

Variation of the K₂O Content of Pelites with Time In Atlasic and South-Atlastic Basins: a Record of Africa Drift Toward the North?

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In North America Paleozoic to Tertiary basins the K₂O content of pelitic sediments (shales and mudstones) increases with depth and age of the sediment. This variation is generally interpreted as an enigmatic potassium metasomatism. In addition, it is well known that shale compositions record the environmental processes occurring from the source to the basin. It is also known that potassium is a weathering sensitive element. So, it was interesting to test the hypothesis of a possible effect, on the pelite K₂O content, of the variation with time of the weathering intensity mainly as a consequence of the local climate conditions. To do that, we sampled 60 pelitic rocks ranging in age from lower Cambrian to Eocene in Atlasic and Sud Atlasic basins from Casablanca to Fezou in Tafilalet Basin (Morocco). The weathering conditions in the basin area have largely varied with the drift of the Africa from the South Pole during Cambrian, crossing equator during Permian and reaching the Mediterranean area during Eocene. As a result, the bulk K₂O content of our pelitic samples varies with age. It shows a global decreasing from Cambrian from 7 to 1 wt% in mean. Standardised to Al₂O₃ to correct the mineralogical effect, the K₂O/Al₂O₃ ratio decreases from Cambrian to Permian and increases from Permian to Eocene reflecting in the same time the crossing of local climate conditions from very cold and very low weathering conditions of the South Pole to very warm, wet and highly weathering conditions of Equator and their decline during the drift from Equator to about the 30° N latitude. The hypothesis of a link between the pelite K₂O contents and the weathering intensity as a consequence of the continental drift is thus strongly supported by the data. We will discuss the implications in term of heat production in basins and mountain building.