

The fissure swarms of the Northern Volcanic Rift Zone, Iceland



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3. Conclusions



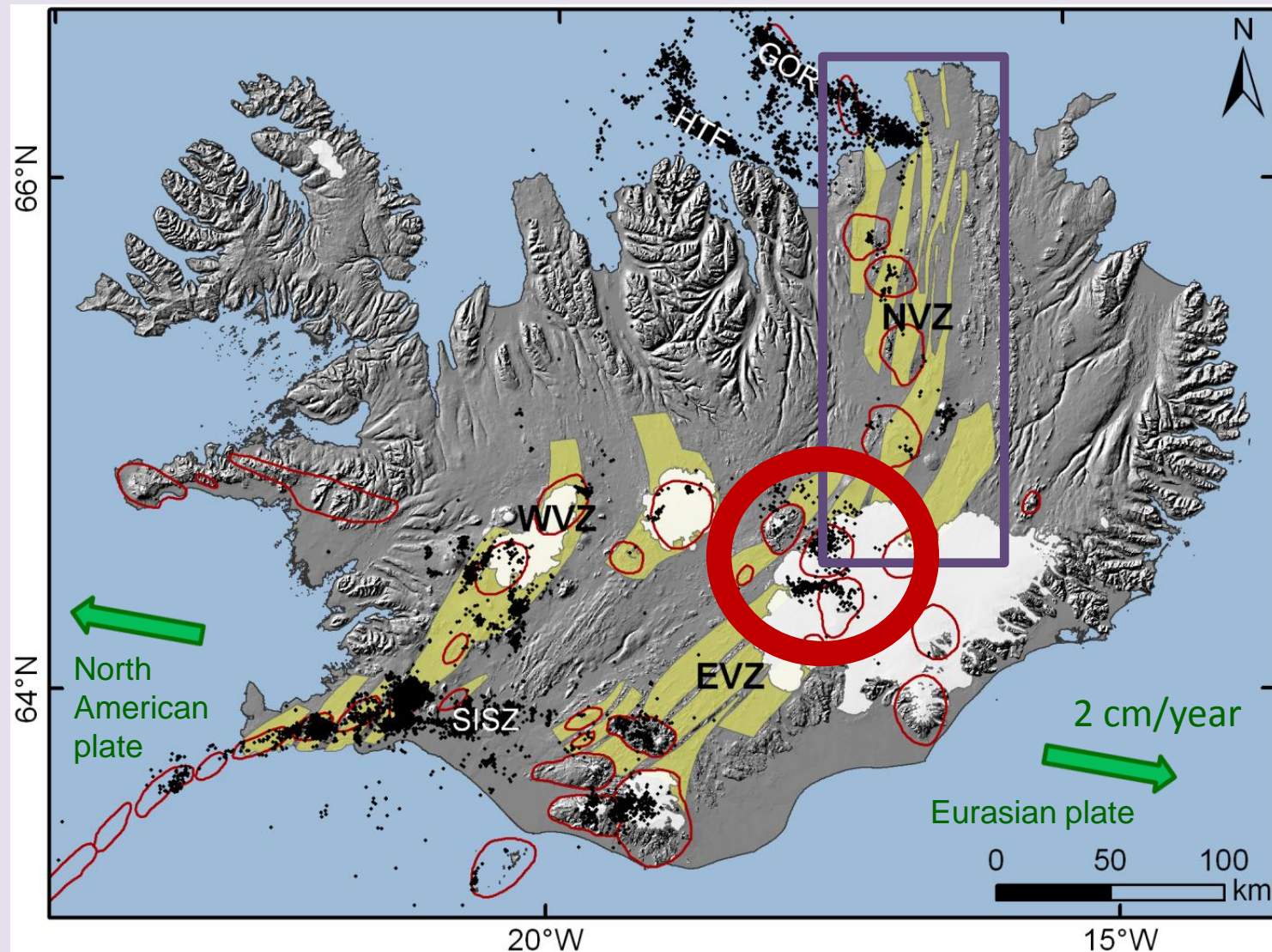
1a. Methods



- Fractures and eruptive fissures were mapped from aerial photographs using a GIS software (ArcMap).
- For an overview, satellite images were in some cases also used.
- Field trips were made to areas where uncertain lineaments were found to try to investigate whether or not they are fractures.



