

# EUROVOLC

European Network of Observatories and  
Research Infrastructures for Volcanology

## Roadmap for implementation of the recommendations from the EUROVOLC VAAC-VO Workshop in 2019



Claire Witham and Nina Kristiansen, Met Office, UK

June 2019



## Contents

Introduction .....	1
Timeframes of relevance.....	1
Recommendations and associated actions .....	2
Roadmap timeline .....	5
Recommendations requiring longer term consideration and further discussion .....	5
Acknowledgements.....	6

## Introduction

A workshop was held at the UK Met Office in February 2019 to bring together the Volcano Observatories (VOs), Volcanic Ash Advisory Centres (VAACs) and Volcanological Research Institutes (VRI) in Europe. This activity was organised under the H2020 EUROVOLC project, as part of its Networking Activity “Connecting the volcanological community with VAACs”. The workshop brought together ~35 leading scientists and operational staff from six of Europe’s VOs (Iceland, Italy, France, Spain, Portugal and Greece), the London and Toulouse VAACs, and seven supporting institutions and organisations. During the workshop, participants identified recommendations for future improvements to the way the VOs and VAACs communicate and share information. These recommendations, along with a summary of the workshop, were reported in the EUROVOLC WP4 deliverable report “D4.4 Outcome of the VAAC-VO workshop”.

This document presents a set of actions designed to enable the delivery of the key recommendations. A roadmap for the completion of these actions is proposed, which will facilitate improvements over the next two years.

## Timeframes of relevance

A number of ongoing initiatives and upcoming meetings of international bodies provide some context (Fig. 1) to the timing and delivery of the roadmap. Foremost, the timeframe of the EUROVOLC project (approx. 2 years remain from 2019 to early 2021) provides a good focus and opportunity to work on implementing the proposed changes. The final EUROVOLC meeting, which is likely to be held in February 2021, will be an ideal opportunity to review progress against the actions. Due to the success of the workshop, a follow up VAAC-VO workshop has been proposed (Action 19). If this can be arranged in 2020, it will give an intermediary point at which participants can report progress, refine any outstanding actions and identify any follow up activities prior to the end of the EUROVOLC project.

The next volcano observatory best practice meeting (VO BP) and VAAC best practice (VAAC BP) meeting are both likely to be held in November 2019. These provide opportunities for the recommendations and changes to be shared with the wider community. The international Volcanic Ash Science Advisory Group (VASAG) has an ongoing action on reviewing the Volcano Observatory Notice for Aviation (VONA) and the workshop recommendations will feed into this ahead of its next meeting in 2020.

The annual European VOLCEX volcanic ash exercises, which are typically held in the autumn, provide good opportunities to test revisions to procedures and communications. Changes to procedures can also be tested during the more numerous bi-lateral exercises between individual observatories and VAACs that happen throughout the year.

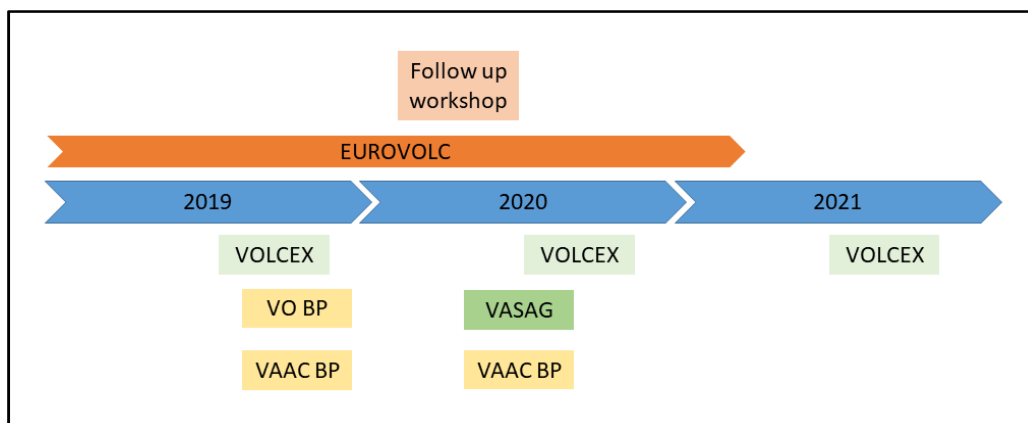


Figure 1: Depiction of the approximate timeframe for key related activities.

## Recommendations and associated actions

Based on the recommendations in the workshop report twenty actions have been identified. These are summarised in Table 1 with more details provided below.

