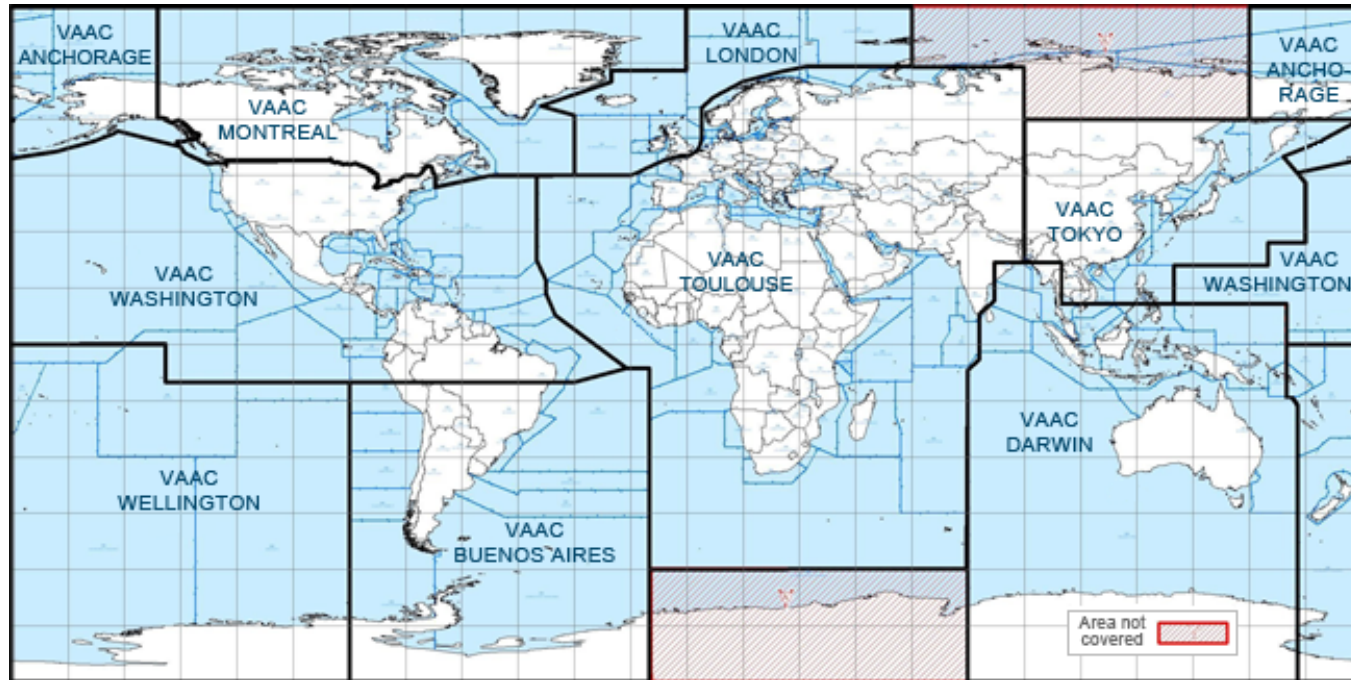


VOLCANIC ANALYSIS

Volcanic Ash Advisories



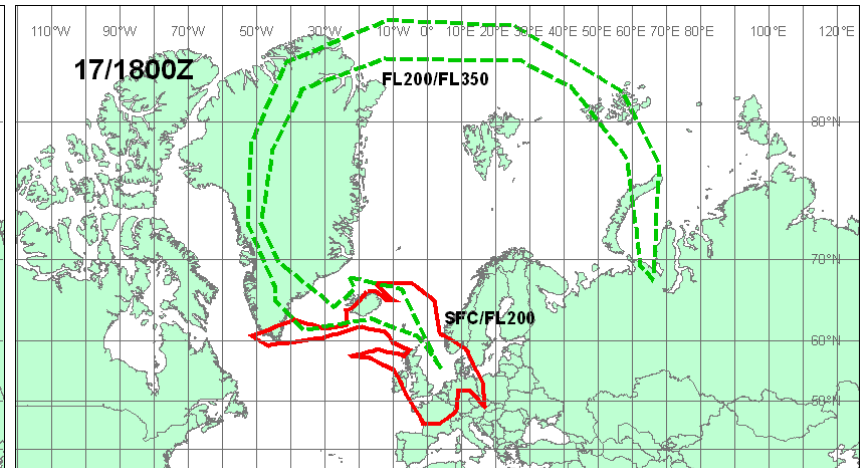
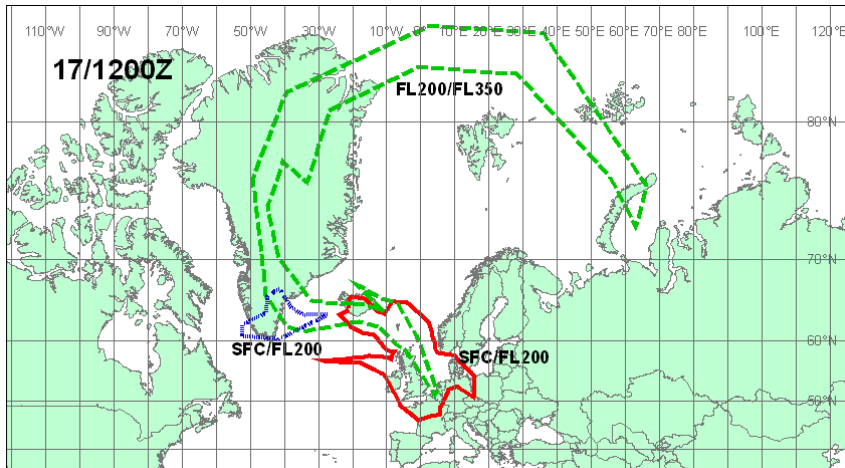
