



How science supports risk scenarios: Nordic volcanic eruption scenario

Sigrún Karlsdóttir, dir. of natural hazards, Icelandic Meteorological Office

Björn Oddsson, geophysicist, Department of Civil Protection and Emergency Management, National Commissioner of the Icelandic Police

Overview



- Risk assessment in Iceland
- Use of science for scenario building and decision making
- Joint Nordic Workshop on volcanic eruption in Iceland



Photo: Halldór Kjartansson



photo: Þ.M. Pétursson

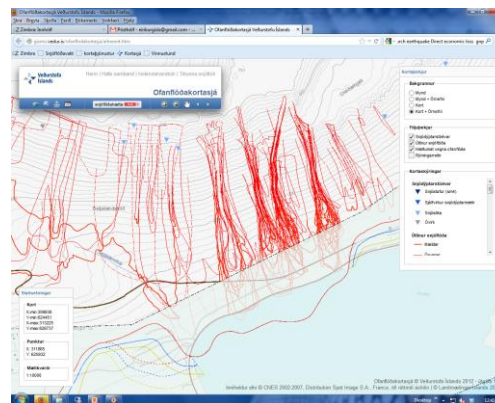


photo: Eiríkur Gíslason

Risk assessments for natural hazards in Iceland



IMO is by law mandatory to monitor and issue forecast and warnings about natural hazards.

Warnings are issued to the Civil Protection which activates appropriate Contingency plans

IMO performs risk assessment for natural hazards on request by the Icelandic government.

- ▶ Risk assessment have been conducted for
 - ▲ avalanche – started 1995
 - ▲ volcanoes in Iceland – started 2012
 - ▲ floods – started 2015
 - ▲ storm surge – started 2015
- ▶ Acceptable Risk → Mitigation actions, e.g. planning



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Collaboration, Contingency plans and Exercises



IMO has strong collaboration with the Civil Protection

- ▶ Daily meetings → the status of the nature

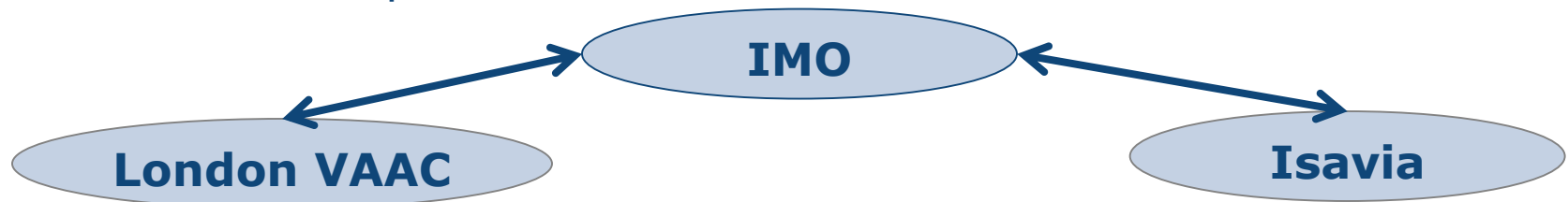
IMO has strong international collaboration

- ▶ UKMO, BGS, Nordic Met-Hydrological Services, USGS, ERCC, ...

IMO has **internal** contingency plans for all types of natural hazard

Exercises important

- ▶ The VOLCICE and VOLCEX exercises are used to test the contingency plans of IMO and communication within the institute and between operational institutes

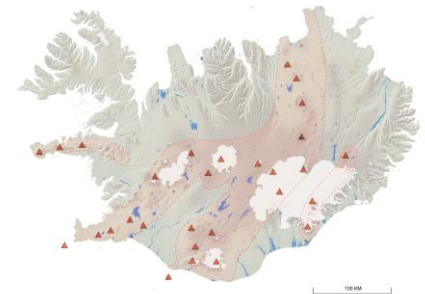


Joint work on risk assessment for volcanoes in Iceland



Tasks

- ▶ An appraisal of the current knowledge of the eruptive activity and potential hazards → Catalogue of Icelandic volcanoes
 - ▲ Event Trees
- ▶ Initial risk assessment of floods triggered by volcanic eruptions
- ▶ Initial risk assessment of explosive eruptions in Iceland
- ▶ Initial risk assessment of volcanic eruptions that may cause extensive damage to property, i.e. eruptions in the vicinity of urban areas and international airports in Iceland
- ▶ Resuspension of ash – ecosystems
- ▶ Eruptions at sea – size and frequency



1. Appraisal of the current knowledge of the eruptive activity and potential hazards



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Main objective

- ▶ Thorough compilation of knowledge about active volcanic sites in Iceland
 - ▲ Information base for hazard and risk assessment
 - ▲ Dissemination of knowledge (response authorities, stakeholders, public)
- ▶ Collection and analysis of new data to enhance knowledge
- ▶ The information collected in a database
 - ▲ Live project with feed of new information into the database
- ▶ Open-access catalogue on the web → <http://futurevolc.vedur.is/>
- ▶ Includes eruption scenarios for 32 volcanic systems in Iceland

http://futurevolc.vedur.is/



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Icelandic Volcanoes

Sign in Additional information

?