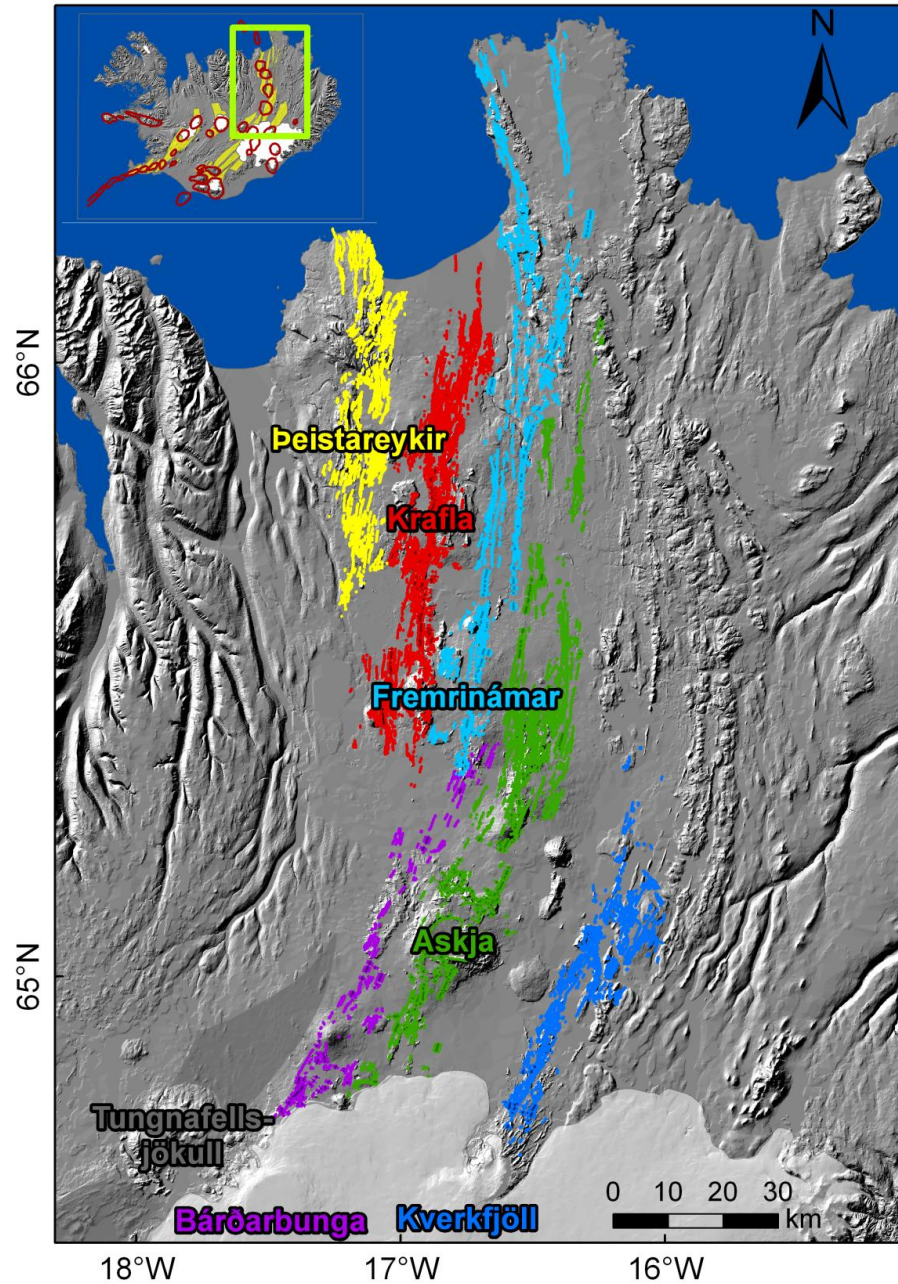
1b. The study area



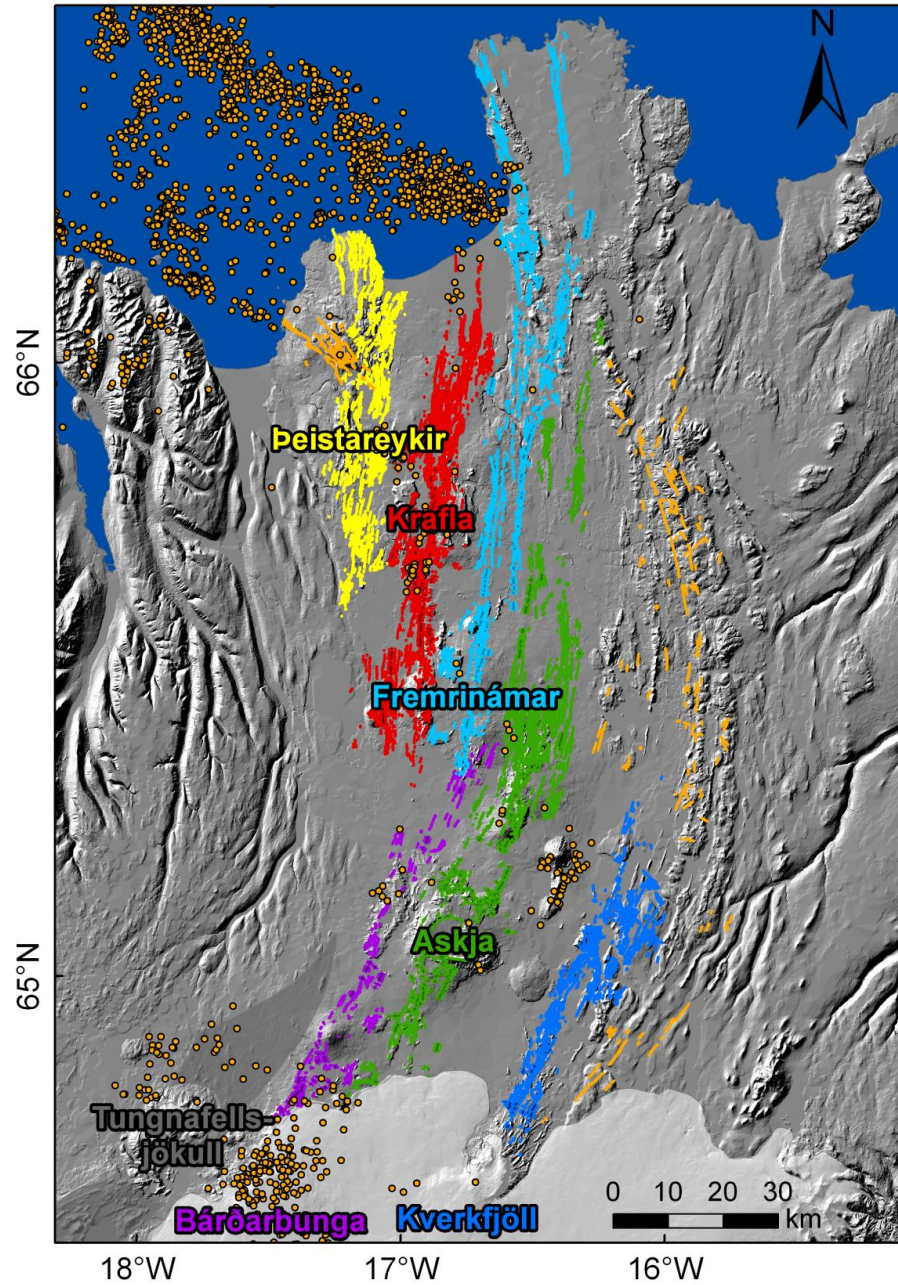
Background: National Land Survey of Iceland
Earthquake data: Icelandic Meteorological Office
Fissure swarms and central volcanoes: Einarsson and Sæmundsson, 1987

2a. Structural architecture

- Part of the Þeistareykir fissure swarm was mapped by Magnúsdóttir and Brandsdóttir (2011).



2a. Structural architecture (cont.)

