Deformation bands in subglacially erupted hyalotuffs at Valahnúkar, Iceland

The purpose of this study was to evaluate the relative roles of edifice collapse, regional tectonism, and ice flow in the generation of deformation bands in subglacial hyalotuffs at Valahnúkar, Iceland. The study was conducted by analyzing the characteristics of rocks with deformation bands, thin section characteristics of the resistant deformation bands, and the characteristics and origin of the surface-parallel resistant layers.

Characteristics of rocks with deformation bands

- Porosity Reduction
  - Grain size decrease
  - Grain shape change

Study Area

The study area is located near the town of Valahnúkar, Iceland. The area is characterized by subglacial hyalotuffs that exhibit well-developed deformation bands.

Outcrop characteristics of the deformation bands

- Deformation bands are well-developed and widespread in the hyalotuffs at Valahnúkar.
- The bands are formed by cataclasis and granular flow.
- In thin section, the bands consist of compacted and sorted material that exhibits polishing and fracturing of grains.

Origin and timing of deformation bands at Valahnúkar

- Deformation bands are evidence of past deformation events that occurred in the area.
- The bands suggest that deformation took place during the Holocene, a period of significant geological activity.

Tectonic and nontectonic deformation bands at Reykjanes

- Tectonic deformation bands are also present in the area, indicating the importance of tectonic processes in the area.
- The bands are formed by faulting and fault-related processes.

Characteristics and origin of the surface-parallel resistant layers

- Outcrop characteristics
  - Layer geometry & occurrence
  - Lineations
    - Prominent weak lineations are observed in the resistant layers.
    - The lineations are parallel to the local topography.

- Origin of the surface-parallel resistant layers
  - The resistant layers are formed by selective palagonitization and brittle faulting.
  - The layers are resistant to erosion and are prominent in the outcrop.

The study provides insights into the role of deformation bands in the geological history of Valahnúkar and contributes to our understanding of the processes that govern the formation of deformation bands in subglacial environments.