Hydrogeology Journal
Instructions for Authors

Hydrogeology Journal is the official journal of the International Association of Hydrogeologists (IAH).

The full content of *Hydrogeology Journal* is available to IAH members or subscribers; non-subscribers can view summary content and abstract pages and they may get full content of articles that have been published with open access, or they may purchase articles via SpringerLink (http://www.springer.com/hydrogeologyjournal).

Groundwater professionals and others may submit relevant manuscripts to *Hydrogeology Journal* for publication consideration. Manuscript acceptance for publication in *Hydrogeology Journal* is not dependent on author having IAH membership.

All authors can choose to publish their article *either* subscription based (at no cost to authors) *or* open access through Springer Nature's Open Choice program (at a cost to authors). IAH members have the opportunity to publish open access articles at a significantly lower cost than non-members.

Hydrogeology Journal is central to the IAH mission – to further the understanding, wise use and protection of groundwater resources throughout the world. Also, freely available on the IAH website is a regular news update on congresses and on worldwide groundwater matters, and a variety of learning resources. For further information, and to view IAH membership and sponsorship benefits, visit http://www.iah.org.

GENERAL GUIDELINES

Please study the guidelines given below before submitting your manuscript to *Hydrogeology Journal*.

The journal's aims and scope are given at: https://www.springer.com/journal/10040/aims-and-scope.

The types of articles published in *Hydrogeology Journal* are described in *Appendix 1* and some formatting and content specifications given in *Appendix 2* (keywords, artwork, etc.). The peer review process, publication procedure and open access arrangements are described in *Appendix 3*, and legal requirements are found in *Appendix 4*.

There are no submission or price-per-page fees, and no fee for use of color.

Rules regarding manuscript content, multiple simultaneous reviews, and prior publication:

- The content of a submitted manuscript (in its entirety or any major part)
  - may not have been published before,
  - may not be under consideration for publication anywhere else when initially submitted to *Hydrogeology Journal*, and,
  - following submittal to *Hydrogeology Journal*, may not be submitted for consideration of publication anywhere else until a final publication decision concerning this manuscript has been made by the Editors of *Hydrogeology Journal*.

- A manuscript that has had prior online publication (in its entirety or any major part) with a digital object identifier (DOI) may not be submitted to *Hydrogeology Journal*.
  - Prior publication is defined as occurring when a manuscript (in its entirety or any major part) is published online with a DOI, because the DOI provides a permanent web address for the publication.

- In particular, a manuscript that has had prior publication as a preprint with a DOI may not be submitted to *Hydrogeology Journal*.
  - Authors who wish to receive helpful review comments on their manuscript to aid in improving it before submitting the manuscript to *Hydrogeology Journal* are encouraged to personally request helpful reviews from their colleagues or from their scientific contacts, and authors should not do this by publishing the manuscript as a preprint with a DOI.
  - The only exception to this requirement is for chapters of student theses that have been published by their university on the university's website with a DOI. Students are allowed to submit the same or similar content to *Hydrogeology Journal* that has been published on their university's website.

Text format and style:

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

- Text must be written in English.
- Do not use first-person narrative or personal pronouns (except in Editor Messages).
- 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 Word table function, not spreadsheets, to make tables.

Instructions for creating the typical components of a submitted manuscript (*examples are shown in italic font***):**

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. Voss[1]*, Craig T. Simmons[2], Neville I. Robinson[2]* 1. *International Association of Hydrogeologists (IAH), PO Box 4130, Reading, RG8 6BJ, UK* *Email: HJ.Editor.CVoss@gmail.com* 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., 'corresponding author' as recorded in the manuscript processing system) should be set at first submittal. • Large Language Models (LLMs), such as ChatGPT, do not currently satisfy *Hydrogeology Journal* authorship criteria. Notably an attribution of authorship carries with it accountability for the work, which cannot be effectively applied to LLMs. Use of a LLM should be properly documented in the Methods section.
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 approximately 80 words (see *Appendix 1*). The first sentences should state the importance of the work, 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 are translated into Chinese, French, Portuguese and Spanish by hydrogeologists appointed by the editorial team. Translation to approximately 40 other languages is possible, if such translations are provided by the author. In this case, 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.
Keywords (These are for indexing purposes)	*Example: Analytical solutions · Numerical modeling · Karst · Switzerland* • Include the name of a country or multi-country region, when appropriate. • Provide up to five keywords. At least two keywords must come from the standard keywords list (see *Appendix 2.1*).

