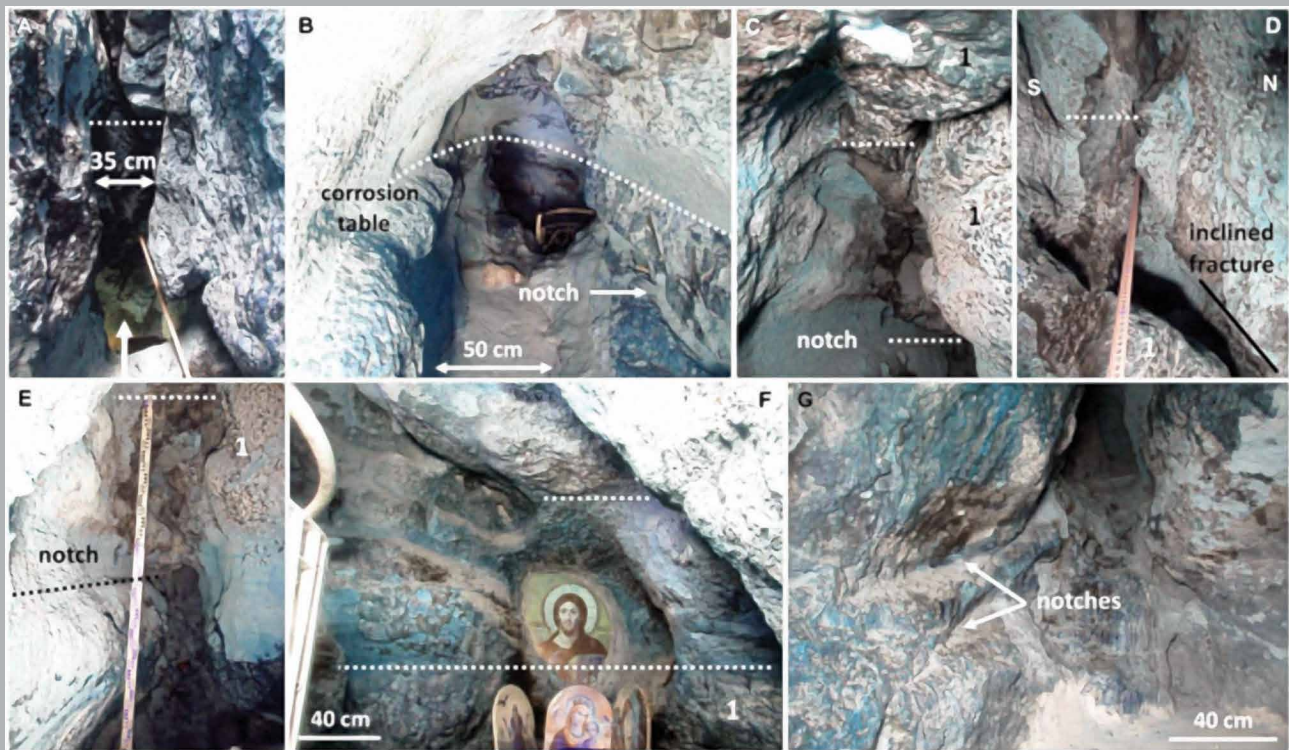


# JOURNAL OF CAVE AND KARST STUDIES

December 2022  
Volume 84, Number 4  
ISSN 1090-6924  
A Publication of the National  
Speleological Society



DEDICATED TO THE ADVANCEMENT OF SCIENCE,  
EDUCATION, EXPLORATION, AND CONSERVATION

**Published By  
The National Speleological Society**

<http://caves.org/pub/journal>

**Office**

6001 Pulaski Pike NW  
Huntsville, AL 35810 USA  
Tel:256-852-1300  
nss@caves.org

**Editor-in-Chief  
Malcolm S. Field**

Washington, DC  
703-347-8601  
field.malcolm1@gmail.com

**Production Editor  
Scott A. Engel**

Knoxville, TN  
225-281-3914  
saecaver@gmail.com

**Copyeditor  
Bert Ashbrook**

caving.ashbrook@comcast.net

The *Journal of Cave and Karst Studies*, ISSN 1090-6924, CPM Number #40065056, is a multi-disciplinary, refereed journal published four times a year by the National Speleological Society. The *Journal* is available by open access on its website, or check the website for current print subscription rates. Back issues are available from the NSS office.