#	Action	Responsible	Target date
1	Share workshop report	Claire Witham	May 2019
2	Update contact list	Nina Kristiansen	Jun 2019
3	Share ICAO documents	Nina Kristiansen	Jun 2019
4	Summarise VONA issues raised by workshop	Claire Witham	Jun 2019
5	Pursue improvements to the VONA and its guidance notes	VASAG representatives	Ongoing
6	Implement plans for exercises with all VOs in Toulouse VAAC region	Toulouse VAAC	Jan 2020
7	Raise with ICAO the engagement of VOs in future VOLCEX	Anton Muscat, London VAAC	Autumn 2019
8	Review feedback processes to VOs	London and Toulouse VAACs	Dec 2019
9	Update VAAC back-up procedures	London and Toulouse VAACs	Dec 2019
10	New VAAC staff training on plume-height uncertainties	London and Toulouse VAACs	Sep 2019
11	Send VONA to both VAACs	All VOs	Sep 2019
12	Display VONA on VO websites	All VOs	Sep 2020
13	Implement better feedback processes to VAACs on the VONA content	All VOs	Jun 2020
14	Include plume height in all VONA	All VOs	Jun 2020
15	Introduce reporting of timeframe for better plume height information	All VOs	Jun 2020
16	Share recommendations at next VO Best Practice meeting	Sara Barsotti	Nov 2019
17	Development of eruption scenarios	WP11	Feb 2021
18	Regular status reporting on volcanoes	All relevant VOs	Jun 2020
19	Follow up workshop	MeteoFrance	Mid 2020-2021
20	Case-study of plume height uncertainty	WP8	Feb 2021

Table 1: Summary of the actions and their target dates for delivery. See text for acronyms.

Recommendation: **Share the report** and the recommendations with the representatives from the VOBP, VAAC BP and VASAG groups to enable pertinent points to be cascaded to these bodies and shared more widely with the international community where relevant.

**ACTION 1:** Met Office to distribute the report to these groups by May 2019.

Recommendation: Finalise and share the updated VO and VAAC **contact list** for Europe.

**ACTION 2:** Met Office to complete by June 2019.

Recommendation: The International Civil Aviation Organization (ICAO) EUR/NAT Aviation document, the International Airways Volcano Watch (IAVW) Handbook and all other **relevant documents** should be shared with all participants and also put on the EUROVOLC wiki, to ensure a common awareness of the ICAO procedures. The VRIs that work and support the VOs should be informed of these procedures and requirements so that there is a wider awareness and understanding across the community.

**ACTION 3:** Met Office to share documents with all attendees via email and also put on the EUROVOLC Basecamp site by June 2019 and ask VOs to share details with their VRIs.

Recommendation: The **guidelines for the use of the VONA** need to be updated to reflect the issues raised during the workshop. These include clarifications on: recording of the eruption start time versus the timing of the ash emission phase; the use of VONA in specific situations including (i) during unrest, (ii) in situations when there is ash in the atmosphere, but the volcano has stopped erupting, and (iii) for resuspended ash clouds. There is also a need for further guidance on defining an update cycle for the VONA to avoid confusion when the volcanic activity is elevated but unchanged for a prolonged period (e.g. an El Hierro type of eruption).

**ACTION 4:** Met Office to produce a briefing document summarising the issues with the VONA raised by the workshop and the resulting recommendations by end June 2019.

**ACTION 5:** VASAG representatives who were at the workshop to take this forward as part of the existing VASAG activity looking at improving the use of the VONA and raise issues at appropriate meetings.

Recommendation: All VOs should take part in **exercises**, and VOs and VAACs should use exercises as opportunities to test the implementation of these recommendations and revisions to procedures. This is particularly important for VOs with few real eruptions in order for them to train and maintain familiarity with the procedures. London VAAC has a regular series of exercises with the Icelandic Met Office called VOLCICE and Toulouse VAAC holds regular exercises with Italy and the Azores, but other VOs would like to be engaged.

**ACTION 6:** Toulouse VAAC to implement “local” scale exercises for those VOs in their region not currently engaged in an exercise process (i.e. similar to the Italy VOLCITA and Azores VOLCAZO exercises).

Recommendation: For all VOs to get involved in larger exercises like **VOLCEX**.

**ACTION 7:** London VAAC to raise with ICAO about looking to engage a wider circle of VOs in future VOLCEX planning.

Recommendation: A **two-way feedback** between the VAAC and VO is essential during an eruption, for example the VAAC should (i) report back on the usefulness and/or missing/inconsistent information in the VONA, (ii) provide additional information on plume height from e.g. satellite imagery or model techniques if available, and (iii) report if observation data (e.g. plume height) are differing from different approaches (e.g. observations vs. model/satellite).

