Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.23844

Biomarkers, Stable Isotopes, and Elemental Geochemistry of the Early Cambrian Mudstones across the Yangtze Platform: Implications for Paleo-environments and Bioradiations

MOÏSE LUEMBA LUEMBA[1,2], ZHONGHONG CHEN[1], KEYU LIU[3], ZHI CHAI[1] AND N'NAHANO-RUHINDWA HERITIER[4]

[1]China University of Petroleum (East China)
[2]University of Kinshasa
[3]China University of petroleum (East China)
[4]Central South University

Presenting Author: mosesluemba@gmail.com

Environment-biota coevolution during the Early Cambrian period (541-514 Ma) has been a longstanding scientific puzzle due to various challenges (e.g., the "Great Unconformity"). Here, we propose a conceptual model based on cross-disciplinary evidence. New drilling core samples, collected in a paleogeographic intrashelf basin (i.e., the Ziyang area on the **Yangtze Platform)** and covering an interval included within 4213-4341 m in depth, were analyzed through a series of geochemical experiments (e.g., GC-MS, MRM GC-MS, ICP-MS, IRMS, total organic carbon and sulfur analyses, and kerogen microscopy). Here are the main results: (A) A predominance of the C_{27} to C_{29} regular steranes over the total steranes, with $0.31 \leq C_{27}/(C_{29}+C_{27}) \alpha\alpha\alpha \leq 0.50$; as well as low values of 2-methyl hopane index (≤2.48%), 4-methyl sterane index (≤0.20), and 24-iso/n-propylcholestanes, are recorded, which, along with Kerogen maceral distribution, point towards a substantial contribution of algae (e.g., green algae); (B) Widely distributed total organic carbon (0.42-7.26%), enrichment factor of molybdenum (4.47-183.52) and uranium (1.03-121.99), delta sulfur ($\delta^{34}S$) of pyrite (+3.50 and +29.90‰), along with low pristane/phytane ratio (0.04-0.92), as well as excursions on curves of delta carbon ($\delta^{13}C$) and oxygen ($\delta^{18}O$) of carbonates suggest fluctuating redox conditions; (C) Widely distributed titanium abundance (0.02-0.88%), Fe/Ti ratio, Al/(Al+Fe+Mn) ratio, and volcanic tuffs indicate a combination of factors involving magmatic-hydrothermal systems and enhanced weathering; (D) High values of the gammacerane index (≤41) along with the lithofacies distribution suggest stratified water columns and fluctuating sea levels. Integration of these results with published data from various paleogeographic settings across the Yangze Platform shows the following pattern: (1) **Five** anoxic peak intervals are suggested; (2) magmatic-hydrothermal events, enhanced weathering**,** sea-level rise, deep-water lithofacies, and high **primary productivity**, **were** coeval with anoxic peak**s**; (3) sea-le**vel fall, shallow-water lithofacies**, and weak/moderate **primary productivity were the key features of** intermediate intervals; (4) **bottom waters remained** anoxic-ferruginous **in slope and deep basin** settings**,** at least until 526.5 Ma**, when anoxic-sulfidic conditions prevailed in some locations**; (5) Magmatic-hydrothermal activities **and** enhanced weathering controlled the levels of bio**essential** elements (e.g., P, N**, Si, Fe,** Ca**, and S)**, which could have shaped the aquatic ecosystems (e.g., sponges, small shelly fossils, etc.)**.**