

The Use of Geographic Information Systems in Morvomitric Mount Sinjar Study

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Abstract

In this research has been to rely on the use of digital elevations model (DEM) and programs of geographic information systems (Arc Map v 10) as well as the use Mapper global program v11 in Morphou metric study of Sinjar mountain, located in the north of Iraq for the purpose of clarifying the slopes and trends or the nature of the longitudinal and cross sections and draw contour maps and written Add to that the Model stereo and compare this process to provide the field data surveying the usual ways that require a stay on the job for a few months or days in addition to the devices, equipment and technical staff with high material cost and required by this type of studies and field surveys show off Fold through research that Mount Sinjar characterized by severe terrain and consistent in terms of the direction of orientation as a class slopes (5° - 15°) and (15° - 35°) and (35° - 55°) are prevalent on other areas of the slopes shade values They are sandwiched between (69° - 180°) is a medium shade area of the flat areas and formed 20% and 50% areas convex and concave regions 30% on cross sections that have been studied along.

Keywords: GIS, Morvomitric study, the digital elevation model (DEM), Slope

Introduction

The digital elevation model DEM which provided American industrial satellites it concerned important resources used in the space of *Geomorphology* studies to explain the topography for area studies and its important means which allow us the space to achieve the three dimension vision by use modern program such as (Arc Map 10)program included the program of Geographic information systems . This modern technical provide the difference studies and analyses results in accurate therefore we know through use the pattern digital height on the size ground slopes and account areas then the remote sensing saved a huge ability to study ground phenomena especially the difficult mountain area and we can get the symbols digital height very easy through internet website and this saved the stress and money cost if we compared as the previous means that used to get this kind of the statements , this modern technical leads to develop the space of scientific researches and the studies which contribute to put future plans to develop the society and the infrastructure and saved the huge information for the researchers and the Geographic information systems that use widely in analyses the surface land phenomena and know the kinds the ground mountains for area studies depend on the capacities that saved by this programs through used the places information and description information to the ground phenomena. It is also use the Ge0graphic information systems in the follow up the changes which witnessed this phenomena because of external factors which faced it.

The Study Area

The study area of Sinjar mountain is located in the south-west of Nainawa province and extends toward the north-west, south-east and it is away from the center of Mosul city (106 KM) between two latitudes (36.2° - 36.4°)north degree and two Longitudes (41.3° - 42°)east degree .The area of the mountain is (462km^2) and the highest of the mountain is (1400m) , the less high is (500m) from the surface of the sea as shown in the fig. (No.1).



Figure 1 The study area position for Iraq (Internet origin)

The Means Used

means to accomplish this research:

1. satellite image of the satellite land sat a spatial resolution of 60 cm for 2012
2. digital elevation data DEM Mount Sinjar, a spatial resolution of 30 cm for 2009
- 3- Arc6is 10 program to store and analyze the data and draw maps morphometric study of Mount Sinjar
- 4- Global Mapper v11 program.

The Method Of The Work

The method of the work focused on using the digital elevation data (DEM) to study the morphometric of Sinjar mountain for the following applications:

1. Stereoscopic Vision:

It has got the hologram model through program (Global Mapper V11) that at first we merged the photo of the digital height (N36E41.dem) with the digital height (N36E42.dem) for the study area in one model by using the program (ARCGIS V10) to get one digital height for the study area and it treated by the program (GLOBAL MAPPER V11) to explain the hologram model of Sinjar mountain as shown in the fig.(2)

