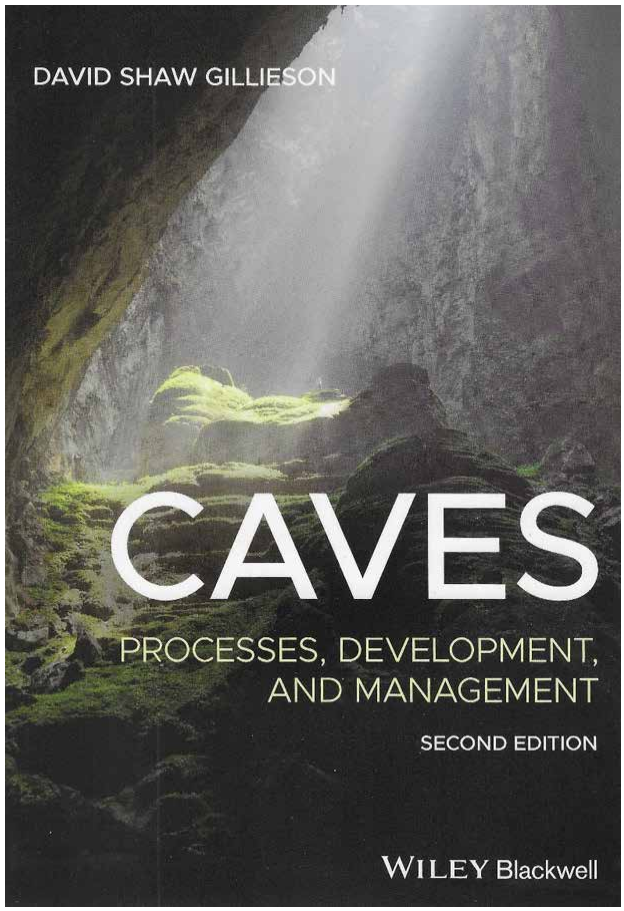

Caves: Processes, Development, and Management, 2nd ed.

David S. Gillieson, 2021. Wiley, Blackwell, Hoboken, NJ; 508 p., 6.6 x 9.6 inches; ISBN 9781119455578 (paperback), ISBN 9781119455592 (adobe pdf), 9781119455622(epub). Paper $64.95 retail, USA. Kindle version $52 from Amazon.

This is a significantly updated version of the 1996 book of the same name. Since then, the science of speleology has taken on new dimensions as its relevance to such global concerns as climate change, the search for petroleum, and tourism are recognized for their importance. Caves are being taken seriously as more than a fun hobby, and there is now a vast and growing literature exploring what caves can tell us about the rest of the world. This book provides a good synthesis of this field by succinctly covering major topics, while supplying references to pertinent literature at a more advanced level, and with a broader international scope than the original edition.

The book is clearly organized and easy to follow. It begins with an explanation of karst and caves, and how they interact with their surroundings and with the hydrologic and geologic history of their surrounding area. The basic concepts of karst hydrology are covered, with the aid of simple flow equations. Methods of quantifying drainage patterns are introduced, such as dye tracing and discharge measurements, which clarify how water moves underground through soluble rock. Processes of limestone and silicate dissolution are described, along with the effects of rock structure on cave patterns. Nomenclature classifying cave systems is discussed, along with distinctions between shallow and deep cave-forming processes. Caves used as type examples include newly discovered systems in remote parts of the world. Processes of shallow vs. deep cave development are introduced, as well as caves in non-carbonate rock types such as gypsum and volcanic rock. Geologic control of cave passages is also mentioned.

The various types of cave deposits are described, including both speleothems and sediments, including ways to extract hydrologic information from them. Recent advancements in dating techniques are summarized, showing how much older many caves and karst landscapes are than previously thought. Climate studies have centered on speleothems, mainly through analysis of isotopes. The Nullarbor Plain of Australia is used as an example of how the analysis of speleothems can aid in the interpretation of environmental history.

The latter half of the book centers on the human use of caves and cave life. An overview of cave ecology is given describing cave life and their interactions, indicating how energy flows in the system. Threats to cave life are described such as White-Nose Syndrome and there is a discussion about the benefit of karst as a CO_2 sink. A chapter deals with cave archaeology detailing the prehistoric uses of caves and describing deposits of human bones. The possible migratory pathways for modern humans out of Africa are outlined, as well as the age ranges for the presence of major hominin groups such as Neandertals and modern humans. Cave deposits are discussed showing how different environments can help to preserve occupation sites. Liang Bua in Indonesia is used as an example of how cave sediment was used to date the remains of early diminutive humans. The many varied uses of caves are noted, such as mines, storage areas, religious sites, shelters, including modern homes that often make use of the cave's constant temperature and humidity. Two of the later chapters concentrate on cave management that other authors usually deal with in a separate book. Many of the concerns of how to manage a cave are addressed, citing present views that have improved past practices. Examples include cave lighting, cave tours, physical alteration of the cave, impact of visitors, and cave rescues. The management of the Gunung Mulu World Heritage site in Sarawak, Malaysia is used as an example of a thoughtfully managed commercial cave area. It is used as a model for sustainable development, balancing commercial interests with consideration for the local people, the biology and protecting the natural physical attractions. Since caves are intimately connected to the overlying karst, catchment management is also covered. Such problems as contamination, changes in drainage or soil cover are discussed. This leads to how to assess vulnerability and where to find

guidelines for cave and karst protection. The final chapter details how we document caves so that we know what we are protecting and its importance. Such innovations as 3-D laser scanning now make it possible to document a cave in blistering detail. Mapping caves and karst in the World Heritage site, Gunung Mulu National Park, is used as an example.

Diagrams are sharp and clearly designed, and many use color for greater clarity. Cave maps that are greatly reduced have fonts that are small but readable. Photos vary greatly in quality. Many, mainly the older ones, have lost their original clarity, mainly because of considerable color shift with time.

This book should appeal to students as an excellent introduction to caves and karst. It's coverage of many aspects of the field will interest cavers who want to know more about what they are crawling through. It should be valuable to anyone who is responsible for managing karst features in general, not only caves. The wide range of topics presents a broad overview without getting bogged down in detail, while still retaining the essential information.

Reviewed by Arthur N. Palmer (NSS 4059) and Margaret V, Palmer (NSS 23685), 619 Winney Hill Rd., Oneonta, NY 13820, April 30, 2022.