EUROVOLC

European Network of
Observatories and Research Infrastructure for Volcanology

Deliverable Report

D3.2 Iceland Monitoring School on eruptive processes, observations, and responses

Work Package:	*Training, Outreach and Dissemination*	
Work Package number:	*3*	
Work Package leader:	*Rosella Nave*	
Task (Activity) name:	*Training*	
Task number:	*3.2*	
Responsible Activity leader:	*Magnús T. Gudmundsson*	
Lead beneficiary:	*University of Iceland*	
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1. Introduction

The Iceland Summer School was defined as Subtask 3.1.2 under Task 3.1 Training within Work-Package 3 in EUROVOLC. The theme of the school was eruptive processes, observations, and responses.

The plan was for the school to take place in August 2020 and be a joint project between EUROVOLC and the Nordic Volcanological Centre within the Institute of Earth Sciences, University of Iceland (IES), as well as including a contribution from the Nordic EPOPS project. However, the onset of Covid-19 in early 2020 resulted in uncertainties and led to the postponement of the school until 2021. It also became clear in early 2021 that the prospects for an in-person school were highly uncertain. Therefore, during the general meeting of EUROVOLC on 1st of March 2021, it was decided to plan the school as an on-line event and scheduled to take place in June. The onset of the eruption in Fagradalsfjall in Iceland in late March 2021 with associated monitoring work taking a great deal of time, resulted in the timing brought to September. However, the effusive eruption in Fagradalsfjall also offered opportunities to use the various monitoring and observations of this on-going eruption as a topic in the school.

This deliverable reports on the Iceland Summer School, which took place using the Zoom platform in the period 20-29 September 2021. The report explains how the school was conducted and how efforts were made to make it an insightful and worthwhile experience for participants. The results of a post-school survey by participating students are reported. Finally, some lessons learned from conducting such an on-line school are presented.

2. Preparation of the School

In early 2020 organization of the school was initiated with Magnús T. Guðmundsson (UI), Sara Barsotti (IMO), Rikke Pedersen (UI) and Bergrún A. Óladóttir (IMO). When the work was commenced in 2021, Tobias Dürig (UI) and Ríkey Júlíusdóttir (IMO) were added to the committee. Besides EUROVOLC, there was participation and contributions from the Nordic Volcanological Centre at IES, and from Nordic EPOS.

It became clear in early 2021 that the only possible format would be an on-line school. Work was put in progress to figure out how to make an on-line school a meaningful and satisfying experience for students of volcanology. The result was to structure the school around three main pillars:

1. **On-line lectures:** Experts in different fields of the school topics would be found to give 30-minute talks followed by 10-minutes question and answering sessions. Six two-hour sessions with three talks each were prepared. These talks were given in six days, the first 12 talks on 20-23 September, and the remaining 6 talks were given on 27-28 September. In addition, one two-hour session with five talks on recent volcanic activity around the world was arranged for the final day, the 29th of September.
2. **Discussion sessions:** Six 1.5-hour long discussion sessions were organized, following the six two-hour lecture sessions. The participants were given assignments which they worked on in groups of 3-5, followed by a short session where they presented their findings on the assignment given to them. The discussion sessions were supervised by a group of moderators.
3. **Demonstration video tutorials:** As there was no travel involved with attending the school, no logistical arrangements had to be made, e.g. on travel for speakers, field trips and meeting facilities. This saved a great deal of costs but resulted in the hands-on experience, an important part of summer schools, was missing. To compensate for this, and to use the opportunities this offered, video tutorials on various aspects of volcanic processes, but especially monitoring,

were made in Iceland. In particular, the aspects of monitoring of the eruption at Fagradalsfjall were recorded and used as examples. Funds that otherwise would have been used for logistics were diverted to the prepare the videos. A total of 16 videos were made, with an average length of about 10 minutes. These videos are now found on a dedicated YouTube channel[1] and accessible from the EUROVOLC webpage[2].

Figure 1. The first circular used to advertise the school. It was distributed to all participant institutions and was visible on the EUROVOLC webpage and other media.

[1] https://www.youtube.com/channel/UCIH3LjMRkxWlS4ntVxjsgpg/featured
[2] https://eurovolc.eu/?page_id=3275

The organizing committee worked on arranging the school in the spring and early summer of 2021. An advertisement (Figure 1) was put out at the beginning of July, at the EUROVOLC webpage and through various media. The target group for the school was the same as for the Etna School: Young scientists at PhD and postdoc level. A deadline for applications was set on 20 August.

