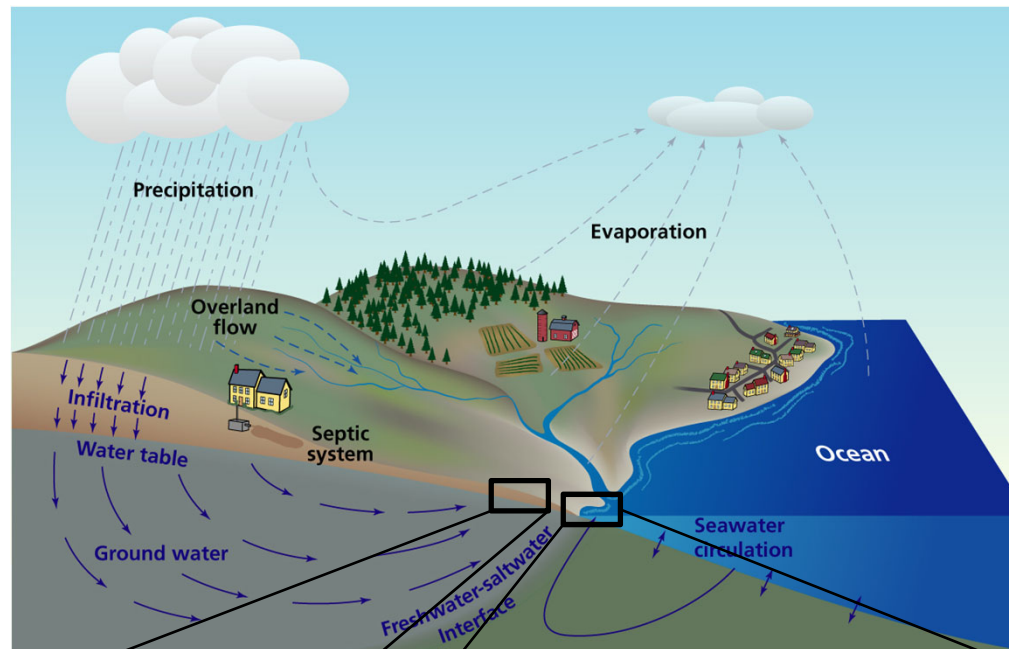


Continuous monitoring of Eh, pH and CE of a coastal multilayer alluvial aquifer under different dynamic conditions

Albert Folch, Alejandro Adan, Laura Martínez, Linda Luquot, Tybaud
Goyetche, Jose Tur-Piedra, Bella Almillategui, and Jesús Carrera



