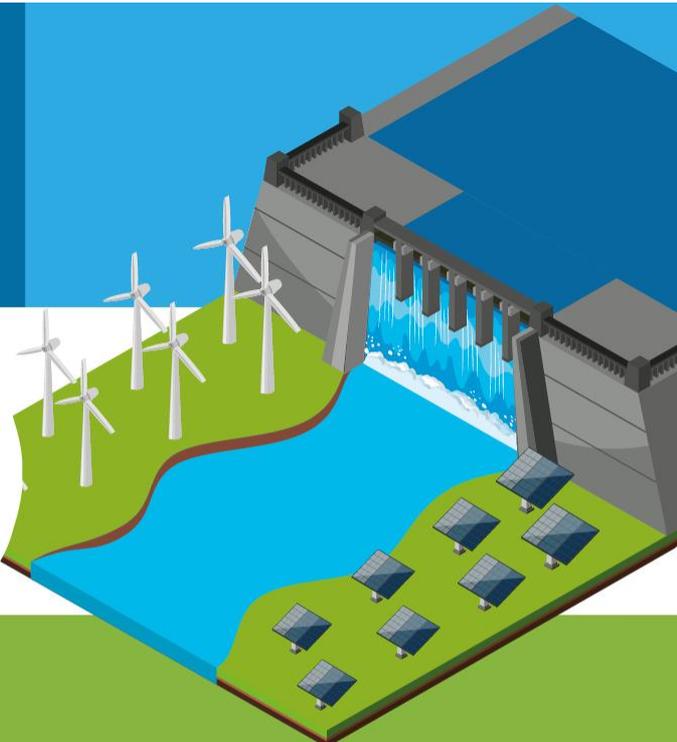




STARTUP COMPETITION

il valore dell'acqua 4.0

Edizione 2020



Organizzato da:



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

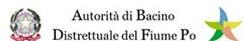
Coordinato da:



In collaborazione con:



Con il patrocinio di:



Ordine dei Dottori Agronomi
e dei Dottori Forestali
della Provincia di Piacenza





OPENSWAP.IT
SHALLOW WATER
AUTONOMOUS PROSPECTOR



OPENSWAP: il primo e più innovativo ASV, anche in kit, tutto made in Italy

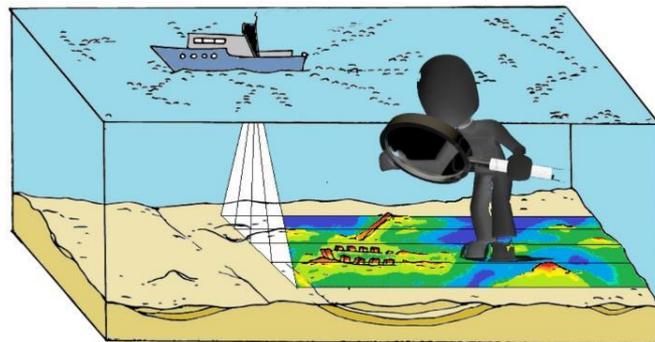
Fabrizio Del Bianco ⁽¹⁾, Francesco Riminucci ⁽¹⁾, Giuseppe Stanghellini⁽²⁾, Francesco Suriano ⁽¹⁾

