



20 & 21 October 2014
Athens, Greece

2nd South-Eastern Europe GEO Workshop
on Integrating Earth Observation Data
and Services for monitoring the
Environment, protecting the citizens and
stimulating the regional economic growth

**WIS - DCPC / WIGOS
Marine Meteorological Centre
for Adriatic
from
Need to Action**

M.Sc. Ivan Čačić and Dr. Krešo Pandžić

Meteorological and Hydrological Service
Zagreb, Croatia



BEOND



GEO GROUP ON
EARTH OBSERVATIONS



CONTENT

- 1. How to reach marine information**
- 2. How it started and evolved**
- 3. Current status and results**
- 4. Further developments**

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1. How to reach marine information

Different kind of WEB portals, languages, possibilities

Slovenia

Weather forecast for Slovenian Coastal Region Valid for: Tu, 08.05.2012
 Issued: 08.05.2012 07:53

Warnings

Forecast

| | morning | afternoon |
|-----------------|-----------|-----------|
| Weather | 12 | 21 |
| Wind speed | 2 - 5 m/s | 2 - 5 m/s |
| Visibility | > 10 km | > 10 km |
| Sea state | slight | slight |
| Sea temperature | 17 °C | 17 °C |

Meteorological and Hydrological Service

Croatia

WEATHER REPORT ISSUED BY THE MARINE METEOROLOGICAL CENTER SPLIT ON 11.05.2012 AT 1300 HOURS

WARNINGS
 NO WARNINGS ARE IN FORCE.

SYNOPSIS
 A field of high pressure is slowly weakening but it is still keeping a settled weather over the Adriatic.

WEATHER FORECAST FOR THE ADRIATIC FOR THE NEXT 12 HOURS
 SW initially with W and NW wind 5-15, in the open of the South and Central Adriatic in the afternoon up to 18 knots. Rising the coast during the night calm or SW wind 4-12 knots. Sea 1-2, in the South, in the afternoon in a part of the Central Adriatic as well, 3-4. Visibility 10-20 km. Mostly clear, but becoming fair in the North Adriatic sea in the day.

WEATHER FORECAST FOR THE NEXT 12 HOURS
 Fine or fair in the South and mostly clear in the rest of the Adriatic. Light to moderate SW, with the coast calm or light SE wind. Sea calm or smooth, in the open of the South and Central Adriatic up to slight. No significant change in air temperatures.

MHC - Split

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Bosnia and Herzegovina

Montenegro

12.5.2012.

21 do 29

27 do 29

Albania

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1. How to reach marine information

Different kind of WEB portals, languages, possibilities

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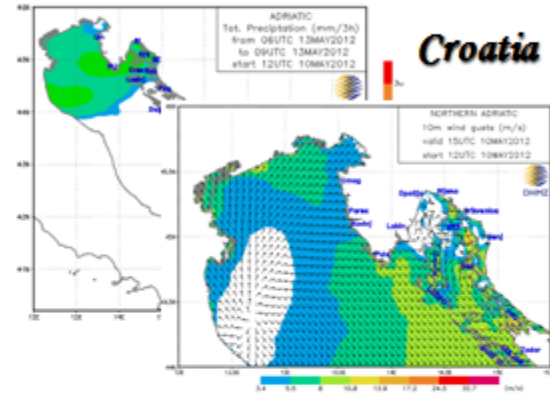
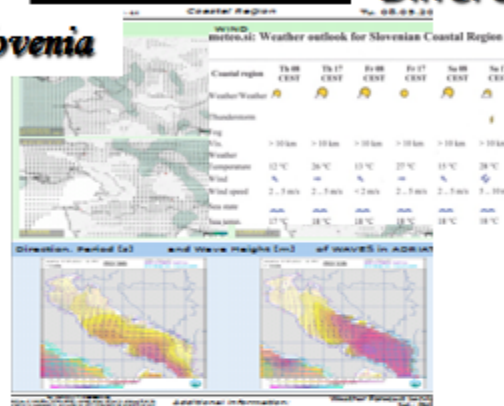
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1. How to reach marine information

Different data and products

Slovenia



Croatia

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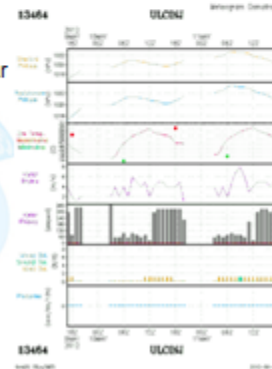
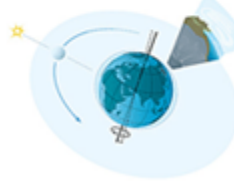


