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Mega-turbidite events and sedimentologic history in Lake Como (Italy)

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Lake Como is the deepest lake of the Alps (-425 m below lake level) and with its surface area of 142 km^2 the third largest along the southern alpine margin lakes. Its drainage basin is in a central position within the Alpine chain and corresponds to one of the major morphological pathways between northern and southern Europe.

For the first time, limno-geological investigations have been carried out in Lake Como combining a bathymetric survey (Multibeam Simrad 3000) with a high-resolution seismic reflection study (single-channel 3.5kHz) and a coring campaign (gravity short-corer). These investigations were concentrated on the western branch of the lake (Como branch) and allow to characterize in detail the sedimentary subsurface to a maximum depth of 50 m.

The recorded data show that the western branch of the lake can be subdivided in several sub-basins, that have different characteristics from the morphological, physical and sedimentological point of view. In particular, two sub-basins of great interest are present in a) the Tremezzo-Bellagio plateau area at the northern end of the Como branch and in b) the Argegno deep basin.

The plateau area, located at the northern tip of the Como branch, has a water depth of about 140 m and separates the Como branch from the rest of lake basin. The high-resolution seismic analyses of this area illustrate that the base of sedimentary cover is composed of glacial deposits. These are interpreted as ice-contact deltas forming a delta moraine built during the last glacier retreat. The morphology of these glacial deposits influenced the subsequent lacustrine sedimentation. The depressions between

the glacial deposits were first infilled by onlapping pelagic and laminated sediments locally intercalated with confined mass-flow deposits. In the following phase, pelagic well-layered sediments composed of finely laminated mud with rare sandy layers draped the glacial deposits. They are interbedded with sub-acqueous mass-flow deposits. The interpretation of the bathymetric data shows that the glacial deposits still influence the geometry of the present sedimentation.

The Argegno sub-basin is characterized by an over 10 km long area with water depths of over 400 m, that also includes the lake's deepest point with a water depth of 425m. This sub-basin shows different depocenters, which are filled with onlapping pelagic well-layered sediments and intercalated turbidite deposits. In particular, two mega-turbidite deposits were detected on the high-resolution seismic lines, each with a volume in the order of $10*10^6$ m^3. The ages of these events will be extrapolated from isotopic analyses (^{137}Cs, ^{14}C) and sedimentation rates obtained from the short cores.

According to the distributions and thickness of these two mega-turbidite deposits, a source area located at the northern tip of the Como branch can be proposed. Based on the morphological and sedimentological characteristics of the area, we suggest that these mega-turbidites resulted from the development of sub-lacustrine mass movements along the southern slopes of the plateau area. Possible trigger mechanisms leading to these catastrophic events include overloading of slope deposits, major flood events, significant lake-level change and earthquake shaking.