DESCRIPTION

*Environment International* is a multi-disciplinary journal publishing high quality information in a wide range of environmental disciplines.

From January 2019 *Environment International* will become an open access journal. Authors who publish in *Environment International* will be able make their work immediately, permanently, and freely accessible. *Environment International* authors will pay an article publishing charge (APC), have a choice of license options, and retain copyright to their published work.

*Environment International* continues with the same aims and scope, editorial team, submission system and rigorous peer review.

*Environment International* authors will pay an article publishing charge (APC), have a choice of license options, and retain copyright to their published work. The APC will be requested after peer review and acceptance and will be required for all accepted articles submitted after October 12th. The introductory APC for Environment International in 2019 is US$1,750 (excluding taxes).

*Please note*: Authors who have submitted papers before October 12th will have their accepted paper published in *Environment International* at no charge. Authors submitting papers after this date will be requested to pay the APC.

For full information on publishing your paper open access in *Environment International*, visit the journal’s open access information page and guide for authors, or visit our FAQs page.

AUDIENCE

Environmental scientists, ecotoxicologists, environmental chemists, environmental health specialists, environmental regulators, ecologists, biologists, hydrologists, geologists, marine and atmospheric scientists.

IMPACT FACTOR

2017: 7.297 © Clarivate Analytics Journal Citation Reports 2018
ABSTRACTING AND INDEXING

Research Alert
EMBASE
MEDLINE®
Elsevier BIOBASE
Environmental Periodicals Bibliography
ABI/Inform
Current Contents
Science Citation Index
Energy Data Base
Energy Research Abstracts
Scopus

EDITORIAL BOARD

Co-Editors-in-Chief:
Adrian Covaci, University of Antwerp, Wilrijk, Belgium
Mark Nieuwenhuijsen, Instituto de Salud Global Barcelona (ISGlobal), Barcelona, Spain
Zhen (Jason) He, Virginia Tech, Blacksburg, Virginia, USA
Yongguan Zhu, Chinese Academy of Sciences (CAS), Beijing, China

Outgoing Editor-in-Chief:
Ruth Alcock, Lancaster University, Lancaster, England, UK

Special Issue Editor:
Da Chen, Jinan University, Gangzhou, China

Associate Editors:

Environmental Chemistry & Health, Risk Assessment
Lesa Aylward, Summit Toxicology, LLP, Falls Church, Virginia, USA
Toxicokinetics, chemical risk assessment; pharmacokinetic modeling and data in the assessment of toxicity, exposure, and risk

Olga-Ioanna Kalantzi, University of the Aegean, Mytilene, Greece
Environmental Chemistry, Analytical Chemistry, Persistent Organic Pollutants, Emerging Contaminants, Ecotoxicology, Environmental Health, Children’s Health, Environmental Epidemiology

Marti Nadal, Universitat Rovira i Virgili, Reus, Catalonia, Spain
Heavy metals, Persistent Organic Pollutants, Polycyclic aromatic hydrocarbons, Emerging Pollutants, Human exposure, Health risk assessment, Waste management, Food toxicity, Dietary intake, Environmental monitoring, In-silico tools, Environmental toxicology

Heather Stapleton, Duke University, Durham, North Carolina, USA
Environmental Chemistry, Human Exposure, Children’s Environmental Health, Metabolism and Biotransformation, Halogenated Persistent Pollutants, Endocrine Disruptors, Flame Retardant Use & Exposure, In Vitro Assays for Thyroid Disruption.

