

**PS Three Rock-Typing Methods and Implementation as Part of the Reservoir
Characterization and Uncertainty Assessment:
An Example from the Arab Formation (Upper Jurassic), Onshore Field United Arab Emirates***

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Abstract

The paper explores some rock-typing approaches to characterize the reservoir quality in the Arab Formation in onshore field of the UAE. The analysis aims to capture the heterogeneity of the reservoir, lateral continuity, and link to the sedimentary and diagenetic settings. The data base used were the core analysis (RCA and SCAL), slab and thin section description, and well logs. That information was assembled/integrated employing different Rock-typing approaches defined.

The main focus was in the upper section of the Arab Formation dominated by dolomitic limestone intercalated with anhydrites. In most of the cases, the precursor rock fabric was preserved or at least interpreted from the thin sections. However, the diagenesis was important enough to have a strong overprint on the rock-quality of the reservoir and needed to be considered. Being the data concentrated in the crest of the structure, the challenge was to link the rock-typing to pre-conditioned sedimentary setting that once defined, it is expected to be the control for the 3D distribution of the rock-types in the reservoir model.

The approaches have in common two main stages, the 1D modeling (at well level) and the 3D extrapolation. It has been considered that in the 1D modeling, rock-type definition, goes in to three layers of analysis: cored, uncored wells, and an integration layer. Basically, the 1D models (rock-typing approaches) were calibrated with the core data to be able to calculate the rock-types in the uncored wells.

Three main approaches were used: (1) Lucia's (1995-2007), (2) PC-Types: FZI iso lines/classes or GHE (Cortez and Corbett, 2005) combined with MICP data families which it is called in this paper PC-Types, and (3) Lithotypes, based on the lithological description which represents a more genetic approach. Lucia's method explores the textural aspects of the rock and aims to translate it into an RFN class that links Poro/Perm transforms and SW estimations to the texture of the rock. The PC-Types on the other hand, based its rock-type classes according to the families of SW-height curves and pore throat distributions. If they are transformed into J-functions, a derivation of PC-Types is then linked to

porosity/permeability relationships (GHE-classes), in which case a correspondence analysis is performed between the PC-Types and the GHE classes. Finally, the Lithotypes explore the lithology classes identified in the core description, partitioned in different categories. They were extrapolated to the uncored wells using different multivariable techniques (i.e. NN and Cluster Analysis). Each Lithotype has a corresponding poro/permeability model and SW estimation functions calibrated with MICP data.

The final resulting rock-type models will use the poro/permeability relationships and SW-H functions defined in 1D modeling stage. They represent scenarios that carry on in the 3D modeling and uncertainty analysis. The link between the rock-types and conceptual sedimentary model will allow a more realistic extrapolation of the rock-types beyond well control leading to more consistent 3D rock-type models and as per consequence a more robust 3D property models linked to them.