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Give us feedback

Volcanoes

Data Portal

Eruption Search

Hide

Layers

Overview map

Legend

Sort by:

Aviation Color Code

Askja

Aviation Colour Code: Green
Activity Level: Moderate
LastEruption: 1961 CE
Catalogue information
Activity status

Brennisteinsfjöll

Aviation Colour Code: Green
Activity Level: Moderate
LastEruption: Late 10th century CE
Catalogue information
Activity status

Bárðarbunga

Aviation Colour Code: Green
Activity Level: High
LastEruption: 2014 CE
Catalogue information
Activity status

Eldey

Aviation Colour Code: Green
Activity Level: Low
LastEruption: 1926 CE
Catalogue information
Activity status

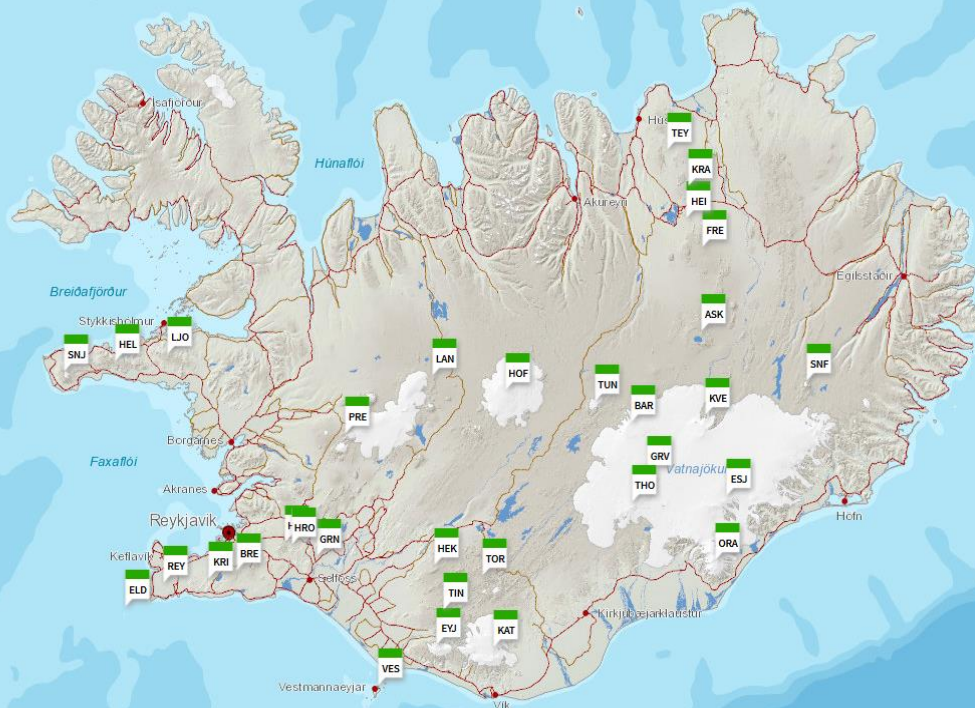
Esjufjöll

Aviation Colour Code: Green
Activity Level: Low
LastEruption: 1927 CE
Catalogue information
Activity status

Eyjafjallajökull



landssund



Department of Civil Protection and Emergency Management



- **Responsible for National Risk Assessment (NRA)**
 - **Risk assessment on national level for all types of hazard**
 - Manmade, complex, natural, health etc.
 - **Responsible for mitigation action national wide**
 - **Responsible for national Contingency plans to respond to crises**
 - **Coordinates response to crises (National Crisis Coordination Centre)**
 - **Responsible for communication with ERCC via CECIS**
-

Nordic collaboration

Nordic Forum for Risk Analysis and Strategic Foresight



Norway, Denmark, Sweden, Iceland, Finland



Workshop on volcanic eruption in Iceland



Held in Iceland late winter 2015

Led by Sweden

“Aim was to learn more and gain collective understanding of the challenges with volcanic eruptions”

