

On behalf of consortium of Icelandic institutes*

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Introduction

An integrated assessment of volcanic risks in Iceland started in the autumn of 2011. The main purpose of the assessment is to decrease the vulnerability of the Icelandic society to volcanic hazards. The work is organized in accordance with the risk assessment framework of the UN and WMO (www.unisdr.org).

A. Catalogue – Icelandic volcanoes

A thorough compilation of knowledge about active volcanic sites in Iceland is being made available through a web-hub (Fig.1). The eruption potential of the systems is characterised by:

1. Chapters describing eruption potential of each system
2. Maps of tephra dispersal and lava flows; web and print versions
3. Event trees and probability density functions for selected systems
4. Grain size data
5. Assessment of monitoring quality and current activity status.

B. Floods triggered by volcanic eruptions

The main objective is to provide authorities with a comprehensive assessment of flood risk in areas prone to floods triggered by volcanic eruptions, featuring:

1. Mapping of historical floods
2. Hydraulic simulations based on melting scenarios
3. Exposure maps, accounting for the spatiotemporal variations in population exposure
4. Danger maps, based on thresholds in depths of flooding and flow velocities (Fig. 2)
5. Evacuation maps.

C. Large explosive eruptions

Three types of eruptions will be investigated and their impact on society estimated:

1. Large explosive eruption
2. Eruption with extensive gas emissions, i.e. Laki-type eruption
3. Medium size eruption, i.e. with size with frequent return period

The VOL-CALPUFF dispersal code (Barsotti et al., 2008) will be used in the simulations with a Monte Carlo approach. The uncertainty in meteorological statistics and in the eruptive source parameters will be represented within probabilistic hazard maps. Focusing on tephra ground loading (e.g. Fig. 3), ash concentration, volcanic PM₁₀ concentration and visibility, the maps will be disseminated to the authorities and stakeholders.

D. Eruptions that may damage infrastructure

Pilot risk assessments of two vulnerable areas, Vestmannaeyjar (Fig. 4) and the Reykjanes Peninsula (Keflavík International Airport) will be produced, including:

1. Maps of previous tephra falls and lava flows
2. Probability distribution functions of eruption source parameters
3. Probabilistic hazard maps for tephra fall, pollutants concentrations in the atmosphere (see § C) and lava flows
4. Maps of the location, value, and weight-bearing capacity of infrastructures within 25 km
5. Multicriteria vulnerability assessment integrating physical, environmental, economic, and seasonal population factors
6. Evacuation maps
7. Information dissemination to vulnerable communities and organizations with mitigation responsibilities.

Four projects, described below, are conducted in the first phase of the project (2012-2014). The overall project benefits from other research projects e.g. FUTUREVOLC EU FP7 consortium.

