



وزارة المياه والري

Ministry of Water and Irrigation

Remote Sensing for crop mapping and assessment for groundwater abstraction

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Introduction

- Groundwater is the major source for irrigated agriculture in highlands that host 70% of the irrigated lands in Jordan.
- Groundwater depletion and illegal access to water have been reported in many locations in the irrigated highlands, particularly in the last few years.
- Therefore, improving groundwater monitoring tools will contribute to the efforts of the Ministry of water and Irrigation (MWI) in managing the scarce water resources of the country.

- Remote sensing techniques were used to derive maps of irrigated crops and their water consumption in the irrigated highlands of Jordan.
- The activities of crop mapping were designed to include the use of remote sensing data of Landsat 8 and SEBAL model (that we will use to map actual crop evapotranspiration), coupled with ground surveys and climatic records to derive maps of irrigation in the basins.

Download of Landsat 8 from Earth Explorer portal

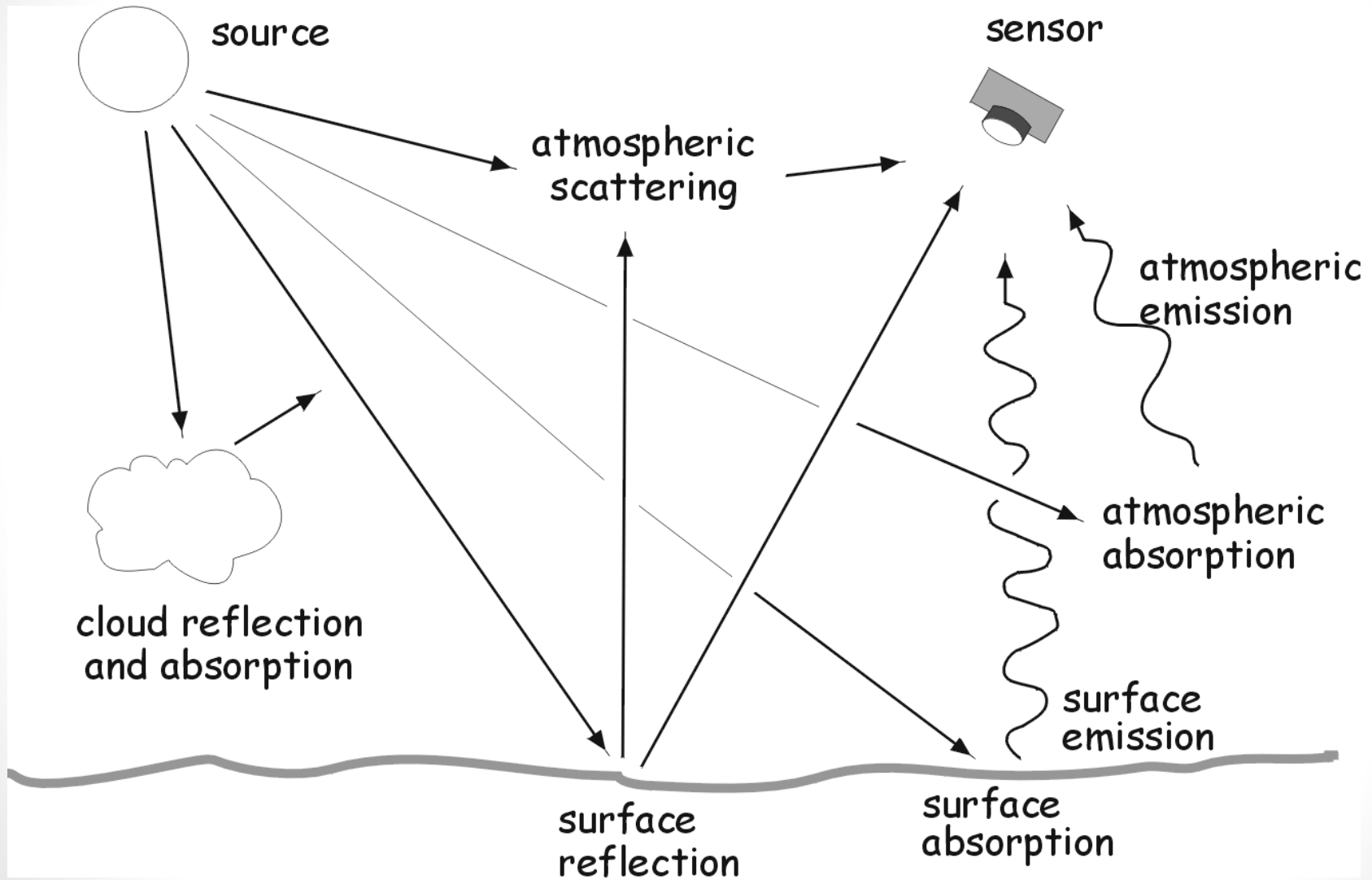
- Remote sensing data of Landsat 8 were downloaded directly from the USGS Earth Explorer portal (<http://landsat.usgs.gov/>).

