

Volcanic Ash Advisory Centre - London

Volcanic Ash Concentration Forecasts

Specifications of Data Formats for Data and Graphic Files

Implementation Date 31st March 2011

Introduction:

During the April/May 2010 eruption of the Icelandic volcano Eyjafjallajökull the UK Met Office – Volcanic Ash Advisory Centre London (VAAC London) commenced production of modelled ash concentration charts supplementary to the ICAO Annex 3 Volcanic Ash Advisory and Volcanic Ash Graphic products. During the period of the eruption these charts developed through several iterations, finally indicating 3 regions which were shown as areas of high concentration (black), medium concentration (grey) and low concentration (red).

Since the Eyjafjallajökull eruption, the data provided by the UK Met Office has been reviewed. One finding was that there was limited documentation relating to the data and graphic files that were issued. This document addresses this issue and provides information on the formats of the data and graphic files that will be provided.

These changes will be implemented on the 31st March 2011 and used in the event of an eruption after this time. These revisions will also be used for the Volcanic Ash Exercise (VOLCEX 11/01). A number of these changes have been implemented following discussions with the UK CAA, a number of airlines and air navigation service providers, some of which were raised as “lessons learnt.”

It should also be noted that attached at Appendix D is the timeline that will be used for the issuance of the volcanic ash forecasts.

VAAC London information is displayed on the UK Met Office webpage at: <http://www.metoffice.gov.uk/aviation/vaac/>

This document discusses:

1. The revised colour scheme for Volcanic Ash Concentration Charts;
2. The height ranges used for Volcanic Ash Concentration Forecasts (Charts and CSV files), and ICAO Volcanic Ash Advisory/Volcanic Ash Graphic products;
3. Changes to CSV data header format;
4. Revisions to the filename structure for the CSV files and the Volcanic Ash Concentration Charts.

Appendix A: Example of the revised colour scheme for Ash Concentration Charts

Appendix B: Example of the CSV data file including header

Appendix C: Explanation of the revised product filename structure

Appendix D: Timeline for the issuance of volcanic ash forecasts

Appendix E: Specifications of data formats for data and graphic files

Implementation:

These revisions will be implemented by the UK Met Office at 1200 UTC on the 31st March 2011, and will therefore be in place for the forthcoming Volcanic Ash Exercise (VOLCEX 11/01) which takes place on 13th and 14th April 2011.

Future Changes

The UK Met Office has noted that further revisions to the data files would provide users with additional valuable information. A number of airlines have also suggested changes that they believe

would increase the usability of the VA Concentration Charts. It is proposed that a paper is presented at the VOLCEX De-brief meeting in June with a view to including this information as an Appendix to the EUR/NAT Volcanic Ash Contingency Plan (ICAO EUR Doc 19 and NAT Doc 06 Part II).

1. Revised Colour Scheme for Ash Concentration Charts:

As provided during the Eyjafjallajökull eruption two chart areas will be provided. One chart will show Europe and NW Atlantic, with FIR boundaries and country borders indicated. The second chart will show the Atlantic, Europe and Asia and on this chart only country borders will be shown. In both cases, the land area will not be coloured. See examples at Appendix A

It has been agreed that the new colour scheme will be:

- >=200 <=2000 micrograms per cubic metre (Low Contamination): Cyan
- >2000 <4000 micrograms per cubic metre (Medium Contamination): Grey
- >=4000 micrograms per cubic metre (High Contamination): Red

An example of the revised colour scheme is shown at Appendix A.

The reasons for the change to the colour scheme are:

1) The original colour scheme, introduced at very short notice, was subsequently not considered the most appropriate, in particular use of red to indicate low contamination areas. The new colour scheme more logically indicates red as the region with expected highest concentrations of volcanic ash.

2) The reproduction of the original red/grey/black charts when printed in greyscale or photocopied in black and white produced indiscernible areas. The new colour scheme has been shown to provide discernable images when printed in greyscale on black and white printers/photocopiers¹.

2. The Height Ranges used for Ash Concentration Forecasts, and ICAO Volcanic Ash Advisory/Volcanic Ash Graphic products:

The 'deep' layer height ranges that will be used for aviation purposes will be as follows

- FL000 to FL200
- FL200 to FL350;
- FL350 to FL550.