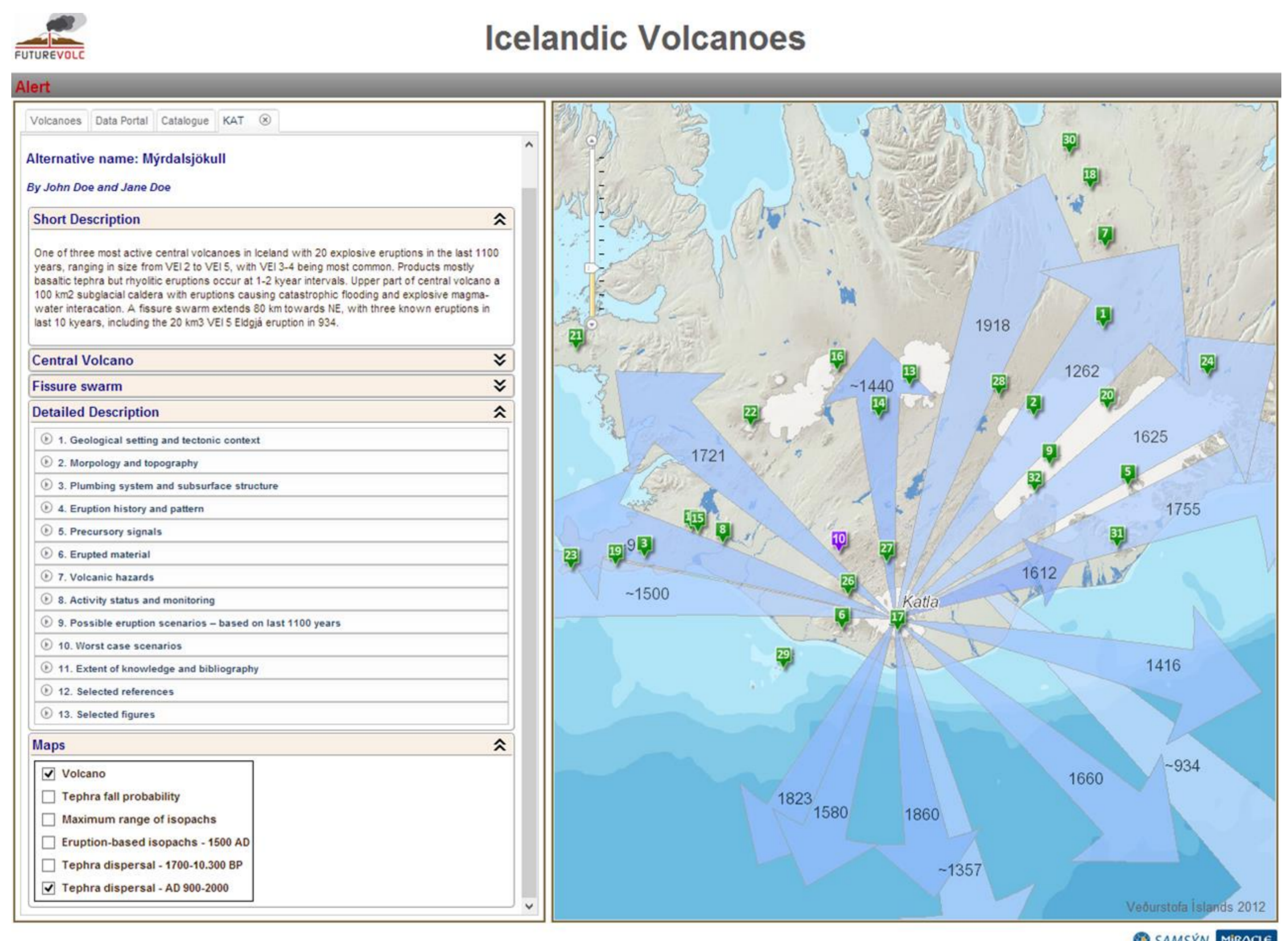


Fig. 1: Demo version of the Catalogue web-hub (data from Guðrún Larsen, IES).

