

La modellistica per il mondo delle acque: contesto attuale e prospettive

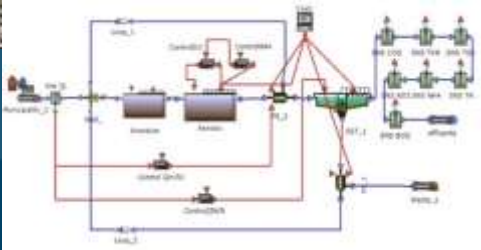
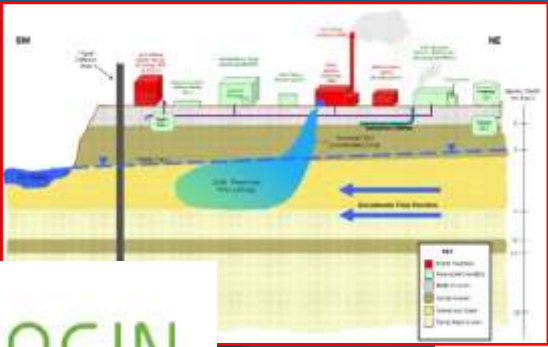
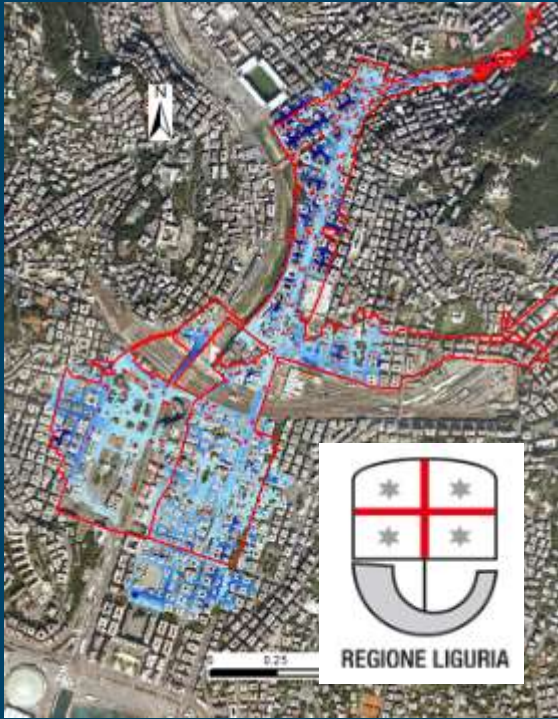
Andrea Crosta
DHI

Torino, 14-15 Ottobre 2015

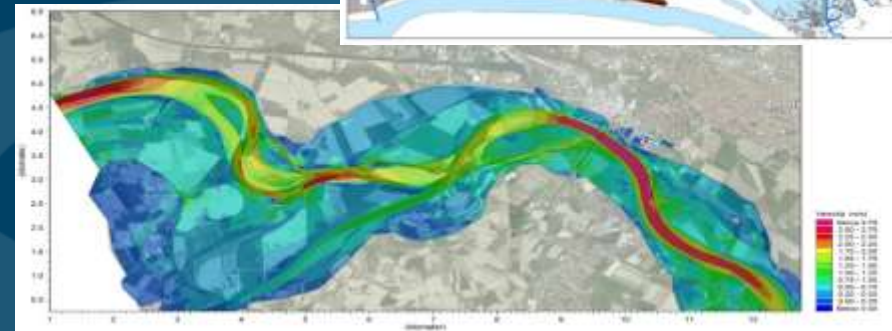
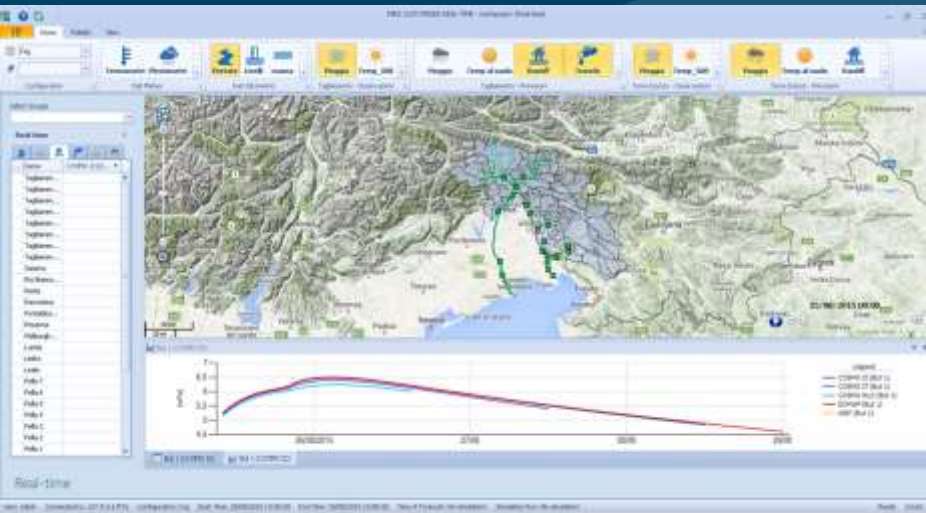


Italian DHI Conference 2015

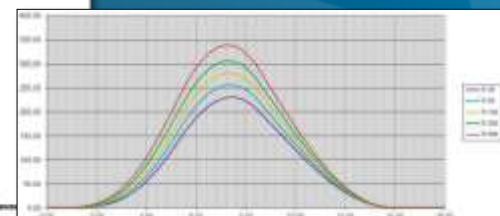
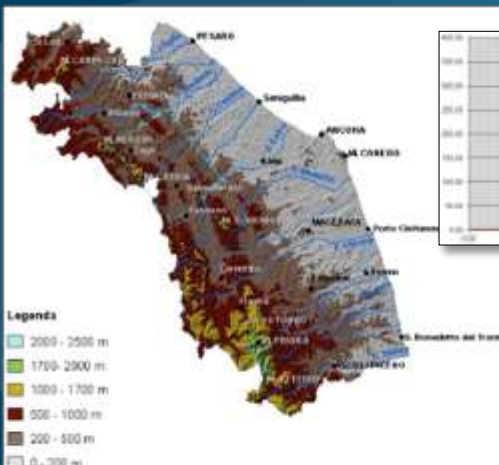
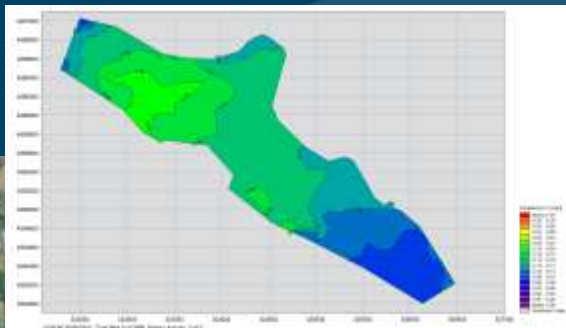
I CODICI DI CALCOLO NEL CONTESTO ITALIANO



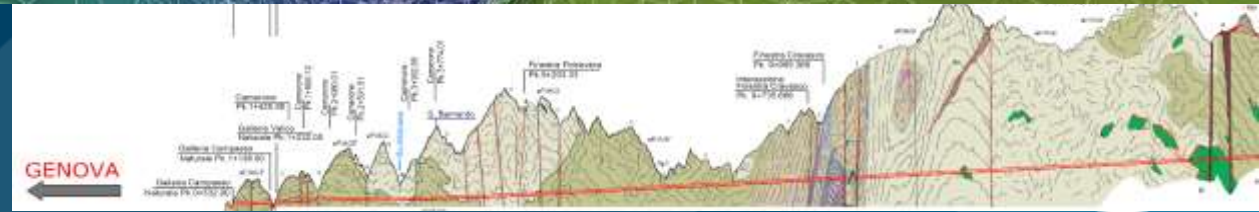
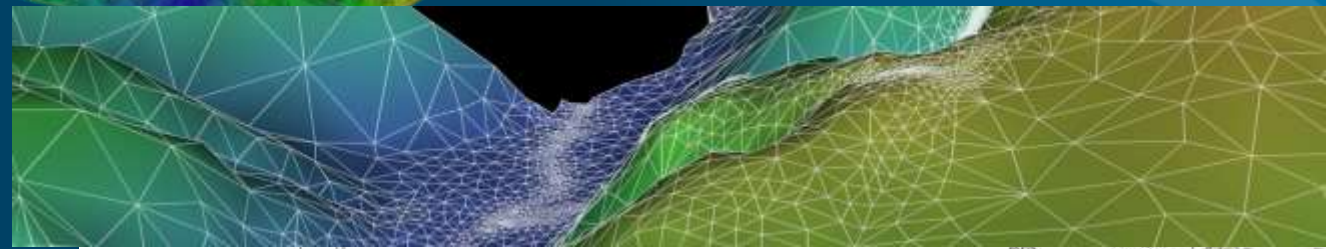
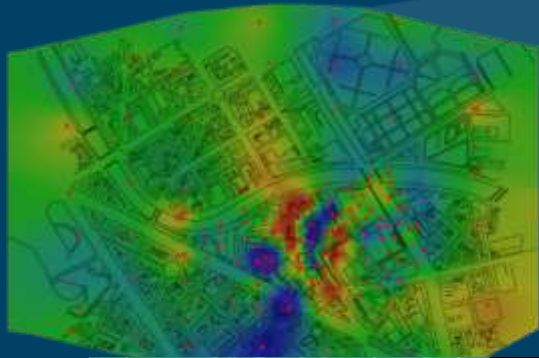
ACQUE SUPERFICIALI – previsione idrologica e flooding



