SeaStatus
Increasing the value of satellite data through modelling of marine waters

Hanne Kaas (DHI)

Lars Boye Hansen (DHI GRAS), Anders Erichsen (DHI), Mikael Kamp Sørensen (DHI)

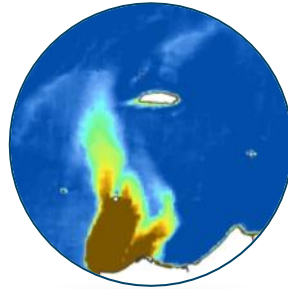**EO4Baltic Workshop, March 2017, Helsinki**

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Remote (satellite) sensing of the marine environment
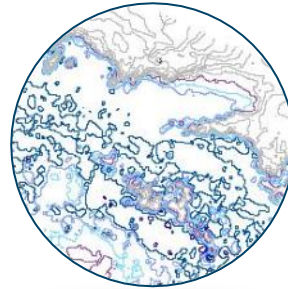

Chlorophyll & Algae

Sea Surface Temperature

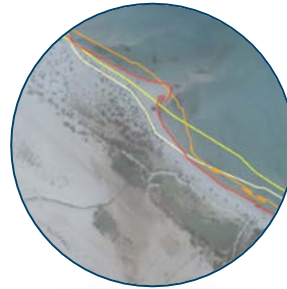*Dredge Plumes*
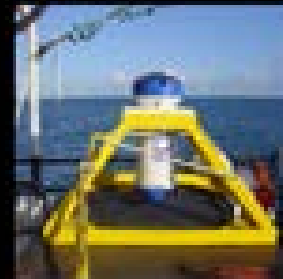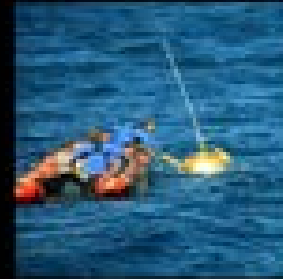
Marine Habitat Maps

Bathymetry

Coastal Dynamics

Marine tools and technologies

Laboratory tests

Field data

Modelling

MIKE 3
3D modelling of coast and sea

FEFLOW
Advanced groundwater modelling

MIKE SHE
Integrated hydrology

MIKE 21
2D modelling of coast and sea

LITPACK
Littoral processes and coastline kinetics

MIKE HYDRO
Integrated basin management

MIKE 11
Unlimited river modelling

MIKE
by **DHI**

WEST
Modelling and simulation of WWTPs
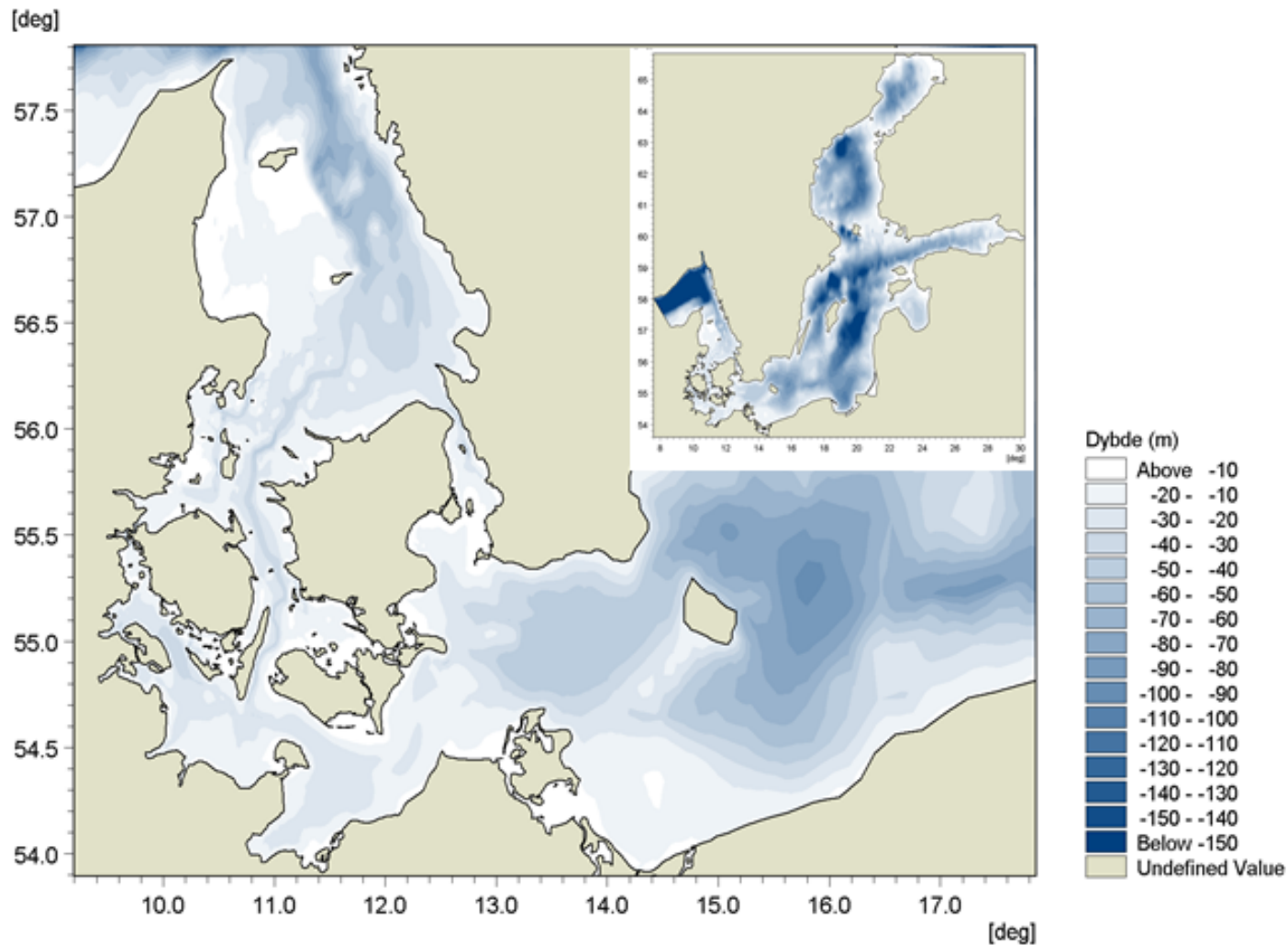
MIKE URBAN
Urban water modelling

