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Apply Effective Method to Determine the Best Suggested Camping Area for Military Units at Undulating Areas Using DEM During the Rainy Season and Floods

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Abstract:

Military units are suffering, especially during the winter from lack of proper positioning and camping areas in the hills and valleys due to road outages and communication among the components of the pieces and military units due to the floods and monsoon rains. For this reason it can be used satellite images and for digital elevation model (DEM, Digital Elevation Models) with some chock programs and specialized in remote sensing, such as programs (ArcGis), to obtain positive results in determining the logic that is likely to flood the water and find the best camping areas which are close to the movement areas and Supply and paved roads and unpaved, and all presence areas such as fixed units, such as medical care and supply centers and certain fixed pieces of heavy artillery.In this paper we use the satellite images (ASTER), which is characterized by precision (30 M). And use of a mathematical model to find flooded areas originally and potential low-lying areas inundated with floodwaters that as we can in this mathematical model to identify river basins permanent or seasonal zones consisting of rain. The river basins and low-lying areas could be excluded from the camping areas for military cuts. As we can see through the river basins of finding the edges of the docks and areas that are an impediment to the movement of vehicles and military vehicles.

Keywords: DEM, Remote sensing, camping military.

1. Introduction

Military units are Suffer, especially during the winter from lack of proper positioning and camping areas in the hills and valleys due to road outages and communication among the components of the pieces and military units due to the floods and monsoon rains. Causing the inability of the military units to communicate with each other, but the floods sometimes lead to the erosion of some military units during the heavy rains and waves drowned some of the fixed and mobile military equipment, or the inability of some military vehicles to perform military duties and special heavy machinery. Which enables the enemy to take advantage of this situation and conducting military operations special anti during the rainy period and flood? For this reason can be used satellite images and for digital elevation model (DEM, Digital Elevation Models) with some chock programs and specialized in remote sensing, such as programs (ArcGis), to obtain positive results in determining the best camping areas which are close traffic areas and Supply and paved roads and unpaved, and all presence areas such as fixed units, such as medical care and supply centers and subsistence and some fixed pieces of heavy artillery, [1].

The use of images of digital elevation model (DEM) accuracy (30 meters) from a number of Internet sites and the global space agencies and satellite own sites with this model, which is free and available for all and at all times in finding the best camping areas and the headquarters of the Armed Forces or even areas sheltering displaced people so that they can connect these images with modern images of road networks. We can also find the best areas for camping and militarization, which are not affected by the torrential rains and floods during the winter period. By creating the potential for small and medium-sized rivers seasonal operations during floods and heavy rains in the winter. The images used in the digital elevation model (DEM) can be described to any area of the northern regions and western Iraq. The same method of application referred to during search .

2. The Study Area

Military Operations areas in Nineveh province are the most important areas to identify and camping forces and military units and considered especially during the rainy season because the rain rates in the province of Nineveh high level elevated from the rest area of the south and central regions. And the fact that the province of Nineveh contains Geography diversity is also different from the central and southern regions. It is known that the Earth's surface is made up of various forms of terrain, including plains, mountains, hills and valleys, rivers and hills, and each of these forms influence in the military Activities . That the earth steppe facilitate the invasion process of being open areas facilitate the transit and mobility in and cover-up in which a limited, on the other hand, we find the movement of sectors across the hills and mountains often collide with resistance slopes with severe slopes that are spread by large rocky boulders scattered hillsides unstable and towering cliffs. As lead rougher areas to roads spacing from each other and sinuosity determined capacity. Some varieties of limited effectiveness if used in mountainous areas of military equipment, vehicles cannot move properly over rugged surfaces, as well as lack of appropriate places to direct artillery fire effectively, as well as difficult to move heavy weapons. Mountains also impose restrictions on surveillance and hinder accuracy in shooting. As well as the seriousness of the flight and the difficulty of monitoring the goals which leads opt-efficiency air support near the earth's surface and in particular either the effect of terrain on the offensive positions shall be in different ways because it requires planning movements and management of military events, according to the nature of the terrain of the site of military operations requirements, the attack is in the regions provides points M a neck increase the effectiveness of weapons of backing also helps the choice of targets as well, but it helps to downward

movements procedures through the use of barriers to protect the wings and disable attacking enemy attempts, either attack in the plain areas exposed not allow unlimited cover, and help to ease military sectors of the movement, but in some places that may impede traffic movement such as land soft.
As for the effect of the topography of the areas father head in the conduct of military operations, the surface hardnessGround and not exposed to floods, they are free from the marshes to make their areas more suitable for the movement of sectors in all seasons of the year. Also suitable for tank warfare and the movement of vehicles, and the presence of hills and highlands create safe zone defense, but the lack of water and the presence in some areas of the select movements and make non-motorized units are not able to stay away from rivers areas. The existence of the Tigris River and Lake area east of Mosul, as well as the mind anhydrous form of a contract of cooperation and maneuvering between area located east of the Tigris in the process of this axis, which calls for a military build bridges over the Tigris River, which are often subject to aerial bombardment,[1]. And generally serve the region to fight the shields and the work of the Air Force is not suitable for the movements of defense and on the contrary, suitable for the movements of the attack, the cities as well as longer being the center of the population and the focal point of the transfer of a military target, with operating buildings as barriers or taken as a point of defense and strong shelters and stores, it must reduce the speed of vehicles which exposes them to the risk of attack ambushes and the region is characterized by the existence of a network land routes valid for automatic movement in all seasons of the year linking Iraq to Syria and Turkey is characterized by the nature of the topography of the area as open does not help the defense, but the offensive operations,[1].

