

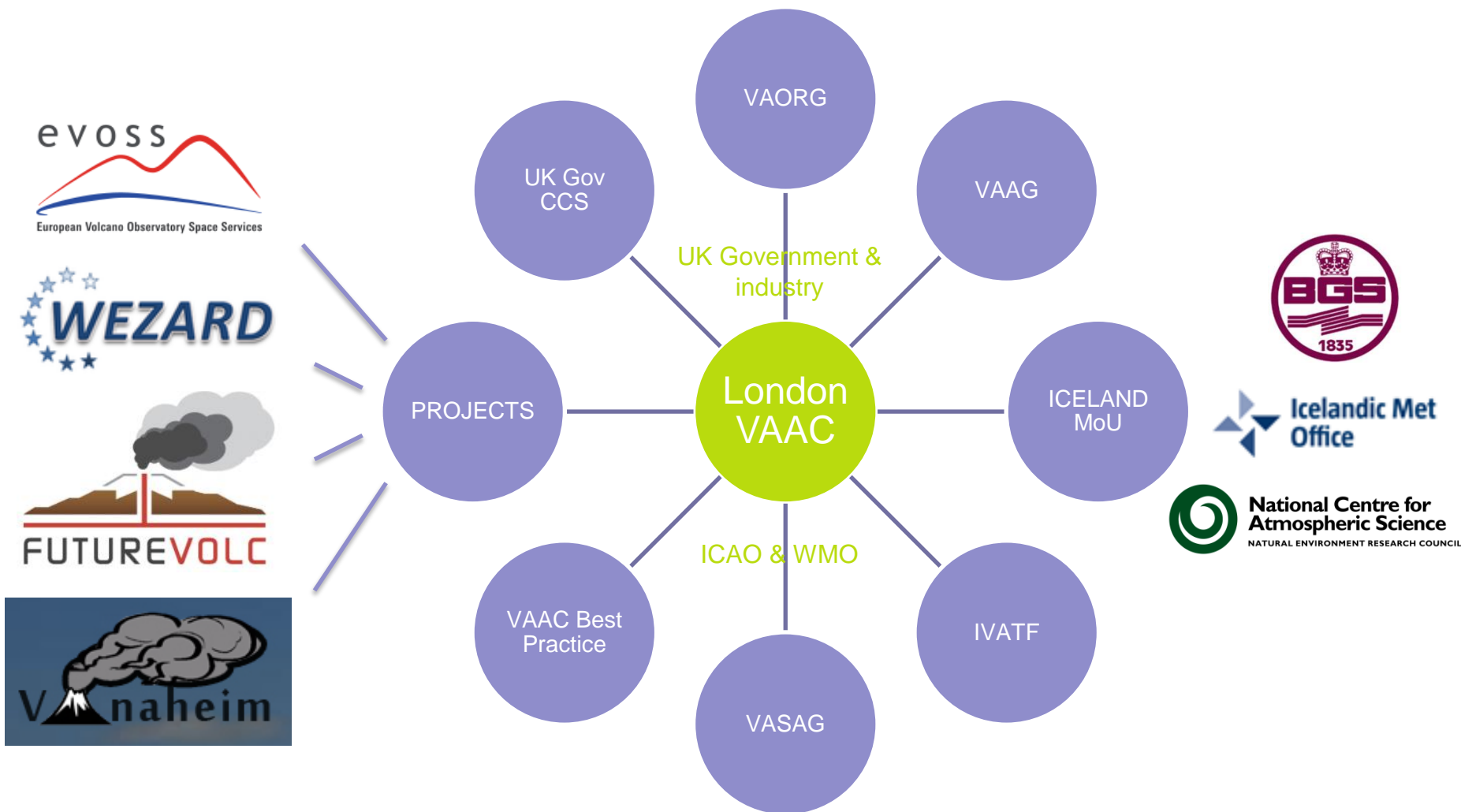


VAAC London operational developments following the recent Icelandic eruptions

Claire Witham, Anton Muscat, Rachel Pelley, Matthew Hort, Susan Leadbetter, Peter Francis, Michael Cooke, Sarah Millington, Ian Lisk



New linkages since 2010





Operational system developments

New forecaster interface to NAME with ESP options



New forecaster tool for VAA/VAG and concentration charts



VAAC-D VAAC System Interface

13/11/2013 14:23:56 UTC User Guide Log System Info Logged in as claire Log out

Task Settings

	Basic		Eruptions		Advanced				
	Top (m asl)	Top (FL)	Bottom (m asl)	Bottom (FL)	Start date/time UTC (click calendar to set)	Mastin mass fraction (%)	Mass release rate (g/hr)	Particle size distribution	Remove?
1	10000	328	3000	98	13-11-2013 09:00	5.0		Default	<input type="checkbox"/>
2	12000	394	4000	131	13-11-2013 09:30	5.0		Default	<input type="checkbox"/>