These height ranges will be used by VAAC London for the ICAO Volcanic Ash Advisory (VAA) and the ICAO Volcanic Ash Graphic² (VAG) products. This will make the VAA and VAG consistent with the Volcanic Ash Concentration forecasts.

These height ranges will be applied to CSV, and Volcanic Ash Concentration Charts.

¹ Note, the UK Met Office as London VAAC has no control over the quality of printers/photocopier models in use by the aviation community. Users may need to adjust print quality settings to achieve discernible images when printing in greyscale (or in colour). UK Met Office does not guarantee that greyscale/colour printouts will be discernable on any particular printer/photocopier model/setting.

² Not to be confused with the supplementary Volcanic Ash Concentration Charts.

3. Revisions to CSV format:

Three minor changes to the CSV formatted data header have been made, in the Volcanic Ash Concentration field High, Medium and Low will now be used. In the Remarks field the addition of the word Test or Exercise will be included as appropriate. Additionally, in order to allow transmission through systems that do not allow lower case, 'Poly' will be changed to 'POLY' to identify separate polygons. Appendix B gives an example of the revised CSV format.

4. Revisions to filename structure:

Changes have been made to the filename structure of the files. The changes have been made to provide metadata about the contents of the file (whether graphic or CSV) which will allow machines to identify what the file represents. Additionally, it is possible for humans to read the filename and likewise be able to determine what the file represents without opening the file. See Appendix C for filename convention.

Appendix A: Example of the revised colour scheme for the Volcanic Ash Concentration Charts