Bosnia and Herzegovina



Montenegro

PLIMA I OSEKA
Prognoza za Luku Bar



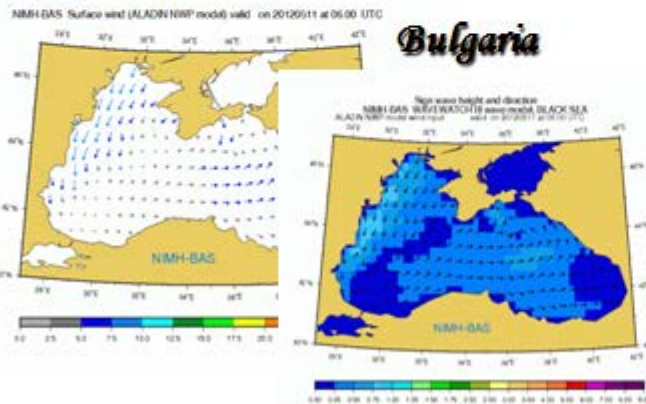
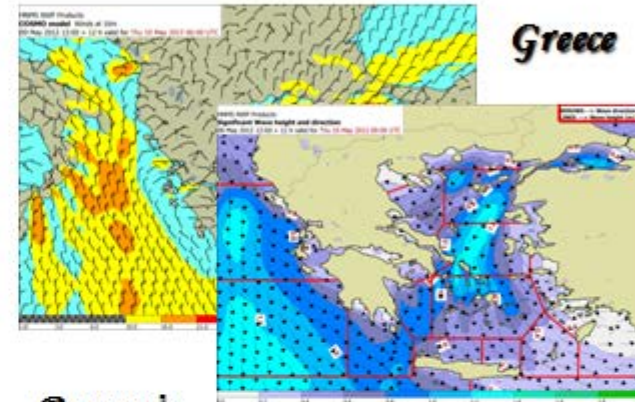
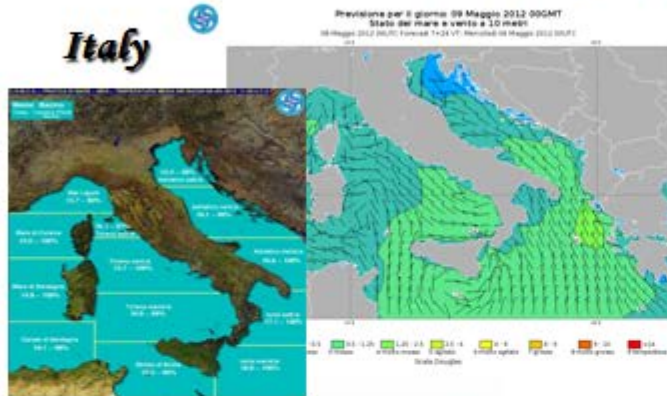
Albania



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1. How to reach marine information

Different data and products



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2. How it started and evolved

WMO Office for Europe initiative

2005

- Explore **NMHSs investment** to building capacities of the **sub-regional centres of excellence** in order to
 - ✓ **prevent risk of the Single European Sky "sindrome"** that could **endanger the role of NMHS**, particular in developing countries, by possibility of eventual appearance of a **single EU Meteorological Service**
 - ✓ **preserve sustainability of the NMHS performance**
- Build up **centres of excellens** as a **core** of the member partners (**NMHSs**) **consortium to respond** to the
 - ✓ **specific country needs**
 - ✓ **country strategic goals** in the sub-regional context

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2. How it started and evolved

Informal Conference of Directors for South-East Europe (ICEED)

Ongoing projects

◆ Regional instrument centre - RIC (Ljubljana, Slovenia)

◆ Sub-regional drought management centre for SE Europe (Slovenia, Romania, ...)

Pilot projects

◆ Sub-regional GCOS training centre for usage of satellite data in climate monitoring (Zagreb, Croatia)

◆ Regional agrometeorology centre (Chisinau, Moldova)

◆ Sub-regional climate centre (Belgrade, Serbia)

◆ Sub-regional marine meteorological centre for Eastern Adriatic (Split, Croatia)

◆ Regional education and training centre on NWP in SEE (Bucharest, Romania)

◆ Sub-regional marine meteorological centre for Black Sea (Bulgaria, Romania)

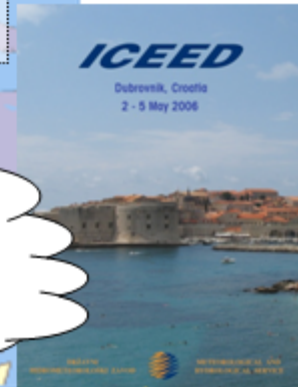
◆ Sub-regional hydrology centre (Ohrid, FRY Macedonia)

May, 2006



Main outcomes and recommendations

ICEED welcomed the creation of such a centre of excellence located in Croatia



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2. How it started and evolved

DHMZ – activities for establishing
the WIS DCPC MMC

October, 2006

Podstrana near Split



*The first meeting of the interested parties
from Croatia*

**Representatives of all institutions
whose activities are connected to
naval meteorology**

- ✓ unanimous support of foundation of Sub-Regional Marine meteorological center
- ✓ commitment for future cooperation with DHMZ to achieve this goal
- ✓ DHMZ initiated the procedure for cost benefit study for **Sub-Regional Marine Meteorological Centre**

- ❖ *National Meteorological and Hydrological Service*
- ❖ *Institute of Oceanography and Fisheries*
- ❖ *Croatian Hydrographic Institute*
- ❖ *Department of Geophysics, Faculty of Science, University of Zagreb*
- ❖ *State Directorate on Rescue and Protection*
- ❖ *Ministry of Maritime Affairs, Transport and infrastructure*
- ❖ *Croatian Navy*
- ❖ *Plovput d.o.o. Split*
- ❖ *Faculty of Maritime Studies, University of Split*
- ❖ *Faculty of Maritime Studies, University of Rijeka*

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2. How it started and evolved

DHMZ – activities for establishing
the WIS DCPC MMC

October, 2007



ICEED Members supported the proposal that:

Sub-Regional Marine meteorological center should seek recognition under the WMO Information System (**WIS**) as an official **Data Collection or Production Centre (DCPC)** for the **Eastern Adriatic**

