

Culture and Calamity: An Integrated Perspective on Historical Eruptions of Hekla, Iceland

Emily Yoder | GEOL 598: Living with Volcanoes | Fall 2022

Background

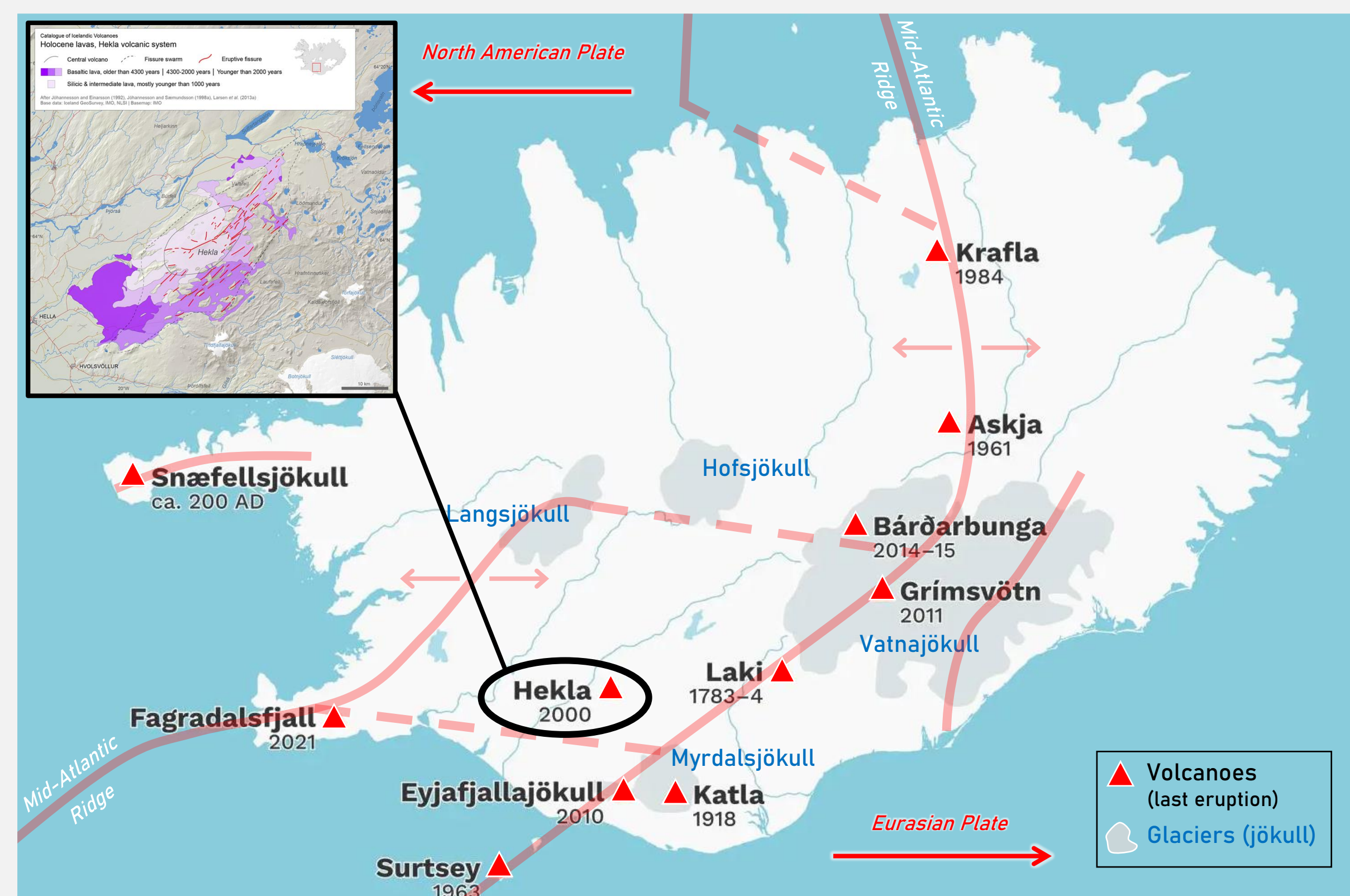


Fig. 1 - Hekla is located in SW Iceland (black circle). Volcanism across Iceland is due to rifting along the Mid-Atlantic Ridge and a hot spot. Inset map: extent of lava flows from Hekla^[8, 12, 15]

Eruptive History^[12]