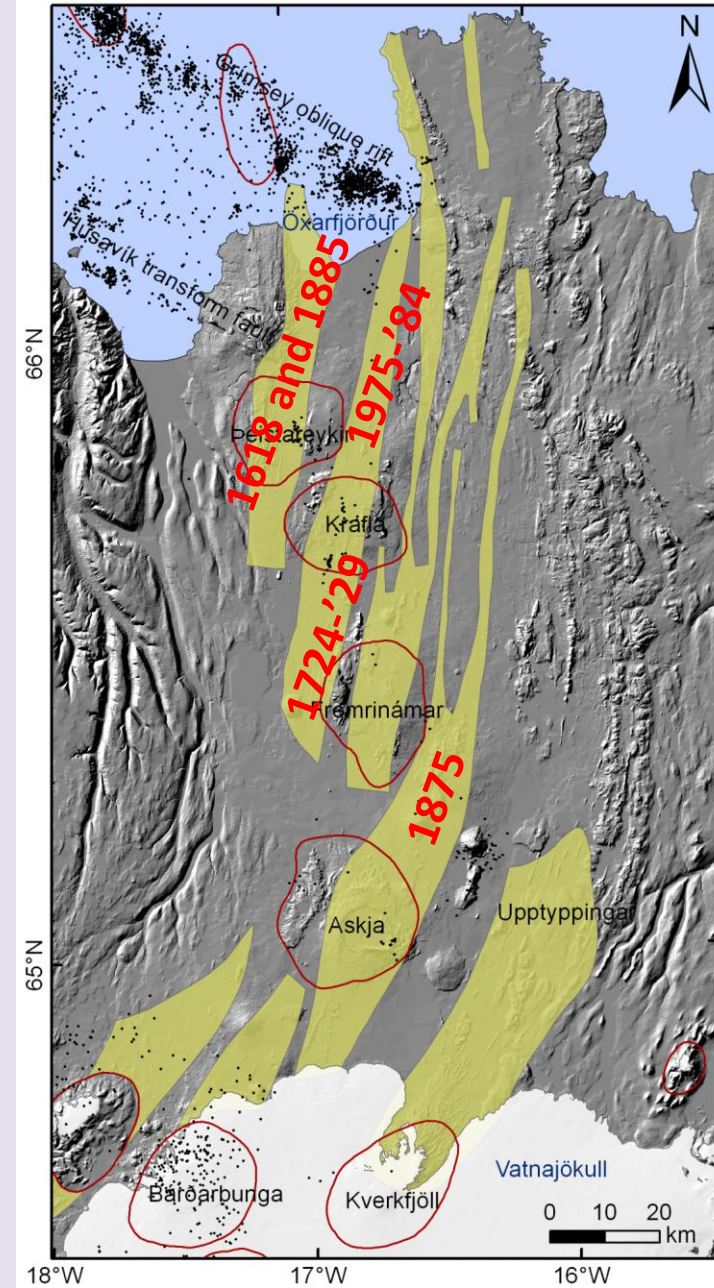


2b. Known historical rifting episodes in the NVZ

Krafla rifting episode 1975-1984. Photo: Halldór Ólafsson

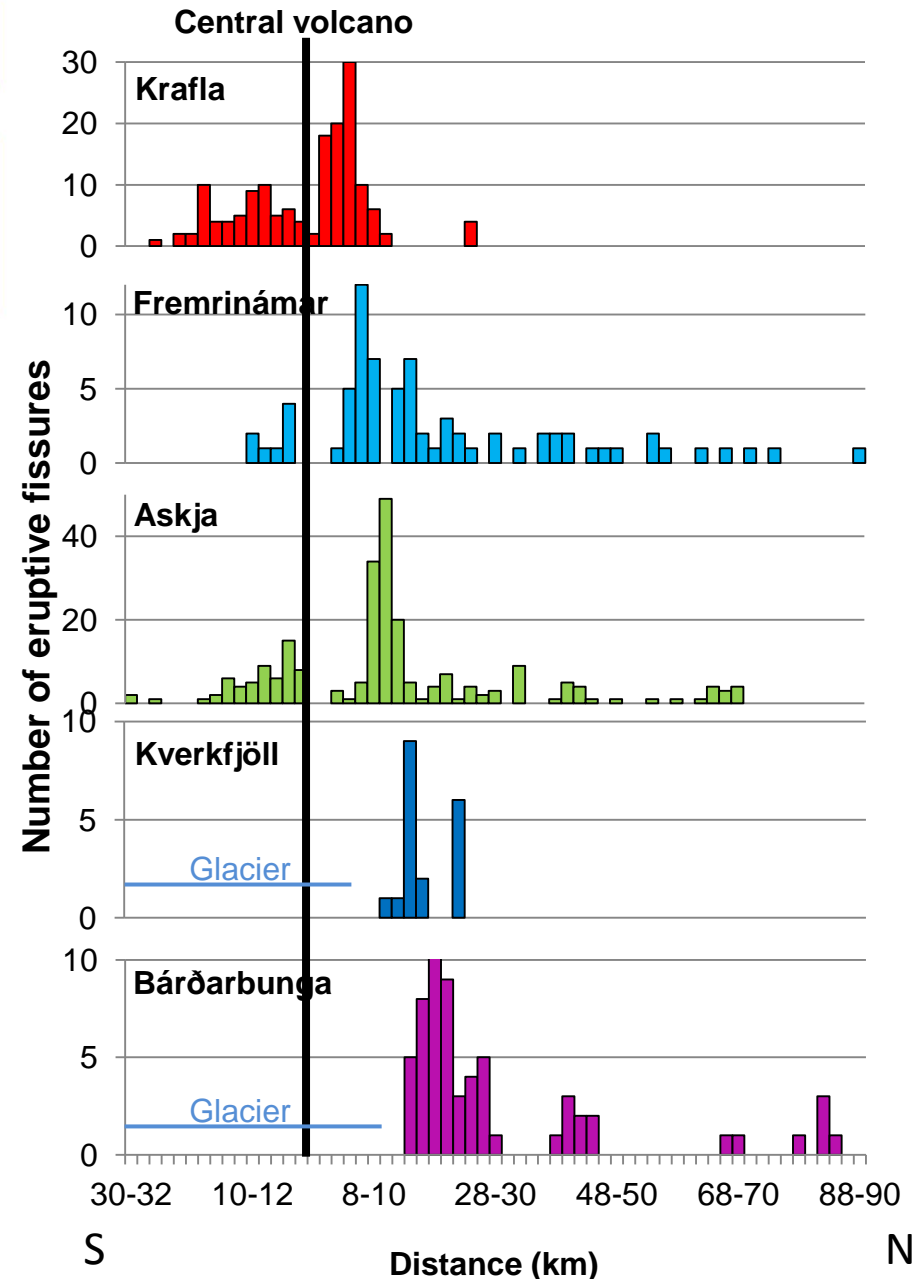
