



**ICHEC**  
Irish Centre for High-End Computing



## SPÉIR: An open resource for geospatial developers

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[www.ichec.ie](http://www.ichec.ie)

# Presentation summary

- SPÉIR: Satellite Platform for Éire
- Mission statement
- Current status
- Development plans
- Further information

# SPÉIR Mission Statement:

To provide access to and facilitate the use of Copernicus EO data and services for Irish users.

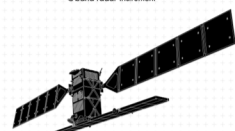
## COPERNICUS AND ITS SENTINELS

European Earth Observation Programme Copernicus: observing our planet for a safer world

-  Known as GMES until 2012. Global Monitoring for Environment and Security
-  30 Public and Private missions are also contributing data
-  16 years of development and testing
-  Sentinel-Missions at the heart of the space component
-  Civil Security: Allowing early warning and crisis prevention in conflict and disaster areas
-  Emergency Management: Accurate and timely data for emergency plans and rescue for disaster management
-  Land Surface Monitoring: Geographical information on land cover, related variables and urban development
-  Marine Environmental Monitoring: Observations and forecasts on the state of the physical oceans and regional seas
-  Climate Change Monitoring: Helps to understand the reason for climate change, rising sea levels and melting ice caps
-  Earth Atmosphere Monitoring: Daily information on the global atmospheric composition and when Sentinel-4 is in service this will be hourly

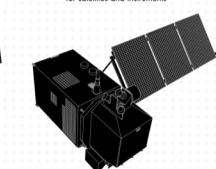
### SENTINEL-1

- All-weather, day-and-night radar imaging satellite for land and ocean services
- Able to "see" through clouds and rain
- Data delivery within 1 hour of acquisition
- Airbus Defence and Space developed C-band radar instrument



### SENTINEL-2

- Medium Res Multispectral optical satellite for observation of land, vegetation and water
- 13 spectral bands with 10, 20 or 60 m resolution and 290km swath width
- Global coverage of the Earth's land surface every 5 days
- Airbus Defence and Space prime contractor for satellites and instruments



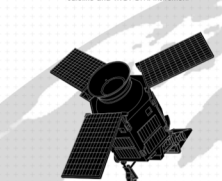
### SENTINEL-3

- Measures sea-surface topography with a resolution of 300 m, sea and land surface temperature and colour with a resolution of 1 km
- Measures water vapour, cloud water content and thermal radiation emitted by the Earth
- Determines global sea surface temperatures with an accuracy greater than 0.3 K
- Airbus Defence and Space supplies Microwave Radiometer



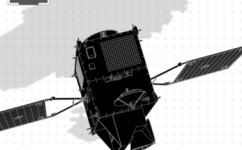
### SENTINEL-5P

- Global observation of key atmospheric constituents, including ozone, nitrogen dioxide, sulphur dioxide and other environmental pollutants
- Improves climate models and weather forecasts
- Provides data continuously during five-year gap between the retirement of Envisat and the launch of Sentinel-5
- Airbus Defence and Space prime contractor for satellite and TROPOMI instrument



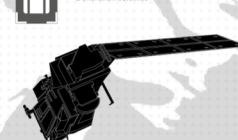
### SENTINEL-4

- Provides hourly updates on air quality with data on atmospheric aerosol and trace gas concentrations
- Spatial sampling is 8 km and spectral resolution between 0.12 km and 0.5 km
- Airbus Defence and Space prime contractor for spectrometer
- Carried aboard EUMETSAT's Meteosat Third Generation (MTG) satellites



### SENTINEL-5

- Measures air quality and solar radiation, monitors stratospheric ozone and the climate
- Global coverage of Earth's atmosphere with an unprecedented spatial resolution
- Airbus Defence and Space prime contractor for instrument
- Carried aboard EUMETSAT's MetOp Second Generation satellites



