### GENERAL GUIDELINES

The types of articles published in *Hydrogeology Journal* are described in Appendix 1. Please study the guidelines given below before submitting your manuscript to *Hydrogeology Journal*, and also the specifications given in Appendix 2 (keywords, artwork, etc.). The peer review process, publication procedure and open access arrangements are given in Appendix 3, and legal requirements in Appendix 4. There are no submission or price-per-page fees, and no fee for use of color.

Microsoft Word is the preferred word processing format. Manuscripts that do not conform to the following requirements will be returned for corrections. In brief:

- Write in English. Do not use first-person narrative or personal pronouns.
- Guidance and restrictions on page length are detailed in Appendix 1.
- The text must be in a single column with double line spacing; margins must be ≥2.5 cm (1 inch) all around.
- Use automatic page numbering and continuous line numbering.
- Save your text and tables in .docx format (Word 2007 or higher) or .doc format (older Word versions). Do not submit TeX or LaTeX files or other formats for text and tables.
- Use a normal plain font (e.g. 10-point Times Roman) for text.
- Use italics for emphasis (do not underline or use bold face).
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.

### Title
Concise and informative title, in sentence case

**Example:**
Three-dimensional benchmark for variable-density flow and transport simulation: matching semi-analytic stability modes for steady unstable convection in an inclined porous box

### Authors and affiliations
First and family names, affiliations, contact details, and email of the corresponding author

**Example:**
Clifford I. Voss¹*, Craig T. Simmons², Neville I. Robinson³

1. US Geological Survey, 345 Middlefield Road, MS 496, Menlo Park, CA 94025, USA
   email: cvoss@usgs.gov
2. Flinders University, GPO Box 2100, Adelaide, 5011, Australia

*corresponding author – displayed in the article as the designated author to accept queries from readers

Provide the 16-digit ORCID identifiers of all authors, if available.

**Note:** The first author (as listed in the article – see example above) and the submitting author (i.e. ‘contact author’ as recorded in the manuscript processing system) should be fixed at first submittal.

### Abstract
Max 250 or 80 words (depending on article type)

For Papers, Reports and Technical Notes, provide an English abstract of maximum 250 words; for essays, the abstract maximum is 80 words (see Appendix 1). The first sentences should state the main result, main conclusion, or main point of the manuscript, followed by a statement of the problem, objectives, methods, results, and other conclusions. The abstract should not contain any undefined abbreviations or unspecified references. The title and abstract will be translated into French and Spanish, as a minimum, and usually also into Portuguese and Chinese by hydrogeologists appointed by the editorial team. Translation to approximately 30 other languages is possible, if provided by the author. The author/translator certifies that the translation faithfully represents the official version in English, which is the published title/abstract of record and is the only title/abstract to be used for reference and citation.

**Example:**
Analytical solutions · Numerical modeling · Karst · Switzerland

**Notes:**
- Include the name of a country or multi-country region, when appropriate.
- Provide up to five keywords. At least two keywords should come from the standard keywords list (see Appendix 2.1).
1. Introduction
The introduction gives a short review of the pertinent literature and states the purpose and novelty of the investigation.

2. Materials and methods
2.1
2.1.1 etc.
This section provides enough information to permit repetition of experimental work. Provide a description of the study area and supply an index map of the study area’s country and adjacent countries.

3. Results
This section describes the outcomes of the study. Data should be presented concisely, for example in the form of tables or figures.

4. Discussion
The discussion gives an interpretation of the results and their significance and limitations, with reference to work by other authors.

5. Conclusions
These summarize the objectives, methods, results, discussion and proposals for further work.

Acknowledgments
Acknowledgments of people, grants, funds, etc. The names of funding organizations should be written in full. Authors must disclose any commercial or other associations that might pose a conflict of interest in connection with the submitted material. It is appropriate to acknowledge oral communications and the contributions of reviewers and editors.

Appendices (optional). Appendix 1, Appendix 2, etc.

References (see References and Citations)

Note: Footnotes and headers/footers are not permitted in the text.

References
The References list should include only works that are cited in the text and only works that have been formally published or have a digital object identifier (DOI).

