

persona version 2.1
How to graphically patch a mask variable
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`persona` is a graphical device, commanded by a simple shell script tool, which only requires a pre-install of the NCO toolkit and of the GIMP Image Manipulation Program software. Developed at CERFACS since 2002, it is fully open source. The 2.1 version no longer requires the X11 BITMAP tools, to increase the portability. "BMP image" is the new exchange format between NetCDF and GIMP.

This tool allows a mouse controlled handling of binary images from files in NetCDF format. It was originally designed for modification of land/sea mask arrays, like those commonly used by ocean/atmosphere sciences community.

2.1 version is available at CERFACS' FTP site:

ftp://ftp.cerfacs.fr/pub/globc/exchanges/maisonna/persona_2.1.tgz

This documentation is an update of the previous user guides [1,2] that are now obsolete.

1. User Guide

`persona` is launched at command line, with the following syntax:

```
> persona -f "NetCDF_file_name" [-hV] [-v variable_name] [-t
modification_type] [-x longitude_min] [-X longitude_max] [-y
latitude_min] [-Y latitude_max]
```

with mandatory argument:

```
-f + file name : name of the mask file
```

and optional:

```
-h          : argument description
-V         : version #

-v + variable name      : name of the mask variable ( default: nmask )
-t + type of modification : kind of mask modification/definition
    1: modify by hand an existing mask variable
    2: create a new mask variable entering lat/lon limits
    3: define lat/lon limits AND modify an existing mask variable
-x + longitude (degrees) : lower longitude limit of masked area
-X + longitude (degrees) : upper longitude limit of masked area
-y + latitude (degrees)  : lower latitude limit of masked area
-Y + latitude (degrees)  : upper latitude limit of masked area
```

Example:

```
> persona -f meshmask.nc -v tmask
```

Concerning the modification strategy:

- With choice 1, an existing mask can be interactively modified by computer mouse.
- With choice 2, a new mask can be defined from latitudes and longitude bounds (to be specified at command line).

- The 3rd choice combines the first two: a limited lat/lon domain intersects the existing mask, and the resulting mask can be modified interactively.

2. Input file format

The mask variable is necessarily a 2D variable (no handling of 1D variable). Variable type does not matter (float, integer, etc). Masked values can be either 1 or 0 (the GIMP graphical tool can easily invert them), but in case of modification strategy 2 or 3 (lat/lon bounds), the 0 value will be set outside these bounds. Latitude (longitudes) bounds must be kept between -90 and 90 (-360 and 360) degrees.

For 3D mask variable, *persona* automatically detects the vertical dimension (third dimension of the variable) but the graphical tool will allow to modify the first level only. The modified 2D array will be saved on the first level of the 3D input variable.

For modification strategy 2 or 3 (lat/lon domain definition), latitude and longitude must be described in variables of the NetCDF input file. For a regular mesh, coordinates have to be stored in 1D variables, that must share their names with the corresponding dimensions. Example:

```
netcdf mesh_11 {
  dimensions:
    lon = 360 ;
    lat = 180 ;
  variables:
    float lat(lat) ;
      lat:units = "degrees_north" ;
      lat:long_name = "Latitude" ;
      lat:actual_range = 89.5f, -89.5f ;
    float lon(lon) ;
      lon:units = "degrees_east" ;
      lon:long_name = "Longitude" ;
      lon:actual_range = 0.5f, 359.5f ;
  ...
}
```

In case of irregular mesh, the user has to provide the associated coordinate variable names at command line:

```
>Longitude variable not found in file $file_name
>Please, specify longitude variable name
>nav_lon
>Please, specify latitude variable name
>nav_lat
```

In this case, only 2D variables are accepted for lon/lat description. Example:

```
netcdf header_orca_T {
  dimensions:
    y = 149 ;
    x = 182 ;
    z = 31 ;
}
```

variables:

```
float nav_lon(y, x) ;
    nav_lon:missing_value = 1.e+20f ;
float nav_lat(y, x) ;
    nav_lat:missing_value = 1.e+20f ;
...
```

3. Graphical handling

The GIMP Image Handler is launched when mask variable is ready to be modified. Since this new 2.1 version, the result must be saved with an `export` (instead of `save`) command before exiting (File/Quit).

