FORENSIC SCIENCE INTERNATIONAL: SYNERGY
An international open access journal showcasing the most cutting-edge interdisciplinary research and policy and management analysis.

TABLE OF CONTENTS
• Description p.1  
• Abstracting and Indexing p.2  
• Editorial Board p.2  
• Guide for Authors p.5

DESCRIPTION

Forensic Science International: Synergy is a gold open access journal - the first ever gold open access journal in forensic science - which welcomes significant and insightful cross-disciplinary research. The journal's aim is to advance and support forensic science while exceeding its expectations for excellence. By being freely available to anyone, we seek to promote and support open discourse across diverse areas of interest, avocation, and geography. Papers are invited from all forensic sciences and influencing disciplines, including but not limited to the humanities, biomedical sciences, life sciences, social sciences, and the law. Cross-disciplinary collaboration promotes innovative approaches, encourages systems-level perspectives, and seeds the literature with insightful opportunities.

Because the good management of science can be as important as the science itself, the journal welcomes articles on issues related to forensic science policy and management. Management, human resources, economic studies, policy implications of new methods or technology, and any other work intended to improve the effectiveness, efficiency, quality, and operations of forensic science laboratories as well as to the education and training of forensic scientists. In addition, the journal welcomes manuscripts on the governmental and institutional policies that affect the practice and management of forensic science.

Our goal is to publish quality work quickly so that information and results that have the potential to affect the public or a criminal justice system can be distributed, discussed, and incorporated into future research or applications. We will consider the following types of manuscripts:

Case Reports
Original Research (Regular Articles)
Perspective Pieces (Invitation Only)
Practitioner/Technical Notes
Review Articles

Forensic science is central to modern criminal justice systems. It supports investigations, demonstrates associations between people, places, and things involved in criminal activity, and exonerates the innocent. Forensic services are sciences integral to a just society governed through rule of law, it is unarguably a public good and should be accessible to anyone. Transparency is key to good science, rational governance, and equitable justice.
Forensic Science International: Synergy adheres to strict ethical publication guidelines and actively supports a culture of inclusive and representative publication. For any submission enquiries, please contact the Editor-in-Chief.


ABSTRACTING AND INDEXING

PubMed Central
National Criminal Justice Reference Service
Directory of Open Access Journals (DOAJ)
Scopus

EDITORIAL BOARD

Editor-in-Chief
Max Houck, Florida International University, Global Forensic and Justice Center, Miami, Florida, United States of America
Areas of Expertise - Forensic Science, Ethics, Management, Leadership, Philosophy of Science

Senior Editors
Bobbie KK Cheung, Hong Kong Government Laboratory, Ho Man Tin, Hong Kong
Areas of Expertise: Crime Scene Investigation; Fire Investigation; Trace Evidence; Forensic Policy and Management

Ruth Morgan, University College London, London, England, United Kingdom
Areas of Expertise: Traces; Interpretation of Evidence; Forensic Science Knowledge; Science in Policy; Science in Practice

Associate Editors
Angeline Tiong-Whei Yap, Health Sciences Authority, Singapore, Singapore
Areas of Expertise: Forensic Science; Illicit Drugs; New Psychoactive Substances

Amritpal Kaur Myrna Kalsi, Independent Forensic Specialist, Nairobi, Kenya
Areas of Expertise: Forensic Odontology; Disaster Victim Identification; Science Diplomacy; Forensic Cooperation and Sustainable Development

Kizzie Shako, Vunja Kimya Foundation, Clinical Forensic Medicine, Division of Forensic Services, Ministry of Health and Forensic Specialist, Nairobi, Kenya
Areas of Expertise: Forensic Medicine; Sexual Assault; Science Diplomacy; Forensic Cooperation and Sustainable Development; Forensic Policy

Editorial Board
Maurice Aalders, University of Amsterdam, Amsterdam, Netherlands
Areas of Expertise: Forensic Biophysics; Forensic Chemistry; Trace Evidence; Fingermarks; Spectroscopy

Mubarak A. Bidmos, Qatar University, Doha, Qatar
Areas of Expertise: Forensic Anthropology; Sex Estimation; Stature Reconstruction

