SEISMIC INVERSION DATA, A TOOL FOR RESERVOIR CHARACTERIZATION / MODELING, SAWAN GAS FIELD – A CASE STUDY

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Seismic inversion process combines all available geologic and geophysical information into a single product /parameter called acoustic impedance in a way that is immediately recognizable to both geologists and geophysicists. Acoustic impedance (AI) is a layer property and can be related directly to the physical properties of the reservoir. Constrained Sparse Spike Inversion (CSSI) algorithm, models the input seismic as the convolution of the estimated wavelet and a reflection coefficient series representing the geology. The processing of seismic data for inversion requires particular attention in preservation of relative amplitude, phase, and frequency. Processes that alter these attributes are not recommended during the processing.

Acoustic Impedance data has been used successfully in optimizing the development of Sawan Gas field. Very low acoustic impedance when coincident with the topset parts of the progradational seismic reflection geometries is indicative of good quality reservoir. Areas identified by such low acoustic impedance looked for development wells locations to optimize deliverability. Acoustic impedance of the reservoir section is converted into an effective porosity grid based on the relationship of well log acoustic impedance and porosity. Isopach maps are generated using acoustic impedance cut offs established from well log acoustic impedance (AI). These isopach and porosity maps are used to depict reservoir sand distribution and its spatial heterogeneity.

The isopach maps are also used to create static models of different reservoir units during reservoir modeling/simulation. Acoustic impedance then provides a control on the population of facies and petrophysical properties in the reservoir model.