IMDIS 2016
International conference on marine data and information systems
ECS - Gdansk, Poland, October 15-17, 2016

Oceanographic system to control the impact of construction works in the sea in a sensitive coastal area - Case Study

Vlado Dadić, Damir Ivanković, Stipe Muslim, Dalibor Jelavić, Gordana Beg Paklar

Institute for Oceanography and fisheries, Split, Croatia

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Introduction

- Construction work at sea
- Sediment

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Station and Data Transfer

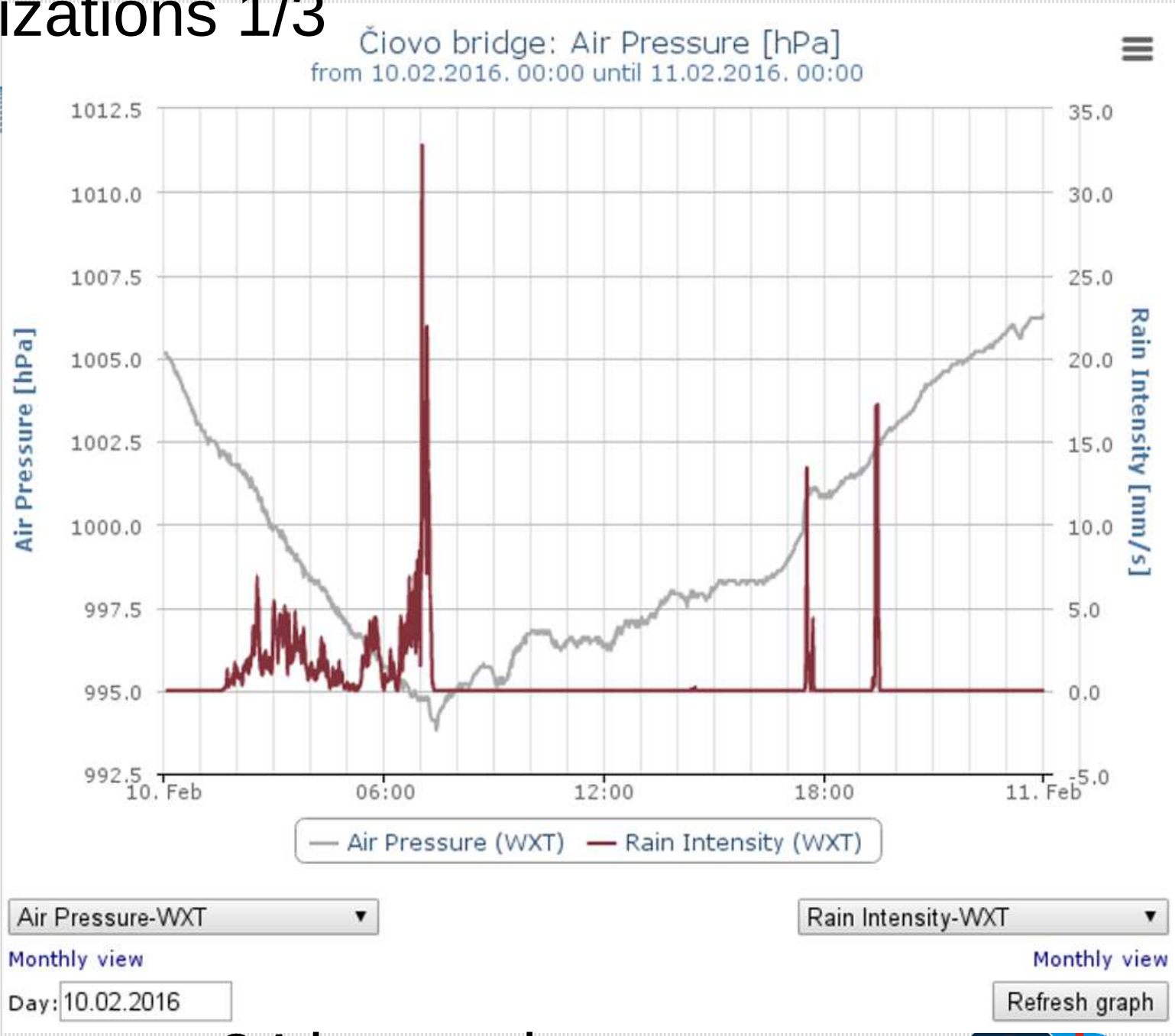
- Embedded linux with GPRS
- Meteo sensor
- Sea currents sensor
- One minute measurements and sending interval
- Sending using FTP

