Incorporating seismic attributes, well-logs, and computer tomography scan for porosity prediction of a 3D seismic survey, Wellington Field, Kansas

The dependence of elastic properties especially on litho-petrophysical properties provides tangible opportunities for seismic hydrocarbon-reservoir characterization. In the case of carbonate reservoirs, porosity is the main controlling parameter on seismic P-wave velocity. Our goal is to establish both seismic facies identification, classification, and build an understanding of the porosity in terms of both volume fraction and pore-surface area and its impact on seismic amplitude especially bandwidth, peakedness, and energy. A 3D seismic data set, well-logs and core samples, are utilized to validate an observed linear relationship of acoustic impedance and porosity from well-logs. The linear relationship that porosity has with impedance allows for porosity prediction. Core samples will be utilized for CT-scans to image and understand carbonate porosity architecture and be a proxy for the impact of petrophysical controls on seismic amplitude (impedance). We achieved a reliable porosity prediction of the reservoir facies on Mississippian carbonates that will enable improved reservoir and fluid replacement modeling.