Author Guidelines

Advances in Geochemistry and Cosmochemistry Author Guidelines

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This document provides general guidelines for manuscripts to be submitted to AGC. Please check the online Guide for Authors for any updates.

1 Manuscript Preparation

The following section summarises the minimum requirements for submitting a manuscript to *Advances in Geochemistry and Cosmochemistry*. Additional suggestions and advice are available in the Style Guide below.

1.1 Minimum Requirements for Initial Submission

For initial submission, authors should submit their manuscript and figures as a single PDF file along with a cover letter. Any Supplementary Materials should be submitted in a separate PDF document. As per our editorial policy: All new data or code must be deposited in a FAIR-aligned online repository prior to manuscript submission and a DOI to this data/software publication must be provided or at least reserved. See details and recommendations in Sample, Data and Software Archiving and the data, code, and outputs availability policy.

Items deposited in FAIR-aligned repositories can be put under temporary embargo until the manuscript is accepted for publication. In this case, access to editors and reviewers can be either given via private share link or submission of supplementary files, depending on repository capabilities.

Minimum formatting requirements for initial submission:

- PDF document(s) for article and any supplementary materials
- Line numbers
- Double spacing
- Font size 12 or larger
- Figures included in text at the appropriate points
- Main text word count should not exceed: 12000 words for Research Articles, 20000 words for Review Articles and 3500 words for Technical Notes. This excludes abstract, figures, tables, captions, acknowledgments, references, data availability and CRediT statements as well as supplementary text files.

We encourage using the *Advances in Geochemistry and Cosmochemistry* templates for Office Open XML and LaTeX to prepare PDF files. Doing so will save time once a manuscript is accepted for publication, at which point authors are required to format their manuscripts using one of these templates. Final production files must be submitted in LaTeX format (.tex), OpenDocument Text format (.odt), or as Office Open XML (.docx). See Post-Acceptance for more details.

The Style Guide provides additional guidance on preferred formats for, dates, units, and abbreviations, as well as general advice on manuscript structure and figure and table design.

Before submission, authors must review their manuscript for spelling and grammar. British or American English spelling may be used as long as the manuscript is self-consistent throughout.

The following sections are required as part of each submitted manuscript:

- **Abstract** (in English), maximum 250 words. The abstract should normally not contain any references. If references in the abstract are necessary (e.g. because the manuscript is in direct response to a published article), the handling editor may allow them (using short form in-line full citation). Such exceptions need to be requested by authors in the cover letter accompanying the submission.
- **Author contributions (CRediT) statement:** *Advances in Geochemistry and Cosmochemistry* requires all authors to provide a statement of contributions to the submitted work following the CRediT taxonomy and declare that each author is responsible for their share of contributions. In addition, the cover letter must indicate that all authors have approved all the contents of the submitted version of the manuscript (or subsequent revised versions). Any contributor who does not qualify under the CRediT taxonomy must be listed in the Acknowledgements section.
- A **Data and Code Availability Statement**, detailing where all data and software used in the manuscript can be accessed. Statements such as "data available from authors upon request" are not acceptable. Wherever possible, authors must provide a DOI of the data/software publication linked to their submission. If the data cannot be made available, the data availability statement should explain why. Please see the *Advances in Geochemistry and Cos-*

mochemistry data, code, and outputs availability policy for more details and pose any questions in advance of submission or in the Comments to the Editor. **Manuscripts presenting new data or code that are not made available via online repositories (e.g. either not available at all or submitted as supplementary material only) will not progress to review until this is either justified or rectified.**

- A list of all **references** cited in the manuscript. DOIs for the references cited must be provided if they are available, the full author list must be included and all entries must be in Latin script. Submissions formatted using LaTeX use the bibtex style "erae". If the corresponding style file (erae.bst) is not included in the authors' LaTeX installation, they should download it from CTAN.org and install it. Submissions formatted using a word processor should use the author-date APA reference style: Author (Year) or (Author, Year) for in-text citations. Note that *Advances in Geochemistry and Cosmochemistry* discourages citing "personal communications" or references to articles "in prep" or "submitted". Preprints and other non-peer reviewed material may be cited where appropriate, as long as they are publicly accessible. Referring to articles in preparation is not permitted and citation of conference abstracts should be avoided to the extent possible (and justified in the cover letter). Please contact the editors (contact@agcj.org) for any questions regarding references to non-peer-reviewed material.
- **Acknowledgements**. Acknowledge any help received, including (but not limited to) relevant discussions or outside input, funding sources, and reviewers. If your funding source requires a pre-defined sentence in a language other than English to be included then it should be followed by its English translation.

