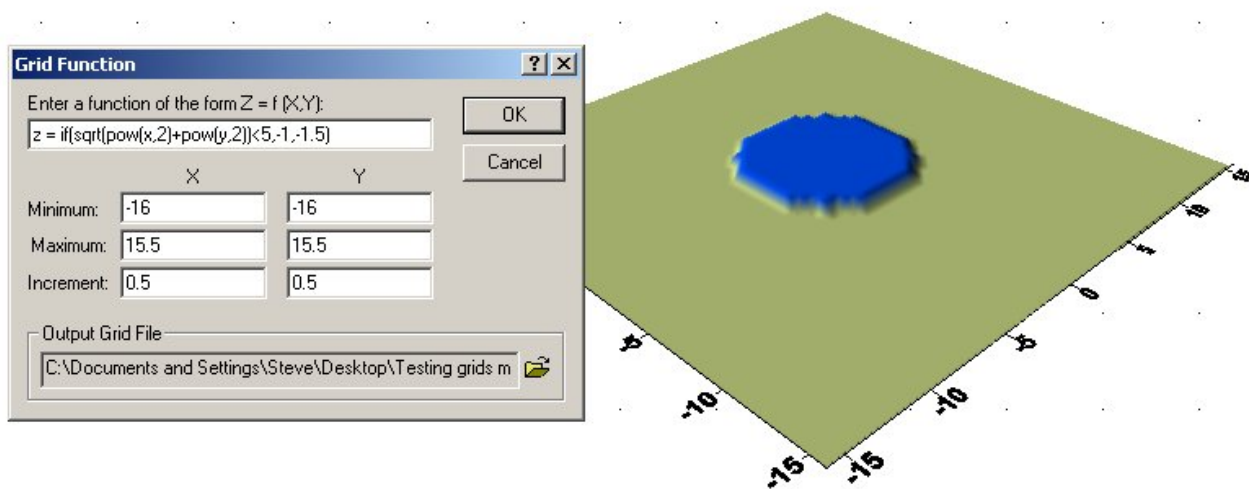


Using PFMAG3D.EXE to forward model simple geometric shapes by Using Oasis Montaj to Convert Files between Surfer and USGS Formats

Step one is to build a subsurface model using Surfer's Grid/Function capabilities. Keep these things in mind:

