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GROUND WATER DEPTH PREDICTION MATHEMATICAL MODEL BASED ON GEOPATHIC STRESS, CURRENT VARIATION AND INTENSITY OF MAGNETIC FIELD

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ABSTRACT. This paper attempts to contribute to the research by Mathematical models – First model relating the Current variation geopathic stress zone (GSZ) locations with the ground water (GW) depth, second the intensity of magnetic field measured on the geopathic stress zone locations with the ground water depth. In this paper the geopathic stress is one of the cause which affects Current and intensity of Earth magnetic field (EMF).

1. INTRODUCTION

Intensity of earth magnetic field (EMF) get disturb due to presence of geopathic stress zone (GSZ) caused by groundwater(GW). Importance of identification of GSZ for health and environment is recognized and used by many researchers; Bachler (1970), David Cowan (1996), Alan Hall (1997), Jane Thurnell-Read (1998), Bird 1994). However, the significance of GSZ as a causative factor for current variation and changes in intensity of EMF has been studied only by few researchers; Dharmadhikari (2011), Manickam), Gerhard (2008), Olsen

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and, Kharat (2000), ANADI SAHOO, (2014), Pimplikar (2017). It may be noted here, that there does not exist any mathematical model which enables to predict the GW depth based on current variation and changes in intensity of EMF at specified spots due to the existence of GSZ. This paper attempts to contribute to the research by suggesting mathematical models – First model relating the current variation GSZ locations with the ground water depth, second the intensity of EMF measured on the GSZ locations with the ground water depth

2. Research Methodology

Identified 15 locations were taken for this study around Pune district with existence of GSZ. The presence of GW was confirmed by resistivity technique. Over each location, current variation readings taken by Naavmeter Figure (1). The readings were observed and suitably plotted Figure(2 and 3).All the collected data is used as input for linear multiple regression model and slope and y intercept calculated. All the calculated value submitted in linear regression formula for required result.

3. Naavmeter

An attempt is made to study the interaction of Laser light beam with GSZ using NaaV meter. In present device there is a gap between laser light source and detector. In case GS is present in the gap, then interaction occurs between photons of laser light and GS which changes the current. If Geopathic Stress is not present in the gap of source and detector, then no interaction occurs keeping the current constant. A NaaV meter is placed at the predetected stress zone. The selenium photodiode and laser light source are arranged as shown in Figure 1. The box is enclosed such that no external light would enter the box. Using copper L rods, the GSZ on the Mumbai-Pune expressway and residential area were located. The current was measured inside and outside the GS. The GS moves vertically upwards and laser light beam travels in horizontal direction. Both are mutually perpendicular. But at same time the laser light beam is also parallel to source of GS (underground water vein). Therefore an attempt is also made to measure variation of current by rotating the horizontally moving light beam from 00to3600 with respect to vertically moving GS. This exercise has

been carried out for the first time to confirm whether the GS get distributed in all possible directions above the earth surface,

4. Proton Precession Magnetometer (PPM)

The orbiting electron acts just like electric current in a coil of wire and sets up a magnetic field about the atom. The proton, the main mass of the atom, is also in motion, spinning about its centre, so that the whole atom looks like a magnetic gyroscope, whose magnetic poles are on its spin axis. Gyroscopes have idiosyncrasies revealed to mechanical engineers, one of them being that they will process if acted upon by an external field. In the hydrogen proton's case, its spin axis will wobble or process about the direction of the earth's magnetic field if that is the only magnetic field acting on it. The frequency of precession will be proportional to the strength of the field and is given by v = kB (1) where v = frequency of precession k = 4.26 x 103 Hz/weber for hydrogen B = intensity of magnetic field. The instrument used for this study consists of a sensor and a detector. The sensor is mounted by means of a rod is kept 1/2 meter above the ground (Weymouth and Huggins, 1985;Burger, 1992). The detector is connected to the sensor by means of a 2m long two core shielded cable. Sensor was arranged with a arrow mark and is pointed towards north.one detector has a manual button anal it is used to take the measurements. The sensor consists of a normal sample of hydrogen—rich material called as a polarizing liquid. The protons present in the liquid are randomly oriented and behave like a magnetic dipole. When it is placed in an external magnetic field, a torque is exerted on it, which aligns its magnetic movement and causes a precession about the spin axis.

5. Observations

Readings of the current variation shows that significant decrease in current variation on GSZ(Figure 1). Observation of intensity of EMF measured by PPM, shows that intensity of EMF increases on GSZ as compared to normal zone (Figure 3).Linear regression model is tested with our observation that gives approximate value of water vein depth for both current variation and intensity of magnetic field. So it is observed that if current variation or intensity of magnetic field is known we can find ground water depth at particular location. This

model will help to identify geopathic stress zone.

