



International Seminar on Paleontology, Evolution,
Paleoecosystems and Paleoprimatology
Room 410, Build. B35 (3rd floor, north wing)

Friday 6 June 2025 – 14pm

Beneath the Karsts: Inside the Intimacy of Caves



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Abstract: My presentation will provide an overview of my scientific career and research on karst systems, focusing on phantomization, speleogenesis, and geoarchaeology.

My research on the geomorphological evolution of the La Rochefoucauld karst in the Charente region has highlighted the importance of phantomization, a process of chemical alteration of carbonate rocks, in the formation of caves in the Charente. This process creates porous “rock ghosts” which, once removed, give rise to complex underground networks without a true main drainage conduit. This distinctive feature has major implications for the long-term preservation of sediments.

Indeed, this type of speleogenesis has enabled the exceptional trapping and preservation of sediments since the Plio-Pleistocene. Although subterranean sedimentary deposits constitute rich natural archives, as they record palaeoenvironmental information relating to cave formation, fluvial system dynamics, Quaternary hydroclimatic variations, and human activities, their study remains challenging. Sedimentation in cave environments depends not only on sediment-transfer conditions, but also on the relationships between the cave and the surface, and, above all, on geometric and volumetric constraints, the structure of the karst, and the organization of underground networks. In addition, post-depositional biogenic, hydrological, aerological, and anthropogenic processes may alter sedimentary sequences, further complicating their interpretation and often introducing uncertainty. While these sediments provide valuable insights into the regional geomorphological and palaeoenvironmental history, distinguishing regional environmental parameters from local constraints related to cave morphometry—the so-called “site effect”—remains a major interpretative challenge.

Gradually, the study of subterranean morphologies led me towards geoarchaeology. By collaborating with archaeologists, we were able to date and interpret stratigraphic sequences in different caves, while, in turn, our interpretations helped archaeologists refine their understanding of the environmental contexts of human occupations. This work subsequently expanded into taphonomic questions in subterranean settings, seeking to address the complex interactions between landscape evolution and human occupation across different timescales. Three main areas of research will be presented here: cave geoarchaeology (subtle traces of human occupation), biocorrosion (a new approach to interpreting subterranean landscapes), and the Homini'karst project, which investigates traces of the earliest humans in southern Africa. In short, karst is a remarkable geological system, offering a powerful means of reconstructing the history of landscapes and human occupations, and providing unique archives, although these can sometimes be complex to interpret.

