Ecography

E7398
Fordham, D. A., Wigley, T. M. L., Watts, M. J. and Brook, B. W. 2011. Strengthening forecasts of climate change impacts with multi-model ensemble averaged projections using MAGICC/SCENGEN 5.3. – Ecography 34: xxx–xxx.

Supplementary material

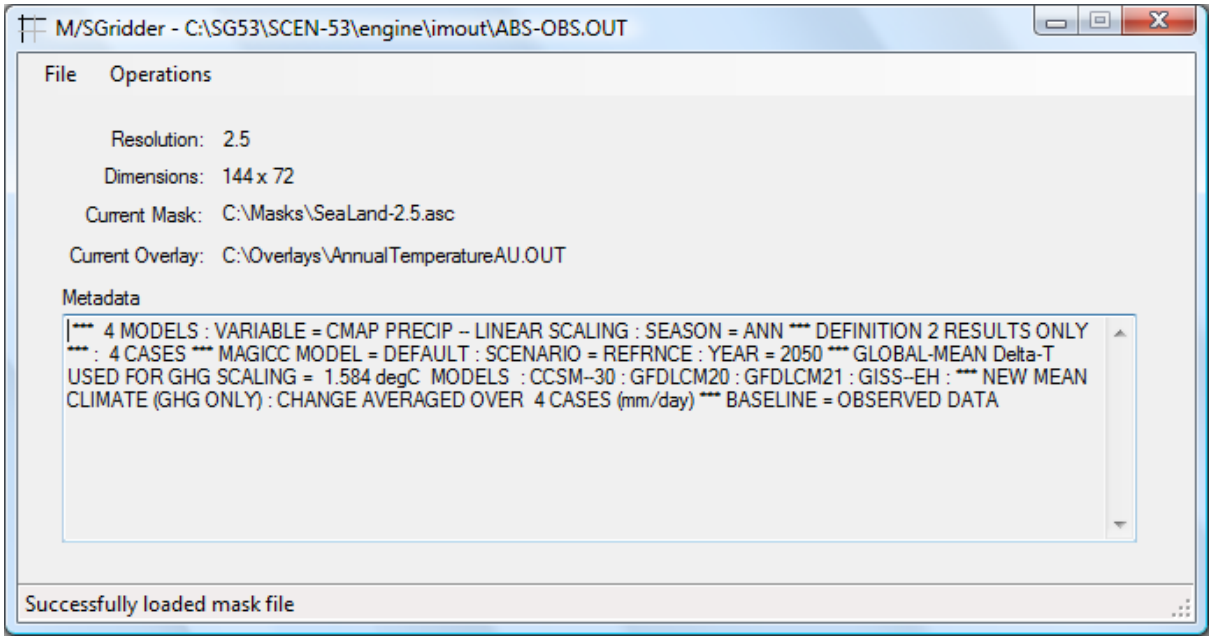
Appendix 1: Overview of MAGICC/SCENGEN gridding (M/SGridder) application

The MAGICC/SCENGEN Gridder (M/SGridder) is a software application for Microsoft Windows. M/SGridder provides a user-friendly application for processing grid output files from MAGICC/SCENGEN, interpolating the data to finer resolutions and adding the low-resolution change from a GCM directly to a high-resolution baseline observed climatology. The functionality of M/SGridder allows raw climate output data (generated using MAGICC/SCENGEN) to be converted to a format and resolution suitable for the construction of ecological models.

The M/SGridder application can be downloaded from the following address: http://purl.oclc.org/globalecology/msgridder

