

ASSEMBLE COMPREHENSIVE DATABASE OF MECHANICAL AND PETROPHYSICAL PROPERTIES OF PLATFORM CARBONATES

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PROJECT OBJECTIVES

- Assemble mechanical properties (velocity, density, elastic moduli) and petrophysical properties (porosity, permeability, resistivity) of carbonate platforms and their adjacent basinal sediments.
- Organize data set according to age, setting, environment, texture, dominant pore type, and mineralogy for the evaluation of interconnected relationships.

PROJECT RATIONALE

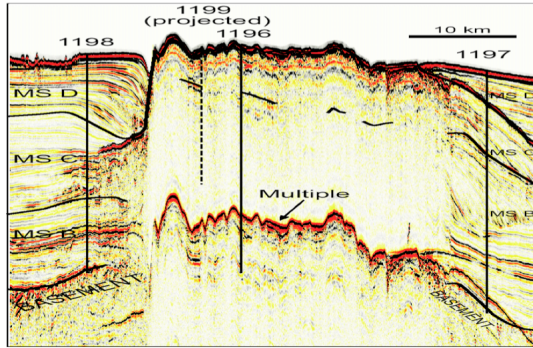
Mechanical and petrophysical properties of carbonates strongly depend on facies, depositional lithology, and diagenetic alteration. Last year we constrained parameter ranges of elastic properties calculated based on density, v_p , and v_s velocity for Ocean Drilling Program Site 1007 (ODP Leg 166), CLINO, and UNDA on Great Bahama Bank (GBB), from platform top to the toe of slope. This data set was intended to provide realistic input parameters for fracture generation models or structural restoration. Because the Bahamas data set is most applicable for Tertiary tropical platforms but not necessarily exemplary for other carbonate systems, we expand the project to other platforms from different ages and settings. In addition, in this year's project we expand the auxiliary information such as platform morphology, age, carbonate factory and others. A comprehensive overview of relationships and trends of mechanical and petrophysical properties within a geologic context is paramount for various types of modeling.

DATA BASE

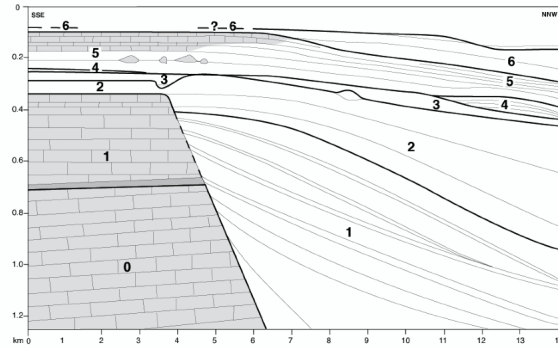
The vast CSL database, assembled during petrophysical studies over the past decades includes approximately 30,000 samples from unconsolidated sediment to Paleozoic limestones and dolomites (Fig. 1). These include amongst others:

- Tertiary sub-tropical carbonates (Marion Platforms, off Australia) (Fig. 1)
- Tertiary tropical carbonates (Maldives, Bahamas, Florida, Dominican Republic)
- Cretaceous carbonates from the Middle East from three large oil fields
- Cretaceous platform carbonates (Maiella Platform – Italy) (Fig. 1)
- Jurassic-Cretaceous carbonate ramp (Neuquén Basin – Argentina) (Fig. 1)
- Permian ooid shoals (Khuff Formation)
- Carboniferous (Pennsylvanian) shelf (Paradox Formation - Utah)
- Carboniferous (Mississippian) ramp (Madison Formation – Wyoming)
- Devonian isolated platforms (Miette and Ancient Wall – Canada) (Fig. 1)
- Microbialites (modern Hamelin Pool/Bahamian and Miocene stromatolites, travertine and tufa).

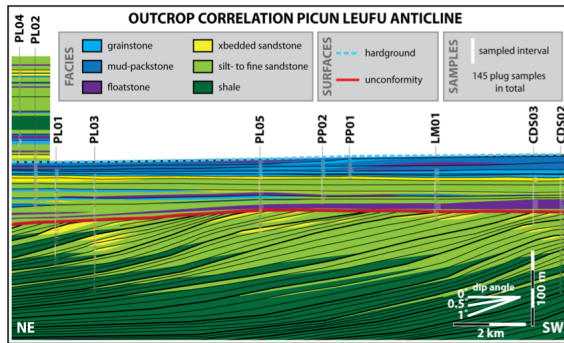
Southern Marion Platform (Miocene)



Maiella Platform (Cretaceous-Tertiary)



Picun Leufu Formation (Jurassic/Cr)



Miette Platform (Devonian)



Figure 1. Four different platform settings of different age out of the CSL database: Seismic line through Southern Marion Platform (Miocene) in offshore NE Australia; interpretation and stratigraphic sequences for Maiella Platform (Cretaceous/Tertiary) in Italy, outcrop correlation of Picun Leufu Formation (Jurassic) in Argentina, and Miette Platform (Devonian) in Canada.

PROJECT DESCRIPTION

The mechanical and petrophysical properties (density, velocity, resulting elastic moduli, resistivity, porosity, and permeability) will be extracted from the CSL database. These properties will be coupled to the geological parameters that will allow the user to search for interconnected relationships. These parameters include:

- Age
- Platform morphology (isolated, shelf, and ramp)
- Climate zone (tropical, cool-water, temperate)
- Depositional environment (top, shoal, slope, basin)
- Type of information (outcrop, subsurface)
- Texture (Dunham)
- Dominant pore type & microporosity
- Sequence stratigraphic position
- Mineralogy.

EXPECTED RESULTS

The result is an unprecedented catalogue of sample set information with interconnected relationships. This will facilitate studies on geotechnical and petrophysical aspects of carbonate environments in a wide range of settings and ages.