Chapter 1

Chapter 2 - Problems

For this and future problem sets, you will need the **PmagPy** package. After you have installed this and properly set your path, you can import the functions from **PmagPy** using these commands:

```
import pmagpy.pmag as pmag
import pmagpy.ipmag as ipmag
import pmagpy.pmagplotlib as pmagplotlib
```

Problem 1

a) Write a python script in an Jupyter notebook that converts declination, inclination and intensity to North, East, and Down. Read in the data fin the file *ps2_prob1_data.txt*. For this the **loadtxt** function in the Numpy module will come in handy.

b) Choose 10 random spots on the surface of the earth. Alternatively, you can use the **pmag.get_unf** to generate a list for you. Then use the **igrf** function in the **ipmag** module of the **PmagPy** package to evaluate the declination, inclination and intensity at each of these locations in January 2006. As with all **PmagPy** programs, and functions, you can find out what they do by printing out the doc string: you can find out what they do by getting the help message:

```
help(ipmag.igrf)
```

Calls like these generates help messages which will help you to call the function properly.

c) Take the vectors from the output of Problem 1b and convert them to cartesian coordinates, using the script you wrote in Problem 1a.

Problem 2

a) Plot the IGRF directions from Problem 1b on an equal area projection by hand. Use the equal area net provided. Remember that the outer rim is horizontal and the center of the diagram is vertical. Azimuth goes around the rim with clockwise being positive. Put a thumbtack through the equal area (Schmidt) net and place a piece of tracing paper on the thumbtack. Mark the top of the stereonet with a tick mark on the tracing paper.

To plot a direction, rotate the tick mark of the tracing paper around counter clockwise until the top of the paper is rotated by the declination of the direction. Then count tick marks toward the center from the outer rim (the horizontal) to the inclination angle, plot the point, and rotate back so that the tick is North again. Put all your points on the diagram.

b) Now use the **ipmag** functions **plot_net** and **plot_di**. or write your own! Both plots should look the same....

Problem 3

You went to Wyoming (112° W and 36° N) to sample some Cretaceous rocks. You measured a direction with a declination of 345° and an inclination of 47°.

a) What direction would you expect from the present (GAD) field?

b) What is the virtual geomagnetic pole position corresponding to the direction you actually measured? [Hint: Use the function **pmag.dia_vgp** in the **PmagPy** module.]
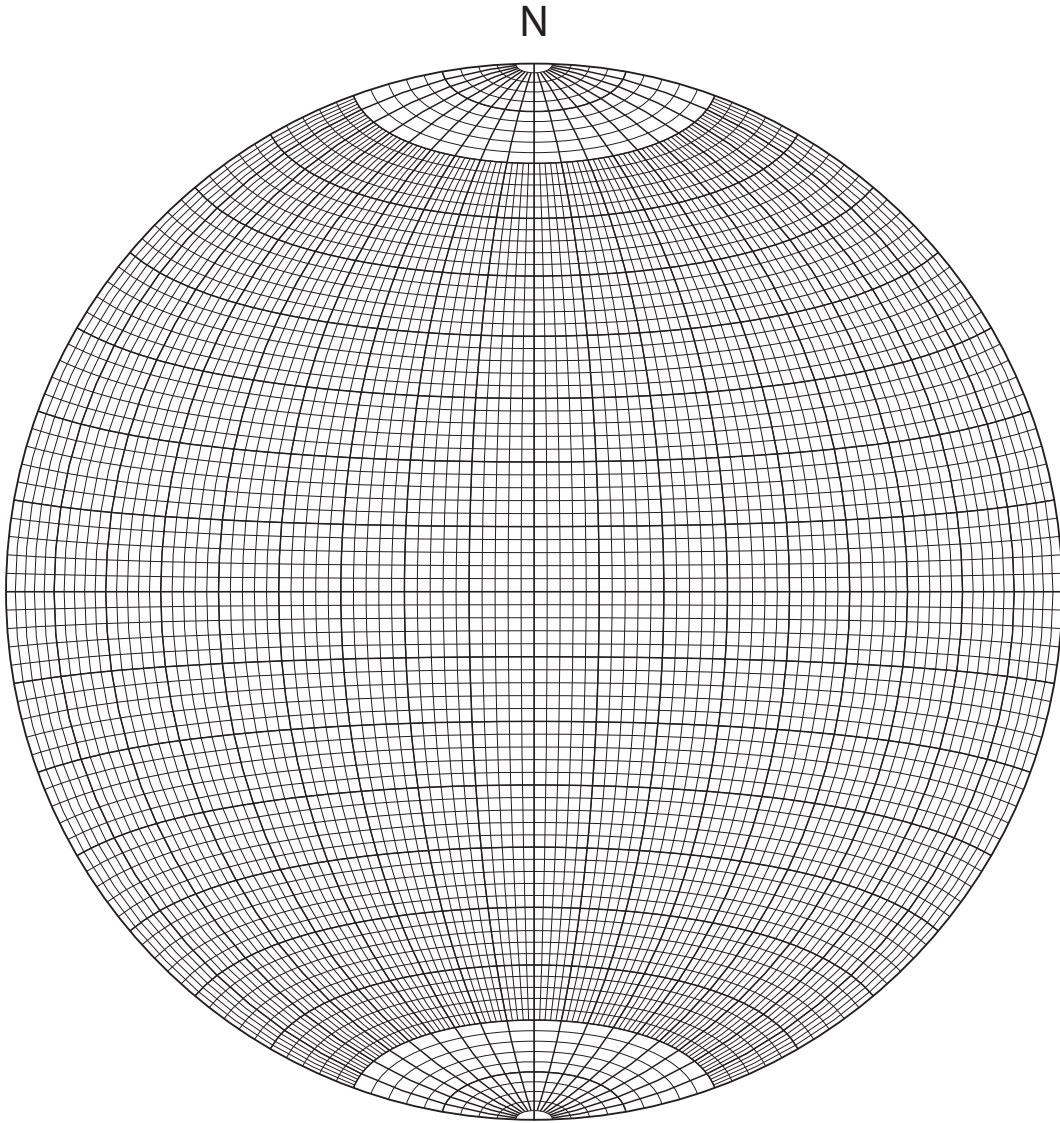
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Figure 1.1: Schmidt (equal area) net.