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GLACIAL CREVASSES AND LAKES IN ANTARCTICA AS POTENTIAL HAZARDS

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Glacial crevasses, as well as periglacial and englacial lakes in the cryolithozone, are of interest as potential hazards for logistics operations and safety reason. The sizes of Antarctic crevasses can reach several dozen meters and more. They presenting near stations and field bases are very dangerous. Outbursting of periglacial and englacial lakes is a special danger because the sudden water releases can cause significant damage to infrastructure. In 2017 outbursting the englacial Dâlk Lake comes to formation of a depression 200×200 m with up to 40 m deep and destroyed the road connected the Russian and Chinese stations with the airfield. Current climatic conditions lead to intensive snow melting. It come to increasing the lake outbursts and formation of new crevasse zones. Thus, monitoring, detection and prediction of these processes has become one of the most important scientific research. The most effective tool to identify crevasses and hidden objects is ground penetrating radar (GPR) method. Mathematical modelling provides significant assistance in interpreting GPR data. However, nowadays, artificial intelligence (AI) methods are been used for automated processing of GPR data. We first apply signal processing techniques to enhance extracted GPR frames, improving image clarity and reducing noise. In subsequent stages, machine learning (ML) and deep learning (DL) methods are used to detect hyperbolic reflections in GPR images, which are related with crevasses. Preliminary results indicate that the AI based methods is effective for detection tasks. These technologies enable automated data processing and improve the accuracy of hazard zone forecasting. AI training is carried out using both field GPR data and synthetic data generated with the gprMax software package.

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