MIKE FLOOD
Urban, coastal and riverine flood modelling

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Operational Modelling

North Sea
Baltic Sea

Vision

Field data
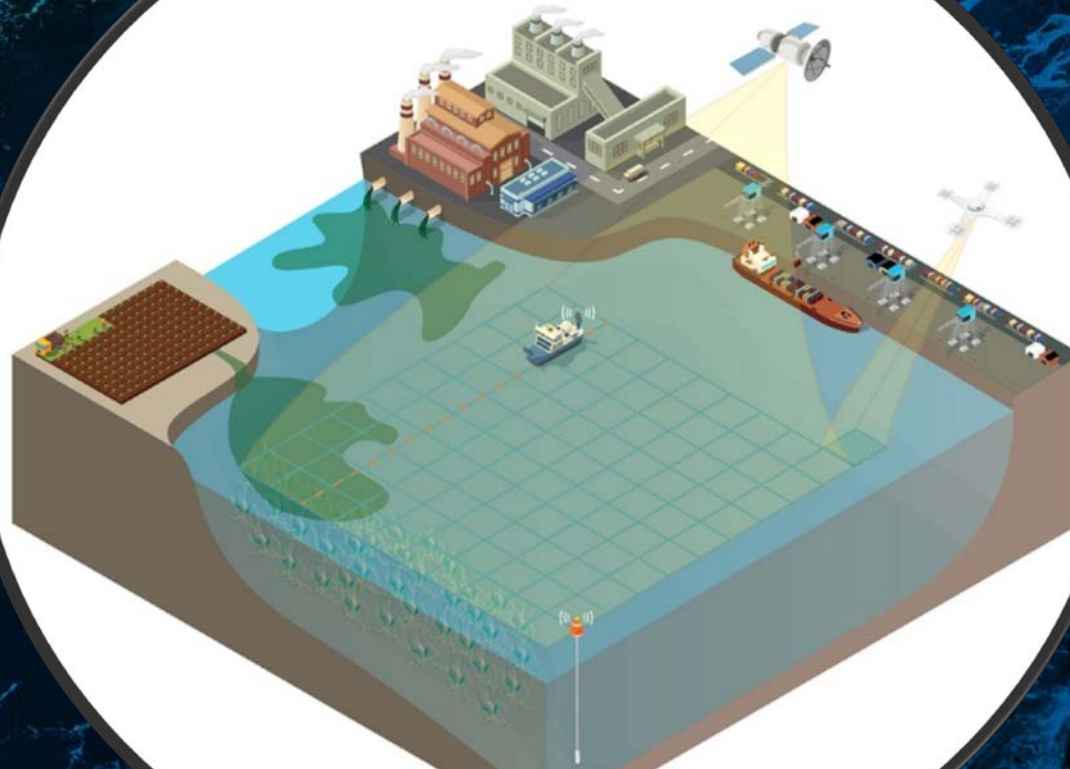
RS data

Model data

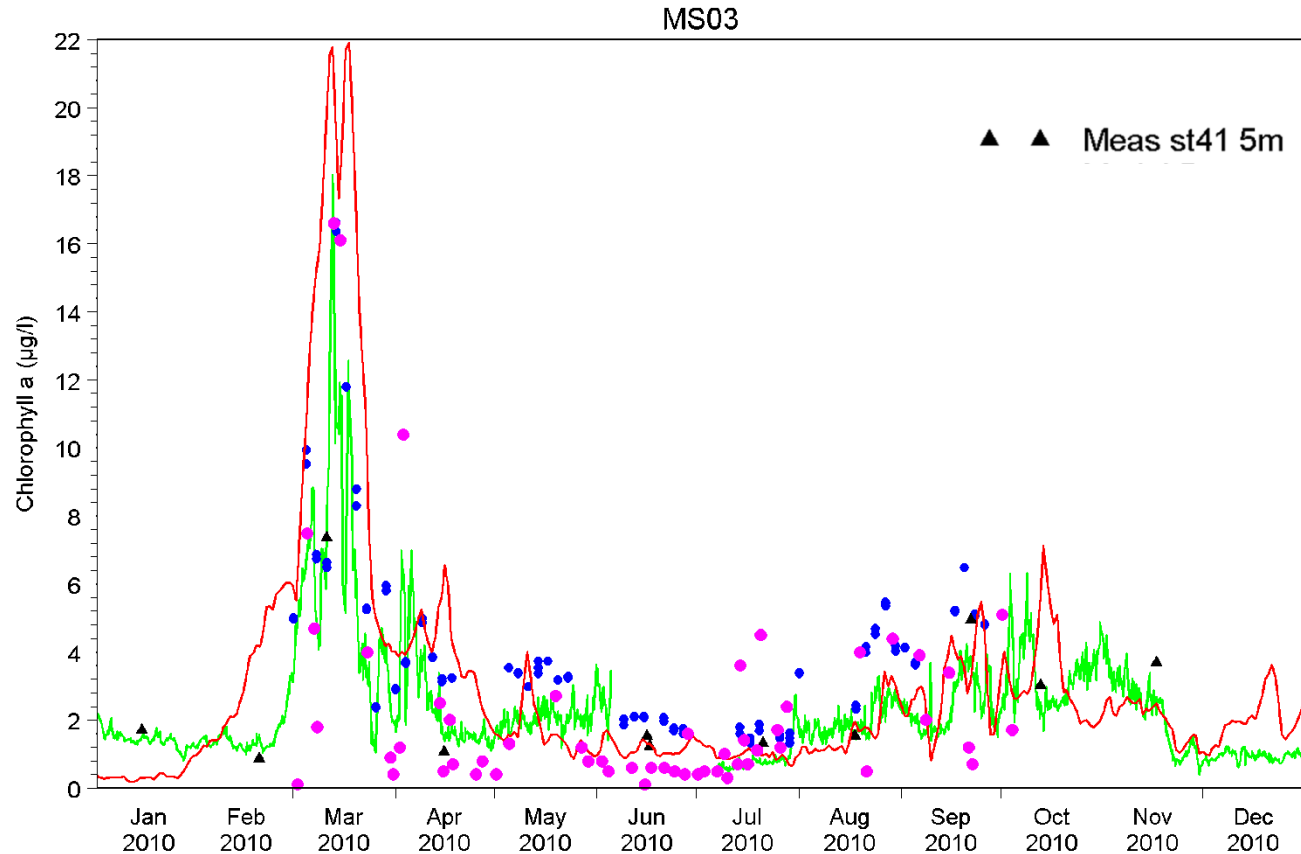Structured data

Unstructured data

satellites

drones

ships

buoys

crowd sourcing

Joining benefits of all types of environmental data

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Combining data enhances the understanding

SeaStatus:

New 1.5 mio € grant to sthrengthen manageent anf support blue
growth in marine sectors by
developing methodologies, software and products
capitalising the integrative value of the multiple data types
collected to describe the marine status and trends

Lead: DHI

Partnere

Marine status, trends, scenarios

- **All types of data**; from monitoring, satellites, buoy, ferrybox, models

- Local algorithms for **Sentinel-2 and -3**

- **Big data and machine learning** methods to integrate and explore 'hidden' info /patterns

- **Data assimilation (DA)**: EO – ferrybox – dynamic models

- **Dynamic models <> box models**

- **Methodologies** for integrative data analyses and uncertainty estimates to achieve full benefit of data

