

Seventh meeting of the WMO-IUGG Volcanic Ash Scientific Advisory Group (VASAG/7)

Status of follow-up of VASAG/6 (2015) actions

*21 to 23 August 2017
USGS, Vancouver, WA United States*



WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

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WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Action 6/1

- **WMO SCOPE-NOWCASTING update**
 - VASAG's continued strong support for this project as an essential component in the science to services system should be expressed to the SCOPE-NOWCASTING panel (through Dr Pavlonis)
- **Proposed status: Ongoing**



Mike comment 24/7: The SCOPE-Nowcasting initiative continues to be relevant to the VASAG. The first formal meeting of the Executive Panel for the WMO SCOPE-Nowcasting initiative will be held in Geneva, Switzerland from 18-20 September 2017. I will serve on the SCOPE-Nowcasting executive panel and can continue to be a liaison between the VASAG and SCOPE-Nowcasting, if desired. Planning is underway to extend the satellite-based volcanic ash cloud product inter-comparison exercise completed in 2015 under SCOPE-Nowcasting. Links to relevant documents are listed below. I will provide additional information/details at the upcoming VASAG meeting (as per the agenda).

Description of next stage of the inter-comparison activity:

http://www.wmo.int/pages/prog/sat/meetings/documents/IPET-SUP-3_Doc_07-01-02_SCOPE-NWC-PP2.pdf

WMO report on 2015 Volcanic Ash Inter-comparison Activity:

http://www.wmo.int/pages/prog/sat/documents/SCOPE-NWC-PP2_VAIntercompWSReport2015.pdf

Volcanic Ash Inter-comparison Website:

http://cimss.ssec.wisc.edu/meetings/vol_ash15/

Action 6/2

- **Relevant publications**
 - VASAG (through Ms Guffanti) to contribute as required to the updated IAVCEI guidelines [here](#) and promote conformance to these guidelines
- **Proposed status: Ongoing**



Andrew comment 25/7/17: Not complete. The first version of the guidelines for volcano observatories is linked from the World Organisation of Volcano Observatories site at <http://wovo.org/assets/docs/gvo2009s.pdf> (Note that the text at <http://wovo.org/aviation-colour-codes.html> will also require updating in due course). A Word version is attached. I have also attached a quick summary of the post Task Force changes to observatory responsibilities, put together for a meeting in Papua New Guinea a couple of years ago. My thinking was to use this as part of an update to the first edition, ask WOVO to publicise it, and then restart discussions on the status of implementation, potentially for a future workshop at a Cities on Volcanoes meeting.

Greg, do you think that this activity could be something that we could ask the WMO Secretariat to become involved with, given the bridging role that WMO plays to the IUGG? The action will need to transfer from Marianne in any case.

Action 6/3

- **ICAO mechanisms and role of VASAG**
 - VASAG reaffirms its commitment to providing and supporting the METP with expert advice on volcanic ash issues. Co-chairs to convey this to the METP chair (completed)
- **Proposed status: Complete**

Andrew comment 25/7/17: Complete, as noted.

[ANDREW/MARIANNE]
[ANDREW/MIKE/LARRY]

Actions 6/4 and 6/5

Aircraft encounters with ash from Kelud

- The ICAO METP to be asked to promote the importance of sharing the outcomes of VA-related investigations with the science community to facilitate more focussed research (Action: Dr Tupper / Ms Guffanti)
- **Proposed status: Complete**
- Coordinate, through Dr Tupper, Dr Pavolonis, Dr Mastin, the further investigation of the Kelud encounter, and report back to the ICAO METP
- **Proposed status: Complete** (and consider developing a new Action at VASAG/7 on on-going work)



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Larry comment 21/7/17: [...] action item, 6/5, would also have to be considered only partially complete. I expect the details to be the subject of discussion in August.

Mike comment 24/7/17: On Action 6/5: Satellite derived information, at 10 minute time intervals, has been made available, and is being analyzed in tandem with other observations and model solutions. The involved parties can provide a more detailed update on this collaborative activity at the VASAG meeting.

Andrew comment 25/7/17: On Action 6/4: Complete (at MOG 2016, with an action 2/11 resulting), but the issue still remains that it's hard to get information from OEMs about the effects of specific encounters.

On Action 6/5: I think that we should mark this complete, but note and report on the ongoing work (as a new action). This is good news, in the sense that there's been a lot of work around Kelud in terms of the eruption itself. We should spend a little bit of time in the meeting on this. The attached MOG meeting report shows that a report was made back to ICAO on the Kelud investigations.