Rebecca Bucht, National Bureau of Investigation, Vantaa, Finland
Areas of Expertise: Forensic Decision Making; Cognitive Forensics and Human Factors; Terrorism

Ángel Carracedo Álvarez, University of Santiago de Compostela Luis Concheiro Institute of Forensic Science, Santiago de Compostela, Galicia, Spain
Areas of Expertise: Forensic Genetics; Forensic Genotyping; Population Genetics

Cristina Cattaneo, University of Milan Faculty of Medicine and Surgery, Milan, Italy
Areas of Expertise, Forensic Anthropology, Forensic Odontology, Forensic Medicine, Humanitarian Forensics

Jason Chin, University of Sydney, School of Law, Sydney, New South Wales, Australia
Areas of Expertise - Law, Expert Evidence, Forensic Science, Social Psychology, Metascience, Open Science

Glinda Cooper, Innocence Project, New York, New York, United States of America
Areas of Expertise: Research Methodology; Statistics/Statistical Analysis; Cognitive Bias in Forensics

Donatella Curtotti, University of Foggia, Foggia, Italy
Areas of Expertise: Jurisprudence; Criminalistics; Crime Scene Investigation

Matthew DeLisi, Iowa State University Department of Sociology, Ames, Iowa, United States of America
Areas of Expertise, Criminology, Criminal Justice, Developmental Psychopathology, Psychopathy

Maria Corazon A. De Ungria, University of the Philippines Diliman Natural Sciences Research Institute DNA Analysis Laboratory, Quezon City, Philippines
Areas of Expertise: Forensic Genetics; Biobanking; Ethics

Helen Earwaker, University of Portsmouth, Portsmouth, United Kingdom
Areas of Expertise: Forensic Decision Making; Fingerprints; Trace Evidence

Haoliang Fan, Southern Medical University, Guangzhou, Guangdong, China
Areas of Expertise: Forensic Genetics; Population Genetics; Microhaplotypes; Microbiomes

Oran Finegan, International Committee of the Red Cross, Switzerland
Areas of Expertise - Forensic Anthropology, Humanitarian Forensics, Forensic Policy and Management

Luis Fondevbrider, Argentine Forensic Anthropology Team Buenos Aires, Buenos Aires, Argentina
Areas of Expertise: Forensic Anthropology; Humanitarian Forensics; Forensic Archaeology

Sally Gamble, Defence Science and Technology Laboratory, Salisbury, England, United Kingdom
Areas of Expertise: Environmental Forensics; Forensic Ecology; Trace Evidence

Matthew Gamette, Idaho State Police Bureau of Forensic Services, Meridian, Idaho, United States of America
Areas of Expertise: Forensic Science Leadership and Management; Forensic DNA Analysis; Forensic Crime Scene Analysis; Forensic Science Policy and Legislation

Graeme Horsman, Teesside University, Middlesbrough, United Kingdom
Areas of Expertise: Digital Forensics; Computer Forensics; Mobile Forensics; Anonymous Communication Services

Ping Huang, Academy of Forensic Science, Shanghai, China
Areas of Expertise: Forensic Pathology; Postmortem Imaging; Cause of Death; Forensic Spectroscopy; Postmortem Intimation Estimation

Christian Jackowski, University of Bern Institute of Forensic Medicine, Bern, Switzerland
Areas of Expertise: Forensic Pathology; Forensic Imaging; Forensic Radiology; Physics and Biomechanics, Traffic Medicine

Roberta Julian, University of Tasmania, Hobart, Australia
Areas of Expertise: Forensic Science Management and Policy; Forensic Contexts; Criminology; Research Methodologies

Xavier Laroch, United Nations Investigative Team to Promote Accountability of Crimes Committed by Da'esh-ISIS, Baghdad, Iraq
Areas of Expertise: Humanitarian Forensics; Legal Contexts of Forensic Science; International Criminal Law; Terrorism

Simon Lewis, Curtin University, Perth, Western Australia, Australia
Areas of Expertise: Forensic Chemistry; Fingerprints; Trace Evidence

