



Presenter
Ph.D. Pablo A. Yaciuk
pabloagustin.yaciuk@igg.cnr.it
pabloyaciuk@gmail.com



Beyond Piezometers: Integrated Supersite Monitoring Framework for Seawater Intrusion in the Brenta and Adige Coastal Plain, Italy

Pablo Agustín Yaciuk¹, Luigi Tosi¹, Marta Cosma¹, Iva Aljinović², Andrea Artuso³, Jadran Čarija², Cristina Da Lio¹, Lorenzo Frison³, Veljko Srzić², Fabio Tateo¹, Sandra Donnici¹
¹IGG-CNR Padova, ²Univ. Split, ³Consorzio Adige Euganeo



THE CORE FINDING

Integrated supersites can capture seawater intrusion dynamics across spatial and temporal scales, ensuring high-quality datasets for scientific and operational use, even under climate change and increasing human pressure scenarios

MOTIVATION

- Saltwater intrusion (SWI) threatens coastal aquifers and agricultural lands worldwide
- Conventional monitoring misses spatial and temporal SWI dynamics
- New monitoring approaches are needed to:
 - Understand SWI forcings,
 - Achieve reliable hydrogeological models,
 - Implement effective management strategies



Scan the QR code and get the full abstract

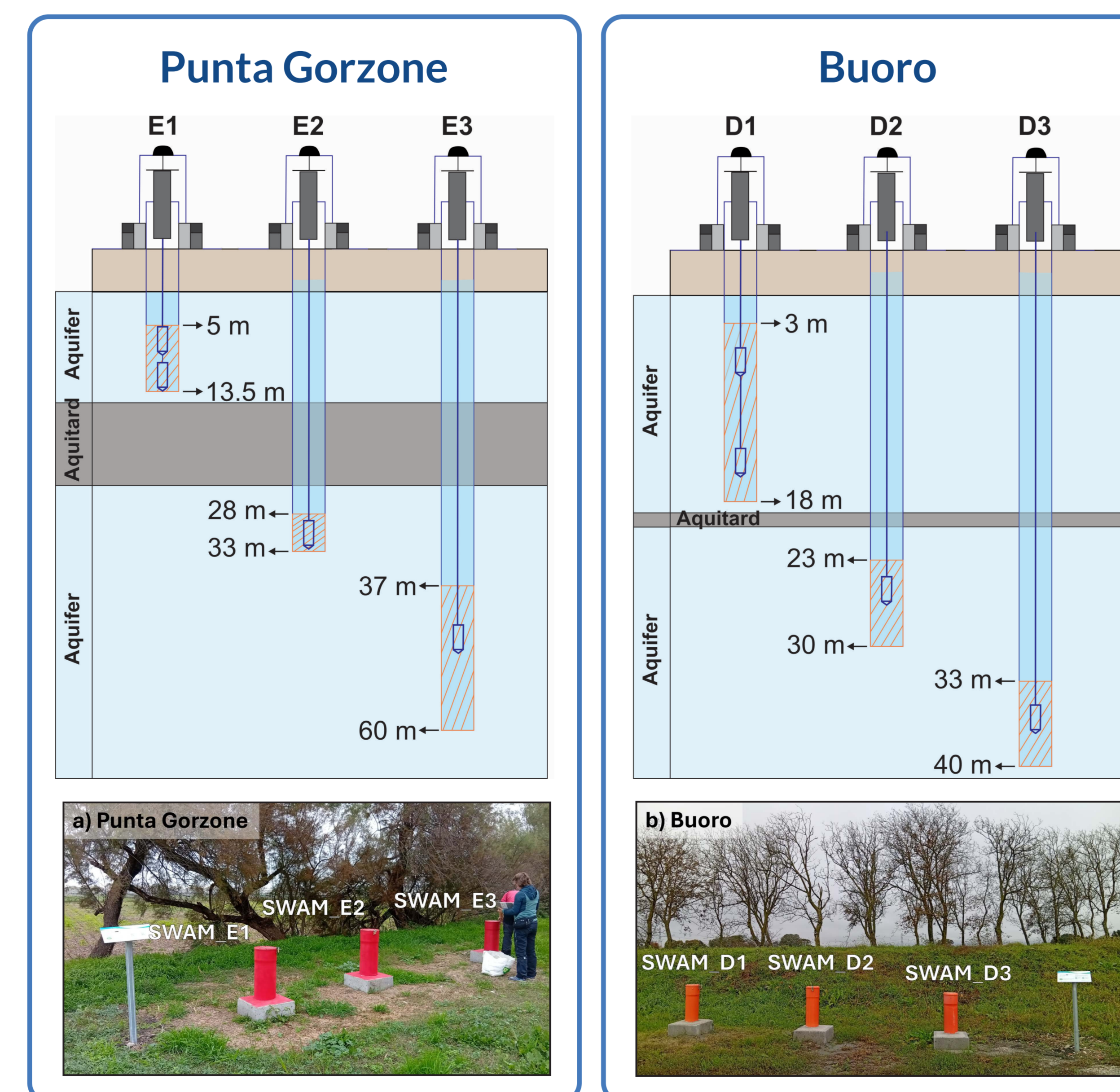
1. BACKGROUND & METHODS

Study System

- Northern Italian Adriatic coast
- Multi-layer aquifer system
- Dense drainage canals and pumping-stations network
- Flat morphology mostly below mean sea level