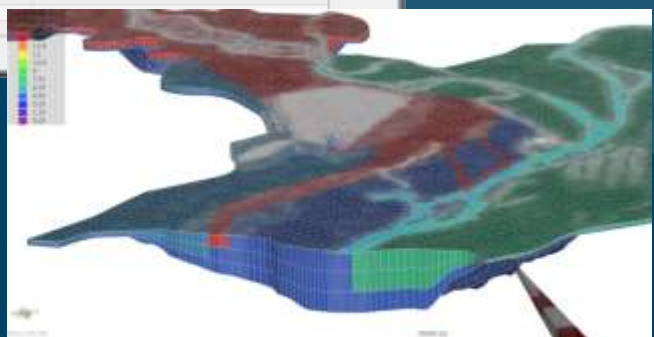
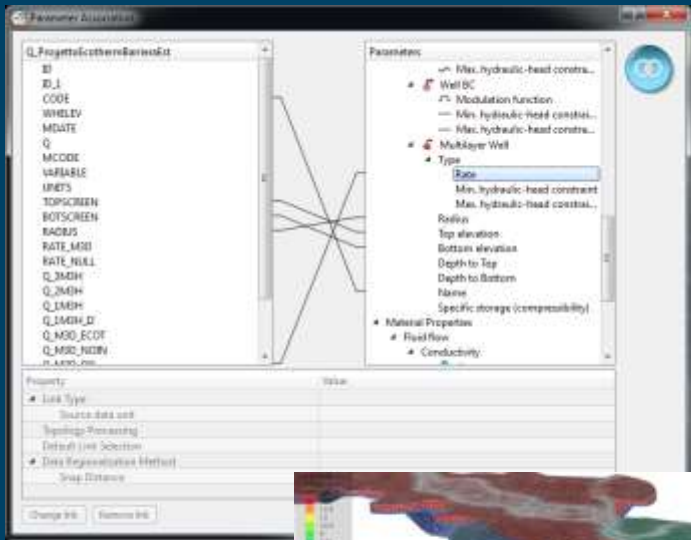
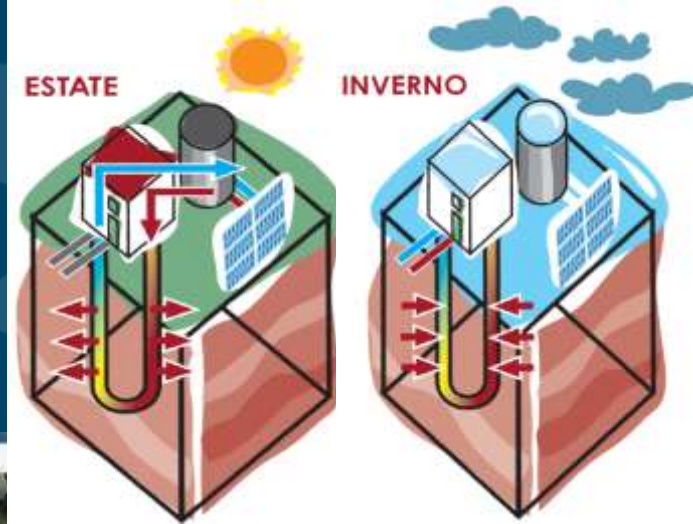
ACQUE SUPERFICIALI: laghi, cave e infrastrutture



ACQUE SOTTERRANEE: bonifiche, gallerie e interferenze



ACQUE SOTTERRANEE: GIS, geotermia



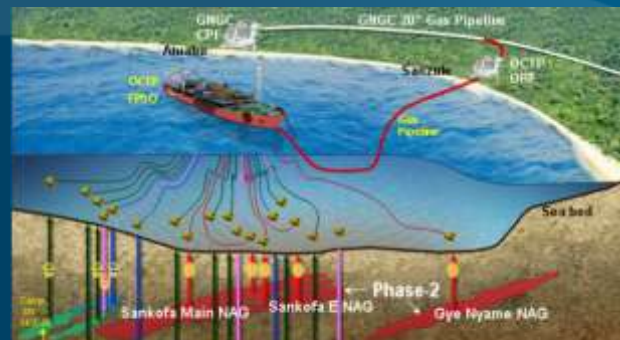
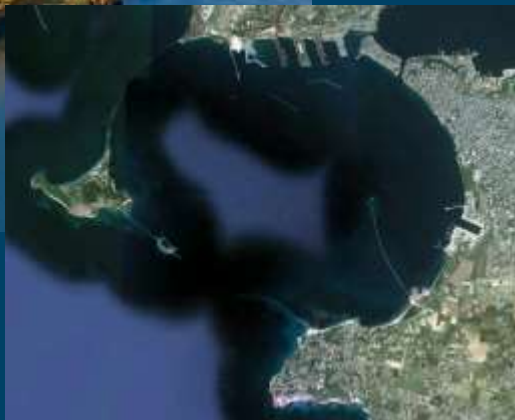
UNIVERSITÀ
DEGLI STUDI
DI TORINO



La "Sessione Acque Sotterranee" si terrà c/o il Grand Hotel Sitea Via Carlo Alberto 35, Torino



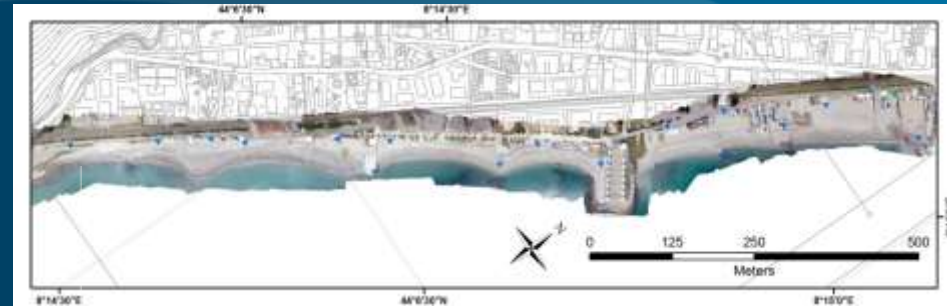
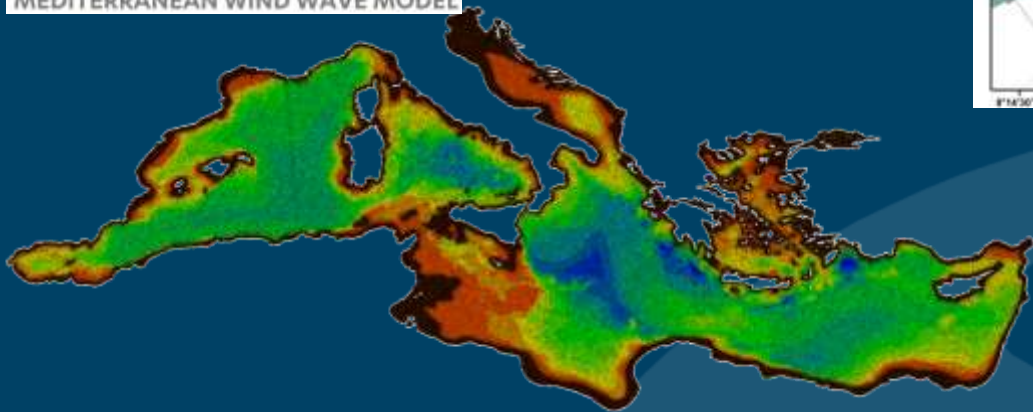
AMBIENTE MARINO: infrastrutture, monitoraggio e qualità



AMBIENTE MARINO: onde, monitoraggio e droni



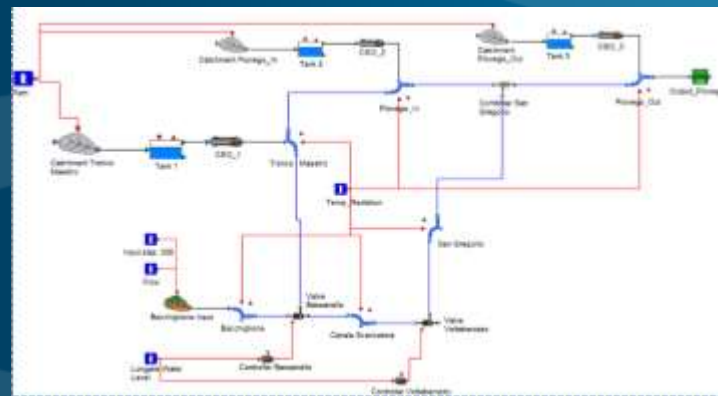
35 anni
ora disponibili !



