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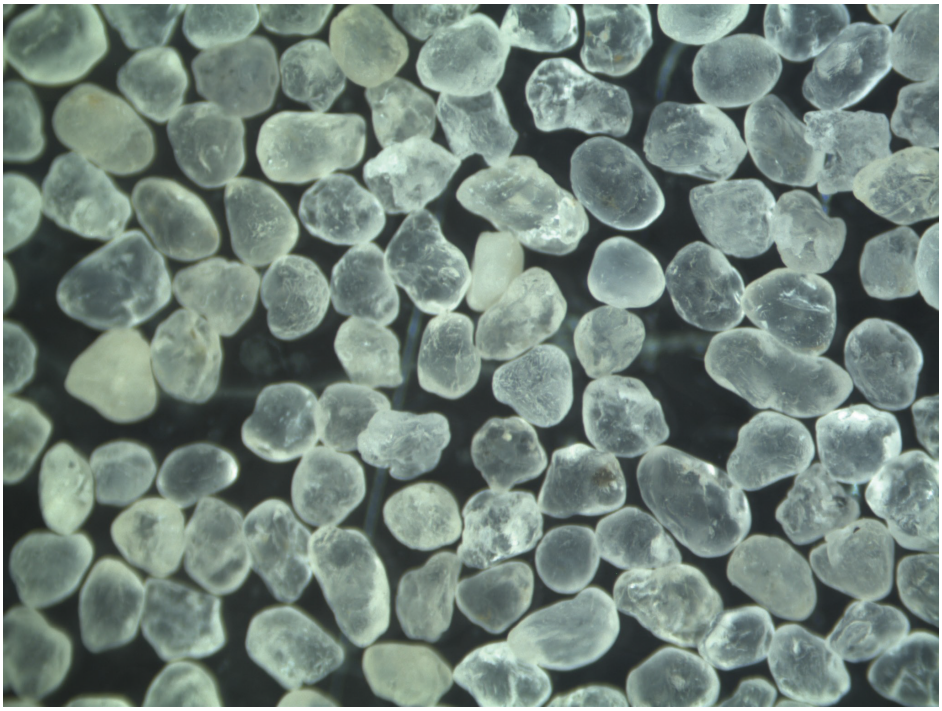
هيئة المساحة الجيولوجية السعودية
SAUDI GEOLOGICAL SURVEY

EVALUATION OF SAUDI SILICA SANDS FOR APPLICATION IN FRACKING FOR OIL AND GAS PRODUCTION, KINGDOM OF SAUDI ARABIA

Silica sand has many industrial uses. Its main use is in the production of green and amber bottle glasses and clear flat glasses through the float process. Its other uses include as materials for filtration, casting, molding, refractory sand, silicon carbide, silica chemicals, etc. Frac sand is a type of sand with small, uniform particles. It is injected into the rock formation along with water to fracture the rock in a process known as hydraulic fracturing or "fracking." The sand is used to fill in the fractures that are created. Because the sand particles are uniform, fluids, like water, oil, and gas, can flow through the spaces between these particles.



Silica sand in Saudi Arabia is notable for its excellent sphericity and roundness, as well as its well-sorted grains, particularly in the northern regions of the country.

There were no previous studies about frac sands that were done in the Saudi Geological Survey. This study is the first attempt to identify and evaluate some of the sand localities that appear to host frac sands. The methodology used in this study includes 1) fieldwork and sampling and 2) laboratory analyses and testing to characterize the frac sands in Saudi Arabia that can be used as materials for the oil and gas industry.

Surface samples were collected from the study area.

The testing service report from the Global Energy Laboratories shows the frac sands in Saudi Arabia are of great quality and can save money for the oil and gas industry in Saudi Arabia, when these deposits are developed and utilized. To do this, more exploration works are recommended, especially in carrying out conductivity tests to qualify the frac sands for use by the Aramco oil and gas industrial activities.

The location of the prospect is about 60 km to the south of Dawmat Al Jandal. This project area is accessible through the new highway that joins Hail to the Al Qurayat area. This asphalt highway intersects the project area. (***SGS-OF-2023-3, Yasser A. Saedi and others)***.

STRATIGRAPHIC VARIABILITY OF UPPER HOLOCENE MARGINAL MARINE SEDIMENTS ALONG THE AL QAHMAH COAST OF THE RED SEA, SAUDI ARABIA