- Volcanism began over 120,000 years ago
- Explosive eruptions (with tephra), effusive basaltic flows, and fissure type eruptions
- 1970-2000 (most recent eruption): eruptions every 10 years (3rd most active in Iceland)

Hazards^[12]

- Lava flows (Fig. 1 inset map)
- Tephra fall (Fig. 2)
- Gas emissions
- Pyroclastic flows
- Jökulhaups (outburst floods)

Nearby Populations^[3, 11]

- Past: Farmers used the rich volcanic soil
- Present: Tourist sites (campgrounds, trails)

Monitoring & Eruption Precursors^[9, 12]

- Monitored by the Icelandic Met Office
- Earthquakes up to 90 min pre-eruption
- Long-term inflation (bulging of volcano) may signal eruption

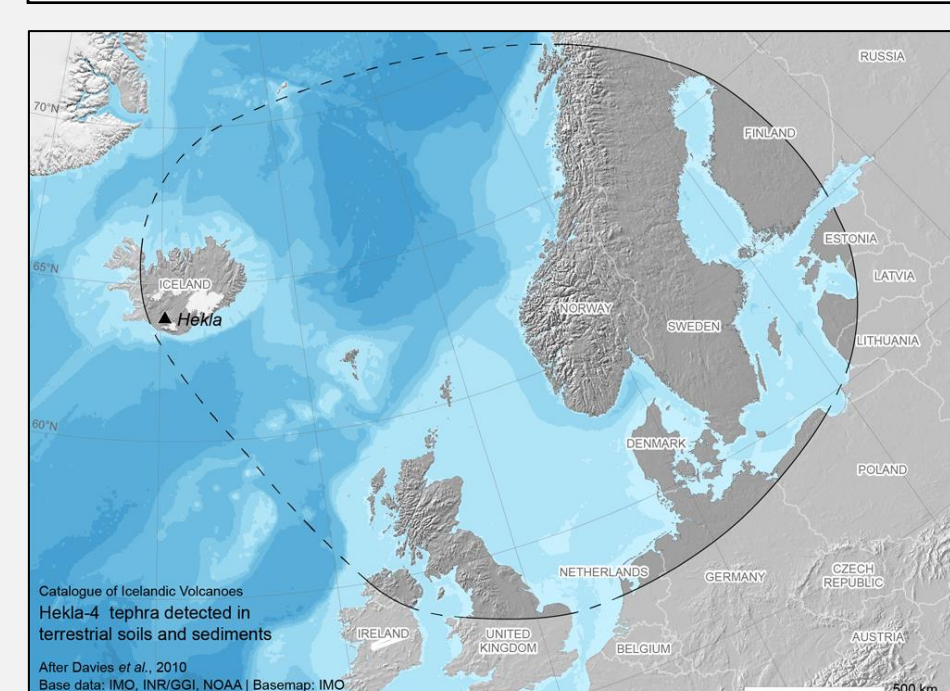
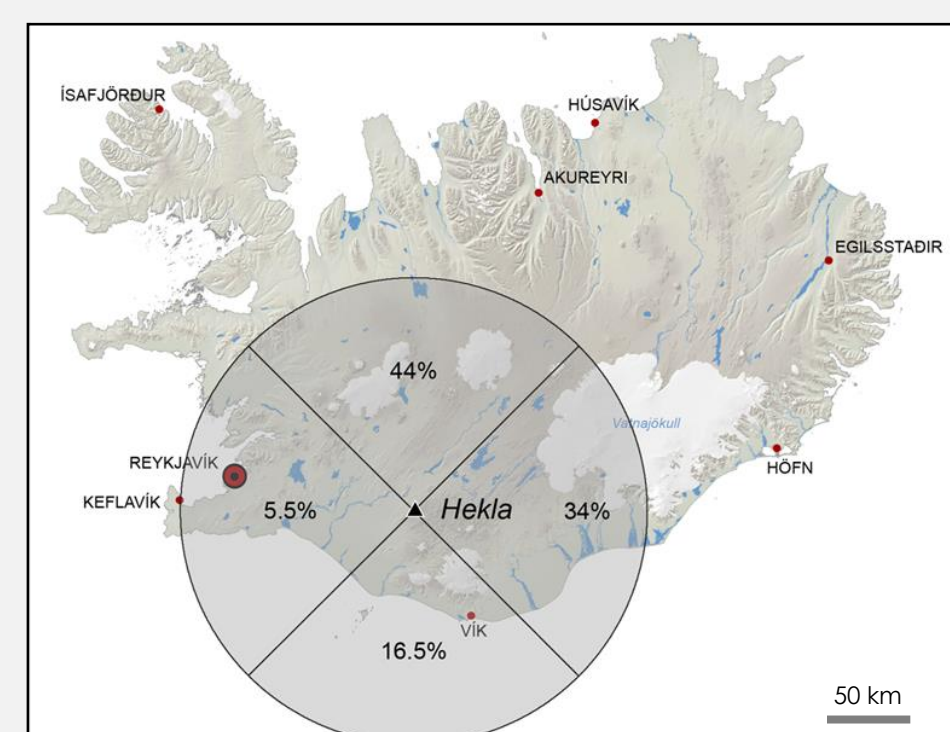


