FESTIVAL ADRIATICO-MEDITERRANEO VIII EDIZIONE

I progetti europei nelle regione Marche per la tutela del mare e delle sue risorse

Rotonda a Mare, Senigallia, 4 Settembre 2014

Progetto IPA POWERED (**P**roject of **O**ffshore **W**ind **E**nergy: **R**esearch, **E**xperimenation and **D**evelopment)

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Organization:

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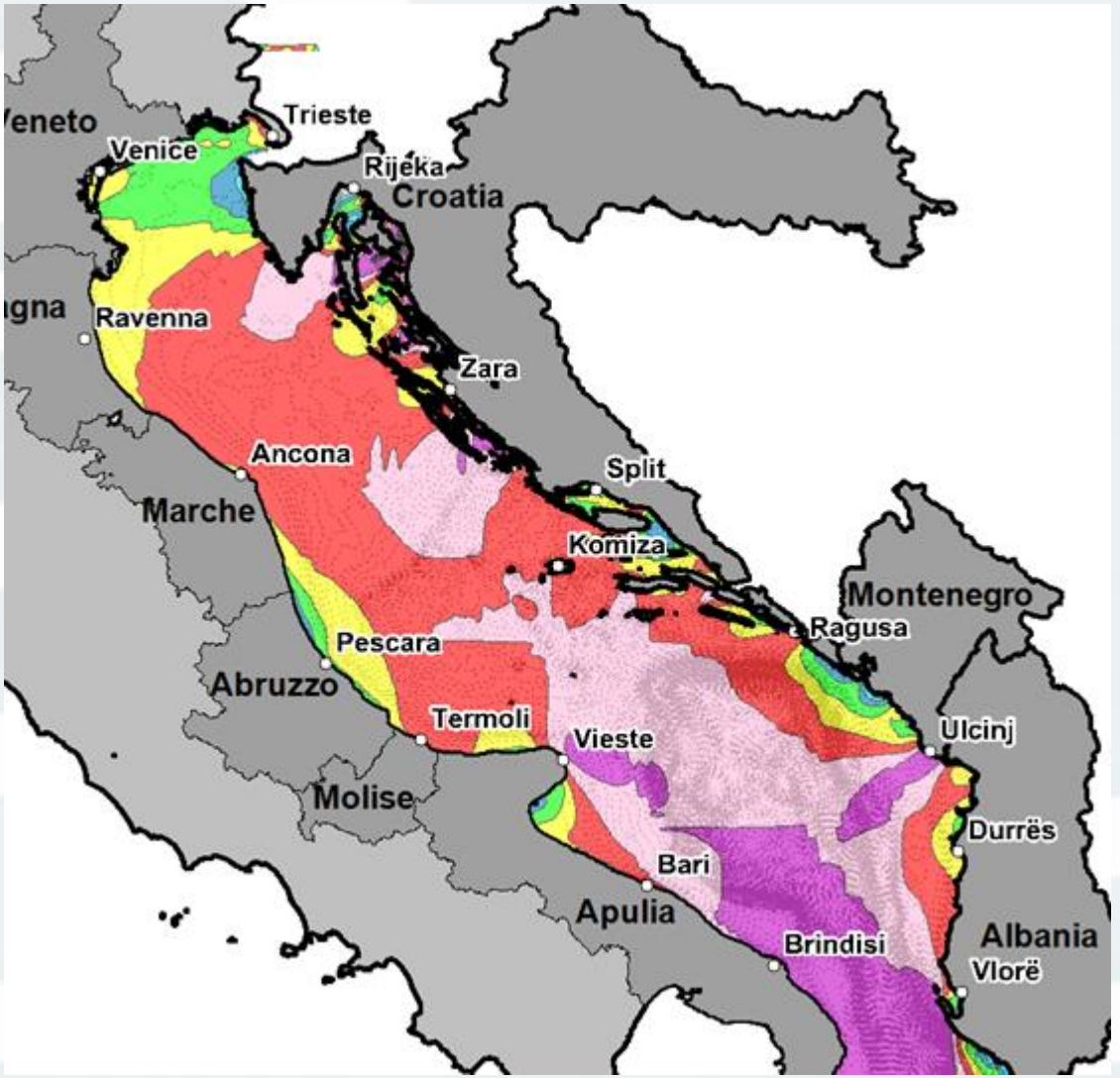
Università Politecnica delle Marche

THE AIMS OF THE POWERED PROJECT

1. State of art of the Offshore Wind Energy Technology (COMPLETED)
2. State of art of the energy policy (COMPLETED)
3. Study of the Adriatic sea wind resources (COMPLETED)
4. Design and realization of a Meteorological network by many tall lattice towers (45 m) (IN PROGRESS)
5. Analysis of the potential enviromental impacts of the offshore wind energy in Adriatic sea (IN PROGRESS)
6. Analysis of the transports and fishing activities interference (COMPLETED)
7. Analysis of the available and proposed grid infrastructures (COMPLETED)
8. Analysis of the Adriatic Industrial Ports capability (COMPLETED)
9. GUIDELINES for the offshore wind energy development in Adratic sea (IN PROGRESS)



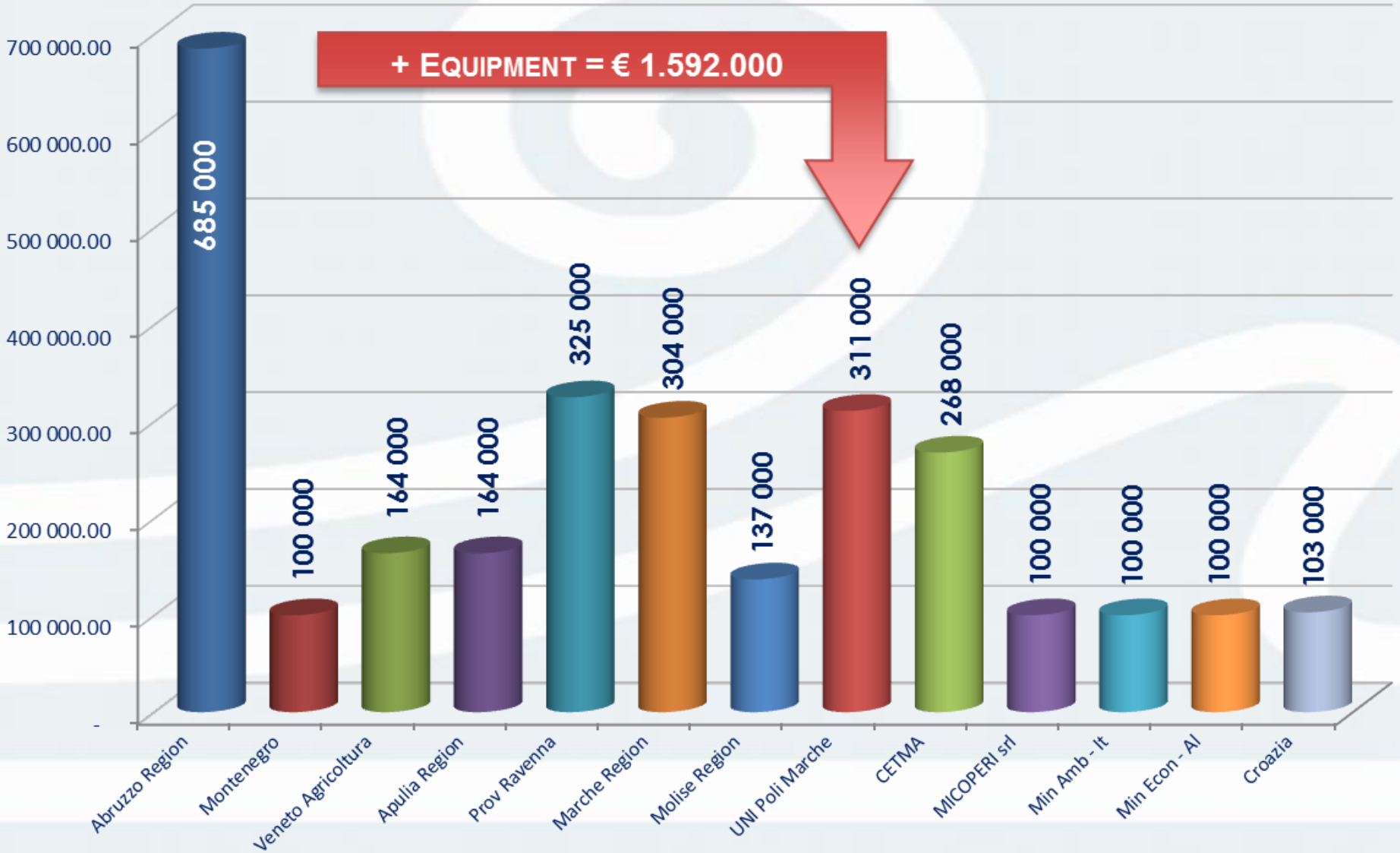
POWERED PARTNERSHIP & SPONSORSHIP

- Abruzzo Region
- Montenegro – Min. of Economy
- Veneto Agricoltura
- Provincia of Ravenna
- Marche Region
- Molise Region
- Apulia Region
- UNIVPM - Ancona
- Cetma Consortium
- Micoperi Marine Contractors Srl
- Italy – Min. for Envir. and Land and Sea
- Albania – Min. Economy, Trade and Energy

SPONSOR

Tozzi Sud
API Nova Energia
WPD Offshore Italia
SIMAM SpA
ERA Albania
Siemens Offshore
DIENCA – ALMA MATER – Bologna University

PROJECT BUDGET (€ 4.453.000)



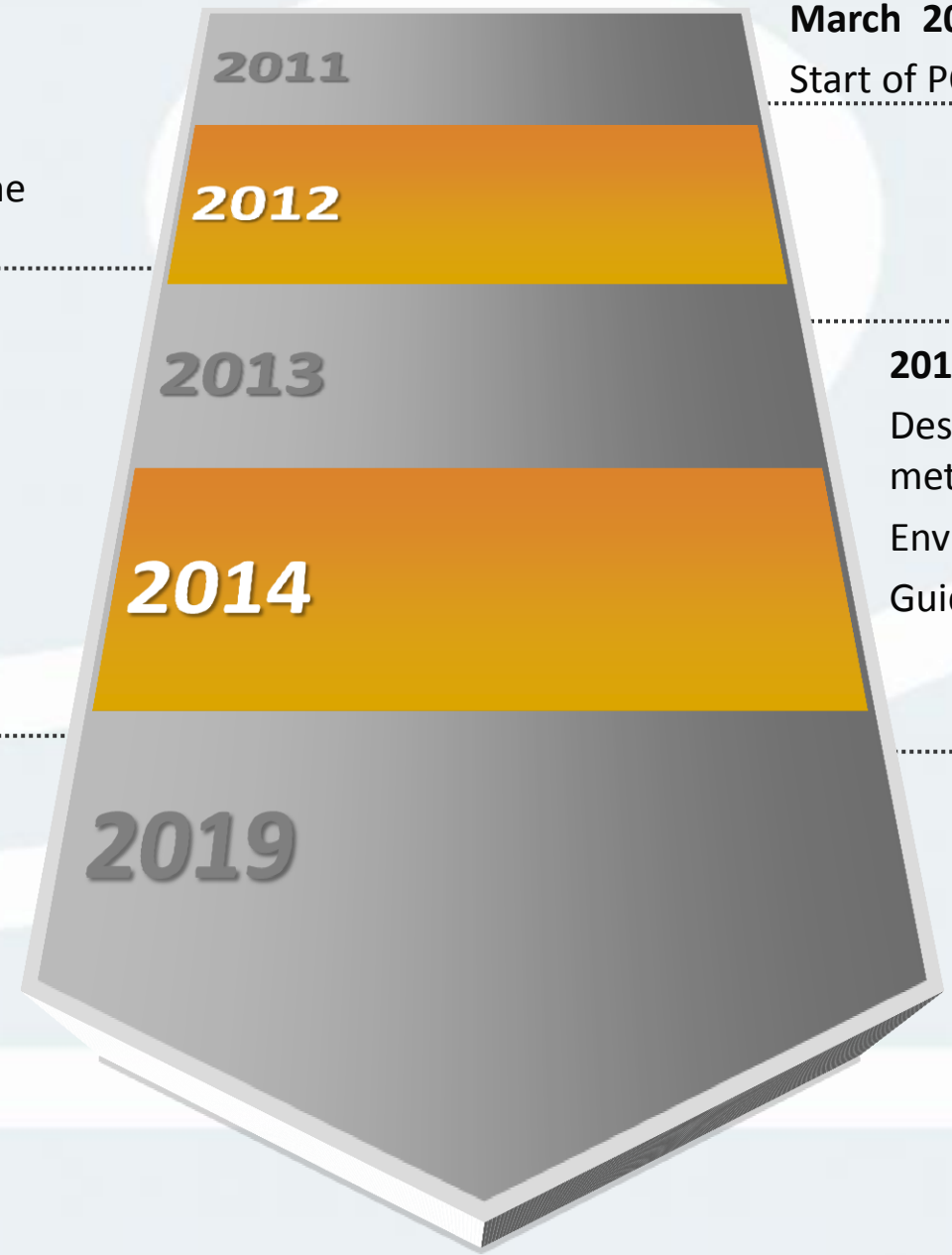
POWERED ROADMAP

March 2011

Start of POWERED

2011-2012

Wind analysis of the Adriatic Basin



2013-2014

Design of th experimental meteorological network.

Enviromental analysis

Guidelines

February 2015

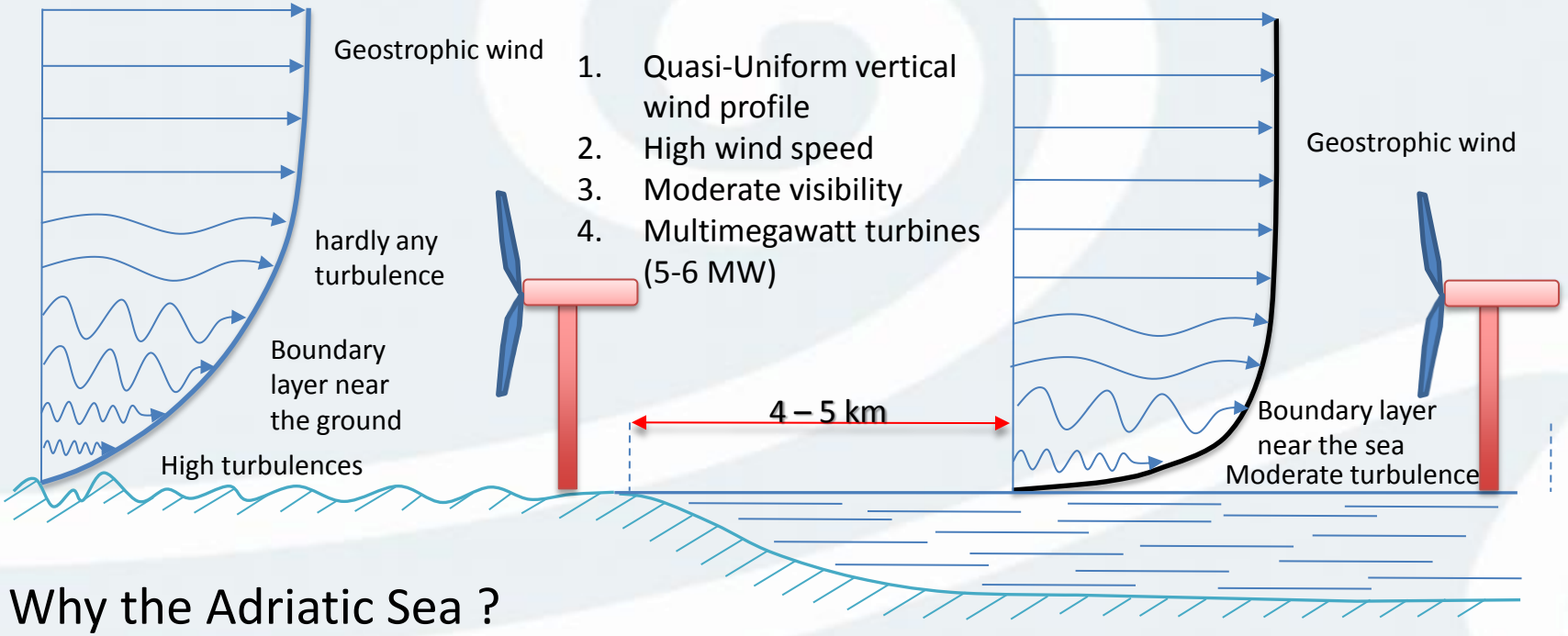
End of Project

2015-2019

Short term forecasting by POWERED meteorological network and computing resources

POWERED REASONS

Why the Offshore Wind Energy ?



Why the Adriatic Sea ?

