Downloading and opening ACE-2 DEM data

About the ACE-2 data

ACE-2 data and documentation can be obtained from http://tethys.eaprs.cse.dmu.ac.uk/ACE2/

The data consists of tiled images, available at different spatial resolution. This tutorial uses the 9" resolution data, downloaded from the FTP site. The files are gz compressed. For this tutorial we have uncompressed the images and then compressed them again using bzip2 compression, which Bilko 3.4 can open directly.

For this tutorial we have used two tiles of 9" resolution height data:

- 30N075E_9S.ACE2.bz2 - covers a region from 45N,75E (top left) to 30N, 90E
- 15N075E_9S.ACE2.bz2 - covers the region from 30N, 75E (top left) to 15N, 90E

To obtain data from other regions please download these from the ACE-2 web site, and use a software capable of uncompressing gzipped data.

Opening the data in Bilko

Information needed to open the images

The documentation for this data set (also available from the ACE2 web site) provides the following information, which is needed in order to open the images in Bilko:

- the data is binary image tiles covering 15 degrees latitude by 15 degrees longitude;
- the file name gives the location of the bottom left (SW corner).
- the pixel size (spatial resolution) is 9" in both latitude and longitude
- there is no header
- there is only one spectral band
- the first row is the northernmost row
- the data is 32-bit floating point (4 bytes = 4 x 8 bit = 32-bit)
- the null value is -32768

In addition to the height data set (the actual DEM) there is a confidence data set, a source data set and an accuracy data set. In this tutorial we will only look at how to open the height data, but the principle should be the same for all.

Opening the images

Using the information from the data documentation it is straight-forward to open the images.

1. From the Bilko Image window, select Open, and then the file you want. If you cannot see the image, select 'All Files' as the file type. (Bilko will see and recognize the bz2 extension, but not the ACE2 extension of the uncompressed data set.)


2. In the 'Open as flat file' dialog you need to set the following options:

- Header length is 0 bytes (default)
- Number of bands is 1 (default)
- Pixels per line: 6000 (documentation)
- Numer of lines: 6000 (documentation)
- Pixel format: 32-bit float (documentation says 4 bytes)
- Interleave format does not matter since there is only one band,
- There is no need to swap bytes, because the data is in 'little endian' format - the default in Bilko.
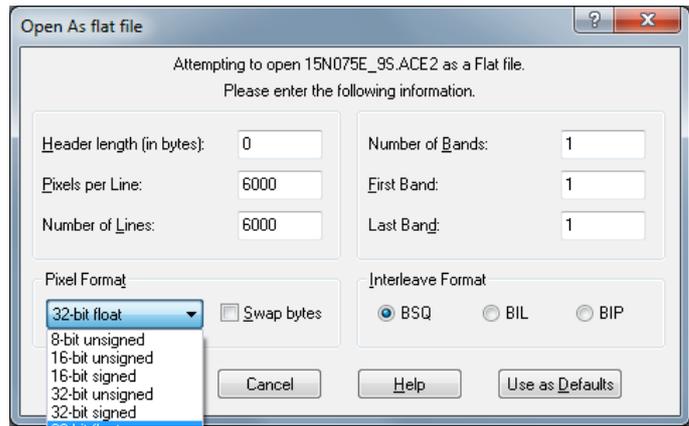
3. Press OK to open the image.

Once you zoom out (Zoom > Preserve Shape) the image should look something like the one on the right. If instead it appears is a mass of speckled or geometric gray, you have most likely forgotten to set one of the options in the flat file dialog, and need to start again.
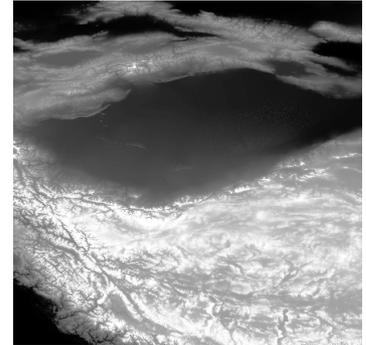
Setting the coordinates

Flat files are simple raster images with no positional information. You therefore need to set the geographical coordinates before you can continue.

