COVID-19 pandemic: an opportunity to monitor the naturalness of show caves

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Abstract

The CO air concentration variations in show caves can be linked to natural and/or anthropogenic factors. The CO increase, linked to climate change or anthropogenic impact, can alter the rock-atmosphere interface and damaging speleothems and ecosystems, therefore, knowing the natural dynamics in the underground environment is fundamental.
Today, before the opening of new tourist caves, a year monitoring of the main environmental parameters is recommended. Instead, the show caves opened in the past hardly have previous data relative to the natural environmental parameter variations.

Thanks to the closure of the caves for Covid-19 pandemic restrictions, it was possible to make assessments in the absence of tourists, highlighting the natural CO air concentration variations. To understand the environmental parameters dynamics in three NW Italian show caves, a continuous monitoring of the main parameters (temperature, air circulation, CO, etc.) was carried out for a year. To monitor the CO air concentration, VAISALA systems with INDIGO 520 sensors were installed in different cave areas, with two GMP 252 probes (maximum error 2%) each. The data was continuously recorded with intervals of 10 minutes. From the reopening after the COVID-19 restrictions, daily variations of CO air concentrations related to the tourist flow were observed in Toirano caves, Liguria, with an increase of even 1000 ppm. In Borgio Verezzi cave, Liguria, during the winter and spring closure period due to restrictions from COVID-19, CO values between 500 and 650 ppm were measured. Since the reopening of the cave, marked decrease of CO of about 1000 ppm in the weeks and of about 2000 ppm in the weekends were monitored; these decreases seem to be linked to the opening of the main door, resulting in significant air exchange and reduction of the concentration of the CO air concentration. In Bossea cave, Piedmont, during the closing period, natural variations of CO air concentration between 750 and 1000 ppm were recorded in winter and spring. In the summer, a further increase, partly natural and partly linked to the anthropic impact was recorded. The anthropogenic increase occurred of about 50 ppm in the week and doubled during weekends and holidays.

Keywords: COVID 19 pandemic, CO air concentration, show caves, monitoring, human impact

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