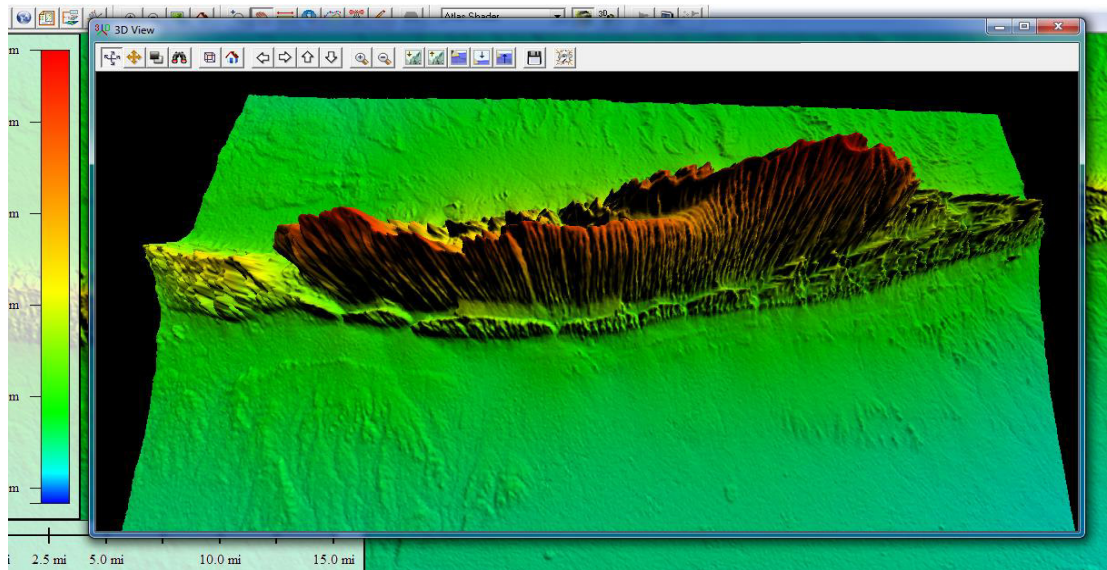


Figure 2 represents a holographic model mount Sinjar (business researcher)

2- Contour Map

It has done the contour map to the Sinjar mountain that is shown in the fig.(3) depending on the model of the available digital height which merged in one model and it appears from the contour map the contour period is (50M) and the highest in the region is (1400M) and the less high is (500M) from the sea level, that leads to rugged region as shown the fig.(3).

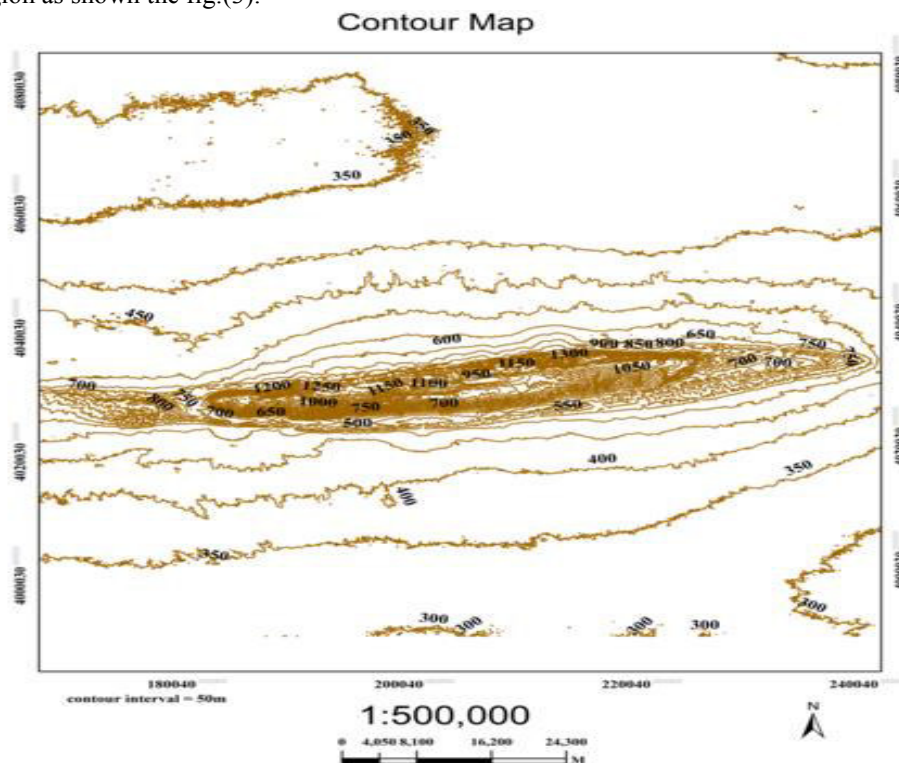


Figure 3 contour map of grid of the study area (the work of the researcher)

3- Slope

It is the slope of the earth's surface from the horizon line and it represents the height difference between two points dividing on the horizon distance land between them. It characterized the study area in a variety of the land slopes because it is rugged region and it has different terrains by depending on class (DEMEK) to know about the fetchers of the slope for the study area which consist of six levels to classify the slope as shown in the table (1). It has got the slopes map to study area according class (DEMEK) in fig. No. (4).

Table 1 classification DEMEK source Falah Shaker Black, thematic maps, the University of Baghdad, Baghdad, 1991 p. 92.

