



RISK MANAGEMENT

INTEGRATED MONITORING
APPROACHES

WAVES

SEDIMENT TRANSPORT

CATCHMENTS

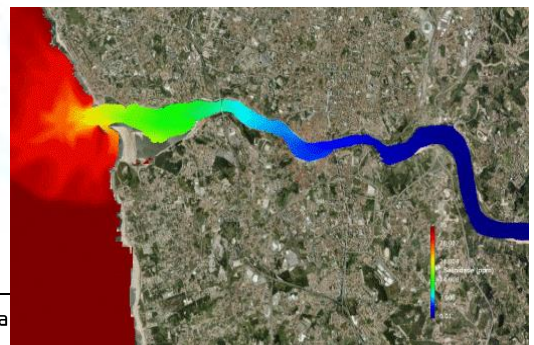
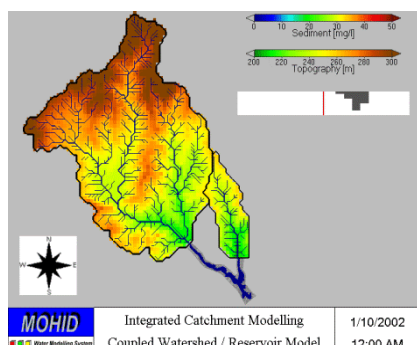
OPERATIONAL MODELING

WEB DATA BASES

WATER QUALITY

WATER NETWORKS
OPERATION OPTIMIZATION


HIDROMOD
modelação em engenharia



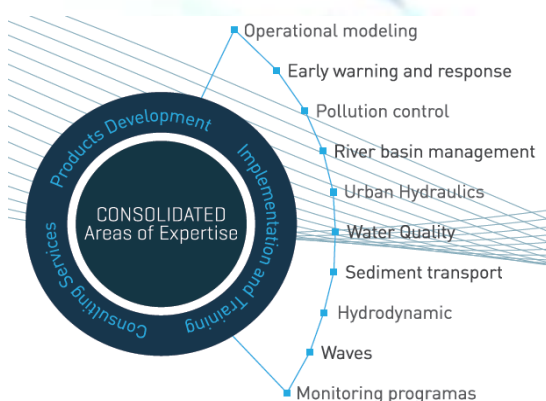


Experience

HIDROMOD is an SME established in 1992 as a high tech consultancy in the field of Computational Modelling of Aquatic Environments. HIDROMOD has participated in about 500 projects connected to hydro-informatics and has highly skilled professionals, including several with Ph.D. and Ms.C. degrees.

In 2002 HIDROMOD implemented a quality management system (QMS) according to the ISO 9001:2000 norm that was later updated according the ISO 9001:2008 norm. The strategic concepts of the QMS are based on the policies defined by HIDROMOD's management board: *"the quality of our organization intends to lead to the client's satisfaction, by producing products and services according the client requirements maintaining a competitive cost. The continuous process improvement, the existence of highly qualified human resources, the innovation and the team work are the foundations of the quality objectives"*.

As the foremost Portuguese engineering company specialised in operational numerical modelling HIDROMOD has worked extensively in operational modelling both in the framework of R&D and Engineering Projects having the capability to deliver solutions at a global scale and to use these solutions to provide high resolution forecasts nearshore, where the economic activities are most important.



HIDROMOD is working for 27 years almost exclusively in modelling having nowadays an accumulated experience gathered with the participation in projects for clients all around the world in Europe, Africa, Asia and South America.

In the framework of these projects HIDROMOD carried out studies on wave propagation, sediment transport by combined wave and current action, effluents dispersion, oil slicks transportation, floodplains delimitation, output evaluation of nutrients

in watersheds, water quality and urban hydraulics.

The core business of HIDROMOD is shaped by the realization that the use of models and information technologies, complemented with the implementation of monitoring systems, is presently recognized as the most efficient tool for decision support, representing an important added value both for designers and decision-makers.

A relevant characteristic of HIDROMOD is the preferential use of internally developed tools in partnership with research groups or other institutions of recognized quality. In order to maintain high standards in the tools and approaches that uses, HIDROMOD maintains an almost continuous participation in multiple international R&D projects of which the following are but representative examples: INSEA, EcoManage, AQUASTRESS, INSEA, SCHEMA in EU FP6 and LENVIS, MYWATER, and FIGARO in EU FP7, AMOS in EEA grants, ODYSSEA and HISEA in H2020.

Among the systems developed in doors or in close cooperation with other institutions it may be referred MOHID and AQUASAFE. MOHID stands out as a unique modelling system (developed jointly by HIDROMOD, the Environmental and Marine Investigation Centre of Instituto Superior Técnico and other teams) composed of several modules, capable of simulating different aspects such as Hydrodynamics, Sediment Transport, Water Quality and Ecology, Soil Water Drainage and Oil Spillage. MOHID system has been applied successfully in several environments worldwide, from oceanic to coastal areas, estuaries, lakes and reservoirs and watersheds, both in engineering and R&D projects.

Along the last decade HIDROMOD also developed high skills in delivering operational meteo-oceanographic services capable to provide user fitted information integrating access to different data sources (including earth observation data and (near) real time local data) and high resolution model forecasts. As a result HIDROMOD is presently serving different clients in areas such as ports, aquacultures, water and energy utilities and coastal waters managing authorities.

In the following pages a list of some relevant projects performed by HIDROMOD along the last years is presented.

Relevant references from the last 10 years

Project:	Madeira Island Alluvial Alert System: Funchal Bay River Sediment Discharges Impact Assessment
Year:	2018-2019
Location:	Portugal – Madeira Island
Client:	Laboratório Regional de Engenharia Civil - LREC
Total project budget:	342.500,00 €
Hidromod's budget:	40.000,00 €
Main project features:	The present service consists of a study of the dynamics of the Funchal coast and the alluvial discharges in the Bay of Funchal in adverse climatic and sea conditions, especially in the zone of influence of the mouths of the three hydrographic basins associated with the S. João, Santa Luzia and João Gomes streams, including the analysis of the operational and hydraulic and structural behaviour of the port infrastructures.
Activities performed:	<p>The main objectives of the study are the following:</p> <ul style="list-style-type: none"> • To diagnose the morphodynamic and hydrodynamic behaviour of the bay of Funchal, taking in consideration the impact of fluvial flows from the S. João, Santa Luzia and João Gomes streams; • To diagnose the state of conservation and structural integrity of marine infrastructures, including the structures confining the mouths of São João, Santa Luzia and João Gomes streams; • To evaluate solutions capable to improve the sheltering conditions provided by the Pontinha breakwater; • To establish maintenance and monitoring programs for the port of Funchal addressing the hydrodynamic and morphological aspects and the behaviour of the infrastructures, including a safety and risk plan for the port operation, depending on the conditions of wave climate and meteorology. <p>In the framework of this project Hidromod is responsible for the simulation and assessment of the transport and deposition of the solid flows discharged by these three rivers.</p>
Project:	HISEA - High resolution marine Copernicus-based information services at sea for ports and aquaculture
Year:	2019-2021
Location:	Europe
Client:	European Commission through H2020 program
Total project budget:	1.941.661,50 €
Hidromod's budget:	302.356,25 €
Main project features:	The HISEA project aims to offer a service that provides high resolution data of water quality at sea that is used to give focused answers to specific questions from the targeted users and clients. HiSea is developing, testing and demonstrating in operational mode novel Copernicus-based downstream information services that will incorporate Copernicus Marine- and Climate Services Products, local monitoring data and advanced modelling to improve operation, planning and management of different marine activities co-designed with users in sectors ports and aquaculture
Activities performed:	HISEA operational service will be set up based on an ICT platform that will benefit from the knowledge and experience of use of existing partner's well proofed ICT platforms such as Hidromod's AQUASAFE. Starting from this knowledge there will be set up an improved HISEA platform that will include all the necessary technical requirements to be fully compliant with a cloud deployment, being by this way ready to use the DIAS infrastructure whenever it is available. Following this objective HISEA platform architecture will make use of relevant innovations such as the use of Docker containers which highly reduces the overhead of the traditional approaches and, being based on virtual machines, is capable to run in different operative systems (e.g. Linux, Windows).

Project:	ICOS: Integrated Coastal Surveillance
Year:	2018
Location:	Europe
Client:	DGPM in the framework of Marine EO: Copernicus Security - SATSURVEILLANCE
Total project budget:	226.918 €
Hidromod's budget:	55.155 €
Main project features:	<p>Marine-EO aims at procuring the development of demand-driven EO-based services, adopted on open standards, bringing incremental or radical innovations in the field of maritime awareness and leveraging on the existing Copernicus Services and other products from the Copernicus portfolio. The present project considers contracting services in the thematic area of Copernicus Security: SATSURVEILLANCE.</p> <p>The procurement targets situations that require radical innovation or R&D and for which there are typically no solutions on or close to the market yet. In this context there were considered three project phases in which of each a number of competing contractors area asked to present different approaches to solving the problem stated. In the end of each phase only part of the solutions are retained to proceed to the next phase.</p>
Activities performed:	<p>HIDROMOD is participating in this project within a consortium leaded be GMV which presented a proposal in phase 1 for an ICT platform and a methodological approach that was retained for the second phase. In the framework of this second phase a prototype of the platform will be developed. In this project HIDROMOD is responsible to provide information related with along route safe meteo-oceanographic conditions.</p>
Project:	PERSEA: Copernicus Based Downstream Information Services
Year:	2018-2019
Location:	Europe
Client:	DGPM in the framework of Marine EO: Marine Environment Monitoring - SATOCEAN
Total project budget:	46.348 €
Hidromod's budget:	37.680 €
Main project features:	<p>Marine-EO aims at procuring the development of demand-driven EO-based services, adopted on open standards, bringing incremental or radical innovations in the field of maritime awareness and leveraging on the existing Copernicus Services and other products from the Copernicus portfolio. The present project considers contracting services in the thematic area of Copernicus Marine Environment Monitoring and Climate Change: SATOCEAN.</p> <p>The procurement targets situations that require radical innovation or R&D and for which there are typically no solutions on or close to the market yet. In this context there were considered three project phases in which of each a number of competing contractors area asked to present different approaches to solving the problem stated. In the end of each phase only part of the solutions are retained to proceed to the next phase.</p>
Activities performed:	<p>HIDROMOD participated in SATOCEAN first phase leading a consortium with GMV and ARGANS. Within this project HIDROMOD developed a platform concept capable to achieve 3 main objectives:</p> <ul style="list-style-type: none"> • Develop, test and validate two sets of demand-driven EO-based services, adopted on open standards, bringing incremental or radical innovations in the field of maritime awareness and leveraging on the existing Copernicus Services and other products from the Copernicus portfolio • Propose a set of "support" / "envelop" services which will better integrate the EO and Copernicus-enabled services to the operational logic and code of conduct • Strengthen transnational collaboration in maritime awareness sector by facilitating knowledge transfer and optimization of resources for the public authorities participating in the buyers group <p>The expected outcome is to provide three downstream feature services:</p> <ul style="list-style-type: none"> • Ocean biotic and abiotic parameters, climatological information and historical statistics (MARINE environmental status in hot spots) • Fish farm monitoring (Detection of Fish farms threats) • Arctic based services (Detection of vessels and icebergs in Arctic areas)