The following sections may be included, but are not required:

- **Additional-language translations of the abstract** to be included in the typeset paper are encouraged. Note that additional-language abstracts may undergo a technical review, but *Advances in Geochemistry and Cosmochemistry* does not guarantee reviews. It is the responsibility of the authors to ensure correct translation.
- A **non-technical summary**, explaining the essential methods and results of your article to non-expert readers. The target audience may include journalists, government staff, other researchers, and the public in general. Non-technical summaries should be limited to about 200 words and, avoiding excessive jargon, cover the current issue addressed by the manuscript and the potential impact and societal benefits of the research.
- **Supplementary material.** Supplementary text and figures may be uploaded as a single PDF document in the journal submission system. All other supplementary files (e.g. data tables or code) should be uploaded to a relevant separate repository and cited in the manuscript (see Sample, Data and Software Archiving). Please also ensure that all relevant data sources are cited in the main manuscript.
- **Graphical abstract** or similar summary figure (including alt-text) to be used by the Media & Branding team for advertising of new papers after publication.

Refer to the editorial policy for details on different article types, their scope and respective figure and word limits. Apart from differences described there, the same author guidelines and templates apply to all article types. All authors are strongly encouraged to provide ORCIDs to unambiguously identify their contribution. Use of **footnotes** is discouraged but they may be used if necessary.

Authors are asked to **suggest at least three potential reviewers** including their current contact information in the *cover letter* or in the Comments to the Editor field in the online submission form.

1.2 Figures and Tables

Figures must be embedded in the manuscript for initial submission. For the final submission after acceptance of the manuscript, figures must be uploaded as separate files. Figures should be sized according to whether they will cover one or two columns: 85 mm or 175 mm width, respectively. Maximum figure height is 255 mm. Multi-panel figures must be combined in a single file that conforms to the figure size limits. Low-resolution images are acceptable for review purposes, provided high-resolution or vector format figures are provided for article typesetting (at least 300 dpi). However, all figures submitted for review must of course be of sufficient quality to serve their purpose. Figures can be submitted in various formats. For best results, we suggest using PDF (.pdf) for line graphics and TIFF (.tif) for pixel graphics. When using PDF format, all fonts must be embedded. All figures should be referenced in the text at least once.

When designing figures, we encourage authors to include meaningful alt-text descriptions for online material and use colour palettes that accommodate colour blindness. More information and guidance can be found in Katsnelson (2021) and links therein. We further recommend authors to consider description of visual content in figure captions to enhance accessibility to the vision impaired community.

Tables should be embedded in the manuscript for initial submission but must be uploaded as separate .csv documents for final production once the manuscript has been accepted. Each table should include a title, table number, column headings and indication of units used (stated in the column or row headings).

Typesetting tables is among the most error prone as well as labour and time consuming tasks during typesetting of an article and *Advances in Geochemistry and Cosmochemistry* is relying solely on volunteers from the community to typeset articles. Complex tables included in the main text may delay production considerably. Authors should consider carefully which tables need to be part of the main text. Large or complex tables could be included in the supplementary data publication. Finally, note that all new data generated for the study are required to be made available online via a data repository (see data, code, and outputs availability policy).

1.3 Sample, Data and Software Archiving

Advances in Geochemistry and Cosmochemistry will not allow publication of data tables or code as supplementary

material. Instead, these should be made available via online repositories before submission.

Remember to allow ample time for the appropriate curation of your data and software in a (domain) repository prior to the submission of your manuscript to *Advances in Geochemistry and Cosmochemistry*. Cite the dataset or software package with its DOI as a standard reference within your manuscript. This citation should include the following elements: Author(s), Publication Year, Title, Publisher, Identifier (DOI), Version.