Text body Use the decimal system of numbered headings with no more than three levels to organize your sections of text. An example of appropriate structure is given here	*Typical sections: (Note: Footnotes and headers/footers are not permitted in the text.)* **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 Examples for numbering of sub-sections*** ***2.1.1*** ***2.1.2*** *etc.* • This section provides enough information to permit repetition of experimental or analytical work. • For location-based studies, provide a description of the study area and include a hydrogeological location map (HLM) and detailed study area map (SAM). HLM and SAM content and format are described in the Figures section of these author instructions. • Use of a Large Language Model (LLM) to create content of the study being presented in this manuscript (such as analysis and/or interpretation) must be properly documented in this Methods section. If a Methods section is not available, use of an LLM must be documented in another suitable part of the manuscript. **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. It is appropriate to acknowledge oral communications and the contributions of reviewers and editors. **Funding Information and Conflicts of Interest** • The names of funding organizations should be written in full. In this section of the text, authors must disclose any commercial or other associations that might pose a conflict of interest in connection with the submitted material. **Appendices** (optional). Appendix 1, Appendix 2, etc. **References** (see *References* and *Citations*)
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) Unpublished works should only be mentioned in the text (see *Citations*) References-list entries should be alphabetized by the	Types (*and examples*): Journal article: *Burns ER, Bentley LR, Therrien R, Deutsch CV (2010) Upscaling facies models to preserve connectivity of designated facies, Hydrogeology J. 18(6):1357-1373, https://doi.org/10.1007/s10040-010-0607-z* Article by DOI: *Voss CI, Duncan SM (2012) Editors' Message: Online re-publication of legacy articles on the occasion of Hydrogeology Journal's 20th anniversary,1992–2012, Hydrogeology J. https://doi.org/10.1007/s10040-012-0928-1* Book: *Taniguchi M, Holman IP (2010) Groundwater Response to Changing Climate. CRC Press* Book chapter: *Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York. p 230-257*

family name of the first author of each work	Online document or website: *Example:* *USGS (2012) Water Science Glossary, US Geological Survey, Water Science School, https://www.usgs.gov/special-topics/water-science-school/science/water-science-glossary Accessed 1 Dec 2013* • 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-ltwa/ • If the reference title is given in a language other than English, include the English translation in parentheses immediately following the title.
Citations	• Cite published references in the text by the first-author name and year in parentheses. *Examples:* - *Negotiation research spans many disciplines (Thompson 1990).* - *This effect has been widely studied (Abbott 1991; Barakat et al. 1995; Kelso and Smith 1998).* • 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).* • Online documents and websites should also be cited in the text using the first-author name and year in parenthesis, e.g. (USGS 2012). Details, including the website URL, should be given in the References section. • 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*).
Language and style In Word, set the language to English (UK or US)	• All articles are published in English. • If English is not your native language, please seek assistance from native-English-speaking hydrogeologists (including coauthors) before engaging a commercial editorial service (that has a cost); such commercial services should be your last resort. Technical reviewers are instructed to equally consider the technical content and organization of manuscripts from authors who are not fluent in English. However, a manuscript will have swifter progress toward publication if it has already received English-language help from suitable native-English-speaking hydrogeologists or related specialists. Once provisionally accepted, *Hydrogeology Journal's* Technical Editorial Advisor and technical editorial support staff, and then Springer copy editors, will further edit the English of the 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: o proper names, e.g., Amazon River, Aswan Dam, the Earth; o adjectives derived from proper names, e.g., Markov series; o *formal* geological eras, formations, etc., e.g., Cambrian, early Holocene, Upper Greensand; and, o references to tables and figures, e.g., "It is seen from Fig. 2 and Table 3 that ...".