The screenshot displays the Earth Explorer portal interface. At the top, the USGS logo and "science for a changing world" tagline are visible. The main navigation bar includes "Home", "Profile", "Save Criteria", "Load Favorite", and "Manage Criteria". The "Search Criteria" section is active, showing a "Search Criteria Summary" for a search area in the Middle East. The search criteria include:

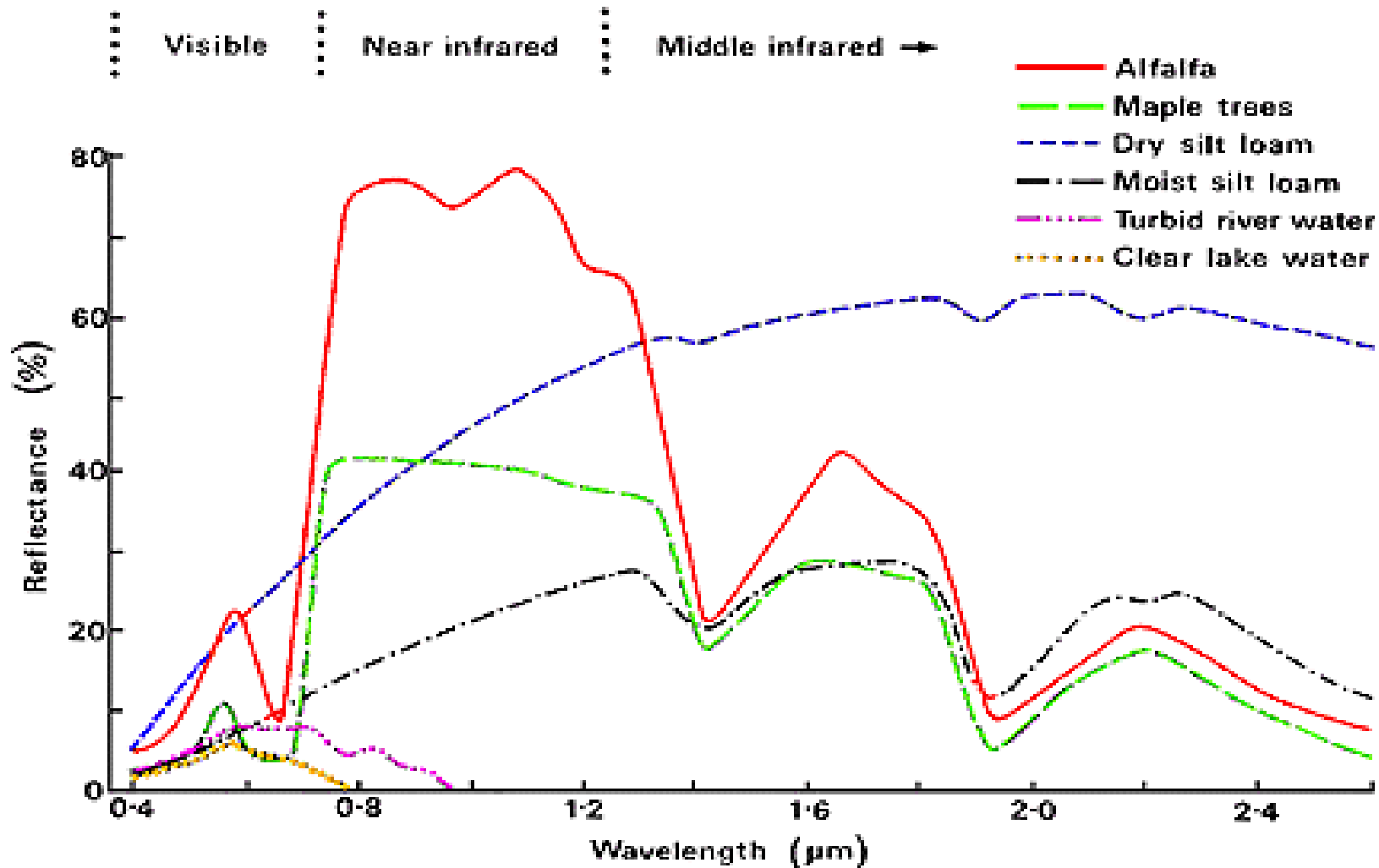
- Search Criteria Summary:** (32° 49' 27" N, 038° 48' 13" E)
- Address/Place:** Path: 173, Row: 38
- Coordinates:** 1. Lat: 31° 44' 49" N, Lon: 036° 55' 41" E