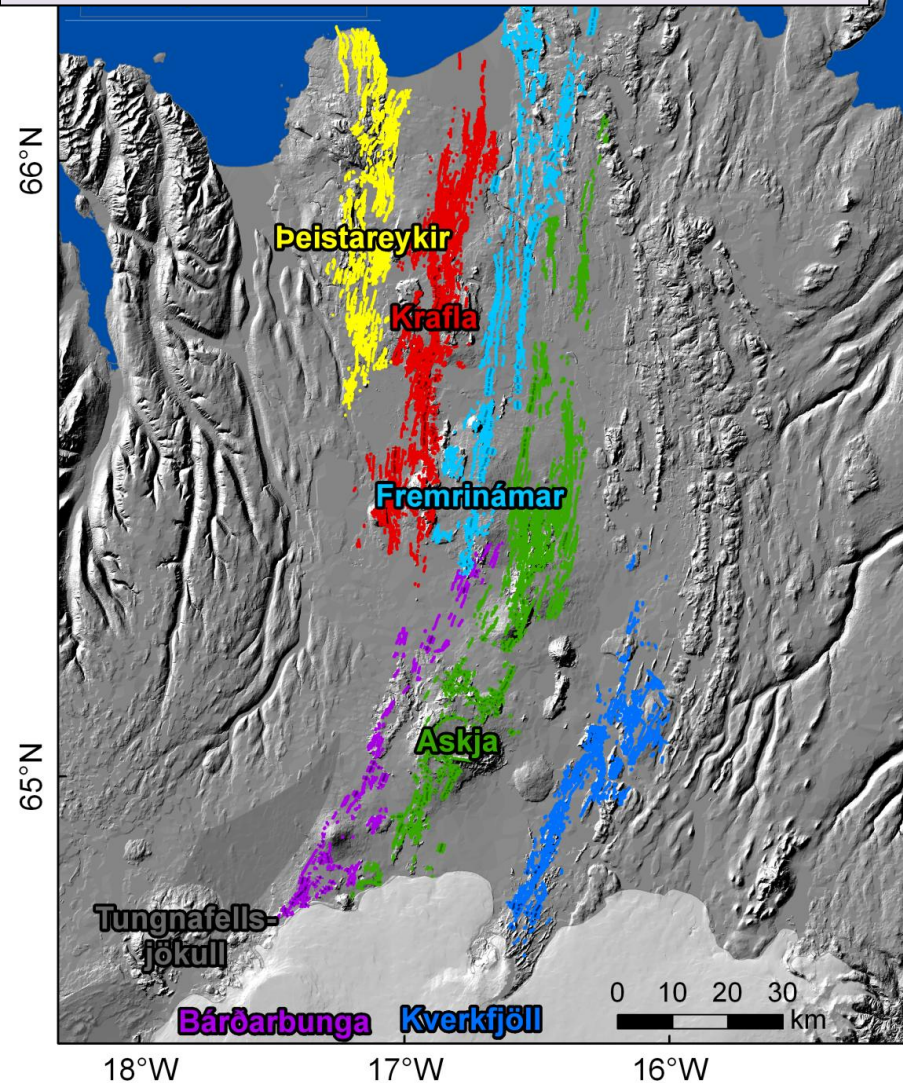


- Historical time in Iceland: the last ~1200 years.
- Central Iceland has always been uninhabited. Therefore, many eruptions may not have been detected.