زاوية الانحدار بالدرجات	شكل الأرض
2 - 0	ارض مستوية
5 - 2	ارض سهلة
15 - 5	ارض متموجة
35 - 15	تلال منخفضة
55 - 35	تلال مرتفعة
55 <	جبال عالية

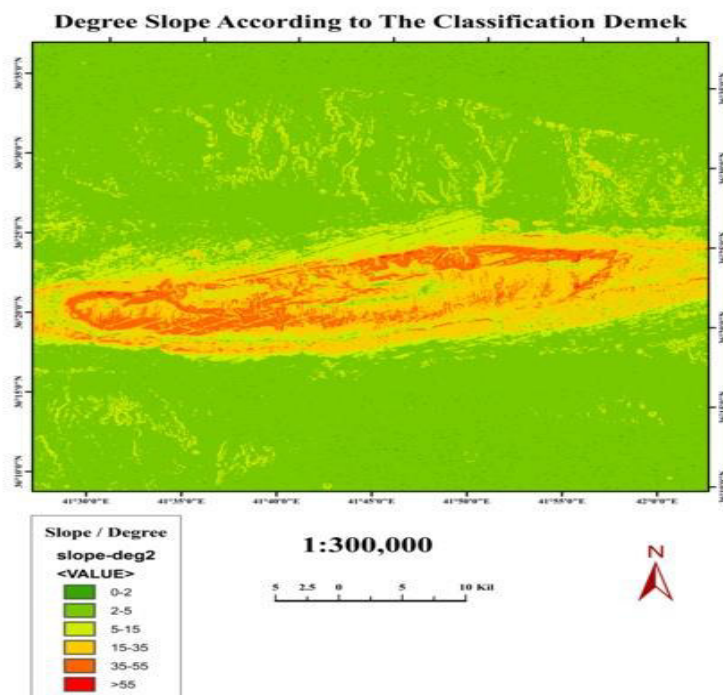


Figure 4 map of the decline of the digital elevation model for the year 2009 according to the classification Demek. (The work of the researcher)

4- Direction Of The Gradient

The direction of slope represents the height area or slope and identifies by the directions (north-south-east- west) or from the quarters directions that located between the fourth directions . the direction is measures through clockwise by degree named (AZIMUTH) the value will be (0-360). To know the slops direction has importance in determine avalanche or the skiing sports or prediction of the motion the land structures which is concerned the dangerous cases in the countries that has so much rains for the long time. The direction of slop to study area as shown in table No.(2) which explained the direction of the earth is homogenous north-east with south-east) and north-west with south-west)as shown No.(5).

اللون	زاوية اتجاه الانحدار بالدرجات	اتجاه الانحدار
رصاصي	-1	المستوي FLAT
برتقالي	- 22.50	شمال
بيجي	22.5 – 67.5	شمال - شرق
اصفر	67.5 – 112.5	شرق
اخضر	112.5 – 157.5	جنوب - شرق
قرمزي	157.5 -202.5	جنوب
سمائي	292.5 -247.5	جنوب - غرب
نيلي	247.5 – 292.5	غرب
وردي	292.5 -337.5	شمال - غرب
احمر	337.5-360	شمال

