

PROJECT PROPOSAL SUMMARY:

VISTA Center for Modeling of Coupled Subsurface Dynamics

Production of hydrocarbons and geothermal energy, extraction of groundwater, subsurface energy storage, CO₂ sequestration and wastewater disposal all involve massive subsurface extraction and/or injection of fluids. This affects the thermal, hydraulic, mechanical and chemical (THMC) state at depth, resulting in strongly coupled THMC processes.

In recent years, the surface manifestations of human fluid injection and production have become increasingly apparent. To improve engineering operations and avoid unacceptable environmental impact, there is a need to understand how fluid injection and extraction effects the mechanics of the geological formation to cause deformation of porous rocks as well as slip, opening and propagation of fractures and faults. These processes can be studied by a combination of data analysis and mathematical modeling and simulation.

C-Mood's primary objective is to develop fundamental knowledge and educate next generation researchers to understand how subsurface fluid injection and extraction results in deformation, fault reactivation and fracturing. The center thus targets critical and fundamental research questions through mathematical and numerical modeling and data analysis. The two research pillars of the center address the potential of Groundbreaking Modeling Concepts for Deformation in Porous Rocks (P1) and the demand for understanding of Fundamentals of Induced Subsurface Deformation (P2).

The third pillar of the center is dedicated to support education and career development for PhD and postdoctoral candidates: The C-Mood Researcher Training Program (P3). Lead by Center Director Prof. Inga Berre, C-Mood gathers an interdisciplinary team at the University of Bergen to tackle fundamental research questions in collaboration with world class academics. The center brings together researchers who have experience from a range of subsurface applications, including CO₂ sequestration, subsurface thermal and mechanical energy storage, ground water management and geothermal energy and hydrocarbon production. Considering also their interdisciplinary and intersectoral expertise, the center brings a unique opportunity to provide breakthroughs in the scientific understanding of induced deformations.

C-Mood is located in the main building for Natural Sciences and Technology at the University of Bergen, in the southern wing of the building "Realfagbygget" at the University of Bergen.