



MOHID Water in Action

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MOHID Meeting @ IST – 7-8 June 2018



Action Modulers – Some history

- Action Modulers is a private consulting company, located in Mafra, Portugal.
 - Established in 2004
 - 2 Main Business Areas
 - 10 fixed employees in Nov 2017
- Action Modulers provided services and software solutions worldwide
- Action Modulers is a **ist spin-off**

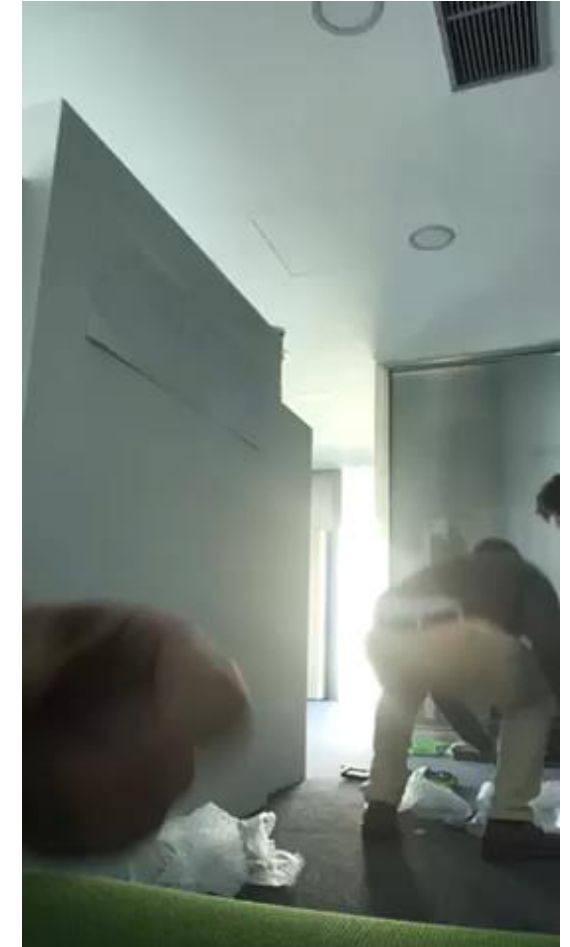


Action Modulers to Bentley



Action Modulers R&D Unit was acquired by Bentley Systems in Oct 2017

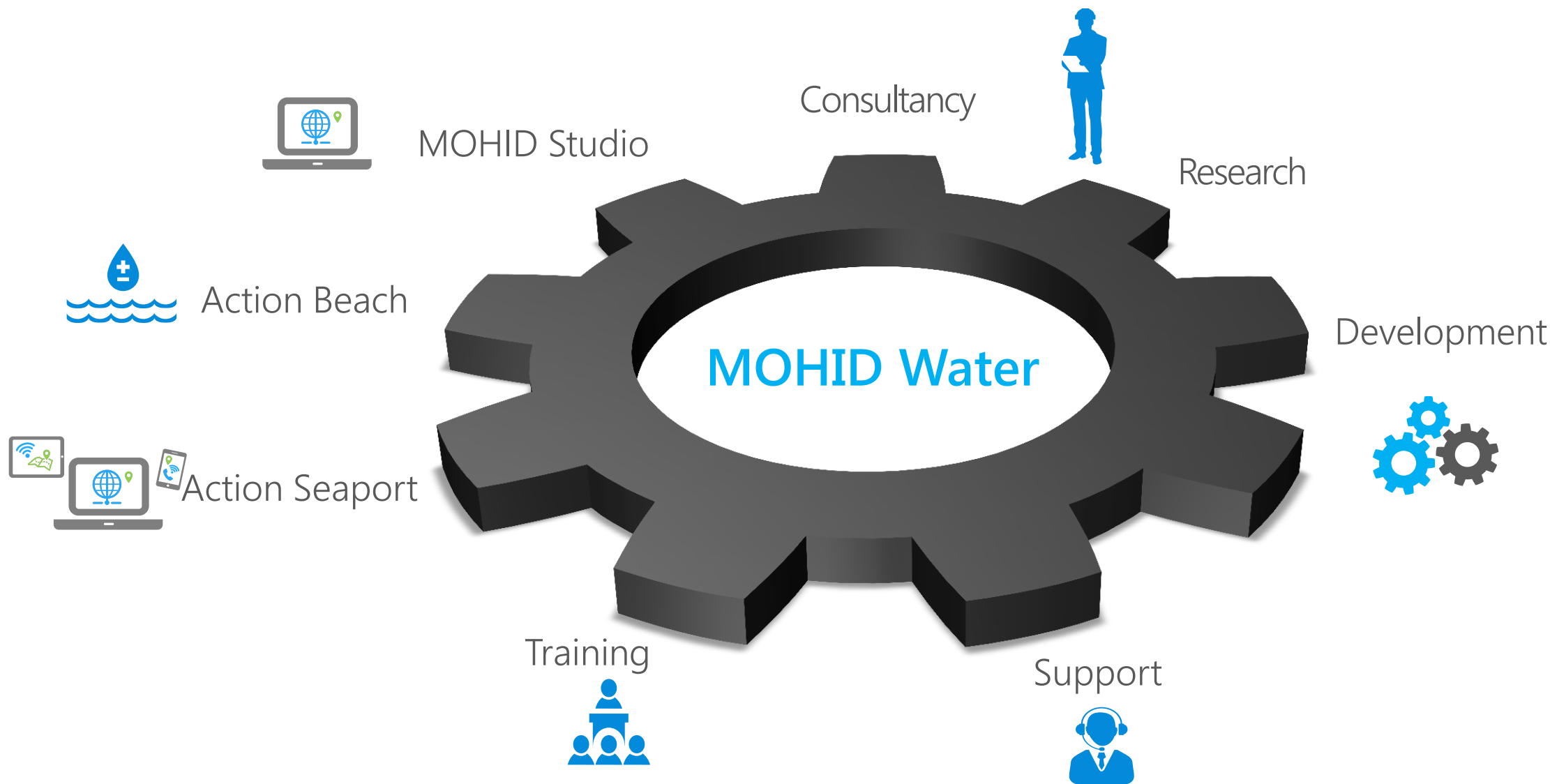
- Engineering software company – Infrastructure design, construction and operation
- Founded in 1984 in the U.S.
- 3500+ employees in 50+ countries
- **Lisbon office since May 2018**



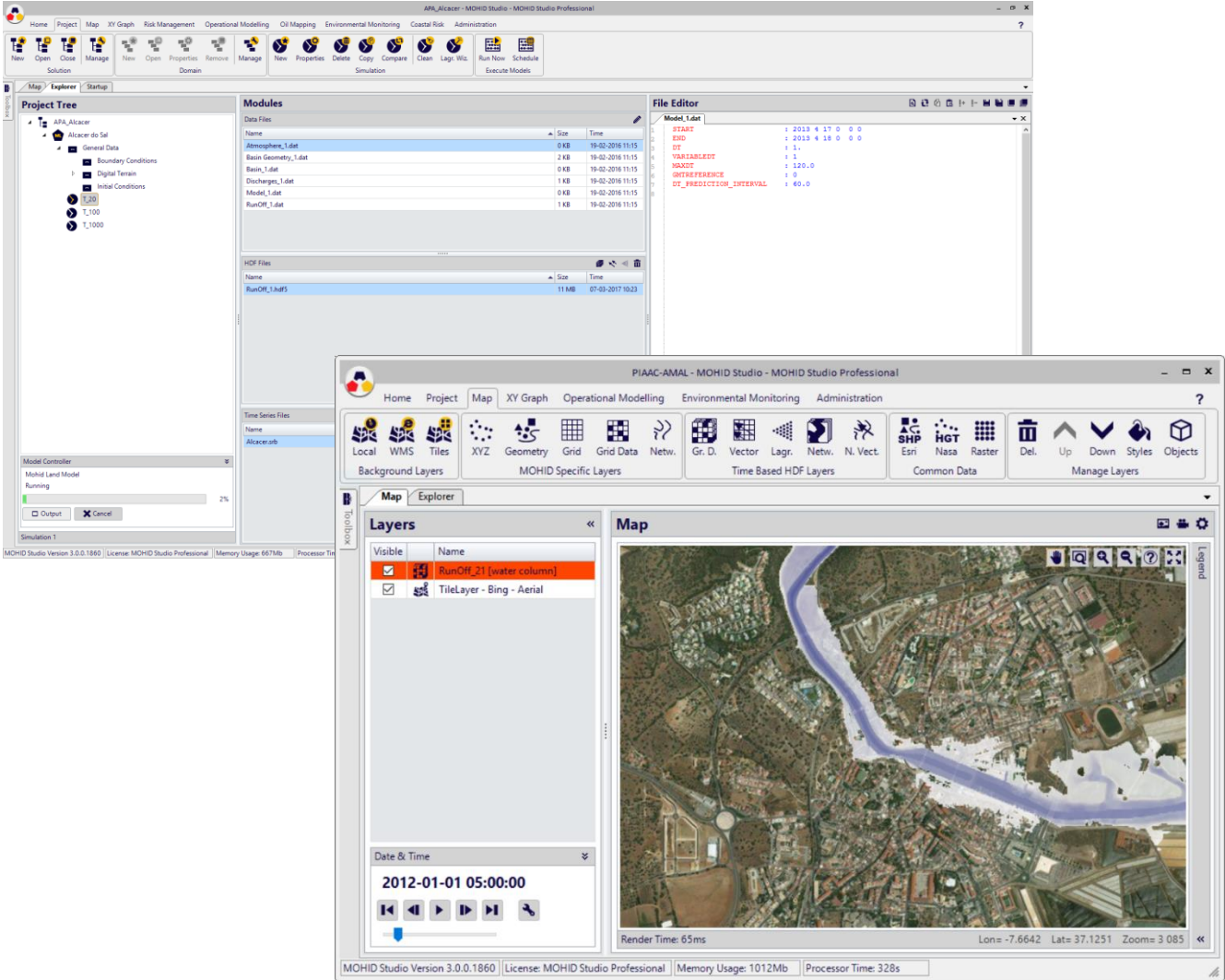
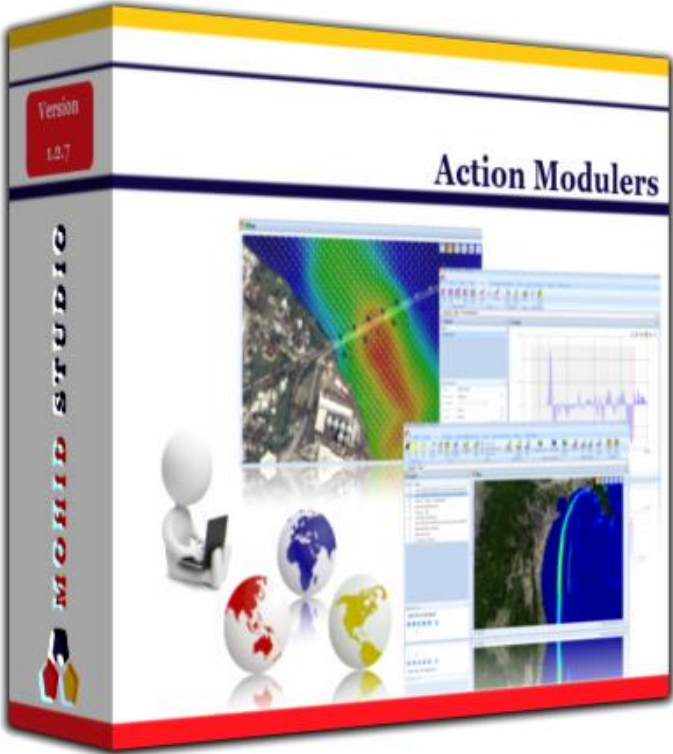
The team



