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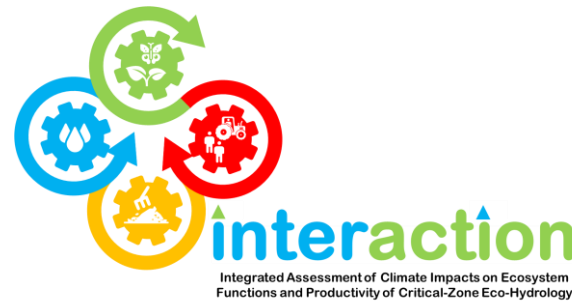
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Italiadomani
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DI RIPRESA E RESILIENZA



Il ruolo dell'IRSA negli studi sull'intrusione marina: progetti e metodologie negli ultimi 10 anni



Maria Clementina Caputo

Studio quali-quantitativo sperimentale e modellistico riguardante il sistema idrogeologico di alimentazione del lago Alimini Piccolo o Fontanelle



June 2013 – December 2014

Coordinator: M. Vurro

Scientific Managers:
M.C. Caputo, I. Portoghese

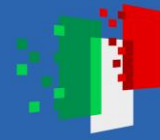
IRSA team:
R. Masciale, L. De Carlo,
A. Pagano, V.N. Palmisano



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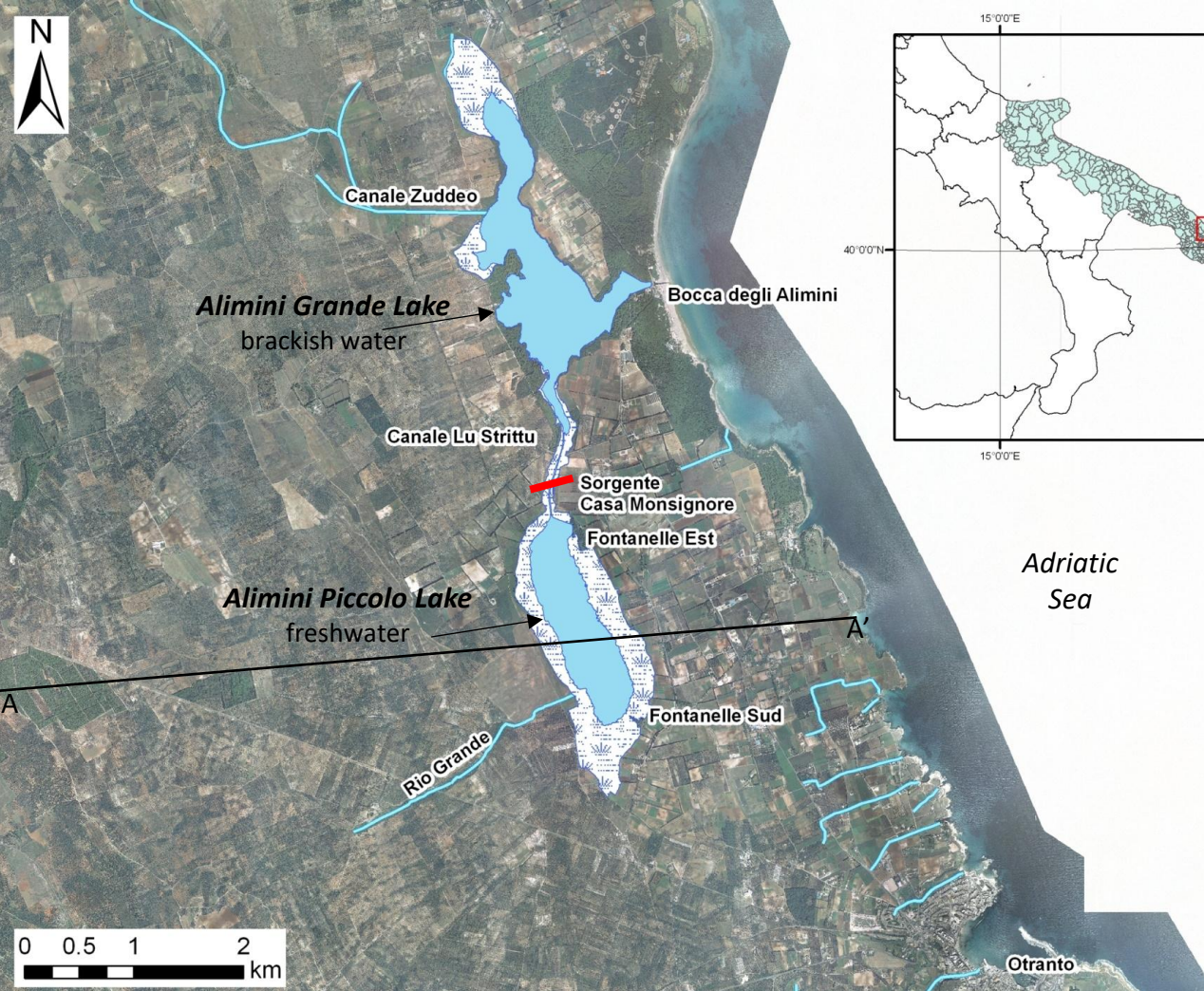
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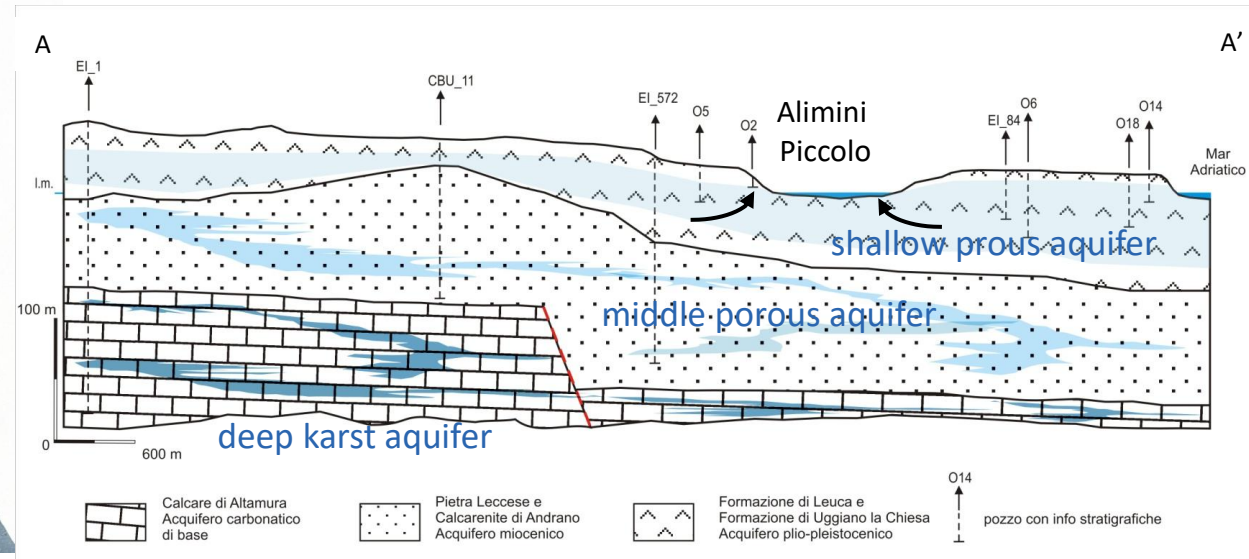


PROGETTO ALIMINI



Aim

- Characterization of the hydrogeological system that feeds Alimini Piccolo lake
- Qualitative and quantitative assessment of Alimini Piccolo water for potential use as drinking water after purifying process