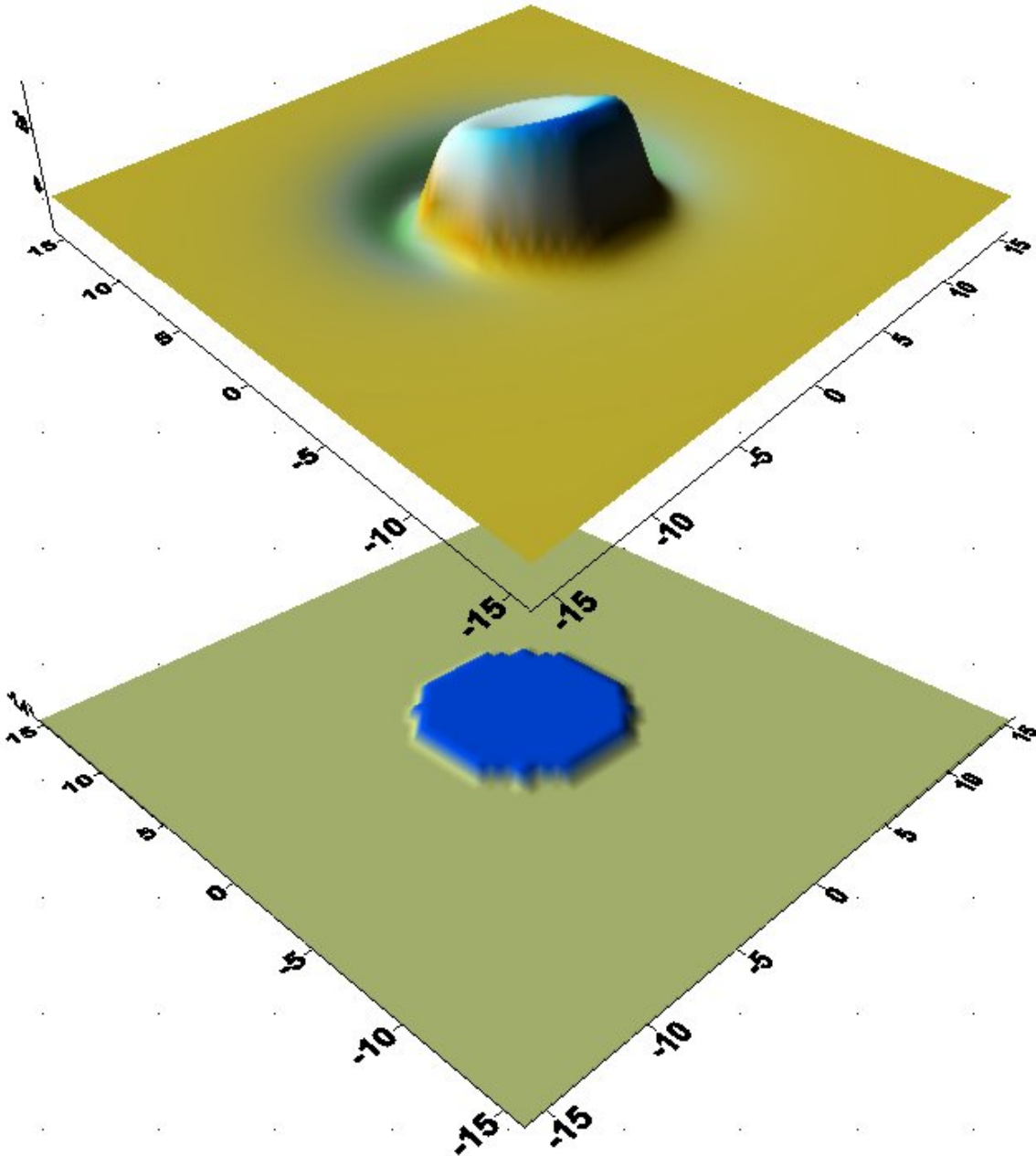
- Limit the resulting grid to 64 x 64, though PFMAG3D will handle a little larger
- Make the width and depth numbers geologically reasonable
- Keep all your calculations in consistent units (kilometers or meters)
- Use a small enough increment to have smooth models (you could smooth them later with a low pass filter)
- Start Oasis Montaj
 - Grid and Image/Utilities/Copy & Convert
 - Set your Surfer model as input grid
 - Set the output grid with a distinguishable name
 - Save the output as a USGS_PC file
- Put a copy of PFMAG3D.EXE in the same directory as the grids; access with RUN/CMD.EXE in DOS.