Environmental Processes, Quality, Toxicology & Microbiology
Hefa Cheng, Peking University, China
Environmental geochemistry; Heavy metals; Environmental monitoring; Health risk assessment; Food safety; Soil pollution; Waste management; Environmental transport and fate of pollutants; Waste treatment and disposal

Frederic Coulon, Cranfield University, Cranfield, Bedfordshire, England, UK
Remediation, hazardous waste, water and wastewater treatment; Risk assessment and remediation; Bioaerosols; Hydrocarbons; Environmental microbiology; Antarctic science

Environmental Technology
Thanh Huong (Helen) Nguyen, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA
Water and food safety; Disinfection; Water distribution system; Hydroponics; Aquaponics

Guo-Ping Sheng, University of Science and Technology of China (USTC), Hefei, China
Biological wastewater treatment; Water reuse technique

Public Health, Environmental Epidemiology & Health Impact Assessment
Hanna Boogaard, Health Effects Institute, Boston, Massachusetts, USA
Air pollution epidemiology; Exposure assessment; Accountability research; Systematic reviews

Zorana Jovanovic Andersen, University of Copenhagen, Copenhagen, Denmark

Xavier Querol, Consejo Superior de Investigaciones Científicas (CSIC), Barcelona, Spain

Environmental geochemistry; Air quality; Atmospheric aerosols; Tropospheric ozone; Black carbon; Ultrafine particles; Metals; Organic pollutants; Inorganic gaseous pollutants, NO2, NO, NOx, SO2, SO3, CO, NH3; Source apportionment; Urban and regional pollution; Atmosphere and climate change; Air quality policy; Mobile, industrial, domestic and agricultural emissions of air pollutants; Leaching of industrial wastes; Impact of mining on environment; Recycling of industrial wastes; Coal use related pollution

Associate Editor – Reviews

Robert Letcher, National Wildlife Research Center, Ottawa, Ontario, Canada

Organohalogen pollutants, Environmental Chemistry, Analytical and Bioanalytical Chemistry, Ecological Chemistry, Ecotoxicology, Metabolism and Biotransformation, Biomarkers, Endocrine Disruption, Marine and Freshwater, Wildlife and Ecosystems, Arctic

Associate Editor – Systematic Reviews

Paul Whaley, Lancaster University, Lancaster, England, UK

Editorial Board:

Sara Adar, University of Michigan, Ann Arbor, Michigan, USA

Air pollution; Particulate matter; Environmental epidemiology; Exposure assessment; Cardiovascular disease

Trini Angelidaki, Danmarks Tekniske Universitet (DTU), Kgs. Lyngby, Denmark

Bioenergy; Biorefineries; Biogas; Biofuels; Bioproducts; Fermentation; Microbial ecology; Algae; Biomass; Microbial electrochemistry; Industrial biotechnology

Largus Angenent, University Tuebingen

Open-culture biotechnology; Power-to-gas; Anaerobic fermentation; Extracellular electron transfer; Bolelectrochemical systems; Chain elongation; Syngas fermentation; Caproic acid; Caprylic acid; Carboxylate platform

Atsuko Araki, Hokkaido University, Sapporo, Japan

Environmental Health; Exposure and Risk Assessment; Birth oshort; Environmental Chemicals (POPs, Phthalates, bisphenols); SNPs and epigenetics; Indoor Environment

Richard Atkinson, St George’s, University of London, London, England, UK

Air pollution epidemiology; Cohort studies; Time series studies; Systematic review; Meta-analysis; Medical statistics

Damià Barceló, Consejo Superior de Investigaciones Científicas (CSIC), Barcelona, Spain

Environmental analysis; Water and soil quality; Organic mass spectrometry; Emerging organic contaminants; Nanomaterials; Biosensors for: Analysis, Fate and Risk of Emerging Pollutants such as Pharmaceuticals and Nanomaterials in the Environment Water Pollution Control and Protection Bridging analytical chemistry with ecotoxicology- toxicity identification; Evaluation techniques used: GC and LC tandem MS, biosensors, sample preparation, automated on-line techniques for water analysis environmental samples (water, including marine waters, sediments soils, biota samples)

Linda Birnbaum, National Institute of Environmental Health Sciences (NIEHS), North Carolina, USA

Environmental Toxicology, Dioxin, Endocrine Disruptors, BPAs, Flame Retardants

Julian Blasco, Instituto de Ciencias Marinas de Andalucía (CSIC), Puerto Real (Cádiz), Spain

