Recent hydrological variability and flood events in Moroccan Middle-Atlas mountains: micro-scale investigation of lacustrine sediments


To cite this version:
Guillaume Jouve, L. Vidal, Rachid Adallal, E. Bard, Abdel Benkaddour, et al.. Recent hydrological variability and flood events in Moroccan Middle-Atlas mountains: micro-scale investigation of lacustrine sediments. European Geosciences Union, Apr 2016, Vienne, Hungary. hal-01875548

HAL Id: hal-01875548
https://hal-univ-tlse2.archives-ouvertes.fr/hal-01875548
Submitted on 1 Oct 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Recent hydrological variability and flood events in Moroccan Middle-Atlas mountains: micro-scale investigation of lacustrine sediments

Steep slopes and a cedar (Middle-Atlas, Morocco) Azigza lake

Scientific context and objectives

Since the 1990s, the Mediterranean basin undergoes an increase in extreme precipitation events and droughts likely to intensify in the XXI century (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 the recent hydrological variability in North Africa, our study focuses on geochemical and microsedimentological analysis of a short sedimentary sequence from Azigza lake (Fig. 1; 2). This endoreic lake is located in the Middle Atlas karst system.

Limited data on past lake level changes during the last decades are provided by Gayral & Panouve (1954), Flower et al. (1989) and Flower & Foster (1992). To refine our knowledge of past hydrological changes in this region, the first objective is to reconstruct high and low lake levels throughout the last hundred years. The second objective is to detect and count flood events.

Results

Figure 5: Geochemistry (XRF intensity) VS lake level changes

- a. Facies 1: sediment rich in wood and calcite shells, with several erosive structures.
- b. Facies 2: homogeneous sediments composed of autochthonous calcite and quartz grains

Discussion and perspectives

Lake level changes during the past hundred years are recorded in the geochemistry and the microfacies of the sedimentary sequence. High lake level facies (Fig. 6a, Facies 1) is deposited when lake shorelines are closer to the vegetation line and steep slopes (Fig. 1). This facies is characterized by light brown sediments, less organic/more minerogenic (Fig. 5, 25 cm depth), with several erosive structures containing wood fragments and calcite shells of ostracods (Fig. 6a, Facies 1). Its geochemical signature is defined by higher Si, K, Fe and Ti that indicates more detrital input. Since (1) Si covary with K (Fig. 5, PCA), and since (2) sands are poorly present in the sediment (Fig. 4), we interpret the Si signal as indicator of the finest detrital fraction (clays and fine silts) brought by superficial runoff (SEM-EDS images of silty quartz are available in Figure 6b, Facies 2). Flood events are marked by Mn peaks, which is interpreted as manganese oxides precipitations under well-oxygenated deep water after flood events. Facies 1 is deposited during periods of higher precipitations (Fig. 5).

Low lake level facies (Fig. 6b, Facies 2) is deposited when shorelines are close to smoother bank slopes, (Fig. 1). This facies is represented by homogeneous sediments composed of autochthonous calcite and detrital clayey silts with few thin laminations of ostracod shells.

Lake photographs showing several water level changes since the 50s.