The map shows the region of the Middle East, including Israel, Jordan, and parts of Syria and Lebanon. Key cities like Beirut, Damascus, Amman, and Jerusalem are labeled. A red pin is placed on the map, indicating the search location. The interface also includes options for "Options", "Overlays", "Map", and "Satellite".

Theory of Remote sensing applications

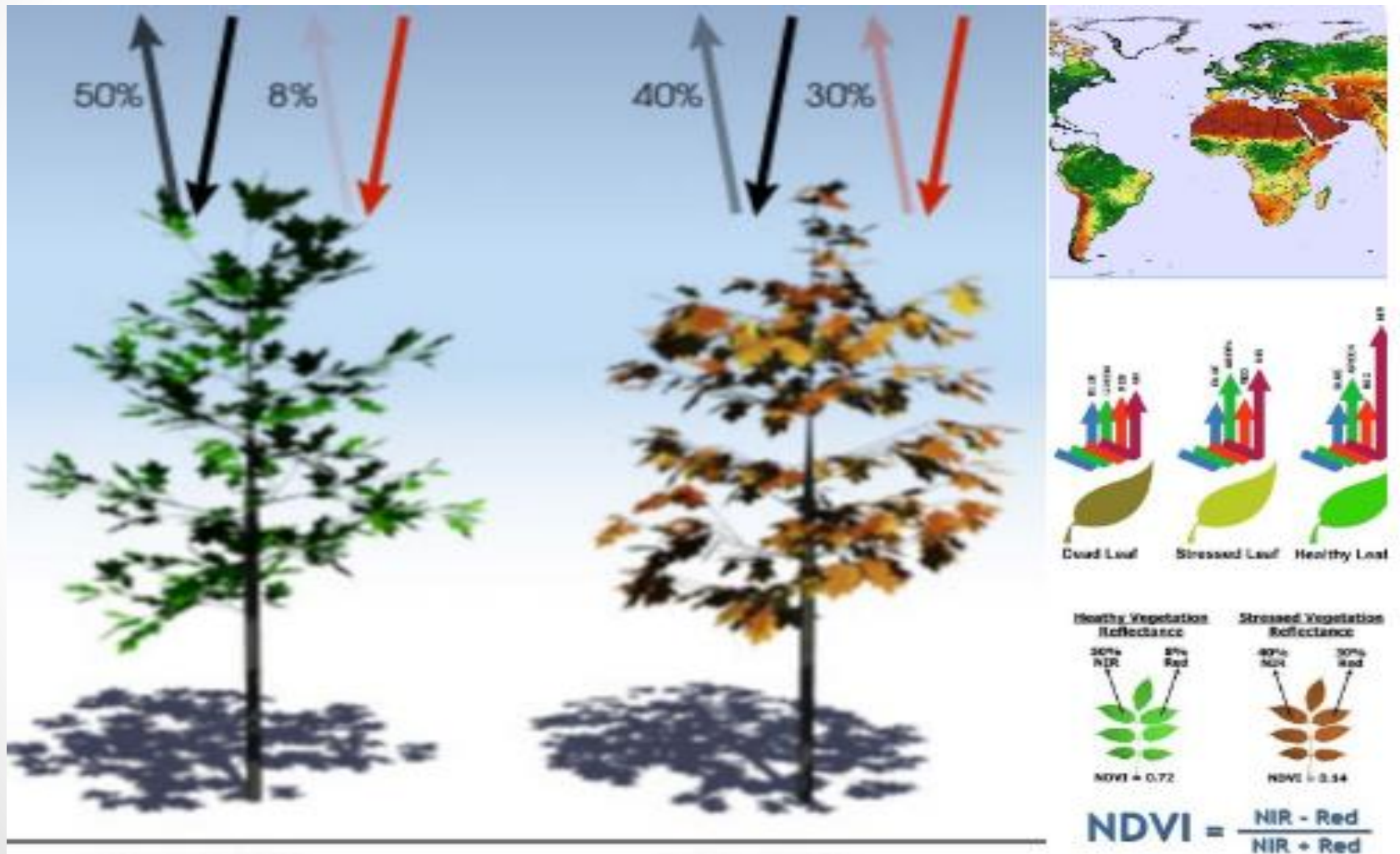


