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**Geochemistry of limestones: implications for environmental and provenance interpretations using a case study from Miocene carbonates (Leitha limestones, Austria)**

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Mineralogical and geochemical investigations were performed on Neogene limestones (Leitha limestones) collected from 3 localities from Austria (Mannersdorf, Wöllersdorf and Kummer quarries) and Fertőrákos quarry from Hungary. The former two quarries are located in the southeastern part of the Vienna Basin, while the later two quarries are located in the Eisenstadt-Sopron Basin.

The mineralogical and geochemical characteristics enabled the grouping of the studied localities into two groups. The first includes Mannersdorf and Wöllersdorf quarries in which the detrital input are apparent in the mineralogy of Leitha limestone with the existence of quartz and clay minerals besides other minerals such as dolomite, pyrite and barite in some facies. Consequently, the major and minor elements are influenced where CaO wt.% is higher in the facies with less detrital input with average value of 56 wt.% (n=35), this average is reduced with the facies rich in detrital input to 51.6 wt.% (n = 6). In a reverse manner the average SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and Fe<sub>2</sub>O<sub>3</sub> wt.% are increased from 0.79, 0.24 and 0.12 in the former facies to 3.67, 1.19 and 0.57 in the later facies, respectively. MgO wt.% average increase from 0.32 wt.% to 5.7 wt.% with the presence of dolomite.

In general, Sr content of the all Leitha limestone facies from these two localities is low with an average of 231 ppm. Post-Archean Australian Shale (PAAS) normalized REEs patterns are flat with negative Ce anomaly (average value of 0.9) and LREEs/HREEs ratio indicated by (La/Yb)<sub>N</sub> ratio of 0.97. All these features indicate the influence of the detrital input which inhibit the reconstruction of the marine conditions under which Leitha limestone were deposited.

On the other hand, the second group including Kummer and Fertőrákos quarries have different specifications, in which the detrital input is weak indicated by the absence of clay minerals and scarce quartz in the studied samples. The dominant major oxide is CaO with average of 54.4 (n = 26) while SiO<sub>2</sub>,

$\text{Al}_2\text{O}_3$  and  $\text{Fe}_2\text{O}_3$  wt.% averages are 0.6, 0.1 and 0.3, respectively. MgO content is low with average value of 0.6 wt.%, while Sr content is higher in this group with average value of 571 ppm. The PAAS normalized REEs patterns are similar to shale normalized seawater pattern with HREEs enrichment with average  $(\text{La}/\text{Yb})_N$  ratio of 0.74, well pronounced negative Ce anomaly with average value of 0.62 and Y/Ho ratio of 39. All these features indicate that Leitha limestone was deposited in a shallow, well oxygenated marine environment.