A total of 102 applications were received. Thereof 59 were PhD students, 10 were postdocs, 11 were MS-students, 10 graduates planning for postgraduate studies, while 12 were others, including active workers in the field in several countries around the world. As there were no obvious reasons for excluding any group of applicants, all applications were accepted.

3. Operation of the on-line Summer School

The school was held online on 20-23 and 27-29 September. Attendance was highest on Day 1 (20 September) where 91-95 people watched the lectures, followed by 84-88 the following day. For other lecture days, attendance was in the range 61-74.

A designated password-protected webpage (https://eurovolcsummerschool.hi.is/) was set up in WordPress (Figure 2) providing access to lectures, videos, and other information.

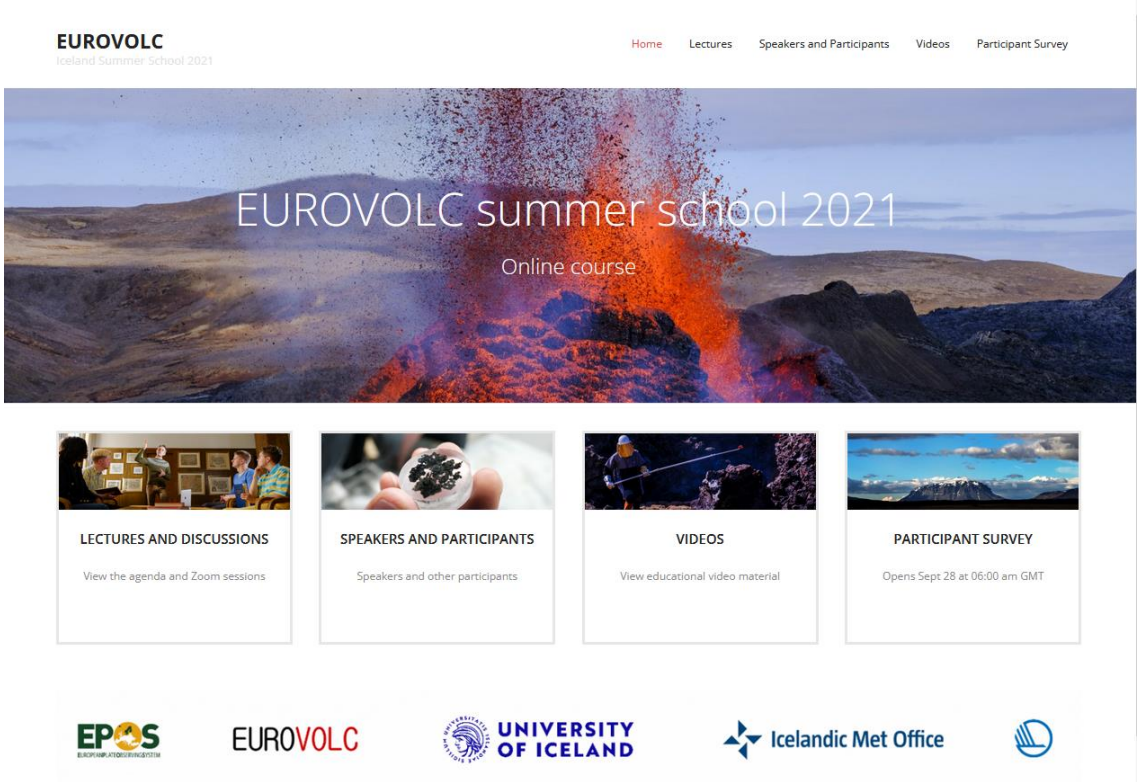


Figure 2. The WordPress webpage set up for the school.

3.1 Lectures

A total of 21 people gave lectures during the school, all experts in their fields with the majority working in institutions that are active beneficiaries in EUROVOLC. Besides, experts from five external institutions also presented at the school. When approached, the response from potential speakers was generally very positive.