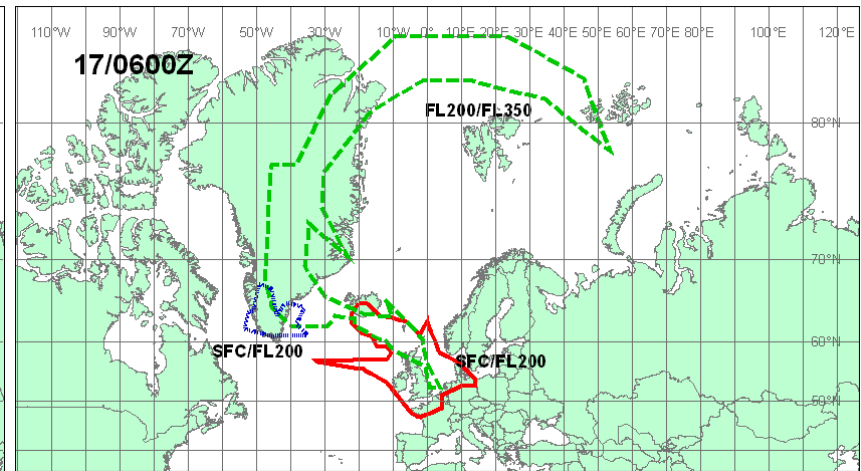
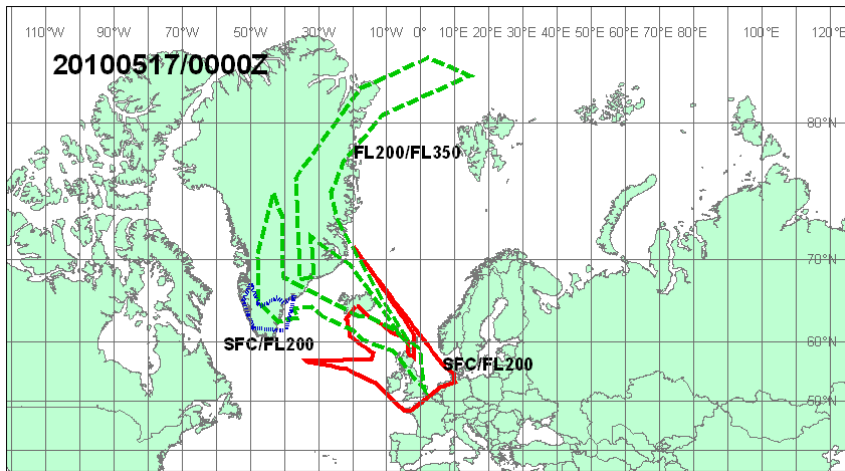
Information Sources:
Pilot reports
Volcano observatories
Satellite imagery

