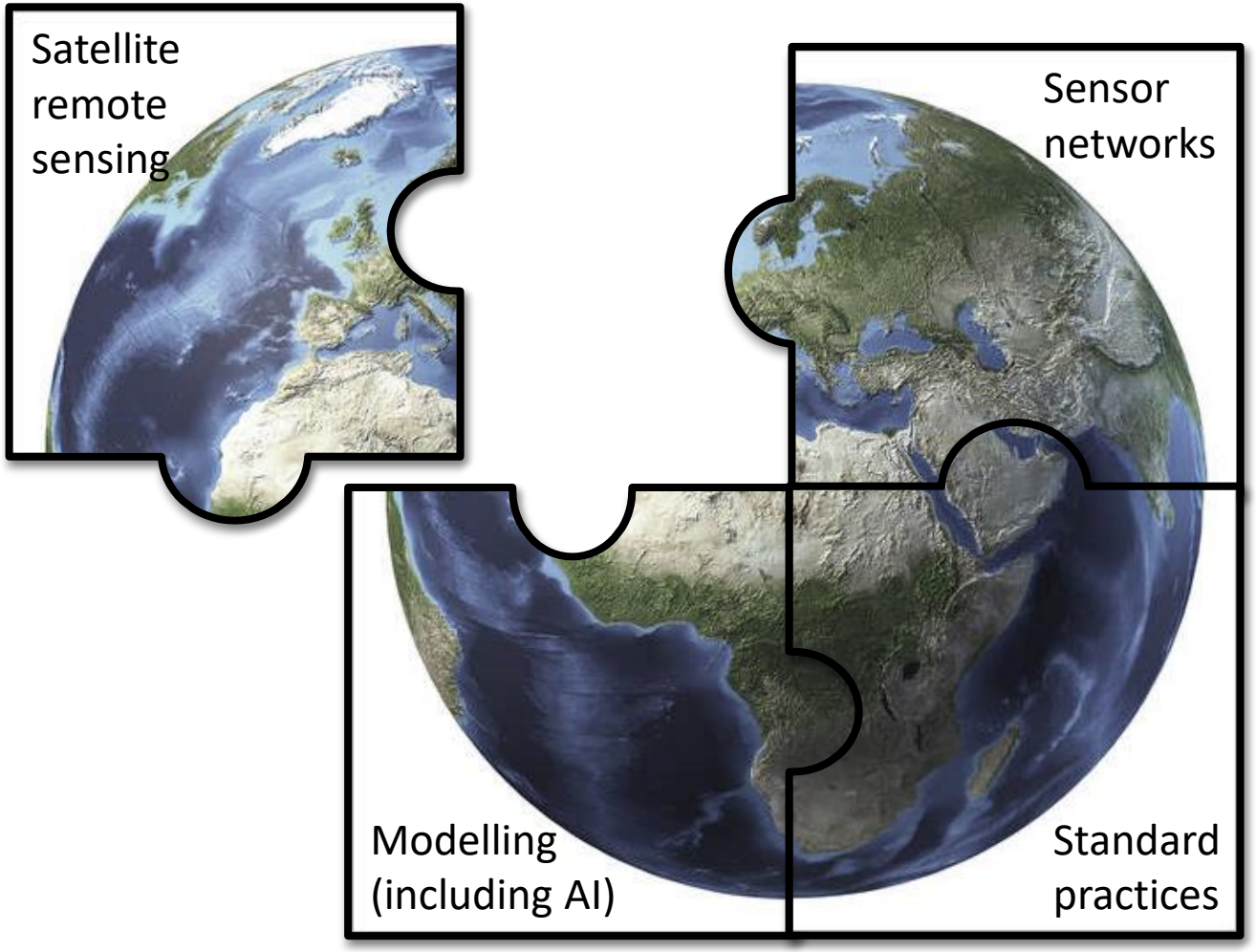
- Consistent measurements (NRT)
- Comparable across catchments, countries, agencies, industries.



iv) Sensor Networks

- Low cost devices
- Collect a lot of temporal data
- Interchangeable.

