

# Geomorphological and sedimentological records of glacial events in the northern part of the marginal zone of Tungnaárjökull, Iceland, since the Little Ice Age

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**Abstract** — *We present geomorphological mapping of glacialacustrine and glacialfluvial landforms and lithofacies analysis of deposits in the northern part of the marginal zone of Tungnaárjökull as it retreated from its Little Ice Age (LIA) maximum. This is the first time that this type of study has been conducted in the marginal zone of Tungnaárjökull. Landforms identified included preserved shorelines, small wave-cut platforms, fossil deltas and a kame terrace, all associated with ice-dammed lakes. Lake, delta and kame depositional environments were interpreted on the basis of sedimentological analysis. Ice-dammed lakes developed in the northern part of the forefield as a result of Tungnaárjökull damming the outflow of meltwater between its snout and the Jökulgrindur volcanic ridge. Based on historical maps and aerial photographs the damming of meltwater was probably associated with the 1945 surge.*

## INTRODUCTION

Tungnaárjökull is one of several outlet glaciers draining the western part of the Vatnajökull ice cap in SE Iceland (Figure 1A). It is located between 64°15' and 64°24' north latitude, between Skaftárjökull in the south and Sylgjujökull in the north (Figure 1B). The marginal zone of Tungnaárjökull covers the area between its maximum extent during the Little Ice Age (LIA) and its current edge. The indicated marginal zone is about 25 km long and ranges in width from approximately 1.2 km in the northern part to 2.5 km in the central and southern parts of its forefield (Molewski, 2005; Evans *et al.*, 2009). Beyond it are extensive outwash plains of various ages. The topography of the volcanic bedrock and forefield of Tungnaárjökull fundamentally determine the spread and dynamics of the glacier snout (Andrzejewski and Molewski, 2000; Andrzejewski, 2002;

Evans *et al.*, 2009). A pattern of parallel, Upper Pleistocene northeast–southwest volcanic ridges are visible both in the relief of the forefield of the glacier and in the morphology of its surface (Figure 1B and 1C). In the northern part of the Tungnaárjökull forefield, at a distance of approximately 1.5 km from its snout and running parallel to this margin, is the Jökulgrindur volcanic ridge of maximum height about 940 m a.s.l. (above sea level), limiting the westward spreading of the glacier's snout. In the central and southern parts of the glacier's forefield, the volcanic ridges are oblique or perpendicular to its snout which has a significant influence on the local dynamics of ice masses and the distribution of meltwaters on the forefield, creating the diverse glacial, glacialfluvial and glacialacustrine landforms of Tungnaárjökull's marginal zone (Andrzejewski, 2002; Evans *et al.*, 2009).