November, 2007

Dr Robert Sherman, establisher and first co-president of the JCOMM, has been engaged for producing a **Feasibility study** for the **Specialised Marine Meteorological Centre** as the **WIS-DCPC** Entity

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2. How it started and evolved

DHMZ – activities for establishing
the WIS DCPC MMC

May, 2008

R.J. Shearman

Potential for the Creation of a
Specialized Marine
Meteorological Centre
for the Eastern Adriatic
as the WIS-DCPC Entity
in the Republic of Croatia

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The Feasibility Study
was completed

Conclusions

- **DHMZ should be able to develop improved services consistent with a centre of excellence for marine meteorology**
- **Cooperation with other agencies, particularly the Hydrographic Institute and Institute of Oceanography and Fisheries, will be essential in developing future products**
- **It is essential that the number of graduate staff be increased and provide a 24 hour service**
- **DHMZ Marine Office in Split, and its satellite office in Rijeka, is well placed geographically, technically and by inclination, to become The Centre for Marine Meteorology in the Adriatic**

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2. How it started and evolved

DHMZ – activities for establishing the WIS DCPC MMC

December, 2008

- ✓ Application to WMO as potential WIS-DCPC for Marine Meteorology in Croatia



REPUBLIC OF CROATIA
METEOROLOGICAL AND HYDROLOGICAL
SERVICE

Kl: 910-04/06-08/97
Ur. br.: 554-920-08/06-01

World Meteorological Organization
Mr. Michel Jarraud, The Secretary-General
7 bis, avenue de la Paix
Case postale No.2300
CH-1211 Geneva 2, Switzerland
December 3, 2008

Subject: Identification for potential WIS-DCPC
for Marine Meteorology in Croatia

Dear Mr. Jarraud,

In your letter of 14 October 2008 (OBS/WIS/T.5-WIS), WMO Permanent Representatives are requested to identify potential GISCs and/or DCPCs until 5 December 2008. It is my great pleasure to inform you that Croatia would like to identify its potential DCPC in Marine Meteorology for the Eastern Adriatic. Please note my high appreciation to the WMO efforts on the identification of the potential DCPC designation in Croatia.
The Croatian areas of responsibility for safety at sea, including navigation and related meteorology.

- ✓ Initiative also recognized in the ANNEX C (ER7) of the WMO RA VI Strategic Plan (2008 – 2011) that was approved in 2009

March, 2009

- ✓ **Acceptance of the application by the WMO - CBS XIV (Dubrovnik, Croatia) by the ANNEX VIII to paragraph 9.5 of the General Summary List of identified 100 WIS centres from over 35 countries and their functions for demonstration of their WIS capabilities**

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2. How it started and evolved

DHMZ – activities for establishing
the WIS DCPC MMC

November, 2009

- ✓ **Recognition** of the **initiative** by the Doc 10.1 at the **JCOMM III** (Marrakech, Morocco)

May, 2011

- ✓ **Follow up designation process** as the **WIS DCPC MMC** at the 16th WMO Congress Cg-XVI, Annex to draft Resolution 11.4/1

September, 2014

- ✓ **Final Recognition** as the **WIS/WIGOS DCPC MMC** at the 14-th Extraordinary Session of the Commission for Basic Systems (CBS-EXT(14)) of the World Meteorological Organization (WMO) will be held in Asuncion, Paraguay, from 9 to 12 September 2014

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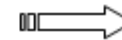
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3. Current status and results

DHMZ – activities in marine meteorology

DHMZ – Weather Analysis and Forecast Division



Department

- Activities mostly through the **Marine Meteorological Centre** (Offices Split and Rijeka) to facilitate
 - ✓ production and distribution of reliable forecasts
 - ✓ warnings and other information related to sea weather
 - ✓ climate in the Adriatic area



Marine Meteorological Centre

SPLIT

Department MMC



Office

RIJEKA



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3. Current status and results

DHMZ – activities in marine meteorology

Marine Meteorological Centre

- Activities are based upon **Safety of Life at Sea - SOLAS** Convention.
- The **weather bulletin** is issued regularly three times per day:

- ✓ warnings
- ✓ brief synoptic analysis
- ✓ weather forecast
- ✓ visibility and sea state
- ✓ weather reports from the selected stations




Državni hidrometeorološki zavod

Aktuelni podaci | Prognoze | Klimatologija | Kvaliteta zraka | Biometeorologija | Hidrologija | Agrometeorologija

> Naslovnica > Prognoze

Weather forecast for the Adriatic

Upozorenja

Prognoza za danas

- Hrvatska
- Zagreb

Prognoza za sutra

- Hrvatska
- Zagreb

Izgleđi vremena

ALADIN/HR

- karte prognoza
- 3 dana

ECHWF

- karte prognoza
- 7 dana

ALADIN i ECHWF

- prognoza za nautičare

Prognoze PMC-a

- Jadran
- naravnici

WEATHER REPORT ISSUED BY THE MARINE METEOROLOGICAL CENTER SPLIT ON 22.04.2012 AT 1200 HOURS

WARNING

A RISK OF LIGHT ISOLATED THUNDERSTORMS AND LOCAL GUSTS OF SE and SW WIND UP TO 35 KNOTS, DIMINISHING IN THE NORTH AND IN A PART OF THE CENTRAL ADRIATIC TOMORROW.

SYNOPSIS

A new shallow trough has approached the Adriatic from the west.