Numerals and units These instructions apply to all components of the manuscript (text, tables, figures, electronic supplementary material (ESM), etc.)	• Use numerals before units of measurement unless the number is at the beginning of a sentence, e.g., "Fifty-milliliter samples were taken every 10 s …". • Leave a character space between the number and its unit, but not for the following types of units: percentage, angle units, degrees, minutes and seconds (these should not have a blank space after the number), e.g., 531 m, 24 °C, 40%, 90°, 50 mg/L or 50 mg L^{-1} • Numbers from one to nine should be spelled out, except where there are units or the number implies arithmetic 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 these forms: 20–23 October 1980, the 1950s, 17th century. • Numbers with orders of magnitude should use 10^{power}, e.g., 1.234×10^{-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, e.g., mg/L or mg L^{-1} (not both). • Compound units are separated from each other by a "/" indicating division or a space indicating multiplication, e.g., "m^3/s" for division and "m s" for 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 on either side of the long dash. • Units should not be repeated in ranges, e.g., "0–213 °C", "from 822 to 900 km^2".

Equations and mathematical terms

Use the Word equation editor or another equation editor that works in Word (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

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:

- Use the standard mathematical notation for formulae, symbols, etc. Multiplication should not be represented with an asterisk; alternatives include: AB or A B, or (A)(B)
- Use *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_{ij}, b_k).
- Use upright for numbers themselves and for symbols that do not act as containers for other values. The typical running index "i" (between 0 and 3, for example, $i = 0, 1, 2, 3$) is set in *italic*, and the numbers are upright.
- Use upright for numerals, operators and punctuation, and for commonly defined functions and abbreviations, e.g., cos, det, e or exp, lim, log, 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_1; Darcy velocity in the x direction, q_x).
- For vectors and tensors, use bold and upright (e.g., $\mathbf{v}$).
- 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 3×3 matrix" or "a $n \times m$ matrix". Matrix determinants can be represented using straight vertical lines $|B|$ or as "det B". For example, note the use of bold, italic and upright in the hydraulic conductivity matrix:

$$\mathbf{K} = \begin{bmatrix} k_{xx} & k_{xy} \\ k_{xy} & k_{yy} \end{bmatrix}$$

- A multi-letter abbreviation (e.g., RMSE) must be presented as upright, even when it represents a value. Use single-letter variables (with superscripts or subscripts, if necessary, e.g., E_{RMS}) wherever possible.
- Use centered dots to substitute for operators used in a range, such as "+" and "×" (e.g., $x_1 + x_2 + \cdots + x_3$) and use line dots to replace commas (e.g., a_i, where $i = 0, 1, \ldots, n$).
- For compound parentheses, apply the general hierarchy $\langle\{[(\quad)]\}\rangle$.

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 like: X_{pos}, d_{pos} or t_{pos} (Note that the subscript "pos" is upright.)
- In Eqn (1), T_{PFL} is the transmissivity of flowing fractures detected with the PFL method (m^2/s), Q is the transverse flow rate (m^3/s), r_e denotes the radius of influence (m), r_w is the well radius (m), and Δh is the

imposed head (m):

$$T_{\mathrm{PFL}} = \frac{Q}{2\pi\Delta h}\ln\left(\frac{r_{\mathrm{e}}}{r_{\mathrm{w}}}\right) \quad (1)$$

- In Eqn (2), E_{p} is the average squared difference between measured and predicted groundwater levels, n_{r} is the number of records, h^{p}_{i+1} is the predicted groundwater level at time i+1, and h^{m}_{i+1} is the measured groundwater level at time i+1:

$$E_{\mathrm{p}} = \sqrt{\frac{\sum_{i=1}^{n_{\mathrm{r}}}\left(h^{\mathrm{p}}_{i+1} - h^{\mathrm{m}}_{i+1}\right)^2}{n_{\mathrm{r}}}} \quad (2)$$

- In Eqn (3), R_t is the cumulative monthly residual rainfall (mm) at time t (months), $M_{i,j}$ is rainfall (mm) in month i, which corresponds to the j-th month of the year, and $\overline{M_j}$ is the mean monthly rainfall (mm) for the j-th month of the year:

$$R_t = \sum_{i=1}^{t}(M_{i,j} - \overline{M_j}) \quad (3)$$

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

$$\mathbf{q} = -\mathbf{K} \cdot \nabla h \quad (4)$$

- Here is an example of an equation containing the functions $f(x)$ and $g(x)$ that is written within lines of text:

"The equation is $y = f(x) + g(x)$, and it is written according to the normal guidelines."

