Script for Contour- and isoline extraction

Introduction

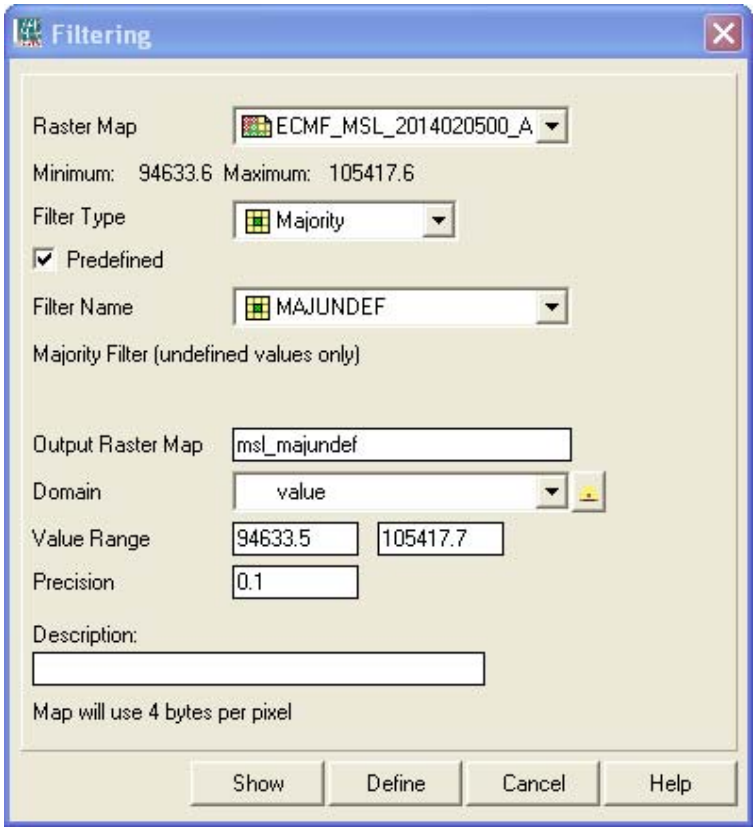
For appropriate value map visualization, especially if a graduated colour scheme is used, contour or iso lines often ease the interpretation. For this purpose vectors, according to user defined interval settings need to be derived.

ILWIS script developed

A script has been prepared which utilizes “GDAL_contour”, a utility available within the sub directory \Extensions\WFS_E-Toolbox\GDAL\bin, called ‘gdal_contour.exe’. This implies that the WFS-Ethiopia toolbox needs to be available. Else download the FWTools package (http://fwtools.maptools.org/) and modify the path (see script listing for: !%ILWIS_LOCATION%\Extensions\WFS_E-Toolbox\GDAL\bin\) according to your local FWTools setup.

Before starting the script, check if you input map has undefined values. If this is the case try to correct for this. A simple method is the use of a “*majority undef*” filter. This filter only replaces those pixels which are undefined with a majority value of the surrounding pixels. From the ILWIS main menus, select “Operations” >> “Image Processing” >> “Filter”. An example is provided in the figure below. Knowing of how many rows and columns the image is consisting, you can see from the histogram for the sum of the column ‘npix’ if all pixels have been assigned an appropriate value.

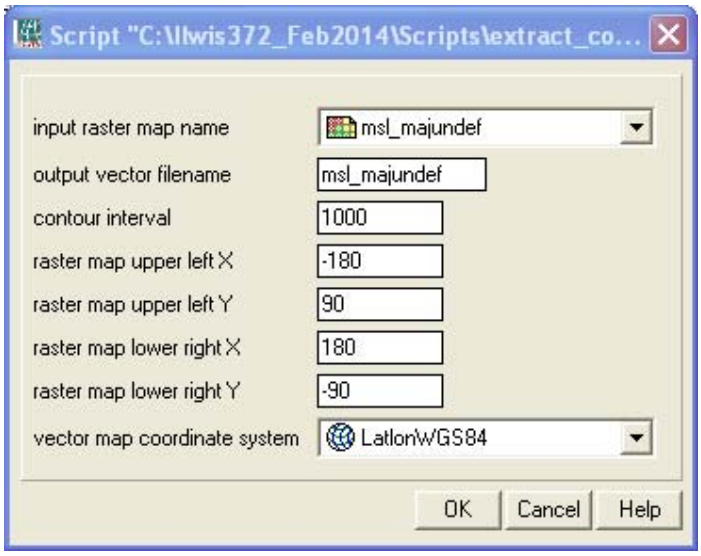
Figure 1: Application of a majority undef filter



Running the script.

Download the ZIP file and copy the “extract_contours.Zip” file into the ILWIS subdirectory \Scripts and then Unzip the file. Start ILWIS and from the main menu, select the option “Operations” >> “Script” and select the script “extract_contours”. From the pop-up script input window specify the required input and output parameters, see also figure 2.