Combining data to better understand our environment



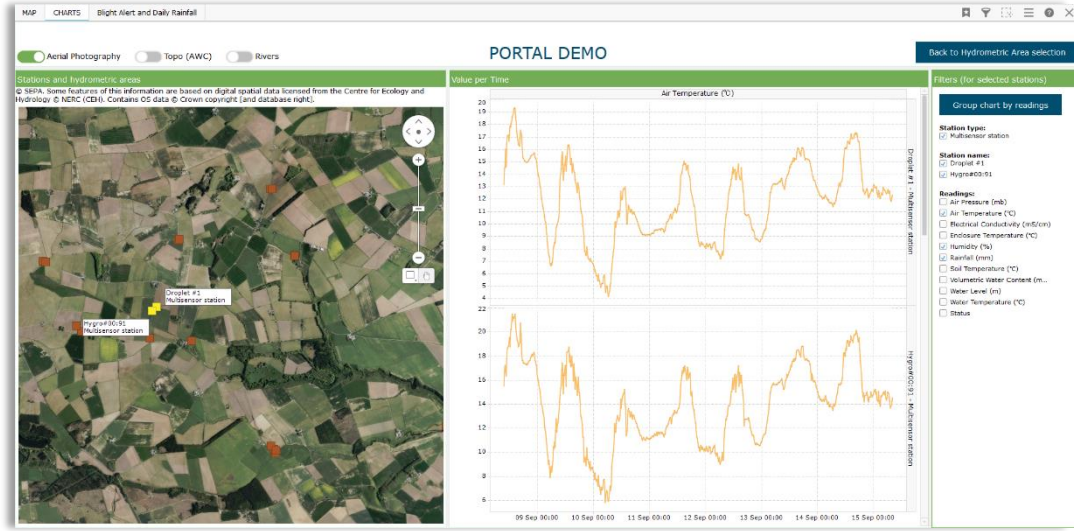
Complete digital environment

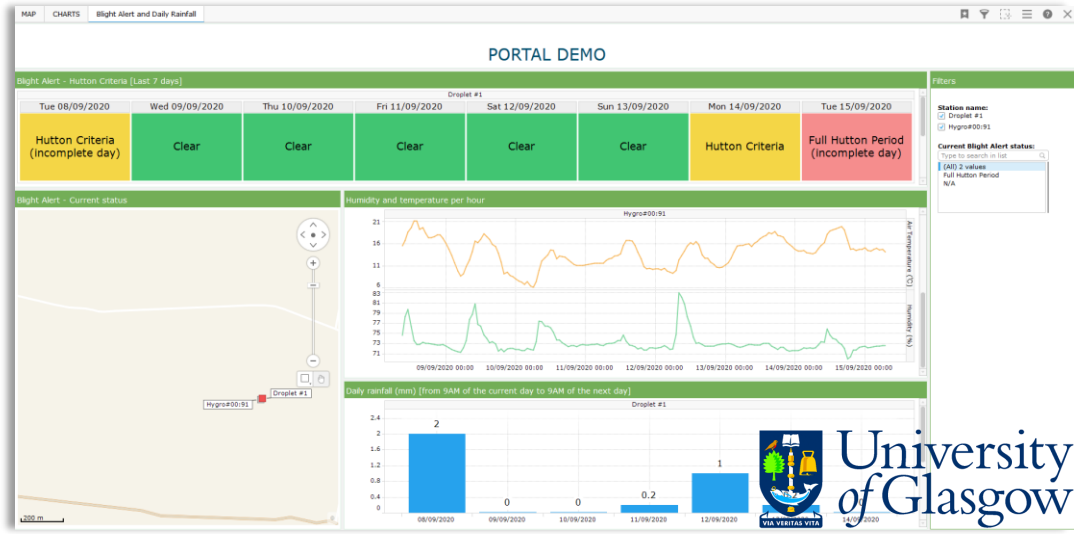
=

Neutral, independent & representative data

SEPA Scottish Environment Protection Agency Buidheann Dion Àrainneachd na h-Alba

Elliot Water irrigation management





University of Glasgow

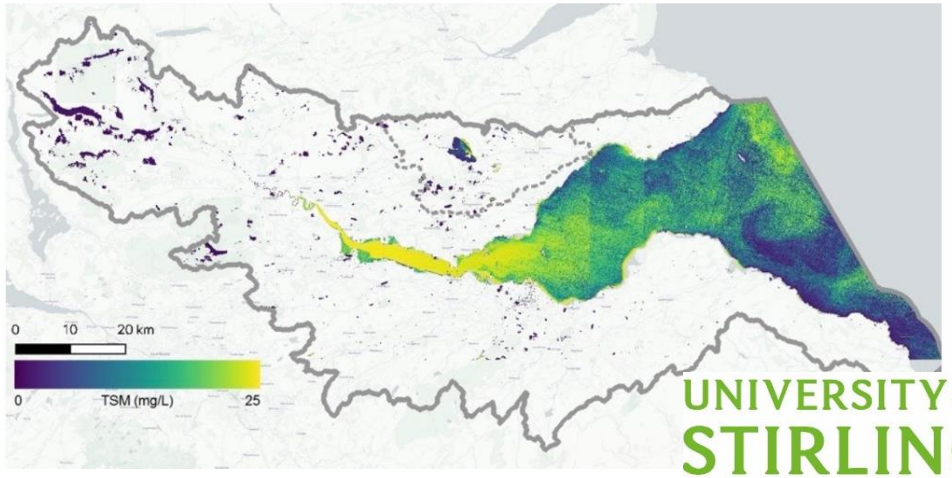
