

## MINERALOGICAL, GEOCHEMICAL AND ISOTOPIC CHARACTERISATION OF EVAPORITES FROM THE "HALLSTÄTTER SALZBERG"

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The evaporites of the deposit "Hallstätter Salzberg" had been the subject of numerous studies, but significant gaps of knowledge still remained with respect to their formation, transformation conditions and characteristic features of individual facial units. In order to provide new insights of the latter aspects two drill cores through the deposit with a total length of 619 m were investigated using a combined mineralogical-petrological and (isotope) geochemical methodology.

The Br content of halite (NaCl) varies between 64 and 223 µg (Br) / g (NaCl) (average:  $124 \pm 25$ ;  $n = 67$ ) which indicates no significant secondary solution metamorphism on halite. The Br content of halite increases along the profile towards the hanging layer and reflects changes in the degree of evaporation in distinct horizons.

<sup>34</sup>S/<sup>32</sup>S-isotope values of sulfate minerals exhibit two significant trends: (i)  $\delta^{34}\text{S}$  values varying between 10.6 and 12.8 ‰ (average  $11.5 \pm 0.7$  ‰;  $n = 16$ ), which are typical for marine sulfates of Upper Permian age. Notably,  $\delta^{34}\text{S}$  values of Mg-sulfates ( $\delta^{34}\text{S} = 10.9 \pm 0.4$  ‰;  $n = 6$ ) such as polyhalite ( $\text{K}_2\text{Ca}_2\text{Mg}[\text{SO}_4]_4 \cdot 2\text{H}_2\text{O}$ ) are isotopically lighter compared to anhydrite ( $\text{CaSO}_4$ ) dominated horizons ( $\delta^{34}\text{S} = 11.8 \pm 0.6$ ;  $n = 10$ ). (ii)  $\delta^{34}\text{S}$  values from 28.5 to 30.8 ‰ (average  $29.5 \pm 1$  ‰;  $n = 4$ ) of anhydrite, associated with dolomite ( $\text{CaMg}[\text{CO}_3]_2$ ) and organic rich layers, indicate marine sulfates from the Triassic "Röt event", but values are up to  $\approx 2$  ‰ isotopically heavier than previously reported isotope signatures for the "Hallstätter Salzberg"

In the Upper Permian, the onset of evaporation led to halite precipitation. An increasing degree of evaporation yield finally in polyhalite formation (Alpine Haselgebirge Fm.). In the Triassic, halite precipitation at lower evaporation degree resulted in lower Br content of halite (Reichenhall Fm.) compared to the Permian salts. Mineral transformation processes are discovered by relicts of anhydrite in polyhalite, polyhalite in anhydrite, anhydrite in görgeyite ( $\text{K}_2\text{Ca}_5[\text{SO}_4]_6 \cdot \text{H}_2\text{O}$ ), glauberite ( $\text{Na}_2\text{Ca}[\text{SO}_4]_2$ ) in anhydrite, and by glauberite rims around polyhalite minerals. A notable feature is the occurrence of kalistrontite ( $\text{K}_2\text{Sr}[\text{SO}_4]_2$ ), which was observed in the Eastern Alps for the first time. Accordingly, an enhanced (age) classification of the investigated layers and stratigraphic units are presented and depicted secondary impacts on the composition of the deposit due to solution metamorphism are discussed.