Note:

biweekly control of biochemical parameters at 6 stations

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Data Visualizations 1/3

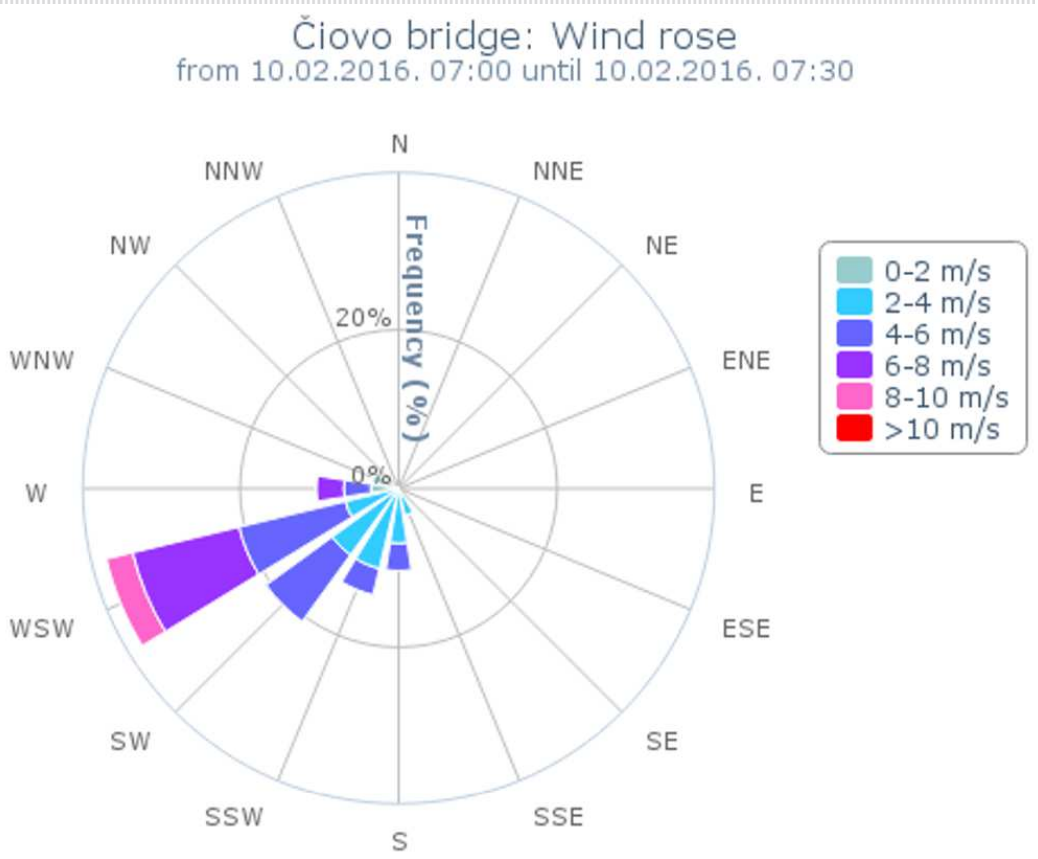


- Two parameters 24 hours view

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Data Visualizations 2/3

- Wind rose and basic statistics



Frequency table (sample contains 29 measurements)							
Direction	0-2 m/s	2-4 m/s	4-6 m/s	6-8 m/s	8-10 m/s	>10 m/s	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	3.45	0	0	0	0	3.45
S	0	6.90	3.45	0	0	0	10.35
SSW	0	10.34	3.45	0	0	0	13.79
SW	0	10.34	10.34	0	0	0	20.68
WSW	0	6.90	13.79	13.79	3.45	0	37.93
W	3.45	0	3.45	3.45	0	0	10.35
WNW	3.45	0	0	0	0	0	3.45
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Total	6.90	37.93	34.48	17.24	3.45	0.00	%