6. Experimental set up of NaaV meter

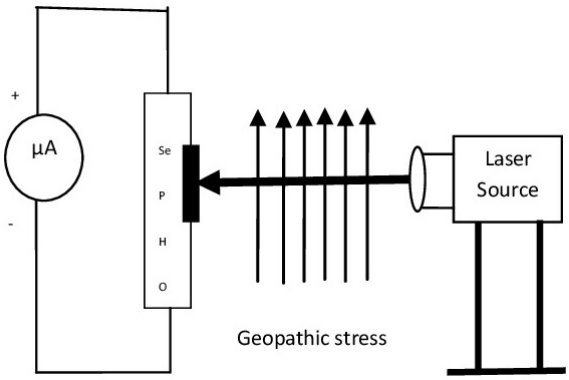

FIGURE 1. Experimental set up (NaaV meter)

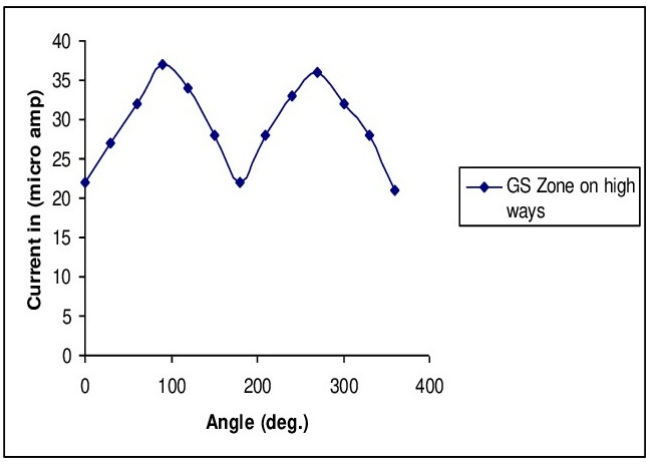

FIGURE 2. Graph for variation in current with respect to angle by using Naav-meter

Mathematical model for Current Variation and Intensity of magnetic field: Linear regression is a way to model the relationship between two variables. The

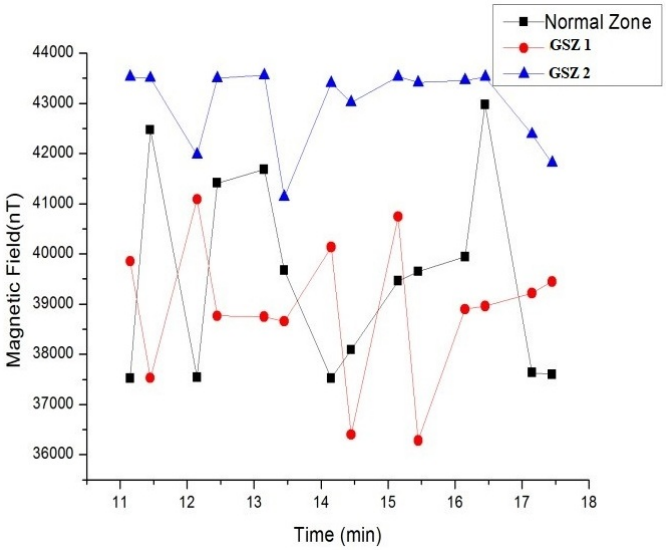

FIGURE 3. Change in magnetic field with respect to time for two different GS zone

equation has the form Y= a + bX, where Y is the dependent variable, X is the independent variable, b is the slope of the line and a is the y-intercept
A residual plot is a graph that shows the residuals on the vertical axis and the independent variable on the horizontal axis. If the points in a residual plot are randomly dispersed around the horizontal axis, a linear regression model is appropriate for the data; otherwise, a nonlinear model is more appropriate.

Residual analysis is performed for both the data i.e. Current variation and intensity of earth magnetic field.
As per the readings of Current variation and change in intensity of magnetic field we have plotted normal probability plot, line fit plot and residual plot shown in Figure 4 to Figure 9.

