

## **PSDM for unconventional reservoirs? A Niobrara Shale case study**

**Morgan P. Brown<sup>1</sup>, Joseph H. Higginbotham<sup>2</sup>, Cosmin Macesanu<sup>2</sup>, Oscar E. Ramirez<sup>2</sup>, Dave List<sup>3</sup> and Chris Lang<sup>3</sup>**

<sup>1</sup>*Wave Imaging Technology Inc., Denver, CO*

<sup>2</sup>*Wave Imaging Technology Inc., Houston, TX*

<sup>3</sup>*Fidelity E&P Company, Denver, CO*

### **Abstract**

Unconventional resource plays currently absorb a significant proportion of onshore U.S. E&P budgets. The perceived simplicity and homogeneity of unconventional reservoirs explained their initial appeal to firms seeking to reduce “dry hole risk”. However, as inconsistent drilling results from many resource plays highlight, shale reservoirs are neither simple nor homogeneous. Used infrequently 5-10 years ago, drillers today commonly employ 3D seismic to improve horizontal well “geosteering”. Looking ahead, there is great interest in exploiting 3D seismic to delineate productive “sweet spots”. In particular, differential horizontal stress (from azimuthal anisotropy analysis) and elastic inversion for “brittleness” are paired to find optimal drill locations and wellbore orientation (Sena et al., 2011).