Tables

Tables should be in original Word (.doc or .docx) table format (not as imported objects or spreadsheets)

Tables in Excel format (.xls or .xlsx) are not permitted

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:

- When placing numbers in a table, carefully follow the instructions found in the '**Numerals and units**' section. 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.
- Do not emphasize data entries with bold, shading or color. For emphasis, use italic and define this usage in the caption or a table footnote.
- Insert hyphens in cells to indicate the unavailability or inapplicability of data.
- Table footnote markers should be consecutive (top left to lower right) using superscript lowercase letters a, b, etc. (or asterisks for significance values and other statistical data). These markers must be explained beneath the table body.
- For each table, supply a table caption (i.e., table title) 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)

Screen No.	Screen depth (m)	Screen length (m)	% Screen length	Non-layered domain	Layered domain		
				Flow rate (m^3/day)	Average *K* [a] (m/s)	% Screen length [b]	Flow rate (m^3/day)
1	33.2–36.2	3.0	23.1	571.1	4.1×10^{-4}	13.4	331.4
2	38.1–41.1	3.0	23.1	571.1	2.0×10^{-3}	66.4	1,643.4
3	50.2–54.2	4.0	30.8	761.5	3.5×10^{-4}	15.3	378.8
4	57.2–60.2	3.0	23.0	571.1	1.5×10^{-4}	4.9	121.2
Total	-	13.0	100	2,474.8	-	100	2,474.8

[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

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 and PDF are preferred but some others are acceptable. See *Appendix 2.3*

Hydrogeological location map and study area map:

- *Hydrogeology Journal* (*HJ*) articles that concern one or more particular locations must include
  (**a**) an overall hydrogeological location map (HLM) and
  (**b**) a detailed study area map (SAM).
  The purpose of the HLM is to give readers a quick and easy impression of the location of the study area(s) on Earth that provides the large-scale hydrogeological setting for scientific purposes. The HLM is often shown as an inset on the SAM.

- Because groundwater systems mostly occur below land, land area is the focus of *HJ*; thus, the HLM shows the adjoining land area surrounding the study area(s). To provide a geographic context, the HLM extends to the on-land borders of the relevant part of the location country and also includes the closest portion of any *neighboring* countries.

- The HLM is *not* a political map of all the location country's territories. Offshore borders of countries are not shown in HLMs, nor are distant disconnected parts of the study-area location country, such as islands. For study areas on remote islands, only the island (or island group) is shown in the HLM.

- Regions/locations that are mentioned in the text or tables should be labelled in the HLM or SAM.

- In the HLM and/or SAM, authors should show:
  - on-land borders of relevant parts of the studied country and the on-land borders between neighboring countries in that region, with labels for the neighboring country names using either their full names or codes (see links below)
  - geographic features of interest, such as rivers, nearby seas, or mountain ranges, with name labels that will make it easy for readers to identify the location,
  - hydrogeological features or sections that assist in the explanation of the work, and,
  - metric scale bars and a north arrow, or, latitude-longitude.

- Because *HJ* is the journal of an international scientific organization that has members from all countries, *HJ*'s politically neutral publication policy requires that authors employ United Nations (UN) practices when creating their HLM. It means that authors may use only country names and borders that appear in UN maps and websites.

  This policy avoids the need for the journal to make political decisions for any manuscript, for example, regarding disputed country names and borders. This policy applies equally to all authors from all countries and regions of Earth.

  - For country or region names and for 3-letter country name codes (ISO-alpha3 code), authors should refer to the UN Statistics Division website that contains current standard country or area codes for statistical use (M49): https://unstats.un.org/unsd/methodology/m49/
  - For border lines, authors should refer to the current UN maps at https://www.un.org/geospatial/mapsgeo/generalmaps
  - Nevertheless, the UN does not give *official* endorsement or acceptance of names and borders, so the following disclaimer should be added to the figure caption *whenever a UN map is reproduced* (modify the list of links as appropriate):

    The boundaries and names shown and the designations used on the country map do not imply official endorsement or acceptance by the United Nations (map information based on https://unstats.un.org/unsd/methodology/m49/ and/or https://www.un.org/geospatial/mapsgeo/generalmaps).

- Some authors may disagree with parts of the country/region-name or border information that *HJ* requires (according to UN conventions). The following disclaimer, indicating use of UN practices, can be added to the figure caption:

  Following the Hydrogeology Journal policy, this map and the country/region names shown conform to the current practices of the United Nations and do not necessarily represent the jurisdictional convictions and opinions of the authors.

