

Summary

From the perspective of the chemical composition of mineral waters, the Mariánské Lázně spring area is considered the most diverse in the Czech Republic. This diversity leads to highly complex hydrochemical and hydraulic relationships among the mineral springs and groups of springs. This study addresses these relational regularities and aims to describe them as thoroughly as possible. Field and detailed research surveys revealed that mineral waters are not concentrated in a single location but are distributed throughout the area of interest. Field and laboratory measurements provided hydrochemical data, which served as the basis for a new classification and zoning of the mineral springs. Using cluster analysis, four main groups of mineral springs within the area of interest were identified. Each group is clearly defined, allowing for this classification to be used in the event of discovering new mineral springs. The first type of mineral water is dominated by Ca^{2+} and HCO_3^- . The second type is dominated by Na^+ and HCO_3^- or SO_4^{2-} . The third type is dominated by Mg^{2+} and HCO_3^- . The last group consists of springs in the so-called transition group, which exhibit characteristics of several groups simultaneously. These hydrochemical groups are not randomly distributed but form distinct units. The magnesian type of water dominates the northern part of the city, calcium-rich waters are prevalent in the southern part, and sodium-rich waters are central to the spa. The transition group is situated between these units. This hydrochemical variability is influenced by the geological bedrock in the infiltration, transit, and springs areas. Besides the horizontal variability of water chemistry, vertical and temporal changes of various parameters were also identified. Notably, the analysis of changes in chemical composition over time raises reasonable concerns regarding the maintenance of the existing balneological significance for some springs, as the original concentration of balneological substances decreases. The knowledge gained from this study can be utilized to establish more effective protection measures for the spa site and fundamentally contribute to the sustainability of the balneological significance of the highly mineralized springs in Mariánské Lázně. Additionally, the methodology for data collection and evaluation can be applied to other spa areas.