University of Anbar

College of Science

Department of Applied Geology

Field Geology

Title of the lecture

Magnetic Declination

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Magnetic Declination

The earth′s rotation pole (true north) is not coincident with magnetic north and varies by as much as 30º either side of true north. This declination varies with geographical location and over time figure (1).

Before taking any azimuth reading it is strongly advised that you adjust your compass for magnetic declination for the area you are visiting and the year so that there are no result errors in the azimuth measurement.

To find out how much the magnetic declination is for the area there are three possibilities: (a) consult the legend of the topographical map of the area, taking note of changes since the publication date; or (b) use one of the many web pages now available that will calculate the declination for the area where you are completing fieldwork; or (c) determine the declination yourself in the field.

Adjusting your compass to take the magnetic north variation into account is easy. On the compass dial or side of the compass there is a screw, the declination adjustment screw turn this screw by the amount of declination relative to grid north for the area and year using either a screwdriver.

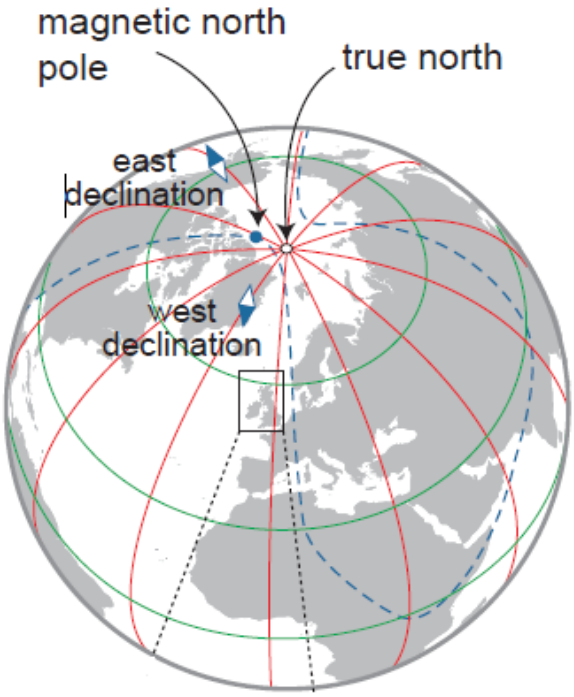

Figure (1) Magnetic north is not coincident with true north

Positive and negative magnetic declination

A legend in the map margin will show the declination at the center of the map between magnetic north and true north. Where magnetic north is west of the true north, the compass needle is deflected to the left. Because the angle to magnetic north is less than true north (360º), this is a negative declination figure (2).

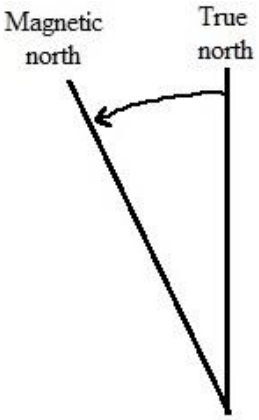

Figure (2) Negative declination, magnetic north is west of true north

Where magnetic north is east of true north, the compass needle is deflected to the right. Here, the angle to the magnetic north is greater than true north (0º), and is therefore a positive declination figure (3).

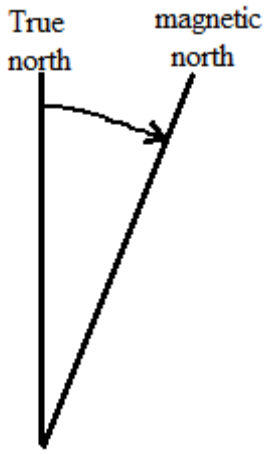

Figure (3) Positive declination, magnetic north is east of true north

Orientation of a dipping plane

The most common type of measurement in geology is the orientation of a dipping plane: for instance, a bedding plane, a cleavage plane or a fault plane. The following three parameters need to be measured and recorded: (1) maximum angle at which the plane dips (dip magnitude) in degrees relative to the horizontal; (2) the orientation of the plane relative to north (strike, i.e., orientation of the horizontal line defined by the plane) in degrees; and (3) the general dip direction figure (4) because from the strike alone the plane could be dipping in one of two directions at 180 ° to each other. To prevent confusion, strike is always recorded as a three-digit number and dip as a two-digit number. Apart from this convention

on the number of digits, there are several equally valid and commonly used notations to combine the dip and strike. For example, the approximate attitude of the below plane is N30ºE, 45º SE which represent strike, dip and dip direction respectively.

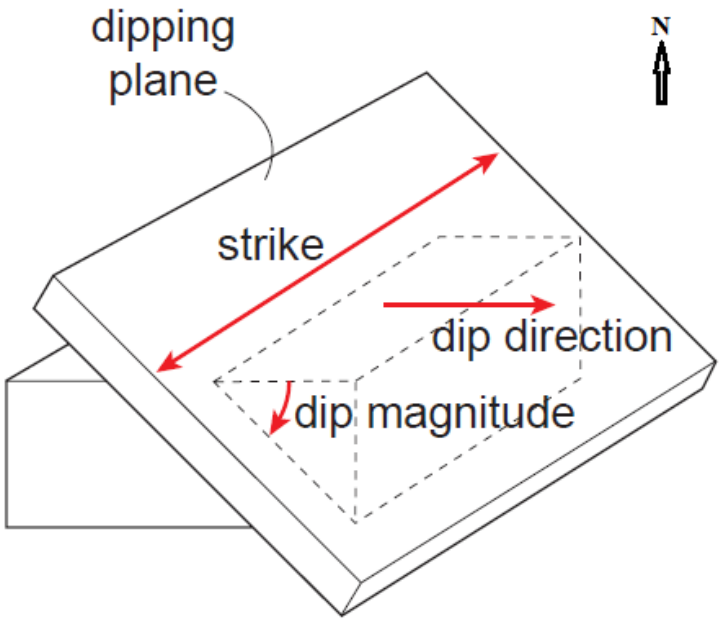

Figure (4) orientation of dipping plane (strike, dip and dip direction)

Orientation of a linear feature

The need to measure the orientation of linear features is common in sedimentary rocks. The steps are similar to measuring a plane except that in this case the orientation of the feature with respect to north (the azimuth) is recorded by orientating the long edge of the compass-clinometer parallel to the linear feature. As for a dipping plane the azimuth should be recorded as a three – digit number and the plunge as a two - digit number. For example, the attitude of the hinge line is 110º/30º represent the azimuth (trend) and plunge respectively.

Reference

Angela L. Coe Tom W. Argles David A. Rothery Robert A. Spicer. 2010 GEOLOGICAL FIELD TECHNIQUES, Department of Earth and Environmental Sciences, The Open University, Walton Hall, Milton Keynes, UK