1. Moderate waves height
2. Wide sea areas at low depth
3. Many industrial Ports
4. Very strong Interconnections (commercial, political, infrastructural…) beetween the coastal countries
5. ***High wind sea areas ?***

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PROPOSED OFFSHORE WIND FARM

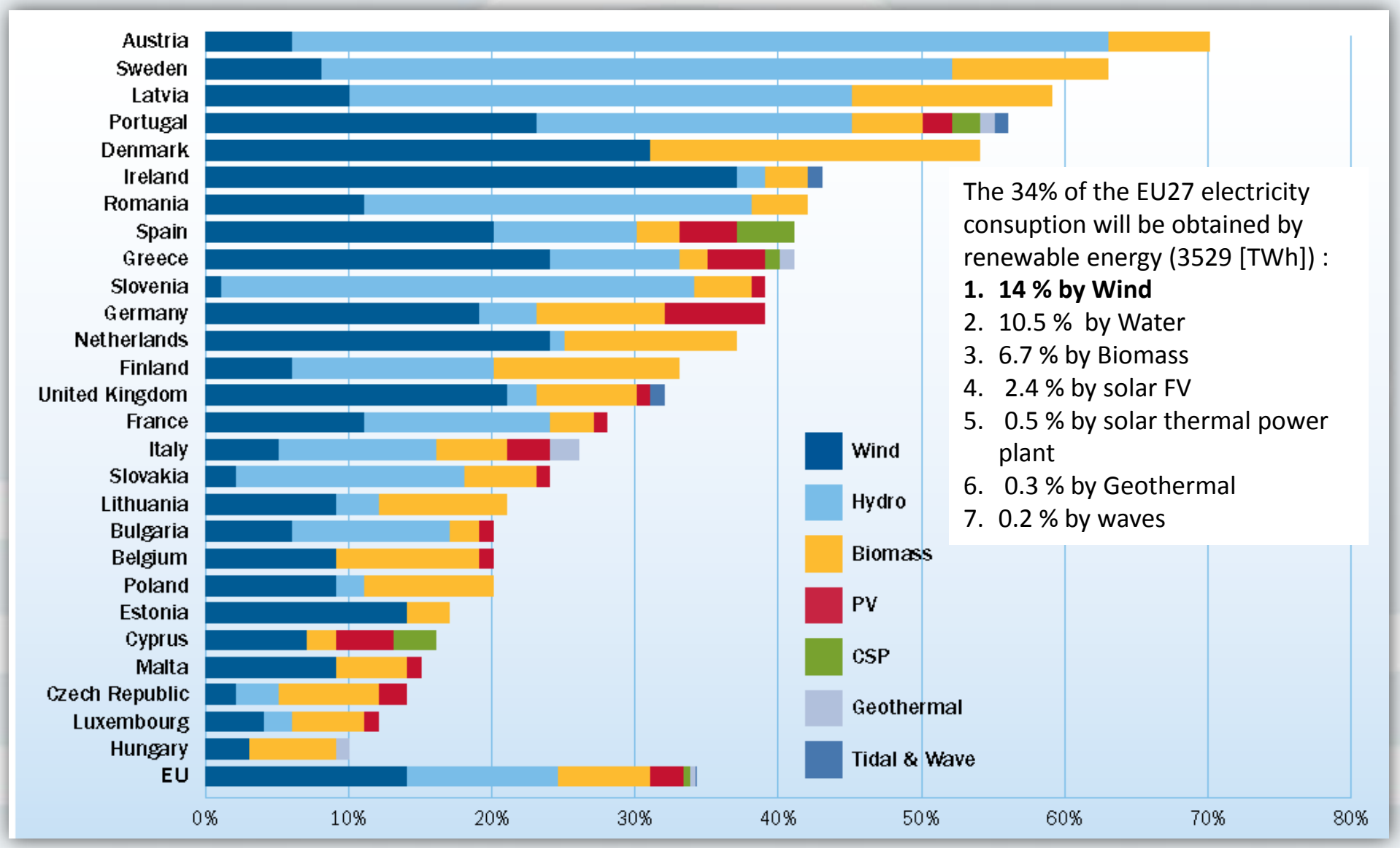
Nome	Luogo	Regione	Potenza [MW]	Distanza Costa (km)		Profondità (m)		Stato di avanzamento	Proprietario
				min	max	min	max		
Brindisi	Brindisi	Puglia	0.08					Decommisioned	Blu H
San Michele	Termoli	Molise	156	4.5	6.4	12	20	Inizio cantiere 2013	Effeventi srl
Chieuti	Chieuti	Puglia	150	5	6	17	24	Richiesta Autorizzazione	Trevi Finanziaria
Gargano Sud (Margherita)		Puglia	342	10	16	13	24	Richiesta Autorizzazione	WPD Offshore Gmbh
Golfo di Gela	Gela	Sicilia	137	3	3	14	21	Richiesta Autorizzazione	TM.E.SpA
Golfo di Manfredonia	Manfredonia	Puglia	300	8	9	15	20	Richiesta Autorizzazione	Trevi Finanziaria
Golfo di Trieste	Trieste	Friuli	30	24	24			Richiesta Autorizzazione	Ansaldo Sistemi Ind.li
Torre San Gennaro (Brindisi)	Brindisi	Puglia	150	3	5	17	30	Richiesta Autorizzazione	Trevi Finanziaria
Tricase	Brindisi	Puglia	92	20	20	118	118	Richiesta Autorizzazione	Blu-H, Dufernergy Italia
Tricase- Fase di Sviluppo	Brindisi	Puglia	2	20	20	118	118		Blu-H, Dufernergy Italia
Etruria		Lazio						Concept	
Golfo di Gela	Gela	Sicilia	345	5	6	30	30		Moncada Energy, ENEL
Is Arenas	Oristano	Sardegna	320	6	6	17	34		Is Arenas Renewable Energy
Margherita di Savoia	Manfredonia	Puglia	720	5	5	15	20		Tozzi Holding
Secche di Vada	Vada	Toscana	60						Progeco
Afefa		Sicilia	700	90	90	75	197	Stand-By	Blu H
Aida		Sicilia	308	22	22	120	316	Stand-By	Blu H
Atair		Sicilia							Blu H
Bari	Bari	Puglia	441	22	22	110	121	Stand-By	Blu H
Bella	Cagliari	Sardegna	280	16	16	108	140	Stand-By	Blu H
Camilla	Oristano	Sardegna	280	15	15	177	250	Stand-By	Blu H
Cerano	Cerano	Puglia	441	17	17	110	121	Stand-By	Blu H
Ginevra		Sicilia	781	17	17	110	121	Stand-By	Blu H
Rosa		Sicilia	319	15	15	51	72	Stand-By	Blu H
Termoli	Termoli	Molise	441	19	19	113	126	Stand-By	Blu H
Gargano Nord	*Chieuti*	*Puglia*	*441*	*19*	*19*	*113*	*126*	*Cancellata*	*Blu H*
Golfo di Manfredonia	*Manfredonia*	*Puglia*	*297*	*10*	*10*			*Cancellata*	*Gamesa Energia Italia*

TOTALE (MW)	6795

SURVIVED PROPOSALS

Wind Farm Name	Developer	Region	Development Status	Capacity (MW)	N.Turbines	Foundation	Water Depth Min (m)	Distance From Shore (km)
Chieuti	Trevi Energy	Puglia	Consent Application Submitted	150	50	Monopile	17	5
Gargano Sud	WPD offshore	Puglia	Consent Application Submitted	342	95	ND	14	10.5
Golfo di Manfredonia	Trevi Energy	Puglia	Consent Application Submitted	300	100	Monopile	15	8
Golfo di Trieste	Ansaldo Sistemi	Friuli-V.G.	Concept	30	ND	ND		24
Margherita di Savoia	Tozzi Holding	Puglia	Concept	720	120	ND	15	5
San Michele	Effeventi srl	Molise	Consent Authorised	162	54	Monopile	0	4.5
TOTAL				1704				

National Renewable Energy Action Plans



The 34% of the EU27 electricity consuption will be obtained by renewable energy (3529 [TWh]) :

1. **14 % by Wind**
2. 10.5 % by Water
3. 6.7 % by Biomass
4. 2.4 % by solar FV
5. 0.5 % by solar thermal power plant
6. 0.3 % by Geothermal
7. 0.2 % by waves

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EUROPEAN WIND POWER CAPACITY

COUNTRY	End 2012						Wind power share of total electricity consumption (%)
	Energy Action Plans al 2012 (MW)		Real Installed (MW)		Difference		
	Onshore	Offshore	Onshore	Offshore	onshore	offshore	
Austria	1435	0	1378	0	↓	---	4
Belgio	720	503	996	380	↑	↓	4
Bulgaria	451	0	684	0	↑	---	4
Cipro	114	0	147	0	↑	---	6
Rep. Ceca	343	0	260	0	↓	---	1
Danimarca	2985	856	3241	921	↑	↑	27
Estonia	311	0	269	0	↓	---	6
Finlandia	380	0	262	26	↓	↑	1
Francia	7598	667	7564	0	↓	↓	2
Germania	30566	792	31027	280	↑	↓	11
Grecia	2521	0	1749	0	↓	---	6
Ungheria	445	0	329	0	↓	---	2
Irlanda	2334	36	1713	25	↓	↓	13
ITALIA	7040	0	8144	0	↑	---	5
Lettonia	49	0	68	0	↑	---	2
Lituania	250	0	225	0	↓	---	4
Lussemburgo	54	0	45	0	↓	---	1
Malta	2	0	0	0	↓	---	0
Olanda	2727	228	2144	247	↓	↑	4
Polonia	2010	0	2497	0	↑	---	3
Portogallo	5600	0	4523	2	↓	↑	17
Regno Unito	5970	2650	5497	2948	↓	↑	6
Romania	1850	0	1905	0	↑	---	7
Slovacchia	150	0	3	0	↓	---	0
Slovenia	2	0	0	0	↓	---	0
Spagna	23555	0	22796	0	↓	---	16
Svezia	2311	97	3582	164	↑	↑	5
TOTAL	101773	5829	101048	4993	↓	↓	

Rest of Europe: 4922 [MW]

China: 75564 [MW]

North America: 67576 [MW]

South America: 3505 [MW]

World Total: 282482 [MW]

Italian electricty consumption: 328.2 [TWh]

Net Italian electricity Production: 287.8 [TWh]

1. Wind: 13.3 [TWh]
2. FV: 18.6 [TWh]
3. Hydro: 43.3 [TWh]
4. Geothermal: 5.3 [TWh]

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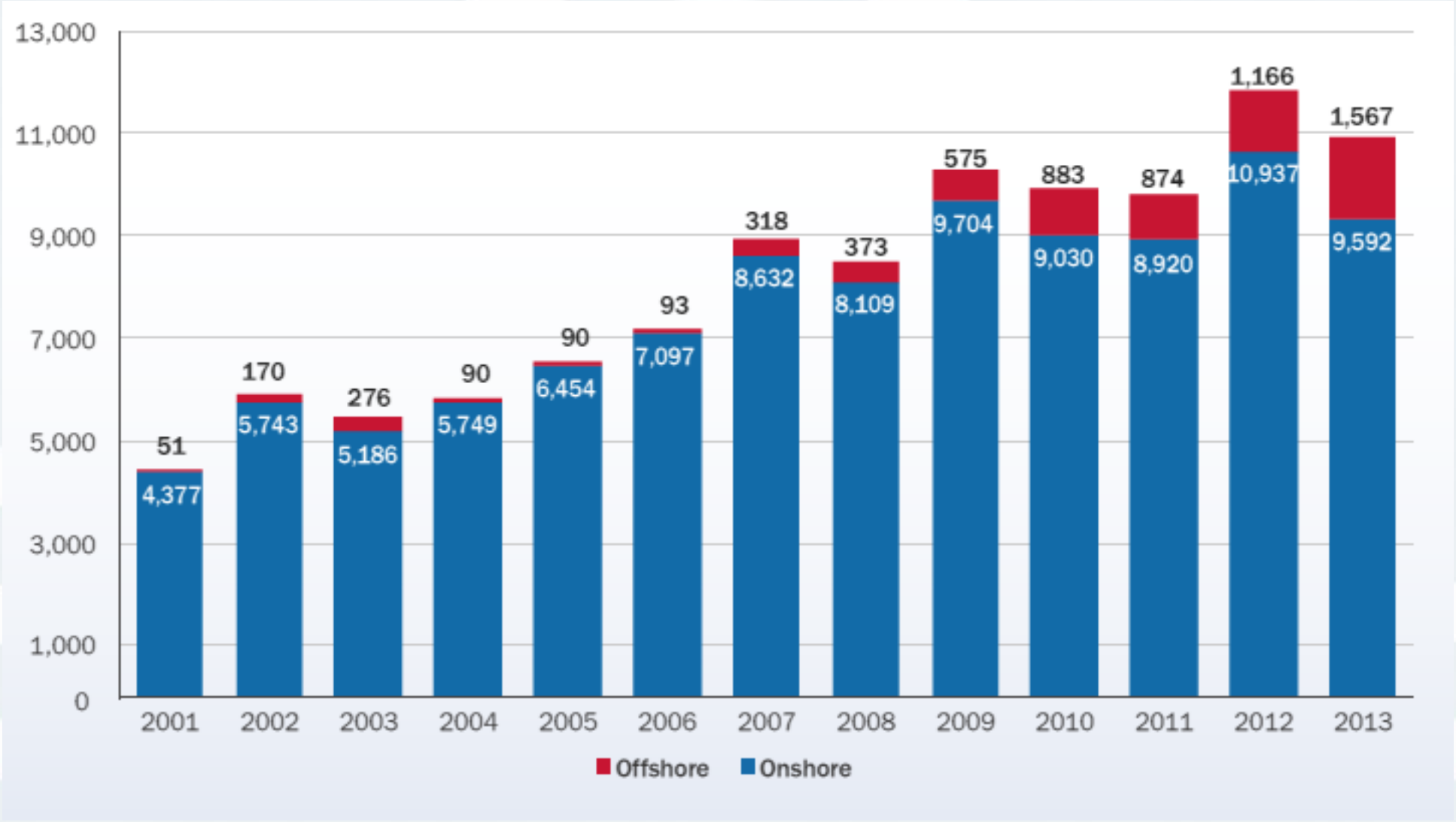
EUROPEAN ANNUAL ONSHORE AND OFFSHORE INSTALLATIONS (MW)



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SUMMARY OF WORK IN OFFSHORE WIND FARM 1ST HALF 2013 AND 1ST HALF 2014

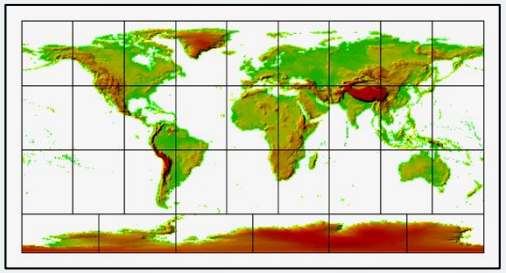
	BELGIUM	DENMARK	GERMANY	UK	SWEDEN	SPAIN	TOTAL
Number of farms	2	1	7	6	1	1	18
Number of foundations installed	25	0	155	87	0	1	268
Number of turbines installed	18	93	52	82	8	1	254
Number of turbines connected	12	98	21	146	0	0	277
MW fully connected to the grid	73.8	352.8	105	513.5	0	0	1,045.1

Source: EWEA

	BELGIUM	GERMANY	UK	TOTAL
Number of farms	1	10	5	16
Number of foundations installed	1	159	73	233
Number of turbines installed	30	126	126	282
Number of turbines connected	47	30	147	224
MW fully connected to the grid	141	108	532	781