- **Software and tools** usable for environmental managers, constructors, water utilizes when making environmental assessments (e.g. adaptive water management, EIAs)

- **Products** based on integrative analyses and smart modelling

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All joint in web-based toolbox
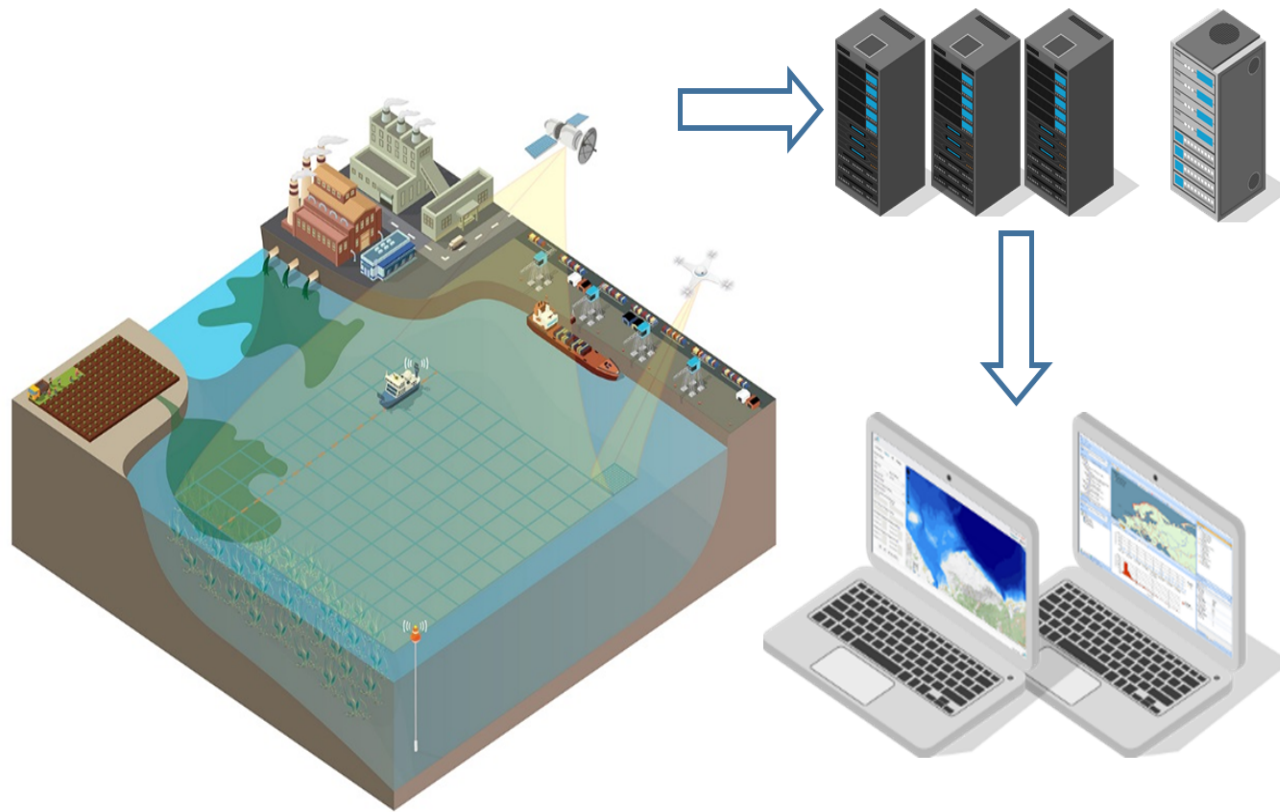
Tools:
- Algorithms for integration of observations
- Stochastic model library
- Linkage between stochastic and mechanistic models
- Ecosystem models and data assimilation

Products:
- Baseline/status data layers and associated uncertainties
- High-quality historical model based data sets and associated uncertainties
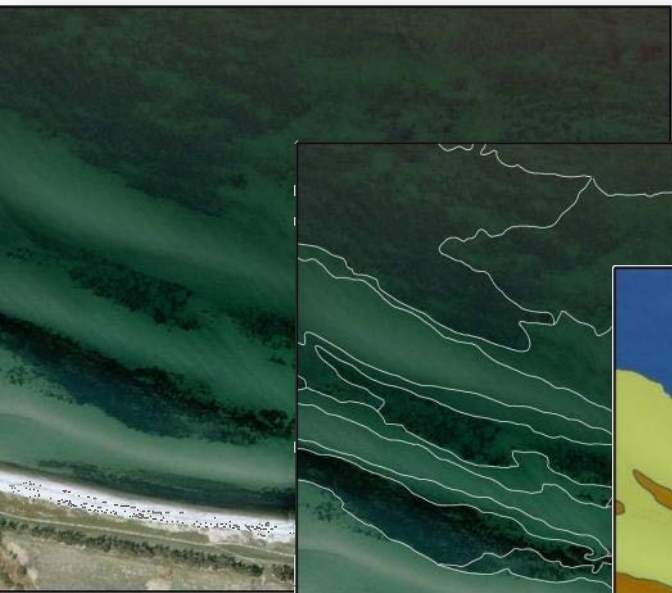- Continuous updating of environmental status