Michael Liebrenz, University of Bern Institute of Forensic Medicine, Bern, Switzerland
Areas of Expertise, Forensic Psychiatry, Addiction Medicine, Legal Contexts of Forensic Psychiatry and Forensic Psychology, ADHD

Chao Liu, Guangzhou Forensic Science Institute, Guangzhou, Guangdong, China
Areas of Expertise: Forensic Genetics; Diatoms; DNA Sequencing

Bertrand Ludes, Forensic Institute of Paris, Paris, France
Areas of Expertise: Clinical Forensic Medicine; Human DNA Profiling; Diatoms; Forensic Anthropology; Terrorism

Yaping Luo, Peking University, Beijing, China
Areas of Expertise: Ballistics; Fingermarks; Toolmarks; Footmarks

Christopher Maguire, ForGenetica Consultants Ltd, Wetherby, United Kingdom
Areas of Expertise: Forensic Genetics; DNA Profiling; Disaster Victim Identification; Forensic Science Management and Policy; Research Methodologies

Carole McCartney, Northumbria University, Newcastle Upon Tyne, United Kingdom
Areas of Expertise: Criminal Law and Evidence; Criminal Justice; Forensic Evidence; Biometrics; Miscarriages of Justice

Judy Melinek, PathologyExpert, Inc., San Francisco, California, United States of America
Areas of Expertise: Forensic Imaging; Forensic Pathology; Medical Examination

José Vicente Pachar Lucio, Institute of Legal Medicine and Forensic Sciences, Catalina, Panama
Areas of Expertise: Forensic Medicine; Disaster Management; Forensic Pathology
Luke Rodda, San Francisco Office of the Chief Medical Examiner, San Francisco, United States of America
Areas of Expertise: Forensic Toxicology; Analytical Chemistry; Novel Psychoactive Substances

Francesco Saverio Romolo, University of Bergamo, Bergamo, Italy
Areas of Expertise: Forensic Toxicology; Drug Abuse; Explosives; Gunshot Residue; New Psychoactive Substances

Jeri Ropero-Miller, RTI International’s Center for Forensic Sciences, Durham, North Carolina, United States of America
Areas of Expertise: Clinical Chemistry; Forensic Chemistry; Forensic Toxicology

Kirstie Scott, Liverpool John Moores University, Liverpool, United Kingdom
Areas of Expertise: Forensic Ecology; Trace Evidence; Forensic Geoscience; Environmental Analysis

Vishal Sharma, Panjab University, Chandigarh, India
Areas of Expertise: Forensic Chemistry; Analytical Chemistry; Molecular Spectroscopy; Questioned Documents; Fingerprint Sensing

Paul Speaker, West Virginia University, Morgantown, West Virginia, United States of America
Areas of Expertise: Forensic Laboratory Financial Management; Corporate Finance; Econometrics; Public Sector Financial Management

Henry Swofford, HJS Consulting LLC, Arlington, Virginia, United States of America
Areas of Expertise: Friction Ridge Examination; Forensic Interpretation; Forensic Statistics; Quality Assurance; Forensic Administration and Management

Christopher Kiu-Choong Syn, Health Sciences Authority, Singapore, Singapore
Areas of Expertise: Genetics; STR Profiling; SNPs; Mitochondrial DNA

Tony Tessarolo, Ontario Centre of Forensic Sciences, Toronto, Ontario, Canada
Areas of Expertise: DNA Testing; Forensic Biology; Forensic Policy and Management; Forensic Serology

Elisabeth Williams, Swansea University, Swansea, United Kingdom
Areas of Expertise: Forensic Biomechanics; Crime Scene Investigation; Blood Patterns

Jian Zhao, Guangzhou Forensic Science Institute, Guangzhou, Guangdong, China
Areas of Expertise: Forensic Medicine; Drowning; Diatoms; Crime Scene Investigation
GUIDE FOR AUTHORS

Your Paper Your Way
We now differentiate between the requirements for new and revised submissions. You may choose to submit your manuscript as a single Word or PDF file to be used in the refereeing process. Only when your paper is at the revision stage, will you be requested to put your paper in to a 'correct format' for acceptance and provide the items required for the publication of your article.
To find out more, please visit the Preparation section below.

