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Using Landsat 8 images to characterize the surface sediments inEl-Marashda area, west of Qena, Upper Egypt

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Abstract: *Theaim of the present work is to investigate the contribution of the Lansat 8 data in classifying and mapping the surface sediments in El-Marasha area, west of Qena, Upper Egypt.In this study, unsupervised and supervised classifications of the Landsat-8 were applied to map the various geological units and to reduce labeling ambiguity during classification processes. The results of classification were compared with a published geological map and tested in the field. The classification of the Landsat 8 image indicates better mapping efficiency and improved the geological boundaries.The mapped units' signatures show a significant correlation with the obtained classes in terms of theirreflectance characteristics.*

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I. Introduction

Satellite image classification process is one of the most used methods for extracting information and mapping surface features from remotely sensed data. It is also a process by which pixels have similar spectral characteristics are assumed to belong to the same class that can be identified and assigned a unique color.In other words, classification is a process of grouping pixels into meaningful classes[1].Classification may be supervised or unsupervised. In supervised classification each training pixel is matched with a single class label, but in unsupervised classification the class labels are not known [2]. The optical, thermal and radar satellite sensors provide various levels of information about the imaged targets. The optical sensors provide the response of the targets when they are subjected to the visible and short wave-infrared energy. Thermal sensors provide information about targets that emit long wave (thermal) infrared energy[3], however, the radar sensors provide information about a target in terms of geometrical (surface roughness) and dielectrical properties through transmitting microwave signals to the ground and a sensorrecords the scattered wave from the ground.

The study area is located to the west of Qena, covering El-Marashda area **(Fig. 1)** that extends from latitude $25^0\ 50'\ 17''$ N to $26^0\ 7'\ 15''$ N and longitude $31^0\ 59'\ 29''$ E to $31^0\ 59'\ 34''$ E and bounds the Nile river in its southwestern part of the famous Qena bend **(Fig. 1).**It is located in an arid zone, which is distinguished by very dry, hot weather condition. It is distinguished by some geomorphological units containing a) the young flood plain of the River Nile, which is flat with an elevation of about 60 to 70 m and is distinguished by the presence of manyirrigation canals, b) the old flood plain of the Nile, that is called the low desert zone; this zone is distinguished by a gentle slope toward the north; its elevation ranges from 64 to 300 m and c) the limestone plateau, which bounds the study area from south and west and distinguished by an irregular surface dissected by dry channels(wadis) trending N-S, NW-SE, and NE-SW[4].It is covered by various geologic units according to the Egyptian General Petroleum Corporation, (scale 1: 500,000)[5] including, fanglomerates, Wadi deposits, prenile deposits, travertine,and Pliocene deposits (compose of siltstone, sandstone, and claystone)**(Fig.2).**

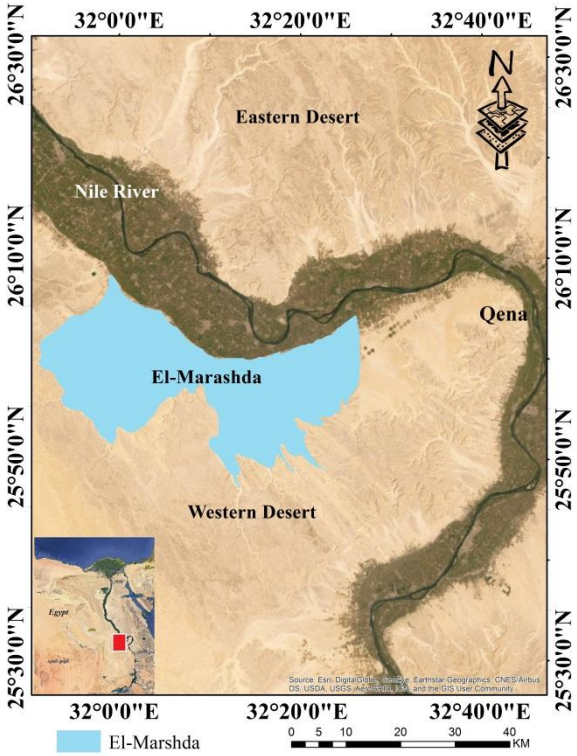

Fig. 1:A Landsat 8 satellite image showing the location of the study area "El-Marashda" that bounds the Nile River at the southwestern part of the famous Qena bend, West Qena.

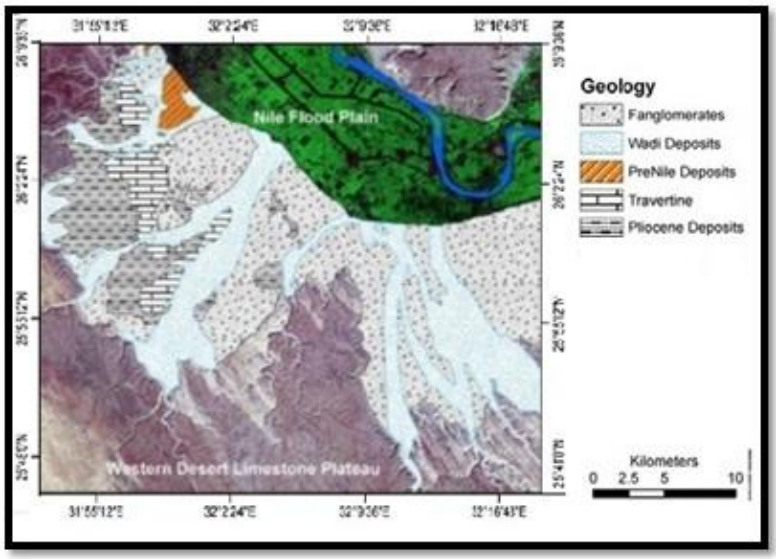

Fig. 2: The geologic map of the study area located[7].

