Society of Exploration Geophysicists
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Infusing rock physics into seismic inversion

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Organized by SEG CUPGS student chapter

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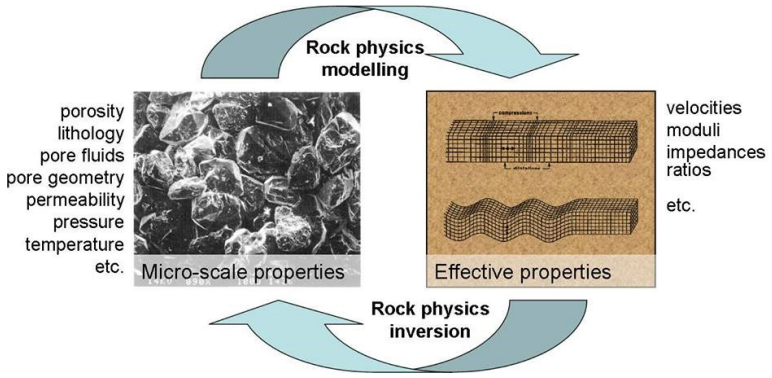
PŘÍRODOVĚDECKÁ FAKULTA UK, MINERALOGICKÁ POSLUCHÁRNA, ALBERTOV 6



Mick Jagger, philosopher and singer of The Rolling Stones back in 1969, sang rather pessimistically "You can't always get what you want." These words should ring true to all geoscientists: What we really want are measures of rock properties (such as facies/rock types, porosity, saturation, etc.), but what we typically measure in the field are quantities like resistivity, density, seismic wiggles, etc., —signals that are "somehow" related (to a smaller or larger degree) to these desired rock properties.

Seismic inversion is a difficult endeavor, for the simple reason that the earth filters out a lot of the useful signal as it travels from a source through the subsurface to the receivers. What we are left with is a band-limited signal with restricted information content. This can be readily seen when we compare a seismic trace against a corresponding impedance profile: The latter typically becomes larger as we go deeper (compaction hardens the earth), whereas the former keeps wiggling around zero. What a mismatch!

The trick really is that somehow we need to add information to the seismic inversion process that is not in the seismic itself. For instance, low-frequency information (as the seismic is band-limited), or high-frequency information (for the same reason). Much of this lecture is about adding this extra information, because there are many ways to do this, though not all equally successful. We shall focus specifically on using rock-physics models to better derive the extra information, because these are nothing other than relationships between what we get and what we want! Just to put the reader's mind (and ears) at ease: I shall not be singing during the lecture.

Biography

Michael Kemper is a geoscientist/petroleum engineer with 28 years experience in geophysics, petrophysics, and reservoir engineering. He spent the first 13 years with Shell International in The Hague, Nigeria, and London, during which time he made a number of contributions to the interface between petrophysics and geophysics.

In May 1999, Kemper became team leader of petrophysics/petroacoustics at Ikoda Ltd., working on a wide variety of projects. It is during this time that RokDoc, now one of Ikon Science's main products, was started. As one of the cofounders of Ikon Science, Kemper now serves as director of research and innovation. In this role, he is responsible for the development of new, innovative, and impactful algorithms and workflows in the area of rock physics, seismic inversion, and numerical earth modeling in the Ikon Science software portfolio.