Table 2 slope of the study area directions

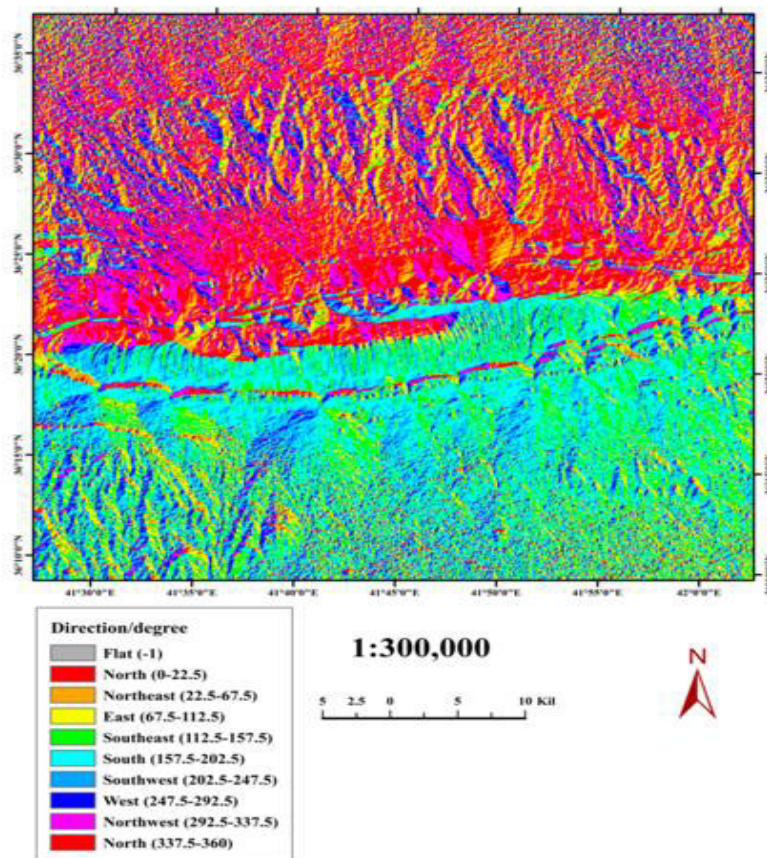


Figure 5 angle direction of the gradient (the work of the researcher)

5_Shadow Of The Hills

The finding the hills shadow has important in determination the suitable locations to set up solar systems and determine the area of density of structural cover and showing the wide area that get continue sun-ray it is also determine the buildings which they can plant and the shadow map No.(6) that explain the size of shadow (less , middle and so much) . we can measure the shadow through the corner fall the sun ray is between (0-181) and the direction of the sun ray in east-west , the value of the shadow (0) is a high value and (181) the shadow will be between two values according class (Jenks)

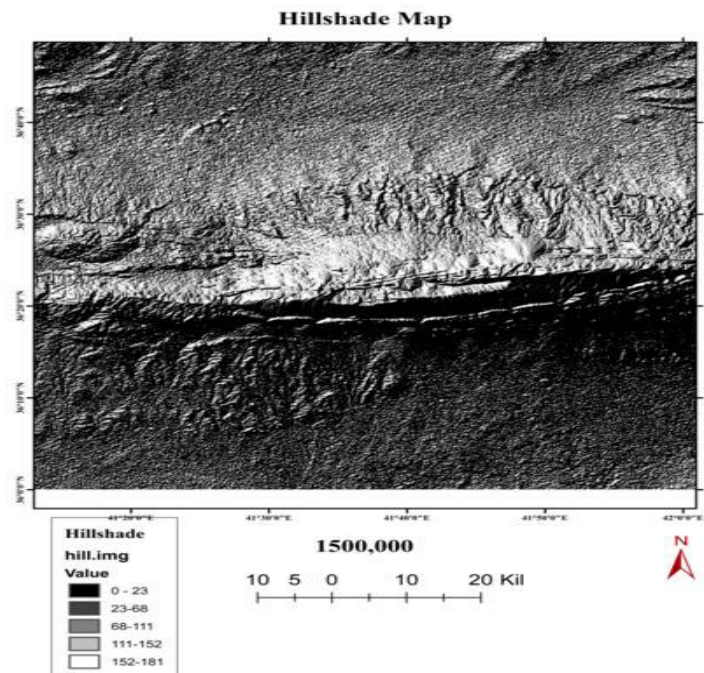


Figure 6 the shade map (the work of the researcher)

6_The Measurement Of Highs

It has done the highs map by using program (Arc Map 10) to study area by depending on the model of digital high (DEM) that represent the model (VECTOR) in fig. No. (7) where we found the highs between (208 M-1448M) from the sea level and the other highs between them , this refers to the severity of the terrain at the middle of the area but the other parts will be less highs and these highs extend from south east to northwest.

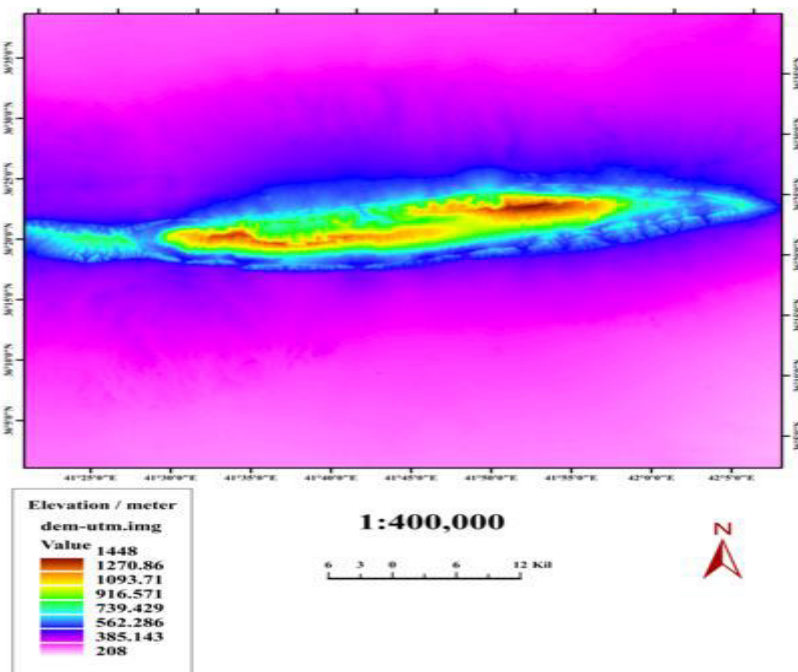


Figure 7 map of the terrain (the work of the researcher)