Selected References

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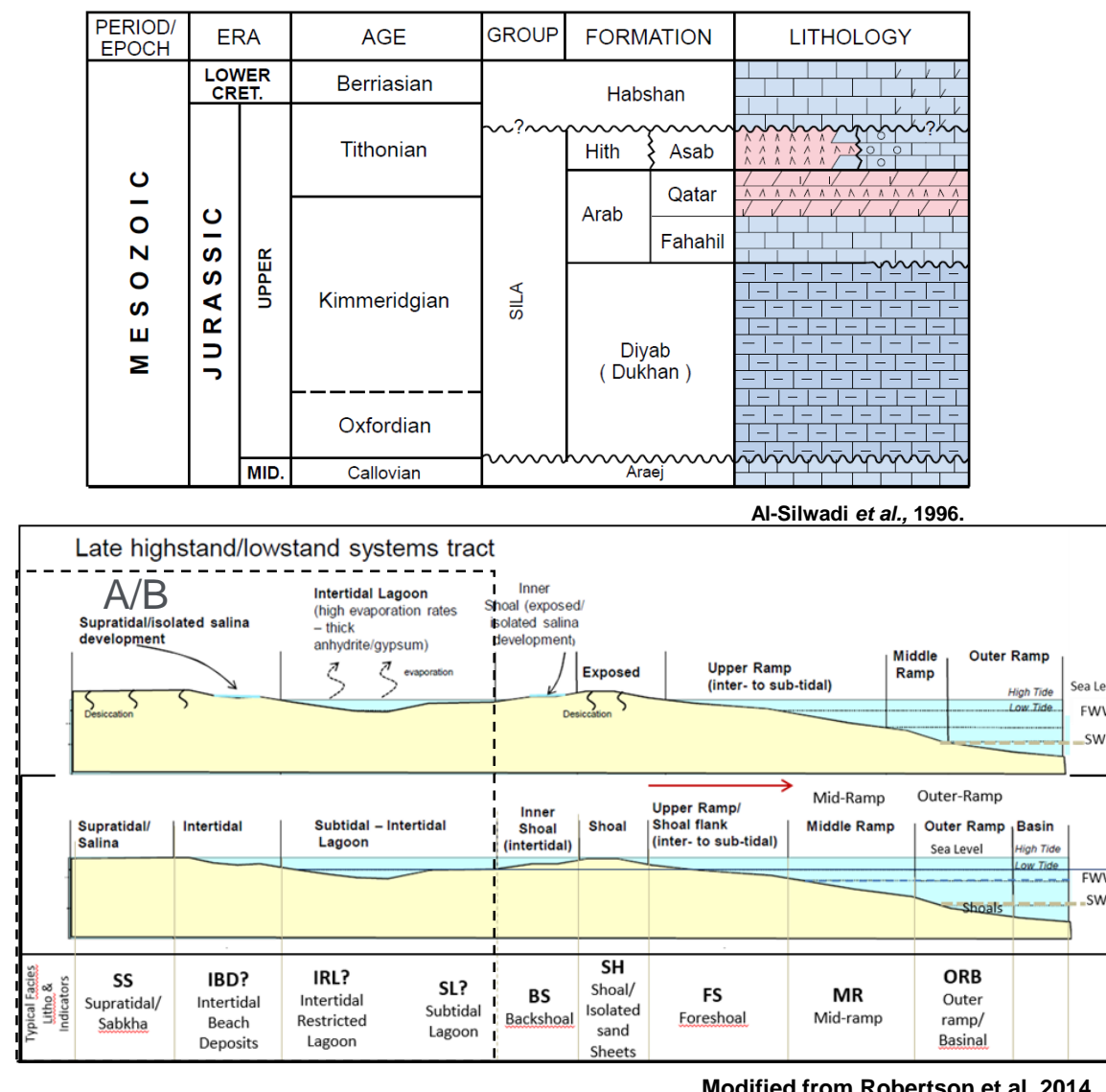
