

Landslide inventory around Torfajökull volcano, South Iceland, 1958 – 2022

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A comprehensive GIS-based slope processes inventory was conducted along the caldera rim of the central volcano Torfajökull using aerial photographs ranging from 1958 to 2022. This volcanic complex, situated at an elevation of 1200 m above sea level, is the largest silicic formation in Iceland, spanning an approximate area of 450 km². Given the absence of prior landslides investigations in this Icelandic region, this study has crucial significance. The context of changing climate conditions and the resultant extreme weather patterns in Iceland have been increasingly instigating slope failures. Addressing this concern, the study documents landslides events around Torfajökull, a region of ecological significance and a tourist destination featuring the Laugavegur hiking route and other visitor facilities. This study examines the distinct slope processes categories as delineated by Varnes (1978), and later by Hungr et al. (2014), alongside the exploration of Torfajökull's geological and seismic dynamics. The thesis presents an exhaustive analysis of sixteen slope deformations within the caldera vicinity where the diverse failure types, their triggering mechanisms, and intriguing patterns are presented within the context of geological dynamics. The observed slope processes encompass nine slow-moving slides, three retrogressive slides, five rock avalanches, one rockslide, five rotational slides, four block slides, and three slump patterns. The analysis suggests that two events were triggered in 1958, one in 1973, seven in 1979, three in 1999, two in 2013 and one in 2020. The failures progressed over time from 7 to 62 years, but none seem to be ongoing since 2020. This inventory aims to discover pattern in the development of landslides which could help for future studies around similar volcanic regions.