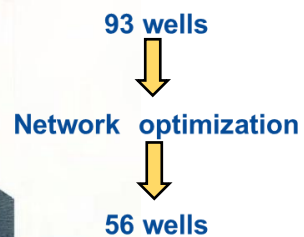


Quantitative monitoring network

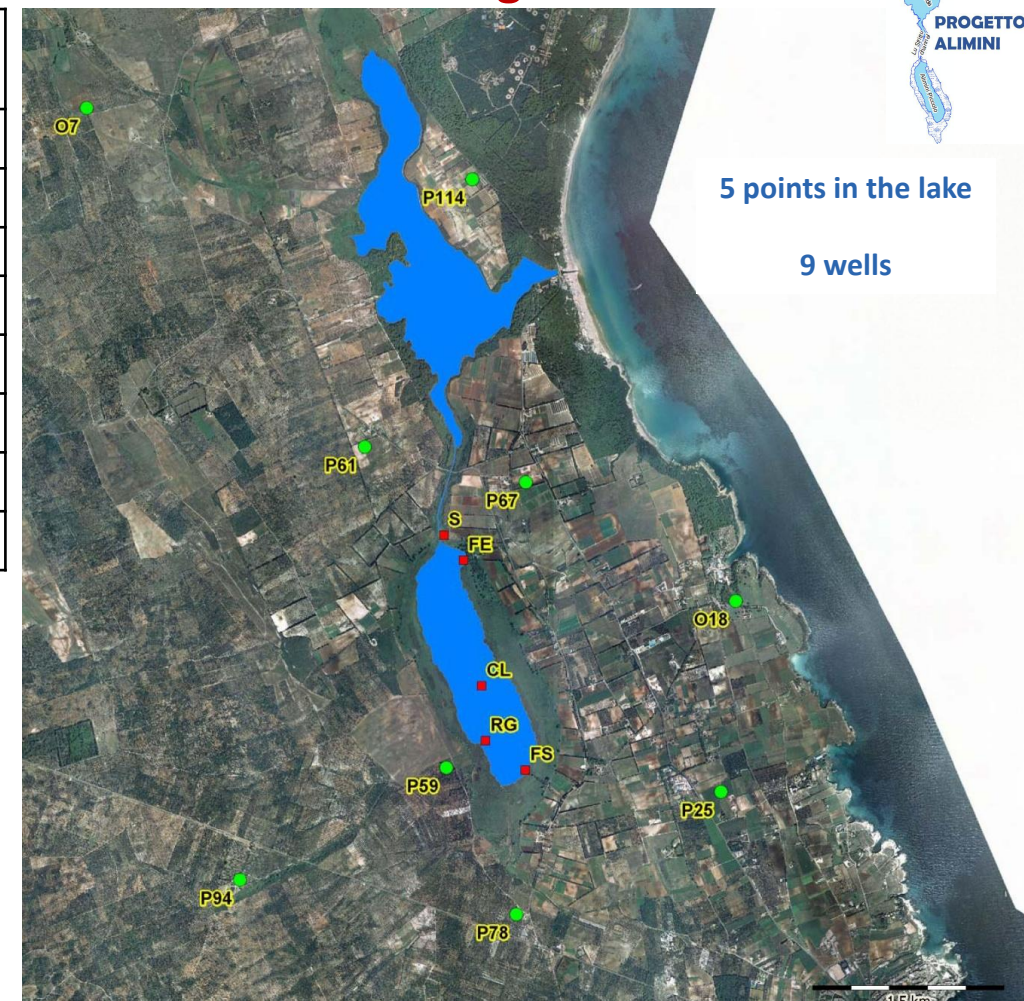


Monitoring campaigns	Quantitative monitoring	Qualitative monitoring
Lug 2013	X	
Ago 2013	X	
Set 2013	X	X
Dic 2013	X	X
Feb 2014	X	X
Apr 2014	X	X
Giu 2014	X	
Lug 2014	X	

Groundwater monitoring network



Qualitative monitoring network



5 points in the lake

9 wells





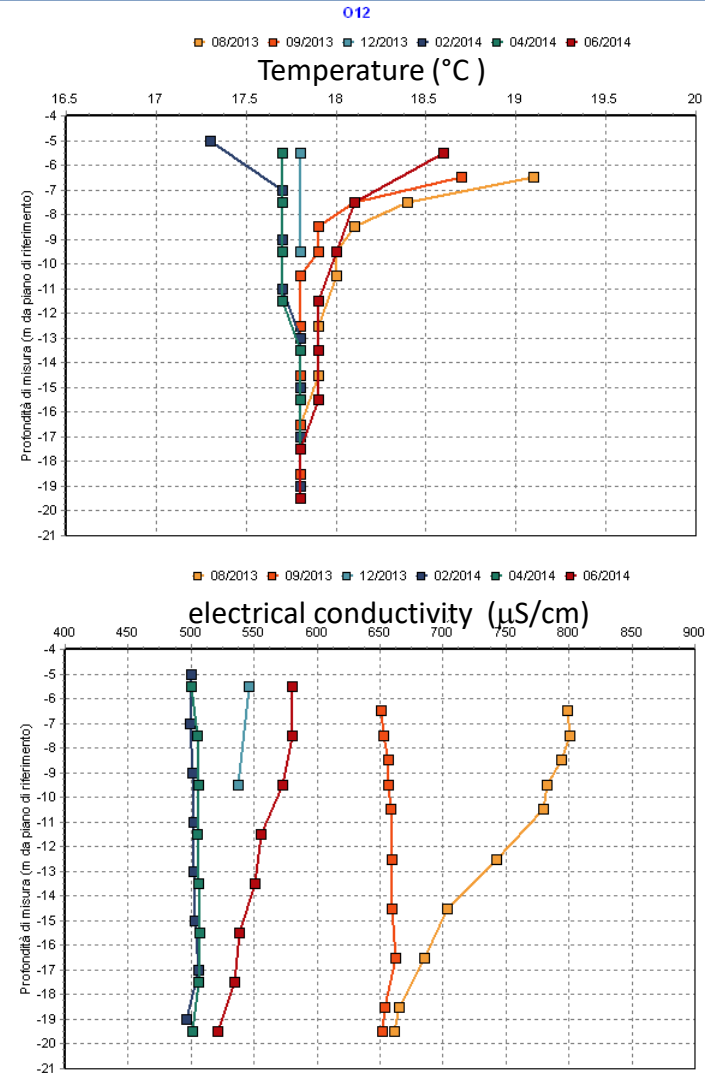
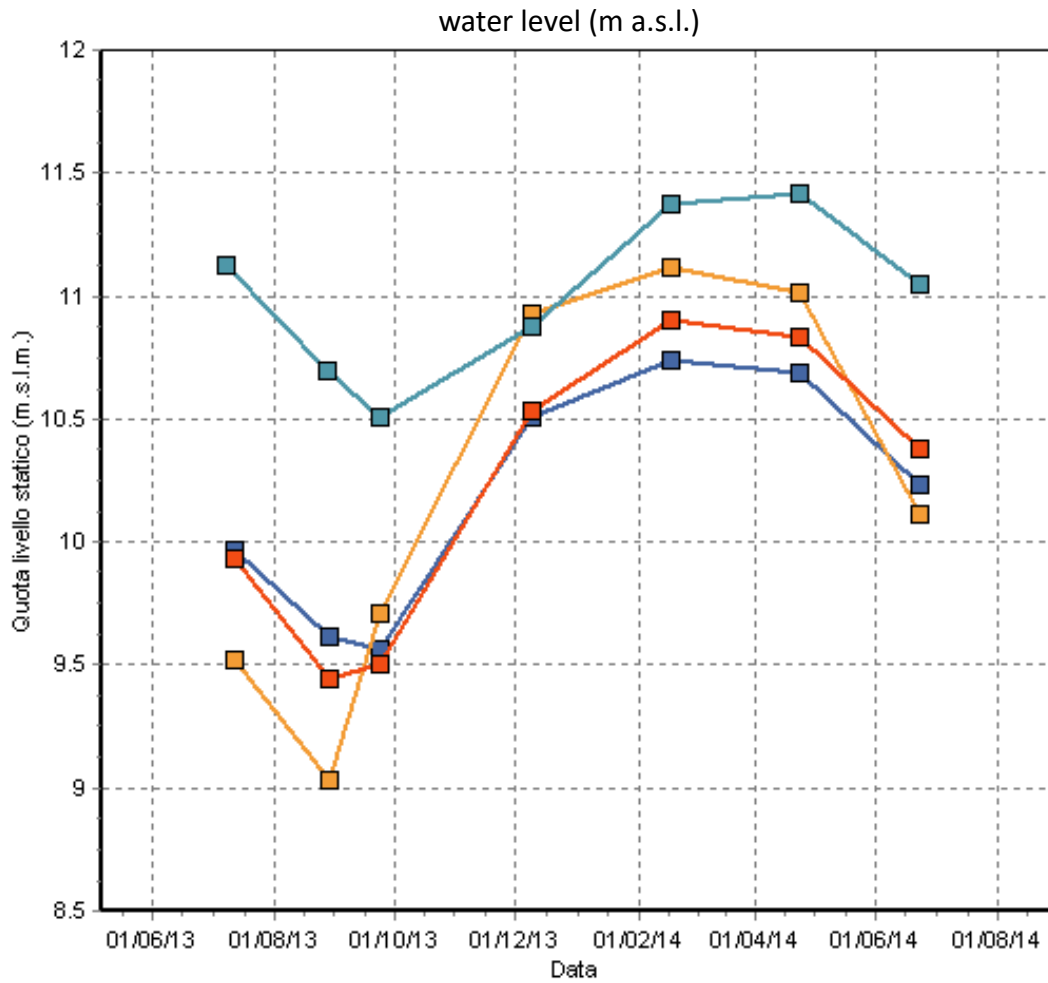
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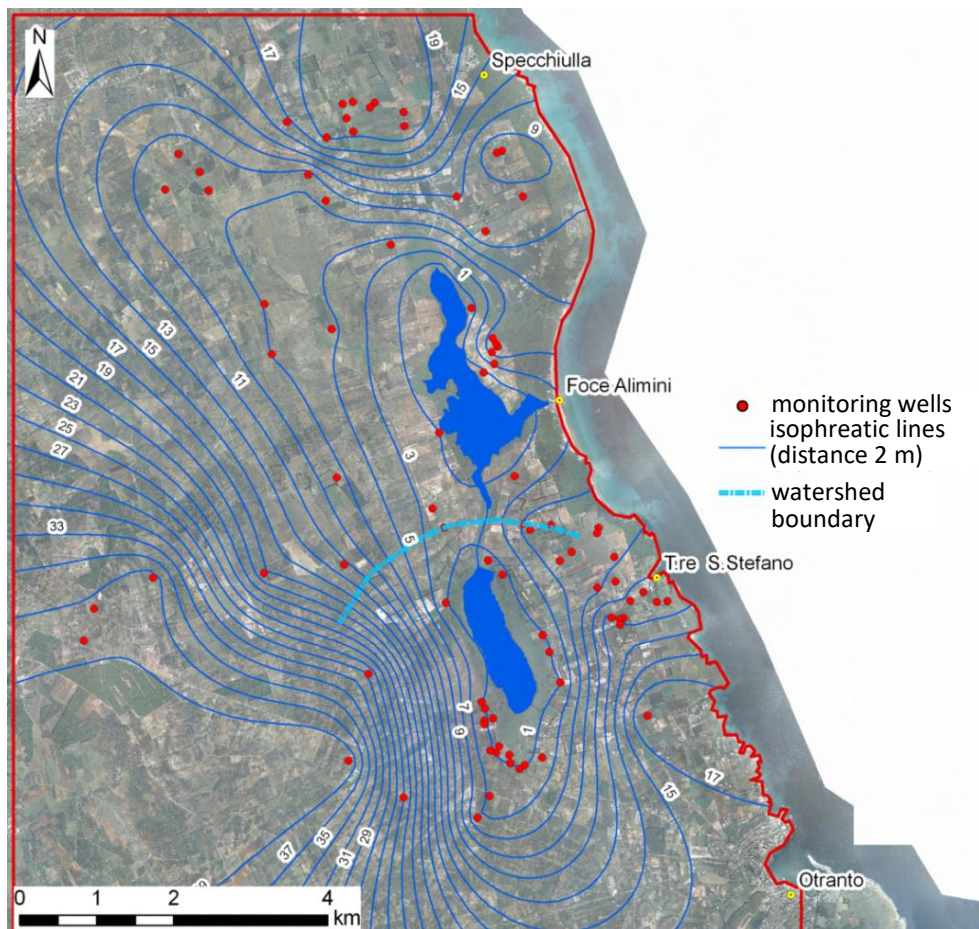
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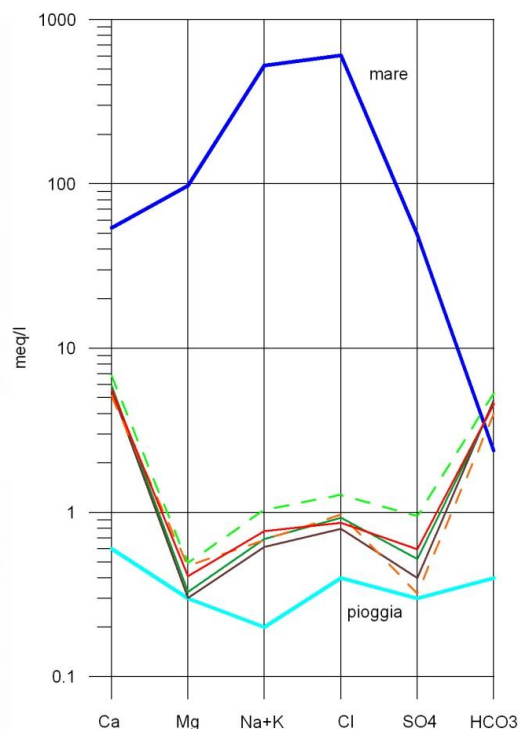
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Phreatic lines (July 2013)