3. Climate

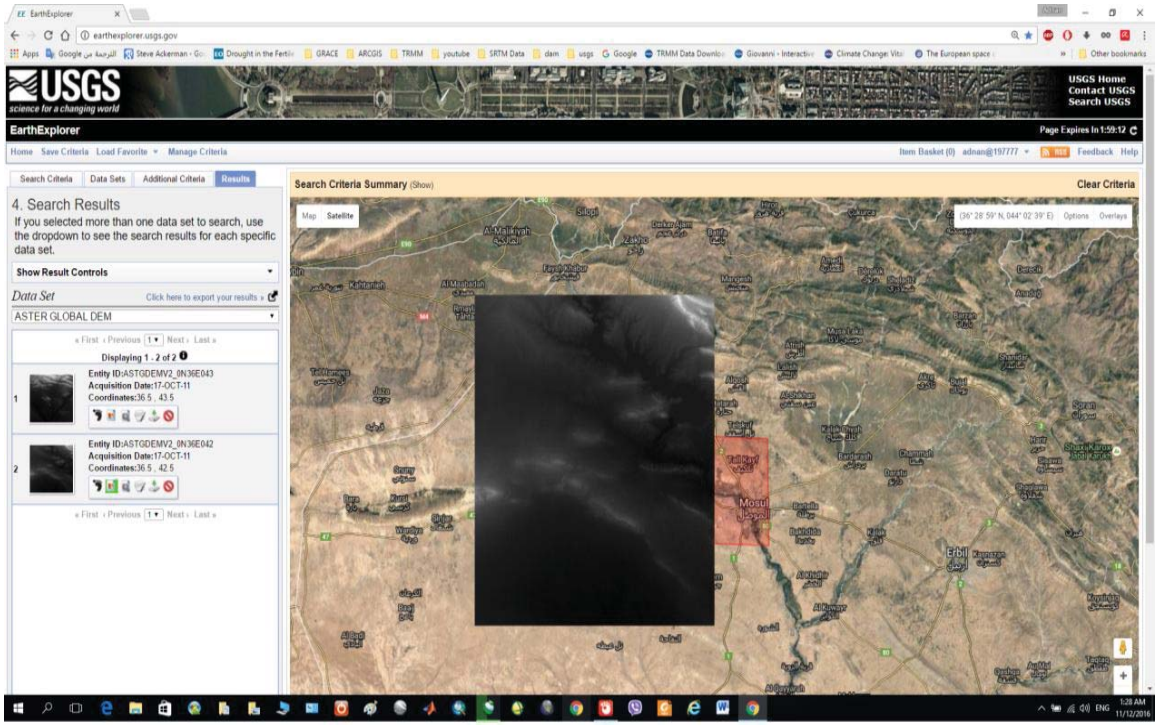
Featuring Nineveh region as a transitional climate between the Mediterranean climate of semi-arid in the north, the climateDry desert in the south. The greatest effect imposed desert environments on the military side is that which arises from the sand and dust and the wind and the rain and the mud, where these phenomena affect the block traffic or interfere with them and determine the field of sore neck and disrupt the work of the equipment to perform its functions, as well as the impact of dust and sand on the cavities defender where he kills to erosion, since vehicles with tires sink in sand and mud and surveillance disrupted by storms, and this requires experience and training to withstand the heat and harm of climate,[2]. As well as fighting in the desert and requires the control of water sources, or provide large quantities of water and increase the proportion of salt in food to reduce sweating. And influenced by the use of direct arms, especially during the daytime high temperatures as it leads to the difficulty of the military repayment as well as the result of a mirage and visual trickery and be dust that may obscure vision, sometimes as the thick dust makes the process of estimating distances difficult despite the availability of lasers accurate maps Portal lead the great variation in temperatures temperature between day and night in the desert areas and the lack of moisture and the plants to be losing ground temperature quickly Especially in night become the air is cool and an independent a year and this will be scanning easier at night and travel more comfortable, and environmental circumstances imposed requests or restrictions on the design of military material to sand fly and dust enters in equipment leads to speed up consumption, [2].

