



## FESAus August 2020 Talk

### *The needle in the haystack: using machine learning to identify specific facies – JB Peyaud*

Looking for a specific facies in large log datasets is commonly done by applying “appropriate” cut-offs on specific signal. The result is commonly satisfying but in doing so, it also is strongly biased by the concept underlying the choice of the limit. And because nature does not like boxes, applying a cut-off may not result in selecting only the facies of interest, or all of its occurrences. Actually, using machine learning might lead to exactly the same result, if used inadequately. But it offers more flexibility, more accuracy and more objectivity.

In this communication, machine learning was used to identify low permeability layers on the site of the SW hub for CO<sub>2</sub> sequestration. A fine comparison between cores and logs allowed to identify a log signature for low permeability intervals and identify them throughout the dataset. In a second time, a semi-supervised approach was used to analyse the dataset. This included a first step of unsupervised spectral clustering, followed by a second step of cluster validation based on the rules used by the Petrophysicist to identify low permeability layers. Clusters containing data of interest were kept, others were discarded and the process was re-iterated until clusters consisting only of the data of interest were obtained. These clusters were then compared with the Petrophysicist’s interpretation, showing a good level of consistency.

**Jean-Baptiste PEYAUD** is a Geologist with a specialty in Mineralogy, Geochemistry and Petrophysics. He defended his PhD in 2003 on the mobility of Rare Earth Elements in a fractured shales as proxies for the migration of radioelements. He then alternated positions as Sedimentologist and Researcher, working on reservoir diagenesis until joining Baker Hughes in 2009, where he became a specialist on geochemical logs. Involved in unconventional evaluation, he established a workflow to identify organic-rich layers from logs, proposed a method to identify lithology in basement rocks and generated two patents to improve the vertical resolution of geochemical logs. Currently an independent Geologist, JB is also a Visiting Scientist at CSIRO and an Adjunct Professor at the University of Electronic Science and Technology of Beijing, China



**DATE:** Tuesday August 11, 2020 - 12:30 – 1:30 PM (WAST, GMT+8) **VENUE:** Ibis hotel (Perth), on the web (rest of the world)  
**COST:** Members \$30.00; Non Members \$40.00; Students/Retirees \$10.00  
**(early bird)** Online registration at [www.fesaus.org](http://www.fesaus.org) by Friday 7<sup>th</sup> August at 11.00 am