Project:	Assessment of the maintenance conditions of the rotation and docking basins of the Teporset wharf (Setúbal)
Year:	2018
Location:	Portugal
Client:	SECIL / CIMPOR
Total project budget:	15.000 €
Hidromod's budget:	15.000 €
Main project features:	Secil and Cimpor intend to provide the necessary conditions to receive ships the Teporset wharf in the port of Setúbal. For this purpose it will be necessary to dredge a docking basin and extend the current manoeuvring basin that also serves the Termitrena wharf.
Activities performed:	The present study had as objective to evaluate the potential conditions of maintenance of the manoeuvring and docking basins of the new Teporset wharf as well as eventual consequences in the current conditions of maintenance of the manoeuvring basin that serves the Termitrena wharf. This evaluation was performed based on a hydrodynamic model duly calibrated for the local conditions and the estuary, which includes a sediment transport module. The results obtained allowed to draw relevant conclusions about these probable maintenance conditions.
Project:	Assessment of potential tsunami flooding areas in the area of the future new Lisbon port ship containers terminal
Year:	2018
Location:	Portugal
Client:	Lisbon Port Authority (APL)
Total project budget:	7.500 €
Hidromod's budget:	7.500 €
Main project features:	In the follow-up of the process to conclude the studies related with the project and environmental impact study of the future new Lisbon port ship containers terminal it was required by the environmental protection authorities the assessment of the potential risk associated with the potential occurrence of a tsunami both in which concerns the new structures and the surrounding areas.
Activities performed:	In the framework of this study it was performed an evaluation of the areas potentially flooded in the case of the occurrence of a tsunami in the area adjacent to the future port in the Tagus estuary. This assessment included the identification of the most vulnerable areas in the present situation and of the potential changes that the construction of the future port may introduce.
Project:	Forecast of meteo-oceanographic conditions to support an aquaculture operation in Sines
Year:	2018
Location:	Sines
Client:	Seaculture
Total project budget:	7.500 €
Hidromod's budget:	7.500 €
Main project features:	This service aims to provide daily information on weather-oceanographic conditions that may be relevant for an aquaculture operation in Sines.
Activities performed:	The service includes the availability of real-time measurements (waves, currents, meteorology, water temperature) and forecasts of these parameters for the next days.
Project:	Southern extension of runway 01-19 of the Montijo Air Base. Hydromorphological impact assessment.
Year:	2018
Location:	Portugal
Client:	ANA Airports
Total project budget:	10.000 €
Hidromod's budget:	10.000 €

Main project features:	This work was part of the project sponsored by ANA Aeroportos de Portugal for the "engineering studies related to the southern extension of runway 01-19 of the Air Base No. 6 in Montijo".
Activities performed:	The main activities performed by HIDROMOD within the project were related with the characterization of the reference situation and assessment of the impacts of the various constructive alternatives proposed for the extension of the airport in which concerns the issues of hydrodynamics (namely currents and sea level variation) and sediment dynamics.
Project:	Calheta marina (Madeira island). Preliminary assessment of solutions to shelter improvement.
Year:	2018
Location:	Portugal
Client:	Proman
Total project budget:	11.400 €
Hidromod's budget:	11.400 €
Main project features:	Calheta marina in Madeira island suffers from lack of proper sheltering for a number of observed sea state conditions. These problems are posing relevant limitations to the marina normal exploitation. In this context is necessary to find solutions capable to minimize the consequences for the sheltering conditions related with these sea states.
Activities performed:	The main activities performed by HIDROMOD within the project were related with the characterization of the reference situation and assessment of the impacts of the various intervention alternatives in which concerns the improvement of the sheltering conditions.
Project:	Albufeira lagoon water quality improvement project and environmental impact assessment. Simulation of different dredging and sea connection options.
Year:	2018
Location:	Portugal
Client:	Nemus
Total project budget:	12.000 €
Hidromod's budget:	12.000 €
Main project features:	Albufeira coastal lagoon connection to the sea is subject to closing cycles that contribute to the degradation of the water quality inside the lagoon. For this reason periodically it is required to open it. The goal of this project was to assess optimal ways to perform this action having has objective to find a solution that may guarantee a longer period for the channel to keep open.
Activities performed:	In the framework of this work there were assessed the impacts in the hydrodynamics, initial transport trends and water renewal times related with the opening of a channel connecting the Albufeira lagoon to the sea. There were took in consideration different options for the channel design considering different alignments and depths.
Project:	Assessment of the hydromorphological conditions for the creation and maintenance of bathing areas between Portinho da Arrábida and Figueirinha beaches
Year:	2018
Location:	Portugal
Client:	Setubal Municipality
Total project budget:	27.000 €
Hidromod's budget:	27.000 €
Main project features:	The coastal zone between the beach of Saúde and Portinho da Arrábida in the Setubal area represents an added value in environmental and tourism terms that it is important to preserve and provide better conditions of use. Currently the stretch between Figueirinha and Portinho da Arrábida in the Setúbal area has been facing a slow erosion process and there is a willingness of the Municipal Council of Setúbal to improve the bathing conditions throughout the beach section of Health - Portinho da Arrábida. The main objective of this project was to identify the most probable causes of the observed erosion problems and to evaluate the viability of artificial feeding of the most affected areas and to create new beach areas between Albarquel and the mouth of the Ajuda / Comenda river.

Activities performed:	In order to achieve the above mentioned goals the work involved an analysis of the available historical data and the execution of numerical simulations to identify the transport patterns and assess the stability of the nourished and new beach areas.
Project:	Dakhla Atlantic (Morocco) new port design studies.
Year:	2017
Location:	Morocco
Client:	Consulmar
Total project budget:	31.000 €
Hidromod's budget:	31.000 €
Main project features:	The present work was related with the project for the construction of a new port in Dakhla (Morocco) in the framework of which was necessary to evaluate the potential impacts over the coastal dynamics.
Activities performed:	In order to assess the potential impacts over the coastal hydrodynamics and coastal transport associated with the construction of the port HIDROMOD carried out a set of hydromorphological simulations considering different design options. These simulations allowed to assess the impact of these different design options on the currents, the coastal drift and the evolution of the coast line.
Project:	Assessment of the hydromorphological patterns in the Setubal estuary outer delta
Year:	2017
Location:	Portugal
Client:	Setubal and Sesimbra ports authority (APSS)
Total project budget:	55.000 €
Hidromod's budget:	46.000 €
Main project features:	Along the last years there had been observed erosion phenomena in the beaches between Figueirinha and Portinho da Arrábida in the region of Setubal that had be responsible for the loss of large beach extensions. Presently the port authority is promoting a deepening of the port access channel and the local public opinion expressed their fear in relation to possible consequences of this work in an aggravation of an already concerning problem. Th aim of this project is to understand the phenomena responsible for the evolution of the beach (s) during the last years and access in which extent the erosive processes may be increased by the channel deepening.
Activities performed:	In the framework of this project HIDROMOD carried out a number of modelling simulations integrating the effects of tides and waves to properly characterize the transport processes. This work was supported by the execution of new detailed bathymetric surveys which enabled to better understand the difference in the transport patterns along the last years and, finally, to assess the potential consequences of the channel deepening and of possible mitigation actions.
Project:	Analysis of currents, waves and sediments in Viana do Castelo's coastal area.
Year:	2017
Location:	Portugal
Client:	Wave Energy Center (WAVEC)
Total project budget:	9.000 €
Hidromod's budget:	9.000 €
Main project features:	In the framework of the assessment of the natural conditions to install an offshore renewable energy production area off Viana do Castelo, it was required to proceed with a characterization of the local meteo-oceanographic conditions and the sediment dynamics.
Activities performed:	In the framework of this project HIDROMOD was responsible for the characterization of the sea currents and waves was based in large scale model results for waves and currents. These large scale model simulations were complemented with high resolution forecasts of waves and currents near the coast. Additionally, wave buoy measured data was also used in the wave analysis. The characterization of sediment dynamics was mainly based in the sediment balance analysis done by the Portuguese Littoral Working Group. This analysis was complemented by a seabed sediment characterization done by the Portuguese Hydrographic Institute in several points along the area of interest.

Project:	São João river plume impact on Funchal port hydrodynamics and sediment transport
Year:	2017
Location:	Portugal
Client:	Madeira ports Authority (APRAM)
Total project budget:	27.000 €
Hidromod's budget:	27.000 €
Main project features:	<p>São João river is one of the three main streams of Funchal along with Santa Luzia and João Gomes rivers. In the final stretch São João river runs under the Avenida do Mar and the Madeira Communities just before entering in the sea near the marina. The potential negative impacts of the discharge of the S. João river in the interior of the port basin are recognized still from before the construction of the port itself, particularly with regard to the capacity to generate intense flows and to transport large amounts of sediment in situations of extreme events.</p> <p>With the changes introduced in the geometry and alignment of the final section of the river bed that resulted from the requalification of Funchal sea front after the 2010 floods, the conditions in which the river discharge is processed was also changed.</p>
Activities performed:	<p>The present study had the objective of evaluating the present river discharging conditions and how they may affect the entrance of the marina both in terms of hydrodynamics and sediment transport. To this end two extreme flow scenarios and different configurations of the marina entrance were simulated.</p> <p>The quantification of the impacts was done using the numerical model MOHID (www.mohid.com), which allows simulating different coastal processes including 3D plumes transport and dispersion.</p>
Project:	Demonstrations of CMEMS Downstream Service
Year:	2017-2018
Location:	Portugal
Client:	Mércator Océan
Total project budget:	245.000 €
Hidromod's budget:	245.000 €
Main project features:	<p>HIDROMOD presently delivers a set of high quality services regarding hydrodynamics, waves and meteorology which provides fit-for-use information to different customers in Europe, Asia and South America. These services result from the integration of different data sources (from which Copernicus Marine Service products represent a relevant contribution) as the starting point of the entire oceanographic service chain. As a result HIDROMOD is delivering user's tailored information useful to better planning of marine activities, improvements in operations safety or improved support to emergency situations.</p>
Activities performed:	<p>The main objective of this project is to promote the services among the marine users and stakeholders and introduce some improvements that may contribute to provide a more universal service</p>
Project:	ODYSSEA: Operating a Network of Integrated Observatory Systems in the Mediterranean Sea
Year:	2017-2021
Location:	Portugal
Client:	EU H2020 program
Total project budget:	8.398.000 €
Hidromod's budget:	306.250 €
Main project features:	<p>ODYSSEA is an H2020 EU-funded project intended to make Mediterranean marine data easily accessible and operational to multiple end-users. ODYSSEA objective is to develop a network of coastal observatories, deploying novel in-situ sensors at sea, employing oceanographic modelling and integrating existing mobile apps for citizen and scientist networks.</p> <p>The ODYSSEA platform will provide, through a public portal, on-demand information services, including forecasts. The project will include capacity building to maximise exploitation of the information services for creating business and research opportunities across the Mediterranean Sea basin</p>

