



## Glaciokarst: a Case Study from the Dinaric Alps

Manja Žebre (1) and Uroš Stepišnik (2)

(1) Department of Geography, Faculty of Arts, University of Ljubljana, Ljubljana, Slovenia (manjazebre@gmail.com), (2) Department of Geography, Faculty of Arts, University of Ljubljana, Ljubljana, Slovenia (uros.stepisnik@gmail.com)

The Dinaric Alps are one of the largest contiguous mountain belts of the European part of Eurasian orogen with the total length of 645 km. The biggest part of the Dinaric Alps is formed of carbonate rocks, mostly limestone and dolomite. Here, the highest massifs are found and karst geomorphic system prevails. Well karstified Dinaric Alps were affected by the Quaternary glaciations. An interaction between glacial action and karst processes is most frequently termed as glaciokarst. Glaciokarst can function only if vertical karst drainage of subglacial waters is active, which results in specific functioning of glaciers as well as in formation of typical geomorphic features. On the other hand inert vertical karst drainage prevents functioning of glaciokarst and causes only subglacial and postglacial surface modification by dissolution, which is referred to as karsti-glacial action. The case study from the Lovćen, Orjen and Velež Mountains in the southern Dinaric Alps provides an insight into specific glaciokarst processes and surface features. Aside from variety of subglacial and postglacial dissolution karsti-glacial features, typical features of subglacial origin such as shafts, dolines, kotlic and kontas (over-deepened cirques) which are all the result of subglacial karstic drainage, are present in the study areas. Vertical karst drainage has also significant effect both on functioning of glaciers and on glacial deposition. Since prevailing process in karst areas following deglaciation is vertical chemical denudation, almost entire absence of other surface processes resulted in almost complete preservation of glacial accumulations. The dynamics of glaciers in karst areas is similar to the one in arid mountain areas where proglacial discharge is relatively low in comparison with sediment supply. Therefore, moraine-dammed glaciers are common in karst areas due to vertical drainage resulting in inability of ice-marginal fluvial processes to evacuate sediment. This type of glaciers deposit distinct lateral moraines which converge towards the end of the valleys forming lateral-terminal moraine complexes. In case glacier exploits a gap in a major lateral moraine ridge breach-lobe moraines form. Thus, this type of glaciers is referred to as multi-lobed moraine-dammed glaciers. Proglacial fluvial transport between glacial and proglacial systems in karst areas is inefficient. Nevertheless, small amount of sediment from the glacier margin is washed away by proglacial streams filling karst depressions and forming piedmont type of poljes. In case of glacial floods triggered by the release of proglacial lakes dammed by moraines, large volumes of water and sediments can be supplied to proglacial zone. As a result, glacial outburst fans with boulder sized material and non-layered sediment are formed.