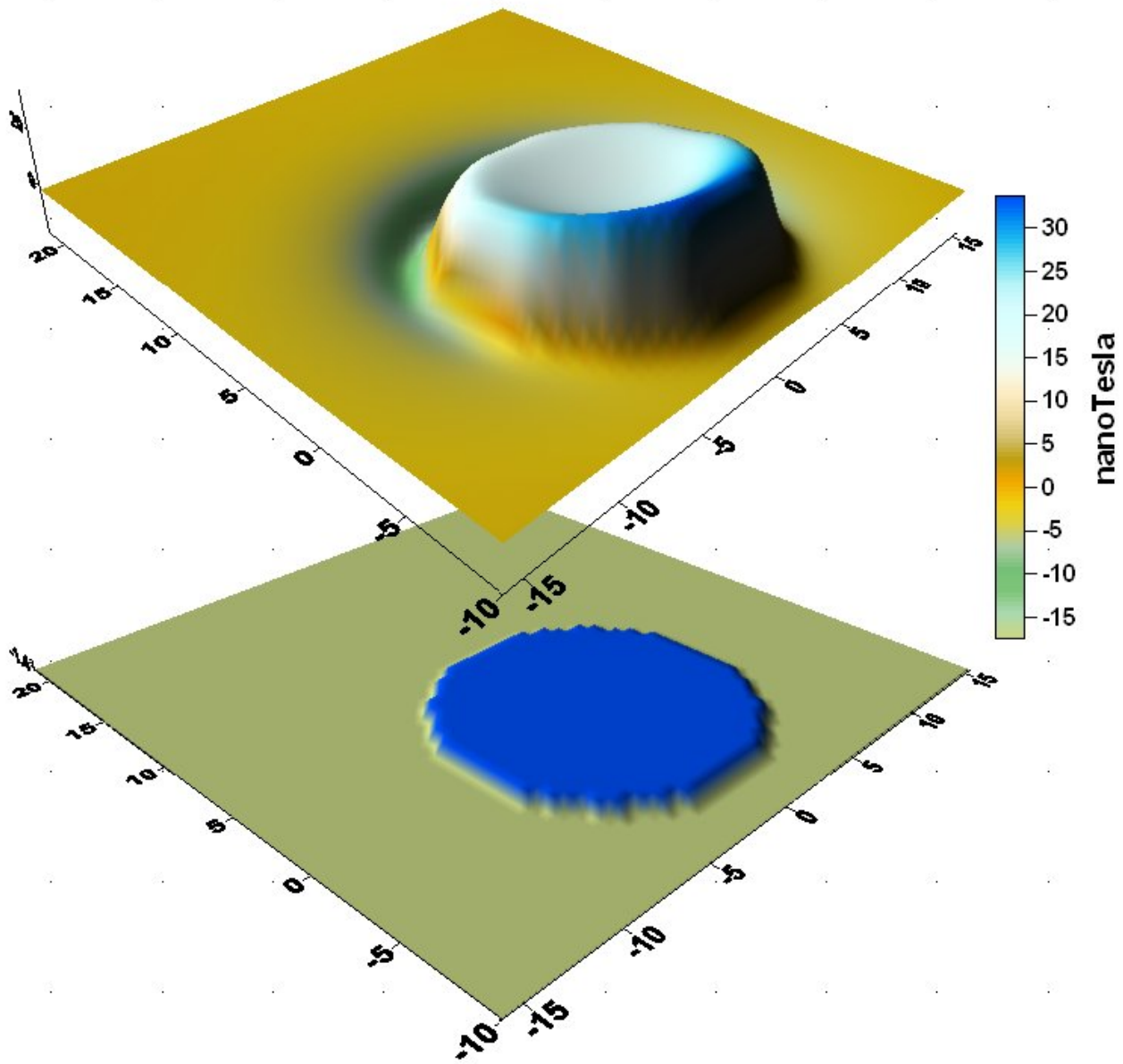
**500 meter thick disk radius = 5 kilometers,
no vertical exaggeration, depth to top = 1 kilometer.**

- Run PFMAG3D.EXE at the command line in the directory with the files (RUN<cmd.exe; cd c:\..., etc.). PFMAG opens, in a DOS window, and you answer the questions as you trick it into doing what you want:
 1. yes (verbose prompts)
 2. no (we'll use our model as the upper surface of a thin layer)
 3. gs_grid.grd (your model file)
 4. -1 (we want "positive down" coordinates, all in kilometers; Surfer plots in positive up)
 5. yes (we'll use a flat bottom layer)
 6. 1.50001 (the flat bottom layer is slightly below the base of your model)
 7. yes (for now we'll use uniform magnetization; you can experiment with gradients, etc. as well)
 8. 0.0005 (this answer should look 'funny' to you. The magnetization is in emu/cm³, not A/m)
 9. GS_mag.grd (the 8-character file name for the calculated magnetics)
 10. mag model sds (an identifying label stored in the file)
 11. 72 14 72 14 0 -.305 20 .05 72 72 (most of these are obvious or use the suggestions. For example, -.305 means we will calculate the magnetics 305 meters above the planar surface below which your model is built. Pick naugx and naugy as the next steps bigger than the number of columns, rows respectively; this decreases the Gibbs effects).
 12. If you entered everything correctly, PFMAG3D does its calculations and you get the calculated anomaly. Any mistakes are punished with a program failure.

- Oasis Montaj – Grid and Image/Display/single grid/ - look at the forward model in the USGS grid to make sure it worked alright.
 - Grid and Image/Utilities/Copy & Convert
 - Set your USGS model as input grid
 - Set the output grid with a distinguishable name
 - Save the output as a Surfer file for manipulation and visualization
 - You can now proceed with edge detection, etc.



Forward results from PFMAG3D. Magnetization is 0.0005 cgs, for a 500 meter thick disk with radius = 5 kilometers, and depth to top = 1 kilometer.



Forward results from PFMAG3D. Magnetization is 0.0005 cgs, for a 500 meter thick disk with radius = 7.5 kilometers, and depth to top = 1 kilometer