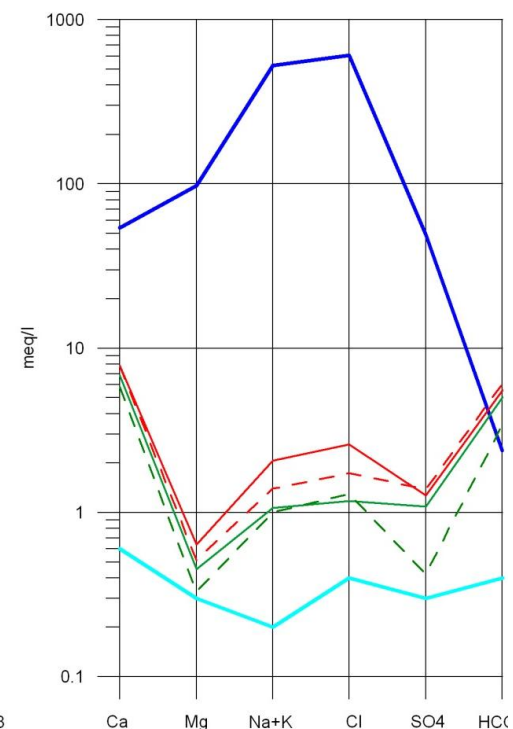
wells further from sea



Pozzi lato monte

- P59
- - - P94
- P78
- - - P61
- O7

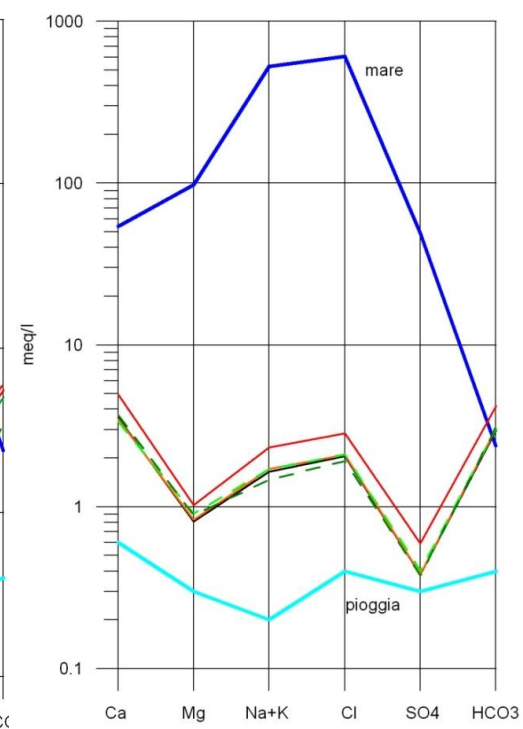
wells closer to the sea



Pozzi lato mare

- P114
- O18
- - - P67
- - - P25

lake



Lago

- - - CL
- - - RG
- FS
- FE
- S



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Valori di Fondo Naturale nei Corpi Idrici Sotterranei Pugliesi



VIOLA Project

Natural background levels for the
groundwater bodies of Apulia Region

July 2018 – March 2023

Coordinator: G. Passarella

Scientific Managers:

G. Passarella, E. Preziosi

IRSA team:

R. Masciale, S. Ghergo, E. Frollini, D. Parrone, M.
Melita, S. Amalfitano, A. Zoppini, G. Ferrari

IGG team:

M. Salvadori, M. Pennisi



REGIONE
PUGLIA



Il futuro alla portata di tutti

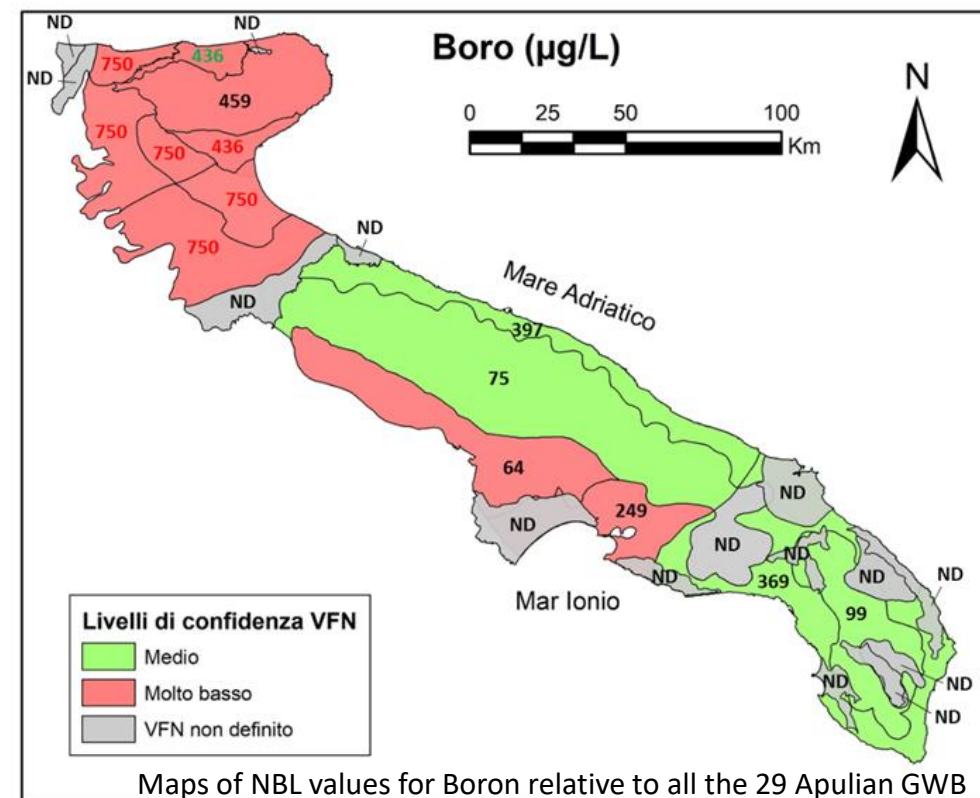
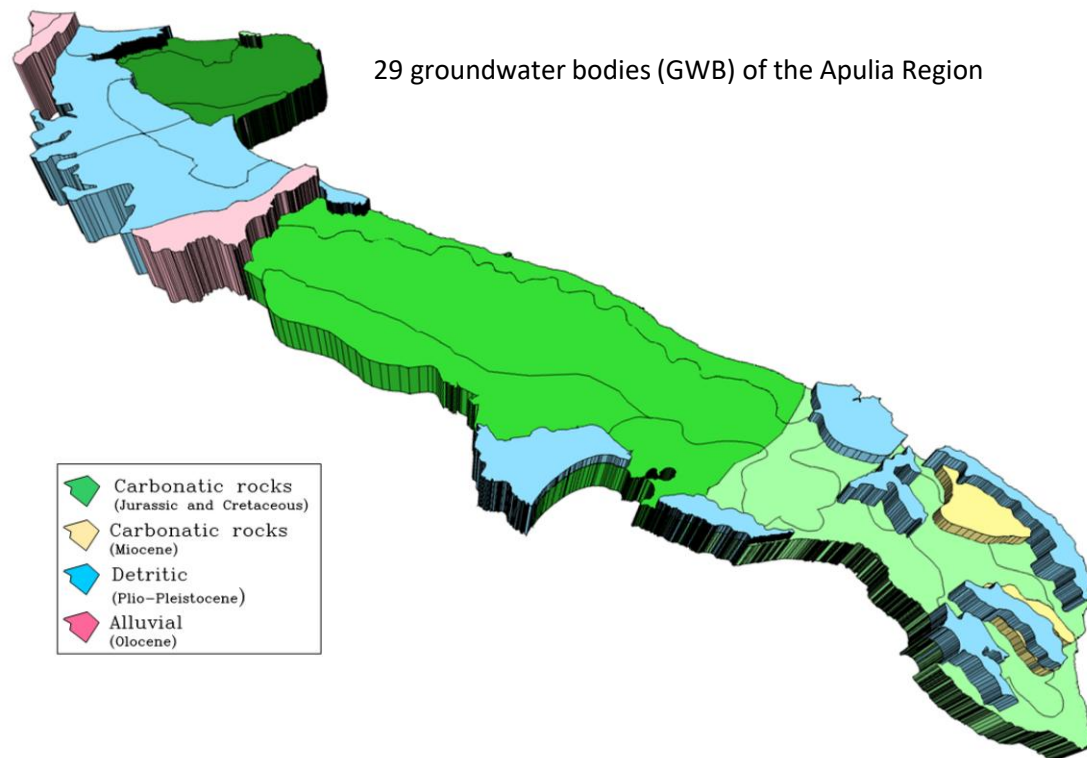
Aim