INTRODUCTION

Types of article
Original Research Articles (Regular Papers) Review Articles Case Reports Perspectives and Opinions (Invited only) Technical Notes

Original Research Articles generally present the outcomes of original and methodologically sound scientific investigations. Articles in FSI Synergy require an extensive description of the study aims, research methods, and findings. The journal also accepts papers in this category which have a legal or social science focus; for example, articles which offer an in-depth discussion of a particular legislative, legal, or philosophical theory.

Review Articles can be either systematic or narrative reviews. Systematic Review papers presenting exhaustive, critical assessments of the published literature on relevant topics or questions will be considered.
Whilst no formal protocols for narrative reviews are mandated in FSI Synergy, authors should be very clear in what criteria they have used for the selection of studies and describe the methods used to undertake the review in the body of the paper.

Case Reports will be accepted only if they contain some important new information for the readers.

Perspectives and Opinions are by invite only and should comment on a current or persistent ‘hot topic’ or focus on a debate affecting forensic science in a specific discipline or geographical region. They do not necessarily report the outcomes of scientific investigations and do not necessarily include original data. Perspectives pieces may include a call to action or address a policy issue; they are intended to stimulate or continue debate. With this in mind, responses to Perspectives pieces are welcomed by the journal and the original author always gets right of reply. Abstracts are optional and peer reviewers may be externally invited or within the handling editor team. Note: articles published in this section do not necessarily represent the views of the journal or the Editorial Team.

Technical Notes should report new developments, significant advances and novel aspects of experimental and theoretical methods and techniques which are relevant for scientific investigations within the journal scope. Highly detailed and specific technical information can be included as supplemental material.

Contact details for submission
If you are in doubt as to what article type your paper falls into or have a submissions enquiry related to the topic of your paper, please contact the Editor-in-Chief, Dr.Max Houck: mmhouck@forensicintelligence.net

Submission checklist
You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address

All necessary files have been uploaded:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided
• Indicate clearly if color should be used for any figures in print

Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)

Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• All references mentioned in the Reference List are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
• A competing interests statement is provided, even if the authors have no competing interests to declare
• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

BEFORE YOU BEGIN

Ethics in publishing
For information on Publication Ethics and Publication Malpractice, please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Studies in humans and animals

If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The manuscript should be in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals and aim for the inclusion of representative human populations (sex, age and ethnicity) as per those recommendations. The terms sex and gender should be used correctly.

Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

Studies involving experiments with animals must state that their care was in accordance with institution guidelines. All animal experiments should comply with the ARRIVE guidelines and should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

The editors reserve the right to reject papers on ethical grounds, regardless of whether requisite local/national ethical guidelines and approvals have been adhered to and confirmed.

Registration of clinical trials (ICMJE)

Informed consent and patient details
Studies on patients or volunteers require ethics committee approval and informed consent, which should be documented in the paper. Appropriate consents, permissions and releases must be obtained where an author wishes to include case details or other personal information or images of patients and any other individuals in an Elsevier publication. Written consents must be retained by the author but copies should not be provided to the journal. Only if specifically requested by the journal in exceptional circumstances (for example if a legal issue arises) the author must provide copies of the consents or evidence that such consents have been obtained. For more information, please review the Elsevier Policy on the Use of Images or Personal Information of Patients or other Individuals. Unless
you have written permission from the patient (or, where applicable, the next of kin), the personal
details of any patient included in any part of the article and in any supplementary materials (including
all illustrations and videos) must be removed before submission.

**Declaration of competing interest**
All authors must disclose any financial and personal relationships with other people or organizations
that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include
employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/
registrations, and grants or other funding. Authors should complete the declaration of competing
interest statement using this template and upload to the submission system at the Attach/Upload Files
step. **Note: Please do not convert the .docx template to another file type. Author signatures
are not required.** If there are no interests to declare, please choose the first option in the template.
More information.