Activities performed:	HIDROMOD has proven experience in developing and implementing operational systems. In the framework of ODYSSEA HIDROMOD will contribute for the ODYSSEA platform, ODYSSEA services and modelling activities. HIDROMOD will also be deeply committed with the dissemination tasks and with the related business support tasks (market assessment, business model and business plan)
Project:	Environmental Incidents Assessment of the Project for the Reinforcement of the Armona and Tavira Islands dunes
Year:	2016
Location:	Portugal
Client:	Matos e Fonseca
Total project budget:	2.000 €
Hidromod's budget:	2.000 €
Main project features:	The objective of this project was to provide support to the Environmental Incidences Assessment of the project for the Implementation of Reinforcement of the Dunes in the Islands of Armona and Tavira in the aspects related to hydrodynamics and hydromorphology.
Activities performed:	The work carried out included a critical analysis of previous works for the site, namely (among others) in the scope of the Environmental Impact Study, the Ria Formosa Lagoon System Requalification Project (ICN, 2000) and the studies carried out by LNEC in Scope of the Study of the Recovery and Valorization of the Armona Island dunes.
Project:	AQUASAFE platform maintenance services for the Lisbon sewage network relating the period 2016/2017
Year:	2016
Location:	Lisboa - Portugal
Client:	EPAL - Empresa Portuguesa de águas LIVRES, S.A.
Total project budget:	20.000 €
Hidromod's budget:	20.000 €
Main project features:	AQUASAFE platform provides a set of the services for the Lisbon sewage network allowing the integration of data (including data acquired in real time) and forecast models to support the operation, issuing warnings and alerts and automatic production of reports.
Activities performed:	These tools presently available for the Lisbon wastewater network allow the integration of data and models, communicate with databases and extract information with the characteristics considered necessary for network management. This includes the ability to search the data in a georeferenced system, with a user-friendly interface, and ask questions that allow you to meet operational requirements
Project:	Hydrodynamic Impacts assessment of the construction of coastal structures in the Marmara Sea near Istanbul
Year:	2016
Location:	Turkey
Client:	Consulmar
Total project budget:	22.500 €
Hidromod's budget:	22.500 €
Main project features:	The government of Turkey is assessing the possibility to build an ambitious project (Marmara Adalari Preliminary Design Concept Master Plan) that, among other features, foresees the dredging of a new navigation channel parallel to the Bosphorus channel and the building of some artificial islands with the residues resulting from these dredging works.
Activities performed:	The present project refers to the modelling work done to quantify the potential impact of three artificial islands over the coastal circulation along a coastal stretch west of the Bosphorus. The hydrodynamic model was set up using MOHID modelling system. A one-way nesting approach (with several levels) was implemented and the model boundary conditions were defined using large scale modelling solutions publicly available.
Project:	Flood propagation in the lower course of the Vouga River. Study on the hydraulic infrastructures of the tidal flood defence system of Rio Velho and Rio Novo do Príncipe
Year:	2016
Location:	Portugal

Client:	Aveiro Region
Total project budget:	39.600 €
Hidromod's budget:	39.600 €
Main project features:	Vouga river final stretch faces frequent floods and the influence of tides that are controlled through hydraulic structures. Presently new infrastructures are required and for this purpose it is necessary to proceed with the necessary hydraulic studies.
Activities performed:	In the framework of this project Hidromod made several simulations to support the project of construction of the required hydraulic infrastructures and the potential changes introduced by these new infrastructures in the Vouga River's hydraulic regime. The study took into account the propagation of flood waves with different return periods, using the FLDWAV model.
Project:	Assessment of the effect of rainwater discharge from Monsanto/Sta. Apolonia and Chelas/Beato tunnels in the local hydrodynamics and sediment dynamics along the Tagus estuary
Year:	2016
Location:	Portugal
Client:	Lisbon Municipality
Total project budget:	16.500 €
Hidromod's budget:	16.500 €
Main project features:	The Lisbon wastewater network is being improved in order to reduce the flood risk due to the storm water discharges. In this context new wastewater interceptors are being built to divert the storm water to more favourable locations along the Tagus estuary.
Activities performed:	The object of the present study was the assessment of the impact of these fresh water discharges in the Tagus estuary. There were considered two possible discharging points (Santa Apolónia and Beato) and, for each one, there were made simulations of the storm water discharges and the resulting plumes dispersion. The simulations were made with a high resolution 3D baroclinic model considering 150 m ³ /s 100 years return period flow and 30 m ³ /s flow corresponding to a frequent flood.
Project	Forecasting service of macro algae occurrence at the cooling water intake of Sines' Power Plant
Year:	2015 - 2016
Location:	Portugal
Client:	Electricity of Portugal
Total project budget:	15.000 €
Hidromod's budget:	15.000 €
Main project features:	Sines' Power Plant suffers from frequent events of macro algae blooms that clog the cooling water intake and leads to unforeseen shutdowns of the central. Although there is not too much one can do to avoid these algae blooms, the impact of a planned shutdown is much lesser than the impact of an unforeseen event. For this reason the capability of foresee the risk of an event in the near future represents a relevant added value for the operation.
Activities performed:	In the framework of this contract HIFDROMOD provides daily forecasts of the conditions that can induce the occurrence of macro algae blooms entering the pumping basin of the cooling water circuit of the Sines electric power plant. The warning system, developed in previous projects, is based on results of numerical models and local measured data. The service is managed by the AQUASAFE platform which is responsible for the preparation of a daily report assessing the risk level sent by email to a set of EDP addresses. This service is in continuous operation since the end of 2008
Project	Provision of high resolution meteo-oceanographic operational services to the port of Sines
Year:	2015 - 2016
Location:	Portugal
Client:	Sines Port Authority (APS)
Total project budget:	50.000 €
Hidromod's budget:	50.000 €

Main project features:	Sines is a major deep-water port in the Portuguese west coast that is benefiting from a fast growth. The Sines' Container Terminal, called Terminal XXI, started its operations in 2004 under a public service concession by the company PSA Sines (PSA – Port Singapore Authority). With a staged, sustained development plan, Terminal XXI provides natural depths down to 17.5 metres ZH, allowing the reception of the last generation container carriers performing intercontinental routes, as well as the concerning feeder. Presently with a quay length of 946m and 9 post-panamax and super post-panamax gantry cranes, the terminal offers a yard with 36,4ha, and a total capacity of 1.700.000 TEU per year. The next development phase will comprise a 200m quay, thus increasing the Terminal's annual handling capacity to 2.100.000 TEU
Activities performed:	<p>This project has the purpose of providing high resolution meteo-oceanographic operational services to the port of Sines. The service is supported both by external metocean models forecast and several internal high resolution models for 3D hydrodynamics and waves. Real time data connections to sea level gauges, wave buoys and meteo stations are also available in the platform. The services provided are:</p> <ul style="list-style-type: none"> • Automatic daily reports and execution of numerical forecasting models (at regional and local level, for meteorology, waves and hydrodynamics); • System audit services; • Corrective maintenance; • Preventive maintenance.
Project	Assessment of potential flooding areas in the region of Pante Massacar, Timor
Year:	2016
Location:	Portugal
Client:	Cenor –TFP Planege
Total project budget:	22.500 €
Hidromod's budget:	22.500 €
Main project features:	This project aimed to make a delimitation of the potential flooding zones in the area of Pante Macassar - Timor.
Activities performed:	To this end there were made flow simulations with the MOHID Land model to simulate the catchment flow and integrate the effect of hydraulic structures (existing or planned) used to control the flow in the lowlands
Project	Operational Oil Spill trajectory forecast system for A. P. A Coruña
Year:	2016
Location:	Spain
Client:	Coruña Port Authority
Total project budget:	20.000 €
Hidromod's budget:	20.000 €
Main project features:	<p>The Port of A Coruña's defined an environmental sustainability strategy consistent with its Integrated Management Policy which has the following objectives:</p> <ul style="list-style-type: none"> • To attain a high level of technical commitment in port services and operation through the control thereof, the systematisation of environmental management and risk prevention • To acknowledge and embrace the concerns of the stakeholders • To seek the collaboration of the competent Government Agencies. <p>This strategy has been conceived to transform its interrelation with the environment into one of the resources that make its growth possible. The adoption of a management plan to deal with accidental spills represents one of the aspects of this strategy</p>
Activities performed:	The AQUASAFE OSS system was implemented for the Ártabro Gulf area with the objective to make predictions of the evolution of a possible oil spill in the area of responsibility of the Port Authority of A Coruña (PAC). The service takes into account the existing agreements with Meteogalicia and Puertos del Estado for the use of its operational models for forecasting meteorological and oceanographic parameters. The tool connects with operational prediction services and allows simulations of the oil spill path using one or more meteo-oceanographic forecasts, simply and quickly, to support decisions in emergency situations. The work had two

	phases: (1) implementation in PAC of AquaSafe OSS and (2) adjustment of the operational meteo-oceanographic models, improving their resolution for up to 50 m in Port areas.
Project:	Assessment of alternative solutions to improve Funchal Marina sheltering conditions
Year:	2016
Location:	Madeira, Portugal
Client:	Proman
Total project budget:	14.000 €
Hidromod's budget:	14.000 €
Main project features:	This study main objective was the assessment of the potential causes of degradation of the Funchal marina sheltering conditions.
Activities performed:	In the scope of this study different wave propagation simulations were performed considering the geometry existing before the coastal works performed in the period 2010-2014, after the February 2010 floods, the current geometry and different project solutions. These simulations aimed to identify changes that could be potentially responsible for the problems experienced at the marina and to evaluate the effectiveness of an eventual extension of the marina jetty. For this purpose, a set of models was used to characterize the approach of the waves to the port and the respective propagation to the interior of the sheltered zone.
Project:	Project of an oceanic swimming pool in Rabat, Morocco
Year:	2016
Location:	Morocco
Client:	Consulmar
Total project budget:	23.000 €
Hidromod's budget:	23.000 €
Main project features:	This study aims to characterize the water quality and the water renewal required to keep the water quality within proper limits of a large oceanic swimming pool to be built near Rabat (Morocco). This swimming pool will have a volume of between 25 000 and 27 000 m ³ , a maximum depth of 4 m and an average depth of about 2 m.
Activities performed:	The study included two implementations of a full 3D baroclinic model based on MOHID: one to simulate the swimming pool water mass and the other to simulate the water circulation in the adjacent coastal area. In the first case, the goal was to characterize the ability to renew the swimming pool water for two scenarios (distribution of water injectors and pool geometry), identifying such possible stagnation areas. Regarding the coastal zone, the goal was to detect situations in which oceanographic weather some type of short circuit could occur between the intake and discharge.
Project:	New Lisbon port ship containers terminal
Year:	2016
Location:	Portugal
Client:	Lisbon Port Authority (APL)
Total project budget:	565.000 €
Hidromod's budget:	65.000 €
Main project features:	The continuous increasing of container ship traffic at the Lisbon harbor, the increasing size of container ships and continued forecasts of increased worldwide containerized cargo traffic led to APL to assess different options to meet the potential growth of container traffic in the medium term. According to the studies performed the options to fit the needs may pass through an increased efficiency of the Alcântara container terminal and the construction of a new container terminal in Barreiro. In this context APL asked for proposals to perform the necessary engineering and environmental impact studies for the construction of a new terminal in Barreiro (which also implies dredging a new navigation channel) capable to receive ship containers with a capacity of 8,000 TEU reaching about 352 meters long, 43 meters mouth and 14.5 meters draft.
Activities performed:	In the framework of this process HIDROMOD is responsible for all the modelling studies necessary to support both the engineering and the environmental impact assessment studies. This includes to assess all the aspects associated with the wave climate, hydrodynamics and

