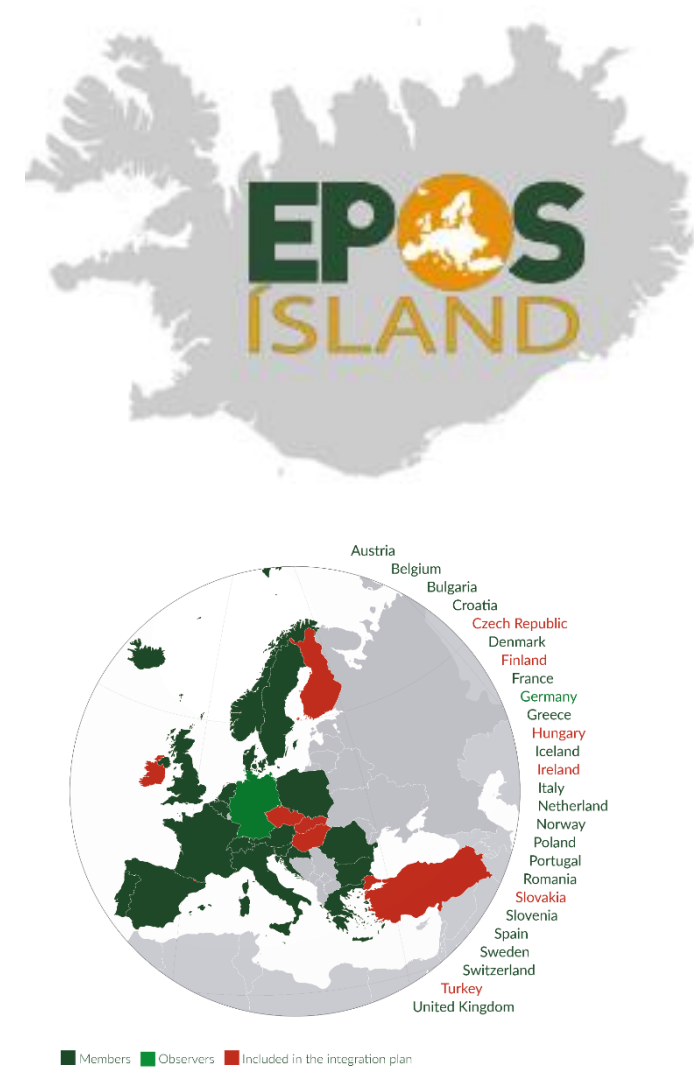




EPOS Iceland

Open Access to Geoscience Data

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Introduction

<https://www.epos-iceland.is/>

EPOS Iceland is an infrastructure project funded since 2021 by the Icelandic national Research Infrastructure roadmap. Four institutions form the collaborative consortium: the Icelandic Meteorological Office (IMO), which leads the project, the University of Iceland (UI), the Natural Science Institute of Iceland (NSII) and Iceland Geosurvey (IG). The project is closely linked to the European Plate Observing System (EPOS) and its services on the EPOS DATA PORTAL.

The goals of the project are to provide long-term access to open, *FAIR* (Findable, Accessible, Interoperable, Re-usable) access to standardized, quality checked geoscience data and products from Icelandic Earth science institutes to support strong Earth science research in Iceland.

The work includes quality checking, correcting, standardization and harmonization of a wide variety of geoscience data as well as construction of powerful, standardized IT services providing access to the data and derived products. The services are provided through an Application Programming Interface (API), which is interoperable with the EPOS *Integrated Core Service* (ICS) and form a part of the *Volcano Observations Thematic Core Service* (VOLC-TCS). Already 16 API operational services are available at <https://docs.epos-iceland.is/> and through the EPOS DATA PORTAL <https://www.ics-c.epos-eu.org/>.

All EPOS Iceland institutions are **Data Providers**, but IMO is the only **Service Provider** and operates the services within the **VOLC-TCS**. Some services are already standardized, and some in the process of becoming standardized. F. ex. the EPOS GNSS data service standard is being installed, connecting Icelandic GNSS data with the EPOS **GNSS-TCS**. Access to geological maps provided by the Natural Science Institute is serviced through the **Geology-TCS**.

Data from Iceland's monitoring networks

Iceland is on an active plate boundary with 33 active volcanoes, frequently in unrest. On average, 2 – 3 volcanic eruptions occur each decade (uncharacteristic year 2024 had 6 eruptions), tens to hundreds of thousands of earthquakes, and magnitudes up to $M_w 7$. Therefore, data from the national GNSS and seismic monitoring networks are rich with signals from these active and sometimes unique processes.