- *HJ* is the official journal of the International Association of Hydrogeologists (IAH), which seeks to maintain political neutrality, yet understands the sensitivity of country borders, names, and affiliations. Please contact the Executive Editor (HJ.Editor.CVoss@gmail.com) for clarification of the HLM policy in particular cases.

Example HLM:

Fig. 1 Location of the study area near Aachen, Germany (modified from Bruckmann and Clauser, 2020)

Other figure requirements:

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.

- 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 information given in 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.
- All contour labels should face in the up-gradient direction. Thus, any change in gradient can be easily seen by a change in orientation of the contour label on the contour line. Alternatively, all contour labels should be upright (not orientated in-line with the lines themselves).

Example graphic (next page)

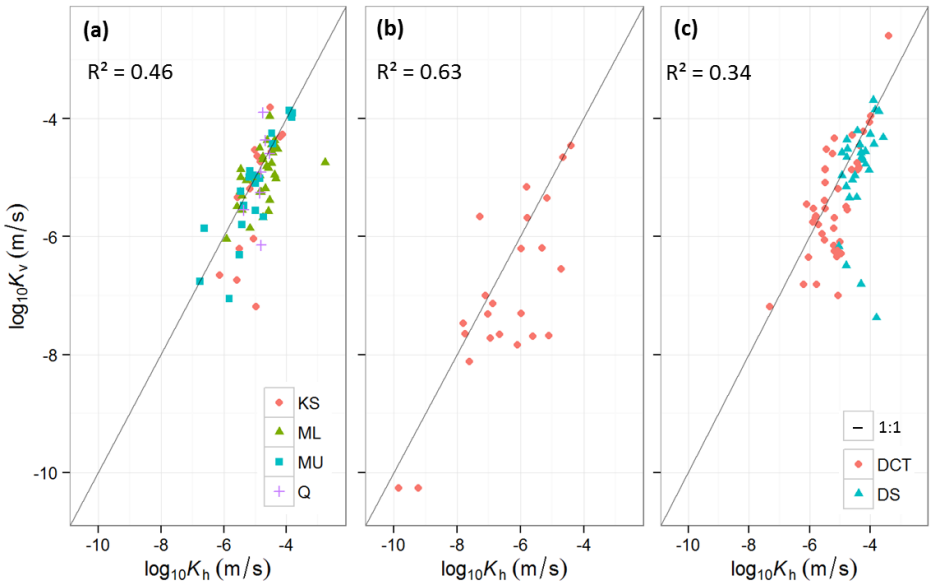

Fig. 2 Scatterplots of K_h versus K_v derived from laboratory measurements of the 100 cm³ steel-ring core samples for: **a** the upper aquifer units of the Quaternary (*Q*), Mol Upper (*MU*) and Lower (*ML*), and Kasterlee Sands (*KS*); **b** the Kasterlee Clay aquitard; **c** the lower aquifer units of Diest Clayey Top (*DCT*) and the Diest Sands (*DS*)

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), both 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 each part should be explained in the caption.
- Identify previously published material with a reference citation (see *Appendix 4*).

APPENDIX 1: ARTICLE PAGE LENGTH, ARTICLE TYPES, SPECIAL ISSUES AND TOPICAL COLLECTIONS

Overview of scope:
Hydrogeology Journal's scope includes contributions on any aspect of scientific and social hydrogeology and related disciplines from authors in any part of the world. 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 more-detailed information on *HJ*'s scope, please visit http://www.springer.com/hydrogeologyjournal.

Article length:
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 length in pages is given in the following section (**Article types**) 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.) – and 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).

Article types:
Articles are classified as 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 pedagogical 'Foundations' article. 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. Reports must contain interpretation as well as characterization. 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 of Eminent Hydrogeologist**
  A biographical-historical 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 or their executor) before the manuscript is submitted. Colleagues who are mentioned in the Profile article should also give consent. A letter of permission from each person mentioned should be submitted along with the manuscript. Typically, 6 article pages (no abstract required).

- **Essay**
  A *very short* article with quite flexible content, giving the author's views and opinion concerning a technical or philosophical subject related to hydrogeology. *Maximum* 6 article pages (abstract required, max 80 words).