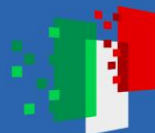
Define Natural Background Levels (NBL - that is the concentration of a substance in a groundwater body corresponding to the absence anthropogenic modifications) for the groundwater bodies (GWB) of Apulia Region, in accordance with the guidelines defined by the Italian Institute for Environmental Protection and Research (ISPRA)



VIOLA Project

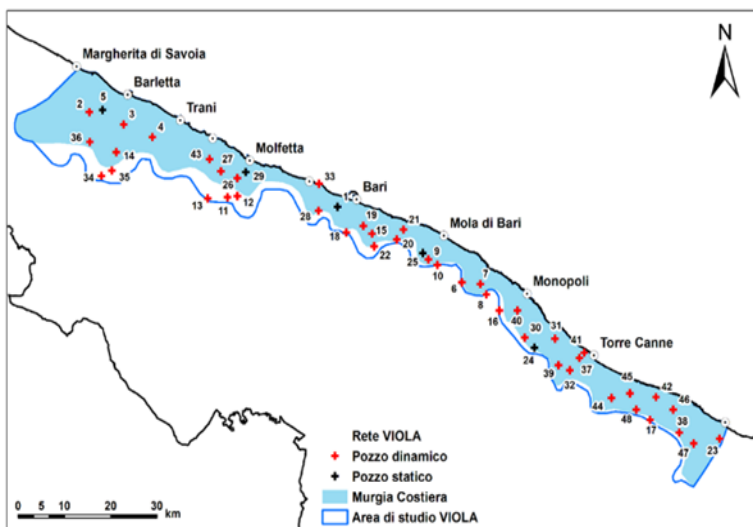
Natural background levels for the groundwater bodies of Apulia Region



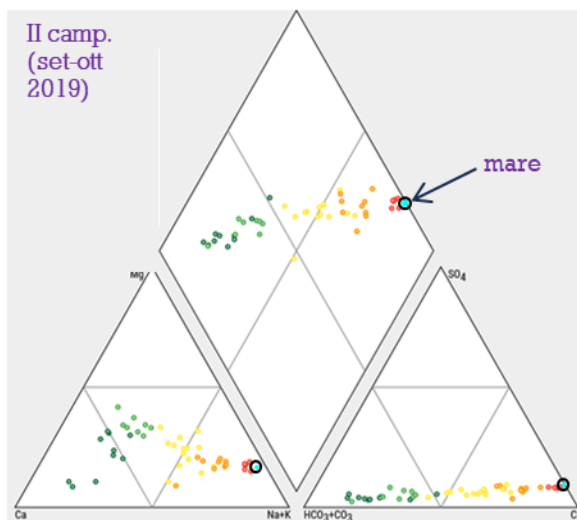


VIOLA Project

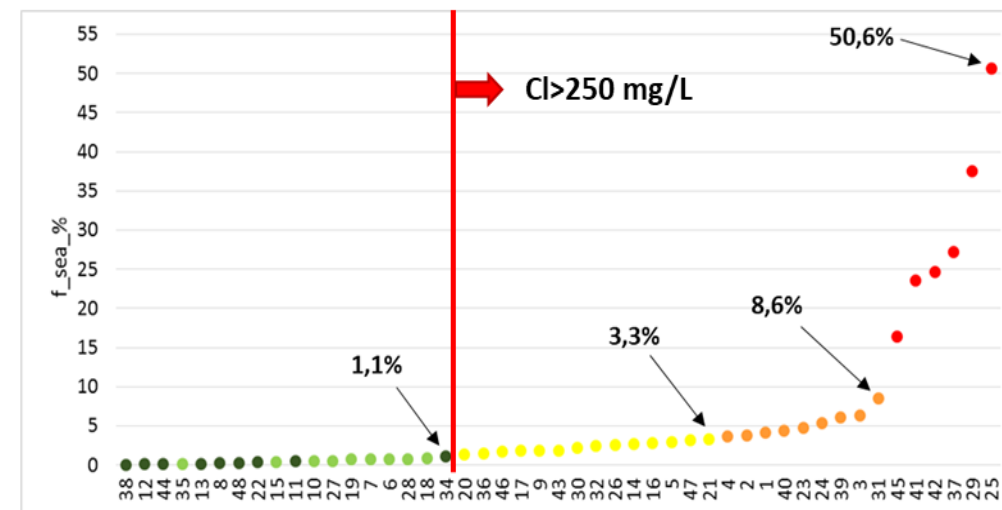
Natural background levels for the groundwater bodies of Apulia Region



VIOLA monitoring network



Piper diagram

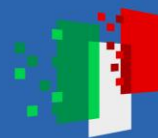


Seawater fraction (f_{sea}%) in Coastal Murgia groundwater samples

n. 4 monitoring campaigns carried out to sample and measure chemical, isotopic and microbiological parameters in about 50 wells, located in an area corresponding mostly to the GWB of the Coastal Murgia

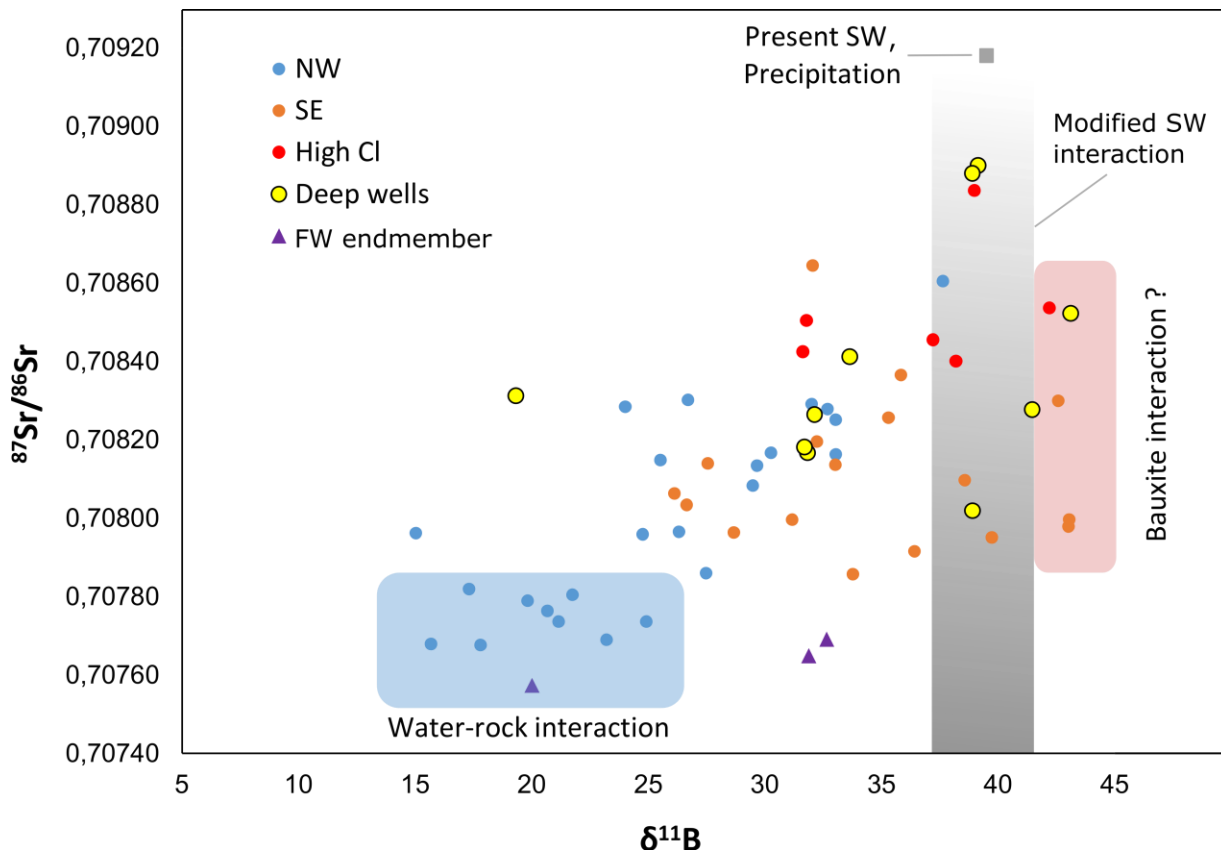


- 1) develop and test innovative methodologies and protocols for NBL assessment better tailored for coastal aquifers affected by widespread problem of salinization
- 2) investigate on the origin of sources of salinization



VIOLA Project

Natural background levels for the groundwater bodies of Apulia Region



Le sistematiche isotopiche dello Sr e del B indentificano come principale fonte di salinizzazione, non l'acqua di mare attuale ma un'acqua di mare modificata in riequilibrio con il serbatoio carbonatico.