Fig. 2 - (top) probability of tephra fall; (bottom) extent of tephra fall from Hekla's eruption in 2310 BC^[9]

Culture

Discovery and First People of Iceland^[17, 20]

*Note: there are no indigenous groups of Iceland

- 330 BC (uncertain) – identified as Thule in Greek and Roman literature
- 750 to 800 AD - Irish monks likely discovered and were first to live in Iceland
- 874 AD - First Norse settlers in Iceland
- Landnámabók (Book of Settlements) – five-part manuscript with stories of Norse discovery and settlement of Iceland in the 9th and 10th centuries

Norse Mythology & Christianity^[7, 17]

- Norse mythology and gods date back to Scandinavian oral tradition
- Some believed the rugged land was an ancient battlefield of the gods
- Conversion to Christianity ~ 1000 AD related to volcanic activity

Hekla: Gateway to Hell^[6, 10, 19]

- Hekla is a feminine name (she/her)
- Hekla means cloak or coat, likely referring to mist hovering around the mountain and/or the snow covering her
- Longtime association with the underworld
- Projectiles believed to be spirits screaming out (as they hiss in the air)
- Witches believed to meet at summit
- First people didn't climb Hekla until 1750 due to fear of what they would find



Fig. 3 - Snow-covered Hekla^[9]

Hekla in Historical Records

"In this island there is likewise a mountain, whose floods of incessant fire make it look like a glowing rock, and which, by belching out flames, keeps its crest in an everlasting blaze. This thing awakens our wonder as much as those aforesaid; namely, when a land lying close to the extreme of cold can have such an abundance of matter to keep up the heat, as to furnish eternal fires with unseen fuel, and supply an endless provocative to feed the burning"
 ~ As recorded by Saxo Grammaticus (Danish historian) in the *Gesta Danorum* (Deed of the Danes; written in the late 12th – early 13th century), a partly mythical history of the Danes^[5]

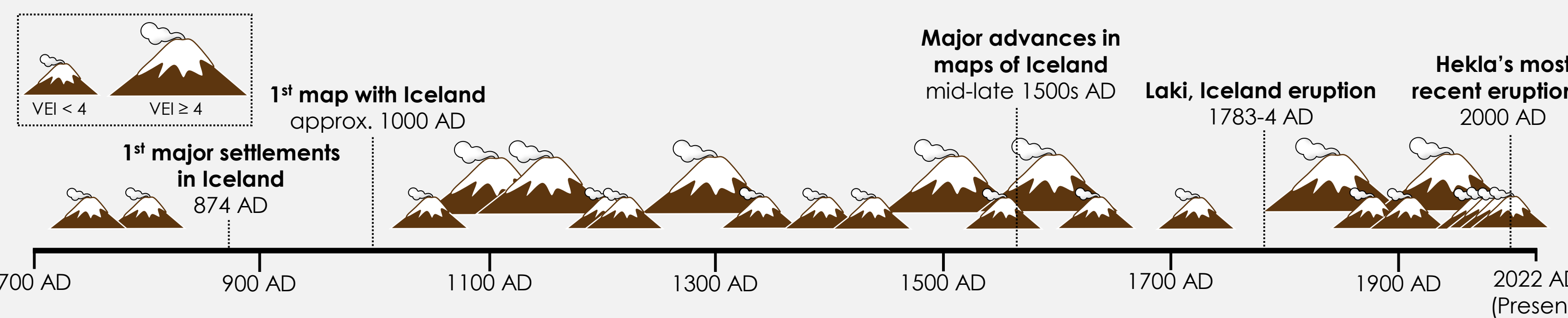


Fig. 4 - Painting of Hekla by Jan Luyken (Dutch)^[13]

"The twenty second bishop was Gottsvin ... in his days fire came up for the 8th time in Hekla – some say for the 7th time – and in that fire 18 farms were destroyed in one morning"
 ~ As recorded in the *Biskupa Annálar* on Hekla's eruption in 1436^[5]



Fig. 5 - Painting of Hekla by Børge Ruud (Danish; painted ~1947)^[11]



Cartography through Time: Art and Science?

