

Geomorphic assessment of the urban setting of Húsavík, North Iceland, in the context of earthquake hazard

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Abstract — *The Húsavík-Flatey Fault Zone (HFFZ) is one of the largest system of transform faults in Iceland on which damaging earthquakes have repeatedly taken place. The town of Húsavík on the coast of the Tjörnes peninsula lies in an extensional basin formed due to a slight bend in the HFFZ. The fault movement and geological processes have over time created considerable spatial variations in both the topography and shallow subsurface materials on which the town resides. As a result, the earthquake hazard varies significantly within the town, and therefore the local seismic risk as well. In this study, we expand on previous research by mapping the geomorphology of the Húsavík area. Namely, the geomorphology identifies the secondary processes that can be activated during strong earthquake motions and cause additional damage or loss. Through field inspection and remote sensing we have examined the predominant surface geological types and actual and potential geomorphic phenomena and processes in the Húsavík area. The results are presented as a set of geological and geomorphological maps outlining the types and classes of geomorphological processes, along with the topography and slope inclinations of Húsavík. The geomorphological characteristics of the Húsavík area are shown to be largely dominated by mass gravitational motion such as landslides and rockfalls, primarily on the Húsavík mountain and along the Botnsvatn incline, but also along the coastline of Húsavík, especially along the steep slopes in the southernmost part of town. We have also identified areas with possible liquefaction potential within the town where fully water saturated Holocene sediments are located, prompting reevaluation of the local earthquake hazard, seismic risk, and urban planning.*

Keywords; Húsavík-Flatey-Fault; tectonic geomorphology; Tjörnes-Fracture-Zone; earthquake hazard; soil liquefaction; gravitational mass movement

INTRODUCTION

The complex seismotectonics of Iceland are a direct result of the interactions of the Icelandic hot spot and the Mid Atlantic Ridge (MAR; Einarsson, 2008; Wolfe *et al.*, 1997). Sequences of strong earthquakes have repeatedly caused damage in the country, pri-

marily in two transform fault zones: the South Iceland Seismic Zone (SISZ) in the south and the Tjörnes Fracture Zone (TFZ) in the north. The Húsavík-Flatey Fault Zone (HFFZ, Figure 1) is the main system of transform faults in the TFZ (Einarsson, 2008, 1991; Garcia *et al.*, 2002; Geirsson *et al.*, 2006). The town of Húsavík, this study's central area of interest, is sit-