GW key for water resources and ecosystems

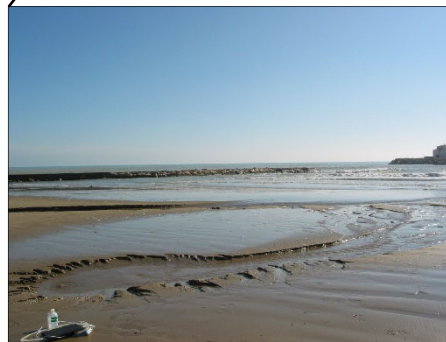


Jack Cook, Woods Hole Oceanographic Institution

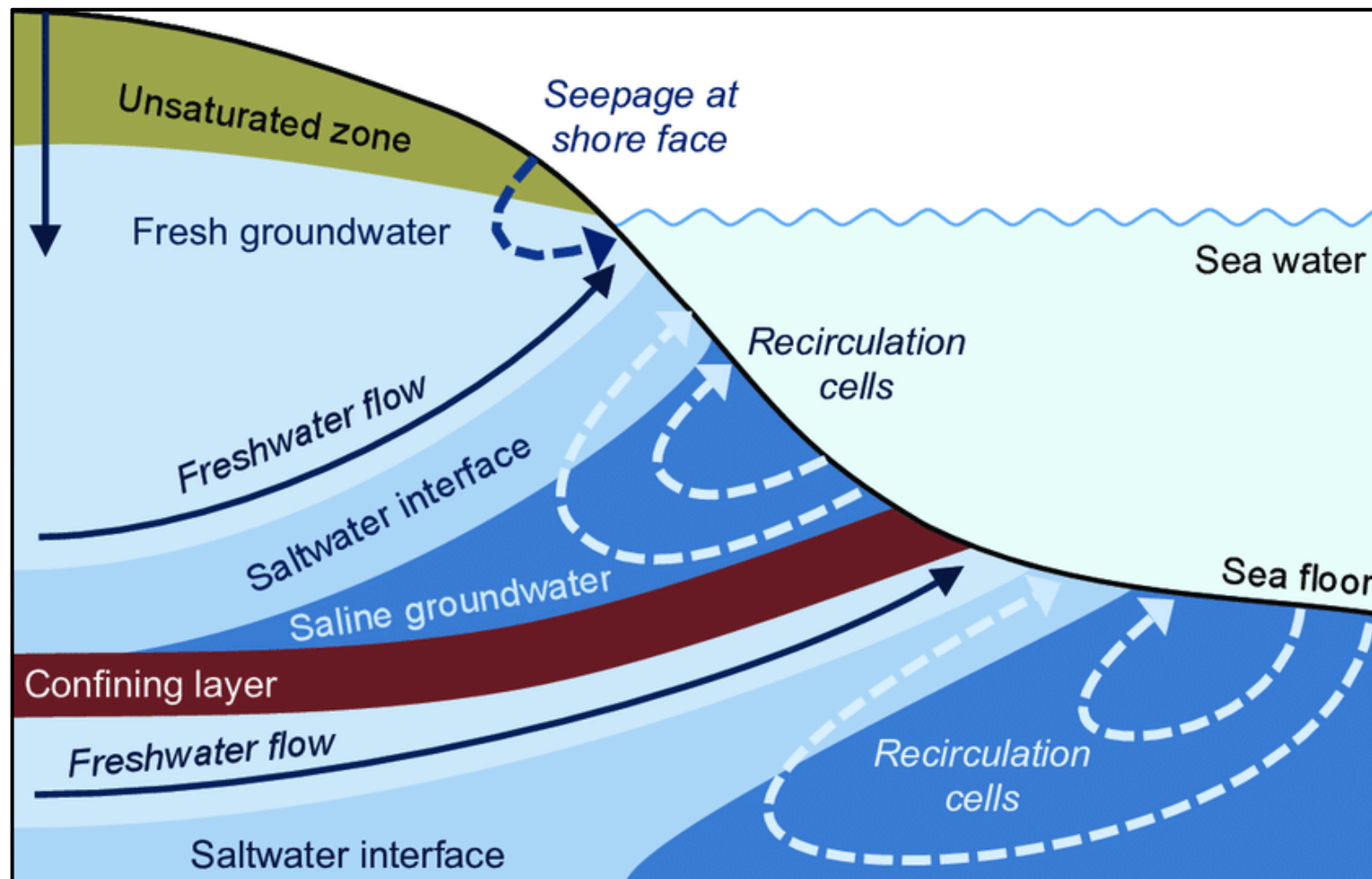
Water Resources



Groundwater Discharge



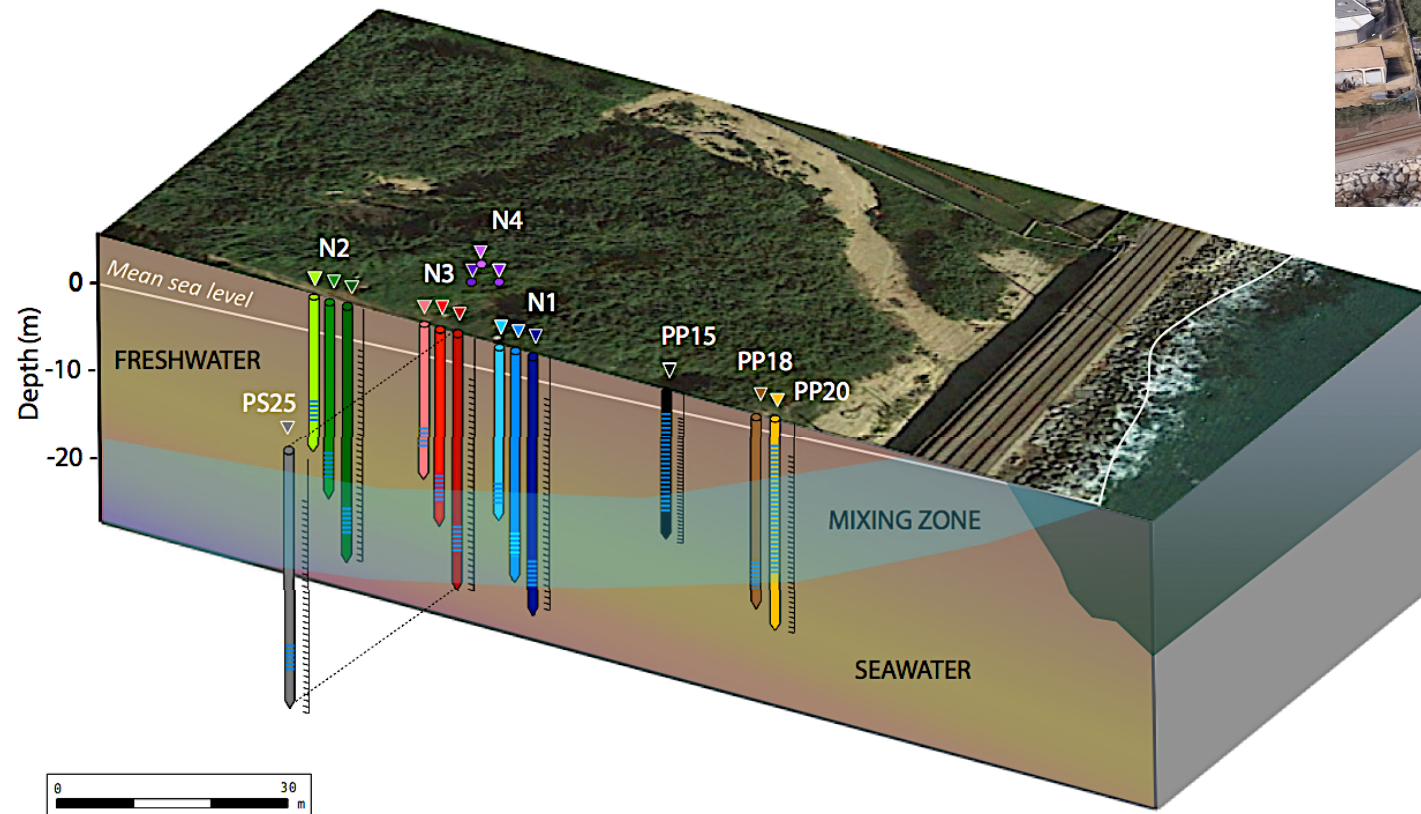
Coastal aquifers: complet SWI and SGD



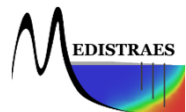
Rodellas, 2010

MEDISTRAES research site – Alluvial aquifer 23 m thick

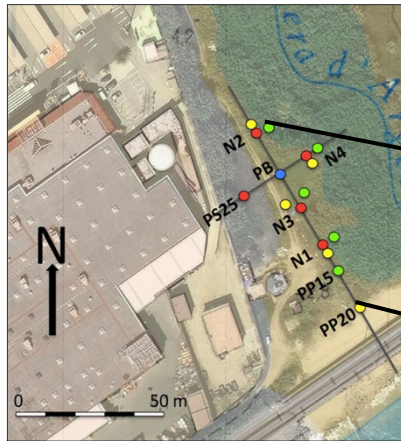
Several piezometers and characterization/
monitoring methods tested