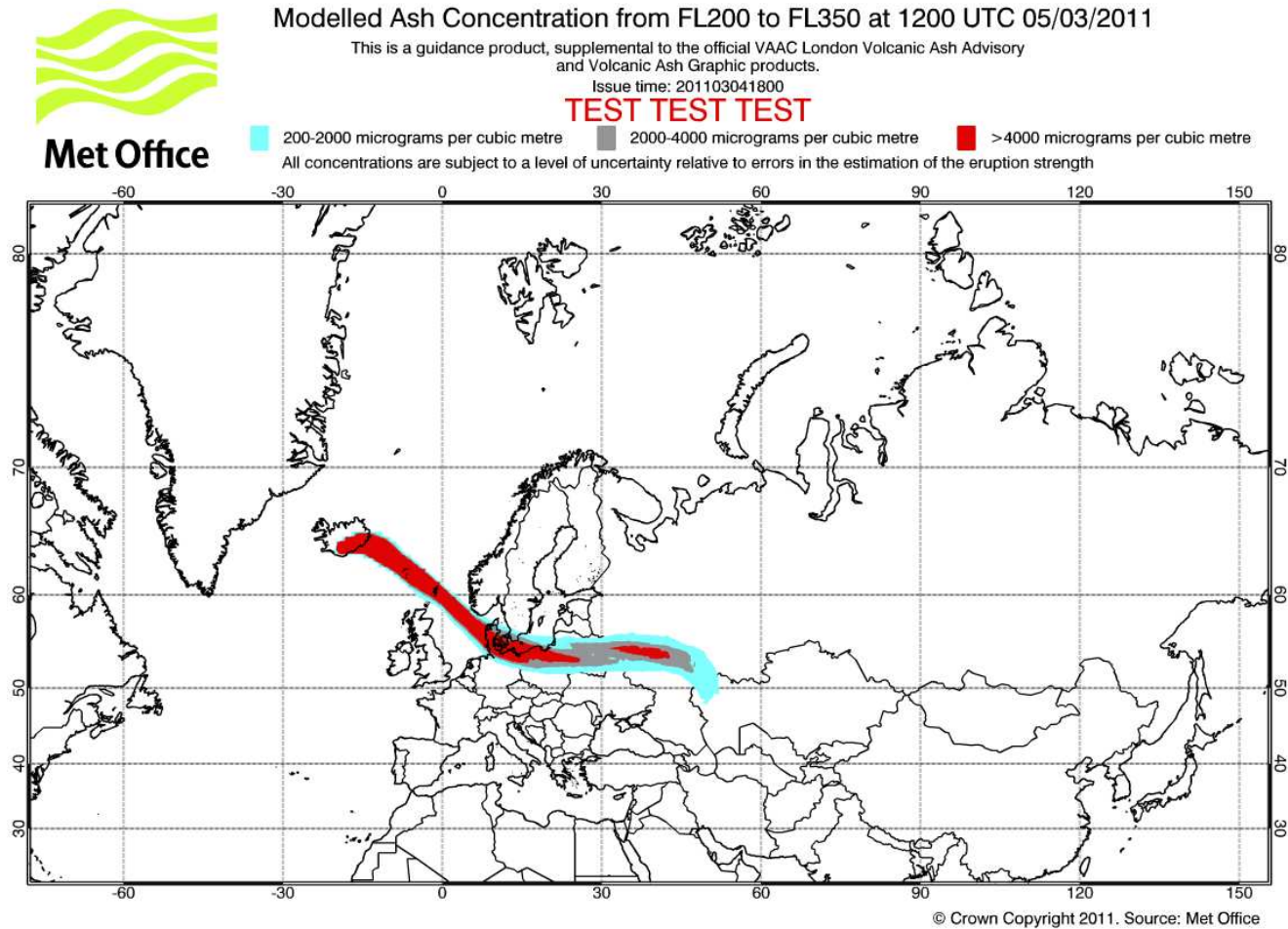


Figure 1: Example of the larger map area using new colour scheme, and also indicating a "TEST TEST TEST" stamp.



Met Office

Modelled Ash Concentration from FL200 to FL350 at 1200 UTC 05/03/2011

Issue time: 201103041800

This is a guidance product generated from model data and is supplemental to the official VAAC London Volcanic Ash Advisory and Volcanic Ash Graphic products. FIR boundaries are indicated for reference

TEST TEST TEST

200-2000 micrograms per cubic metre 2000-4000 micrograms per cubic metre >4000 micrograms per cubic metre

All concentrations are subject to a level of uncertainty relative to errors in the estimation of the eruption strength

