

## COMPARISON BETWEEN LAKE-LEVEL CHANGES, POLLEN AND SEDIMENTOLOGICAL DATA AT LAGO DI MEZZANO (VT), CENTRAL ITALY

Laura Sadori <sup>1</sup> & Carlo Giraudi <sup>2</sup>

1 Università La Sapienza, Roma

2 ENEA, C.R. Saluggia, Saluggia (VC)

Corresponding author: L. Sadori <laura.sadori@uniroma1.it>

**ABSTRACT:** Sadori L. & Giraudi C., *Comparison between lake-level changes, pollen and sedimentological data at Lago di Mezzano (VT), central Italy*. (IT ISSN 0394-3356, 2011)

Results from geomorphological investigations in the catchment of Lago di Mezzano (VT) have been compared with data from a long sediment core sampled in the lake center. The palaeoenvironmental reconstruction was based on vegetation (deduced from pollen and microcharcoal) and hydrological (reconstructed through lake-level) changes.

**RIASSUNTO:** Sadori L. & Giraudi C., *Confronto tra variazione di livelli lacustri, dati palinologici e sedimentologici al Lago di Mezzano (VT), Italia centrale*. (IT ISSN 0394-3356, 2011)

*I risultati ottenuti da indagini geomorfologiche condotte nel bacino del Lago di Mezzano sono stati messi a confronto con dati ottenuti da una carota di sedimento campionata al centro del lago. La ricostruzione paleoambientale è stata basata su variazioni vegetazionali, dedotte dal polline e dai micro carboni, e idrologiche, ricostruite tramite le variazioni di livello lacustre.*

**Key words:** Lago di Mezzano, lake-level changes, palynology

**Parole chiave:** Lago di Mezzano, variazioni del livello lacustre, palinologia

The Mediterranean region possesses a large number of Holocene lacustrine records. These terrestrial archives are widespread across a range of environments in a region that is located at the transition between high and low latitude influences. Regional palaeoenvironmental studies may provide key contributions to the understanding of climate changes in the Mediterranean area during the Holocene. In this view the comprehension of conditions behind hydrological changes is crucial for the Mediterranean area, particularly in relation with the presumed present-day global warming. Systematic studies aimed specifically at lake-level reconstructions are still scarce in the Mediterranean area (see GIRAUDI *et al.*, 2011 for a review of Italian lake-level changes). As pointed out by investigations of the last decade (REED *et al.*, 2001; MAGNY *et al.*, 2007) Holocene lake-level data offer independent palaeohydrological data to help refine palynological studies. Close examination of pollen records reveals that specific local and regional patterns characterize the post-glacial vegetation succession, reflecting climatic differences and intrinsic geological and geomorphological features. Additionally, anthropogenic effects are often hard to discern from climate causes, as both can produce similar alterations of natural vegetation successions (SADORI *et al.*, 2011).

The comparison between geomorphological investigations and sediment proxies from a deep coring carried out at Lago di Mezzano is proposed to provide new palaeoenvironmental data to update

and increase data already published (SADORI *et al.*, 2004) on the Bronze age period.

Lago di Mezzano (Latium, Central Italy, 42°37'N, 11°56'E, 452 m a.s.l.) is a maar lake lying inside the caldera formed by the collapse of the Latera volcano.

The volcano evolved, starting about 300,000 years ago, mainly during the Middle and late Middle Pleistocene. The whole caldera forms the catchment basin of the Olpetà River, and can be divided into many smaller basins: some of these basins are connected by narrow valleys produced by the erosion of the sills of former lakes. Lago di Mezzano is the youngest of the caldera lakes and fills the bottom of a small crater produced by a phreatomagmatic eruption during the last phases of volcanic activity, about 100,000 years ago (NAPPI *et al.*, 1995). The lake is 800m wide and has a maximum water depth of 31 m. The surface area is about 0.5 km<sup>2</sup>, and the catchment area is about 1 km<sup>2</sup> with few, very small, surface inflows and one outflow.