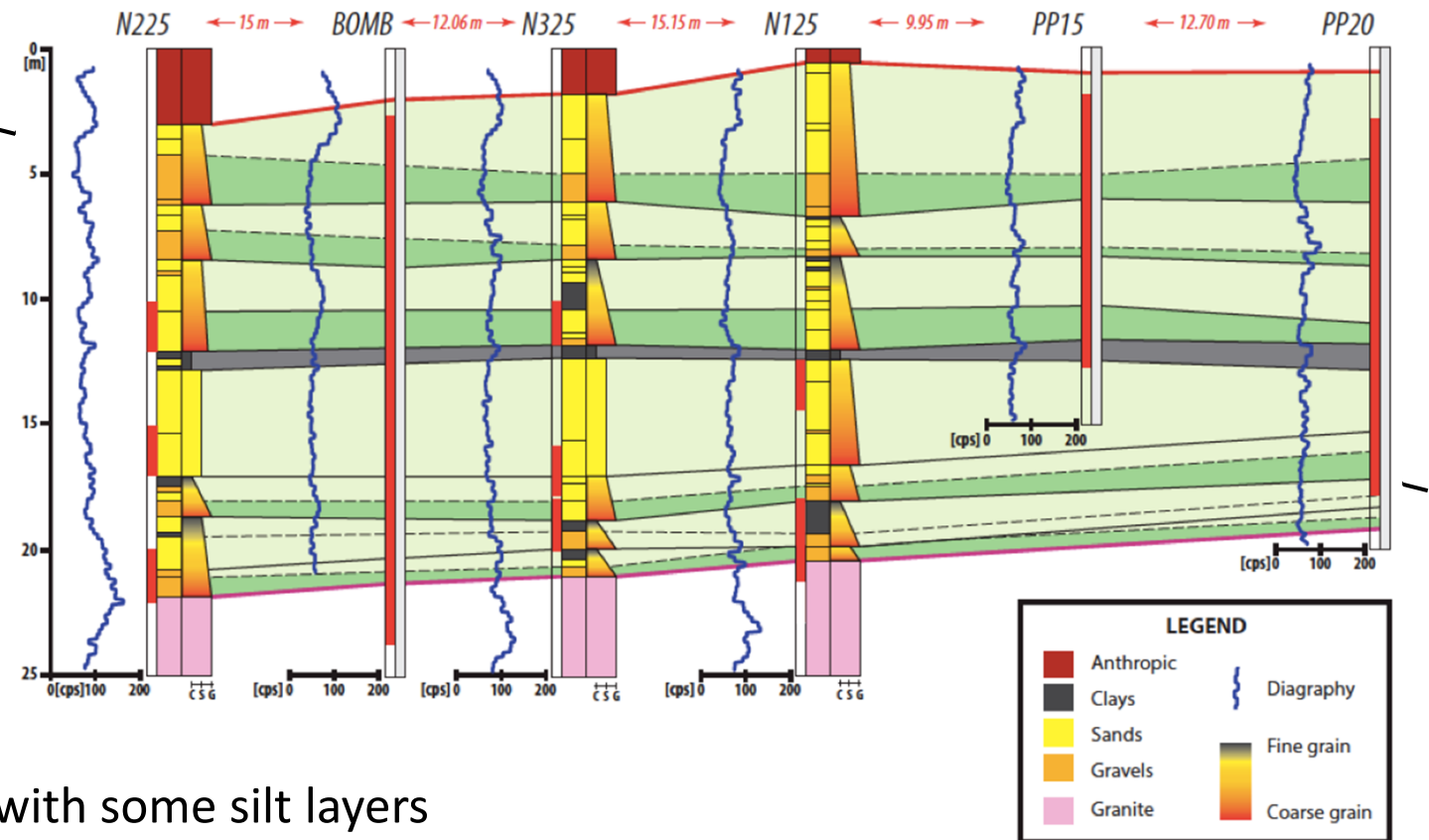
Experimental
site 30 Km
North of
Barcelona city