4. Select Edit > Coords from the menu bar. In the Set Coordinates dialog do the following:

- Select the coordinate type as Longitude/Latitude,
- Set the top left longitude and latitude (remember that the coordinates given in the documentation is bottom left, so you need to add 15 degrees to the latitude to get the top left corner.
- Set the pixel size to 0˚ 0' 9"

5. Repeat 1 - 4 for the second tile.
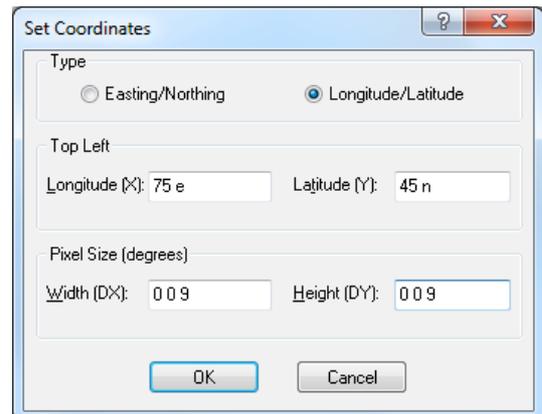
Combining two tiles

The region we want crosses the boundary between two tiles, so we need to combine these. This is done using the following steps:

- Resampling each tile to region of interest
- Connecting the images into a stack and applying a formula to calculate the combined height data.

1. Resampling the image tiles

6. From the image menu, select Resample.

7. In the Resample dialog do the following:

- select the Window tab and set the region of interest; make sure you click Apply to fix the new window.
- select the Interpolation tab and set the null value to -32768 (specified in the documentation); leave the rest as suggested by the default (Based on Self, Nearest neighbour method; click Apply to fix the settings. .

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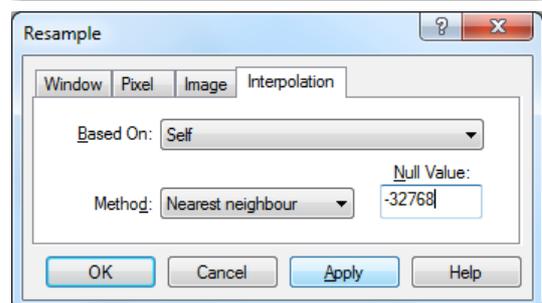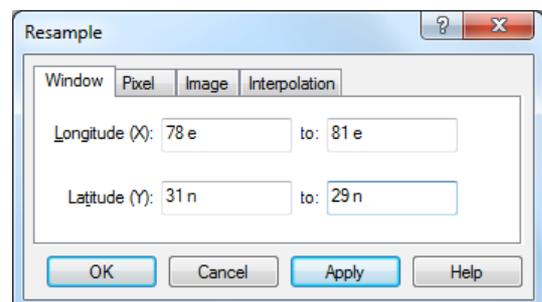
- Click OK to resample the image. The result will contain a region with no data - this is the area that was outside the tile you just resampled.

The second image tile can now be resampled, based on the result of the first resampling.

8. From the second tile, select **Image > Resample** from the menu bar.

9. In the **Interpolation** tab of the Resample dialog, click on the arrow next to 'Based On' and select the image you resampled earlier (it is probably near the bottom). If you don't see this, it's probably because you have forgotten to edit the coordinates for the second image tile.
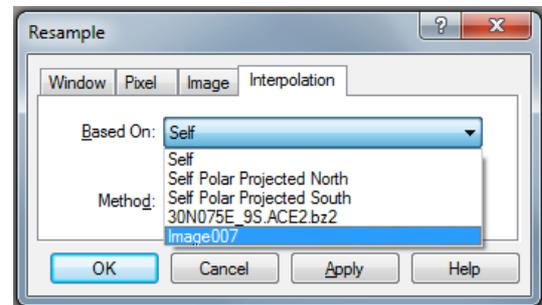
10. Set the null value as before and click Apply, to fix the settings, then OK to resample.