### SENTINEL-6

- Observes changes in sea surface height with an accuracy of a few centimeters
- Global mapping of the sea surface topography every 10 days
- Enables precise observation of ocean currents and ocean heat storage, vital for predicting rises in sea levels
- Airbus Defence and Space prime contractor for satellite



# SPÉIR Aims

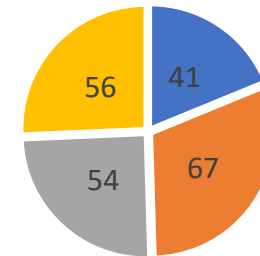
- To collate and archive Sentinel and third party mission data relevant to Ireland
  - Data automatically archived over Ireland
  - Other areas of interest will be archived on request
- To provide free and open access to archives
- To provide data and processing services
- To develop a user base including public agency, academic and commercial users



# SPÉIR Current Status

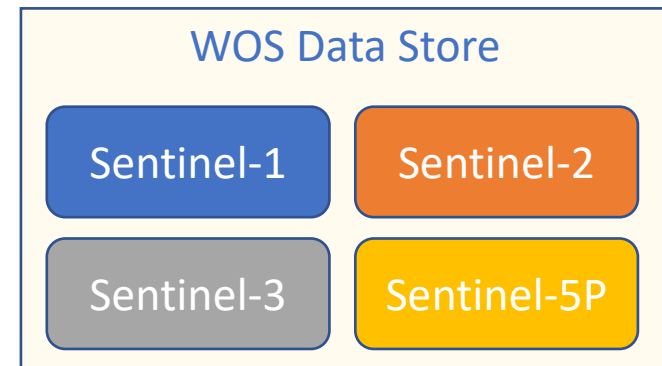
- Data archive is accumulating
  - Sentinel-1
  - Sentinel-2
  - Sentinel-3 (Land)
  - Sentinel-5P (not yet public)
- Data is being stored over Ireland and the North Atlantic
- Requests for additional data coverage should be made to: [speir@ichec.ie](mailto:speir@ichec.ie)