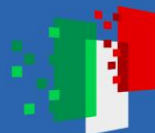
Strontium and Boron isotopic characteristics of groundwater in Coastal Murgia



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Integrated Assessment of Climate Impacts on Ecosystem Functions and Productivity of Critical-Zone Eco-Hydrology



June 2021 – June 2025



جامعة
حمد بن خليفة
HAMAD BIN KHALIFA
UNIVERSITY



Italian PI:

G. Passarella

IRSA team:

M.C. Caputo, L. De Carlo

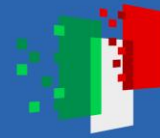
R. Masciale, I. Portoghese, A.C. Turturro



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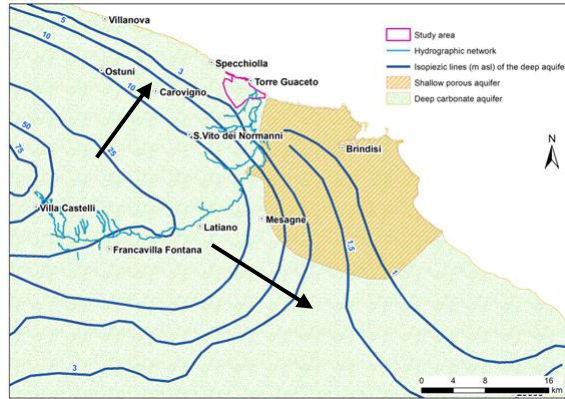
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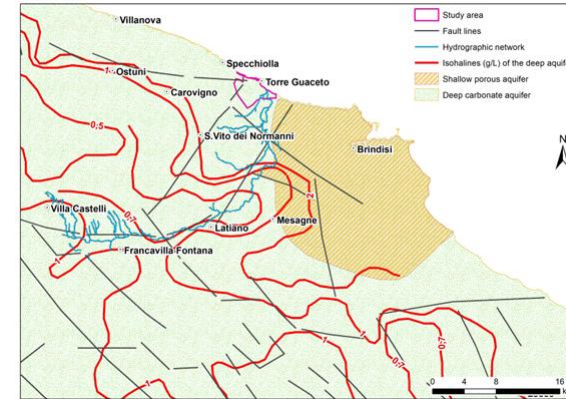
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isopiezic map

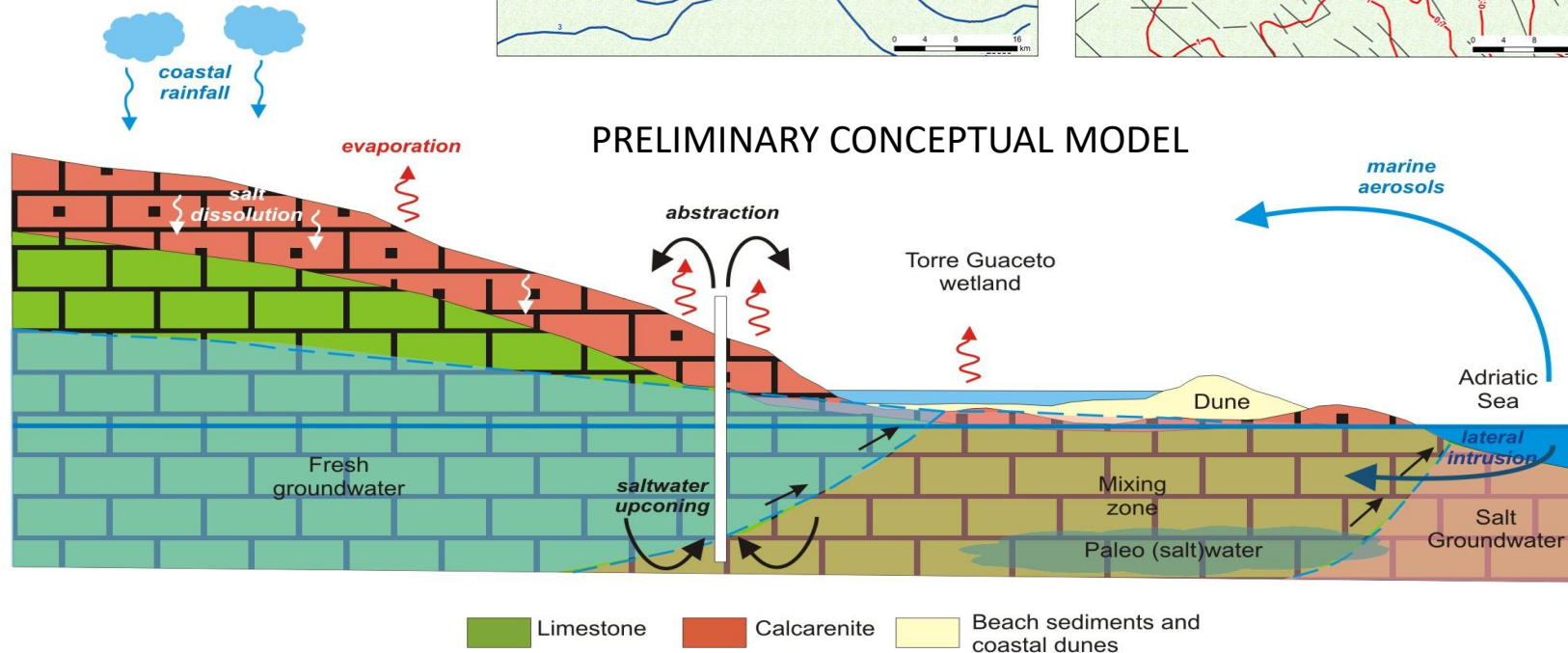


isohaline map



Aim

Propose novel approach to manage the environmental risks, climate change, and anthropogenic impacts on Water-Scarce Critical Zones (WSCZ) to define solutions to preserve soil productivity and groundwater quality





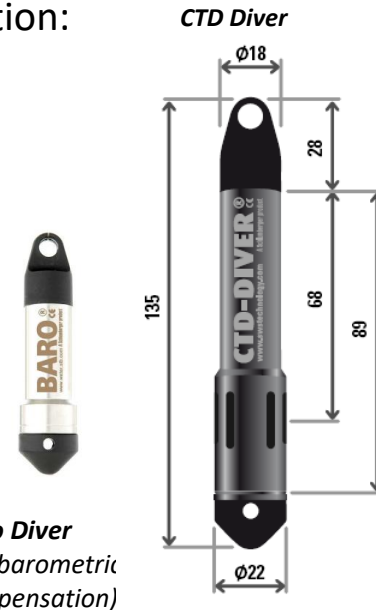
Monitoring network

n. 8 monitoring campaigns of temperature and electrical conductivity, from Apr '22 to Jan '24

n. 3 sampling survey for hydro-chemical and isotopic characterization: Nov '22 - Apr '23- Jan '24

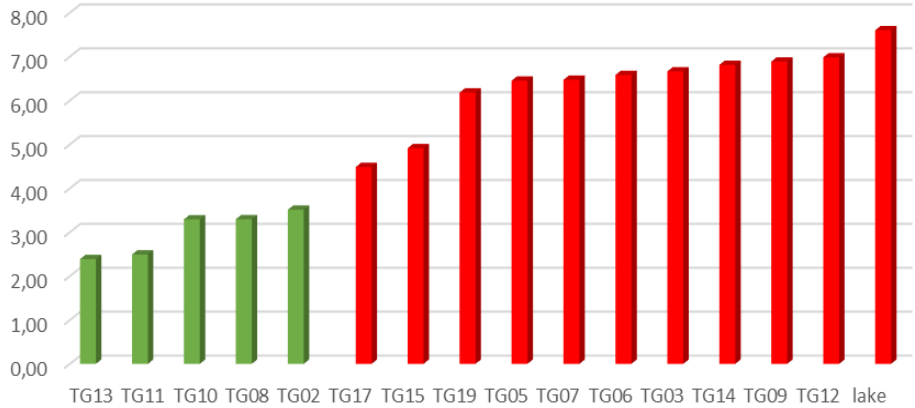
n. 3 continuous monitoring points:

- well TG14
- well TG19
- lake

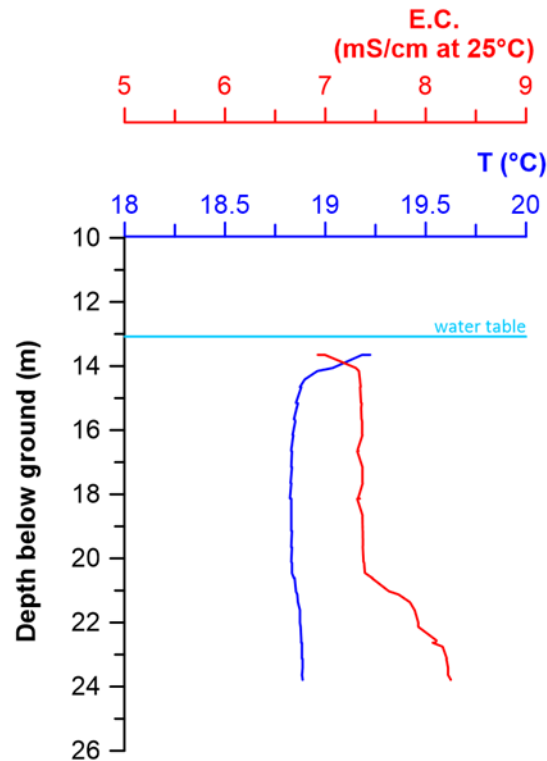




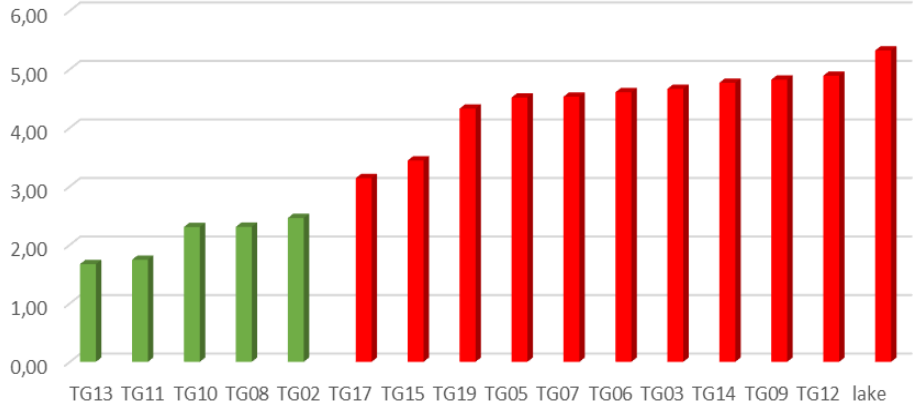
EC (mS/cm)



Log of electrical conductivity (E.C.) and temperature (T) in the well TG14



Salinity (g/L)



○ wells with low salinity value





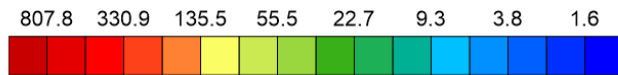
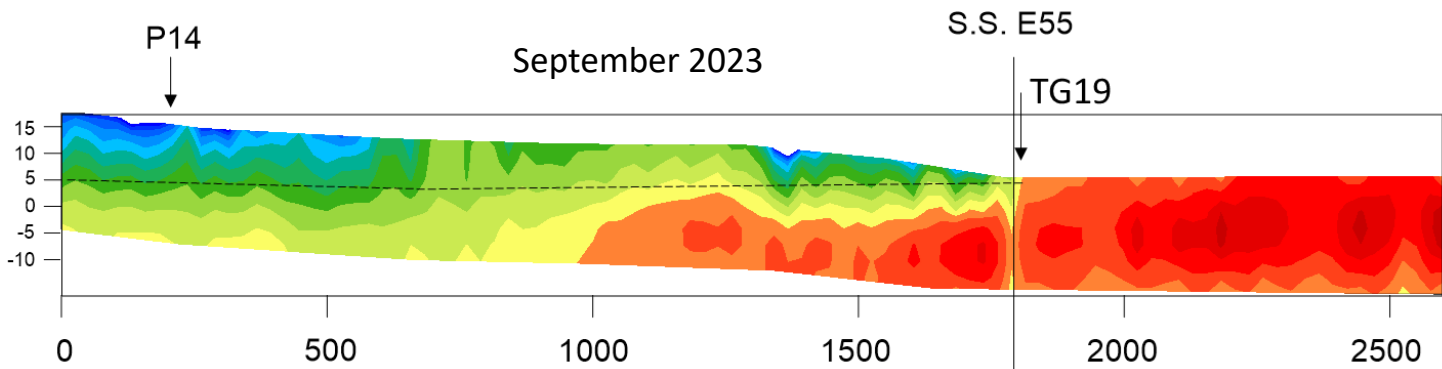
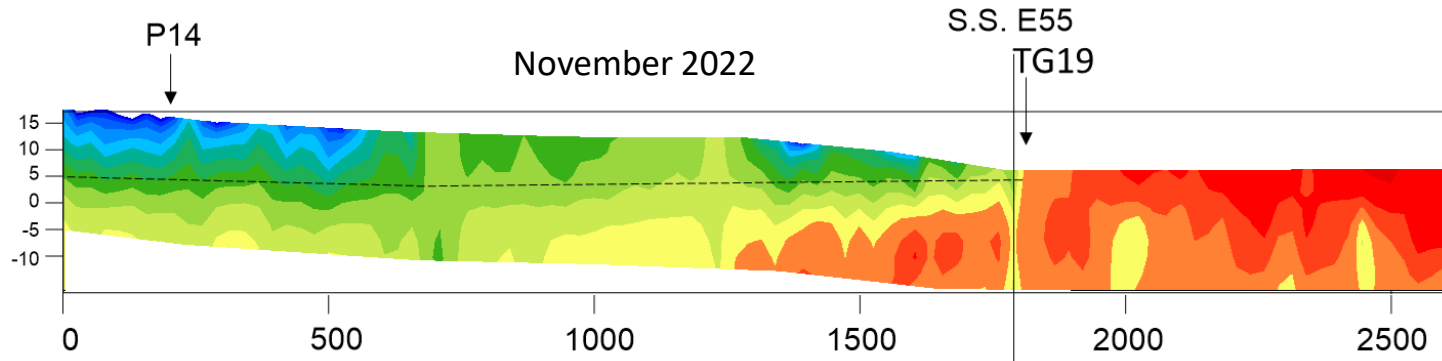
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Electrical conductivity (mS/m)

sea side



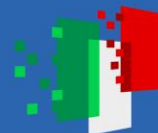
n. 2 geophysical profiles, 2600 m long overall, by using Electromagnetic Induction (EMI) technique.



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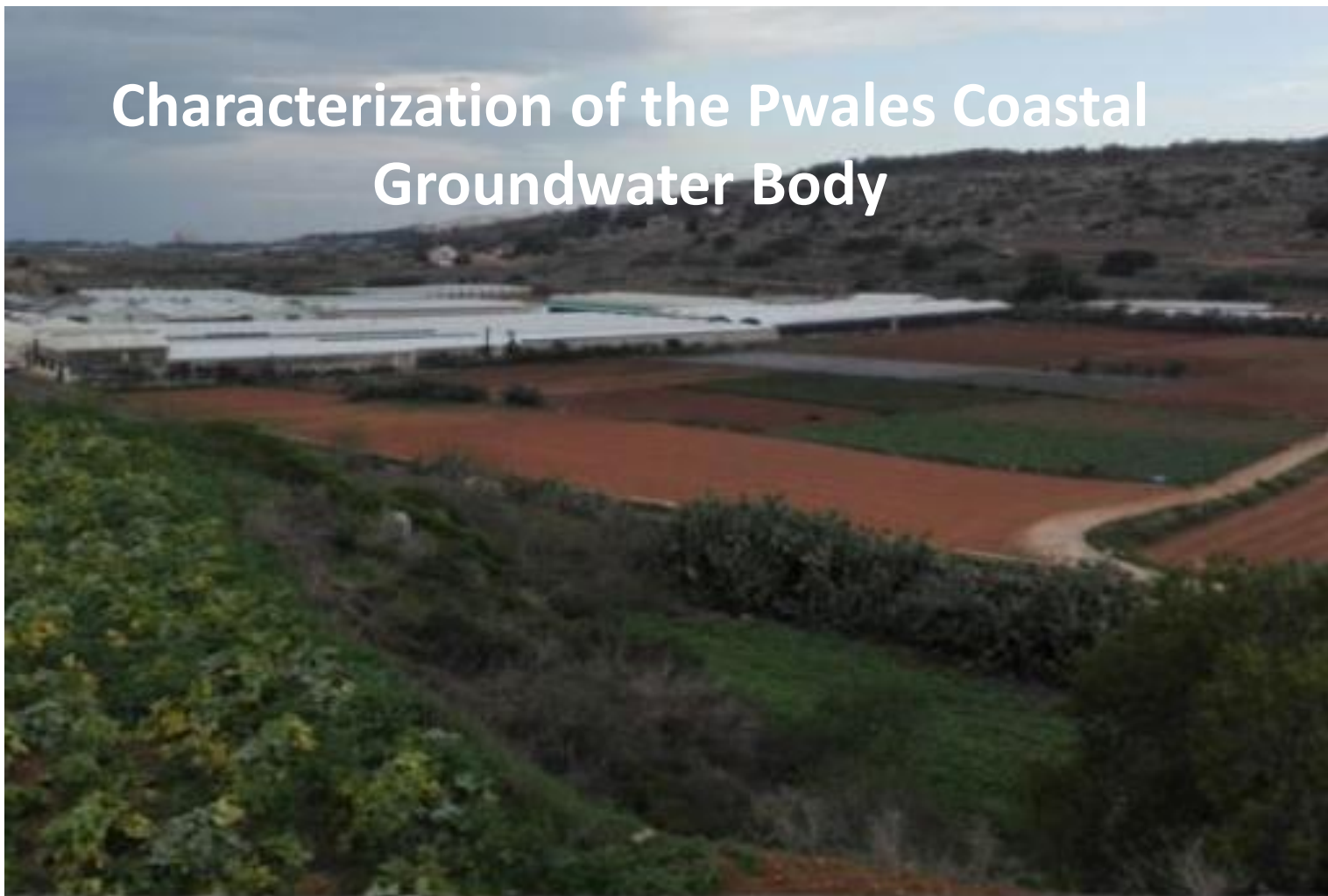
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Characterization of the Pwales Coastal Groundwater Body



Ottobre 2020 – in corso



Coordinators:

M.C. Caputo, Lorenzo De Carlo

Scientific Managers:

M.C. Caputo, Lorenzo De Carlo

IRSA team:

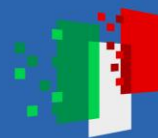
R. Masciale, I. Portoghese, A.C. Turturro