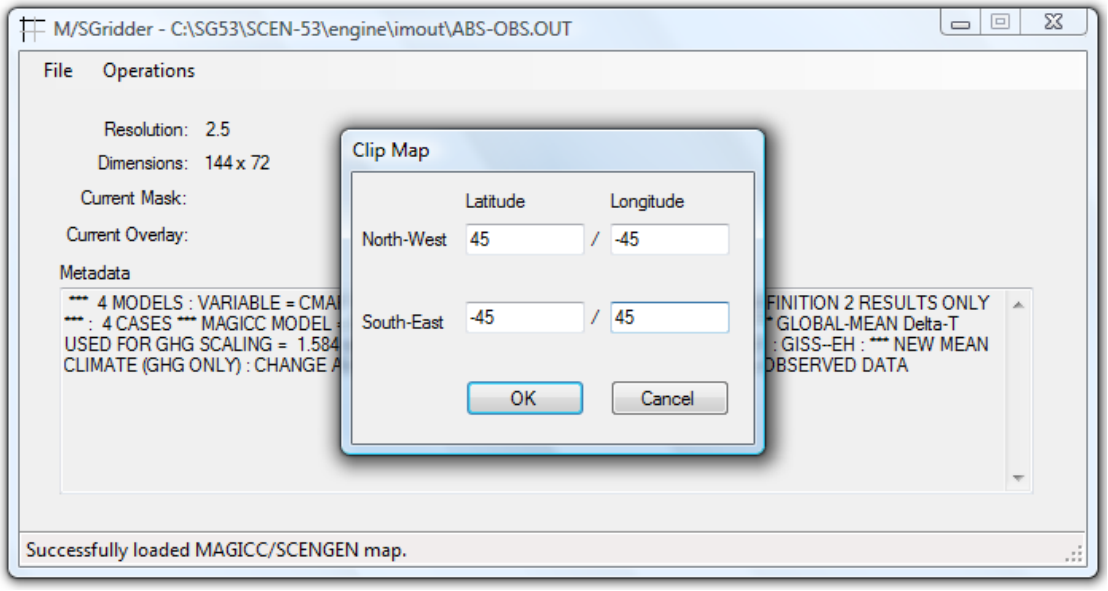
Loading and Gridding

The main form of M/SGridder application is shown below. In this example, a MAGICC/SCENGEN output map has been imported and will be manipulated using the functions in M/SGridder. A mask in ArcGIS ASCII format has also been loaded, as has a MAGICC/SCENGEN map to use as an overlay. The resolution and dimensions of the current map are displayed along with the metadata, which is read from the MAGICC/SCENGEN file (see below). Maps saved from M/SGridder are in ArcGIS ASCII format, which is widely used by ecological modelling software packages.



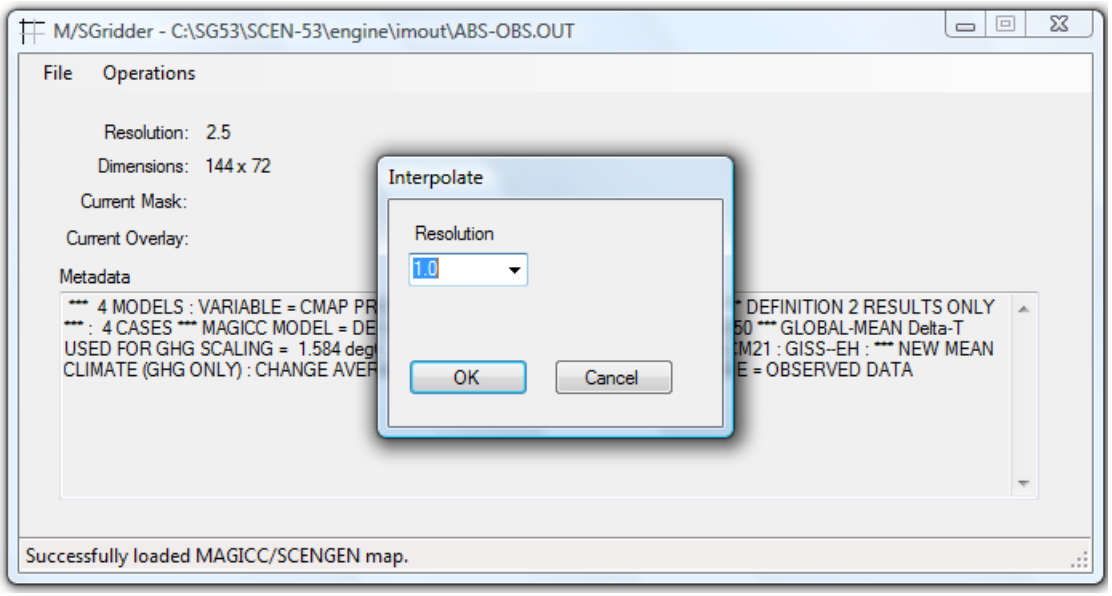
Clipping / Cropping

Clipping (or cropping) is simply the process of extracting a defined subset of a map. In the M/SGridder application, this is done by specifying the coordinates (Latitude and Longitude) of the North-West and Southeast corners, as shown below. Any parts of the map outside of the rectangle defined by these corners are discarded.