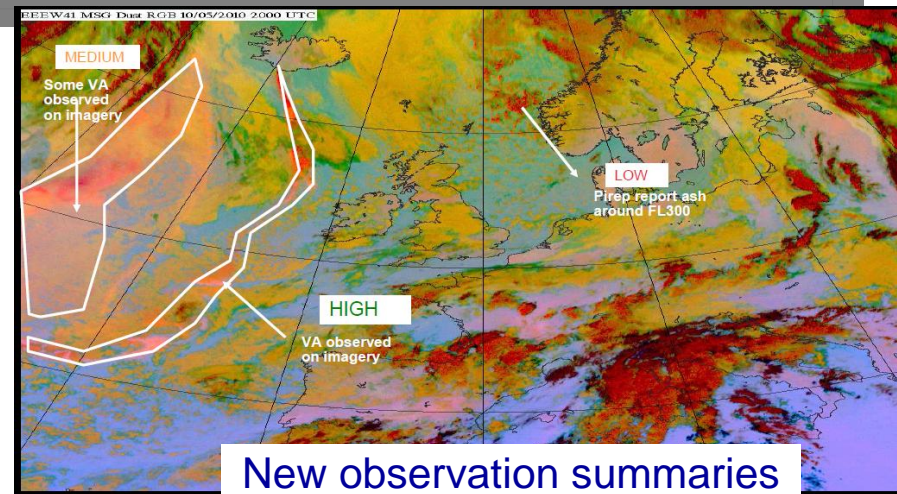
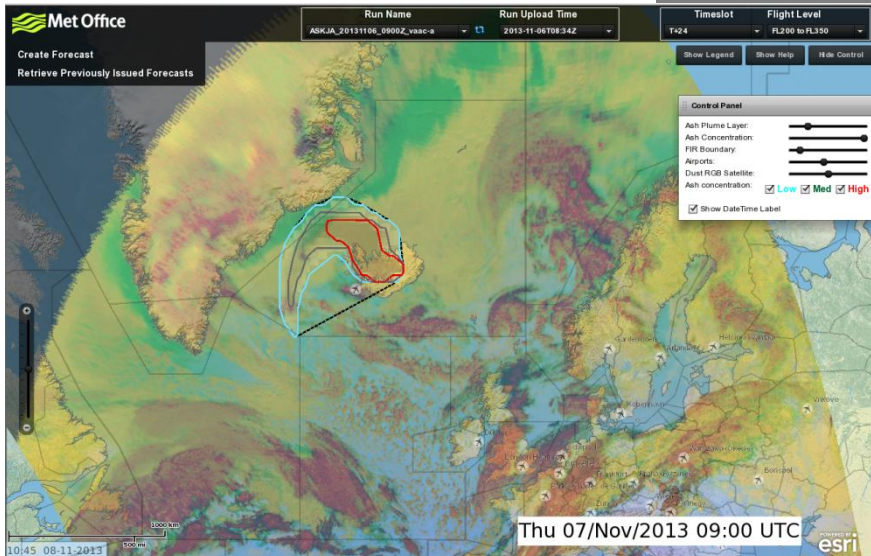
Add an eruption source Remove a source row Pause eruption

Scenarios (optional)

B: Top (m): Bottom (m): Mastin mass fraction (%): Mass release rate (g/hr):

C: Top (m): Bottom (m): Mastin mass fraction (%): Mass release rate (g/hr):

