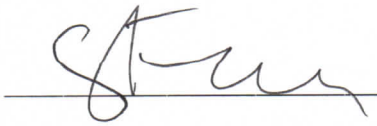
Seismic and well log data integration using data matching techniques

Sean Bader

ABSTRACT

Relating well log data, measured in depth, to seismic data, measured in time, involves estimating well log impedance and a time to depth relationship using available sonic and density logs. When sonic and density logs are available, the seismic to well tie typically involves a subjective, labor-intense, workflow that depends on the interpreter's experience and intuition. The problem is worsened when sonic and density logs are not available as it is challenging to incorporate wells into integrated reservoir studies that cannot be tied to seismic. I propose an approach that estimates missing well log information, automatically ties wells to seismic data and generates a global log property volume using data matching techniques. I first use local similarity to align all logs to constant geologic time and interpolate missing well log information. Then, I use local similarity to tie available wells with seismic data. To validate the approach, I interpolate log data from each well along the local seismic structure to generate global log property volumes. The accuracy of seismic well ties is tested using blind well tests. I apply this workflow to a 3D seismic dataset with 26 wells and achieve consistent and verifiably accurate seismic well ties.



(Signed Name)

Advisor: Sergey Fomel **(Printed Name)**