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The role of deep dissolution in slope deformations of the Western Alps

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The deep dissolution involve great part of soluble rocks (e.g. gypsum) of the Western Alps, as testified by geological literature and field evidences. The surface phenomena are not limited to typical karst landscape: often soluble rocks don't even outcrop but the dissolution phenomena in depth are indicated by groundwater chemical composition.

Following the corrosion processes, the volume reduction taking place in depth induces gravitational instability phenomena, characterised by variable evolutionary stages.

Dimensions of involved bedrock volumes and related surface phenomena are variable between small collapses and deep-seated gravitational slope deformations. Location, dimension and state of activity of instability phenomena are influenced by the local geological (i.e. the presence of gypsum), structural (discontinuities influencing fluid circulation) and geomorphological settings (energy relief, slope forms).

Currently the gravitational collapse forms have very different evolutionary stages: some are early "embryonic"; others are more evolved, up to typical sinkholes. Some cases show an extreme complexity in the interactions between corrosion phenomena and slope deformations (from one side) and karst, fluvial and glacial phenomena (from the other). Case studies show these interactions have been going on at least since late Pliocene to Present (preliminary pollen data).

Geomorphological reworking of the original collapse forms has brought to very different morphological situations and different possible interpretations: from closed depressions "captured" by the surface drainage system (fluvial or glacial), to relief inversion cases due to extremely evolved phenomena.

Important consequences on natural hazards has to be taken in account: slope deformations can take place even if dissolved rocks are located hundreds of metres underneath the surface, having a substantial impact on structures and human activities.