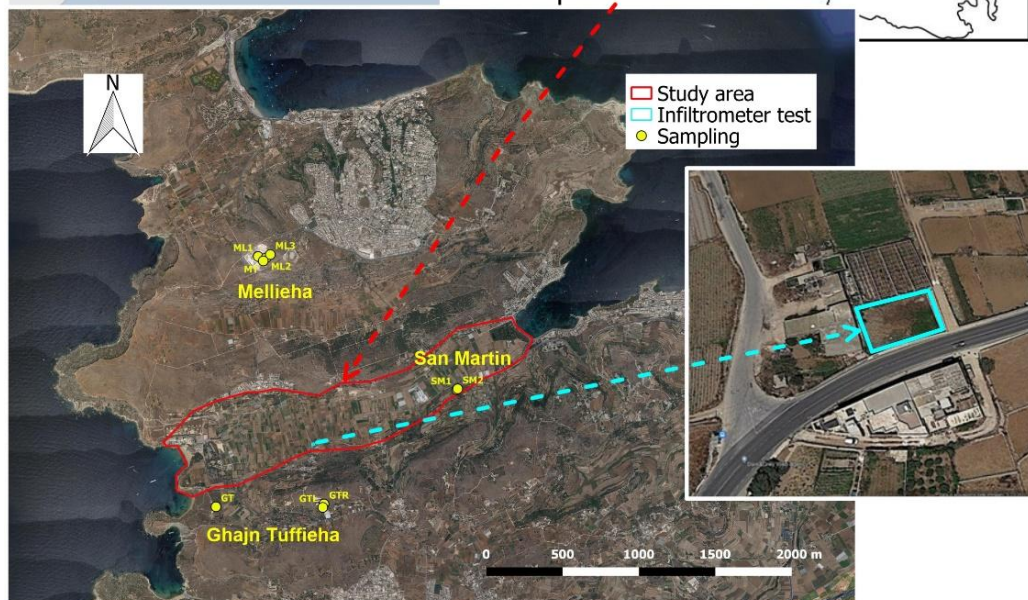
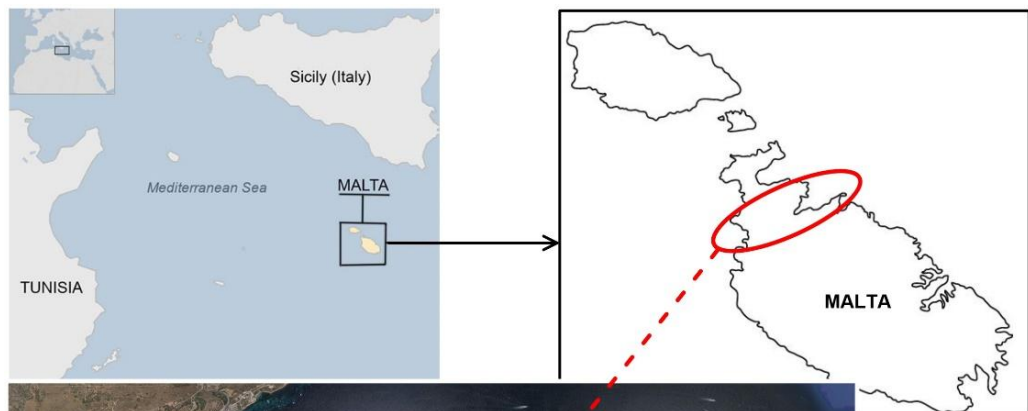
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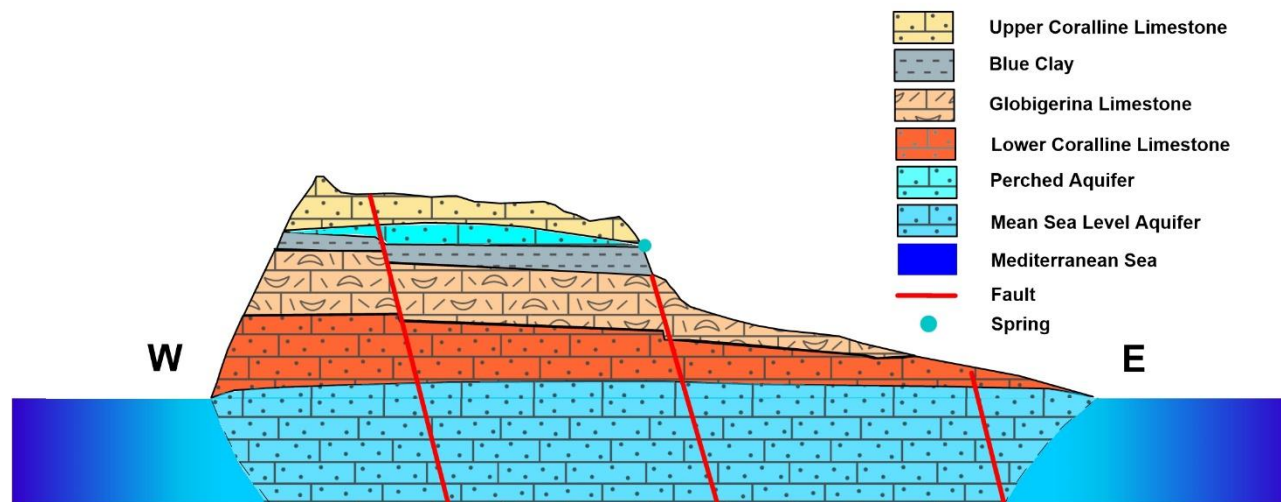
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Study area with locations of the origins of the samples tested in the laboratory and of the place where the infiltrometer test was carried out.

Aim

Hydraulic Characterization of Pwales Aquifer in Mal' Island preparatory for planning managed aquifer recharge (MAR) pilot plant



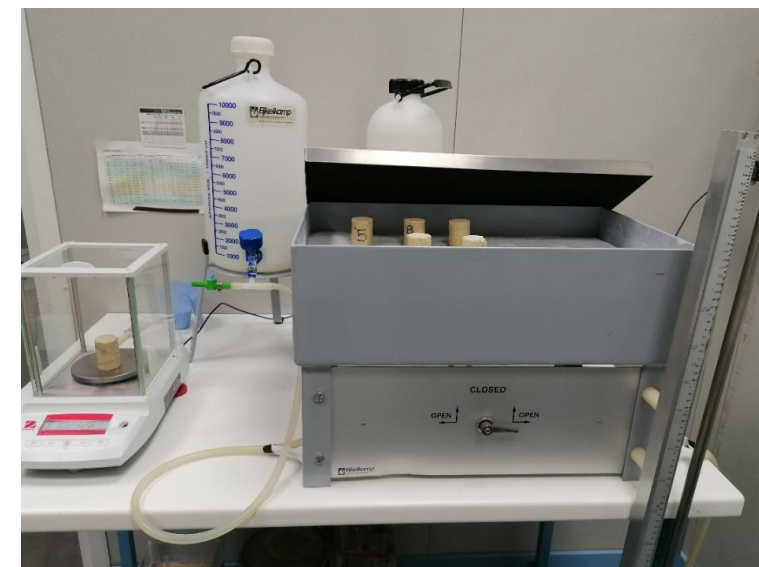
Schematic hydrogeological cross-section from West to East of Malta Island (modified figure of Polemio et al., 2019)

Laboratory hydraulic characterization



Quasi-Steady Centrifuge method

Psicrometro



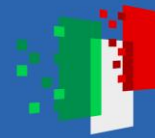
Sand box or Stackman method



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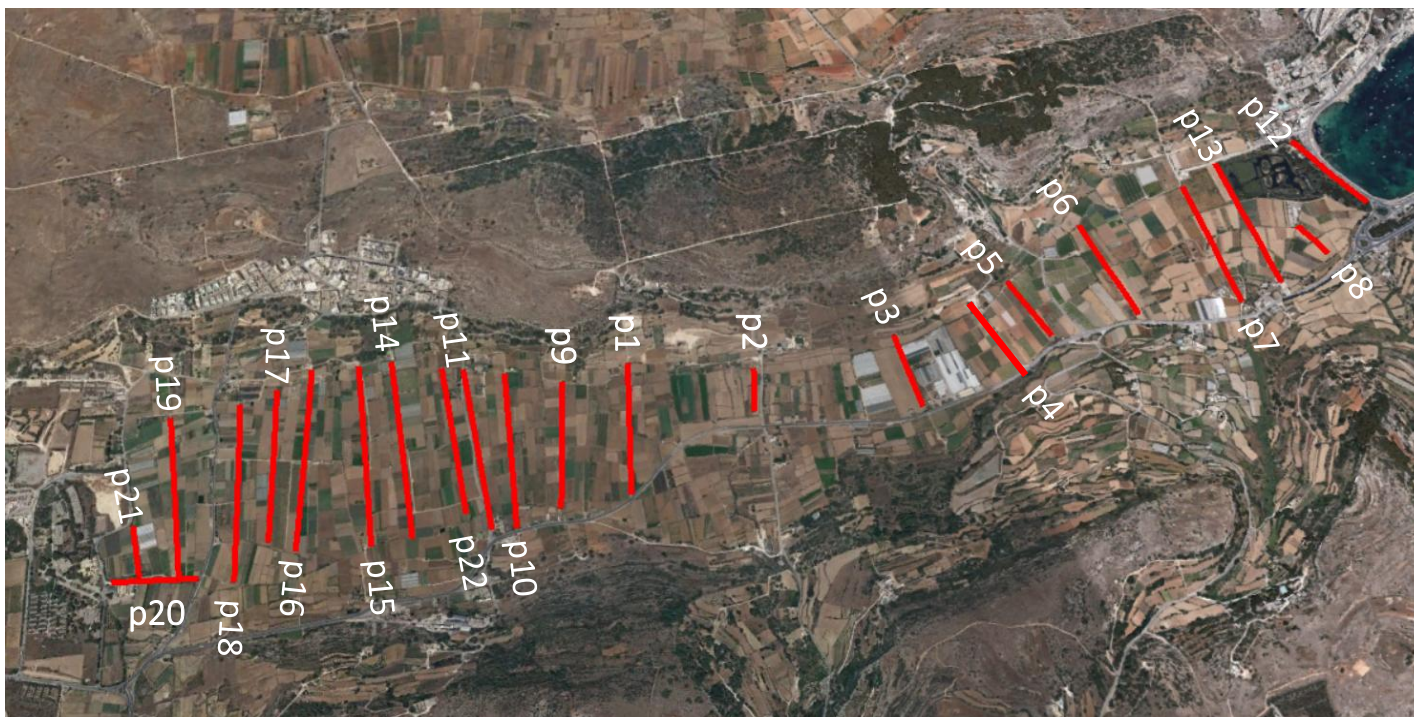
Hydraulic characterization at field scale



