# Specific Productivity Index From Nuclear Magnetic Resonance and Production Logging: an Innovative Way to Address Production Optimization and Reservoir Modeling Issues

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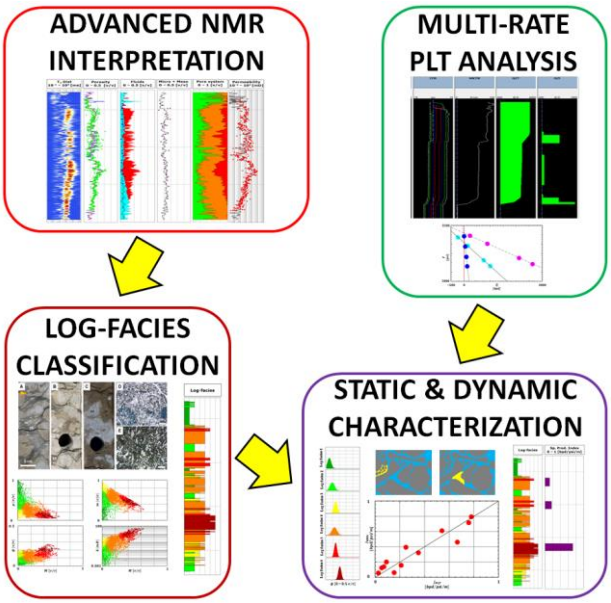
Conventional formation evaluation consists of petrophysical properties estimation and, possibly, log-facies classification by means of dedicated open-hole well log interpretation and modeling. The static formation evaluation outputs lack a direct and robust link with the actual dynamic behavior of the fluid flow in the porous medium they are describing. A simultaneous quantitative static and dynamic characterization at well location is a long-standing open problem to address production optimization issues and to produce a comprehensive and accurate reservoir model.

This talk deals with a novel approach for a static and dynamic petrophysical characterization that integrates special core analyses, nuclear magnetic resonance (NMR) log and multi-rate production logging tool (PLT) interpretation. The methodology provides an innovative log-facies classification and characterization that can be used to predict well performances.

The workflow is presented by means of a study performed on several wells intercepting an oil-bearing carbonate reservoir. In details, core-calibrated porosity partition and permeability from NMR represent the input for a multivariate statistical technique used to produce a log-facies classification with an inherent dynamic meaning. The actual dynamic characterization of the facies is established by the corresponding specific productivity index from multi-rate PLT analysis. Two wells used as blind tests demonstrate the reliability of the proposed workflow with respect to its prediction capability of oil production, even in a multi-layer scenario with different pressure regimes.

Although various approaches exist to qualitatively link static and dynamic properties at well location, the presented quantitative methodology allows an important step towards a real integrated petrophysical characterization. It represents a production optimization purposes driver and a fast and accurate tool to joint distribute static and dynamic properties in reservoir modeling.



**BIOGRAPHY:**

Marco Pirrone is a Production Petrophysicist at Eni and he has been with the company since 2009. He specializes in dielectric dispersion log analysis, rock physics modeling, nuclear magnetic resonance in porous media, cased-hole formation evaluation and production logging. Marco has authored or co-authored more than 15 technical papers. He holds a MSc degree in Physics and a PhD in Theoretical Physics from the University of Milano-Bicocca, Italy