**GMD - Model description papers**

Model description papers are **comprehensive descriptions of numerical models** which fall within the scope of GMD. The **papers should be detailed, complete, rigorous, and accessible to a wide community of geoscientists.** In addition to complete models, this type of paper may also describe model components and modules, as well as frameworks and utility tools used to build practical modelling systems, such as coupling frameworks or other software toolboxes with a geoscientific application. The GMD definition of a numerical model is generous, including statistical models, models derived from data (whether model output or observational data), spreadsheet-based models, box models, 1-dimensional models, through to multi-dimension mechanistic models.

The **main paper must give the model name and version number** (or other unique identifier) **in the title.**

The publication should consist of **three parts: the main paper, a user manual, and the source code**, ideally supported by some summary outputs from test case simulations.

The **main paper should describe both the underlying scientific basis and purpose of the model and overview the numerical solutions employed**. The scientific goal is reproducibility**: ideally, the description should be sufficiently detailed to in principle allow for the re-implementation of the model by others, so all technical details which could substantially affect the numerical output should be described**. Any non-peer-reviewed literature on which the publication rests should be either made available on a persistent public archive, with a unique identifier, or uploaded as supplementary information.

**The model webpage URL, the hardware and software requirements and the license information should be given in the text.** If papers are describing subsequent development to a paper already published in GMD, authors should request them to be electronically linked to the previous version(s) in a special issue, and an overview webpage will be created.

The **model description should be contextualised appropriately**. For example, **the inclusion of discussion of the scope of applicability and limitations of the approach** adopted is expected.

**Examples of model output should be provided, with evaluation against standard benchmarks, observations**, and/or other model output included as appropriate. In this respect, **authors are expected to distinguish between verification** (checking that the chosen equations are solved correctly) **and evaluation** (assessing whether the model is a good representation of the real system). **Sufficient verification and evaluation must be included to show that the model is fit for purpose and works as expected**. Where evaluation is very extensive, a separate paper focussed solely on this aspect may be submitted.

**Code must be published on a persistent public archive with a unique identifier for the exact model version described in the paper** or uploaded to the supplement, unless this is impossible for reasons beyond the control of authors. **All papers must include a section, at the end of the paper, entitled "Code availability". Here, either instructions for obtaining the code, or the reasons why the code is not available should be clearly stated**. It is preferred for the code to be uploaded as a supplement or to be made available at a data repository with an associated DOI (digital object identifier) for the exact model version described in the paper. Alternatively, for established models, there may be an existing means of accessing the code through a particular system. In this case, there must exist a means of permanently accessing the precise model version described in the paper. In some cases, authors may prefer to put models on their own website, or to act as a point of contact for obtaining the code. Given the impermanence of websites and email addresses, this is not encouraged, and authors should consider improving the availability with a more permanent arrangement. Making code available through personal websites or via email contact to the authors is not sufficient. After the paper is accepted the model archive should be updated to include a link to the GMD paper.

When code cannot be made public, topical editors and reviewers must still be given access to the model code. Access must also be granted to the reviewers whilst preserving their anonymity, if this is legally possible.

**Although the source code and user manual will not be reviewed formally, the editors and reviewers are free to make general comments on the code if they so wish**. During the review process, the ease of model download, compilation and running of test cases may be assessed.