Outcrop/Behind Outcrop Characterization in Onshore Western Mediterranean Basins of Southern Iberia*

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Abstract

The recent geologic evolution of the southern Iberian Peninsula has resulted in spectacular Mesozoic and Cenozoic outcropping formations whose study has been crucial on unraveling the evolution of the western Mediterranean region.

Its preliminary outcrop/behind outcrop characterization is valuing these well-studied outcrops as oil and gas clastic reservoir analogs in a basin margin setting. This has been allowed by the recent PTR Unit foundation in the Scientific Instrumentation Center at the University of Granada, including drilling equipment, a set of probes for geophysical well logging and a core scanner. Borehole logs obtained include Natural and Spectral Gamma Ray (QL40-GAM, QL40-SGR), as well as Optical and Acoustic Televiewers (QL40-OBI, QL40-ABI). Architectural and facies analysis of the outcrop as well as petrological and petrophysical characterization of potential reservoir and seal rocks complete this study.

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Selected Reference

Viseras, C., and J. Fernandez, 2010, Triassic braidplain deposits and their potential as reservoir rocks. Examples from Spain and Morocco: 18th Sedimentological Congress, Mendoza, Argentina, Abstracts volume, p. 216.

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UNIVERSITÀ DELLA CALABRIA

Team Expertise

- Stratigraphic Architecture of Detrital Formations
- Sandstone Sedimentology and Petrology
- Carbonate Sedimentology and Petrology
- Claystone and Soil Micromorphology
- Reservoir Modelling

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Current Project *(MICINN)*

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Geometrical and facies analysis of sedimentary bodies as outcrop analogs for hydrocarbons reservoirs and aquifers

Triassic and Neogene examples from south Iberia

REPSOL

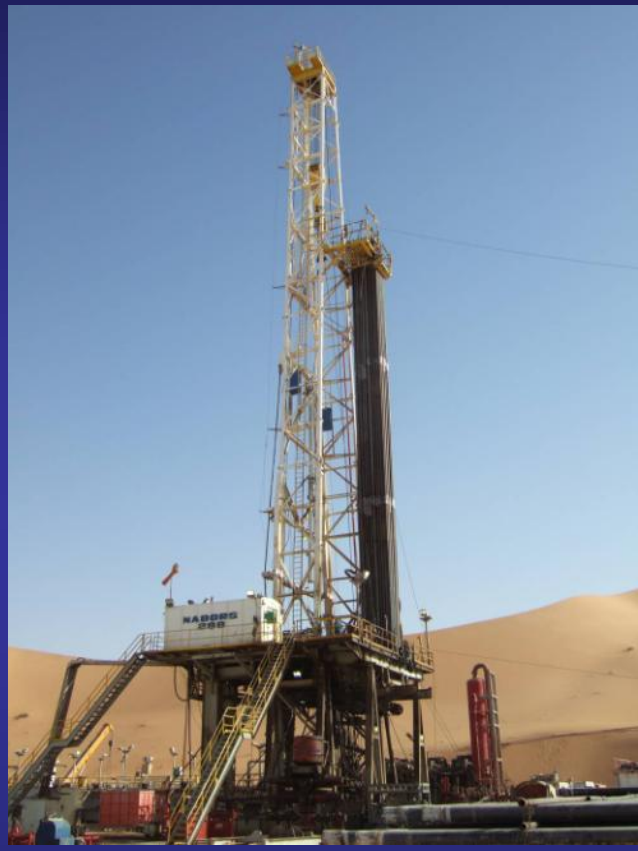
CEPSA

Observer Promoting Entities (E.P.O.)

Why to compare TAGI and TIBEM?

Unknowns

- Dry wells between productive wells?
- Differential impregnation in the same bed?
- Different stratigraphy in contiguous wells?
- Low yields in rocks of positive petrophysics?
- Volume of oil crude lost in undrilled discontinuous beds?
- Suitability of directional/deviated drilling?
- Desirability of stimulating the production?
- Modeling of a highly heterogeneous reservoir?



