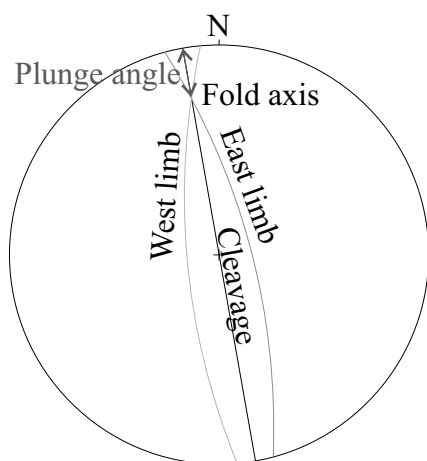
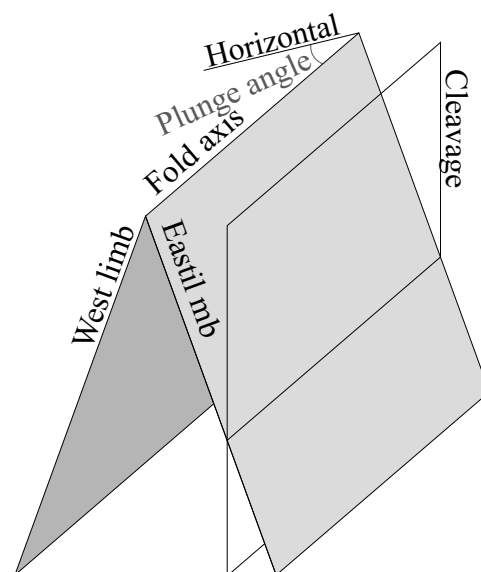


3.5. Determining the plunge of folds

What is plunge?

By definition, the hinge of the fold is the tightest point of curvature on a fold (NB: practically in a drill hole we locate the change in vergence direction). Joining the hinge points on a single bed maps out the plunge of the fold. This line is measured as an angle from the horizontal in the direction of the fold axis.

In theory, the intersection lineation of axial planar cleavage and bedding on either limb is parallel to the fold axis



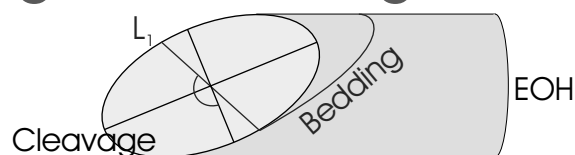
On a stereonet, we plot one of two data types: planes or lines. A plane plots as a line that fits on a great circle. A line plots as a point.

Where two planes cross, they create an intersecting line. Where the plane of an east limb intersects the plane of a west limb, the intersecting line is the fold axis. So the point where the plane of the east limb crosses the plane of the west limb defines the plunge of the fold. Similarly, cleavage intersecting either limb defines the plunge of a fold.

The fold axis can additionally be directly measured in outcrop if the hinge is exposed or more commonly from measuring the intersection lineation where visible on a bedding or cleavage surface

Plunge in drill core I: measuring of the angle

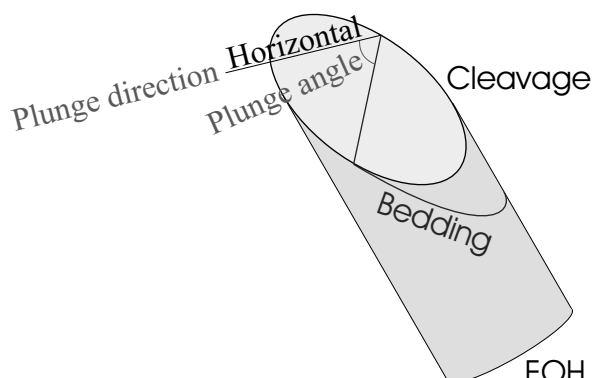
Measuring the intersection lineation relative to the short axis on a cleavage (or bedding) plane will record the orientation of the lineation relative to the drill hole. You will need to then calculate the true orientation of the lineation based on the orientation of the drill hole



Plunge in drill core II: direct measurement

Orient the core into its true position in a sand box or core orienting device. Using a clinometer or a compass, measure the plunge angle and plunge direction as you would in outcrop.

This is the quickest method to accurately determine plunge. Unfortunately these two methods require the intersection lineation to be visible, which is not always common

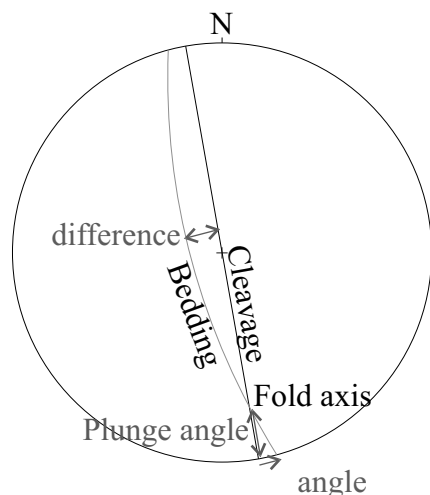


3.5. Determining the plunge of folds

Plunge in drill core III: using the angle

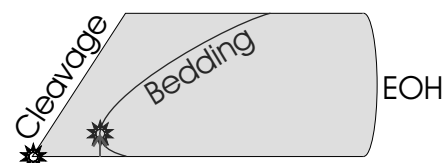
This method utilises the bottom of the ellipse as the dip direction, perpendicular to strike. The relative change in strike can approximate the likely plunge.

The relative change in strike is measured by determining the angular difference of bedding from cleavage measured clockwise or anticlockwise when viewed down the hole.



If a vertical, regional cleavage is assumed, the relative change in strike of bedding can be plotted by the measured angle clockwise or anticlockwise from the strike of the cleavage. If there is a significant change in the alpha angle, the difference can be approximated and the bedding plane more accurately reconstructed. Be careful to correctly assign an east or west dip.

This method can quickly approximate plunge. When done once for a limb, it can be quickly monitored down a hole for any changes. Given that planes are more common down a hole than intersection lineations, this is the most desirable method to use.

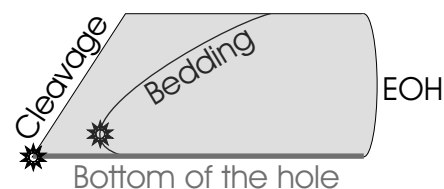


- ✱ Bottom of the cleavage ellipse
- ✱ Bottom of the bedding ellipse

Plunge in drill core IV: stereonet plots

The alpha and beta angles for the bedding and cleavage can be directly measured and using the hole orientation, can accurately plot the plunge of the fold on a stereonet. The method to do this is defined in a previous section.

This is an accurate method to determine plunge. However, requires an advanced ability to use a stereonet.



- ✱ Bottom of the cleavage ellipse
- ✱ Bottom of the bedding ellipse