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The geomorphology and ground penetrating radar survey results of the Múlajökull and Þjórsárjökull surge-type glaciers, central Iceland

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Múlajökull and Þjórsárjökull are surge-type outlet glaciers of the Hofsjökull ice cap, central Iceland (Björnsson et al., 2003). The forefield of Múlajökull comprises the active drumlin field of more than 110 drumlins (Johnson et al., 2010; Jónsson et al., 2014) and therefore is an excellent area for studies of glacial geomorphology, subglacial topography and ice structures.

This work describes preliminary results obtained during the expedition to Múlajökull and Þjórsárjökull glaciers in August, 2014. In the research ground penetrating radar (GPR) Zond 12-e was used. GPR measurements were performed on both outlet glaciers using 38 MHz and 75 MHz antenna systems. During data acquisition 2000 ns time window was used, while length of profiles was determined using GPS device Garmin GPS-76. In total approximately 3 km of GPR profiles were recorded. GPR signals propagation speed in glacier ice was determined using reflections from internal meltwater channels of glacier. In obtained radarogramms it was possible to trace reflections from the glacier bed till depth of approximately 144 m as well as numerous prominent reflections from internal meltwater channels of glacier. In one of the obtained radarogramms possible subglacial channel below Múlajökull glacier was identified. Also feature of subglacial topography that resembles drumlin was identified. The area of abundant infiltrated water was distinguished close to the ice margin in the radarogramm obtained on Þjórsárjökull suggesting successive supraglacial meltwater infiltration towards glacier margin.

During the field work numerous radial crevasses, supraglacial channels and moulins were observed in the marginal zone of Múlajökull. The forefield of Múlajökull mainly consist of subglacial landforms (drumlins, flutes and crevasse-fill ridges), end moraines and sandur plains. Flutes and crevasse-[U+FB01]ll ridges were found superimposed on drumlins in places. Till macrofabric was measured close to the surface of two drumlins and at one section on the slope of drumlin. The fabrics possess strong orientations parallel to the axis of drumlins, as well as glacial striations on the boulders exposed at the drumlin surface. These striations indicate glacier sliding over its bed during the termination of the last surge.

References

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