Interactive scenario based workshop

Report presented at the Nordic Director General meeting in Stavanger May 2015

Scenario – Sources from the Catalogue



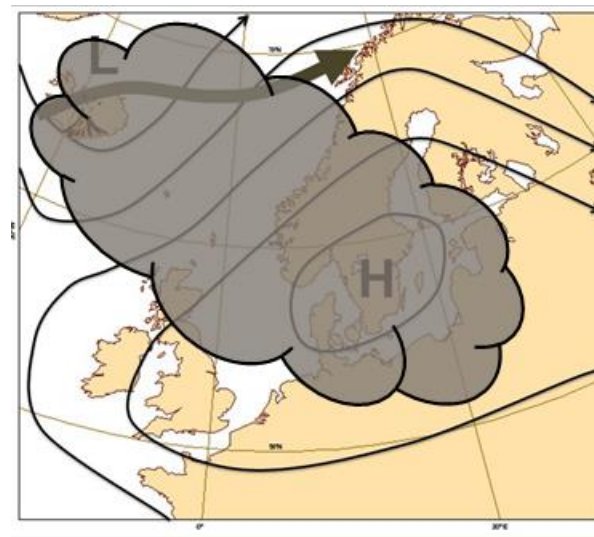
Volcanic eruption in Iceland with cross border consequences

- Eruption under 800 m thick ice
- Significant flooding (jökulhlaup)
- Eruption cloud (Ash)
- Eruption cloud (SO₂)

Iceland

- Eruption cloud (Ash)
- Eruption cloud (SO₂)
- Acid rain

Scandinavia



Significant consequences



Discussion of the results: which are the most significant consequences (i) on Iceland (ii) rest of the Nordic countries?

Significant consequences in vital societal sectors

Function	Examples	Applicable
Energy supply	Production & distribution of electricity, local heating, fuel, etc.	✓
Financial services	Payments, access to cash, central payment systems, securities, trading, etc.	
Trade and industry	Construction, retail, manufacturing, etc.	✓
Health, medical and care services	Emergency medical services, pharmaceutical and equipment supply, childcare, disabled and elderly care, primary health care, psychiatry, social services, disease control for animals and people, etc.	✓
Information and communication	Telephony (mobile and fixed), internet, radio communications, distribution of mail, production & distribution of daily papers, web site information, social media, etc.	✓
Municipal technical supply	Drinking water supply, sewage treatment, sanitation, road maintenance, etc.	✓
Foodstuffs	Distribution, primary production, inspection and manufacturing etc.	✓
Public administration	Local, regional, national management, funeral services, diplomatic and consular services, etc.	
Protection, safety and security	The judiciary, prosecution service, military defence, prison service, coastguard, police, fire and rescue service, PSAP, customs and excise, border protection, immigration control, guarding and security activities, etc.	
Social security	Public pension system, sickness and unemployment insurance, etc.	
Transport	Air, rail, maritime, road and public transport, etc.	✓

Capabilities for detection, early warning and model simulation



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Capability Analysis:

1. Early warning (how does Iceland inform the other Nordic countries and can the Nordic countries receive the information?)
2. Tasks and capability needed in the scenario
3. Potential difficulties fulfilling the tasks
4. Cooperation between the Nordic countries
5. How is information exchanged between the Nordic countries? (Crisis communication and sharing a common picture)
6. Host nation support (Necessary? Possible administrative problems?)

Achievements



- ☐ **The risk of a volcanic eruption has been included in several of the Nordic countries' national risk assessments.**
 - ☐ **Awareness of the risks from volcanic eruption is increasing across the Nordic countries (not only in Iceland),**
 - ☐ **The duty-officers in the Nordic countries have tested their alert functions, which is a critical capability for managing cross-border events.**
 - ☐ **Videoconferences at the level of Director Generals are being organized in between regular meetings.**
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Challenges and the way ahead / recommendations:



- ▶ Enhance the capacity for Host Nation Support have to continue.
 - ▶ The barrier to ask for support among the Nordic countries in different situations is currently high.
 - ▶ There is a need for a more proactive approach among Nordic countries in terms of offering support in situations of need.
 - ▶ More cooperation is needed for developing capacities for mutual support in the area of information management and crisis communication/information to the public.
 - ▶ The Nordic countries need to develop their capability to exchange personnel with different kinds of expertise, i.e. communication specialists, duty-officers, analysts and scientific expertise like geology.
 - ▶ There is a need to establish a better overview of available capacities and response assets across the region
 - ▶ The Nordic countries should continue to establish and test structures for meetings with the Director Generals and the duty-officers as often as needed.
 - ▶ The Nordic Forum for Risk Analysis and Strategic Foresight should continue for the sharing of experiences and best practices, and to maintain personal networks among analysts in the Nordic emergency management agencies.
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