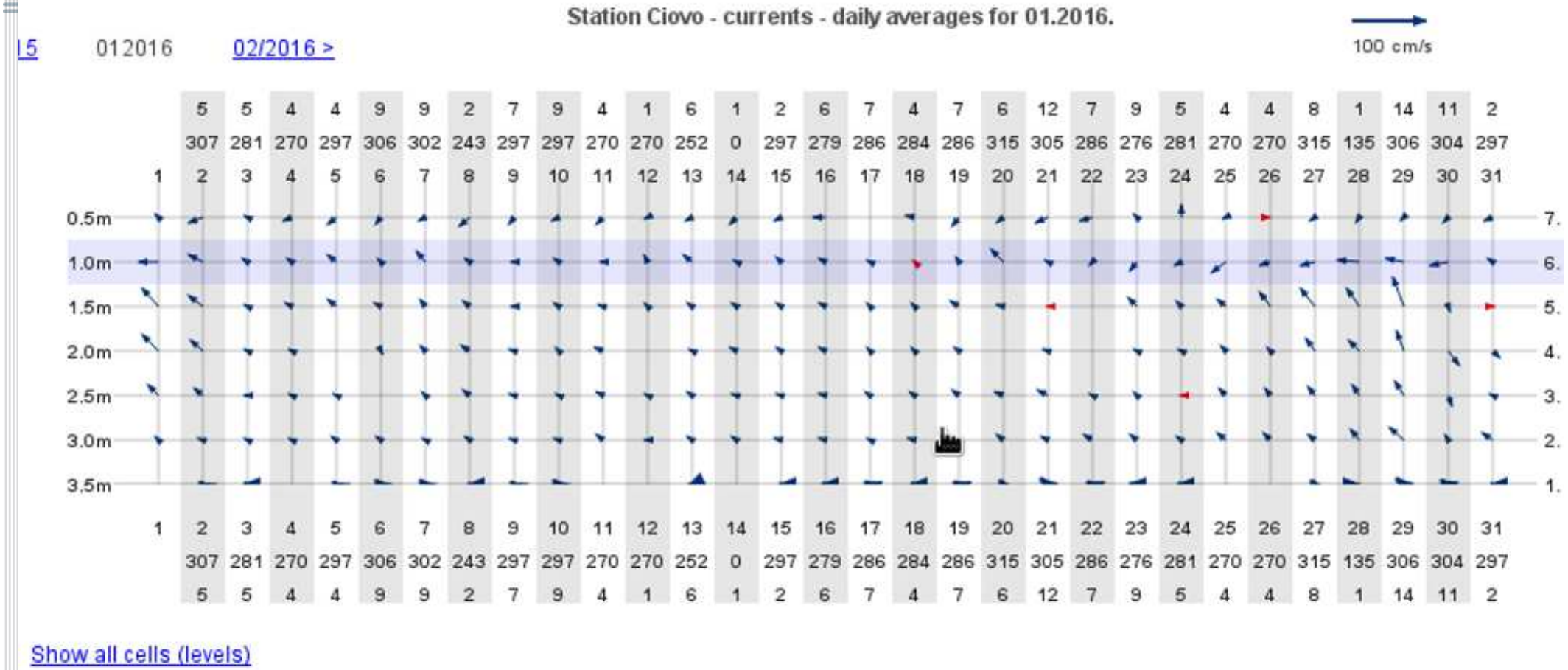
Day: 10.02.2016

Refresh graph

*Click on legend to disable/enable wind class

hide background map
show background map

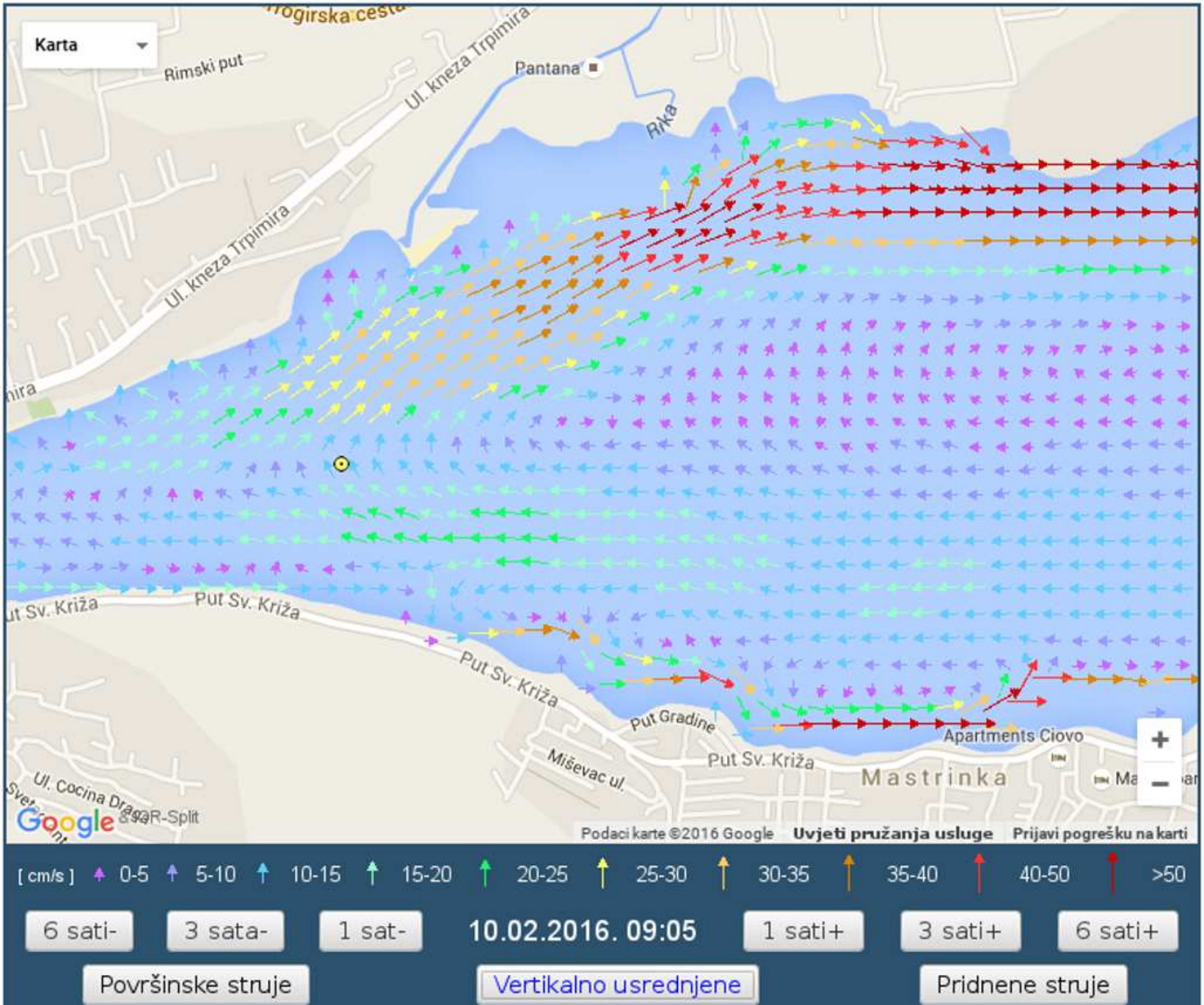
Data Visualizations 3/3



- Sea currents