**Submission declaration and verification**
Submission of an article implies that the work described has not been published previously (except in
the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent
publication' for more information), that it is not under consideration for publication elsewhere, that
its publication is approved by all authors and tacitly or explicitly by the responsible authorities where
the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in
English or in any other language, including electronically without the written consent of the copyright-
holder. To verify originality, your article may be checked by the originality detection service Crossref
Similarity Check.

**Preprints**
Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy.
Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple,
redundant or concurrent publication' for more information).

**Use of inclusive language**
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences,
and promotes equal opportunities. Content should make no assumptions about the beliefs or
commitments of any reader; contain nothing which might imply that one individual is superior to
another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health
condition; and use inclusive language throughout. Authors should ensure that writing is free from bias,
stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek
gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible
to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to
personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health
condition unless they are relevant and valid. These guidelines are meant as a point of reference to
help identify appropriate language but are by no means exhaustive or definitive.

**Systematic reviews and meta-analyses**
Systematic reviews and meta-analyses of randomized controlled trials of studies that evaluate
health care interventions and of observational studies submitted to the Journal must follow the
recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-analysis
(PRISMA) statement. See http://www.prisma-statement.org or BMJ 2009;339:b2535. Reports should
include a flow diagram of study inclusion and exclusion and the abstract headings (Objectives, Data
Sources, Review Methods, Results, Conclusions) as described in the PRISMA guidelines. Systematic
reviews and meta-analyses of diagnostic research should include a methodological assessment,
guided by e.g. the QUADAS-2 tool, an instrument specifically developed for quality assessment of

**Methods of reporting results and case reports**
Reporting of research results, especially regarding methods:
https://www.nih.gov/research-training/rigor-reproducibility/principles-guidelines-reporting-preclinical-research
Care Guidelines for Case Reports: http://www.care-statement.org/resources/checklis

**Author contributions**
For transparency, we encourage authors to submit an author statement file outlining their individual
contributions to the paper using the relevant CRedit roles: Conceptualization; Data curation;
Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources;
Software; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing. Authorship statements should be formatted with the names of authors first and CRediT role(s) following. More details and an example

**Changes to authorship**
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

**Clinical trial results**
In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

**Reporting clinical trials (CONSORT)**
All randomised controlled trials submitted for publication in the Journal should include a completed Consolidated Standards of Reporting Trials (CONSORT) flow chart. Please refer to the CONSORT statement website at http://www.consort-statement.org for more information. Forensic Science International: Synergy has adopted the proposal from the ICMJE which require, as a condition of consideration for publication of clinical trials, registration in a public trials registry. Trials must register at or before the onset of patient enrolment. The clinical trial registration number (ISRCTN) should be included at the end of the abstract of the article. For this purpose, a clinical trial is defined as any research project that prospectively assigns human subjects to intervention or comparison groups to study the cause-and-effect relationship between a medical intervention and a health outcome. Studies designed for other purposes, such as to study pharmacokinetics or major toxicity (e.g. phase I trials) would be exempt. Further information can be found at http://www.icmje.org.

**Article transfer service**
This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

**Elsevier supports responsible sharing**
Find out how you can share your research published in Elsevier journals.

**Role of the funding source**
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

**Open access**
Please visit our Open Access page for more information.

Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.
If you need to comply with your funding body policy you can apply for a CC BY license after your manuscript is accepted for publication.

**Elsevier Researcher Academy**

Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

**Language (usage and editing services)**

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's Author Services.

**Submission**

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

**Referees**

Please submit the names and institutional e-mail addresses of several potential referees. For more details, visit our Support site. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

**PREPARATION**

**NEW SUBMISSIONS**

Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.

As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or layout that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

**References**

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

**Formatting requirements**

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.

If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes. Divide the article into clearly defined sections.

**Peer review**

This journal operates a double anonymized review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the
editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. A disclaimer will be included on each article to that effect. More information on types of peer review.