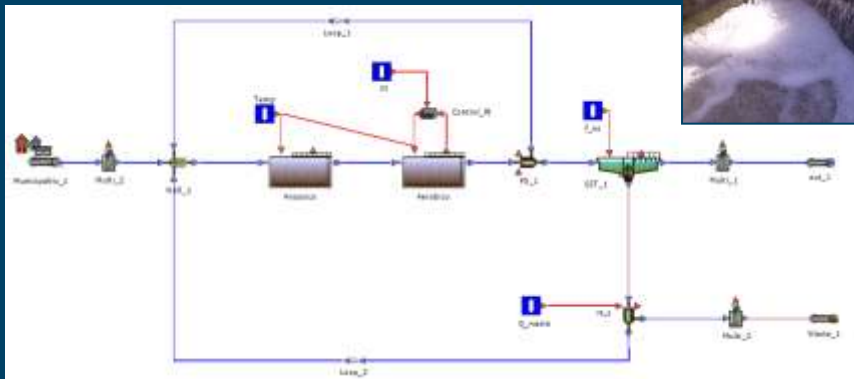
HyMOLab
Hydrodynamics · MetOcean



AMBIENTE URBANO:



AMBIENTE URBANO:



WEST



Modelling and simulation of WWTPs

ENEA

ENTE PER LE NUOVE TECNOLOGIE,
L'ENERGIA E L'AMBIENTE



INGEGNERIE TOSCANE

SMART WATER DAI MONTI AL MARE

Gestione invasi



	Giorno mercato (g - 1)	Giorno mercato (g - 2)
Errore medio %	5.03%	9.22%
Errore medio MW	4.83 MW	5.32 MW
ore con E < 5 %	71%	47%
ore con E < 10 %	86%	68%
ore con E < 15 %	93%	81%
ore con E < 20 %	95%	88%



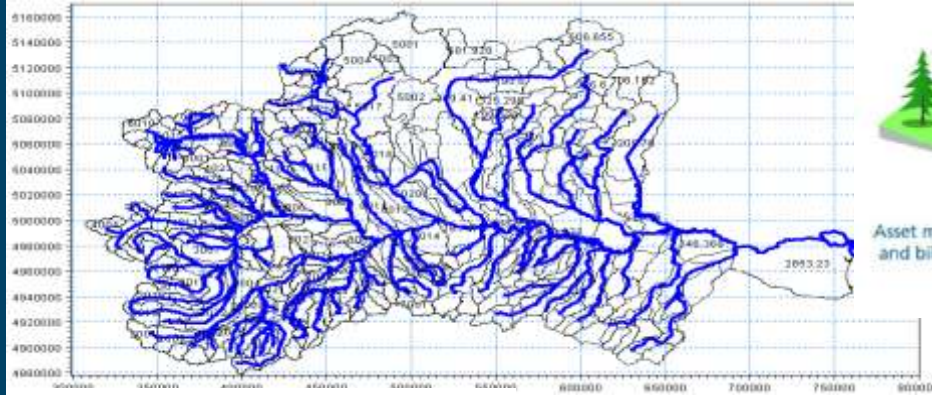
Forecasting idroelettrico



Italian DHI Conference 2015

SMART WATER DAI MONTI AL MARE

Gestione idrologica




Distribuzione e trattamento reflui



SMART WATER DAI MONTI AL MARE

SEAP@L


HOME



HINDCAST

Prototype system aimed at the analysis and processing of data meteorologic aimed at evaluating the renewable energy potential of the Ligurian Sea

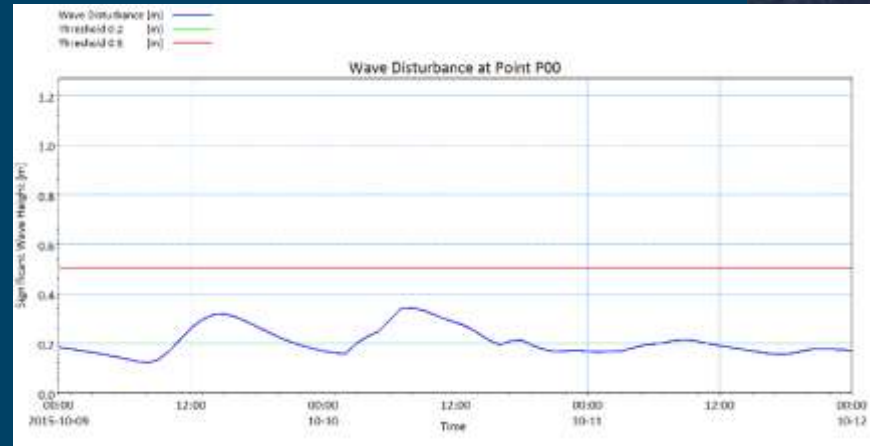

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FORECAST

Prototype system for forecasting service operating on climatic variables with high temporal and spatial resolution

Enter >



TAVOLI TECNICI



I MODELLI NUMERICI NEI PROGETTI DI BONIFICA:
POTENZIALITA' E LIMITI. INTERFACCIA CON LA
SPERIMENTAZIONE A SCALA DI SITO PILOTA



GESTIONE OTTIMALE DELLE RETI IDRICHE
ESPERIENZE E PROSPETTIVE IN UN CONTESTO
ITALIANO IN EVOLUZIONE



TAVOLI TECNICI

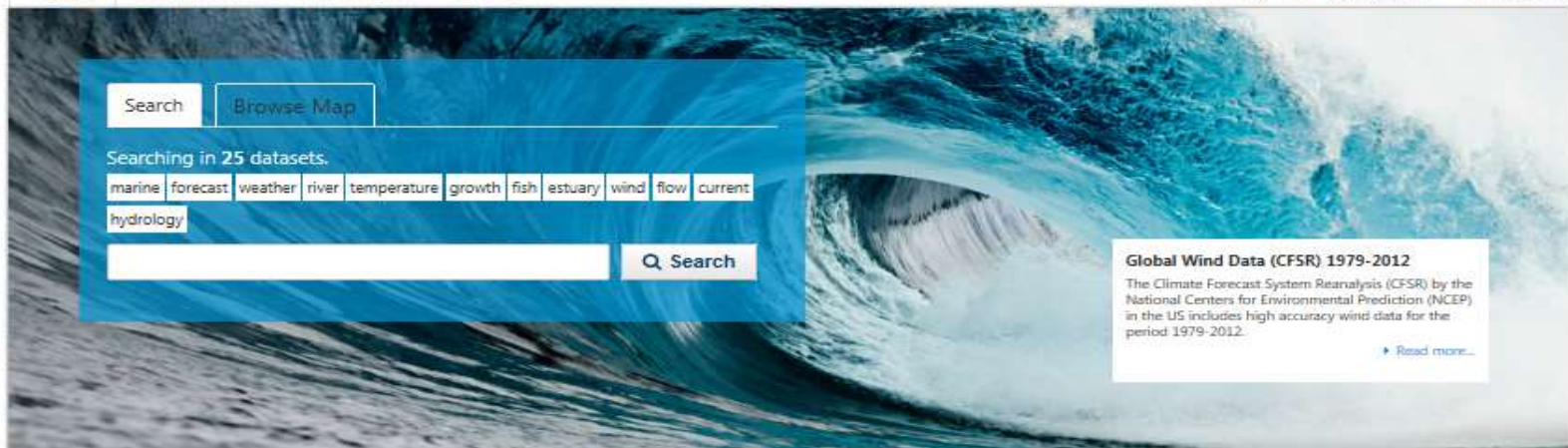


LA GESTIONE DEI GRANDI INVASI – OTTIMIZZARE GLI OBIETTIVI NON ECONOMICO-PRODUTTIVI: rilascio ambientale, laminazione delle piene, vincoli paesaggistici e per la fruizione sociale, riserva strategica in presenza di cambiamento climatico



LE NUOVE FRONTIERE DELLE RETI DI DATI DEL MARE





Searching in 25 datasets.

