

COMPARATIVE STUDY OF THE PHOSPHORITES FROM THE CONTINENTAL MARGIN AND THE SEAMOUNTS IN THE ATLANTIC NORTH OFF PORTUGAL

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This study provides a comparison of the phosphorites from some areas along the Continental Margin off SE Portugal, "shelf deposits/type", and the seamount phosphorite nodules with Mn crust coatings from Lion and Ampere Seamounts, between Portugal and Madeira Island - "open ocean/type". The mineralogy and major element chemistry is similar. Mineralogical studies of the phosphate content suggest a coexistence of francolite (carbonate fluorapatite) and fluorhydroxycarbonate apatite in the shelf deposits and seamount types, characterized respectively by $\text{CaO/P}_2\text{O}_5 = (1.6 - 1.52)$, $\text{F/P}_2\text{O}_5 = (0.124 - 0.12)$, $\text{CO}_2 = (5.5 - 6\%)$ and $\text{F} = (4.3 - 4.1\%)$. Values of P_2O_5 between 5% and 26% are found. The influence of the Mediterranean Outflow Water (MOW) seems to be similar in their formation. Calcite, the only carbonate mineral present in seamounts samples, is associated with the phosphate material to compose a typically nanoplanktonic foraminiferal phosphatized limestone. In the shelf deposits Calcite, dolomite, quartz, glauconite, goethite, and alumino-silicate clastics are associated with the phosphate to compose the diversity of forms like glauconitic phosphatic conglomerate, ferruginous and non-ferruginous phosphatized foraminiferal limestones. The U content in seamount samples is very low (3-6ppm) in the bulk sample, but higher (mv. 234ppm) in shelf deposits. However, the difference of the $\text{U/P}_2\text{O}_5$ is more evident, i.e. 0.14 - 0.69 and 3 - 19, respectively. In contrast to shelf deposits, seamount phosphorites are geochemically characterized by very low concentrations of Rb, Cs and Sr, although relatively enriched in Mn and Co.