Save changes Save as copy Close

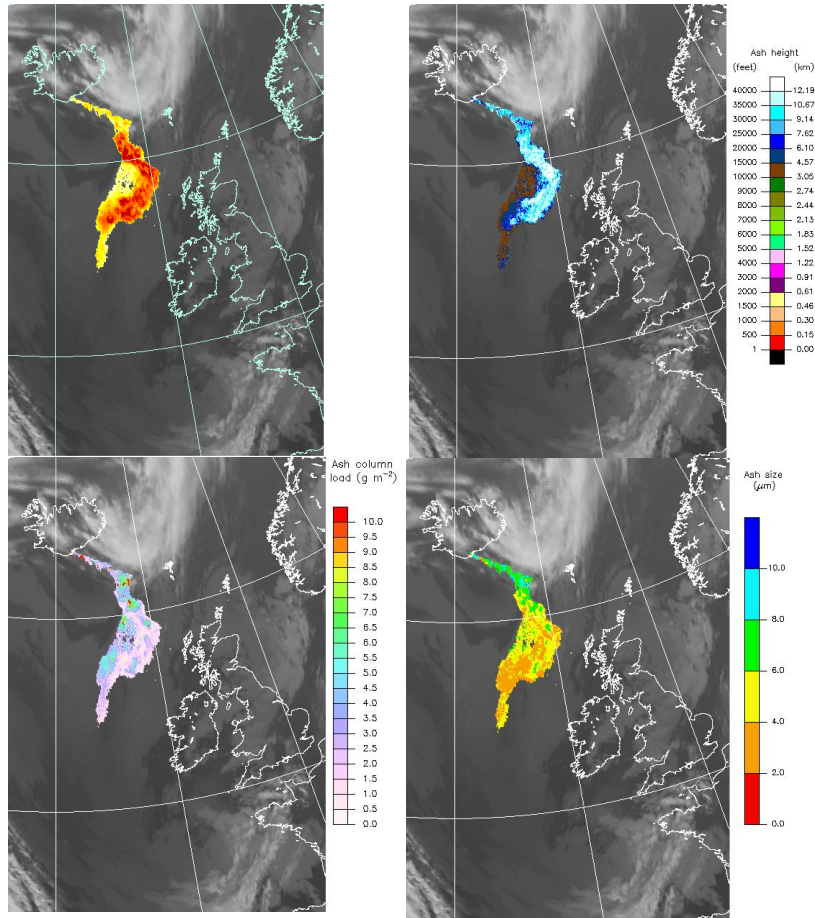


New observation summaries and 16:30 briefing

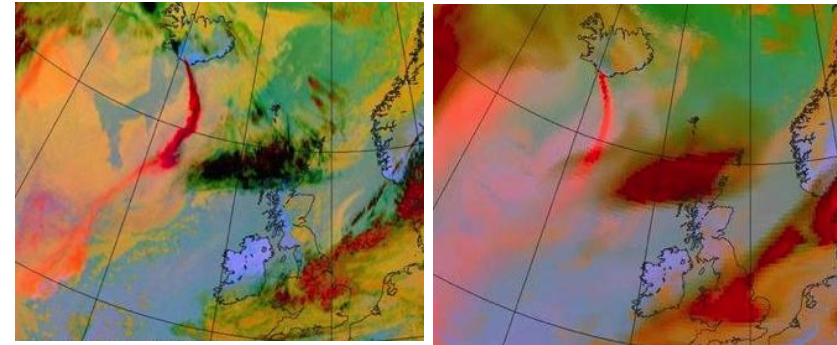
Satellite developments

See poster by Sarah Millington

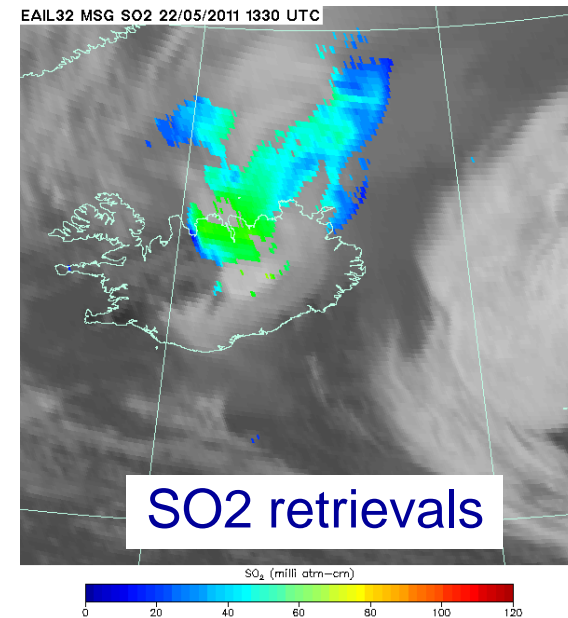
Quantitative ash retrievals



Francis et al, 2012, JGR spec. ed.



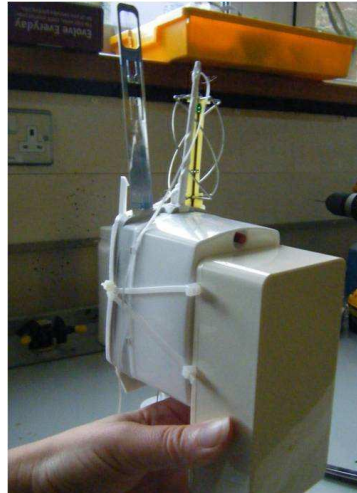
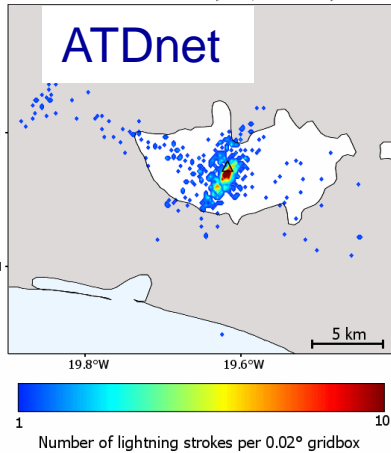
Simulated ash products
Millington et al, 2012, JGR spec. ed.



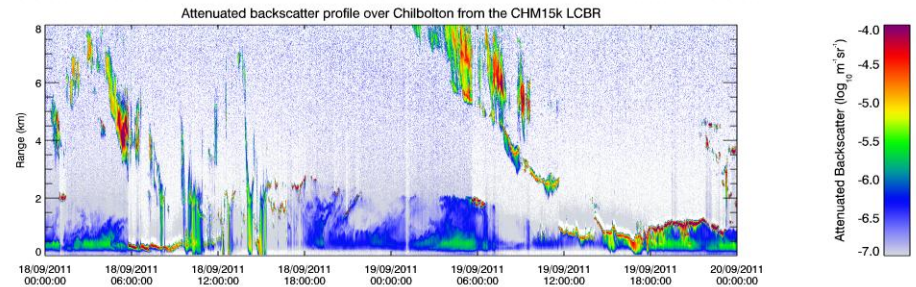
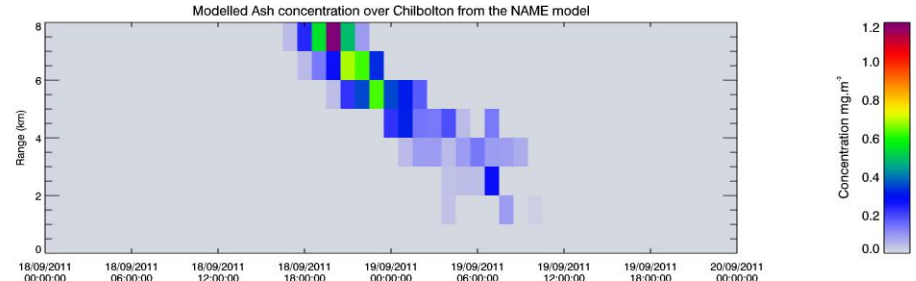
SO₂ retrievals

