DIPARTIMENTO
DI SCIENZE DELLA TERRA

SAPIENZA
UNIVERSITÀ DI ROMA

DOTTORATO DI RICERCA
IN SCIENZE DELLA TERRA

Research activity

The main objective of our study is to evaluate the probability of CO_2 Storage in Lorestan which is located in Zagros area of Iran. In the first stage, the four proposed sites will be evaluated based on the required criteria to create an important and practical database for purpose of storage in this zone. This screening will be based on the interpretation of seismic lines available in the area (provided by NIOC) and the reconstruction of the 3D geological models. Once the geological model has been defined, based on the analysis of the available logs and other geological information potential formations as a reservoir and caprock will be highlighted. This will allow evaluating the depth of the reservoir, the thickness of the main formations (both reservoir and seal) and the occurrence of faults, which should be considered as well as other criteria for opting the probable site of storage. Following finding the main reservoir in terms of geological storage of CO_2, different methods of capacity estimation will be applied for capacity calculation. Since further steps such as modeling is a time taking procedure, at the end of this stage the list of potential sites will be ranked to reach a most probable anticline for purpose of CO_2 Storage in the Lorestan area. For this purpose below procedure will take place:

1. Storage Capacity estimation
In order to define the capacity estimation of the selected site in detail, the analysis will be performed following two phases: an experimental phase (to acquire petrophysical parameters of involved formations) and the dynamic modelling.

2. Experimental phase
In this stage due to the importance of permeability, porosity and other parameters for validation of injection security, capacity estimation and their role in accreditation of our dynamic model, petrophysical parameters of host formation (reservoir) and seal will be acquired by performing different experiments on sample of reservoir rock and caprock. First, samples will be taken from the nominated formations of site in a field trip to the Lorestan area of Iran. For this purpose, in case of accessibility to the well-cores, samples will be collected for further analysis and experiments will be performed in Laboratory of Sapienza Università di Roma to achieve effective porosity and permeability. Otherwise, the sample will be taken from the outcrop of formations to execute the same procedure for attaining required petrophysical parameters.

3. Dynamic modelling
In this part of the project, based on the data provided by NIOC, the geological model of our nominated anticline will be populated for dynamic modelling. The volumes corresponding to reservoir and seal will be reconstructed and populated by data from well logs and field work sample porosity and permeability results. In this part we will use the model to emphasize on the long-term effects of the CO_2 injection into a geological formation and to finalize the best location of the injection well. The existence of faults and the occurrence of heterogeneities into the reservoir will be deeply evaluated in response to the injection point of CO_2 to reach the optimum model for running CO_2 storage project. It will assure us for the security of injection and will highlight the accuracy of proposed site of injection.

At the end of this stage, coupling these two methods will reduce the uncertainties of site selection which plays an important role in the validation of our approach for performing CCS scenario in this area.