



Marine Services using Copernicus Data

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Marine Data Systems
Robust, Reliable, Secure

- Company Overview – The Digital Ocean
- TechWorks Marine Data Services
- Marine Data Services using Copernicus data
- Challenges

ROBUST
RELIABLE
SECURE
MARINE
DATA



D I G I T A L
O C E A N



TECHWORKS MARINE

Robust, Reliable, Secure Marine Data



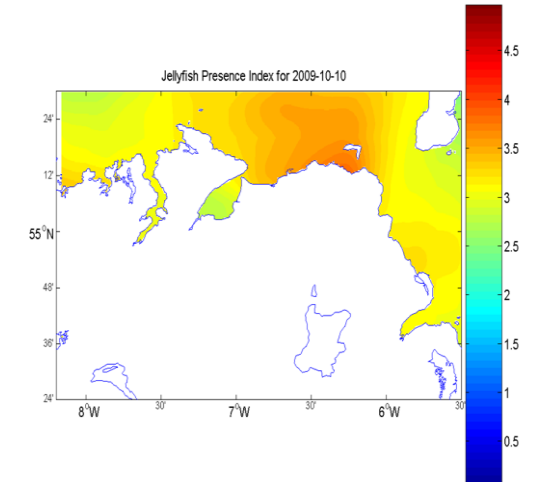
Integrated Data Buoys

- Real-time enabled
- TMBB data acquisition technology
- Plug and play with a wide range of marine sensors
- 3G, VHF, and Iridium communications.



Through-life service provision

- Regular field service
- Data telemetry
- Data management including: quality assurance, calibration
- Live data portals



Value added products/services

- Validating numerical models
- Hydrographic/Metocean survey provision
- Equipment sales/Rental
- Developing validated EO data services

TechWorks Marine are providers of comprehensive **data acquisition services** to private and public sectors internationally including :

- Aquaculture
- Coastal Engineering
- Ports and Harbours
- Marine Renewables
- Water and Utilities
- Research and Academia



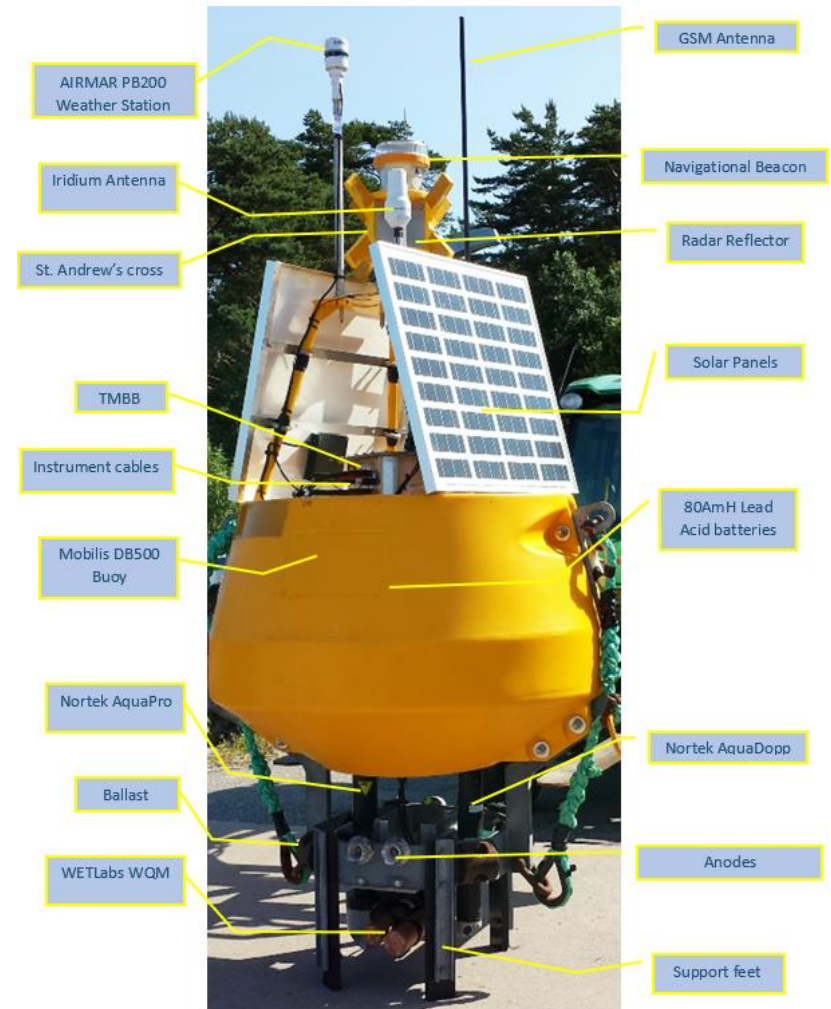
Based around the TMBB Buoy Controller



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Integrated MetOcean Data Buoys:

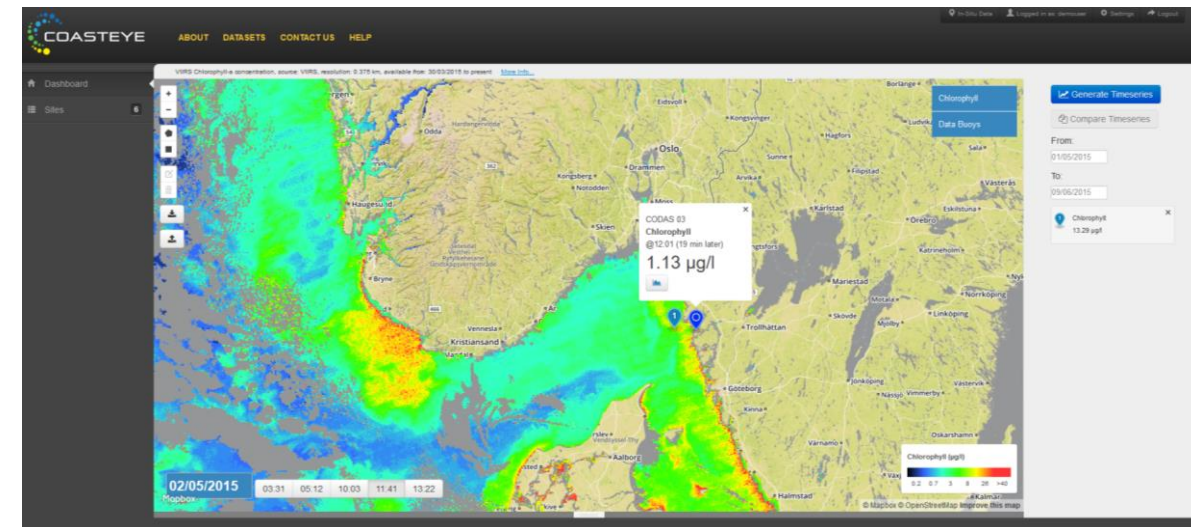
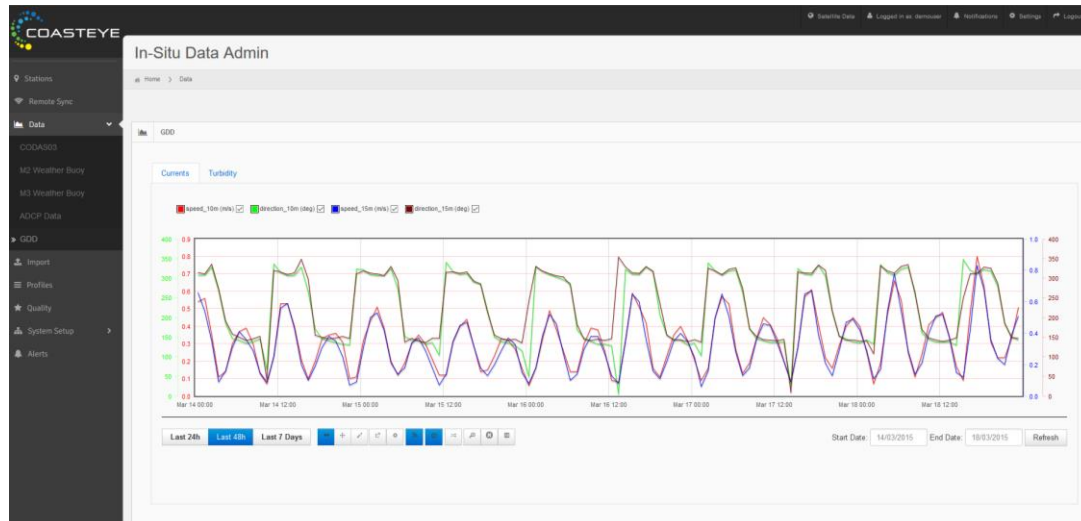
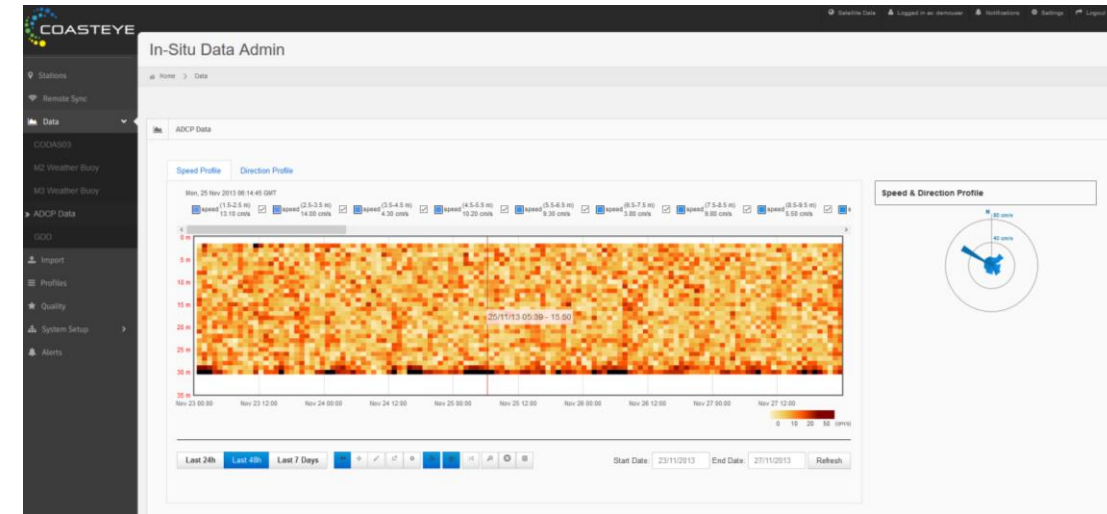
- Meteorological Data
 - Wind Speed/Direction
 - Pressure
 - Temperature
- Oceanographic Data
 - Water Quality
 - Currents
 - Spectral Wave
 - Temperature/Salinity
 - Video
 - Hydrophones
 - Radiance/Irradiance
- AIS
 - Transmitting live Met. And Sea State Data over AIS



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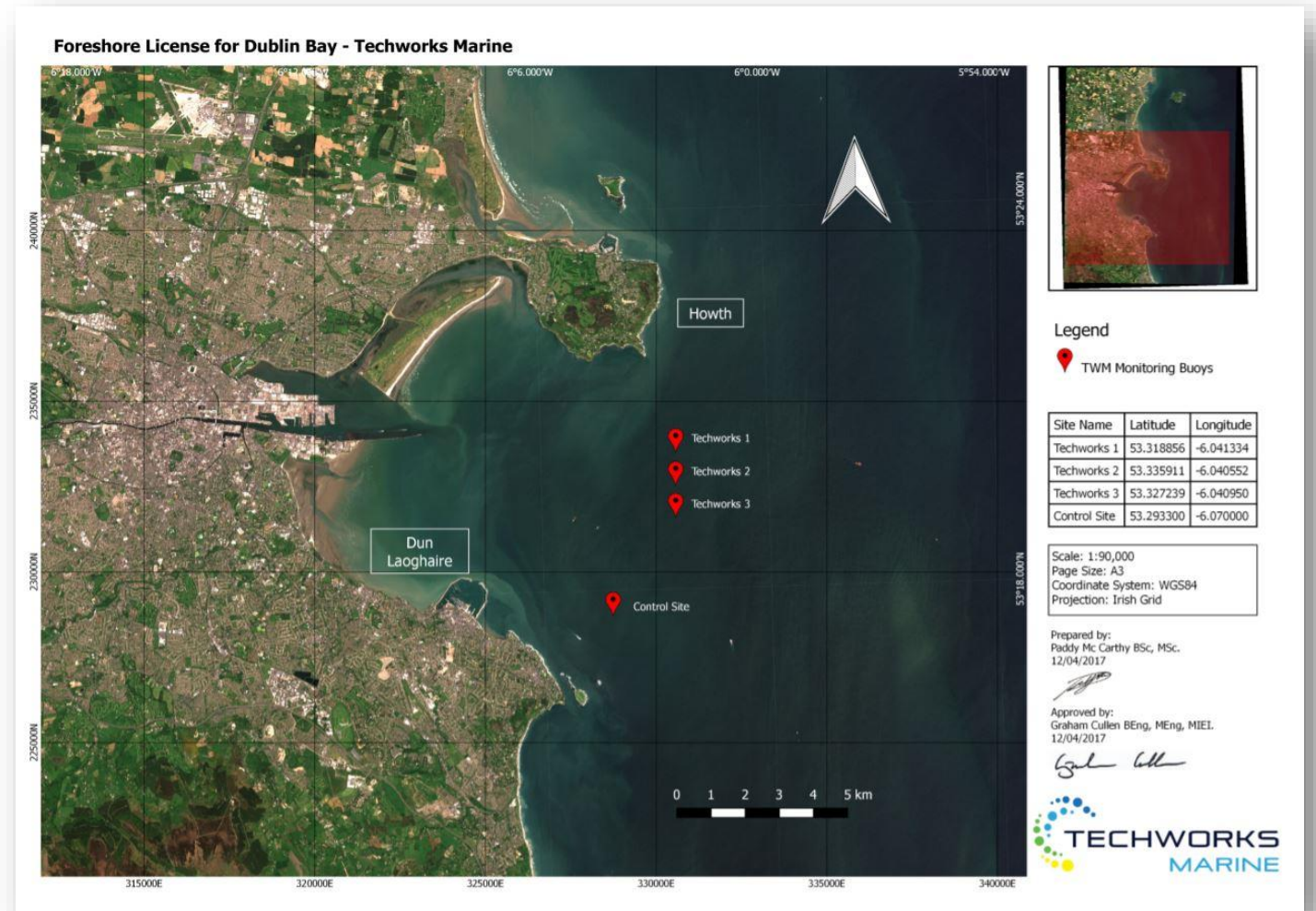
Cloud Based Data Fusion Platform