Number of Tb stored

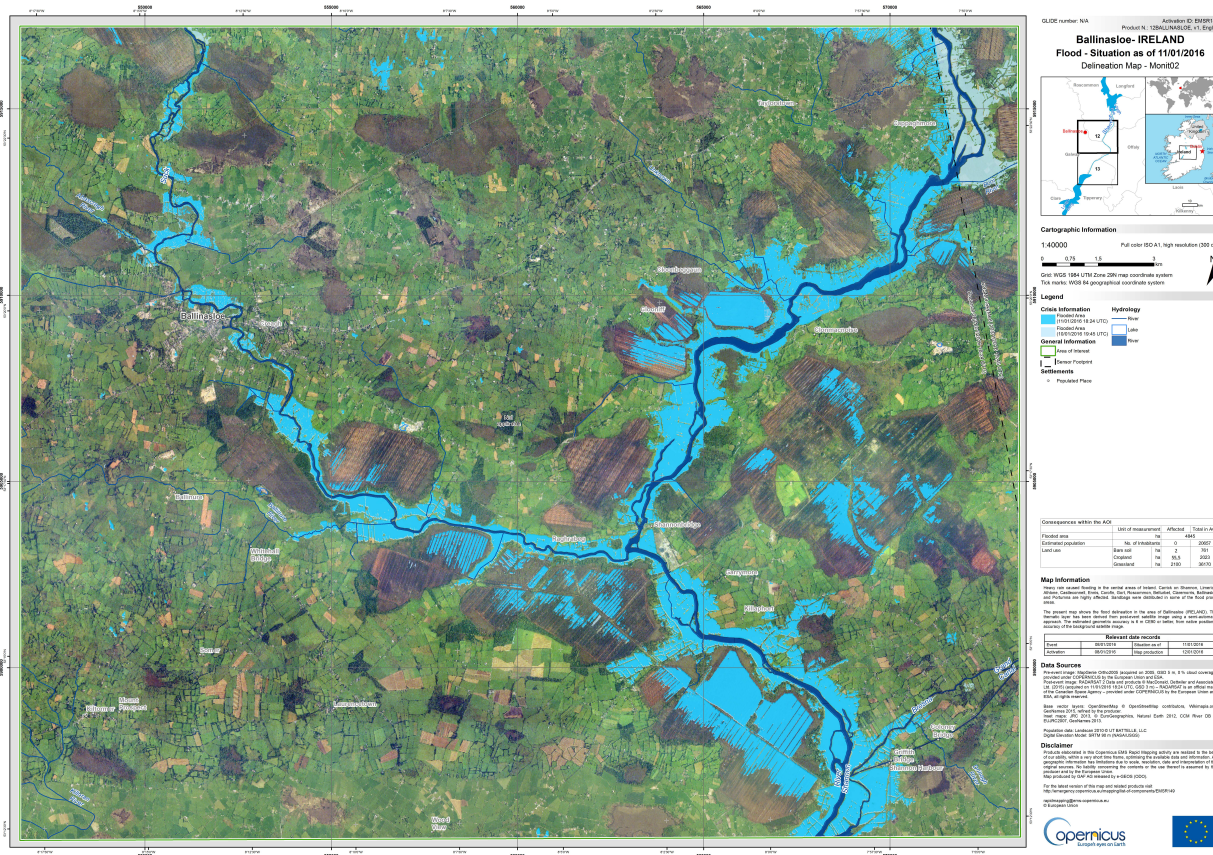


■ S-1 ■ S-2 ■ S-3 ■ S-5P

WOS Data Store



# Sentinel-1: Synthetic Aperture Radar

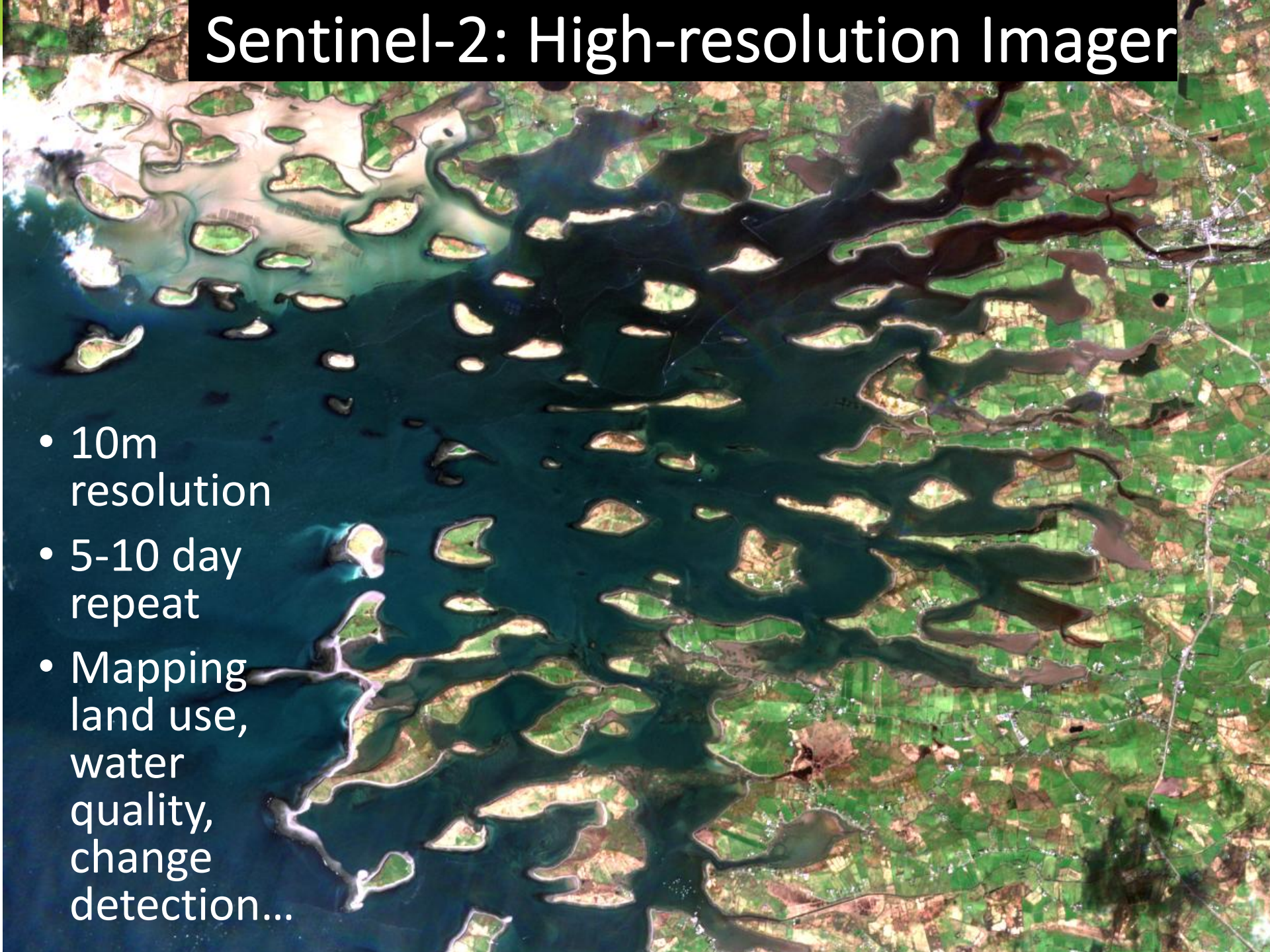


- Measures elevation and surface roughness
- Mapping land use, water bodies, forestry, flooding
- Sees through clouds



# Sentinel-2: High-resolution Imager

- 10m resolution
- 5-10 day repeat
- Mapping land use, water quality, change detection...