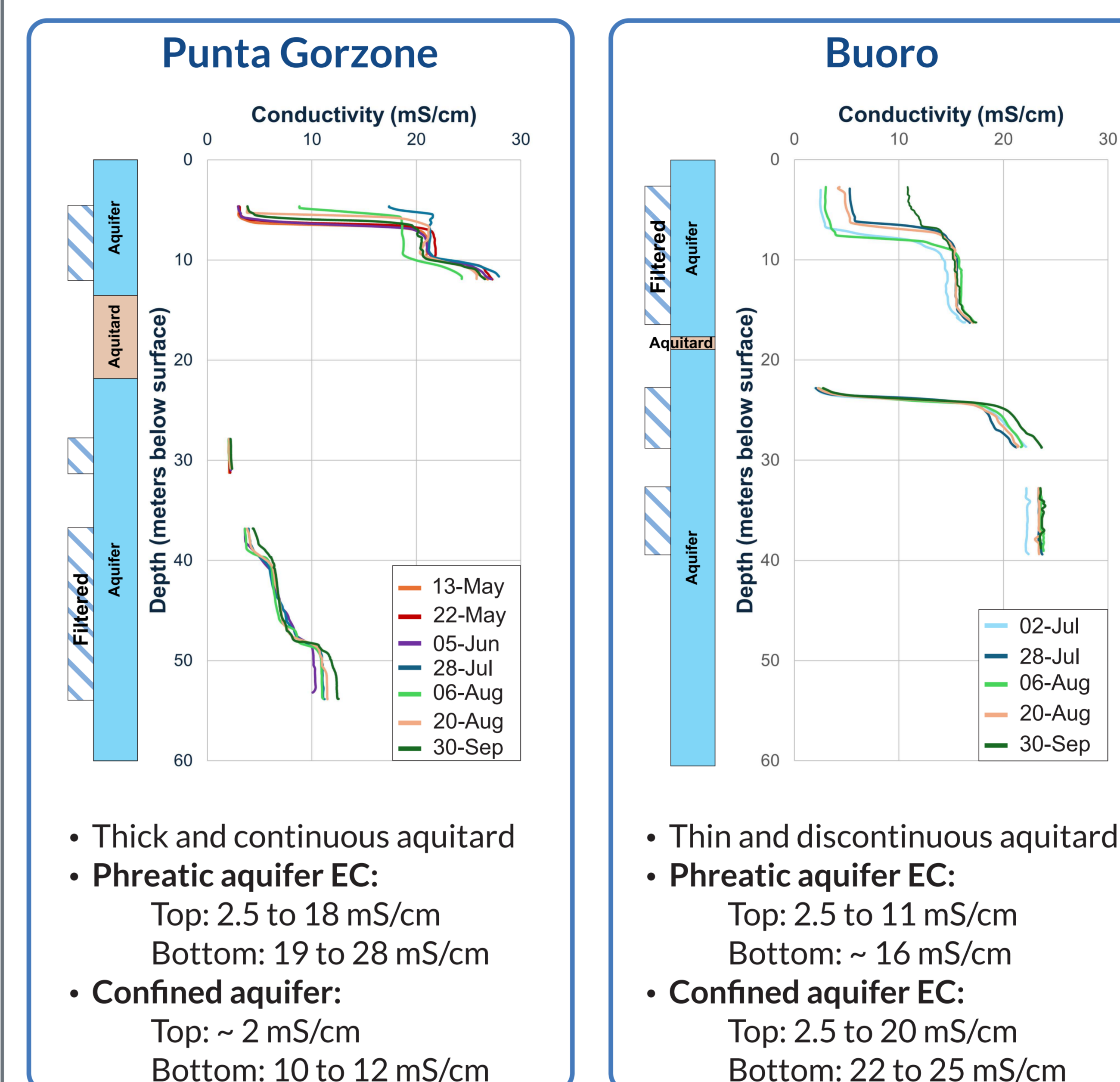
Supersite Design

- Supersites: Punta Gorzone & Buoro
 - Multilevel piezometers per site
 - Fixed-depth CTD (Conductivity, Temperature, Depth) sensors per site
- Monthly CTD profiling & water table measurements
- Surface-water level monitoring
- Meteorological & tide-gauge data integration