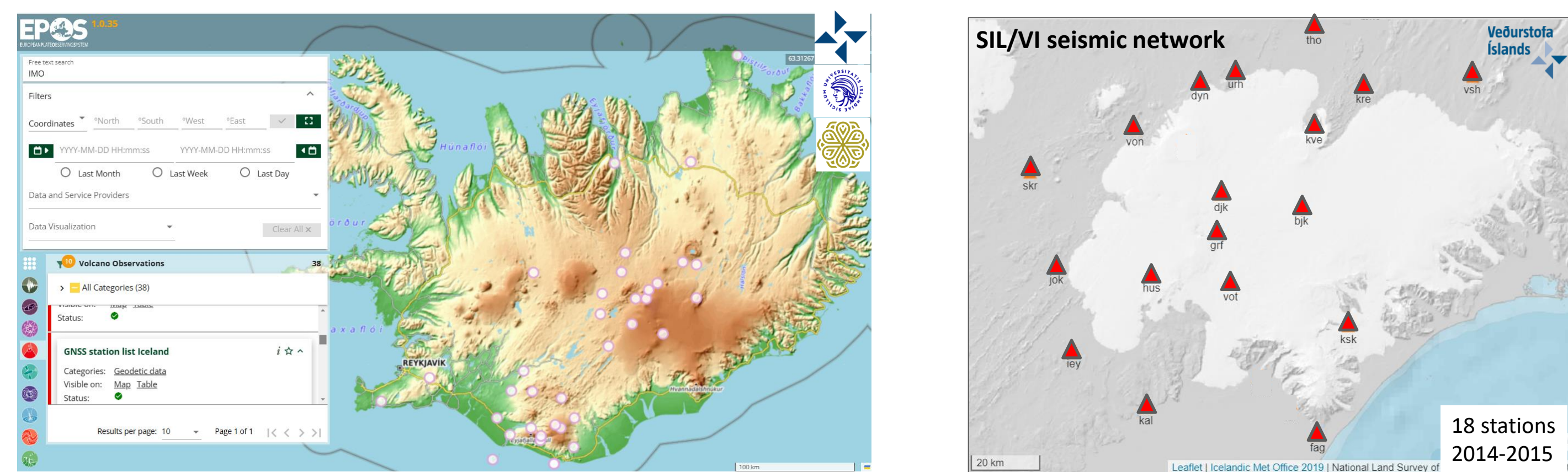


Figure 1: (Left) Several years of GNSS data from 36 stations of the *ISGPS* network (white dots) is already available on the DATA Portal. Presently the data is provided under *VOLC-TC*, but will soon be through the EPOS standard service *GLASS*, connected with the *GNSS TCS*. Three institutions, IMO, UI and INSII provide the data. (Right) Two years of seismic data (2014-2015), from 18 station of IMO's *SIL/VI* network (red triangles), and covering the Bárðarbunga 43 km-long dike intrusion, volcanic eruption and 60 m caldera collapse have been quality checked standardized and will be sent to Orfeus for access.