⁽¹⁾ Proambiente S.c.r.l.- Tecnopolo CNR, 40129, Bologna

⁽²⁾ CNR-ISMAR, Istituto di Scienze Marine, 40129, Bologna

E-mail: f.delbianco@consorzioproambiente.it

Monitoraggio ambienti acquatici



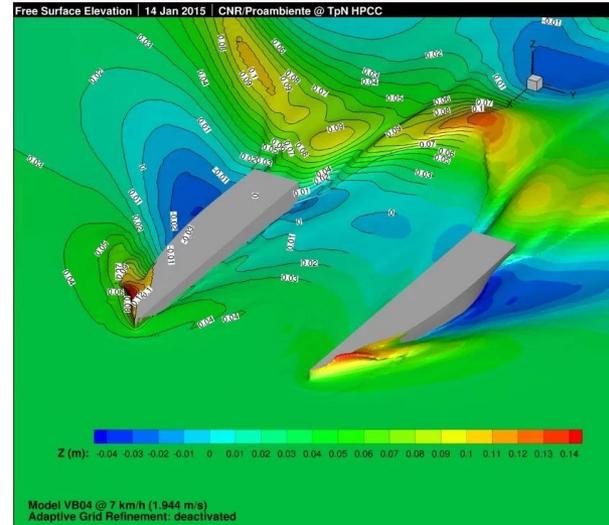
*Tecniche
tradizionali*



*Tecniche
innovative*

Kit modulare e personalizzabile

Alcune caratteristiche



LLDPE – asimmetria – tanto spazio - semplicità

SEMPLICITA' DI UTILIZZO - DETTAGLI TECNICI



Peso del veicolo equipaggiato di 20kg, con eventuale Payload aggiuntivo di 40 kg

Dimensions:

Catamaran Length x Width.....	120x120 cm (Hull 120x30 cm)
Hull & Central Case Material.....	LLDPE
Hatches.....	screw caps with gasket IP67: 2x 24 cm and 2x 12.2 cm – Hull 1x 43.5 cm diameter – Central C
Weight.....	20 kg (w/ 2x LiPO(4S)20Ah batt)
Additional Payload.....	40 kg max
Draft.....	20 cm

Electrical:

Power.....	12-16VDC provided by 2 x LiPOs (4S) 20Ah battery pack
Motors.....	4 brushless (4x 350Wmax) w/ protection grid

Navigation Capability:

Typical Survey Speed.....	1.5-2 knots (3.5 knots max)
Battery Endurance.....	7-8 hours (@ Typical Survey Speed)
Radio Control/Link Range.....	1 km @2.4 GHz (2 km @ 433MHz)
Navigation Software.....	OPENSWAPNAV (Linux) routes planning and real-time remote control with GIS technology using free database of land images



SOFTWARE DI GESTIONE

The screenshot displays the OpenSWAP software interface. The central map shows a satellite view of a coastal area with a blue route overlaid. The route starts with a grid of waypoints and then follows a path along the coast. A red 'MANUAL' button is visible on the map.

SwapCONTROLLER Panel:

- RLAT: 44.5247825
- RLON: 11.3381174
- RYAW: 99.8
- RDST: N/A
- WLAT: 44.5246924
- WLOn: 11.3381854
- WDST: 10m
- WNUM: 1/9
- WTEMP: 0.00°C
- WDEPTH: 1.06m
- 0.1Ah | 0.0 | 0.0 | 0.0
- 0.0Kn | 0.00/ | 0.10km
- 3D FIX/HDG MAGN
- GPS0 1.58m
- *****
- MANUAL
- 16.7V | 0.5A
- P00% R00% | T023°C

Map Legend:

- MANUAL
- 3D FIX/HDG DEADR
- GPS0 1.59m
- 0.01Kn 11m
- 44 31.487562 N
- 11 20.286768 E
- 1/9 - 0.0/0.1Km
- 1.06m

Connections & Maps Panel:

- SWAP connections
- SWAPController UDP port: 5017
- Vehicle ID & KEY for remote service: MBeam 7utemova
- Log data to file: ~/Swap.log
- Maps path & orientation
- Maps path: ~/Maps/
- Maps theme: ~/Maps/Themes/Elevate4/Elevate.xml
- Tile cache path: ~/Maps/TILECACHE/
- Tile store path: ~/Maps/TILESTORE/
- Additional tile servers: Google SATELLITE, NOAPIKEY, Bing SATELLITE, etc.

System Status:

- cpu 03%
- 390.3 GiB
- lan: 192.168.4.128 1000 Mbit/s
- 100%
- 18.07.14:13



SOFTWARE DI GESTIONE

The screenshot displays the SwapCONTROLLER software interface, which is used for managing hydrographic surveys. The main window shows a satellite map with a yellow grid overlaid, indicating the survey track. A red boat icon is positioned on the track, with the date '2019-10-25.txt' displayed nearby. The interface includes a top toolbar with icons for Maps, Ship, Layers, Dash, Zoom in, and Zoom out. A bottom toolbar contains Log, Prefs, Restart, and About buttons. On the left side, there is a 'SwapCONTROLLER' panel with a compass and various data fields. On the right side, there is a sonar plot showing depth data over time, with a red bar at the bottom indicating the current depth and other parameters. Below the sonar plot is a video feed showing a lake scene.

