PhD programme in Civil Engineering and Architecture - 36th cycle (2020-2023)

Numerical modelling to support aquifer management concerning climate change and socio-economic future scenarios

Innovative Groundwater Management

Pillar 1
**Strengthening** the understanding of groundwater functioning and trends;

Pillar 2
**Improvement** of groundwater resilience and security in a social learning process;

Pillar 3
**Development** of sustainable management and remediation strategies;

Pillar 4
**Reinforcement** of the DSS, communication and dissemination activities.

Participatory approach and stakeholder engagement in five typical case studies

Tutor: Eng. Prof. Maria Giovanna Tanda
PhD student: Eng. Daniele Secci
Surrogate Models

The physical properties and processes that determine the so-called "groundwater flow" are highly heterogeneous. To capture this characteristic, many aquifer management problems require complex distributed mathematical models, which can host fields in relation to hydraulic properties and boundary conditions that vary in time and space.

The spatial and temporal variables and the parameters for complex physical models typically generate very high processing times that prevent a complete calibration and accuracy of the analysis performed.

Surrogate models (data-driven) aims at providing simpler models, and, consequently, faster, which emulates the specified output of a more complex model, depending on the input parameters that characterize it.
Goals

- Analysis of surrogate models present in the literature, used for groundwater case studies;
- Focus on neural networks as a surrogate models;
- Neural network application for surrogate simulation of aquifers (groundwater flow & transport) in 5 case studies within the European project InTheMed (Funded in the European Program PRIMA Partnership for Research and Innovative in the Mediterranean Area).