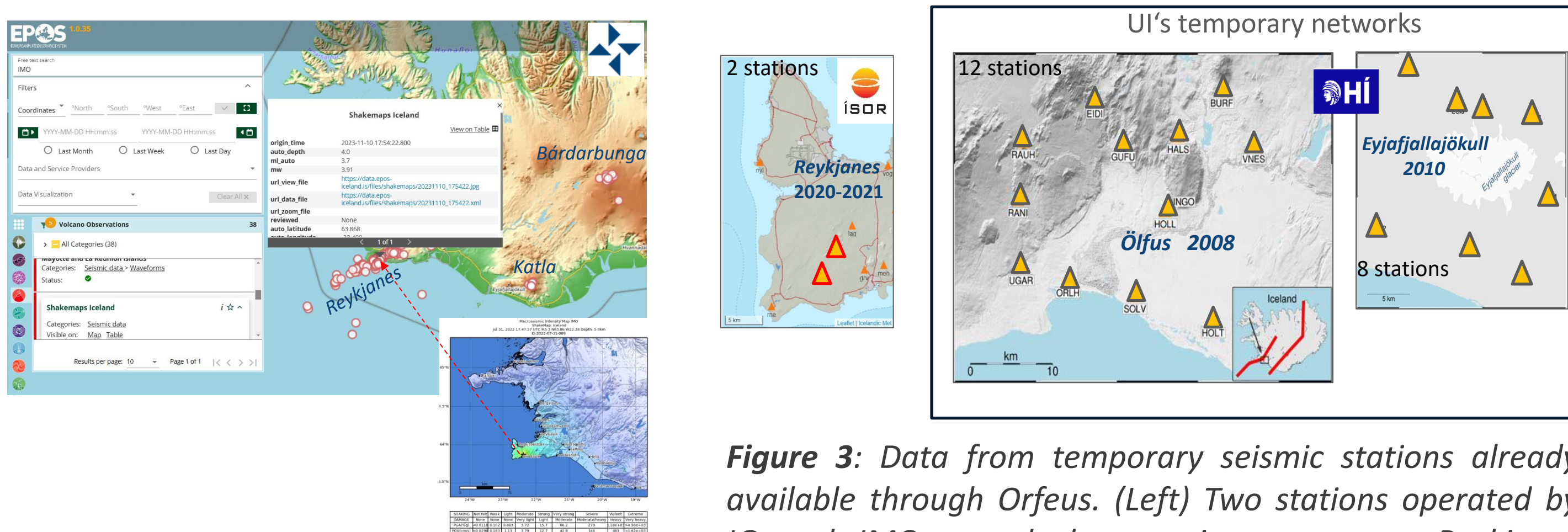


Figure 2: Service providing automatic *ShakeMaps* for earthquakes (white dots) recorded on the *SIL/VI* seismic network during 2020-2025. Includes tens of events from the ongoing volcano-tectonic episode on Reykjanes, as well as events from Bárðarbunga and Katla volcanoes. *ShakeMap* shown for a $M_w 5.3$ event on Reykjanes peninsula.

Figure 3: Data from temporary seismic stations already available through Orfeus. (Left) Two stations operated by IG and IMO record the ongoing unrest on Reykjanes peninsula. (Middle) Eight stations operated in Ölfus area following a $M 5.3$ earthquake in 2008. (Right) Nine stations operated around Eyjafjallajökull volcano during unrest and eruption in the volcano in 2010.

Other Volcanological Data

Ground-based gas data – UV spectra (DOAS)
Ground-based radar data of volcanic plumes
Wrapped interferograms
Plume height determinations from calibrated cameras
Various types of hazard maps

Volcano information and reports:

- Volcano activity weekly reports
- Aviation volcano color code
- VONA (Volcano Observatory Notice for Aviation)
- Volcano list
- Eruption list

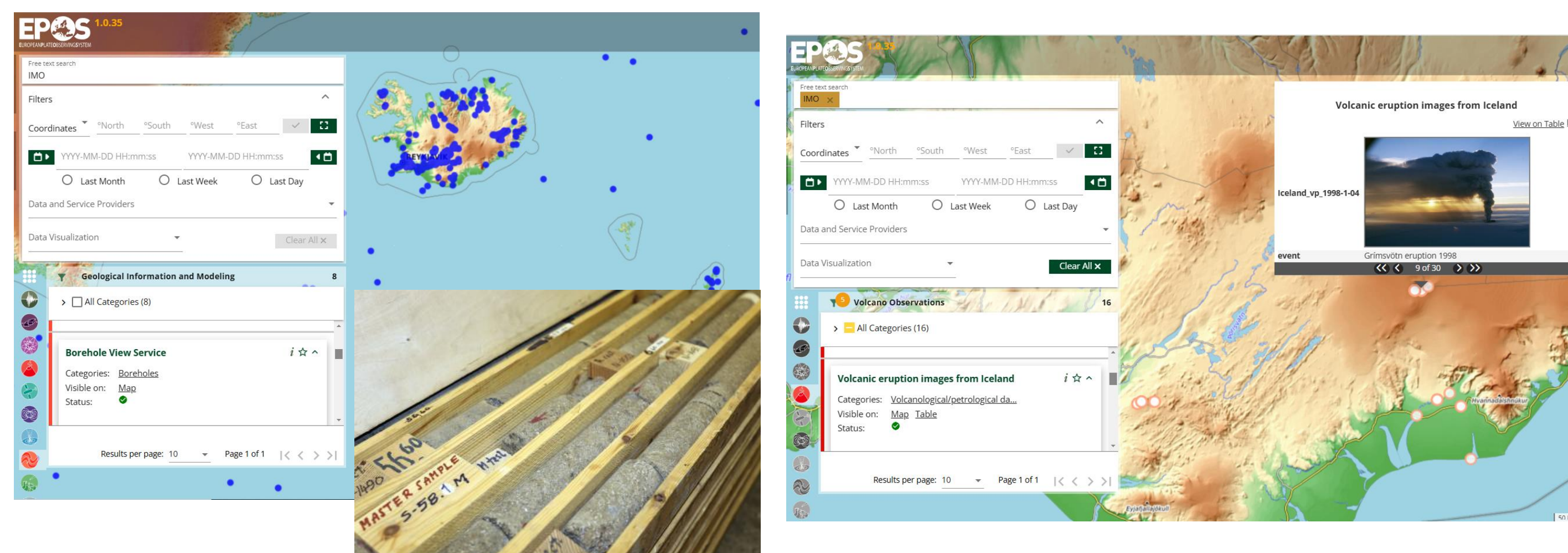


Figure 4: (Left) Access to metadata for borehole cores along with an overview of borehole locations will be provided by NSII. An example photo provided for each core (inset). (Right) UI has created a database of photographic images with associated metadata, giving access to images of volcanic eruptions and related processes.

