



Unconventional sub-basalt imaging and geological interpretation in terms of porosity/permeability in buried volcanic reservoirs.

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Seismic absorption-scattering mapping is becoming the new standard in volcano imaging, as it allows a description of the Earth in terms of parameters tangibly related to porosity and permeability. This technique has an unexplored interpretational potential for the oil & gas industry in terms of how we relate rock-matrix permeability with unconventional seismic parameters, more sensitive to the presence of fluids and to the location of interfaces than seismic velocity. We propose a joint sub-basalt imaging and geological interpretational project inspired by the experience acquired in volcanic environments and focused on the application of volcanological mapping techniques to industrial data. The project will involve processing raw seismic data to understand the effect of different volcanic facies on absorption and scattering of seismic energy. These two parameters will then be linked to the porosity and permeability of the host rock by means of petrophysical and seismic experiments on core samples and field analogues, using state of the art facilities at the University of Aberdeen funded by the Oil & Gas Innovation Centre (OGIC). After careful petrophysical mapping of dry and fluid-saturated samples, P- and S- waves will be propagated at a range of frequencies into them to understand the potential subsurface seismic response. The final up-scaling will tackle the problem of exposing the physical properties of the basin trying to set new benchmarks in seismic interpretation of volcanic oil & gas fields.