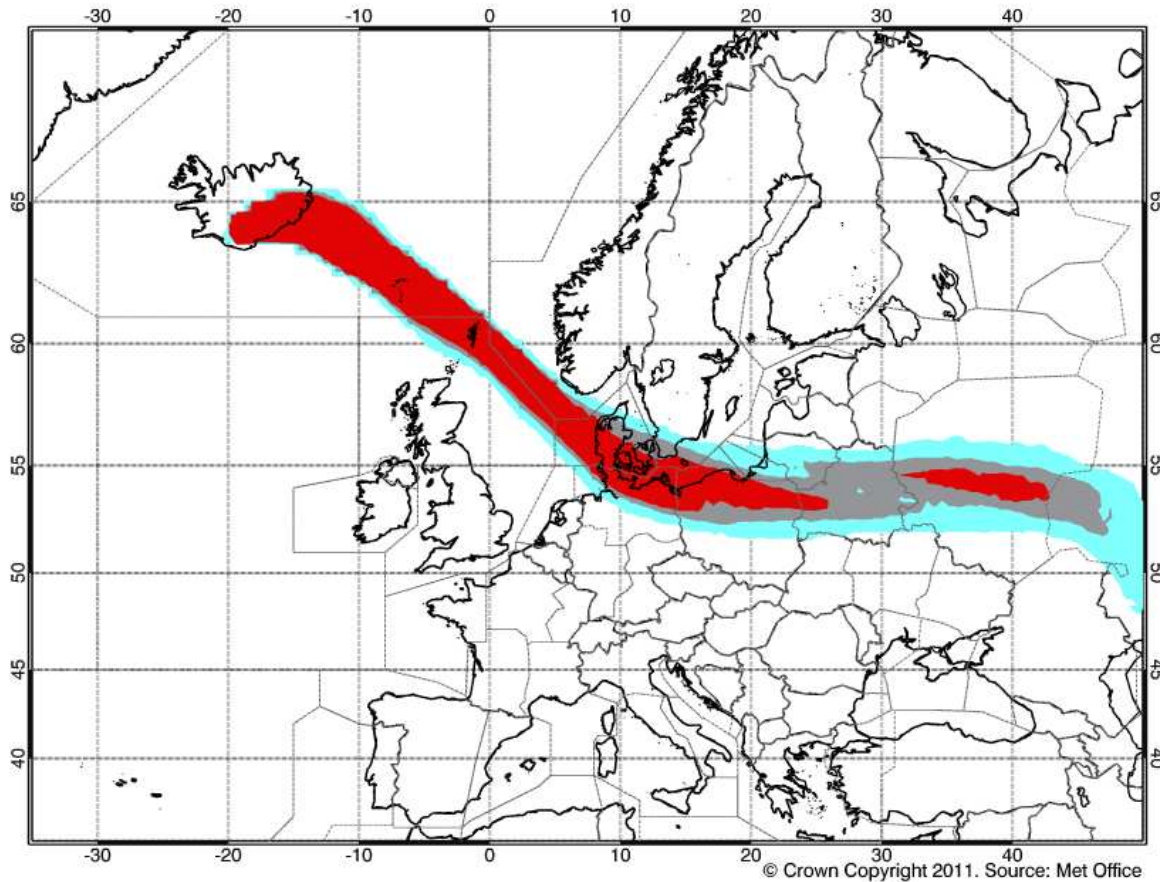


Figure 2: Example of the smaller map area using new colour scheme, and also indicating a "TEST TEST TEST" stamp. Note, FIRs are indicated.

APPENDIX B: Specification of simple CSV files for Volcanic Ash Concentration data.

The following is the template to be used for ALL Volcanic Ash Concentration CSV files issued by UK Met Office for Aviation Purposes.

Blue text is intended to give guidance in interpreting the field where necessary. Additionally, examples of descriptive text are given to indicate how the fields are expected to be populated. These formats will be introduced as indicated in the 'Implementation' section of the main document.

VOLCANO: EYJAFJALLAJOKULL 1702-02
PSN: N6338 W01937

VOLCANIC ASH CONCENTRATION: HIGH *Change from RED, GREY, BLACK to HIGH, MEDIUM LOW*
MODEL RUN: 20100523/0600
VALIDITY TIME: 20100523/0600
FLIGHT LEVEL: SFC/FL200
REMARKS: MODEL DATA EXERCISE *Addition of EXERCISE (or TEST) flags to Remarks, or similar* *free text*

COORDINATES FORMAT: EXAMPLE N625313 = 62 DEG 53 MINUTES 13 SECONDS NORTH

POLY 1 *All characters upper case³, followed by incrementing number for each new polygon.*
N625313,W0213241
N625542,W0214124
etc
etc
etc
N625313,W0213241 *Last point will be a repeat of the first point, so indicating that the polygon is complete.*

³ 'NO POLYS' is used if there is no contamination in the flight level range that the CSV file relates to

APPENDIX C: Specification for Volcanic Ash Concentration Data filenames

Explanation of filename conventions used for Volcanic Ash Concentration Forecasts. These filenames will be introduced as indicated in the 'Implementation' section of the main document.

69 characters for graphic files

VMA01_ASH_CONC_FLaaa-bbbDTyyyymmddhhmmVTyyyymmddhhmmITddhhmm_Thhh.PNG

73 characters for CSV files

VCA99_ASH_CONC_CxnnFLaaa-bbbDTyyyymmddhhmmVTyyyymmddhhmmITddhhmm_Thhh.CSV

Breakdown of meaning of 69 characters for graphic filename structure

Element of filename metadata	Description	Characters
Vabnn (see table 3)	Product code	5 chars
_ASH_CONC_	Human readable identifier, with underscore characters	10 chars
FLaaa-bbb	Flight level range	9 chars
DTyyyymmddhhmm	'DT', followed by model run data time	14 chars
VTyyyymmddhhmm	'VT', followed by data valid time	14 chars
ITddhhmm	'IT', followed by day, hour minute of issue time only	8 chars
_Thhh	'_T' followed by time step.	5 chars
.PNG	'.' followed by file type.	4 chars

