

Appendix D. Map Overlays

The Panoply application distribution includes several continental “overlay” files. These may be in the form of outlines (CNO and CNOB files) or they may be black-and-white bitmap masks (GIF and PNG files). As shown in Section 7.1, masks may be inverted, so there is no need, for example, for a separate oceans mask file which is the inverse of a continents mask.

D.1. Included Overlays

Two overlays are embedded within the Panoply application itself:

- **Earth outline:** Earth’s modern-day continents. Resolution is low/moderate and many large islands are omitted. Also known as Earth_aplot, this outline dataset comes from the aplot plotting application used at GISS and is based on an old NCAR Graphics continent outlines file.
- **Earth mask:** 720×360 black-and-white pixel mask based on the above outline.

Other overlays are included in the “overlays” directory of the Panoply application distribution. Any overlays here in the directory that are unneeded can be removed, and they will not be included in the plotting options the next time that Panoply is launched. These overlays are:

- **Earth_MWDB3 outline:** Earth’s modern-day continents at moderate resolution from the MWDB II dataset*.
- **Borders_MWDB3 outline:** Earth’s continents and national borders at moderate resolution.
- **USA_MWDB3 outline:** Earth’s continents and national and U.S. state borders at moderate resolution.

D.2. Additional Overlays

Other compatible overlay files may be downloaded from the Panoply website at <http://www.giss.nasa.gov/tools/panoply/overlays/>. The following subsections describe the overlays available as of June 30, 2009.

After download (and uncompression, if necessary), just place the file in the “overlays” directory in the Panoply distribution. It will appear in Panoply’s plotting options the next time you launch the application.

D.2.1. Continent Overlays

- **Earth_5x4 outline:** Earth’s continents approximated on a 5°×4° grid.
- **Earth_5x4 mask:** 720×360 black-and-white mask based on the above outline.
- **Earth_10x8 outline:** Earth’s continents approximated on a 10°×8° grid.
- **Earth_10x8 mask:** 720×360 black-and-white mask based on the above outline.
- **Earth_MWDB1 outline:** Earth’s modern-day continents at very high resolution.
- **Earth_MWDB1 mask:** 1440×720 black-and-white mask based on the Earth_MWDB1 outline.
- **Earth_MWDB2 outline:** Earth’s modern-day continents at high resolution.
- **Earth_MWDB4 outline:** Earth’s modern-day continents at low resolution.
- **Earth_MWDB5 outline:** Earth’s modern-day continents at very low resolution.

D.2.2. Continent and Political Border Overlays

- **USA_MWDB2 outline:** Earth’s continents and national and U.S. state borders at high resolution.

* MWDB II stands for Micro World Data Bank II, an outlines dataset created by Fred Pospeschil. The data allow for extracting outlines at five different resolutions. Panoply offers various outlines at each of these resolutions and denotes them by including an MWDBx in the file name, where x is the resolution, from 1 (very high) to 5 (very low). Please note that on older computers, Panoply can be a bit slow when plotting outlines from MWDB1 files. Unless high resolution is needed for a regional plot, MWDB3 outlines should be sufficient for most map plots.

D.2.3. Paleo Continent Overlays

- **Paleo_Pliocene_3ma outline:** Earth's continents during the Pliocene approx. 3 Mya*.
- **Paleo_Pliocene_3ma mask:** 1440×720 black-and-white mask based on the Paleo_Pliocene_3ma outline.
- **Paleo_Sturtian outline:** Earth's continents during the Sturtian glaciation approx. 750 Mya.
- **Paleo_Sturtian mask:** 720×360 black-and-white mask based on the Paleo_Sturtian outline.
- **Paleo_Varanger2 outline:** Earth's continents during the Varanger glaciation approx. 650 Mya.
- **Paleo_Varanger2 mask:** 720×360 black-and-white mask based on the Paleo_Varanger2 outline.

D.2.4. Mars Overlays

- **Mars_datum outline:** The line of average elevation (the datum) on Mars.

D.3. CNO File Format

If you have other outline data which you would like to use in Panoply, it should be a relatively easy task to create a CNO outline file that Panoply can read. Although such files have a .cno filename extension, the file contents are simple ASCII text. Each line of a CNO file is a comma-separated longitude-latitude pair defining a point. A sequence of lines in the file defines the outline of a shape in a "connect the dots" manner. The point defined in the last line of a sequence should be the same as the point in the first line. A line which says "9999" is interpreted as a break between shapes.

For example, the first ten lines of Earth_MWDB3.cno read:

```
-117.117,32.533
-117.283,33.000
-117.650,33.450
-118.117,33.767
-118.400,33.750
-118.533,34.050
-119.117,34.117
-119.533,34.417
-120.450,34.450
-120.617,34.567
```

These points define a part of the California coast next to the Mexican border.

D.3. CNOB File Format

The CNOB format for continental outline overlays is a binary scheme. It is intended for outlines with a large number of points and which load relatively slowly if saved in the text-based CNO format. For example, "Earth_MWDB1 outline" loads about eight times faster if it is a CNOB file rather than a CNO file. Additionally, a CNOB file is typically about half the size of the corresponding CNO file.

The first eight bytes of a CNOB file are a character string which identify the file as being in CNOB format. These bytes read "GISSCNOB".

After the initial identifier, a CNOB file is structured as a sequence of "big-endian" four-byte integers. A point on the outline path is a pair of these integers, the first being the longitude and the second the latitude. The values of the integers are 1000 times the actual longitude and latitude values. (Note that this limits the resolution of the CNOB format to no better than about 110 meters.) So for example, the point -117.117°E 32.533°N would be saved as the integers -117117 and 32533.

To interrupt the outline (i.e., to shift from the end of one shape to the start of the next), a single four-byte integer with a value of 999999 is inserted into the sequence.

* Data for creating the Pliocene, Sturtian, and Varanger continent outlines were provided by Linda Sohl.