

KB001: What is all this about the Earth's magnetic field strength and dip?

The Earth's magnetic field can crudely be represented as being generated by a large bar magnet located at the centre of the Earth. The south pole of this magnet points generally towards the geomagnetic north pole – hence the north pole of a compass needle is attracted to it and points north. In the absence of any local magnetic anomaly, the strength of the Earth's magnetic field and the dip of this field are constants for a given geographical location.

The strength of the magnetic field is strongest near the poles and weakest near the equator. The values vary from about 30000nT (nanoTesla) at the equator to about 60000nT at the poles.

The dip of the field can be quite large at moderate latitude (e.g., typically -70° or more in Canada). In equatorial areas, the magnetic field will be near-horizontal, and in southern latitudes the dip is positive (i.e., the field lines are coming up out of the ground, trending northward). For information on the expected magnetic field strength and dip in your area, go to <http://www.ngdc.noaa.gov> and follow the links to data about the geomagnetic field.

We do not recommend that our tools be used in areas where the magnetic dip exceeds $\pm 85^{\circ}$. This is because there is so little horizontal component to the Earth's field that any measurement error results in a large azimuth error.