Figure2: Script parameters required



Note that for the input map “msl_majundef” used as example here the following parameters are valid:

- this map is providing the global mean sea level pressure in ‘pa’
- at 0.5 degree resolution, using a coordinate system ‘LatLonWGS84’.
- Therefore the map upper left X,Y is -180,90 and the lower right corner is defined for X,Y as 180,-90.
- As the map is in ‘pa’ a contour interval of 1000 is specified.

Before you start the script you need to check the bounding coordinates and the coordinate system used, as well as think about a suitable interval to be used, note that this can be derived from studying the data range from the histogram! If all parameters are provided click the “OK” button to invoke the script.

Script listing.

```
// transform raster map to contours

// according to user specified interval

// expects installed wfs-ethiopia toolbox plugin

//From ILWIS format to GeoTif using map dimensions (ULLR corners)
```

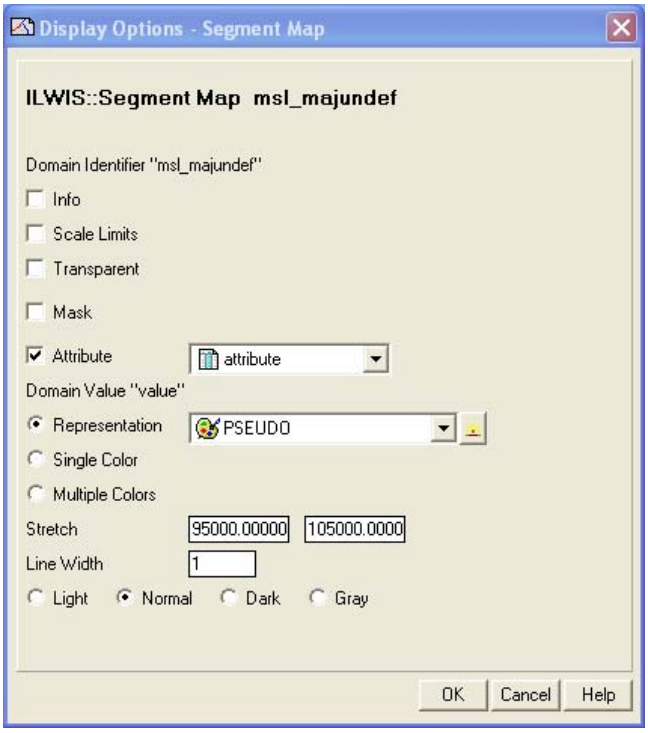
```
!%ILWIS_LOCATION%\Extensions\WFS_E-Toolbox\GDAL\bin\gdal_translate.exe -of GTiff -
a_ullr %4 %5 %6 %7 %1 contour_temp.tif


// From GeoTif to shape format using specified interval and create attribute column call attribute

!%ILWIS_LOCATION%\Extensions\WFS_E-Toolbox\GDAL\bin\gdal_contour.exe -a attribute
contour_temp.tif contourshp.shp -i %3


//Import shape file in ILWIS according to the file name specified

import shape (contourshp.shp,%2)


//Select the appropriate cooordinate system as defined by the user

setcsy %2.mpS %8


// remove obsolete objects

!cmd /c del contour_temp.tif

!cmd /c del contourshp.dbf

!cmd /c del contourshp.shp

!cmd /c del contourshp.shx
```

Note: within the active working directory a vector file and attribute table is created, the table contains a column called 'attribute' providing the value of the contour line! This column can be used to create a new segment map with this attribute!

Output.

