

Topics

1-4.7 Seismic Velocities & Imaging - Velocity Model Estimation
2-7.1 Static Geomodels

Title

Time-Depth conversion with Uncertain and/or Incomplete Data

Authors and affiliations

Jean-Marc CHAUTRU^{1*}, H el ene BINET¹, Pedram MASOUDI¹, Fran ois GEFFROY¹, Marc PAPOUIN², Salvador RODRIGUEZ² and Didier Renard³

¹ Geovariances, 49 Bis avenue de Franklin Roosevelt, 77210 Avon, France

² Neptune Energy International S.A., 9-11 All e de l'Arche – Tour EGEE – 92400 Courbevoie, France

³ MINES ParisTech – PSL University, Centre de G eosciences, 35 rue Saint Honor e 77305 Fontainebleau, France

*Corresponding: chautru@geovariances.com

Abstract

It is quite common during the exploration phase or at the early stage of a field development to work with a few of or even no well data, with uncertain Time or Velocity maps and with doubts about fault location. Such a lack of data and the uncertainty associated with the available data has a negative impact on the robustness of Time-to-Depth calculations, thereafter on the structural maps used in estimation of the field economic potential.

Geostatistical methods developed in the framework of the UncerTZ R&D consortium can help dealing with uncertain data and with a few data when calculating depth maps:

- First, the uncertainty of each source of data is accounted for in the geostatistical algorithms;
- In addition, specific methodologies were defined to overcome the limitations induced by a lack of data;

The paper describes the combined use of advanced geostatistical techniques which offer a solution for generating realistic depth maps at exploration or delineation phases:

- Misties can be fixed with a variant of kriging with measurement error method;
- Uncertain markers at wells or estimated markers (when wells are missing) can be managed also with kriging with measurement error method;
- Stochastic conditional simulations allow integrating uncertainty on Time maps or Velocity maps and on fault location. They also allow quantifying the global uncertainty resulting from all the uncertainties on each data source.

With this set of methods, it is possible to get usable results from which the uncertainty on extension of petroleum traps and their spill point depth can be estimated, allowing stakeholders to take the most appropriate decisions about field development.