References list entries should be alphabetized by the family name of the first author of each work.

Unpublished works should only be mentioned in the text (see Citations).

Types and examples:

Journal article:

Book:

Book chapter:

Article by DOI:

Online document:

Notes:
- Use the standard abbreviation of a journal’s name according to the ISSN List of Title Word Abbreviations, see http://www.issn.org/services/online-services/access-to-the-itwa/
- If the reference title is given in a language other than English, include the English translation in parentheses immediately following the title.
### Language and style

In Word, set the language to English (UK or US)

All articles are published in English. Technical reviewers are instructed to equally consider the technical content and organization of manuscripts from authors that are not fluent in English, although smooth progress will be facilitated by manuscripts that have already received help from suitable native-English-speaking hydrogeologists or related specialists. *Hydrogeology Journal*’s Technical Editorial Advisor and Springer copy-editors will further edit the English of an accepted manuscript to improve the clarity of writing.

Do not use the first person or personal pronouns (I/my, we/our, etc.).

Terms and names must be correct and consistent (spellings, capitalization, etc.) throughout the text, tables and figures. Use ‘groundwater’ (one word), ‘hydrogeology’ (not ‘geohydrology’), and ‘water table’ (not ‘groundwater table’).

Abbreviations should be defined at first mention and used consistently thereafter, e.g. U.S. Geological Survey (USGS).

Use initial capitals for:
- proper names, e.g. River Amazon, Aswan Dam, the Earth;
- adjectives derived from proper names, e.g. Markov series;
- *formal* geological eras, formations, etc., e.g. Cambrian, early Holocene, Upper Greensand;
- references to tables and figures, e.g. “It is seen from Fig. 2 that ...”.

### Numerals and units

These instructions apply to all components of the manuscript (text, tables, figures, ESM, etc.)

Use numerals before units of measurement unless the number is at the beginning of a sentence, e.g. “Fifty-millilitre samples were taken every 10 s ...”.

Leave a character space between the number and its unit. Exceptions are for: percentage, angle units, degrees, minutes and seconds (these should not have a blank space after the number). For example: 531 m, 24 °C, 40%, 90°.

Numbers from one to nine should be spelled out, except where there are units or the number implies arithmetical manipulation, e.g. a factor of 7.

The decimal sign is a full point (period) on the line. Commas can only be used for thousand separators, e.g.10,347. Numbers less than one must have 0 before the decimal point, e.g. 0.824.

Set out dates in the form 20–23 October 1980, the 1950s, 17th century.

Numbers with orders of magnitude should use 10\( \text{power} \), e.g.1.234\( \times 10^{-5} \)

Standard International (SI) or other metric units should be used. If English units are required, follow them with equivalent SI units in parentheses. All units should be in the same font as the text and these should be upright (not italic).

Presentation of units should be consistent throughout the text, tables and figures. For example: mg/L or mg L\(^{-1} \) (not both). Note that compound units are separated from each other by a “/” indicating division or a space indicating multiplication.

Ranges should be given in full, e.g. years 1956–1963, pages 241–243; to avoid confusion with subtraction, there should be no space either side of the long dash. Units need not be repeated in ranges, e.g. 0–213 °C, from 822 to 900 km\(^2 \).

### Citations

Personal communications and unpublished works should only be mentioned in the text. Give “name, affiliation, personal communication (or unpublished data), year” in parentheses.

*Example:*

Groundwater is important as a water resource in Ozville (George A. Expert, International Agency for Groundwater, personal communication, 2012).

Cite published references in the text by the first-author name and year in parentheses.

*Examples:*

- Negotiation research spans many disciplines (Thompson 1990).
- This result was later contradicted (Becker and Seligman 1996).
- This effect has been widely studied (Abbott 1991; Barakat et al. 1995; Kelso and Smith 1998; Medvec et al. 1993).

If supplying electronic supplementary material, the text must make specific mention of the material as a citation, similar to that for figures and tables, e.g. “Fig. S1 of the electronic supplementary material (ESM)” (see also *Figures, Tables and Appendix 2.2*).
Equations and mathematical terms

Use the Word equation editor or MathType (English versions)

These instructions apply to all components of the manuscript (text, tables, figures, ESM, etc.)