Metals; Pharmaceuticals; Nanoparticles; Pollution; Ecotoxicology; Risk assessment; Seawater; Sediment

Michael Bloom, University at Albany, SUNY, Rensselaer, New York, USA

Environmental Epidemiology; Reproductive Epidemiology; Endocrine Disruptors

Bin Cao, Nanyang Technological University, Singapore, Singapore

Andrea Capodaglio, Università degli Studi di Pavia, Pavia, Italy

Membrane bioreactors; Microbial Fuel Cells; Microbial Electrolytic Cells; Radiolysis; AOPs; Sustainability; Decentralized Wastewater Treatment; Resources Recovery; Energy Recovery; Nutrients Recovery

Nicole Cardello Deziel, Yale School of Public Health, New Haven, Connecticut, USA

Exposure Science (environmental measurements, biomonitoring, geospatial models); pesticides; persistent organic pollutants; hydraulic fracturing

Corinne Charlier, CHU Sart-Tilman, Liege, Belgium

KyungHo Choi, Seoul National University (SNU), Seoul, The Republic of Korea

Environmental Health, Environmental Toxicology, Exposure and Risk Assessment, Endocrine Disruption, Thyroid Hormones, Reproduction, Ecotoxicology, Persistent Organic Pollutants, Phenolics, Personal Care Products
Angel del Valls, Universidad de Cádiz, Cádiz, Spain
Julio Díaz Jiménez, Instituto de Salud Carlos III, Madrid, Spain
José G. Dórea, University of Brasilia, Brasilia, DF, Brazil
Carlos G. Dosoretz, Technion - Israel Institute of Technology, Haifa, Israel
Raquel Duarte-Davidson, Health Protection Agency, Didcot, Oxon, England, UK
José G. Dórea, University of Brasilia, Brasilia, DF, Brazil
Carlos G. Dosoretz, Technion - Israel Institute of Technology, Haifa, Israel
Raquel Duarte-Davidson, Health Protection Agency, Didcot, Oxon, England, UK
Mingliang Fang, Nanyang Technological University, Singapore, Singapore
Yanzheng Gao, Nanjing Agricultural University, Nanjing, China
Yuming Guo, Monash University, Melbourne, Victoria, Australia
Stuart Harrad, University of Birmingham, Birmingham, England, UK
Gerard Hoek, Universiteit Utrecht, Utrecht, Netherlands
Barbara Hoffmann, Heinrich-Heine-Universität Düsseldorf, Dusseldorf, Germany
Mirna Horvat, Jožef Stefan Institute, Ljubljana, Slovenia
Ching-Hua Huang, Georgia Institute of Technology, Atlanta, Georgia, USA
Xia Huo, Jinan University, Guangzhou, China
Antarpreet Jutla, West Virginia University, Morgantown, West Virginia, USA
Kurunthachalam Kannan, University at Albany, SUNY, Albany, New York, USA
Nancy Bixian Mai, Chinese Academy of Sciences (CAS), Ganzhou, China
Gabriele Ludewig, University of Iowa, Iowa City, Iowa, USA
Len Ma, University of Florida, Gainesville, Florida, USA
Nancy Bixian Mai, Chinese Academy of Sciences (CAS), Ganzhou, China
Gabriele Ludewig, University of Iowa, Iowa City, Iowa, USA
Len Ma, University of Florida, Gainesville, Florida, USA
David Oliver, University of Stirling, Stirling, Scotland, UK
Diffuse microbial pollution from agriculture; modelling & decision support in environmental systems; fate & transfer of human pathogens; recreational water quality

**Spyros G. Pavlostathis**, Georgia Institute of Technology, Atlanta, Georgia, USA
Environmental biotechnology; Bioprocess engineering; Wastewater treatment; Anaerobic digestion; Biotransformation; Bioremediation; Bioenergy and biofuels; Bioelectrochemical systems; Kinetics and modeling