Guidance
- Methodology for introducing uncertainty
- Recommendations on methods for specific use-cases
- EIA aligned with new directive
- Intelligent ecosystem management

Platform technologies

Habitat mapping

Strengthening high resolution images (**Sentinel-2**) interpretation by using **machine learning**

Class

	Unclassified
	Algae
	Algae on hard buttom
	Algae on hard buttom in swallow water (often nearshore)
	Algae on sandy buttom
	Blue mussels with algae
	Eelgrass
	Eelgrass/algae mixed vegetation
	Jetty spurs, bridges and other constructions
	Sand
	Sand reef (sandy area with visible ripples)

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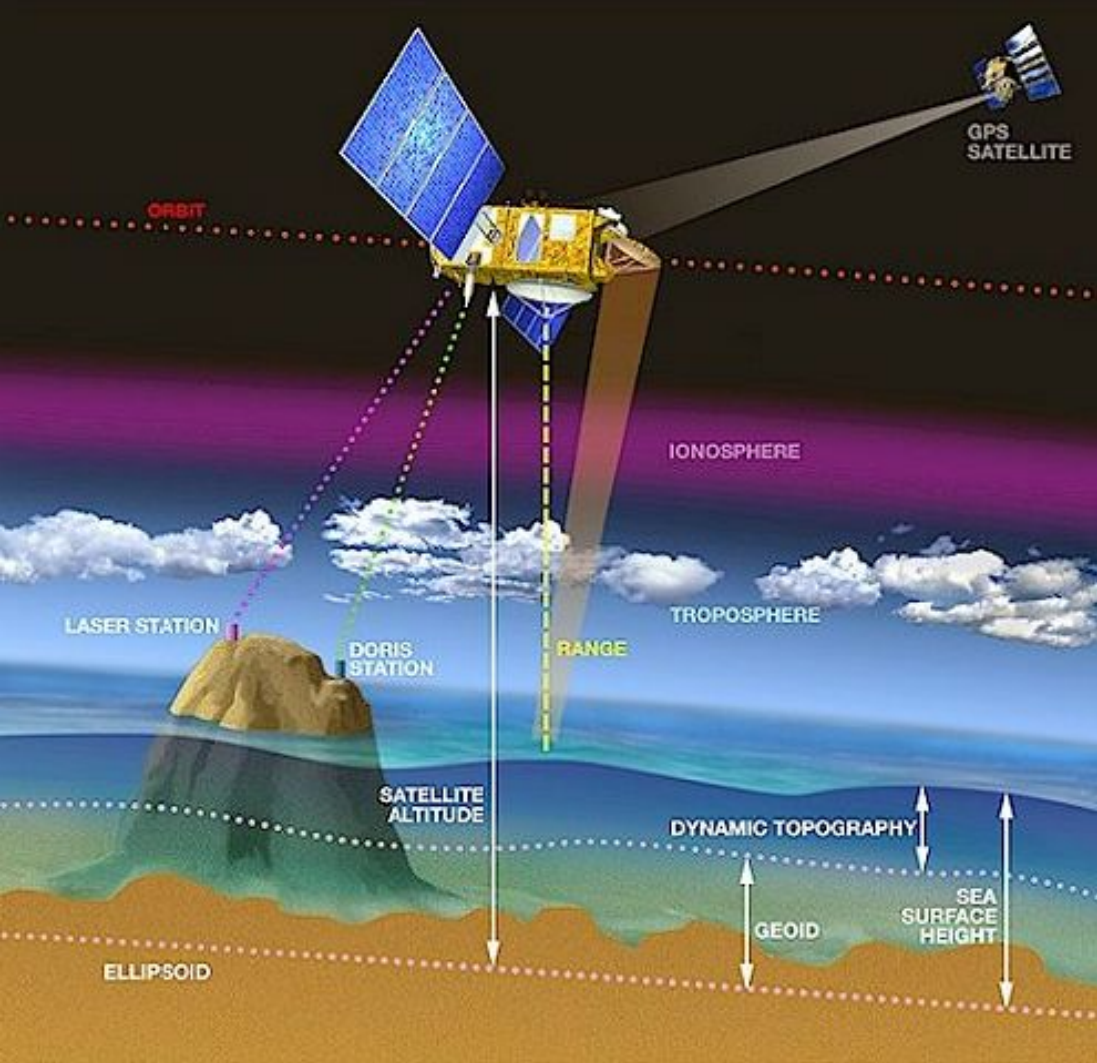
Improving modelling by **data assimilation** of EO