[marine](#) [forecast](#) [weather](#) [river](#) [temperature](#) [growth](#) [fish](#) [estuary](#) [wind](#) [flow](#) [current](#)
[hydrology](#)

Global Wind Data (CFSR) 1979-2012

The Climate Forecast System Reanalysis (CFSR) by the National Centers for Environmental Prediction (NCEP) in the US includes high accuracy wind data for the period 1979-2012.

[Read more...](#)

WATER DATA FIT FOR USE

WaterData not only provides access to a wide range of quality data for water environments. This portal also provides access to data ready to fit your project needs. Furthermore, the data comes with recommendations from DHI experts, who explain how they may be used, and what alternatives exist.

The portal is for data that is related to water, be it flow, energy, environment or usability. All data indexed and available from here has been checked and used by DHI, and is distributed in formats that are easy to use for both modelling and other analysis.

Data sources include model data, measured data (*in situ*) and remote sensing data, and we are always interested to hear about other datasets to include, so please feel free to use our online chat or email us to ask questions and express your views.

Featured datasets

[weather](#) [rainfall](#) [trmm](#)

Global Rainfall data (TRMM) and Consolidated Datasets (Raw Data)

Published 2013-05-23 09:53:11 by DHI

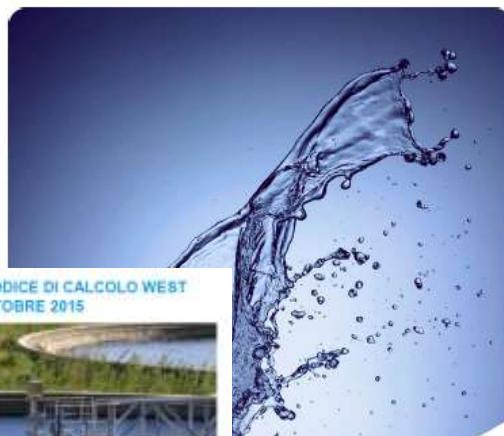
Overview of dataset: The TRMM is a joint mission between the National Aeronautics and Space Administration (NASA) and Japanese Aerospace Exploration Agency (JAXA) ...

SUGGEST NEW DATASETS

Do you want to suggest your own data through the WaterData? Or maybe you want your own data shop inside the portal? Please ask us about the possibilities. We are ready to help you make better use of your valuable data!

SHARE OR SELL YOUR DATA

Do you want to share your own data through the WaterData? Or maybe you want your own data shop inside the portal? Please ask us about the possibilities. We are ready to help you make better use of your valuable data!



	AREA D'INTERESSE	TITOLO	DATE	
DRENAGGIO URBANO	WEST	Gestione e simulazione degli impianti di depurazione	14-15 Aprile	Torino
	MIKE URBAN WD	Gestione e simulazione delle reti di distribuzione idrica	18-19 Novembre	Torino
ACQUE SUPERFICIALI & SOTTERRANEE	MIKE 11	Simulazioni di fiumi e canali	21-22 Gennaio	Torino
	FEFLOW	Simulazione di acque sotterranee, qualità ed aspetti gestionali	10-11 Giugno	Torino
	MIKE SHE	Simulazione integrata di acque superficiali e sotterranee	15-17 Settembre	Torino
	MIKE HYDRO Basin	Modelli di idraulica a scala di bacino	16-17 Dicembre	Torino
FLOODING	MAPPATURA DELLA PERICOLOSITÀ IDRAULICA	Mappatura della pericolosità idraulica in adempimento alla Direttiva Alluvioni 2002/66/CE	1-2 Luglio	Torino
	MIKE FLOOD (River)	Simulazioni di fiumi e aree galleggianti e costiere (Modulistica 1D e 2D accoppiata)	17-19 Febbraio	Torino
AMBIENTE COSTIERO & OFFSHORE	MIKE 21 & MIKE 3 AD e ECO Lab	Simulazioni 2D e 3D di qualità delle acque	12-14 Maggio	Torino
	MIKE 3 FLOW MODEL HD FM	Simulazione idrodinamica tridimensionale per laghi e mare	4-5 Marzo	Torino
	DINAMICHE COSTIERE	Studio delle dinamiche costiere e supporto alla progettazione di opere di difesa con MIKE 21 e LITPACK	9-12 Giugno	Torino
	PROGETTAZIONE PORTUALE	La modellistica a supporto della progettazione portuale	27-29 Ottobre	Torino

CORSO DI FORMAZIONE SUL CODICE DI CALCOLO FEFLOW TORINO, 12-13 OTTOBRE 2015



FEFLOW (Finite Element subsurface FLOW system) è uno tra i più sofisticati codici numerici per la simulazione dei processi di flusso e trasporto in mezzi porosi, in condizioni sature ed insature. La piattaforma modellistica è dotata di un ambiente grafico avanzato che permette di simulare le dinamiche di flusso sotterraneo in situazioni complesse ed utilizza un approccio agli elementi finiti che garantisce un'estrema flessibilità nella discretizzazione spaziale del dominio ed una migliore rappresentazione degli elementi naturali e delle condizioni di anisotropia.

Durante il corso verranno trattati argomenti che riguardano la modellazione numerica 2D e 3D del flusso sotterraneo e del trasporto di massa.

Al termine del corso i partecipanti saranno in grado di simulare in ambiente FEFLOW 8.2 le più comuni problematiche relative al flusso e al trasporto di massa e disporranno delle basi teoriche e pratiche per applicare FEFLOW in contesti idrogeologici tridimensionali anche complessi.

CORSO DI FORMAZIONE SUL CODICE DI CALCOLO WEST TORINO, 12-13 OTTOBRE 2015



WEST è un software modellistico per la simulazione ed il supporto alla gestione di impianti di trattamento delle acque reflue (WWTP), in grado di simulare tutti i processi in acqua di tipo fisico, biologico e chimico. La particolare flessibilità ed affidabilità del codice consentono di analizzare e simulare ogni tipo di processo e configurazione degli impianti, nonché di implementare diverse strategie di controllo.

WEST ha un ampio database di modelli ed una struttura aperta che permette di implementare nuove tipologie di processo o di modificare quelle già esistenti, nonché di integrarlo con sistemi di telemonitoraggio (SCADA) e sistemi di gestione dei dati. Utilizzando questo approccio è possibile implementare un sistema di supporto decisionale facilitando la gestione giornaliera dell'impianto e, nello stesso tempo, ottimizzando i costi operativi e l'efficienza.

Il corso ha come obiettivo la realizzazione di un modello in WEST, l'esecuzione di simulazioni dinamiche e la valutazione di possibili strategie di controllo.

PRINCIPALI SVILUPPI MIKE Powered by DHI 2016

MIKE 2016 release preview
Embedding knowledge in technology

Disponibile da Dicembre 2015

(cut-off date 30.9.15)

NEW PRODUCTS

DATA MANAGEMENT AND DECISION SUPPORT

The latest additions to MIKE Powered by DHI's software family include three new products for data management and decision support.

MIKE INFO optimises your data handling workflows and provides one window to all your data. **MIKE OPERATIONS** brings you real-time forecasting and operational control capabilities. **MIKE PLANNING** helps you in scenario analysis and decision making.

These new products integrate smoothly with our classic MIKE products but can also be tailored to work with your existing technologies – whether they are other water modelling systems, SCADA systems or existing data management solutions. Together, they stand as a unified product suite for data management and operational decision support.