- Manage and monitor all deployed data buoys systems
- Visualise real-time data
- Upload/download and annotate data
- Visualise spatial data e.g Earth Observation Data services
- Access to model output e.g. WW3
- All data quality controlled
- Secure client access



Multi-annual deployment of 4 state-of-the-art real-time data buoys (2017-2021):

- TWM 1:
 - Real-time Turbidity (3 water depths)
 - Real-time Hydrophone (PAM) system
- TWM 2:
 - Real-time Turbidity (3 water depths)
 - Real-time Hydrophone (PAM) system
 - Spectral Wave and through water Current Profile
- TWM 3:
 - Real-time Turbidity (3 water depths)
- Control:
 - Real-time Turbidity (3 water depths)



Dredge Monitoring – Dublin Port ABR

Equipment: Best in Class

- Mobilis Buoy Hull – International leader in the provision of buoy hulls (UK MetOffice, Ifremer)
- TechWorks Marine – TMBB buoy controller, used Internationally (SMHI, Marine Institute, DAFM)
- Seaview Wave Sensor (used by NOAA, CEFAS, Port of Cork)
- Nortek ADCP, International leaders (NOAA, CEFAS, NOCS)
- Seapoint Turbidity Sensors, International leader (AFBNI, DAFM)
- TFI Marine – Silent moorings
- JASCO – Observer acoustic system, International leader (Port of Vancouver)



Robust, Reliable, Secure Marine Data

CoastEye Data Portal:

Flexible:

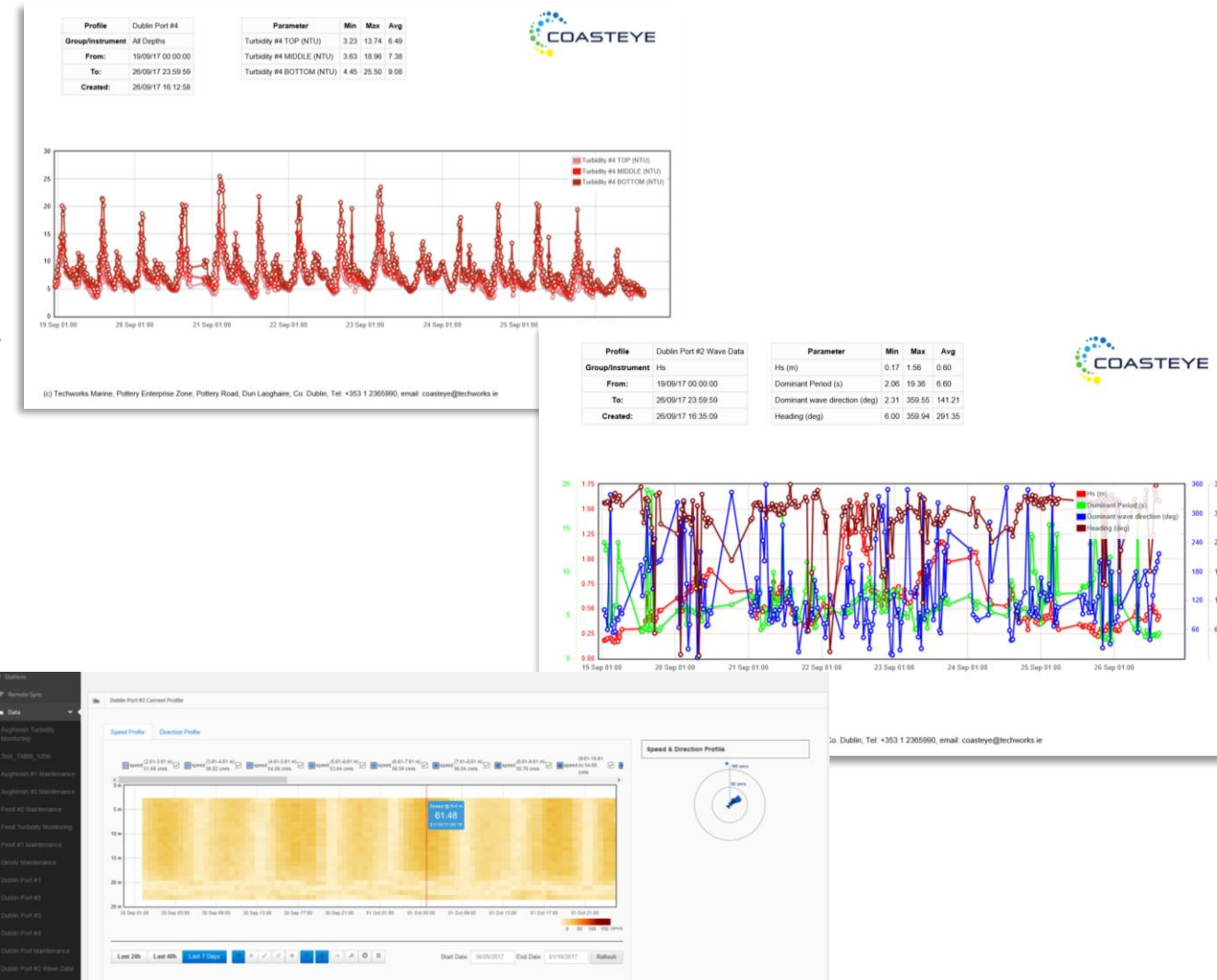
- Automated real time data delivery or archive access
- Any type of data can be included: time-series, spatial, multi-dimensional
- In-situ module: two-way data acquisition and platform management and monitoring.
- Bespoke data processing scripts and chain management can be implemented
- Portal can be web-based or stand-alone with only intranet access

Scalable:

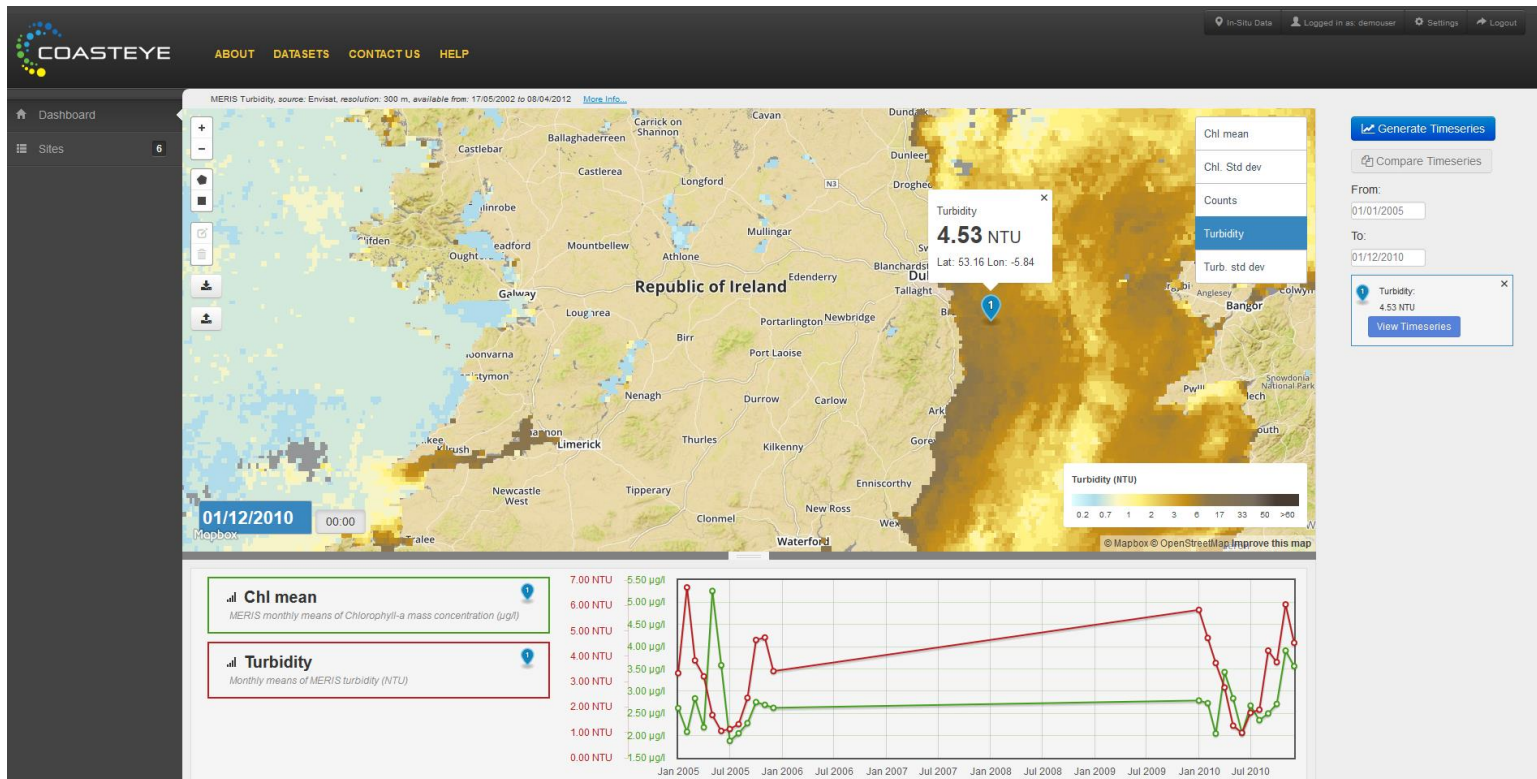
- Spatial database – stores raster and vector data with API to fully scalable database
- Sensor configuration management and control – scales with your network
- Multiple portal instances possible for different applications

Secure:

- Secure logins provided
- User management, including access control and configuration, is standard
- Stand-alone versions with only local access can be provided



Robust, Reliable, Secure Marine Data



Service: Monthly Turbidity average

- Client: Irish Water
- Data Source: All available Cloud free EO data (EU and US)
- Hindcast (Meris archive)
- Ongoing (Modis/Sentinel)

Marine Data Services– Turbidity Plumes

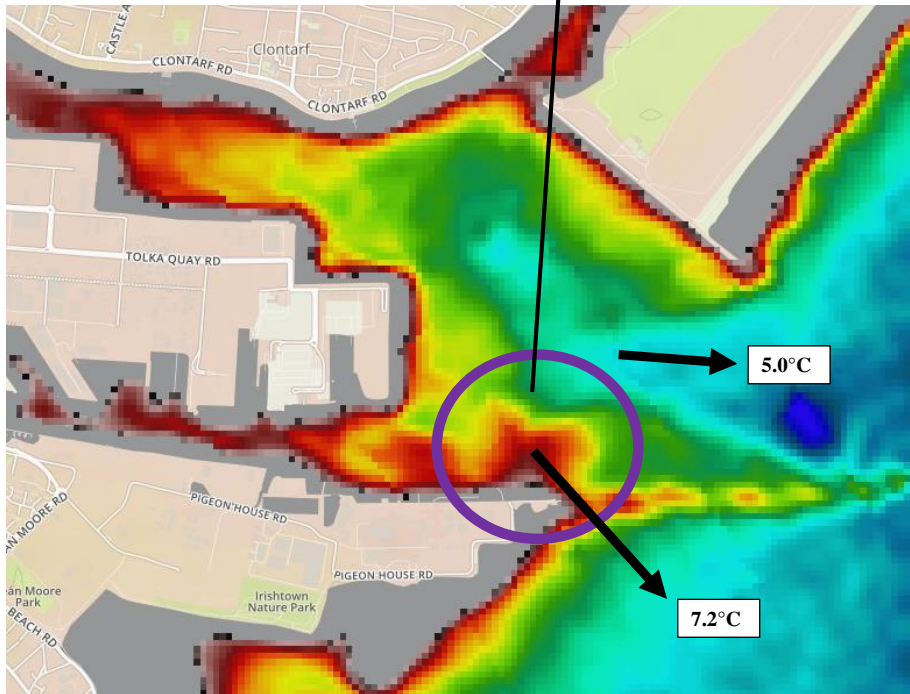


Turbidity Plumes

Service: Monitoring Turbidity Plumes

- Client: Irish Water
- Data Source: All available Cloud free EO data (EU and US)