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

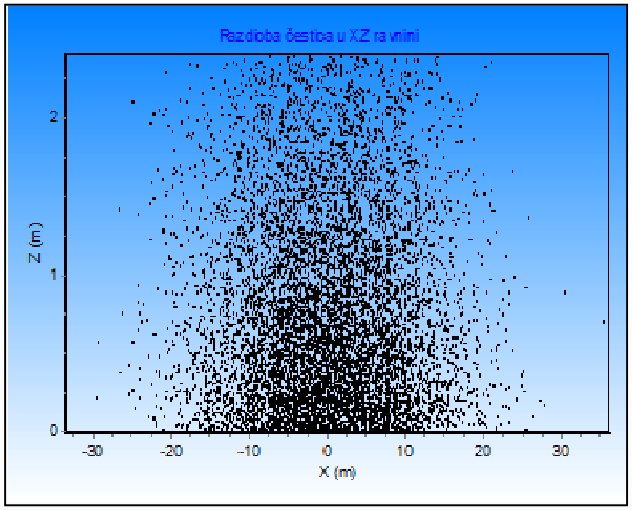
Numerical Modeling (Experimental)



- ROMS model, station data
- PARTRACK model- sediments distribution

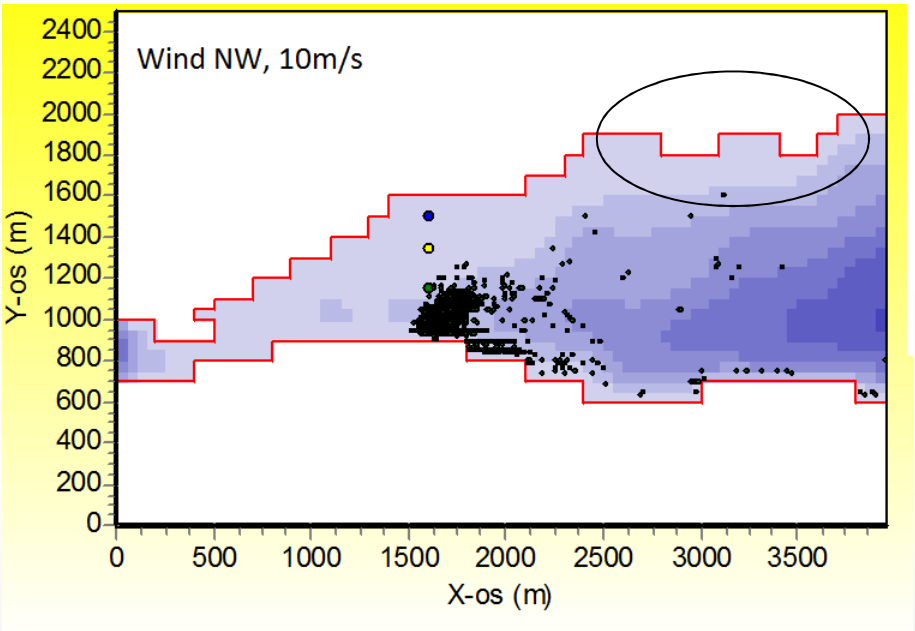
INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