POSTMASTER: send address changes to the National Speleological Society Office listed above.

The *Journal of Cave and Karst Studies* is covered by the following ISI Thomson Services Science Citation Index Expanded, ISI Alerting Services, and Current Contents/Physical, Chemical, and Earth Sciences.

Copyright © 2022  
by the National Speleological Society, Inc.

**BOARD OF EDITORS**

**Anthropology**

**George Crothers**  
University of Kentucky  
Lexington, KY  
george.crothers@utk.edu

**Conservation-Life Sciences**

**Julian J. Lewis & Salisa L. Lewis**  
Lewis & Associates, LLC.  
Borden, IN  
lewisbioconsult@aol.com

**Earth Sciences**

**Benjamin Schwartz**  
Texas State University  
San Marcos, TX  
bs37@txstate.edu

**Yongli Gao**

University of Texas at San Antonio  
yongli.gao@utsa.edu

**Mario Parise**

University Aldo Moro  
Bari, Italy  
mario.parise@uniba.it

**Carol Wicks**

Louisiana State University  
Baton Rouge, LA  
cwicks@lsu.edu

**Exploration**

**Paul Burger**

National Park Service  
Eagle River, Alaska  
paul\_burger@nps.gov

**Microbiology**

**Sarah Keenan**

South Dakota School of Mines and Technology  
Rapid City, SD  
Sarah.Keenan@sdsmt.edu

**Paleontology**

**Greg McDonald**

National Park Service  
Fort Collins, CO  
greg\_mcdonald@nps.gov

**Social Sciences**

**Joseph C. Douglas**

Volunteer State Community College  
Gallatin, TN  
615-230-3241  
joe.douglas@volstate.edu

**Book Reviews**

**Arthur N. Palmer & Margaret V Palmer**

State University of New York  
Oneonta, NY  
palmeran@oneonta.edu

Front Cover: Saint Anthony Cave. See Fahim in this issue.

## GUIDE TO AUTHORS

The *Journal of Cave and Karst Studies* is a multidisciplinary journal devoted to cave and karst research. The *Journal* is seeking original, unpublished manuscripts concerning the scientific study of caves or other karst features. Authors do not need to be members of the National Speleological Society, but preference is given to manuscripts of importance to North American speleology.

**LANGUAGES:** The *Journal of Cave and Karst Studies* uses American-style English as its standard language and spelling style, with the exception of allowing a second abstract in another language when room allows. In the case of proper names, the *Journal* tries to accommodate other spellings and punctuation styles. In cases where the Editor-in-Chief finds it appropriate to use non-English words outside of proper names (generally where no equivalent English word exist), the *Journal* italicizes them. However, the common abbreviations i.e., e.g., et al., and etc. should appear in roman text. Authors are encouraged to write for our combined professional and amateur readerships

**CONTENT:** Each paper will contain a title with the authors' names and addresses, an abstract, and the text of the paper, including a summary or conclusions section. Acknowledgments and references follow the text. Manuscripts should be limited to 6,000 words and no more than 10 figures and 5 tables. Larger manuscripts may be considered, but the *Journal* reserves the right to charge processing fees for larger submissions.

**ABSTRACTS:** An abstract stating the essential points and results must accompany all articles. An abstract is a summary, not a promise of what topics are covered in the paper.