MOHID Water is at the core of our business



MOHID Studio



Training



Reference Projects - Research



Project
Information

PROJECT
Enhancing HNS preparedness through training and exercising

LOCATION & COUNTRY
NE Atlantic region: Portugal, Spain, France, United Kingdom

FUNDING
EU Project "Humanitarian Aid and Civil Protection"
<http://mariner-project.eu/>

PARTNERS
CETMAR, Intecmar, Universidad de Vigo, CEDRE, Public Health England, CIMAR

DATES
January 2016 - December 2017

ACTION MODULERS' MAIN TASKS
Chemical spill modelling and environmental impact, integrated in a web-based common operational picture.

MARINER - Enhancing HNS preparedness through training and exercising



MARINER project focuses on improving planning, preparedness and response to HNS (Hazardous and noxious substances, also known as chemical) spills in Europe by:

- Capitalizing and translating relevant HNS R & D outcomes into operational resources applicable by planners and responders;
- Improving training and exercise capabilities;
- Upgrading and/or improving tools to support decision making and response;
- Increasing awareness and encouraging information exchange.

Action Modulators improves the operational use of tools for modelling HNS transport, behaviour and biological impact, mainly upgrading an HNS spill model properly integrated into a web-based and mobile friendly Common Operating Picture (COP), and hence improving maritime situational awareness when facing HNS pollution management.

In addition, Action Modulators is also contributing to the definition of protocols and guidelines for environmental impact assessment of HNS Spills, as well as the development of innovative multimedia training materials on HNS spill modelling.

Outcomes of the projects can be found on the project website.

For further informations, please contact us.

Action Modulators is the leader of the task *Modelling and Environmental Impacts* and participates in all other work packages.



Project
Information

PROJECT
Multinational Response and Preparedness to Oil and Chemical Spills

LOCATION & COUNTRY
Canary Islands (Spain), Madeira Archipelago (Portugal), Morocco

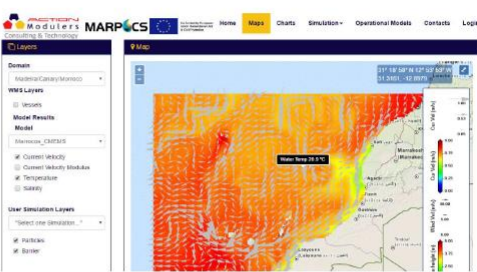
FUNDING
EU Project "Humanitarian Aid and Civil Protection"
<http://marpocs.eu/>

PARTNERS
CEDRE, IST, PLOCAN, ULPGC, ARDITI-OOM, INRH

DATES
January 2016 - December 2017

ACTION MODULERS' MAIN TASKS
Model-based decision support tools and risk assessment. Oil and chemical spill model development.

MARPOCS - Multinational Response and Preparedness to Oil and Chemical Spills



MARPOCS aims to implement an integrated operational framework for preparedness and response to oil and HNS spills in the Atlantic sub-region involving Morocco, Madeira and Canary Islands in the context of Lisbon Agreement, easily transferable and extendable to other areas.

The general objective is achieved by the sharing and development of common guidelines, methodologies, decision support tools and exercises adapted to the regions of study and promoted by effective implementation and training of local, regional and national authorities.

Action Modulators developed the concept of the project and leads the task entitled *Decision Support Tools and Risk Assessment*. The main contributions to the project are:

- Decision Support systems supported by 3D oil & HNS spill modelling system, using high resolution meteocean forecasting systems
- Dynamic shoreline holistic risk from spills in the area of interest, to improve management of the distribution of response resources, and to allow real time risk shoreline monitoring)
- Automatic early warning spill forecasting system connected to existing maritime surveillance automatic detection services
- Training sessions and hands-on demonstrations with authorities



Project
Information

PROJECT
Improvements of Shorelines Defenses Against Marine Pollution

LOCATION & COUNTRY
Tagus Estuary Portugal
La Rochelle, France
Falmouth, England

TYPE OF PROJECT
EU Research Project co-financed under "Humanitarian Aid and Civil Protection".
<http://isdamp.eu>

DATES
January 2013 - December 2014

ACTION MODULERS' MAIN TASK
Integration of mathematical models, web interface, operational server and central data base.

ISDAMP - Improvements of Shorelines Defenses Against Marine Pollution



The main strategy of the project ISDAMP is to adapt numerical devices of research to the needs of local operators. The results of these devices and its use in real situations will enable an appropriate answer to maritime disasters.

The objectives throughout the 24 months of the project are:

- Implement operational models in the study areas (model MOHID);
- Develop operational models of floating barriers (BAR3D model);
- Integration of the models through the OpenMI library;
- Development of software components for the exploitation of the system;
- Perform real and simultaneous tests in the three regions of the study;
- Improve operational skills with training for system users;

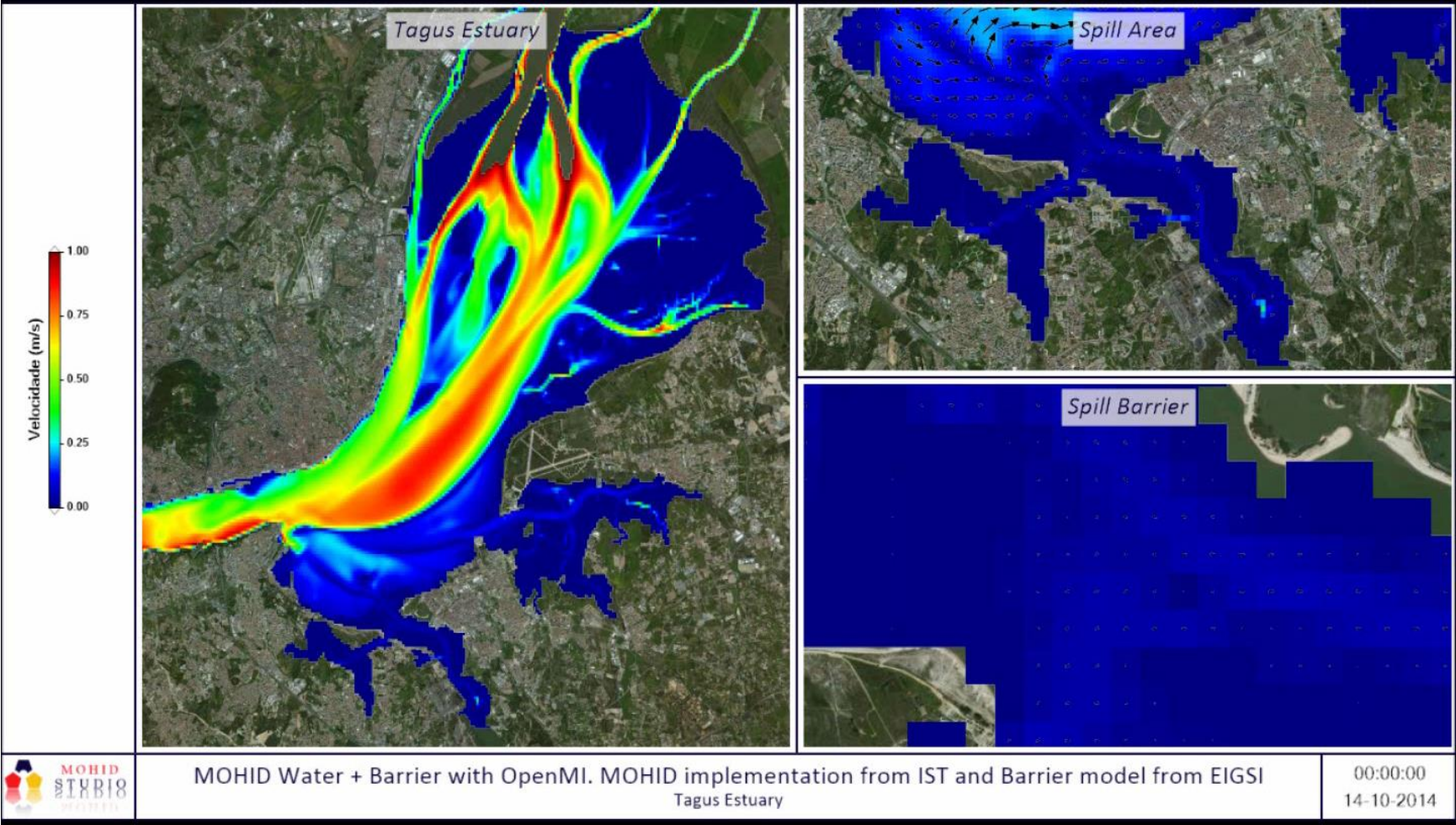
Promote among local and regional actors the best practice of efficiency.