The stratigraphic architecture of Upper Holocene sediments along the coast of Al Qahmah in southern Red Sea, Saudi Arabia, provides a high-resolution analog of marginal marine carbonate and siliciclastic sedimentation under variable climatic, tectonic, and sea-level conditions. The sediments include a basal shallow marine limestone and overlying beach, deltaic, fluvial, eolian, and sabkha siliciclastic deposits, comprising four stratigraphic units ranging from 10s to 100s cm thick. A lithostratigraphy is established using subsurface stratigraphic and petrographic data from 64 trenches and three shallow refraction seismic sections. A chronostratigraphy is established using four age points and sedimentation rates. The entire interval has been deposited in the last ~4000 years. Significant stratigraphic variability is reflected by vertical and lateral changes in the thickness, type, and stratal geometry of the four units. Five major geological events are interpreted: Initial shallow marine carbonate deposition during a relative sea-level highstand was terminated by seaward progradation of deltaic-beach sediments during a slow shoreline regression. This is followed by a major stream channel incision during the maximum regression and a relative sea-level fall. The ensuing fluvial channel filling, transgressive ravinement, and deposition of beach sediments signify a relative sea-level rise. Finally, eolian, sabkha, and beach sediments have been deposited in a stabilized and diversified environmental setting under an arid climate. The lacuna associated with stream erosion and transgressive ravinement is up to ~400 years long, resulting in a stratigraphic completeness of ~88%. The sedimentation rate of the siliciclastic sediments is ~0.1 cm/year estimated at a scale of 1000s of years. Episodic syn-depositional faulting in the source area and depositional site, relative seal-level change, autogenic environmental shift, and/or climatic changes between humid and arid conditions have collectively played variable roles in the formation of the stratigraphic variability. The interpreted tectonic, relative sea-level, and climatic trends offer an important data point for future studies in the Red Sea region and beyond for the Late Holocene. (**Article published in the *Journal of Sedimentary Geology 433: 1-19 - Nabhan and Yang***).

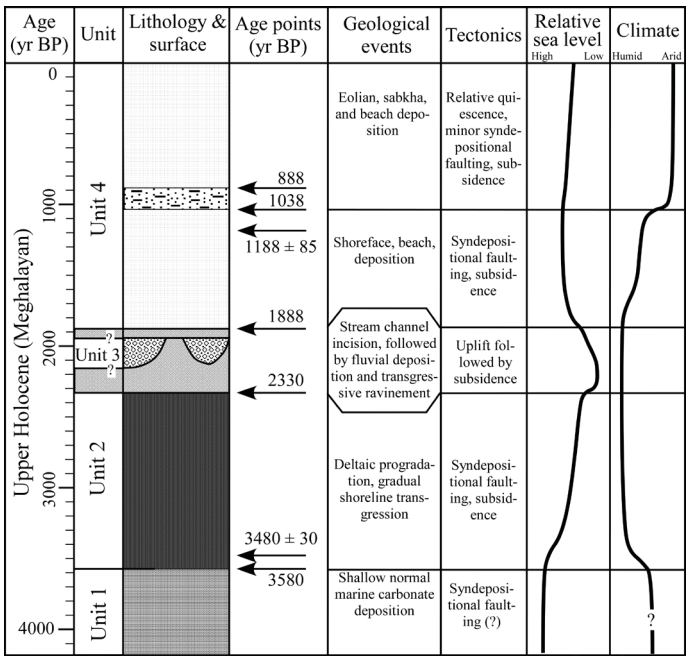
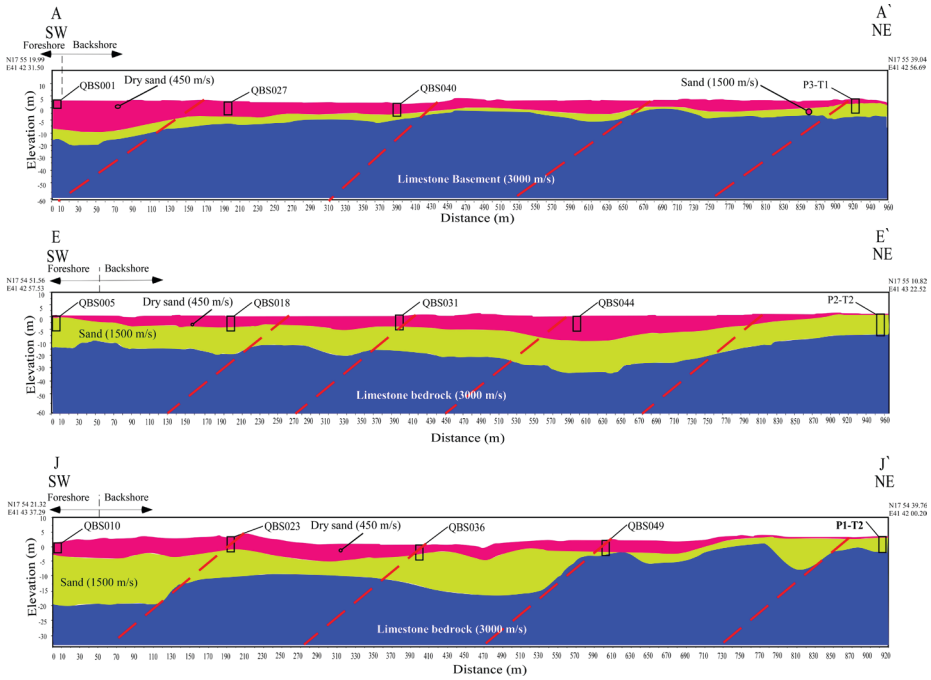


Chart showing the chrono- and litho-stratigraphy and interpreted geological events and trends of tectonic, relative sea-level, and climatic changes of Trench P1T2.



Three 2-D seismic refraction sections (A-A', E-E' and J-J') showing the tomographic model results. Three velocity layers are interpreted. Trench profiles used in the modeling are labeled and marked with rectangular boxes. Several normal faults are also interpreted and marked as dashed lines.