MEDISTRAES site geology

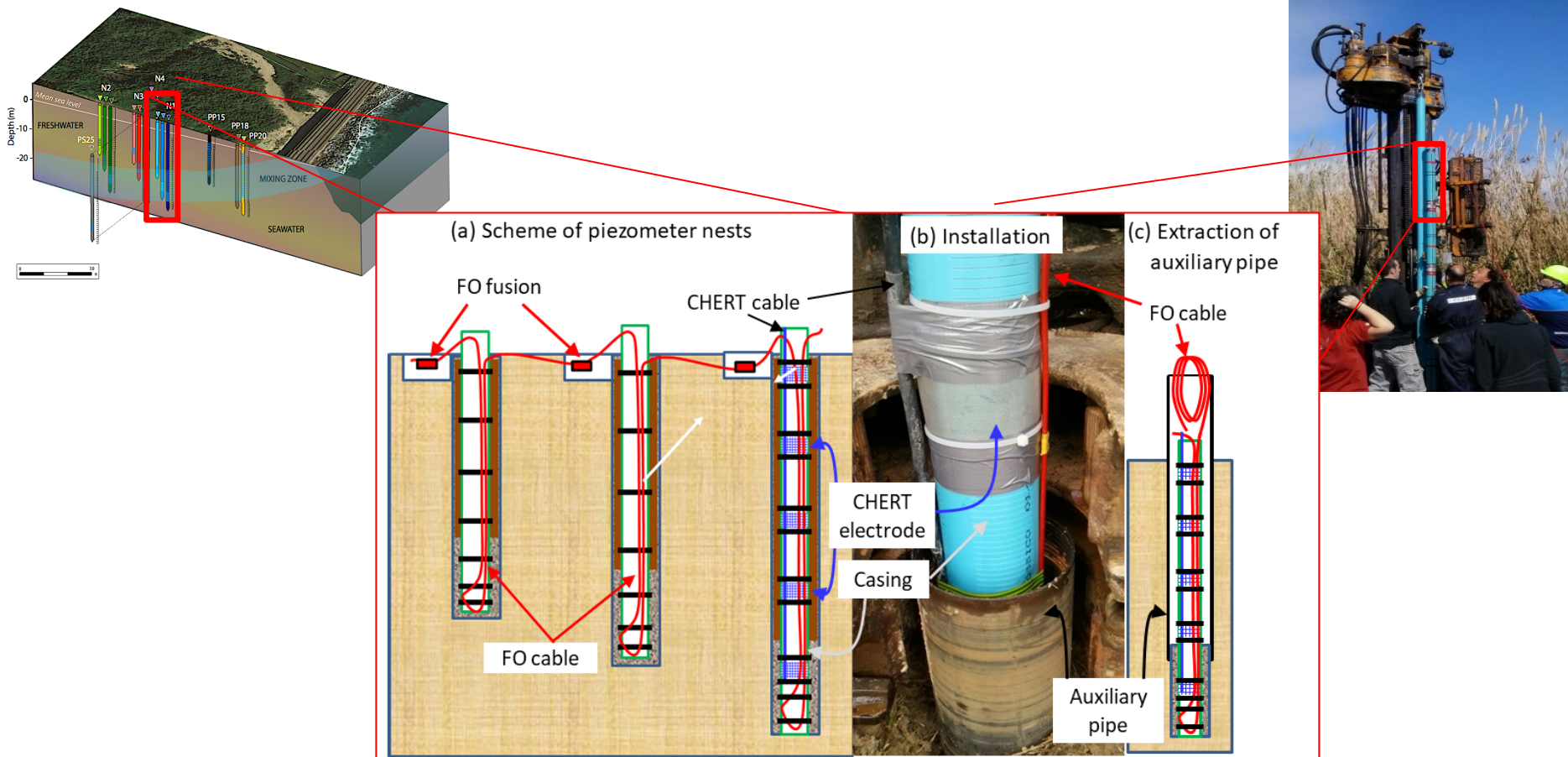


Cross-section perpendicular to the sea



- Sandy aquifer with some silt layers
- Each borehole nest screened at different intervals

