Faculty of Water and Soil

Soil Science Department

Thesis for Obtaining an M.Sc Degree in Soil Resource Management - Soil Resource and Land Evaluation

Title

Comparison of the ability of multispectral and radar sensors in soil texture components and organic carbon mapping in wetland soils

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Abstract

Spatial distribution recognition and spatial variability of soil tissue and organic carbon are evaluated as important features for optimal land management. Therefore, using remote testing and Satellite Images helps to evaluate the spatial variability of soil features in a short time and at low cost. The aim of this study is to compare the ability of multispectral and radar images to prepare a map of soil texture and organic carbon components using geostatistical methods in a part of Hamoon wetlands in Sistan Province .Therefore by supervised random sampling, ۹۵ points in the Case study located in Hamoon Sabouri wetland with an area of about ۳۵۰۰۰ hectares and two depths ۰-۱۵ cm (surface) and ۱۵-۵۰ cm (subsurface) Soil sampling accomplished. The amounts of soil tissue components, soil organic carbon and mass in soil samples were measured for standard procedures. Multispectral satellite images (Sensor ۲ and Landsat sensors) and radar (Sentinel ۱ sensors) were taken from the study area. Analyze data using statistical and graphical software SPSS, Arc GIS and ERDAS was performed. After that, soil property plans were measured using geostatistical methods and compared with each other based on different sensors (satellites). The Soil texture results showed that the dominant soil texture in surface and subsurface soils was in the silt loam region. Coefficient of variation of soil properties ranged from ۷٫۹۴۱٪ for the lowest mass density to ۶۳٫۳۷٪ for the highest organic carbon storage. Simple coking method (SCK) for estimating organic carbon, organic carbon storage, environmental worthiness of stored carbon and bole and conventional coking method (OCK) for estimating parameters equivalent to atmospheric carbon dioxide and sand indicated the best performance. In topsoil, prepared organic carbon map, organic carbon storage, atmospheric carbon dioxide equivalent and environmental value of stored carbon using simple coking estimate using Landsat_B۱۰ auxiliary variable and bulk density using Sentinel ۲_NDVI and bole From Landsat-B۷ as well as silt and sand using Sentinel ۱_ETETH-VV showed good and acceptable results. In Subsoil, organic carbon, organic carbon storage, atmospheric carbon dioxide equivalent and environmental value of carbon stored using simple coking estimate method with auxiliary variable Landsat_NewIndex and bulk density using Sentinel۲_B۱۲, clay using Sentinel-۱ VV as well as silt and sand using Sentinel ۱_ SLC-VH showed good results. The results indicated that the use of remote sensing data is beneficial in preparing soil characteristics plans, but it seems that based on the studied characteristics, the type of sensor should also be considered carefully.

Keywords: Remote sensing, Sentinel, Landsat, Geostatistics, Hamoun Wetlands