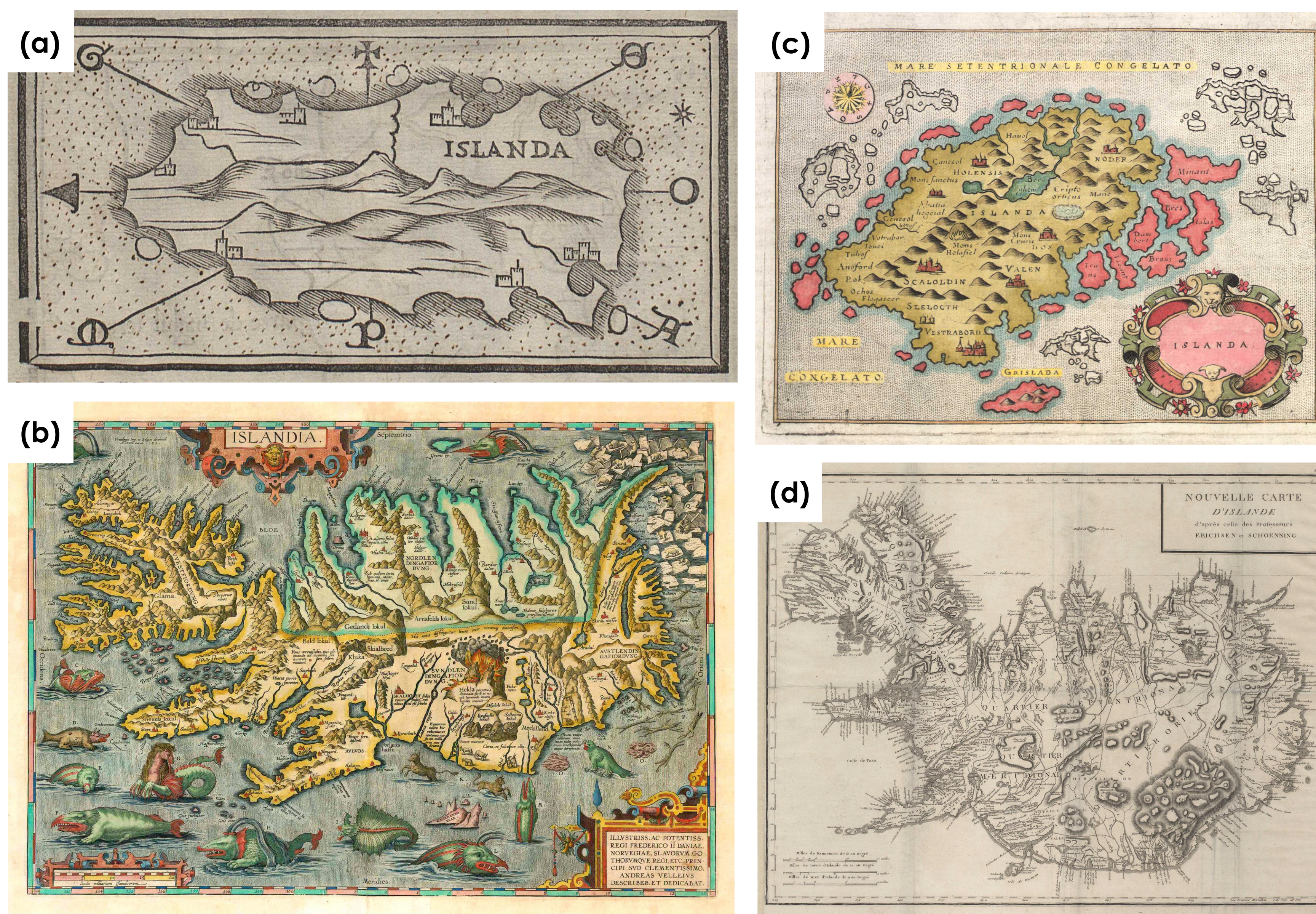


Fig. 6 - (a) 1528 map by Benedetto Bordone (Italian); note simple design (b) 1587 map by Guðbrandur Thorláksson (Icelandic) and published by Abraham Ortelius (Flemish), who is credited with creation of the first atlas; note mythical creatures and Hekla shown prominently as if erupting, labeled "Hekla perpetuis damnata estib. et ni uib. horrendo boatu lapides evomit," meaning "Hekla, condemned to perpetual fire and ice, belches forth boulders amid horrendous (dreadful) bellowing" (c) 1713 map by Raffaello Savonarola (Italian); note simple design and less emphasis on Hekla, but still drawn as if erupting (d) 1802 map by Eggert Ólafsson and Bjarni Pálsson (Icelandic); note significant detail but emphasis is on glaciers (drawn with higher relief)^[14, 18]

Intersection of Science & Storytelling

Are eye-witness accounts reliable?

Observation of Volcanic Activity During the A.D. 1610 Voyage of the Discovery^[2]

- Interpretation of written records from sailors of the Discovery
- Include observations from ship of volcanic activity, but is it Hekla?