Fiber optic DTS and Cross Hole ERT

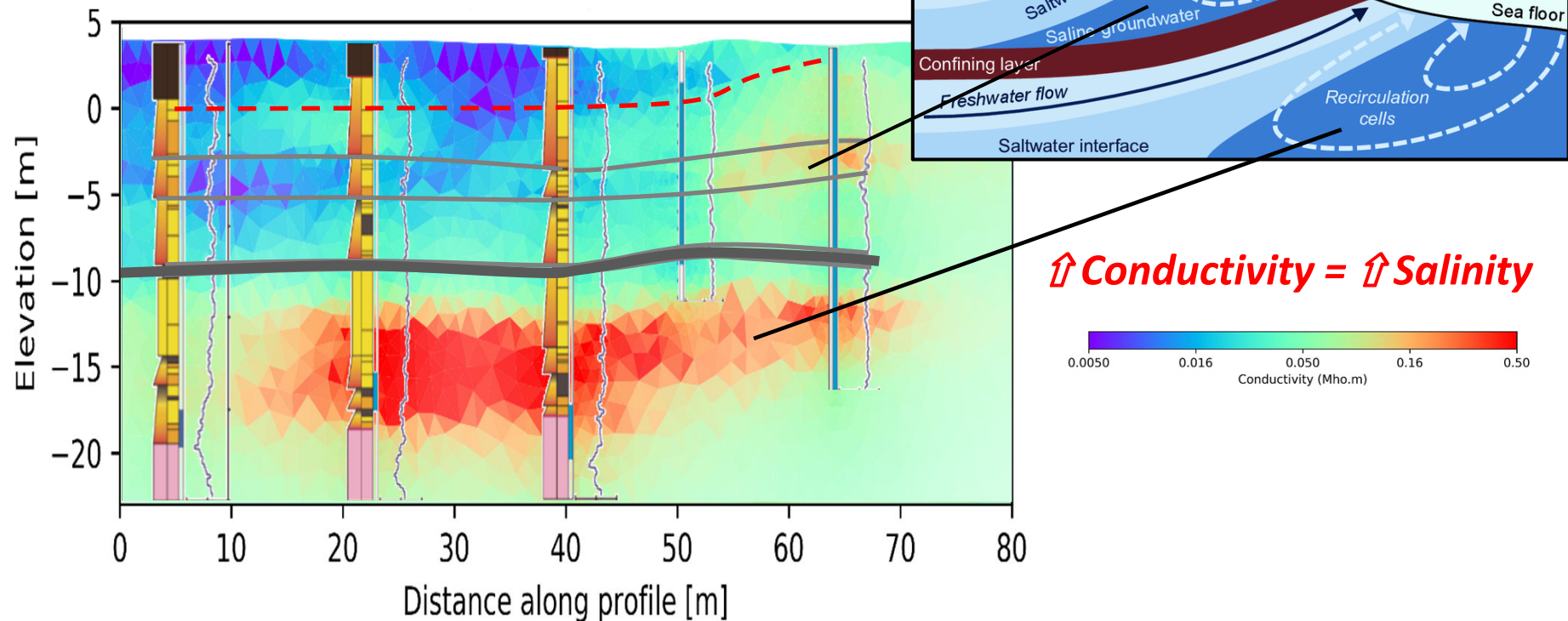


We have moved the electrodes and sensors close to the area of interest

- FO-DTS → aquifer matrix
- CHERT → along the deepest piezometer of each nest

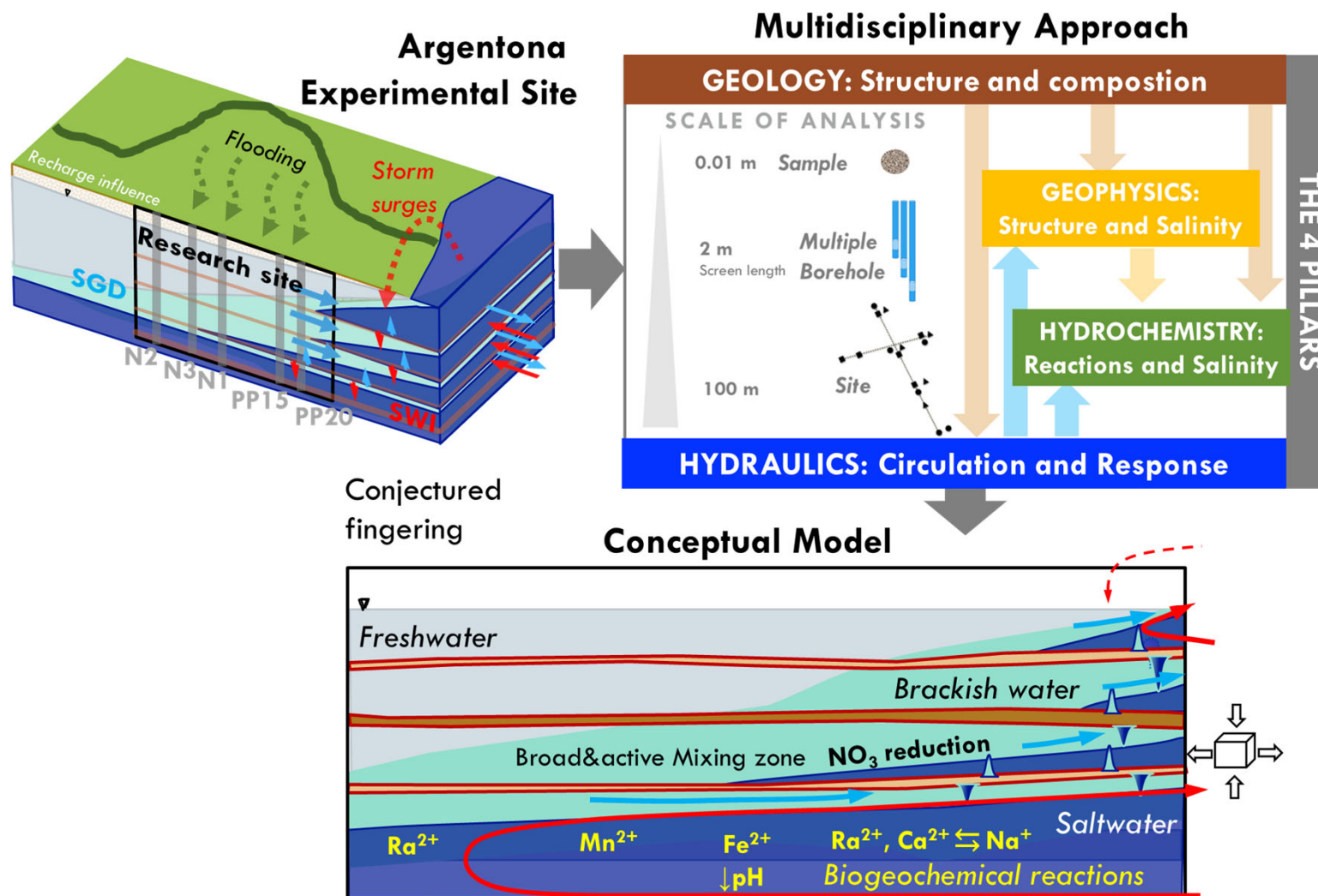
CHERT allow significant spatial resolution

CHERT measures the bulk electrical conductivity of the materials underground which is related with salinity