Table 1: Structure of volcanic ash concentration chart graphic filenames

e.g: VMA01_ASH_CONC_FL200-350DT201011290000VT201011300000IT290015_T024.PNG

Breakdown of meaning of 73 characters CSV filename structure

Element of filename metadata	Description	Characters
Vabnn (see table 3)	Product code	5 chars
_ASH_CONC_	Human readable identifier, with underscore characters	10 chars
Cxnn (see table 4)	'C' followed by a	4 chars

	'multiplier code', followed by a numeric value representing the concentration in combination with the multiplier	
FLaaa-bbb	Flight level range	9 chars
DTyyyyymmddhhmm	'DT', followed by model run data time	14 chars
VTyyyyymmddhhmm	'VT', followed by data valid time	14 chars
ITddhhmm	'IT', followed by day, hour minute of issue time only	8 chars
_Thhh	'_T' followed by time step.	5 chars
.PNG	'.' followed by file type.	4 chars.

Table 2: Structure of volcanic ash concentration csv filenames

e.g: VCY99_ASH_CONC_ **CE40**FL000-200DT201011290600VT201011291800IT290615_T012.CSV

Product Code breakdown: Vabnn

V	= Volcanic Ash	
a	M= Map, C= CSV X = XML G= GRIB others to be defined as necessary	
b	<ul style="list-style-type: none"> A is Atlantic and Europe (21-81.5N, 77.5W-155.5E) E is Europe only (35-70N, 35W-50E) Y is northern hemisphere Z is global domain Others to be defined as necessary.	
nn	01 to 99 to differentiate otherwise similar products.	

Table 3: Explanation of product codes.

Concentration information in CSV filename,

Consider the filename:

VCY99_ASH_CONC_ **CE40**FL000-200DT201011290600VT201011291800IT290615_T012.CSV

The CE40 (highlighted) in the filename above represents the concentration. 'C' represents concentration information, the second letter, 'E' in this case, represents a multiplier, 0.0001 in this case. The two numeric characters following should be multiplied accordingly to give the grams per cubic metre concentration value. So, $(0.0001) \times 40 = 0.004$ grams per cubic metre (= 4000 micrograms per cubic metre).

x = grams per cubic metre:

A 0.00000001

B 0.0000001

C 0.000001

D 0.00001

E 0.0001

F 0.001

G 0.01

H 0.1

I 1

J 10

K 100

L 1000

M 10000

N 100000

O 1000000

P 10000000

Table 4: Explanation of how concentration information is indicated in CSV file filenames.

**APPENDIX D:
Timeline for the issue of Volcanic Ash Forecasts**

On being informed of an eruption, VAAC London will issue forecast products as soon as they can be generated. After the first issue VAAC London will issue forecasts every 6 hours according to the schedule below:

'Nominal' start time of forecast	DD0000 (UTC)	DD0600 (UTC)	DD1200 (UTC)	DD1800 (UTC)
Forecast validity times in forecast dataset. ⁴	T+0 (valid 18-00) T+06 (valid 00-06) T+12 (valid 06-12) T+18 (valid 12-18)	T+0 (valid 00-06) T+06 (valid 06-12) T+12 (valid 12-18) T+18 (valid 18-00)	T+0 (valid 06-12) T+06 (valid 12-18) T+12 (valid 18-00) T+18 (valid 00-06)	T+0 (valid 12-18) T+06 (valid 18-00) T+12 (valid 00-06) T+18 (valid 06-12)
VAA ⁵	(DD-1)2345	DD0545	DD1145	DD1745
VAG ⁶	(DD-1)2345	DD0545	DD1145	DD1745
VAA CSV ⁷	(DD-1)2345	DD0545	DD1145	DD1745
Volcanic Ash Concentration Charts - deep layer	DD0015	DD0615	DD1215	DD1815
Volcanic Ash Concentration CSV - deep layer	DD0015	DD0615	DD1215	DD1815

Above are issue times. Time of receipt by users based on how they collect data (via web pages or ftp etc) will necessarily be slightly after the above times.

⁴ Forecasts valid for the 6 hour period prior to the validity time

⁵ Official ICAO Volcanic Ash Advisory

⁶ Official ICAO Volcanic Ash Graphic

⁷ Simplified CSV formatted latitude/longitude file of Volcanic Ash Advisory areas (not an official ICAO product)

**APPENDIX E:
Specifications of Data Formats for Data and Graphic Files**

Example filenames of modelled ash concentration forecasts to be made available on Met Office publicly accessible web pages.