**Nuno Ratola**, Universidade do Porto, Porto, Portugal
Environmental presence and behaviour of legacy and emerging organic contaminants; Biomonitoring and chemical transport of chemicals; Advanced analytical techniques of extraction and quantification; Field sampling campaigns and sample handling protocols; Exposure assessment and prioritisation of relevant compounds; Climate change scenarios

**Benoit Roig**, Université de Nîmes, Nîmes, France
Environmental presence and behaviour of legacy and emerging organic contaminants; Biomonitoring and chemical transport of chemicals; Advanced analytical techniques of extraction and quantification; Field sampling campaigns and sample handling protocols; Exposure assessment and prioritisation of relevant compounds; Climate change scenarios

**Ivan Rusyn**, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA
Gene expression Omics

**Heqing Shen**, Chinese Academy of Sciences (CAS), Xiamen, China
Biological monitoring (Bio-monitoring); Endocrine disrupting chemicals; Human microbiome; Birth cohort; Male fertility; Biomarkers; Epigenetics; OMICS with emphasis toxicometabolomics

**Luis Felipe Silva Oliveira**, Universidad de la Costa (CUC), Barranquilla, Colombia
Nano-technology in Real Samples (in special nanomaterials and advanced electron bean); Soil and water researches; Atmosphere impacts (in special particulate matter)

**Christian Sonne**, Aarhus University, Roskilde, Denmark
Biological effects, environmental chemicals, infectious diseases, climate change, veterinary science, wildlife medicine, predatory mammals, raptorial birds, sea birds, fish, internal organs, reproductive organs, histopathology, morphology, skeletal system, bone density, immune system, endocrinology, PBPK modelling, blood biochemistry, implantation of PTT satellite transmitters, immobilization.

**Massimo Stafoggia**, Lazio Regional Health Service, Rome, Italy
Exposure assessment; statistical methods; air pollution; epidemiology; study design

**Ashlynn S. Stillwell**, University of Illinois at Urbana-Champaign, Urbana, Illinois, USA
Water resources; Energy systems; Policy; Urban water; Sustainability

**Guanyong Su**, Nanjing University of Science and Technology, Nanjing, China
Analytical Chemistry; Ecotoxicology; Molecular Toxicology; Environmental Monitoring; Risk Assessment; Human studies; Organic Contaminates; Flame Retardants; Urinary Biomarkers; Metabolites; Gas Chromatography-Mass Spectrometry (GC-MS); Lipid Chromatography-Mass Spectrometry (LC-MS)

**Phong K. Thai**, University of Queensland, Woolloomooloo, Queensland, Australia
Wastewater analysis; Water quality; Air quality; Air pollution; Environmental monitoring; Environmental health

**Shilu Tong**, Shanghai Jiao Tong University, Shanghai, China
Environmental epidemiology, climate change, planetary health, sustainable development, quantitative risk assessment, spatiotemporal modelling

**Eric D. van Hullebusch**, Institut de Physique du Globe de Paris, Paris, France
Resource Recovery, Solid Waste, Biological wastewater treatment, Bio-hydrometallurgy, Anaerobic Digestion, Biogeochemistry, Critical Elements

**Nicolas M. van Straalen**, Vrije Universiteit Amsterdam, Amsterdam, Netherlands
Exposure assessment, pharmacokinetic modeling, environmental epidemiology, persistent organic pollutants, risk assessment

**Kai Zhang**, University of Texas Health Science Center at Houston (UTHealth), Houston, Texas, USA
Air quality; Built Environment; Climate Change and Health; Environmental and Occupational Epidemiology; Exposure assessment; Exposome; GIS; Urban Health; Statistics
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.

Types of paper
No single format can accommodate all useful contributions to this journal. Five formats are offered, two of which (Reviews and New Developments), fall within the Progress in Environmental Science reviews section:

1. Editorial articles are published by the Editor-in-Chief or other Editors, members of the Editorial Board or invited Guest Editors. These focus attention on contemporary important environmental issues and are designed to stimulate debate and discussion.

