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DEEP-SEATED GRAVITATIONAL SLOPE DEFORMATION UNDER THE SEDIMENT FILL OF INSUBRIC VALLEYS (ITALY – SWITZERLAND)

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Within some valleys located along the Linea Insubrica, some seismic investigations (using the reflection method) along profiles transversally orientated respect to the direction of the valley have been carried out in the frameworks of different projects. Two profiles are in the Magadino Plane, northward to the Maggiore Lake in Switzerland (FELBER et al., 1994; FELBER & BINI, 1997) and another profile is in the eastern part of Valtellina near Valgella (BINI et al., this issue; BIELLA et al., this issue).

The first (carried out in the project PNR20) of the two profiles reveals a buried valley bottom at 750 m below the topographic surface reaching the depth of 510 m below the actual sea level. The second profile carried out by Ferrovie Federali Svizzere 1 km eastward from the previous one not reach the rock basement investigating only the upper 400 m of the sediments. The Valgella profile shows a buried valley bottom at 550 m ca. below the surface that reaches the depth 180 m below the actual sea level.

All the profiles show the same structural assessment characterised by the upper part until 200 m of depth with chaotic and irregular reflectors and the lower one with a series of sub horizontal and parallel reflectors that pinching out on the rock sides of the valley.

The deposits of the upper part have been attributed to the glacial deposition during the Last Glacial Maximum (LGM) (FELBER et al., 1994; FELBER & BINI, 1997) while the sub horizontal reflectors can be interpreted as fluvial and/or lacustrine deposits earlier than LGM. The occurrence of terraces constituted by LGM fluvial and fluvioglacial deposits at the outflows of Como and Maggiore lakes at an altitude much higher than the top of the buried deposits found in the seismic prospections confirms that the last one are older than LGM.

In all the profiles are clearly visible deep-seated slope gravitational deformations (DGSD) along almost the entire buried slopes, not genetically linked with the glacial evolution in the valleys (BINI et al., this issue).

In correspondence of the DGSD the sub horizontal reflectors are deformed and folded according a compressive stress due to the sliding or creeping of the bedrock. The absence of evidences of inverse faults or "flower structure" within the bedrock, confirm that deformations both in the rock and in the overlying sediments is not due to a transpressive tectonic style.

The DGSD continued their downward movement and deformation even after the filling of the valley without any constraints by the deposits.

References

BINI, A., BIELLA, G. DE FRANCO, R., GUGLIELMIN, M. & TOGNINI, P. (2001) : Deep seated gravitational slope deformations as origin of the terraces on the Northern slope of Valtellina (Italian Central Alps) . – This issue.

BIELLA, G., DE FRANCO, R., CAIELLI, G., VIGNOLA, P., LOZEJ, A., BINI, A., GUGLIELMIN, M., CARBONARA, S. & TERENZONI, M. (2001): Imaging the deposits that fills Valtellina (So, Italy) by seismic reflection investigation. – This issue.

FELBER, M. & BINI, A. (1997): Seismic survey in alpine

and prealpine valleys of Ticino (Switzerland): evidences of a Late-Tertiary fluvial origin. Southern Alps Quaternary Geology, IGCP 378 Meeting, Lugano ottobre 1995. Geologia Insubrica 2 (2): 46–67

FELBER M., BINI A., HEITZMANN P. & FREI W.(1994): Evidenze sismiche di valli sepolte nel Mendrisiotto e nel Piano di Magadino (Ticino, Svizzera). Proc. Symp. Crop – Alpi Centrali, Sondrio 1993. – In: Quaderni di Geodinamica Alpina e Quaternaria 2: 103–133.

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