The present size of the lake is due to reclamation works which can be observed both in aerial photos and in the field. Before drainage, the lake catchment was much larger and the water flowed, across a sill at the northeastern margin of the catchment area, to the river Olpetà which was the original outflow of the lake. The present outflow (Fosso delle Volpi) is man made, and other streams, formerly flowing to the lake from the northern basin, were artificially diverted to the

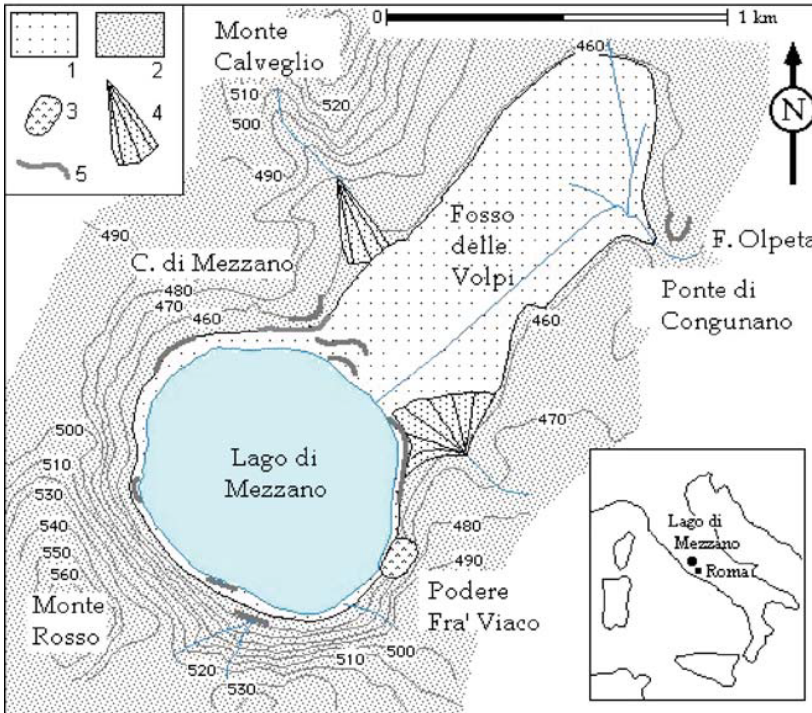


Fig. 1, Lago di Mezzano. Geological sketch map of the basin. 1- Lacustrine and shore sediments; 2- volcanic materials; 3- landslide deposits; 4- alluvial fan; 5- terrace scarplet (from SADORI *et al.*, 2004)  
 Lago di Mezzano. Carta geologica del bacino di alimentazione. 1- Sedimenti lacustri e di spiaggia; 2- materiali vulcanici; 3- accumuli di frana; 4- conoide di deiezione; 5- scarpate di terrazzo (da SADORI *et al.*, 2004)

Olpeta (Fig. 1 and Fig. 2).

The geological study (GIRAUDI, 2004) of the non-volcanic sediments has established that inside the Caldera di Latera some terraced lacustrine sediments, alluvial and colluvial deposits and a limited amount of travertine are exposed.

Underwater archaeological investigations carried out at the lake bottom during the 70ies and the 90ies revealed traces of Bronze age dwellings named M1, M2, and M3 (Fig. 2) along the north-eastern arc of the shore (PETITTI, 2000; SADORI *et al.*, 2004).

Three parallel cores (LMZA, LMZB, LMZC) were taken from the centre of the lake, each with a minimum length of 28 m, in May 1995 using a modified Livingstone piston corer (Usinger corer)

by the GeoForschungsZentrum Potsdam. Core LMZB was selected for pollen analysis. Core preliminary palynological results have so long been published (RAMRATH *et al.*, 2000; SADORI *et al.*, 2004; SADORI & GIARDINI., 2007).

The chronology of the record, spanning in all 34000 years, and expressed in calendar years BP, was established on the basis of varve counting, nine AMS radiocarbon dates, two tephras and interpolated sedimentation rates.

The results of the geomorphological and stratigraphical investigations, carried out by means of trenches dug in the area surrounding the lake, allowed to recognize changes in the catchment basin and lake level variations during the Late Glacial and the Holocene (GIRAUDI, 2004). The