Example filenames based on an origination day/time of 140600 April 2011. Clearly, parsing software will need to be flexible to deal with different days/times, and in order to allow for initial eruption data and updates in the event of significant changes to the eruption. Parsers should pay particular attention to the product codes (first 5 characters of the filenames), but note the simplified VAA coordinates as presented in batch of 4 CSV files has its own naming convention.

Deep Layer Graphics (FL000-200, 200-350, 350-550) Atlantic, Europe and Asia;

Time step	Flight level range	Concentration information	Filename <i>(note DT, VT and IT elements of the filename will change as necessary as forecasts are updated)</i>
T+00	FL000-FL200	High & Medium & Low	VMA05_ASH_CONC_FL000-200DT201104140600VT201104140600IT140615_T000.PNG
	FL200-FL350	High & Medium & Low	VMA05_ASH_CONC_FL200-350DT201104140600VT201104140600IT140615_T000.PNG
	FL350-FL550	High & Medium & Low	VMA05_ASH_CONC_FL350-550DT201104140600VT201104140600IT140615_T000.PNG
T+06	FL000-FL200	High & Medium & Low	VMA05_ASH_CONC_FL000-200DT201104140600VT201104141200IT140615_T006.PNG
	FL200-FL350	High & Medium & Low	VMA05_ASH_CONC_FL200-350DT201104140600VT201104141200IT140615_T006.PNG
	FL350-FL550	High & Medium & Low	VMA05_ASH_CONC_FL350-550DT201104140600VT201104141200IT140615_T006.PNG
T+12	FL000-FL200	High & Medium & Low	VMA05_ASH_CONC_FL000-200DT201104140600VT201104141800IT140615_T012.PNG
	FL200-	High & Medium &	VMA05_ASH_CONC_FL200-350DT201104140600VT201104141800IT140615_T012.PNG

	FL350	Low	
	FL350- FL550	High & Medium & Low	VMA05_ASH_CONC_FL350-550DT201104140600VT201104141800IT140615_T012.PNG
T+18	FL000- FL200	High & Medium & Low	VMA05_ASH_CONC_FL000-200DT201104140600VT201104150000IT140615_T018.PNG
	FL200- FL350	High & Medium & Low	VMA05_ASH_CONC_FL200-350DT201104140600VT201104150000IT140615_T018.PNG
	FL350- FL550	High & Medium & Low	VMA05_ASH_CONC_FL350-550DT201104140600VT201104150000IT140615_T018.PNG

Deep Layer Graphics (FL000-200, 200-350, 350-550) Europe;

Time step	Flight level range	Concentration information	Filename
			<i>(note DT, VT and IT elements of the filename will change as necessary as forecasts are updated)</i>
T+00	FL000- FL200	High & Medium & Low	VME06_ASH_CONC_FL000-200DT201104140600VT201104140600IT140615_T000.PNG
	FL200- FL350	High & Medium & Low	VME06_ASH_CONC_FL200-350DT201104140600VT201104140600IT140615_T000.PNG
	FL350- FL550	High & Medium & Low	VME06_ASH_CONC_FL350-550DT201104140600VT201104140600IT140615_T000.PNG
T+06	FL000- FL200	High & Medium & Low	VME06_ASH_CONC_FL000-200DT201104140600VT201104141200IT140615_T006.PNG
	FL200- FL350	High & Medium & Low	VME06_ASH_CONC_FL200-350DT201104140600VT201104141200IT140615_T006.PNG
	FL350- FL550	High & Medium & Low	VME06_ASH_CONC_FL350-550DT201104140600VT201104141200IT140615_T006.PNG
T+12	FL000- FL200	High & Medium & Low	VME06_ASH_CONC_FL000-200DT201104140600VT201104141800IT140615_T012.PNG
	FL200- FL350	High & Medium & Low	VME06_ASH_CONC_FL200-350DT201104140600VT201104141800IT140615_T012.PNG
	FL350- FL550	High & Medium & Low	VME06_ASH_CONC_FL350-550DT201104140600VT201104141800IT140615_T012.PNG
T+18	FL000-	High & Medium &	VME06_ASH_CONC_FL000-200DT201104140600VT201104150000IT140615_T018.PNG

	FL200	Low	
	FL200- FL350	High & Medium & Low	VME06_ASH_CONC_FL200-350DT201104140600VT201104150000IT140615_T018.PNG
	FL350- FL550	High & Medium & Low	VME06_ASH_CONC_FL350-550DT201104140600VT201104150000IT140615_T018.PNG

Deep Layer CSVs (FL000-200, 200-350, 350-550), no domain restrictions.