- **Comment and Reply**
  A discussion related to an article published in the journal within the last two years. *Maximum* of 4 article pages (no abstract required).

Special issues and topical collections:
To discuss the possibility of organizing a **special issue** or **topical collection**, please contact the Executive Editor: HJ.Editor.CVoss@gmail.com

- **Special Issues**
  Special issues are focused on one general topic and include about 25 to 35 articles, including an introductory Preface that is written by the special issue Guest Editors who have been appointed by the Executive Editor.

- **Topical Collections**
  Topical collections may fill, at most, about one half of an issue, and consist of 4 to 15 articles that focus on one specific topic, including an introductory Essay that is written by the topical collection organizers who have been appointed by the Executive Editor.

APPENDIX 2: MANUSCRIPT PREPARATION (further information)

2.1) Keywords are subject index terms that are included with the submitted manuscript. Online searches for articles that concern a particular topic are often based on these keywords. A maximum of five keywords is permitted.

The following is a list of the most commonly used keywords. Authors are encouraged to select at least two keywords from this list. If needed, the authors may create new keywords that describe their article's content.

agriculture
alluvial aquifers
analytical solutions/modelling
aquifer properties
aquifer testing
aquitard
arid regions
arsenic
artificial recharge
biological conditions
bioremediation
capture zones
carbonate rocks
chlorinated hydrocarbons
clay rocks
climate change
CO2 sequestration
coastal aquifers
cold regions hydrogeology
compaction
conceptual models
confining units
contamination/contaminants
cryohydrogeology
crystalline rocks
data assimilation
decision making
developing countries
diffusion
dispersion
drilling
earthquakes
ecology
economics
emerging contaminants
environmental tracers
equipment/field techniques
evapotranspiration
fault hydrogeology
fluid dynamics
fluid-rock interaction
fractured/macroporous systems
fractured rocks
foundations (pedagogy)
general hydrogeology
geochemistry
geoethics
geographic information systems
geologic fabric
geomorphology
geophysical methods
geostatistics
geothermal systems
groundwater age
groundwater and society
groundwater density/viscosity
groundwater development
groundwater exploration
groundwater flow
groundwater hydraulics
groundwater management
groundwater monitoring
groundwater protection
groundwater recharge/water budget
groundwater remediation
groundwater sampling and monitoring
groundwater science communication
groundwater statistics
groundwater/surface-water relations
health
heterogeneity
history of hydrogeology
hydraulic fracturing
hydraulic properties
hydraulic testing
hydrochemical modeling
hydrochemistry
hydrogeomechanics
hyporheic zone
igneous rocks
injection wells
inverse modeling
island hydrology
isotopes
karst
laboratory experiments/measurements
landfills
landslides
legislation
lineaments
low-permeability media
machine learning
managed aquifer recharge (MAR)
matrix diffusion
metamorphic rocks
microbial processes
micro-organisms
mining
mountain hydrology
multiphase flow
nitrate
non-aqueous phase liquids (NAPLs)
numerical modeling
optimization
organizations
over-abstraction
paleohydrology
parameter estimation
participatory methods
permafrost hydrology
pore scale study
profile of eminent hydrogeologist
pumping/well test
radioactive isotopes
radon
rainfall/runoff
reactive transport
recharge
remote and satellite sensing
rural groundwater
salinization
salt-water/fresh-water relations
satellite imagery
scale effects
sea-level rise
sedimentary rocks
site characterization
socio-economic aspects
soil processes
solute transport
springs
stable isotopes
statistical modeling
stochastic hydrogeology
submarine groundwater discharge
subsidence
sustainability
tectonics
thermal conditions
tracer tests
transboundary aquifers
unconsolidated sediments
unsaturated zone
urban groundwater
vegetation/groundwater relations
viruses
volcanic aquifer
vulnerability
waste disposal
water-energy nexus
water-resources management
water supply
well enhancement
wetlands
[country or region name]

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. All those who have access to the articles in the journal 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,
- text sections that would make the main article too long, should these sections appear in the main article.

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

The text in the main article 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/tables/text in one file (or in as few files as possible).

ESM files and formats

- The author is creating the exact final content and appearance of all ESM material.
- 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 .mpg (MPEG-1) 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 with the Editor, 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 cited 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.

