

## BREAKOUT SESSIONS

The associated breakout sessions provided an opportunity for continued discussion of issues raised by presenters in the five plenary sessions.

### **Breakout Session 1: Improving Volcanic Ash Cloud Detection**

**Session Moderators:** Dr. David Schneider, *U.S. Geological Survey (USGS), Alaska Volcano Observatory*  
Dr. Steven Ackerman, *Cooperative Institute for Meteorological and Satellite Services, University of Wisconsin - Madison*

**Rapporteur:** Ms. Emily McCarthy, *Michigan Technological University (MTU)*

This breakout session was associated with Plenary Session 3 (Ash Cloud Observations, Modeling, and Forecasting). Some of the issues discussed dealt with enhanced satellite imagery for ash detection, satellite-based assessments of ash density and height, and ash detection using remote sensing by radar and reconnaissance flights.

### **Breakout Session 2: Improving Modeling Capabilities**

**Session Moderators:** Mr. Rene Servranckx, *Environment Canada, Canadian Meteorological Center, Volcanic Ash Advisory Center, Montreal*  
Ms. Barbara Stunder, *National Oceanic and Atmospheric Administration/Office of Oceanic and Atmospheric Research/Air Resources Laboratory (NOAA/OAR/ARL)*

**Rapporteur:** Ms. Alexandra Matiella, *MTU*

This breakout session was associated with Plenary Session 3 (Ash Cloud Observations, Modeling, and Forecasting). Some of the issues discussed dealt with defining the ash cloud edge, identifying source-term improvements, assimilating ash cloud observations into dispersion models, and educating the user of model output for better interpretation and decision making. It was recommended that a database be established for use by researchers, modelers, volcanologists, etc. The database would include information on eruptions, ash clouds, satellite imagery, and model output and would serve as a central location of information.

### **Breakout Session 3: Understanding the Socioeconomic Consequences**

**Session Moderators:** Mr. Floyd Hauth, *Science and Technology Corporation (STC)*  
Mr. Peter Lechner, *Civil Aviation Authority of New Zealand*

**Rapporteur:** Mr. Floyd Hauth, *STC*

This breakout session was associated with Plenary Session 1 (Encounters, Damage, and Socioeconomic Consequences). Some of the issues discussed dealt with the costs to en route operations associated with the ash hazard; identifying the impact on aerodrome operations; identifying the cost benefits associated with improved detection, reporting, and forecasting; and identifying criteria for prioritizing research. Recommendations included identifying costs associated with ash encounters and the benefits from mitigation efforts; establishing a process for closing an airport because of volcanic ash; and establishing a policy on the required spatial separation for ash avoidance. It was also recommended that all volcanic ash incidents, level 3 and above, be reported.

### **Breakout Session 4: Improving Volcanic Eruption Reporting**

**Session Moderators:** Ms. Christina Neal, *U.S. Department of the Interior/USGS/Alaska Volcano Observatory*  
Ms. Cynthia Gardner, *U.S. Department of the Interior/USGS/Cascades Volcano Observatory*

**Rapporteur:** Ms. Gari Mayberry, *USGS*

This breakout session was associated with Plenary Session 2 (The Volcanic Source-Eruption Monitoring and Reporting). Some of the issues discussed dealt with identifying new methods of volcano monitoring in support of aviation users, characterizing the type of volcano activity report that is optimal for aviation users, and identifying where volcano reporting can be improved. The group agreed that the characteristics of a good volcanic activity report included being timely, consistent, and simple. Other considerations for aviation users included plume height, use of feet, miles, and decimal degrees as the preferred units, and the notification of increasing volcano activity.

