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To improve the understanding and interpretation of the depositional environment of a late Oligocene lacustrine organic rich oil-prone source rock succession, 2464 hand held (HH)-XRF measurements were made systematically on the 500 m long, continuous core from the fully cored Enreca-3 well. This core, drilled on the remote Bach Long Vi Island, northern Gulf of Tonkin, offshore Vietnam, represents a deep lake succession alternating between lacustrine pelagic dominated sediments interrupted by hyperpycnal turbidites, high density turbidites and debris flows [1, 2].

From a combined HH-XRF-XRD data set, multivariate data analysis and regression models are used to type the rock and to predict the XRD mineral composition based on HH-XRF composition. The rock types and the modelled mineral composition highlight the geochemical variations of the sediment and allows for direct comparison with sedimentological processes and facies changes. The modeling also depicts the cyclic alteration of rock types that are present on many different scales ranging from centimeters to hundreds of meters [1, 2].

The sedimentological and geochemical variations observed throughout the cored section reflects fluctuating paleoclimate, tectonism and hinterland condition controlling the depositional setting, which may provide a deeper understanding of the deposition of this and similar Paleogene syn-rift succession in the South China Sea region. It allows furthermore the development of a more generalized depositional model relevant for other deep-lacustrine syn-rift basins.

[1] Petersen et al. (2014) Journal of Petroleum Geology, 37: 373–389.
[2] Hovikoski et al. (2016) Journal of Sedimentary Research, 86(8): 982-1007.