

ANALYSIS OF MULTI TEMPORAL IMAGES FOR ENVIRONMENTAL IMPACT

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Landsat images constitute the inspirer of multi temporal geological investigations which required output of an analysis may not be measured directly, this is particularly important in geological researches. In addition, the techniques of image processing address many of the primary challenges in the realm associated with environmental and other geostatistical data. Multi temporal resolution is the process of collecting data of specific area acquired in different periods of time to provide multi tactical valuable information to the user, the data can come from one or several sources either similar or different sources. A key issue is the ability to cover an area for long period of time which provides continuous results that could improve the database more as they become available, and enhance the comparative capability while offering the opportunity to monitor geological changes over time.

The main purpose of this study is assessing the impact of environmental factors on lithological sites in three different areas within 10 years by using numerous Landsat images accompanied with serial of statistics calculations, classification, tasseled cap transformation, and images analysis, also to experiment with the effectiveness of using multi temporal data for such geological studies.

Two types of Landsat images discussed in this study; seven-bands TM images were acquired from Landsat Thematic Mapper instrument on 25 July, 1st August, and 31st July 1990 covered the three study areas. Eight-bands ETM+ images (with two thermal bands using low and high gain) were acquired from Landsat-7 Enhanced Thematic Mapper Plus instrument on 31st July 2001, 26 December, and 4 March 2000 covered all study areas.

The areas of study located in: the central part of Libya 600 km southern east of Tripoli (Sahara Desert environment), the north part of Libya 200 km east of Tripoli bounded by Mediterranean sea from the north and the east (Mediterranean environment), and the third study area lies in the west part of Libya 100 km south Tripoli on Jebel Nafusa (mountain environment).

The geographical location of Libya considers the main factor which affecting the environment, where Libya is one of the largest countries in Africa (1,757,000 sq km) bounded from the north by the Mediterranean Sea and from the south by the Sahara Desert. Within Libya as many as five different climatic zones have been recognized, but the dominant climatic influences are Mediterranean in most of the coastal lowland and in some patches of mountain situated in the north of the country where a fall of rain in quantities sufficient for the growth of plant life, and arid Sahara in the southern part where rainfall is scanty and mostly devoid of any vegetation. However, the major influential factors in Libyan environment are: temperature, altitudes and topography, rainfall, and vegetation cover.

Various statistics calculations and image processing techniques were applied in this study to enhance the visual interpretation and to distinguish between different geological formations and rocks units, additional to detecting surface formations changing on the study areas within 10 years. This combination of information obtained from multi temporal analysis, calculating statistics and image processing have been used for generate multi temporal surface formations maps of study areas.