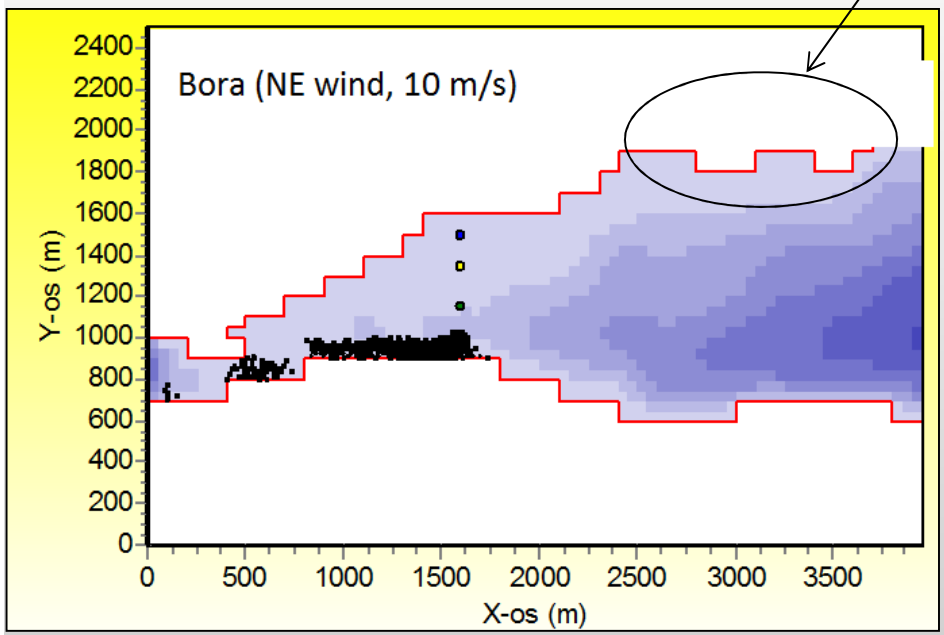
Influence of winds and currents on of sediment particles movements after 1 hour (PARTRACK model)

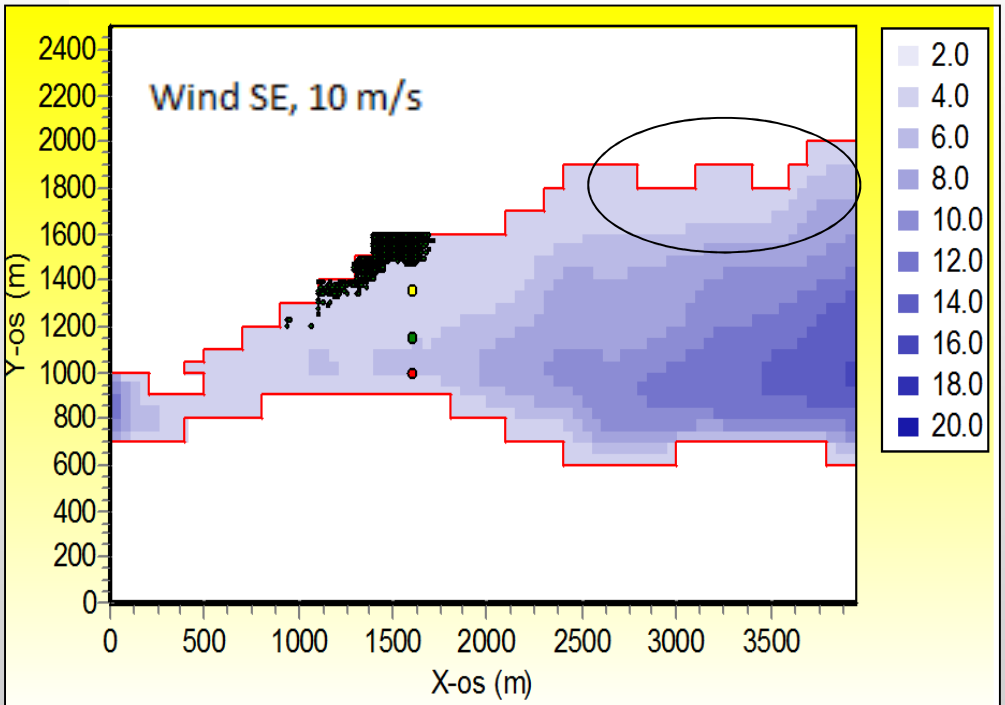


Modeling of sediments distribution in water column during digging for central bridge pillar