Source: EWEA

THE ADOPTED NWP MODEL: MM5v3



DS083.2 METEO DATA

LAM

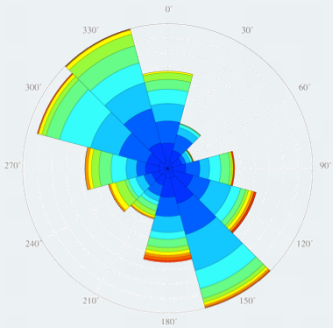
$$
\begin{aligned}
\frac{\partial U}{\partial t} + m_x\left(\frac{\partial(Uu)}{\partial x} + \frac{\partial(Vu)}{\partial y}\right) + \frac{\partial(\Omega u)}{\partial \eta} + \\
\mu_d \alpha \frac{\partial p}{\partial x} + \frac{\alpha}{\alpha_d}\frac{\partial \phi}{\partial x}\frac{\partial p}{\partial \eta} &= F_U \\
\frac{\partial V}{\partial t} + m_y\left(\frac{\partial(Uv)}{\partial x} + \frac{\partial(Vv)}{\partial y}\right) + \frac{m_y}{m_x}\frac{\partial(\Omega v)}{\partial \eta} + \\
\mu_d \alpha \frac{\partial p}{\partial y} + \frac{\alpha}{\alpha_d}\frac{\partial \phi}{\partial y}\frac{\partial p}{\partial \eta} &= F_V \\
\frac{\partial W}{\partial t} + \frac{m_x m_y}{m_y}\left(\frac{\partial(Uw)}{\partial x} + \frac{\partial(Vw)}{\partial y}\right) + \frac{\partial(\Omega w)}{\partial \eta} + \\
-\frac{1}{m_y} g\left[\frac{\alpha}{\alpha_d}\frac{\partial p}{\partial \eta} - \mu_d\right] &= F_W \\
\frac{\partial \Theta}{\partial t} + m_x m_y\left(\frac{\partial(U\theta)}{\partial x} + \frac{\partial(V\theta)}{\partial y}\right) + m_y\frac{\partial(\Omega\theta)}{\partial \eta} &= F_\Theta \\
\frac{\partial \mu_d}{\partial t} + m_x m_y\left(\frac{\partial U}{\partial x} + \frac{\partial V}{\partial y}\right) + m_y\frac{\partial \Omega}{\partial \eta} &= 0 \\
\frac{\partial \phi}{\partial t} + \frac{1}{\mu_d}\left[m_x m_y\left(U\frac{\partial \phi}{\partial x} + V\frac{\partial \phi}{\partial y}\right) + m_y\Omega\frac{\partial \phi}{\partial \eta} - m_y g W\right] &= 0 \\
\frac{\partial Q_m}{\partial t} + m_x m_y\left(\frac{\partial(Uq_m)}{\partial x} + \frac{\partial(Vq_m)}{\partial y}\right) + m_y\frac{\partial(\Omega q_m)}{\eta} &= F_{Q_m}
\end{aligned}
$$

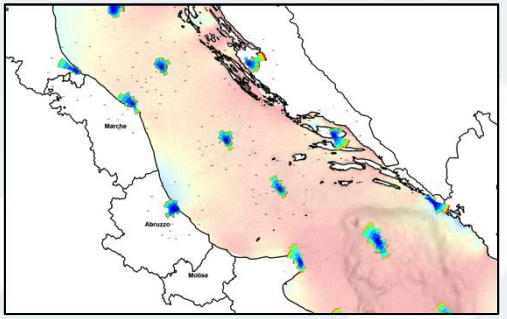
TERRAIN

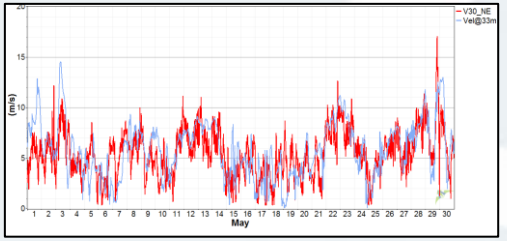
REGRID

INTERPF

MM5





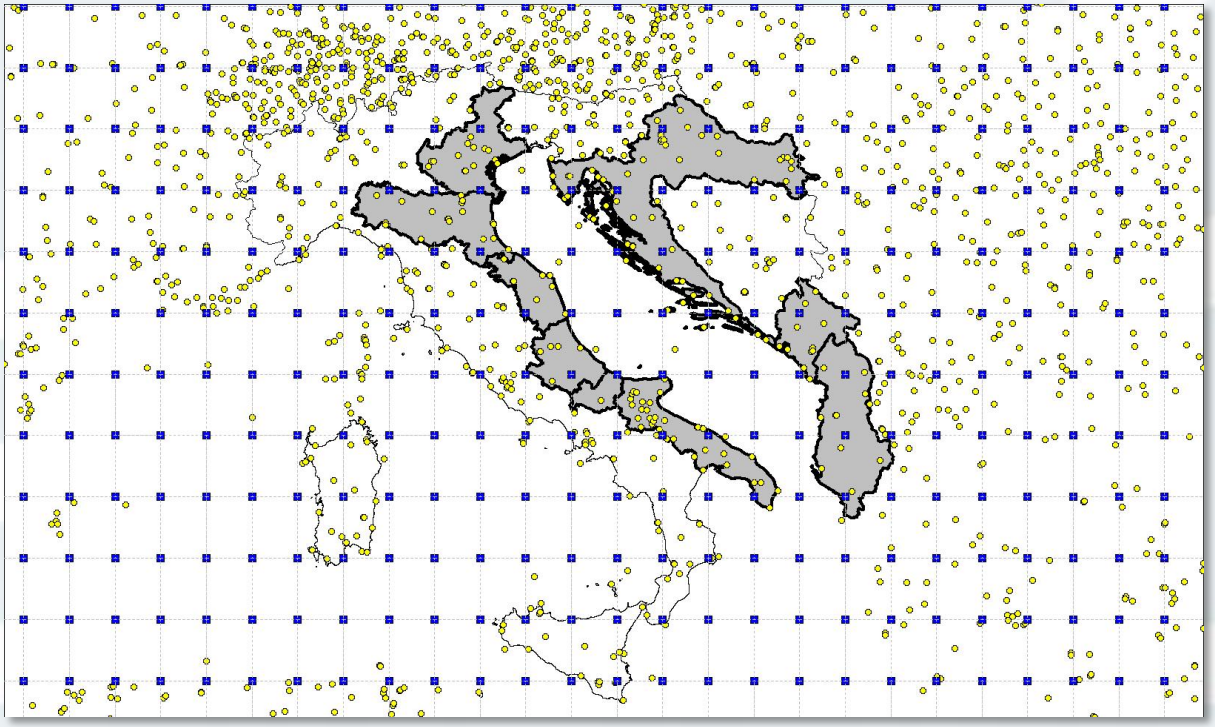


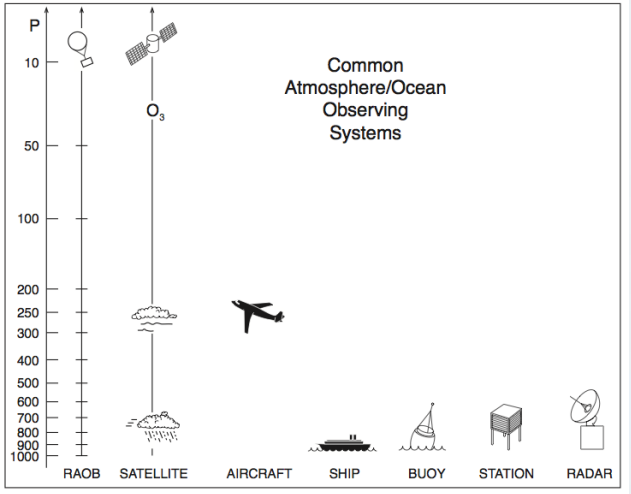
"The PSU/NCAR mesoscale model (known as MM5) is a limited-area, nonhydrostatic, terrain-following sigma-coordinate model designed to simulate or predict mesoscale atmospheric circulation."

THE IMPLEMENTED HINDCASTING PROCEDURE

DS083.2 METEO DATA

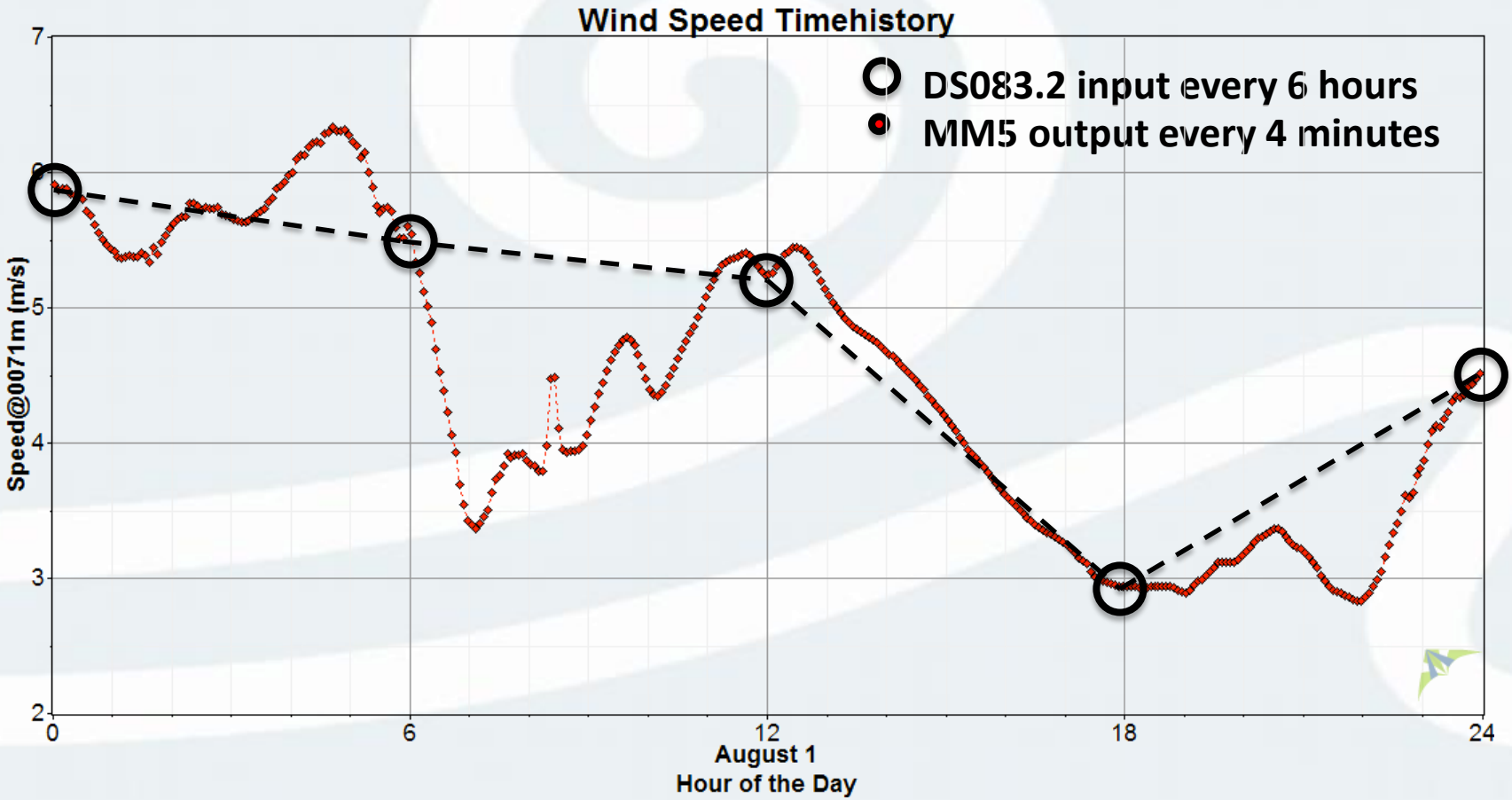
- Meteorological Data deriving from a FNL reanalysis procedure Data available from 1999-07-30 to a near-current date
- Data available with a time step of 6 hour
- Data available with a spatial grid of 1 degree (~ 80 km)





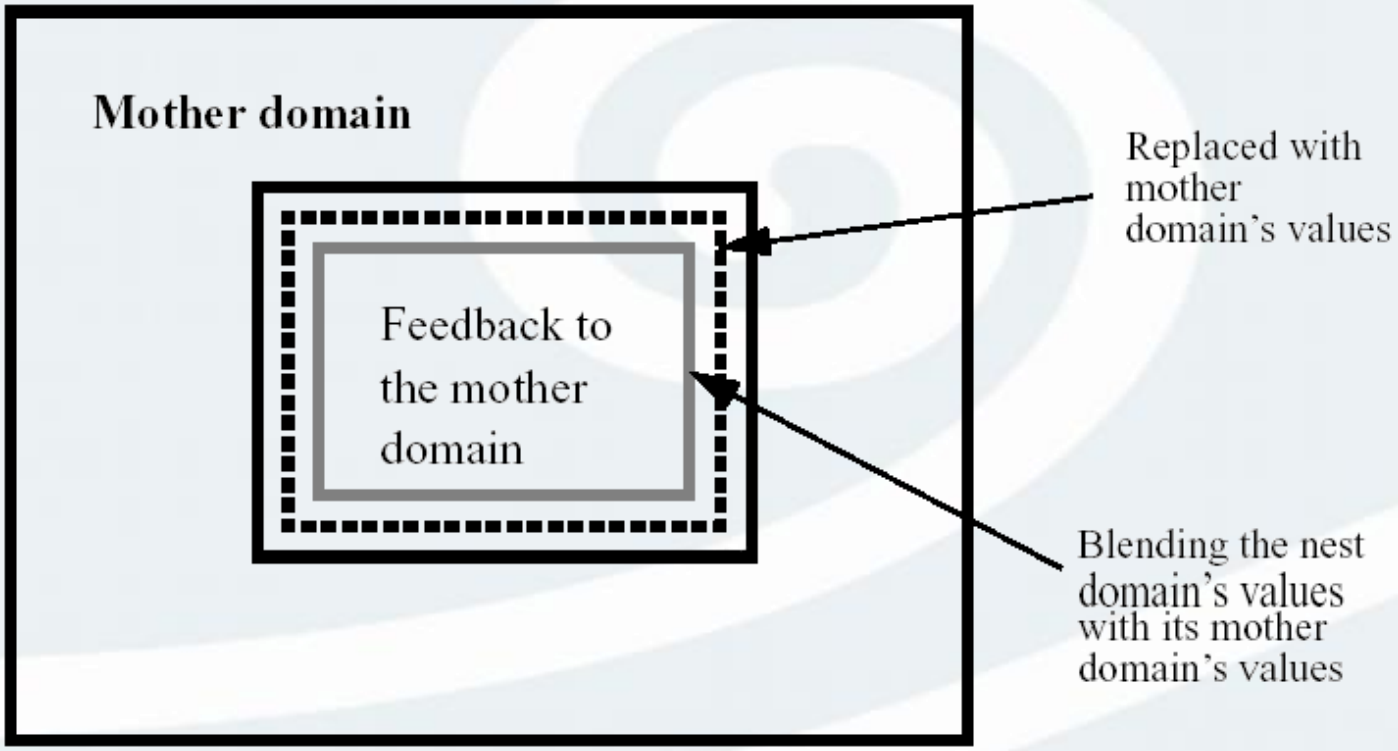
DS083.2 are obtained from the Global Data Assimilation System (GDAS), which continuously collects observational data from the Global Telecommunications System (GTS), and other sources, for many analyses

THE IMPLEMENTED HINDCASTING PROCEDURE



Using the MM5 code is possible to describe the wind behaviour in the period separating two DS083.2 input. This is very useful especially to evaluate the wind turbine energy production.

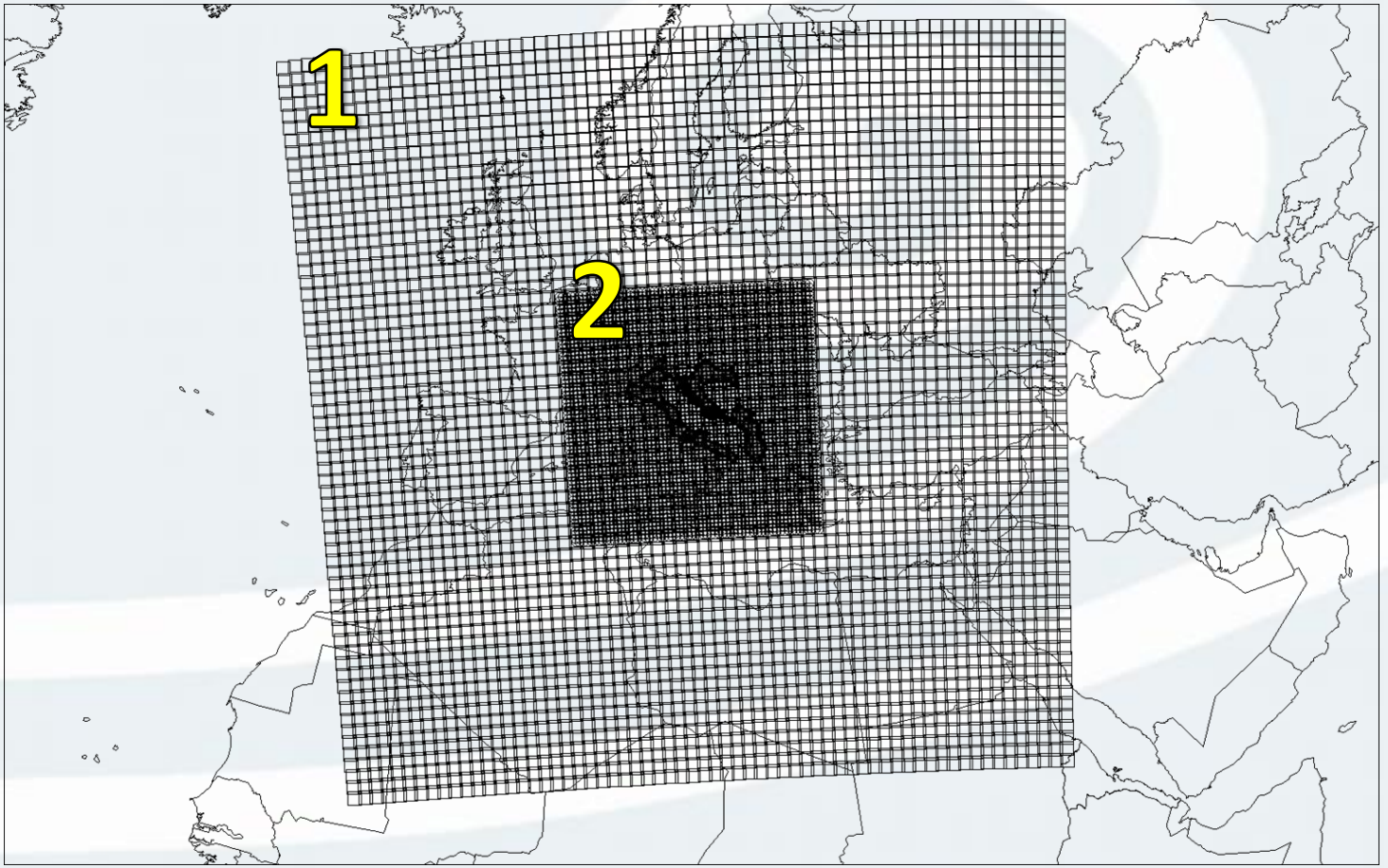
THE IMPLEMENTED HINDCASTING PROCEDURE



The hindcasting analysis is implemented with a **two way nesting** procedure. In this way the initializing meteo data are ingested by the coarser mother domain and they propagate to the finer nested domains; at the same time the more accurate results of the nested domains are fed back to the mother ones so to improve the global solution accuracy.