Number all “displayed” equations (e.g. Equation 1 of the examples) in parentheses using sequential whole numbers at the right-hand margin, even if they are not referenced in the text. Inline equations are not numbered and they follow normal punctuation rules as part of the sentence.

If there is an appendix and it contains equations, continue the consecutive numbering of the main text.

Use the standard mathematical notation for formulae, symbols, etc. Multiplication should not be represented with an asterisk; alternatives include: A × B, AB or A B, (A)(B) or A • B.

The following rules describe the final appearance of mathematics in published papers. The closer these rules are followed in the initial manuscript, the smaller the risk of errors and misprints:

- Italic for symbols or single letters that denote mathematical constants, variables and unknown quantities. Place the symbol in italic if it is a container that can be replaced by a value (e.g. spatial coordinates x, y and z, time t, hydraulic conductivity K, Darcy velocity q). This rule includes typical subscripts that indicate running indices (e.g. use italic for subscripts i, j, k, such as in a\textsubscript{ij}, b\textsubscript{ij}).
- Numbers themselves do not act as containers for other values and so are upright. The typical running index “i” (between 0 and 3, for example, i = 0, 1, 2, 3) is set in italic, as mentioned just above.
- Upright for numerals, operators and punctuation, and commonly defined functions or abbreviations, e.g. cos, det, e or exp, lim, log or ln, max, min, sin, tan, ndfs, d (for differential). The symbol or single letter is upright if it is a label and it does not act as a container for a value. This is true for superscripts and subscripts as well (e.g. hydraulic conductivity of layer 1, K\textsubscript{i}; Darcy velocity in the x direction, q\textsubscript{x}).
- For vectors and tensors, use bold and upright (e.g. \textbf{v}). Vector elements/components should be italic, not bold (e.g. k).
- Full matrices should be written as displayed equations. Matrix elements should be italic and nonbold. The superscripts “T” or “t” (transpose) and “H” (Hermitian) should be (nonbold) upright. For matrix dimensions, use “×”, e.g. “a 3x3 matrix” or “a n x m matrix”. Matrix determinants can be represented using straight vertical lines |B| or as “det B”. For example, note the use of bold, upright and italic in the hydraulic conductivity matrix:

\[
K = \begin{bmatrix}
k_{xx} & k_{xy} \\
 k_{yx} & k_{yy}
\end{bmatrix}
\]

- A multi-letter abbreviation (e.g. RMSE) will be presented as upright, even when it represents a value. Use single-letter variables (with superscripts or subscripts if necessary, e.g. E\textsubscript{MSE}) wherever possible.
- Use centered dots to substitute for operators such as “+” and “×” (e.g. x + y or xy).
- Use single dots to replace commas (e.g. i, j, k).
- For compound parentheses, apply the general hierarchy: ((((( ))))).

Examples:

- If a point x, distance d or time t may be labeled as being in some positive (pos) region of some space, then the presentation would be as x\textsubscript{pos}, d\textsubscript{pos} or t\textsubscript{pos} (note the subscript “pos” is upright).
- In Eqn (1), T\textsubscript{PFL} is the transmissivity of flowing fractures detected with the PFL method (m\textsuperscript{2}/s). Q is the transverse flow rate (m\textsuperscript{3}/s), r\textsubscript{c} denotes the radius of influence (m), r\textsubscript{w} the well radius (m), and Δh the imposed head (m):

\[
T_{PFL} = \frac{Q}{2\pi \Delta h} \ln \left(\frac{r_c}{r_w}\right)
\]

- In Eqn (2), E\textsubscript{p} is the average squared difference between measured and predicted groundwater levels, n\textsubscript{i} is the number of records, h\textsubscript{p}\textsubscript{i+1} is the predicted groundwater level at time i+1, and h\textsubscript{m}\textsubscript{i+1} is the measured groundwater level at time i+1:

\[
E_p = \frac{1}{n_i} \sum_{i=1}^{n_i} (h_{p,i+1} - h_{m,i+1})^2
\]

- In Eqn (3), R\textsubscript{i} is the accumulative monthly rainfall at time t (months), M\textsubscript{i,j} is rainfall (mm) in month i, which corresponds to the j-th month of the year, and M\textsubscript{j} is the mean monthly rainfall (mm) for the j-th month of the year:

\[
R_i = \sum_{j=1}^{i} (M_{i,j} - M_j)
\]

- Here is an example of an equation containing the functions f(x) and g(x), written within lines of text. The equation is y = f(x) + g(x), and it is written according to the normal guidelines.