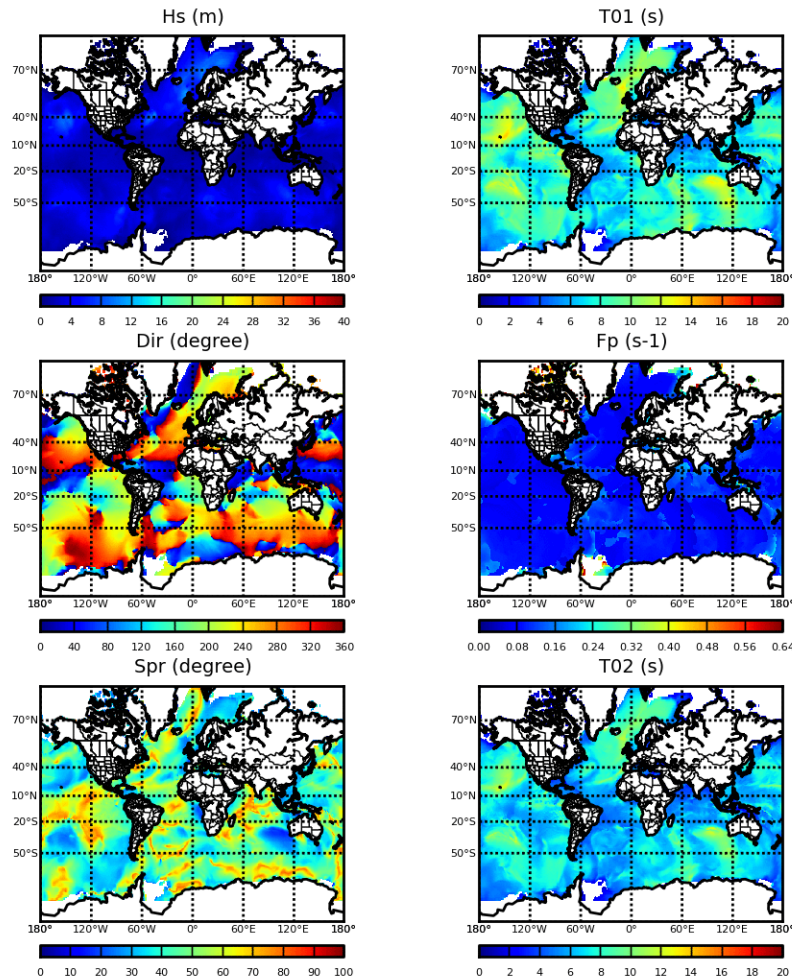
Thermal Plumes



Service Case Study:

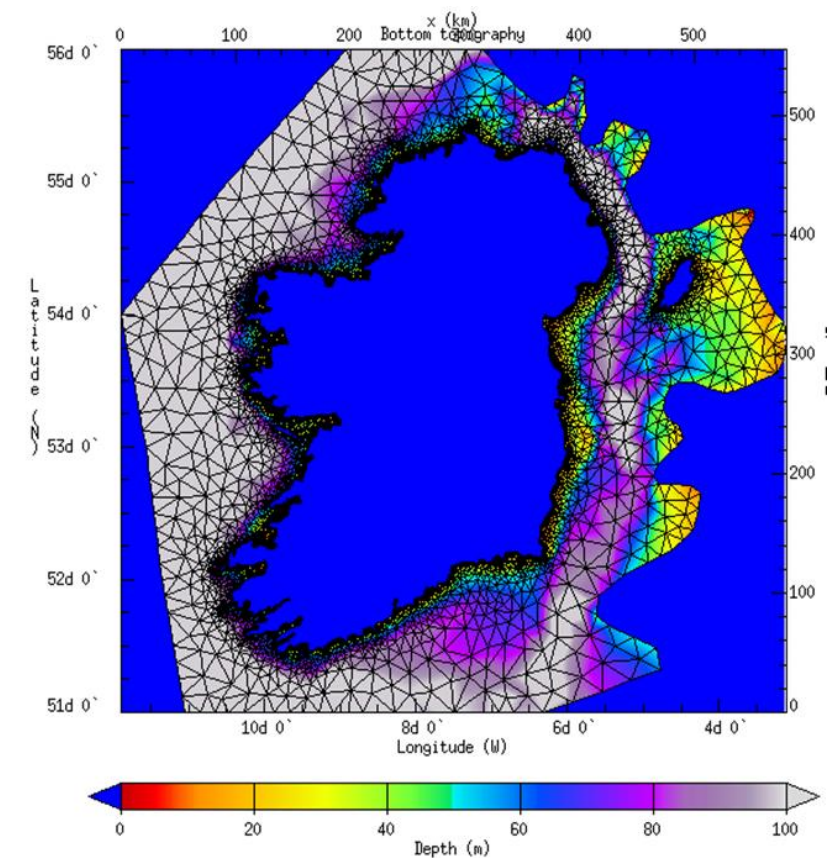
- Monitoring Thermal Plumes
- Client: Irish Water
- Data Source: Landsat

1995-02-01 00:00:00



Service Case Study:

- High resolution spectral data
- 20 year hindcast
- Assimilated altimeter data
- ECMWF wind forcing
- 3-hourly time-step



Validation of EO data is essential for Robust Marine Data services:

- ESA Funded CoastVAL project, is specifically looking to develop a Coastal Validation platform for Ocean Colour services (atmospheric, optical).
- CoastVAL is the first Coastal Validation platform funded by ESA, project is part of the Sentinel 2 Validation Activities
- CoastVAL was accepted into the FRM4SOC project (sensor uncertainty)
- Non validated EO data only good for change comparison over time
- Qualitative information requires validation mostly in the variable coastal zone.

EO Data Products used:

- Sentinel 2 (Land and Coastal)
 - Sentinel 2a (operational), 2b (pre-operational)
 - 20m resolution
 - 5 day over pass
- Sentinel 3 (Ocean):
 - 3a now available , 3b (launch in 2018)
 - 300m resolution
 - 0.5-1 day over pass