The Zoom links were set up for each day in advance, the connection, and the way the Zoom operation would work was rehearsed the day before, with the person operating the Zoom going through the procedures with the speakers to try to secure smooth running of the lecture sessions. This worked very well, and no technical problems were encountered during the talks. Most talks were recorded, but the

decision to do so was taken by each lecturer. Most opted for recording and these lectures were available through the webpage until 6 October. The detailed schedule can be found in Appendix 1.

It was decided that lectures could not be preserved or made publicly available by the school organizers after the event. The speakers that opted to do so, were given copies of the recordings and are free to use them in any way they see fit. However, records of the talks were not kept by the organizers. The list of speakers is given in Appendix 2 and the numbers on attendance in Appendix 3.

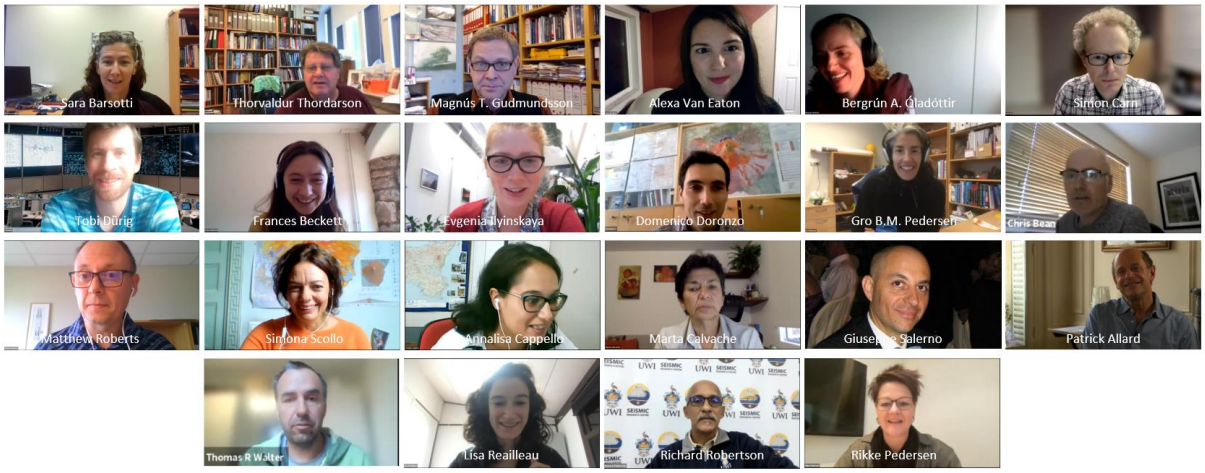


Figure 3. The speakers of the summer school presenting. The speakers talking from South and North America were usually presenting at a very early hour in their home countries.

3.2 Discussion sessions

The discussion sessions provided training in the following:

(1) making assessments of volcanic processes and events,
(2) the use of the various available tools (e.g. European Catalogue of Volcanoes, EUROVOLC on-line tools for analysis).

Moreover, it was acknowledged by the organisers that the hardest part in an on-line school like this is to stimulate social interaction among participants and in that way allow them to get to know each other. This was, together with the scientific/technical training, an important aim of the discussion sessions. The participants (70-90 people) were split into four main groups with about 15-20 in each (A, B, C and D). All groups received the same problems to deal with. There was extensive interaction within groups. However, to keep the work manageable, no discussion session interaction between the main groups was arranged.

The discussion sessions lasted for 90 minutes. Each day they dealt with four related topics (1-4). Each of the groups (A-D) was each day split randomly into four breakout rooms with 3-5 participants each. Each breakout room dealt with one of the four topics. The last 15 minutes were used for presentations of the results from each breakout room to the whole group. Each room prepared a set of 3-4 slides during their group work. The role of presenting was usually shared within the group, usually with each participant presenting one slide. This setup resulted in almost all participants that completed the school presenting some material. Attendance to discussion sessions is listed in Appendix 3.

3.3 Demonstration videos

The demonstration videos will be permanently available and free for use in teaching and demonstration purposes from now on as a contribution from EUROVOLC to education and training in observations and monitoring of volcanic activity.

Table 1: Demonstration videos made for the Iceland Summer School.