SwapCONTROLLER Data Panel:

RLAT: 44.5399437	RLON: 11.3377970		
RYAW: 280.1	RDSI: N/A		
WDAT: 44.5400270	MLON: 11.3372029		
WDST: 48m	WNUN: 47.56		
WTEMP: 18.1 C	WDEPTH: N/A		
0.2Ah	0.0	0.0	0.0
2.5Kn	0.10/	1.60km	
3D FIX/HDG RTKFIX			
GPS0 1.26m	36°C 1A 1900rpm	37°C 1A 1900rpm	36°C 1A 1705rpm
*****	35°C 1A 1734rpm		
AUTO			
16.2V	7.6A		
P75%	R02%	T033°C	
v/ttyUSB0	input/js0	no gps	

Sonar Plot Data:

4.0ms	
2.4ms	
3.6ms	
4.8ms	
6.0ms	
7.2ms	
8.4ms	
9.6ms	
10.8ms	
12.0ms	

Video Feed Data:

192.168.2.1:8081 - Lettore multimediale VLC

System Status:

cpu 17% | 361,2 GiB | no fan | 100% | 25.10.12:38

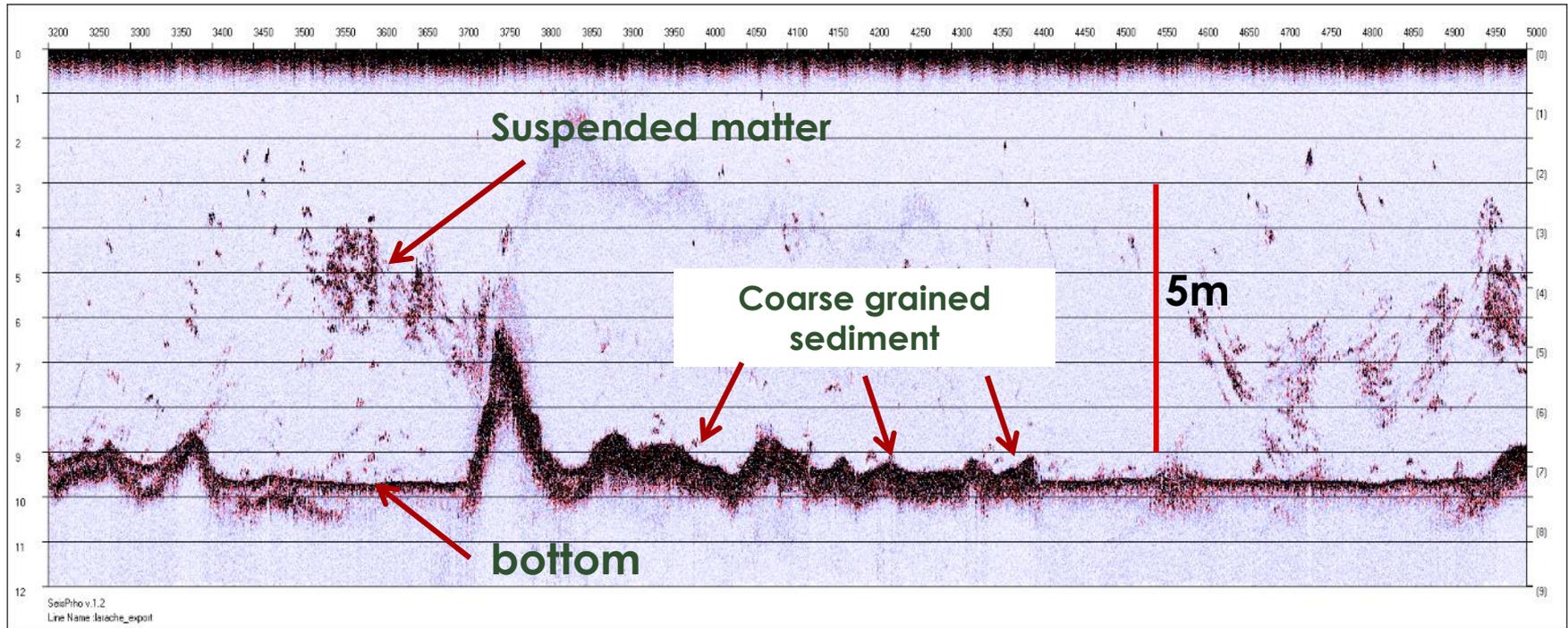
Ripetibilità della navigazione autonoma = precisione 20cm