2. Research Articles are up-to-date, original papers that present developments in any environmental scientific field. Informative abstracts are required and articles must be fully referenced. Criteria for publication are weighted toward scientific quality and environmental significance. The manuscript will be evaluated on the basis of its conciseness, clarity, and presentation. The work will be assessed according to its originality, scientific merit, and experimental design. Poorly written manuscripts will be returned to the authors with a request to improve the quality of the paper prior to peer review.

3. Correspondence is encouraged. Opinions, perspectives and insight on articles published in Environment International are very welcome.

4. Reviews represent articles that distill recent developments and discuss trends in a particular field of research. They may be of a broader nature than Research Articles, providing accounts of specific fields of interest in relevant research areas related to our Aims and Scope. Authors are encouraged to write in a clear and simple manner so that the article is understandable to readers from a broad cross section of disciplines. On average, a text length (excluding references) of approximately 8000 words is advised and brevity is encouraged. Prospective authors should contact the relevant Editors-in-Chief and the Associate Editor for Reviews (Robert Letcher) in the first instance to discuss the suitability of proposed topics. Review articles should not be case studies, nor reporting of personal research.

5. Systematic reviews provide a comprehensive summary and critical appraisal of existing evidence. They relate to answering a research question, and are conducted using methods which seek to minimize risk of bias in results and conclusions. A systematic review may include a meta-analysis, which uses statistical techniques to pool the results of multiple individual studies into a combined summary result. Environment International does not accept meta-analyses which do not critically appraise the included evidence. While there is no word or figure limit on systematic reviews, they should be as concise as possible to function effectively as summaries of the evidence. Authors are encouraged to make full use of supplemental information in submitting manuscripts. Please consult the detailed Guidance notes for authors of systematic reviews.

6. New Developments are short articles presenting the latest developments in scientific, technological and policy developments. On average, a text length (excluding references) of about 3000 words is required. Abstracts are not included in these short articles. Please note that submissions to this article type have to be made as Short review. Readers are encouraged to suggest subjects for inclusion in this section. Since the journal will serve a multidisciplinary audience, authors are urged to write for non-specialists. In particular, they are discouraged from using expressions that are comprehensible only to a select audience.

Special issues
Proposals for special themed issues or special issues arising from conferences should be sent to the Editors-in-Chief (envint@elsevier.com). Guest Editors will coordinate the review and submission process of special issue papers and will prepare an editorial. Special prices for bulk orders of a special issue can be arranged.
Contact details for submission
All manuscripts should be submitted electronically through EVISE (https://www.evise.com/profile/#/ENVINT/login).
If you are not able to submit your paper electronically please contact the journal mailbox (envint@elsevier.com) for further instructions.

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
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Declaration of 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 competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. 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. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

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.

Copyright
Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (see more information on this). Permitted third party reuse of open access articles is determined by the author's choice of user license.

Author rights
As an author you (or your employer or institution) have certain rights to reuse your work. 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.

Funding body agreements and policies
Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the gold open access publication fee. Details of existing agreements are available online.

introduction CC licenses for full OA journals
From January 2019 Environment International will move from a subscription to a gold open access publishing model. Authors who publish in Environment International will make their work immediately, permanently, and freely accessible. Authors submitting to the journal on or after 12th October 2018 will be expected to cover the cost of the Article Publishing Charge (APC) to publish in the journal, will have a choice of license options and will retain copyright to their published work.
Creative Commons Attribution (CC BY)
Let others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

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.

The gold open access publication fee for this journal is **USD 3500**, excluding taxes.