Larry comment 28/8/17: I agree with Andrew that Action item 6/5 (on the Kelud eruption) should be closed. Scientifically, we have learned a lot. A special volume of JVGR is nearing completion, with some papers already [posted](#). Mike and I are co-authors on one paper (below) that interprets cloud dynamics and lightning. [Hargie, K. A., A. R. Van Eaton, L. G. Mastin, R. A. Holzworth, J. W. Ewert, and M. Pavolonis (in review), Globally detected volcanic lightning and umbrella dynamics during the 2014 eruption of Kelud, Indonesia, Journal of Volcanology and Geothermal Research.]

Action 6/6

- **Global volcano ESP database for restless volcanoes**
 - Encourage BGS to continue to work on making the web-based version of the ESP database available for VASAG review as soon as possible (Dr Mastin)
- **Proposed status: Ongoing**



Sam comment 21/7/17: Action 6/6 is ongoing with the data loaded into an SQL database and development of a front end continuing. To support production of the web-based version, work has been undertaken to:

- a. Identify current use, and requirements for the database through surveys of the VAACs.
- b. Update parameters in the database. The web-based version will enable observatories to comment on current values, and identify any changes that are required.

In addition, work is underway at BGS to utilise information contained within past VAA's to examine volcano classification as a means of validating the database, and to inform eruption source parameter allocation. I am presenting this research at IAVCEI, and intend to discuss results and data with the USGS, Smithsonian and NOAA – I would be happy to talk further about this during the meeting.

Larry comment 21/7/17:

Sam Engwell of the BGS has made much progress on this task and will report her work at the VASAG-7. The database is an ongoing project but not yet available to the VASAG. "Ongoing" would be an appropriate classification. But more meaningful would be some feedback for Sam about what products would be valuable, and perhaps some revision of the action item.

Action 6/7

- **Outreach**
 - Further development of graphically-based information brochures and the website to underpin and complement the priorities and themes of the 3-yearly science workshops (Secretariat, with inputs from VASAG members)
- **Proposed status: Ongoing**

Action 6/8

- **Next generation geostationary satellite applications**
 - Mr Lisk to liaise with the VAACs at the next VAAC Best Practice meeting to discuss how VAAC provider States can best be supported in undertaking their training opportunities
- **Proposed status: Complete**

Action 6/9

- **‘Volcano Desk’ at WMO**
 - WMO Secretariat, with Mr Lisk, to make contact with the GEO Secretariat to explore options for future engagement
- **Proposed status: Ongoing** (or mark as complete and replace by a new Action at VASAG/7)



Ian comment 21/7/17: Action 6/9 is a bust. Dimitar knows more but within available resources the development of a volcano desk is not going to happen. Barbara Ryan is moving on so perhaps we should close this action and open a new one to make contact with the new Head of GEO when they're in post?

Oksana comment 23/7/17: GEO is a branding agency, they do not represent WMO, "volcanic desk" should preferably stay with WMO or link with VAACs

Action 6/10

- **Use of radar data for volcanic ash applications training**
 - Icelandic Meteorological Office, through Dr Barsotti and Dr Karlsdóttir, to consider potential approaches to radar training modules, in collaboration with other relevant countries and with CAeM ET-ETC
- **Proposed status: Ongoing**



Oksana comment 23/7/17: please involve Werner Thomas with scilometer network (he collaborates with SAG Aerosol)

Sigrun and Sara comment 25/7/17:

The status of the VASAG action 6/10 is **on-going**.

Until now IMO has been working on the use of the radar data, mainly to allow an automatic top plume height assessment plus the estimation of mass flow rate by using the inversion model. In addition automatic procedures have been installed to monitor the “uptime” of the radars. Training material as such has not been worked on, but the steps taken so far are important in utilizing the radar observations for volcanic ash monitoring.

The next steps will be:

IMO, AVO and NZ (Wellington VAAC) to exchange of experience and working-procedures regarding radars

Discuss within the VASAG about the feasibility of a workshop on the use of radars at the COV10 (to be held in Naples 2018) – This will give an opportunity to understand the needs of VO and get requirement analysis of training material.

