Submission code: NYX0M5JPYP

See this and other abstracts on our website: https://home.sbgf.org.br/Pages/resumos.php

PALEOENVIRONMENTAL AND PALEODEPOSITIONAL STUDY BASED ON X-RAY FLUORESCENCE DATA FROM THE ALIGRA-1 CORE, TAUBATÉ BASIN

Matheus Tavares (Fluminense Federal University), Raphael Da Rocha Silveira (Universidade Federal Fluminense), Karen Mendonça (Fluminense Federal University), Bruna Maia Imbuzeiro (Universidade Federal Fluminense), Victor Matheus Joaquim Salgado Campos (Universidade Federal Fluminense - UFF), Pedro Raietparvar (Fluminense Federal University), André Ferrari (Universidade Federal Fluminense), Antonio F. M. Freire (UFF)

PALEOENVIRONMENTAL AND PALEODEPOSITIONAL STUDY BASED ON X-RAY FLUORESCENCE DATA FROM THE ALIGRA-1 CORE, TAUBATÉ BASIN

Introduction

This study aims to infer the paleoenvironmental and paleodepositional conditions of a section of the Aligra-1 core, obtained from a stratigraphic well drilled at the Aligra mining site in the Taubaté Basin, São Paulo State, Brazil. Drilled by GEOSOL in the early 2000s, the analyzed interval (101.45–105.11 m) revealed a significant uranium (U-238) anomaly, identified through gamma spectrometric measurements and confirmed by open-hole gamma-ray logging. The core section consists mainly of greenish-gray laminated mudstones with sandy layers and bioturbation features, suggesting intense biological activity in a lacustrine setting.

Method and/or Theory

X-ray fluorescence (XRF), a geochemical technique based on atomic excitation by primary X-rays and subsequent secondary emission, was employed to quantify elemental composition. The intensity of the emitted radiation is proportional to the concentration of each element, enabling precise analysis of major, minor, and trace elements. Samples were collected every 10 cm, pulverized in a porcelain mortar, sieved to 106 µm, and analyzed using the EDXRF Epsilon-1 (Malvern Panalytical) via loose powder method. Uranium concentrations from XRF were compared with gamma-ray measurements from the RS-230 spectrometer (Radiation Solutions), and Spearman correlation analysis was used to explore relationships among geochemical variables.

Results and Conclusions

A strong correlation was observed between U-238 concentrations and gamma-ray anomalies. The Cu/Zn ratio, a redox proxy, exhibited a positive correlation with the U-238 peak, while the Th/U ratio showed a strong negative correlation, suggesting reduced detrital input and possible preservation of organic matter under anoxic conditions. Elevated Fe/Al and Ni/Co ratios at the base of the uranium anomaly indicate increased extrabasinal detrital influx, potentially linked to a wetter climatic phase. Subsequently, a decrease in humidity, possibly associated with lake deepening due to rift subsidence, may have contributed to U-238 enrichment. This study highlights the value of integrating geochemical, geological, and geophysical approaches to understand depositional processes and assess the exploratory potential of geochemically mature intervals.