For all articles submitted before **31-DEC-2019**, there is a **50%** discount off the open access publication fee so authors pay **USD 1750**, excluding taxes. For all articles submitted from **1-JAN-2020** to **31-DEC-2020**, there is a **25%** discount off the open access publication fee so authors pay **USD 2625**, excluding taxes. Learn more about Elsevier's pricing policy: [https://www.elsevier.com/openaccesspricing](https://www.elsevier.com/openaccesspricing).

**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](https://www.elsevier.com/learnenglish) available from Elsevier's WebShop.

**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.

**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 lay-out 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. Systematic reviews demand specific submission requirements, see the [Guidance notes for authors of systematic reviews](https://www.elsevier.com/learnenglish).

**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.

Please ensure your paper has consecutive line numbering - this is an essential peer review requirement.

Figures and tables embedded in text
Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.

Peer review
This journal operates a single blind 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. More information on types of peer review.

REVISED SUBMISSIONS
Use of word processing software
Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). 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. Formulae 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 formulae 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 lowercase 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.

Abstract
A concise and factual abstract is required. 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 $531 \times 1328$ pixels ($h \times w$) or proportionally more. The image should be readable at a size of $5 \times 13$ 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.

Highlights
Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and 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). You can view example Highlights on our information site.

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.

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 build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork
Electronic artwork
General points
• Make sure you use uniform lettering and sizing of your original artwork.
• Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
• Number the illustrations according to their sequence in the text.
• Use a logical naming convention for your artwork files.
• Indicate per figure if it is a single, 1.5 or 2-column fitting image.
• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
• Please note that individual figure files larger than 10 MB must be provided in separate source files. 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
Regardless of the application used, 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 the font or save the text as 'graphics'.
TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.
TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.
Please do not:
• Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
• 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) regardless of whether or not these illustrations are reproduced in color in the printed version. For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article. Please indicate your preference for color: in print or online only. Further information on the preparation of electronic artwork.

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.

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 management software
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use
reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link: http://open.mendeley.com/use-citation-style/environment-international

When preparing your manuscript, you will then be able to select this style using the Mendeley plugins for Microsoft Word or LibreOffice.

Reference formatting

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. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: All citations in the text should refer to:
1. Single author: the author's name (without initials, unless there is ambiguity) and the year of publication;
2. Two authors: both authors' names and the year of publication;
3. Three or more authors: first author's name followed by 'et al.' and the year of publication.

Citations may be made directly (or parenthetically). Groups of references can be listed either first alphabetically, then chronologically, or vice versa.

Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999).... Or, as demonstrated (Jones, 1999; Allan, 2000).... Kramer et al. (2010) have recently shown ...'

List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

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:

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 linking**

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

**Mendeley Data**

This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. During the submission process, after uploading your manuscript, you will have the opportunity to upload your relevant datasets directly to Mendeley Data. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.
Data in Brief
You have the option of converting any or all parts of your supplementary or additional raw data into one or multiple data articles, a new kind of article that houses and describes your data. Data articles ensure that your data is actively reviewed, curated, formatted, indexed, given a DOI and publicly available to all upon publication. You are encouraged to submit your 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 and published in the open access data journal, Data in Brief. Please note an open access fee of 500 USD 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.

MethodsX
You have the option of converting relevant protocols and methods into one or multiple MethodsX articles, a new kind of article that describes the details of customized research methods. Many researchers spend a significant amount of time on developing methods to fit their specific needs or setting, but often without getting credit for this part of their work. MethodsX, an open access journal, now publishes this information in order to make it searchable, peer reviewed, citable and reproducible. Authors are encouraged to submit their MethodsX article as an additional item directly alongside the revised version of their manuscript. If your research article is accepted, your methods article will automatically be transferred over to MethodsX where it will be editorially reviewed. Please note an open access fee is payable for publication in MethodsX. Full details can be found on the MethodsX website. Please use this template to prepare your MethodsX article.

Data statement
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

AFTER ACCEPTANCE

Online proof correction
Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors. If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.

We will do everything possible to get your article published quickly and accurately. 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. 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.

Offprints
The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier’s Webshop. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

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.