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SHOWCAVE: a multidisciplinary research project to quantify and mitigate the environmental impacts in tourist caves

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Over the past decades, interest for the underground karst environments has grown remarkably, not only from the scientific viewpoint, but also from an economic perspective. The so-called “show caves” are caves open to the public for touristic purposes, managed by a governmental or commercial organization. The numbers of visitors (up to 500,000/year/cave) and the profits deriving from such activities have recently gained importance worldwide. The research project of relevant national interest (PRIN 2017) “SHOWCAVE”, aims at providing an in-depth characterization of the environmental impacts related to tourist exploitation in the major Italian show caves. During the first year of the project, 12 Italian show caves were chosen as ideal setting to develop the core of the research program, i.e. the multidisciplinary evaluation of tourism impacts based on a wide set of indicators, encompassing all the abiotic and biotic components. By adopting innovative techniques and original methods, the different research units are currently monitoring: i) physical indicators, namely water and air parameters; ii) geological indicators, such as the alterations of the carbonate rocks; iii) biological indicators, including invertebrates, lampenflora and the microbiota; iv) palaeontological and archaeological indicators. Side researches are being performed on the contamination by lint, the description of the natural heritage of Italian show caves and the human perception of the tourism impacts in

the subterranean environment. The development of the first LCA (Life Cycle Assessment) method to comprehensively evaluate the impacts of the touristic service offered by show caves, together with a review of available literature on show caves, are also being carried out. Preliminary results have already been disseminated in several public engagement and educational activities. At the end, the results obtained by all the research activities will be combined to develop general protection measures and provide specific suggestions for the sustainable use of show caves.