Protected area







Data validation

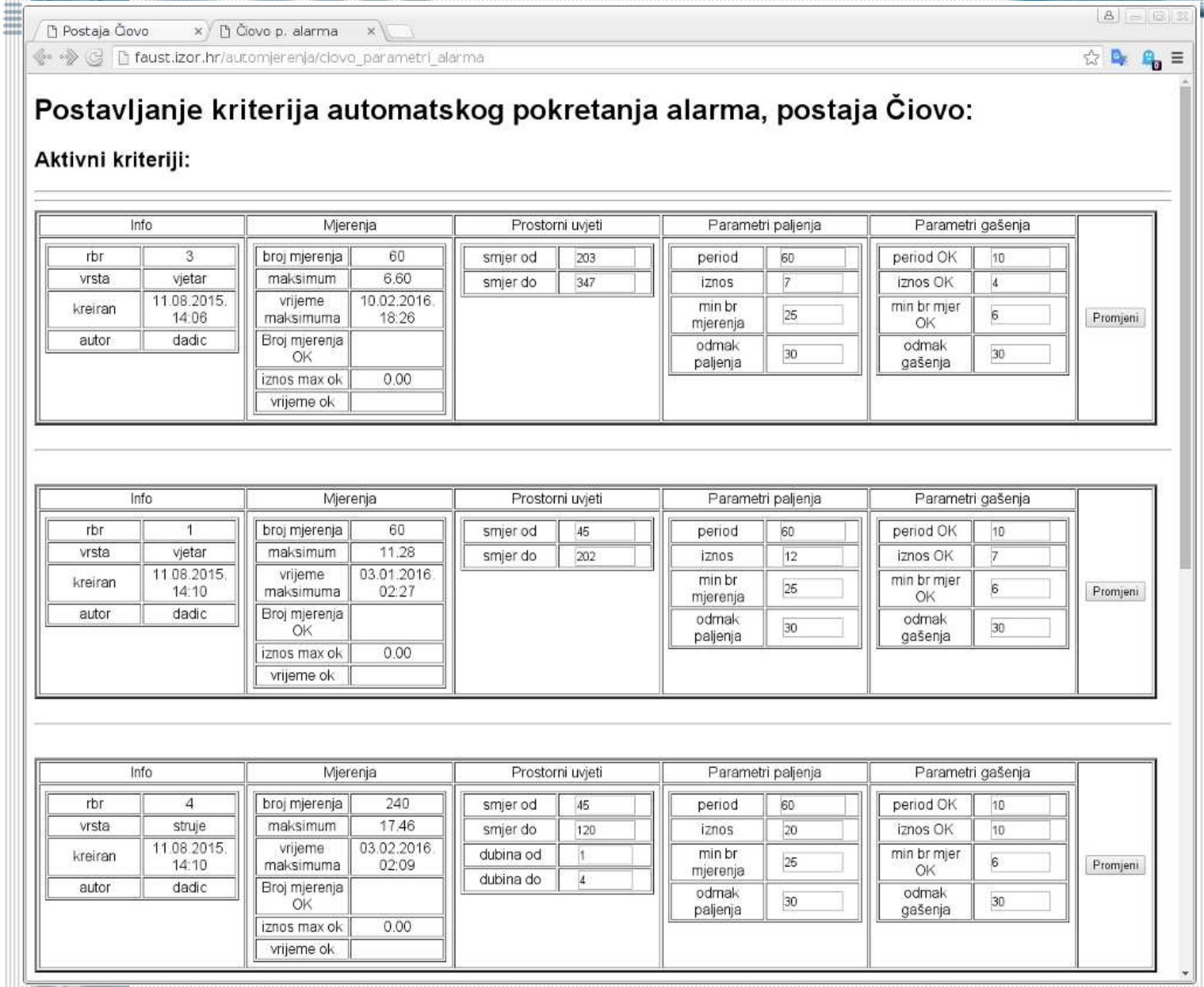
Automatically by database:

- broad ranges (min, max, std)
- gradient: in space and time
- parameters data comparison
- measuring data and model results comparison

Control of red alarm switch on/switch off

- predefined number of acceptable speed and direction of wind and currents
- Predefined number of over speed values of wind and currents
- Delay in red alarm switch on/switch off

