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Peculiar outflow behaviour of the Kläffer karst springs (Hochschwab, Austria)

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Regarding their total average discharge of 5.4 m^3/s, the Kläffer springs are the biggest karst springs in the Eastern Alps and the most important ones for the water supply of the Austrian capital Vienna. They are situated below a cirque like rock cliff of 200 m diameter on the north side of Hochschwab, which is one of the large karst massifs of the Northern Calcareous Alps. The water does not emerge from a single opening but, controlled by the actual hydrologic conditions, diverse fault bound outlets become active and four of them are small accessible caves. Many hydrological investigations have been conducted on the tapped sources in the subsurface but hardly at any of the untapped overflow outlets. Based on hydrological data it has been claimed that one water body emerges at the Kläffer springs, but the outflow behaviour seems to be more complex as several elevated outlets become active earlier than lower ones. This study aims at the documenting and understanding the behaviour of the spring outlets. Therefore five stop-motion cameras monitored the activity of the main outlets during snow melt from March, 17th to July, 6th 2017 and occasional measurements on discharge, temperature and electric conductivity were taken.
Combining the rating curve of the overall discharge of the Kläffer springs with the activity of the spring outlets showed only moderate accordance. This is partly due to problems with the overall discharge measurement but especially two of the major outlets showed a chaotic flow behaviour concerning water volume and retardation with respect to their elevation. Two other outlets seemed to be interconnected. In contrary, at least during normal flow conditions water temperature and electric conductivity were equal at all outlets. An explanation for the strange outflow behaviour of Kläffer springs could be a uniform karst water body with a complex channel overflow system at significant distance to the outlets. Another explanation for the chaotic activity pattern considers a mixture of hydrologically different but hydrochemically similar sources at least during flood conditions.