Future plans

Continued effort of the EPOS Iceland consortium will result in further access to even more diverse geoscience data. In addition to adding more data into already existing services, new ones will be created, such as:

- Metadata and map layers for impact maps, indicating which infrastructure might be at risk in case of explosive eruptions from Hekla, Katla and Öraefajökull volcanoes
- Wind-roses for selected locations to predict tephra dispersal
- Plume height calculations from radar data
- Electric resistivity, temperature and water level gauge data from glacial rivers
- Tephra isopach map layers for selected volcanic eruptions

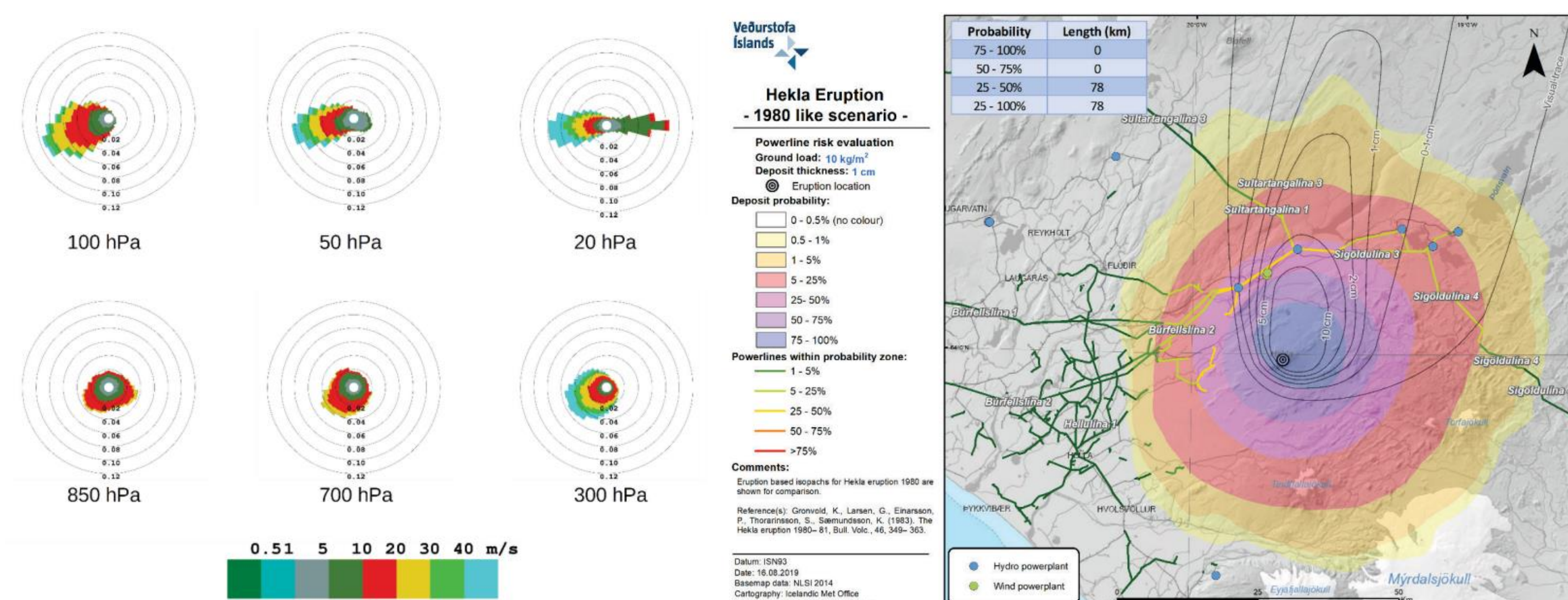


Figure 5: (Left) Wind roses and (Right) tephra fallout impact maps will be offered as GIS layers, along with associated metadata.

Importance of data sharing

As knowledge and technology continues to improve, our research capabilities will become stronger. More and improved access to quality checked, multidisciplinary data will increase the use of these data, accelerating knowledge on volcanic processes and enhancing predictions of potential volcanic hazards.