



Petrophysical data analysis using MATLAB tools for the middle Miocene sediments in the Gulf of Suez, Egypt

Douaa Fathy¹ and Eun Young Lee²

¹Department of Geology, Faculty of Science, Minia University, El-Minia, Egypt

²Faculty of Earth and Environmental Science, Chonnam National University, Gwangju, Rep. Korea

Study background

Study area

- Eastern coast of the central Gulf of Suez
- Belayim Land Oil Field

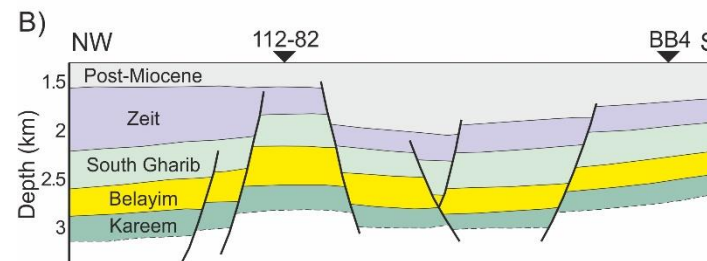
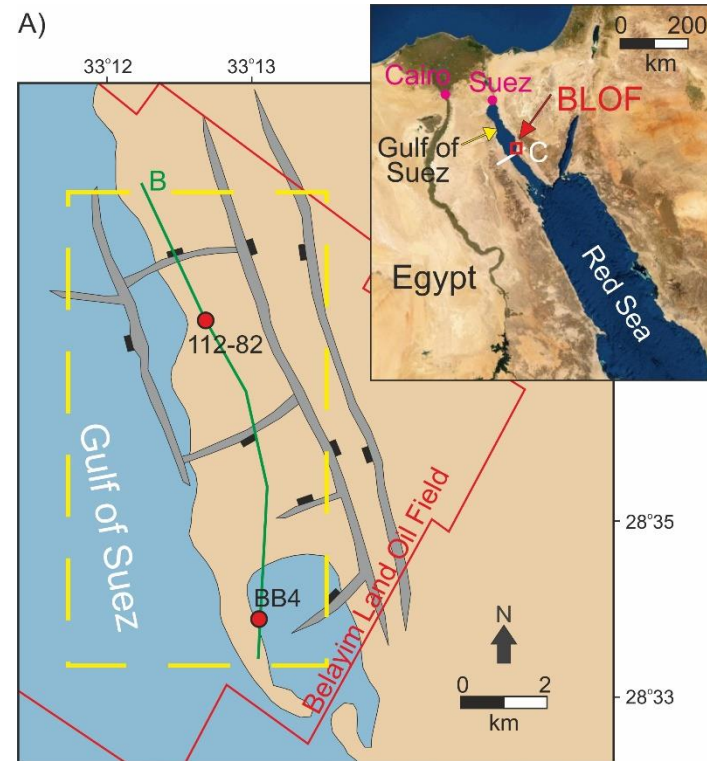
Target interval

- late Middle Miocene clastic sequence
- Sidri Member of the Belayim Formation
- Sandstones and Shales

