
Solid Earth Research; Studies from Newcastle University Provide New Data on Solid Earth Research (The Assessment of Organic Matter Young's Modulus Distribution With Depositional Environment and Maturity)

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2021 FEB 12 (NewsRx) -- By a News Reporter-Staff News Editor at Science Letter -- Research findings on Solid Earth Research are discussed in a new report. According to news reporting originating from Newcastle upon Tyne, United Kingdom, by NewsRx correspondents, research stated, "Quantification of risk to seal integrity in CCS, or gas extraction from hydraulic fracturing, is directly affected by the accessibility of organic pores within organic rich mudrocks. Knowledge of the host organic matter's mechanical properties, which are influenced by depositional environment and thermal maturity, are required to reduce operational risk."

Funders for this research include NERC Natural Environment Research Council, Newcastle University, NERC Natural Environment Research Council, Engineering & Physical Sciences Research Council (EPSRC), **Bureau of Economic Geology**, Texas.

Our news editors obtained a quote from the research from Newcastle University, "In this study we address the effect of both depositional environment and maturity on organic matter Young's modulus by means of Atomic Force Microscopy Quantitative Imaging(TM), which is a nondestructive technique capable of nanomechanical measurements. Shales from varying marine depositional environments covering kerogen Types II (Barnett), IIS (Tarfaya), and II/III (Eagle Ford/ Bowland) are analyzed to capture variance in organic matter. The findings show organic matter has a Young's modulus ranging between 0.1 and 24 GPa. These marine shales have a bimodal distribution of Young's modulus to some degree, with peaks at between 3-10 and 19-24 GPa. These shales exhibit a trend with maturity, whereby Young's modulus values of <10 GPa are dominant in immature Tarfaya shale, becoming similar to the proportion of values above 15 GPa within the oil window, before the stiffer values dominate into the gas window. These peaks most likely represent soft heterogeneous aliphatic rich kerogen and stiff ordered aromatic rich kerogen, evidenced by the increase in the stiffer component with maturity and correlated with C-13 NMR spectroscopy."

According to the news editors, the research concluded: "These findings enable increased realism in microscale geomechanical fracture tip propagation models and may allow direct comparison between Young's modulus and Rock-Eval parameters."

This research has been peer-reviewed.

For more information on this research see: The Assessment of Organic Matter Young's Modulus Distribution With Depositional Environment and Maturity. Journal of Geophysical Research Solid Earth, 2020;125(12). Journal of Geophysical Research Solid Earth can be contacted at: American Geophysical Union, 2000 Florida Ave NW, Washington, DC 20009, USA.

The news editors report that additional information may be obtained by contacting T. D. Fender, Newcastle University, Sch Nat & Environm Sci, Newcastle Upon Tyne, Tyne & Wear, United Kingdom. Additional authors for this research include C. Van der Land, D. M. Jones, M. Rouainia, S. P. Graham, C. H. Vane and T. Wagner.

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