- In Eqn (4), h is the piezometric head [L], q is the Darcy flux vector [L T\textsuperscript{-1}] and K is the tensor of hydraulic conductivity for the saturated medium [L T\textsuperscript{-1}]:

\[
q = -K \cdot \nabla h
\]
Figures

Initial submittal/s for technical review:
Figures must be embedded into one manuscript file (.doc or .docx), with a figure caption placed beneath each figure.

Final submittal: Each figure (without caption) must be in a separate file (i.e. separate from the main text file). The figure captions must be listed at the end of the text file. The acceptable resolution of electronic images depends on the type of figure. Files in TIF, TIFF, EPS, AI and PDF are preferred but some others are acceptable. See Appendix 2.3.

Figures should be cited in the text in consecutive numerical order (Fig. 1, Fig. 2, etc.). If there is an appendix and it contains one or more figures, continue the consecutive numbering of the main text.

Figure content:
- A country map is required for all studies, locating the study area. Adjacent countries must be located and named. This also applies to large countries, such as China and Russia, and to USA (which must show adjacent countries, not just states). For borders that are disputed, authors must provide a map that delineates and labels nations/regions that are internationally accepted.
- Maps must show locations of any significant places/sample points, etc. cited in the text or tables.
- Rivers should be marked as “River Xyz”, “Riv. Xyz” or “R. Xyz”, preferably in dark blue.
- On every map, include a metric scale bar and a north arrow, or latitude-longitude.
- For graphs, all axes should be labeled with appropriate metric/SI units. Use circles or boxes as coordinate points in graphs.
- Labels/data in figures should match the relevant text.
- Labels/data should be legible and adequately sized, preferably in black (see Appendix 2.3). Labels must be in English.
- An explanation of all symbols is preferred within the figure, rather than in the caption. Symbols/shading should be adequately sized/matched in the figure itself and the legend. Head the legend as “Legend” or “Explanation”.
- Rotated labeling (e.g. axes for graphs) or lettering (e.g. within maps) should read from left to right when the paper is turned clockwise by 90 degrees.

Figure captions:
- For each figure, supply a figure caption describing accurately what the figure depicts. Figure captions begin “Fig.” followed by the figure number (Arabic numeral), in bold type.
- Any terms in the caption that describe internal items in the figure (except mathematical terms) should be italicized, e.g. The yellow stars indicate data points…
- Figure parts should be denoted by lowercase letters (a, b, c, etc.) and explained by parts in the caption.
- Identify previously published material with a reference citation (see Appendix 4).

Examples:

![Geological map of Serra da Estrela mountain region](image)

Legend
- **Cenozoic Sedimentary Cover**
  - Alluvia
  - Glacial and fluvio-glacial deposits
  - Arkosic sandstone
- **Precambrian-Cambrian Metasedimentary Rocks**
  - Quartzite and schist
  - Siltstone, graywacke, metaconglomerate, migmatisite and greisses
- **Variscan Granitic Rocks**
  - Granite, medium to coarse grained with megacrystals
  - Granite, medium to fine grained essentially biotite
  - Gneiss, migmatisite and gneissic granite

- Water courses
- Town
- Place of interest
- Sierra da Estrela limits

Fig. 1 Geological map of Serra da Estrela mountain region (adapted from Oliveira et al. 1992). *BVMFZ* stands for Bragança-Vilarica-Manteigas fault zone.
Fig. 2 Scatterplots of $K_h$ versus $K_v$ derived from laboratory measurements of the 100-cm³ steel-ring core samples for: (a) the upper aquifer units of the Quaternary (Q), Mol Upper (MU) and Lower (ML), and Kasterlee Sands (KS); (b) the Kasterlee Clay aquitard; (c) the lower aquifer units of Diest Clayey Top (DCT) and the Diest Sands (DS).