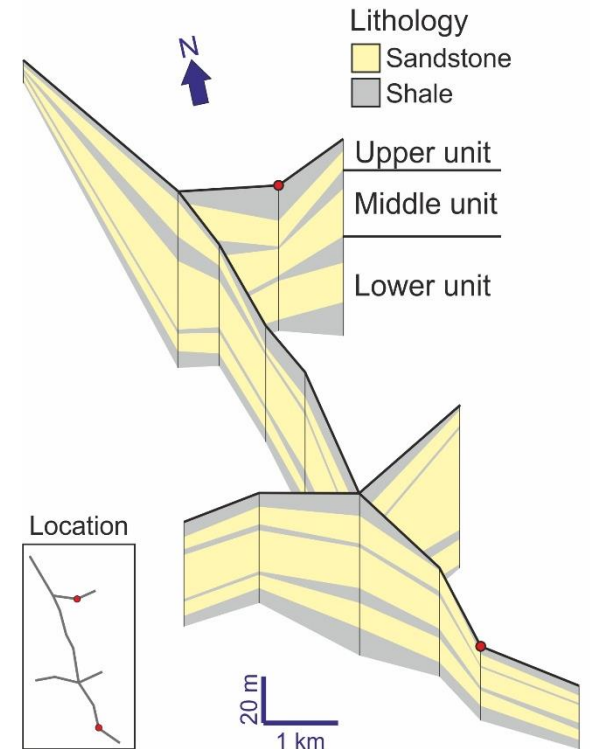
Data sites

- Two drilling wells at Sites 112-82 and BB4

Data analysis and visualization using BasinVis 2.0



3D distribution mapping of the Middle Miocene clastics in the study area

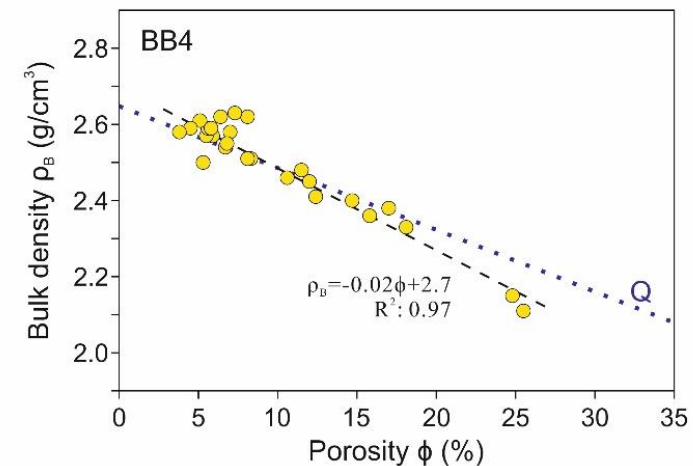
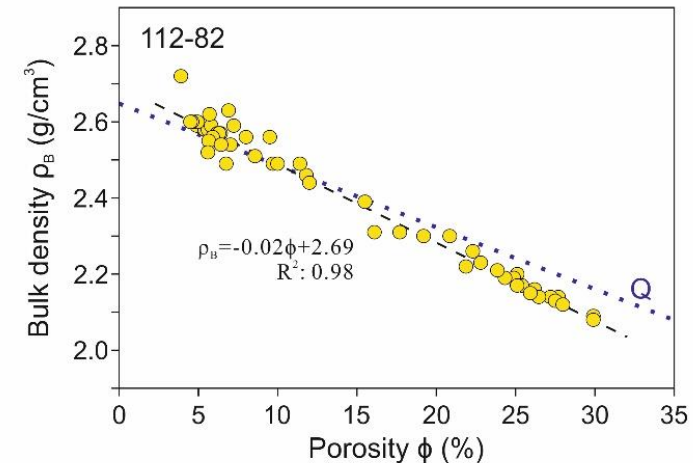


Petrophysical correlation

Bulk Density and Porosity

- Correlation trends with equations
- Q: modelled trend of bulk density and porosity in a setting of the quartz sandstone with water-filled pores (quartz grain density 2.65 g/cm^3 and water density 1.0 g/cm^3)
- The Bulk density values have an excellent negative correlation with the porosity values.
- Higher bulk density and lower porosity correspond to cementation and precipitation of high-density minerals (e.g., calcite $\sim 2.71 \text{ g/cm}^3$, dolomite $\sim 2.84 \text{ g/cm}^3$, anhydrite $\sim 2.97 \text{ g/cm}^3$).