See the data, code, and outputs availability policy and the Style Guide for full instructions. A few additional recommendations:

- Samples: If your institution or project does not have specific guidelines for sample registration with an International Generic Sample Number (IGSN), we recommend the international community platform SESAR. Once samples have been registered, make sure to refer to these samples by their IGSN in conjunction with sample names within the manuscript text and/or tables.
- Data: Domain repositories enhance the value of data/code for future reuse through discipline-specific curation and metadata review. Data published in generalist repositories, such as Figshare, Zenodo, Dryad, will be accepted but are not encouraged if an appropriate domain repository exists. The re3data registry of research data repositories can be used to identify appropriate repositories beyond the recommended list in the data, code, and outputs availability policy.
- Software: common developer platforms such as GitHub are not sufficient for software publication since they do not guarantee long-term archiving and do not assign DOIs to specific versions of the content. Authors may choose to use the Zenodo GitHub integration or any other repository to publish static copies of any code used for a manuscript. Again, the use of domain repositories for software publication is encouraged whenever appropriate. Code should include comprehensive documentation, and a licence specifying how it may be used or reused by others.

1.4 Licensing Considerations

By submitting an article to *Advances in Geochemistry and Cosmochemistry*, the authors agree that their article will, upon acceptance for publication, be distributed under the Creative Commons Attribution 4.0 International licence (CC BY 4.0), with copyright retained by authors by default. Articles will generally contain the following statement after the Acknowledgements and before the References:

> This article is distributed under the terms of the Creative Commons Attribution 4.0 International Licence (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided appropriate credit is given to the original author(s) and source, as well as a link to the Creative Commons licence, and an indication of changes that were made.

Should any author(s) require that the published article deviate from the above (e.g. copyright needs to reside with your employer or an alternative licence is required – e.g. authors who are Crown employees), you must add this request to your cover letter to the editor. The submitting author is responsible for requesting (and following up) this deviation from the standard licensing agreement. All deviations from the above must be agreed in writing as early as possible in the submission process and must be in place before the article is sent for typesetting.

1.5 Submitting a Manuscript for Double-Anonymous Review

Authors may elect not to share their identities during the review process by requesting double-anonymous review during submission. Note that complete anonymity may not be possible if manuscripts are linked to data or software publications that disclose author information, or can be linked to conference abstracts or similar publicly accessible material. For double-anonymous review, it is the authors' responsibility to anonymise their submitted manuscript file to the best of their ability; identifying data will be collected during manuscript submission but will not be passed on to reviewers with the manuscript file. The submitted manuscript PDF should not include author names and affiliations or an author contributions statement. If authors choose to use one of the *Advances in Geochemistry and Cosmochemistry* submission templates, they should list "Anonymous" in the author field.

2 Preparing a Revised Submission

For submission of a revised manuscript, the following files must be included for assessment by the handling editor:

- A "Response to Reviewers" that addresses each separate point raised by each reviewer and the editor, including a clear statement of the associated changes made to the manuscript where appropriate.
- A track-change version of the revised manuscript clearly showing all in-line changes made to the manuscript (e.g. strikethrough for deletions, different colour for new text).
- A clean version of the revised manuscript (showing no comments, strikethroughs, or tracked changes).

Authors should ensure that revisions to manuscripts are comprehensive and all comments are addressed to prevent multiple rounds of reviews and reviewer fatigue. The corresponding author is responsible for the accuracy of all content in the manuscript, including co-authors' names, addresses, and affiliations.

The revised manuscript submitted after the review process should be considered the final version. For this purpose, authors are also required to upload the following documents for article production:

- All source files of the revised manuscript using the *Advances in Geochemistry and Cosmochemistry* template in Microsoft Word, OpenOffice or LaTeX format with figures included in the text, along with separate publication-ready figures at a minimum of 300 dpi resolution (see Manuscript

Preparation and Style Guide for detailed formatting instructions).
- Any supplementary material as a separate PDF file. *Advances in Geochemistry and Cosmochemistry* will not typeset supplementary material and it does not need to be formatted using a template.
- A figure or artwork that will be used for promotion of the article if accepted for publication. This can be a single panel figure of the manuscript or new artwork with direct relevance to the article that has been specifically created by the authors for promotion purposes.
- An optional photo or artwork that can be used by the media team to design a journal issue cover. This should have direct relevance to the manuscript and should be free of copyright.

