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INDAGINI GEOFISICHE SUL FONDOVALLE VALTELLINESE (dal Lago di Como a Teglio, prov. di Sondrio)

ABSTRACT: PETRUCCI F., CAREGGIO M. & CAVAZZINI R., Geophysical examination of the Quaternary deposits in the Valtellina Valley floor (from Lake Como to Teglio, Sondrio Province, Italy) (IT ISSN 0084-8948, 1982).

An investigation was made of the lithostratimetry of the Quaternary deposits lying under the present Valtellina Valley floor, the facies and sedimentary environment relationships, and the pattern of the rock substrate corresponding to the lowest limit of the maximum glacial scouring. Thirty-two vertical electrical soundings were performed for this purpose. Coupled with direct investigation of the local Quaternary Geology, their results enabled the conclusions illustrated in table 1 to be reached. It will be recalled that the Parma University Department of Geology, directed by prof. Sergio VENZO, has been studying the Valtellina Quaternary for some thirty years. The results of this work can be seen in the monograph: "Gli stadi tardo-wurmniani nelle Alpi insubriche valtellinesi" (VENZO, 1971) and in other papers published in cooperation with the University of Milan, Petrography Department.

Analysis of the geophysical data and their geological, lithostratimetric and environmental interpretation starting from the furthest expansion of the Valtellina I Stage, have led to new and unexpected results with regard to the Quaternary deposits that fill the post-glacial cirque stretching from Lake Como to Teglio. The results were surprising insofar as it might have been expected that coarse sediments, such as morainic, fluvio-glacial, or fluvial sediments, would be found, interspersed with a few restricted lacustrine or fluviolacustrine episodes, and new to extent that they led to the conclusion that the valley floor is covered by tens of metres of lacustrine materials, overlain by fluvial and gravel deposits up to the present surface. Thick, continuous lacustrine sedimentation has occasionally been interrupted by fan deposits that descend from the side valleys to form deltas in the waters of the lake.

The insinuation of lake into the valley to the East of Morbegno was due to the fact that the level of Lake Como was higher throughout Valtellina I Stage. During Stage II, the Culmine del Dazio threshold determined the development of the middle part of the valley as far as Rogna for some time, and created a valley lake that extended for several kilometres. In the middle valley, there is more coarse material than in the lower valley, due to the local orography. In the two valley segments, filling by lake deposits obviously took place in successive periods, i.e. in Stages I and II in the West and East sections respectively.

The fluvial cover of the Adda on both lake basins points to regular fluvial (post-Buhl) deposition after the lakes were filled in. The thickness of the sediments that run down the river bed in question for about 60 km are indicative of regular repetition of transportation and fluvial deposition. The classification of these sediments is completely normal, and there are appreciable percentages of thin fractions several kilometres upstream before the lake is reached. This state of affairs is only interrupted locally by lateral contributions.

The continuous presence of lithologies with fine particle fractions, over 100 metres thick in some places, referable to lacustrine deposits had cast doubt on the lithostratimetric interpretation on the basis of the geophysical results. Careful analysis of the geological and environmental conditions from the Valtellina I Stage down to the present time provided a congruent picture of the geophysical data with a possible geological interpretation. The water did not run along the valley floor due to the presence of the lakes. The fluvial and fluvio-glacial materials came to a halt either near Culmine di Dazio or at the level of Ponte in the two distinct periods, and formed ordinary deltas at the outlet into each lake. Attention can usefully be drawn to the original surface of the trough scoured by glaciers. Near Caiolo (vertical sounding 3), this was 60 m lower than the level of Lake Como during the Valtellina I Stage. This basic level, therefore, is valid not only for the lower valley as far as Culmine, but may also have made its influence felt as far as Teglio or thereabouts in the middle of the valley, at any rate for a certain time after the retreat of Valtellina I Stage.

Geological studies in the Culmine area between the lower Masino and Tartano valleys would appear to have made it sufficiently clear that the area may have been influenced by movements between the Valtellina I and the Buhl stages that either prolonged or brought about damming of the valley bottom, with the formation of a lake upstream on the retreat of Stage I. A certain degree of lively tectonic activity has also been observed to the East of Sondrio, as far as Teglio. The Quaternary tectonic data mentioned here should be reviewed in a careful investigation with the assistance of petrographers, since substrate specialists alone would be in a position to substantiate recent recommencement of tectonic disturbances in an area that has been the scene of such heavy displacement, even in the past.

The main questions posed in this study can be answered as follows: a) the Quaternary cover reaching up from the valley bottom to the present surface includes extensive, thick lacustrine sediments; b) these sediments are covered by fluvial deposits with a uniform thickness that decreases as one moves downhill, and with transitions to fine lithologies (sand, silt) near the lake; c) the thickness of the alluvial "mattress", thought to be of the order of 100 metres by VENZO (1971), can now be regarded as generally greater and often more than 200-250 metres in the light of the present result. This is illustrated in the sections in table 1.

RIASSUNTO: PETRUCCI F., CAREGGIO M. & CAVAZZINI R., Indagini geofisiche sul fondovalle valtellinese (dal Lago di Como a Teglio, prov. di Sondrio) (IT ISSN 0084-8948,1982).

La ricerca ha avuto lo scopo di determinare la litostratimetria dei depositi quaternari sepolti sotto l'attuale fondovalle valtellinese e di definire la profondità del contatto fra questi e il top del substrato roccioso. Lo studio si è avvalso di un'indagine geofisica basata su 32 sondaggi elettrici verticali distribuiti lungo 57 km di fondovalle.

La Cronostratigrafia e Geologia dei depositi quaternari di questa regione cui si fa riferimento nel lavoro è quella esposta da S. VENZO. Rilievi e revisioni originali sul terreno hanno riguardato in particolare i depositi quaternari in affioramento sotto l'aspetto geologico-stratigrafico e tettonico, ai fini di una migliore interpretazione dei depositi sepolti. Nel corso dell'indagine sono emerse alcune considerazioni di Tettonica recente suscettibili di ulteriori sviluppi. I risultati ottenuti possono essere sintetizzati come segue: a) lo spessore del materiale alluvionale nel fondovalle è generalmente superiore ai 100 metri e spesso supera i 200-250 metri; b) il colmamento della conca glaciale è attribuito ad una spessa coltre di sedimenti lacustri, talora interrotta dall'apporto delle conoidi laterali. Il fondovalle doveva essere diviso in due distinte aree lacuali, la prima a W del Culmine di Dazio, la seconda ad E; c) dopo la fase di riempimento dei laghi lungo l'intero fondovalle si è sovrapposta la regolare deposizione fluviale fino ai giorni nostri.

TERMINI CHIAVE: Geofisica; Quaternario; Glaciazione; Neotettonica; Alpi Centrali.