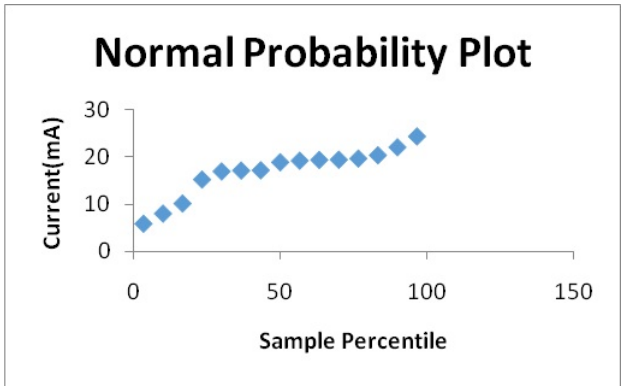

FIGURE 4. Normal probability plot for current variation

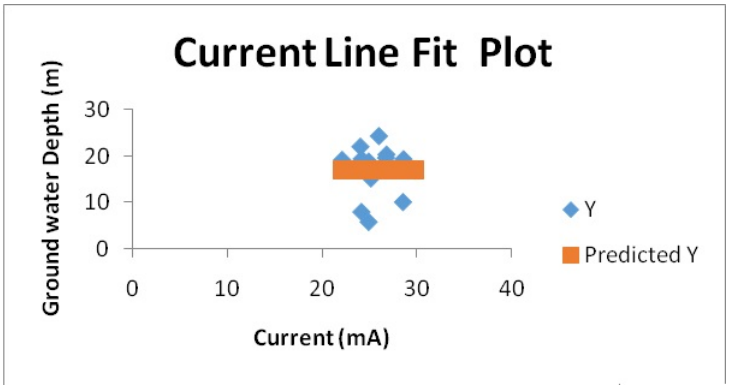

FIGURE 5. Line fit plot for current variation

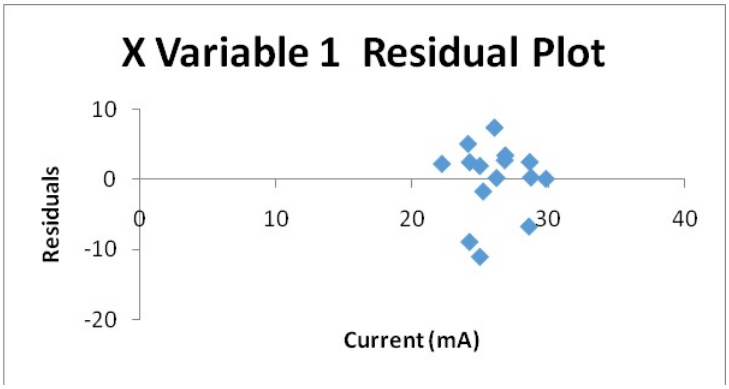

FIGURE 6. Residual plot for current variation

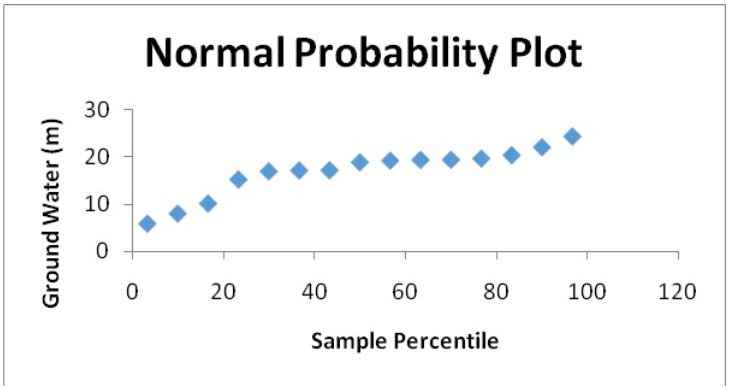

FIGURE 7. Normal probability plot for Intensity of magnetic field

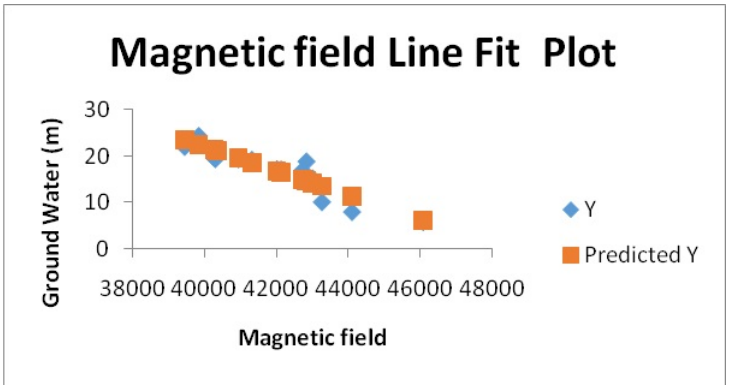

FIGURE 8. Line fit plot for intensity of magnetic field

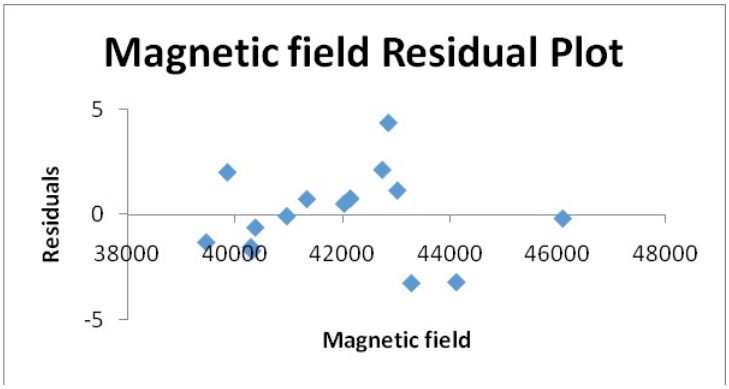

FIGURE 9. Residual plot for intensity of magnetic field

To show the relationship between current variation and intensity of magnetic field with Ground water depth we have used linear regression model
Ground Water Depth = a + b* (Current variation) (i.e. y = a + b x)

(1) Linear regression model for Ground water depth with Current variation.