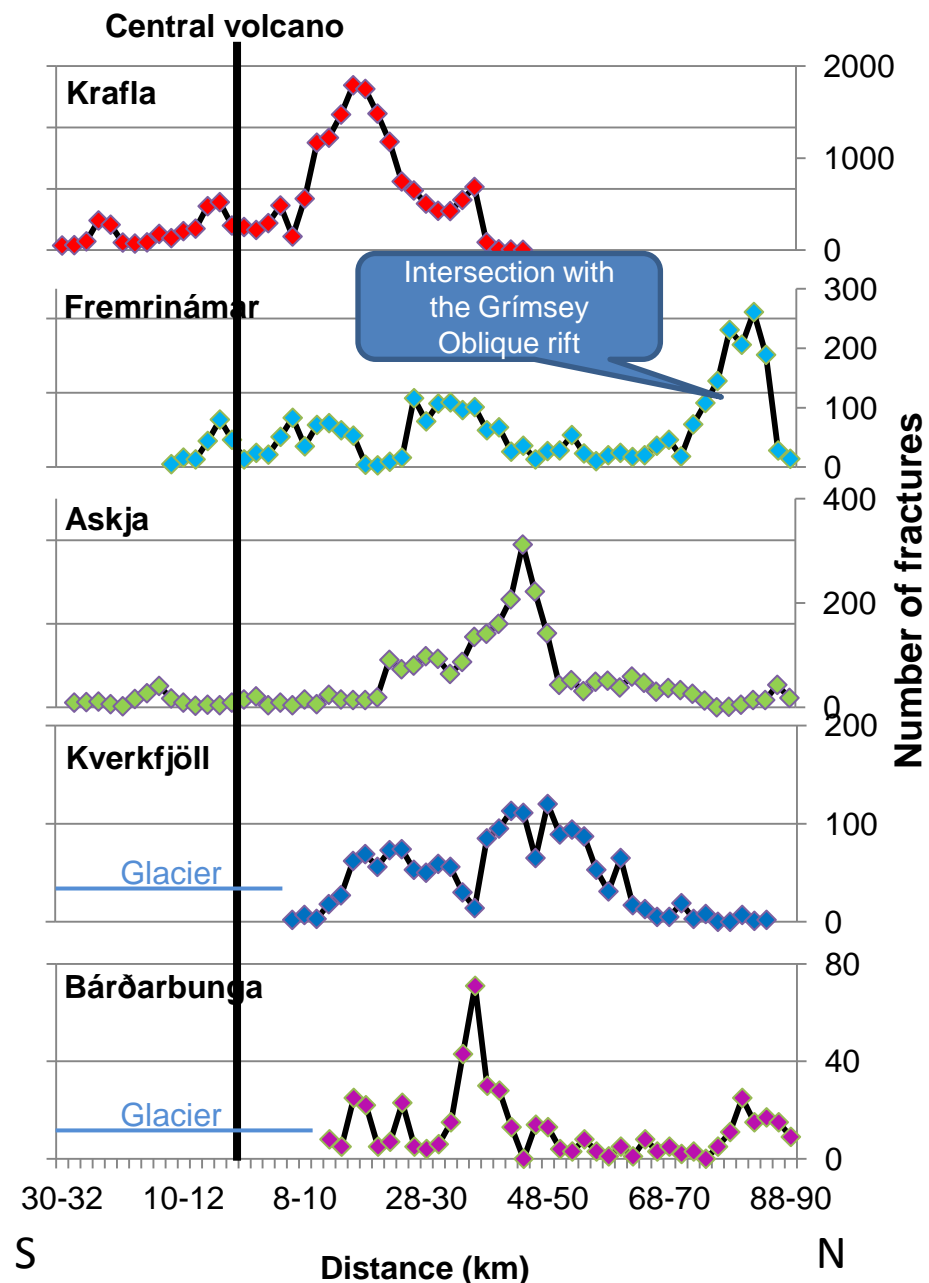
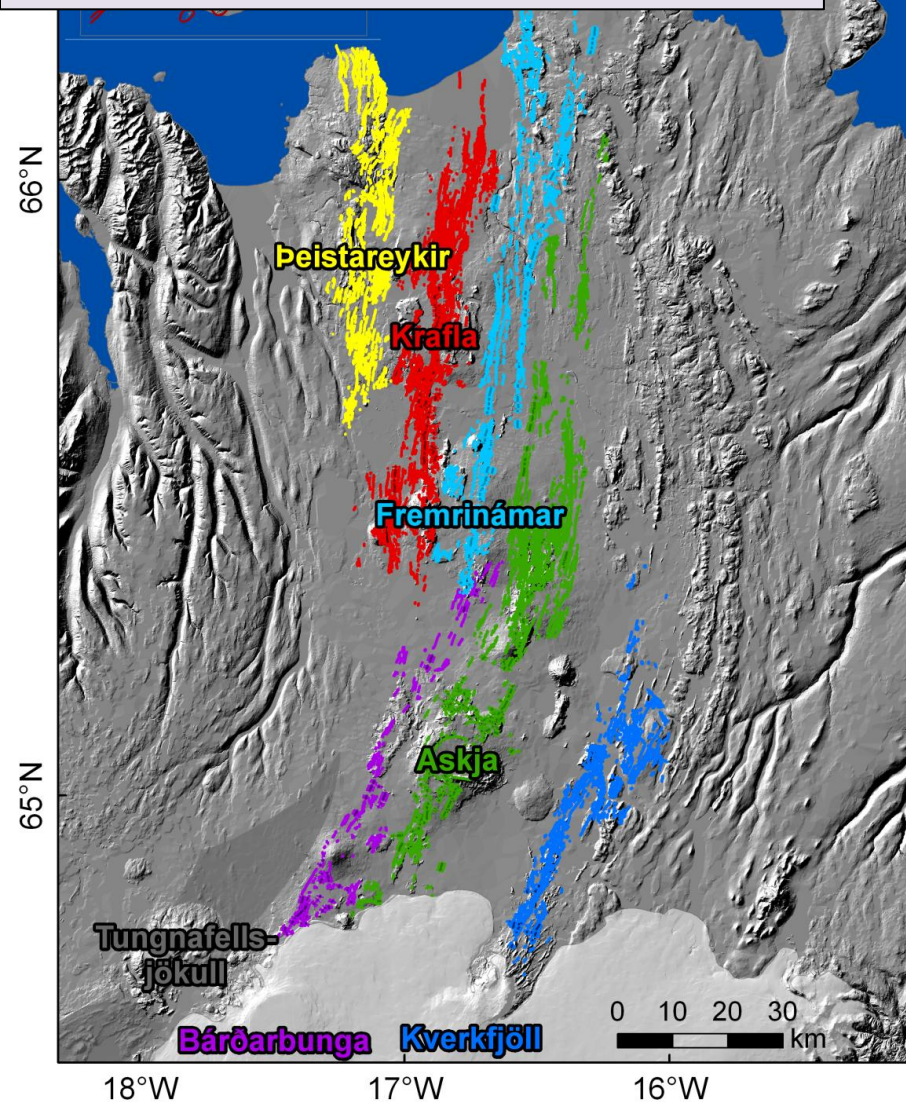
2c. Number of eruptive fissures with distance from central volcanoes

Eruptive fissures within the fissure swarms most common within 20-30 km distance from the central volcanoes.