Forth-Environmental Resilience Array

World-leading "living laboratory" for central Scotland

9 September 2020

A state-of-the-art environmental monitoring system – the first of its kind – will be launched in central Scotland to enable businesses and organisations to make decisions based on real-time data.

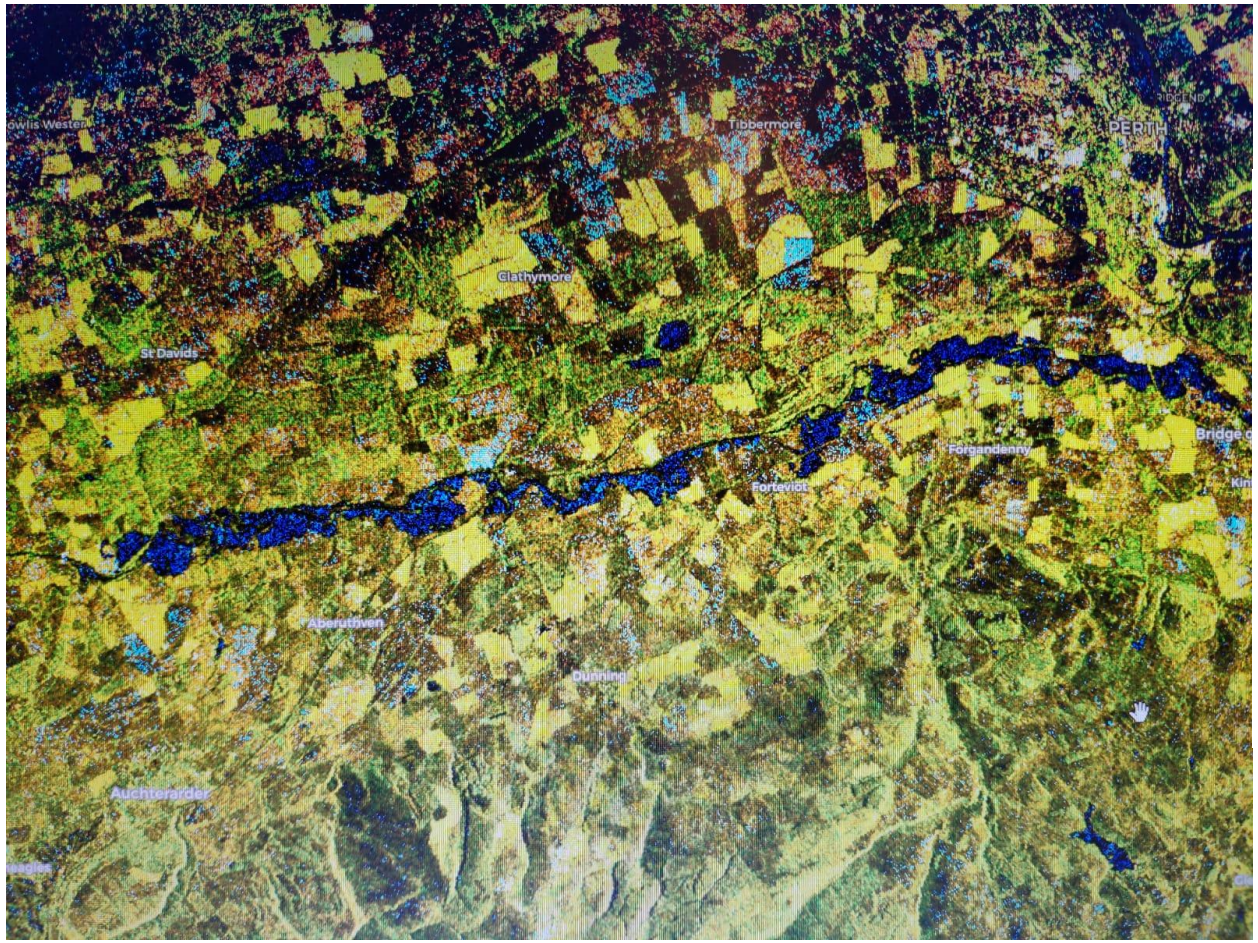
The multi-million-pound project, led by the University of Stirling, will be a "living laboratory" –capturing, processing and sharing data from across Forth Valley using EE's 5G network. It will use sensors, satellite data and artificial intelligence to provide vital information on water quality and other factors to inform decisions that could provide major economic and sustainability benefits to the area.



