

Orientation

How can the WCB be determined from observations?

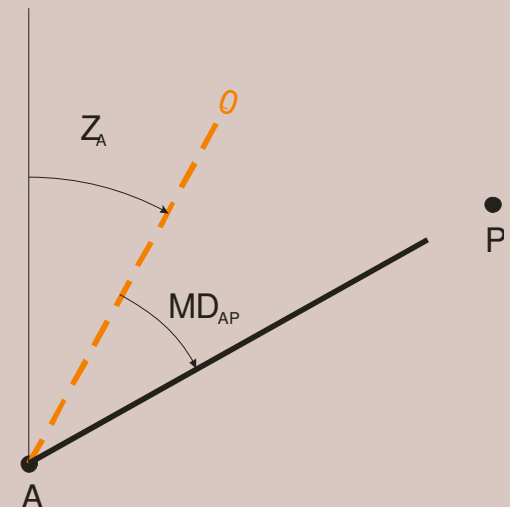
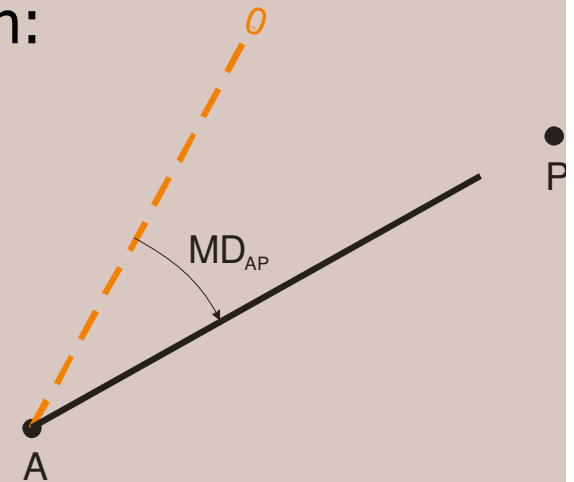
Recall the definition of mean direction:

All the angular observations refer to the index of the horizontal circle, but they should refer to the Northing instead!



Orientation

z_A – orientation angle

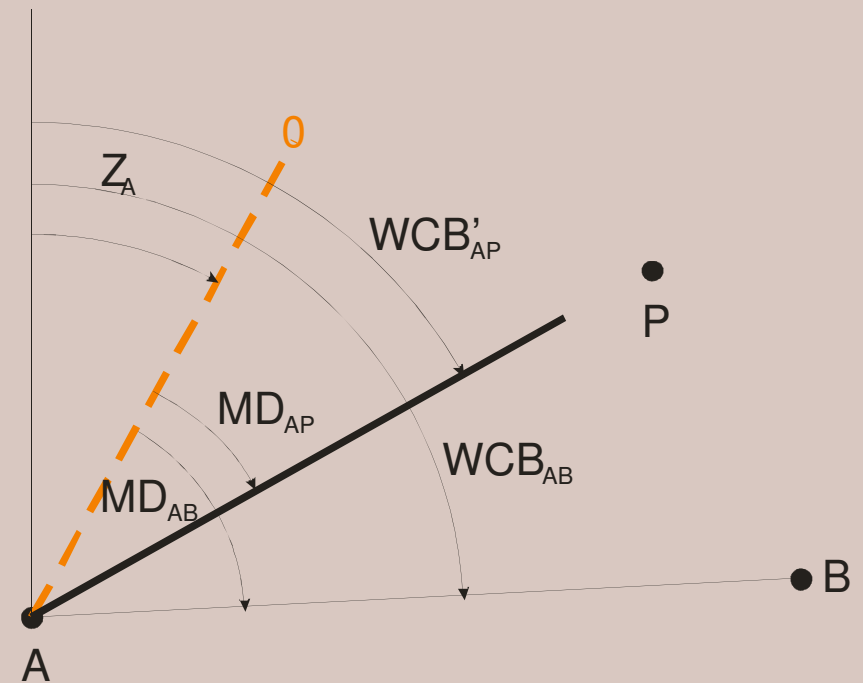


Orientation

How to find the orientation angle?

A, B are known points,
 MD_{AP} and MD_{AB} are
observed.

Aim: Compute WCB'_{AP}



Compute the orientation angle:

$$z_A = WCB_{AB} - MD_{AB}$$

Computing the WCB'_{AP} :

$$WCB'_{AP} = z_A + MD_{AP}$$

Computing the mean orientation angle

In case of more orientations, as many orientation angles can be computed as many control points are sighted:

$$z_A^B = \text{WCB}_{AB} - \text{MD}_{AB}$$

$$z_A^C = \text{WCB}_{AC} - \text{MD}_{AC}$$

$$z_A^D = \text{WCB}_{AD} - \text{MD}_{AD}$$

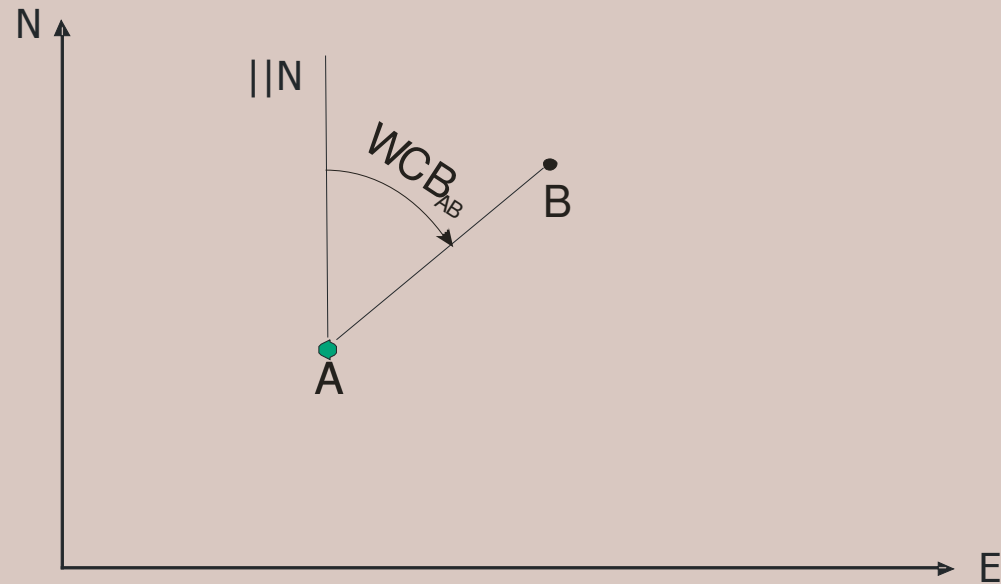
z_A^B , z_A^C and z_A^D are usually slightly different due observation and coordinate error.

However, the orientation angle is constant for a station and a set of observations.

Mean orientation angle:
$$z_A = \frac{z_A^B \cdot d_{AB} + z_A^C \cdot d_{AC} + z_A^D \cdot d_{AD}}{d_{AB} + d_{AC} + d_{AD}}$$



WCB vs provisional WCB



Whole circle bearing (WCB_{AB}): computed from coordinates, between two points, which coordinates are known.

Provisional whole circle bearing (WCB'_{AB}): an angular quantity, which is similar to the whole circle bearing. However it is computed from observations, by summing up the (mean) orientation angle and the mean direction.