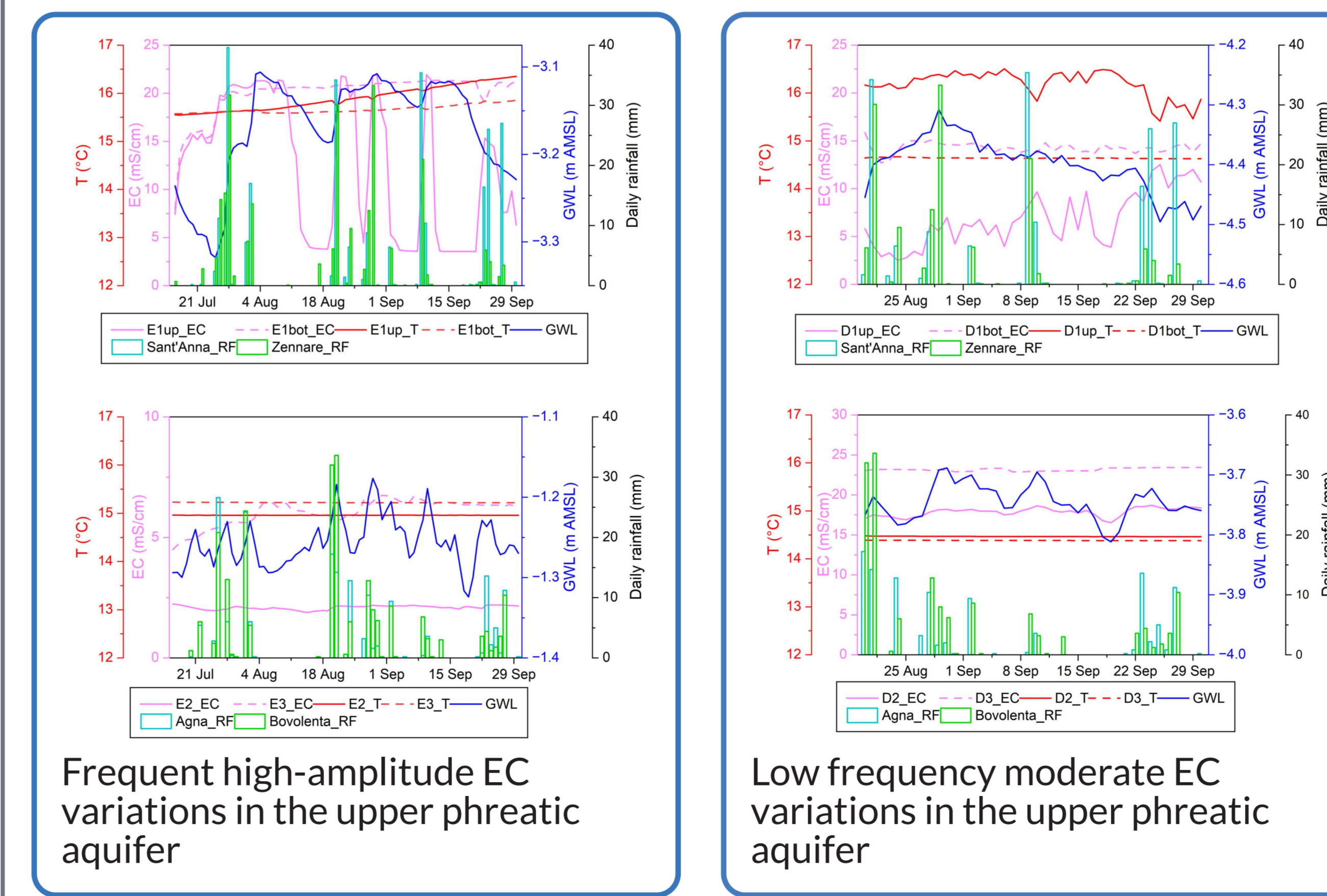


2. KEY RESULTS

CTD Profiles



CTD Time Series & External Data



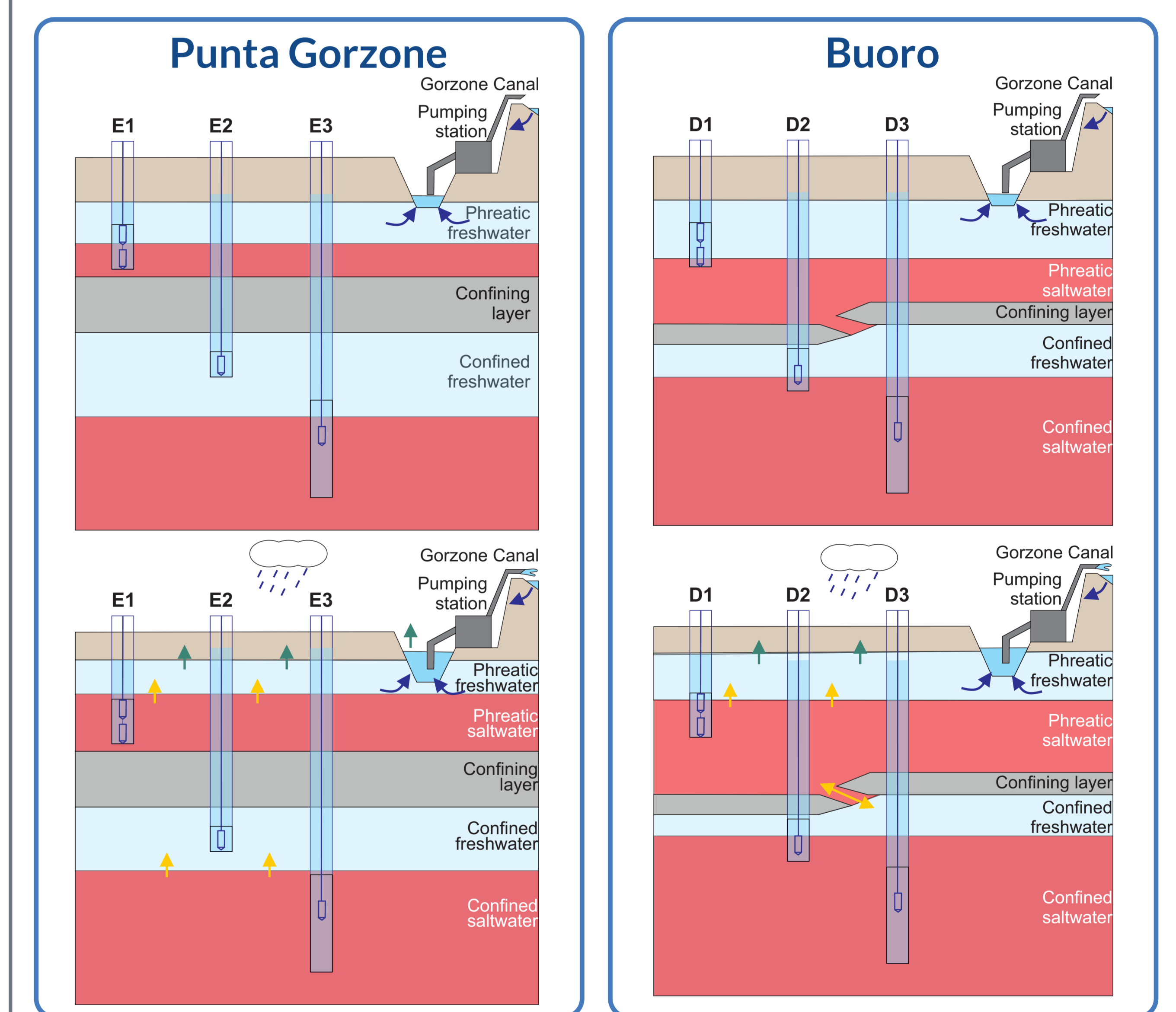
Highlights

Vertically layered systems, with small fluctuations in groundwater level and pronounced vertical variability in EC

3. DISCUSSIONS & IMPLICATIONS

Study Overviews

- Short term groundwater level and salinity fluctuations are dominated by local mechanical controls
- Long-term stratification in confined aquifers are governed by regional recharge and density-driven processes
- Supersites: Capture both scales, improving model calibration and management



Key takeaways

- Supersites reveal SWI dynamics across spatial and temporal scales, enhance driver-response relationships understanding
- Ensure data continuity, and reduces operational costs, delivering high-quality datasets for scientific and operational use
- Enhance management support practices: early warning systems, pumping regulation, model calibration, and long-term sustainability assessment

Bibliography

Tosi, L., Cosma, M., Yaciuk, P. A., Aljinović, I., Artuso, A., Čarija, J., Da Lio, C., Frison, L., Srzić, V., Tateo, F., & Donnici, S. (2025). Developing Integrated Supersites to Advance the Understanding of Saltwater Intrusion in the Coastal Plain Between the Brenta and Adige Rivers, Italy. *Journal of Marine Science and Engineering* 2025, Vol. 13, 13(12). <https://doi.org/10.3390/jmse13122328>

This research was conducted within the framework of the SWAMrisk Project "SubsurfaceWater Monitoring and Management to Prevent Drought Risk in Coastal Systems" (Project ID: ITHR0200479), funded under the Interreg Italy - Croatia 2021 - 2027 Programme.