DATA MANAGEMENT AND DECISION SUPPORT

MIKE INFO

Data management,
integration and reporting

MIKE OPERATIONS

Real time forecasting
and operational control

MIKE PLANNING

Scenario analysis and
decision making

CITIES

GREEN IS THE NEW BLACK

Green infrastructure is crucial to combating climate change, creating healthy built environments, and improving quality of life. The new features of MIKE URBAN in the 2016 release make it even easier to properly build and implement water sensitive urban design practices:

- detailed hydraulic modelling tools support design, construction, and maintenance of green infrastructure on screening level (catchments)
- new mode type for pipe flow simulations: socalways
- state-of-the-art water quality modelling product ECO Lab linked with MIKE URBAN, enabling you to model biological processes in urban water systems
- seamless modelling of hydraulic and water quality parameters in collection systems combined with overland flow and/or receiving waters in MIKE FLOOD
- significant speed improvement of MIKE 1D numerical simulation engine, the heart of MIKE URBAN

COAST AND SEA

2D SHORELINE EVOLUTION MODELLING

Long-term shoreline morphology modelling in 2D environments poses a serious challenge in coastal engineering. To address this, we're launching a new module in MIKE 2016: MIKE 21 Shoreline Morphology (SM):

- combines detailed 2D modelling of currents and waves with a constrained morphological model
- possible to conduct stable and robust modelling of shoreline evolution in 2D environments
- possible to perform previously unfeasible coastal engineering applications

We've enhanced Graphics Processing Units (GPU)s support to include MIKE 3:

- easy and economical way of enhancing calculation speed – speed-up factors in the range of 5-10, compared to quad-core computers
- straight-forward GPU application – MIKE 3 will automatically recognise a compatible GPU and give you the option to use it

WATER RESOURCES

NEXT GENERATION RIVER MODELLING

MIKE 2016 continues the transformation of our water resources products. River modellers can now use our intuitive, map-centric Graphical User Interface (GUI), MIKE HYDRO, which includes:

- MIKE HYDRO River – comprehensive river network modelling (replaces MIKE 11)
- MIKE HYDRO Swat – river basin management and planning

MIKE 21 and MIKE FLOOD have also been extended with:

- infiltration and leakage dynamics for 2D surface flow modelling
- the Flood Screening Tool (FST) – simpler and faster numerical solutions enable more rapid flood screening outputs

Our new flood modelling toolbox, which allows for additional processing tools developed by you, includes:

- a new map-based toolbox for post-processing of 1D and 2D flood modelling results
- flood mapping and hazard calculations
- extended result processing and extraction

GROUNDWATER AND POROUS MEDIA

UNPRECEDENTED GEOMETRICAL FLEXIBILITY

By giving you the ability to use layered, partially unstructured, or fully unstructured meshes in 3D, FEFLOW provides a new level of geometrical flexibility:

- easier setup for groundwater models in demanding geological settings
- new meshing options especially helpful for precisely mapping inclined boreholes or other underground structures
- more computationally efficient solutions due to lower total number of calculation nodes

FEFLOW now also allows you to:

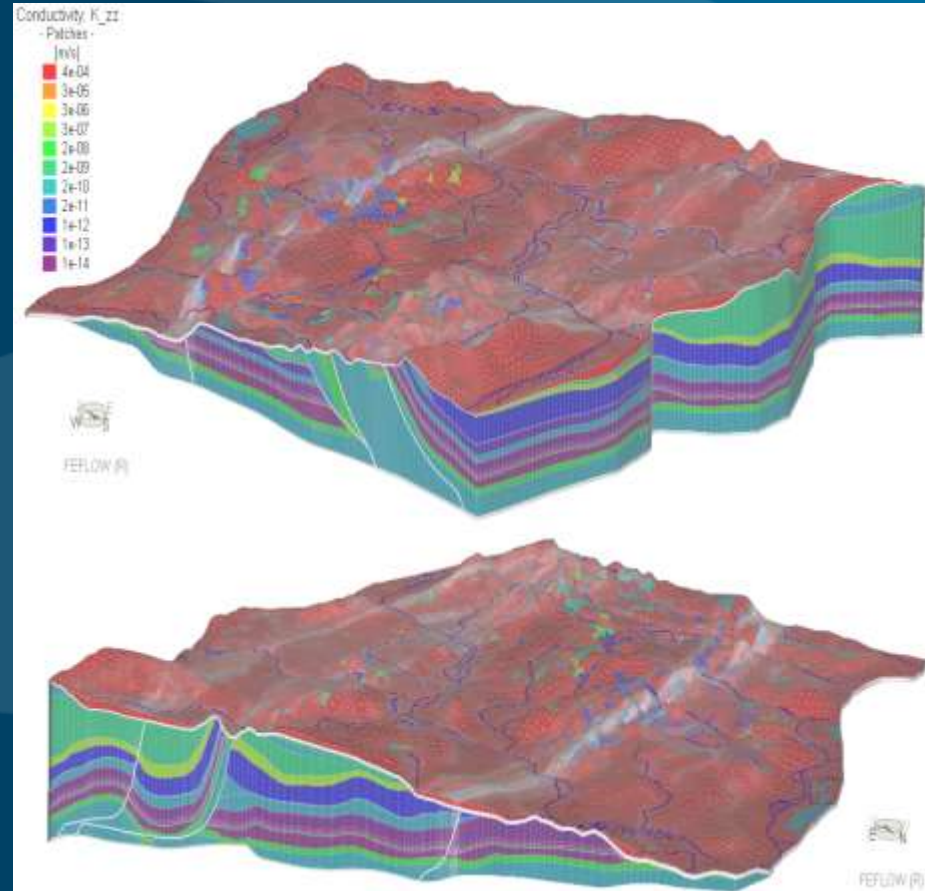
- calculate and graphically display descriptive statistics for all parameters, either for a subset or the entire mesh
- consider both flow direction and bedding direction when it comes to dispersivity
- use the Control-Volume Finite Elements (CVFE) method for more stability, faster convergence, and a better mass balance – especially for unstructured and variably saturated conditions

MIKE by DHI 2016 - FEFLOW

FEFLOW garantisce già oggi una ottima flessibilità nella rappresentazione di stratigrafie complesse ma il numero di nodi ed elementi può essere molto elevato

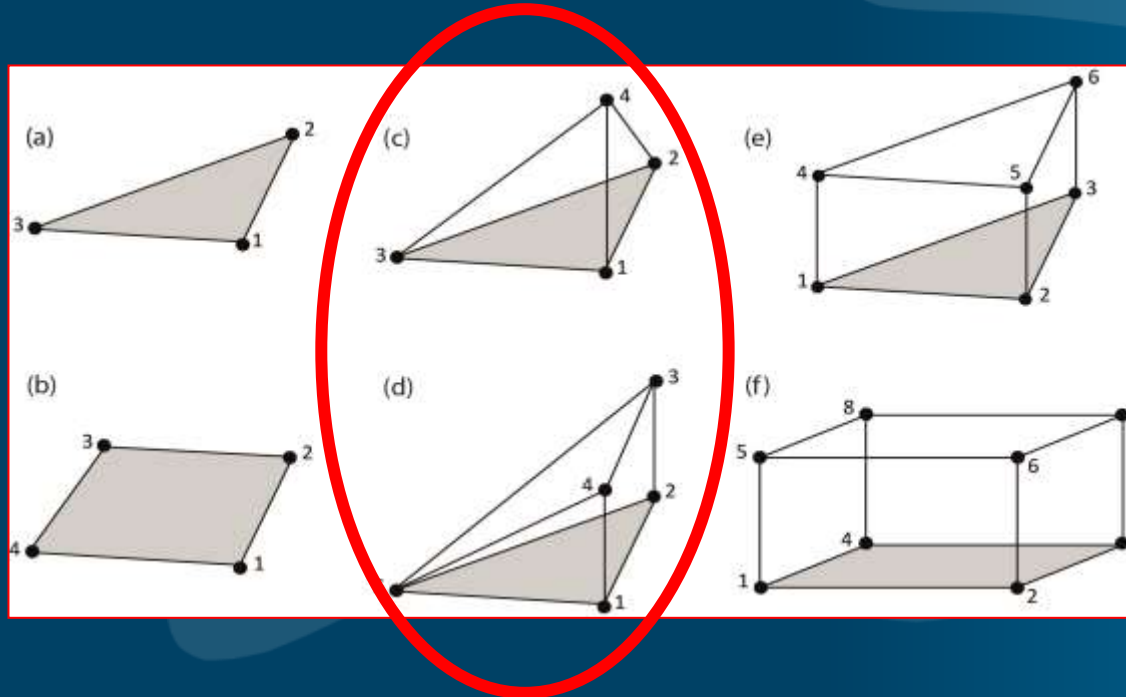
Nel caso in figura:

- 18 formazioni geologiche
- 85 layer di calcolo
- 10 milioni di elementi
- **5 milioni di nodi**