4. Methodology

Digital Elevation considered important in determining the topography images of any region of the world images and rely on a number of countries in the regions of topographic mapping cannot be accessed. It can reach beyond it, a topographic drawing pictures of snow and water during the rainy seasons and snow in

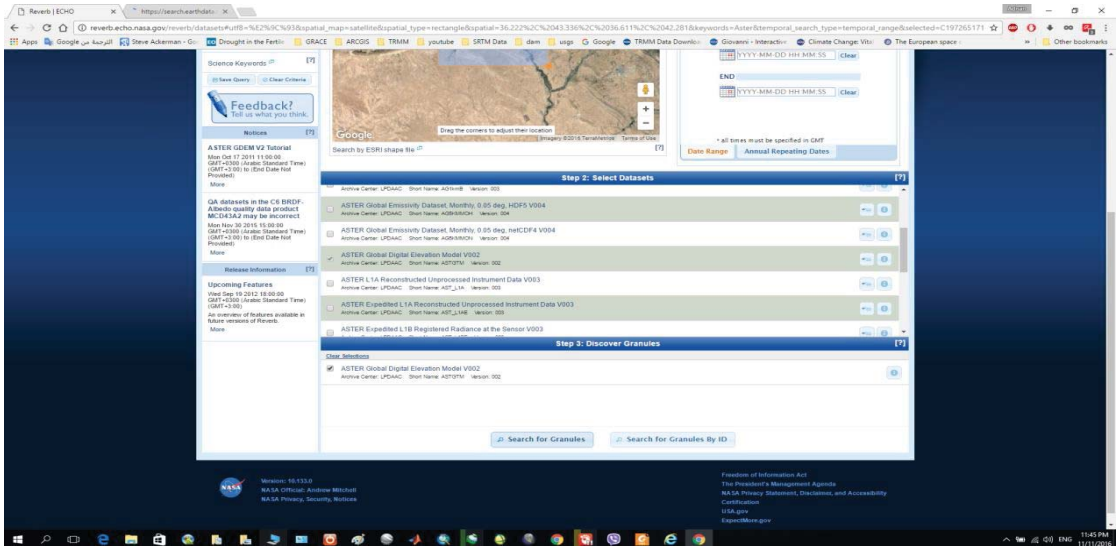
remote areas and remote and cannot link to it during the winter period.Adopted in this study a particular area west of Mosul so that this region covers an area of Tal Afar and around the city so that was loaded and removes image (DEM) and one from the satellite (ASTER). And accurately (30 meters),[3]. There are a number of online sites that can download them and easily and at all times. As in the attached photos below:

1. The first site can download satellite images of the sitehttp://earthexplorer.usgs.gov/

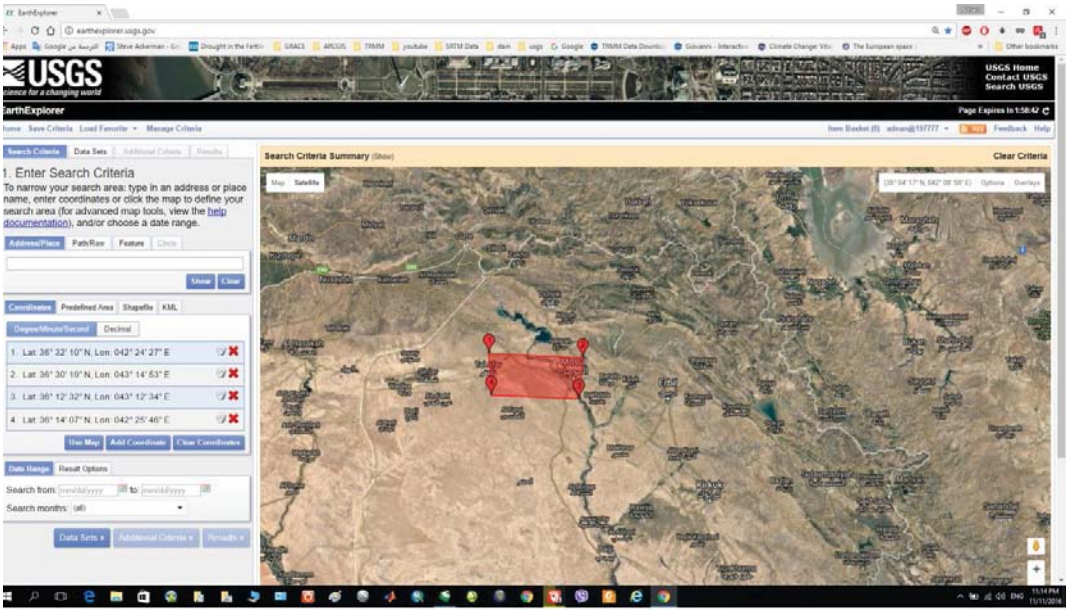


Through this site you can choose any area of the world via the identified drawing and then choose the satellite you want to download it kind? Through the free registration at the site of the site that can provide you with a certain accuracy private satellite image. And then download .Is the image that has been downloaded and patched engineered with full coordinate can be used in remote sensing projects or image processing for the purposes of scientific research. In the case of the study area it has been loaded image for Western city of Mosul as pictures shown above. It was the use of the program (ArcGis) to extract the rivers and their basins during the period of rains and floods, which can be used later as shown in study,[4].