LINEE BIANCHE: rotte pianificate

LINEE BLU TRATTEGGIATE: linee eseguite in automatico

Ecoscandaglio batimetrico

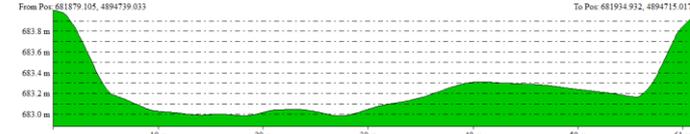
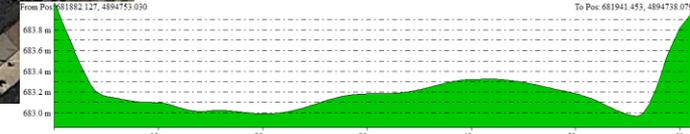
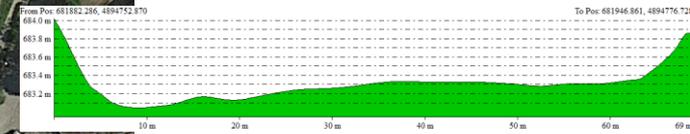
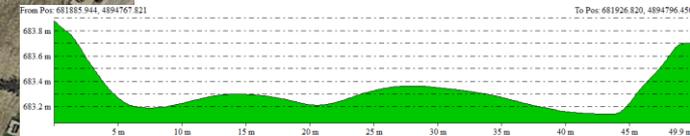
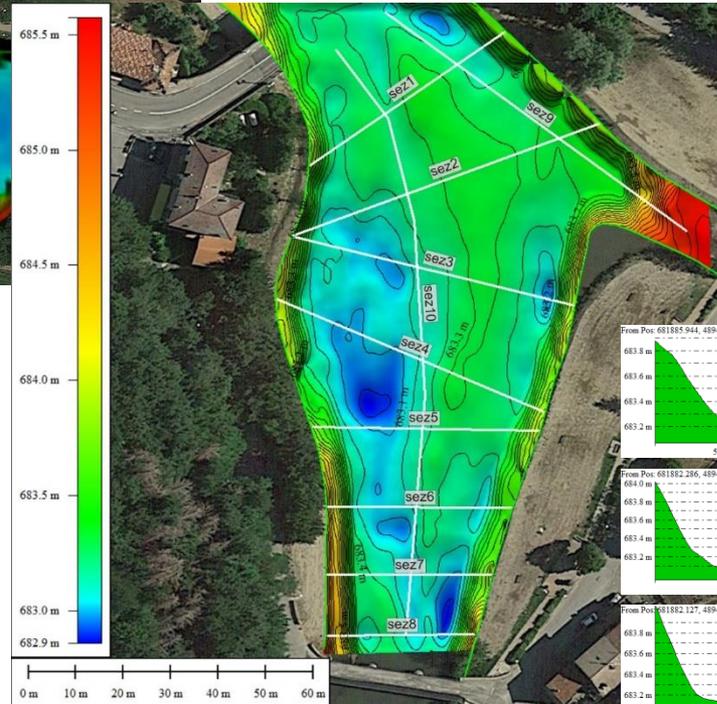
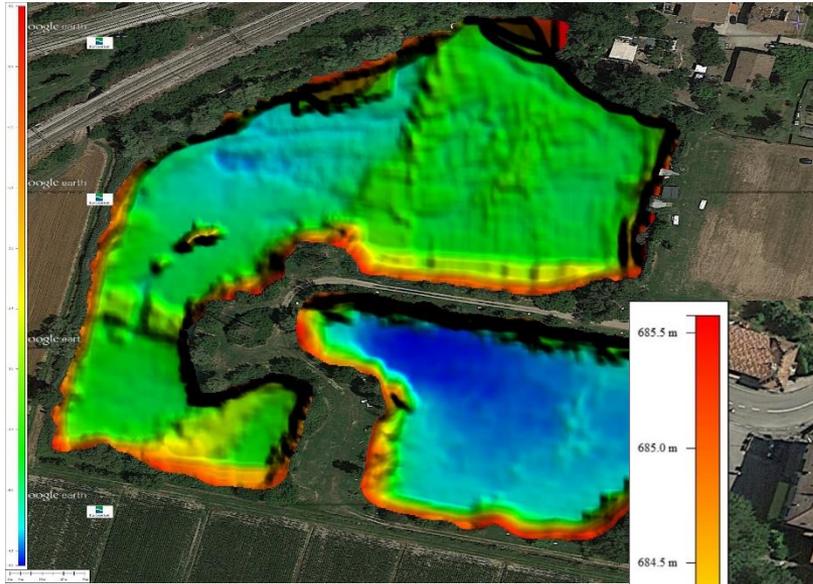


