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Understanding Reservoir Quality in the Petroleum System of the Ediacaran-Early Cambrian Ara Group (South Oman Salt Basin):

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The Ediacaran-Early Cambrian Ara Group of the South Oman Salt Basin consists of six carbonate to evaporite (rock salt, gypsum) sequences. These Ara Group carbonates are termed A0C to A6C from the bottom towards the top of the basin. Differential loading of locally 5 km thick Cambrian to Ordovician clastics onto the mobile rock salt of the Ara Group caused growth of isolated salt diapirs, which resulted in strong fragmentation and faulting of the carbonate intervals into several isolated so-called 'stringers'. These carbonate stringers represent a unique intra-salt petroleum system, which has been successfully explored in recent years.

Initially the reservoir properties of the carbonate stringers were controlled by their depositional facies. After deposition, the stringers experienced a complex diagenetic history from the shallow to the deep burial realm. Diagenetic processes like anhydrite and halite plugging exerted a negative affect on poroperm properties, whereas e.g. calcite dissolution had a positive affect.

Our goal is to detect spatial and temporal distribution patterns of diagenetic phases and their effect on reservoir properties. Mineralogy, rock fabrics, paragenetic relationships and geochemistry of $\tilde{2}00$ samples from several petroleum wells from the late Neoproterozoic A2C interval were analyzed. For a mineralogical overview the samples were measured by XRD – powder diffraction, whereas the rock fabric was studied by thin section analysis and if required additionally with SEM. This high-resolution dataset was used in combination with external petrophysical observations to defined porosity-permeability trends for different rock-fabric groups according to LUCIA (1995). The spatial distribution of these petrophysical characteristics will be displayed in field-scale distribution maps of the analyzed diagenetic phases.

The expected integrated 3D – diagenesis model will enable better predictions of the reservoir qualities in the Ara fields and will additionally benefit the planning of new exploration wells in the Stringer Petroleum System of the South Oman Salt Basin.