RESERVOIR PROPERTIES OF THE APULIA CARBONATE PLATFORM (GARGANO PROMONTORY, ITALY)

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PROJECT OBJECTIVES

- Analyze the middle to late Eocene carbonate system of the Apulia Carbonate Platform.
- Conduct Acoustic velocity, Resistivity and Digital image analysis for a reservoir characterization.
- Identify the mineralogy to better understand variations in the petrophysical properties of the measured samples.

PROJECT RATIONALE

Collapse structures and their associated slope gravity deposits are common features of platform margins imaged in seismic sections and multibeam geophysical data as well as in outcrops (e.g. Eberli et al., 1993). Carbonate margin and slope are increasingly being recognized as significant conventional hydrocarbon reservoirs as well (Verwer et al.,2014). Nevertheless, outcrop studies are needed because the details of architecture and textural details of associated gravity deposits are near or below the limit of resolution of geophysical imaging (Lehrmann et al., 2020). The present research project aims to analyze the base-of -slope resedimented gravity flow carbonates belonging to the middle to upper Eocene carbonate system of the Apulia Carbonate Platform, located in the Gargano Promontory, in terms of facies, spatial distribution and depositional architecture.

The carbonate base-of-slope deposits, divided into two main sedimentary models such as apron and carbonate conoids, are little known from the sedimentological point of view, although they are important economically because they can contain large amount of hydrocarbons (Mullins and Cook, 1986). The few systems studied still leave many unanswered questions about what may be the control factors that affect the depositional architecture and the transport mechanisms (Payros and

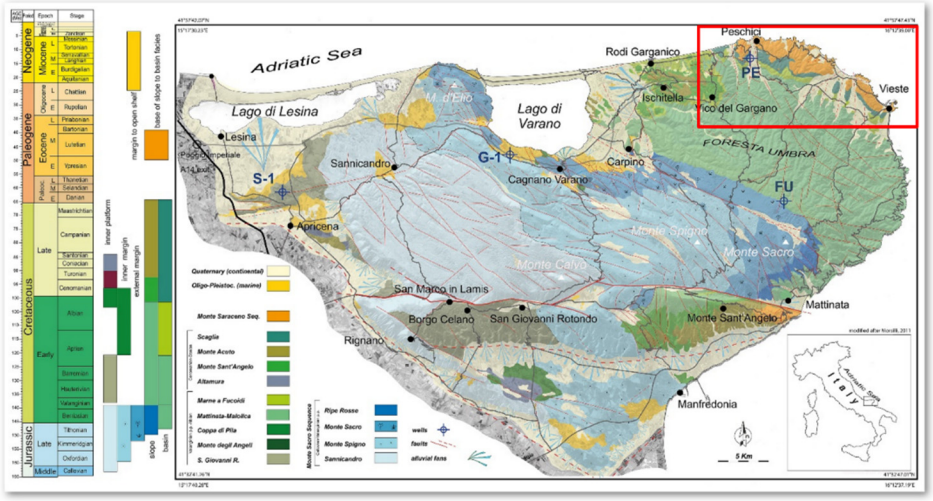

Figure 3: Geological map of the Gargano Promontory (Morsilli et al., 2017). The red box highlights the studied area.

Pujalte, 2008). These still open questions can find answers in detailed sedimentological studies, improving scientific knowledge about such systems in terms of identification and characterization of carbonate reservoirs, since submarine fans form important oil and gas reservoirs around the world.

In addition, slope environments also provide an extensive stratigraphic record that, although it is preserved differently than platform-top or basinal strata, can be utilized to unravel the growth evolution, sediment factories, and intrinsic to extrinsic parameters that control carbonate platform systems (e.g. Verwer et al., 2014). Thus, the focus of this study is to reconstruct the depositional geometries useful to understand re-sedimentation processes, analyze and map the facies present in order to improve the scarce knowledge about these depositional systems, implement the facies models and understand the controlling factors that act during deposition. Finally, the results will be compared with other coeval carbonate systems.

WORK PROPOSED

In order to reach the stated objectives, 54 carbonate rocks from the Gargano Promontory, belonging to the Vieste and Peschici area and from Lutetian-Bartonian in age, will be analyzed. Acoustic velocity and resistivity properties will be measured using the Autolab 1000 system at the CSL. Digital Image Analysis will be performed on thin sections using the method described by Weger et al. (2009) to quantify the pore structures. Mineralogical analysis will be fundamental to better understand the petrophysical properties (sonic velocity, resistivity, porosity) response to the different mineralogies.

SIGNIFICANCE

The analysis of the petrophysical properties (sonic velocity, resistivity, porosity) combined with the mineralogical analysis, will be extremely useful for the reservoir characterization of the Gargano Promontory samples and the further comparison with coeval systems.

REFERENCES

Eberli, G.P., Bernoulli, D. Sanders, D. and A. Vecsei, 1993. From aggradation to progradation: The Maiella Platform margin (Abruzzi, Italy), in J. T. Simo, R. W. Scott, and J.-P. Masse, eds., Cretaceous carbonate platforms: AAPG Memoir 56, p. 213–232.

Lehrmann, D.J., Minzoni, M., Enos, P., Kelleher, C., Stepchinski, L., Xiaowei Li, Payne, J.L. and Yu, M., 2020. Giant sector-collapse structures (scalloped margins) of the Yangtze Platform and Great Bank of Guizhou, China: Implications for genesis of collapsed carbonate platform margin systems. Sedimentology, v. 67, no. 6, p. 3167-3198.

Payros, A. and Pujalte, V., 2008. Calciclastic submarine fans: An integrated overview: Earth-Science Reviews, v. 86, no. 1-4, p. 203–246.

Verwer, K., Playton,T.E. and Harris, P.M., 2014. Deposits, Architecture, and Controls of Carbonate Margin, Slope, and Basinal Settings—Introduction. SEPM Spec.Publ., vol. 105.

Weger, R. J., Eberli, E.P., Baechle, G.T., Massaferro, J.L. and Sun, Y.F., 2009. 'Quantification of pore structure and its effect on sonic velocity and permeability in carbonates', AAPG bulletin, 93: 1297-317.