3 Post-Acceptance

Once an article has been accepted, *Advances in Geochemistry and Cosmochemistry* will publish the typeset, formatted version of the paper using the documents uploaded by authors after manuscript revision. Manuscripts that do not meet *Advances in Geochemistry and Cosmochemistry* submission guidelines will be returned to authors, which will delay the publication.

Since LaTeX will be used for typesetting of the final article, we strongly recommend submitting the final documents in LaTeX format, if possible. Doing so significantly speeds up the copy-editing process, reducing the workload on the volunteer team of copyeditors, gives the author(s) the greatest amount of control over the final design (particularly in terms of figure placement and table formatting), and decreases the chance of errors or miscommunication in the proof-reading phase. *Advances in Geochemistry and Cosmochemistry* provides templates in multiple formats for authors' convenience, but please note that a submission in .docx or .odt format will likely take several additional days in production for file conversion. Please consider the time and effort of our volunteer copy-editors. Authors who want their article processed more rapidly are advised to use the .tex template.

Publication-formatted versions of the manuscript (proofs) will be sent to the corresponding author for approval or revisions, but changes should be kept to a minimum. If changes to the content should become necessary in the proof stage, authors should contact the handling editor and copyeditor for approval. In cases of substantial changes, additional (limited) reviews may be necessary at the handling editor's discretion.

The *Advances in Geochemistry and Cosmochemistry* Media & Branding team will contact the corresponding author after proof validation to discuss text and figures to be used for publicity. Posts about a new article on *Advances in Geochemistry and Cosmochemistry* social media channels will postdate the official publication date. Authors retain all rights to the typeset article and are welcome to share it on platforms such as ResearchGate, institutional repositories and personal websites.

4 Style Guide

(inspired by and adapted from the Seismica style guide)

This page provides a few basic style guidelines for things like figure and table references, date/time formats, and units. Authors should try to follow these guidelines to the best of their ability. The Standards and Copy-Editing team will attempt to standardise articles post-acceptance, but the *Advances in Geochemistry and Cosmochemistry* volunteer copy-editors would greatly appreciate authors' help in preparing their articles according to this style guide.

4.1 General Rules

Define Your Acronyms (DYA): The first use of all acronyms and initialisations must be defined within text, with the abbreviation in parentheses. Any further use may simply use the acronym. Authors may elect to spell out acronyms an additional time at the first use in each section for longer papers.

Emphasis: Do not use italics, bold or underlining to emphasise text. Single quotation marks or italics may be used to define new terms but are not used for general emphasis of words within the text.

Citation ordering: If multiple sources are cited, the individual items must be separated with semicolons and ordered by year of publication first and name of authors second (e.g. Bear et al., 1290; Cow and Dear, 1290; Apple, 1968).

Supplementary material: If you have a supplementary document that you refer to in your article, supplementary items should be labelled with the letter "S" and a number, as in "Supplementary Section S1" or "Supplementary Figure S4a". Note that *Advances in Geochemistry and Cosmochemistry* will not copy-edit or typeset supplementary documents.

4.2 Manuscript Structure

Advances in Geochemistry and Cosmochemistry suggests the following subdivision of manuscripts into sections (items marked with* are mandatory):

- Title*
- Abstract(s)*
- Introduction
- Methods
- Results
- Discussion
- Conclusions
- CRediT statement*
- Acknowledgements and Declarations*
- References*

Deviations from this scheme are permissible but usually not advisable. It can sometimes be necessary or useful to combine Results and Discussion into a single section, if some of the results are only comprehensible after some discussion of other results. Similarly, the subject matter of a manuscript may make it appropriate to include conclusions in the Discussion section instead of a dedicated Conclusions section or to replace the Conclusions with Implications. These decisions are left to the author(s) in agreement with the handling editor and reviewers.

4.3 Abstract

The abstract should be comprehensible to as wide an audience as reasonably possible. Authors are therefore advised to avoid overly specific jargon and keep the writing style plain and easy to understand. Filler words, colloquialisms, unnecessary intensifiers (e.g. "very"), tautologies (e.g. "close proximity"), arcane or esoteric language (using uncommon words in place of their common synonyms), ambiguous wording, and similar rhetorical (de)vices are to be eschewed in a scientific manuscript in general but particularly in the abstract. In an open access journal such as Advances in Geochemistry and Cosmochemistry, it is generally not necessary to squeeze numerical data into the abstract in order to allow everybody to work with them. Citations are to be avoided in the abstract unless absolutely necessary, in which case they must appear in full short in-line format: Author et al. (year) J. Abbrev. Volume(Issue), Pages.

