Lab 13
-- Fledermaus Visualization Software --

Fledermaus is a powerful, interactive 3-D data visualization system that is used for a variety of geoscience applications in both research and teaching. Fledermaus has many uses, both academic and commercial, in ocean exploration, mapping, and development-related fields, as well as other geospatial/geoscience research and industry fields.

The **Fledermaus software suite** allows researchers and educators to create and interact with full-resolution terrain and bathymetric surface models, and then integrate those surfaces with a variety of other data types to make a "scene." Users can add images, vertical imagery, ASCII points and lines, Electronic Nautical Charts (ENCs), 3-D models, and ESRI shape files to build attractive and easy-to-use visualizations. Users can also use Fledermaus to run profiles along a surface, do slope calculations, and create fly-throughs (flight paths). Users can interact with the data using a standard 3-button mouse or a 3-D navigation device (3DConnexion Space Navigator) in normal viewing mode or stereo (split-screen or full stereo). In the near future, Fledermaus will support the integration and display of time-stamped data, so that users can show things like earthquakes, sediment migration, and wave propagation over time.

Two companion applications of the Fledermaus suite are **DMagic** and **MovieClient**. DMagic prepares data files for import into the primary Fledermaus software. MovieClient is used to create and render animated movies of Fledermaus visualization files.

iView3D is a *free* viewer for Fledermaus format files. Users can download, view, and interact with already-created scenes that others have posted; flight paths created in Fledermaus can also be played back in iView3D.

Before beginning the practice exercise, you should familiarize yourself with where the following four Fledermaus programs are located on your computer :

Fledermaus	**primary visualization program**
DMagic	**program for preparing grid data for Fledermaus**
FMCommand	**program for preparing data files (command line)**
iView3D	**FREE program for showing visualization scenes**

- **PCs:** All Programs → Fledermaus →
- **Macs**: Navigate to: Macintosh HD → Applications → IVS Fledermaus → Macs, drag-n-drop the four icons for Fledermaus, DMagic, MovieClient, and iView3D to your desktop "dock", where several other icons are located at the bottom of your screen. You can access these from this location in the future.

For more information and official documentation on Fledermaus, go to:
http://www.ivs3d.com/docs/Reference_Manual.pdf

Step 1. Try out Fledermaus

- First set up a Lab13 folder on your Desktop. Don't forget to copy this folder to your \\geobase folder before logging off!
- Copy all files from the Instructor/Lab13 folder on \\geobase to your Lab13 folder on your Desktop.
- Next you are going to open up the file SoCal.scene. Launch **`Fledermaus`** and open up the SoCal.scene with **`File → Open scene`**...
- Once your file has loaded into Fledermaus, you can interactively explore your data set. Use the widget (the thing with an x- and y-axis) to rotate and scroll bars (horizontal and vertical) to zoom.
- Turn on/off the different layers by checking/unchecking the different data layers, which are listed in the panel below the visualization screen, left side.
- Change the vertical exaggeration of your topography by entering different values into the **`Exag`** box (left side also).
- Try out the other options and buttons available. If you get lost, just hit the camera icon (top, right) to return to your original viewing position.

Step 2. Obtaining topography data

Next you will create you own scene file. You will be working with pre-formated topography data (ASCII format) from the Shuttle Radar Topography Mission (SRTM), the same data that you used in GMT to make a topography map of Texas and El Paso. This particular data set that you will be working with for the lab spans 5 degrees in both longitude (-110 to -105 W) and 5 degrees in latitude (30 to 35N), and has a resolution of 90 m. The name of the file is 30N110W.ASC, corresponding to the *lower-left* corner of the grid coordinates.

Below, use the box to label the latitude and longitude range of the data set that you are about to work with:

Note, this is a BIG file (172 MB), so if you'd prefer to save time, you may use a lower resolution (900 m) grid version of the same area (29N111W.grd), however realize that the directions below are provided for the *.ASC file.

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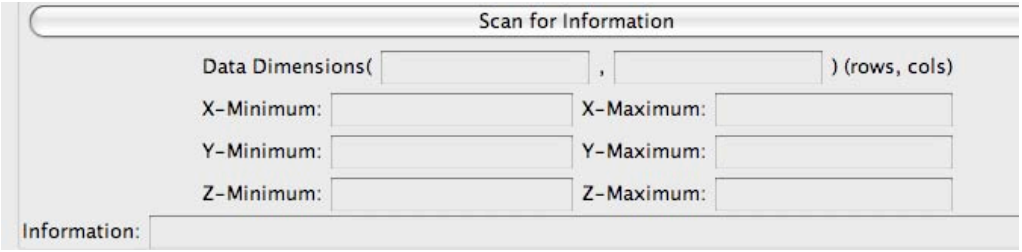
3. Preparing topography for 3D scenes: DMagic

Now you will import **30N110W.ASC** into the **DMagic** program.

- Launch the **DMagic** application, located in the same folder at **Fledermaus**
- Next open a new project, where you will specify where your data file is (Lab 13 folder), and where new files will soon be saved. Go to **File → Open Project** and choose your **Lab13** folder on your Desktop. You will need to do this every time you begin a new dataset to visualize.