Observation developments

ATDnet stroke density April–May 2010

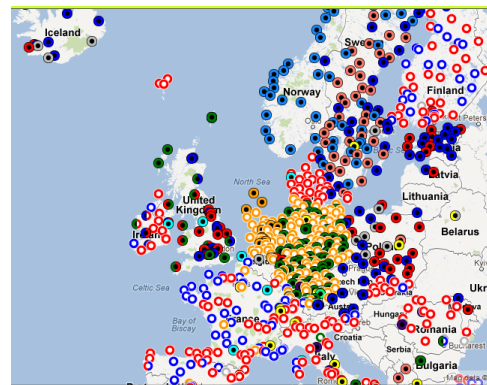


Aerosol sonde



LIDAR

MOCCA



European 'LidarNet'



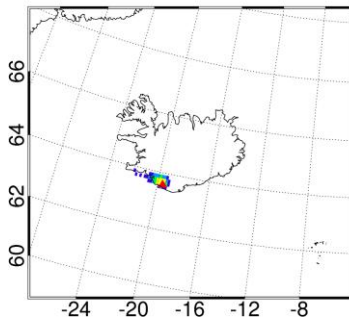
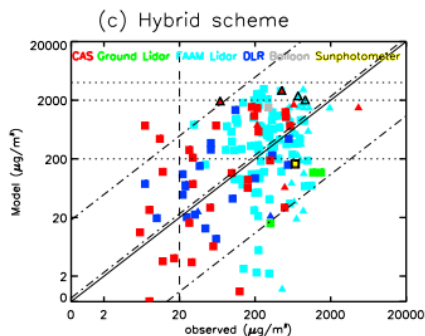
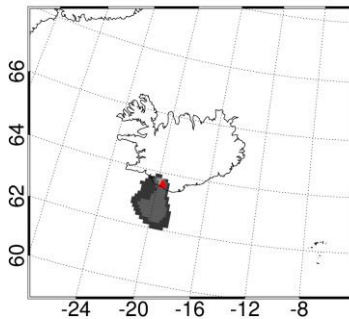
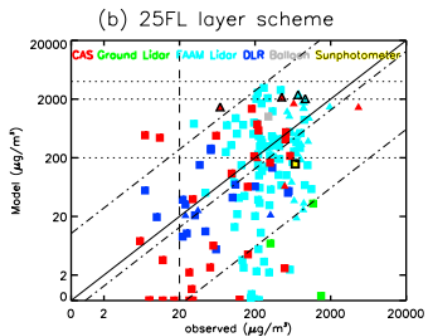
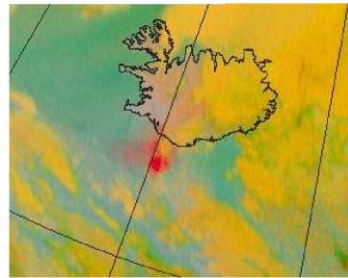
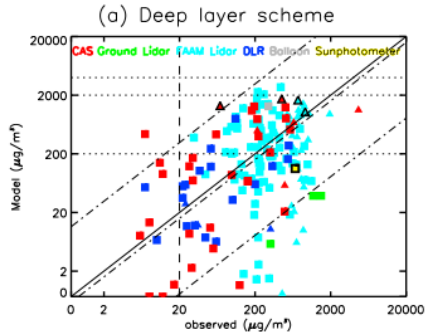
New UK network



Met Office

Model developments

2100 UTC 25/05/2010



- 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

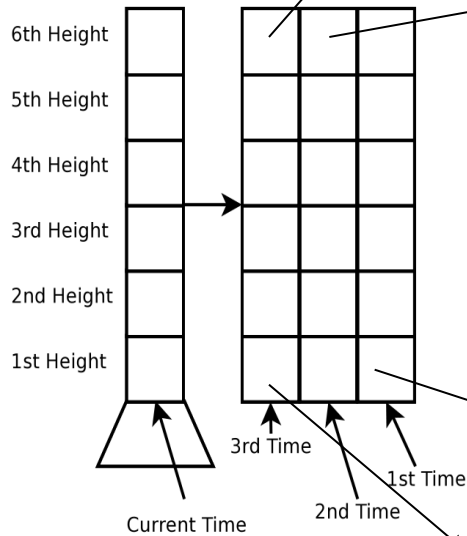
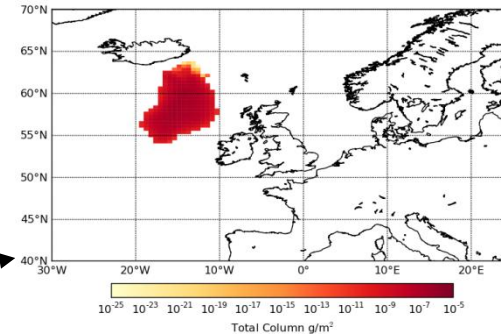
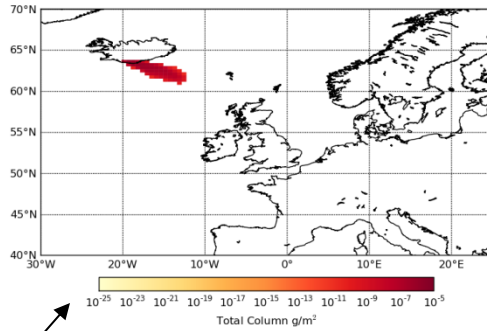
Webster et al, 2012,
JGR spec. ed.

Leadbetter et al, 2012,
JGR spec. ed.

