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Nadace
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pro ochranu přírody

Nadace Ivana Dejmala pro ochranu přírody



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Vivianite concretions in periglacial laminites of Batizovské pleso, Tatra Mts., Slovakia

poster

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The Batizovské pleso is a mountain lake of glacial origin, located in Batizovská dolina glacial trough at an altitude of 1884 m a.s.l., with surface area of 3 ha, surrounded by highest peaks of Tatra Mts. (>2600 m a.s.l.). Lake is dammed by solid bedrock, recharged exclusively by underground flow through surrounding moraines and discharged by one surface stream. Two cores of bottom sediments were taken by piston corer in 2016.

Microchemical scanning (XRF) revealed laminae with distinct phosphate enrichment. Rare dark blue drusy aggregates of vivianite $\text{Fe}^{2+}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ are bound to these layers, of size up to 18 mm. Vivianite concretions are buried in the depth of 315 cm within finely laminated, organic-poor sequence presumably deposited in periglacial conditions. Size fraction <0.06 mm dominates, composed of quartz, plagioclase, K-feldspar, muscovite, illite/smectite, chlorite, kaolinite and biotite. Alternating dark- and light grey laminae have thickness ca. 0.5 - 2mm, dark laminae are enriched in iron and fine grained organic matter. Vivianite was identified by Raman spectroscopy and X-ray powder diffraction, X-ray fluorescence analyses show enrichment in Mn.

In lake sediments, vivianite forms postdepositionally, when Fe^{III} oxyhydroxides dissolve under reducing conditions, releasing Fe^{II} and sorbed P, in absence of sulphur subsequently precipitating as Fe^{II} phosphates. Organic origin of phosphorus cannot be excluded, yet considering that upon deglaciation large rock surfaces had been exposed to weathering, the P might be mobilized from accessory phosphates in granitoids, such as apatite, monazite, xenotime.

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