Here is the **mandatory** procedure:

- 1- Select the export in main menu File>Export as ...
- 2- Select the `persona.pbm` file
- 3- Save under Image PBM format
- 4- Select the ASCII sub-format

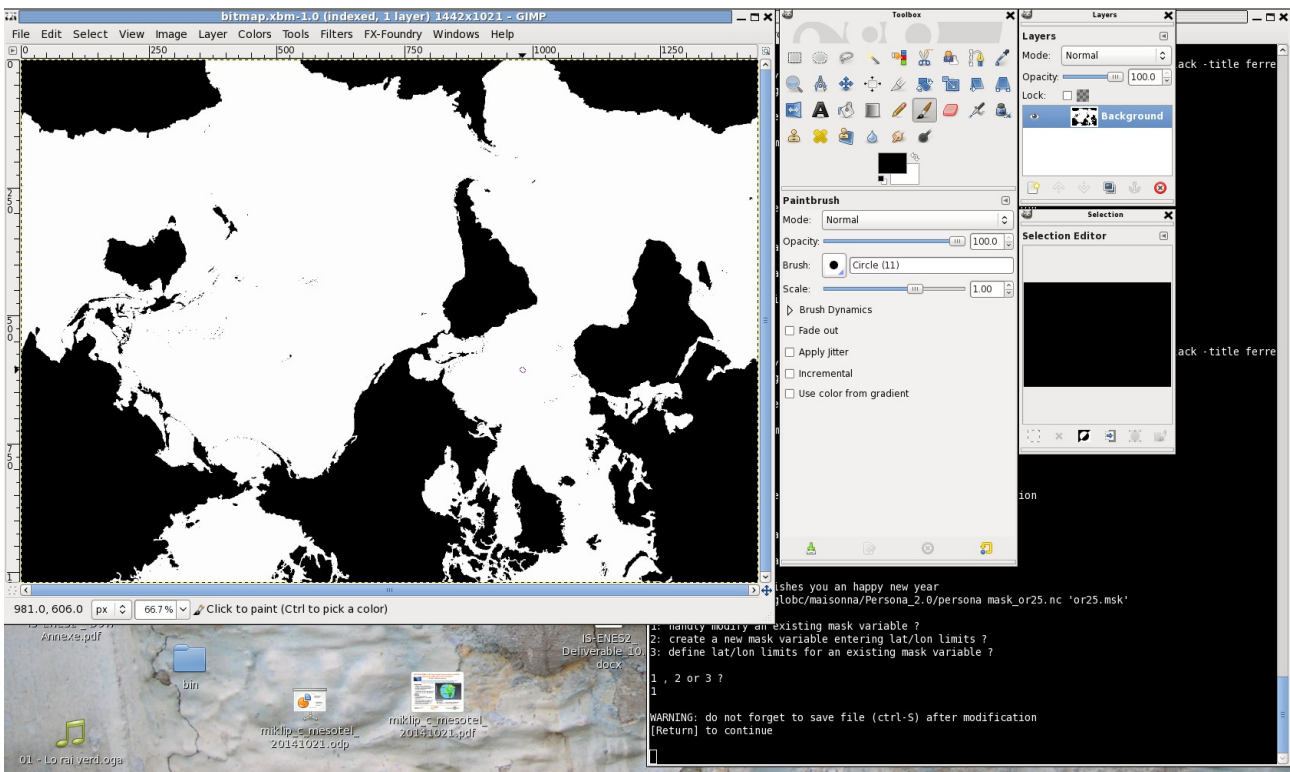


Figure 1: Land-sea mask edited with GIMP for corrections with “Pencil” tool

A world of functionality is offered by the GIMP Image Handler. Among possible operations, we can mention:

- View/Zoom : to accurately modify a high resolution mask
- Image/Transform/Flip Vertically: to visualise an upside-down variable

- Tools/Paint tools/Pencil: for point to point modifications
- Tools/Paint tools/Bucket fill: to fill large areas
- Colour/Value invert: to proceed on "1" values

For advanced features, we can emphasize the edge detection (Tools/Edge-Detect/Edge), very useful to define e.g. river mouth grid points. Be careful that this operation requires to change colour mode from "indexed" to "RGB" (Image/Mode) and vice-versa when saving.

The author warmly thanks Nicolas Barrier for stimulating discussion focusing on PyPago [3] (Python Physical Analysis of the Gridded Ocean) graphical interface. This work is supported by the FRIISM initiative.

Bibliography:

- [1] Maisonnave, E., 2002:: [persona: Masking Field Tool in Netcdf Format, User Guide](#) (in french), Technical Report, **WN-CMGC-02-117**, Cerfacs, France
- [2] Maisonnave, E., 2015: [persona v2.0, how to graphically patch a mask variable](#) Working Note, **WN/CMGC/15/57**, SUC au CERFACS, URA CERFACS/CNRS No1875, France
- [3] N. Barrier, 2018: "Physical Analysis of Gridded Ocean" (PyPAGO), <http://www.pypago.nicolasbarrier.fr/>