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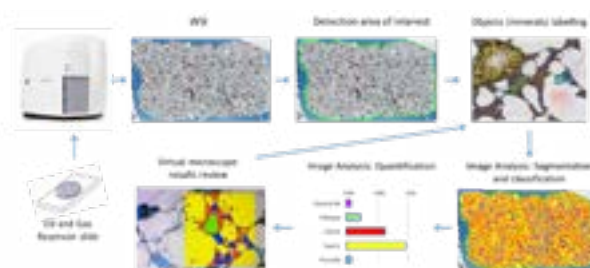
## DIGITAL IMAGE ANALYSIS IN OIL AND GAS RESERVOIR SLIDES: PRELIMINARY TESTS

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The oil and gas industry has recently sped up the adoption of digital technologies, with a focus on better understanding of a reservoir's resource and production potential. In the past, determination of rock properties using image analysis relied upon petrographic transmitted-light images, but with limited success due to lack of resolution and restricted computer processing power. We have tested an image analysis software platform (Visiopharm) that is widely accepted as a Digital Pathology software tool. Its color and pattern recognition capabilities allowed us, instead of with its classic healthcare application, to do digital image analysis on several varied lithology, real reservoir rock whole slide images. The defined workflow (Figure 1) included automated high-resolution whole slide image scanning (0.9 μm/pixel). Advanced image analysis software was used for automatic detection of the entire area of interest, image segmentation to label the different relevant minerals (objects) and object-based image classification for the organized quantification of different mineral types and porosity. Finally, virtual microscopy was used to verify the segmentation algorithms and, in the design stages, misclassification could be adjusted and computation repeated, assuring highly accurate results. It is needed to continue testing this approach with different types of lithologies and even drill cutting rock samples, but the obtained results proved that it is possible to use artificial intelligence with a large set of samples and a reference image library. These newly developed algorithms then have potential to allow for higher analytical throughput, increased data reproducibility and better data accuracy in automated rock analysis and interpretation.



**Figure 1:** Digital image analysis workflow applied to mineralogy and porosity characterization in a real subsurface sandstone reservoir rock.

### Biography

Miguel Ángel Caja is a Geoscientist and Researcher at Repsol Technology Center. He received his PhD in Petrology and Diagenesis from Madrid Complutense University and Post-Doctoral fellowship from Barcelona University. His current research interests include clastic and carbonate diagenesis linked to reservoir quality evolution using state-of-the-Art microscopy techniques.

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