**ACTION 8:** VAACs to review their procedures to make sure this aspect is incorporated.

Recommendation: The VAACs should include in their **back-up procedures** the notification of the VOs if a handover of lead responsibility occurs. Ideally this procedure should be practiced annually, possibly as part of an exercise.

**ACTION 9:** VAACs to update procedures accordingly.

Recommendation: VAAC staff need to be **educated** about the limitations and sensible use of data in the VONA, in particular around uncertainties in the plume height.

**ACTION 10:** London and Toulouse VAACs to include this aspect in their regular staff training.

Recommendation: All **VONA** should be sent to both the lead and back-up VAAC for improved back-up response during events and for additional training opportunities. The issuance of a VONA must be accompanied by a phone call to the lead VAAC. If there is a language concern, then construction and use of a template is recommended.

**ACTION 11:** VOs to update their procedures so that the VONA is sent to both the Toulouse and London VAACs.

Recommendation: All VONA should be displayed and archived on the **VO's website** and this should become a standard practice.

**ACTION 12:** VOs to discuss with their IT staff displaying the VONA on their website, with an aim to implement this during 2020.

Recommendation: The **VO should feedback/report** to the VAAC its difficulties in (i) communicating (due to the language and/or the type of the eruption and/or local impediments), (ii) measuring the source parameters, and (iii) filling in the VONA and why.

**ACTION 13:** VOs to update procedures.

Recommendation: An observed or best guess estimate (e.g. from scenarios based on previous eruptions) of the **plume height** should always be provided in the VONA and ideally be accompanied by information about the level of uncertainty. If plume height observations are poor and/or with little confidence, additional information should be provided to highlight this.

**ACTION 14:** VOs to update their procedures and discuss further at future BP meetings.

Recommendation: During an eruption, it would be useful for VOs to provide a **timeframe** to VAACs within which they might expect to have better plume height information.

**ACTION 15:** VOs to update their procedures

Recommendation: Many of the identified issues and recommendations are likely to be common across other VOs and VAACs and so details should be shared and **discussed within the wider global community**.

**ACTION 16:** European VOs to share information from the workshop, including the recommendations and the resulting updates to procedures, at the next VO BP meeting, which is proposed to be in November 2019.

Recommendation: **Eruption scenario information** (e.g. likely plume heights, expected eruption duration) should be supplied by the VO to the VAAC both in quiet time and during activity. The European Catalogue of Volcanoes that is under development by EUROVOLC (WP11) would be an ideal centralised location for such information for volcanoes in Europe.

**ACTION 17:** WP11 of EUROVOLC to work with VOs to develop scenario information as part of the new European Catalogue of Volcanoes as a starting point.

Recommendation: There needs to be better exchange of information between VAACs and VOs on the current status of volcanoes. **Regular summary reports** on volcano status should be supplied by the VOs to the VAACs to improve knowledge, for example following the practice that is currently implemented between the Icelandic Met Office and the London VAAC, which

involves a weekly update. The frequency of these reports should be commensurate with the activity of the area.

**ACTION 18:** VOs to develop procedures to share this information and implement by mid-2020.

Recommendation: There should be a continued focus on **building relationships**, trust and understanding between the VO and VAACs.

**ACTION 19:** Toulouse VAAC to explore hosting a follow-up workshop in 2020.

Recommendation: Details around the requirements and definition of the plume height needed by the VAACs must be clarified during quiet times. A **case-study using different heights**, obtained with different instrumentation, as input to the VAAC dispersion models could be useful to understand differences in the observed plume height and to define and clarify the VAAC requirements for modelling.

**ACTION 20:** Scientific study to be led by EUROVOLC WP8 (University of Geneva) with engagement from WP4 (Met Office) to explore the uncertainty in different observations of plume height and the impact this has on dispersion model outputs.

Recommendation: The importance of a **debrief process** between the VAACs and VOs after eruptive events was identified by the workshop.

**ONGOING ACTION:** From now onwards the VAACs agree to engage with the relevant VOs following an eruption to learn any relevant lessons.

## Roadmap timeline

Figure 2 shows the suggested timeline for the implementation of these actions, starting from the original workshop in 2019 and running through to the end of the EUROVOLC project in 2021. Each organisation will have different restrictions to work within and so the timeline is a suggestion of what might be feasible to work towards, rather than an absolute deadline. A review of progress at the EUROVOLC annual meetings led by WP4 for those participants involved in the EUROVOLC project is recommended.

## Recommendations requiring longer term consideration and further discussion

Several recommendations in the workshop report do not lend themselves so easily to immediate actions and/or are not as straight forward to implement. These will be best approached by being the subject of further discussion at a future workshop (Action 19) and for consideration by the wider community at the appropriate Best Practice meetings (Action 16 relates).

