3D parametric model of a potential trap for carbon dioxide storage. Case study: oil structure Valcele, Romania.

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The objective of the work is the construction of the 3D model of the main characteristics (rocks and fluids) of a potential trap for carbon dioxide. Model must provide the information necessary to select an optimal location for carbon dioxide injection and fluid dynamics modeling.

3D parametric model is built based on data obtained from drilling and seismic investigations using geostatistical methodology (indicator kriging and universal kriging for the achievement of lithologic and parametric component of the model, and conditional simulation for assessment of uncertainty models).

The succession stages of building the model assumes: 1) separation of oil and gas productive complexes, cap-rocks intervals and aquifers; 2) identification of major structural faults; 3) evaluation of parameters distribution in each lithologic units; 4) study of uncertainty in two 3D models (kriging and simulation models).

The main steps of preliminary data processing were: statistical analysis of the data, de-clustering for representative distribution and trend analysis. Special attention was paid to the study of the anisotropy made with surface variograms. Directional variograms has a convenient tool to calculates a series of orthogonal directions and finding the major and minor directions of anisotropy.

Case study is devoted to the oil structure Valcele that has 29 complexes with oil, associated gazes and free gazes in Oligocene, Upper Burdigalian (Helvetian old name), and Sarmatian. For our reasons, storage of carbon dioxide, only Oligocene and Upper Burdigalian deposits are important. Oligocene is the most important oil complex (thickness between 500 m in the east part of the structure and 1500m in the west part. Upper Burdigalian has thickness between 1000 m, in the central part of the structure and 20-80 meters in west part of the Valcele structure. Available data are: 241 boreholes drilled (the deepest borehole, with a depths of 4656 m) with complete geophysical investigations and 3D seismic work.