APPLICATIONS OF REMOTE SENSING

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Outline

- Introduction
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- SAR
- Material
- Method
- Results
- Conclusion&challenges
Background Introduction

- Sebkhas are wet depressions in desert environments
- Sebkhas are sandflats that are formed along arid coastlines
- Rainwater is another source of water for these excavations
The primary objective of this paper was to monitor the evolution of water cavities in Sebkha over a certain period. Using the features of GEE to monitor Sebkha by extracting its wetness, salt, and humidity indices and contribute to the development of a GEE-based methodology. Using the radar/optic combination to extract hydrogeological and geomorphological information. Using the random forest classification possibilities to improve the mapping accuracy in this desert region.
Google Earth Engine (GEE)

Google Earth Engine is a computing platform that allows users to run geospatial analysis on Google's infrastructure. There are several ways to interact with the platform.

The Code Editor is a web-based IDE for writing and running scripts.

The Explorer is a lightweight web app for exploring our data catalog and running simple analyses.

It provides Python and JavaScript wrappers around web API.
Google Earth Engine (GEE)

In this work, the GEE platform was used to:

- monitor the salt states of permanent water cavities in Sebkha
- monitor the wet/dry conditions of these cavities
- assess the capability of cloud computing
- analyze the function of the Sebkha aquifer system
SAR

SAR is an active remote sensing technique that can penetrate the cloud cover, operate day or night, and allow an effective classification of surface water.
Material

The material of this research comes from 2 part:

- Earth Observation Data
- Surface Soil Data Measured in the Field
### Material

#### Dataset for deriving the spectral indices

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<tr>
<th>Data Source</th>
<th>Characteristics</th>
<th>Extracted Indices</th>
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| **Optical Imagery** | 280 individual 30-m TM/Landsat-5 images acquired from the study area in 1984, 1994 and 2004 | — Water index used in this study (ABWI)  
— Normalised Difference Salinity Index (NDSI)—Salt Water Cavity Index (SWCI)  
— Sar/Optic Saltwater Cavity Index (SOSWCI) |
|             | 83 individual 10-m MSI/Sentinel-2A images acquired from the study area in 2017   |                                                                                   |
|             | 50 individual 10-m MSI/Sentinel-2A images acquired from the study area in 2019   |                                                                                   |
| **Radar Imagery** | 211 individual Sentinel-1 SAR ground-range-detected images collected at a 10 m spatial resolution from 2015 to present | — Microwave-Normalised Difference Polariation Index (MNDPI)  
— SAR/Optic Salt Cavity Index (SOSWCI) |
| **Reference Data** | **CHIRPS Precipitation Data**  
Vector-point-based data that represent the position of water cavities  
Spatial: 0.05° Date range: 1985–2019 | Water cavities characteristics in the attribute table  
Precipitation graph generated by ClimateEngine.org |
Method
Results

- Results from optical data
- Results from SAR data
- Results from data combined with optical and SAR
- Random tree verification
Results—from optical data
Results—from optical data
Results—from SAR data
Results—combined with optical data and SAR data
Results—combined with optical data and SAR data
Results—random tree

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Results—precipitation data from 1984 to 2004
Conclusion & challenges

- Multi-sensors
- Data cubes
- Cloud platforms
- More machine learning using
THANK YOU!