7. Cross-Sections

The study area has divided in to three cross sections . one cross locates in the west ,and one in the middle and the other in the east .the first cross starts less high(504 M) and finish in high (1350M) it has known (AB) the middle cross (CD) starts from the less high (734M) to the high (1180M) then the third cross (EF) starts from the high (600M) to the high (1440M) and it has drawn the speared sheets to these crosses depending on the program (ArcMapv.10) to study the produced figures and known the characters the slop as shown the fig. No.(8).

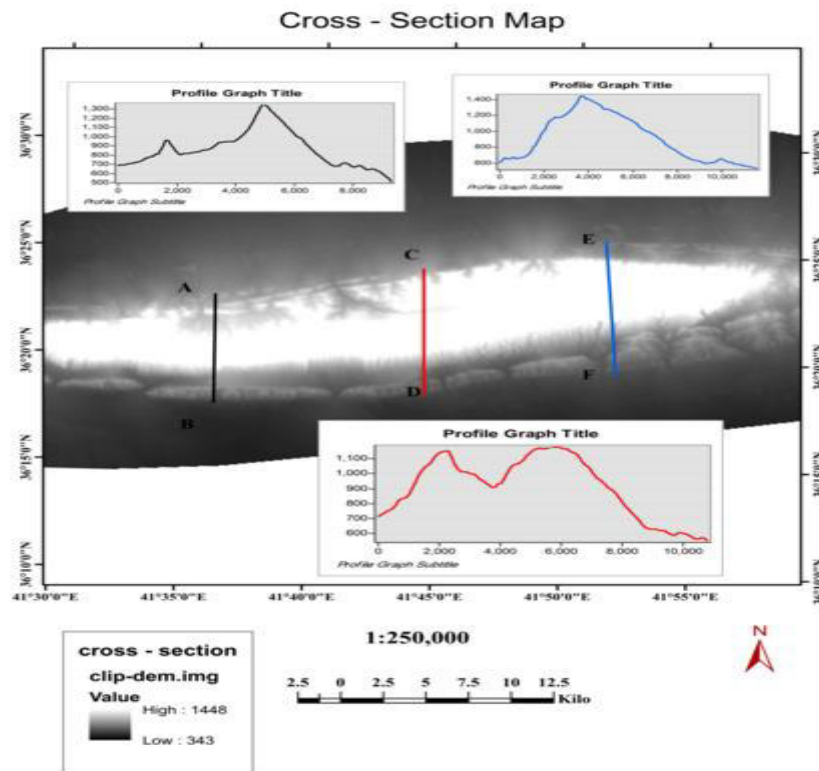


Figure (8) cross-sections (the work of the researcher)

The First Section AB

This cross starts from the height at station A about (700M) until reach to the maximum highest (1350M) from the sea level then starts landing from the other side and there are many sudden low ground as the shape concavity that means there were simple water streams in the area it is also there were severely concavity that means there were soil erosion process because of rains water .

The Second Section CD

This cross starts from the height (734M) from the sea level and starts in severely slope until reach to the maximum height (1170M) then the cross starts landing and formation valley such as (v) until reach (900M) from the sea level and starts come up to the height (1180M) then landing in the other direction to the height (522M) and appear severely slope because of concavity process.

The Third Section EF:

The details of this cross section doesn't different from the previous two crosses that leads to homogenous the area study , this cross section starts from the height (600M) and ends at maximum height (1440M) from the sea level then starts landing until reach to height (528M) from the sea level by the second side and take sever slope because of soil erosion .

Conclusions

- 1-It concerned model of digital height DEM main resource to study the mountains and analyses slopes.
- 2-The features of the chain mountains slopes effected directly by factors climate.
- 3-The program of (ARCMAP 10) , it concerned the important practical program which enable use in analyses the slope features .
- 4-Sinjae regular and perfect mountain serious and has difference topography and severely slope.
- 5-through draw cross section it appear the weathering soil erosion that effected in the feature Sinjar mountain sloping .
- 6-Sinjar mountain chain contain the deep valley at the middle area and locates at so much shadow .

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