9°Simpósio de Meteorologia e Geofísica da APMG
16°Encontro Luso-Espanhol de Meteorologia

ALEX2014
ALqueva hydro-meteorological EXperiment

ALQUEVA HYDRO-METEOROLOGICAL EXPERIMENT (ALEX): FIRST RESULTS OF AQUATIC ECOLOGICAL ASSESSMENT

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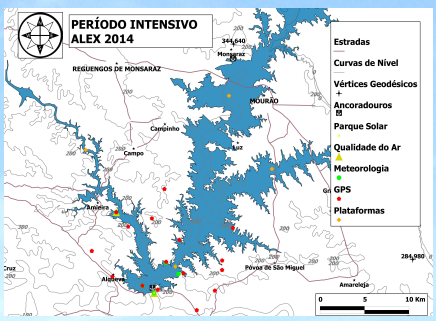
Introduction

Water resources in the Mediterranean Region are limited, fragile and threatened, and there is an urgent need for their sustainable management, which can only be achieved by understanding and predicting the complex interactions between climate, hydrology, ecosystem processes, water quality and biodiversity.

The main goal of this component of the ALqueva hydro-meteorological EXperiment (ALEX) field campaign is the analysis of the physico-chemical and biological vertical dynamics in the Alqueva reservoir, based in: 1) water temperature, pH, dissolved oxygen, oxidation-reduction potential and electrical conductivity profiles measured *in situ*; 2) water chemistry analysis carried out at the surface and bottom of the reservoir; 3) biological elements including phytoplankton and cyanobacteria blooms.



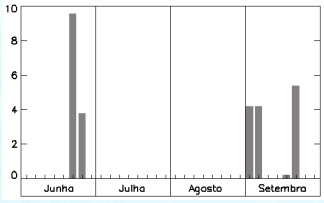
Map of the experimental setup.

Methodology

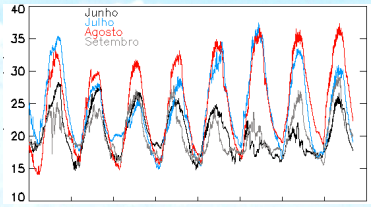
The ALEX field campaign in Alqueva reservoir took place during summer 2014, from June to September. Along this period, *in situ* measurements, water samples and biological elements were monthly collected from three fixed platforms placed in the lacustrine zone. In July, an intensive field work was performed for a week, and additional water samples were held in July and September, in the presence of surface cyanobacteria blooms.

Results

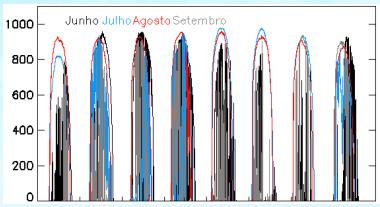
Precipitation (mm)



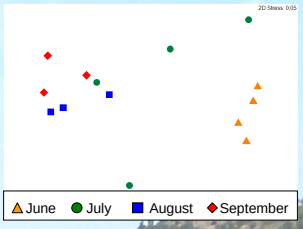
Temperature (℃)



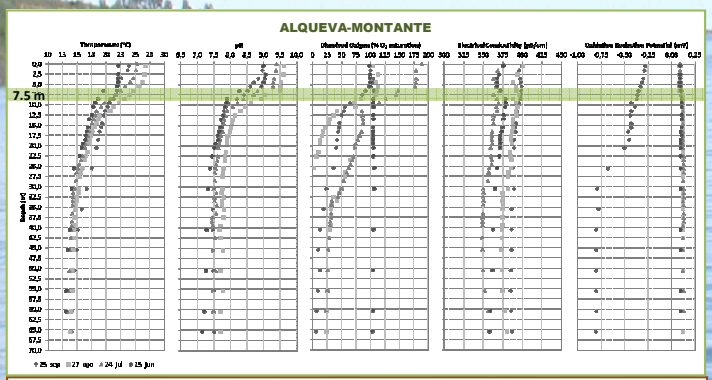
Solar Radiation (W m^{-2})