Video	Presenter/author	Length
Volcanic plumes: General introduction	Tobias Dürig, UI	8:27
Effusive eruptions	Thorvaldur Thordarson, UI	15:33
Tephra measurements and sampling	Bergrún A. Óladóttir, IMO and UI	14:06
Tephra dispersion models	Sara Barsotti, IMO	15:53
Mass eruption rate: REFIR tutorial	Tobias Dürig, UI	10:36
Eruption monitoring: The control room of the IMO	Kristín Jónsdóttir and Sara Barsotti, IMO	23:10
Seismic monitoring of an ongoing eruption	Kristín Jónsdóttir, IMO	10:14
Mass eruption rate: Radar monitoring	Hermann Arngrímsson and Elín Björk Jónasdóttir, IMO	5:41
Aircraft monitoring of volcanic signals in glaciers	Magnús Tumi Gudmundsson, UI	10:18
Lava mapping by photogrammetry: In the field	Birgir Óskarsson, NI	6:02
Lava mapping by photogrammetry: Processing data	Joaquin Belart and Gro B.M. Pedersen, UI	12:46
Volcanic gas monitoring: DOAS traverse in the field	Talfan Barnie and Melissa Pfeffer, IMO	6:54
Volcanic Plumes: Plume heights from webcams	Talfan Barnie, IMO	5:06
Volcanic gas monitoring: DOAS traverse – Process data	Melissa Pfeffer, IMO	15:20
Volcanic gas monitoring: Drone-based approaches. Part 1	Melissa Pfeffer, IMO	8:08
Volcanic gas monitoring: Drone-based approaches. Part 2	Melissa Pfeffer, IMO	7:41

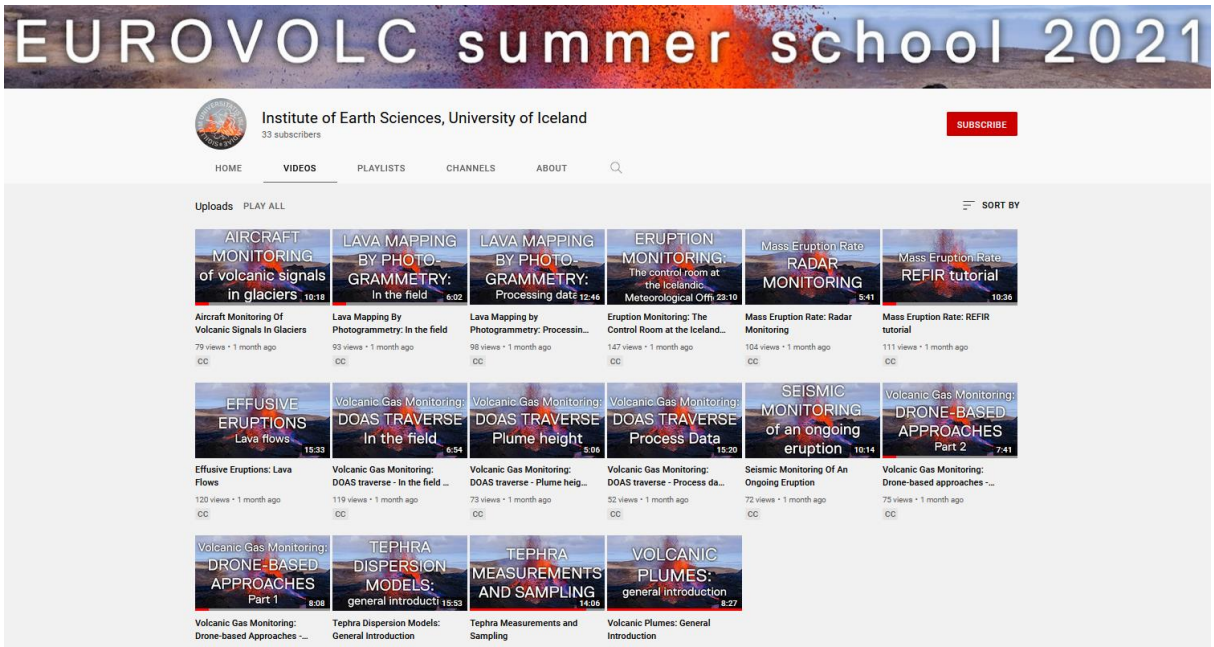


Figure 4. The demonstration videos were produced in June-September 2021 as support materials for participants. These videos are stored on a designated YouTube channel and are freely available on the EUROVOLC webpage.