A) Bulk density vs. Porosity

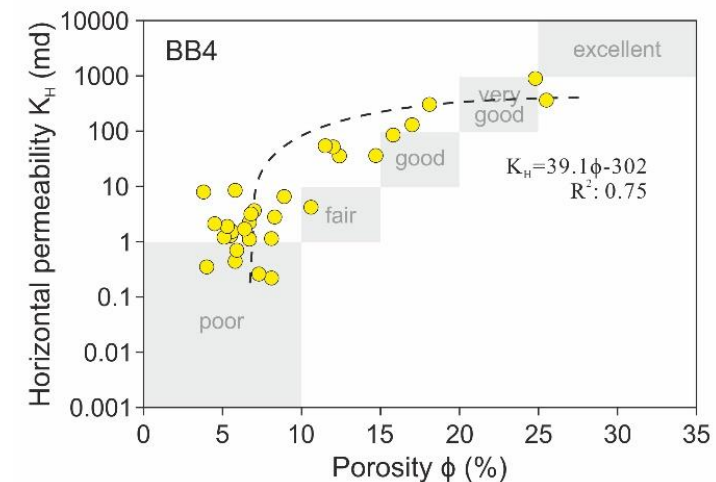
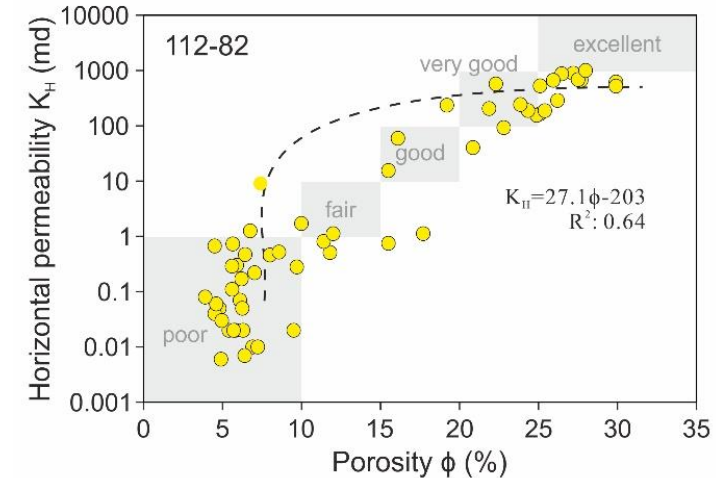


Petrophysical correlation

Horizontal Permeability and Porosity

- Correlation trends with equations
- Reservoir quality classification is present based on permeability and porosity.
- The horizontal permeability values range 0.006–1002 md in well 112-82 and 0.22–897 md in well BB4, which increase with porosity values.
- The increasing permeability corresponds strongly to the increasing pore throat size.
- The porosity and permeability are the most important parameters to classify the reservoir quality. Poor to excellent quality is indicated.

A) Horizontal permeability vs. Porosity

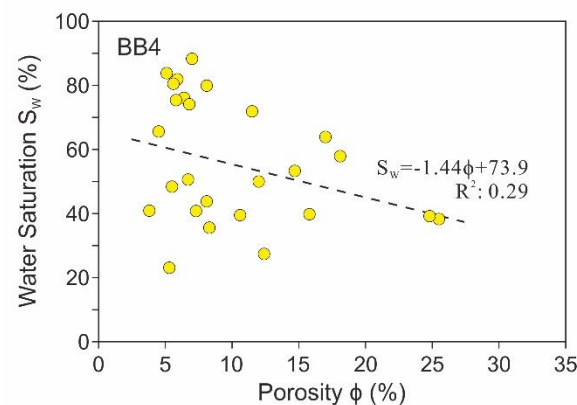
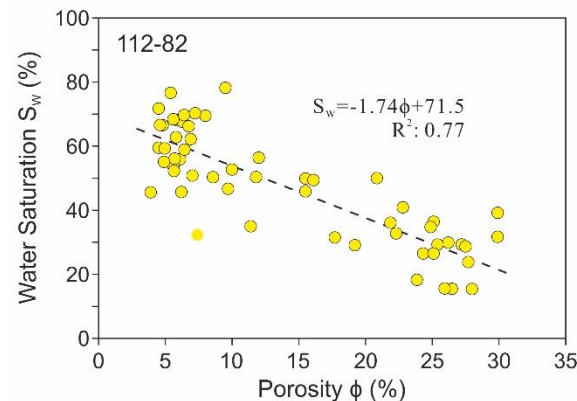


Petrophysical correlation

Water and Oil Saturation / Porosity

- Correlation trends with equations
- Water saturation decreases with porosity and oil saturation.
- Reservoir quality is evaluated from poor to excellent with oil saturation up to 70.3%.
- This corresponds to the decreasing hydrocarbon saturation with increasing shale content toward the south in the study area.

A) Water saturation vs. Porosity



B) Oil saturation vs. Porosity