The main results of the services provided by ACTION MODULERS will include:

- Integrated model (MOHID Water and Bar3D) to optimize the response to oil spill emergency;
- Operational software components for continuous data processing included into ACTION Server;
- Integration of new features into MOHID Studio;
- Training in the use of the system.



Reference Projects - ISDAMP



Reference Projects - Consulting



PROJECT
Operational bathing water quality prediction in Constanta, Romania (Action Beach)

LOCATION & COUNTRY
Constanta, Romania

CLIENT
National Institute for Marine Research and Development
Blvd Mamaia no. 300
Constanta 3, RO-900581
Romania

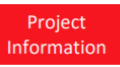
PARTNER
-

DATES
Jan 2016 - March 2016

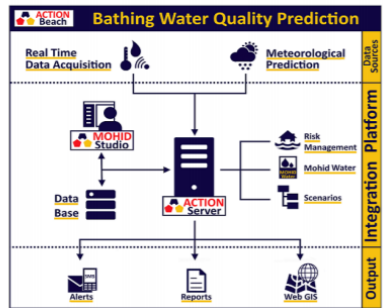
ACTION MODULERS' MAIN TASKS
Implementation, installation, configuration, training and maintenance of Action Beach in Constanta, Romania.

SOFTWARE & SUPPORT
Action Modulers offers a wide range of customizable software products. We also provide professional support to implement your projects.

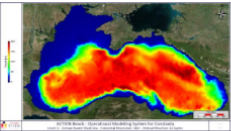
CONTACTS
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sales@actionmodulers.com
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Operational bathing water quality prediction in Constanta, Romania



An operational bathing water quality prediction system was implemented in Constanta, Romania. The core of the system is a 3D high resolution numerical model **MOHID Water** which is operated daily through **ACTION Beach**. **MOHID Water** was implemented using a nested approach, using three nested levels: (i) Black Sea, (ii) Romanian Coast and (iii) Constanta Coast. **ACTION Beach** is used to manage, store and publish the entire workflow. GFS solution is downloaded daily and stored on the server and **MOHID Water** models are run as soon as new boundary conditions are available. All data is stored on a server and will be published soon in a mobile friendly web page.



PROJECT
Optimization of Korean Operational Oceanographic System

LOCATION & COUNTRY
South Korea

CLIENT
KIOST – Korean Institute of Ocean Science and Technology
<http://eng.kiost.ac/>
South Korea

PARTNER
-

DATES
2016

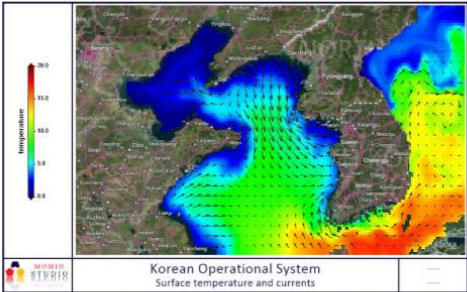
ACTION MODULERS' MAIN TASKS
Technical and scientific support, as well as MOHID source code optimization, in order to optimize Korean Operational Oceanographic System.

SOFTWARE & SUPPORT
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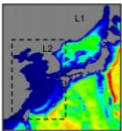
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Optimization of Korean Operational Oceanographic System



This project involved technical and scientific consultancy in the optimization of the Korean Operational Oceanographic System (KOOS), to cope with the scheduled computational grid resolution increment to 300m along the Korean coast. The services provided focused on two main topics: a) Improving the setup methodology of **MOHID Water**, the numerical model used in the forecasting system, by providing guidance in the definition of the high resolution domains, interfacing the downscaling process using an offline method, thus efficiently eliminating redundancies; b) Increasing the computational speed of the model through revision and expansion of the numerical code of **MOHID Water** related with parallelization routines (using MPI and OpenMP) and/or memory allocation and access and by redesigning the domain decomposition approach used in the Korean operational system, optimizing the workload partition. Additionally, the interoperability of the two parallelization methods (MPI and OpenMP) was analyzed and tested. The new proposed methodologies and the development outputs will be implemented by KIOST in the new version of the Korean hydrodynamic operational forecast system.



PROJECT
MOHID Water training courses

LOCATION & COUNTRY
Portugal, Germany, Brazil, Argentina, Colombia, Mexico, South Korea, Turkey, Oman

CLIENTS
MOHID worldwide users community, GWZ Dresden (Germany), INVEMAR (Colombia), EKMAN, ENVIRONLINK & IEAPM (Brazil)

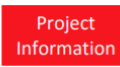
PARTNERS
KIOST (South Korea), GEOMAR & UNAM (Mexico), UNC (Argentina), EPAGRI (Brazil), IGEM (Turkey), SQU (Oman)

DATES
Oct 2010- May 2015

ACTION MODULERS' MAIN TASKS
Providing technical and scientific support and training on MOHID model for researchers and professionals.

SOFTWARE & SUPPORT
Action Modulers offers a wide range of customizable software products. We also provide professional support to implement your projects.

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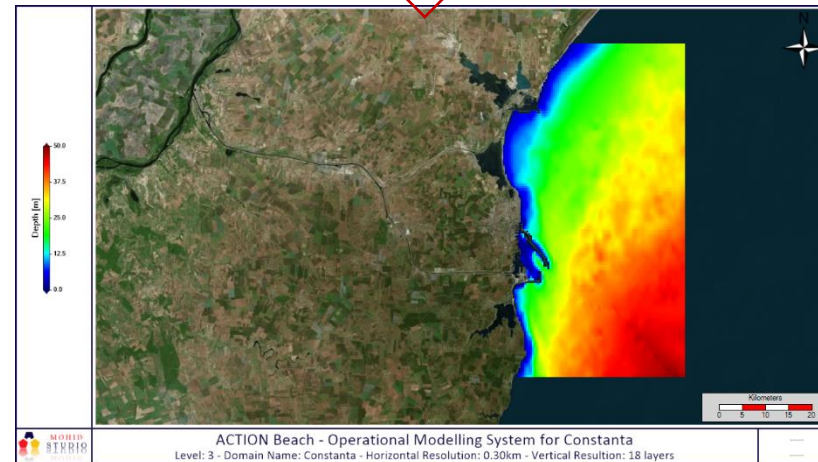
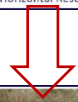
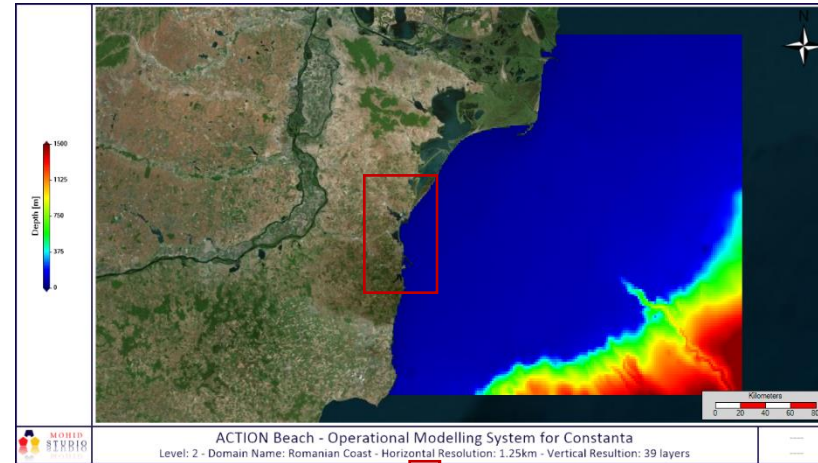
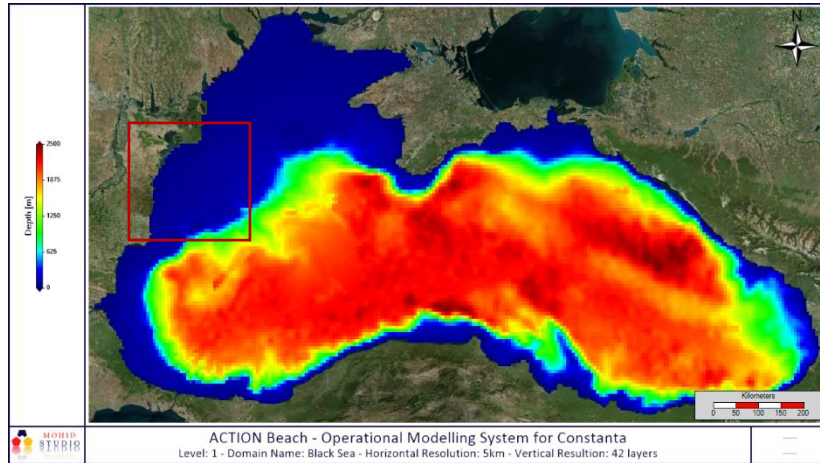
MOHID Water training courses



ACTION Modulers has been actively leading scientific/technical training and support regarding **MOHID Modelling System** since 2010, having held several **MOHID training courses** in 4 different continents for more than 150 professionals. The courses consist of two main formats: open or private. Open courses are typically organized in collaboration with one or more institutions (universities, research institutes or private companies) and were open to the general public. The training level in these courses can either be basic or advanced. In basic level, an introduction of **MOHID** and **MOHID Studio** is provided, enabling the user to come in contact with the model and its capabilities and learn about the different tools available to explore them, by helping in the pre-processing, execution and post-processing tasks. Advanced courses were held focusing on specific themes and areas of application of the model. These courses were designed for **MOHID** users with experience in the model that wish to extend their capabilities in exploring the numerical software to fit their purposes. Private courses are normally organized for research institutes and private companies to train their research or engineering teams with **MOHID Modelling System** typically focusing on a specific application or project. Topics like operational modelling can also be addressed. For any further please don't hesitate to contact us.