Numerical simulations with a 3 [km] horizontal spatial resolution are carried out by using four nested domains, while 1 [km] simulations use five nested domains.

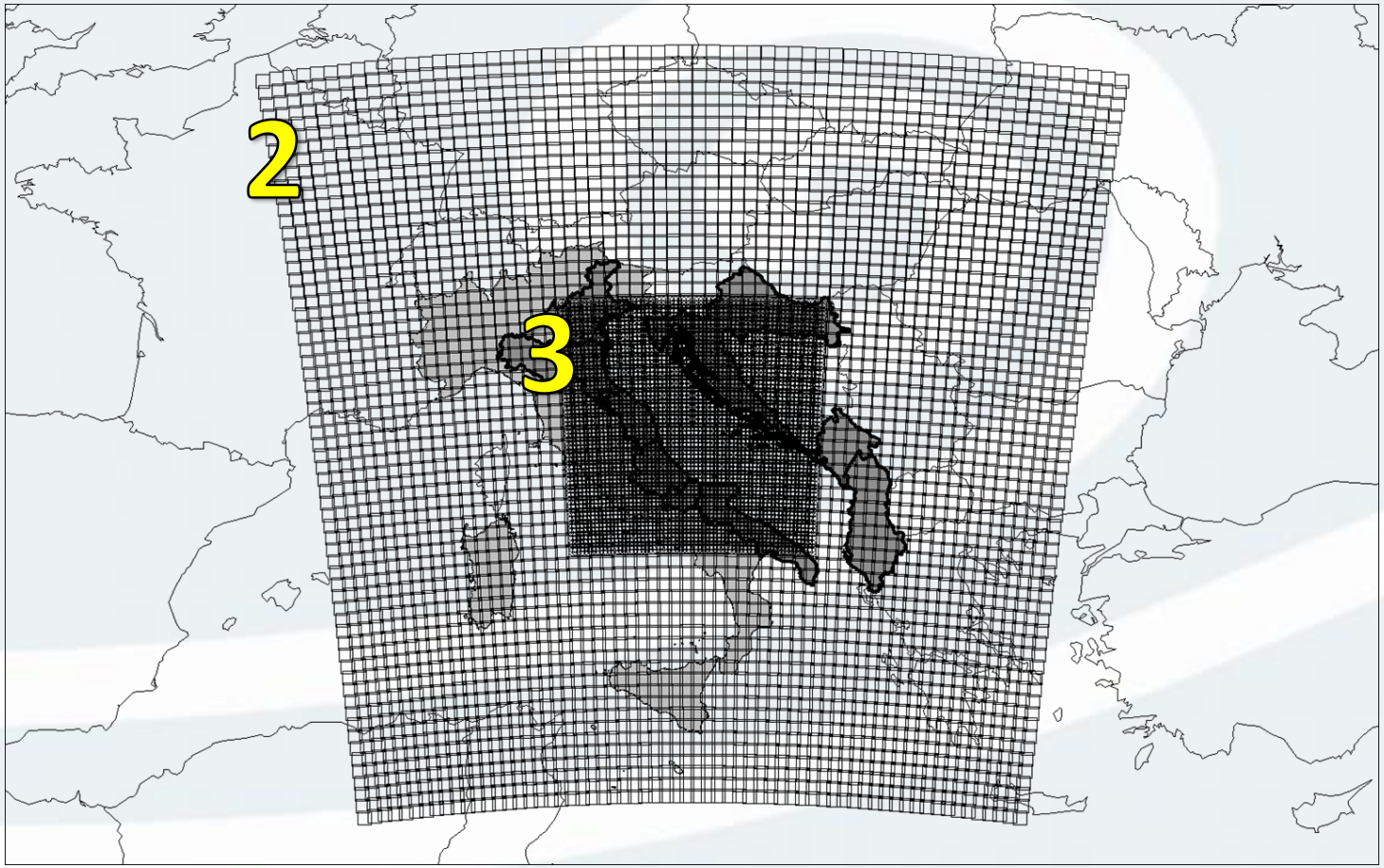
THE IMPLEMENTED HINDCASTING PROCEDURE



DOMAIN-1: Horizontal Spatial Resolution of 81 km (Continental)
DOMAIN-2: Horizontal Spatial Resolution of 27 km (Sub-Continental)

Each calculus domain has the same number of cells but the two way approach imposes a 3:1 growth ratio of the spatial resolution.
The main consequence of these expansion ratio is that the mother domain is so large to cover a large part of Europe and North Africa. With a so large mother domain is possible to fully take in account synoptic phenomena and to propagate their effects to inner domains.

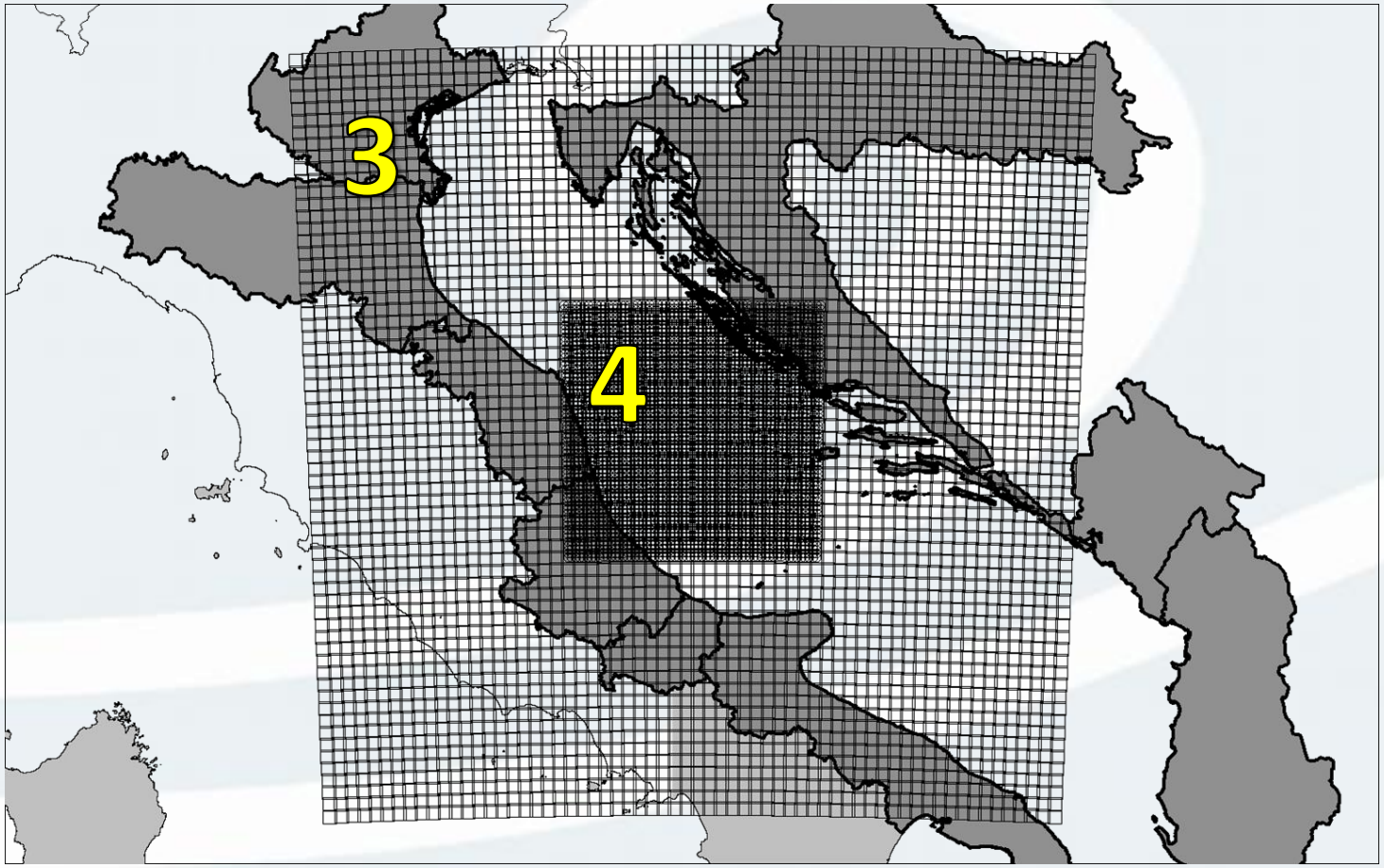
THE IMPLEMENTED HINDCASTING PROCEDURE



In this example the second domain covers all the POWERED partners countries and also the main mountains areas surrounding the Adriatic Basin.

DOMAIN 2 – Horizontal Spatial Resolution of 27 km – Subcontinental
DOMAIN 3 – Horizontal Spatial Resolution of 9 km – Interregional

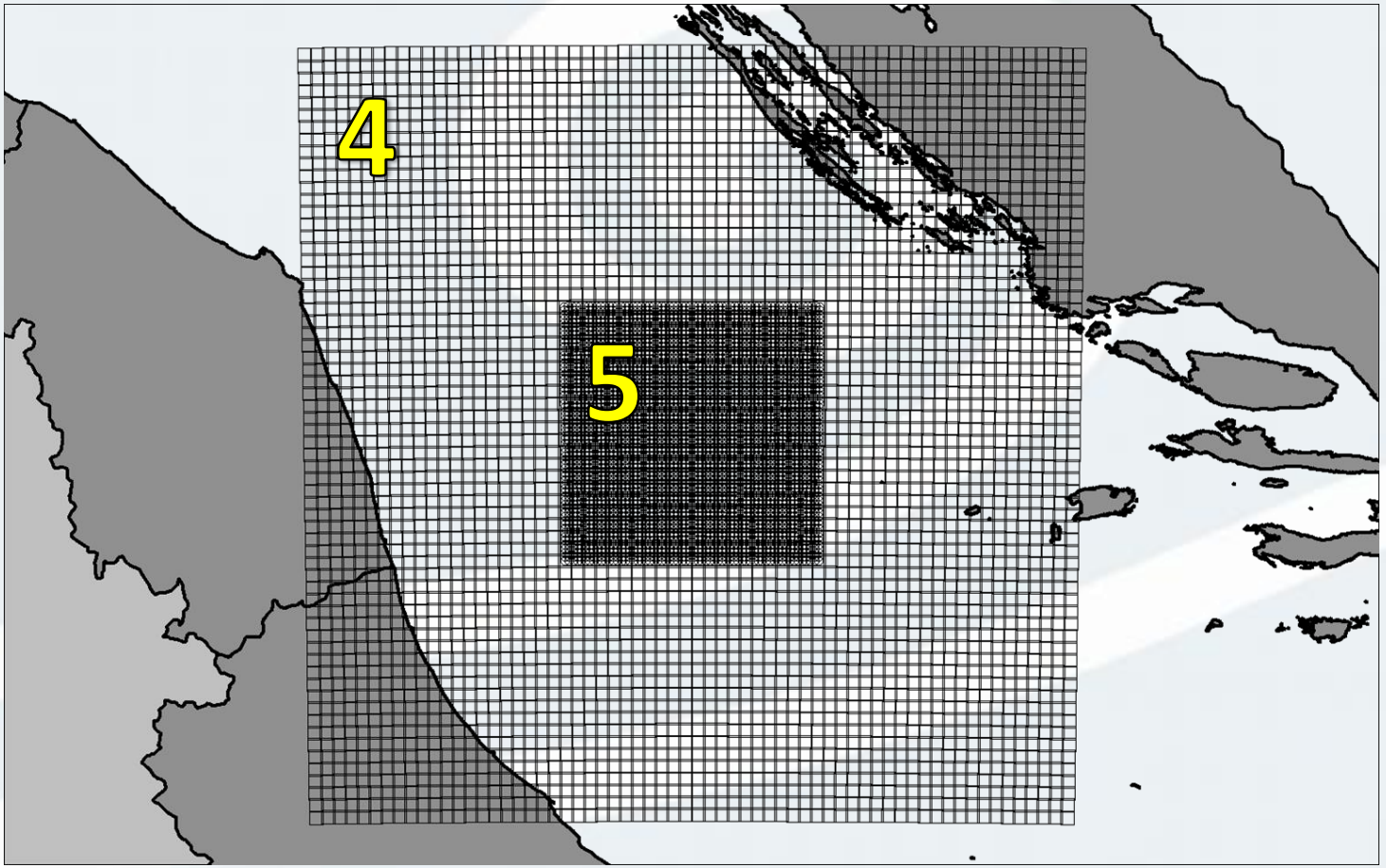
THE IMPLEMENTED HINDCASTING PROCEDURE



The third domain covers part of the Adriatic basin and also a significant area of land surfaces that strongly interacts with wind behaviours.

DOMAIN 3 – Horizontal Spatial Resolution of 9 km - Interregional
DOMAIN 4 – Horizontal Spatial Resolution of 3 km - Regional

THE IMPLEMENTED HINDCASTING PROCEDURE



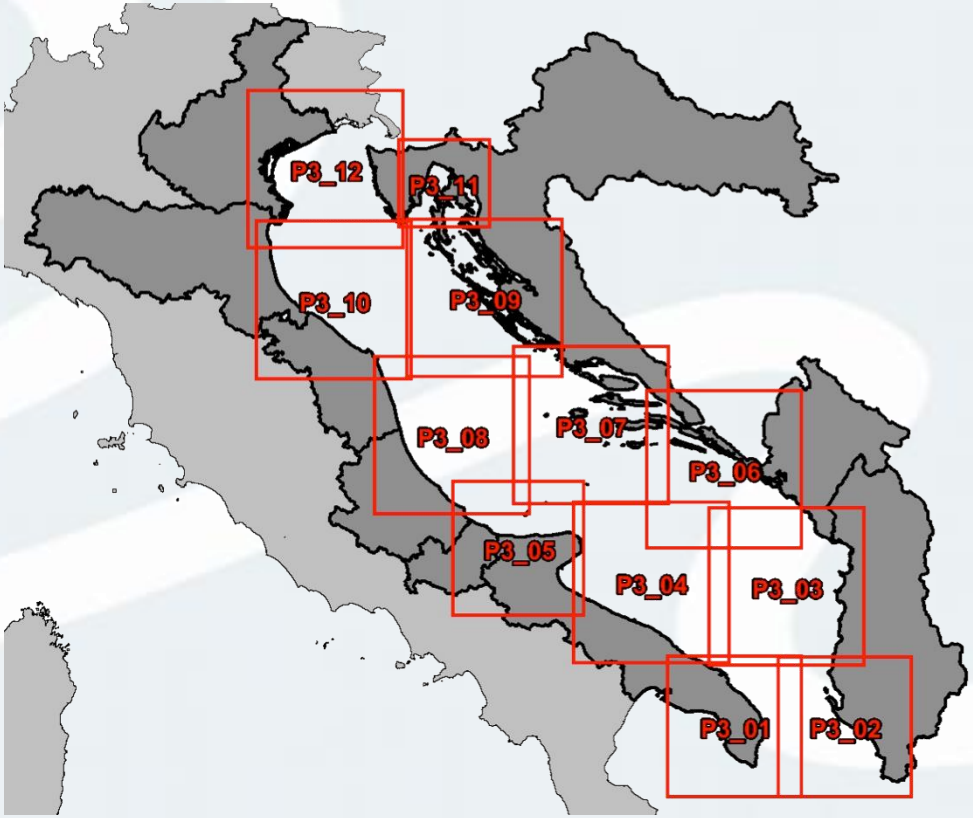
DOMAIN 4 – Horizontal Spatial Resolution of 3 km - Regional
DOMAIN 5 – Horizontal Spatial Resolution of 1 km - Local

The fourth domain is the final step for a 3 [km] Powered analysis while the fifth domain is the final one for the 1 [km] simulations. The finer domains are able to take in account local wind phenomena that originates by interactions with local complex terrains.