WEATHER FORECAST FOR THE ADRIATIC FOR THE FIRST 12 HOURS

SE, in places of the North and in the open of the rest of the Adriatic SW wind, 10-20, briefly up to 24 knots. Sea 2-3, locally 3-4. Visibility 10-20 km. Variably cloudy with scattered rain, isolated rain showers and thunder, more precipitation expected along the coast.

WEATHER FORECAST FOR THE NEXT 12 HOURS

Variably cloudy with scattered rain, isolated rain showers and thunder. Moderate to fresh SE, in the North and locally in the open SW wind, gradually diminishing in the North and in a part of the Central Adriatic to light to moderate. Sea smooth or slight, in the open possibly up to moderate, mainly in the South Adriatic. No significant change in air temperature.

PMC - Split

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3. Current status and results

DHMZ – activities in marine meteorology

Marine Meteorological Centre

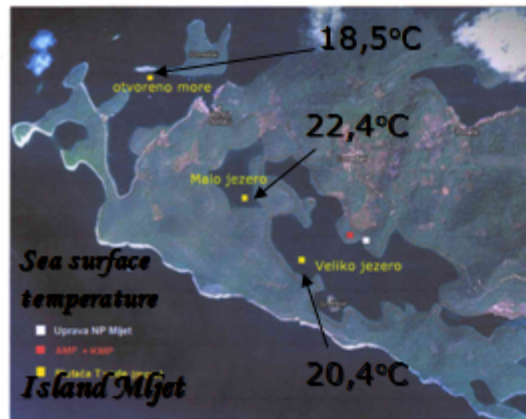
Temperatura mora (°C) za Mijet z 11.05.2012. godine **11th May 2012**

| Postaja \ Termin mjerenja (h) | 07 | 08 | 11 | 14 | 15 | 17 |
|-------------------------------|------|------|------|------|------|------|
| Mijet - otvoreno more | 18.5 | 18.6 | 18.8 | 19.3 | 18.8 | 18.5 |
| Mijet - Veliko jezero | 19.7 | 19.8 | 20.1 | 20.7 | 20.5 | 20.4 |
| Mijet - Malo jezero | 21.5 | 21.5 | 21.9 | 22.3 | 22.4 | 22.4 |

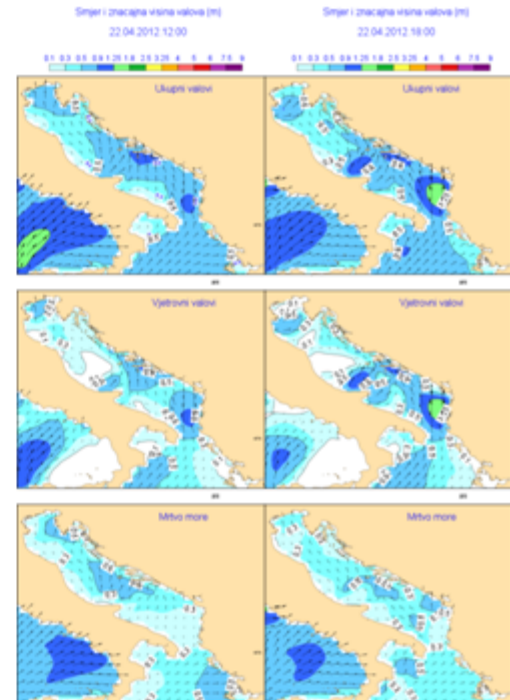
15 UTC

Opširnije o mjerenju površinske temperature mora na Mijetu

Sustav mjerenja temperature mora na području Mijeta



Položajni prikaz postojećeg meteorološkog mjernog sustava NP Mijet



- **Specific data and products for different users**

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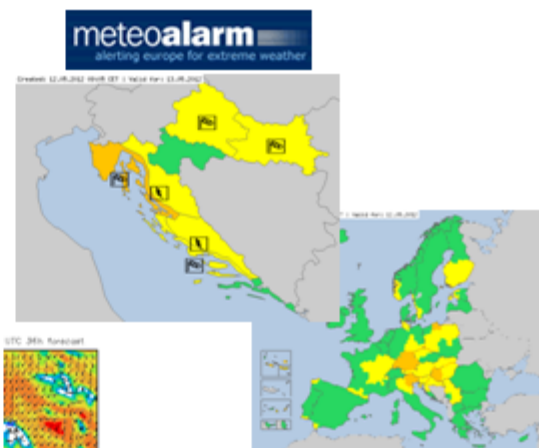
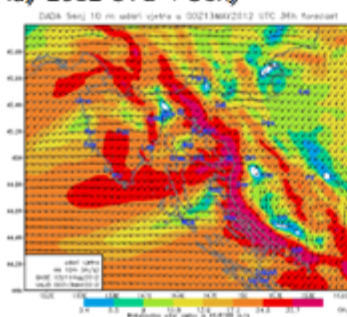
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3. Current status and results