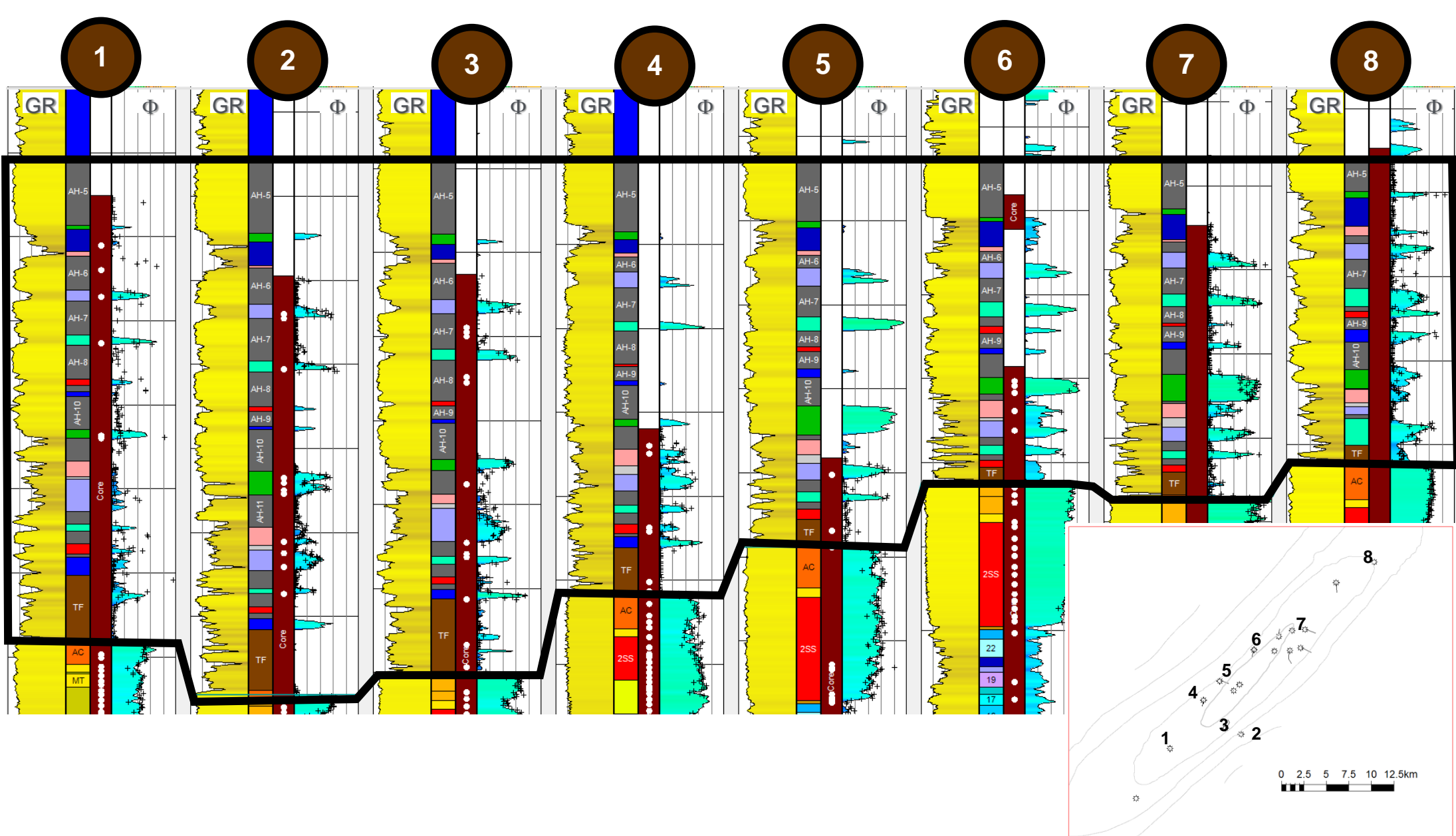
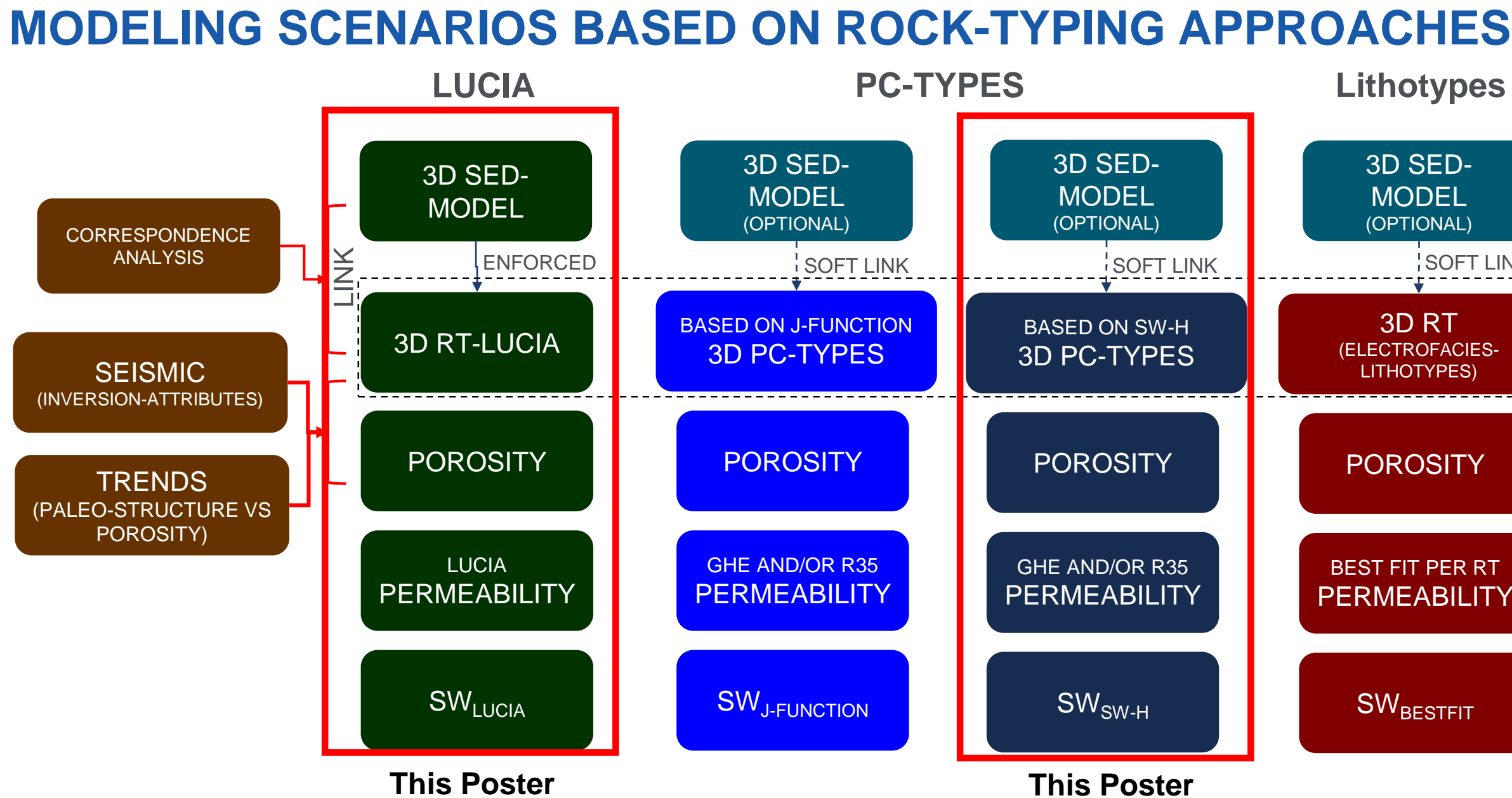
INTRODUCTION AND AIMS