Time step	Flight level range	Concentration information	Filename <i>(note DT, VT and IT elements of the filename will change as necessary as forecasts are updated)</i>
T+00	FL000- FL200	High	VCZ96_ASH_CONC_CE40FL000-200DT201104140600VT201104140600IT140615_T000.CSV
		Medium	VCZ96_ASH_CONC_CE20FL000-200DT201104140600VT201104140600IT140615_T000.CSV
		Low	VCZ96_ASH_CONC_CE02FL000-200DT201104140600VT201104140600IT140615_T000.CSV
	FL200- FL350	High	VCZ96_ASH_CONC_CE40FL200-350DT201104140600VT201104140600IT140615_T000.CSV
		Medium	VCZ96_ASH_CONC_CE20FL200-350DT201104140600VT201104140600IT140615_T000.CSV
		Low	VCZ96_ASH_CONC_CE02FL200-350DT201104140600VT201104140600IT140615_T000.CSV
	FL350- FL550	High	VCZ96_ASH_CONC_CE40FL350-550DT201104140600VT201104140600IT140615_T000.CSV
		Medium	VCZ96_ASH_CONC_CE20FL350-550DT201104140600VT201104140600IT140615_T000.CSV
		Low	VCZ96_ASH_CONC_CE02FL350-550DT201104140600VT201104140600IT140615_T000.CSV
T+06	FL000- FL200	High	VCZ96_ASH_CONC_CE40FL000-200DT201104140600VT201104141200IT140615_T006.CSV
		Medium	VCZ96_ASH_CONC_CE20FL000-200DT201104140600VT201104141200IT140615_T006.CSV
		Low	VCZ96_ASH_CONC_CE02FL000-200DT201104140600VT201104141200IT140615_T006.CSV
	FL200- FL350	High	VCZ96_ASH_CONC_CE40FL200-350DT201104140600VT201104141200IT140615_T006.CSV
		Medium	VCZ96_ASH_CONC_CE20FL200-350DT201104140600VT201104141200IT140615_T006.CSV
		Low	VCZ96_ASH_CONC_CE02FL200-350DT201104140600VT201104141200IT140615_T006.CSV
	FL350- FL550	High	VCZ96_ASH_CONC_CE40FL350-550DT201104140600VT201104141200IT140615_T006.CSV
		Medium	VCZ96_ASH_CONC_CE20FL350-550DT201104140600VT201104141200IT140615_T006.CSV
		Low	VCZ96_ASH_CONC_CE02FL350-550DT201104140600VT201104141200IT140615_T006.CSV
T+12	FL000- FL200	High	VCZ96_ASH_CONC_CE40FL000-200DT201104140600VT201104141800IT140615_T012.CSV
		Medium	VCZ96_ASH_CONC_CE20FL000-200DT201104140600VT201104141800IT140615_T012.CSV
		Low	VCZ96_ASH_CONC_CE02FL000-200DT201104140600VT201104141800IT140615_T012.CSV
	FL200- FL350	High	VCZ96_ASH_CONC_CE40FL200-350DT201104140600VT201104141800IT140615_T012.CSV
		Medium	VCZ96_ASH_CONC_CE20FL200-350DT201104140600VT201104141800IT140615_T012.CSV
		Low	VCZ96_ASH_CONC_CE02FL200-350DT201104140600VT201104141800IT140615_T012.CSV