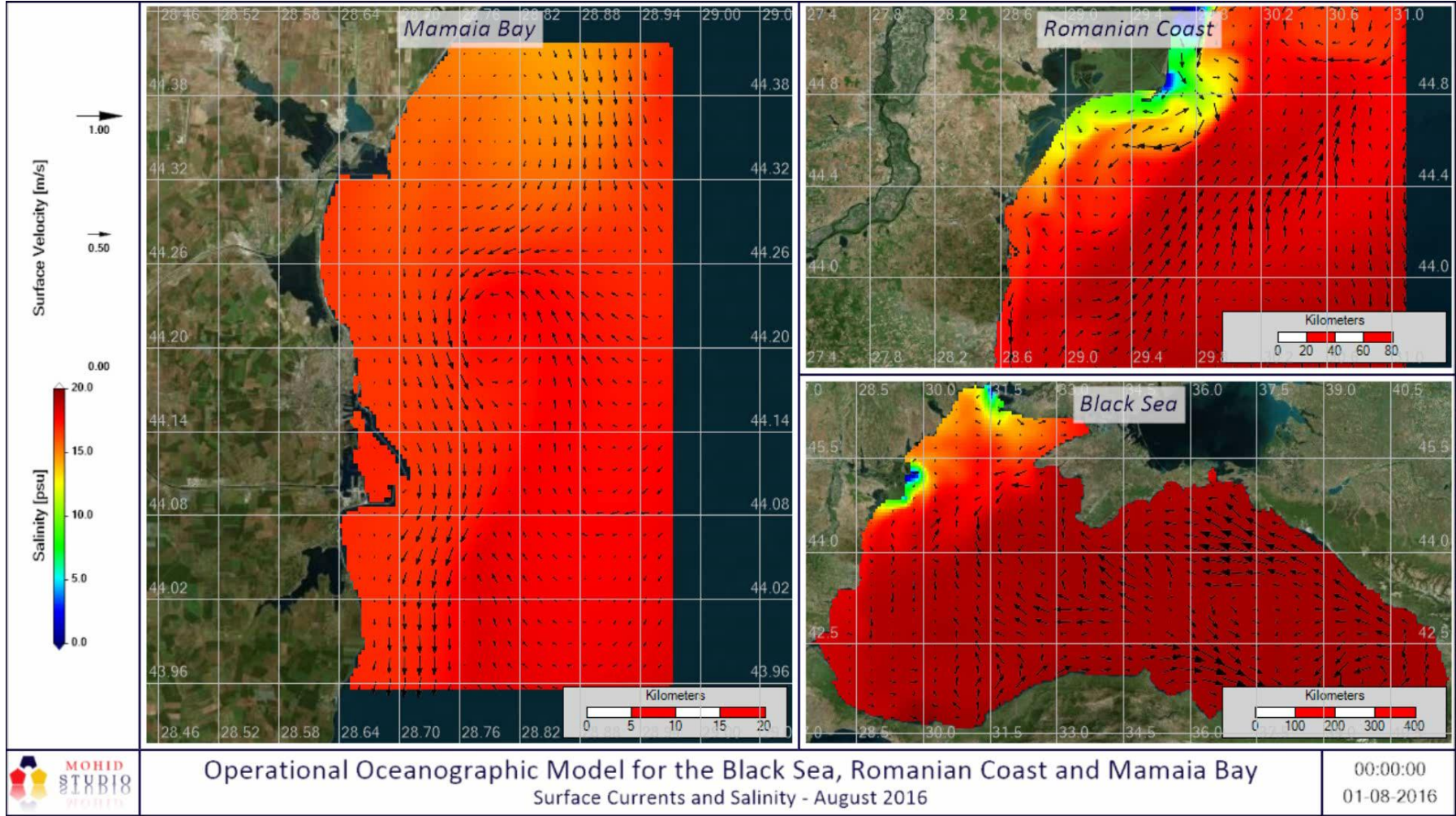
Reference Projects - Romania



- Level 1 - Black Sea
- Level 2 – Romanian Coast
- Level 3 - Constanta

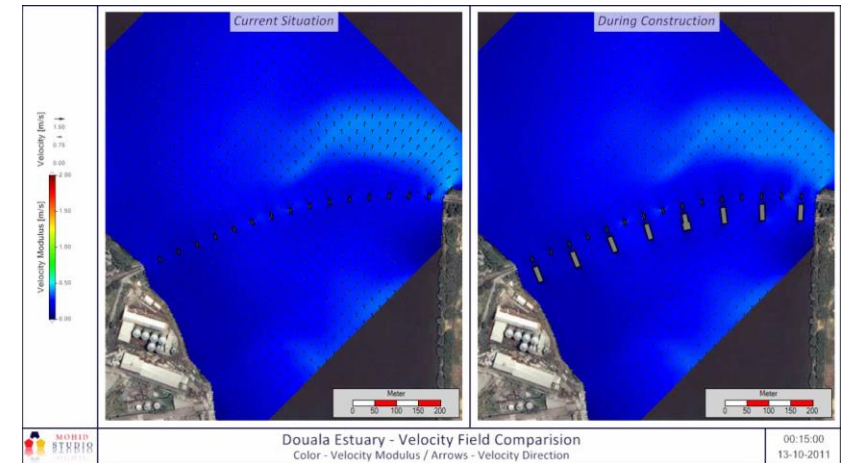


Reference Projects - Romania



Other projects

- Korean oceanographic operational forecasting system
 - Implementation and improvement
- WWTP Submarine outfall discharge in Galicia, Spain
 - Dispersion scenario studies
- Brine discharge modelling in Canary islands, Spain
 - Dispersion scenario studies
- Hydrographic conditions for bridge construction, Cameroon
 - Scouring estimation
- Dredged material dispersion and disposal, Brazil
 - Port dredging operations planning and impact mitigation
- Harbor construction impact assessment, Angola
 - Impacts on hydrodynamic, wave and sediment transport

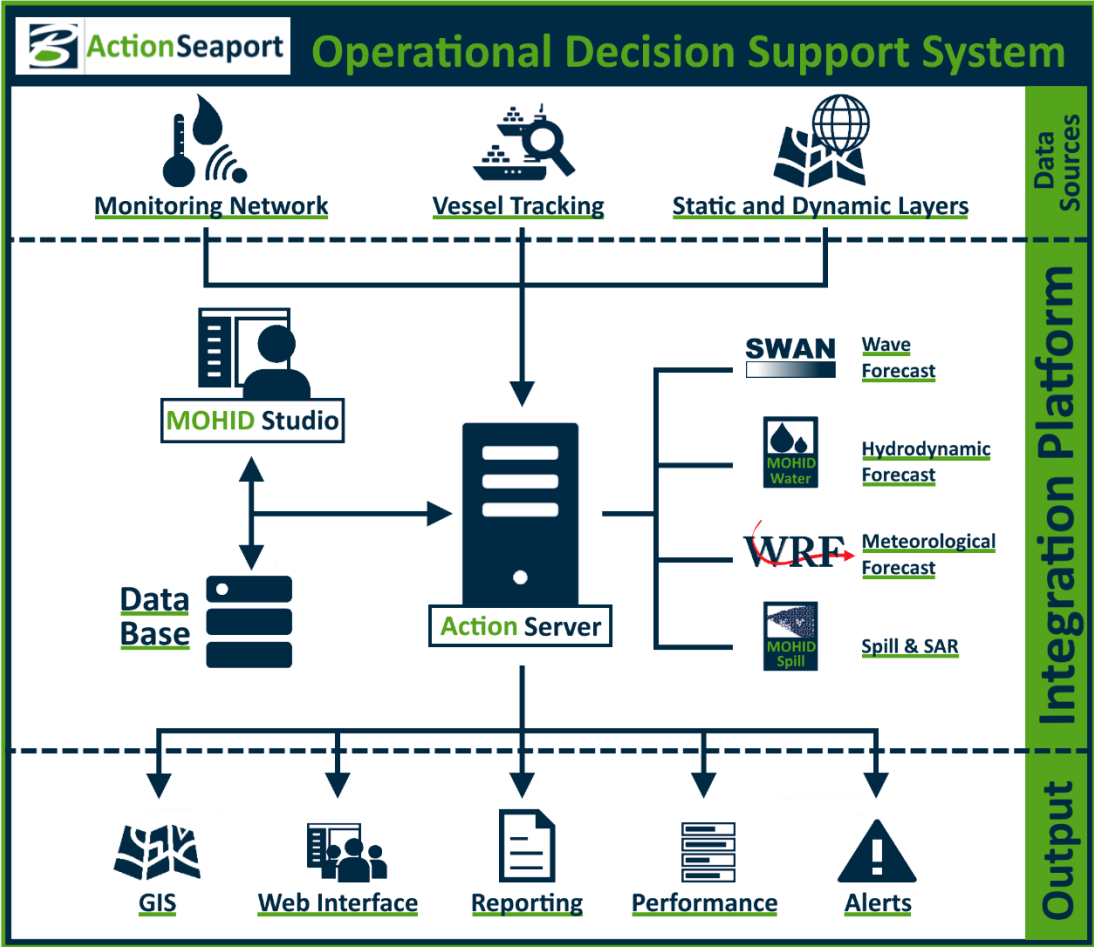
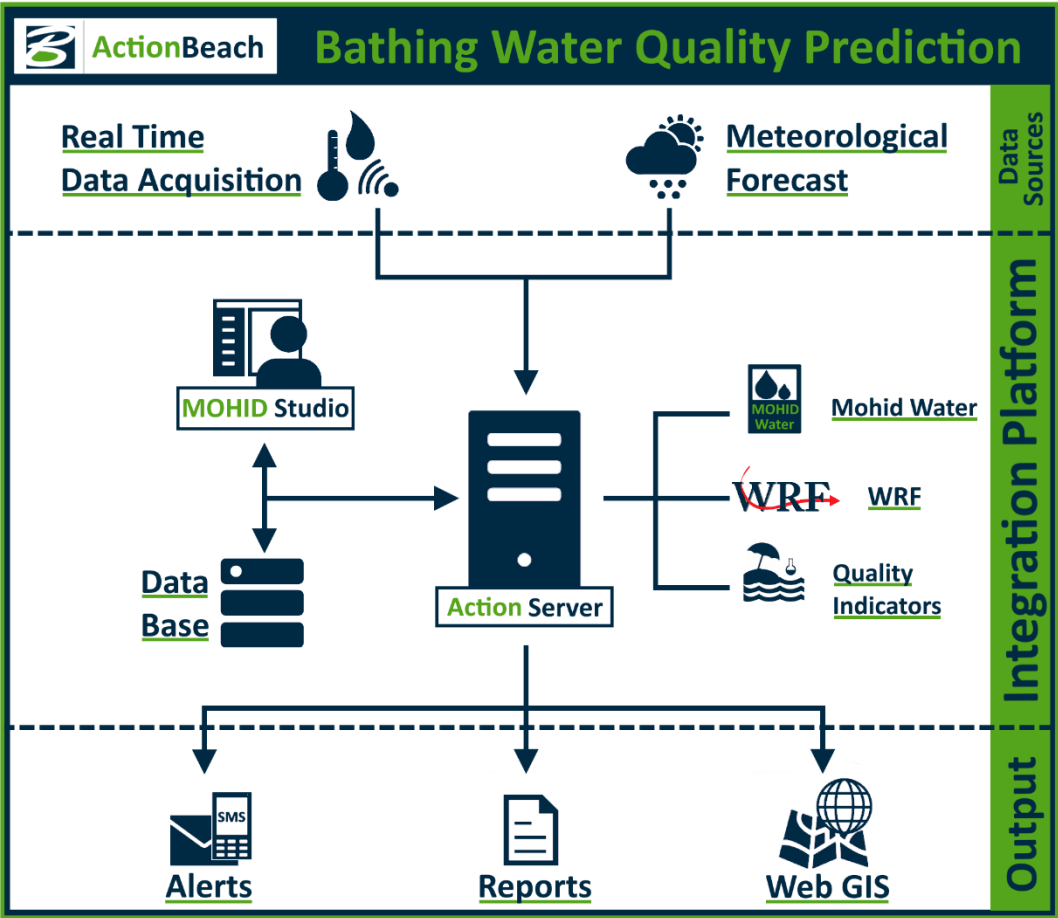