UNIVERSITY of STIRLING

Use case: Flooding

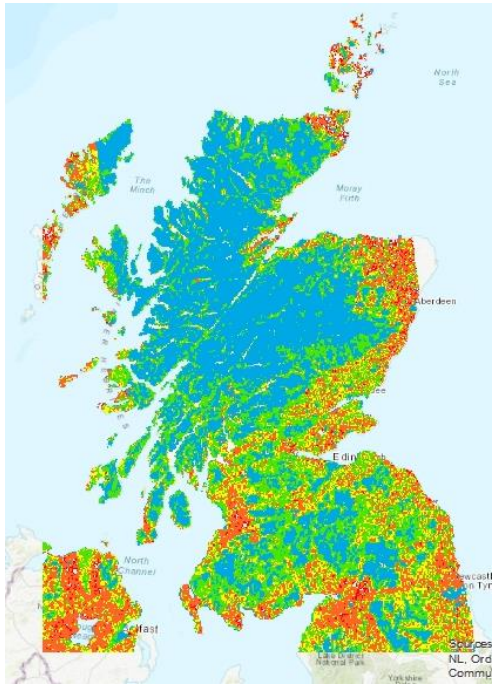
Sentinel-1 image of River Earn



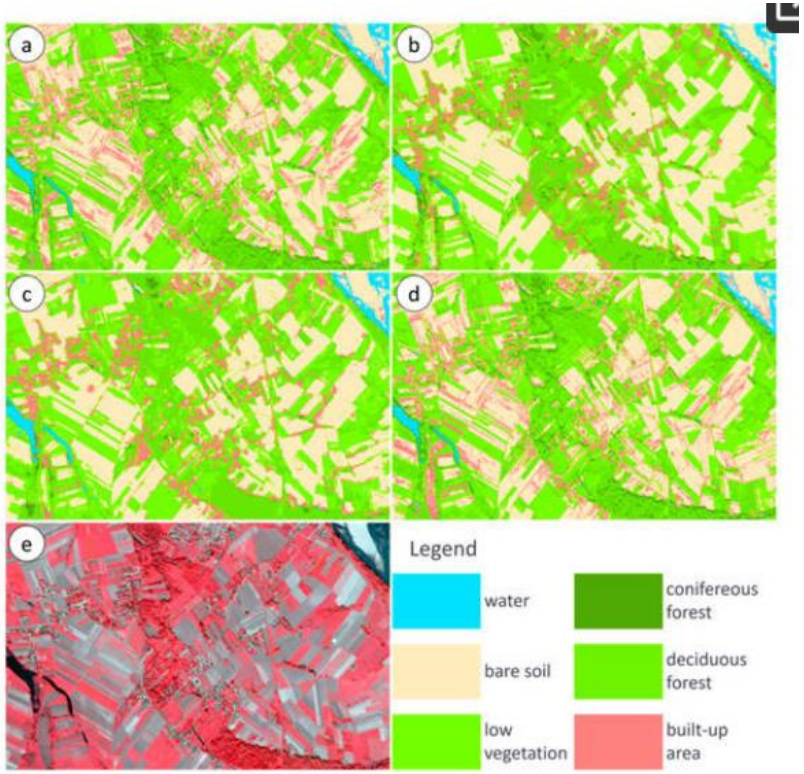
- SAR imagery allows us to calculate the probability that a pixel will be water or land based on historical satellite time series.
- This means we can use these data to generate maps of observed flood risk.

Use case: Drought and impact on soils

Sentinel-1 soil moisture



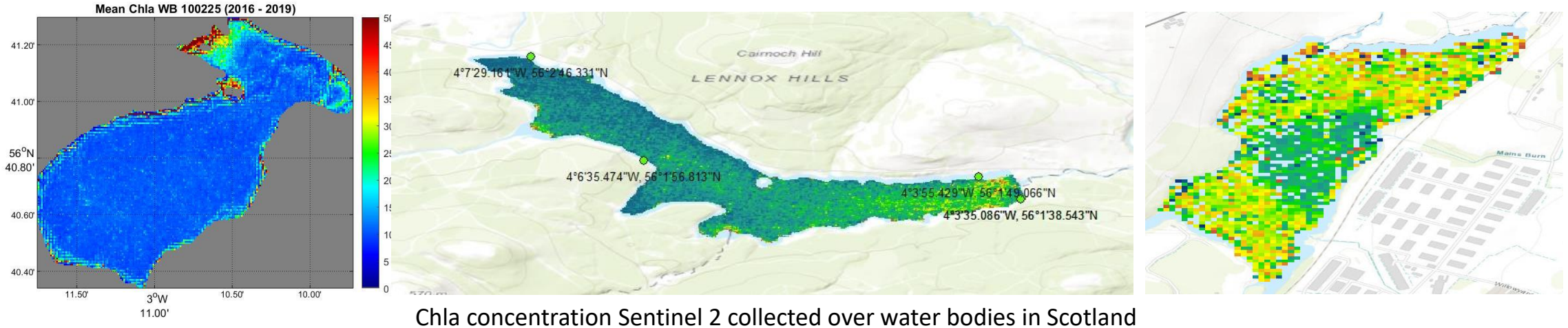
Sentinel-2 and WorldView -2 land classification



- Assessing saturation of land across large spatial areas using soil moisture from satellites.
- Land classification from satellite data allows us to identify regions of bare soil.
- Optimise land management (agriculture and flooding).

