

RESERVOIR POTENTIAL OF CRETACEOUS-PALEOCENE CARBONATE TURBIDITE SUCCESSIONS: A CORE AND OUTCROP STUDY, ADRIATIC SEA, ITALY (YEAR 2)

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PROJECT GOAL

The main goal of this project is to assess the reservoir potential of Cretaceous–Tertiary carbonate turbidite successions through a sedimentological, diagenetic, and petrophysical characterization of the strata in the basin adjacent to Adriatic carbonate platforms. The main tasks for this year are:

- Petrophysical characterization of the re-deposited carbonates that includes permeability, porosity, sonic velocity, and resistivity measurements from the core plugs.
- Comparative study of coeval onshore strata at Monte Conero and the Maiella Mountains, and coeval strata in the Bahamas.

PROJECT RATIONALE

Porosity and permeability measurements of carbonate turbidite successions, including large megabreccias found in outcrops along the Maiella platform margin documented that such turbidites have a reservoir potential. Interestingly, the underlying Cretaceous strata have significantly more porosity than the overlying Tertiary strata (Eberli et al., 2006). A 286 m core taken by ENI offshore in the Adriatic Sea from coeval slope and basinal facies shows similarly a better reservoir quality in the Cretaceous strata. The better reservoir quality is most likely related to the original mineralogy of Cretaceous re-deposited carbonate, which is calcite, compared to the Tertiary sections with aragonite that are prone to remobilization and recrystallization (Maura et al., 2011). To test this hypothesis a thorough petrographic and petrophysical analysis of the carbonate turbidite successions and the associated background sedimentation is needed.



Figure 1. Locations of the two main outcrop areas at Maiella and Monte Conero, and the position of Well 1 in the Adriatic Sea. The core of Well 1 is provided by ENI for this study.

APPROACH AND SCOPE OF WORK

For the assessment of the reservoir potential of re-deposited carbonates a comprehensive petrophysical characterization will be conducted, which includes sonic

velocity, porosity, permeability, and some resistivity measurements on samples from various outcrops and the core material from Well 1. A thin section will be cut from each sample for analysis of texture, pore structure, and diagenetic overprint. Digital image analysis of the pore structure will allow this feature to be related to both the acoustic and hydraulic properties.

The diagenetic alteration of both the turbidite successions and the background sediment will be investigated in order to test the hypothesis that the difference between calcite (Cretaceous) and aragonite (Tertiary) seas influences the reservoir potential. Both thin sections and extensive SEM imagery will document the differences (Figure 2). We plan to study samples from several outcrop localities to assess potential local effects. In addition, a comparison will be made with the diagenetic state of coeval carbonate successions in the Bahamas that were cored during DSDP Leg 11 (Bernoulli, 1972) and during ODP Legs 101 and 166.

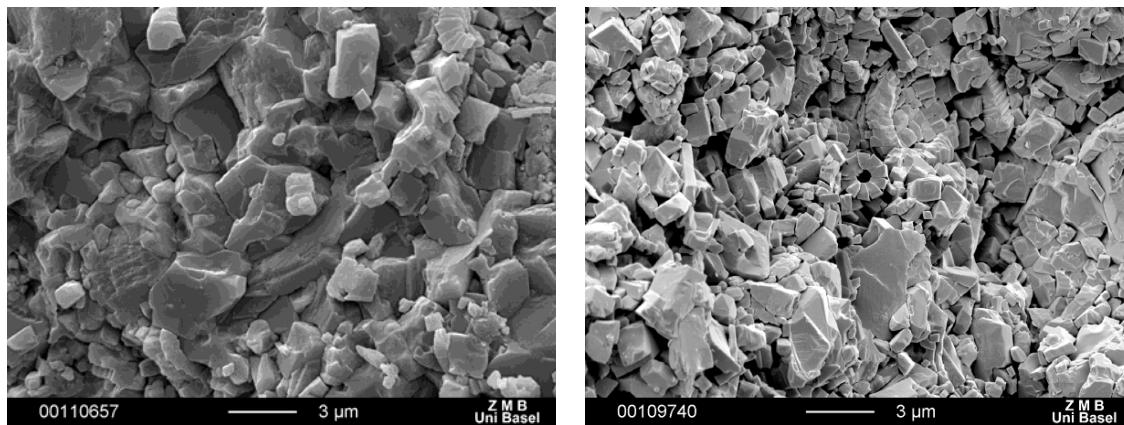


Figure 2. SEM photomicrographs of the background sediments in Well 1 (Left) Recrystallized coccolith-rich matrix of Upper Paleocene background sediment. (Right) Coccolith chalk with abundant micro-porosity in the Cretaceous portion of Well 1. (Photos provided by University of Basel). The difference in crystallization indicates a variable diagenetic overprint related to the stratigraphic position.

KEY DELIVERABLES

This project will provide a comprehensive sedimentological, petrophysical and diagenetic characterization of Cretaceous and Tertiary mass gravity flow deposits along some Adriatic carbonate platforms. Together these results will help assess the reservoir potential of re-deposited carbonates and quantify the differences that variations in the original mineralogy might have on the petrophysical properties.

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