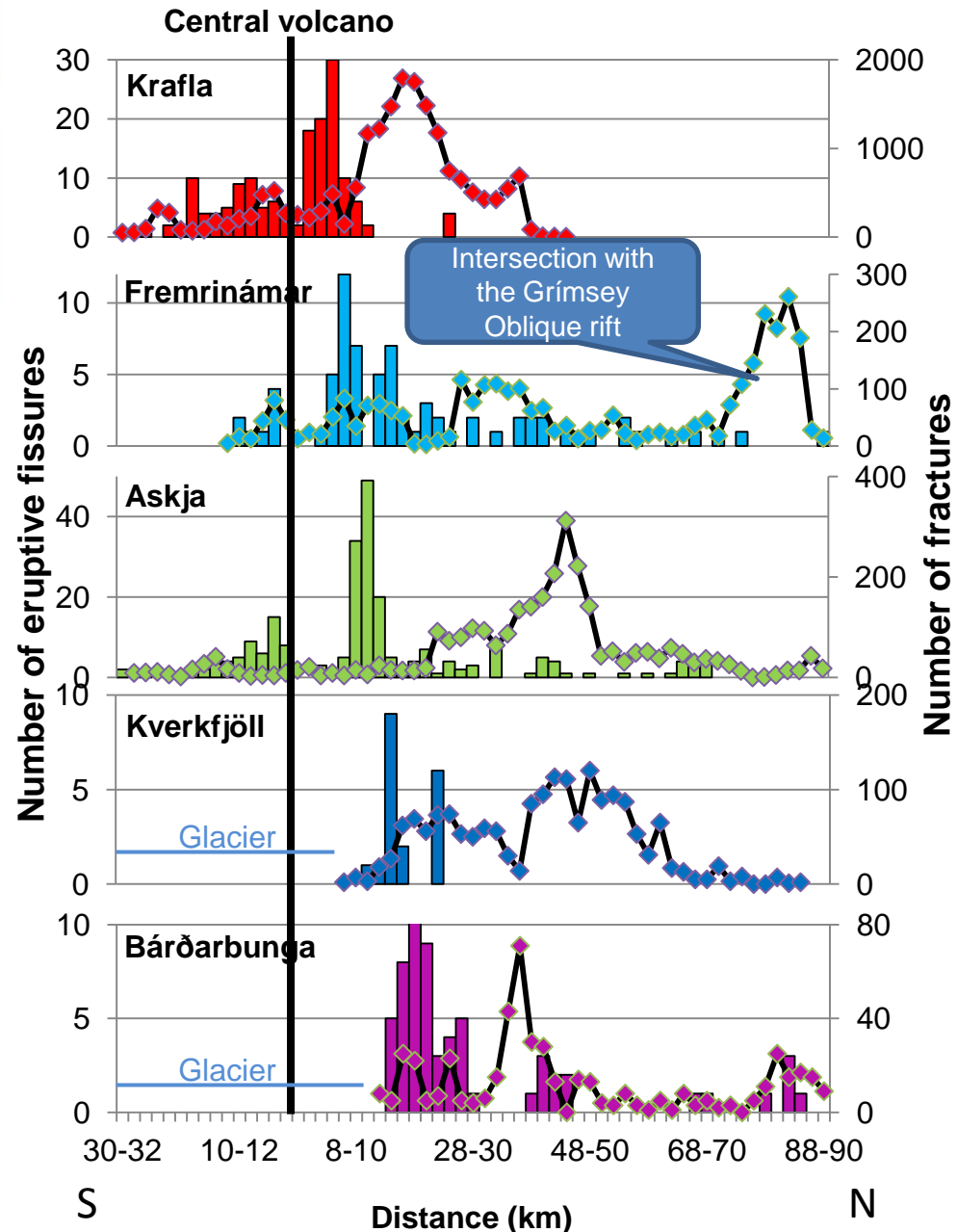
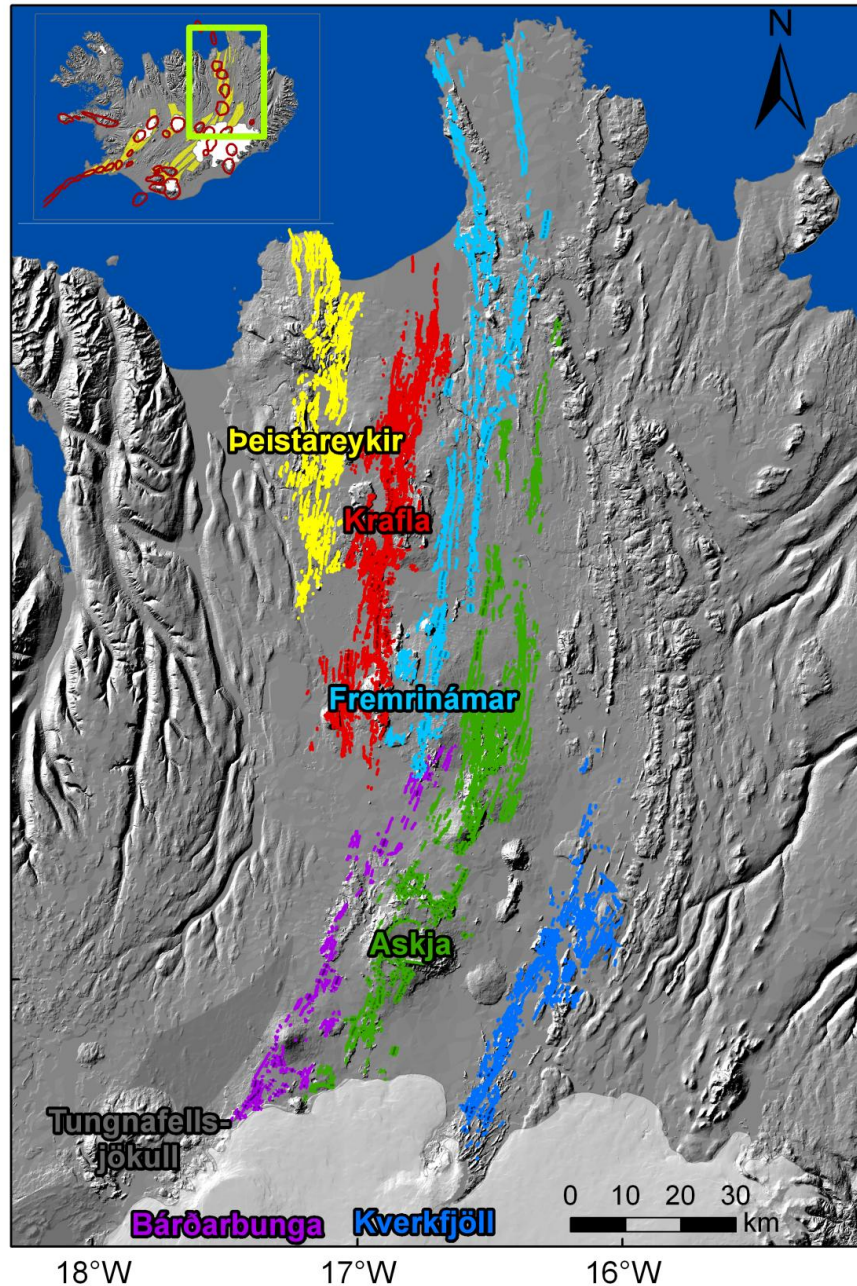


