# Studies of fracture network geometry of reservoir outcrop analogues from terrestrial lidar data: attempts to quantify spatial variations of fracture characteristics

E.A. Vsemirnova (1), R.R. Jones (1), and K.J.W. McCaffrey (2)

(1) Geospatial Research Ltd, Earth Sciences, Durham University, Durham DH1 3LE, UK (katya@geospatial-research.co.uk),
(2) Earth Sciences, Durham University, Durham DH1 3LE, UK

We describe studies analysing terrestrial lidar datasets of fracture systems from a range of reservoir analogues in clastic and carbonate lithologies that represent geological analogues of offshore hydrocarbon reservoirs for the UK continental shelf. As fracture networks (observed here from centimetre to kilometre scale) can significantly affect the permeability of a fractured reservoir, the definition of fracture network geometry at various scales has become an important goal of structural analysis.

The main aim of the study has been to extend the investigation of fracture networks in order to quantify spatial variations in fracture parameters in a variety of lithologies. The datasets were pre-processed using RiSCAN PRO software, and then re-sampled and filtered to derive characteristics which are traditionally measured from outcrops, including size distributions, fracture spacing and clustering statistics. This type of analysis can significantly reduce the uncertainty associated with some field fracture network measurements. The digitised fracture networks datasets are then used to investigate various aspects of spatial heterogeneity. A series of fracture maps (joints and faults) were generated at different scales, and fracture trends were studied to test scale dependency of fracture orientations. Multiscale trend analysis was then applied to describe the trend structure of the fracture networks.