

GEOLOGY 365: STRUCTURAL GEOLOGY

Stereonet plotting reference sheet

Prepare to plot:

- (a) You'll need a sharp pencil to make precise points.
- (b) Puncture the center of the stereonet with your thumbtack from the back and tape the tack on (if it isn't already there). Spear your tracing paper overlay onto the thumbtack (and perhaps add a piece of tape over the hole to strengthen your paper).
- (c) Trace the primitive circle and mark and label the four principal cardinal points with their geographic orientation and their azimuths as follows: N - 000, E - 090, S - 180, and W - 270.
- (d) You can now spin your tracing paper relative to the stereonet and plot up your data.

Plotting rules of thumb:

- To plot trend and strike azimuths count clockwise around the primitive circle (000 to 360).
- To plot plunge or dip angles count inwards from along either the N-S meridian or E-W parallel. (You can also do this other ways, but this is easiest.)
- Always double-check your plotting and make sure that the data you've plotted on your stereonet makes sense.

Plotting a line:

- 1) Starting with the overlay and stereonet N marks coinciding, mark the trend of the line you want to on the primitive circle. (e.g., for a line whose orientation is 45 -> 080, mark 080)
- 2) Rotate the overlay relative to the stereonet so that your labeled tick mark coincides with N
- 3) Count in from the primitive circle the number of degrees that the line plunges. Make a dot at that point. (e.g., if it's horizontal, the dot is on the primitive circle)
- 4) Rotate the overlay back so that the two N marks coincide again. Check that your plotting makes sense.

Plotting a plane:

- 1) Starting with the overlay and stereonet N marks coinciding, mark the strike azimuth on the primitive circle.
- 2) For strike values in the northern part of the stereonet (for strikes ranging from 270 clockwise through 000 to 090), rotate the labeled tick mark to N. For strike values in the southern part of the stereonet (for strikes ranging from 090 clockwise through 180 to 270) rotate the labeled tick mark to S.
- 3) Pause here and *think* about the direction the plane is dipping and what direction that is now that you've rotated the plane in space. When you're comfortable with this, count in from the appropriate direction (either E or W) on the primitive circle the number of degrees that the plane dips.
- 4) Trace the great circle that crosses through this dip.
- 5) Rotate the overlay back so that the two N marks coincide again. Check that your plotting makes sense.

Plotting a pitch

- 1) Plot the plane for which the pitch is given as above, *but don't do step 5*.
- 2) Starting from the azimuth that your pitch is taken from, count down from the primitive circle along the great circle the number of degrees of pitch. (For example, if the measurement is 000 / 75E, pitch 10N, then count in from the N end of your great circle.) Make a dot at this point.
- 3) Rotate the overlay back so that the two N marks coincide again. Check that the pitch is trending in the right direction (towards the strike azimuth given).

Plotting poles to planes

Although a plane is two-dimensional, its orientation can be uniquely represented by the line orthogonal to the plane. For example, if you put your pencil perpendicular to this piece of paper, the pencil's orientation can be used to describe the paper's orientation. This special line is called the pole to the plane. Plotting up poles to planes represents the planes as points on a stereonet instead of as great circles. Geologists often plot poles to planes instead of the actual planes because it makes it easier to look at a large amount of data.

- 1) Start as if you're plotting a plane (above), *but don't do steps 4 & 5*.
- 2) Starting from the great circle corresponding to the plane's dip, count toward the center of the stereonet along the E-W meridian and make a mark 90 degrees from the dip.
- 3) Rotate the overlay back so that the two N marks coincide again. Check that your plotting makes sense.

Retrieving orientations from data on a stereonet

If you are given a stereonet with data already plotted on it, you can retrieve the exact orientations of lines and planes by following the procedures outlined above, except in reverse.

So, to find the orientation of lines plotted on a stereonet projection:

- 1) Rotate the net until the point lies on the E-W meridian. Then, count down from the primitive circle to determine the plunge.
- 2) Put a tick mark on the great circle where you just counted in. Then, rotate the N arrow back to its position and count around to the bearing (azimuth).
- 3) and to the bearing (azimuth).

Or, to find the orientation of planes from poles plotted on a stereonet projection:

- 1) Rotate the net until the point lies on the EW line. Then, count in to the point. Then go 90° more degrees along the EW line. Make a tick mark there – this is where the plane's great circle crosses. Keep counting the same way to the primitive circle to get the numerical value of the dip.
- 2) Make another tick at the underlay N position – this is the strike. Then, rotate the overlay so that the stereonet and overlay N marks coincide. Count around for the numerical value (azimuth) of the strike.