2c. Number of eruptive fissures with distance from central volcanoes

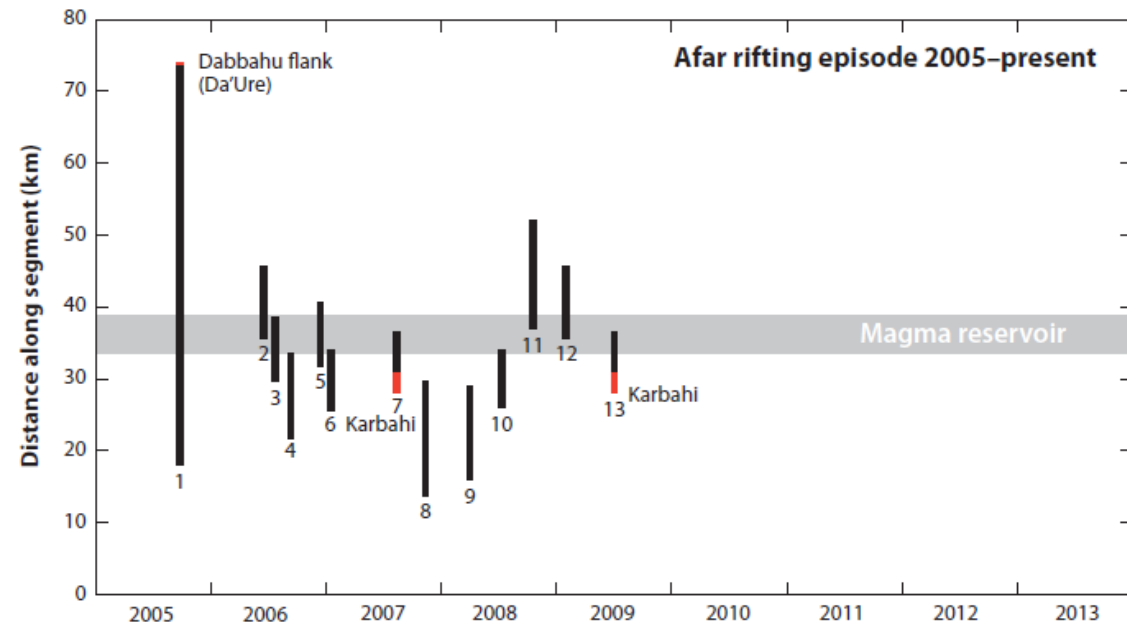
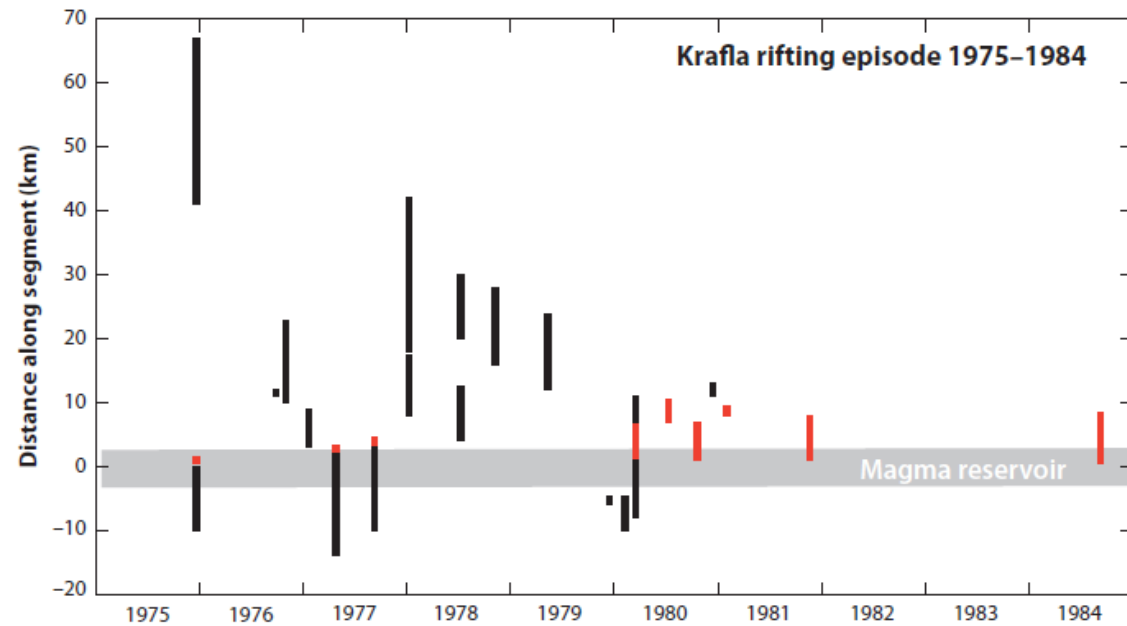
Fractures within the fissure swarms common at up to a distance of 70-90 km from the central volcanoes.