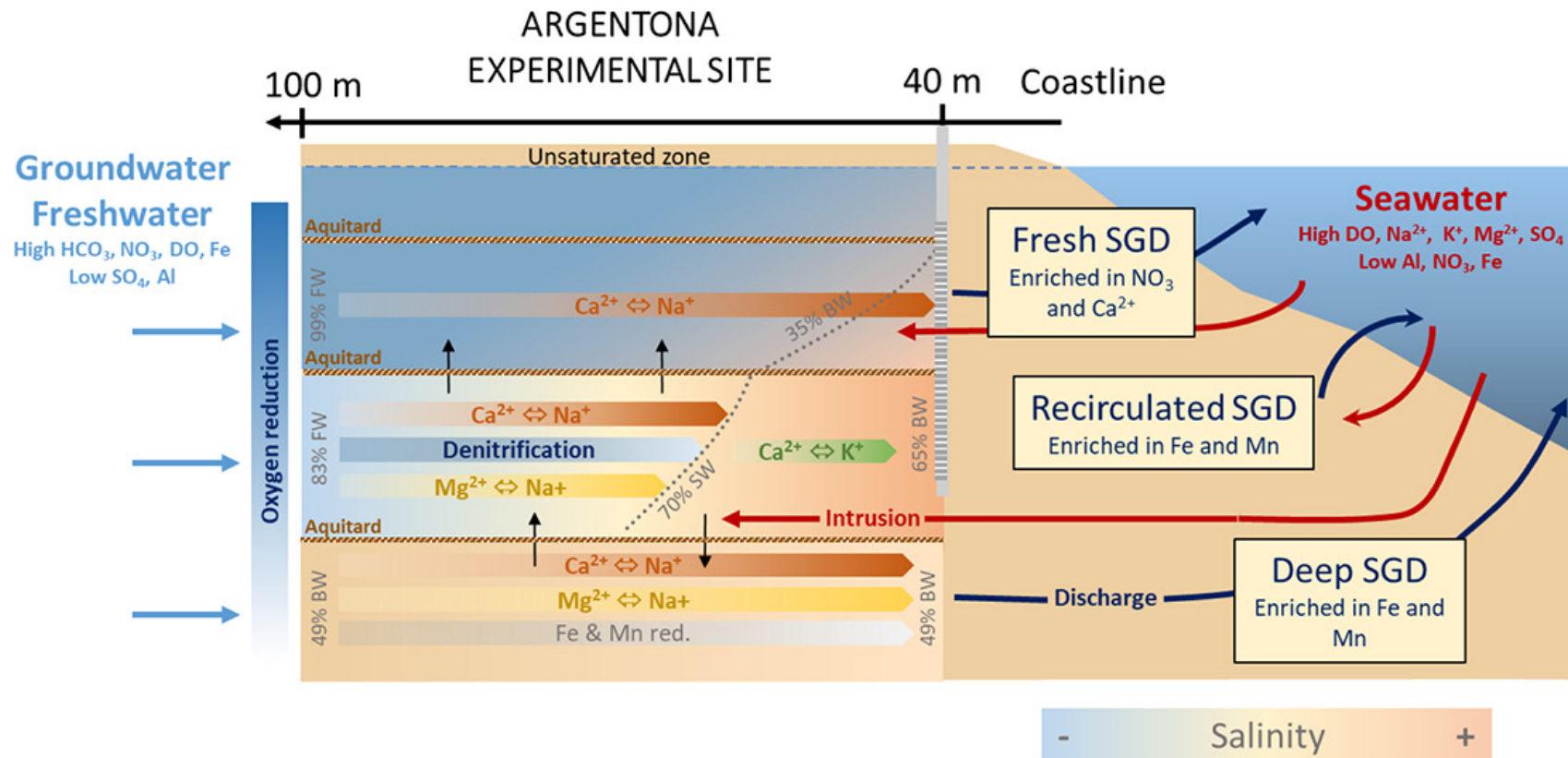
Palacios et al 2020. Time-lapse cross-hole electrical resistivity tomography (CHERT) for monitoring seawater intrusion dynamics in a Mediterranean aquifer. *Hydrology and Earth Systems Sciences*, 24.

SWI and SGD take place at multiple levels



Martínez et al. 2022. A multidisciplinary approach to characterizing coastal alluvial aquifers to improve understanding of seawater intrusion and submarine groundwater discharge. *Journal of Hydrology* 607, 127510