DESCRIPTION OF THE SIMULATED AREA

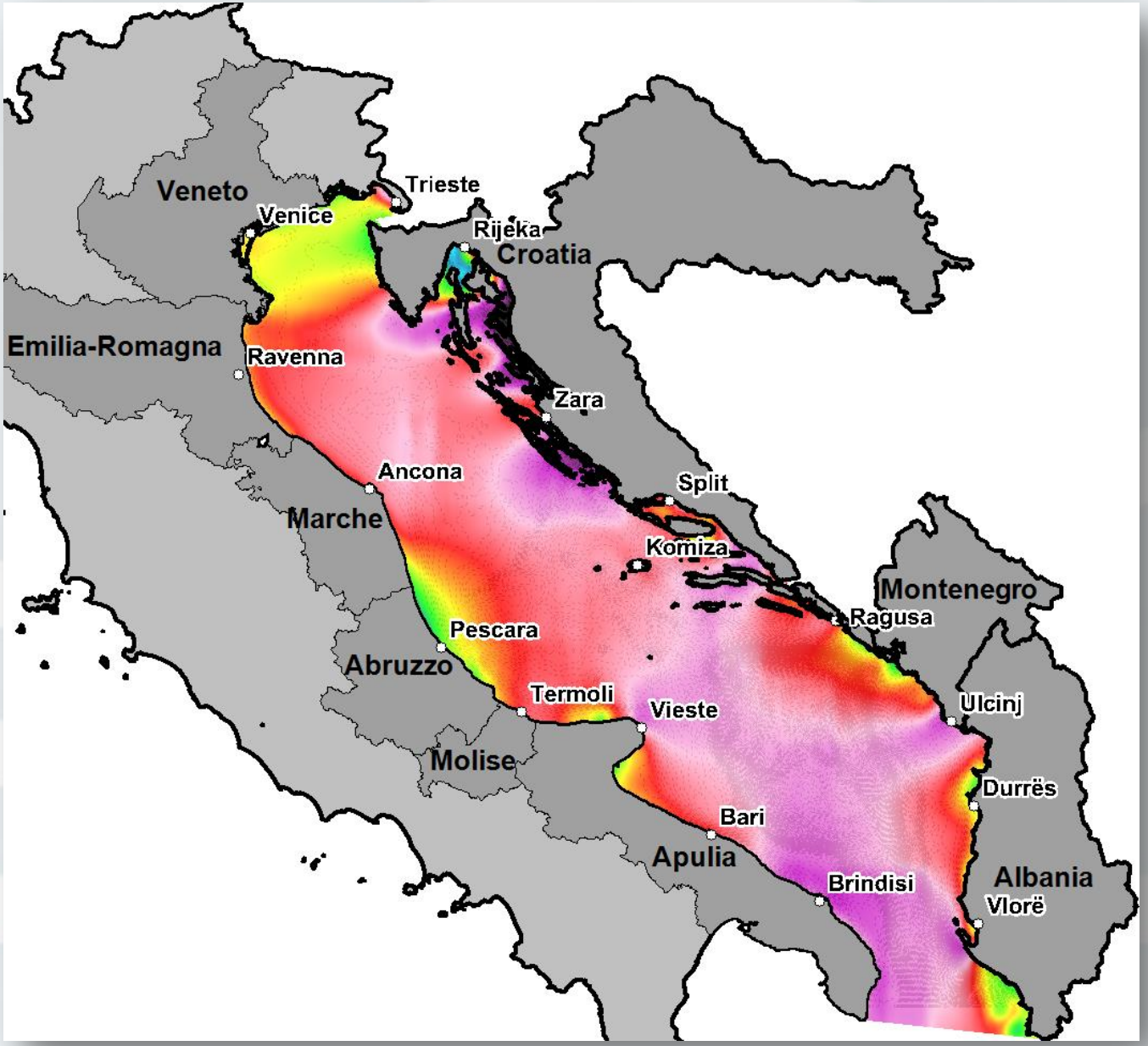
79 DOMAINS HAVING A SPATIAL GRID RESOLUTION OF 1 Km

12 DOMAINS HAVING A SPATIAL GRID RESOLUTION OF 3 Km



Long term analyses are actually obtained with a 3 [km] resolution for the years from 2008 to 2011, while 1 [km] simulations are carried out for the 2010 year.

3 KM SIMULATIONS WIND RESULTS - 2008



Year 2008 Height 90 [m] a.s.l.

3 KM SIMULATIONS WIND RESULTS – 2009 VS. 2008

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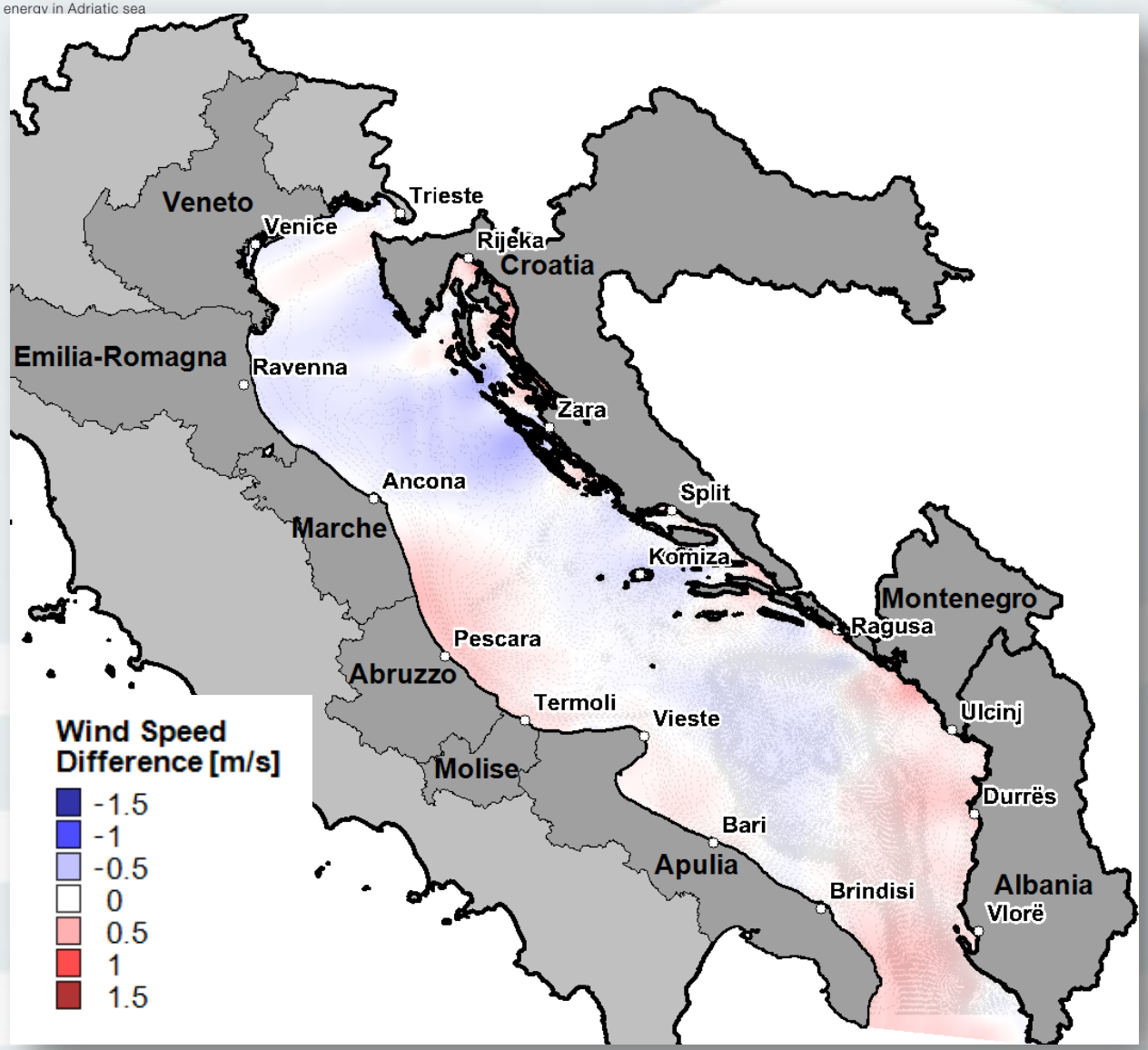
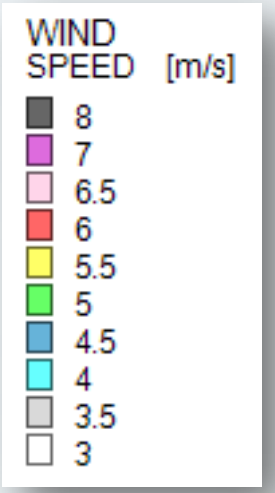
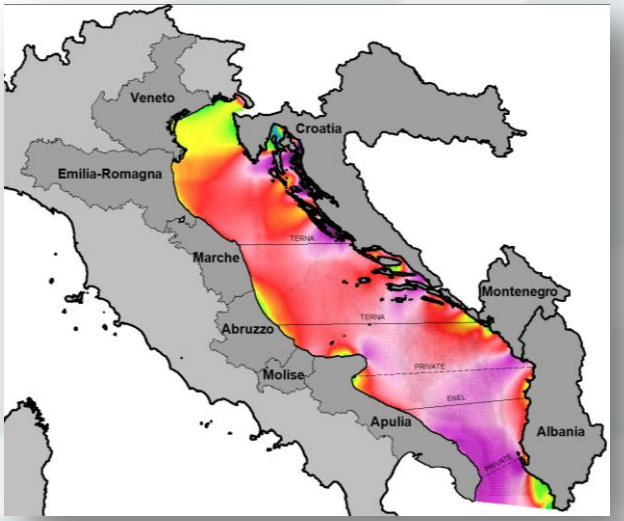




Year 2009 Height 90 [m] a.s.l.



3 KM SIMULATIONS WIND RESULTS – 2010 VS. 2008

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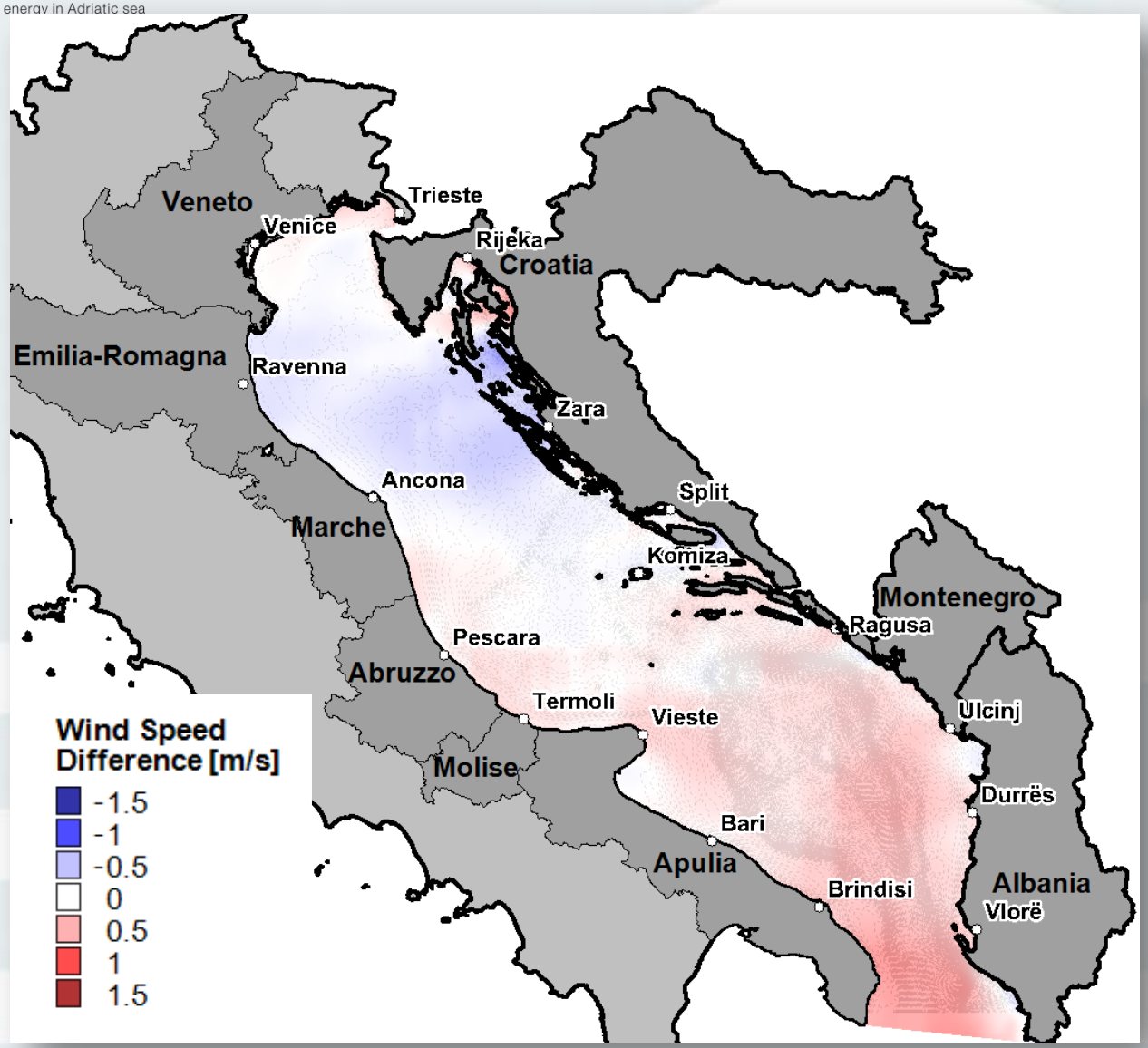
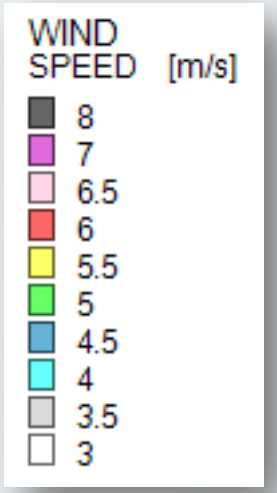
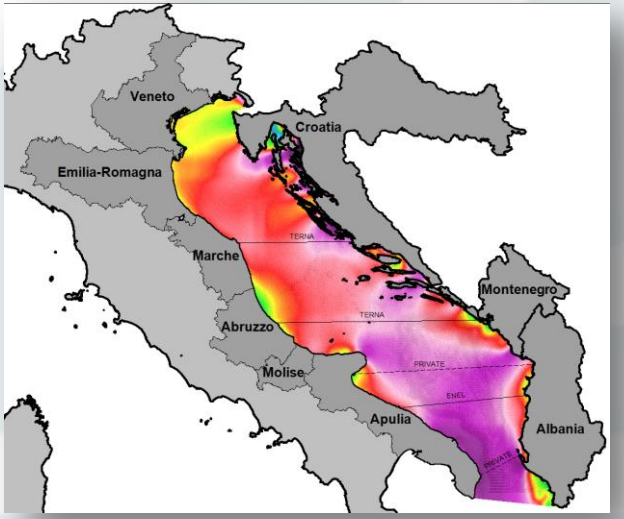
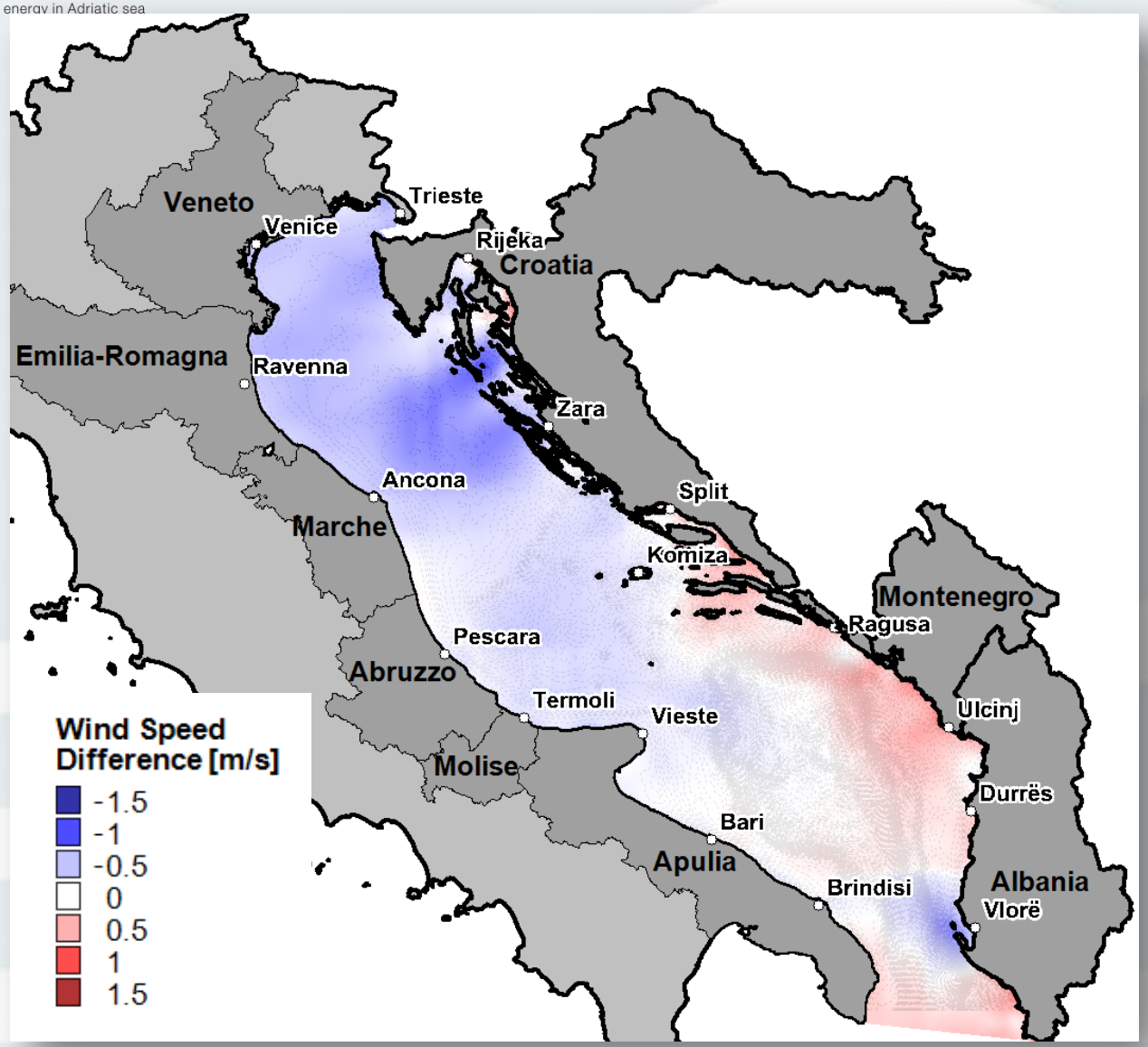