High frequency profiles information is

- High precision depth (bathymetric maps)
- Water column information
- Bottom information (reflectivity \gg grain size)
- Fine sediment depocenters

200 kHz

ESEMPIO DI RISULTATI OTTENUTI



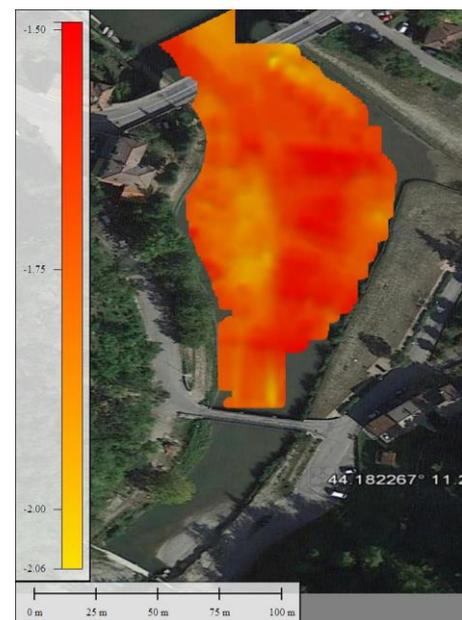
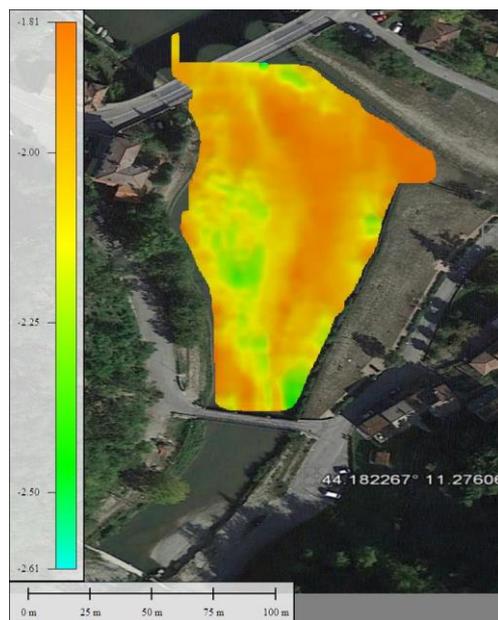
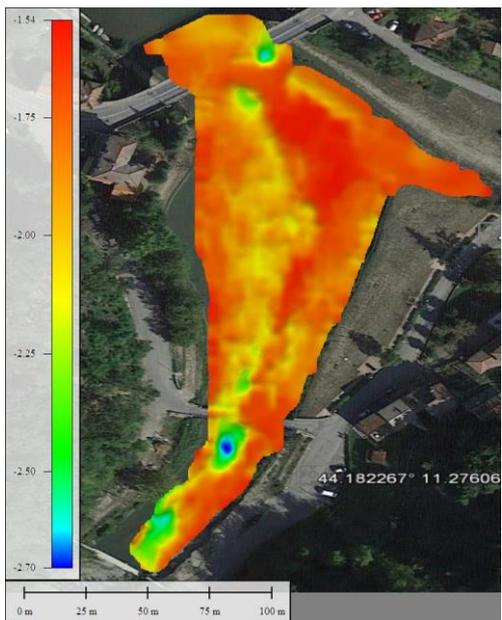
Dicembre 2017