**Use of word processing software**
It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.
To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

**Article structure**

**Subdivision - numbered sections**
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

**Introduction**
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

**Material and methods**
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

**Theory/calculation**
A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

**Results**
Results should be clear and concise.

**Discussion**
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

**Conclusions**
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

**Appendices**
If there is more than one appendix, they should be identified as A, B, etc. Formulæ and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

**Essential title page information**
- **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulæ where possible.
- **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-
case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

• **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

• **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a ‘Present address' (or 'Permanent address’) may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Highlights**

Highlights are optional yet highly encouraged for this journal, as they increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

**Abstract**

A concise and factual abstract is required, except for papers in the Perspectives and Opinions section, where this is optional. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

**Graphical abstract**

Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.

Authors can make use of Elsevier's Illustration Services to ensure the best presentation of their images and in accordance with all technical requirements.

**Keywords**

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Abbreviations**

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

**Acknowledgements**

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Formatting of funding sources**

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].
It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Units
Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.

Math formulae
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Footnotes
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

Artwork
Image manipulation
Whilst it is accepted that authors sometimes need to manipulate images for clarity, manipulation for purposes of deception or fraud will be seen as scientific ethical abuse and will be dealt with accordingly. For graphical images, this journal is applying the following policy: no specific feature within an image may be enhanced, obscured, moved, removed, or introduced. Adjustments of brightness, contrast, or color balance are acceptable if and as long as they do not obscure or eliminate any information present in the original. Nonlinear adjustments (e.g. changes to gamma settings) must be disclosed in the figure legend.

Electronic artwork
General points
- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.
- Ensure that color images are accessible to all, including those with impaired color vision.

A detailed guide on electronic artwork is available. You are urged to visit this site; some excerpts from the detailed information are given here. Formats
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format. Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
- EPS (or PDF): Vector drawings, embed all used fonts.
- TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
- TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
- TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.
Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionately large for the content.

Color artwork

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF) or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites). Further information on the preparation of electronic artwork.

Illustration services

Elsevier's Author Services offers Illustration Services to authors preparing to submit a manuscript but concerned about the quality of the images accompanying their article. Elsevier's expert illustrators can produce scientific, technical and medical-style images, as well as a full range of charts, tables and graphs. Image 'polishing' is also available, where our illustrators take your image(s) and improve them to a professional standard. Please visit the website to find out more.

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Reference links

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.
Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
Reference to a journal publication with an article number:
Reference to a book:
Reference to a chapter in an edited book:
Reference to a website:
Reference to a dataset:
Reference to software:

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video
Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file’s content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.
**Data visualization**
Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

**Supplementary material**
Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

**Research data**
This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

**Data in Brief**
You have the option of converting any or all parts of your supplementary or additional raw data into a data article published in *Data in Brief*. A data article is a new kind of article that ensures that your data are actively reviewed, curated, formatted, indexed, given a DOI and made publicly available to all upon publication (watch this video describing the benefits of publishing your data in *Data in Brief*). You are encouraged to submit your data article for *Data in Brief* as an additional item directly alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to *Data in Brief* where it will be editorially reviewed, published open access and linked to your research article on ScienceDirect. Please note an open access fee is payable for publication in *Data in Brief*. Full details can be found on the *Data in Brief* website. Please use this template to write your *Data in Brief* data article.

**AFTER ACCEPTANCE**

**Proofs**
One set of page proofs (as PDF files) will be sent by e-mail to the corresponding author (if we do not have an e-mail address then paper proofs will be sent by post) or a link will be provided in the e-mail so that authors can download the files themselves. To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. Elsevier now provides authors with PDF proofs which can be annotated; for this you will need to download the free Adobe Reader, version 9 (or higher). Instructions on how to annotate PDF files will accompany the proofs (also given online). The exact system requirements are given at the Adobe site.

If you do not wish to use the PDF annotations function, you may list the corrections (including replies to the Query Form) and return them to Elsevier in an e-mail. Please list your corrections quoting line number. If, for any reason, this is not possible, then mark the corrections and any other comments (including replies to the Query Form) on a printout of your proof and scan the pages and return via e-mail. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. We will do everything possible to get your article published quickly and accurately. It is important to ensure that all corrections are sent back to us in one communication: please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.
AUTHOR INQUIRIES
Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch. You can also check the status of your submitted article or find out when your accepted article will be published.

© Copyright 2018 Elsevier | https://www.elsevier.com