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| Title: Implementation of 3D unstructured meshes in storage site subsurface reservoir and geochemical models  Project Leader: | | Demonstration Project:  CTSCo |
| Project Number:  Status: Under Development | Commencement: 2018  Completion: | Total Budget:  ANLEC R&D Contribution: |

***The Context***

CTSCo wishes to understand the options for maximising the efficiency of access to available storage porespace within a southern Surat storage complex. A key requirement will be to monitor and verify the vertical extent of the plume and its physical/chemical attributes in the M&V wells. This specific project is to analyse the application of 3D unstructured mesh construction for subsurface GHG storage site reservoir models.

***Unknowns***

The ability of full 3D unstructured mesh construction for subsurface GHG storage site reservoir and geochemical modelling.

***Research objective***

This project aims to understand if full 3D unstructured mesh construction and the population of the mesh with appropriate static and dynamic reservoir properties can be implemented into its preferred suite of reservoir modelling software Petrel™, tNavigator™ and ToughReact™. They have the potential to eliminate the current restrictions that structured meshes have on modelling CO2 plume movement to predict local impacts adjacent to the well bore that require a very fine 3D mesh size and regional reservoir impacts requiring increasing coarsening of the 3D mesh size to allow efficient computational speed.

***New Knowledge***

* Understanding the advantages and pitfalls in the use of 3D unstructured mesh construction for subsurface GHG storage site reservoir models.
* Implementing 3D unstructured mesh construction that can be incorporated into existing commercial software applications such as Petrel™ (static geological model), tNavigator™ (dynamic reservoir simulation model) and ToughReact™ (geochemical reactive transport model)
* Ability to populate the 3D mesh with both static and dynamic reservoir properties

***Work Program***

The project involves:

* Literature review of currently available technologies.
* Evaluation of the ability of 3D unstructured grids to model the variation of grid block scale required to model all elements required for subsurface storage reservoir (and geochemical reactive transport) models.
* Develop software to construct 3D unstructured meshes and populate them with appropriate static and dynamic property arrays.
* Develop software plug-ins that allow implementation of 3D unstructured meshes into commercial modelling software suites such as Petrel™, tNavigator™ and ToughReact™.

***Milestones***

### Milestone 1: Literature review

### Milestone 2: Milestone 2: 3D unstructured mesh construction software design

### Milestone 3: Population of 3D mesh with static and dynamic properties

### Milestone 4: Milestone 4: Development of software plug-ins