

The achievements of AdriaMORE project after 18 months from the beginning of the works


The Italy-Croatia Programme-funded project AdriaMORE is drawing to its conclusion and several activities have been concluded with the aim of reaching the final goal of the project, that is to **increase the management capacity** of responding to marine and coastal hazards in the Adriatic basin and to **mitigate the damage impact** caused by increasingly frequent severe weather conditions along the coastal regions in Italy and Croatia.

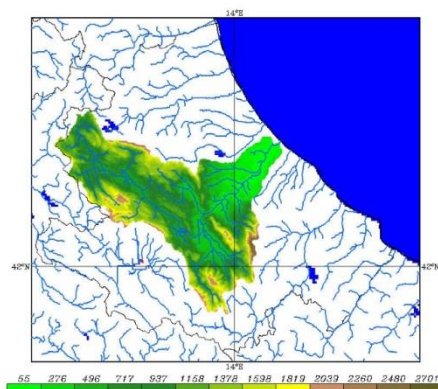
Software developments, models implementation, testing on relevant case studies and sophisticated instruments' acquisition have been carried out in order to **capitalizing** the 2007-2013 IPA Adriatic CBC programme-funded project ADRIARadNet. The latter **developed a decision support system** (DSS) to observe and forecast possible scenarios at high hydro-meteorological risk for civil protection purposes.

Currently **the AdriaMORE integrated system has finalized the development of new components**, of the DSS with more details:

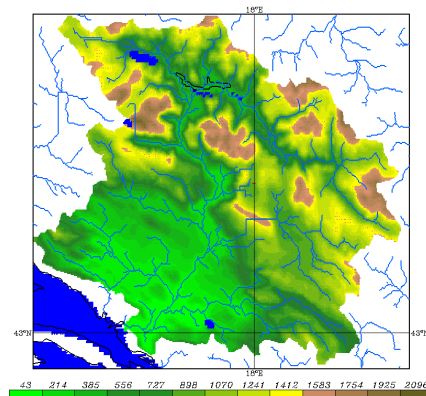
- a **weather radar composite software** able to ingest and process data from systems with different features has been developed and its assessment has been conducted on case studies utilizing Italian and Croatian radar data. A WEB interface has been arranged at <http://radar.aquila.infn.it/network/>, where the instantaneous rainfall estimates for the Croatian and Italian composites are displayed in real-time.

- a new version of the **hydrological model (CHyM)**, to be used operationally for coastal flood prediction on the Pescara and Neretva river basins has been designed. The new specific parameterization has been calibrated and tested over the two catchments, through the simulation of relevant case studies, characterized by intense winds and sea level rise. The CHyM model is able to read sea level measurements in input, to modify the friction of the river flow in the river outlet, enhancing the coastal flood prediction capability.

 Pescara-Aterno River Basin



 Neretva River Basin

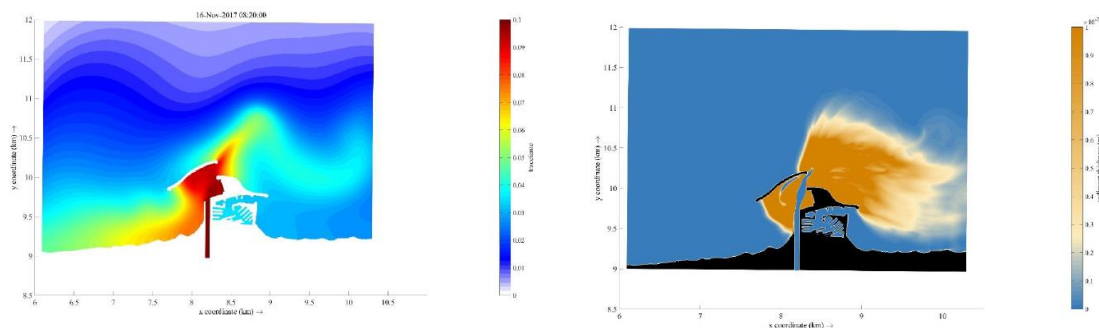


Target catchments altitudes (shaded colors) and their drainage network (blue lines) as rebuilt by the cellular automata techniques used in the CHyM model

- an **air-sea coupled prediction system** was built on the Adriatic area that, previously tested on two case studies, one for the Abruzzi Region and one for Croatia, is now working in operational mode on the website <http://oceanlab.univpm.it/>, allowing to forecast the most important meteorological and marine variables such as the 3h accumulated precipitation, the 2m air temperature, the 10m wind, the sea level and wave height. In this system a procedure that "ingests" (by means of the so-called 3D-Var variational assimilation technique) surface and radio sounding data available in the area covered by the domain was also developed.