**STYLE:** The *Journal* consults The Chicago Manual of Style on most general style issues.

**REFERENCES:** In the text, references to previously published work should be followed by the relevant author's name and date (and page number, when appropriate) in brackets. All cited references are alphabetical at the end of the manuscript with senior author's last name first, followed by date of publication, title, publisher, volume, and page numbers. Geological Society of America format should be used (see [http://www.geosociety.org/documents/gsa/pubs/GSA\\_RefGuide\\_Examples.pdf](http://www.geosociety.org/documents/gsa/pubs/GSA_RefGuide_Examples.pdf)). Please do not abbreviate periodical titles. Web references are acceptable when deemed appropriate. The references should follow the style of: Author (or publisher), year, Webpage title: Publisher (if a specific author is available), full URL (e.g., <http://www.usgs.gov/citguide.html>), and the date the website was accessed in brackets. If there are specific authors given, use their name and list the responsible organization as publisher. Because of the ephemeral nature of websites, please provide the specific date. Citations within the text should read: (Author, Year).

**SUBMISSION:** Manuscripts are to be submitted via the PeerTrack submission system at <http://www.edmgr.com/jcks/>. Instructions are provided at that address. At your first visit, you will be prompted to establish a login and password, after which you will enter information about your manuscript and upload your manuscript, tables, and figure files. Manuscript files can be uploaded as DOC, WPD, RTF, TXT, or LaTeX. Note: LaTeX files should not use any unusual style files; a LaTeX template and BiBTeX file may be obtained from the Editor-in-Chief. Table files can be uploaded as DOC, WPD, RTF, TXT, or LaTeX files and figure files can be uploaded as TIFF, AI, EPS, or CDR files. Extensive supporting data may be placed on the *Journal's* website as supplemental material at the discretion of the Editor-in-Chief. The data that are used within a paper must be made available upon request. Authors may be required to provide supporting data in a fundamental format, such as ASCII for text data or comma-delimited ASCII for tabular data.

**DISCUSSIONS:** Critical discussions of papers previously published in the *Journal* are welcome. Authors will be given an opportunity to reply. Discussions and replies must be limited to a maximum of 1000 words and discussions will be subject to review before publication. Discussions must be within 6 months after the original article appears.

**MEASUREMENTS:** All measurements will be in Systeme Internationale (metric) except when quoting historical references. Other units will be allowed where necessary if placed in parentheses and following the SI units.

**FIGURES:** Figures and lettering must be neat and legible. Figure captions should be on a separate sheet of paper and not within the figure. Figures should be numbered in sequence and referred to in the text by inserting (Fig. x). Most figures will be reduced, hence the lettering should be large. Photographs must be sharp and high contrast. Figures must have a minimum resolution of 300 dpi for acceptance. Please do not submit JPEG images.

**TABLES:** See <http://caves.org/pub/journal/PDF/Tables.pdf> to get guidelines for table layout.

**COPYRIGHT AND AUTHOR'S RESPONSIBILITIES:** It is the author's responsibility to clear any copyright or acknowledgement matters concerning text, tables, or figures used. Authors should also ensure adequate attention to sensitive or legal issues such as land owner and land manager concerns or policies and cave location disclosures.

**PROCESS:** All submitted manuscripts are sent out to at least two experts in the field. Reviewed manuscripts are then returned to the author for consideration of the referees' remarks and revision, where appropriate. Revised manuscripts are returned to the appropriate Associate Editor who then recommends acceptance or rejection. The Editor-in-Chief makes final decisions regarding publication. Upon acceptance, the senior author will be sent one set of PDF proofs for review. Examine the current issue for more information about the format used.

# Journal of Cave and Karst Studies

Volume 84 Number 4 December 2022

## CONTENTS

### Article

Saint Anthony Cave: Morphology, Genesis, and Age of One of the Oldest Religious Shrines, Southern Galala Plateau, Eastern Desert, Egypt

*Wafaa Khalaf Fahim*

105

### Article

Consequences of the Global Climate Crisis on the Cave Beetle *Darlingtonia kentuckensis* Valentine Based on Thermal Tolerance and Dehydration Resistance

*A.S. Apostolopoulos and T. Keith Philips*

119

Visit us at [www.caves.org/pub/journal](http://www.caves.org/pub/journal)