A total of 16 videos were made in June-September 2021, with a total combined length of about 3 hours. A professional producer (Katla Líndal) was hired to oversee, film, and arrange the video work. Additional assistance was provided by the Department of Digital Learning at the University of Iceland. The list of videos with the presenter/authors is in Table 1. Extensive use was made of the on-going eruption at Fagradalsfjall in the Reykjanes Peninsula.

Figure 5. Snapshots from the educational videos.

3.4 Post-Summer School fieldtrip

Although not an official part of the school, a one-day excursion took place on October 6 to the eruption site in Fagradalsfjall, offered to those that came to Iceland at their own expense. Five summer school participants took part in the fieldtrip, whereof four came specifically from overseas to do so.

4. Participation

Out of the 103 that registered, 58 took part in at least three out of six discussion sessions and attended lectures. Out of these 50 took part in at least four discussion sessions. These participants fulfilled requirements set by the Faculty of Earth Sciences at the University of Iceland for passing a 4 ECTS graduate course at UI: JAR213F Nordvulk Summer School in Volcanology. However, only registered students at University of Iceland could be awarded ECTS units by the University of Iceland.

The 103 people registered came from 29 countries. The majority from Europe (Figure 6), while the others came from countries around the world. The 58 that received a certificate of completion, included participants from the Democratic Republic of Congo, Chile, Singapore, Brasil, Indonesia, Mexico, Argentina, India and New Zealand. The certificate sent to the 58 participants that completed the school is shown in Figure 7.