Answers from the sedimentology

- Post depositional history (diagenesis, tectonics)
- Original heterogeneity (geometry, lithofacies)

outcrop analogs for the TAGI: TIBEM, THATLAS

Outcrop analogs for the TAGI

Research techniques *(macro and mesoscale)*

Facies Analysis

Architectural Elements Analysis

Research techniques *(microscale)*

- X-ray diffraction, Ultrasounds, Porosimetry, Permeability

New equipment (PTR unit, *Scientific Instrumentary Center*, UGR)

Drilling equipment

Drill core scanner

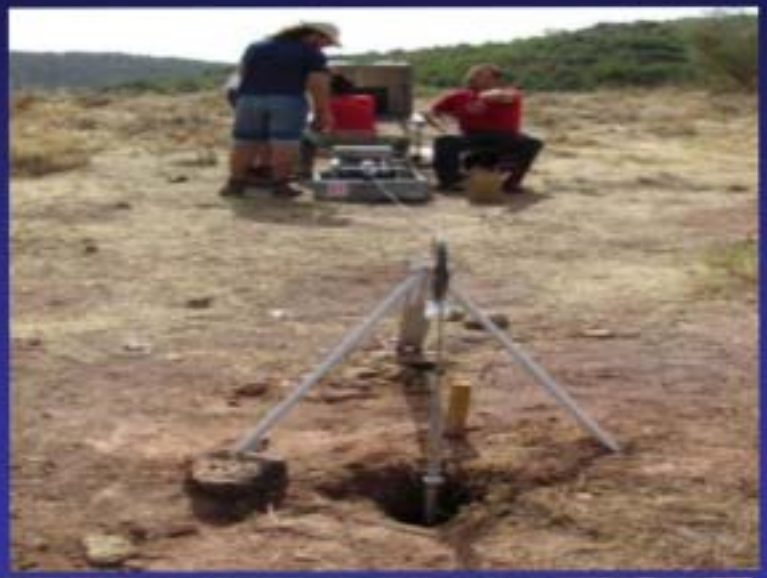
Set of probes:

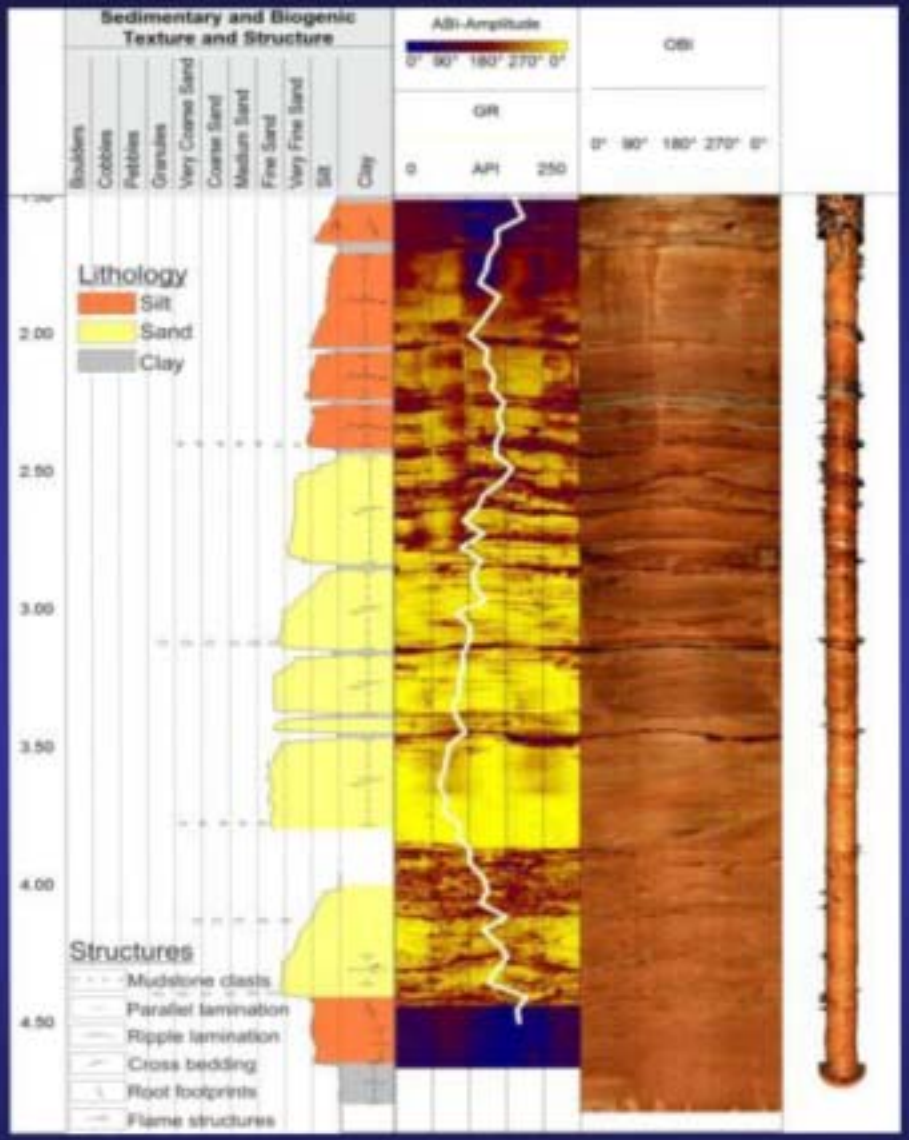
-Optical Televiewer (QL40-OBI)
-Acoustic Televiewer (QL40-ABI)
-Gamma Ray Natural sonde (QL40-GAM)
-Spectral Gamma sonde (QL40-SGR)

