Morocco is one of the most sensitive areas to climate fluctuations. It is a transition zone of Atlantic, Western Mediterranean and Saharan air mass trajectories.

Understanding the past precipitation changes is crucial to assess scenarios of water resource management in the context of future changes.

Lacustrine archives can provide continuous, scalable and datable records of climatic and hydrologic changes in such area.
Lacustrine sequences from Middle Atlas wetlands are ideally suited to understanding the response of Mediterranean semi-arid environments and hydrosystems to climatic changes.

A new site was studied to gain more insights into Holocene paleohydological changes history of the region.

Flowers Marsh: small pond (6-12 ha) lying on the Liasique calcareous dolostones of the Tabular Middle Atlas (32° 59’ 04” N, 5° 27’ 13” W, 1554 m asl).
The 3m-long core (AZA-SUP-1-A-16) was recovered in 2016 using a Russian corer.

AZA-SUP-1-A-16 chronology was constrained by 9 AMS $^{14}$C analyses performed on organic bulk sediments

Multi-proxy analysis of AZA-SUP-1-A-16 were performed:

- Sedimentologic studies;
- High-resolution elemental geochemistry;
- Bioindicators: ostracods, diatoms and coprophilous fungi spores;
- Oxygen and carbon isotope ($\delta^{18}$O and $\delta^{13}$C) of ostracods.
Palaeohydrological changes recorded from a small Moroccan Middle Atlas pond during the last cal. yr BP: a multi-proxy study

Id Abdellah H., Vidal L., Benkaddour A., Rhoujjati A., Jouve G., Tachikawa K., Sonzogni C., Mazur J.C., Paillès C., Sylvestre F.
Paleohydrological reconstruction

- Between 6 and 2.3 cal. ka BP, dominance of the detrital fraction with poor bioindicators preservation, indicate the existence of an ephemeral waterbody associated with drier conditions.

- Between 2.3 and 1.4 cal. ka BP, transitional phase, shows the beginning of a permanent waterbody and high lake level.

- Since the last 1.4 cal. ka BP, drier conditions have been prevailed indicated by a relative high Ca and δ¹⁸O values.
During the Mid-Holocene (6,000 - 2,300 cal. yr BP), ephemeral water conditions recorded at Flowers Marsh contrast with humid periods in the Middle Atlas as indicated by the arrival and expansion of cedar after ~6 cal. kyr BP.

At Flowers March, recorded hydrological fluctuations demonstrate a coherent pattern with major climatic phases (Iberian-Roman period, Little Ice Age and Medieval Climate Anomaly) recorded in other Middle Atlas and Mediterranean region archives during the last 6,000 years.
The Flowers Marsh record shows **arid conditions prior to 2,300 cal. yr BP**, a large increase in **water availability** during the wetter Iberian-Roman period (2,000-1,400 cal. yr BP) and during the Little Ice Age (650-150 cal. yr BP) and **lower lake levels** were recorded during the Medieval Climate Anomaly (1,400-650 cal. yr BP). **Intensification of human pressure** by pastures in the Flowers Marsh catchment is recorded since the last 150 yr.

Our findings confirms the **Mid- to Late Holocene aridification trend** observed more widely in the western Mediterranean, at the same time highlight some **spatial and temporal variability** due to latitudinal differences and some site specific patterns.