2.The second locationhttp://reverb.echo.nasa.gov/reverb/#utf8=%E2%9C%93&spatial_map=satellite&spatial_type=rectangle



It is similar to the first location of the site and the same way in the adoption of upload and downloads satellite images and the same private satellite specifications for each satellite image.Showing that more than one location in this research because of the possibility huh loading and downloading at any time to the fact that these sites stop sometimes for maintenance and continuous updating and permanent. In order to have the user time and different locations in the load and download satellite images of any the suspended.Been using satellite image of the satellite (ASTER) by the following coordinates,[5] :-



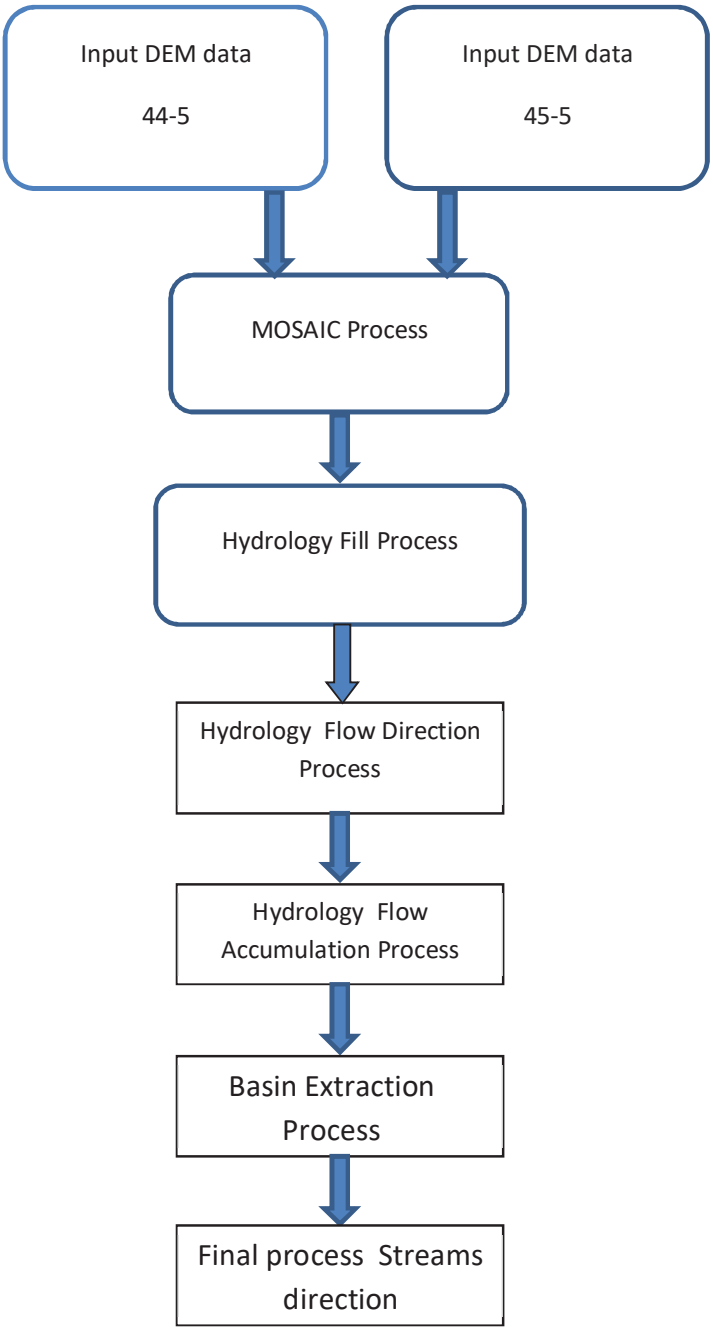
5. ASTER Satellite Characteristics

The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model (GDEM) was developed jointly by the U.S. National Aeronautics and Space Administration (NASA) and Japan's Ministry of Economy, Trade, and Industry (METI). ASTER is capable of collecting in-track stereo using nadir- and aft-looking near infrared cameras. Since 2001, these stereo pairs have been used to produce single-scene (60- x 60-kilomenter (km)) digital elevation models (DEM) having vertical (root-mean-squared-error) accuracies generally between 10- and 25-meters (m). The methodology used by Japan's Sensor Information Laboratory Corporation (SILC) to produce the ASTER GDEM involves automated processing of the entire ASTER Level-1A archive. Stereo-correlation is used to produce over one million individual scene-based ASTER DEMs, to which cloud masking is applied to remove cloudy pixels. All cloud-screened DEMS are stacked and residual bad values and outliers are removed. Selected data are averaged to create final pixel values, and residual anomalies are corrected before partitioning the data into (1°x 1° tiles) . The ASTER GDEM covers land surfaces between 83°N and 83°S and is comprised of 22,702 tiles. Tiles that contain at least (0.01%) land area are included. The ASTER GDEM is distributed as Geographic Tagged Image File Format (GeoTIFF) files with geographic coordinates (latitude, longitude). The data are posted on a 1 arc-second (approximately 30–m at the equator) grid and referenced to the 1984 World Geodetic System (WGS84)/1996 Earth Gravitational Model (EGM96) geoid. While the ASTER GDEM 2 benefits from substantial improvements over GDEM 1, users are nonetheless advised that the products still may contain anomalies and artifacts that will reduce its usability for certain applications, because they can introduce large elevation errors on local scales. The data are provided "as is" and neither NASA nor METI/ERSDAC will be responsible for any damages resulting from use of the data. V002 data set release date: 2009-06-28 Data Set Characteristics: Geographic Extent: Global between 83º latitude Scene Coverage: 1º x 1º tiles Image Dimensions: 3601 x 3601 Total Number Tiles: V001: 22,604; V002: 22,702 Tile Volume: ~25MB, 6.4 MB compressed Compression Type: zip File Format: GEOTIFF Map Projection: Geographic Lat/Lon Datum: WGS84/EGM96 Resolution: 1 arc second (30-m horizontal posting at equator), [6],[7].