High resolution altimetry data
acquired by satellites for accurate calibration of water level and water level dynamics (waves)
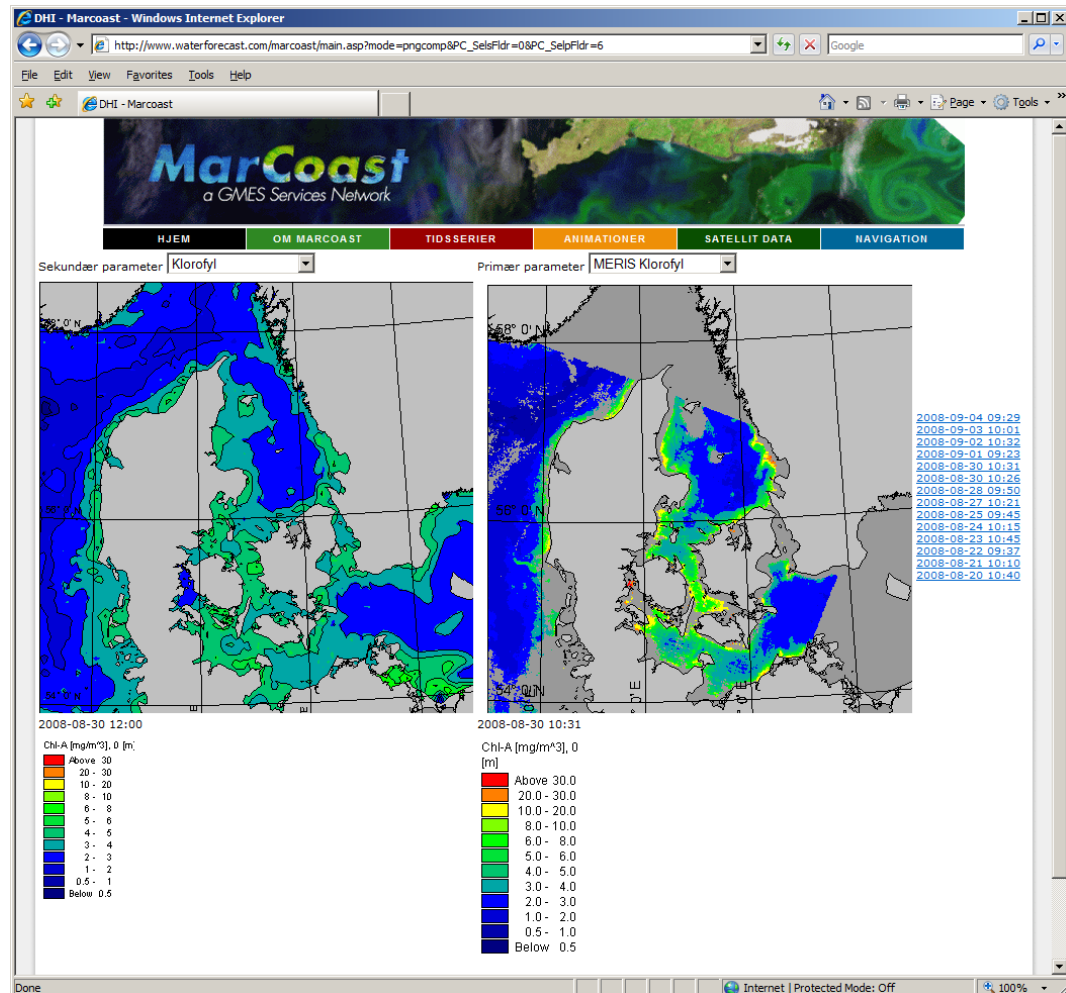