Current challenge: behind-outcrop drilling

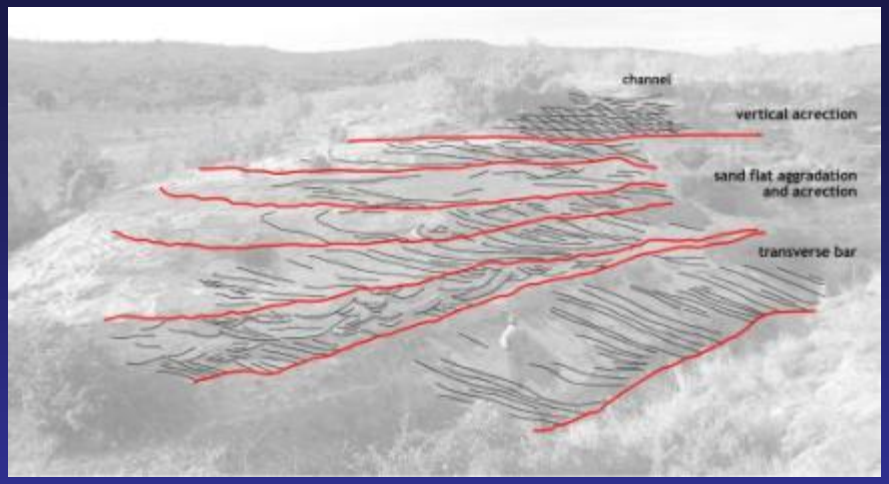
Drilling cores

Well logging





Well logging in the TIBEM
(after Henares et al., 2013, modified)



Comparative architectures between K2 unit (TIBEM) and T6 member (THATLAS)

After Viseras and Fernández, 2010

Comparative architectures between Seq II (TIBEM) and Ourika Valley sandstones (THATLAS)