MOHID Water Support

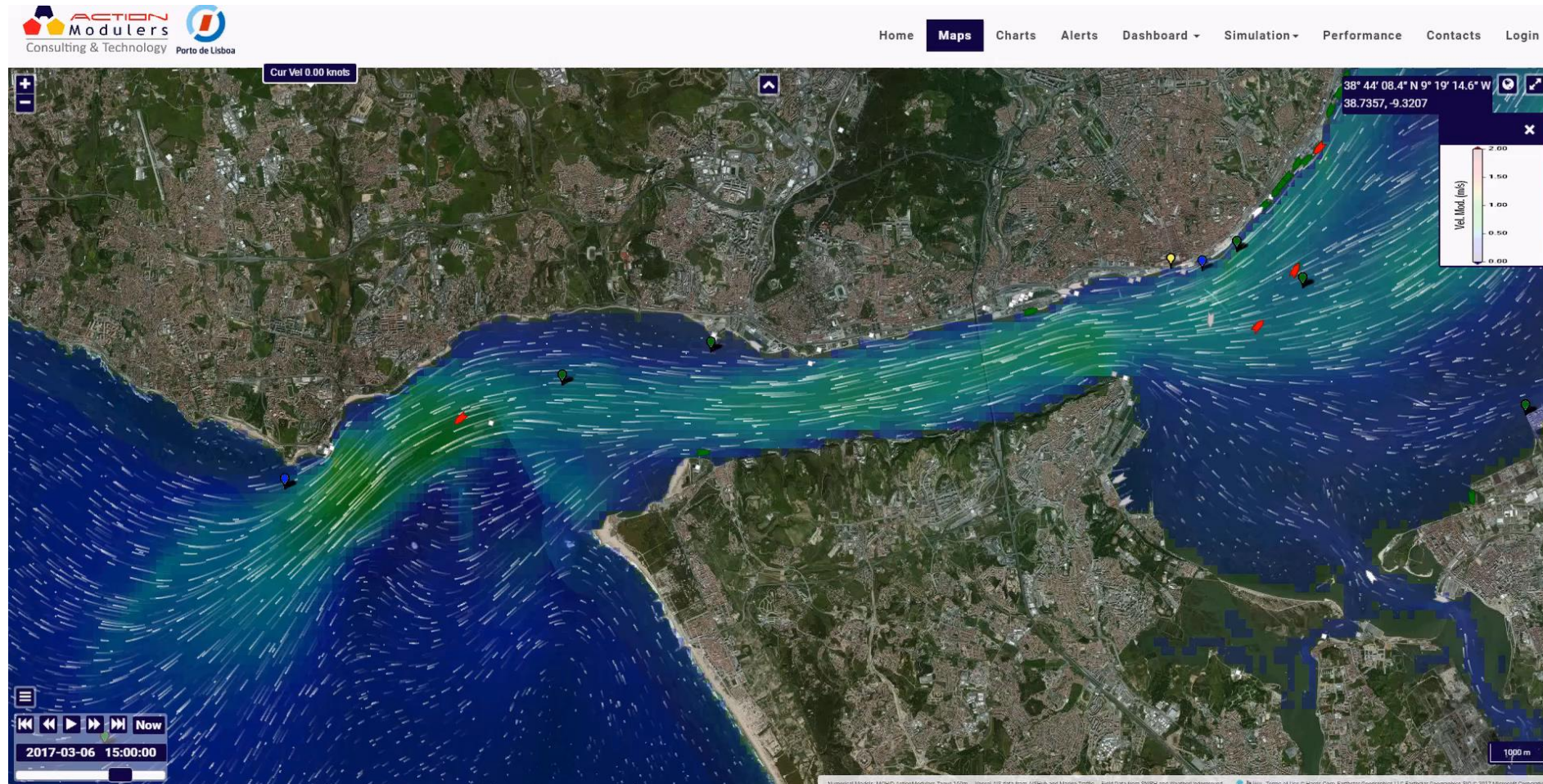
- Professional support services for companies, research institutes and universities
 - Hydrodynamics
 - Sediment transport
 - Water quality
 - Urban and industrial waste water discharges
 - Cooling water recirculation
 - Brine discharges
 - Oil spills
 - Search and rescue
 - Coastal flooding
 - Ecological modelling
 - Aquaculture
 - etc



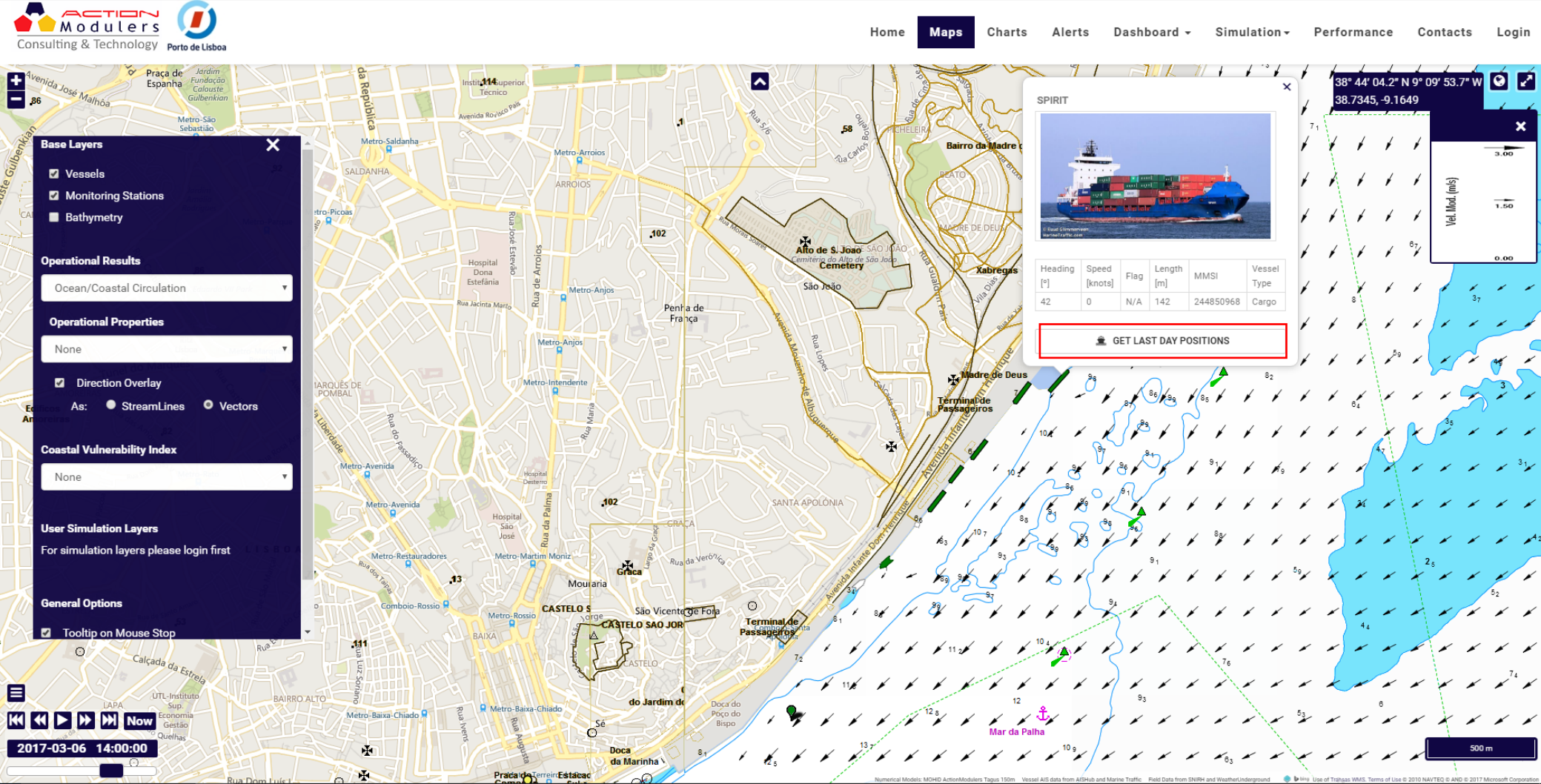
Software for MOHID Water



Software for MOHID Water – Action Seaport



Software for MOHID Water – Action Seaport



Software for MOHID Water – Action Seaport



Charts

This page shows timeseries of measured and modelled data for selected points in form of charts and tabular data.