- No scientific evidence for 1610 Hekla eruption, but there is evidence for: Katla (1612), Eyjafjallajökull (1613), or Grimsvötn (~1608 tephra)

"But in our course, we saw that famous Hill, Mount Hecla, which cast out much fire, a signe of foule weather to come in short time"
 ~ Abacuk Pricket, sailor

"How can we interpret this observation, filled as it is with a 17th century seafarer's fears, superstitions, and the search for phenomena believed to portend future weather, yet seemingly straightforward?"
 ~ Friedman & Larsen (study authors)

Can historical accounts provide quantitative data?

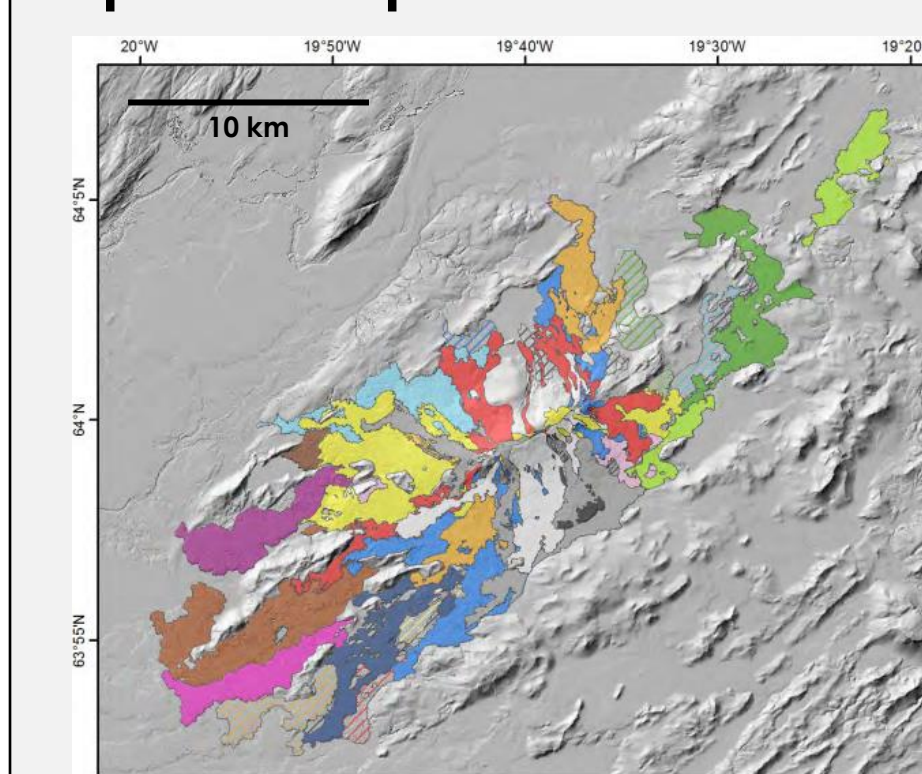


Fig. 7 - Lava flows from Hekla mapped based on historical descriptions of lava extent, in addition to modern mapping^[16]

What can science add to historical accounts?

The Peopling of Iceland^[14]



Fig. 8 - Tephra deposit from Hekla at a dig site; studies of colonization traditionally use written accounts; this study uses tephrochronology and archaeological artifacts

How do stories inform future precautions?