### Tables

Tables should be cited in the text in consecutive numerical order (e.g. Table 1, Table 2, etc.). Table parts (1a, 1b, etc.) are not permitted. If there is an appendix and it contains tables, continue the consecutive numbering of the main text.

**Table content and captions:**

- **Numerals and units.** In particular, note that the decimal sign is a full point (period), not a comma.
- Use only horizontal labels for column headers and rows/subheadings.
- Insert hyphens in cells to indicate the unavailability or inapplicability of data.
- Table footnotes should be numbered consecutively and indicated by superscript lowercase letters (or asterisks for significance values and other statistical data) and included beneath the table body.
- For each table, supply a table caption that explains clearly and concisely the components of the table.
- Any terms in the caption or table footnotes that describe internal items in the table should be italicized (however, do not adjust mathematical terms in this way).
- Identify any previously published material by giving the original source in the form of a reference citation in the table caption.

**Example:**

**Table 1** Proportioning of total pumping rate for multiple well screens in WW2 (from Bridger and Allen 2010)

<table>
<thead>
<tr>
<th>Screen No.</th>
<th>Screen depth (m)</th>
<th>Screen length (m)</th>
<th>% Screen length</th>
<th>Non-layered domain</th>
<th>Layered domain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flow rate (m³/day)</td>
<td>Average $K^a$ (m/s)</td>
</tr>
<tr>
<td>1</td>
<td>33.2–36.2</td>
<td>3.0</td>
<td>23.1</td>
<td>571.1</td>
<td>4.1x10⁻⁴</td>
</tr>
<tr>
<td>2</td>
<td>38.1–41.1</td>
<td>3.0</td>
<td>23.1</td>
<td>571.1</td>
<td>2.0x10⁻⁴</td>
</tr>
<tr>
<td>3</td>
<td>50.2–54.2</td>
<td>4.0</td>
<td>30.8</td>
<td>761.5</td>
<td>3.5x10⁻⁴</td>
</tr>
<tr>
<td>4</td>
<td>57.2–60.2</td>
<td>3.0</td>
<td>23.0</td>
<td>571.1</td>
<td>1.5x10⁻⁴</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>13.0</td>
<td>100</td>
<td>2,474.8</td>
<td>-</td>
</tr>
</tbody>
</table>

$^a$ Average $K$ obtained based on average of Hazen $K$ values from grain size results within screened interval

$^b$ % Screen length for Layered domain calculated by multiplying the length of screen section by the average hydraulic conductivity value within the screen section divided by the total length
APPENDIX 1: HYDROGEOLOGY JOURNAL - ARTICLE TYPES and PAGE LENGTH

Hydrogeology Journal’s scope includes contributions on any aspect of scientific hydrogeology and related disciplines from authors in any part of the world (for scope, see http://www.springer.com/hydrogeologyjournal). An article based on supporting disciplines is acceptable if a primary emphasis is also on or dependent upon hydrogeology – the study of the interaction of subsurface water with the solid earth.

For article types that have no maximum page limit, manuscripts will be returned to authors if they exceed a length that seems necessary to convey the science adequately. Guidance on the typical or maximum page length is given below for each article type. If there are no figures, tables or internal headings, one "article page" will occupy approximately 6,000 characters with spaces (approximately 1,000 six-letter words). FOR ALL MANUSCRIPTS, subtract 3,000 characters (500 words) for the first-page layout (contact details, white space, etc.) – subtract more if there are several co-authors. Thereafter, the following estimates can be subtracted from the total character/word count:

- A whole page figure/table replaces approx. 6,000 characters (1,000 words)
- A full width, half page-height figure/table replaces approx. 3,000 characters (500 words)
- A full width, quarter page-height figure/table replaces approx. 1,500 characters (250 words)
- A half width, half page-height figure/table replaces 1,500 characters (250 words)
- A half width, quarter page-height figure/table replaces approx. 750 characters (130 words).