For example, it was identified that best practice should be for each VAAC (including the back-up VAAC) and VO to be in contact at least once per year. This is both to test the communications chain and to maintain familiarity and awareness. However, how this would work in practice for those VOs which do not experience regular unrest and/or are not formally supported was unclear. All participants agreed that more opportunities for VOs and VAACs to meet face-to-face (e.g. workshops such as this one) are desirable, but suitable funding to facilitate this does not necessarily exist.

There are several issues around the use and understanding of the VONA and how additional information should be shared. This includes a need to identify which types of observations and information should be included in a VONA and which should be supplementary information shared via other channels. For example, information on the grain-size distribution of ash is a useful eruption source parameter for the VAACs, but it is currently unclear how such information should be shared between the VOs and the VAACs. The VONA is not flexible enough to include such detailed information, therefore alternative distribution routes and data

formats need to be agreed between the VOs and VAACs. The adoption of standard file formats for this would greatly facilitate international coordination.

There is also a need to better understand the requirements of the VONA in terms of data accuracy. One suggestion was the addition of an optional field for communicating uncertainty in the observations of eruption source parameters, which would also be useful to the end users.

An assessment and a summary of which quantitative eruption source parameters each VO can provide, as a function of time during an eruption, would be useful for the VAACs. However, the availability of this information is likely to be situation dependent and keeping such a database up to date will be a challenge.

## Acknowledgements

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731070.

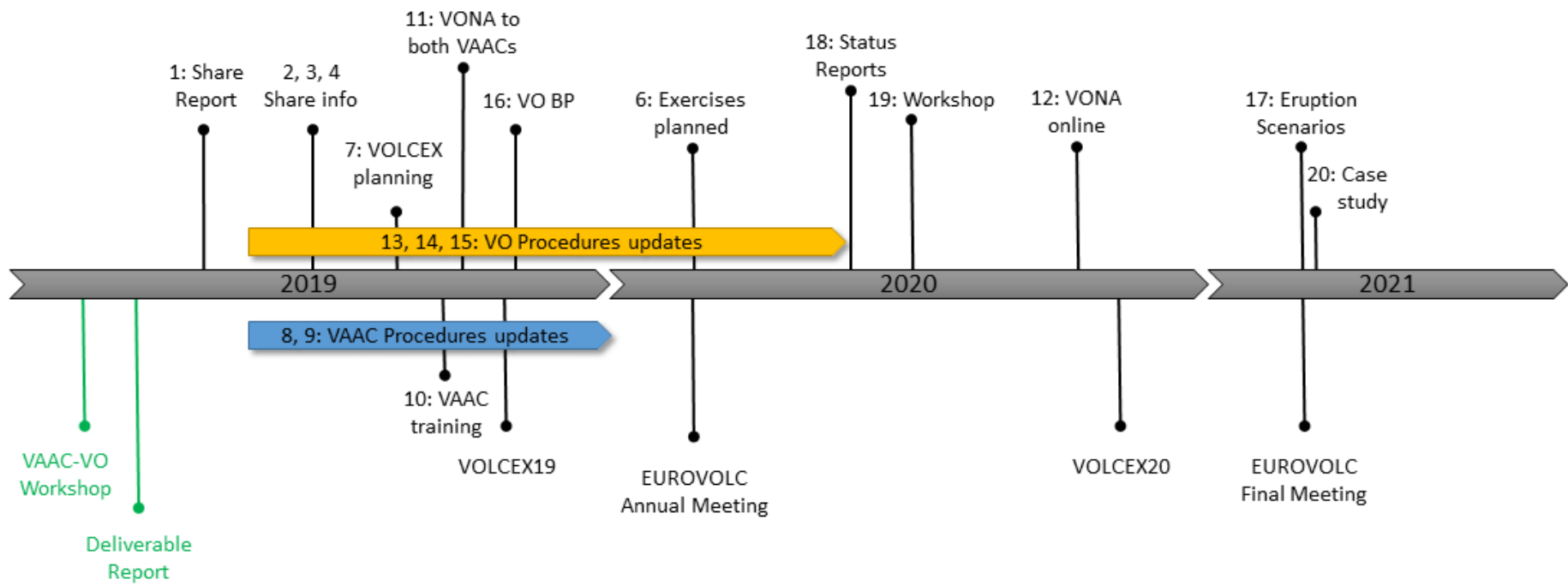


Figure 2: Roadmap for the delivery of the recommendations from the EUROVOLC WP4 workshop on VAAC-VO communications held in February 2019.