Volcanic Ash Advisory Centres:
Initiate dispersal simulations
Validate simulation results
Provide volcanic ash advisory

Aviation Sector:
Use information to
inform flight paths

Volcanic Ash Advisories

Forecast ash dispersion



VA ADVISORY
DTG: 20100517/0000Z
VAAC: LONDON
VOLCANO:
EYJAFJALLAJOKULL
PSN: N6338 W01937
AREA: ICELAND

SUMMIT ELEV: 1666M
ADVISORY NR: 2010/126
INFO SOURCE: ICELAND MET OFFICE
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTION CONTINUING
TO AN ESTIMATED HEIGHT OF FL230 TO FL260,
OCNL FL290.

RMK: A SEPARATE AREA OF SFC TO FL200 OVER GREENLAND IS
MARKED IN BLUE ON GRAPHICS.
NXT ADVISORY: 20100517/0600Z

text providing key information on
the volcano, eruption and source of

Volcanic Ash Advisories

IDD41290

VA ADVISORY

DTG: 20160106/0330Z

VAAC: DARWIN

VOLCANO: SINABUNG 261080

PSN: N0310 E09824

AREA: INDONESIA

SUMMIT ELEV: 2460M

ADVISORY NR: 2016/1

INFO SOURCE: GROUND REPORTS, HIMAWARI-8

AVIATION COLOUR CODE: RED

ERUPTION DETAILS: MINOR VA/STEAM EMISSION TO FL140

EXTENDING TO THE WEST

OBS VA DTG: 06/0330Z

OBS VA CLD: SFC/FL140 N0314 E09824 - N0310 E09810 - N0305

E09811 - N0304 E09817 - N0310 E09826 MOV SW 5KT

FCST VA CLD +6 HR: 06/0930Z SFC/FL140 N0314 E09824 - N0313

E09811 - N0304 E09754 - N0248 E09738 - N0235 E09737 - N0222

E09748 - N0237 E09809 - N0309 E09827

FCST VA CLD +12 HR: 06/1530Z NO VA EXP

FCST VA CLD +18 HR: 06/2130Z NO VA EXP

RMK: VA EXPECTED TO DISSIPATE WITHING 12 HRS.

NXT ADVISORY: NO LATER THAN 20160106/0930Z

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volcano_name
colour_code
advice_date,
advice_time
time, date, fl,

Volcanic Ash Advisories

Each advisory constitutes a text file containing the following information:

VA ADVISORY

DTG:	20150223/2302Z	[Date and time issuance of advisory]
VAAC:	WELLINGTON	[Responsible VAAC]
VOLCANO:	AMBRYM 257040	[Volcano name and no]
PSN:	S1615 E16807	[Coordinates of volcano]
AREA:	VANUATU	[Volcano area]
SUMMIT ELEV:	1334M	[Elevation of volcano summit]
ADVISORY NR:	2015/17	[Advisory number]
INFO SOURCE:	PIREPS AND SATELLITE SO2 IMAGERY	[Source of information]
AVIATION COLOUR CODE:	UNKNOWN	[Typically provided by local VO's]
ERUPTION DETAILS:	NO OBSERVATIONS OF SIGNIFICANT ASH SINCE PIREP AT 212100Z OF ASH TO 8000FT.	[Information regarding information]
OBS VA DTG:	23/2300Z	[Date and time of observed ash]
EST VA CLD:	VA NOT IDENTIFIABLE FM SATELLITE	[Estimated height (FL) and extent of cloud]
FCST VA CLD+6 HR:	24/0500Z SFC/FL600 NO VA EXP	[Forecast of plume height & extent in 6 hrs]
FCST VA CLD+12 HR:	24/1100Z SFC/FL600 NO VA EXP	[Forecast of plume height & extent in 12 hrs]
FCST VA CLD+18 HR:	24/1700Z SFC/FL600 NO VA EXP	[Forecast of plume height & extent in 18 hrs]
RMK:	SATELLITE IMAGERY SHOWS NO SIGN OF ASH. NO FURTHER ADVISORIES WILL BE ISSUED UNTIL CONFIRMED REPORTS RECEIVED.	[Further info. on eruption and observations]
NXT ADVISORY:	NO FURTHER ADVISORIES=	[Time of next advisory]