- Measured data is represented with yellow lines in the charts
- Modelled (forecasted) data is represented with blue lines in the charts
- The vertical line in the charts indicates current date
- The tabular data shows forecasted values
- The column of the current date is highlighted in yellow

Please select a station for which data should be displayed:

Forte São Julião

Torre VTS

Mar da Palha

Tanquilor

Terminal Passageiros

Scooping Area

Forte São Julião

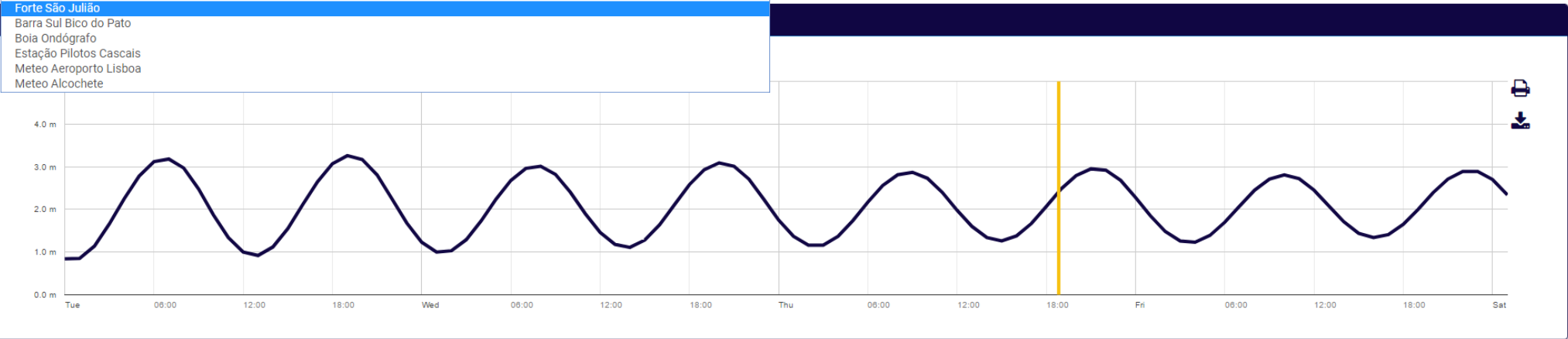
Barra Sul Bico do Pato

Boia Ondógrafo

Estação Pilotos Cascais

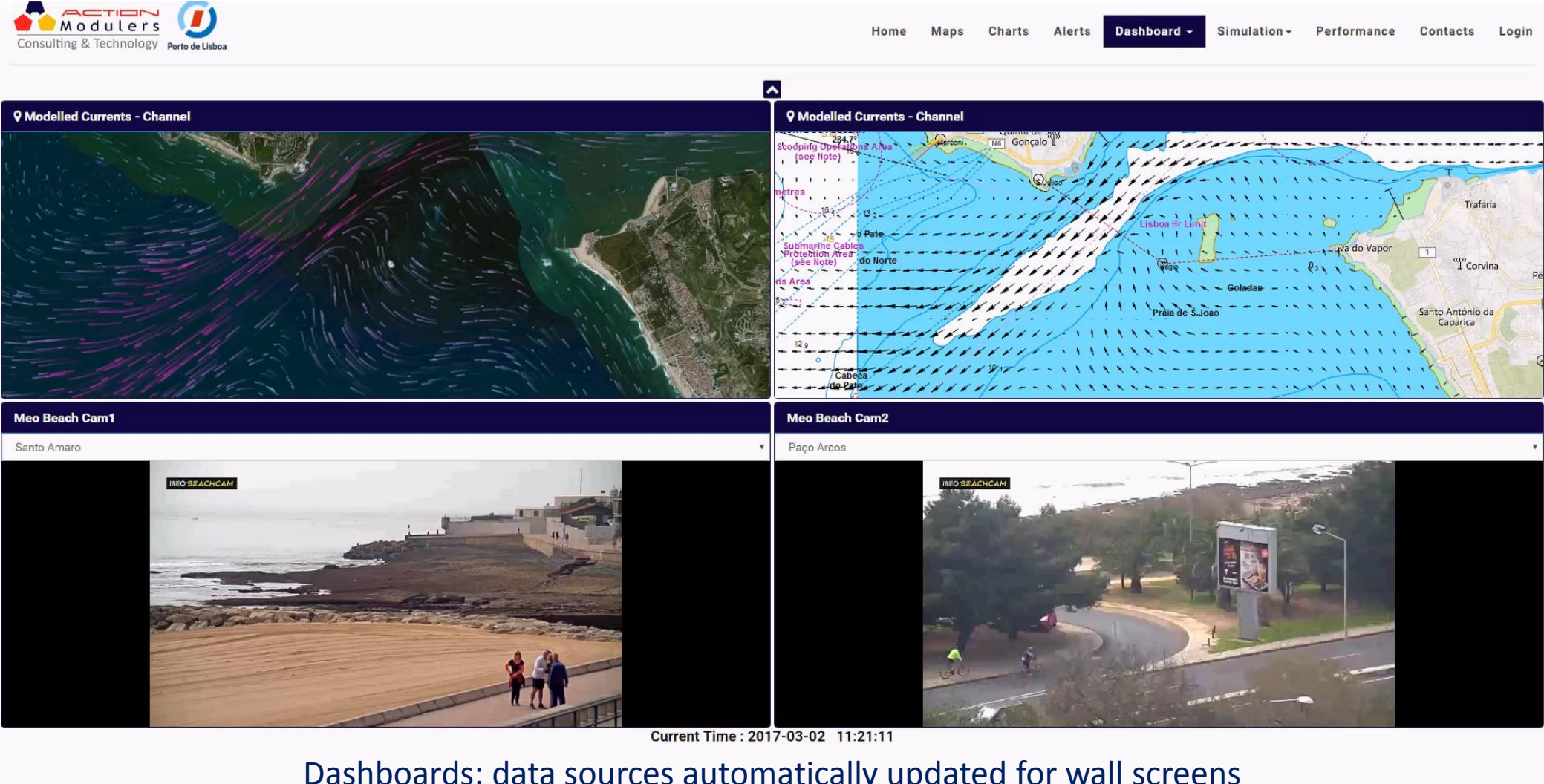
Meteo Aeroporto Lisboa

Meteo Alcochete

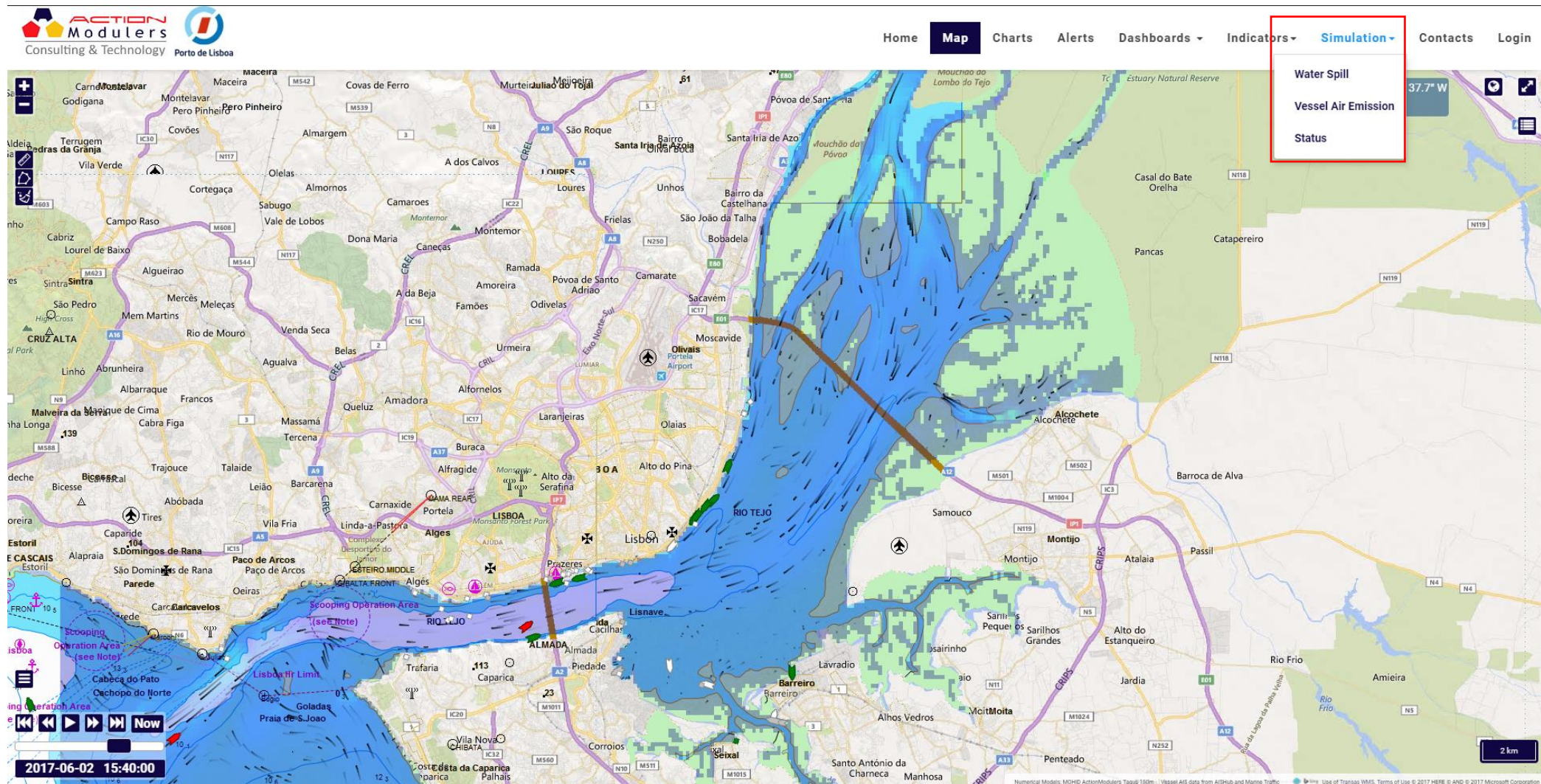


Current Velocity [knots]


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Software for MOHID Water – Action Seaport



Software for MOHID Water – Action Seaport



Consulting & Technology



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1. What?