This poster explores the rock-typing approaches to characterize the reservoir in the Arab formation in onshore field of the UAE. The analysis aims to capture the heterogeneity of the reservoir, lateral continuity and link to the sedimentary and diagenetic settings. The data base used were the core analysis (RCA and SCAL), slab and thin section description and well logs. That information was assembled/integrated employing different Rock-typing approaches defined.

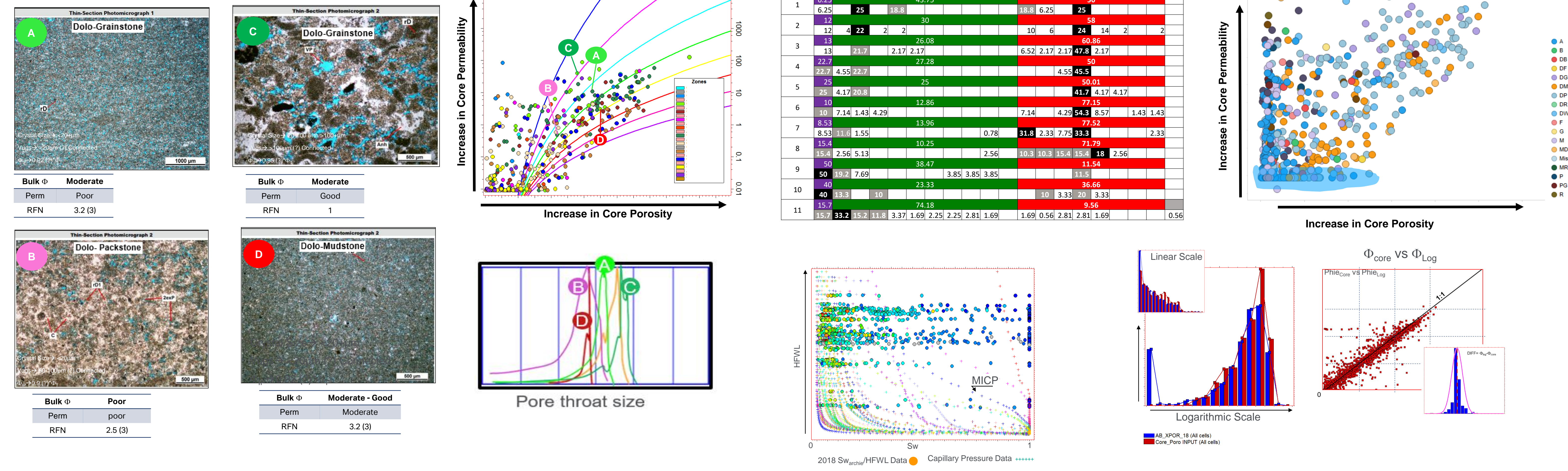
Three main Rock typing approaches were used:

- Lucia's (1995-2007)
- PC-Types
- Litho-types (Not Shown)

