



MSc thesis proposal

- Title of the research

Advanced Sensitivity Analysis of Groundwater Contaminant Transport Models in Scenarios of Climate Change

- Objectives of the research

The computational models that quantify the contaminant release from industrial activities and its transport in groundwater are computationally expensive. Furthermore, many uncertainties affect the inputs and boundary conditions of such models. In particular, climate-related variables (temperature, CO₂, precipitation, ...) play a relevant role for contaminant mobility, and the concerns for *Climate Change* (CC) demand increased attention to their characterization. To alleviate the computational burden, *Sensitivity Analysis* (SA) can be employed to identify the most relevant model inputs that drive the model output in contamination-critical situations and screening out non-influential inputs, so that the dimensionality of the problem is reduced and surrogate modeling enabled for uncertainty quantification.

In this thesis, advanced SA methods will be studied and applied to contaminant transport models, within a framework of risk assessment for radionuclide-contaminated aquifers under CC scenarios.

References

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- Di Maio, Francesco, et al. "Global sensitivity analysis for segmented inverse uncertainty quantification in the safety analysis of nuclear power plants." *Annals of Nuclear Energy* 208 (2024): 110791.
- Alibrandi, Umberto, Lars V. Andersen, and Enrico Zio. "Informational probabilistic sensitivity analysis and active learning surrogate modelling." *Probabilistic Engineering Mechanics* 70 (2022): 103359.

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