Use case: Ecology and Water Framework Directive

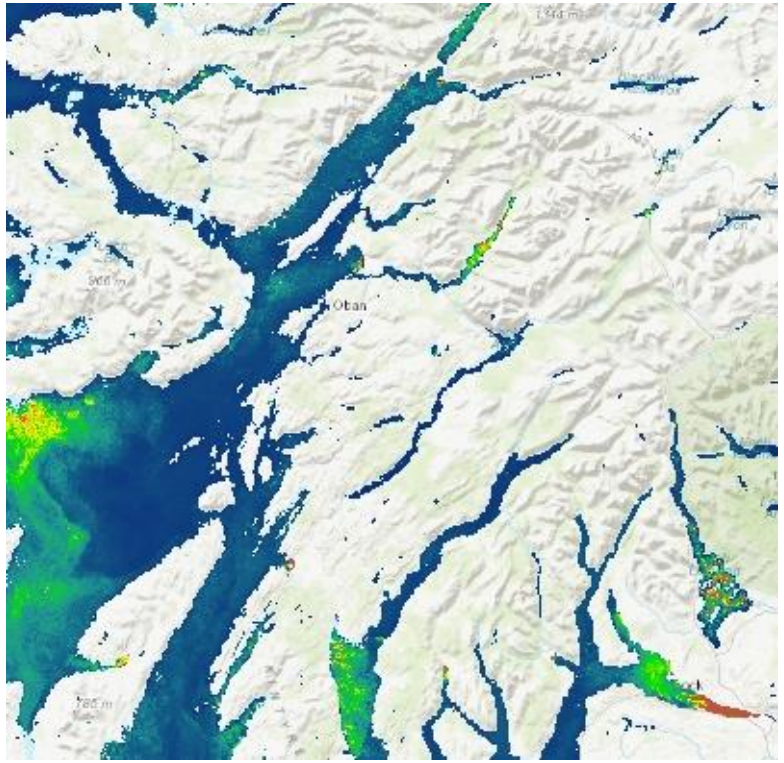
- Provides evidence for lake health.
- Opportunity to quantify and visualise change (trends).
- Fill gaps in space and time (can provide evidence in the absence of sampling).
- Next step: combine cyanobacteria from satellite to complete WFD phytoplankton requirements.



Chla concentration Sentinel 2 collected over water bodies in Scotland

Use case: Aquaculture

Chla concentration Sentinel 2



RGB Sentinel 2

- Additional knowledge of Chla dynamics (space and time).
- Identify regions at (environmental or regulatory) risk.
- Strategic monitoring.
- An immediate resource for assessing and identifying algal events.

Collaboration is key to ensuring sustainability of digital approach

SEPA are working with a number of organisations interested in exploiting satellite technology for environmental monitoring.

marinescotland

defra
Department for Environment Food and Rural Affairs

UNIVERSITY of STIRLING

Scottish Water
Always serving Scotland

Environment Agency

THE UNIVERSITY of EDINBURGH

University of Strathclyde

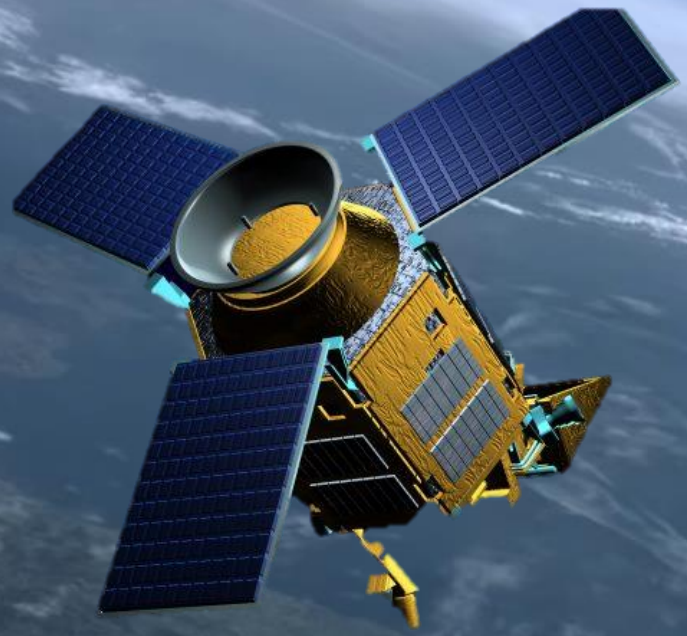
University of Glasgow

epa
Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

The Scottish Government
Riaghaltas na h-Alba

UKRI Natural Environment Research Council



Thank you!

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