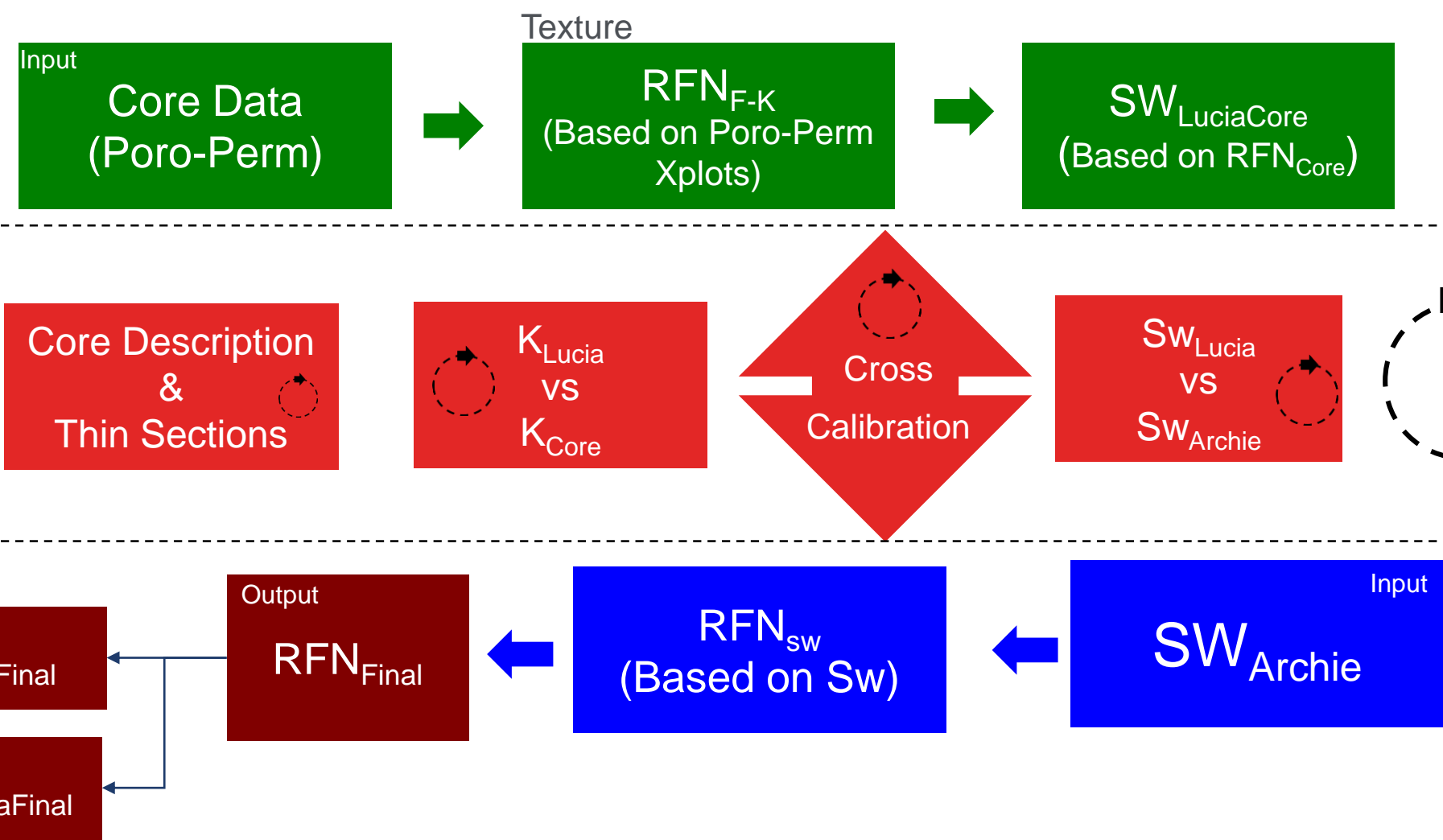
Modeling Scenarios based on RT



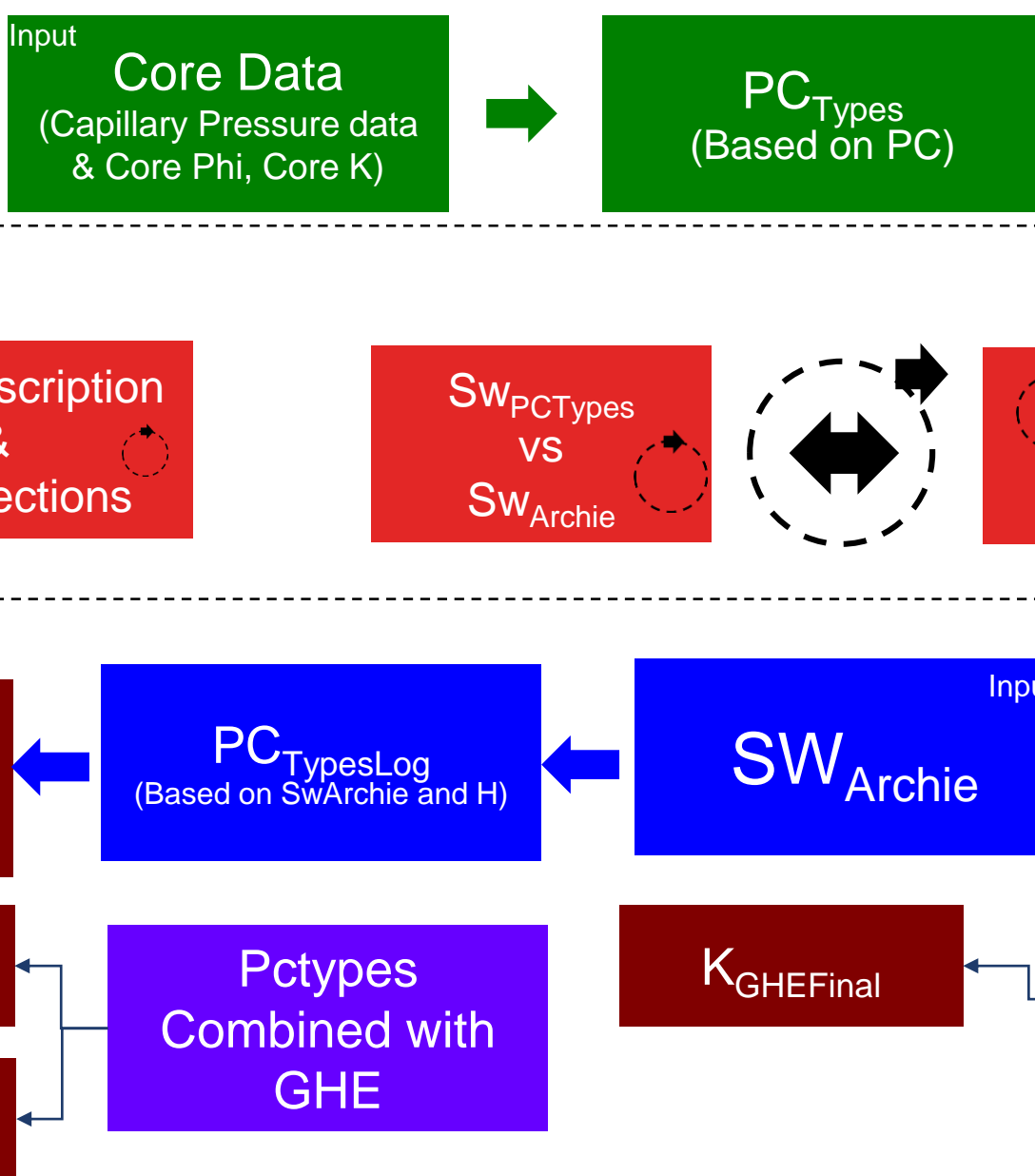