Articles are classified into one of the following categories for publication:

- **Paper**: An article concerning new scientific results of general interest, or an article that applies innovative techniques to evaluate the hydrogeology of an area, or a regional or subject-oriented review, or a pedagogic 'Foundations’ article. Invited special issue articles (often expressing the state of science) are usually Papers. Typically 10 article pages (abstract required, max 250 words).
- **Report**: An article that applies conventional techniques to evaluate the hydrogeology of an area, or an article that gives a description of the hydrogeology of an area. Typically 10 article pages (abstract required, max 250 words).
- **Technical Note**: A short article that describes innovative techniques of data collection or analysis. Typically less than 10 article pages (abstract required, max 250 words).
- **Profile**: A biographical sketch of an eminent hydrogeologist (retired or deceased), describing his or her contributions to the science. Permission must be sought from the profile subject (or their family) before the manuscript is submitted. Typically 6 article pages.
- **Comment and Reply**: A discussion related to an article published in the journal within the last two years. Maximum 4 article pages.
- **Essay**: A very short article giving the author’s view on a technical or philosophical subject related to hydrogeology. Maximum 4 article pages (abstract required, max 80 words).

For advice on or proposals related to special issues and topical collections, please contact the Executive Editor: cvoss@usgs.gov

APPENDIX 2: MANUSCRIPT PREPARATION (further information)

### 2.1 Keywords

Keywords are subject index terms. A maximum of five keywords is permitted. The following is a list of the most commonly used keywords.

- Agriculture
- Analytical solutions
- Aquitard
- Arid regions
- Arsenic
- Artificial recharge
- Biological conditions
- Bioremediation
- Carbonate rocks
- Chlorinated hydrocarbons
- Climate change
- Coastal aquifers
- Comment
- Compaction
- Conceptual models
- Confining units
- Contamination
- **[country or region name]**
- Crystalline rocks
- Developing countries
- Diffusion
- Drilling
- Earthquake
- Ecology
- Editorial
- Equipment/field techniques
- Fractured rocks
- Foundations (pedagogy)
- General hydrogeology
- Geographic information systems
- Geologic fabric
- Geomorphology
- Geophysical methods
- Geostatistics
- Groundwater age
- Groundwater density/viscosity
- **Agriculture**
- **Analytical solutions**
- **Aquitard**
- **Arid regions**
- **Arsenic**
- **Artificial recharge**
- **Biological conditions**
- **Bioremediation**
- **Carbonate rocks**
- **Chlorinated hydrocarbons**
- **Climate change**
- **Coastal aquifers**
- **Comment**
- **Compaction**
- **Conceptual models**
- **Confining units**
- **Contamination**
- **[country or region name]**
- **Crystalline rocks**
- **Developing countries**
- **Diffusion**
- **Drilling**
- **Earthquake**
- **Ecology**
- **Editorial**
- **Equipment/field techniques**
- **Fractured rocks**
- **Foundations (pedagogy)**
- **General hydrogeology**
- **Geographic information systems**
- **Geologic fabric**
- **Geomorphology**
- **Geophysical methods**
- **Geostatistics**
- **Groundwater age**
- **Groundwater density/viscosity**
- **Agriculture**
- **Analytical solutions**
- **Aquitard**
- **Arid regions**
- **Arsenic**
- **Artificial recharge**
- **Biological conditions**
- **Bioremediation**
- **Carbonate rocks**
- **Chlorinated hydrocarbons**
- **Climate change**
- **Coastal aquifers**
- **Comment**
- **Compaction**
- **Conceptual models**
- **Confining units**
- **Contamination**
- **[country or region name]**
- **Crystalline rocks**
- **Developing countries**
- **Diffusion**
- **Drilling**
- **Earthquake**
- **Ecology**
- **Editorial**
- **Equipment/field techniques**
- **Fractured rocks**
- **Foundations (pedagogy)**
- **General hydrogeology**
- **Geographic information systems**
- **Geologic fabric**
- **Geomorphology**
- **Geophysical methods**
- **Geostatistics**
- **Groundwater age**
- **Groundwater density/viscosity**
2.2) Electronic supplementary material (ESM)

ESM is published only online and it is linked to the main article, without it appearing in the main article. Journal subscribers will have access to this additional material. Such material might include:

- information that cannot be printed: animations, video clips, sound recordings;
- information that is more convenient in electronic form: sequences, spectral data, etc;
- large original data, e.g. additional tables and illustrations, and supplementary text that would make the main article too long.