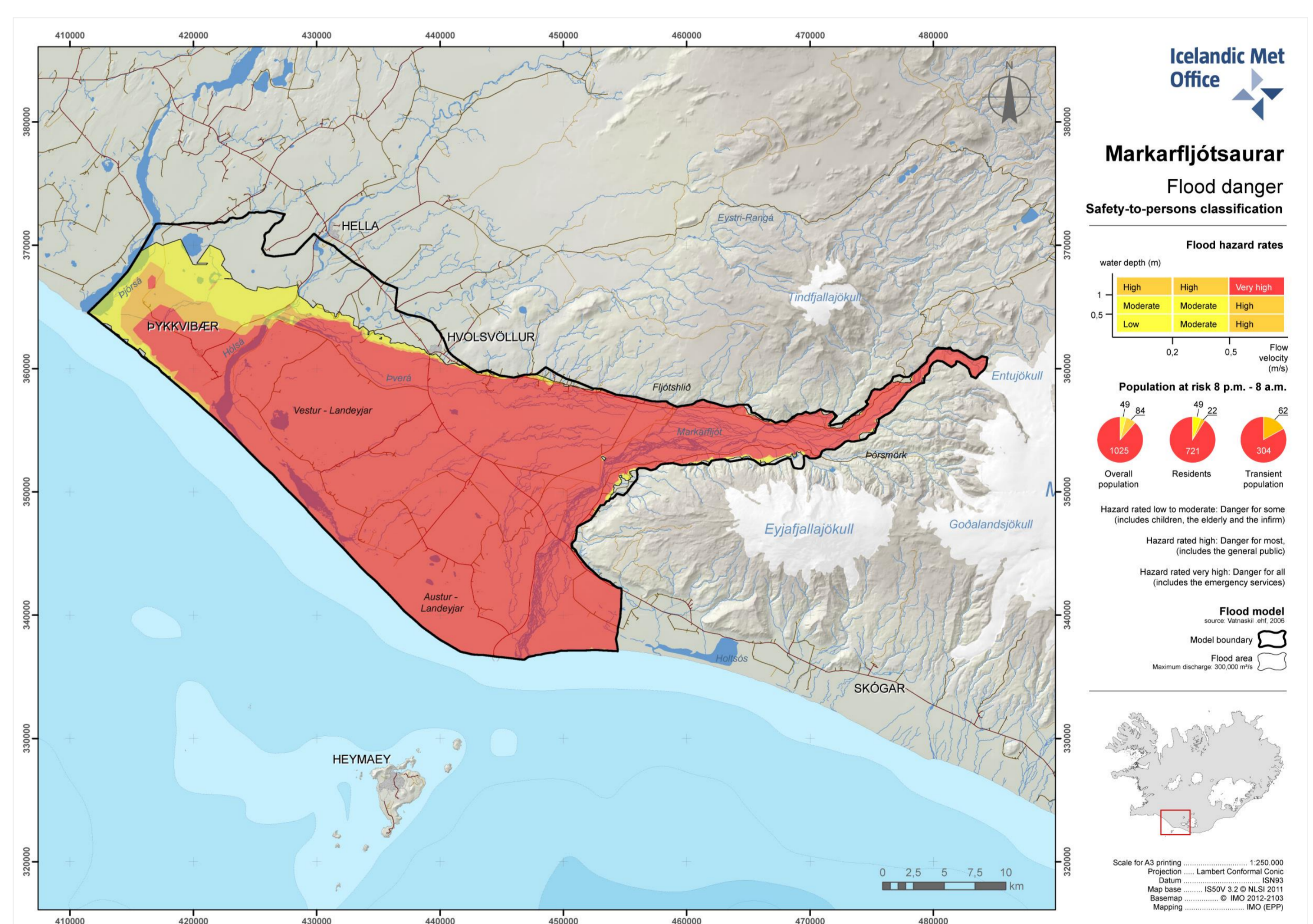


Fig. 2: Flood danger map for the Markarfljót outwash plain. Reference flood: glacial outburst originating from Entujökull, peak discharge 100,000m³/s, manning n=0.1

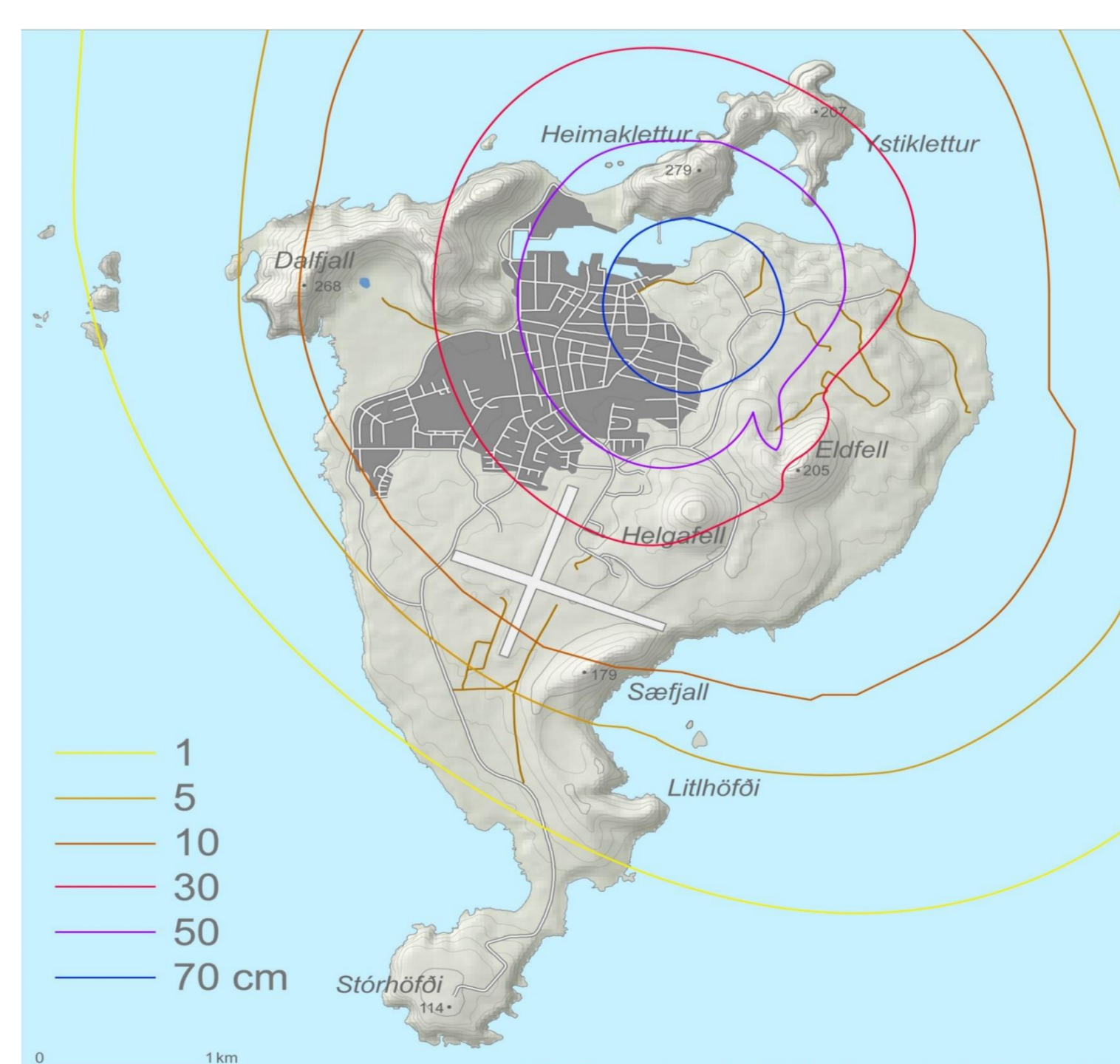


Fig. 3: Simulated tephra thicknesses in Vestmannaeyjar for a dry magmatic eruption.