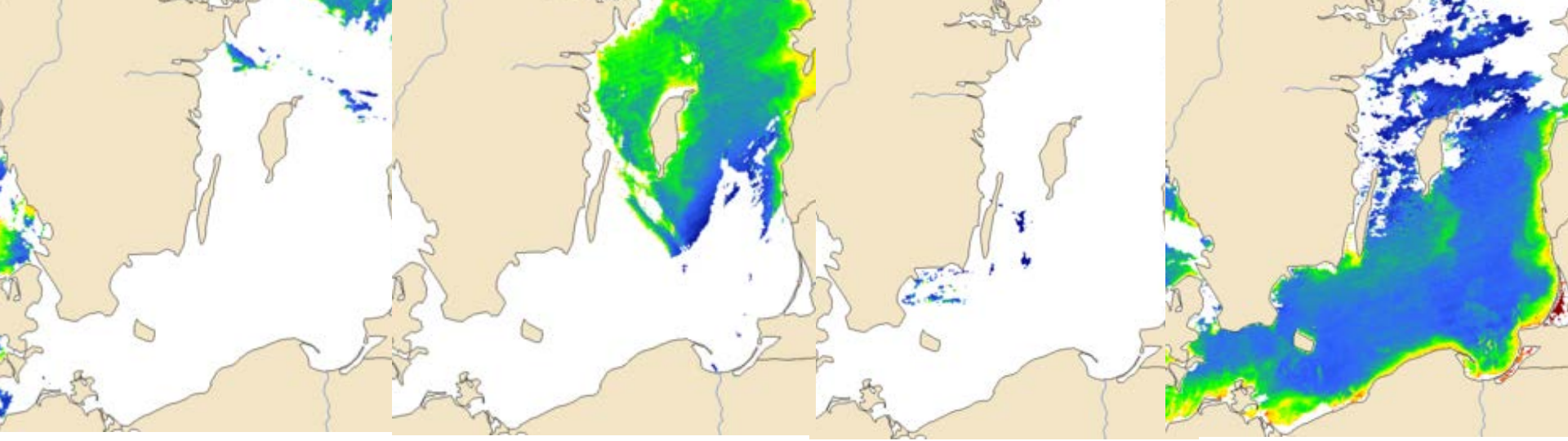
Water Quality Service
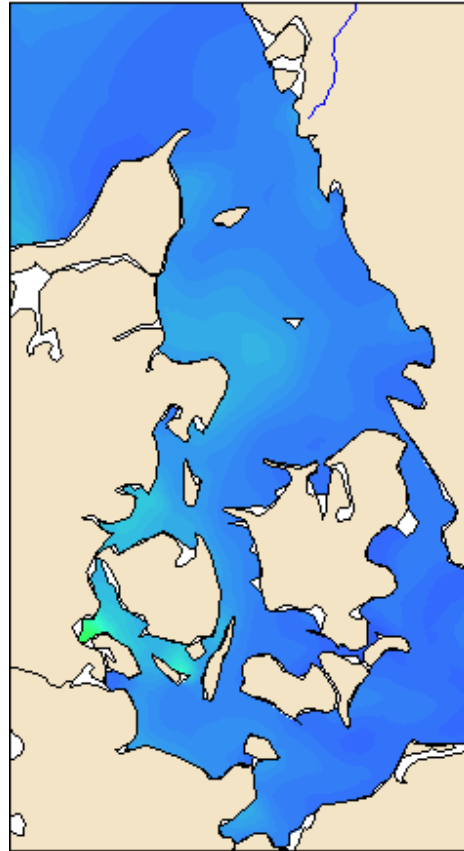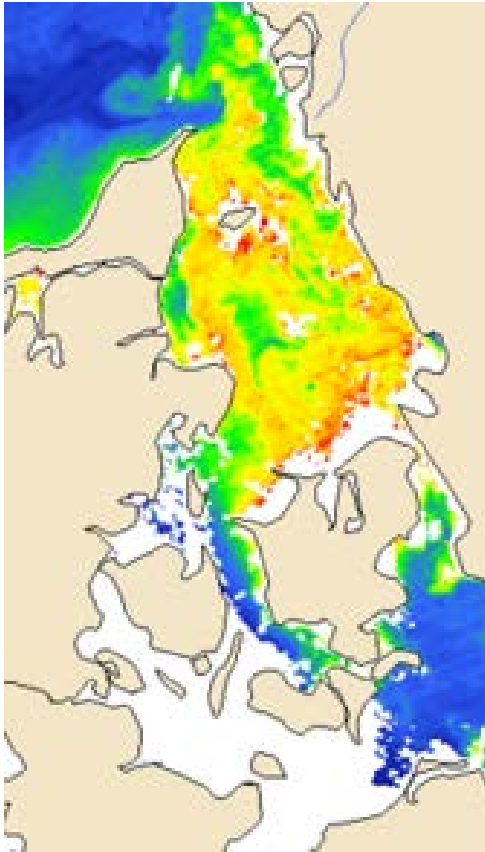
Marcoast – Assimilation