	transport processes, including the assessment of the channel maintenance conditions, potential impacts associated with the dredging works and the suitability of the places selected to dispose the dredged material.
Project:	LIFE SWSS - Smart Water Supply System
Year:	2015-2017
Location:	Portugal
Client:	EU LIFE program
Total project budget:	802.747 €
Hidromod's budget:	96.922 €
Main project features:	SWSS is an innovative platform for management and decision support for water supply systems (WSS) under real working conditions. The SWSS platform is composed by five modules: (1) Predictive, (2) Hydraulic simulation, (3) Assessment , (4) Leakage and (5) Optimization, which together enable to support the water companies to improve energy efficiency and water efficiency in their systems. The SWSS modules are based on previous developments from consortium partners, which will be integrated in one single platform in this project. The SWSS platform will be demonstrated in 3 demonstration WSS from AdA, AdC and AdO, which were selected due to their distinctive characteristics and instrumentation level
Activities performed:	In the framework of this project HIDROMOD was responsible for the development of the SWSS platform and for the provision of the Leakage Detection Module.
Project:	Assessment of potential inundation areas resulting from the occurrence of a tsunami in the Portuguese coast
Year:	2015
Location:	Portugal
Client:	Civil protection authority (ANPC)
Total project budget:	46.890 €
Hidromod's budget:	46.890 €
Main project features:	The Portuguese mainland has a high susceptibility to earthquakes and tsunamis, either due to its location along the Atlantic ridge or due to its proximity and position on the Fracture Zone Azores-Gibraltar (boundary between the lithosphere plates Eurasian and African). This region is designated as AT2- "Atlantic" in the catalog Genesis and Impact of Tsunamis on the European Coasts (GITEC) and extends from the Azores to the Strait of Gibraltar. Without a way to avoid this natural phenomenon, the risk mitigation effort focuses primarily in prevention and preparation of appropriate responses in case of an event. Specifically, the identification of potentially flooded areas is a very important aspect with regard to the implementation of preventive measures and the preparation of response actions. In order to produce reliable flood areas maps, is essential to have reliable top-bathymetric information (Emodnet, acoustic survey bathymetries, digital terrain models, LIDAR, etc.) and also a numerical model that can accurately calculate the tsunami propagation from its origin to the coastal areas and that allows also to calculate the subsequent flooding.
Activities performed	In the framework of a project promoted by the Portuguese National Authority for Civil Protection (ANPC) to assess the tsunami flood risk along the Portuguese coast, there were performed different simulations of tsunami events that have potential to strongly impact the coastal areas. These simulations were performed using MOHID water modelling system (http://www.mohid.com) which is a fully 3D open source modelling system offering the capability to use hydrostatic or non-hydrostatic approaches that allows the adoption of an integrated modelling philosophy, not just for the physical and biogeochemical processes, but also different spatial scales allowing the user to use a nested model scheme. The tsunami generation follows the methodology adopted by the COMCOT model (Cornell Multi-grid coupled Tsunami Model).
Project:	Evaluation of the alternative solutions for the deepening of the Setubal harbour access channel.
Year:	2015
Location:	Portugal
Client:	Setubal and Sesimbra ports authority (APSS)
Total project budget:	31.000 €

Hidromod's budget:	31.000 €
Main project features:	In response to the expected changes in the hinterland containerized trade demand, the Setubal port administration (APSS) planned to start a program to improve the sea accesses contemplating a deepening of the access channel that will offer, initially, a permanent access to 3000 TEU Under -Panamax type vessels up to 12 m draft and, on a second stage, a permanent access to 4000 TEU Panamax type vessels of up to 13 m draft in any normal sea conditions.
Activities performed:	In the framework of this process HIDROMOD was hired to advise APSS in the evaluation of potential impacts associated with the deepening of the access channel, particularly with regard to aspects associated with the wave climate, hydrodynamics and transport processes, including the assessment of the channel maintenance conditions.
Project	Water resources management in Myanmar and Cambodia
Year:	2016
Location:	Cambodia
Client:	European Space Agency (ESA)
Total project budget:	50.000 €
Hidromod's budget:	50.000 €
Main project features:	This project objective was the assessment of the effectiveness of the use of Satellite data as input for a Soil Plant Air model allowing to estimate variables useful to support irrigation channels. These variables includes the estimation of the water needs, the energy needs for pumping and the drought impact. The final client of the project was ADB and local ministry of Cambodia (MOWRAM - Ministry of Water Resources and Meteorology) that is delineating the irrigation channels. The project was done in partnership with GISAT and it was funded by ESA
Activities performed:	In the framework of this project AQUASAFE platform was used to demonstrate the possibility of using models in an operational system to support irrigation management.
Project:	AMOS - Advanced meteo-oceanografic Forecasting Services for sea
Year:	2015 - 2016
Location:	Portugal
Client:	EEA Grants program
Total project budget:	199.880 €
Hidromod's budget:	119.983 €
Main project features:	The goal of the present project is to make available a high resolution sea storm warning service covering Portugal's mainland and autonomous regions at scales compatible with the coastal uses and activities
Activities performed:	<p>The service have the ability to communicate with several data sources and provide detailed daily forecast of:</p> <ul style="list-style-type: none"> • Meteorology (wind, precipitation, visibility, etc.); • Oceanography (sea temperature, currents, water levels and salinity) • Waves (Hs, T, Dir, spectral parameters); <p>These services may be used to provide advice (and warning) to the navigation, fishing, coastal recreational activities, coastal erosion and flooding. The system is ready to provide daily forecasts for the upcoming days and it may be used not only to issue alerts but also to provide high resolution forecasts for the remaining periods. It may also be used to provide support to other related activities such as search and rescue missions, sea pollution events or most probable places for fish stocks location.</p>
Project:	Assessment of the future sustainability of the Sines power plant water intake
Year:	2015
Location:	Portugal
Client:	EDP
Total project budget:	125.200 €
Hidromod's budget:	125.200 €
Main project features:	Sines power plant cooling system uses sea water source that, being critical for the plant operation, may suffer from impacts associated with future coastal developments. For this

	reason it is most relevant to have a proper assessment of eventual constrains associated with some foreseen developments in the coastal area such as the future expansion of Sines port.
Activities performed:	In the framework of this project it was performed an evaluation of the present situation of the Sines power plant water intake and assessed its sustainability for the horizons 2025 and 2030. For this purpose there were considered the processes associated with the algae blooms, the sediment transport and the possibility of occurrence of short-circuit phenomena between the water rejection and intaking facilities, taking into account its historical evolution and the evolution scenarios for the Sines port infrastructure.
Project	Updating of the S. Francisco river Catchment Water Resources Plan prepared for the period 2004-2013
Year:	2015
Location:	Brazil
Client:	Nemus
Total project budget:	107.432 €
Hidromod's budget:	107.432 €
Main project features:	The São Francisco River Basin Management Plan (PRHSF) deals with the water availability requirements necessary for the maintenance of a good status of the aquatic ecosystems. The current Basin Plan was drawn to the horizon of 10 years, covering the period 2004 to 2013. Given that since 2004 some changes and advances have occurred in the institutional and legal arrangement of the water management, it is objective of this project to proceed to the respective update, producing an instrument for continuing the activities of the various institutions responsible for the management of the surface and groundwater resources in order to ensure a multiple, rational and sustainable use of water and the achievement of a good environmental status of the basin.
Activities performed:	In the framework of this project Hidromod was subcontracted to perform the required studies for the evaluation of surface water resources.
Project:	Implementation of real time data service in INTECMAR (Galicia, Spain)
Year:	2015 (ongoing)
Location:	Spain
Client:	INTECMAR
Total project budget:	37.185 €
Hidromod's budget:	37.185 €
Main project features:	The main goal of this project is to centralize at a single point (AQUASAFE Server) access (AQUASAFE client) all meteocean measured data (e.g. buoys, campaigns, HF-Radar) and modelling results (e.g. wave climate, winds and currents forecasts) relevant to INTECMAR's activity. The implemented system allows users to analyse in real-time all the relevant meteocean data (measured/modelled) both in time and in space.
Activities performed:	In the framework of this process HIDROMOD set up and configured a full AQUASAFE service allowing INTECMAR to perform the above described activities.
Project	Simulation of mud and oil dispersion processes resulting from sea bottom drilling activities over Argentinean Continental Platform
Year:	2014
Location:	Argentina
Client:	Serman y Asociados S.A.
Total project budget:	15.400 €
Hidromod's budget:	15.400 €
Main project features:	----
Activities performed:	Under this project it was evaluated the probability of Argentina and Uruguay coastal areas being affected by the occurrence of possible oil blow-outs resulting from new drilling areas offshore of the Uruguayan coast. Additionally it was also assessed the potential impact of the dispersion of waste from these drilling works (e.g. sewage, oily water, mud, etc.)
Project	Lisbon wastewater network: AQUASAFE platform maintenance and addition of new capabilities
Year:	2014

Location:	Lisbon
Client:	Simtejo
Total project budget:	20.000 €
Hidromod's budget:	20.000 €
Main project features:	---
Activities performed:	AQUASAFE platform has been used along the last years to generate operational information from data and model results to support the management of Simtejo's infrastructure. This project is a continuation of the activities that have been developed around the platform over the past few years that have allowed to increase continuously the number of data sources managed by the system and the number of key performance indicators to help on the real-time infrastructure management.
Project:	RA City Real Estate Development Project in Yeroskipou/Paphos. Preliminary Study for Marine Infrastructures & Bridge Design
Year:	2015
Location:	Cyprus
Client:	Consulgal
Total project budget:	56.200 €
Hidromod's budget:	56.200 €
Main project features:	The present project was related with a preliminary evaluation of the RA City Real Estate Development Project (CREDP) in Yeroskipou/Paphos. The project includes an artificial island of about 105 ha (reclaimed land, protections, beaches), an access bridge, a new marina and the artificial island protections
Activities performed:	In the framework of this project HIDROMOD is in charge of the characterization and impacts assessment of the issues related with wave propagation, hydrodynamic, sediment transport and water quality.
Project:	Praia da Vitória Lagoon hydrodynamic and water quality characterization and evaluation of project remediation solutions
Year:	2014
Location:	Praia da Vitória, Terceira Island, Azores
Client:	Praia da Vitória Municipality
Total project budget:	30.000 €
Hidromod's budget:	30.000 €
Main project features:	Praia da Vitória coastal lagoon shows poor water quality problems that are intended to be reduced or eliminated. Whereas the quality of water in Paul is influenced by climatic conditions, in particular by rainfall and the seawater exchange
Activities performed:	There were conducted monitoring studies to characterize the salinity distribution and there were performed numerical simulations to simulate the lagoon dynamics and establish a conceptual model for defining the operation of the system. As a result there were proposed potential intervention solutions that may contribute to increase the dynamics of the system, thereby reducing the time required for the water renewal.
Project:	Operational forecasting of river flow into EDP's hydro power plants on the Douro river
Year:	2014-ongoing
Location:	Portugal
Client:	EDP
Total project budget:	77.000 €
Hidromod's budget:	77.000 €
Main project features:	Douro and Tâmega rivers houses several dams that represents a relevant source of hydro electric energy production in Portugal. The capability to foresee the flows for the near future represents an important information to optimize the use of the water for the energy production purposes.
Activities performed:	In the framework of this project, a river flow forecasting system which predicts inflows to hydro power plants of EDP in Douro and Tâmega rivers was implemented. This system is the basis of a daily forecast service covering eleven sections of the watershed of the River Douro based on different rainfall forecast scenarios from different meteorological models. Forecasts are