Volcanic Ash Advisories

- An “entry”/”row” per report, gathered by “Volcano ID”, with 22 “variables”/”columns”

0502-09	colour_code	fl_eruption_L2	no_id_satelite	fl_eruption_L1	file_name	id	confirmed	info_source		issued_time	iss	
	yellow		-1		Darwin/2006/IDD41300.200607130420.txt	0502-09	1	RVO/Sat/Imagery		0420	20	
	yellow		-1		Darwin/2006/IDD41300.200607140356.txt	0502-09	1	RVO/MTSAT-1R/TERRA/MODIS		0356	20	
0502-08	colour_code	fl_eruption_L2	no_id_satelite	fl_eruption_L1	file_name	id	confirmed	info_source	issued_time	issued_date	vaac_obs	r
	orange		0	140	Darwin/2012/IDD41290.201207101643.txt	0502-08	1	MTSAT-2	1643	20120710	Darwin	C
	orange		0	140	Darwin/2012/IDD41290.201207102229.txt	0502-08	1	MTSAT-2	2229	20120710	Darwin	C
	orange		2	140	Darwin/2012/IDD41290.201207110417.txt	0502-08	1	MTSAT-2	0417	20120711	Darwin	C
	red		0	400	Darwin/2012/IDD41295.201205030543.txt	0502-08	1	MTSAT	0542	20120503	Darwin	C
	red		0	450	Darwin/2012/IDD41295.201205030608.txt	0502-08	1	MTSAT-2	0607	20120503	Darwin	C
	orange		0	450	Darwin/2012/IDD41295.201205030722.txt	0502-08	1	MTSAT-2	0721	20120503	Darwin	C
	colour_code	fl_eruption_L2	no_id_satelite	fl_eruption_L1	file_name	id	confirmed	info_sc				
			0		Anchorage/FVAK21PAWU_1701121900.txt	311300	1	SATELLITE				
			-1		Anchorage/FVAK21PAWU_1701150130.txt	311300	1	HIMIWARI/GOES/SEISMICITY				
			0		Anchorage/FVAK21PAWU_1701181405.txt	311300	1	HIMIWARI/GOES/AVO/PILOT/REPORT/LIGH				
			0		Anchorage/FVAK21PAWU_1701181910.txt	311300	1	HIMAWARI/GOES				
			0		Anchorage/FVAK21PAWU_1701190140.txt	311300	1	GOES/MODEL/DATA				
			2		Anchorage/FVAK21PAWU_1701190635.txt	311300	1	GOES/POES/				
			0		Anchorage/FVAK21PAWU_1701201515.txt	311300	1	HIMAWARI/GOES/POES/AVO/PIREPS				
			0		Anchorage/FVAK21PAWU_1701201950.txt	311300	1	HIMAWARI/GOES/POES				
			2		Anchorage/FVAK21PAWU_1701210140.txt	311300	1	HIMIWARI/GOES/POES				
			0		Anchorage/FVAK21PAWU_1701221805.txt	311300	1	HIMAWARI/GOES				