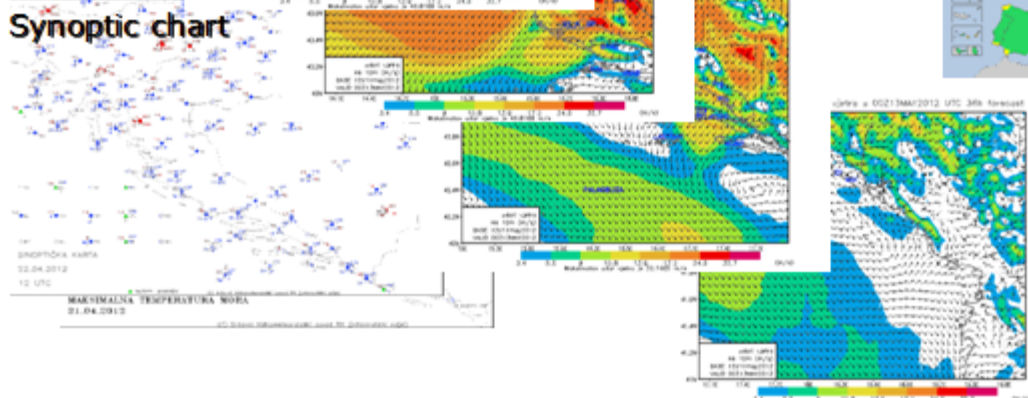
DHMZ – activities in marine meteorology

Marine Meteorological Centre

- 10 m Wind gust field
(12Z 11May 2012 UTC + 36h)



- Synoptic chart



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4. FURTHER DEVELOPMENTS

- **Need for centralized and comprehensive marine information**
- **DCPC Marine Meteorological Center WEB portal**
- **WIS DCPC / WIGOS Partners – contribution inventory**
- **Marine Meteorology Center - Best Practices**
- **Products and Functions of the WIS DCPC / WIGOS Marine Meteorological Centre for Adriatic**
- **DCPC partner consortium**
- **Current practices versus the WIGOS concept of operations**
- **Major WIGOS-WIS Interoperability interfaces**
- **Development of WIS DCPC / WIGOS Marine Meteorological Centre for Adriatic**
- **Conclusion and Follow ups**

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Need for centralized and comprehensive marine information

Example 1

Catastrophic pollution
treat of the Adriatic Sea

February, 2008, Marine accident.

Turkey cargo ship "Und Adriyatik" reported fire 13 nautical miles from Rovinj (Croatian town at the eastern coast of west Adriatic). Ship has contained 1000 tone oil and unknown content of dangerous substance.

Close approach to the ship as well as effecting the fire from the fire plains was not possible because the fire has raised from the interior of the ship.

Ship was not sinking but sea streams was slowly pushing it to the eastern coast. Croatian authorities struggled with dilemma: to allow the ship to crash at the coast with heavy ecological consequences or to drown the ship still at some distance from the coast.



Dilema has been luckelly solved by the ouptups of Aladin model that has has shown in the next 12 hours apearance of strong bura wind (NE wind) with the convincing pushing the cargo ship in the opposite direction at the open sea.

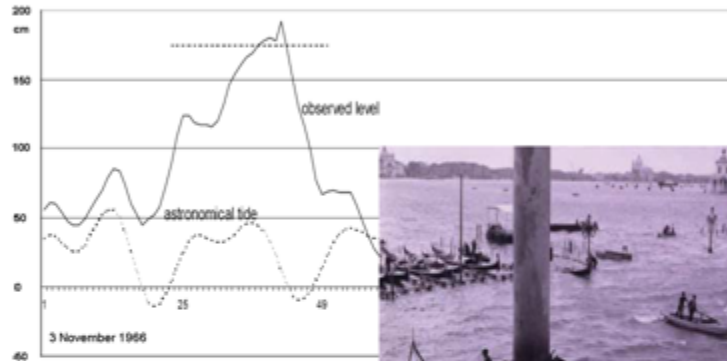
In has given the time to take fire under control and finally cancel it.

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Need for centralized and comprehensive marine information

Example 2

Natural extremes



Flooding in Venice (Italy)

Flooding in Korčula (Croatia)



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DCPC Marine Meteorological Center WEB portal

dcpc-ammc(at)cirus.dhz.hr'."/>

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WIS DCPC / WIGOS Partners - Contribution Inventory -

Partners in Croatia

Data and product contribution

- | | |
|--|--|
| ◆ National Meteorological and Hydrological Service | • daily weather bulletins, data and special marine products (sea temperature, visibility, 10-min mean wind, wind gusts, waves) |
| ◆ Institute of Oceanography and Fisheries | • sea temperature, waves, sea streams, salinity, sea water quality |
| ◆ Croatian Hydrographic Institute | • sea temperature, sea level, waves, sea streams, education, national NAVTEX coordinator |
| ◆ Department of Geophysics, Faculty of Science, University of Zagreb | • sea level, ocean models, education |
| ◆ State Directorate on Resque and Protection | • public warnings (SOP) • maritime safety information management |
| ◆ Ministry of Maritime Affairs, Transport and infrastructure | • search and rescue at sea |
| ◆ Plovput d.o.o. Split | • NAVTEX provider |
| ◆ Institut Ruđer Bošković | • remote sensing sea temperatures, see waves, sea streams |

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**WIS DCPC / WIGOS Partners
- Contribution Inventory -
Department of Geophysics
Faculty of Science, University of Zagreb**



Mareographic station Bakar (North Adriatic)

One of the oldest mareographic stations **in the Mediterranean** and
the **oldest** in the **Adriatic**

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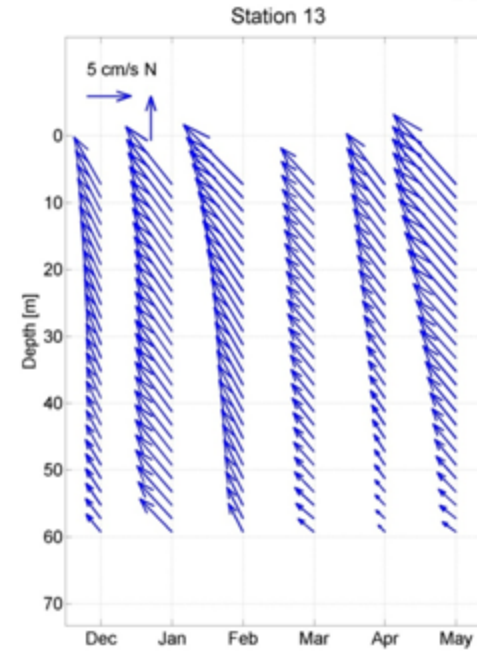
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Work with
stream sensors