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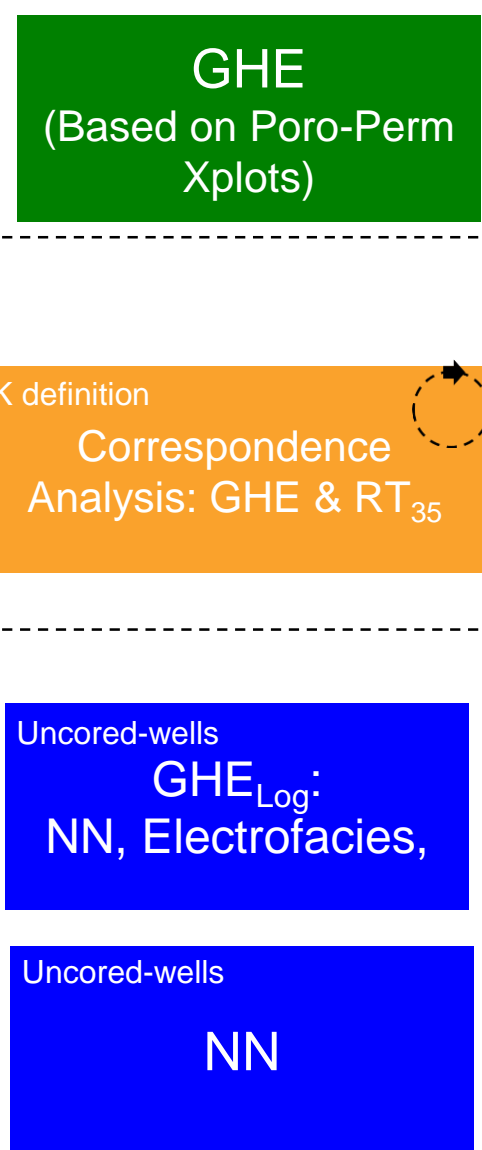
Lucia's Method