Typical spectral Reflectance of vegetation, soil and water



NDVI

Normalized Difference Vegetation Index



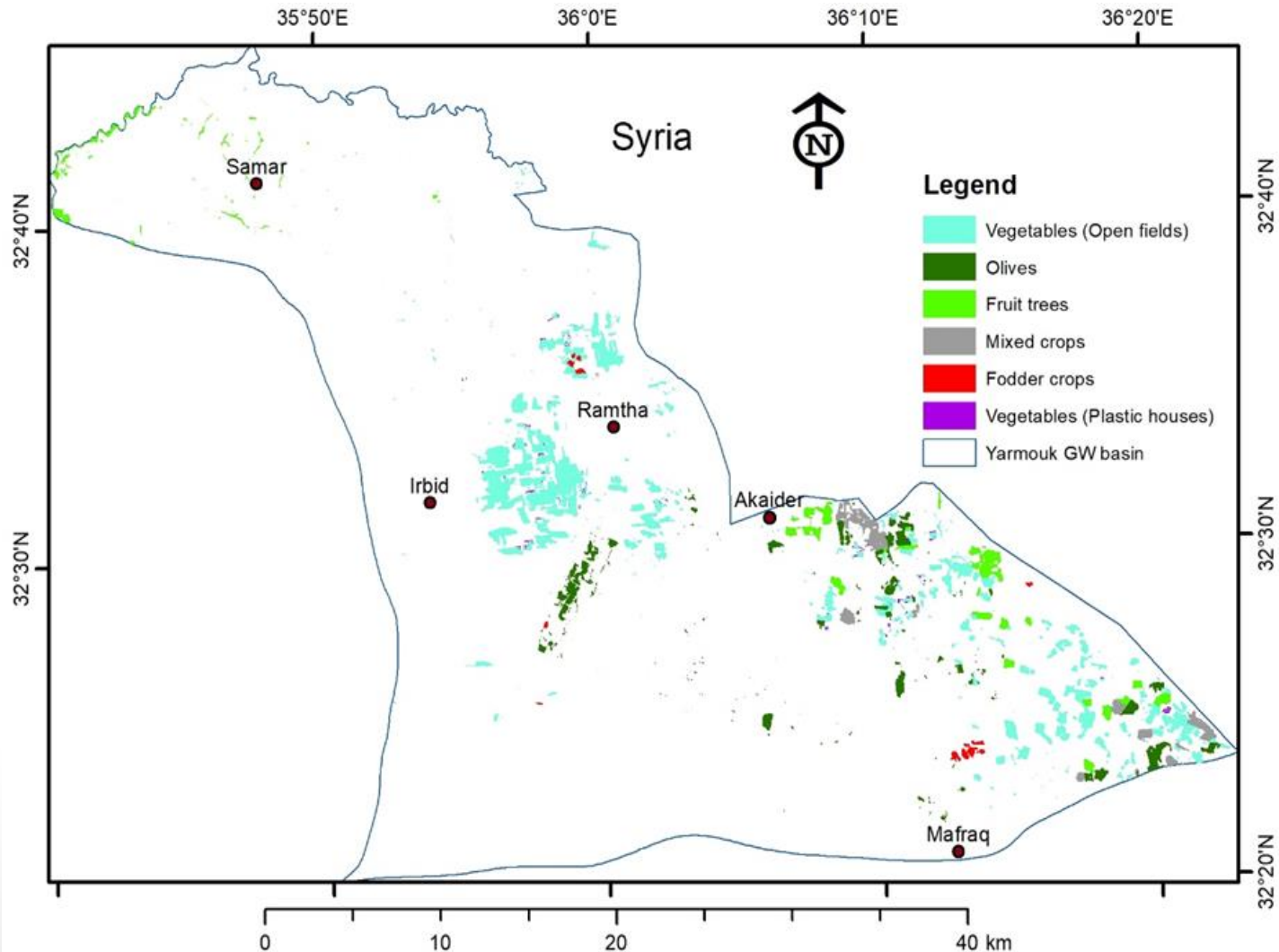
Advantages of remote sensing (**ETa** actual evapotranspiration)

- Maps with spatial distribution of ETa.
- No need to know crop type and crop calendar.
- Covers large areas
- Maps can be integrated with other datasets and GIS maps.

