Carbonate Petrophysical Rock Typing Road Map: Flexible and Fully Integrating Geological Attributes, Petrophysical Properties and Dynamic Behavior

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Abstract

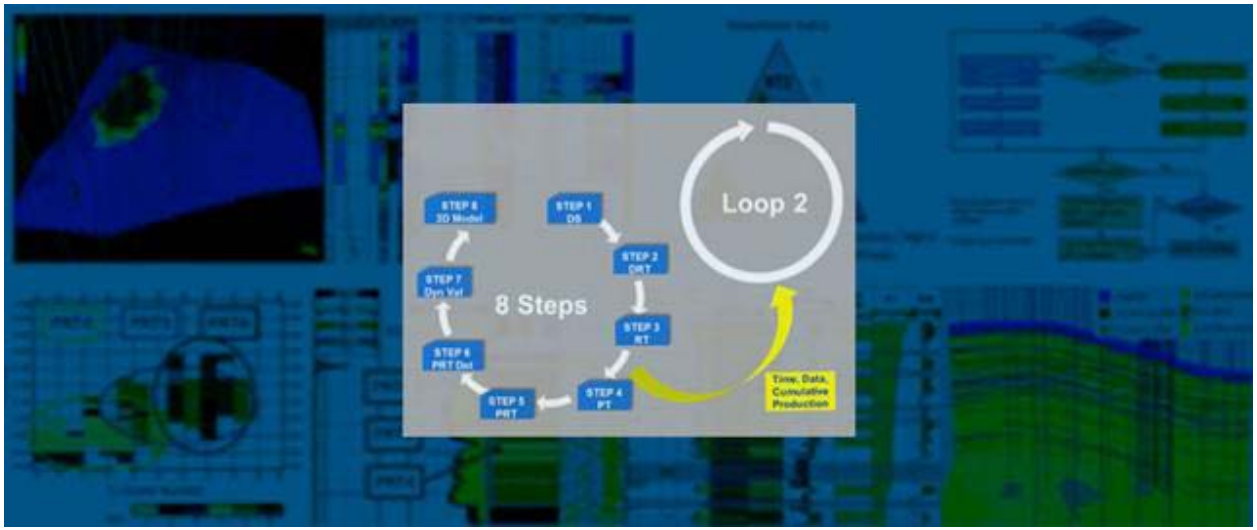
Carbonate rock typing provides a vehicle to propagate petrophysical properties through association with geological attributes and therefore is critical for distributing reservoir properties, such as permeability and water saturation, in the reservoir model. The conventional approaches to rock typing have significant gaps in: incorporating diagenetic processes, transferring rock types from core - to log domain, accounting for fractures, and using appropriate methodology to realistically distribute rock types in the static reservoir model.

The road map proposed in this paper addresses these issues in a comprehensive way by determination of petrophysical rock types (PRTs), which control static properties and dynamic behavior of the reservoir while optimally linking to geological attributes (depositional and diagenetic) and their spatial interrelationships and trends.

This approach is novel for the fact that it:

1. integrates geological processes, petrophysics and earth modeling aspects of rock typing,
2. integrates core and log scales and,
3. provides a flexible “road map” from core to 3D model for variable data scenarios which can be updated with progressive changes in data quality and quantity during life the cycle of an asset.

This paper introduces the rationale behind this road map and demonstrates its workings and agility through deployment in two large carbonate fields.


Loop 2
8 Steps
STEP 1
DS
STEP 2
DRT
STEP 3
RT
STEP 4
PT
STEP 5
PRT
STEP 6
PRT Dist
STEP 7
Dyn Val
STEP 8
3D Model
Time, Data,
Cumulative
Production