4.4 Data Reporting, Terminology and Units of Measurement

Most manuscripts published in *Advances in Geochemistry and Cosmochemistry* will contain geochemical or cosmochemical data. Here we provide recommendations for how those data should be reported and described in manuscripts and associated data publications.

All procedures should be described in a sufficient manner so that an expert with access to similar equipment and reagents would be able to duplicate the procedure. Generally accepted quality metrics should also be reported. Typically, this will include reporting, in full, analyses of reference materials that are independent of technique calibration, and that these measurements are transparently and fully compared to appropriate reference values.

When available, data reporting should closely follow consensus recommendations from scientific communities. For example, see compilations in https://onegeochemistry.github.io/best_practices.html.

Sample collection procedures should be described with as much detail as is relevant to the study. For example, "rock samples were collected using a hammer" is sufficient when reporting trace element concentrations in a basalt from a large outcrop, but more detail might be required when reporting volatile or organic components from a meteorite fall (e.g. King et al., 2022).

Sample sizes should be reported where relevant, for example the mass of a whole sample prior to a digestion, or the size of a SIMS sputtering- or laser ablation pit. If an element is separated, the amount separated should be stated in the method description.

Manuscripts should report the type and location of the instrument that was used to generate the data, with as much detail as is relevant for a reader to understand the context of the measurements, and for a skilled user to reproduce them. Procedures should include relevant figures of merit, which may include (but not be limited to), yields, blanks, sensitivities, and limits of detection. Instrumentation, reagents, and labware should not be solely referred to by their brand name (e.g. "18.2 MΩ resistivity water" rather than "Milli-Q water"; high-resolution secondary ion mass spectrometer rather than "SHRIMP") and proprietary names, particularly when ambiguous, should be avoided (e.g. "Teflon" is a brand name that refers to a range of fluoropolymers, such as PTFE, FEP, and PFA).

Uncertainties should be reported for all reported data. The coverage interval (e.g. confidence limit, sigma-level, credible interval etc.) should always be clearly indicated. The calculation of uncertainty should be made clear, particularly when differentiating between the standard error (also called the standard deviation of the mean) and standard deviation. Where appropriate, correlated or systematic uncertainties may be reported in a hierarchical manner (e.g. Condon et al., 2024), but care should be taken to ensure these levels are appropriately assigned and distinguished.

When plotting data, uncertainties should always be indicated visually. We strongly recommend plotting uncertainties at 2σ level (or k = 2, or 95 % confidence/credible interval). This gives the clearest indication to a reader as to whether separate data points are distinguishable or not. When data are plotted at 2σ, uncertainty bars that just barely overlap have a p-value for a χ^2 test that are ≥ 0.05 (and are therefore typically considered indistinguishable), whereas at 1σ, uncertainty bars that do not overlap give the appearance of being well differentiated but may be statistically indistinguishable. Conversely, at 3σ, conventionally distinguishable measurements may appear to overlap.

Authors are encouraged to use terminology that has specific, well documented definitions that are used by as wide a range of the scientific community as possible. For example, metrological terms defined by the latest JCGM VIM: International Vocabulary of Metrology (JCGM 200:2012, 2012; Potts, 2012, see also https://www.geoanalyst.org/glossary/). Common terms that may be ambiguous outside of a specific community that are recommended to be avoided are the term "error" (where a manuscript might mean "uncertainty" in the sense of the JCGM VIM), and also "internal precision" and "external reproducibility", which have limited use outside of geo- and cosmochemistry, but are closer to the VIM defined terms "intermediate measurement precision" and "measurement repeatability". Instead of relying on convention terms, authors are instead encouraged to be descriptive of how a particular level of uncertainty is calculated. When discussing geo- or cosmochronological results, if it is convenient for a manuscript to differentiate between a result with units of time from an interpreted event in the past at a particular time using specific terms (by some conventions are referred to as "dates" and "ages", respectively), these definitions should be specifically defined and not implied.