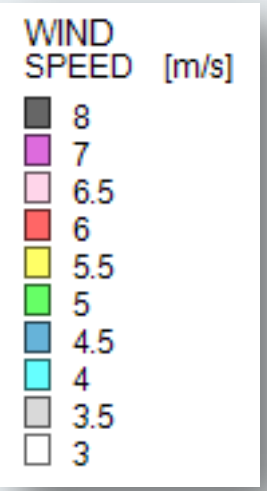


Year 2010 Height 90 [m] a.s.l.

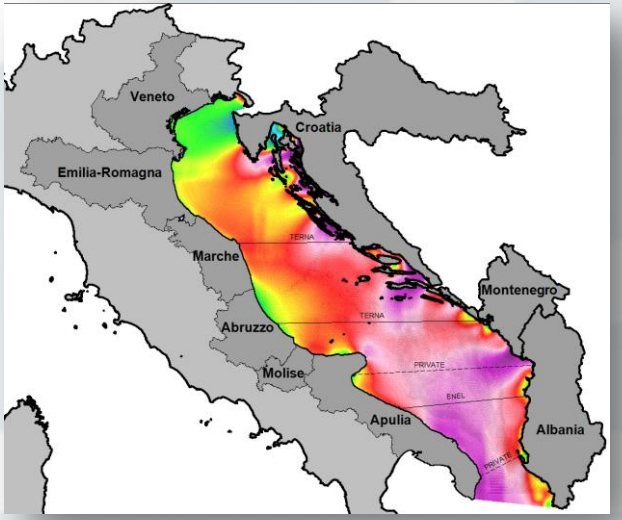


3 KM SIMULATIONS WIND RESULTS – 2011 VS. 2008





Year 2011 Height 90 [m] a.s.l.



3 KM SIMULATIONS WIND RESULTS – 2012 VS. 2008

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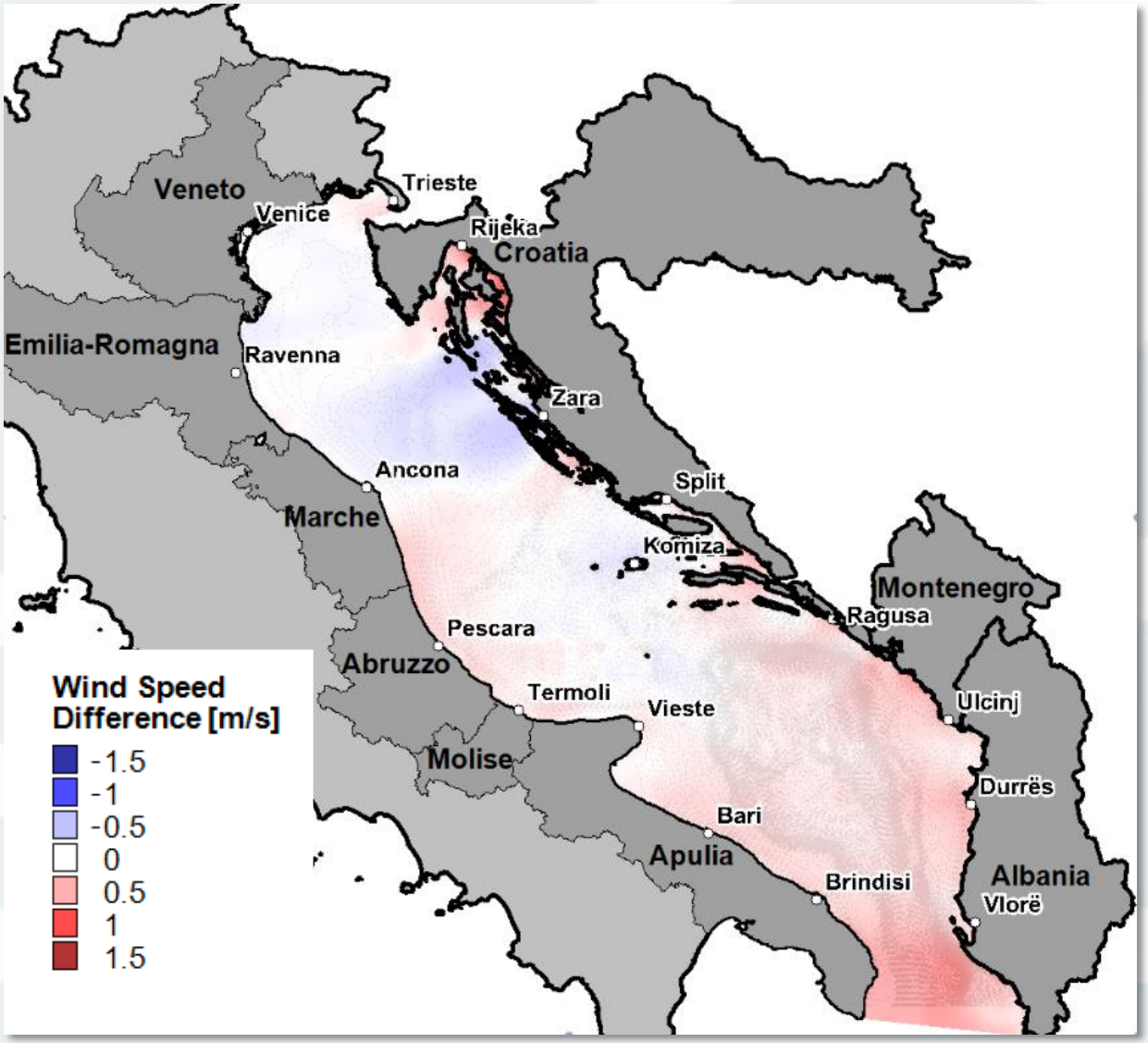
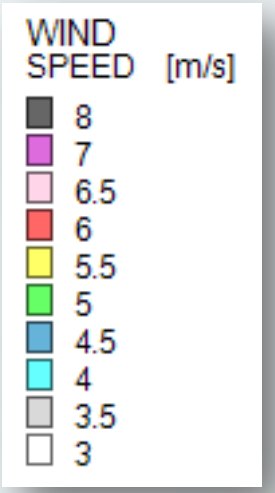
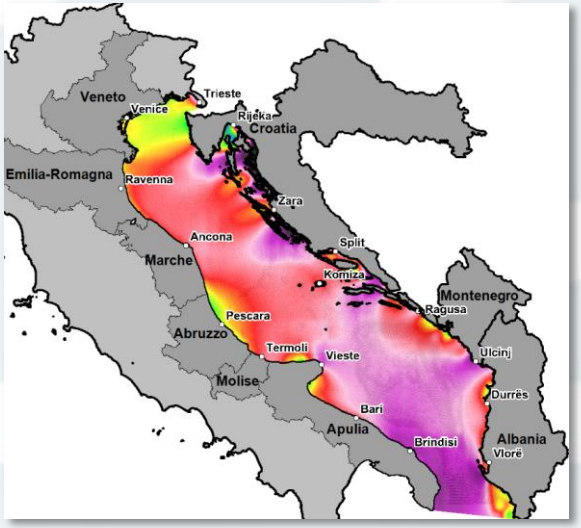
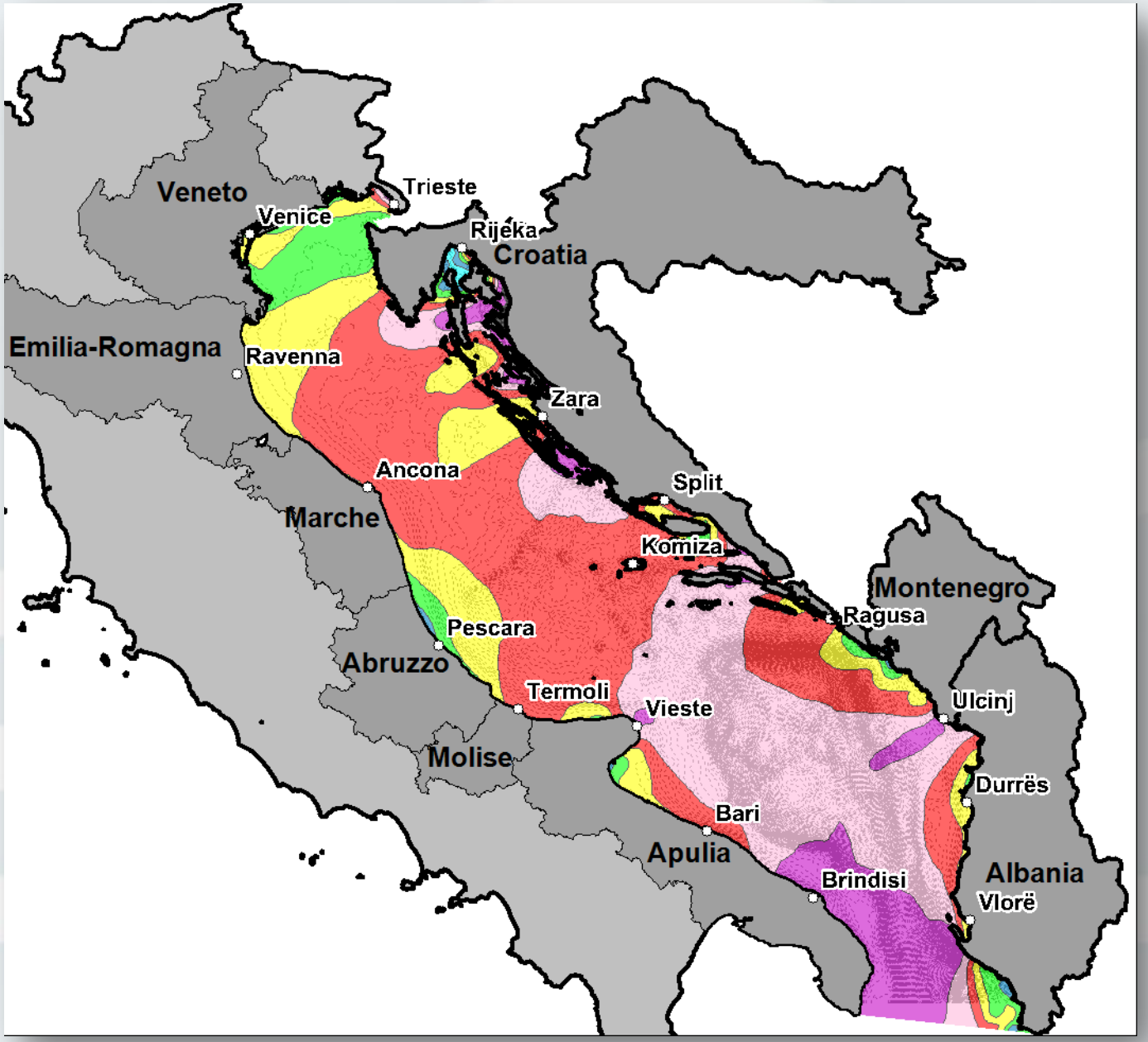




Year 2012 Height 90 [m] a.s.l.



ADRIATIC WIND MAP – 2010 – 3KM GRID SIZE

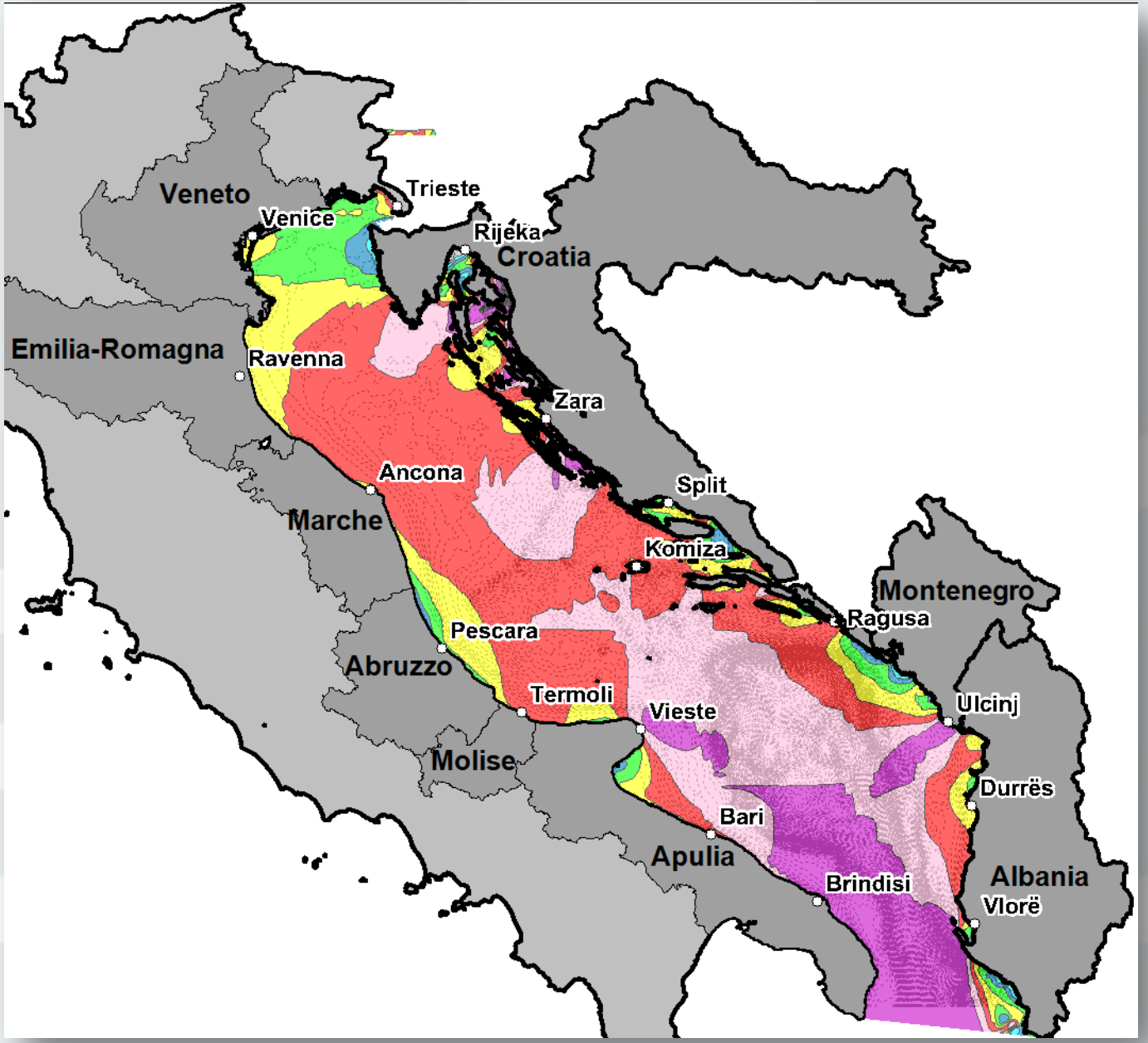


Height
90 [m] a.s.l.