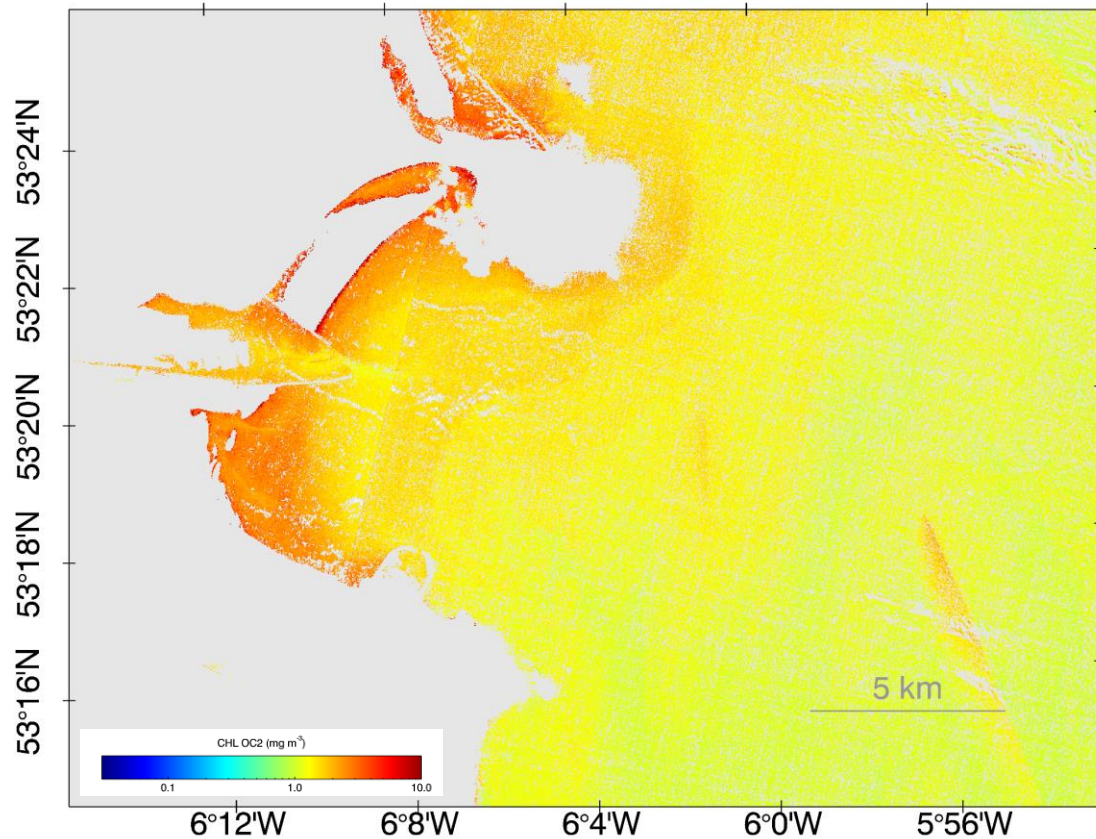


Sentinel 2b 12th July 2017

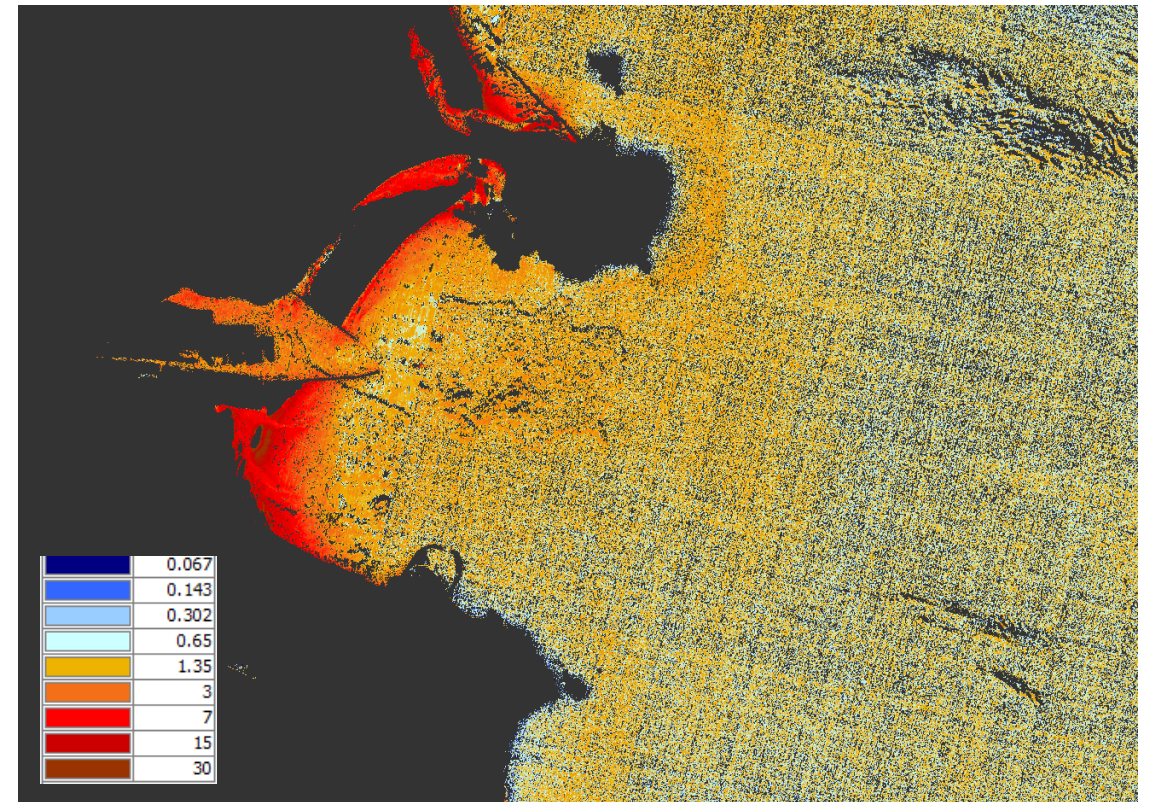


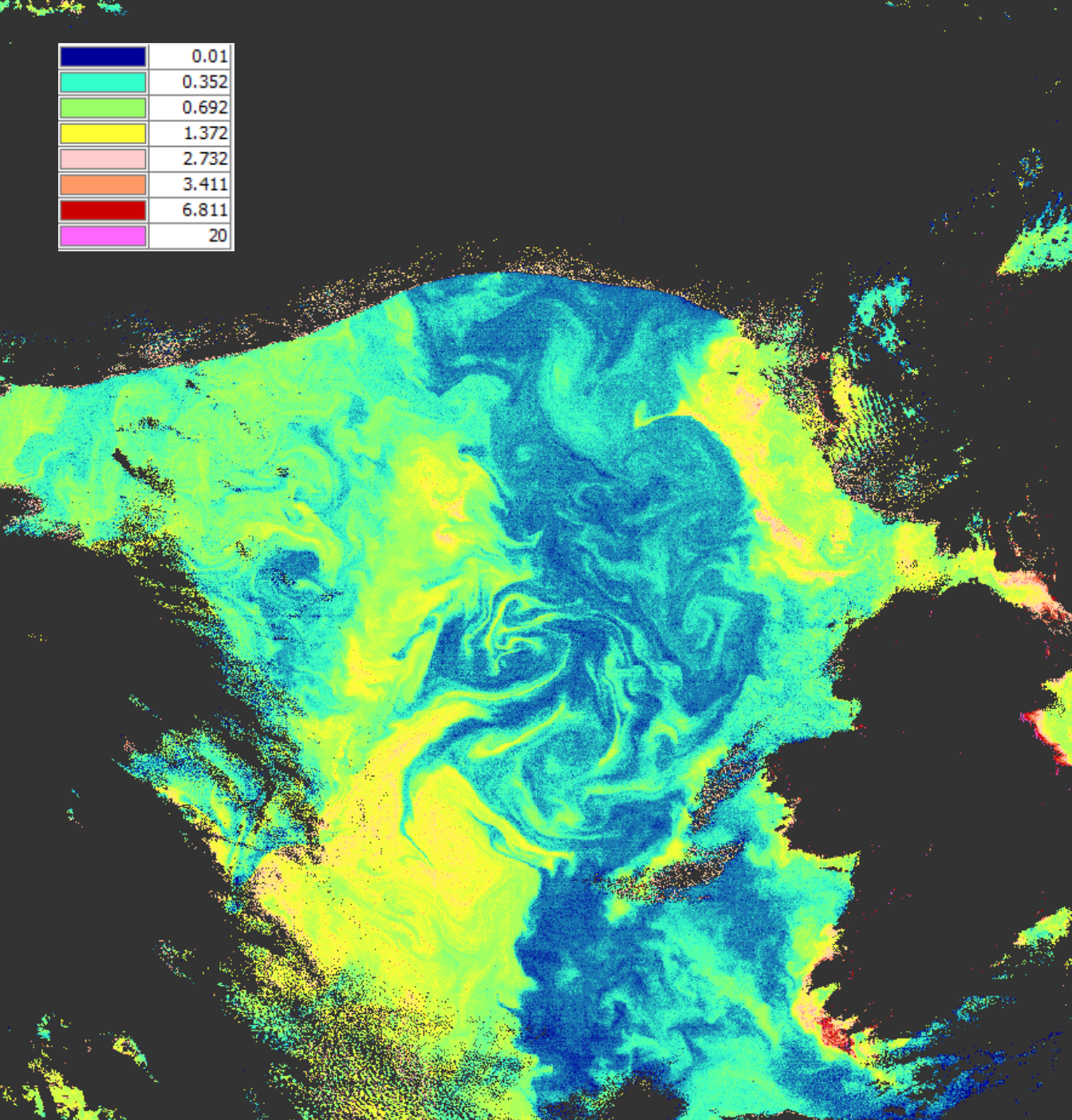
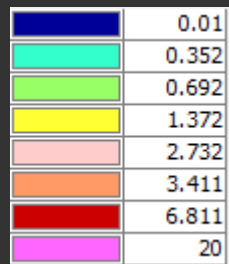
Sentinel 2a 17th July 2017

