

SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

Roberto Feo^a, Giuseppe Barbera^a, Nadia Di Prima^a, Maria Gabriella Giustra^a,
Vincenzo Pampalone^a, Gaetano Di Bella^a and Gabriele Freni^a



^aFacoltà di Ingegneria ed Architettura, Università "Kore" di Enna



AARHUS
UNIVERSITY

DEPARTMENT FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

GENERAL AIMS OF THE RESEARCH



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni

- ❖ Verify the suitability of Ecomapper, an Autonomous Underwater Vehicle (AUV), in waters where critical contamination condition results in a health hazard
- ❖ Develop a new methodology of monitoring systems by using Autonomous Underwater Vehicles (AUVs)
- ❖ Monitoring seawater in the northern zone of Augusta Harbour (Sicily, Italy), one of the most polluted ports of Mediterranean Sea



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

INDUSTRIAL PROJECT

SIBSAC

SIBSAC is an industrial research project funded on economical resources of the Italian Programma Operativo Nazionale Ricerca e Competitività 2007-2013 n° 01_01844 Ministero dell'Ambiente e della Tutela del Territorio e del Mare.

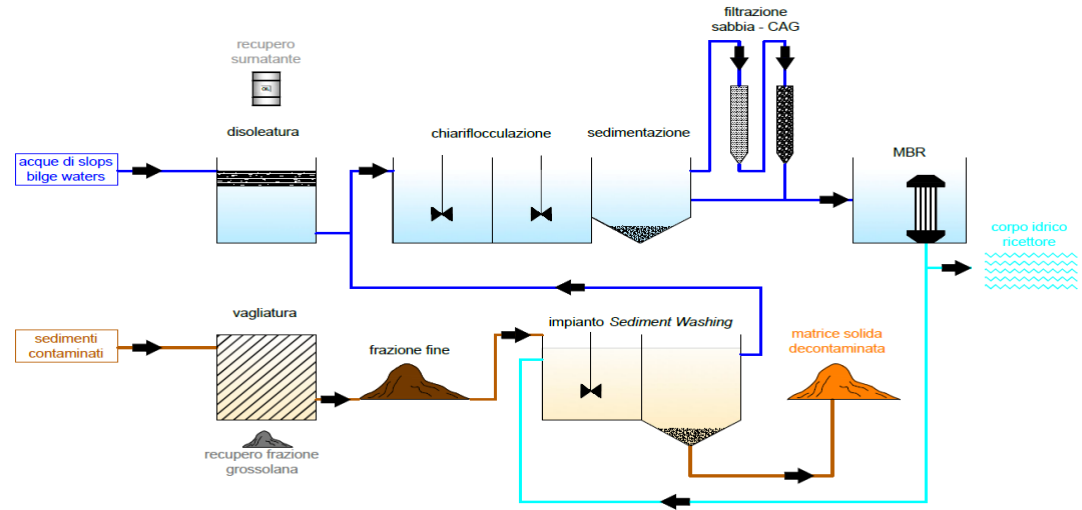


SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni

SCHEMA DEL SISTEMA INTEGRATO DI TRATTAMENTO

Linea Acque - Linea Sedimenti



AARHUS
UNIVERSITY
DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

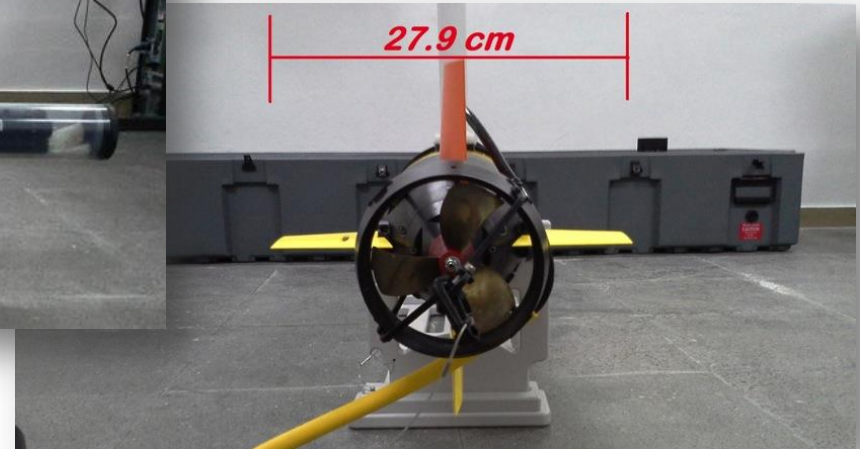
SCIENCE FOR THE ENVIRONMENT
01 OCTOBER 2015

