Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.27510

The use of diverse geochemical methods to discuss fresh Pelotas Basin data and the relation with Santos Basin, Brazil.

ILANA LEHN[1], TIAGO JONATAN GIRELLI[1], MONIQUE APARECIDA MARCHESE RIZZI[1], HENRIQUE SERRATT[1], MATHEUS FERNANDES DA CRUZ[1], ADOLPHO HERBERT AUGUSTIN[1], CRISTIANO LANA[2] AND FARID CHEMALE JUNIOR[1]

[1]UNISINOS
[2]Stellenbosch University

The evolutionary history of the Pelotas and Santos basins, located in South Atlantic, is closely linked to the breakup of Gondwana during the Cretaceous. To better understand the evolutionary history of these basins, we conducted carbon, oxygen, and nitrogen isotope analyses using a Secondary Ion Mass Spectrometer (SIMS) to characterize sedimentary and hydrothermal processes. Additionally, petrographic and in-situ U-Pb dating of carbonates were carried out in Cretaceous carbonate rock of the Pelotas Basin to define the absolute age of the section. Petrographic analysis of the Pelotas Basin samples reveals reworked facies with a fine-grained matrix and bioclasts of shallow-platform marine organisms, including inoceramids, benthic and planktonic foraminifera, and serpulid worms. U-Pb dating of an interval within this hybrid facies yielded an age of 95.09 ± 1.26 Ma. Elemental isotopic mapping through ion imaging indicates a close association between ^{13}C and ^{14}N, suggesting the presence of organic compounds. The $\delta^{13}C$ values of Pelotas Basin samples range from -5.55‰ to 4.57‰ in bioclasts and from -5.91‰ to -1.01‰ in organic compounds, while $\delta^{18}O$ values in bioclasts range from 10.22‰ to 31.13‰. In contrast, the analyzed facies from the Santos Basin primarily consist of in-situ deposits, including stromatolitic shrub structures and spherulites from fine-grained laminated facies. The Santos Basin exhibits a wider range of $\delta^{13}C$ values, varying from 4.17‰ to -19.37‰ in calcite particles and from -19.11‰ to -33.66‰ in organic compounds. The $\delta^{18}O$ values range from 5.4‰ to 33.1‰. Carbon-oxygen isotope plots indicate that most Pelotas Basin samples reflect a marine water signature, while some suggest hydrothermal influence and diagenetic effects. In contrast, the Santos Basin results predominantly reflect hydrothermal influence, with diagenetic signatures associated with meteoric waters. The observed $\delta^{18}O$ enrichment and positive value variability are likely attributed to the recrystallization of calcite in bioclasts, further supporting hydrothermal and diagenetic effects. The distinct isotopic signatures indicate different environmental conditions for the two basins. The use of diverse methods confirms that both basins were subjected to hydrothermal and diagenetic processes.