

# Assessment of the spatio-temporal evolution of Aguelmam Sidi Ali Lake using multitemporal Landsat Imagery (Middle Atlas - Morocco)

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**Abstract:** In the middle of the Cedar forest, at an altitude of 2078 m, the Lake Aguelmam Sidi Ali is an endorheic depression located in the volcano-karst environment of the Middle Atlas known as "Morocco's water tower". Endowed with an apparent catchment of 15.6 km<sup>2</sup>, this permanent depression of about 44m depth is mostly fed by karst springs and meteoric runoff waters and some intermittent streams.

The regular observations for more than ten years from the lake's banks has found that a very sensitive withdrawal of their level of submersion during the dry years. The purpose of this project is to present the spatiotemporal changes model of Lake Aguelmam Sidi Ali during the period 1985-2015 using the multi-temporal Landsat 5-TM (Thematic Mapper) and Landsat 8-OLI (Operational Land Imager) images. After the application of the corrections on these images, a series of different satellite-derived indexes including Normalized Difference Water Index (NDWI), Modified NDWI (MNDWI), Normalized Difference Moisture Index (NDMI), Water Ratio Index (WRI) and Normalized Difference Vegetation Index (NDVI) were used for the extraction of water's of surface Landsat data.

The results indicate a direct relationship between the importance of the meteoric waters intakes (rain and snow) with the extent of the lake. As well, the dry period 1985-1995 recorded a strong recorded a strong tendency towards the reduction of the size of the Lake, but in the wet period 1995-2015 shows a progressive increasing trend of the level of reference covering about one third of its surface.

**Keywords:** Aguelmam Sidi Ali Lake, Middle Atlas, landsat Imagery, water Index, surface water, spatiotemporal changes.