T+18	FL350- FL550	High	VCZ96_ASH_CONC_CE40FL350-550DT201104140600VT201104141800IT140615_T012.CSV
		Medium	VCZ96_ASH_CONC_CE20FL350-550DT201104140600VT201104141800IT140615_T012.CSV
		Low	VCZ96_ASH_CONC_CE02FL350-550DT201104140600VT201104141800IT140615_T012.CSV
	FL000- FL200	High	VCZ96_ASH_CONC_CE40FL000-200DT201104140600VT201104150000IT140615_T018.CSV
		Medium	VCZ96_ASH_CONC_CE20FL000-200DT201104140600VT201104150000IT140615_T018.CSV
		Low	VCZ96_ASH_CONC_CE02FL000-200DT201104140600VT201104150000IT140615_T018.CSV
	FL200- FL350	High	VCZ96_ASH_CONC_CE40FL200-350DT201104140600VT201104150000IT140615_T018.CSV
		Medium	VCZ96_ASH_CONC_CE20FL200-350DT201104140600VT201104150000IT140615_T018.CSV
		Low	VCZ96_ASH_CONC_CE02FL200-350DT201104140600VT201104150000IT140615_T018.CSV
FL350- FL550	High	VCZ96_ASH_CONC_CE40FL350-550DT201104140600VT201104150000IT140615_T018.CSV	
	Medium	VCZ96_ASH_CONC_CE20FL350-550DT201104140600VT201104150000IT140615_T018.CSV	
	Low	VCZ96_ASH_CONC_CE02FL350-550DT201104140600VT201104150000IT140615_T018.CSV	

Example Concentration CSVs: Filename: VCZ96_ASH_CONC_CE40FL000-200DT201104140600VT201104141200IT140615_T006.CSV

VOLCANO: EYJAFJALLAJOKULL 1702-02
PSN: N6338 W01937

VOLCANIC ASH CONCENTRATION: HIGH
MODEL RUN: 20110414/0600
VALIDITY TIME: 20110414/1200
FLIGHT LEVEL: SFC/FL200
REMARKS: MODEL DATA EXERCISE

POLY 1
N633824,W0195537
N635927,W0195739
N640100,W0195734
N642053,W0195555
etc
etc
N631902,W0185711
N631902,W0192612
N633824,W0195537

(note, there is no limit to the number of points that may be produced per polygon. During the April/May 2010 eruption of Eyjafjallajökull, occasions where there were 650+ points per polygon were known).

'Simple' CSV of VAA/VAG

Valid time	Flight Levels	Concentration	Filename	Notes:
VTdd0000	FL000-FL200 & FL200-FL350 & FL350-FL550	No concentration, ash/no-ash boundary, as per VAA/VAG.	CAA_VAA_Zone_0000.csv	Filename indicates time of validity, not time-step. Parse file for explicit validity information. Will overwrite previous files. Use file timestamp as indicator of last update. Format is different to concentration CSVs, with the height range of the polygon explicitly stated to right of the polygon count.
VTdd0600	FL000-FL200 & FL200-FL350 & FL350-FL550	No concentration, ash/no-ash boundary, as per VAA/VAG.	CAA_VAA_Zone_0600.csv	
VTdd1200	FL000-FL200 & FL200-FL350 & FL350-FL550	No concentration, ash/no-ash boundary, as per VAA/VAG.	CAA_VAA_Zone_1200.csv	
VTdd1800	FL000-FL200 & FL200-FL350 & FL350-FL550	No concentration, ash/no-ash boundary, as per VAA/VAG.	CAA_VAA_Zone_1800.csv	

Example of Simple CSV for VAA/VAG: For filename 'CAA_VAA_Zone_1200.csv', issue ~0600 UTC on 14th April 2011. Parse file to determine model run (0600 UTC) and Valid time (1200 UTC), to deduce time step (T+06 in this case).

VOLCANO: KRISUVIK
PSN: N6356 W02201

MODEL RUN: 20110414/0600
VALIDITY TIME: 20110414/1200
REMARKS: EXERCISE EXERCISE EXERCISE

POLY 1: SFC/FL200
N621400,W0184900
N642000,W0255000

N661700,W0235000
etc
etc
N672500,W0131700
N652400,W0190900
N623700,W0155800
N621400,W0184900

POLY 2: FL100/FL200
N623700,W0183900
N645900,W0254000
N681400,W0251000
etc
etc
N682900,W0094700
N664600,W0182900
N623700,W0183900

-END-

Version 13
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