	made daily for the next 7 days and the entire management of the simulations and information flows is made with the AQUASAFE platform.
Project	Licensing, updating and maintenance of Aquasafe software and respective forecasting models for ports of Leixões and Viana do Castelo
Year:	2014-2017
Location:	Portugal
Client:	Leixões Port Authority
Total project budget:	103.400 €
Hidromod's budget:	103.400 €
Main project features:	This project has the purpose of providing upgrade and maintenance services to the AQUASAFE system installed in the ports of Leixões and Viana do Castelo. Several external metocean forecast models are used, along with several internal models for 3D hydrodynamics and waves, for both ports. Real time data connections to sea level gauges, wave buoys, meteo stations and river flow meters are available in the platform. A mobile platform was also developed in close cooperation with the client.
Activities performed:	The services currently provided are: <ul style="list-style-type: none"> • Automatic daily reports and execution of numerical forecasting models (at regional and local level, for meteorology, waves and hydrodynamics); • System audit services; • Corrective maintenance; • Preventive maintenance;
Project	Faecal contamination warning system for the Santos beaches (Brazil)
Year:	2014 (ongoing)
Location:	Brazil
Client:	UNISANTA
Total project budget:	46.000 €
Hidromod's budget:	46.000 €
Main project features:	A faecal contamination alert service for the Santos urban beaches is implemented. This alert service is based mainly in numerical models run in forecast mode (urban runoff - SWMM, sea currents - MOHID, waves - SWAN). The models are forced with rainfall data provide by the CEMADEN network (rain gauges) and atmospheric forecasts provided by CPTEC and NOAA. The alert service aims to support a more efficient management of urban drainage channels's locks that prevent the urban sewage being discharged directly on the beaches.
Activities performed	The system was implemented together with the University of Santa Cecilia, in collaboration with the company SABESP (for data campaigns) and the municipal authorities of Santos. The same system is being used in the local pilotage service of the Santos Harbour. The pilotage service provides access to sea level, wave and meteorological data and receives daily forecast reports and permanent access to the AQUASAFE desktop client, which is displayed in the control room.
Project:	Environmental assessment and characterization of the marine conditions related with the expansion of Sines port container terminal
Year:	2014
Location:	Portugal
Client:	Sines Port Administration
Total project budget:	30.000 €
Hidromod's budget:	30.000 €
Main project features:	Sines is a major deep-water port in the Portuguese west coast that is benefiting from a fast growth. The Sines' Container Terminal, called Terminal XXI, started its operations in 2004 under a public service concession by the company PSA Sines (PSA – Port Singapore Authority). With a staged, sustained development plan, Terminal XXI provides natural depths down to 17.5 metres ZH, allowing the reception of the last generation container carriers performing intercontinental routes, as well as the concerning feeder. Presently with a quay length of 946m and 9 post-panamax and super post-panamax gantry cranes, the terminal offers a yard with 36,4ha, and a total capacity of 1.700.000 TEU per year. The next

	development phase will comprise a 200m quay, thus increasing the Terminal's annual handling capacity to 2.100.000 TEU.
Activities performed:	In the context of the studies for the expansion of the container terminal, HIDROMOD was in charge of the assessment of the potential impacts of the works, mainly on the local hydrodynamic conditions. This assessment included the simulation of the currents, the port wave sheltering, the coastal dynamics, the cooling water intake of the nearby thermoelectric power plant and the growing conditions of some algae species that are dependent of some particular hydrodynamic conditions. A full 3D hydrodynamic model based on MOHID modelling system was used to perform these simulations.
Project	Salvador - Itaparica bridge environmental impact assessment
Year:	2013
Location:	Brazil
Client:	Nemus
Total project budget:	135.000 Real
Hidromod's budget:	135.000 Real
Main project features:	With six lanes and two shoulders, the swing bridge will be 11.7km long and 32m wide, with a 160m moveable section. It will have a 70m clearance for ships to pass under it and the navigation channel is set to be 25m deep. The project aims to preserve the scenic area of Todos os Santos bay while supporting the expansion of Salvador port, allowing for the implementation of shipyards and industry in the surrounding municipalities. Bahia's state government owns the project through its infrastructure authority SEINFRA, which is leading the advanced project studies phase.
Activities performed:	In the framework of this project there were made simulations of the hydrodynamic and sediment transport processes and made an assessment of the potential impacts that may occur as a result of the construction of the Salvador - Itaparica bridge. The study involved the evaluation of the hydrodynamics, the wave climate and sediment transport patterns in the bridge influence area considering the actual and after construction situations.
Project:	Mira river estuary. Hydromorphologic characterization and analysis of possible solutions to minimize the coastal erosion risk
Year:	2014
Location:	Portugal
Client:	Nemus
Total project budget:	13.500 €
Hidromod's budget:	13.500 €
Main project features:	This project aimed to identify the causes of the erosion process observed in the Franquia beach in the Mira Estuary and propose possible actions that may contribute to the elimination or minimization of the problem.
Activities performed:	Model simulations based on the current situation and different intervention scenarios.
Project:	Implementation of an information management platform to integrate the forecasts and meteo-oceanographic data available in Setubal estuary as a basis of a real time navigation support system
Year:	2013 (ongoing)
Location:	Portugal
Client:	Setubal and Sesimbra ports authority (APSS)
Total project budget:	65.000 €
Hidromod's budget:	65.000 €
Main project features:	In the framework of this project it was deployed an operational system supported by AQUASAFE platform that aims to make easily available different data sets and meteorological and estuarine forecasts that, among other purposes, may be used to provide information for navigation support and to implement analysis tools that may contribute to optimize the dredging effort
Activities performed:	An operational system based on AQUASAFE platform was set-up. The system includes daily simulation forecasts of waves, currents and meteorology, integration of real time data from

	wave buoys, tide gauges and meteorological stations and production of daily automatic reports and alerts.
Project	Madeira Archipelago River Basin Districts Management Plan
Year:	2013
Location:	Madeira, Portugal
Client:	DROTA - Direcção Regional do Ordenamento do Território e Ambiente
Total project budget:	---
Hidromod's budget:	12.000 €
Main project features:	The River Basin Management Plans are sectoral planning instruments that aim at the management, protection and environmental, social and economic valorisation of waters at the level of each hydrographic region. One of the key aspects of the plans is the classification of bodies of water according to the rules established at European level under the Water Directive. For this purpose it is necessary to carry out studies to characterize the quantity and quality of the water of the different bodies of water based on, among other aspects, the hydrological characterization and the evaluation of punctual and diffuse loads
Activities performed:	Hidromod's work in this project was focused in providing support to River Basin Management Plans in what concerns the evaluation of water quantity, quality, water masses classification, scenarios evaluation and effectiveness of measures to improve ecologic/potential status in water masses that are below the good status.
Project:	Leakage Detection System for Water Transmission Network in Muscat Governorate (Oman)
Year:	2013
Location:	Muscat - Oman
Client:	AQUAGEO - PAEW
Total project budget:	--- €
Hidromod's budget:	68.000 €
Main project features:	The existing Water Transmission Network in Muscat Governorate includes components such as reservoirs, pumping stations, transmission and distribution pipelines and district metering points. The integration of these components, through a centralized SCADA and leak detection system was managed with the AQUASAFE® software. An hydraulic model of the Muscat network capable to provide a network forecast tool and an operation management tool by means of scenario simulation was also integrated in AQUASAFE® enabling the operation improvement and the water leakages reduction.
Activities performed:	Hidromod implemented an operational system capable to keep running a leakage detection system supported by modelling tools and the analysis of the real time data.
Project	SW4E - Smart Water 4 Energy
Year:	2013-2015
Location:	Portugal
Client:	Portuguese Innovation Agency
Total project budget:	872.017 €
Hidromod's budget:	126.250 €
Main project features:	The project Smart Water 4 Energy (SW4E) was focused in the development of an energy management smart system for application in waste water treatment plants. The project was developed by a consortium including Simtejo, ISQ and Hidromod, and provides tools for real-time monitoring of energy consumption associated with wastewater treatment processes, as well as changes in the consumptions resulting from the implementation of energy efficiency measures in the WWTP.
Activities performed:	In the framework of this project here was developed a smart management tool for the analysis, interpretation, treatment and management of information from the monitoring systems that contributes to a more efficient the operations management enhancing the use of real-time information and predictive and diagnostic tools.
Project:	AQUASAFE® operational system implementation in the pacific coast of Colombia
Year:	2013
Location:	Colombia

Client:	DIMAR
Total project budget:	32.000 €
Hidromod's budget:	32.000 €
Main project features:	An implementation of the AQUASAFE® platform was done to operationalize oceanographic models for the Pacific coast of Colombia, focusing in the areas of Tumaco and Buenaventura
Activities performed:	A downscaling from meteorological (GFS) and oceanographic (NTOFS) models was done in order to include all the relevant forcing mechanisms of the coastal circulation. The hydrodynamic model MOHID model was used to downscale the global solutions. A WWIII to forecast wind waves was also implemented. The AQUASAFE Oil Spill Simulator was installed in several departments of DIMAR.
Project	ARCOPOL +: Implementation of a risk management decision support service to support operational actions associated with coastal pollution events resulting from ship accidents
Year:	2013
Location:	Portugal
Client:	IST
Total project budget:	14.550 €
Hidromod's budget:	14.550 €
Main project features:	This project aimed to build an integrated risk analysis system for coastal contamination resulting from ship accidents, adaptable to various regions and integrating data obtained from different sources such as AIS, numerical models, coastal sensitivity maps statistical analysis of past accidents, etc. and allowing the access of these information through a website. The system includes of a risk assessment component that may be used in real time or on delayed mode.
Activities performed:	In the framework of this project Hidromod made available a platform, support by AQUASAFE, capable to make available the above referred capabilities.
Project	AQUASAFE platform upgrade to the Lisbon wastewater network under Simtejo's supervision
Year:	2012
Location:	Lisboa
Client:	Simtejo
Total project budget:	19.500 €
Hidromod's budget:	19.500 €
Main project features:	In the framework of its activity, Simtejo has a set of data and model results that properly exploited, would achieve gains in the operation and management of the network and which were integrated in AQUASAFE platform.
Activities performed:	Under this project there were implemented a set of new features in AQUASAFE platform that apart from other, included the link to the WWTPs of Beirolas, Chelas, Vila Franca de Xira and Alverca SCADA, the Alcântara subsystem and data of the pumps of lower Alcântara drainage area
Project:	Malacca and Singapore Straits Oil Spill dispersion forecasting system
Year:	2012
Location:	Malacca and Singapore
Client:	IMO (International Maritime Organization)
Total project budget:	135.000 €
Hidromod's budget:	120.300 €
Main project features:	In the framework of MEH (Marine Electronic Highway), a demonstration project promoted by IMO which seeks to place environmental protection and conservation in parallel efforts with safety of navigation. MEH combines an Electronic Chart Display and Information System (ECDIS), an Automated Identification System (AIS), shore-based marine information databases and advanced ship-to-shore communications.
Activities performed:	Hidromod implemented a decision support system, capable to provide operational support in case of marine pollution incidents in the Malacca and Singapore Straits. Hidromod made use of AQUASAFE platform to set up an operational system capable to gather data for the sea

	sensors (wave buoys, tide gauges, current meters, meteorological stations) and keep running hydrodynamic operational models to support an oil dispersion model capable to provide on time predictions of the movement, dispersion and trajectory of oil slicks and to assess the potential shore reach points and the potential impact of the pollutants on the coastal area and marine structures.
Project	Water quality studies for the reservoirs of Foz Tua and Régua
Year:	2012
Location:	Portugal
Client:	Nemus
Total project budget:	8.000 €
Hidromod's budget:	8.000 €
Main project features:	In the framework of the Foz Tua Reservoir Management Plan it was necessary to assess the water quality in the present and future scenarios of exploitation.
Activities performed:	In the framework of this project, Hidromod made a mathematical modelling study of the water quality in Foz Tua (river Tua) and Régua (river Douro) reservoirs using the CE-QUAL-W2 and MOHID models. MOHID was used to perform 3D simulations of the water pumping from Régua reservoir into Foz Tua reservoir. The water quality modelling work was preceded by a compilation and analysis of baseline information and an estimate of the loads of nutrients and organic matter produced in the respective watersheds. The influence of the outflow from Foz Tua and the pumping inflow from Régua into Foz Tua was included in the numerical simulations to study the impact of the Foz Tua Hydroelectric Development in the water quality of both reservoirs.
Project:	ENVITEJO: Development, Implementation and Testing of appropriate Tools for the exploitation of the Tagus Estuary Model
Year:	2011
Location:	Portugal
Client:	Simtejo, SA
Total project budget:	47.000 €
Hidromod's budget:	47.000 €
Main project features:	ENVITEJO aimed to integrate knowledge and information about Tagus estuary.
Activities performed:	In the framework of this project HIDROMOD developed and implemented a set of web tools capable to allow the exploitation of the estuary mathematical models by non-specialized technicians.
Project:	ENVITEJO: Development of an internet portal to support Environmental Data Services for the Tagus Estuary
Year:	2011
Location:	Portugal
Client:	ARH Tejo
Total project budget:	108.500 €
Hidromod's budget:	108.500 €
Main project features:	ENVITEJO aimed to integrate knowledge and information about Tagus estuary.
Activities performed:	In the framework of the project ENVITEJO, the Tagus Basin Authority hired HIDROMOD to develop a computer application, in the format of an internet Portal that may make available information about the estuary. This information is intended to serve both the general public and professionals that need specific data or forecasts related with the estuary.
Project:	Dispersion study of the temporary discharge of the WWTP of Ribeira dos Moinhos directly in the beach
Year:	2012
Location:	Portugal
Client:	Santo André Waters
Total project budget:	11.000 €
Hidromod's budget:	11.000 €
Main project features:	----