By knowing these specifications of the satellite and its satellite images can now be handled through a program (ArcGis ver. 10.1) so that they can take advantage of the features of this moon in the inclusion of accuracy and the dimensions of the image in some of the values that must be entered in finding areas and the decline of values and configure some rivers during work. We'll extract a satellite image with a good specification in determining the rise and identify areas of rivers formed during the rains and floods from the use of digital images rise,[7].

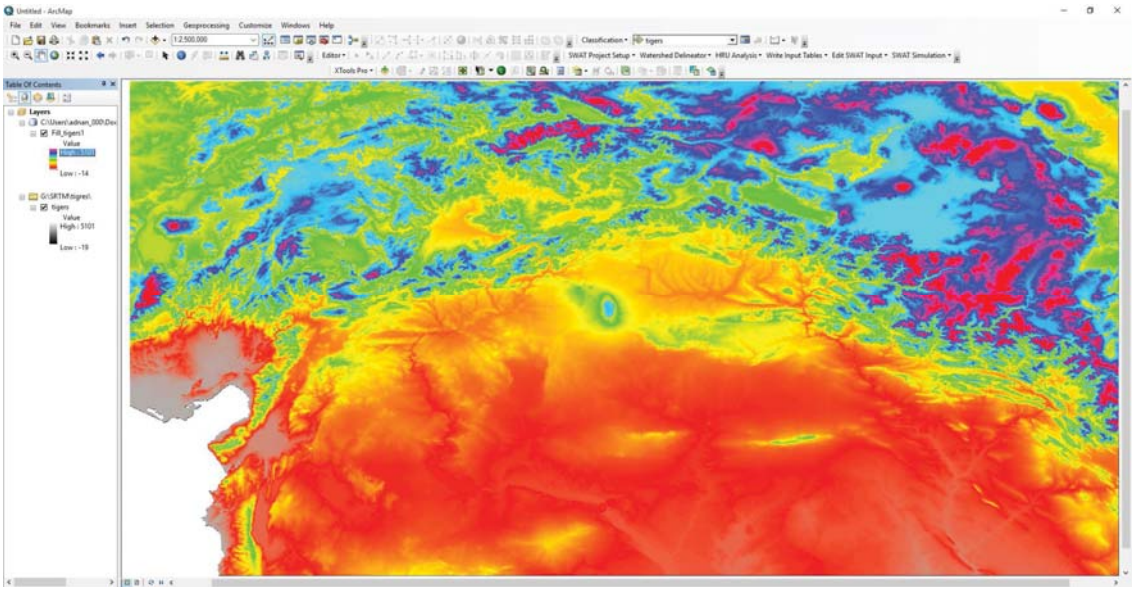
6. Process Steps

First: the method of work is done by the Mathematical model as in Figure follows:

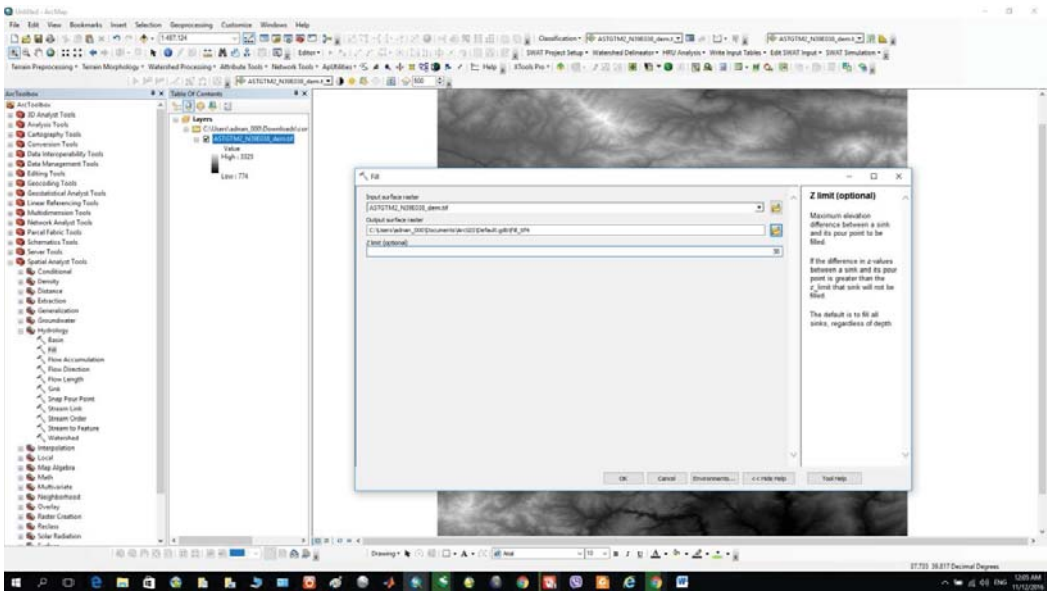


Where the introduction of satellite images (DEM) and whether the region needs more than one satellite image are then to integrate satellite images into a single image through the process of restoration measures (Mosaic Image Process).

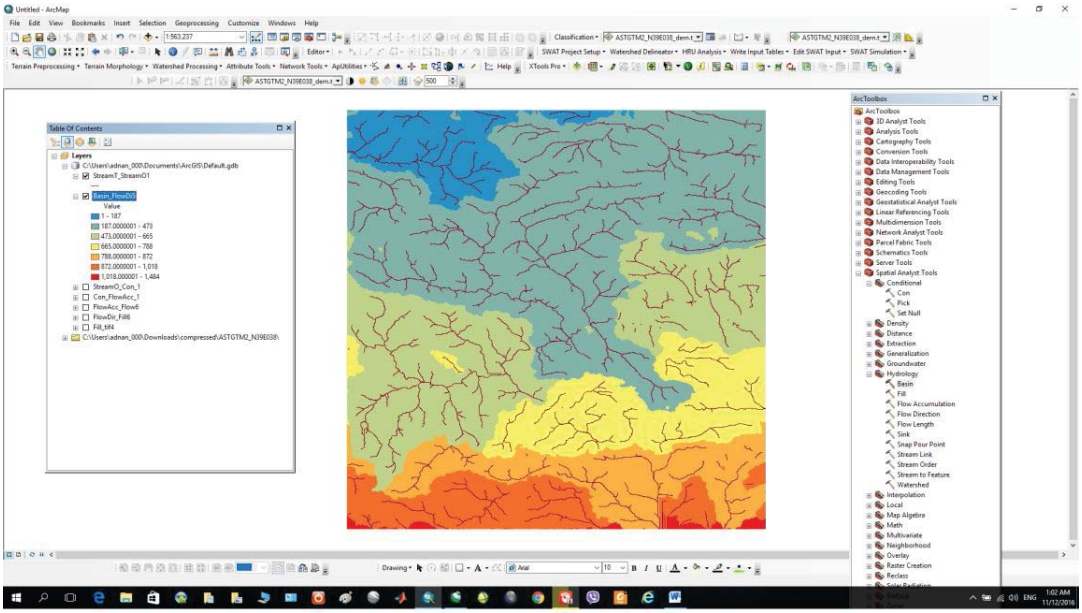
1- Creates a mosaic images for the area by using a ARCGIS 10.1 programs. This programs providing a great result with short time. For this step must use the ASTER image DEM.



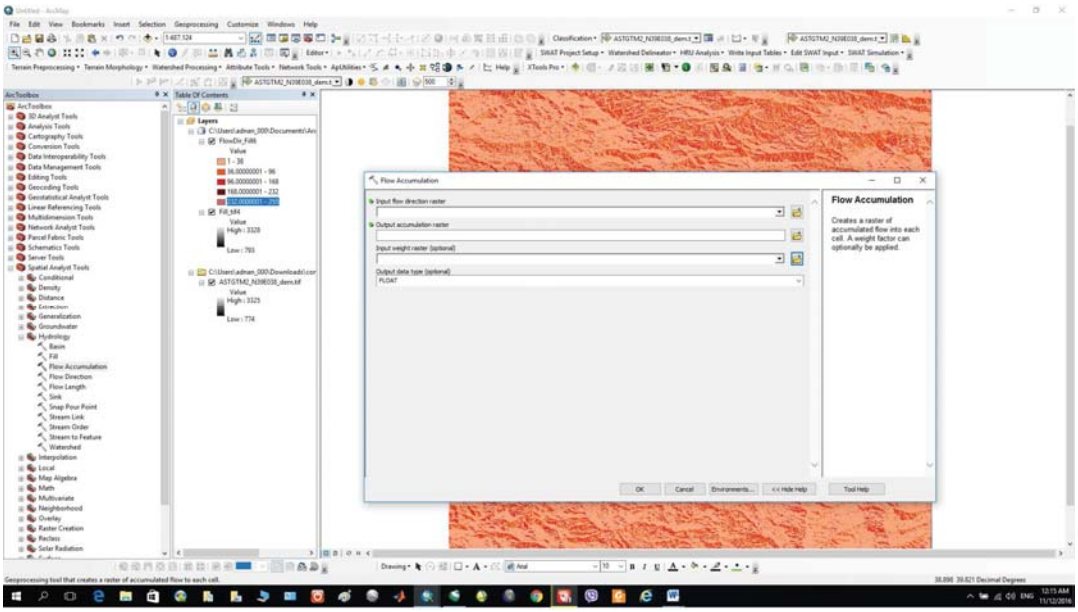
2- The direction of the rainfall tributaries can easily be defined on each DEM point by defining the lowest gradient value between the point and its 8-surrounding neighbors. The result of this operation is an image grid, each of its point assigned a directional arrow referring to lowest elevation differencing value, as illustrated in figure, the output image with oriented grid's cells may confuse the viewer, because of the huge assigned directional lines overlaid on its pixels, but this preprocessing operation is very important to delineating the terrain accumulation flows in the following subsequent step.