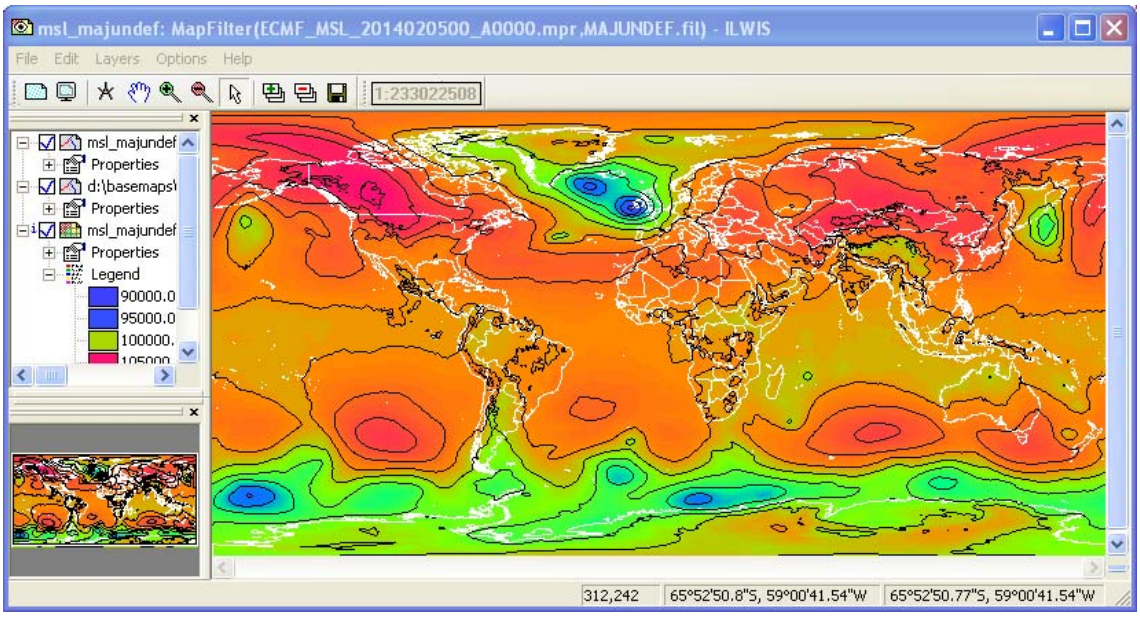
When calculation has completed, two files have been created, a vector file and attribute table. Display the table and note the column "attribute", this column can also be used for visualization, in case of showing the extracted contours in a graduated colour. Note also figure 3 for the Vector Display Options window.

Figure 3: Assign a look up table to the vector file for visualization



When these settings are used the vectors are displayed using a graduated colour assignment as defined by the look up table 'Pseudo', for the low values – blue – green – orange towards the high values in red. These can also be displayed as an overlay on the map which was used to extract the contours. A result of such visualization, using a single colour (black) for the vectors is given in the figure below.

Figure 4: Display of value map and contours derived



Advanced visualization contours

Based on your selected interval there might be very short contour – iso lines which are not needed for visualization and you might want to add the contour or iso line values for ease of interpretation (instead of using a graduated colour). Below a number of steps are described how to perform these actions.

Open the segment table “msl_majundef”. You note that the column ‘Attribute’ is showing MSL in ‘Pascal’, having 3 decimals. Leave the table open and right click with the mouse on the segment file “msl_majundef” and from the context sensitive select “Statistics” >> “Histogram” and press “Show”. You see from this histogram listing that a column ‘Length’ is created, close this histogram.

From the table “msl_majundef”, select from the table menu the option “Columns” >> “Join” and specify as table the ‘histogram of the segment file’, also called “msl_majundef” (note the histogram icon with a very small segment-layer included at the bottom right!) and select a column “Length”, Press “Next” and as Output Column use the default (here ‘Length’) and press “Finish” >> “OK” (use default values). Now the column ‘Length’ is added to the ‘msl_majundef’ table, note this value is in degree – see also the vector map coordinate system used here (figure 2).

In the table command line type the following expression (assuming that segments having a length less than 5 degree are not needed for visualization):

msl_selected:=iff(length>5, attribute,?)

From the ‘Column Properties’ window, specify as ‘Precision’ “1” and press “OK” to execute the operation. The segments having a length greater than 5 degree are presented with a value, without decimals, shorter segments are assigned undefined and will not be visualized!

Once more right click with the mouse on the segment file “msl_majundef”, now from the context sensitive menu, select the options “Point Operations” >> “Point in Segment”, select the option “Vertex” and as output point map specify “msl_majundef” and press “Show” and “OK”. Close the point map.

Right click with the mouse on the newly created point map “msl_majundef”, select the option “Properties”, activate the option “Attribute Table” and select the table “msl_majundef” and press “OK”.

Now visualize your data. Show the raster map “msl_majundef”, use as representation “Pseudo”. From the active map window, select from the menu the option “Layers” and “Add Layer”, now select the segment map “msl_majundef” , press “OK”, activate the option “Attribute” and select the column “msl_selected”, as ‘Representation’ select “Inverse” and press “OK”. Note that only the segments longer than 5 degree are visualized!

Once more select from the menu the option “Layers” and “Add Layer”, now select the point map “msl_majundef” , press “OK”, activate the option “Attribute” and select the column “msl_selected”, activate the option “Text”, specify as “Font” >> “Size” a font size of “8”, press “OK” and as “Text Color” select “White”.

Now select the option “Symbol”, as ‘Symbol’ specify “Cross”, as ‘Color’ select “Black” and as ‘Size’ specify “2” and press “OK” twice.

Note that you can create a new column in the segment table providing the pressure values in hPA and then use this as your annotation. Subsequently select this column as attribute when displaying the point file. Your results should resemble the figure below, here using annotations in hPA. Also add a country boundary vector file.

Figure 5: Visualization of longer segments only and annotation – in hPA