ECOMAPPER AUV



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY
DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT
01 OCTOBER 2015

ECOMAPPER AUV

Probes and Sensors



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY
DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT
01 OCTOBER 2015

STUDY AREA

Augusta Harbour (Siracuse, Italy)



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



- ✧ N-S length: 8 km;
- ✧ E-W: 4 km;
- ✧ Mean depth: 15 m;
- ✧ Area: 23.5 km²;
- ✧ 2 mouths connect the harbour with open sea
- ✧ Several piers are located along the coastline



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

STUDY AREA

Augusta Harbour (Siracuse, Italy)



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



1998 Contaminated Site of National Interest



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

MISSION DESIGN



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY
DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

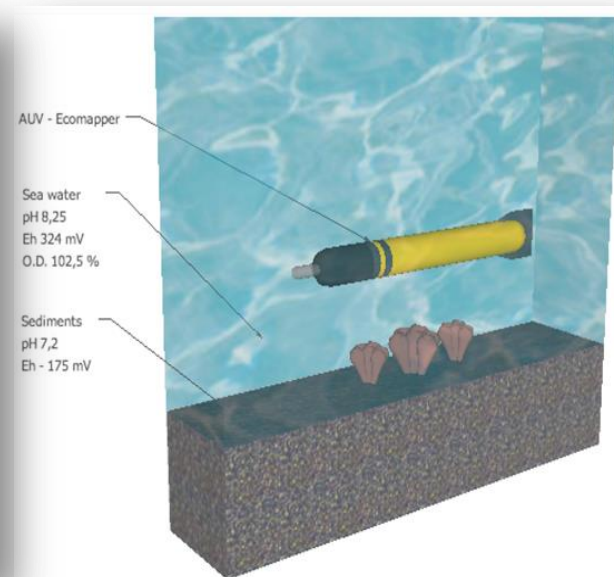
SCIENCE FOR THE ENVIRONMENT
01 OCTOBER 2015

DATA ACQUISITION



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

PROBLEMS



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

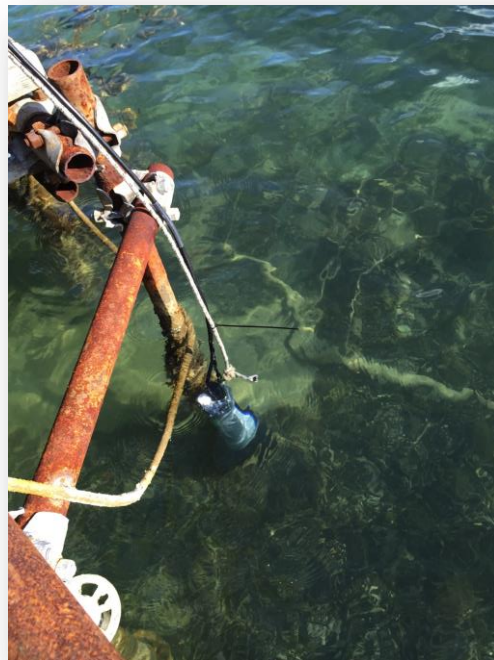
PROBLEMS

DATA INTEGRATIONS



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

RESULTS

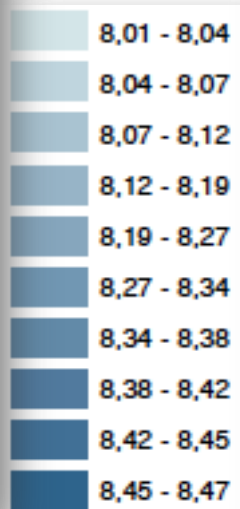


SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

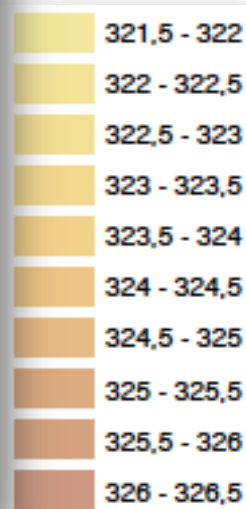
R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