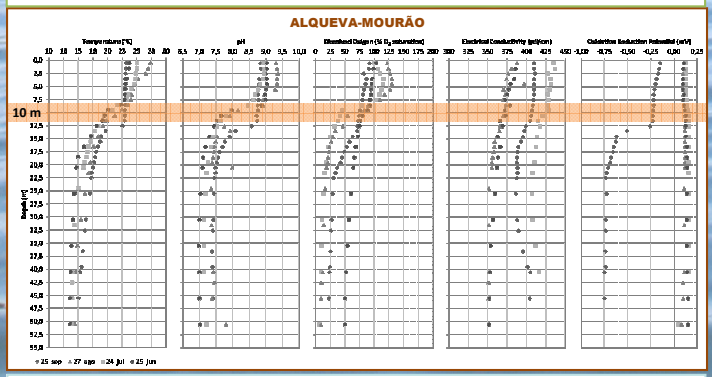


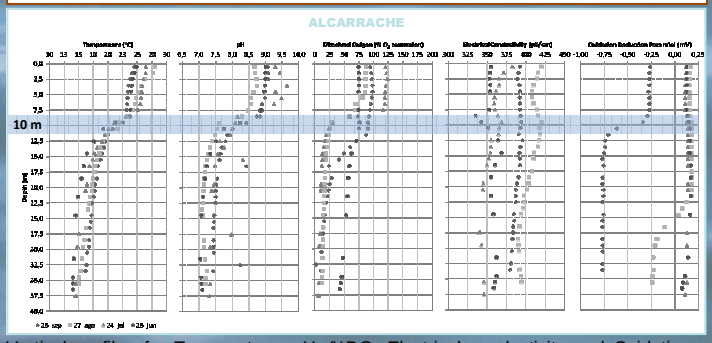
Meteorological characterization in the 8 days prior to biological and water chemistry sampling.



Multidimensional scaling (MDS) ordination plot for phytoplankton assemblages.

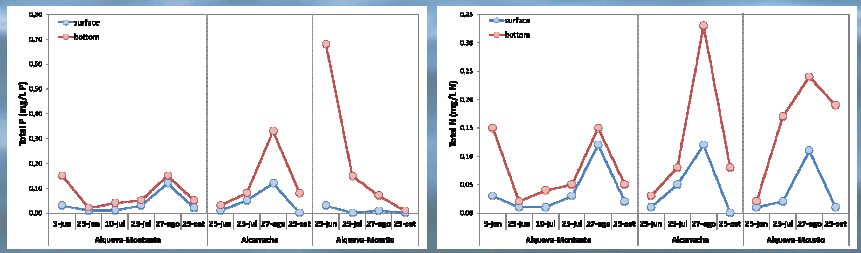






Vertical profiles for Temperature, pH, %DO, Electrical conductivity and Oxidation-Reduction Potential.

- **Precipitation occurence was observed in June and September;**
- **air temperature and solar radiation were higher in July and August;**
- **vertical profiles similar in the three platforms and show the stratification of the reservoir, with the thermocline at 7.5m in Alqueva-Montante and 10m in Alcarrache and Mourão;**
- **vertical profiles also show a temporal evolution, with the stratification clearly visible since June;**
- **low values of Total Phosphorus and Total Nitrogen in all platforms and during the whole campaign, higher in bottom samples, thus reflecting the low contribution of external loads to the system;**
- **highest TN values in bottom samples at Alcarrache, due to the contribution of ammonia and organic nitrogen, due to the fact that the vegetation was not removed from this site when the reservoir was built;**
- **cyanobacteria dominated phytoplankton assemblages in abundance throughout the experiment, whilst chlorophyta were the taxa richest group;**
- **MDS ordination shows a clear separation of phytoplankton assemblages in relation with the sampling campaigns, thus reflecting the meteorological conditions;**
- **phytoplankton assemblages were dominated by: *Aphanocapsa* sp., *Aphanizomenon flos-aquae* and *Coelastrum reticulatum* in June; *Cylindrospermopsis* sp., *Coelastrum reticulatum*, *Aphanizomenon flos-aquae* and *Oscillatoria* sp. in July; *Cylindrospermopsis* sp. and *Oscillatoria* sp. in August; *Cylindrospermopsis* sp. in September;**
- **there is a sucession of phytoplankton species, mainly cyanobacteria, thus representing a temporal dynamics, typical of reservoirs that are not under the influence of severe anthropogenic pressure.**



Temporal evolution of Total Phosphorus and Total Nitrogen.

Final Remarks

All the abovementioned results (meteorological, environmental and biological) contribute to improve the knowledge of the reservoir dynamics and therefore to propose adequate management measures to preserve the observed biological integrity. Meteorological data greatly contribute to understand the abiotic and biotic temporal evolution of the system.

Acknowledgements

The authors acknowledge the funding provided by the Évora Geophysics Centre, Portugal, under the contract with FCT (the Portuguese Science and Technology Foundation), PEst-OE/CTE/UI0078/2014.
This research was funded by the FCT: EXPL/GEO-MET/1422/2013 project.