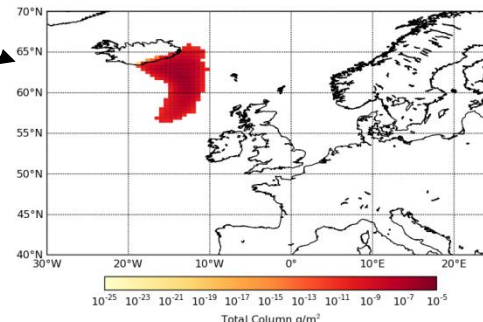
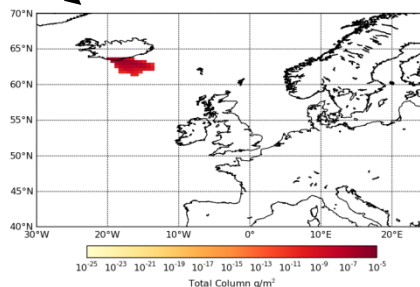
Inversion work conducted primarily by Rachel Pelley and Michael Cooke, UK Met Office



NAME run for use with InTEM



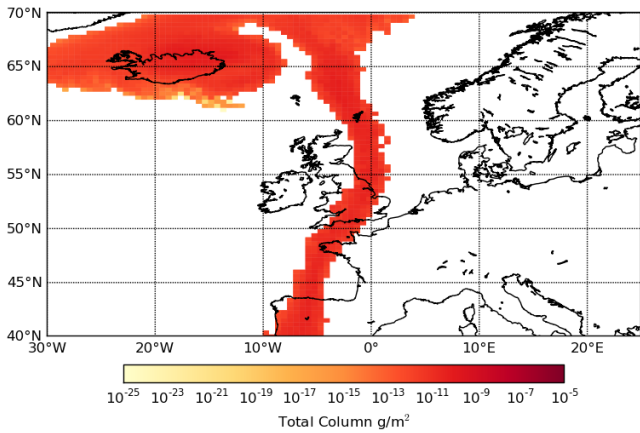
- Particles are released from the volcano at a rate of 1g/s within each height block.
- 3-hour time-steps
- Model and satellite compared hourly
- Sensitivity tests have been conducted for different time-steps and height ranges



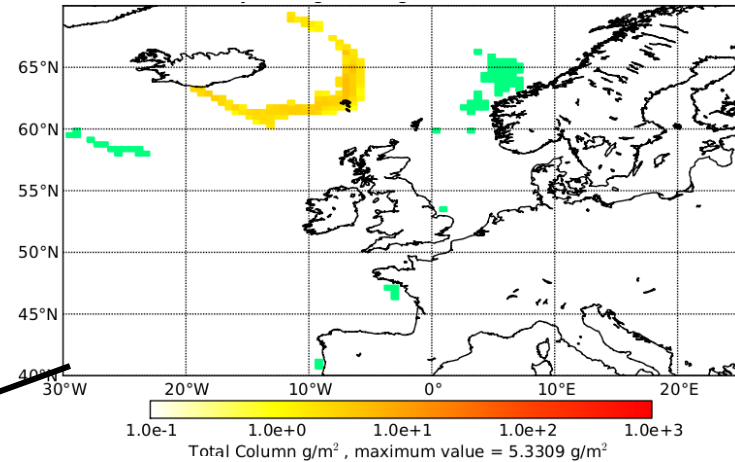


Inversion Modelling

Met Office
Example of modelled
plume from 1g/s release

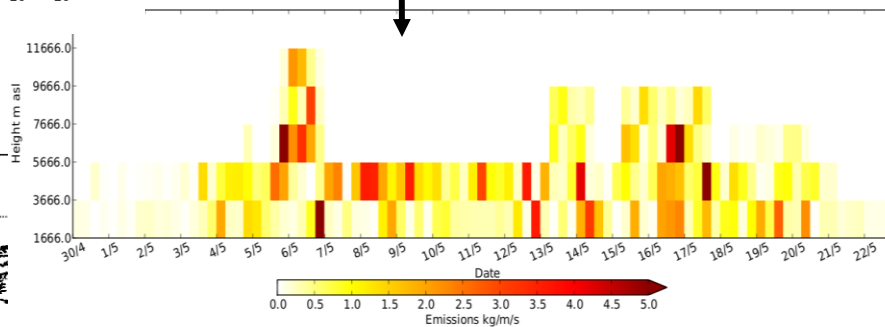
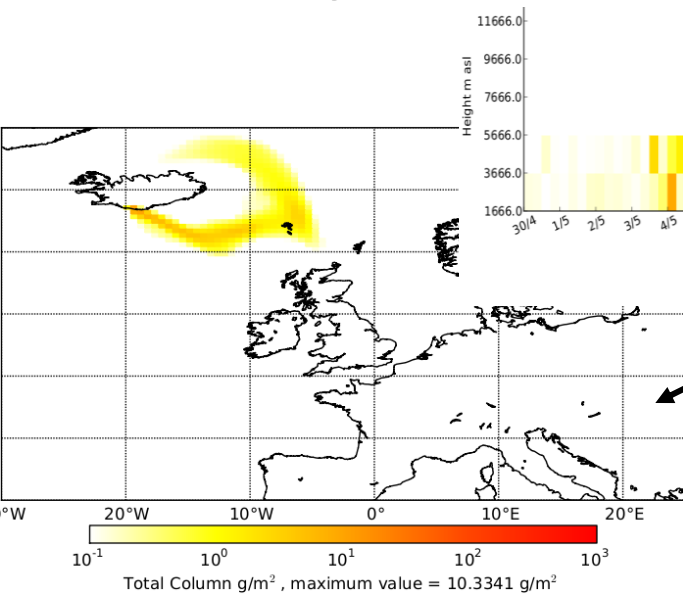