Marzo 2018



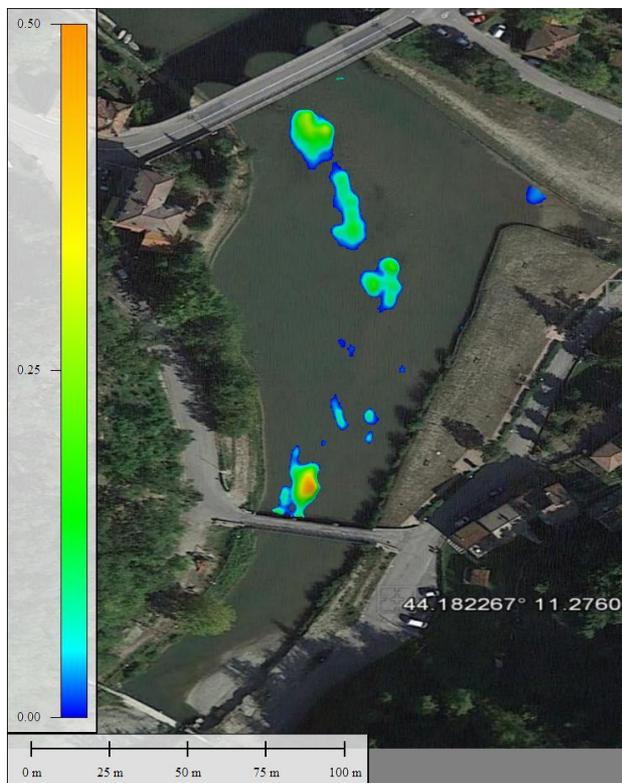
Dicembre 2018



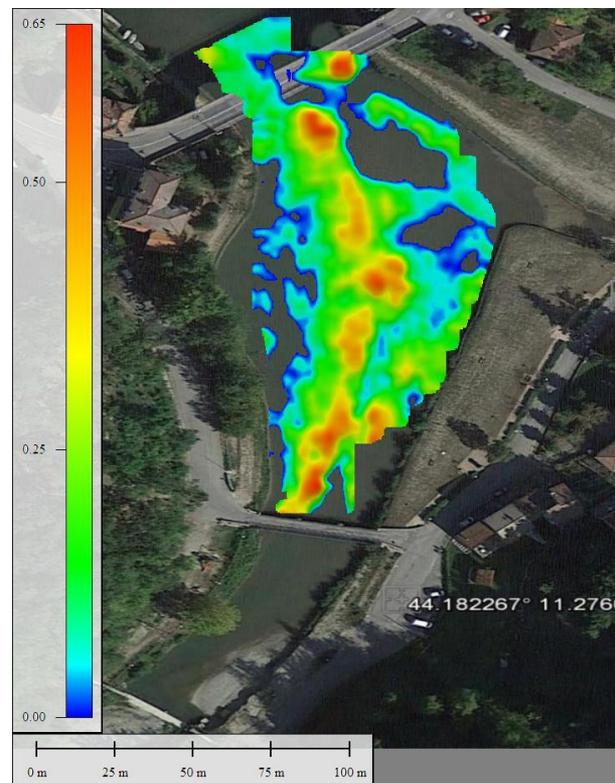
Mappe degli spessori accumulati nel tempo



Dicembre 2017 >> Marzo 2018 (3 mesi)