Activities performed:	In the framework of this project it was made an assessment of the potential impact of a discharge on a beach associated with a by-pass resulting from maintenance works of an outfall. Based on this study it was evaluated an area which should be closed to the public during the period in which the bypass is active.
Project	Figaro - Flexible and Precision Irrigation Platform to Improve Farm Scale Water Productivity
Year:	2012-2016
Location:	Europe
Client:	EU FP7 program
Total project budget:	5.999.986 €
Hidromod's budget:	305.840 €
Main project features:	FIGARO is a Europe-wide research project that is co-funded by the European Commission under the 7th Framework Programme for Research and Technological Development of the European Union. FIGARO focuses on significantly reducing the use of fresh water at the farm level through developing a cost-effective, precision irrigation management platform. The Europe-wide consortium aims to develop a holistic and structured precision irrigation platform which will offer farmers flexible, crop-oriented management tools with a DSS (Decision Supporting System) module to optimize irrigation and fertilizer dosing. The FIGARO project is comprised of 17 organizations from eight different countries, including a number of academic and commercial leaders in the field of irrigation.
Activities performed:	In the framework of this project Hidromod was responsible for the integration of models and near real time data in the AQUASAFE platform.
Project:	Assessment of flood risk situations in Maputo Bay
Year:	2011
Location:	Mozambique
Client:	Nemus
Total project budget:	40.000 €
Hidromod's budget:	40.000 €
Main project features:	The region south of Maputo will represent in the near future a relevant area in terms of urban, touristic, ecological and industrial development and the Mozambique government asked for a study that may take in consideration the evaluation of the relevant impacts and risks and may propose recommendations to follow in the projects that will be presented for this area in the near future.
Activities performed:	Hidromod was subcontracted to make an evaluation of the vulnerability to the floods and to characterize the bay of Maputo from the hydrodynamic point of view. The evaluation of the floods vulnerable areas takes in consideration the increase of the water levels due to the rivers flow but also due to the meteorological and wave effects. For this purpose a set of models (catchment, costal hydrodynamics and wave propagation) is being implemented to support the simulation of the most probable and extreme scenarios.
Project	Risk assessment of the coastal contamination by shipping and industrial facilities in Galiza
Year:	2011
Location:	Spain
Client:	INTECMAR
Total project budget:	20.000 €
Hidromod's budget:	20.000 €
Main project features:	----
Activities performed:	This work identified the areas of the Galician coast most likely to be affected by a spill originating from a ship. This study was based on results of currents, models, winds and waves to the year 2010 and also the position of vessels during the year 2010. This work was the base of the Risk analysis that support the Camgal Plan (Galicia Region) (https://vimeo.com/100332577 e http://ww3.intecmar.org/plancamgal/)
Project	Rio de Janeiro vulnerability to floods. Mapping of urban slopes and land use.

Year:	2011
Location:	Brazil
Client:	Critical Software
Total project budget:	7.000 €
Hidromod's budget:	7.000 €
Main project features:	----
Activities performed:	In the framework of this project there were used modelling tools to demonstrate the added value of having detailed topography and land cover/land use information to simulate potential flooding areas. The chosen models were Mohid Land and Mohid Water applied to a watershed in Rio de Janeiro. The first was used to estimate water generated in the watershed according to different land uses and the second was used to calculate the inundation area using SPOT topography as main input.
Project	EIA of a CCGT in Soyo, Angola. Study of the cooling water intake and disposal.
Year:	2011
Location:	Angola
Client:	Coba
Total project budget:	12.500 €
Hidromod's budget:	12.500 €
Main project features:	This project was made in the framework of the environmental impact assessment of the construction of a combined cycle power plant in Soyo, Angola, and aimed to perform the study of uptake and rejection of water from the cooling circuit in the Pululu channel, which is one of the channels of the left bank of the Congo River Estuary. The power plant was designed for a capacity of 400 MW in the start-up phase and includes a cooling circuit involving the water intake and rejection in the estuary.
Activities performed:	In order to support the above described processes, modelling studies were made to characterize the hydrodynamic conditions in the Pululu channel and the over the areas potentially affected by the water uptake and rejection of the cooling circuit and assessed the thermal plume dispersion quantifying the temperature changes in the aquatic environment.
Project	Specialized technical support in the fields of coastal and estuarine hydrodynamics
Year:	2011
Location:	Portugal
Client:	ParqueExpo
Total project budget:	30.100 €
Hidromod's budget:	30.100 €
Main project features:	---
Activities performed:	Technical advisory to ParqueExpo S.A. in fields relating coastal and estuarine hydrodynamics as support to the plans and projects proposed to the Ria Formosa lagoon area under the supervision of the Polis litoral Ria Formosa.
Project	Cap Lopez Bay (Gabon) new harbor project: Simulation of the hydromorphologic conditions and the wave climate
Year:	2011
Location:	Gabon
Client:	Intecsa-Inarsa
Total project budget:	80.000 €
Hidromod's budget:	80.000 €
Main project features:	In the framework of the project there were performed several characterization studies having as objectives to improve the knowledge of the local hydromorphological conditions and the local wave climate conditions
Activities performed:	Beyond the analysis of the existing and collected data there were performed model simulations of hydrodynamics, sediment transport and wave propagation. As a result a conceptual model for the local hydrodynamic, wave climate and sediment transport which supported the project design options
Project	Fridão hydroelectric development. Mathematical modelling of water quality in Fridão reservoir

Year:	2011
Location:	Portugal
Client:	AgriPro Ambiente Consultores
Total project budget:	18.500 €
Hidromod's budget:	18.500 €
Main project features:	---
Activities performed:	In the framework of environmental impact assessment of Fidrão dam it was done a study for modelling water quality in the two reservoirs to be built having in mind the optimization of the quality of water discharged for Tâmega river.
Project	S. Roque Port (Azores). Wave climate characterization for different project solutions in view of the improving of the port sheltering conditions
Year:	2011
Location:	Azores Island, Portugal
Client:	Consulmar
Total project budget:	4.900 €
Hidromod's budget:	4.900 €
Main project features:	Assessment of wave climate inside of S. Roque Port to support different project options for improving the sheltering conditions
Activities performed:	This study had the objective of assessing the wave propagation patterns inside the Port of São Roque (Azores) and comparing the current situation with the situation after completion of two new sheltering structures.
Project	Ria de Arousa water quality monitoring program
Year:	2011
Location:	Spain
Client:	INTECMAR
Total project budget:	18.000 €
Hidromod's budget:	18.000 €
Main project features:	---
Activities performed:	In the framework of this project it was implemented and validated a model to simulate the water quality and the shellfish faecal contamination due to WWTP discharges in Ria de Arousa region. AQUASAFE platform was used to provide support to the interaction with model results and measured data.
Project:	Wave climate characterization for different project solutions concerning the extension of the Ribeira Quente port breakwater
Year:	2011
Location:	Portugal
Client:	Consulmar
Total project budget:	12.000 €
Hidromod's budget:	12.000 €
Main project features:	Ribeira Quente Harbor is the main port of S. Miguel Island and it suffers from lack of appropriate shelter for some wave conditions. The goal of the project was to evaluate the potential benefits of the improvement of the sheltering conditions.
Activities performed:	Simulation of the wave climate inside Ribeira Quente Harbor (S. Miguel Island – Azores). The simulations were performed using MOHID modeling system.
Project:	MyWater – Merging Hydrologic models and EO data for reliable information on water
Year:	2011-2013
Location:	Europe and Africa
Client:	EU FP6 program
Total project budget:	2.976.784 €
Hidromod's budget:	321 090 €
Main project features:	MyWater is a R&D FP7 funded project which aims to develop a water management system integrating satellite data, models and in situ data in order to improve knowledge and create the forecasting capabilities necessary to <u>catchment managers</u> , and at the same time <u>optimizing the ratio cost/benefit of water resources monitoring</u> .

	<p>MyWater project aims at developing a water management system integrating satellite data, models and in situ data in order to improve knowledge and create the forecasting capabilities necessary to catchment managers, and at the same time optimizing the ratio cost/benefit of water resources monitoring.</p> <p>The specific products of the project are: 1) A webGIS data tool; 2) Tools for improving operational model exploitation; 3) Training and technological transfer.</p> <p>The MyWater consortium includes representatives of the type of users expected. For that reason the consortium includes European, African and Latin-American teams to work in selected case studies (Portugal, Greece, Netherland's, Mozambique and Brazil).</p> <p>In view of the present tender this Project may represent an added value once most of its objectives are inline with the objectives of this tender.</p>
Activities performed:	<p>In the framework of this Project it was a prime objective to promote the creation of a number of service chains related with the following services: Early flood warning system; Support to irrigation activities; Desertification risk assessment; Reservoir Management. Hidromod was the main responsible for the development of the information technology components, namely for the following activities:</p> <ul style="list-style-type: none"> • Design, technologies to use and development methodology • MyWater platform development • Automatize numerical models • Data Exploitation and Publication tools • Dissemination and training
Project:	Evaluation of the availability of water in the hydrographic basin of Guadiana river
Year:	2010
Location:	Portugal
Client:	ARH Alentejo
Total project budget:	75.000 €
Hidromod's budget:	75.000 €
Main project features:	<p>This project was aimed at evaluating the balance between the availability of water and the needs until 2025. As the hydrographic basin of Guadiana is shared between Portugal and Spain, and it is subject to a series of formal agreements (called "Convenção de Albufeira") it was necessary to evaluate how these agreements will be met in the future in scenarios of greater needs for water in both sides of the border.</p>
Activities performed:	<p>Hidromod was the main contractor of this project and was also responsible for doing the watershed modeling (around 60000 km²) and the specific studies of different values of river flow entering the Portuguese territory. It also made specific studies of the balance of the Alqueva/Pedrogão reservoir system, for different values of incoming and outgoing water.</p>
Project:	Albufeira Fishing Harbour. Simulation of the local wave climate considering the increasing of the West breakwater length.
Year:	2010
Location:	Portugal
Client:	Consulmar
Total project budget:	8.500 €
Hidromod's budget:	8.500 €
Main project features:	<p>In the framework of this project there were carried out simulations of wave propagation and littoral drift in order to assess the potential benefits of extending Albufeira's fishing harbour western breakwater to improve the present shelter conditions.</p>
Activities performed:	<p>The simulations were performed using MOHID and SWAN models. MOHID model was used to compute the wave climate inside the harbour and the littoral currents. SWAN model was used to compute the radiation stress for subsequent determination of littoral drift.</p>
Project:	Assessment of the dispersion conditions of a salt plume in Figueira da Foz coastal zone
Year:	2010
Location:	Portugal
Client:	Consulmar
Total project budget:	4.000 €

