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Interactions between the drainage basin and the lacustrine environment: evolution and sediment input of a delta system in the Lake Como (Italy)

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The interactions between the catchment basin and the lake are highlighted by the morphological and structural pattern of the sedimentary deposition. Lacustrine deltas are the sedimentary bodies that par excellence record these relations above all the others. Analysing a delta, in fact, it is possible to enter in a special archive in which are recorded the terrigenous input, the wind control, the climatic variations, the lake level changes and the tectonic activity of the area.

The western branch of Lake Como (northern Italy) is characterized by the absence of an outflow river, due to the glacial and neotectonic evolution of the area, and by the presence of few incoming rivers. The main tributary river of this Lake Como branch is the Breggia river, with a length of 12 km and a catchment area of ca 87 km^2. The Breggia river drainage basin is composed by three portions: the mountain zone with a gradient of 1300 m as maximum; the Faloppia affluent valley, of intra-morainic origin; and the wide terminal glacial valley infilled by Late Pleistocene and Holocene glacial, lacustrine and alluvial deposits. The Breggia plain ends in the Lake Como with a large underwater and subaerial delta system.

The underwater portion is investigated using a multibeam system (Simrad EM3000). For the inland portion of the basin, the Gavrilovic-Zemljic empirical method and different Magnitude formulae suitable for the Alpine environment are applied to calculate the sediment input, lacking direct data of the rivers turbiditic discharge.

The new bathymetric data offer the opportunity to distinguish in the complex sub-

lacustrine delta system the presence of:

- a small delta body with a minimum volume of $6,3*10^6 m^3$ that is in correspondence of the current Breggia river mouth in the south-eastern part of the Breggia plain;

- a complex delta body localized 580 m northward, with a vertical expression of 130 m from the lake bottom and an extension toward the lake centre of ca 900 m. This body is composed by a lower portion, with a minimum volume of $31,3*10^6 m^3$, and an upper littler digitate body with a minimum volume of $0,7*10^6 m^3$.

According with this morphological data it is possible to argue the following evolution: the principal body can be ascribe to a previous developing phase of the Breggia river while the digitate overlapping body represents the actual sedimentary activity of the Greggio stream, that has a catchment of ca 6 km^2 and a course length of 5,6 km.

In order to define the chronology and the evolutionary steps of the delta system a calculation of the sedimentary input of the Greggio stream is undertaken. In this way it is possible to define: an indicative age of the minor digitate body, the consequently time of the overlapping of the Breggia paleodelta; and so the minimum age of the Breggia river course shift to the nowadays position.

Considering the usual high urbanization of a river plain and the common shortage of the written historical information of these areas of the Alps, the detailed study of the lacustrine sediments is a possible way to reconstruct the environmental evolution of the region.