PC-Types Method

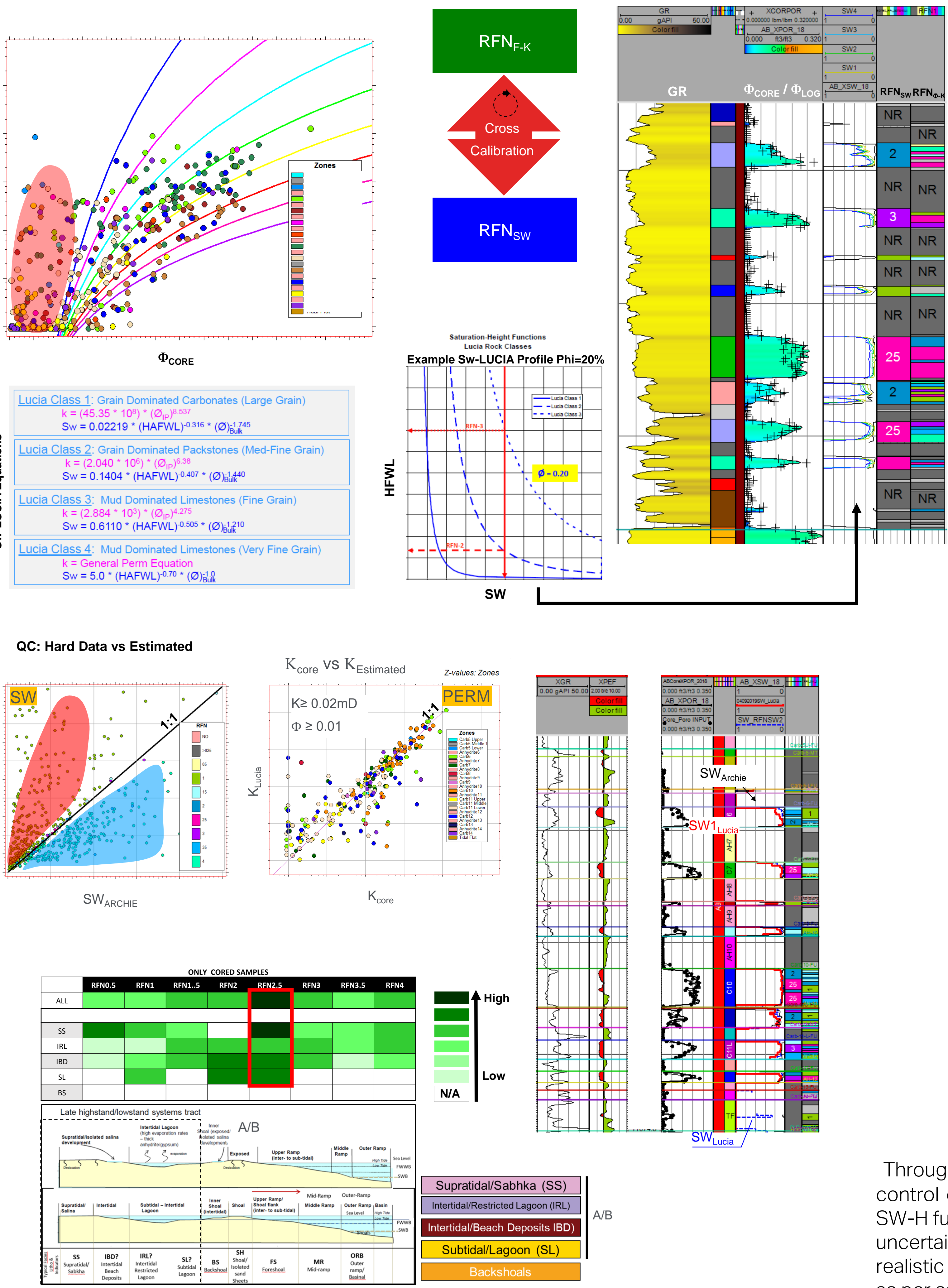


Perm Method

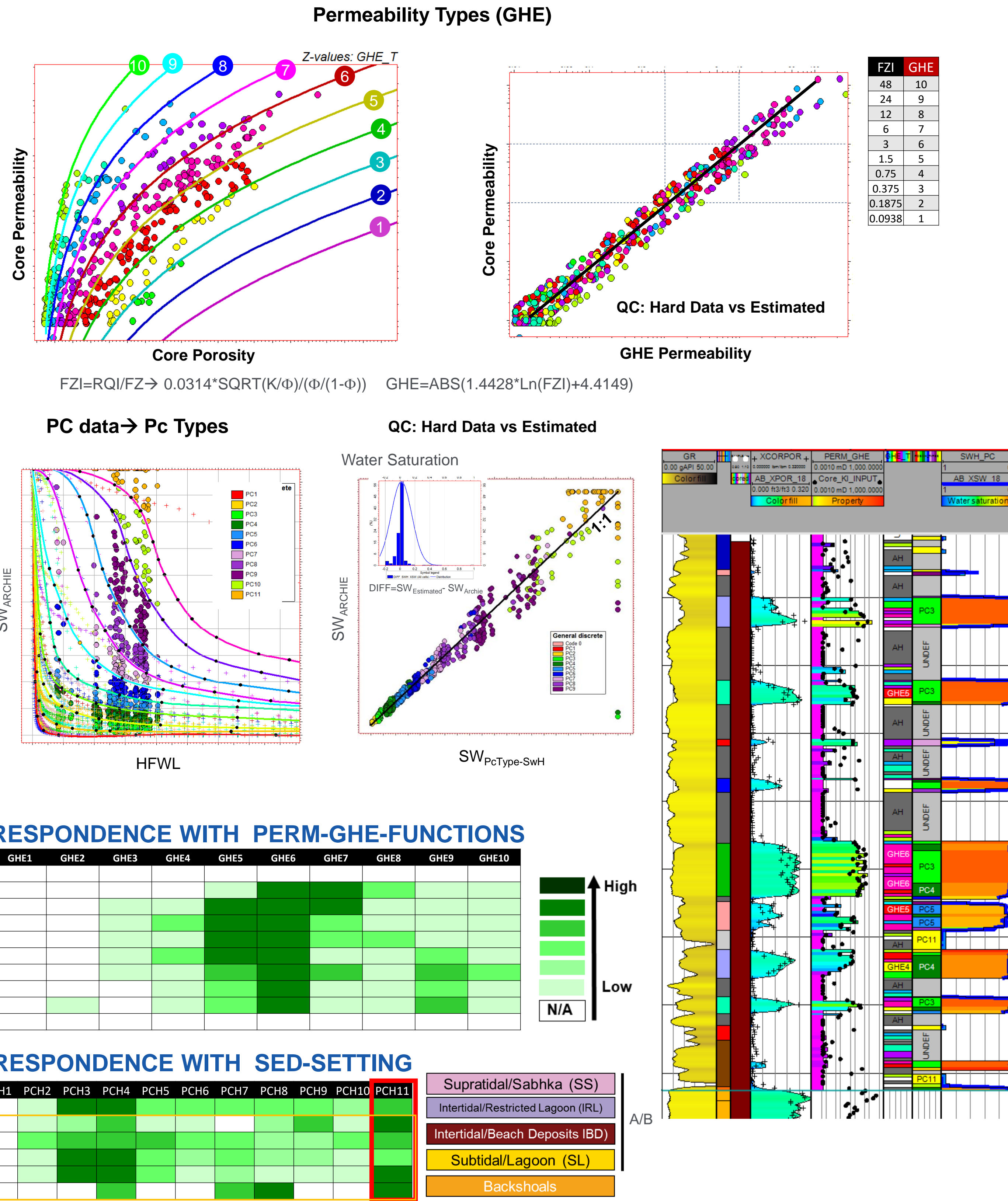


Methodology

Lucia's Method Implementation



PC-Types Method Implementation



SUMMARY

Through the implementation of the rock-typing methods, the extent of variation, heterogeneity & diagenetic control on the RQ can be explored. The resulting rock-typing methods will use the poro/perm relationships and SW-H functions defined in 1D modeling stage. They represent scenarios that are carry on in the 3D modeling and uncertainty analysis. The link between the rock-types and conceptual sedimentary model will allow a more realistic extrapolation of the rock-types beyond well control leading to more consistent 3D rock-type models and as per as consequence a more robust 3D property.