Hidromod's budget:	4.000 €
Main project features:	This study aimed to verify the dilution conditions of a brine effluent resulting from the construction of gas storage caverns in a beach in Figueira da Foz area.
Activities performed:	The work included the characterization of the local wave climate, the computation of the littoral drift and the simulation of effluent dispersion conditions
Project	Alert system for the entrance of algae in the water intake of the Sines Power Plant
Year:	2010-2013
Location:	Portugal
Client:	EDP Produção
Total project budget:	150.000 €
Hidromod's budget:	150.000 €
Main project features:	---
Activities performed:	The objective of this contract was to maintain the alert system for the excess of algae in the water intake of the Sines Power Plant (which is working since 2007) and to migrate this service to the AQUASAFE platform. This alert service uses forecasts from meteorological and wave propagation models, while comparing it with data acquired in a wave buoy, a tide gauge and a meteorological station from the Port Authority of Sines. Additionally, sampling of algae at the water intake and at the beaches south of the water intake structures is also made in order to better predict algae biomass and species in the area. The system is also based in a previous study that characterized the transport processes of algae to the water intake.
Project	Tanger fishing harbor project. Evaluation of the sheltering conditions
Year:	2010
Location:	Morocco
Client:	Consulmar
Total project budget:	13.000 €
Hidromod's budget:	13.000 €
Main project features:	---
Activities performed:	Simulation of the wave climate inside Tanger Fishing Harbour (Morocco) in order to evaluate the sheltering conditions provided by different project options. There were considered different offshore wave conditions including the evaluation the potential resonance effects due to the presence of long waves. The simulations were performed using MOHID modelling system.
Project	Assessment of the impacts on the water quality of Foz do Lizandro WWTP emergency discharges
Year:	2010
Location:	Portugal
Client:	Simtejo
Total project budget:	21.870 €
Hidromod's budget:	21.870 €
Main project features:	This project aimed to assess the possible impacts on the water quality of emergency discharges of Foz do Lizandro wastewater treatment plant.
Activities performed:	The work included the simulation of the effluent plume dispersion in the coastal zone considering two possible points of discharge and the comparative analysis of the two solutions. The study results also have the function to support the definition of the characteristics of diffusers (number, diameter, geometry, orientation, spacing, etc.).
Project:	SOWFIA - Streamlining of Ocean Wave Farms Impact Assessment
Year:	2010-2013
Location:	Europe
Client:	Intelligent Energy Europe
Total project budget:	3.150.000 €
Hidromod's budget:	112.000 €
Main project features:	The SOWFIA project aims to achieve the sharing and consolidation of pan-European experience of consenting processes and environmental and socio-economic impact assessment (IA) best practices for offshore wave energy conversion developments. Studies of wave farm demonstration projects in each of the collaborating EU nations are contributing

	to the findings. The study sites comprise a wide range of device technologies, environmental settings and stakeholder interests. The overall goal of the SOWFIA project is to provide recommendations for approval process streamlining and European-wide streamlining of IA processes, thereby helping to remove legal, environmental and socio-economic barriers to the development of offshore power generation from waves.
Activities performed:	Hidromod was the main responsible and executer of the Data Management Platform made in the project.
Project:	Management Plan of the Algarve Hydrographic Basins
Year:	2010
Location:	Portugal
Client:	ARH Algarve
Total project budget:	750.000 €
Hidromod's budget:	85.000 €
Main project features:	This Plan followed the rules established in the EU directive 2000/60/EC, of 23 October 2000, where the contents of the River Basin Management Plans are described. This Plan is a tool for management and protection of water but also to improve the environmental status and socio-economic value of the water in the whole Hydrographic Region of the Algarve (in the south of Portugal). This Plan was already delivered to the client and is due to be released for public consultation in September 2011
Activities performed:	Hidromod was part of the consortium that made the Plan and was the leader of all the hydrologic studies including the implementation, validation and use of a hydrologic basin model (SWAT). It was also responsible for the flood, drought and erosion risk evaluation. Other modeling tools implemented in the Plan by Hidromod supported the evaluation of water quantity, quality, water mass classification, scenario evaluation and effectiveness of measures to improve ecologic/potential status in water masses that are below the good status. The models used in the work were: MOHID, SWAT and CE-QUAL-W2
Project:	National Operational Plan for Ships in Distress
Year:	2010
Location:	North Atlantic
Client:	DGRM (former IPTM)
Total project budget:	598.000 €
Hidromod's budget:	198.835 €
Main project features:	In the sequence of the Prestige oil tanker accident it was realized by the Portuguese authorities the need of a decision support system that may provide advice about the most suitable options to evaluate in case of occurrence of a similar situation in the future.
Activities performed:	Hidromod was part of a consortium that developed the Operational system that supports the decision of Places of Refuge for Ships in Distress. In the framework of this project Hidromod was responsible for the access to operational meteo-oceanographic forecast, oil spill modelling, HNS modelling and aerial spills modelling in the North Atlantic area where Portugal has Search and Rescue responsibilities. The AQUASAFE system was used to provide data through web services to the team in charge of the web user interface.
Project:	EIA of the relocation of Tanquipor terminal in Barreiro: Hydrodynamic, sediment transport and dispersion of pollutants assessment
Year:	2010
Location:	Portugal
Client:	NEMUS
Total project budget:	13.000 €
Hidromod's budget:	13.000 €
Main project features:	This project aimed to evaluate the potential impacts on hydrodynamics and transport processes resulting from the construction of the new wharf of Tanquipor Liquid Terminal.
Activities performed:	The numerical simulations were based on the hydrodynamic and transport model of the Tagus Estuary whose mesh was locally reworked to ensure an adequate description of processes. The numerical modelling was performed with the MOHID system (www.mohid.com) to study

	hydrodynamics and residence times, and the SWAN model was used to study the wave climate.
Project:	Tagus estuary managing plan
Year:	2010
Location:	Portugal
Client:	DHV-FBO
Total project budget:	20.000 €
Hidromod's budget:	20.000 €
Main project features:	----
Activities performed:	the framework of Tagus Estuary Managing Plan Hidromod carried out a set of activities related to the characterization of hydrodynamic processes that evaluate the transport mechanisms inside the estuary, identifying water residence times in each region of the estuary (including in each of the water bodies)
Project:	ARGOMARINE: software services to support research activities in operational modelling
Year:	2010
Location:	Portugal
Client:	Algarve University
Total project budget:	33.000 €
Hidromod's budget:	33.000 €
Main project features:	ARGOMARINE project, among other activities, aimed at the implementation of an operating system for the simulation of oil slicks drift based on the use hydrodynamic and meteorological modelling forecasts.
Activities performed:	The contribution of Hidromod was focused on three main tasks: i) make available tools for easy data format conversion and to allow the interoperability of different models and data storage structures; ii) adaptation of an existing "multimesh" lagrangian model in order to enable it to simulate oil slicks dispersion processes by the combined effect of currents, wind and wave climate and, iii) development of an web based operational interface for managing modelling runs
Project:	Angeiras coastal area planning and building of boat shelter area
Year:	2010
Location:	Portugal
Client:	Consulmar
Total project budget:	5.500 €
Hidromod's budget:	5.500 €
Main project features:	The present work refers to the studies made in the framework of the planning of Angeiras area as it is defined in the Caminha-Espinho coastal development plan which foresees the requalification of Angeiras urban area and the improvement of the local fishing infrastructures. In the framework of this project there were assessed 4 project solutions for the construction of a breakwater that could improve the access to the beach of the local fishing boats
Activities performed:	HIDROMOD was responsible for the assessment of the sheltering conditions provided by the different proposed solutions and in their possible impacts over the littoral drift.
Project:	Assessment of the trophic status in 29 Portuguese reservoirs
Year:	2009
Location:	Portugal
Client:	IST
Total project budget:	21.800 €
Hidromod's budget:	21.800 €
Main project features:	----
Activities performed:	In the framework of this project it was performed a detailed analysis of the available data regarding the concentrations of nutrients, chlorophyll-a, dissolved oxygen and transparency in 29 Portuguese dam reservoirs having as main objective the evaluation of the reservoirs trophic status and simultaneously to develop a new index concept.
Project:	Alentejo River Basin Districts Management Plans

Year:	2010
Location:	Portugal
Client:	Nemus
Total project budget:	800.000 €
Hidromod's budget:	130.000 €
Main project features:	This Plan, coordinated by the company Nemus for the ARH Alentejo, followed the rules established in the EU directive 2000/60/EC, of 23 October 2000, where the contents of the River Basin Management Plans are described. This Plan is a tool for management and protection of water but also to improve the environmental status and socio-economic value of the water in the whole Hydrographic Region of the Alentejo (region between Tejo and Algarve, in Portugal). This Plan was released for public consultation in June 2011.
Activities performed:	Hidromod was subcontracted by the consortium that made the Plan to make hydrologic studies including the implementation, validation and use of a hydrologic basin model (SWAT). It was also responsible for the flood, drought and erosion risk evaluation. Other modeling tools implemented in the Plan by Hidromod supported the evaluation of water quantity, quality, water mass classification, scenario evaluation and effectiveness of measures to improve ecologic/potential status in water masses that are below the good status. The models used in the work were MOHID, SWAT and CE-QUAL-W2.
Project	Submarine coastal groundwater resources assessment. A marine modeling approach
Year:	2009
Location:	Spain
Client:	INTECSA-INARSA
Total project budget:	106.300 €
Hidromod's budget:	106.300 €
Main project features:	The goal of this project was to assess the availability and potential to exploitation of submarine fresh water resources in the Spanish Mediterranean coast.
Activities performed:	In the framework of this project there were estimated the potential impacts of groundwater discharges of fresh water made directly into the sea in two places of the Spanish Mediterranean coast (La Herradura and Cabo Gata dee). Based on the performed simulations it was evaluated the potential impact of underwater discharges of freshwater into the marine environment in the temperature and salinity. The results of these simulations were then compared with available field data in order to check the validity of estimates (location, flow rate and discharge type) made by teams of hydrogeology.
Project:	RAIA
Year:	2009-2010
Location:	Portugal and Spain
Client:	INTERREG Program
Total project budget:	87.000 €
Hidromod's budget:	87.000 €
Main project features:	RAIA project intended to consolidate an extended grid of oceanic-meteorological observations and operational models on the continental shelf in the trans-frontier region of Northern Portugal and Galicia. A common data platform (observations and predictions) was created with the application of international standards, such as OpenDAP and WMS. This project has 13 partners in Portugal and Spain.
Activities performed:	In the context of this project Hidromod was commissioned with an implementation of its AQUASAFE solution where data and models are downscaled for the ports of Leixoes and Viana do Castelo. Therefore, several levels of hydrodynamic and wave propagation models were implemented and dynamically coupled with the larger scale models available in the RAIA OpenDAP service. The AQUASAFE system was installed and customized to port's needs.
Project:	Monitoring program of the S. Martinho do Porto outfall and of the ecosystems receiving the water treated by the WWTP
Year:	2009
Location:	Portugal
Client:	Águas do Oeste