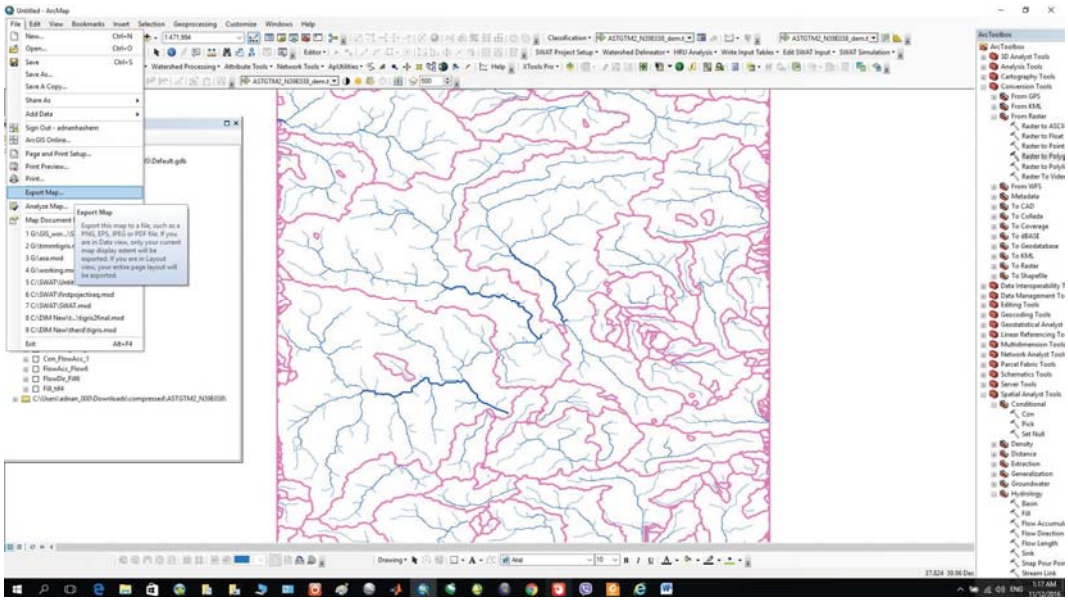
3- Now apply the flow accumulation In addition to the definition of the flow direction from each DEM cell, the flow accumulation represents the number of upstream DEM cells whose flow paths "pass through" the given DEM cell. below display accumulated stream patterns whose cell's values is equal or greater than 200 (which represent the number of tributaries or flows directed into the point). Thus, outlet point of a watershed should have the highest flow accumulation of any of the DEM points since the flow paths of all points in the watershed will eventually pass through the outlet point.



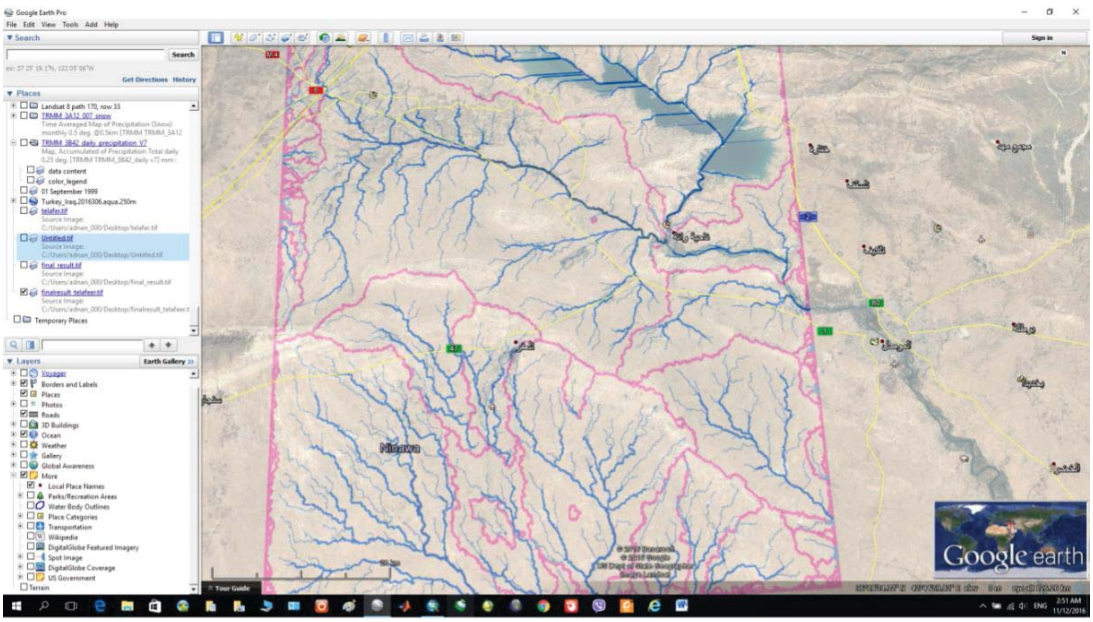
4- Get the stream direction form the flow accumulation in this steps we can see the sub-rivers that found form the rain.