- **satellite data processing procedure** to evaluate environmental bio-chemical indicators of coastal seawaters in Adriatic Sea, like total suspended matter (TSM) and Chlorophyll content (CHL) has been performed. These indicators provided information about coastline morphology (erosion-sedimentation dynamical balance) and eutrophication trends of the marine coastal ecosystem.

- **numerical model simulations of transport and dispersion** in the Adriatic Sea basin were furtherly developed. An established modelling software was set up in order to simulate Lagrangian trajectories on the sea surface. Large-scale circulation fields are provided by INGV whereas an innovative Lagrangian model for the unresolved sub-grid scale motions, developed at CNR ISMAR, takes into account small-scale turbulent dispersion. As far as coastal flow modelling is concerned, a 3D high-resolution hydrodynamical model was implemented and set-up for upcoming applications to the pilot studies (e.g. Pescara River interaction with the harbor area) on the last leg of the project.



Examples of output data computed from model simulations for a Pescara river case study: passive tracer distribution (left) and sediment deposition map (right).

Moreover, the **wind profiles** site has been chosen in the Dubrovnik area and the related infrastructure work completed. The instrument has been installed and the first operational tests performed, it will be used to improve wind monitoring and forecast. Currently, wind speed and direction data are available each 15 minutes up to about 4 to 7 kilometers above ground. These data are, since 28 May 2019, operationally available to all AdriaMORE Project Partners as well as to World Meteorological Organization (WMO) members via WMO and EUMETNET (European Network of National Meteorological Services) telecommunication lines in BUFR format. Maintenance of the wind profile will be done by DHMZ. Available data are in two wind profiler modes: the first up to 3 km height above ground and the second up to 7 km above ground.



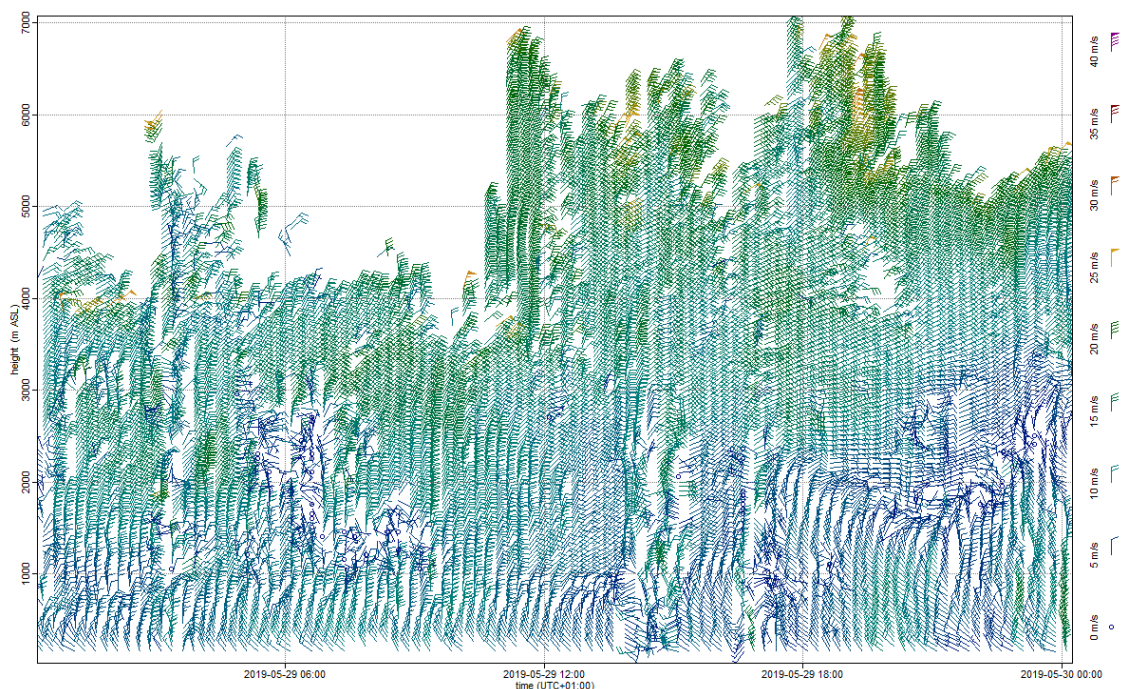
The wind profiler installed at GMP Dubrovnik