- Eruption precursors
- Eruption style
- Types of hazards
- Mitigation & recovery

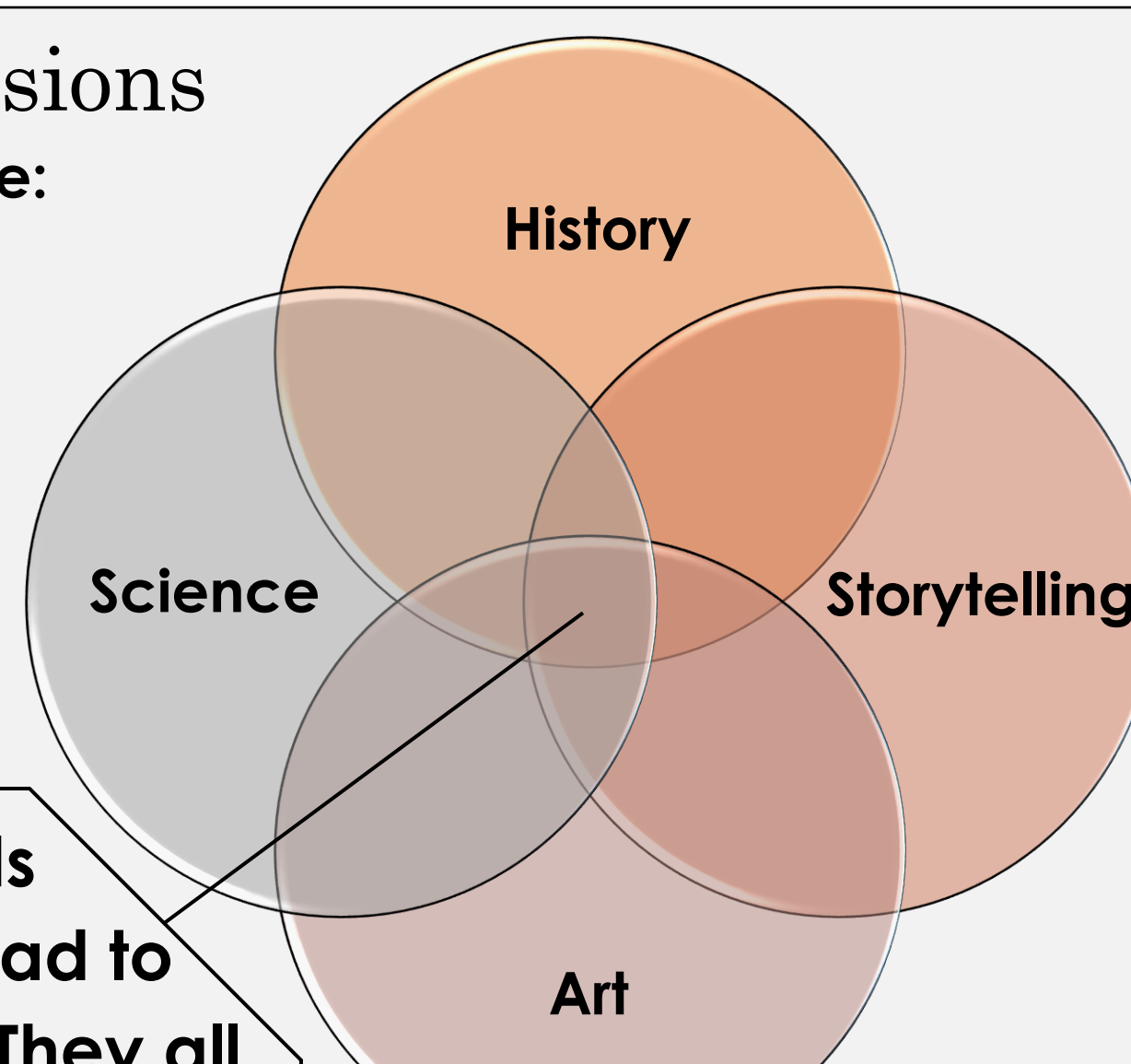


Fig. 9 - Sketch of Hekla's 1845 eruption^[4]

Conclusions

Each tool provides a different perspective:

- Science – systematic method of observation and interpretation
- Art – visual depiction of events
- Storytelling – personal experiences
- History – places events in context, often told from a bigger-picture view



Overall, science and other records tend to support each other and lead to new questions when they do not. They all provide different observations that help us study volcanoes like Hekla. Interpretations should account for all observations.

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Fig. 10 - Hekla's eruptive history^[4]