The resampled tiles should like the screenshot below:
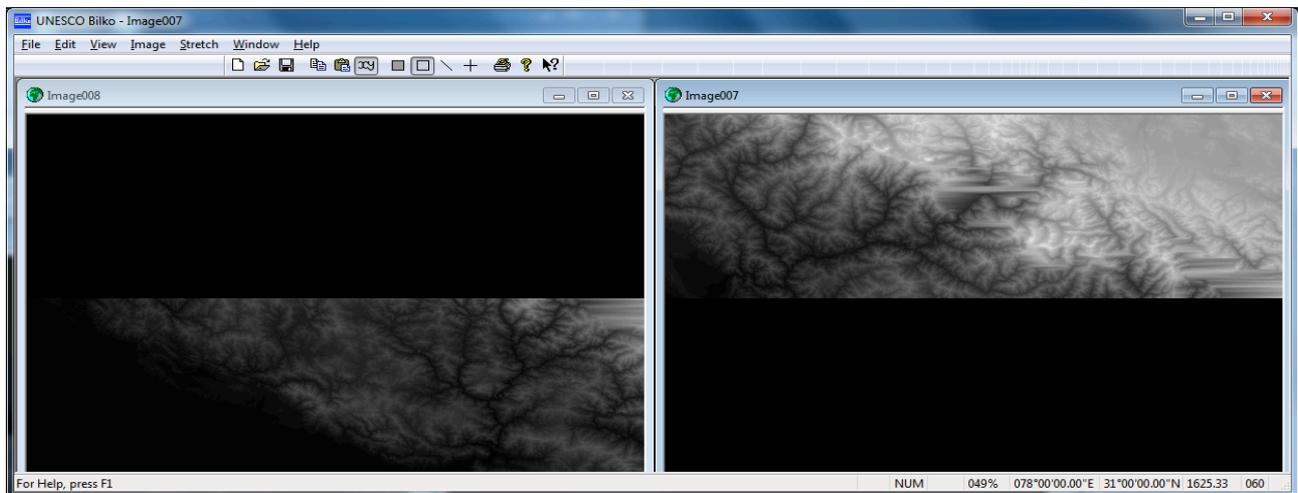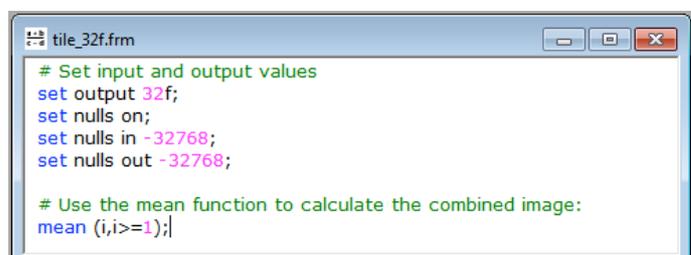

2. Combining the resampled images

This is done by connecting the two resampled images into a stack and using a formula document to calculate the new, combined image.

11. Select **Image > Connect** from the menu bar. In the Connect dialog do the following:

- Select both images,
- make sure the Stacked check box is ticked,
- Click OK to connect them.

12. Open a new formula document and write the instructions to Bilko :

- Set the output to 32-bit floating point
- Switch on null handling
- Set the null value for input to -32768
- Set the null value for output to -32768
- Finally use the mean function to calculate the combined image

```
# Set input and output values
set output 32f;
set nulls on;
set nulls in -32768;
set nulls out -32768;

# Use the mean function to calculate the combined image:
mean (i,i>=1);
```

Note: You can find the information on how to do this in Bilko Help, by using 'formula' as the search keyword, and selecting 'formula documents' as the topic to display.

13. Apply the formula to the stack of resampled images

If you are planning to use this data set again, you should save your formula so you can use it to connect ACE-2 tiles in future.