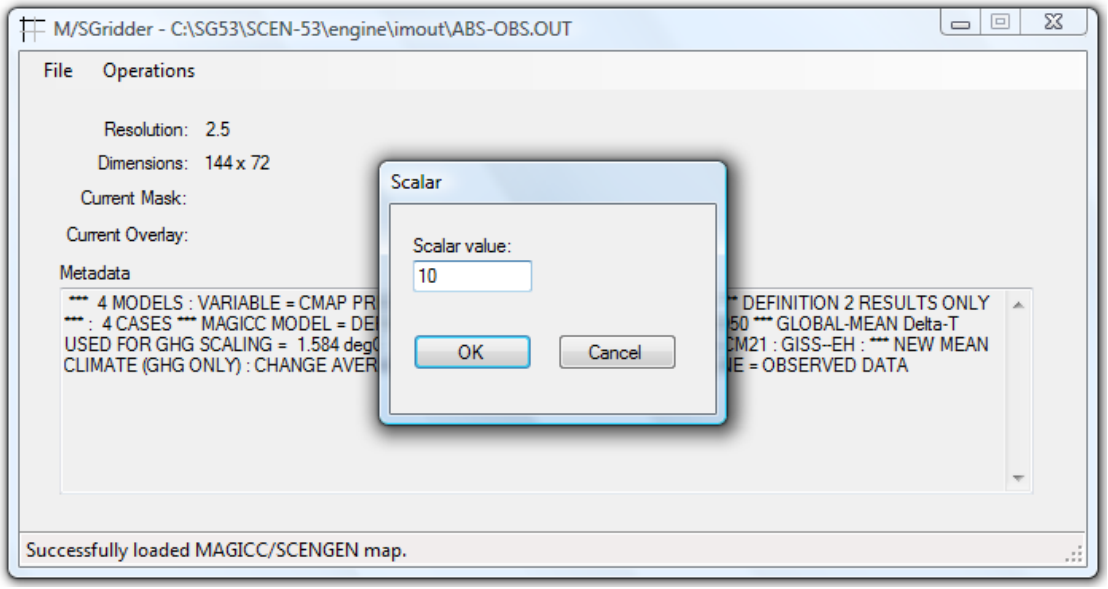
Interpolation

Interpolation transforms a map from a coarser resolution to a finer resolution. M/SGridder uses bilinear interpolation (for justification see Fordham et al. 2011). The user selects a target resolution (1x1° or 0.5x0.5° latitude / longitude grid cells) from the Interpolate dialog box (see below) and the currently loaded map will be interpolated to the new resolution.



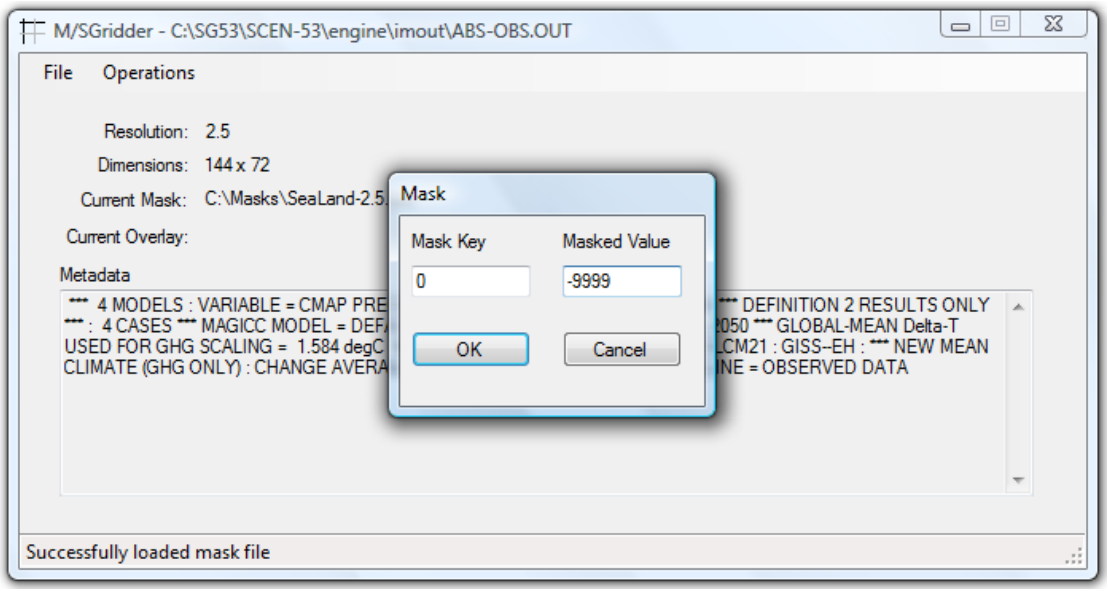
Scalar Operation

This operation will apply a scalar value to each cell in the current map. The scalar value is specified via the dialog shown below. Scalar operations are either multiply (multiply each map cell value by the scalar) or divide (divide each map cell value by the scalar). Scalar operations are useful for such tasks as rescaling the values in a map when, for example, preparing maps to use as climate overlays.



Masking

The masking operation replaces the value of each cell in the current map according to the values in the mask file. The following figure shows the Masking dialog. In this dialog, “Mask Key” is the value in the mask map on which the replacement keys. In other words, if a cell in the mask has this value, the value in the corresponding cell of the current map will be replaced. The masking algorithm will insert “Masked Value” into each masked cell.



Change-Factor Downscaling

The change-factor procedure involves bi-linearly interpolating annual climate-change anomalies to a finer a resolution (0.5 º x 0.5º latitude/longitude) using steps described above and overlaying the climate signal on much finer-scale baseline observed data. The baseline data is user supplied and should closely match the temporal scale of the baseline data from which the GCM projections are modelled. Temperature anomalies are added to the baseline, while precipitation anomalies, are converted to percentage changes and used to scale up the baseline data.

References

Fordham, D. A., et al. 2011. Multi-model climate projections for biodiversity risk assessment. - Ecological Applications doi:10.1890/11-0314.1.