2c. Number of eruptive fissures with distance from central volcanoes

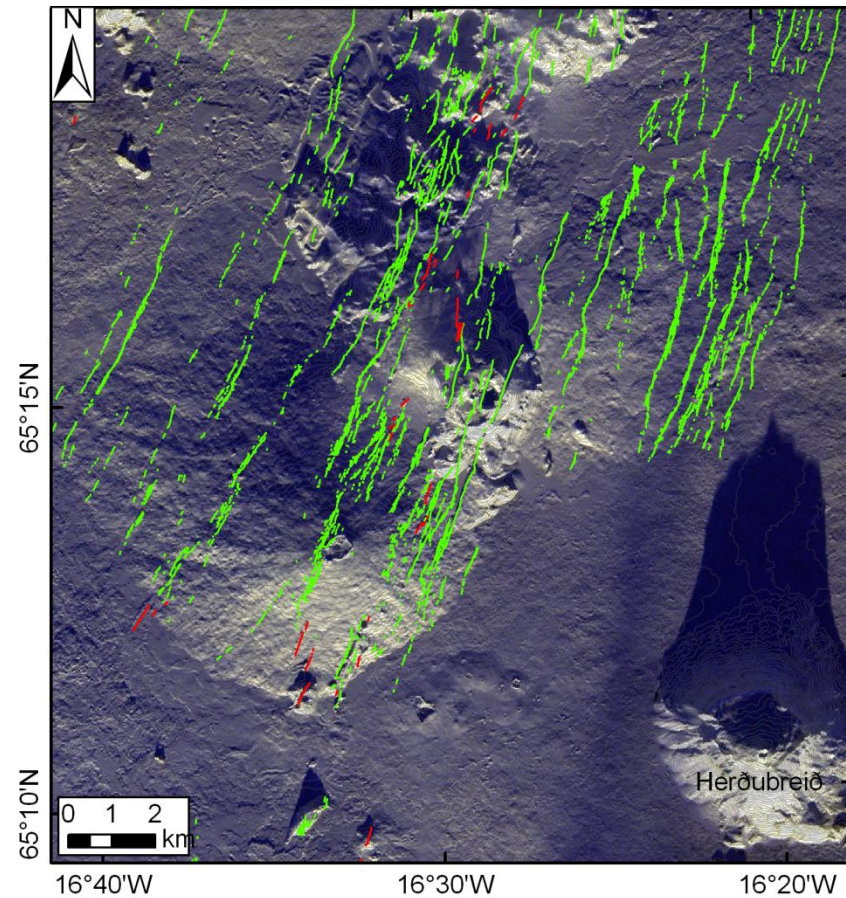
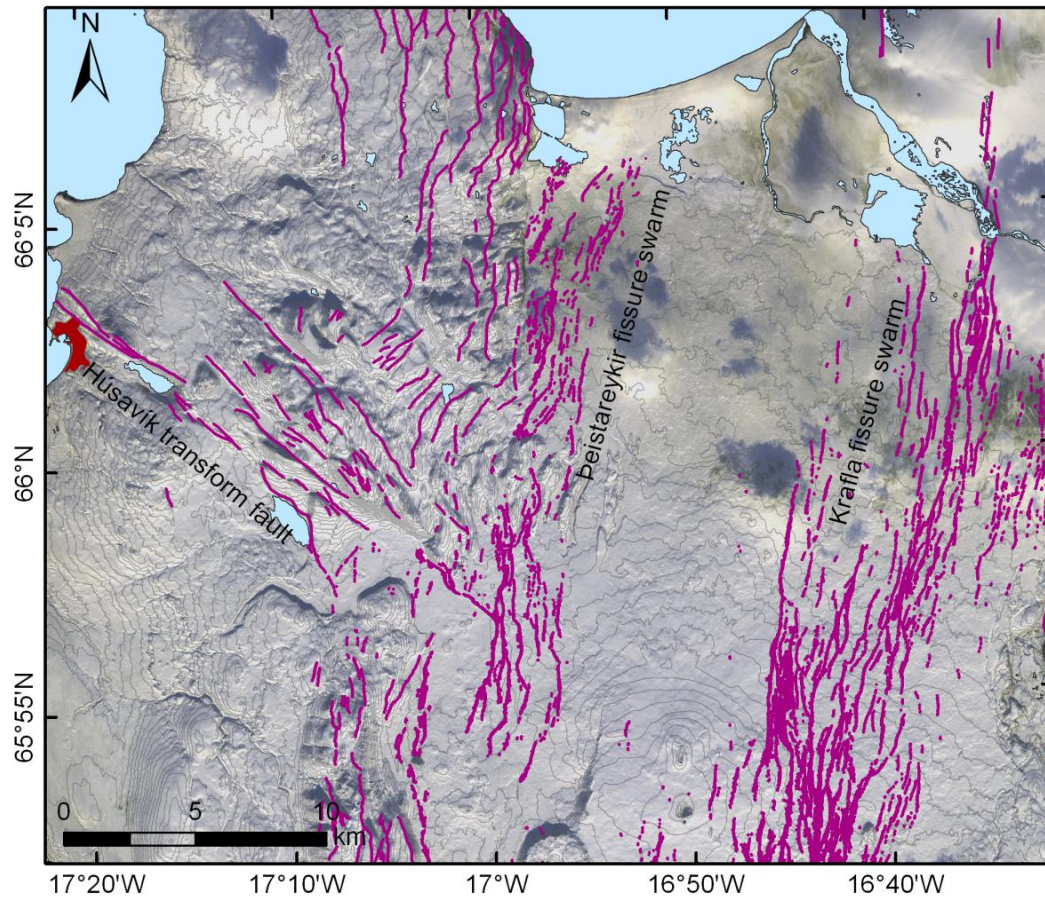


2c. Number of eruptive fissures with distance from central volcanoes



- Figure from Ebinger et al., 2010, based on Einarsson, 1991 and Hamling et al., 2009.

2d. Rift-transform intersection – NVZ / Húsavík transform fault



ASTER data courtesy of NASA/GSFC/METI/ERSDAC/JAROS, and U.S./Japan ASTER Science Team

- Fractures within the fissure swarms are generally subparallel to each other.
- Irregular fracture pattern found where the Húsavík transform fault meets the fissure swarms.
- Indicates interaction between the fissure swarms and the strike-slip faults.

3. Conclusions



- Fractures and eruptive fissures within the NVZ, Iceland cluster into fissure swarms, extending from the 5-6 central volcanoes.
- Several rifting episodes have taken place within the NVZ during the last ~400 years, each affecting distinct part of the NVZ.
- In the fissure swarms, eruptive fissures are most common within ~20-30 km distance from the central volcanoes, while fractures are common at distances up to 70-90 km.
- Fractures within fissure swarms are generally subparallel to each other. However, fractures within the fissure swarms are in direct continuation of the Húsavík transform fault show a more irregular pattern.

4. References

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Thank you!



Lava from the Krafla rifting episode (1980's)