Setting down



Picking up



Year 2002/2003



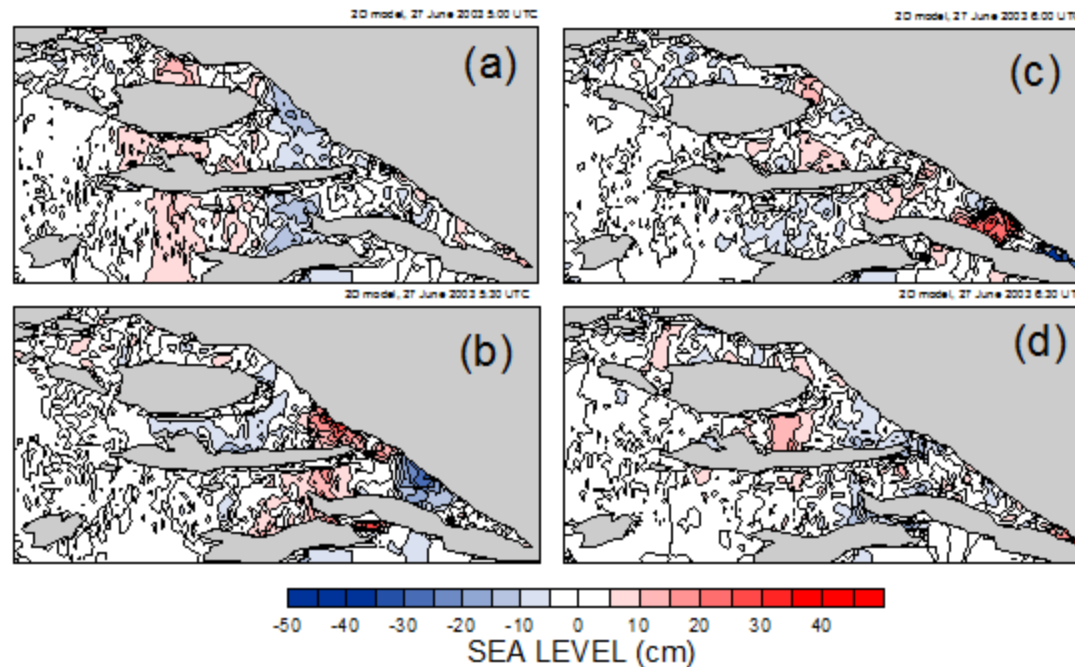
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Modelling – sea level



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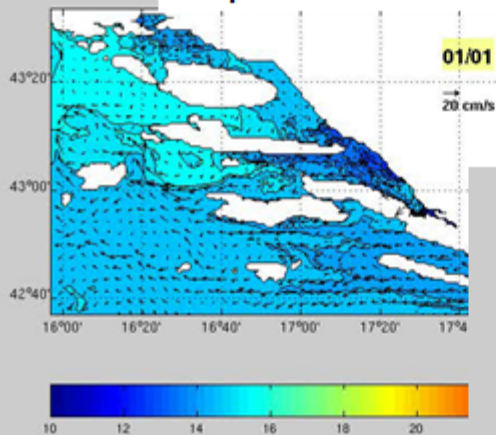
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Department of Geophysics

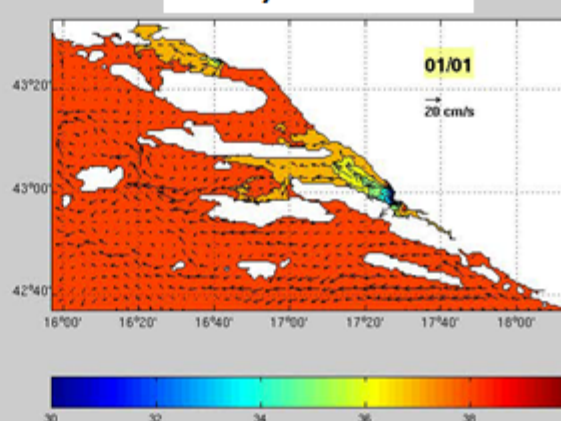
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Temperature and currents



Salinity and currents



Simulation results

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WIS DCPC / WIGOS Partners - Contribution Inventory -

International partners inventory

- ❖ MS (Italy) ✓ **Needs and requirements**
- ❖ ARSO (Slovenia)
- ❖ DHMZ (Croatia) ✓ **Data and product contribution**
- ❖ FHMI (Bosnia and Herzegovina)
- ❖ HMZCG (Montenegro)
- ❖ IGEWE (Albania)
- ❖ HNMS (Greece)
- ❖ Bulgaria
- ❖ Romania

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Marine Meteorology Center - Best Practices

[Home](#) > [Weather and Meteorology](#) > [How to Use Our Forecasts](#) > [Marine Weather Forecasts](#)
> Marine Forecast Guide

Guide to Environment Canada Marine Weather Forecasts

Environment Canada (EC) provides a marine forecasting service to mariners and marine interests. This enables them to make informed decisions about marine weather conditions that may impact their safety, security or operations. EC also provides marine forecasts in order to meet Canada's treaty obligations under the International Maritime Organization's **Safety Of Life At Sea (SOLAS)** Convention.