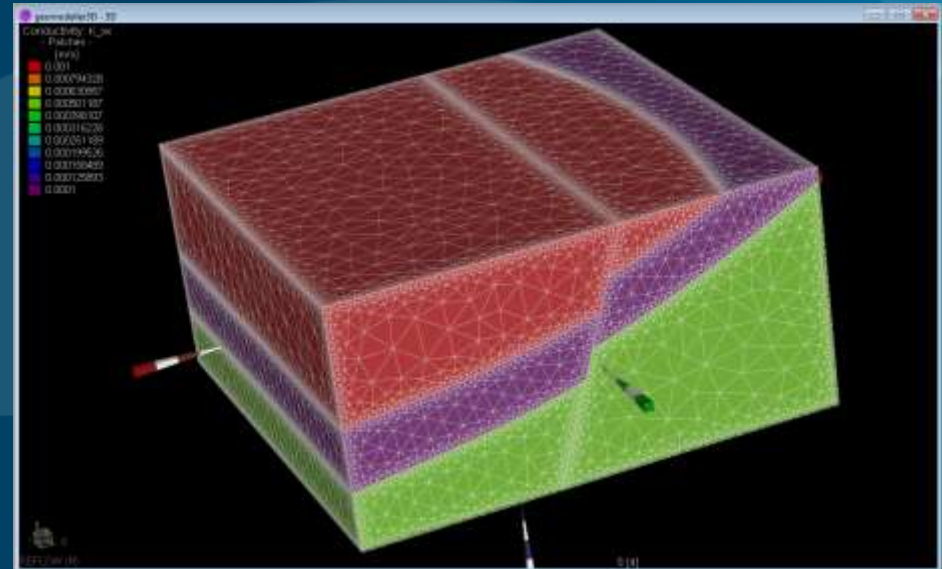
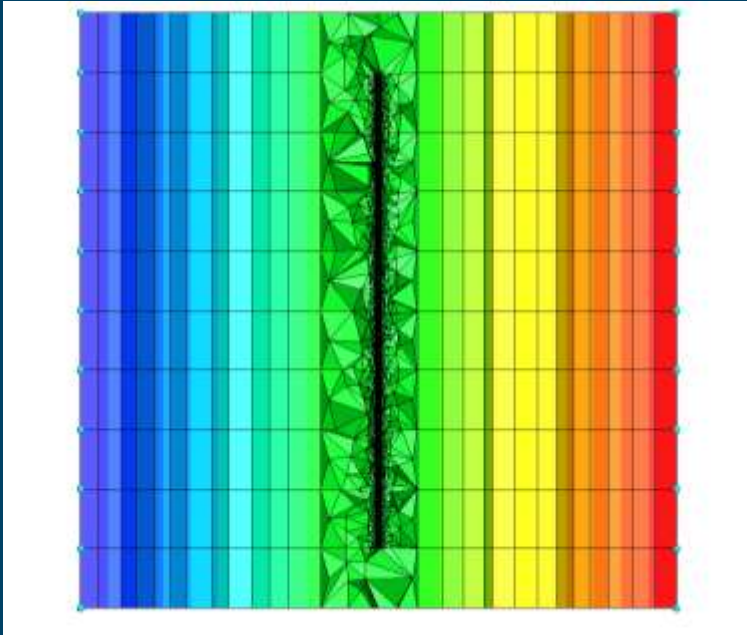
MIKE by DHI 2016 - FEFLOW

Dalla versione 2016 sarà disponibile la versione a maglia non strutturata, basata su elementi tetraedrici o piramidali in aggiunta a quelli prismatici



MIKE by DHI 2016 - FEFLOW

Possibilità di coniugare le due tipologie di maglia di calcolo in modo da privilegiare la struttura a layer ove possibile ma adottando i più flessibili tetraedri dove necessario (es. lenti, contesti carsici, faglie inclinate, ...)



MIKE HYDRO: la nuova generazione dei codici per le acque superficiali



MIKE HYDRO Basin

Gestione e pianificazione delle risorse idriche



MIKE HYDRO River

Simulazione di fiumi e canali in 1d

“MIKE 11 in MIKE HYDRO”

MIKE by DHI 2016 – MIKE HYDRO River

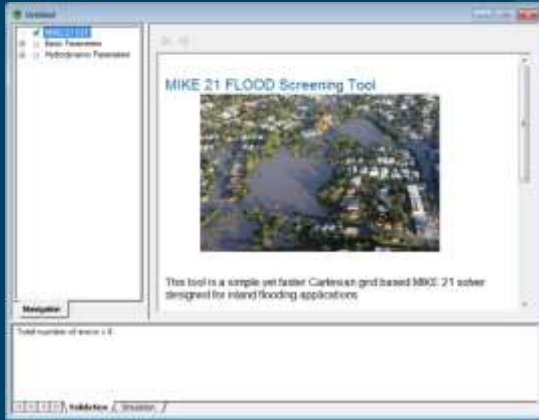
The screenshot displays the MIKE HYDRO River software interface. The main window shows a map of a river network with various structures and storage elements. The interface is divided into several panels:

- Setup:** A tree view on the left containing various model configuration options such as "Simulation specifications", "Map configurations", "River network", and "Hydrodynamic parameters".
- Map:** The central area showing a topographic map with a blue river network and red structures.
- Property:** A panel on the right showing the properties of the selected element (7450). It includes fields for "Start Change", "End Change", "Flow Direction", "Branch Type", "Upbit connect type", "Downbit connect type", "Downbit Name", "Downbit Change", and "Downbit storage ID".
- Other Section:** A panel at the bottom right showing a cross-section plot titled "VIDAA-MAG, 1120". The plot shows "Elevation [meters]" on the y-axis (ranging from -2.5 to 3) and "Horizontal coordinate along cross section [m]" on the x-axis (ranging from 0 to 600).

At the bottom of the interface, there are tabs for "Setup", "Symbology", and "Result", and a "Validation" section with "Simulation" and "Time Series" options.



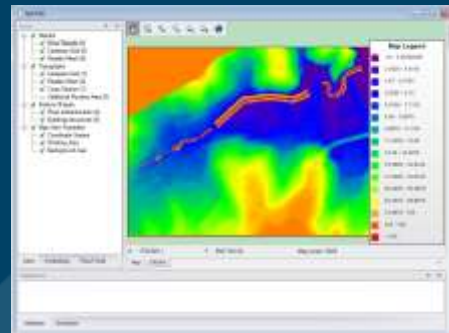
MIKE by DHI 2016 – Studi flooding



MIKE 21 FST

FLOOD SCREENING TOOLBOX

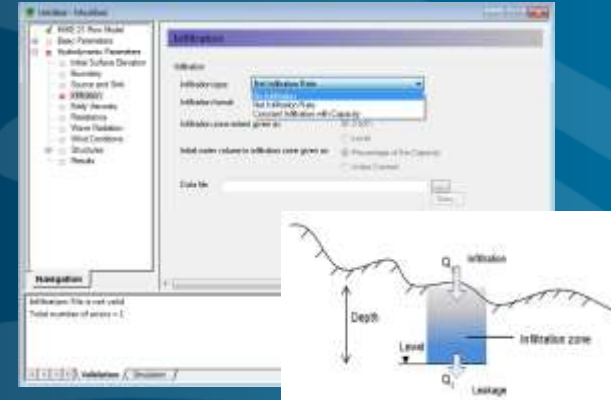
valutazione rapida delle aree
allagabili



FM TOLBOX

FLOOD MAPPING TOOLBOX

elaborazione mappe di rischio
logiche programmabili



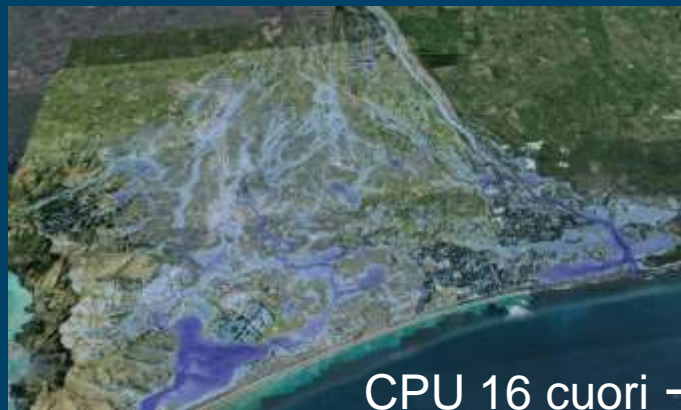
MIKE 21 Infiltration

modulo per simulazione
dell'infiltrazione nel terreno

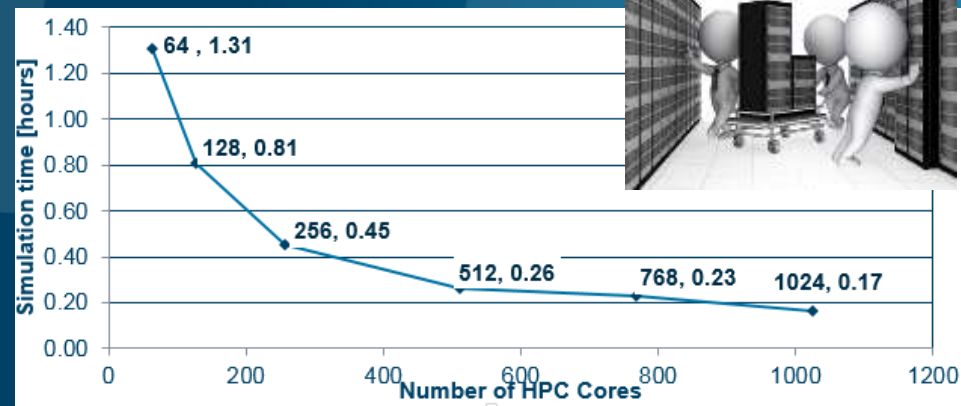
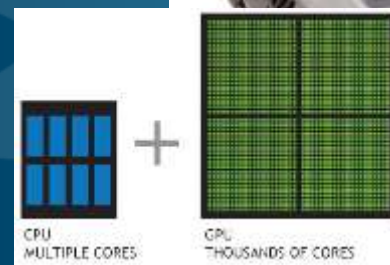