Final submittal:

- Each figure (without caption) must be in a separate file.
- For vector graphics, the preferred formats are EPS, AI and 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.

Formatting figure content:

- Line art (black and white graphic with no shading):
    - Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
    - All lines should be at least 0.1 mm (0.3 pt) wide.
    - Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
    - Vector graphics containing fonts must have the fonts embedded in the files.

- 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:
  - 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 lettering sizes in final figures that appear 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.

- Figure placement and size:
  - When preparing the figures, make the figures and their content large enough to be clearly visible.
  - Whenever possible, each figure must fit within a single column width. When this is not possible, fit the figure across a page.
  - One column width is 8.6 cm, and page width is 17.6 cm.

- Accessibility:
  - In order to give people of all abilities and disabilities access to the content of the figures, please make sure that all figures have descriptive captions. Blind users could then use text-to-speech software or text-to-Braille hardware to understand the content of a figure.
  - Try to use patterns instead of, or in addition to, colors for conveying information, so that color-blind users would then be able to distinguish the visual elements.

APPENDIX 3: PUBLICATION PROCEDURE

Publication speed

- For most scientific articles that must go through the full technical review process, the minimum time from initial submittal until formal online publication is about 6 months. Longer times are common, depending on the speed of the review process, on how quickly the author makes required revisions and resubmits their revised manuscript, and on whether additional rounds of revision are required.
- Manuscript types that, in some cases, may require less review, such as Editor Messages, Profiles and Essays, can be published online within a few months following initial submittal.

Manuscript submission

- Authors must submit their manuscripts to the online site: https://www.editorialmanager.com/hyjo. You may already have an account for *Hydrogeology Journal* in Editorial Manager, in which case, log in. If no account exists, click "Register Now" and follow the instructions given on the screen.
- The (i) first author and (ii) submitting author (i.e., the contact author in Editorial Manager) must be set before submittal. (Adding and/or deleting authors at revision stage requires permission from the Editor.)
- Upload your manuscript and enter email addresses for *all* authors.
- For submittal, the total manuscript size (including all text, tables, and figures) may not exceed 100 MB. Electronic supplementary material has no total size limit, and is not included in the total manuscript size.
- Include a cover letter, explaining how the content is in the scope of Hydrogeology Journal and/or how it is novel or interesting to the readership. Also provide any information that may be important for Editors and Reviewers to consider.

Scientific-technical (peer) review process

Initial review process

- Upon initial receipt of a manuscript, an Editor will make a preliminary judgment of acceptability for publication in *Hydrogeology Journal*.
- All promising articles within the journal's subject matter scope then undergo two or more independent scientific-technical reviews. The Editor selects an Associate Editor who oversees the review process.
- The completed (usually two) reviews are returned to the Editor with the Associate Editor's recommendation.

- The Editor then makes a publication decision and returns the reviewers' and Associate Editor's comments to the author, with the publication decision. This first decision usually takes at least 3 months from the time of initial submittal.
- The decision categories resulting from this review process are "provisional accept", "provisional accept following minor revisions", "provisional accept following major revisions", and "not accept".
- The decision is provisional (except for "not accept", which is a final decision) because final acceptance for publication depends on the success of the author(s) in making revisions that may be required as part of the subsequent technical editorial process (see next sections).
- The Editor also confirms or designates article type (see *Appendix 1*).

Revision process

- For the decision categories, "provisional accept following minor revisions" and "provisional accept following major revisions", the author must consider review comments, revise the manuscript accordingly, and submit the revised version online.
- Any discussion or disagreement of the author with review comments or questions about required revisions may be sent by e-mail to the Editor.
- The required parts of the resubmittal are
  (1) a complete list of author responses to each review comment made by the reviewers, Associate Editor and Editor,
  (2) the .docx revised manuscript file with tracked changes, and,
  (3) a clean version of the manuscript .docx file with all changes accepted.
- The length of time for this revision process depends on the speed with which the author makes revisions and resubmits (a maximum of 2 months is allowed for resubmittal).
  Please note: if within 2 months following the publication decision a revision is not submitted or if the author does not respond, the manuscript will be withdrawn from further consideration for publication.