There are three main marine forecast bulletins issued by EC. In addition to this, descriptive marine synopses are issued by the Department in conjunction with these marine forecast bulletins. The three marine forecast bulletins are each described in further detail in the next section.

[Introduction](#) [Next Page](#)

| |
|--|
| Introduction |
| <u>1. Types of Marine Forecasts</u> |
| <u>2. Forecast Issue Times and Valid Periods</u> |
| <u>3. Forecast Time Qualifiers in Relation to Clock Time</u> |
| <u>4. What information is included in the Marine Forecast?</u> |
| <u>5. Marine Forecasts - Sample Text Bulletins</u> |
| <u>6. Marine Forecasts - Weatheroffice Website</u> |
| <u>7. Forecast Updates - When and Why</u> |
| <u>8. Major Weather Elements Included in the Marine Forecasts</u> |
| <u>9. Interpreting the Wording of a Marine Forecast</u> |
| <u>10. Marine Warnings and Watches Program</u> |
| <u>11. Synoptic Warnings</u> |
| <u>12. Localized Warnings & Watches</u> |
| <u>13. Ice Warnings</u> |

Date Modified: 2011-11-07

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Example 1.



Canada

Marine Services On-line



Marine Meteorology Center - Best Practices

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National Weather Service Marine Forecasts <http://www.noaa.gov/marine-forecast>



Example 2.



USA

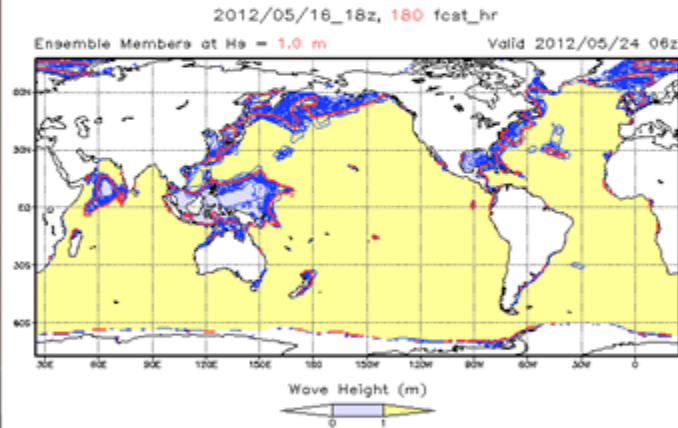
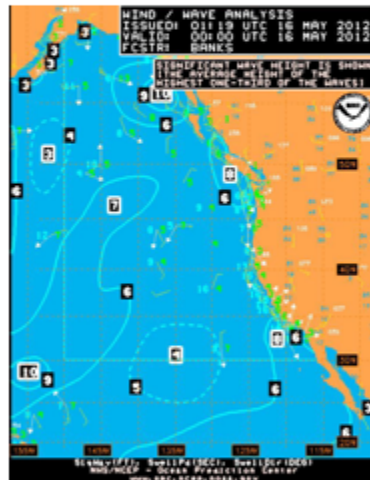
Follow ups: best practice inventory

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Products and Functions of the WIS DCPC / WIGOS Marine Meteorological Centre for Adriatic

Proposals for brainstorming

- Development of new specific products for Adriatic like
 - ✓ WIND/WAVE CHARTS, (e.g. for Pacific) and PROBABILITY CHARTS (NOAA WAVEWATCH)



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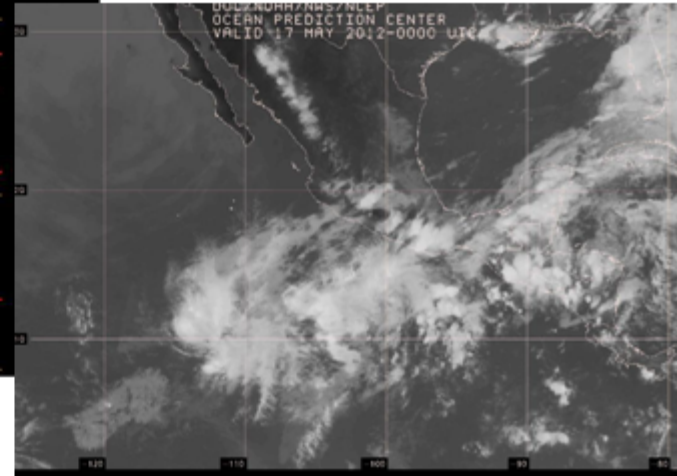
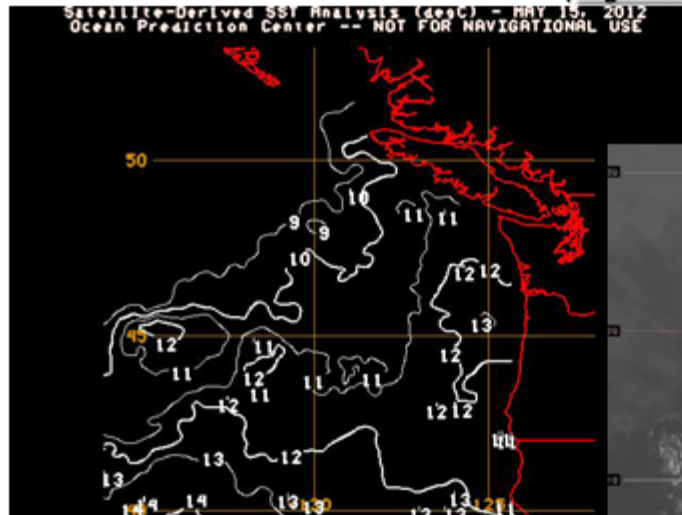
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Products and Functions of the WIS DCPC / WIGOS Marine Meteorological Centre for Adriatic

