Environmental parameters monitoring in the oldest show cave of Italy: Bossea Cave

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Valentina Balestra*†[1,2], Adriano Fiorucci[1,2], Guido Peano[2], Ezechiele Villavecchia[2], Giovanni Agnesod[2], Massimo Faure Ragani[3], and Bartolomeo Vigna[1,2]

[1]Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino – Italy
[2]Underground Karst Laboratory of Bossea Cave - S.O. Bossea C.A.I. – Italy
[3]ARPA Valle d'Aosta – Italy

Abstract

Bossea Cave (Piedmont, Italy) was opened to the pubblic in 1874, making it the first show cave of Italy. This cave develops for about 2800 m in a tectonic contact between carbonate rocks of Middle Triassic, and Permotriassic metavolcanics, and it is crossed for about 1.5 km by a subterranean collector.
Three different underground laboratories are present inside the cave to monitor and study several environmental parameters: the Underground Karst Laboratory of Bossea Cave managed by the S.O. Bossea C.A.I. and by the DIATI - Politecnico di Torino, the Karst Hydrogeology Lab, financed by the DIATI – Politecnico di Torino, and the "Giovanni Badino" Climatological Research Centre, funded by PaleoLab of DIATI – Politecnico di Torino and S.O. Bossea C.A.I.

The Underground Karst Laboratory of Bossea Cave, together with ARPA Piemonte and ARPA Valle d'Aosta, is mainly concerned with the Radon (222Rn) monitoring. The gas exchange dynamics between water, rock and atmosphere are studied: three Radon monitors for water and two for air tracking were installed in different areas of the cave.

The Karst Hydrogeology Lab has 11 data acquisition systems to monitor every 15 minutes water levels, temperature and electrical conductivity of the main subterranean collector and a series of secondary water supplies. The flow rate of the main collector and some secondary inputs are recorded since 1982.

The "Giovanni Badino" Climatological Research Centre is aimed at monitoring air, rock and water temperature with extremely precise instruments, calibrated by INRiM. Six main stations are located in touristic and non-touristic cave areas. From June 2021, 52 temperature probes are present in the cavity, acquiring data every 10 minutes. Three atmospheric pressure meters, a pluviograph and two data acquisition systems with four probes for CO monitoring are part of the same Lab.
Caves are the most important geo-heritage worldwide, however, when cavities are transformed in show caves, an additional impact is produced (e.g. air temperature and CO increment, lampenflora growth and pollution). Research allows a greater knowledge of the peculiarities and problems of the system, considering the cave not only a tourist attraction,

*Speaker
†Corresponding author: valentina.balestra@polito.it

but an important ecosystem to preserve. Bossea cave is a perfect example of how managers, speleologists and scientists collaboration can exist and bring innovation to natural resources conservation.

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