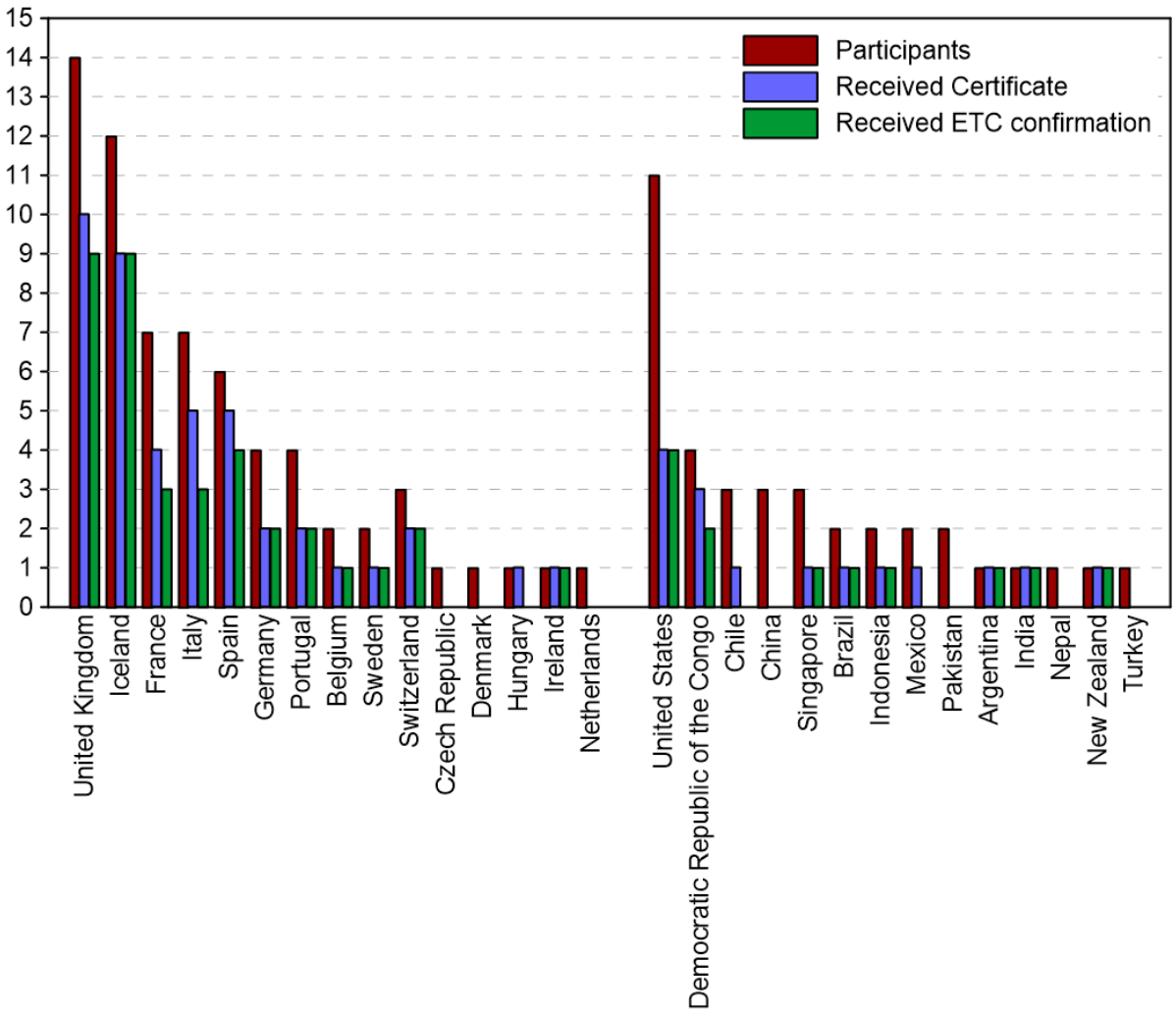
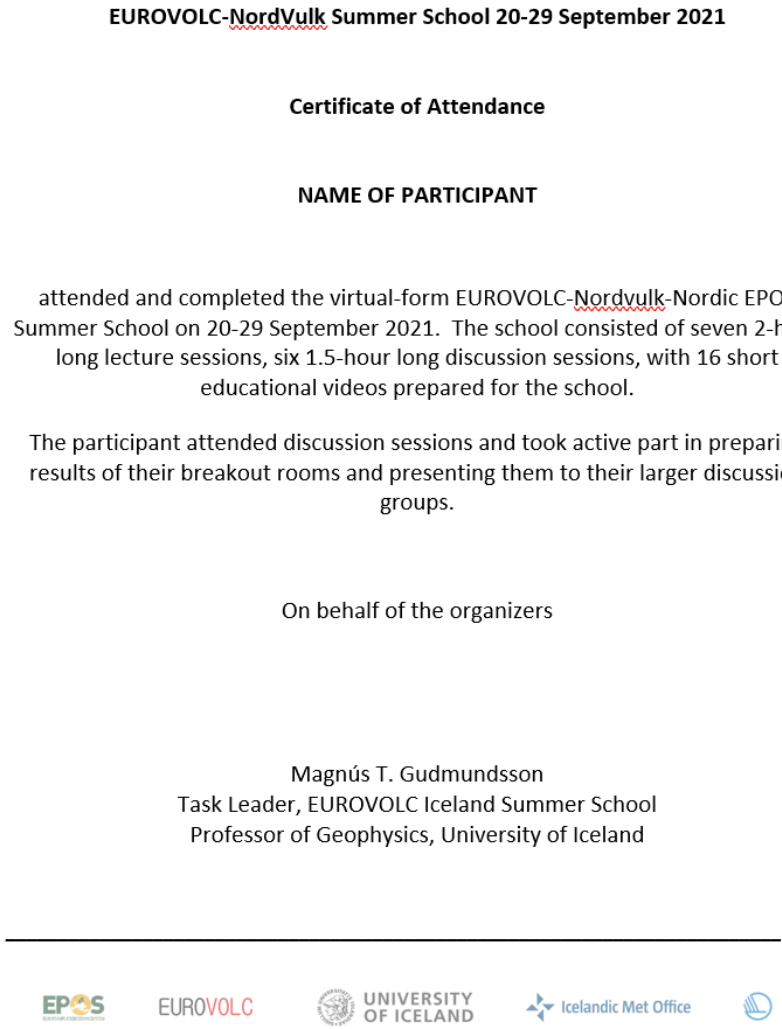


Figure 6. Registered participants, their country of residence, receipt of certificate of participation and confirmation of fulfilling the requirements for a 4 ECTS graduate course at the University of Iceland.



EUROVOLC-NordVulk Summer School 20-29 September 2021

Certificate of Attendance

NAME OF PARTICIPANT

attended and completed the virtual-form EUROVOLC-Nordvulk-Nordic EPOS Summer School on 20-29 September 2021. The school consisted of seven 2-hour long lecture sessions, six 1.5-hour long discussion sessions, with 16 short educational videos prepared for the school.

The participant attended discussion sessions and took active part in preparing results of their breakout rooms and presenting them to their larger discussion groups.