After Viseras et al. 2012

Potential as reservoir rocks

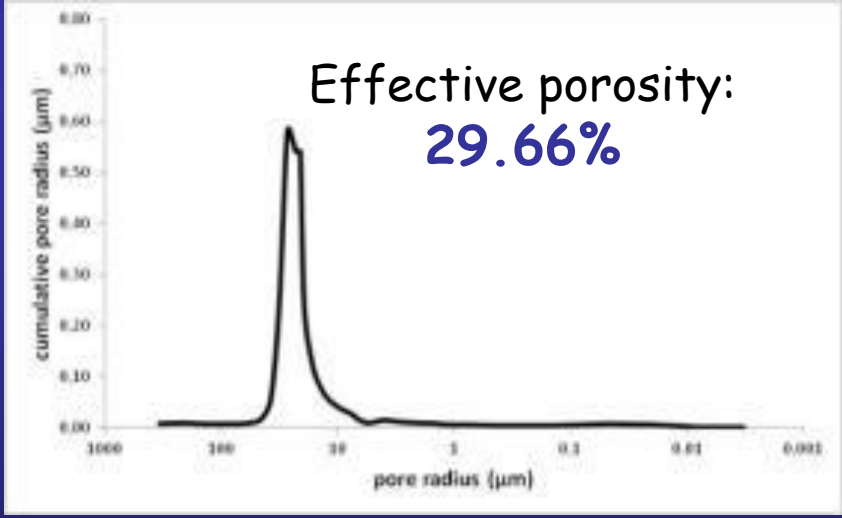
Implications for exploration geology

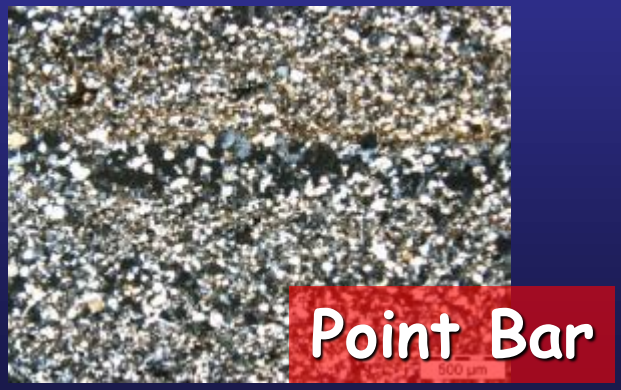
(High sinuosity channels)

1.- High petrophysical heterogeneity

2.-Channel deposits: most porous facies

3.-Clay beds - lateral baffles to fluid movement





Potential as reservoir rocks

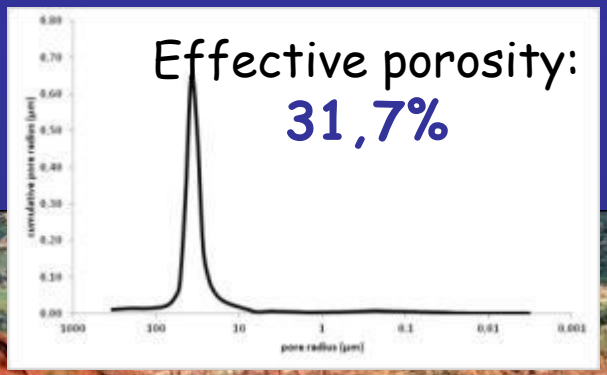
Interesting reservoir characteristics (braidplain sandstones)

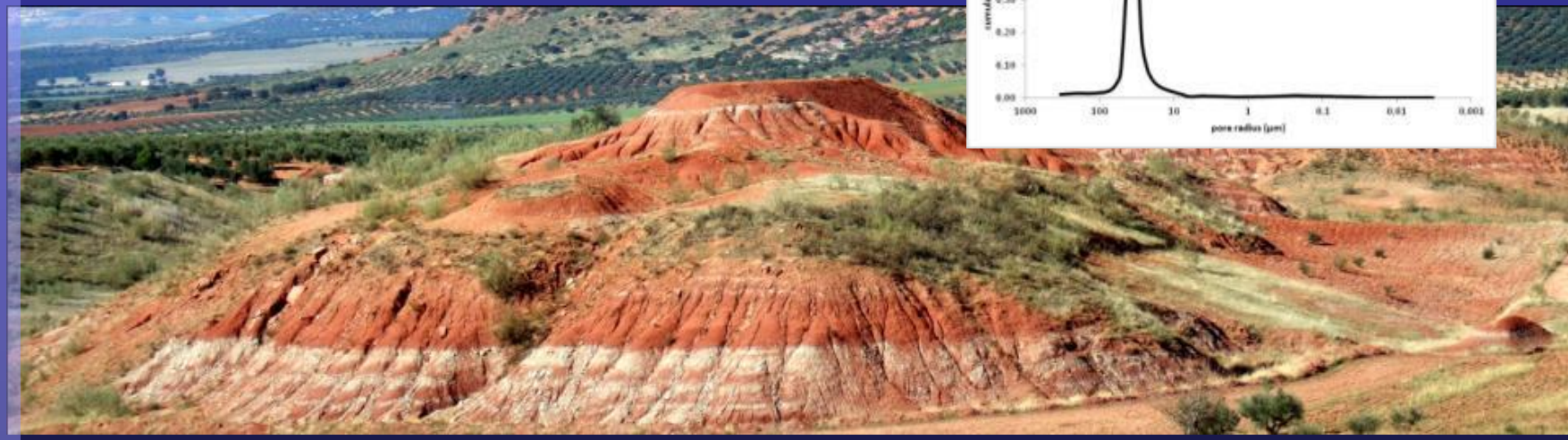
1- Thick layer of kilometric lateral continuity

2- High porosity, no lateral/vertical baffles

3- Accurate reserves estimation

4- Extrapolation of the discovery throughout km^2





Potential as outcrop analogs

TIBEM, THATLAS: outcrop analogs for the TAGI

- Fluid movement
- Enhanced Oil Recovery
- Modelling
- Production strategies

…Thank you

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