Developing a Method to Build a 3D Geological Model with gOcad in a Complex Thrust and Fold Belt Environment

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A new 2.5D geological map of Moose Mountain dome, 50 km SW of Calgary, is produced based on detailed field surveying. The method uses orthophotos drapped on a Digital Elevation Model (DEM) where geological features (contact and faults) are digitized by visual interpretation directly in the 3D environment using a Computer Aided Design (CAD). Hence, the geological map provides 3D coordinates for all the features. Balanced cross-section are then constructed in the same 3D environment using the surficial contacts of the map as control points.

These steps provide two distinct datasets (map and cross-sections) to create the geological model. Using the data of the cross-sections, primitive surfaces representing the top of the geological units are interpolated. The map combined with geometrical and geological parameters are the guidelines to constrain the surfaces and ensure structural compatibility of the model. This process in turn corrects discrepancies that are incorporated in the map or the cross-sections during the initial interpretation of the geological map.

Lateral propagation of complex structures such as detachment and fault-propagation folds, thrust and backthrusts are represented in the model. Hence, a more realistic 3D geometric representation of these structures involved in the formation of reservoir provides a better kinematic interpretation and a better formulation of exploration models.