

NERC Model Metadata - Guidance Document

1. Introduction

The increasing interest within NERC and the wider environmental science community in the use of models to understand the interactions between systems has resulted in a greater focus on environmental modelling, and specifically on linking different models together to solve environmental problems.

Over recent years it has become increasingly apparent that to realise maximum benefit from the resource investment in environmental/earth science models it is necessary to record a rich level of model metadata information in order to allow others to identify and locate models of interest, and re-use existing models in their own work.

Accordingly the NERC Environmental Data Centres now require the submission of metadata about all models developed with NERC funding, for inclusion in this NERC model metadata portal <http://model-search.nerc.ac.uk>

(See below for information about how to submit metadata to the NERC Model Metadata Portal).

2. Model Metadata – Key Concepts

A recent NERC funded study (Hughes et. al, 2013) evaluated the requirements of researchers for model metadata and concluded that existing metadata schemes available (e.g. ISO19115) did not fully meet the requirements of modellers. Areas where there was a significant gap in meeting modellers requirements included particularly the provision of temporal information, and also in not providing sufficient information to assist in re-use of the model (e.g. details of boundary conditions, and links to relevant manuals and reports).

The model metadata scheme described here has been developed to address these concerns and provide a rich level of metadata to support modelling. This includes both “discovery” metadata required to help users discover and locate existing models, and “descriptive” (or “usage”) metadata which provides the necessary information required when making use of a model developed by another researcher.

Examples of the types of metadata which might be recorded could include the geographic bounding box of an area being modelled, and also the science discipline involved, together with information on the science question being addressed by the model, and links to reports or manuals describing how to use it. **A detailed list of the metadata attributes being captured is provided in Section 5. below.**

Two key principles which underlie the NERC model metadata scheme are the concepts of “model code” which refers to the computer code, algorithm or method used to construct the model and “model instance” – the application of the model code or algorithm to a particular geographic area or modelling scenario.

Typical attributes which are recorded for a model code are a name and description for the code, plus a link to where the code can be downloaded (if applicable) together with details of the computing environment. In the case of a model instance spatial location information can be recorded, together with information about the datasets actually used to build the model.

3. Submitting metadata to the NERC Model Metadata Portal

Currently metadata about NERC funded models should be entered into two spreadsheet templates, one for model code details, and one for model instance information, which can be downloaded from the NERC metadata Portal <http://model-search.nerc.ac.uk/metadata> . Should any help or advice be needed when completing these spreadsheets, please email ngdc@nerc.ac.uk in the first instance.

4. Searching for models using the NERC Model Metadata Portal

The NERC model metadata portal provides several search options:

- [Search by subject](#)
- [Search by location](#)
- [Search by model code](#)
- [Search by application](#)

5. Metadata Concepts and Attribute Descriptions

Metadata Concept	Attributes Recorded
Model Code	Name by which the model code is known
	Description of what the model code does
	Purpose for which the model code is designed (constrained by a vocabulary)
	Type of model (constrained by a vocabulary)
	Link to a URL where the code can be downloaded (if available)
	Minimum time step
	Maximum time step
	Version of the model code (e.g. 1.01)
	Date of publication of the model code
	Mathematical basis of the code (constrained by a vocabulary)
Model Documentation	Title of the paper/report
	Flag to indicate whether the paper/report is published
	URL link to the paper/report (where available)
	Digital Object Identifier to a published paper/report
	List of authors
	Year of publication
Model Code Parameters	Details of the paper/report
	Name parameter (e.g. ground water level etc.)
Computing Environment	Flag field to indicate whether the an input or output parameter
	Code language (e.g. C++, Fortran etc., constrained by a vocabulary)
	Details of the compiler used to compile the code (if relevant)
	Operating system used (constrained by a vocabulary)
	Details of the CPU required to run the code
	Required system memory
Contact Details	Comments field
	Contact Name
	Country
	Email address

Metadata Concept	Attributes Recorded
	Organisation name
Model Instance	Model instance title
	Model instance abstract
	Maximum vertical extent of model instance
	Minimum vertical extent of model instance
	spatial reference system (constrained by vocabulary)
	Vertical datum (e.g. mean sea level) constrained by vocabulary
	Vertical scope (constrained by vocabulary)
	Publication date of the model to which this metadata refers
	Start date of the period which the model represents
	End date of the period which the model represents
	Temporal reference system (constrained by vocabulary)
	Completion status of the metadata (e.g. partial or complete)
	Alternative title (e.g. used to store a shortened title for the model instance for display purposes)
	Date the metadata record was submitted
	The interval for time step (if relevant) e.g. hour, day month etc.
	The frequency of that time step e.gf. every 6 hours etc.
Science Discipline	Unique code representing each scientific discipline (constrained by vocabulary)
Spatial Information for Model Instance	The easting of the north west corner of the bounding rectangle
	The northing of the north west corner of the bounding rectangle
	The easting of the south east corner of the bounding rectangle
	The northing of the north east corner of the bounding rectangle
	Oracle spatial Geometry object representing the bounding rectangle
Supplementary Information about a model instance (science questions, boundary conditions etc.)	Text representing the additional information (e.g. stating the boundary conditions etc.)
Details of grid used for model (where relevant)	Grid spacing in the X dimension (horizontal plane)
	Grid spacing in the Y dimension (horizontal plane)
	Grid spacing in the Z (depth) dimension
	Number of grid cells in the X dimension
	Number of grid cells in the Y dimension
	Number of grid cells in the Z dimension
	Type of grid used (constrained by vocabulary)
Details of Datasets used in Model Instance	Name of dataset
	Description of dataset
	Dataset version
	Dataset type (constrained by vocabulary)
	A URL providing more information about the dataset or from where it can be accessed
	Temporal reference system relating to the dataset

Metadata Concept	Attributes Recorded
	Temporal resolution relating to the dataset
	Flag to indicate whether the dataset is input to the model or an output from it
Model instance - Parameters	Unique code for each parameter (constrained by vocabulary)
	Specific parameter value
	Units of measurement used for the parameter (constrained by vocabulary)

References

Hughes, A.G.; Harpham, Q.K.; Riddick, A.T.; Royse, K.R.; Singh, A.. 2013 [*Meta-model : ensuring the widespread access to metadata and data for environmental models : scoping report.*](#) Nottingham, UK, British Geological Survey, 39pp. (OR/13/042) (Unpublished)