Dicembre 2017 >> Dicembre 2018 (12 mesi)



...strumenti di ausilio per la programmazione degli interventi di manutenzione

Integrazione con strumentazione commerciale e non

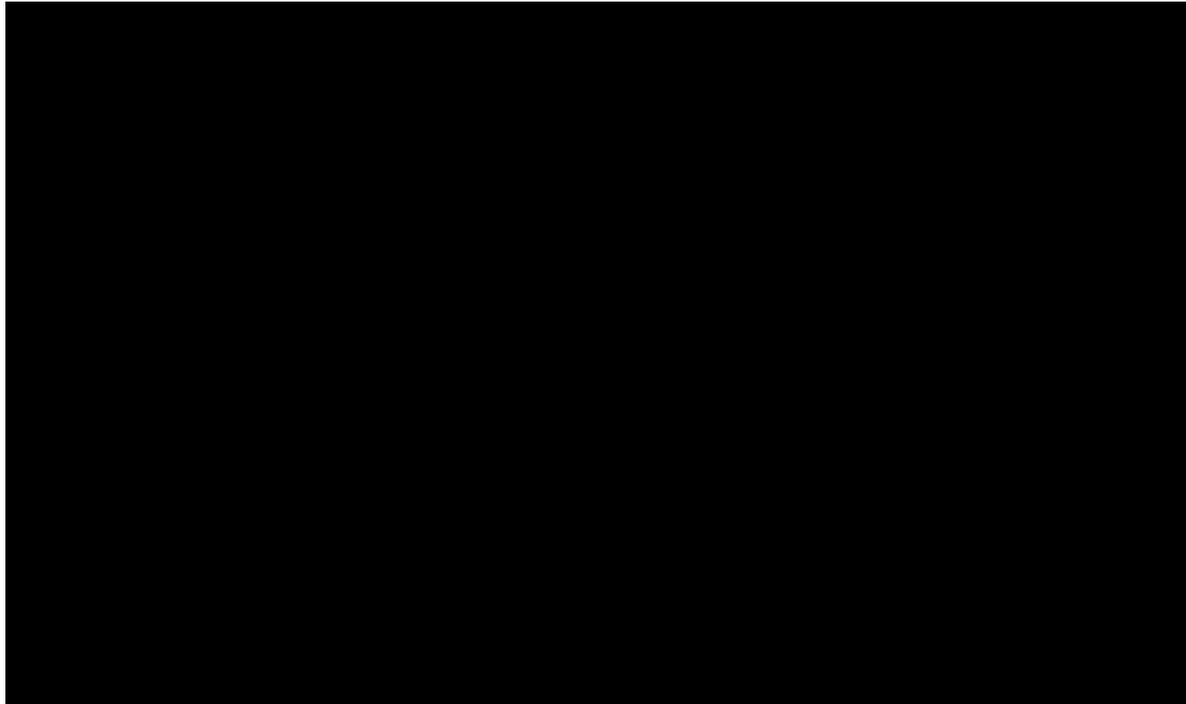


AVAILABLE INTEGRATION:

- EXTERNAL GPS (eg. Trimble);
- ADCP ACOUSTIC CURRENT DOPPLER PROFILER (eg. RDI RiverPro);
- SIDE-SCAN SONAR (eg. Starfish);
- MULTIBEAM ECHOSOUNDERS w/ CUSTOM MRU (Octans emulation);
- MULTIPARAMETRIC SENSOR (CTD);
- WATER SAMPLING;



FILOSOFIA DEL PROGETTO



Piattaforma autonoma acquatica – versatilità – tanto spazio disponibile – facilità di utilizzo – made in Italy
Personalizzazione - Costi contenuti



OBIETTIVI...!!!!



OPENSwap - Hydro

Sistema completo -ready to use-
per rilievi batimetrici single-beam

OPENSwap - Kit

Configurazioni variabili
ed auto assemblabili

OPENSwap - Custom

Sistema personalizzato in base alle
Richieste del cliente



OPENSAP.IT

SHALLOW WATER
AUTONOMOUS PROSPECTOR



*Grazie
per
l'attenzione*



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