WIND SPEED [m/s]

- 8
- 7
- 6.5
- 6
- 5.5
- 5
- 4.5
- 4
- 3.5
- 3

ADRIATIC WIND MAP – 2010 – 1KM GRID SIZE



Height
90 [m] a.s.l.

WIND SPEED [m/s]

- 8
- 7
- 6.5
- 6
- 5.5
- 5
- 4.5
- 4
- 3.5
- 3

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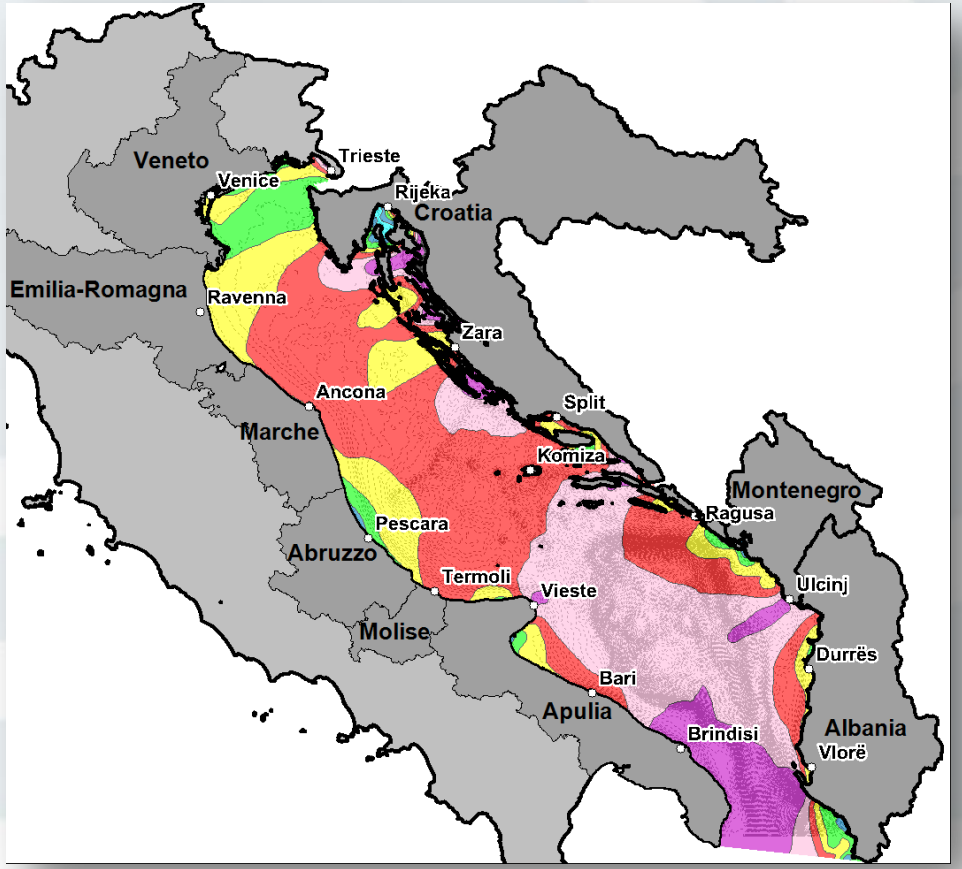
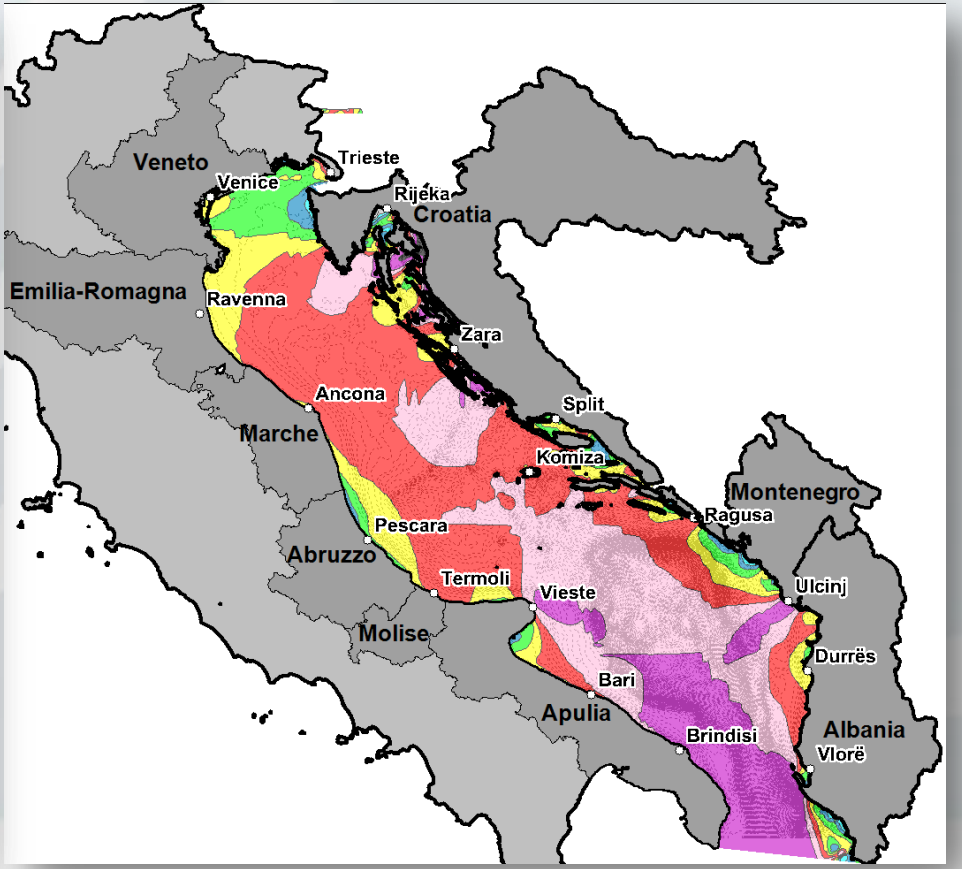
ADRIATIC WIND MAP
COARSE GRID VS. FINE GRID

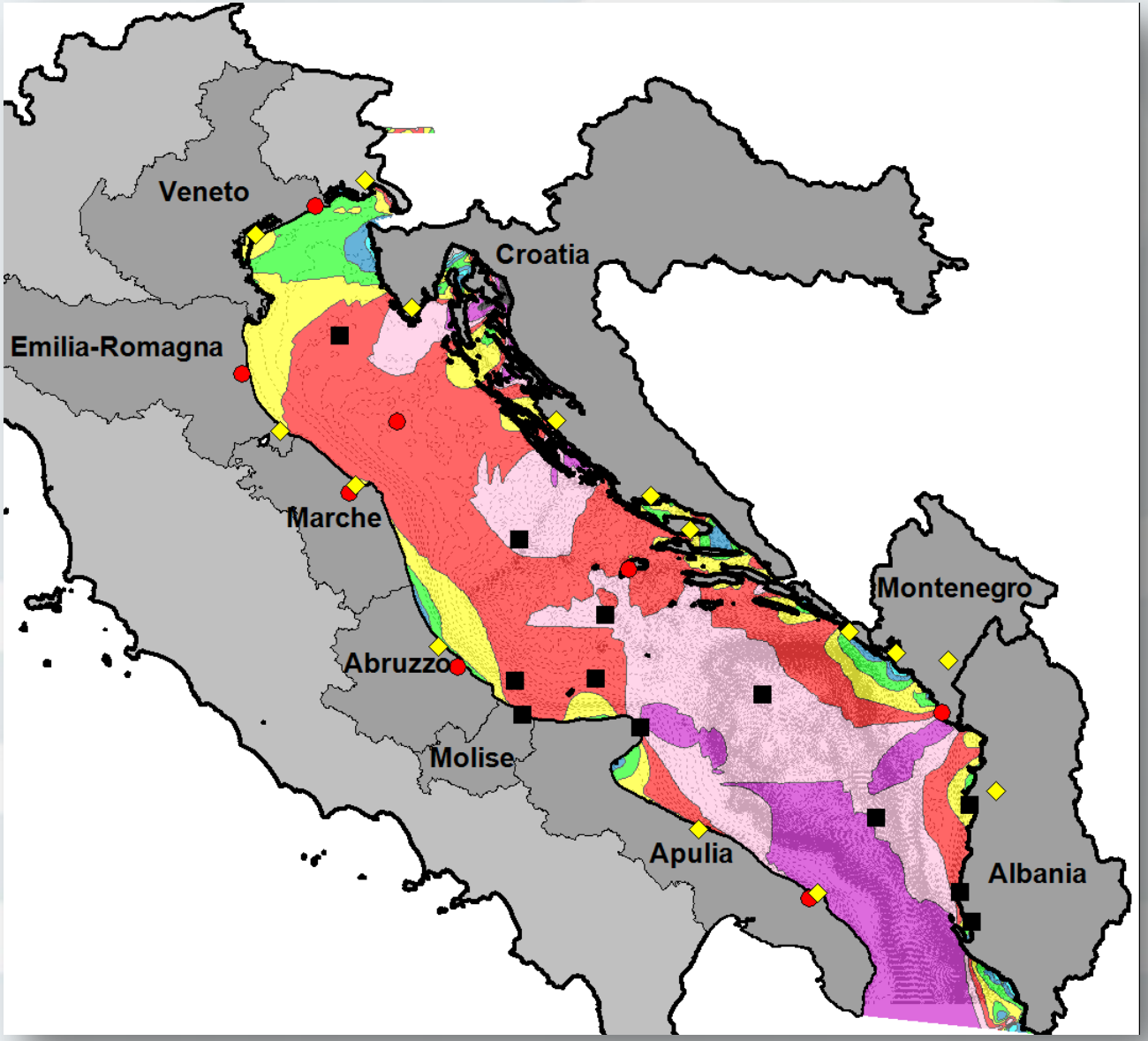
Coarse Grid (3km x 3km)



Fine Grid (1km x 1km)



VIRTUAL METEO MAST NETWORK

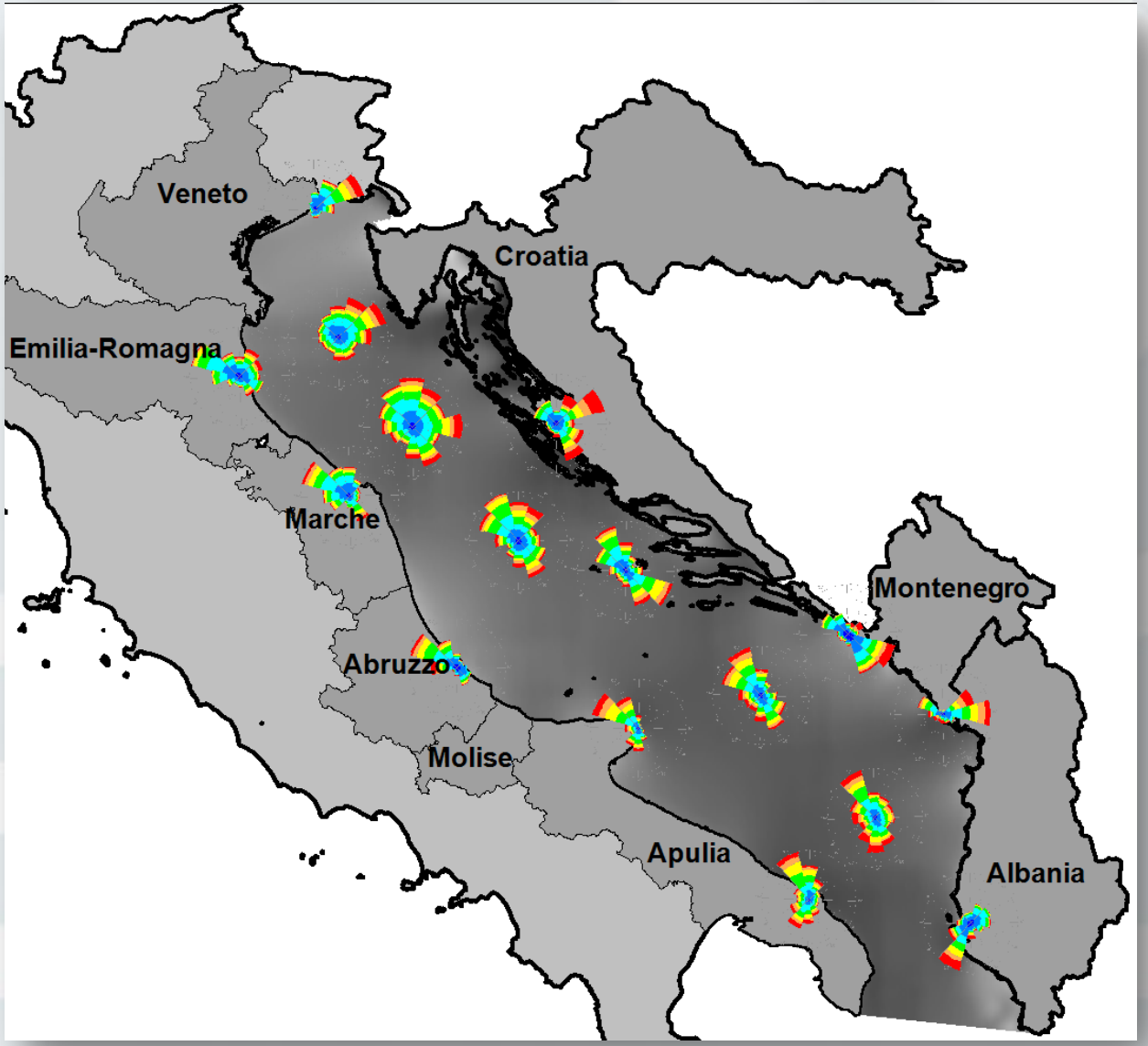


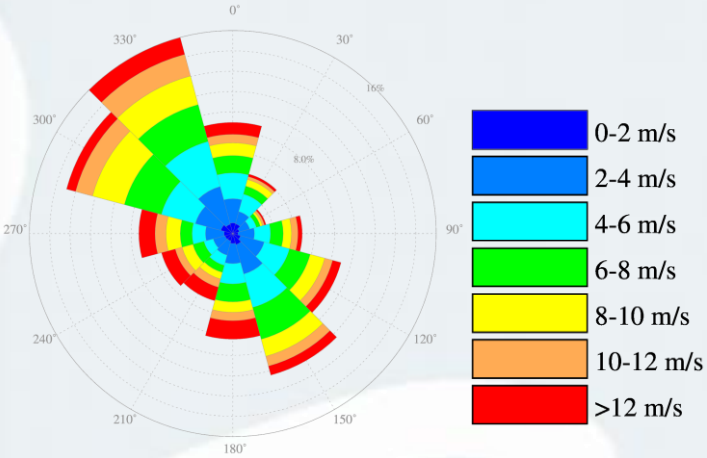
POWERED MAST
SAMPLE MAST
AFIS (*)

Several Virtual Meteo Mast was extracted in significant point on the Adriatic Basin in order to analyse the detailed wind distribution. Direct comparisons with experimental data becoming from Powered partners and Powered sponsors was carried out.