MIKE by DHI 2016 – GPU

L'utilizzo delle risorse di calcolo da scheda grafica consente di ridurre drasticamente i tempi di calcolo (MIKE 21 FM e MIKE 3 FM)



CPU 16 cuori → 8.9 h
1 GPU → 3.1 h
2 GPU → 1.7 h



MIKE by DHI 2016 – Parallelizzazione e LINUX

• OpenMP parallelization:

- Release 2005: MIKE 21 SW
- Release 2008: MIKE 21 FM
MIKE 3 FM
- Release 2009: MIKE 21 BW
MIKE 21 'Classic'
MIKE 3 ' Classic'

• MPI parallelization:

- Release 2011: MIKE 21 SW
MIKE 21 FM
MIKE 3 FM

• Porting of engines to Linux:

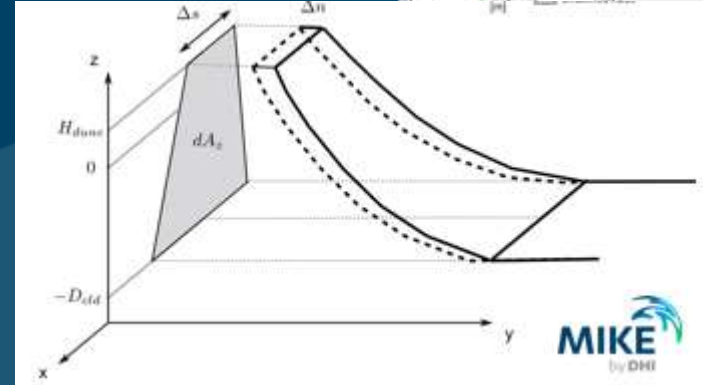
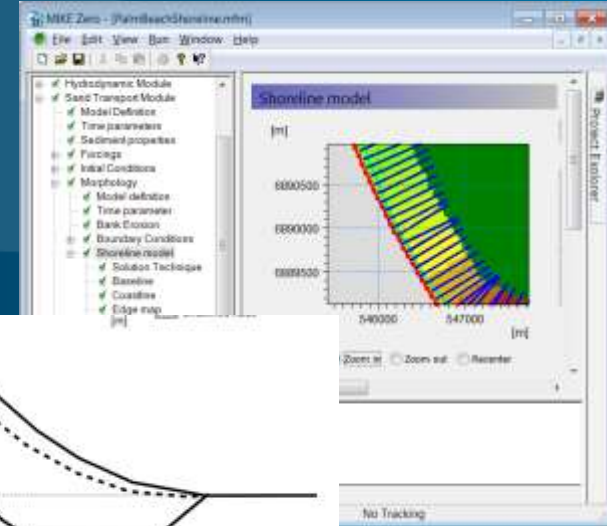
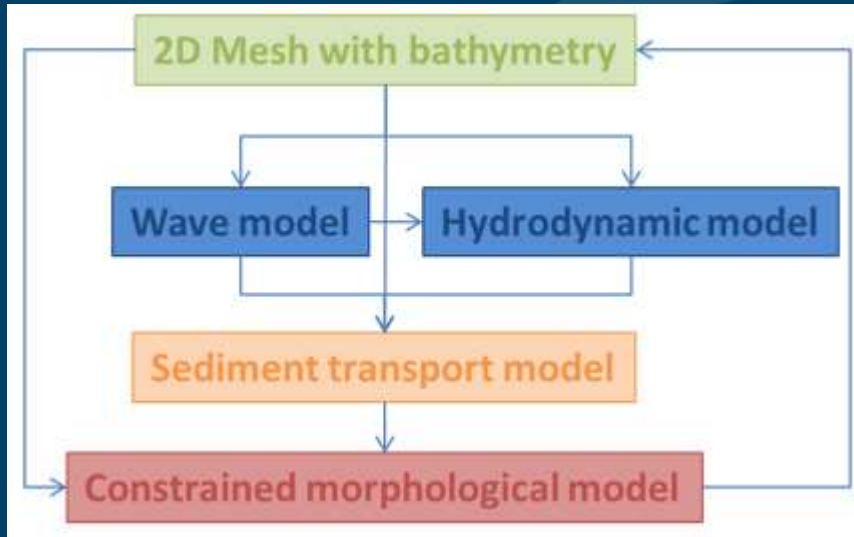
- Release 2012: MIKE 21 SW
MIKE 21 FM
MIKE 3 FM

Release 2014, Use of GPU's: MIKE 21 FM HD

Release 2016, Use of GPU's: MIKE 3 FM HD
and Coupled Modelling with MIKE 21 and MIKE 3



MIKE by DHI 2016 – MIKE 21 Shoreline model

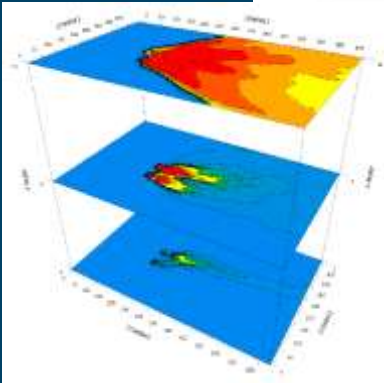
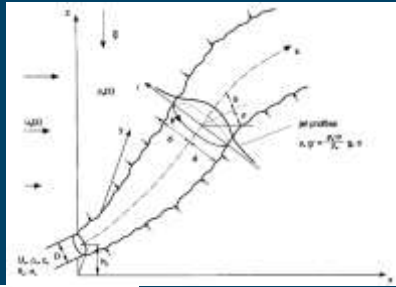


Fondato sull'integrazione di MIKE 21 e LITLINE, il nuovo Shoreline Model consente la simulazione dell'evoluzione morfologica di lungo periodo anche in presenza di opere e dinamiche costiere complesse

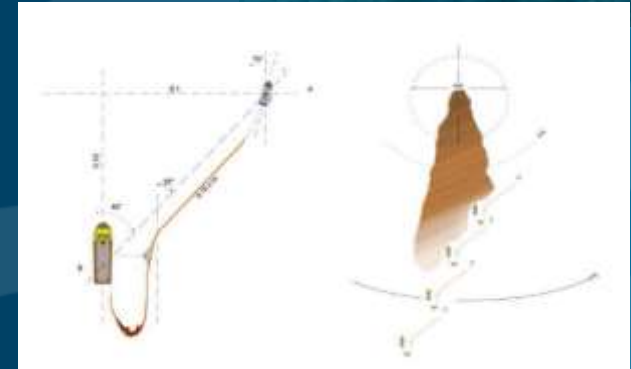
Italian D



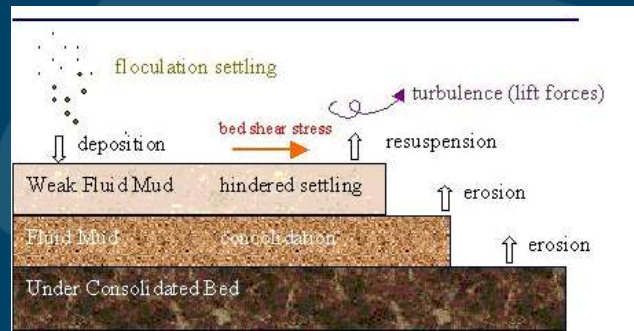
MIKE by DHI 2016 – Ambiente Marino



Migliorata la rappresentazione del near field



Skimmers e boomers



Sviluppi nei modelli di trasporto



MIKE by DHI 2016 – Ambiente Urbano

Completato lo sviluppo di MIKE 1d

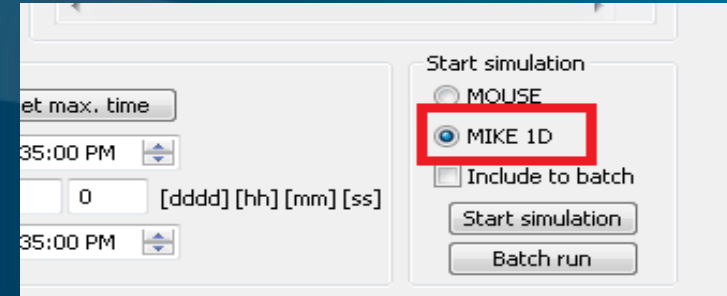
Introduzione per componente idrodinamica
già nella versione attuale