Observational Data



Inversion
system

$$M_e \approx O_a$$



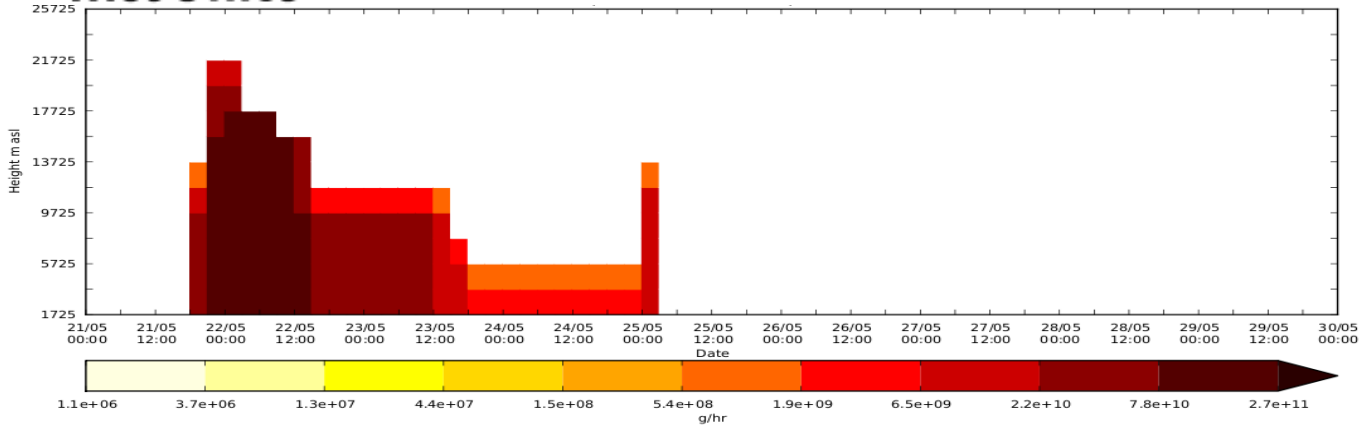
New source term
profile

Gives a new modelled plume closer
to satellite observations

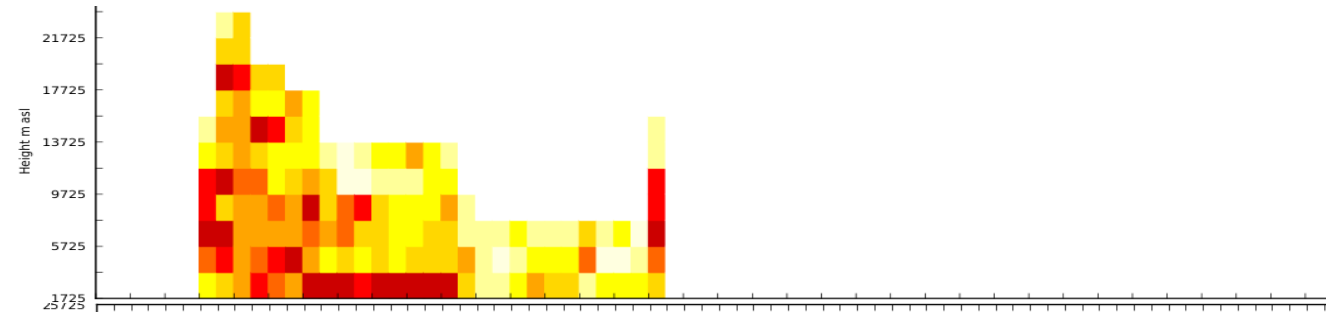