- Next you will import the topography data. Go to **File → Import Gridded Data** and select your 30N110W.ASC file (use the Browse button).
- Under the **File Type** menu, select **Arcview Ascii Grid**. *Note, if you went with the low-res option and selected the 29N111W.grd file, select GMT GRD/NETcdf for the file type.*
- Click **Scan for Information.** You may have to wait a few seconds for this action to complete. *In the graphic provided below, write down the information.*
- Under **Surface Interpretation**, select **Output a DTM (.dtm)** button.
- Click **Convert & Save**. Name your file **30N110W.dtm**, save it in your **Lab13** folder. Click **Okay** when your file has finished saving.



You now should have two files listed under the **Data Components** panel: **30N110W.dtm** & **30N110W.geo**. DMagic automatically prepared the ***.geo** file for you, which contains the geographic information of your .dtm file.

- To view these files, click on the ***.dtm** file and then click on the **>** (play) button on the right side of the **Data Components** panel. Your file should then load and display in the view window.

Inspect the color scale values to the right of your image.

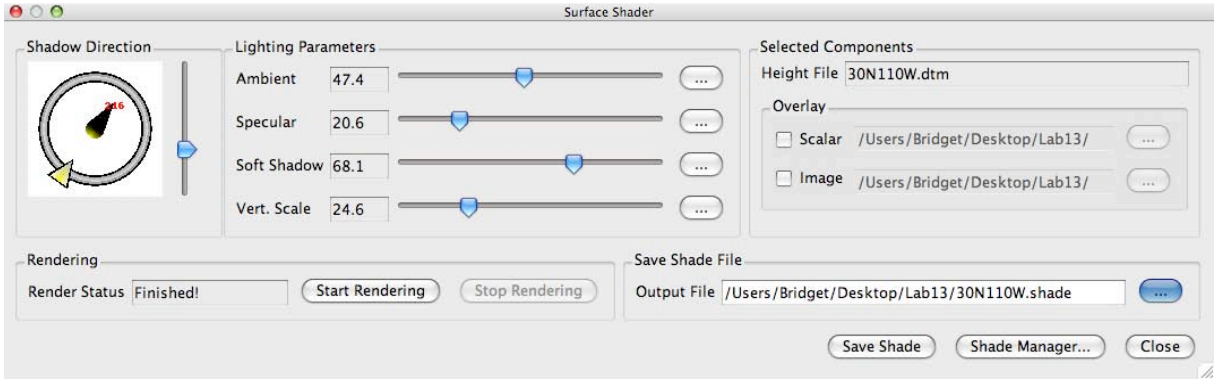
- To use an alternative color map, click on **CMap Librarian** (located under the color bar). Here you will find a variety of color schemes.
- There are a few color maps that are particularly good for illustrating elevation

changes. For regions encompassing both water bodies and landforms, **gmt_topo.cmap**, is a good choice. The colors in **gmt.cmap** (very colorful)or **gmt_globe.cmap** (more natural) are also good for land-only color schemes.

- Choose your favorite cmap and click **Okay**. To refresh your view, click on **>>**.

Next you will add illumination to your topography scene.

- Click on the **Surface Shader** button in the **Data Components** panel.
- In the **Shadow Direction** panel, experiment with the direction (*circular dial*) and magnitude (*vertical slider*) of the sun/shadow.
- Choose a setting and click **Start Rendering** to preview the shade. Once you have a setting that you like, check the new shaded output file name (**30N110W.shade**) and then click **Save Shade** to finish. Then click **Close**.



The final step in **Dmagic** is to assemble all of your map pieces.

- Click on **Assemble Fledermaus Objects** in the **Data Components** panel. The default settings should be fine.
- Note that your final object file will be named **30N110W.sd.**
- Click on **Build Object**. Then click **Okay** and **Close**.

Next you will run the **Fledermaus** program to visualize your topography scene in 3D.

- Click on **Run Fledermaus** in the **Data Components** panel for a shortcut to the application. You can also just launch **Fledermaus** as you would any application (from the All Programs menu), and open your new Fledermaus file, called **30N110W.sd**.

4. Visualizing topography: Fledermaus

Once your file has loaded into **Fledermaus**, you can interactively explore your data set, just as you did with the previous examples that you explored. Use the widget to rotate and scroll bars to zoom. Also change the vertical exaggeration of your topography by entering a different value into the **Exag** box. *Can you identify where El Paso is?*

5. Adding a layer to the scene

Next add the layer USA_states.sd to add a geographic reference to your topography data.

- Go File → Open Data Object and select **`USA_states.sd`**
- If the lines disappear beneath your topography, click on the layer name in the panel on the bottom left (click to highlight), then click on **`Resample and Drape`** button in the **`Line Height Controls`** panel. Use **0.1** as the **`Sampling Interval.`**
- Change the color of the line to yellow. Click on the **`Change Color`** button to do this.

6. Finishing up

When you're done, save your two data layers (.sd files) to a scene file, which will package up these items into one file.

- Go **`File → Save Scene`** and save your file as **`Yourname_Lab13.scene`** to your **Lab13** folder.
- Quit all Fledermaus programs.
- Copy all of the contents of your Lab13 folder to \\geobase and drop your **`Yourname_Lab13.scene`** file in the **`DropBox`**.