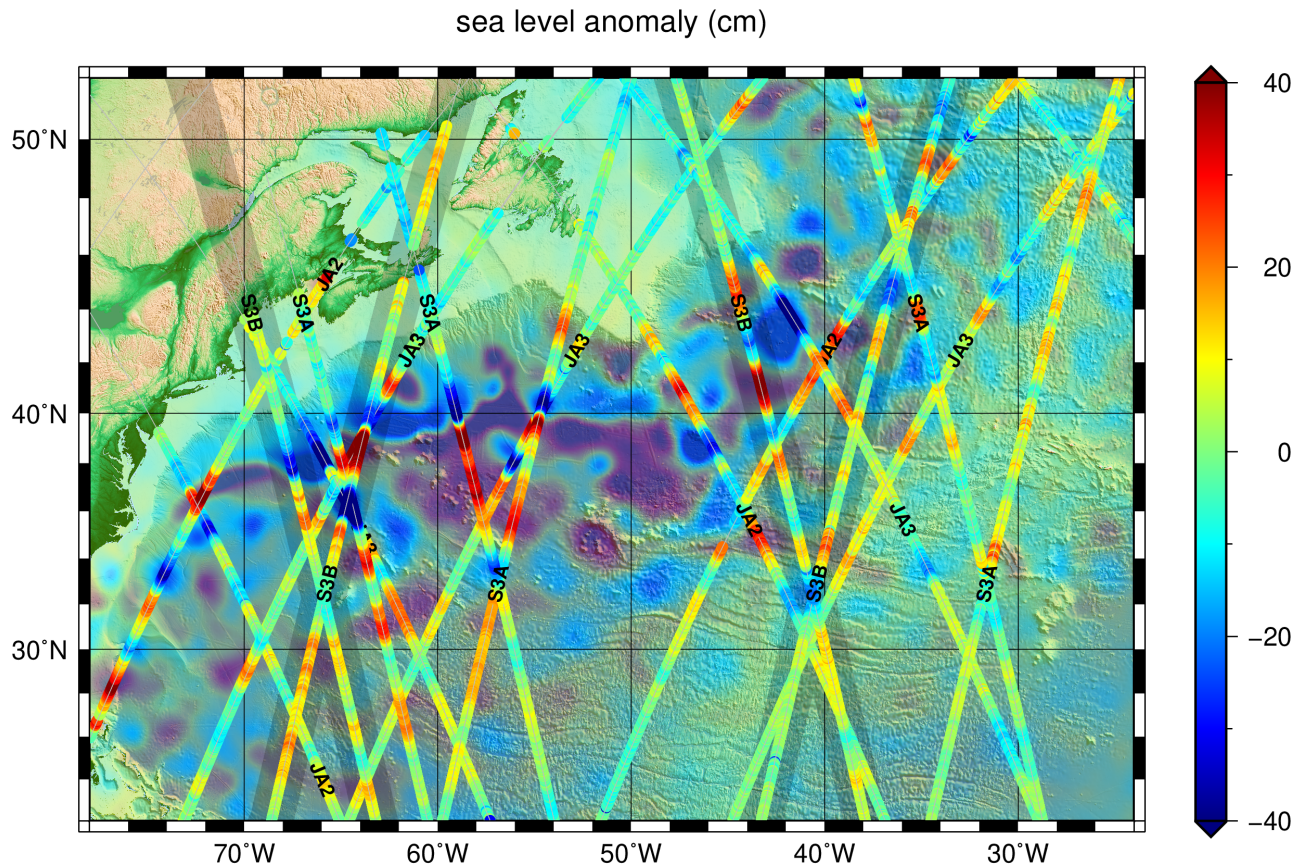
# Sentinel-3: Medium- resolution Imager

- 300m resolution
- Daily overpass
- Ocean chlorophyll, PAR, TSM, absorption





# Sentinel-3: Altimeter

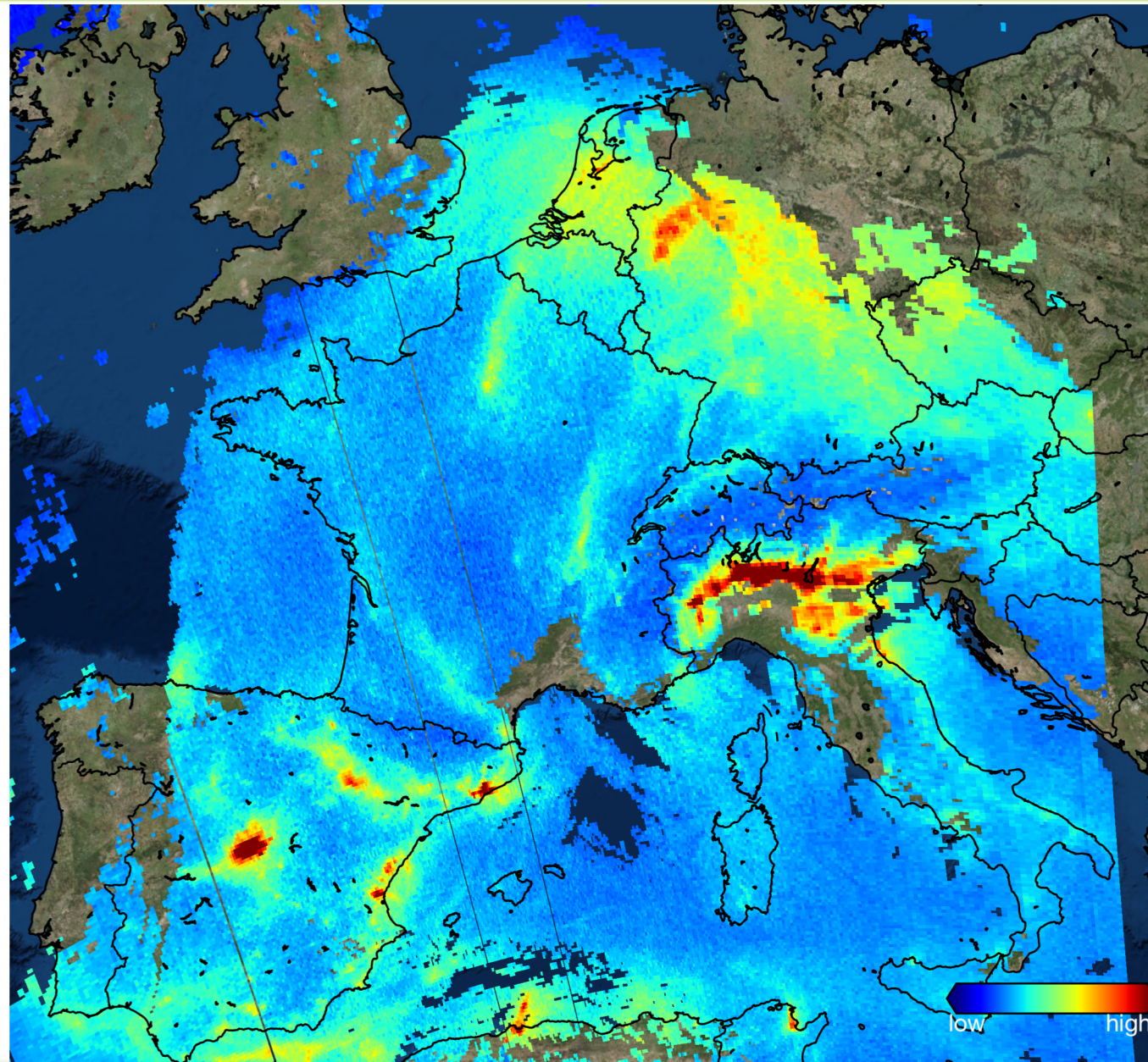


- Sea surface height gives geostrophic currents
