Quadrant II – Transcript and Related Materials

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Module Name: Earths Magnetism: earth as a magnet, line of force, inclination and declination, geomagnetic axis and geographic axis

Module No: 12

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NOTES:

MAGNETISM AND THE EARTH'S MAGNETIC FIELD

The Earth acts like a great spherical magnet; it is surrounded by a magnetic field. This magnetic field varies in its strength and direction both with time and at different locations on the Earths e shape of this field largely resembles, the field generated by a dipole magnet (i.e., a straight magnet with a north and a south pole) located at the center of the Earth. The axis of the 'dipole is offset from the axis of the Earth's rotation (the geographic north) by approximately 11 degrees, and the dipole is constantly shifting slightly. This means that the north and south geographic poles and the north and south magnetic poles do not coincide.

At any place and at any time, the Earth's magnetic field can be described by its direction and intensity which can be measured. Often the parameters measured are the magnetic declination, D, inclination, I, the horizontal intensity, H, and the vertical intensity, Z. From these elements, all other parameters of the magnetic field can be calculated.

There are some regular features of the magnetic field. At the magnetic poles, a dip needle stands vertical (dip=90 degree) the horizontal intensity is zero, and a compass does not show direction (D is undefined). At the North Magnetic pole; the north end of the dip needle points vertically down; at the south magnetic pole, the north and is vertically up. At the magnetic equator the dip or inclination is zero. The needle remains horizontal and points to the magnetic North pole.

Unlike the Earth's geographic equator, the magnetic equator is not fixed, but slowly changes.

This is because the central dipole (the main field) is always changing position, though it generally remains fairly close (at a small angle) to the rotation axis.

The earth magnetic field can be described by

Its direction and intensity which can be measured from the following parameters:

- Magnetic declination **(D)**
- Inclination **(I)**

- Horizontal intensity **(H)**
- Vertical intensity **(Z)**

The Parameters describing the direction of the magnetic field are declination) (D) and Inclination (I) is the angle between magnetic north and true geographic north.
D is considered positive when the angle measured is east of the north and negative when west.
Magnetic inclination is the angle between the horizontal plane and the total field vector) measured positive into Earth.
D and I are measured in units of degrees, positive= east for D (negative=west) and positive = down for I (negative = up).