Grimsvötn 2011 results

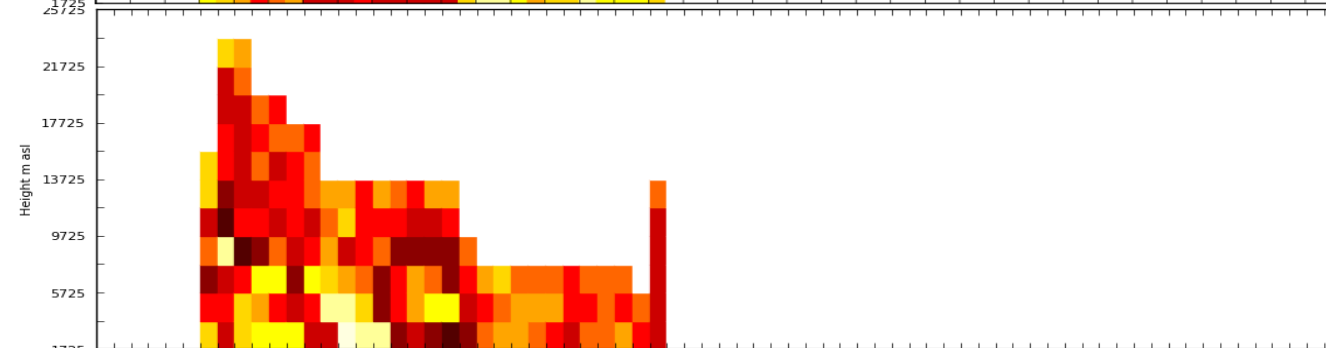
Met Office



a priori



inversion with
clear sky
retrievals

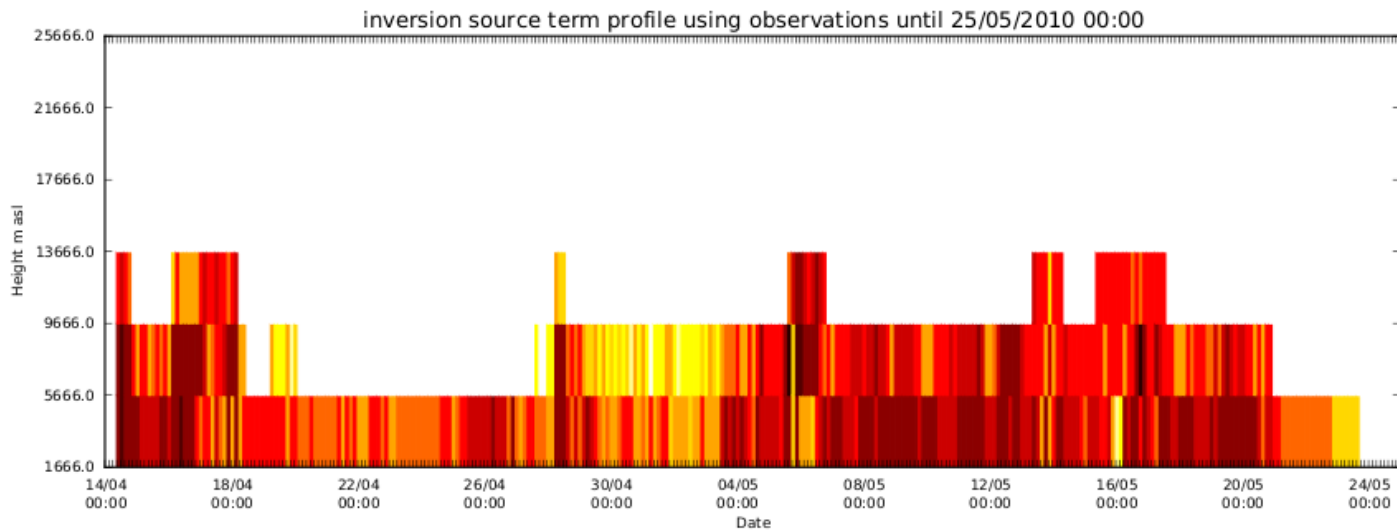
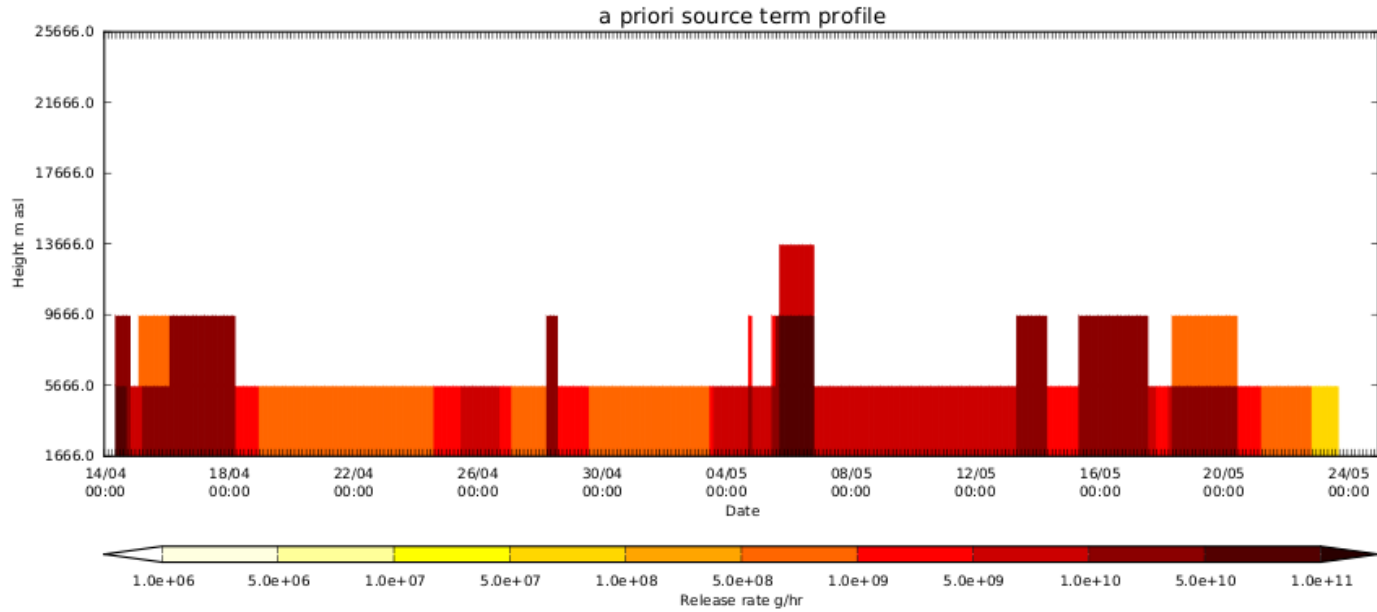