Manuscripts should, whenever possible, use SI units as described by the latest SI Brochure issued by the BIPM (e.g. https://www.bipm.org/en/publications/si-brochure). All non-SI units described in the SI Brochure are suitable alternatives. In addition, some equivalent non-SI units are acceptable in Advances in Geochemistry and Cosmochemistry due to their long-standing use and direct equivalence to SI units. These include the unit

amu (atomic mass unit) which is equivalent to the Da, or $1.660\,539\,066\,65(50) \times 10^{-27}$ kg, and the annum (abbreviated "a") defined as exactly $3.155\,692\,544\,5 \times 10^{7}$ s (Holden et al., 2011). Authors are encouraged to follow the recommendations of Holden et al. (2011) and not use different units to differentiate between time intervals that include the present day, and time intervals that do not include the present day. Ambiguous units, or those that follow discipline specific conventions, should be avoided. These include "ppm" (and related units) when referring to µg/g, because ppm has multiple meanings, and "nano cubic centimetres" when reporting amounts of noble gases, because they depend on the specific choice for STP, which are almost never defined.

4.5 Figures, Tables, Equations

Capitalisation for Figures, Tables, Equations, and Sections: When referring to a figure, table, epuation, or section in your article, capitalise "Figure", "Table", "Equation", or "Section".

Figure formatting: The figure captions should be understandable without relying on additional information from the main text ("see text"), if possible. Single-column figures can have a maximum width of 85 mm, page-width figures are 175 mm wide at most. The maximum possible height for all figures is 255 mm. To ensure comprehensibility and legibility of the figures, we suggest that authors design their figures for the final printed size from the beginning. This helps avoid illegibly small labelling.

Combination figures with several subfigures should only be used if the content of the subfigures is related or they shall be compared in some way. Typical examples would be multiple photomicrographs or several plots that share one or more axes.

All labels must be clearly readable. We suggest using sans serif fonts such as Bitstream Vera Sans, DejaVu Sans, Computer Modern Sans, Futura, Helvetica, Arial, or Verdana for all labels. Mixing several fonts in the same figure or having different fonts for different figures is discouraged. Italic or ornate fonts are best avoided in the interest of readability. Font sizes 10 to 12 pt are usually most appropriate in figures. The minimum font size when scaled to final production dimensions should be no less than 8 pt. When several data points or data sets in a single plot need to be labelled, this can be done directly or via a key.

Colour should be utilised deliberately to help make graphics easier to understand. Authors should take care not to use misleading colour palettes. All figures should be as accessible to people with vision impairment as possible. Please consider aspects such as font type, font size, colour contrast and meaningful alt-text descriptions for online versions. Regarding colour, only perceptually uniform colour maps and palettes should be used. Suitable examples include the following colour maps from the Python plotting library Matplotlib: "Magma", "Inferno", "Plasma", and "Viridis", as well as greyscale or single-hue gradients. These are all available in most modern plotting and graphics software, as well as via online tools (e.g. https://waldyrious.net/viridis-palette-generator/). For more examples and further advice on the use of colours, see Crameri et al. (2020) and Stoelzle and Stein (2021).

Abbreviation only in parentheses: Use full words for references to tables, equations, figures, and sections in the main body of the text; abbreviated forms in parentheses. Example: "As Figures 2 and 3 show, the correlation holds across the entire study region (mapped in Fig. 1)."

Plurals and abbreviations: When using the abbreviated forms for references, plurals do not have a trailing period. For example, the plural abbreviation for "Figures" is "Figs" rather than "Figs." and the same extends to "Tabs" and "Eqs".

Labelling components of a figure: If a figure consists of multiple parts (sub-figures), it is necessary to label these appropriately. If the sub-figures can be referred to by a short, concise label (like "CI chondrite" or "Earth's mantle"), direct labelling may be used. If more complicated descriptions are needed, alphabetical labelling using lower case letters is generally the best option to mark the sub-figures. The sub-figures should be addressed one by one in the caption using these letters in one of these formats: "a." or "(a)". Again, consistency is key: use the same labelling scheme across all figures and figure captions in your manuscript unless there is a really good reason not to do so. To reference a part of a figure in the article text, use the number and letter with no space in between, as in "Figure 1a". Note that for accepted papers, all parts of a multi-part figure will need to be combined into a single image file, and must include alphabetic labels for the parts of the figure in that image file.