2. Where?

3. When?

4. Run

Incident Name

test spill

Substance Type

Oil Spill ▾

Oil Spill Options


Medium Oils (Most Crude Oils) ▾

Previous


Next

State-of-the-art, on-the-fly, and reliable water and air dispersion modelling for floating containers, inert, oil and HNS spills

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1. What?

2. Where?

3. When?

4. Run

Incident Name

test spill

Substance Type

Oil Spill

Oil Spill

HNS Spill

Human Body

Passive Tracer (e.g. Ballast waters)

Floating Object (e.g. Container)

Previous

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1. What?

2. Where?

3. When?

4. Run

Incident Name

test spill

Substance Type

Oil Spill

Oil Spill Options

Medium Oils (Most Crude Oils)

Very Light Oils (Jet Fuels, Gasoline)


Light Oils (Diesel, No 2 Fuel Oil, Light Crudes)

Medium Oils (Most Crude Oils)

Heavy Oils (Heavy Crude Oils, No 6 Fuel Oil, Bunker C)

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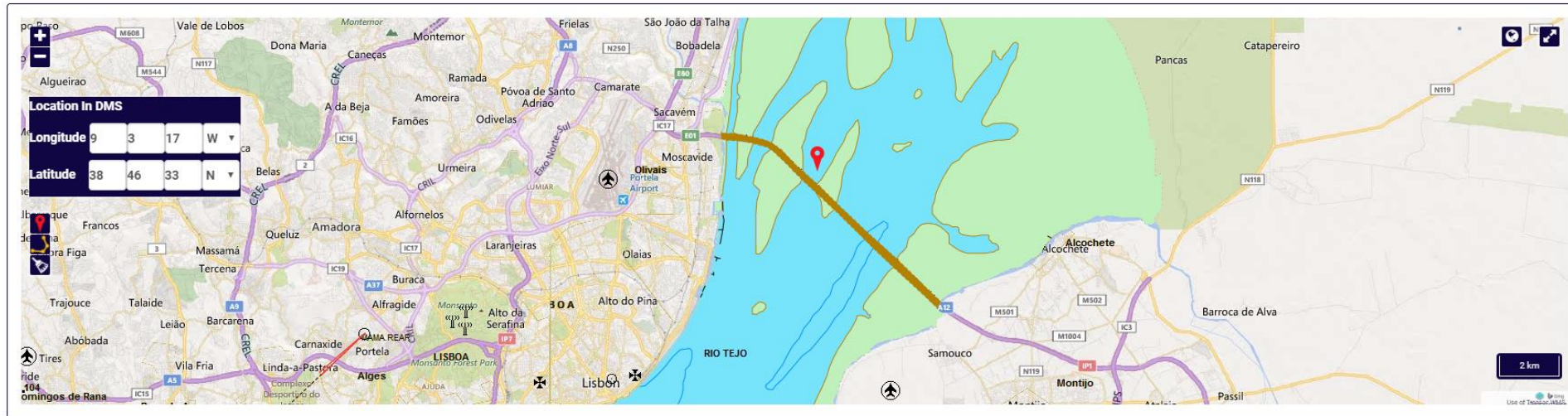
1. What?

2. Where?

3. When?

4. Run

Pick Incident Locations Interactively


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1. What?

2. Where?

3. When?

4. Run

Incident Type

☐ Continuous

☒ Instantaneous

Incident Instant/Simulation Start

2017-06-02 00:00

Simulation End


2017-06-02 06:00

Volume (m3)

100

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1. What?