- Following submittal of a revised manuscript by the author, the Editor, after reviewing the responses of the author to the review comments and the changes made to the manuscript, makes another publication decision (same categories as listed above).
  - Sometimes, the Editor will not immediately make a decision, because some additional reviews may be needed by the Associate Editor or by other reviewers.
- Once the Editor has made a decision, it is sent to the author.
- It is possible that the author may be requested to make additional revisions and submit again, or the Editor issues the "provisional accept" decision, and then the manuscript moves to the next stage of processing, described just below.

Technical editorial stage: editing for scientific expression, language and format

- Following receipt of a scientific review-process "provisional accept" decision from the Editor, the manuscript passes to *Hydrogeology Journal*'s Technical Editorial Advisor.
- The Technical Editorial Advisor undertakes or supervises a review of scientific expression, language and conformance to journal format and will correspond with the author concerning any required changes.
- Only editorial changes are made at this stage; authors may not make revisions that alter the technical arguments or data presented in the manuscript.
- Following satisfactory revisions, the Technical Editorial Advisor forwards the manuscript to the publisher (Springer Nature).
- The technical editorial process can take up to 2 months.

Acceptance by the publisher

- After receiving the final manuscript from the Technical Editorial Advisor, the publisher (Springer Nature), then issues the final decision, an "accept for publication" notification to the author.
- Upon acceptance by Springer, the manuscript receives a digital object identifier (DOI) and it can be cited, although it is still unpublished.

Final production phase

- The author will receive a link to the Author Query Application on Springer's web page, where the author must:
  - either, sign the Copyright Transfer Statement online (i.e., grant the publisher exclusive publication and dissemination rights, to ensure the widest possible protection and dissemination of information under copyright laws), which means the article is subscription-based and the author does not incur any fee for publication,
  - or, opt for Open Access via the Open Choice program, for which the author must pay Springer an Article Processing Charge. For more information on the fee, visit https://link.springer.com/journal/10040/how-to-publish-with-us#Fees%20and%20Funding. Please note that the discounted OA fee for IAH members only applies to papers having been submitted to the journal prior to December 12, 2024.
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- Proof reading by author: The proof is made available to the author.
  - This step allows the author to check for typesetting errors and for the completeness and accuracy of the text, tables and figures.
  - Substantial changes in content, e.g., new results, corrected values, title and authorship, are not allowed without approval; in such a case please contact *Hydrogeology Journal*'s Technical Editorial Advisor.
  - After online publication, further changes can only be made in the form of a Correction (erratum) which will be hyperlinked to the article.

- Publication:
    - The article will be published online (https://link.springer.com/journal/10040) after receipt of the corrected proofs.
    - This is the official first publication, citable with the DOI, and usually occurs within one month of "accept for publication" by Springer.
    - The online publication step takes about 1 month.
    - A few months later, the article will be selected for inclusion in a *Hydrogeology Journal* issue, which will be released online and in print. After release of the issue, the article can also be cited by issue and page numbers.

- Offprints/reprints/e-offprint PDF:
    - The submitting/contact author will receive a free e-offprint (this is a PDF file of the article, with "Author's personal copy" printed at the top of each page).
    - Paper versions of the article will incur a charge.

APPENDIX 4: LEGAL REQUIREMENTS

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- Any illustration from a published source, including tables, maps and diagrams, even when redrawn
- Any photograph – especially from a professional photographer – even if it is of yourself
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Informed consent
All individuals have individual rights that are not to be infringed. Individual participants in studies have, for example, the right to decide what happens to the (identifiable) personal data gathered, to what they have said during a study or interview, as well as to any photograph that was

taken. Hence it is important that all participants gave their informed consent in writing prior to inclusion in the study. Identifying details (names, dates of birth, identity numbers and other information) of the participants that were studies should not be published in written descriptions, photographs, and genetic profiles unless the information is essential for scientific purposes and the participant (or parent or guardian if the participant is incapable) gave written informed consent for publication. Complete anonymity is difficult to achieve in some cases, and informed consent should be obtained if there is any doubt. If identifying characteristics are altered to protect anonymity, authors should provide assurance that alterations do not distort scientific meaning.

The following statement should be included: "Informed consent was obtained from all individual participants included in the study."
If identifying information about participants is available in the article, the following statement should be included: "Additional informed consent was obtained from all individual participants for whom identifying information is included in this article".

4.2) Information on Springer Nature's publishing policies:

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