(*) Aerodrome Flight Information Service

NUMERICAL WIND ROSES - GENERAL RESULTS



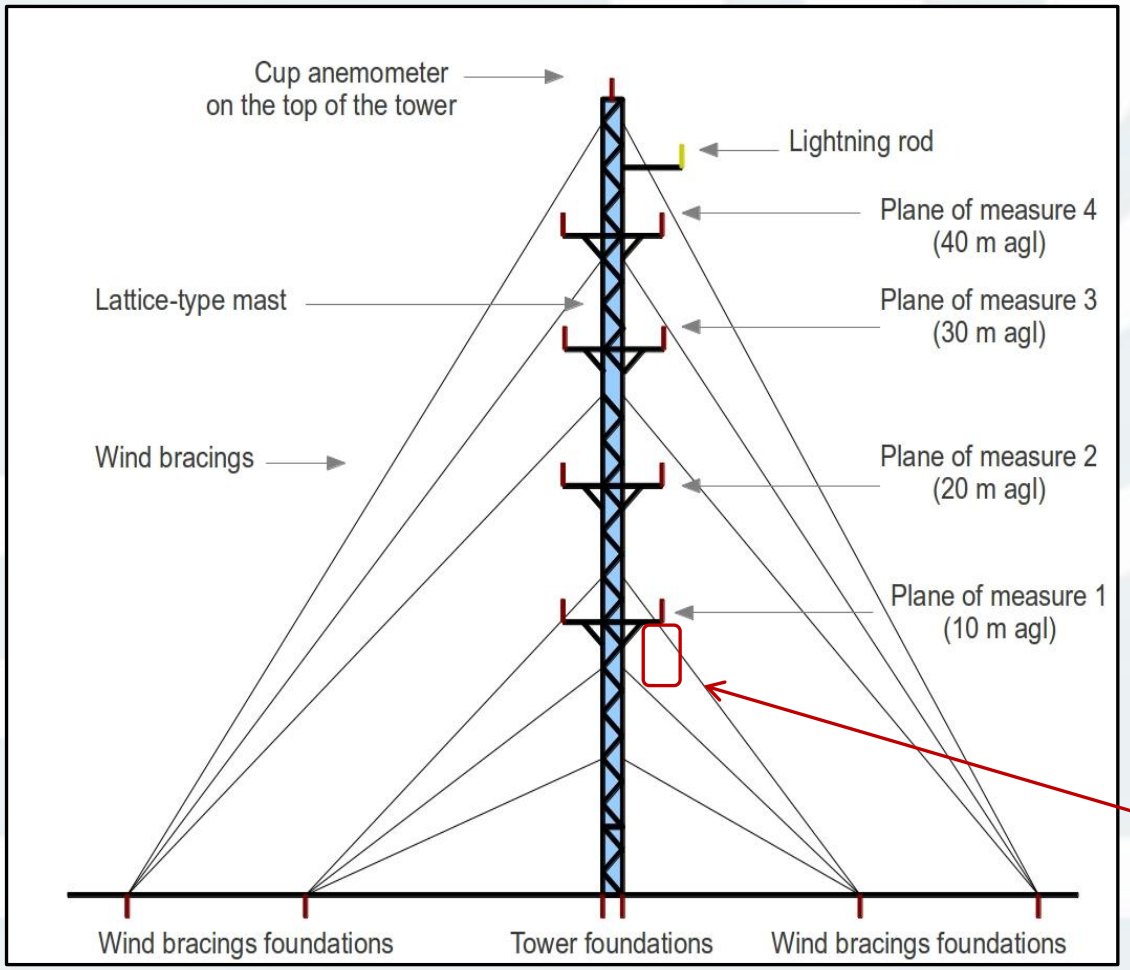


Annual wind roses show a NNW-SSE directionality in the south Adriatic Basin while an omnidirectional behaviour may be observed at higher latitudes. Wind roses near coastal line show instead different occurrences due to interactions with the local terrain conformation.

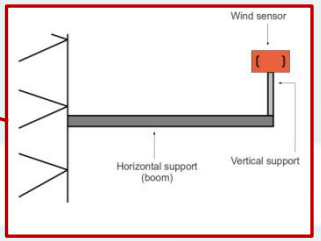
POWERED METEOROLOGICAL NETWORK

METEOROLOGICAL MAST

Technical requirements of an anemometric tower for high quality wind measurements



- Suitable siting of the tower
- Minimun tower height: 40 m agl
- Lattice-type tower structure
- 4 planes of measure
- Each plane of measure is equipped with a cup anemometer and a wind direction vane; the highest plane is equipped with two cup anemometers and a wind direction vane.
- One temperature sensor
- Measnet or NIST calibration for cup anemometers



Wind sensor support

- Data logger and remote data transmission system (GSM/GPRS)
- On-board solar panel and rechargeable batteries

SHORT PERIOD FORECASTING (IN PROGRESS)

FDDA TECHNIQUE (FOUR DIMENSION DATA ASSIMILATION)

USING LOGGED DATA FROM THE P.O.W.E.R.E.D METEOROLOGICAL NETWORK ON MM5 MODEL

GFS (Global Forecasting System) meteo data processed by REGRID

Observational Data from the POWERED meteorological network

MM5 short–term forecasting on mesoscale area. Coarse Domain area (2400x2400 km^2)

Useful monitoring the crossing of meteorological fronts on Adriatic Basin

GFS (Global Forecasting System) meteo data processed by REGRID

Observational Data from a POWERED single tower . High time resolution.

Microscale resolution MM5 forecast. Coarse Domain area(1000x1000 km^2)

Useful monitoring the area of interest near the weather station

ARTIFICIAL NEURAL NETWORK SOLUTION

OUTPUT Implementation of a short – term wind forecasting system

COUPLING THE MM5 METEOROLOGICAL MODEL WITH AN ARTIFICIAL NEURAL NETWORK (ANN) BASED APPROACH: AN HIBRYD SYSTEM FOR SHORT – TERM WIND FORECASTS

- DEVELOPMENT OF AN HYBRID APPROACH FOR SHORT TERM WIND FORECASTING

FULLY AUTOMATED SYSTEM

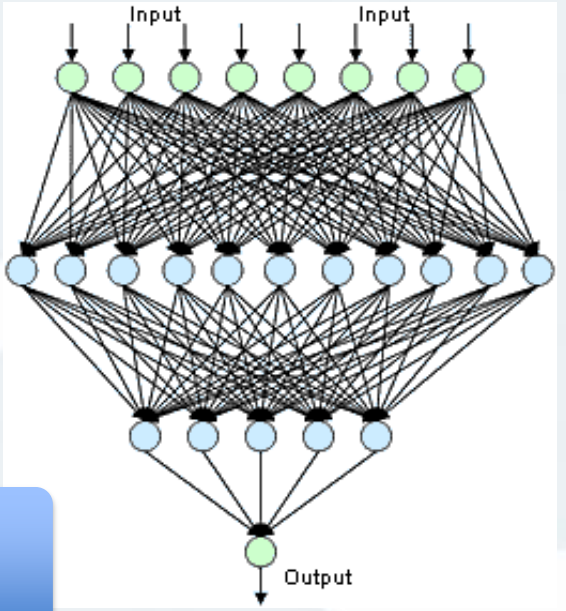
GFS (Global Forecasting System) meteo data download

MM5 short – term forecasting (24 – 48 h)

MM5 forecast post – processing

ANN forecast correction (P.O.W.E.R.E.D. anemometric network)

Sketch of an ANN



CORRECTION OF MM5 NATIVE FORECAST BY MEANS OF A PREVIOUSLY TRAINED ANN: DELIVERING OF THE FINAL SHORT-TERM WIND FORECAST.

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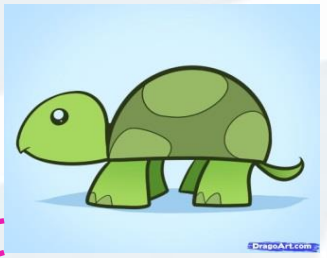
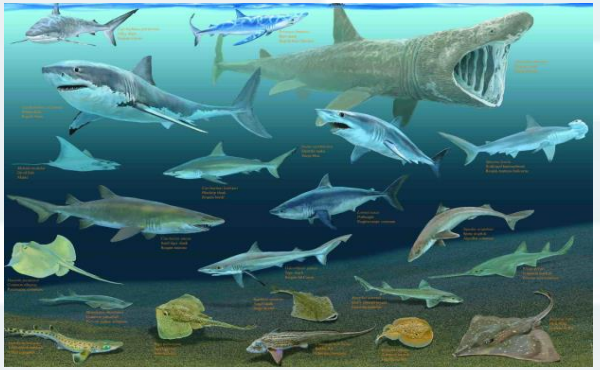
ENVIROMENTAL COMPONENTS

AREA	PARTNERS												
MACROAREA	LB	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
1. OBSTACLES AND INTERFERENCES AT SEA WITHIN 12 MILES FROM THE COAST								B7					
1.1. Mining (oil and gas included) concessions and energy supply facilities at sea under authorization	LB	B1		B3	B4	B5	B6		B8	B9	B10	B11	B12
1.2. Submarine cables, pipelines and any conduit under authorization	LB	B1		B3	B4	B5	B6		B8	B9	B10	B11	B12
1.3. Offshore aquaculture plants (finfish and shellfish)	LB	B1	B2	B3	B4	B5						B11	B12
1.4. Dumping areas at sea, including those for sediments resulting from dredging activities (including those carried out in harbors)	LB	B1		B3	B4	B5			B8	B9	B10	B11	B12
1.5. Trade naval routes	LB	B1							B8	B9		B11	B12
1.6. Shipwrecks and archaeological sites (at sea and along the coast)	LB	B1		B3	B4	B5						B11	B12
1.7. Unexploded ordnance and areas of interest or pertaining exclusively to military activities	LB	B1		B3	B4	B5						B11	B12
1.8. Contaminated sites at sea and along the coast (currently in remediation or potentially to be reclaimed)		B1							B8		B10	B11	B12
1.9. Areas of submerged beach nourishment	LB	B1		B3	B4	B5			B8		B10	B11	B12
1.10. Areas with a high risk of environmental crisis		B1							B8		B10	B11	B12
1.11. Underwater caves to supply relict sand (for the purpose of beach nourishment)	LB	B1		B3	B4	B5			B8		B10	B11	B12
1.12. Areas pertaining to harbor activities (including access corridors and transit)	LB	B1		B3	B4	B5	B6		B8			B11	B12
1.13. Areas used for diving and spearfishing	LB	B1		B3	B4	B5						B11	B12
2. ENVIRONMENTAL (including landscape) CONSTRAINTS AT SEA AND ON								B7					
2.1. Special Protection Areas (SPA)		B1						B7			B10	B11	B12
2.2. Sites of Community Interest (SCI) [at sea and along the coast]		B1						B7			B10	B11	B12
2.3. Zones of biological protection		B1									B10	B11	B12
2.4. Ramsar Areas		B1									B10	B11	B12
2.5. Parks and Marine Reserves		B1									B10	B11	B12
2.6. Areas subjected to special attention for purposes of hydrogeological asset	LB			B3	B4	B5	B6				B10	B11	B12
2.7. Areas hosting historical buildings of public interest	LB	B1		B3	B4	B5	B6				B10	B11	B12
2.8. Areas of public and/or military interest along the coast	LB	B1		B3	B4	B5	B6				B10	B11	B12
2.9. Areas pertaining to Local/Regional/National Landscape Plans	LB	B1		B3	B4	B5	B6				B10	B11	B12
2.10. Scenic Drives, aggregation points and places of memory	LB			B3	B4	B5	B6				B10	B11	B12
3. BIOECOLOGICAL ASPECTS								B7					
3.1. Migration routes of birds		B1									B10	B11	B12
3.2. Quality of sea water (in relation to harvesting, culturing and marketing of bivalve mollusks)	LB	B1	B2	B3	B4	B5	B6					B11	B12
3.3. Monitoring data according to the dictates of the EU Marine Framework Directive (wherever available or applicable), with specific reference to benthic biocoenoses and habitats			B2								B10	B11	B12
3.4. Bio-ecological data included in environmental studies for EIA (Environmental Impact Assessment) procedures at the regional and / or national level at sea or on land, but with potential consequences to the sea	LB			B3	B4	B5	B6	B7				B11	B12
3.5. Bio-ecological data derived from LIFE, IPA, INTERREG and any other EU or national funded projects, related with marine ecosystems	LB	B1		B3	B4	B5	B6	B7				B11	B12
3.6. Areas of clam fishing	LB	B1	B2	B3	B4	B5	B6				B10	B11	B12
3.7. Distribution of fishing effort and fleet composition		B1	B2									B11	B12
4. SPATIAL PLANNING AND LANDSCAPE USE (including present and future plans)								B7					
4.1. Synthesis of local/regional/national plans of landscape management presently in force or that are going to be established in the	LB	B1		B3	B4	B5	B6					B11	B12
4.2. Information dealing with coastal traffic, tourism management and develoment and so on…	LB			B3	B4	B5	B6					B11	B12
4.3. Any other info possibly of interest to your opinion	LB	B1	B2	B3	B4	B5	B6	B7		B9		B11	B12
5. RISK ANALYSIS (SINOSSI & SINTESI)									B8				

Protect planet MPAs

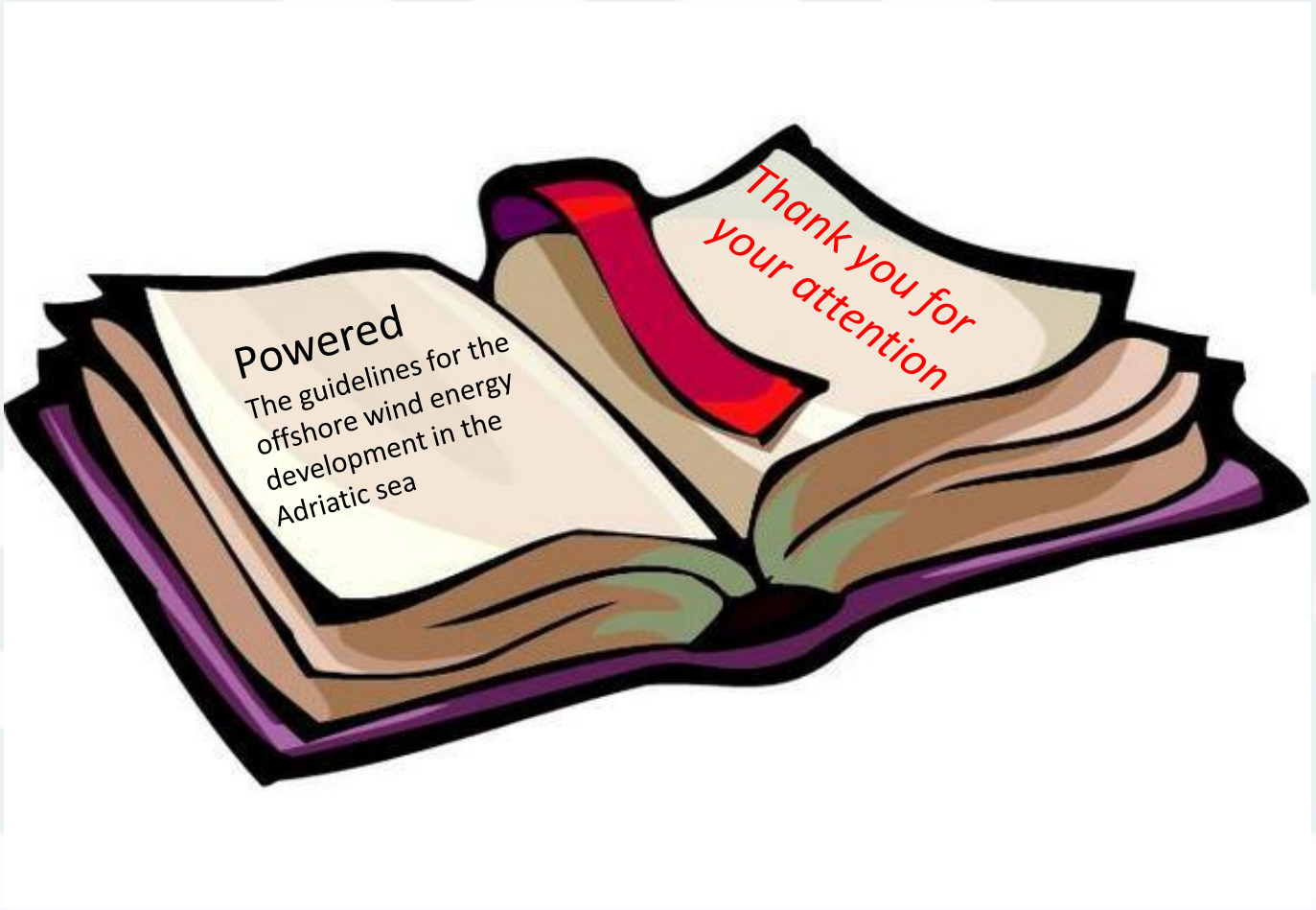




SHIP FACILITIES

The offshore wind energy offers new possibilities at the industrial ports. Many different ships are used during the wind farm construction and its availability is poor.
To build entire wind turbine into the port boundary is preferred in order to reduce the financial risk connected to offshore assembling

GUIDELINES


Powered
The guidelines for the offshore wind energy development in the Adriatic sea
Thank you for your attention