



## 6<sup>th</sup> YOUNG GEOMORPHOLOGISTS' DAY

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# THE INFLUENCE OF THE GEOMORPHOLOGICAL PROCESSES ON THE TREELINE POSITION IN THE UPPER VALTELLINA

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At high altitude the vegetation growth and dynamics are strongly influenced by climate. The treeline is considered a sensitive climate indicator, as it shifts following the climate change. Nowadays the treeline is moving upward as a response to climate warming. However human activities and geomorphological processes can control the potential position of the treeline, conditioning its maximum altitude.

In the higher mountain region, tree germination and growth are affected by slope processes with debris flow and rock fall being the main processes causing the movement of debris and blocks. Geomorphological processes, including glacial ones, are also responsible of bare surface modelling. Both slope processes and rock outcrops affect treeline dynamics. Investigation about the role of geomorphological factors on treeline position represents an important step in assessing the current treeline upward shift.

This study was carried out in the Upper Valtellina, Central Italian Alps, where about 360 km of treeline were analyzed, considering the tree altitude and the main limiting factors.

The position of the trees has been established on ortophotos by means of GIS software. Besides, active and inactive landforms, grouped according to their genetic origin, have also been examined through the shapefiles available on the Geoportale della Lombardia. Glacial, periglacial, gravitative and water runoff processes and related landforms have been analyzed in detail.

First results allow to define the current treeline position which varies in relation to the main limiting factor: human impacts (mean altitude 2335 m a.s.l.), geomorphological (2355 m a.s.l.) and climatic treeline (2530 m a.s.l.).

More than 80% of the 1814 analyzed trees at the treeline are influenced by geomorphological factors. Gravitative processes seem to be more responsible of the position of the treeline; active debris cones are the more common landforms associated with a lower position of the treeline.

The ongoing research aims to estimate the treeline shift in the recent years to contribute to a more detailed characterization of the responses of the abiological and biological systems to climate change.