Parallelizzazione già disponibile

Ora esteso alla componente RR ed integrato con MIKE 21

Esteso alle componenti di trasporto e di qualità

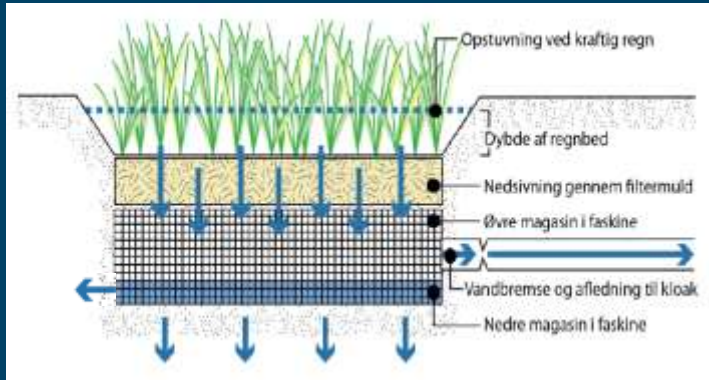
Risultati in formato .res1d gestibili con MIKE URBAN e MIKE VIEW



MIKE 1D

File Type	Suffix
Runoff result file	*RR.res1d
Catchment discharge result file	*CatchmentDischarge.res1d
Catchment discharge AD results	*CatchmentDischarge.AD.res1d
RDI Additional output result file	*Add.res1d
Additional output as specified in the dhiapp.ini file	*ADDOut.res1d
User specified result file	UserSpecified."resultSpec.MUID".res1d

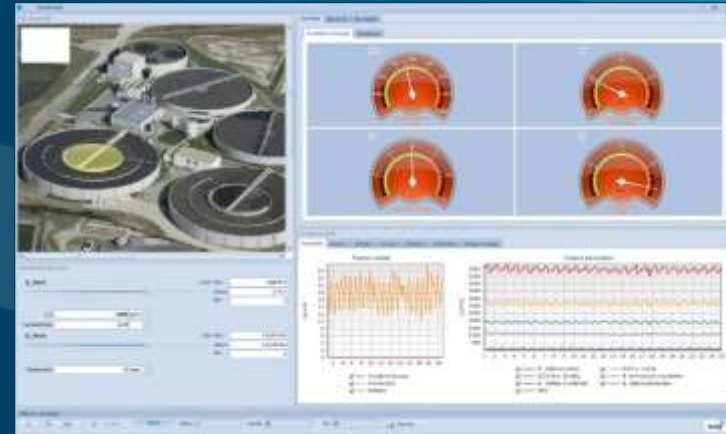
FOCUS SU "GREEN CITIES"



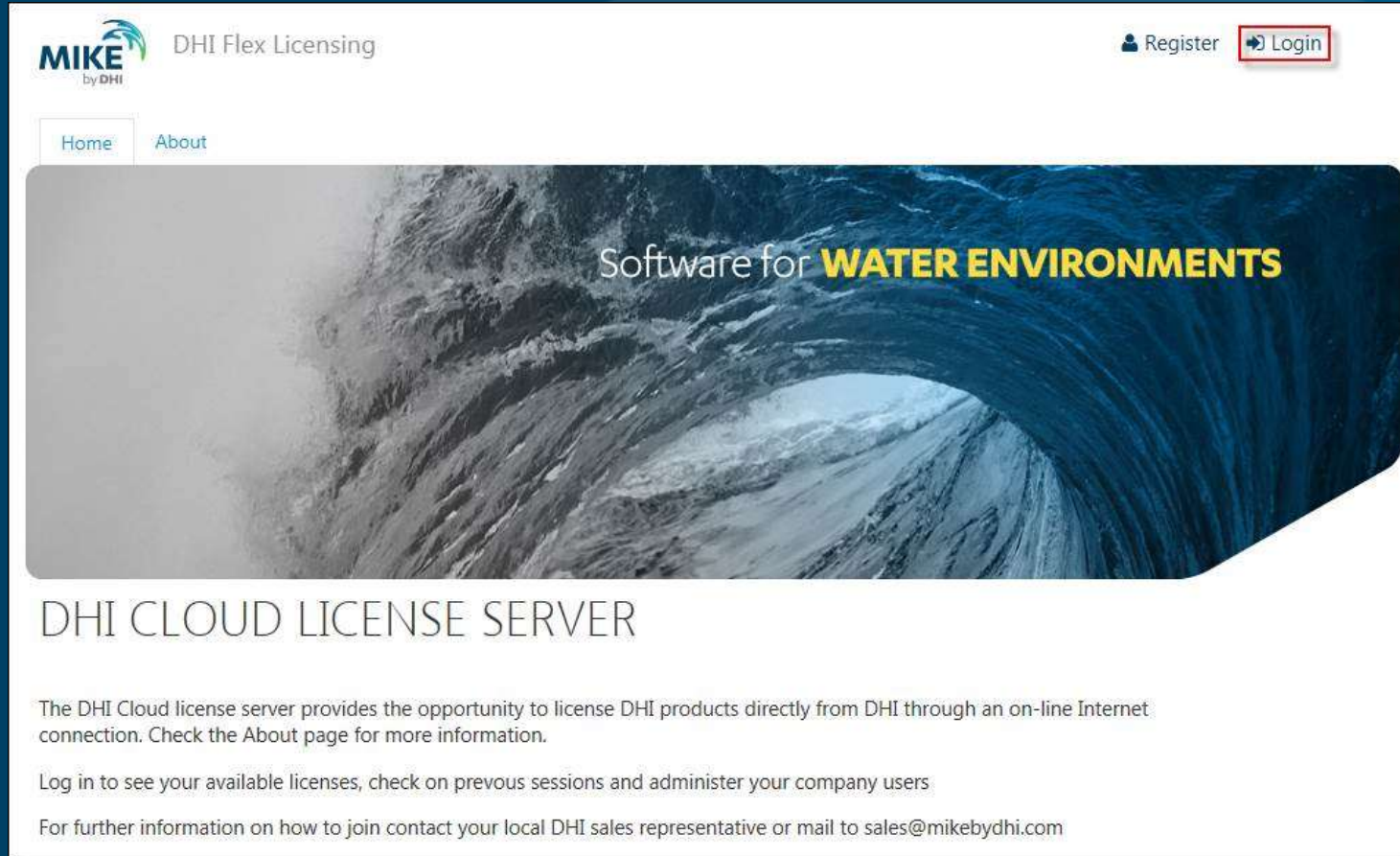
Funzioni specifiche per strutture LID e soluzioni green in città

MIKE by DHI 2016 – Ambiente Urbano - WEST

- Estensione della libreria IUWS (Integrated Urban Water System) con la possibilità di creare modelli tipo MIKE URBAN semplificati
- Nuovi modelli di pompe che consentono stime energetiche molto più accurate
- Model Editor completamente riscritto, che consente di visualizzare e modificare modelli in modo semplice e sicuro
- Generatore "sintetico" di influente
- Possibilità di personalizzare l'interfaccia con nuovi controlli per creare input dashboard..



MIKE by DHI 2016



The screenshot shows the top navigation bar with the MIKE by DHI logo and 'DHI Flex Licensing' text. On the right, there are 'Register' and 'Login' buttons, with 'Login' highlighted by a red box. Below the navigation are 'Home' and 'About' links. The main content area features a large image of a cave opening with water flowing through it, overlaid with the text 'Software for WATER ENVIRONMENTS'. Below the image is the heading 'DHI CLOUD LICENSE SERVER' and a paragraph of text describing the service. At the bottom, there are two more paragraphs of text providing login instructions and contact information.

MIKE by DHI DHI Flex Licensing

Register Login

Home About

Software for **WATER ENVIRONMENTS**

DHI CLOUD LICENSE SERVER

The DHI Cloud license server provides the opportunity to license DHI products directly from DHI through an on-line Internet connection. Check the About page for more information.

Log in to see your available licenses, check on previous sessions and administer your company users

For further information on how to join contact your local DHI sales representative or mail to sales@mikebydhi.com





BUONA DHI CONFERENCE 2015 !!!