



# Coupling air temperature records and gravimetric data to interpret ventilation patterns in a Mediterranean karstic system (Nerja-Pintada caves, southern Spain)

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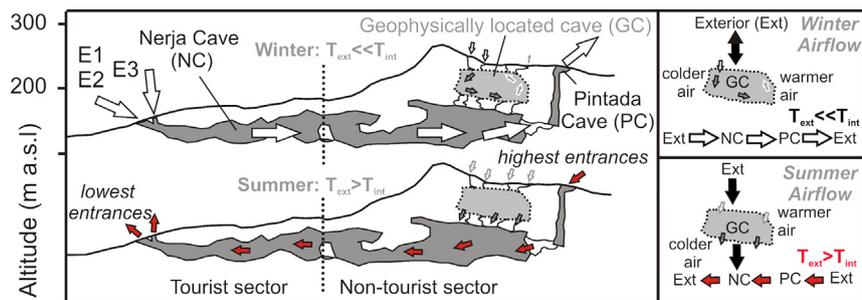
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## HIGHLIGHTS

- The study links gravimetric and thermal anomalies in a karst system.
- A large cavity near the Nerja Cave exists which influences its ventilation.
- Thermal anomalies allow to propose a ventilation model based on a hydrodynamic analogue.
- Transmissive and capacitive voids coupled together may explain airflow in caves.
- The temperature differences drive the change between the DAF-UAF ventilation modes.

## GRAPHICAL ABSTRACT



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## ABSTRACT

Microclimate and geophysical studies are commonly applied to the characterization of karst systems although they are usually used separately. The main purpose of this manuscript is to show how the analysis of the data from both these research methods is a useful tool in the characterization of karst systems and we present the analysis of a specific case study: the Nerja-Pintada caves system. The joint analysis of the Nerja Cave and external air data (mainly temperatures) and the pre-existing gravimetric data of its surroundings (residual gravity anomaly map) have allowed us: 1) to postulate the existence of an unknown great cavity located near to the Nerja Cave and with direct influence in its ventilation and 2) to propose a new model of the Nerja-Pintada caves ventilation based on the changing connection between a “main cavity” system (Nerja Cave), with basically a transmissive function of airflows and an “annex cavities” sub-system, with different functioning as far as the airflow is concerned: transmissive in the case of Pintada Cave and capacitive in the case of the geophysically-located cave.

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## 1. Introduction

Air temperature and airflow are two key factors for studying and characterizing caves because they intervene in numerous processes such as mineral precipitation and evaporation and condensation processes, amongst others (Spötl et al., 2005). So, they are considered in many diverse studies such as those related to the conservation of the

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