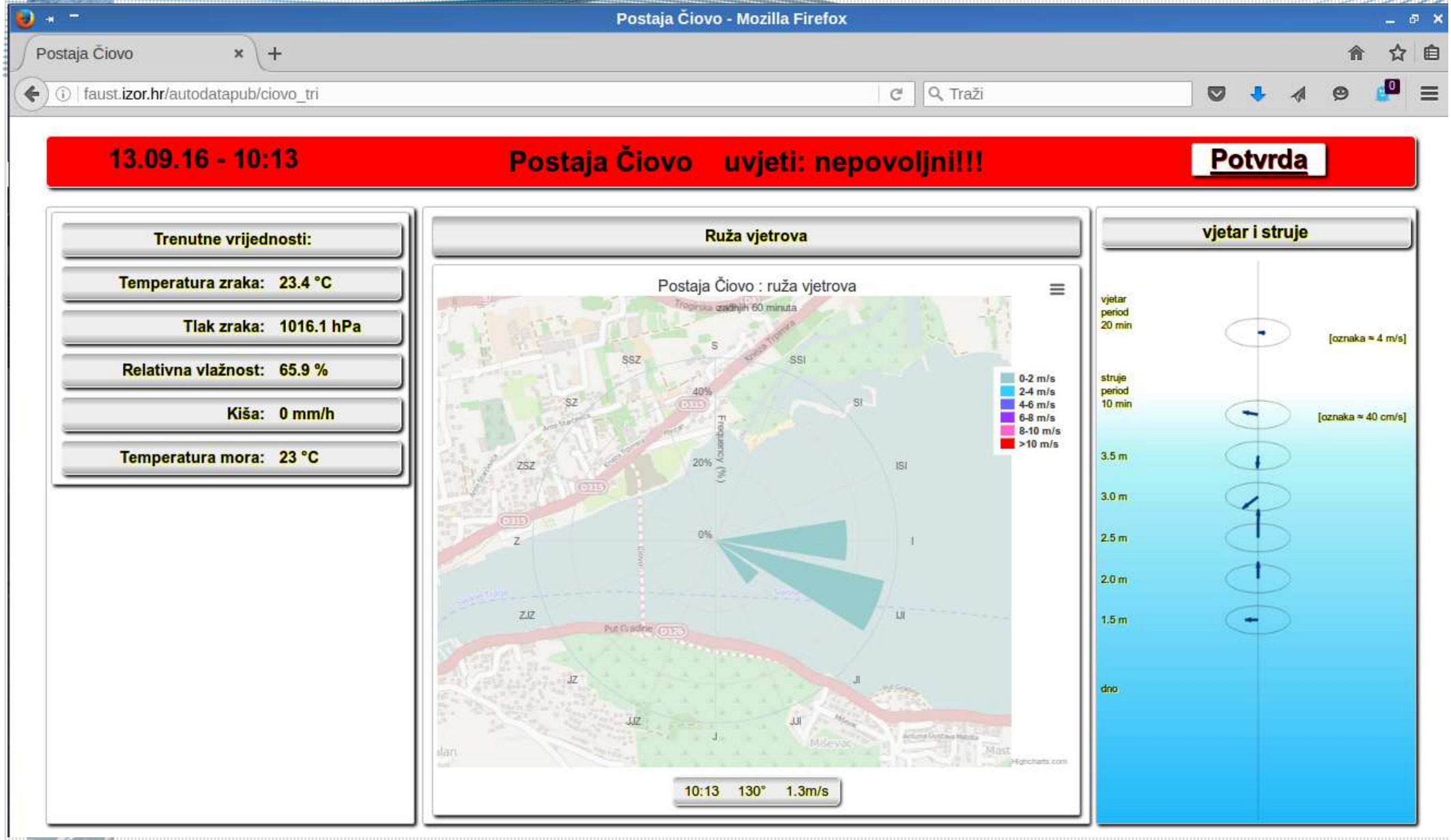
Data Processing



- Loading process (crontab)
- Wind and sea currents criteria

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Alarm Notification

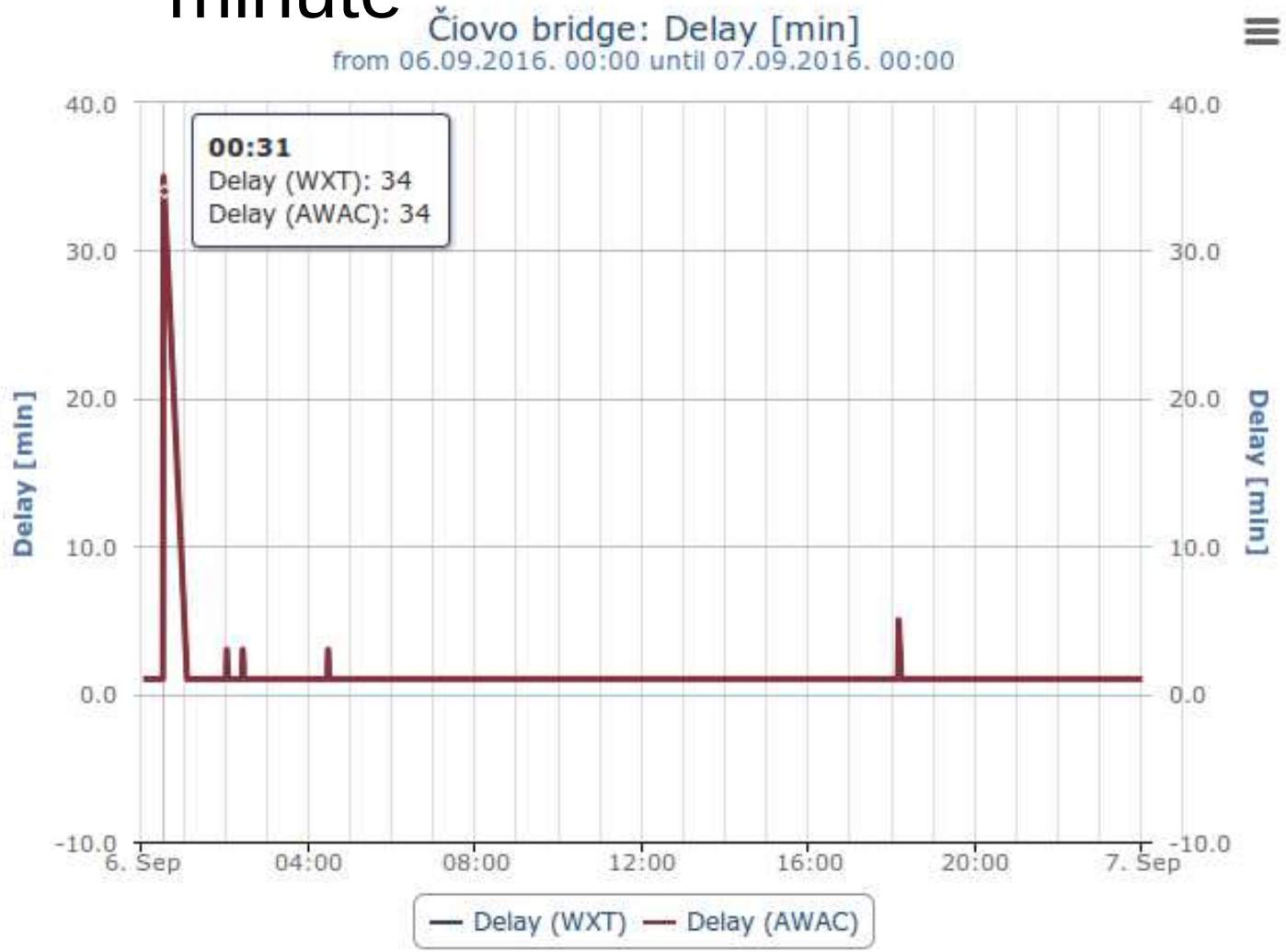


Special web page and Email

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Results 1/2

- Data delay usually 1 minute



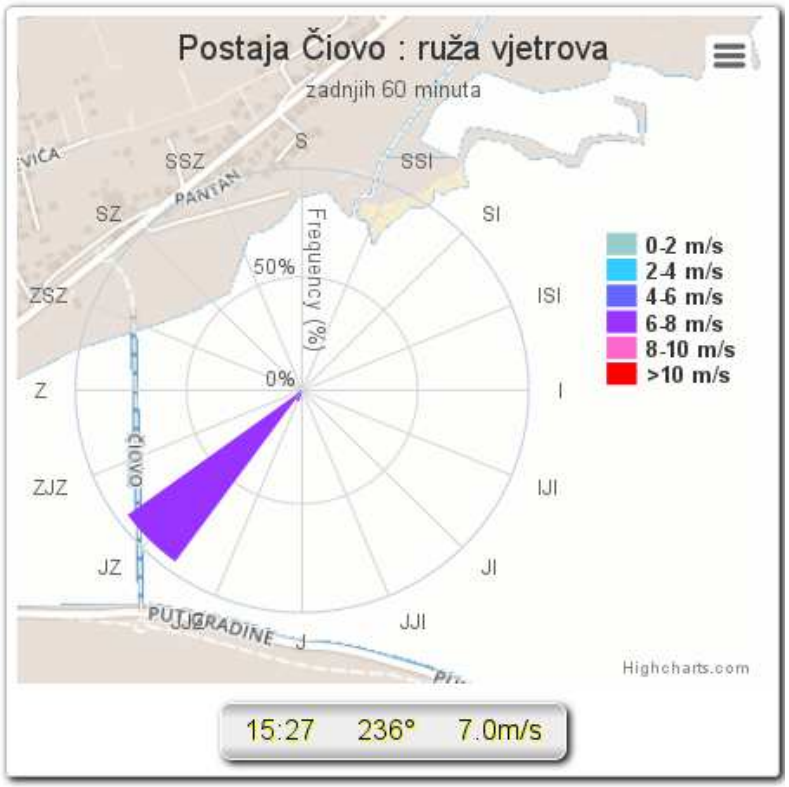
INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Results 2/2 (Statistics)

- From 24.07.2015. until 11.10.2016. (445 days) measurement percentage is 99,93% (number of measurements / number of minutes * 100)
- Average time from measurement to transferred and processed data is 1.4 minutes. There was 640325 measurements.
- Standard delay is one minute, and standard delay because of station restart (once a day) is six minutes.

Red alarm Statistics

- In 445 days there was total 466 alarms
- Average alarm duration is 87.97 minutes
- Alarm was on (works should be stop) 6.4% of total time
- 86% of alarms are caused by sea currents and rest of 14% is caused by winds



INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT

Conclusions

Regular and on-line measurements with data assimilation into numerical models can:

- help in protection of ecologically important area located in vicinity of construction work in the sea
- many important alerts can be issued: meteo-tsunami alerts, big wave alerts etc
- system like this can be used for beaches monitoring (fecal and other pollutants spreading) and for informing wide public about conditions at the sea (turism, fisheries and safety at the sea)

Http://faust.izor.hr/autodatapub/coastal_station

Thank you for attention!

INSTITUTE OF OCEANOGRAPHY AND FISHERIES SPLIT