Total project budget:	53.870 €
Hidromod's budget:	53.870 €
Main project features:	The objective of this monitoring program is to evaluate any potential impacts in the water quality that may be related with the wastewater discharged in the coastal zone trough the S. Martinho do Porto outfall and with the Tornada river outflow inside the S. Martinho do Porto bay.
Activities performed:	The work performed in the framework of this project included the collection of water samples in several points and the characterization of the circulation patterns using a mathematical model capable to deal with the hydrodynamic and dispersion processes.
Project	Sediment dynamics impact assessment resulting from the increase of length of Vilamoura's harbour breakwater
Year:	2009
Location:	Portugal
Client:	Nemus
Total project budget:	5.000 €
Hidromod's budget:	5.000 €
Main project features:	In the framework of the project of increase of the length of the Vila Moura harbor breakwater it was requested to Hidromod to make an assessment of the potential effects of the Works on the sediment dynamics.
Activities performed:	There were performed model simulations to evaluate the potential changes that might be introduced in the sediment dynamics with consequences on the coastal erosion processes
Project:	Douro inlet breakwaters final impact assessment evaluation of the hydrodynamic and sediment transport
Year:	2008
Location:	Portugal
Client:	Nemus
Total project budget:	5.800 €
Hidromod's budget:	5.800 €
Main project features:	In the framework of the construction of the Douro inlet breakwaters there were performed several mathematical modelling studies to forecast the potential impacts on the hydrodynamics and sediment transport associated with the coastal works. During the construction period it was maintained a monitoring program that included the evaluation of the movements of the coastline, bathymetric surveys and beach profiles.
Activities performed:	Being the Works in its final stage it was requested to Hidromod to make an assessment of the present situation and in what extent the models were able to predict the system behaviour until now and to make new simulations that may help to increase the level of confidence in the system evolution forecasts. It was given special attention to the issues related with: effectiveness of the coastal structures to protect the Douro river entrance from the waves; the potential effects of saline intrusion; the potential effects of the structures on the floods outflow; the potential effects on the stability of the coast south to Douro river.
Project:	Assessment of the impacts on sediment transport and surface water quality due to the construction of Gouvães, Padroselos, Alto Tâmega and Daivões dams
Year:	2008
Location:	Portugal
Client:	PROCESL
Total project budget:	31.500 €
Hidromod's budget:	31.500 €
Main project features:	---
Activities performed:	This project was focused in environmental impact assessment of Gouvães, Padroselos, Alto Tâmega and Daivões dam reservoirs construction. In the framework of this the study nutrient and organic matter loads to each reservoir were estimated as well as the interactions between them according to exploitation plan proposed by Iberdrola. 16 different alternatives were studied. Among the results obtained are the legal classification of the reservoirs in the framework of actual legislation and proposals for impact minimization. An example of this is

	the deviation of Louredo river around Gouvães reservoir. The study also contemplates an analysis of impacts on sediment transport dynamics in Louredo, Beça and Tâmega rivers.
Project:	Hydromorphological impact assessment due to changes foreseen to the Aveiro port navigation channel
Year:	2008
Location:	Portugal
Client:	Aveiro Port Authority
Total project budget:	4.000 €
Hidromod's budget:	4.000 €
Main project features:	The main objective of the present work was to evaluate the potential impacts associated to some engineering works that are intended to be implemented in some parts of the Aveiro port navigation channel. These works includes the realignment of the edge of Monte Farinha island and the partial demolition of the south wall of S. Jacinto dike.
Activities performed:	There were performed hydrodynamic simulations based on MOHID modeling system for the reference and project channel configurations. On the basis of these results it is made an evaluation of the impact of the works over the currents field and over the tidal prisms in different sections of the lagoon
Project:	Saint Helen wharf wave propagation simulation
Year:	2008
Location:	Saint Helen Island
Client:	Consulmar
Total project budget:	15.000 €
Hidromod's budget:	15.000 €
Main project features:	Saint Helen is a lone mid-Atlantic island 1200 miles west of Angola. There is as yet no airport and the port facilities, the only door for the exterior, impose severe restrictions to the people and goods movements
Activities performed:	In the framework of the present study different project solutions were evaluated in what respects the protection against wave action that each one could provide. This evaluation was done by means of the use of a wave propagation model, based on MOHID code that helped to identify the sheltering provided by the different possible options.
Project:	Hydrodynamic and sediment transport studies for the Mearim Port Terminal (MA-Brazil)
Year:	2008
Location:	Brazil
Client:	Mercoshipping
Total project budget:	19.000 €
Hidromod's budget:	19.000 €
Main project features:	The goal of this project was to characterize the hydromorphological conditions in Mearim Port and provide support to assess the relation of the port sheltering structures with the existing coastal erosion processes.
Activities performed:	In this work, a 2D hydrodynamic model with 4 levels of sub-models for the Baía de S. Marcos (MA-Brazil) was implemented and validated. Maps of currents were obtained in the manoeuvring and berthing of vessels near the Mearim Port Terminal the interference of the Port structures with the local sediment transport processes was assessed. The levels and currents in one of the lowest depths of the fairway were also characterized.
Project:	Evaluation of the impacts over the hydrodynamic and littoral drift resulting from offshore sand extraction
Year:	2007
Location:	Portugal
Client:	Amb & Veritas
Total project budget:	24.000 €
Hidromod's budget:	24.000 €
Main project features:	In the framework of this project there were conducted studies for the evaluation of the impacts over the hydrodynamic and littoral drift resulting from offshore sand extraction that are intended to take place in 8 different sites of the Portuguese coast.

Activities performed:	The above referred assessment included the study in mathematical model of the potential modifications on the wave propagation patterns and over the littoral drift that may result from dredging at depths ranging from -20 m to -30 m.
Project:	Environmental impact study regarding the project for the dredging of the channels and protection of the Óbidos lagoon south margin
Year:	2008
Location:	Portugal
Client:	NEMUS
Total project budget:	8.000 €
Hidromod's budget:	8.000 €
Main project features:	Óbidos Lagoon suffers from a progressive process of sediment deposition that contributes for reduction of the water renewal and an increasing of the water quality problems. Also the lagoon inlet is mobile and, during the last years it has been located near the lagoon south margin posing some important erosion problems. In view of this situation there were proposed solutions having as objective to increase the water renewing capacity and solve the problem of the south margin erosion.
Activities performed:	In this work the proposed solutions were analysed from the hydrodynamic point of view. The results obtained shows that these interventions will in fact contribute to achieve the project objectives once it will be able to reduce the water residence time inside the lagoon and guarantee that the inlet will become fix in the lagoon central part.
Project:	Sediment transport evaluation on Sado estuary, Setúbal harbor
Year:	2007
Location:	Setubal, Portugal
Client:	Setubal Port Authority
Total project budget:	24.000 €
Hidromod's budget:	24.000 €
Main project features:	Setúbal harbour is served by a dredge channel which, beyond the environmental concerns associated with the regular dredging works, represents a relevant cost for the port. Being aware of this situation Setubal port authority keeps supporting a monitoring program to help to better characterize the local sediment dynamics and, hopefully, may help to adopt dredging strategies that may contribute to optimize the maintenance costs.
Activities performed:	In the framework of this project it was implemented a sediment transport model supported by the available data that may help to quantify the sediment fluxes observed in the different channels. The goal is that the sediment transport model may act as the basis of a dredging management tool that associated to statistic methods and empirical models may lead to the optimization of the amount of sand to dredge each year.
Project:	Wave climate and hydromorphology processes evaluation along Lisbon Port south channel
Year:	2007
Location:	Portugal
Client:	Lisbon port authority (APL)
Total project budget:	41.000 €
Hidromod's budget:	41.000 €
Main project features:	The Lisbon Port Administration signed a contract with BCEOM to the installation of a DUCK (Dynamic Under Keel Clearance) system capable to assure the optimization of the dredging effort along the Lisbon port south channel.
Activities performed:	In the framework of this project HIDROMOD was contracted to provide a modelling system capable to deal with the combined action of waves and currents was implemented to simulate the wave propagation and hydro morphological processes in the Tagus inlet. The model results provides the required support the implementation of a DUCK system.

Operational and risk assessment projects

Project:	AQUASAFE – Water management support tools
Year:	2009-2010
Location:	Portugal
Client:	Funding: QREN Program
Main project features:	AQUASAFE project, funded by the Portuguese Innovation Agency through the QREN program, it was specially focused in providing advanced real time data management and forecasting capabilities.
Activities performed:	Presently it represents a step forward in issues such as monitoring programs, improved system exploitation schemes and improved public communication methods, providing answers in four relevant sectors: the urban water cycle (water and wastewater), the bathing water quality (continuous status and alert systems), coastal pollution (oil spills) and navigation safety (high resolution forecasts and real time data management). Taking advantage of the team know-how and of the most recent technologic solutions that allow making easier the process of integration and interaction of different data sources it enables the integration of data and models in order to achieve improved diagnostic and prognostic capabilities
Project:	SCHEMA - Scenarios for Hazard-induced Emergencies Management
Year:	2007-2010
Location:	Portugal
Client:	EU 6 th Framework program
Main project features:	R&D project
Activities performed:	A consortium of 12 organisations participated in this R&D project aiming at using earth observation data to develop a generic methodology able to help experts to build vulnerability and hazard impact maps associated with tsunamis. As a result there were proposed methodologies for the creation of vulnerability maps which involves intrinsic vulnerability variables of systems facing a hazard (types of building, categories of inhabitants, ...), secondary environment vulnerability variables (location of buildings in old areas, access conditions,...) and crisis organisations vulnerability variables which shape efficient rescue operations (enhance or inhibit actions near the impacted regions). The notion of hazard scenario was revisited with end-users (including Turkey) and players in countries recently impacted by coupled earthquakes/tsunamis events
Project:	INSEA - Data Integration System for Eutrophication Assessment in Coastal Waters
Year:	2006-2009
Location:	Portugal
Client:	EU 6 th Framework program
Main project features:	R&D project
Activities performed:	Coastal waters are transitional ecosystems buffered by variable landward-based freshwater input volumes and constituents, influences of oceanic provinces, and human disturbances, including nutrient enrichment, superimposed on these natural regimes. One of the results of this project was the development of methodologies to downscale physics from large scale data systems to regional models in order to force ecological modelling systems on coastal areas and make use of the full potential given by the fast growing computer power and IT skills to deliver useful information to decision makers and other data users. Following these type of methods it was demonstrated the potential of the combination of Earth Observation (EO) data, numerical modelling and in-situ data. This project was leaded by Instituto Superior Técnico which is responsible by the project coordination and by Hidromod which was responsible by the executive implementation. It gathered teams from 5 European countries and it had a budget of about 2.5 million Euros.
Project:	EROCIPS: Emergency Response to Coastal Oil, Chemical and Inert Pollution from Shipping
Year:	2004-2007

Location:	Portugal
Client:	INTERREG Program
Main project features:	In the framework of EROCIPS, common transnational methodologies, tools and techniques for dealing with the shoreline response to coastal pollution incidents, transferable across the EU, in order to support the sustainability of sea transport systems, were developed. In order to achieve this, Regional and Local Governments were called to share an understanding of the many socio economic and environmental factors that contribute to achieving an effective response to addressing coastal pollution problems from shipping.
Activities performed:	This included understanding the baseline situation along coastlines and what tools and techniques could be effectively applied in different situations, in relation to different environments and types of pollution (oil, chemical and inert). Hidromod was responsible for the demonstrations of modelling techniques and the co-development of a platform with the Environmental Sensitivity Index and a Socio Economic Index for the coast of Portugal.