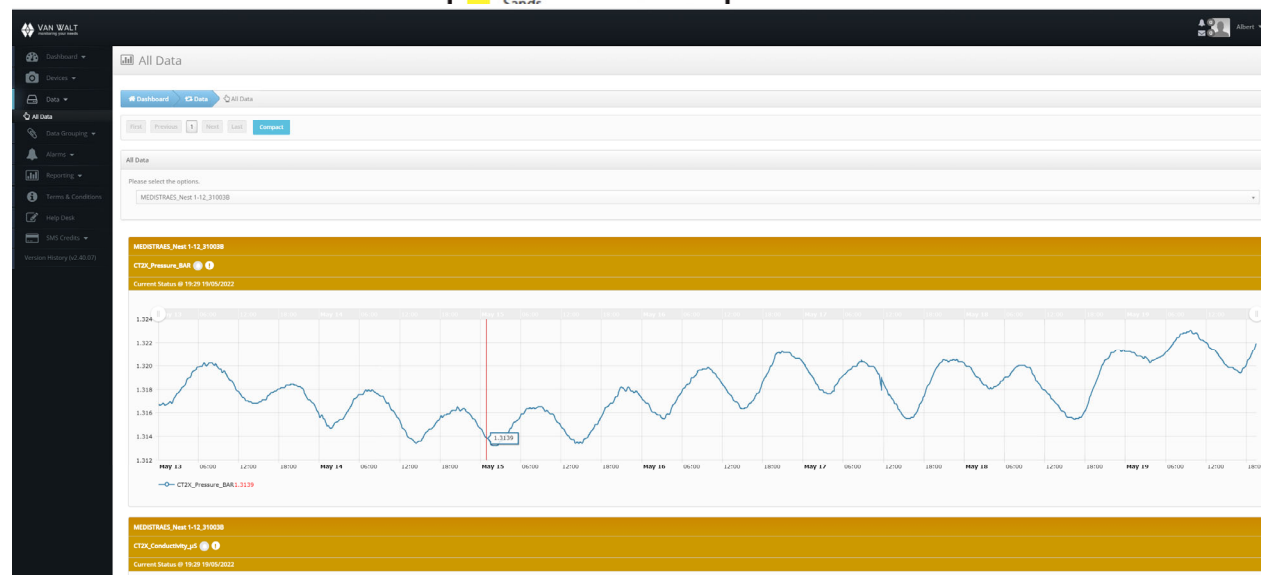
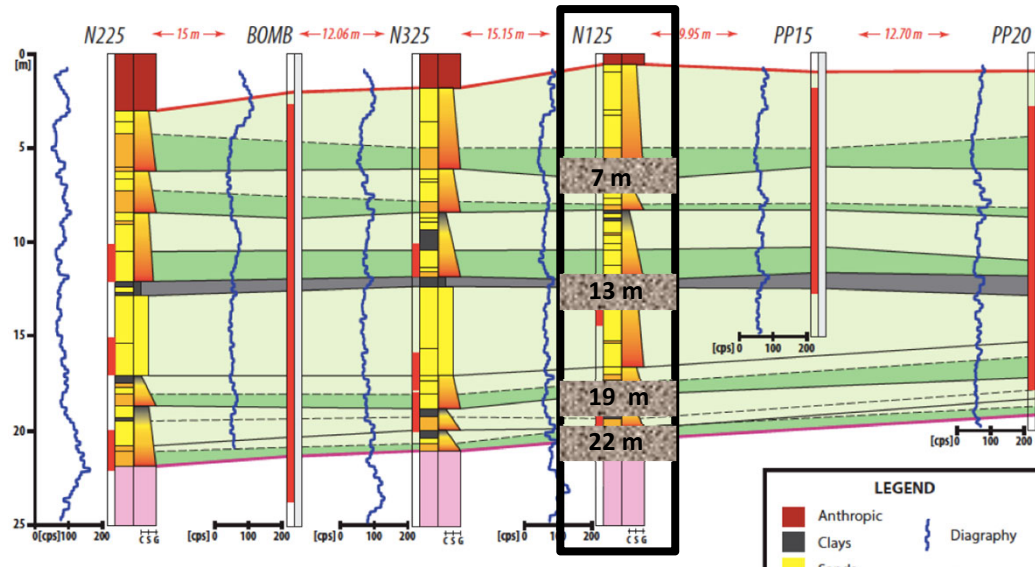
Different reactions at different “aquifer” levels



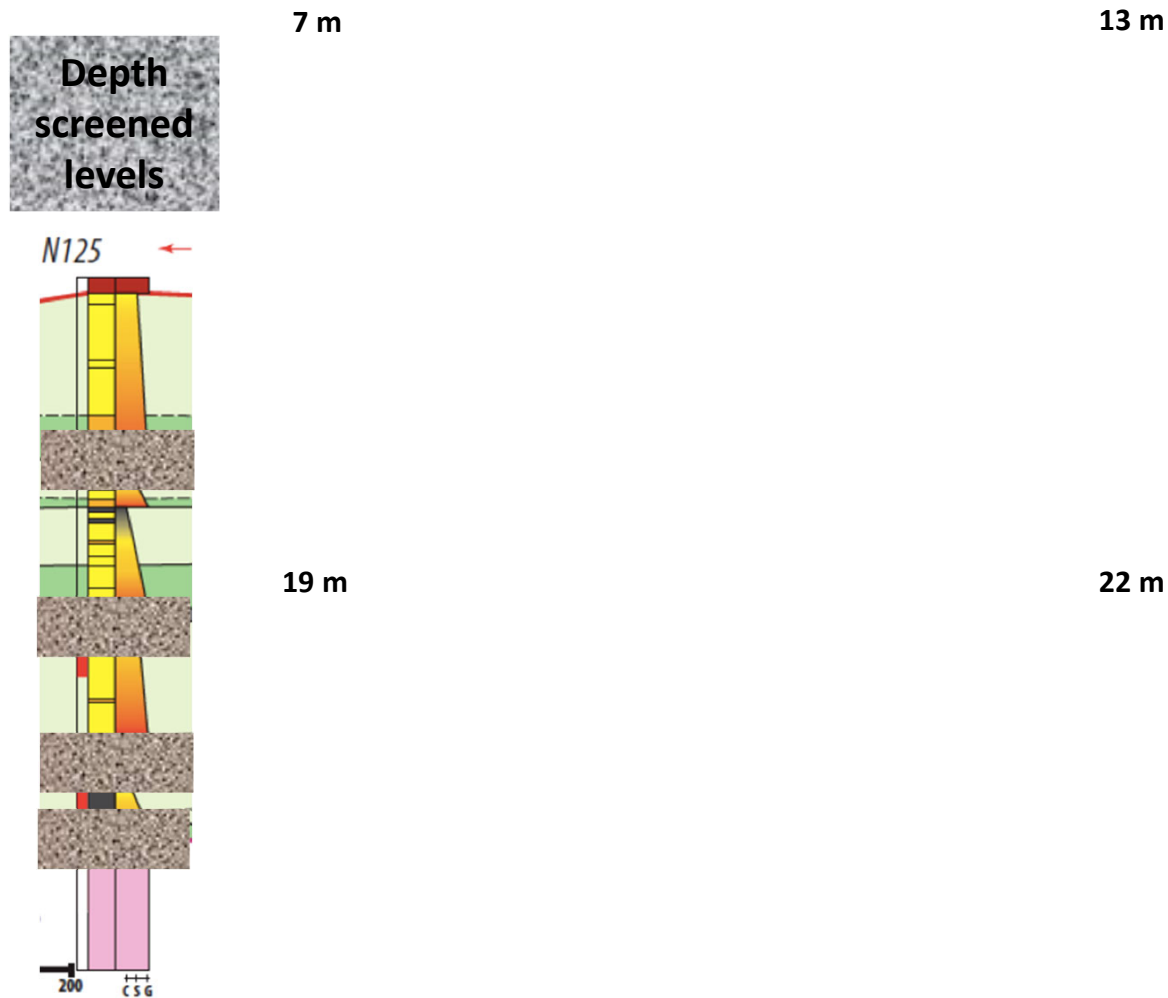
Tybaud et al. 2022. Identification and quantification of chemical reactions in a coastal aquifer to evaluate submarine groundwater discharge composition. *Science of the Total Environment*, *in press*

