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Glacial and hydrokarstic interactions in the evolution of the Gomance piedmont polje (Dinaric karst), as revealed by ground penetrating radar (GPR) surveys

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The Dinaric karst is the largest continuous karstified area in Europe. Characteristic forms associated with the karst areas are, among others, karst poljes. The latter are the largest enclosed depressions in karst. Quaternary glaciations played an important role in the evolution of several Dinaric poljes. Accordingly, poljes filled by outwash deposits and positioned completely in a vadose zone are classified as piedmont type poljes. One of those is the Gomance polje, enclosed between the Snežnik Mountain (Slovenia) to the north and Gorski Kotar (Croatia) to the southeast. The polje was positioned at the edge of local ice caps during the late Pleistocene glaciation. The north-eastern part of the polje is covered with two outwash fans, indicating the outlet of two glacial lobes. Two ridges rise from the plain in the proximal part of the fans. One ridge is made of bedrock and partially covered by scattered glacial boulders, while the other one is made of glacial till. Almost the entire polje floor is flattened by outwash deposits, slightly inclined towards southwest, where the depression is closed by a high bedrock ridge. The sediment filling of the polje starts with proximal bedded gravels, visible in gravel pits, and becomes more complex in the distal outwash plain. The main aim of the research is to reconstruct the evolution of the Gomance piedmont polje and its importance in unravelling the changing hydrological function through time. Multiple approaches, combining geomorphological mapping, sedimentological study and GPR measurements, supported by hand-drillings, were performed in order to determine the continuation of the buried moraines and to investigate the polje sedimentation. Preliminary results point towards the evolution of the Gomance polje in two main phases, connected with two glacial advances. Deposition of the frontal moraine system in the early glacial advance was subsequently almost entirely buried by the outwash deposits of the younger, slightly less extensive glaciation. Moreover, efficient surface outwash system in the proximal part, strongly controlled by karst in the distal part, is also assumed.