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Recent hydrological variability and extreme precipitation events in Moroccan Middle-Atlas mountains: micro-scale analyses of lacustrine sediments

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Since the 1990s, the Mediterranean basin undergoes an increase in precipitation events and extreme droughts likely to intensify in the XXI century, and whose origin is attributable to human activities since 1850 (IPCC, 2013). Regional climate models indicate a strengthening of flood episodes at the end of the XXI century in Morocco (Tramblay et al, 2012). To understand recent hydrological and paleohydrological variability in North Africa, our study focuses on the macro- and micro-scale analysis of sedimentary sequences from Lake Azigza (Moroccan Middle Atlas Mountains) covering the last few centuries. This lake is relevant since local site monitoring revealed that lake water table levels were correlated with precipitation regime (Adallal R., PhD Thesis in progress).
The aim of our study is to distinguish sedimentary facies characteristic of low and high lake levels, in order to reconstruct past dry and wet periods during the last two hundred years. Here, we present results from sedimentological (lithology, grain size, microstructures under thin sections), geochemical (XRF) and physical (radiography) analyses on short sedimentary cores (64 cm long) taken into the deep basin of Lake Azigza (30 meters water depth). Cores have been dated (radionuclides 210Pb, 137Cs, and 14C dating). Two main facies were distinguished: one organic-rich facies composed of wood fragments, several reworked layers and characterized by Mn peaks; and a second facies composed of terrigenous clastic sediments, without wood nor reworked layers, and characterized by Fe, Ti, Si and K peaks. The first facies is interpreted as a high lake level stand. Indeed, the highest paleoshoreline is close to the vegetation, and steeper banks can increase the current velocity, allowing the transport of wood fragments in case of extreme precipitation events. Mn peaks are interpreted as Mn oxides precipitations under well-oxygenated deep waters after runoff events. The second facies is linked to periods of increased detrital input by incising sediments during low lake levels. This interpretation is supported by chronological jumps in this facies (incoherent old 14C ages). Finally, the presence of numerous anhydrous calcium sulfates in the recent low lake level facies supports the observation of a decreasing lake level for the last decades (Flower et al., 1989; Adallal R., PhD Thesis in progress).
Our study demonstrates that several lake level changes occurred during the past two hundred years, and highlights the unprecedented lake level drop since the 1980s.

Bibliography

Flower, R.J., Stevenson, A.C., Dearing, J.A., Foster, I.D., Airey, A., Rippey, B.,Wilson, J.P.F. & Appleby, P.G. (1989). Catchment disturbance inferred from paleolimnological studies of three contrasted sub-humid environments in Morocco. J Paleolimnol 1: 293-322.
IPCC, AR 5. Climate Change (2013). The physical Science Report.
Tramblay, Y., Badi, W., Driouech, F., El Adlouni, S., Neppel, L. and Servat, E. 2012. Climate change impacts on extreme precipitation in Morocco. Global and Planetary Change 82-83: 104-114.