On behalf of the organizers

Magnús T. Gudmundsson
Task Leader, EUROVOLC Iceland Summer School
Professor of Geophysics, University of Iceland

EPOS EUROVOLC UNIVERSITY OF ICELAND Icelandic Met Office

Figure 7. A signed certificate of attendance was sent to participants that took part in at least three discussion sessions.

5. Student survey

An on-line survey was set up and the participants were asked to evaluate the different aspects of the school. The questions and possible choices offered in the form are reported below. The number of participants doing the survey was 35, 60% of the 58 completing the school.

The overall view of the school is favourable. Regarding questions on the lectures 75% were very satisfied and 20-22% satisfied. When it came to the discussion sessions, 48% rated them as very helpful and 45% as somewhat helpful. The demonstration videos received a very positive response with 91% being very positive, 3% somewhat positive while 6% (2 participants) were neutral.

When it came the social side, this was addressed by asking whether participants got to know new people. Only 15% said that they had got to know many people, 45% a few, 30% said that they had only got to know new people in a minor way and 10% (3 participants) that they had not got to know new people.

1. How well did the school reflect the main themes of Eruptive Processes, Observations and Responses?

More Details

Very well	26
Mostly	6
Not enough	1
Not at all	0

2. How well did the lectures explain the topics covered?

More Details

Very well	26
Well	6
Moderately well	0
Not well	1

3. Did the lectures match your expectations?

More Details

Yes	23
Mostly, but not all did	9
Moderately	0
Not well	1

4. Did you learn new things during the school?

More Details

Yes, many new things	27
To an extent	5
Only a few	1
No	0

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5. The question session following each lecture

More Details

Was too short	10
Too long	0
Of the right length	23

6. What is your view of the discussion sessions with breakout rooms?

More Details

They were very helpful	16
They were somewhat helpful	15
Not helpful	2
A waste of time	0

7. Did you learn new things in the discussion sessions?

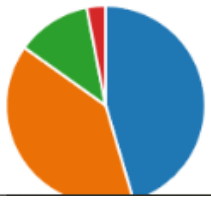
More Details

Yes, many new things	14
Yes, a few new things	15
A little but but not much	4
Not at all	0

8. How do you rank the format of the discussion sessions, with people working together through Zoom?

More Details

Very useful and productive	15
Somewhat useful	13
A little bit useful	4
Not at all useful	1



Questions | Responses 35

9. How do you rank access and communication to lecturers/teachers in the course?

More Details

Good and adequate	23
Okay, but would have liked t...	3
Would have liked to have m...	5
Not enough, a missing part fr...	1

10. Did you get to know people in a similar position as yourself during the discussion sessions?

More Details

Yes, many colleagues	5
Got to know a few people	15
Only in minor way	10
No	3

11. Have you watched the educational videos?

More Details

Yes, all of them	16
I have watched most of the...	15
I have only seen a few	1
Not looked at the videos	1

12. What is your view on the educational videos?

More Details

Very positive	30
Somewhat positive	1
Neutral	2
Negative	0

Questions Responses 35

13. What is your view of the difficulty level of the videos?

More Details

To technical and difficult	0
Most at the right level but so...	4
At the right level	25
Too easy – should have been...	3

14. I am currently:

More Details

Studying at MS-level	5
Studying at PhD-level	21
Working at postdoctoral level	3
None of the above	4

15. Have you been to an in-person intensive graduate-level summer school before?

More Details

Yes	9
No	24

16. Have you been to an intensive web-based gradual-level school before?

More Details

Yes	7
No	26

17. Would you recommend colleagues/co-workers to attend a similar school in future?

More Details

Yes	31
Maybe	1
No	1

18. Is there anything you would like to point out that should be done in possible future online summer school?

More Details

18
Responses

Latest Responses

"First of all, excellent course! Congratulations! Maybe the discussion ses...

"For the discussion sessions, following the same principles, it would be g...

6. Concluding remarks

It was a challenge for the organisers to arrange an on-line-only school aimed at PhD students and other early-stage researchers. The combined use of on-line lectures, active discussion sessions with tasks to solve and present, and a series of demonstration videos seems to have worked reasonably well. The participant survey shows a very positive view of the lectures and in particular the demonstration videos. The view on the discussion sessions is more mixed, although being generally positive.

