SUMMARY

Křídelní stěny cliffs (National Park Bohemian Switzerland) are built of the Upper Cretaceous quartz sandstones. Salt efflorescences on the rock surface represent widespread weathering phenomenon in this area. This thesis is focused on the spatial variation of the distribution of different salts species. The changes in physical properties that accompany this weathering phenomenon were studied as well.

Petrographic characteristics of sandstones have been studied by conventional optical microscopy and ultraviolet light microscopy of thin sections prepared by staining of the pores space using fluorescent dye – epoxy resin mixture. Selected sandstone samples were examined by electron microscopy in order to show changes in porosity and cement content in surface layers showing case hardening. Study of physical properties focused on the changes in water absorption, bulk porosity and microporosity. The latest parameter was determined by high pressure mercury porosimetry. The phase analysis of salt efflorescences was performed by X-ray diffraction (XRD). The presence of minor phases, that are not detectable by XRD analysis, was extrapolated from the results obtained by the analysis of water soluble salts (ion exchange chromatography, IEC).

Gypsum ($CaSO_4 \cdot 2H_2O$) and $KAl(SO_4)_2 \cdot 12H_2O$ are the most common minerals of the studied salt efflorescences. Other minerals detected are tsermigite ($NH_4Al(SO_4)_2 \cdot 12H_2O$), alunite ($K(Al_3(SO_4)_2(OH)_6$), alunogen ($Al_2(SO_4)_3 \cdot 17H_2O$), hydrophilite ($CaCl_2$) and nitrammite ($NH_4NO_3$). The occurrence of salt efflorescences on the rock surface is affected by geographical exposition and solubility. Salts with higher solubility (chlorides, nitrates, tsermigite) crystallize preferentially on the cliffs exposed to the south, whereas the north side is characterized by less soluble phases – gypsum and $K(Al_3(SO_4)_2(OH)_6$.

Vertical zonation of salt distribution on natural outcrops differs from the salt distribution in masonry. Salt distribution near the base of cliff (about 2-2.5 m above the ground) is affected by capillary rise from the ground level (maximum salt concentration is at the level 1-1.5 m) and by percolation of atmospheric precipitation from the higher parts of the cliff (higher salt content at the level 2-2.5 m above the ground). Percolation of salt solution from higher parts is affected by asperity of rock surface.

Changes of physical properties of studied rock partly follow variation of the content of water-soluble salts in rock pore system. The porosity, microporosity, moisture content and absorption generally increase with the increasing volume of sulphates and nitrates.