Equations: Please encode all equations in the appropriate equation environment of your word processor. The typesetting of mathematical expressions and equations is a major source of errors and miscommunication in scientific publishing. We strongly encourage submitting any manuscripts that are heavy on equations in LaTeX format (if possible) to avoid errors stemming from format conversion. Irrespective of the chosen submission format, authors should always double check that all equations are rendered correctly in the PDF files for submission and pay special attention to equations during correction of the final proofs. Any variables and symbols that occur in equations should be explained in the text immediately before or after the equation, unless the meaning of the symbol can be expected to be obvious to any potential reader (e.g. T for temperature or Σ for sum) in context. In addition, a list of symbols and variables may be included in the appendix at the authors' discretion or by request from the reviewers. Authors should consider carefully which expressions should be typeset in-line (e.g. $a^2 + b^2 = c^2$) and which should go on a separate line or lines as a referenceable equation. In-line maths should generally be reserved to very short and simple mathematical expressions. Short referenceable equations, such as Bragg's law (Eq. 1) will normally be typeset in a single column.

$$n\lambda = 2d \sin\theta \tag{1}$$

wherein $n = 1, 2, 3 \ldots$ = order, λ = wavelength, d = grating constant, and θ = angle of incidence. Equations can be

more than one line long. In these cases, every line gets its own reference number, which can be referred to in the text. If necessary, equations can also span the entire width of the page. Such equations will not be printed at the specified place in the text but at the top of the following page; authors should account for that when referring to the equation. It is often useful to gather these full-width equations and print several or even all of them together on the same page.

4.6 Use of Abbreviations

All abbreviations must be introduced upon first usage. Further instances of the same term, e.g. scanning electron microscope (SEM) shall then only use the abbreviation, in this case SEM. An exception to this rule is the beginning of a sentence; sentences should not start with an abbreviation. If a published set of abbreviations is used, these can be referenced without individual explanation, if the source of the abbreviations is cited. Example: "Mineral abbreviations are used as suggested by Whitney and Evans (2010)". Terms that occur only once or twice should not be given an abbreviation. Abbreviations should be avoided in the abstract unless this means that an overly long term such as "laser ablation-inductively coupled plasma-mass spectrometry" would need to occur excessively often.

Other abbreviations:

- Use periods with lower case abbreviations (i.e., e.g., etc., a.k.a., p.m., vol., et al.).
- Do not use periods with upper case abbreviations (USA, BCE, NASA, ICP-MS).
- Do not abbreviate longitude or latitude.

4.7 Numbers and Statistics

Statistical tests: For terms like *p*-value or *t*-test, italicise *p, t.* Hyphenate the term and do not capitalise.

Non-breaking spaces: Use non-breaking space between numbers and their units, when applicable (Ctrl + Shift + Space in Word). LaTeX submissions should use the package `siunitx` for this purpose.

4.8 Dates and Times

Long form dates: Write long form dates as dd M yyyy, e.g. 27 January 1888.

Short form dates: Write short form dates in international format (ISO 8601) as yyyy-mm-dd, e.g. 1888-01-27.

Times: Use 24-hour time. UTC is the default time zone unless otherwise specified. If you are using a different time zone, be sure to clarify, and do not assume the reader will know. Example times: 14:35, 14:35:22, 14:35:22.187, 07:35:22 PDT.

References

Condon, D., Schoene, B., Schmitz, M., Schaltegger, U., Ickert, R. B., Amelin, Y., Augland, L. E., Chamberlain, K. R., Coleman, D. S., Connelly, J. N., Corfu, F., Crowley, J. L., Davies, J. H., Denyszyn, S. W., Eddy, M. P., Gaynor, S. P., Heaman, L. M., Huyskens, M. H., Kamo, S., Kasbohm, J., Keller, C. B., MacLennan, S. A., McLean, N. M., Noble, S., Ovtcharova, M., Paul, A., Ramezani, J., Rioux, M., Sahy, D., Scoates, J. S., Szymanowski, D., Tapster, S., Tichomirowa, M., Wall, C. J., Wotzlaw, J.-F., Yang, C. and Yin, Q.-Z. (2024). Recommendations for the reporting and interpretation of isotope dilution U-Pb geochronological information. *Geological Society of America Bulletin* doi:10.1130/b37321.1.