Proposals for brainstorming

- Development of new specific products for Adriatic like

- ✓ SEA SURFACE TEMPERATURES (e.g. for Pacific)



- ✓ SATELLITE IMAGERY (e.g. for Pacific)

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Products and Functions of the WIS DCPC / WIGOS Marine Meteorological Centre for Adriatic

Proposals for brainstorming

- Development of warning system (marine-alarm) in simple graphycal form Marine Warnings (e.g. Canada Marine Weather Warnings)
- Establishment of operational oceanography and hydrography (observation, analysis and forecasting)
- Sea water quality including human disaster warning
- Management with coastal region (sea rise, surge wave/floods, adaptation to climate change, sectors of human activities as economy, transportation, energy etc.)
- Closer collaboration with co-sponsored partners (oceanography, hydrography and users) with metadata on their data and products





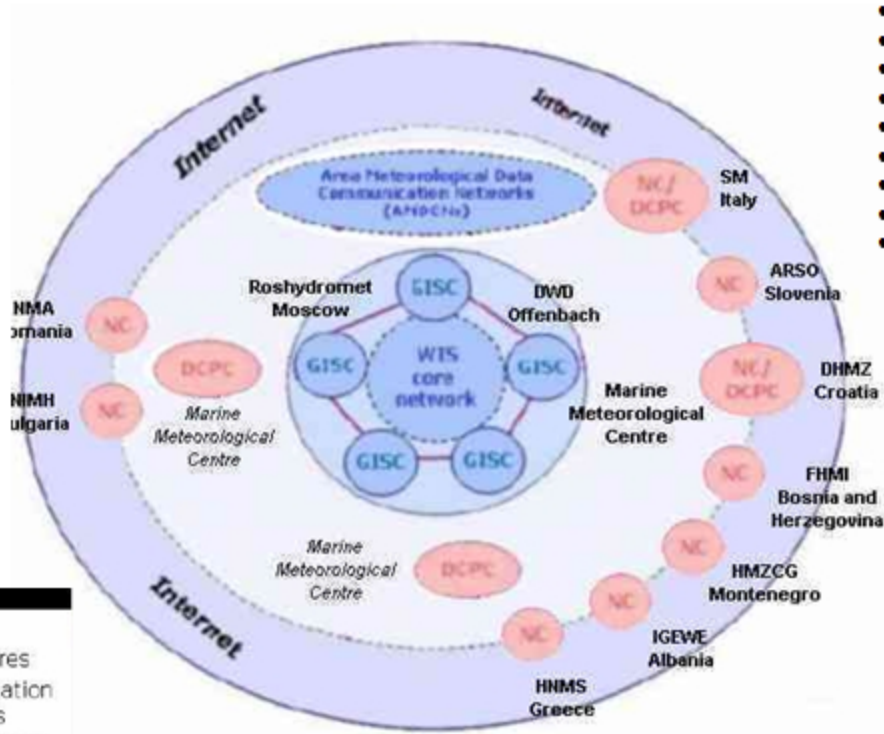
DCPC partner consortium

NMHS partners

- Croatian Hydrographic Institute
- Croatian Navy
- Department of Geophysics, Faculty of Science, University of Zagreb
- Institute of Oceanography and Fisheries
- Ministry of Maritime Affairs, Transport and Infrastructure
- Ministry of Environment and Nature Protection
- Plopput d.o.o. Split
- State Directorate on Rescue and Protection

NMHS partners

- Albania
- Bosnia and Herzegovina
- Bulgaria
- Croatia
- Greece
- Italy
- Montenegro
- Romania
- Slovenia



KEY:
 NC = National Centres
 GISC = Global Information System Centres
 DCPC = Data Collection or Production Centres

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Follow ups and Conclusions

- Need to secure
 - ✓ commitment of members
 - ✓ road map
 - ✓ proper capacity building and performance of the WIS - DCPC DCPC / WIGOS Marine Meteorological Centre
- Need to establish
 - ✓ Project on the capacity development and performance of the WIS - DCPC Marine Meteorological Centre for the Adriatic Sea Area as the WIGOS marine component
 - ✓ Coordination group constituted on member Focal points
 - ✓ Project Manager
- Development of the RA VI WIS DCPC / WIGOS entity should be in accordance with the WIGOS Implementation Plan and adequate coordination with WMO Sectarariat (WIGOS Project Office) / CBS ET/ RA VI TT

Follow ups and Conclusions

- WMO Information System **WIS** is the new **strong** and **flexible** - **backbone** in providing NMHSs mission and performance in accordance to the country needs and requirements
- **WIS DCPC / WIGOS Marine Meteorological Centre**
 - ✓ is enabling to fill the gaps of marine information (data and products) by the existing NHMS partners resources
 - ✓ is highly effective two way communicator facility (both of NMHS and its partners) users and decision makers
 - ✓ Croatia, as the new EU state, has high opportunity to apply to the EU funds for WIS - DCPC WIGOS building capacities on benefit of all members
 - ✓ proper performance of the WIS - DCPC / WIGOS centre seeks contineous commitment of interested members



Follow ups and Conclusions

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