S2 Chlorophyll-a, using MUMM Acolite tool, using OC2 algorithm

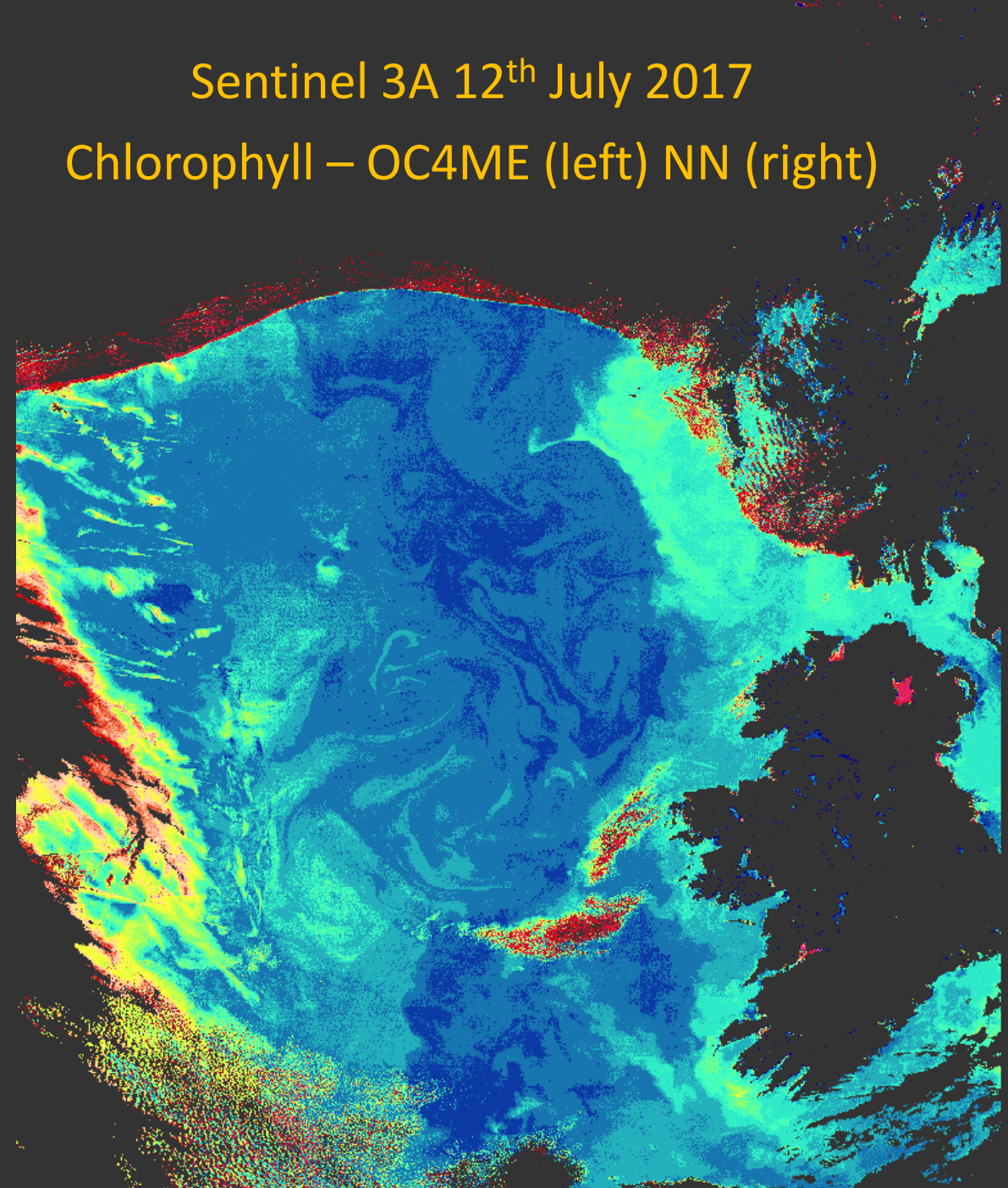


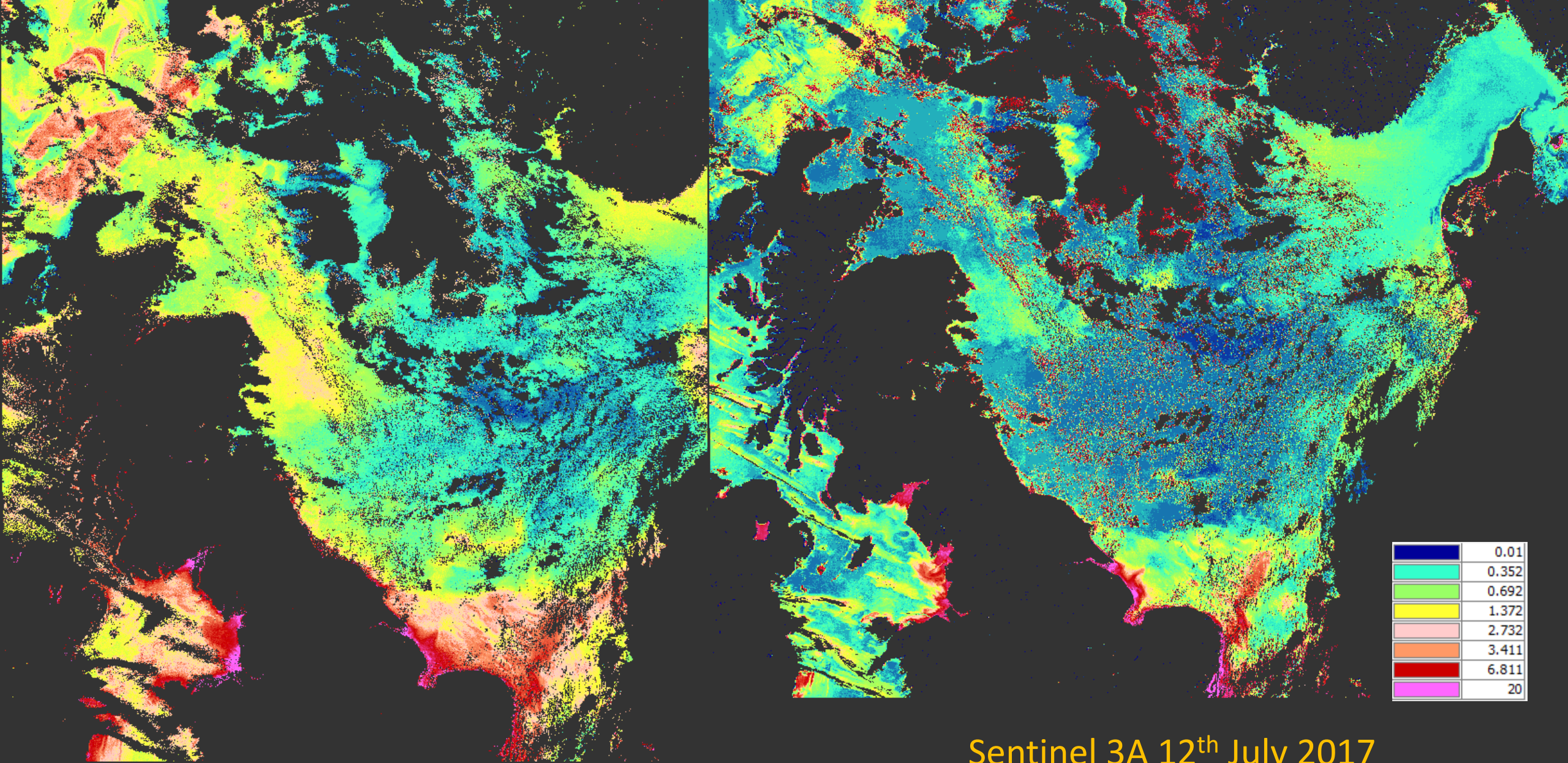
S2 Turbidity, using MUMM Acolite tool, using Dogliotti algorithm





Sentinel 3A 12th July 2017
Chlorophyll – OC4ME (left) NN (right)





Sentinel 3A 12th July 2017

Chlorophyll – OC4ME (left) NN (right)

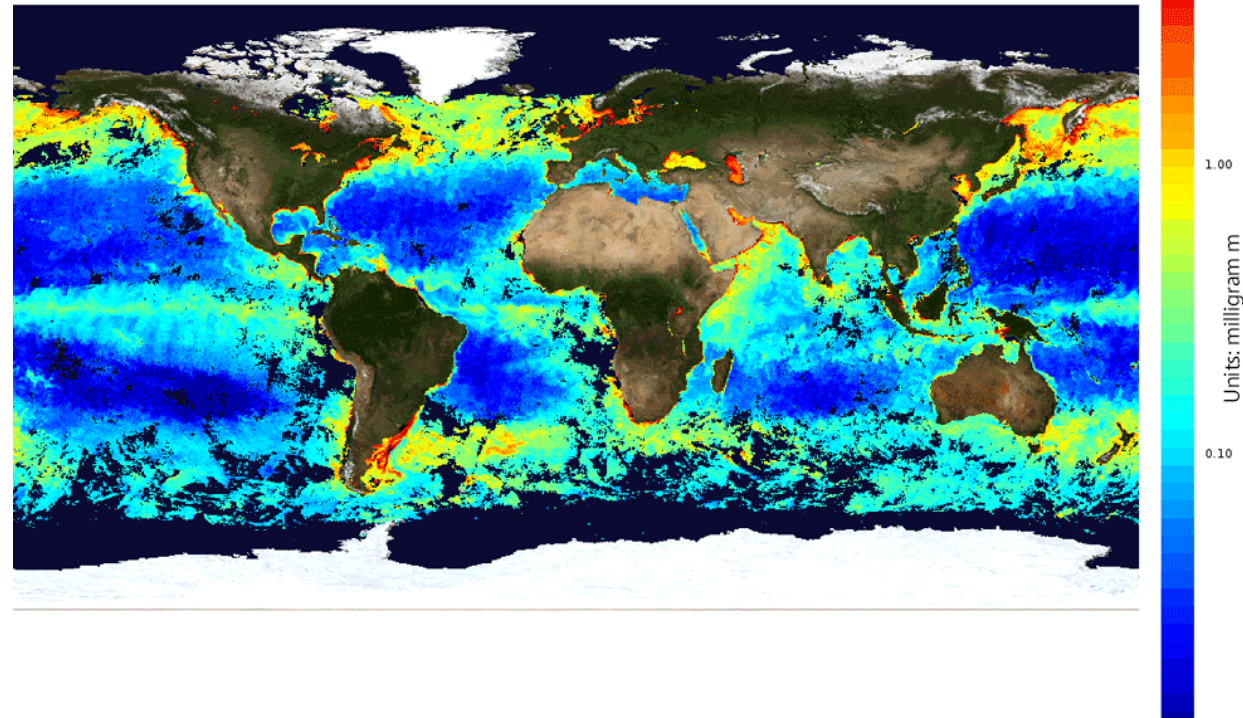
Once validated EO data, work will need to be done on the Ocean Colour algorithms:

- From previous examples it is clear that Sentinel 3 data is too coarse for some coastal applications
- Sentinel 3 Ocean Colour data in the Coastal Zone will need to have specific algorithms developed using validated data set to ensure a reliable quality data service.
- Lots to be done and properly validated for robust service roll out.



dataset-oc-glo-chl-olci a-l4-av 25km 8days-rt-v02
mass concentration of chlorophyll a in sea water
Date: 2017-10-08 00:00 UTC

New global and regional ocean colour products using data from the Sentinel-3A satellite and its OLCI sensor have been released in mid October, 2017 by the Copernicus Marine Service (CMEMS). These new products can be found on our site in the product portfolio covering the Global Ocean, Mediterranean Sea, Baltic Sea, Black Sea, Arctic Ocean, European North West Shelves Seas and Iberia Biscay Ireland regional seas.







Thank You

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