The ESM should not contain programs that might need updating at a later stage. Links to other websites may be provided for such codes.

The text must make specific mention of the ESM material as a citation, similar to that for tables and figures.

ESM submission: Include in each ESM file submitted the following information: article title, author names, “Electronic supplementary material – Hydrogeology Journal”, and the affiliation and e-mail address of the corresponding author. To accommodate user downloads, please keep in mind that larger-sized files may require very long download times and that some users may experience other problems during downloading; however, where file size is not large, keep ESM figures/text in one file (or in as few files as possible).

ESM files and formats: Submit the ESM text and presentations in PDF format, because .doc, .docx or .ppt files are not suitable for long-term viability. Remove any line numbering before saving as PDF. A collection of figures and/or tables should be combined in one PDF file. For audio, video and animations, always use MPEG-1 (.mpg) format, with max file size 25 GB. Specialized formats such as .pdb (chemical), .wrl (VRML), .nb (Mathematica notebook), and .tex can also be supplied. Name the submitted ESM files consecutively, e.g. “ESM1.mpg”, “ESM2.pdf”. By special arrangement, it is possible to collect multiple files in a .zip or .gz file that will be posted as the single permanent ESM file online.

Spreadsheets should be converted to PDF if no reader interaction with the data is intended. If the readers are being encouraged to make their own calculations, spreadsheets should be submitted as .xls or .xlsx files (MS Excel). However, ESM should not contain programs that might need updating in the future (place these programs on a cit but separate website).

For each item in the ESM file (figure, table, etc.), supply a concise caption describing the content. Captions should be located at the top of tables and at the bottom of figures. Use a consecutive numbering system beginning with number 1 (unrelated to the numbering system in the main article). Begin with “Fig. S1”, “Table S1”, etc.

2.3) Artwork specifications

Figures

- Initial submittal and all submittals during the technical review process: Figures should be created as for the final submission (see instructions below) and must then be embedded, in sequential order, as objects into the body of the manuscript file (Word .doc or .docx), or placed together in sequence at the end of the manuscript text. Figures may not be created within the manuscript file itself as Word artwork (i.e. figures must be created externally to the manuscript file). Use the Word facility to compress embedded figures to help reduce total file size. It is required that a caption is placed beneath each figure in the manuscript file, as this helps the reviewers.

- Line art: Each figure (without caption) must be on a separate file. For vector graphics, the preferred formats are EPS, PDF, or PDF for halftones; use TIF or TIFF format. Most MS Office files are also acceptable for figures, except .xls, .xlsx and .ppt. Vector graphics containing fonts must have the fonts embedded in the files. Name the individual figure files with "Fig" and the two-digit figure number, then the graphic format, e.g. Fig04.eps.

- Halftone art (photographs, drawings, paintings with fine shading, etc.): If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves. Halftones should have a minimum resolution of 300 dpi.

- Combination art (a combination of halftone and line art, e.g. halftones containing line drawing, extensive lettering, color diagrams): Combination artwork should have a minimum resolution of 600 dpi.

- Color art is published free of charge. Color illustrations should be submitted as RGB (8 bits per channel).

- Figure lettering: To add lettering, it is best to use Helvetica or Arial (non-serif fonts). Keep lettering consistently sized for groups of features throughout the final-sized artwork; the best sizes in the final figure that appears in a single column (there are two columns on each page) or across a page (see Figure placement and size) are about 2–3 mm (8–12 pt). Variance of type size within an illustration should be minimal, e.g. do not use 8-pt type on an axis and 20-pt type for the axis label. Avoid effects such as shading, outline letters, etc. Do not include titles or captions in the illustrations.

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APPENDIX 3: PUBLICATION PROCEDURE

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