P, EC, Eh, and Ph monitoring at different depths

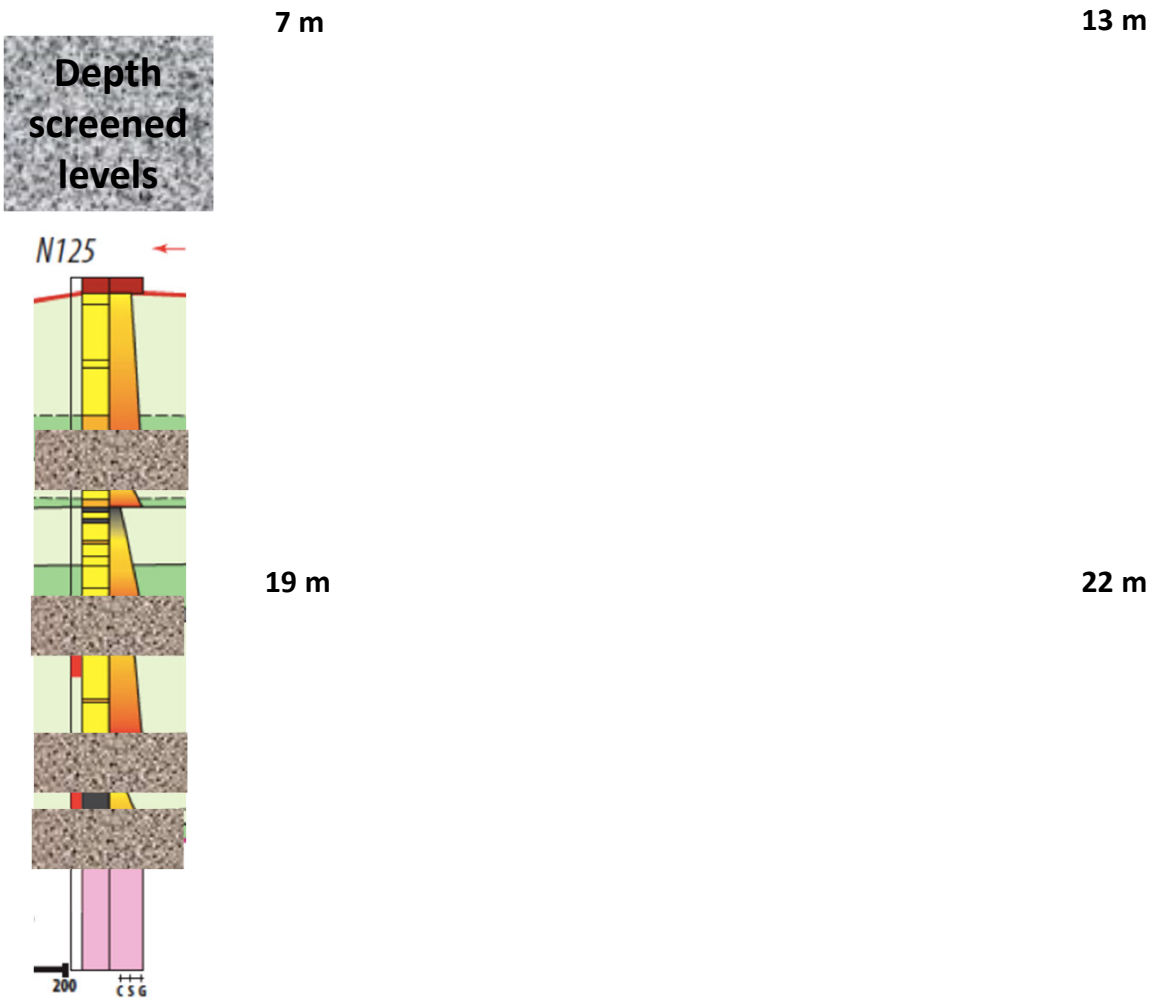
Monitoring depths Nest 1



Evolution GW level and Electrical Conductivity



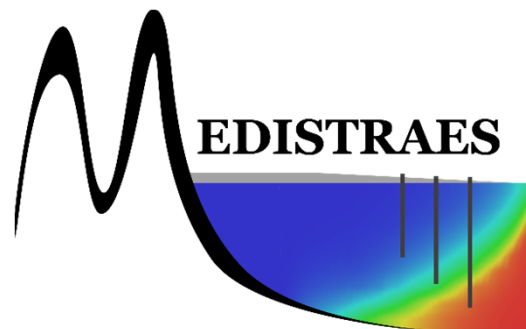
Evolution GW level and redox potential



Take home message

A relatively thin and “homogeneous” alluvial aquifer effectively behaves as a multi-aquifer and reactive system with different dynamics and different redox (biogeochemical) processes at each depth

Thank you



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**Agència Catalana
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Departament de Territori
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Research team

