Multi-component Digital Receivers: Comparison of Subsurface and Conventional Surface Datasets

Tagir Galikeev[1], Jason Criss[1], and Vince Rodych[2]
[1]Input/Output Inc., Denver, CO, United States; tagir.galikeev@i-o.com
[2]Input/Output Inc., Calgary, AB, Canada

Abstract/Excerpt

Datasets described in this abstract were acquired over an area planned for a heavy oil Steam Assisted Gravity Drainage (SAGD) project in Northeastern Alberta. Due to complex near-surface conditions in the area, surface seismic data, particularly C-waves, often deliver poor results, which can not be used reliably in the consequent process of lithology discrimination and, therefore, location planning for horizontal injector/producer well pairs. Optimal location of the wells ensures better oil sweep efficiency, and, thus, economics of a given SAGD project. As well, results of this data analysis also hold promise for 4D steam monitoring projects using subsurface multi component digital receivers.

Geometry of the undertaken project is shown in Figure 1. Two lines with a total of 17 surface and 17 subsurface locations were recorded with multi-component digital point receivers. A study area was selected where thick muskeg was present. The surface receivers were part of a larger 3D surface survey that had a typical layout: 30 m spacing between receivers and sources, 90 m between receiver lines and 150 m between source lines. The reservoir is shallow (no deeper than 500 ms of seismic two-way time). Resolution and frequency content of the seismic data plays an important role, since one of the objectives is to distinguish between the bitumen sands and thin shale layers, which act as barriers in the way of steam distribution and, therefore, degrading an ideal picture of steam chamber within the reservoir imaged by engineers.