DEFINITION OF THE NATURAL SEDIMENT DYNAMICS BEFORE THE DREDGING OF THE PORT OF GENOA (ITALY)

M. Capello¹, R.M. Bertolotto², A. Pieracci³, L. Cutroneo¹, F. Gaino², S. Tucci¹, P. Povero¹, M. Bassetti⁴, M. Vaccari³, S. Fioravanti⁴

¹ DIP.TE.RIS. - University of Genoa, Genoa (Italy)
² A.R.P.A.L., Genoa (Italy)
³ Genoa Port Authority, Genoa (Italy)
⁴ N.U.R.C, La Spezia (Italy)

Oslo, 27th-29th May 2008
Polcevera torrent

Bisagno torrent

a – $1.7 \times 10^6$ m$^3$

(130,000 m$^2$ ca)

b – $0.7 \times 10^6$ m$^3$

(44,000 m$^2$ ca)
ANALYSES CARRIED OUT IN THE WATER COLUMN
(5 campaigns)

Suspended particulate matter
(Total, Organic and Inorganic Particulate matter)

Dimensional analyses of the TPM

Physical data and turbidity

Measures of current with the V-ADCP

Calibration “TPM vs turbidity” data for the ADCP

Evaluation of the TPM with the V-ADCP and SediView
Horizontal distribution of the TPM (mg l\(^{-1}\)) (27.02.2008)
Vertical distribution of the TPM inside the Port (transect 9-1)

(direction of the wind)

SW <- SE

N <- NE

SE

(the vertical scale is exagerate)
station Grima 0 - h. 10:16 - $1.0 \times 10^6$ particles l$^{-1}$
station Grima 1 - h. 10:32 - $6.0 \times 10^6$ particles l$^{-1}$
station Grima 4 - h. 10:44 - $3.5 \times 10^6$ particles l$^{-1}$
station Grima 6 - h. 10:50 - $1.5 \times 10^6$ particles l$^{-1}$
Physical parameters

Surface

Bottom

Turbidity (FTU)
wind swinging from SE to SW - Depth: 2.0 m

25 cm s$^{-1}$
wind swinging from NE to N - Depth 2.0 m
wind from SE - Depth 2.0 m
Calibration of the turbidimeter

turbidity (FTU) vs TPM (mg l$^{-1}$)

$y = 0.1468x + 3.8654$

$R^2 = 0.9528$
27.02.08 - Station 1, near the *Posidonia o. meadows* (wind swinging from SE to SW)

TPM concentration (mg l\(^{-1}\))
27.02.2008 - Station 3, eastern entrance to the port
(wind swinging from SE to SW)
21.03.2008 - Station 8, western entrance to the port
(wind from SE)

TPM concentration (mg l⁻¹)
27.02.2008
(wind swinging from SE to SW)

“Grimaldi” experiment - turbidity (FTU)

TPM concentration (mg l⁻¹)

“Grimaldi” experiment
TPM
(ADCP + SediView)
“Grimaldi” experiment - turbidity (FTU)

05.03.2008 (wind swinging from NE to N)

TPM concentration (mg l⁻¹)

“Grimaldi” experiment TPM
(ADCP + SediView)
In brief...

“Normal” conditions:
(higher limits)

Turbidity – 10 FTU
TPM – 6-8 mg l⁻¹
Particles – 1.0 million l⁻¹

“Disturbed” conditions:
(maximum limits)

Turbidity – 60 FTU
TPM – 600 mg l⁻¹
Particles – 6.5 million l⁻¹
Residence time – 45-60’

Winds from SE, SW and NE

I
V
sediments -> inside the port area

Wind from N

I
V
sediments -> outside the port area
Position of the instruments
(red circle, up, and red line, on the right)

Eastern entrance to the Port

(photo: the left "red" light of the eastern entrance to the Port)
Western entrance to the Port

Position of the instruments
(sky-blau circle, up, and red line, on the right)

(photo: the right "green" light of the western entrance to the Port)
Monitoring of Sediment Release during the Dredging
MArine Coastal Information SysTEm (MACISTE)

Port Section
...thank you!!!