- Backscatter gives significant wave height



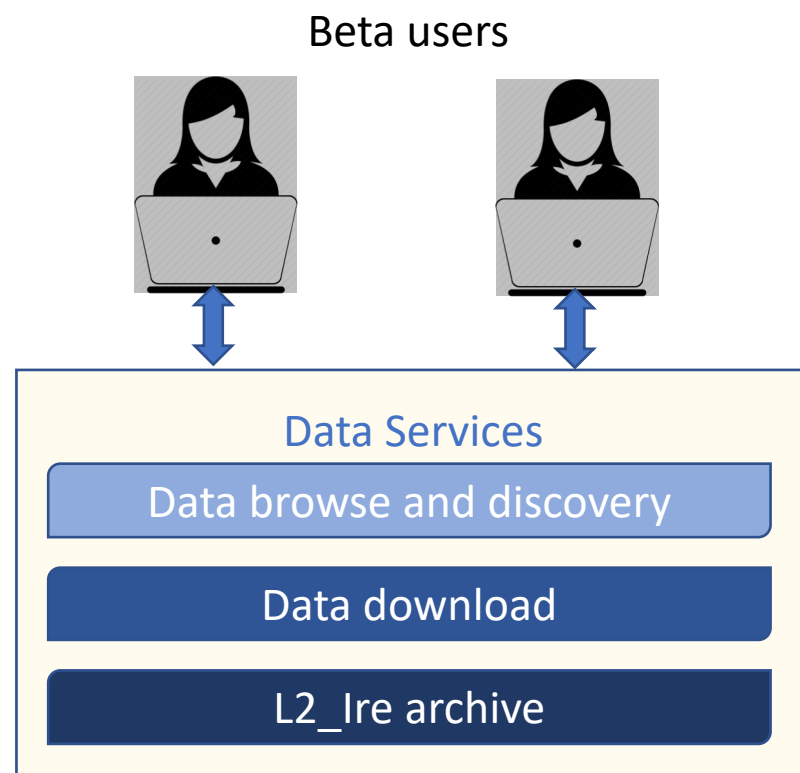
## Sentinel-5P: Atmospheric trace gases, aerosols and clouds

- Monitoring of greenhouse gas emissions
- Air pollution monitoring and alerts
- Volcanic aerosols