Infiltrometer test



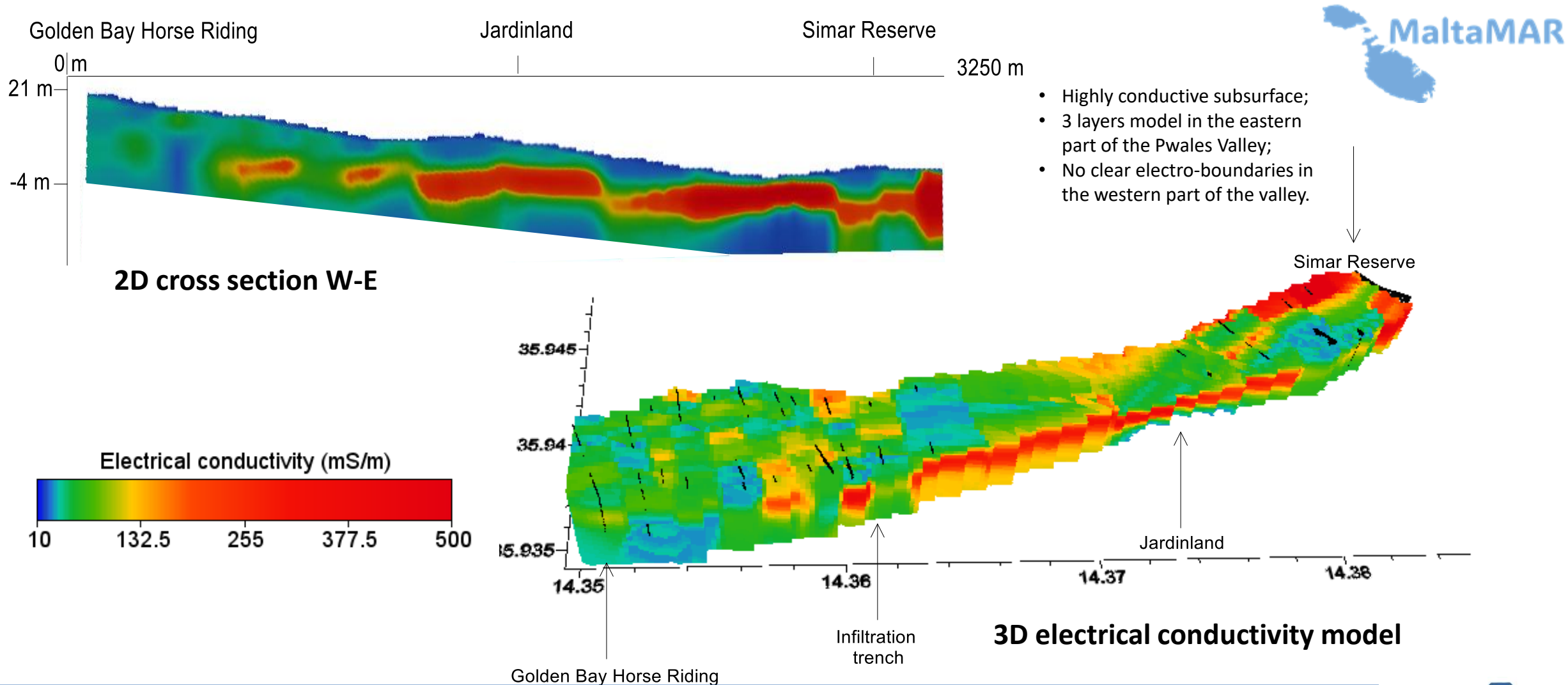
Electromagnetic Induction (EMI) measurements carried out over an area of 2 km²



- n.22 EMI profiles collected using CMD DUO sensor, each profile was repeated 6 times (10-20-40 m cable and VMD-HMD configuration);
- about 20000 collected measurements;
- more than 40 km traveled.

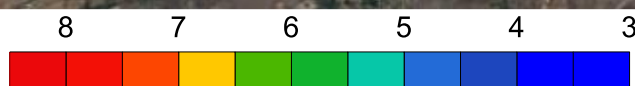
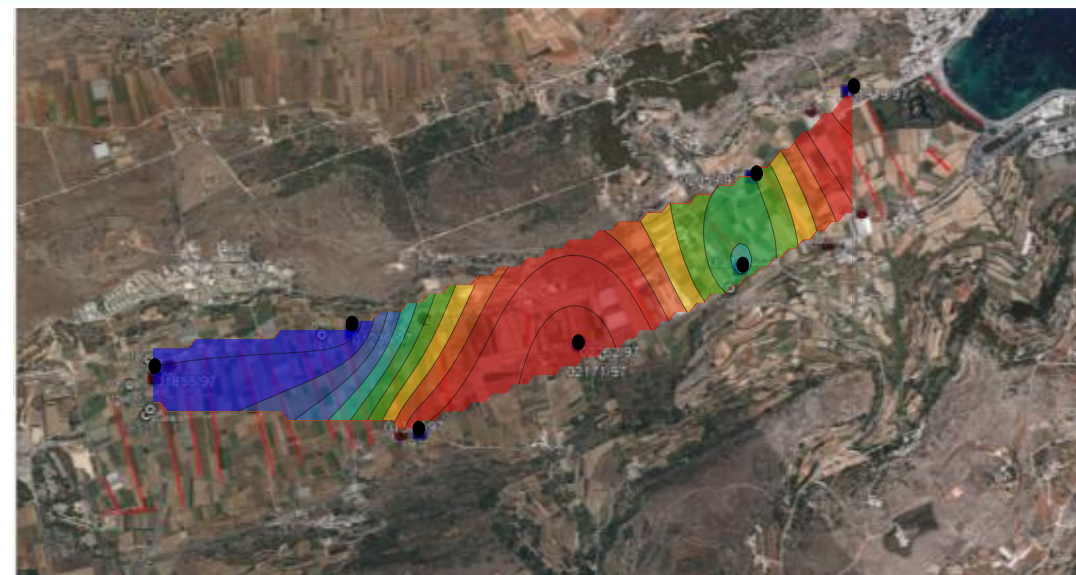


CMD DUO transmitter and receiver sensor

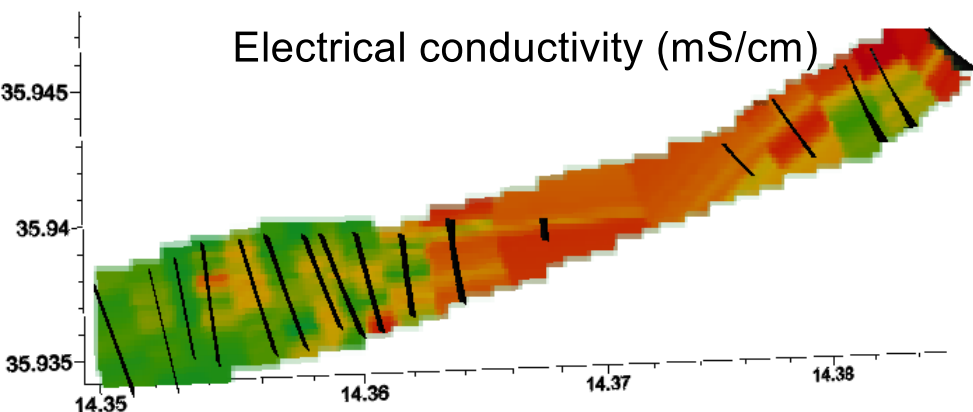


Comparison between EC map from CTD DIVER and EMI

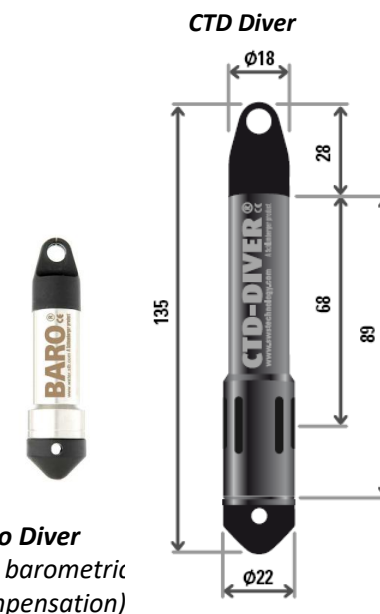
Map of EC obtained from DIVER sensors installed in 7 wells belonging to the monitoring network



Electrical conductivity (mS/cm)



Map of EC inferred from EMI survey



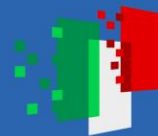
Baro Diver
(for barometric compensation)



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GRAZIE