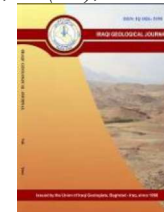




Iraqi Geological Journal

Journal homepage: <https://www.igj-iraq.org>



Monitoring Soil Contamination by Hydrocarbons and Heavy Metals in Parts of Basra Southern Iraq Using Remote Sensing and GIS Techniques

Shatha S. Abd Al-Qadir^{1,*}, Ali K. Al-Ali¹ and Basim H. Soltan¹

¹ Department of Geology, College of Science, Basrah University, Basrah, Iraq

* Correspondence: Shatha.Omran.sci@Uobasrah.edu.iq

Received:
11 October 2022

Accepted:
28 December 2022

Published:
30 April 2023

Abstract

The Sentinel-2B sensor was used to monitor oil spills using advanced techniques and methods. This study is considered one of the first local studies to use remote sensing techniques to watch oil spills and contaminated soil using an advanced support vector control machine with minimal noise. Algorithm Minimum Noise Fraction. The study area was on the main street near the oil depot in Al-Faw, located in southern Iraq. This study aims to use remote sensing techniques and geographic information systems to monitor the environment and find hydrocarbon pollution resulting from intentional and accidental oil spills from remote or large areas whose area is difficult to determine by traditional methods and access to this area. Surface soil samples were taken as an average of 4 from a polluted and uncontaminated area. Laboratory tests (PSD, Ph, EC, heavy metals, and TPH test) were performed on them. Based on the analysis of petroleum hydrocarbons, ENVI 5.3 and ArcGIS 10.8 were used in the study. the study area was polluted and toxic and needed to be treated. The study proved the success of remote sensing systems and geographic information. The monitoring of the environment and oil spill areas. It can be relied upon by using advanced remote sensing methods without needing to visit the site or rely on it in regions that cannot be accessed.

Keywords: Oil spills; Soil contamination; Remote sensing; Pollution

1. Introduction

Oil pollution is one of the most severe problems in the natural and human environment because of its direct impact on living organisms. Oil and its derivatives are considered a high toxicity hazard due to the emission of gases upon evaporation or decomposition of spilled oil particles and to contain crude oil (Nasr and Suha, 2016). In addition, it has toxic gases such as hydrogen sulfide H₂S and others. Pollution is measured by its size, concentration, or damage. Environmental damage arises from various human activities, particularly industrial activities. This study was conducted in the Al-Faw District in Basra, southern Iraq, which it is considered one of the most important places from an economic point of view. It is located to the southeast of Basra (Fig.1), about 100 km between latitudes 29° 97' N north and longitudes 48° 47' E east. One of the large oil spills is located next to the main Al-Faw street close to the Al-Faw oil depot studied, the oil spills appears annually due to rain. The study area is located within regions of the Mesopotamian Zone of the unstable shelf of the Arabian plate according to the tectonic division of Buday and Jassim (1987). Stratigraphically setting, it is represented by the sediments of the