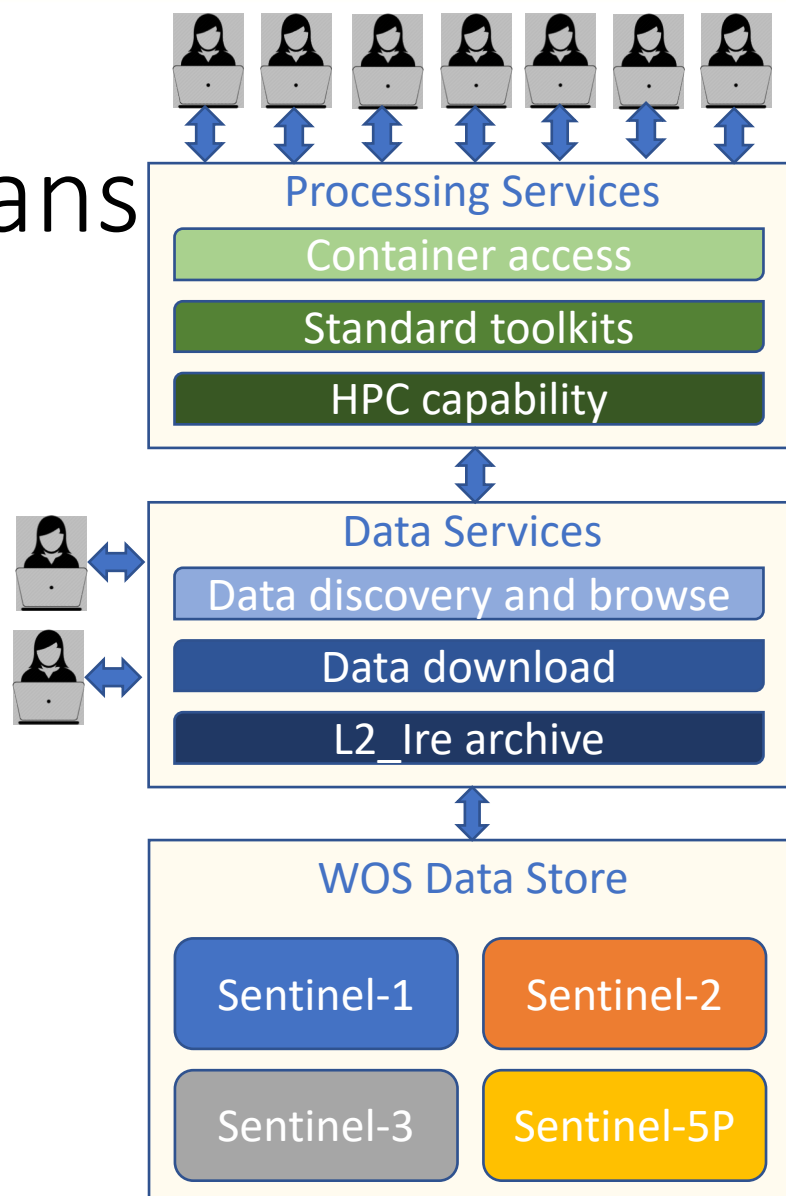
# SPÉIR target for end Q3 2018

- Migration to new HPC infrastructure
- Data processing services:
  - L2\_Ire: new ITM reprojected Sentinel 2 data product to facilitate data cube applications
- Data access services:
  - Browse, discovery
  - Download, subset
- Beta users invited to try out system



# SPÉIR – future plans

- User survey
  - Get feedback on most useful data and services in Irish context
  - Prioritise service development based on feedback
- Launch and roll-out of data services early 2019
- Development of processing services from 2019 onwards
  - Container access
  - Toolkits for remote processing of data
  - HPC facilities





# SPÉIR – further information

- Please get in touch to be part of
  - User survey
  - Beta-user group
  - **Machine learning for environmental applications of satellite data** proposal – EPA open call
- For more information, please see the website:  
speir.ichec.ie
- Or email:

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