Crameri, F., Shephard, G. E. and Heron, P. J. (2020). The misuse of colour in science communication. *Nature Communications* 11, doi:10.1038/s41467-020-19160-7.

Holden, N. E., Bonardi, M. L., De Bièvre, P., Renne, P. R. and Villa, I. M. (2011). IUPAC-IUGS common definition and convention on the use of the year as a derived unit of time (IUPAC recommendations 2011). *Pure and Applied Chemistry* 83: 1159–1162, doi:10.1351/pac-rec-09-01-22.

JCGM 200:2012 (2012). International vocabulary of metrology – basic and general concepts and associated terms (VIM). *Bureau International des Poids et Mesures* doi:10.59161/jcgm200-2012.

Katsnelson, A. (2021). Colour me better: fixing figures for colour blindness. *Nature* 598: 224–225, doi:10.1038/d41586-021-02696-z.

King, A. J., Daly, L., Rowe, J., Joy, K. H., Greenwood, R. C., Devillepoix, H. A., Suttle, M. D., Chan, Q. H., Russell, S. S., Bates, H. C., Bryson, J. F., Clay, P. L., Vida, D., Lee, M. R., O'Brien, Á., Hallis, L. J., Stephen, N. R., Tartèse, R., Sansom, E. K., Towner, M. C., Cupak, M., Shober, P. M., Bland, P. A., Findlay, R., Franchi, I. A., Verchovsky, A. B., Abernethy, F. A., Grady, M. M., Floyd, C. J., Van Ginneken, M., Bridges, J., Hicks, L. J., Jones, R. H., Mitchell, J. T., Genge, M. J., Jenkins, L., Martin, P.-E., Sephton, M. A., Watson, J. S., Salge, T., Shirley, K. A., Curtis, R. J., Warren, T. J., Bowles, N. E., Stuart, F. M., Di Nicola, L., Györe, D., Boyce, A. J., Shaw, K. M., Elliott, T., Steele, R. C., Povinec, P., Laubenstein, M., Sanderson, D., Cresswell, A., Jull, A. J., Sýkora, I., Sridhar, S., Harrison, R. J., Willcocks, F. M., Harrison, C. S., Hallatt, D., Wozniakiewicz, P. J., Burchell, M. J., Alesbrook, L. S., Dignam, A., Almeida, N. V., Smith, C. L., Clark, B., Humphreys-Williams, E. R., Schofield, P. F., Cornwell, L. T., Spathis, V., Morgan, G. H., Perkins, M. J., Kacerek, R., Campbell-Burns, P., Colas, F., Zanda, B., Vernazza, P., Bouley, S., Jeanne, S., Hankey, M., Collins, G. S., Young, J. S., Shaw, C., Horak, J., Jones, D., James, N., Bosley, S., Shuttleworth, A., Dickinson, P., McMullan, I., Robson, D., Smedley, A. R., Stanley, B., Bassom, R., McIntyre, M., Suttle, A. A., Fleet, R., Bastiaens, L., Ihász, M. B., McMullan, S., Boazman, S. J., Dickeson, Z. I., Grindrod, P. M., Pickersgill, A. E., Weir, C. J., Suttle, F. M., Farrelly, S., Spencer, I., Naqvi, S., Mayne, B., Skilton, D., Kirk, D., Mounsey, A., Mounsey, S. E., Mounsey, S., Godfrey, P., Bond, L., Bond, V., Wilcock, C., Wilcock, H. and Wilcock, R. (2022). The Winchcombe meteorite, a unique and pristine witness from the outer solar system. *Science Advances* 8, doi:10.1126/sciadv.abq3925.

Potts, P. J. (2012). Glossary of analytical and metrological terms from the international vocabulary of metrology (2008). *Geostandards and Geoanalytical Research* 36: 231–246, doi:10.1111/j.1751-908x.2011.00122.x.

Stoelzle, M. and Stein, L. (2021). Rainbow color map distorts and misleads research in hydrology – guidance for better visualizations and science communication. *Hydrology and Earth System Sciences* 25: 4549–4565, doi:10.5194/hess-25-4549-2021.

Whitney, D. L. and Evans, B. W. (2010). Abbreviations for names of rock-forming minerals. *American Mineralogist* 95: 185–187, doi:10.2138/am.2010.3371.