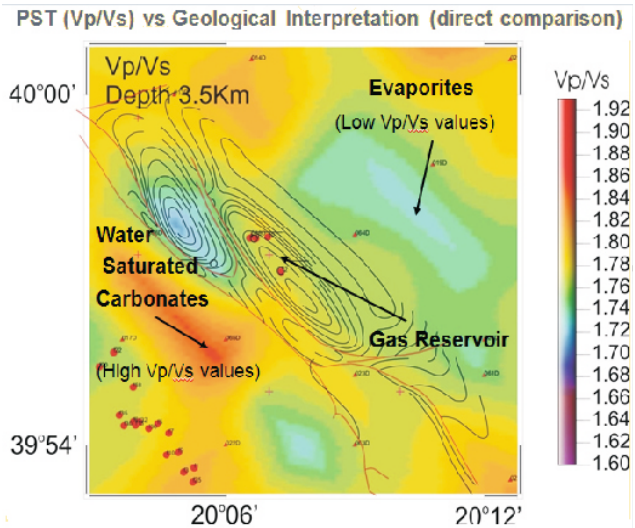
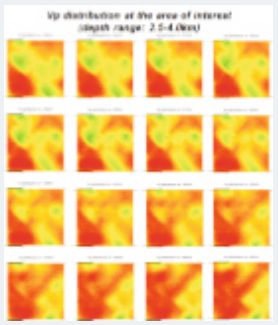
# Fluids identification using PST©

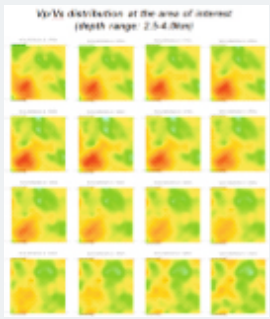
The use of shear wave together with the compressional wave may be very useful for fluid identification. From observation, it is found that light hydrocarbon saturation decreases the velocity of compressional wave and increases the velocity of shear wave through porous rocks (relative to formation water saturation). Shear wave and compressional wave velocites are conjugately affected by rock density and elasticity. There is a smooth decrease of density with the replacement of water by light hydrocarbon or gas. Elasticity, however, is different. The ease with which the solid material can deform into pore is scarcely affected by the presence of some water; all deformation is readily absorbed by gas in the reservoir. This is true whether the water saturation in the pore is 10, or 40, or 70%; the remaining gas absorbs deformation. Therefore, over this range of water saturation the elasticity remains substantially constant, while the density decreases; it follows the shear velocity increases with the gas saturation increase. When the water saturation approaches 100%, the compressional wave velocity must rise considerably; there is no gas left to absorb the deformation and the deformation is resisted appreciably by the water. Significant change between gas saturated velocities and water saturated velocities therefore occurs with the very first bubble of free gas within the pore.

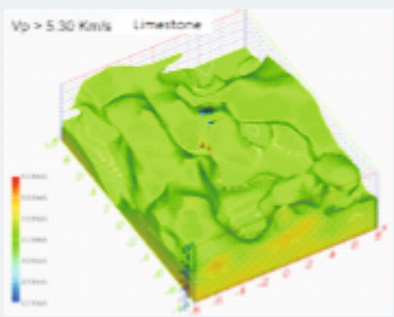
When gas content reaches residual saturation and the water becomes the major fluid, there is no gas free to absorb deformation and the compressional wave velocity will abruptly increase. On the other side, shear wave velocity will not be much affected and it will keep the same decreasing trend with the increase of water saturation.




Although the analysis of S-wave data can significantly reduce the uncertainty in interpreting seismic data, such data are also more difficult to collect. PST methodology can provide reliable $V_P$ and $V_S$ data below the entire block and at a function of the cost of conventional methods which provide data locally (e.g. VSP).







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