pH



Eh mV



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

RESULTS

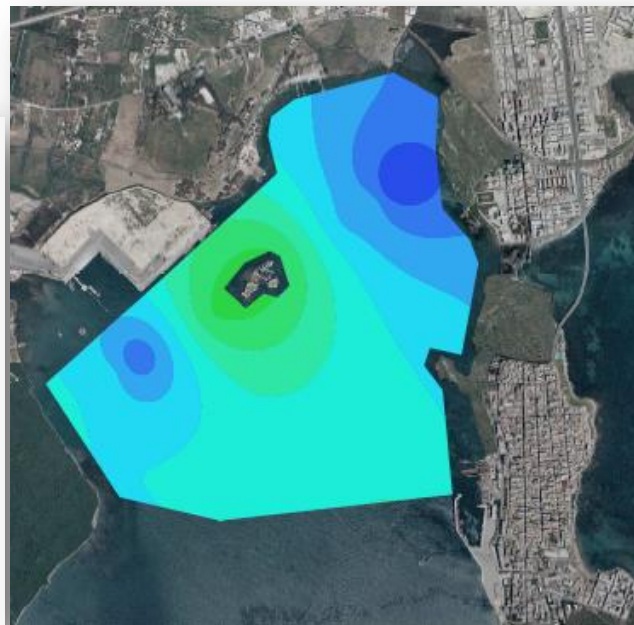
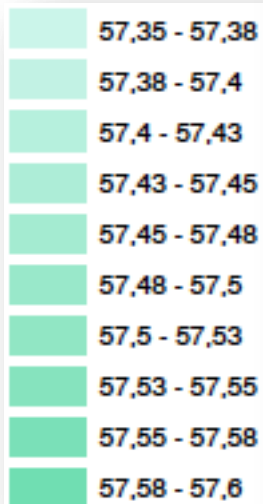


SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

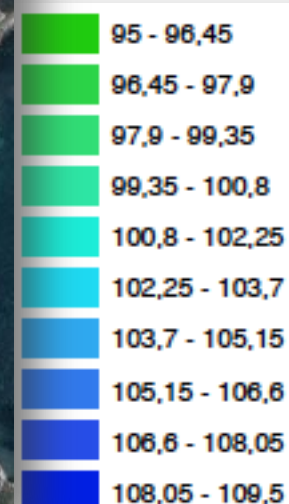
R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



**Cond.
mS/cm**



DO%



AARHUS
UNIVERSITY

DCE - DANISH CENTRE FOR ENVIRONMENT
AND ENERGY

SCIENCE FOR THE ENVIRONMENT

01 OCTOBER 2015

CONCLUSION



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni

- ✧ Use of Autonomous Underwater Vehicles (AUVs) is an helpful tool in waters where critical contamination condition results in a health hazard
- ✧ AUVs are not always exploitable, particularly in the presence of docks and several reefs
- ✧ The integration of many tools allow the acquisition of various parameters during a single mission, as well as the significant number of data acquired in a short time
- ✧ A good seawater quality condition has been measured in the northern zone of the Augusta Harbour



CONTACTS

Roberto Feo

roberto.feo@unikore.it



SEAWATER QUALITY MONITORING IN AUGUSTA HARBOUR (SIRACUSE, ITALY) THROUGH THE USE OF AN AUV ECOMAPPER

R. Feo, G. Barbera, N. Di Prima, M. G. Giustra, V. Pampalone, G. Di Bella and G. Freni



**AARHUS
UNIVERSITY**