

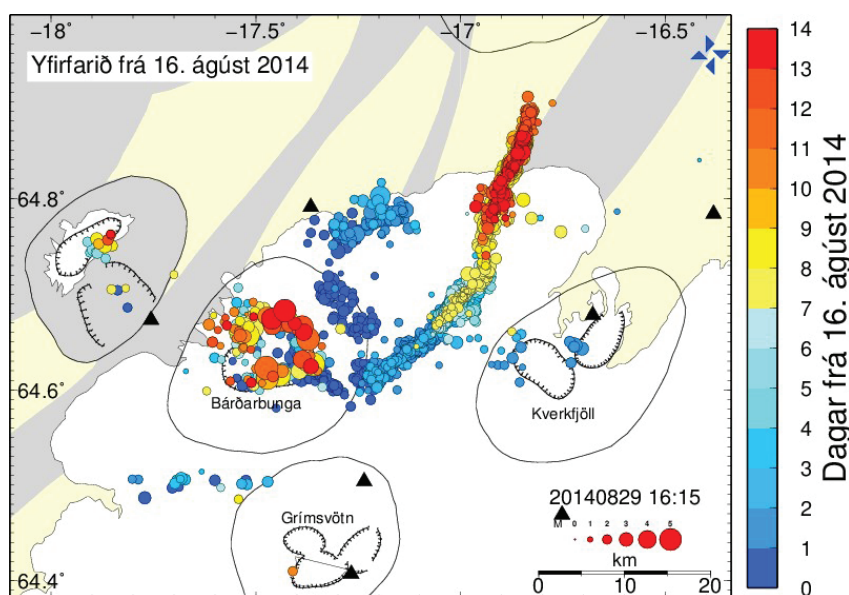
## Information on volcano Bardarbunga, Iceland

Since August 13th, heightened seismic activity at the volcano Bardarbunga in Iceland has been observed. Several hundreds of earthquakes per day, some exceeding strength 5 on the Richter scale were sensed, and it was feared that the volcano might erupt. Status of the volcano had been set to **RED** for some time, and a danger area around the volcano had been established. IFR flights were not cleared into this area; it was de facto a no-fly zone.

When the situation had stabilized again, the status of the volcano returned to **ORANGE**, and the danger area had been removed. Early on August 29th, lava flow had been detected northeast of Bardarbunga, where the bulk of the seismic activity moved. The Icelandic authorities are closely monitoring the situation and have installed additional mobile observing stations. Information about an eruption affecting the airspace over and around Iceland can therefore be expected almost in real-time.

NOTAMs, SIGMETs and Volcanic Ash Advisories would be produced in due time.

Graphic 1 shows earthquakes around Bardarbunga volcano from August 16th to August 29th. The color code (on the right side of the graphic) indicates days since August 16th. It can be seen that activity continues at the Bardarbunga caldera, while other activity started northeast and east of the volcano, from where it moved gradually to northeast. There, the lava flows have been observed on August 29th.



Graphic 1: Earthquake activity around Bardarbunga volcano between 16 and 29 August 2014.

Authoritative and detailed information is available from these sources:

- ▶ Icelandic Met Office: <http://en.vedur.is/>
- ▶ VAAC London: <http://www.metoffice.gov.uk/volcano/public/natlantic.html>
- ▶ Eurocontrol Network Ops Portal: <https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html>
- ▶ Eurocontrol Skybrary: [http://www.skybrary.aero/index.php/Volcanic\\_Ash](http://www.skybrary.aero/index.php/Volcanic_Ash)

### Information regarding flight operations

Should the volcano erupt like Eyjafjallajökull in 2010, procedures for flight crews are nearly unchanged. The main objective is to avoid flight in visible volcanic ash. When volcanic ash has been encountered, the escape maneuver specified in the operations manual must be performed.

The overall responsibility for flight safety rests with the operator, who should have produced a Safety Risk Assessment to the satisfaction of his supervisory authority. These SRAs are the basis for flight planning. Operators are responsible to brief their flight crews on the conditions taken account of in the SRA and provide them with specific operational instructions, in particular for situations that deviate from the SRA conditions.

Assurance of the safe execution of flights is the responsibility of pilots. Useful recommendations can be found in the latest edition of the Safety Information Bulletin of EASA, issued on 21.8.2014: <http://ad.easa.europa.eu/ad/2010-17R6>

**Quote: Avoid operation in visible volcanic ash or, where visibility of the ash is impaired (IMC, night), avoid operation in discernible volcanic ash.**

Visible ash is the ash that can be seen by the human eye, and discernible ash is the ash that can be detected by use of satellites or other technical means, or by observing its impact on aircraft.

### Air Traffic Services

The ICAO procedures developed after 2010 follow the principle that decisions about safe flight operations need to be taken by the pilots. The Air Traffic Services shall provide information and support.

Unfortunately, the respective amendment to ICAO Doc 4444 (Procedures for Air Navigation Services – Air Traffic Management) does not come into force before 13 November 2014. The Icelandic Air Navigation Service Provider will therefore up to that date not provide IFR clearances into Danger Areas established for volcanic contamination over the High Seas.

### Volcanic Ash Information

According to ICAO regulations, the official information products are SIGMETs and NOTAMs. Volcanic Ash Advisories (VAA; or in graphic form: VAG) are to be produced by the Volcanic Ash Advisory Centers (VAACs) and are intended as input for the generation of SIGMETs and NOTAMs. They are however nowadays widely used as planning tool by airspace users. National Meteorological Watch Offices might edit the information contained in the charts, based on their own measurements. The Ash Concentration Charts of the Volcanic Ash Advisory Centers (VAACs) London and Toulouse that are provided since 2010 as supplementary information serve as guideline during flight planning. They show areas of low/medium/high ash concentration for the benefit of enabling flight planning into these areas based on a Safety Risk Assessment.

SRAs of individual airlines may prescribe consideration of additional sources of information, like satellite pictures, or even the consideration of “all” sources of information. Some airlines have a contract with specialized scientific institutes for advice. All these details are contained in the SRA of each airline. If you have a question regarding timely ash information, ask your own airline!

Volcanic eruptions will cause a great amount of information, but not all of it will necessarily be consistent. Operators and pilots are advised to carefully review the available information and to plan and perform flight operations with ultimate caution.

Complicating matters is the fact that volcanic SO<sub>2</sub> aerosol can be emitted by volcanoes in large quantity. No information from VAACs is presently available on this, although the smell can well disturb passengers and, in larger concentrations, may even pose a health risk. ICAO is in the process of considering the inclusion of SO<sub>2</sub>-measurements and forecasts into the official documents. Today, a good source of near real-time information on SO<sub>2</sub> in the atmosphere, as well as ash clouds, can be found at: <http://sacs.aeronomie.be>

### Aviation Volcano Colour Code

- GREEN:** Volcano is in typical background, non-eruptive state.
- YELLOW:** Volcano is exhibiting signs of elevated unrest above known background level.
- ORANGE:** Volcano shows heightened or escalating unrest with increased potential of eruption.
- RED:** Eruption is imminent or in progress - significant emission of ash into atmosphere likely.