EO Chla in MIKE 3 Classic

Now in flexible mesh
(FM) models using
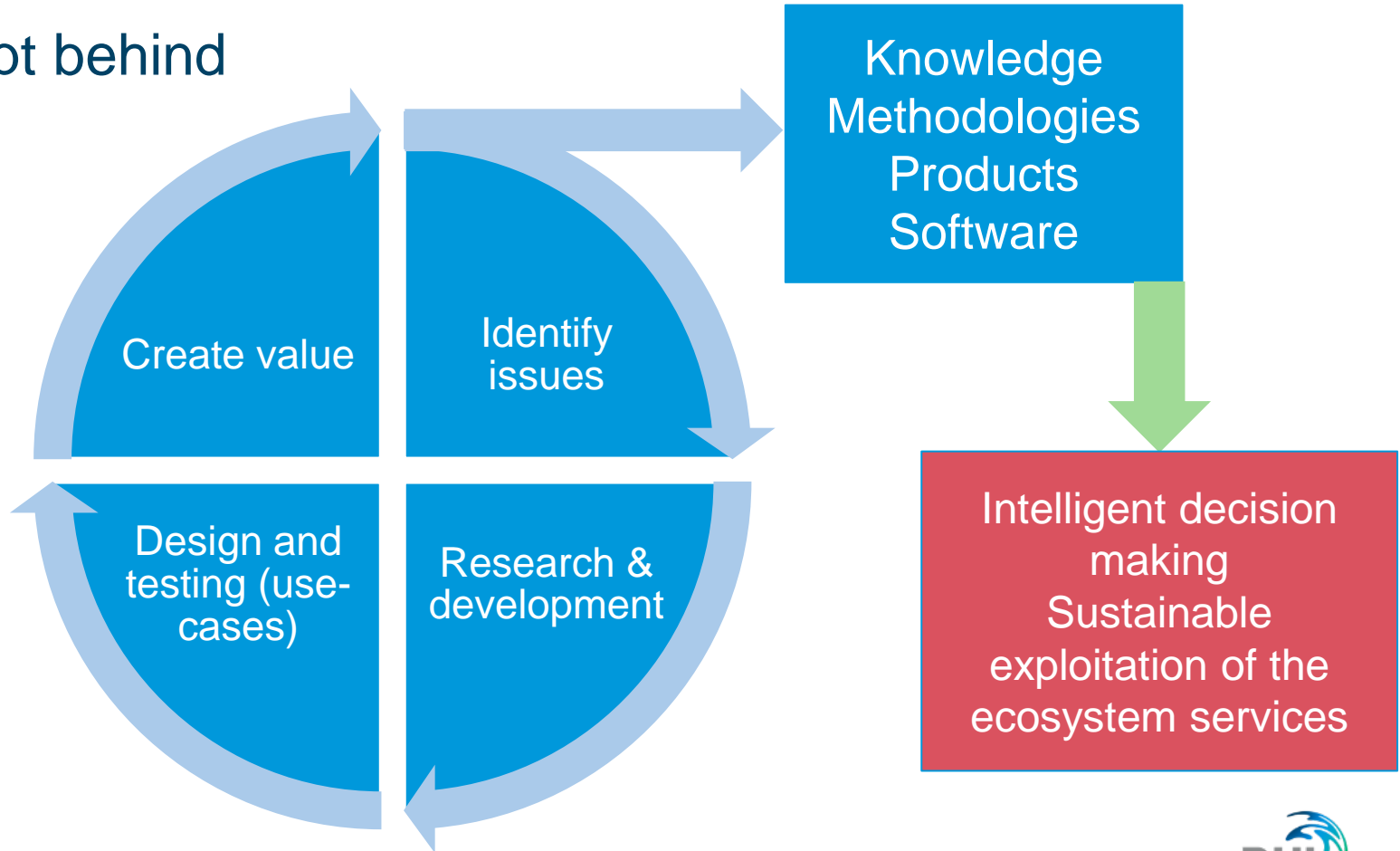Ensemble Kalman
Filter (EnKF)

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EO provides data of high spatial resolution
Modelling fills in the gabs in space and time using intelligent
methods considering the environmental processes
Modelling gives 3D descriptions

Unusual bloom of phytoplankton can rarely be modelled without guidance from e.g. EO

Pseudochattonella bloom in Danish marine waters March 2017

Concept behind

Knowledge
Methodologies
Products
Software

Create value

Identify issues

Design and testing (use-cases)

Research & development

Intelligent decision making
Sustainable exploitation of the ecosystem services

Thank you