TABLE 1. Linear regression model for Ground water depth with Current variation.

Sr No	x as current variation (μ A)	y as Ground water depth(m)	x*y	y^2	x^2
1	29.8333333	16.96	505.9733	890.0278	287.6416
2	28.575	10.15	290.0363	816.5306	103.0225
3	25.1833333	15.24	383.794	634.2003	232.2576
4	24.1916667	19.44	470.286	585.2367	377.9136
5	26.7833333	19.68	527.096	717.3469	387.3024
6	26.025	24.38	634.4895	677.3006	594.3844
7	24.9416667	5.86	146.1582	622.0867	34.3396
8	24.9416667	18.9	471.3975	622.0867	357.21
9	28.6333333	19.4	555.4867	819.8678	376.36
10	24.175	8.01	193.6418	584.4306	64.1601
11	24.0666667	22.08	531.392	579.2044	487.5264
12	22.1333333	19.24	425.8453	489.8844	370.1776
13	28.7333333	17.2	494.2133	825.6044	295.84
14	26.175	17.15	448.9013	685.1306	294.1225
15	26.825	20.39	546.9618	719.5806	415.7521
	$\sum$ x = 391.2167	$\sum$ y=254.08	$\sum$xy =6625.673	$\sum y^2$= 10268.52	$\sum x^2$= 4678.01

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n * (\sum x^2) - (\sum x)^2},$$
$$b = \frac{(\sum xy) - (\sum x)(\sum y)}{n * (\sum x^2) - (\sum x)^2}$$

a = 17.3453, b = 0.01559, y = 17.3453 - 0.01559 x

Ground Water Depth = 17.3453 - 0.01559(Current variation)
Similarly

Ground Water Depth = a + b* (Intensity of magnetic field)

(2) Linear regression model for Ground water depth with intensity of magnetic field.

TABLE 2. Linear regression model for Ground water depth with intensity of magnetic field

Sr No	x as intensity of Magnetic field (nT)	y as depth of ground water(m)	x*y	y^2	x^2
1	42733	16.96	724743.9	1826069843	287.6416
2	43274	10.15	439230.3	1872632419	103.0225
3	43014	15.24	655526.3	1850164491	232.2576
4	40309	19.44	783610	1624827884	377.9136
5	40284	19.68	792790.6	1622806853	387.3024
6	39848	24.38	971484.9	1587832451	594.3844
7	46093	5.86	270106.8	2124593014	34.3396
8	42845	18.9	809761.8	1835654476	357.21
9	40954	19.4	794498.6	1677192312	376.36
10	44112	8.01	353335.9	1945854971	64.1601
11	39454	22.08	871147.7	1556630256	487.5264
12	41327	19.24	795134.4	1707933645	370.1776
13	42025	17.2	722827.4	1766087694	295.84
14	42138	17.15	722661.4	1775585113	294.1225
15	40368	20.39	823111.4	1629606477	415.7521
$\sum$	$\sum$ x =628776.3	$\sum$ y =254.08	$\sum$ xy =10529971	$\sum x^2$= 26403471900	$\sum y^2$= 4678.0104

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n * (\sum x^2) - (\sum x)^2},$$
$$b = \frac{(\sum xy) - (\sum x)(\sum y)}{n * (\sum x^2) - (\sum x)^2}$$

a = 126.506
b = -0.0026138
y = 126.506 - 0.0026138 x

Ground water Depth= 126.506 - 0.0026138(intensity of Magnetic field)

7. Results

It is observed that by substituting values of current variation and intensity of magnetic field for particular location we can find depth of underground water, which proves mathematically that due to presence of Ground water earth radiation i.e. GSZ can be identified

8. Discussions

The particular study focuses on bringing the fact into light that a subtle energy is possessed by the GSZ that impacts the earth radiation. The dowsing subjectivity can be removed mathematically with the help of modification measurements in current variation as well as intensity of magnetic field as per depth of the underground water. Therefore, this has been accomplished that the mathematical method of utilizing the Naavmeter and PPM for detecting sub-terranean characteristic like groundwater disturbs the current variation as well as intensity of earth magnetic field.

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