inversion without
clear sky
retrievals



Met Office

Eyjafjallajokull 2010 results



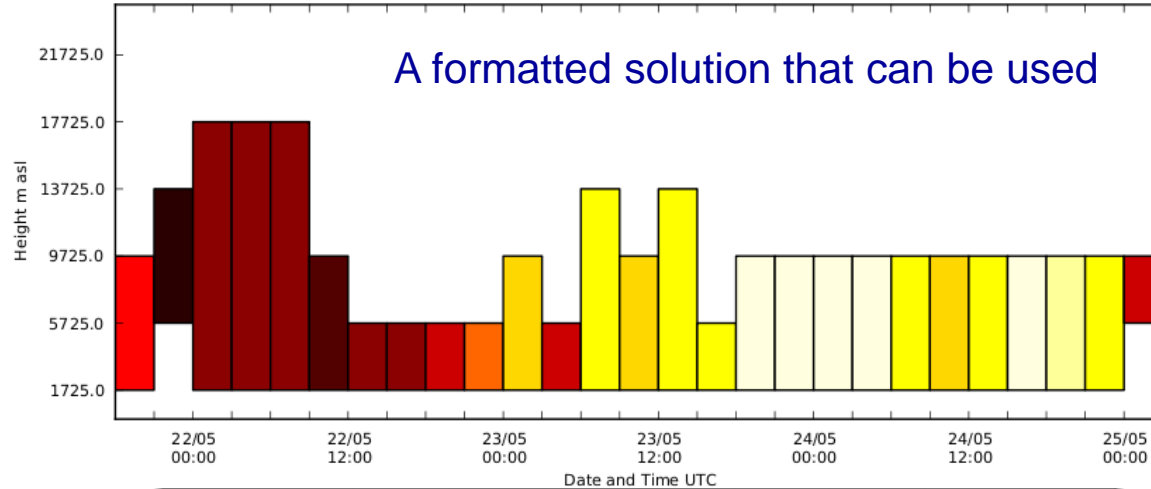
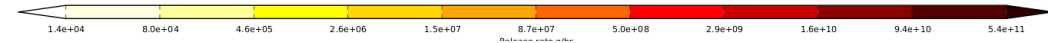
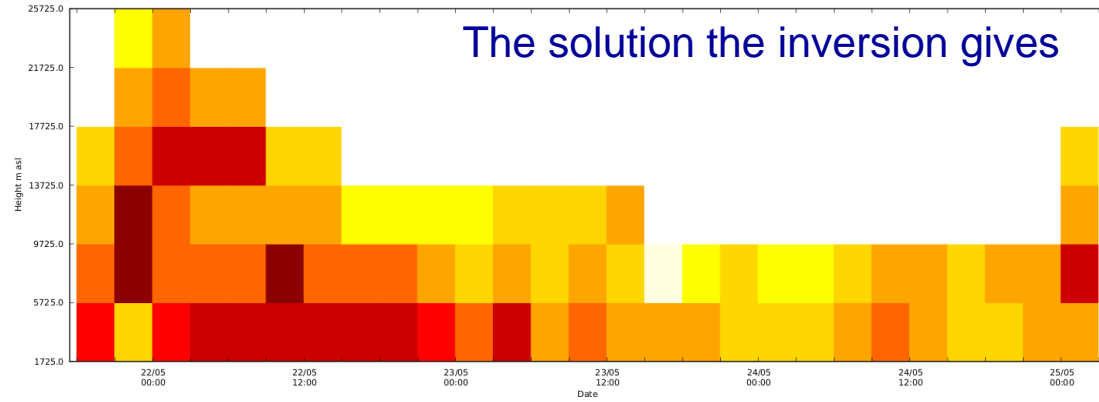


Using the Solution in Operations

- How reliable is the inversion vertical distribution?

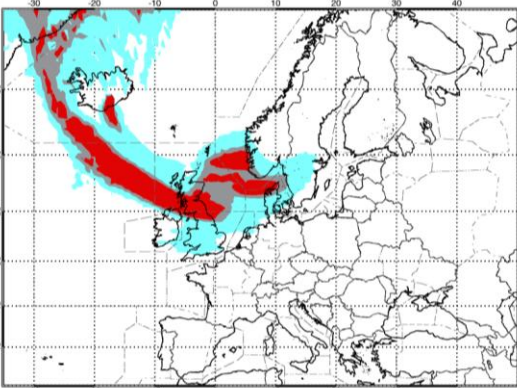
Per time-step:

- 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



Start Time	Low mass	Inv. Mass	Prior Mass	High mass	Bottom	Top
21/05/2011 18:00	2.21e+09	2.21e+09	1.23e+11	2.22e+09	1725.0	9725.0
21/05/2011 21:00	6.30e+10	6.30e+10	1.39e+12	6.30e+10	5725.0	13725.0
22/05/2011 00:00	1.06e+10	1.06e+10	1.72e+12	1.06e+10	1725.0	17725.0
22/05/2011 03:00	1.92e+10	1.92e+10	2.07e+12	1.92e+10	1725.0	17725.0
22/05/2011 06:00	1.54e+10	1.54e+10	2.07e+12	1.55e+10	1725.0	17725.0
22/05/2011 09:00	4.98e+10	4.98e+10	1.16e+12	4.98e+10	1725.0	9725.0
22/05/2011 12:00	1.33e+10	1.34e+10	4.95e+11	1.34e+10	1725.0	5725.0
22/05/2011 15:00	1.48e+10	1.48e+10	1.62e+11	1.48e+10	1725.0	5725.0

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