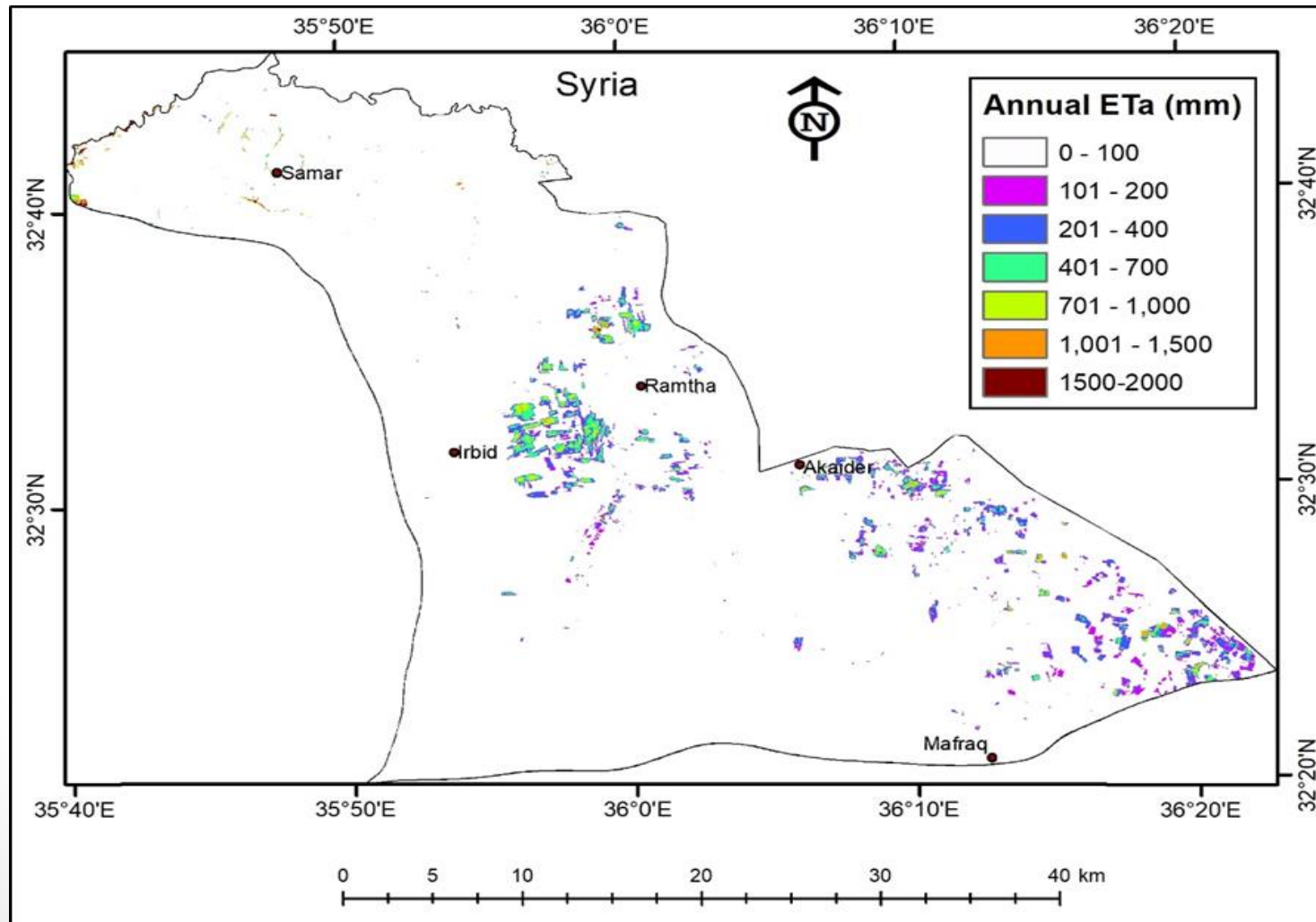
Data and Information needed for SEBAL

- DEM for slope and location for each pixel.
- The satellite overpass date and time
- The latitude and longitude of the center of the image
- The sun elevation angle (β) at the overpass time
- Land cover map (if not available then NDVI)
- Climatic data

Distribution of irrigated crops in Yarmouk basin



Map of ETa for irrigated crops in Yarmouk basin



- Results obtained from remote sensing data and SEBAL were also deployed to identify hotspots in the basin, where water consumption was much higher than the recorded abstraction.

Thank You