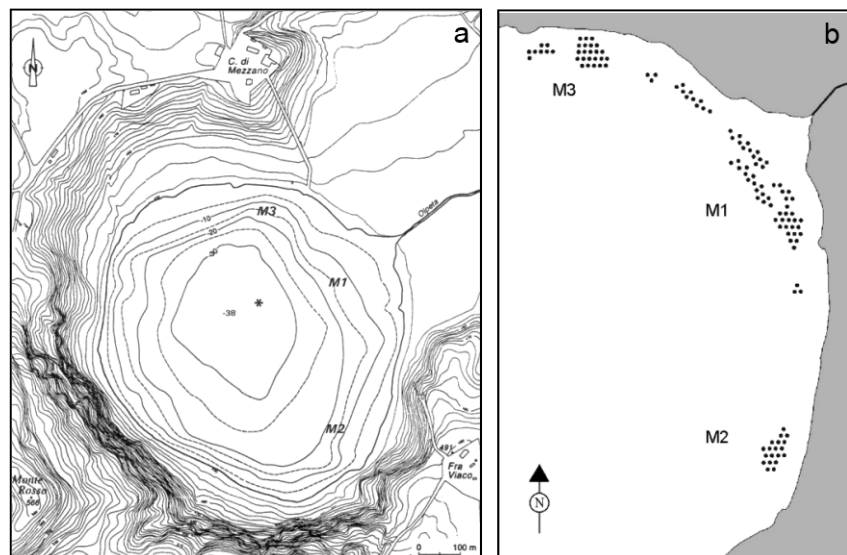


Fig. 2, Lago di Mezzano. a- Topographical map of the basin; the asterisk marks the location of LMB coring; b- Bronze age submerged lake dwellings named M1, M2, and M3  
 Lago di Mezzano. a- Carta topografica del bacino, l'asterisco indica la posizione del carotaggio LMZB; b- insediamenti perilacustri sommersi dell'età del Bronzo denominati M1, M2 e M3

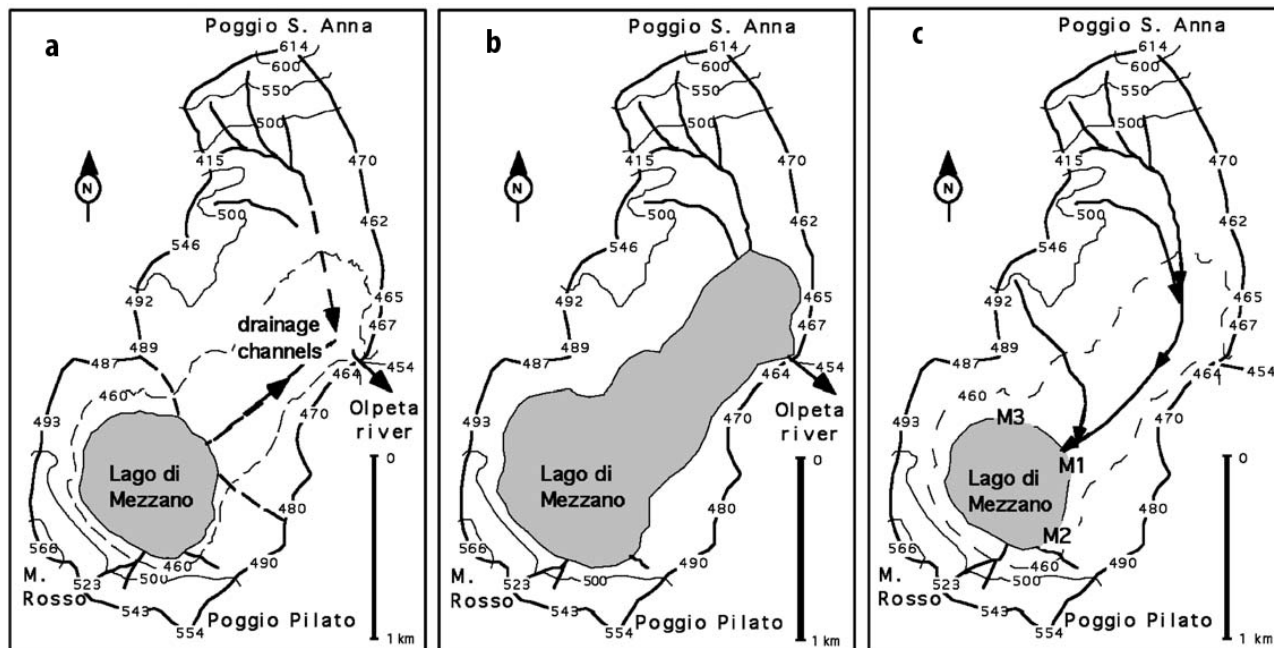


Fig. 3, Lago di Mezzano: lake-level changes. a- present day and 20<sup>th</sup> century; b- 16<sup>th</sup> and 17<sup>th</sup> century; c- Bronze age. M1, M2, and M3 perilacustrine archaeological settlements (SADORI L. *et al.*, 2004)

*Lago di Mezzano: variazioni dei livelli lacustri. a- situazione attuale e del XX secolo; b- XVI e XVII secolo; c- età del Bronzo. M1, M2 e M3 insediamenti archeologici perilacustri (SADORI L. *et al.*, 2004)*

radiocarbon data of the Holocene sediments show the maximum detail for the last 5000 years. The Mezzano lake level oscillations seems in phase with other central Italian lakes (GIRAUDI *et al.*, 2011).

A good correspondence is found between pollen, microcharcoal, lithological curves obtained by the core investigations and lake-level fluctuations deduced by geomorphological investigations for the last five millennia.

Coherent changes in the different proxies have been taken as evidence of hydrological changes in the catchment, while incoherent ones as indication of human action.

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