Spectral decomposition influence on AVO effect

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INTRODUCTION
Under construction …

SUMMARY
Delineating the extend of a producing reservoir is one of the main challenge of exploration and development interpreters. Our approach to address this challenge is to use “spectral decomposition” of pre-stack data couple with an AVA/AVO studies (Amplitude Versus Angle/Offset).

Seismic spectral decomposition is a known method to determine more accurately the lithology of an area of interest. AVO effect are used to identify and quantify the extend of a fluid anomaly in a potential reservoir. Combine together, the aim of this method is to provide a better delineation of the producing area. A shared earth approach will be used in order to perform cross validation of the results at each step.

The first step is a 1D study well bore centred:
Using well logs information: Vp (compressional velocity), Vs (Shear velocity) and the density to compute a first set of synthetic gather that will constitute our reference. The chosen well has an AVO effect and should be visible on this reference set.
A real set of pre-stack gather at the well bore will then go through a series of tests to identify the best frequency bandwidth that identify more accurately the AVO effect.
In a second phase, this frequency bandwidth will be used to produce two results:
A 3d set of gather with this optimum bandwidth. Producing Gradient and the Intercept of this set, a cross plot of those attributes should confirm the result of the 1D study and will help to delineate the AVO effect spatial extent.
An inversion based on this spectral decomposition should help to delineate more accurately the reservoir lithology.

Those results unified well bore information, seismic pre and post stack data, frequency analysis and inversion results. The analysis will tend to demonstrate that lithology and gas anomaly can be better mapped using combined methodology, compare to a juxtaposition of methods.