

3D Thermo-Hydro-Mechanical Modelling of Sedimentary Basins ? First Steps towards a Multi-Physics approach linking Geology, Geodynamics and Georesources

[Seminario](#)

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Abstract:

Sedimentary basins represent highly complex systems where several components interact in a nonlinear and dynamic way through diverse temporal and spatial scales. They play a strategic role in the whole Earth's system dynamics, buffering deep geodynamics to processes occurring at the Earth's surface. They share a socio-economic dimension in the prospect to secure long-term, sustainable usage of their mineral, fossil and renewable resources. Processes taking place in these systems occur over more than 15 orders of magnitude in spatial scales (from the nanometer scale of lattice defects to the thousand kms scale of mantle convection) and across more than 20 orders of magnitude in temporal scale (from less than seconds to millions of years). Interestingly, despite differences in their relevant wavelengths and temporal scales, all of these processes are interdependent and non-linearly coupled. The amount of data nowadays available enables a detailed characterization of both their geological settings and thermo-mechanical state. As many geological processes occur over very long time- and large length-scales and involve complex rheologies, computer models, tightly coupled to observations and data, are ideally suited to their study. This field of research is a relatively new scientific discipline, and as a result, there are still unresolved technical challenges particularly related to modelling geodynamic processes in three dimensions.

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