VAAC London operational developments following the recent Icelandic eruptions

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New linkages since 2010

- UK Gov CCS
- VAORG
- VAAG
- ICELAND MoU
- ICAO & WMO
- VAAC Best Practice
- VASAG
- IVATF
- PROJETS
- UK Government & industry
Operational system developments

- New forecaster interface to NAME with ESP options
- New forecaster tool for VAA/VAG and concentration charts
- New observation summaries and 16:30 briefing
Satellite developments

Quantitative ash retrievals

Simulated ash products

SO2 retrievals
Observation developments

- **ATDnet** stroke density April–May 2010

- **MOCCA**

- **LIDAR**

- **Aerosol sonde**

- **European ‘LidarNet’**

- **New UK network**
Model developments

- Validation, analysis and publication
- Ash resuspension scheme and forecast
- Improved wet deposition scheme
- Eulerian-Lagrangian hybrid scheme
- Inversion system for real-time use
  - Ash mass retrievals from SEVIRI

Inversion work conducted primarily by Rachel Pelley and Michael Cooke, UK Met Office


NAME run for use with InTEM

- Particles are released from the volcano at a rate of 1g/s within each height block.
- 3-hour time-steps
- Model and satellite compared hourly
- Sensitivity tests have been conducted for different time-steps and height ranges
Inversion Modelling

Example of modelled plume from 1g/s release

Inversion system

\[ M_e \approx o_a \]

New source term profile

Gives a new modelled plume closer to satellite observations

Observational Data
Grimsvötn 2011 results

Inversion with clear sky retrievals

Inversion without clear sky retrievals

a priori
Eyjafjallajökull 2010 results

*a priori source term profile*

*inversion source term profile using observations until 25/05/2010 00:00*
Using the Solution in Operations

- How reliable is the inversion vertical distribution?

Per time-step:

- Calculate the total mass released

- Estimate a bottom height for from the location of the 5th mass percentile

- Estimate a top height from the location of the 95th percentile

- Guidance values provided to forecasters to use with complimentary data
Operational Challenges

• Computational resource limitations 
  • Real-time requirement
• Forecaster familiarity with new data streams and their limitations 
  • Training courses & competency testing
• EUR/NAT requirement for a contoured Safety Risk Assessment product
• Over-reliance on radar height data as ESP
• Understanding and conveying uncertainty