Wind vertical profile observation by weather radars (blue color) and wind profiles (red color) within e-profile of EUMTNET

Source: https://e-profile.eu/#/wp_profile

Vertical profile of wind at the Dubrovnik weather station (latitude: 42.64 N; longitude: 18.08 E; elevation: 52m) for 29 May 2019 which has been observed by “high mode” wind profile. It is obvious from the Figure that height of upper air, wind observation varies from 4 km to 7 km depending on state of the atmosphere (up to 4 km in clear air and beyond in precipitation). Colors indicate wind speed categories indicated on the right side of the figure.



Vertical profile of wind at the Dubrovnik weather station for 29 May 2019 observed by wind profiler (high mode and wind vector azimuth)

A firefighting boat has been procured, which is now moored in Dubrovnik. The vessel is used for firefighting operations and are tasked with the monitoring of the southernmost part of the Adriatic that is difficult to be reached overland. Because of its size, it would also be suitable for interventions in case of pollution, not only for the installation of the floating dams, but also for quick interventions by chemical means in the event of minor pollution of the sea surface. The procurement of the firefighting boat within the AdriaMORE project has significantly raised the level of fire protection in the coastal area, in particular the Mljet National Park. The firefighting boat has been additionally equipped with the equipment necessary for working at night and in conditions of reduced visibility. She has also proved particularly useful in the search for lost persons and the rescue of people in minor maritime accidents during the summer months.

Furthermore, the initial activities for the **integration on the DSS** platform of the new developed components were carried out, in particular the new types of data and applications to be integrated were defined and their conformity to the structure of the DSS management system was assessed. Finally, the methodology for carrying out the upcoming measurement campaigns in Italy and Croatia, where the entire new system will be tested, was discussed, in particular a work group was appointed and a list of available models and tools was drawn up.



Some images of the firefighting boat which has significantly raised the level of fire protection in the Dubrovnik coastal area, in particular in the Mljet National Park

The Third project meeting in Venice

On April 2nd, 2019, in the beautiful scenario of the Venetian Arsenal, the home of **CNR – ISMAR Institute of Marine Sciences**, the partners of AdriaMORE met to debrief the state of the art of the project.



During the third **Project and Steering Committee meeting** held in Venice, Italy, on April 2nd, 2019 and led by the Abruzzo Region, Service of Territorial Cooperation, project partners have been discussing on the state of the art of the project. Each partner described the activities carried out together with the results and problems encountered, moreover the partners shared and debated on administrative and financial issues,

outlined the achievements over the first twelve-month period of implementation, as well as remaining works.

The Final conference in Pescara



The AdriaMORE project successfully ends with the **final conference** organized in Pescara on **18 September 2019** by the **Region Abruzzo** as the lead partner in the project. The meeting venue is at the **Aurum Ufficio Europa Area Metropolitana, Largo Gardone Riviera.**

Representative of the lead partner Paola Di Salvatore, together with representatives of other partner organizations, will hold a press conference briefly presenting the results of the project and discussing the importance of the cross-border cooperation programs, in this case INTERREG

Italy-Croatia program, for risk research connecting scientific institutions and developing civil protection systems in both countries.

About the Project

AdriaMORE is a project co-funded by the European Union through Interreg Italy-Croatia CBC Program. AdriaMORE is the acronym of the "Adriatic DSS exploitation for Monitoring and Risk management of coastal Extreme weather and flooding" and brings together 4 partners from Croatia and Italy: Abruzzo Region (LP), Dubrovnik-Neretva Region (PP1), Croatian Meteorological and Hydrological Service (PP2) and National Research Council (PP3).

Acronym: AdriaMORE

Title: Adriatic DSS exploitation of Monitoring and Risk management of coastal Extreme weather and flooding

Lead partner: Abruzzo Region

Total budget: 1.150.000,00 €

ERDF: 977.500,00 €

Duration: 21 months

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