Action 6/11

- **Appropriate methods for assessing aviation hazards and risk**
 - The VASAG agreed to, under the leadership of the co-chairs, develop an information paper to present at the next meeting of the METP WG-MOG in 2016, based largely on the information provided to VASAG and relevant outcomes (including 'Ins and Outs' modelling tables update, other relevant comparison exercise outcomes, and so on) arising from the seventh International Volcanic Ash Science Workshop in Alaska in October 2015
- **Proposed status: Complete**



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Andrew comment 25/7/17: The wording of the action is muddy, but updates on the Workshop and VASAG meetings were given to WG-MOG and WG-MISD. I suggest that we mark complete, but plan on a new action to report back as appropriate.

Action 6/12

- **SO2 monitoring**
 - The VASAG (Dr Witham leading, subject to confirmation) agreed to coordinate the gathering of hazardous gases health impact data and science to (potential) service capability assessments to support the delivery of a paper to the 2016 meeting of the ICAO METP WG-MISD (date to be advised later)
- **Proposed status: Complete**



Oksana comment 23/7/17:

SAG RG can advise on SO₂, this is one of the pollutants in LRTAP convention and EANET and it's been studied for many decades. Health impacts happen in the boundary layer (where you have people). This is a well studied phenomena in air quality community. I do not see the role of VASAG here.

GB comment in response 24/7/17:

There is a growing interest of the aviation community (pilots and flight planners especially) for knowledge of where SO₂ is in the atmosphere – not just at the surface but at altitude. It seems evident from discussions already in certain circles that while there is a great amount of data/information on the monitoring/detectability and health impacts of SO₂ at the surface (occupation health exposure policies etc.), little if anything has been done to study the effects of SO₂ under the lower atmospheric pressures that exist at altitude and of the effects of SO₂ (or even sulphuric acid) on the engines and airframes. This is why one of the ICAO working groups is now involved in this effort and they are seeking the engagement of VASAG and others such as OEMs (original equipment manufacturers of engines, airframes) to progress this issue. They are interested in where people fly, not simply where people live.

CW comment 24/7/17:

Action 6/12 regarding SO₂ monitoring was indeed picked up by me after the VASAG6 meeting. This was completed and a paper presented at the METP MISD-WG meeting in Buenos Aires in April 2016. [METPWG_MISD2_VA-2_SN11_en_SO2_VASAG.pdf]

Action 6/13

- **Future Space-based payloads**
 - VASAG (Dr Pavolonis leading) to coordinate the development of a paper to be submitted to the US National Academies' decadal review
- **Proposed status:** Cancelled (no longer relevant)



Mike comment 24/7/17:

Given the very tight deadline, we were not able to submit a white paper, to the Decadal Survey, on the need for advanced space-based lidar measurements for volcanic cloud detection and characterization. This action was initiated in response to a NASA program manager encouraging the VASAG to advocate for an advanced space-based lidar, as proposed by the NASA Langley High Spectral Resolution Lidar (HSRL) group. In an email, Dr. Chris Hostetler (NASA PI for HSRL activities) stated the following on January 20, 2016:

"The HSRL technique has been a requirement for the ACE Decadal Survey mission, which has been in a perpetual preformulation phase. We anticipate that the science of ACE will be recommended in the next Decadal Survey and the implementation will still call for an HSRL."

Thus, advanced space-based lidar measurements have strong advocacy, even without a VASAG white paper. During the VASAG meeting I hope we can have a discussion on membership gaps/needs, so that we can more effectively respond to large effort, short-fused, tasks like the Decadal Survey white paper action.

Action 6/14

- **IAVW Roadmap**
 - Co-chairs to ensure that sufficient discussion time is allocated at VASAG/7 to review the ICAO METP IAVW and SO2 job cards and the ICAO IAVW Roadmap and to consider the opportunities to map these plans to the on-going and future science and research activities in preparation for a more detailed discussion at the next VASAG meeting. Co-chairs to raise any other related business for discussion between meetings as required
- **Proposed status:** To be determined (to be discussed further at VASAG/7)



Andrew comment 25/7/17: Suggest we review following the discussions at the meeting.

[ANDREW/LARRY]

[MARIANNE]

[ANDREW]

Action 6/15

- **Date and place of next meeting**
 - Co-chairs to discuss proposed meeting arrangements with WMO Secretariat;
 - VASAG (Ms Guffanti) to contact other Scientific Organizing Committees to discuss possible relevant sessions;
 - Consideration be given to updating the explanatory material on the IAVW previously prepared for SVOs (Dr Tupper)
- **Proposed status: Complete**



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Andrew comment 25/7/17: Complete