## **Breakout Session 5: Technology Transfer from Research into Operations**

**Session Moderators:** Mr. Mark Andrews, *Department of Commerce/NOAA/National Weather Service/Aviation Weather Services*  
Ms. Debi Bacon, *U.S. Department of Transportation/Federal Aviation Administration*

**Rapporteur:** Mr. Thomas Fraim, *Office of the Federal Coordinator for Meteorological Services and Supporting Research*

This breakout session was associated with Plenary Session 5 (Aviation Industry Perspectives). Some of the issues discussed dealt with current technology transfer procedures and possible improvements to these procedures, the private-sector perspective implementing new technologies, and understanding how technology is introduced in support of international air navigation. The discussion focused on the FAA's Aviation Weather Technology Transfer (AWTT) process which covers end-user products. Systems such as the Integrated Terminal Weather System (ITWS) do not come under the AWTT process. It was noted that one product (Volcanic Ash Graphic) is currently in the AWTT pipeline. It was recommended that the AWTT process be expanded to include agencies involved in more basic research in order to better link basic research with operational applications.

## **Breakout Session 6: Improving VAAC Operational Capabilities**

**Session Moderators:** Mr. Raul Romero, *International Civil Aviation Organization, Montreal, Canada*  
Ms. Grace Swanson, *U.S. Department of Commerce/NOAA/National Environmental Satellite, Data, and Information Service (NESDIS)/Volcanic Ash Advisory Center, Washington, D.C., USA*

**Rapporteur:** Ms. Donna McNamara, NOAA/NESDIS

This breakout session was associated with Plenary Session 4 (VAAC Operations and Capabilities). Some of the issues discussed dealt with reducing inconsistencies among VAACs and Meteorological Watch Offices (MWOs) in interpreting the significance of ash events, achieving necessary staffing levels and training, reducing communications problems, and leveraging opportunities for improved cooperation and sharing of information. Two issues from this session concerned the dissemination of Volcanic Ash Advisories and training. Graphical products are preferred, but format standardization and communications present challenges. Training is a continuing issue. It was noted that ICAO only sets training requirements; the actual training is the responsibility of individual states. The biggest operational challenges are eruption notification, determining plume height, model inaccuracies, and communications.

## **Breakout Session 7: Meeting Aviation Needs**

**Session Moderators:** Mr. William Phaneuf, *Air Line Pilots Association*  
Mr. Richard Heuwinkel, *FAA*

**Rapporteur:** Mr. Donald Carver, *FAA*

This breakout session was associated with Plenary Session 5 (Aviation Industry Perspectives). Some of the issues discussed dealt with requirements for the dissemination and display of volcanic ash information, evaluating current and proposed products, the ash threshold for closing airspace and the criteria for resuming operations, and the timeliness of reports and ash information. Emerging themes from this session included the standardization of products from VAAC to VAAC, the need for graphical products, communication links to get the information to the cockpit, and training.

### **Breakout Sessions Summary**

The breakout sessions continued to have similar issues and action items which were first mentioned in the plenary sessions. These are:

- Clearly define the 5-minute warning issue as a requirement or a goal.
- Define a detection threshold concentration for volcanic ash cloud.
- Establish a database on volcanic eruption for use by all interested parties. This database would include, for example, information on ash clouds, satellite data, and model output.
- Establish a web page for volcanologic community to contain at a minimum 1) sample interagency plans and notification strategies; 2) recommended standard reporting format for volcanic warnings from volcanologists; 3) tutorial for volcanologists on the aviation and aviation-meteorology terms and procedures (e.g., SIGMETs); and 4) information on how to obtain ICAO Annex 3 and the ICAO Manual on Volcanic Clouds.
- Explore the issue of uncertainty in modeling results. Would a measure of uncertainty be useful to the user community?
- Provide education/training on models and on the interpretation of model results. As a first step, model guidance could be posted on VAAC web sites for education and decision making.
- Establish a process to identify and collect cost/benefit data.
- Establish/coordinate a policy on spatial avoidance of known volcanic ash clouds.
- ICAO should initiate/coordinate a requirement to report all volcanic ash incidents on Level 3 and above (severity scale index).
- Improve the FAA's technology transfer process to include more participation from users, particularly those agencies involved in basic research (e.g., NASA), to provide a user's utility feedback loop.
- Improve the requirements for advanced sensors for ash and eruption detection on future geostationary satellites.

- Improve and provide more graphical depiction of volcanic ash products and forecasts to pilots/dispatchers for situational awareness and route planning.
- Standardize products between VAACs.