vaac_total_line.json

Volcanic Dataset

```
{"colour_code": null, "fl_eruption_L2": null, "no_id_satelite": 0, "fl_eruption_L1": null, "file_name": "Darwin/2004/IDD41295.200412170409.txt", "issued_date": "20041217", "confirmed": 1, "info_source": "AVHRR/MODIS/USAF", "issued_time": "0408", "id": "252010", "vaac_obs": "Darwin", "referral": 0, "fl_fcst_18hr_L2": null, "fl_fcst_18hr_L1": null, "fl_fcst_12hr_L1": null, "fl_fcst_12hr_L2": null, "nxt_date": "NO_NXT_ADV", "report_id": "IDD41295", "name": " LANGILA", "fl_obs_cld_L1": null, "fl_fcst_6hr_L1": null, "fl_fcst_6hr_L2": null, "fl_obs_cld_L2": null, "nxt_time": "NO_NXT_ADV", "v_id": "252010"}
```

```
{"colour_code": null, "fl_eruption_L2": null, "no_id_satelite": 0, "fl_eruption_L1": null, "file_name": "Darwin/2004/IDD41295.200412170950.txt", "issued_date": "20041217", "confirmed": 1, "info_source": "AVHRR/MODIS/GOES9", "issued_time": "0949", "id": "252010", "vaac_obs": "Darwin", "referral": 0, "fl_fcst_18hr_L2": null, "fl_fcst_18hr_L1": null, "fl_fcst_12hr_L1": null, "fl_fcst_12hr_L2": null, "nxt_date": "NO_NXT_ADV", "report_id": "IDD41295", "name": " LANGILA", "fl_obs_cld_L1": null, "fl_fcst_6hr_L1": null, "fl_fcst_6hr_L2": null, "fl_obs_cld_L2": null, "nxt_time": "NO_NXT_ADV", "v_id": "252010"}
```

Metadata of the columns

- colour_code :
 - Green
 - Yellow
 - Orange
 - Red
 - None
- no_id_satellite:
 - Nonidentifiable form satellite (-1)
 - METEOROLOGICAL CLOUDS (1)
 - WX CLDS (2)
 - Dissipated (3)
 - Do not say (0) / we consider identified
- confirmed (information):
 - confirmed (1)
 - unconfirmed (-1)
 - Do not say (0)
- referral:
 - no issued time/date (1)
 - issued time/date (0)
- id : volcano id
- name: volcano_name
- vaac_obs: VAAC name
- report_id: report number
- fl_fcst_(6/12/18)hrs_L(1/2): Forecast of plume height & extend in 6/12/18 for L1/2
- fl_eruption_L(1/2): Eruption details for L1/2
- fl_obs_cld_L(1/2): Observed ash for L1/2
- issued_time: time issued the report
- issued_date: date issued the report
- nxt_time: next time for next report
- info_source: e.g. MTSAT-1R

Explore the volcanic dataset - ideas

- Analyse the number of reports that we have by year or by VAAC or by volcano
- Analyse the Flight Levels (eruption or observed)
 - Variables: fl_eruption_L1 ; fl_eruption_L2 ; fl_observed_L1; fl_observed_L2
- Analyse the colors (warning) of a volcano
- Analyse which is the volcano that erupted more during the last two years
- Analyse which is the volcano that erupted more across the entire dataset
- Analyse which volcanos appears in more than one VAAC

Exploring the Encyclopedia Britannica

https://github.com/EPCCed/prace-spark-for-data-scientists/blob/master/lab_exercises/lab_rdd_dataframes_NLTK.ipynb

Login NODE:

- Remember to “load module anaconda/python3
- Call python → \$python

```
>> import nltk
>> nltk.download("wordnet")
>> nltk.download("punct")
>> nltk.download("stopwords")
```

- Ideas:

- Get the number of pages per year.
- Get the number of words per year.
- Frequency of topics per year:
 - Normalize results by number of words
 - Plot Frequencies

- Sports: golf, rugby, tennis, football

- Cities: Aberdeen, Dundee, Edinburgh, Glasgow, Stirling, Inverness, Perth

- Animal: cat, dog, kitten, puppy, goldfish, parrot

- Philosophers: Francis Hutcheson, David Hume, Adam Smith, Dugald Stewart, Thomas Reid

<https://medium.com/towards-artificial-intelligence/text-mining-in-python-steps-and-examples-78b3f8fd913b>

<https://www.dataquest.io/blog/tutorial-text-classification-in-python-using-spacy/>

Login NODE:

You can also use **spacy** instead **NLTK**, but it needs to be installed first, as a user:

```
$ pip install spacy --user
```

Reimplement NLTK functions in the **notebook**:

sent_tokenize_func, remove_stop_words_func,