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## Multi-methodological three-dimensional investigation of a closed-system Pingo in Northwestern Canada

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The Mackenzie-Delta region is known for widespread permafrost and the association of different landforms, which are characteristic of a periglacial landscape development. Especially the density of closed-system pingos is nowhere on earth higher than in the area of the Tuktoyaktuk Peninsula. This type of pingos is common only in the continuous permafrost zone and is very sensitive to changing thermal conditions. In this study, we investigated the surface and subsurface conditions in the area of such a closed-system Pingo near Parsons Lake in the southern part of the Tuktoyaktuk Peninsula to study its internal structure and evolutionary state. Therefore, we used a combined approach of electrical resistivity tomography (ERT), ground-penetrating radar (GPR) and manual frost probing. In addition, a high-resolution digital elevation model and an orthophoto were generated using in situ drone acquisitions. These enabled a detailed and areawide mapping of surface characteristics (e.g. vegetation height or type) and should contribute to the investigation of linkages between surface and subsurface characteristics.

Such a linkage could be observed comparing the mapped vegetation type and heights with active layer depths derived from manual frost probing and GPR measurements. Both parameters show a significant zonation in the area of the pingo and its surrounding. In addition, the results of the quasi three-dimensional ERT measurements could deliver new insights into the three-dimensional internal structure of the pingo and a massive ice core could be detected. However, the shape as well as the position of the massive ice core in relation to the elevated surface of the pingo differ from the previous theory of closed-system pingo formation and therefore raises some questions. Also the existence of a talik could be confirmed, but its position beside the ice core within the eastern flank of the pingo and not below the massive ice core also differs from the theoretical models and should be discussed.