5- Basin Extraction process this steps can get it gust from the flowdirection and accumulation as in the watershed analysis.

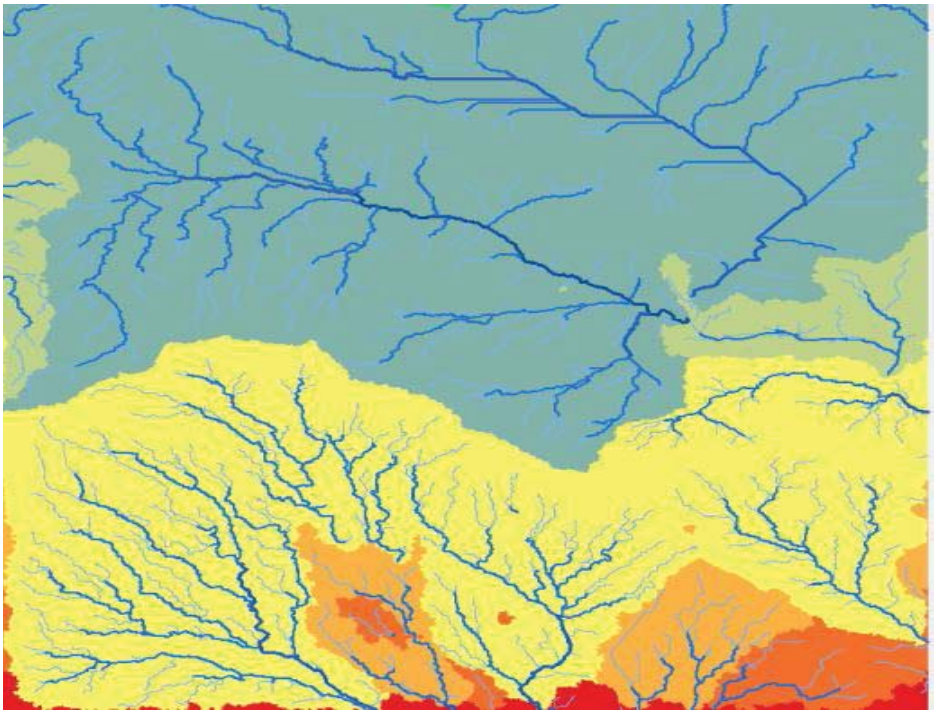


6- Export the final result from the watershed delineation to the google earth to overcome the real region of interest



The last image is a satellite image with a digital elevation determines the rivers which can be formed during the rainy season and floods, which can be utilized to find camping areas for military cuts and fixed units are connected to each other via dirt roads that are not affected by these streams and rivers formed by rain and flooding can also be through the previous steps in finding the limits of the high areas and low-any

configuration, including the so-called river Basin and the possibility of knowing the high these basins from each other, as in the following details.



The use of satellite imagery with digital elevation (DEM), which can be used to determine the tables and rivers assumed configuration during the rains and floods in the plain areas (undulating areas and hills and mountains) and through these tables and the day also can find tubs of these tables and rivers (Basins). Through the available road maps directly put these satellite images which contain graphic information (geo-reference) can be placed directly on the cockles Earth (google earth software) search can directly put places and coordinates camping military units are not affected by the presence of tables and potential rivers composition during the winter season .

7. Conclusions:

1. This technique can be applied to images digital elevation model in any area in Iraq, and this by downloading satellite images of the area and carrying out previous operations and can add some characteristics it is very quickly in the event of online availability and paved roads and unpaved and identify areas that are affected Maps rain water and through this selection are areas that are not affected by water and that can be nominated to be the military headquarters of the fixed units which do not separate rainwater and floods from each other to determine.
2. This methods can Knowing and identifying low-lying areas (Basin) for high-speaking and what separates the area from another easily using the previous methods.
3. It can use special high-resolution images (14 meters), which will give a very high accuracy in identifying areas affected by the rains, and even a few percent of the rain.

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