2. Where?

3. When?

4. Run

Simulation Resume

Name : test spill

Substance : Oil Spill

Localization : -9.055 38.776

Emission Type : instantaneous


Start Date : 2017-06-02 00:00

End Date : 2017-06-02 06:00

Expected Run Duration : 3 minutes

Previous

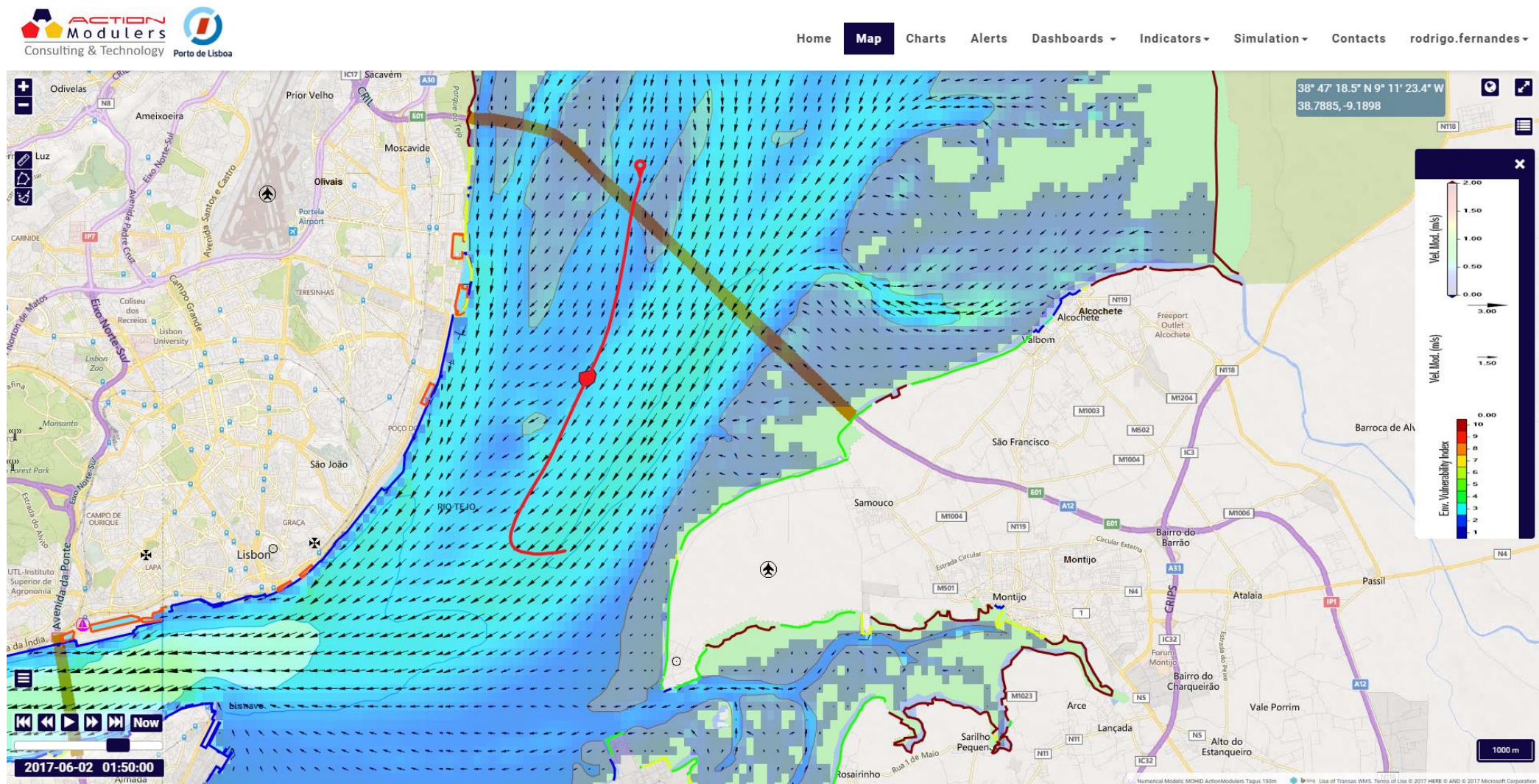
Finish



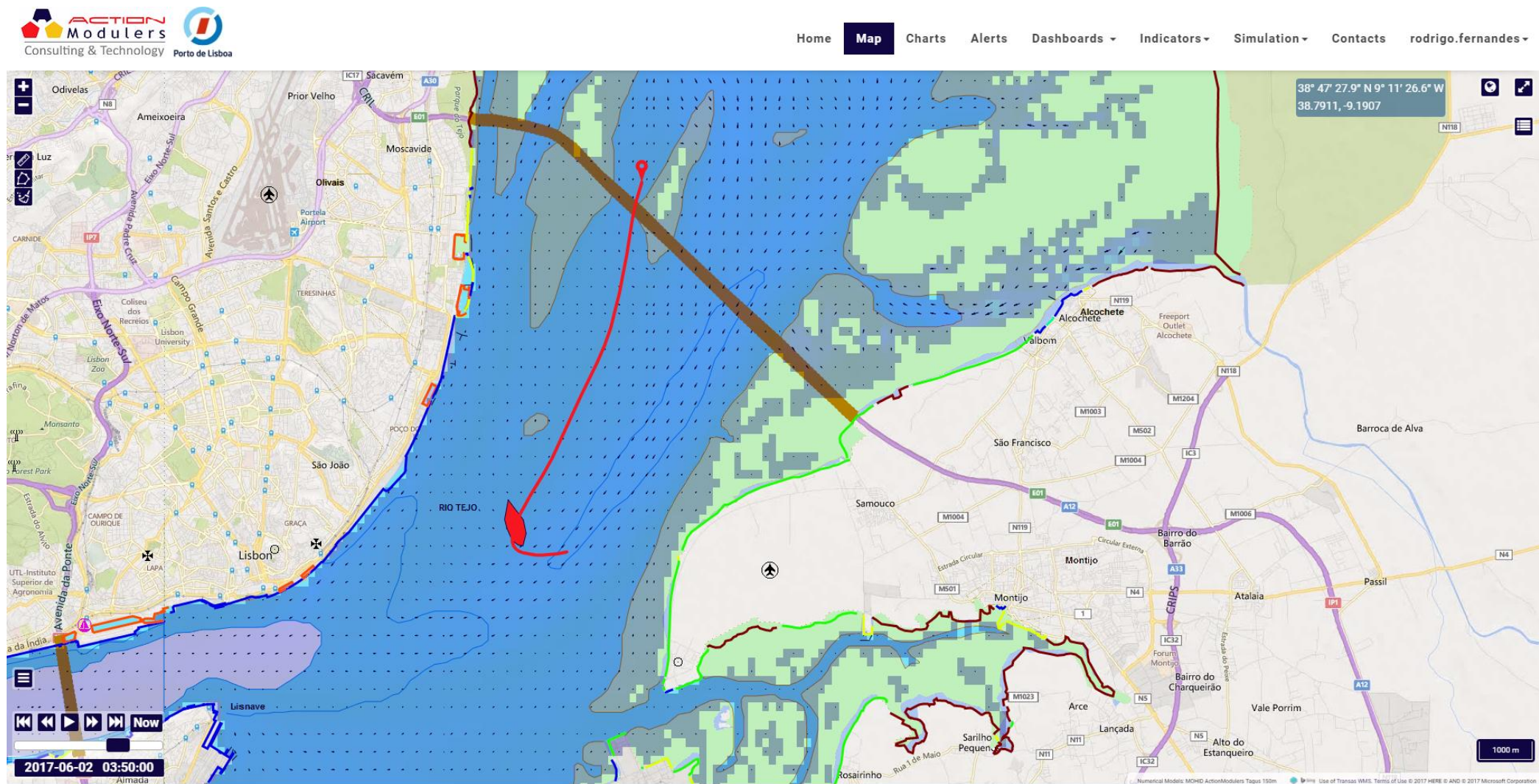
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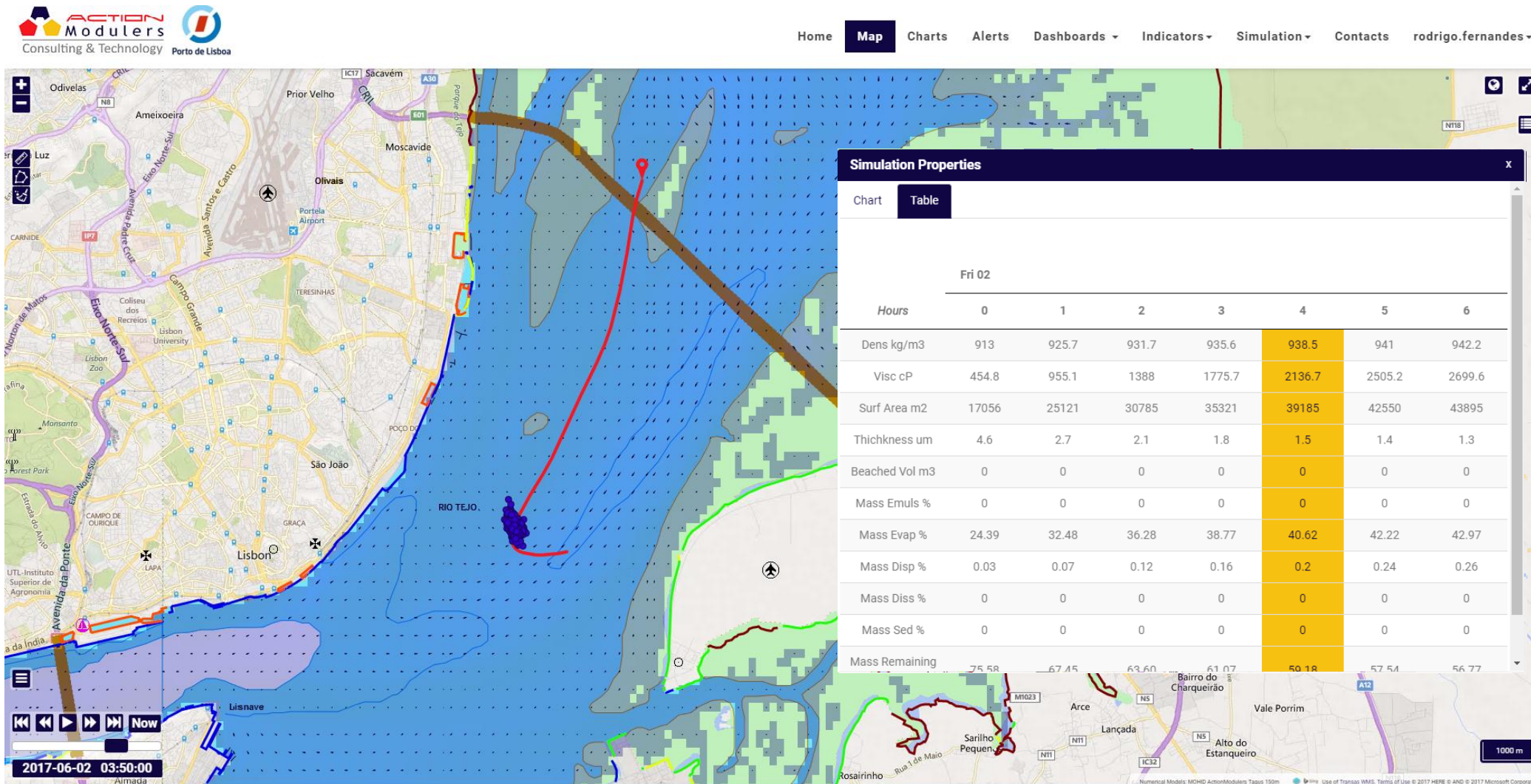
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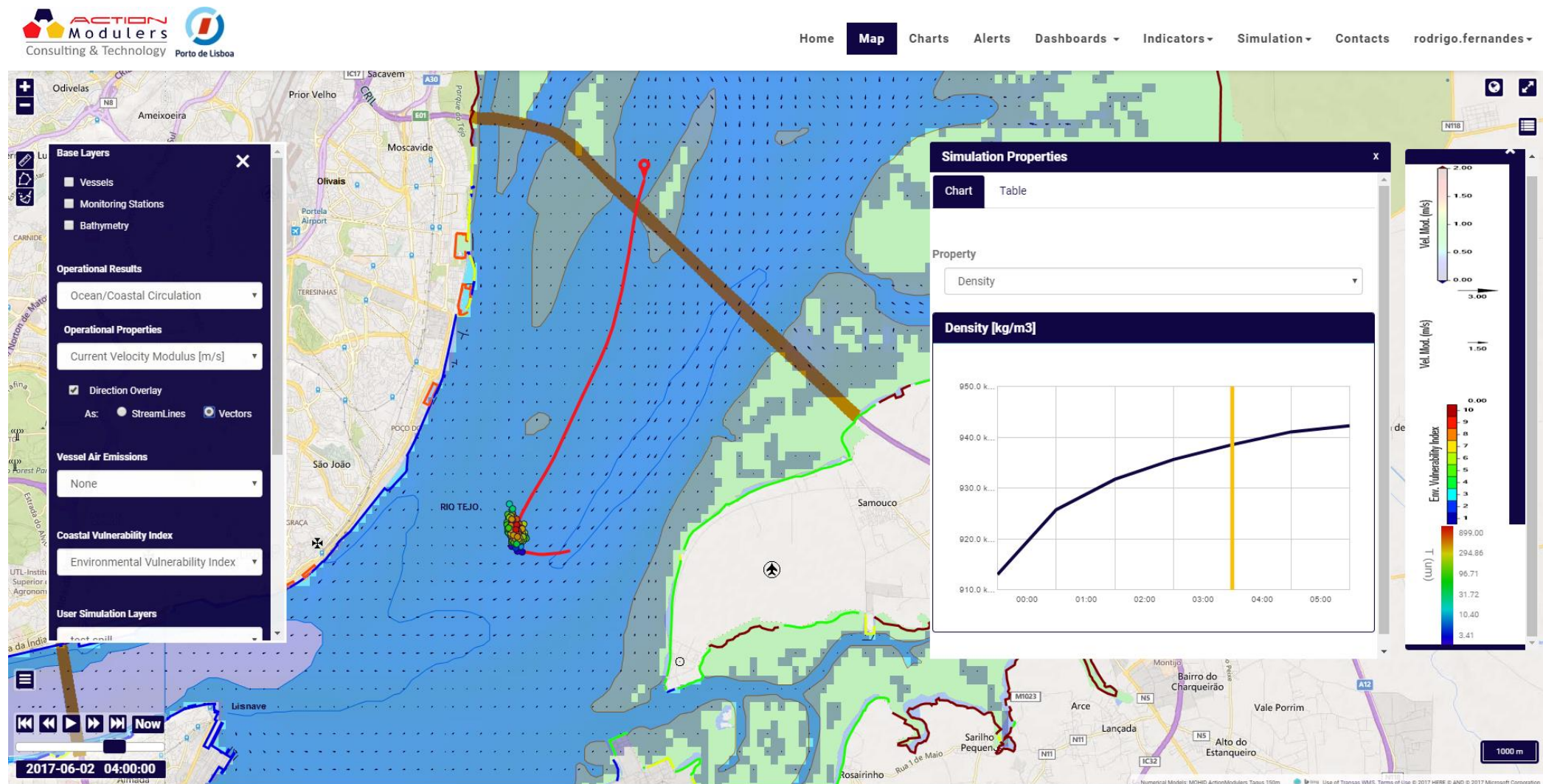
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Software for MOHID Water – Action Seaport



Software for MOHID Water – Action Seaport



MOHID Water @ Bentley

- Integrate MOHID Water & MOHID Studio into Bentley's portfolio (mid-term)
- Integrate Action Seaport into Bentley's portfolio
- Integrate MOHID Water with other Bentley Products

