



ASEG-PESA 2015

Geophysics and Geology together for Discovery

24th International Geophysical Conference and Exhibition
15–18 February 2015 Perth, Western Australia

Geological uncertainty and geophysical inversion

Minerals keynote paper

Mark Jessell

Centre for Exploration Targeting

Mark.Jessell@uwa.edu.au

SUMMARY

One of the major challenges for geophysical inversion schemes is to retain geological meaning during the inversion process. In voxel-based methods based on prior geological models we are typically forced into a manual reinterpretation of smooth petrophysical images in terms of discrete structures and lithostratigraphy.

Recent work in the characterisation of geological uncertainty has demonstrated the inherent weaknesses in classical 3D geological model building strategies. The analysis of 3D geological uncertainty provides several pathways to improved geophysical inversion. The uncertainty can be characterised at the local scale to provide constraints on petrophysical inversions, and at the global scale to provide end-member geologically and topologically distinct prior models. Although in its infancy, geological uncertainty analysis shows promise in workflows aimed at integrating geological and geophysical constraints in 3D.