II. Material And Methods

Characteristics of the Landsat 8 satellite dataset

Optical data (Landsat-8): One dataset of the Landsat -8 image was used with (Path 175 / Row 042) with UTM projection, Zone 36 North, and WGS-84 datum, acquired in July 25, 2018 with scene ID (LC81750422018206LGN00). All these optical data were downloaded from the public domain (http://earthexplorer.usgs.gov).

Remote sensing data processing

An integrated use of the commercial software; ArcGIS and ENVI-5.1 were used to process the data. The optical image was imported to ENVI-5.1 to generate an unsupervised classification map using a K-means clustering algorithm (with 4 initial classes and 4 iterations).

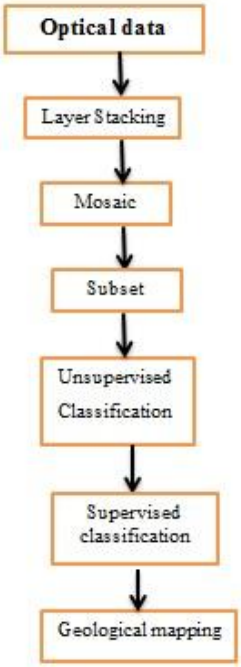

Fig. 3: Flowchart of the main processing.

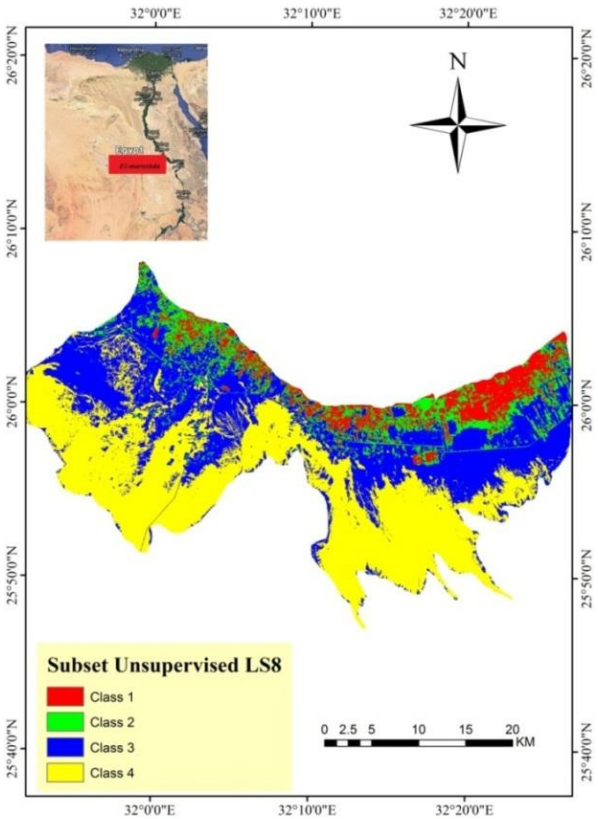

Fig. 4: The unsupervised classification mapgenerated from Landsat 8 image.

III. Discussion

As seen in the geologic map and Goggle Earth, a supervised map can begenerated. As the area considered as alluvial environment, where the surface sediments are dry, large in size and hence the four classes were defined as; Urban area, Vegetation area, Gravel/Sand, and Boulder **(Fig. 5)**.

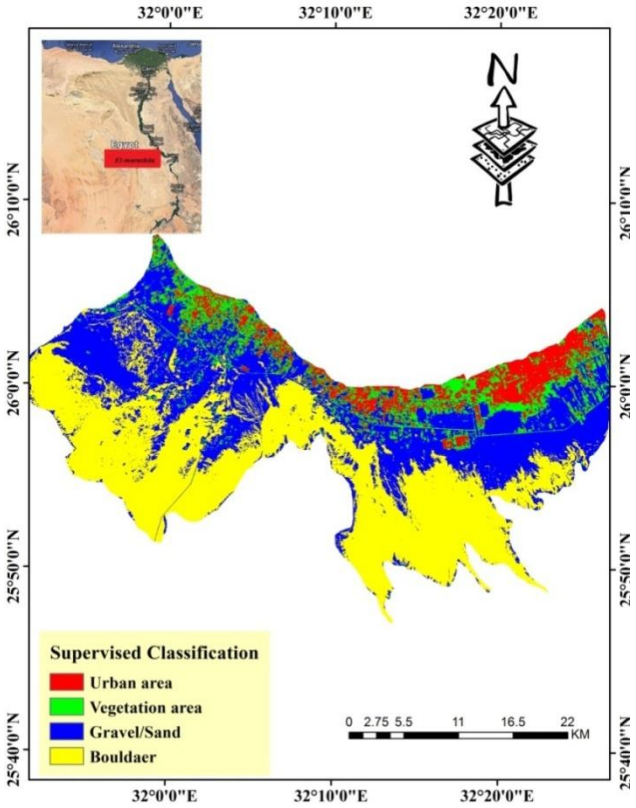

Fig. 5:The supervised classification map for the west of Qena "El-Marshda".

IV. Conclusion

Classification of surface land cover using Lansat-8 was performed in this study. The classification of the Landsat 8 image indicates better mapping efficiency and improved the geological boundaries**.**

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