Useful lessons drawn from this experience include the following:

- Meaningful and rewarding sessions of lectures can be arranged on-line. Ensuring good technical preparation is very important. This includes rehearsals where possible technical problems are found and solved beforehand.
- Demonstration videos can be a very effective way of engaging participants and providing insight into various surveys and technical issues.
- The remote form where people do not physically meet is challenging when it comes to social aspects of meetings. For most people it will always be a poor second compared to the social experience obtained at an in-person meeting.
- The experience of allowing all those that applied to take part is both positive and negative. Active PhD students and postdocs are in general enthusiastic and positive. However, the open, on-line format may result in people taking part that have negative impact on the experience of other participants. Those chairing sessions need to be prepared to take necessary action to minimize such impact.
- The on-line format allowed people to take part that would not have had the means to travel to e.g. Iceland/Europe to attend a summer school. This is a very positive aspect of on-line schools.

Appendix 1: The Summer School programme

20. Sept. 2021

Day 1: Introduction; Volcanic phenomena and processes

Time (UTC)	Title	Lecturer
09:00 – 09:15	Introduction to school and topics	Magnús T. Guðmundsson, Sara Barsotti, Rikke Pedersen
09:15 – 09:55	Explosive eruptions	Sara Barsotti
09:55 – 10:35	Effusive eruptions	Thorvaldur Thordarson
10:35 – 11:15	External effects on volcanic activity, eruptions in ocean, lakes and glaciers	Magnús T. Guðmundsson
11:15 – 11:45	BREAK	
11:45 – 13:00	Discussion session 1	Breakout rooms with moderator

Each lecture slot includes 30 minutes presentation, 5 minutes of questions + a short break

Video tutorials / presenter:

- Volcanic plumes – the basics / Tobias Dürig
- Lava field observations / Thorvaldur Thordarson
- Tephra measurements and sampling / Bergrún A. Óladóttir

21. Sept. 2021

Day 2: Observations, measurements, and modelling (I)

Time (UTC)	Title	Lecturer
09:00 – 09:40	Observations and estimates of explosive eruptions	Alexa Van Eaton
09:40 – 10:20	Tephra dispersal: Deposit characteristics and deposit mapping	Bergrún A. Óladóttir
10:20 – 11:00	Satellite observations of eruptions	Simon Carn
11:00 – 11:30	BREAK	
11:30 – 13:00	Discussion session 2 Topic for discussion groups	Breakout rooms with moderator

Video tutorials / presenter:

- Mass Eruption Rate estimates – REFIR tutorial / Tobias Dürig
- Mass Eruption Rate estimates – tephra dispersion models / Sara Barsotti
- Tephra measurements and sampling / Bergrún A. Óladóttir

22. Sept. 2021

Day 3: Observations, measurements, and modelling (II)

Time (UTC)	Title	Lecturer
09:00 – 09:40	MER estimates from plume modelling	Tobias Dürig
09:40 – 10:20	Simulating atmospheric dispersal of volcanic cloud and its deposition	Frances Beckett
10:20 – 11:00	Gas composition and emission rate from direct observations	Evgenia Ilyinskaya
11:00 – 11:30	BREAK	
11:30 – 13:00	Discussion session 3 Topic for discussion groups	Breakout rooms with moderator

Video tutorials / presenter:

- Radar monitoring of eruption plumes / Hermann Arngrímsson
- Mass Eruption Rate estimates – REFIR tutorial / Tobias Dürig
- Mass Eruption Rate estimates – tephra dispersion models / Sara Barsotti
- Volcanic gas monitoring 1: DOAS-traversing / Melissa Pfeffer & Talfan Barnie (Part 1: In the field) (Part 2: Plume height) (Part 3 :Process data)
- Volcanic gas monitoring 1: Drone-based observations / Melissa Pfeffer & Yves Moussallam (Part 1) (Part 2:)

23. Sept. 2021

Day 4: Observations, measurements, and modelling (III)

Time (UTC)	Title	Lecturer
09:00 – 09:40	Gas dispersal – observations and modeling	Sara Barsotti
09:40 – 10:20	Pyroclastic density currents – observations and impact	Domenico Doronzo
10:20 – 11:00	Lava flow mapping and models	Gro B.M. Pedersen
11:00 – 11:30	BREAK	
11:30 – 13:00	Discussion session 4 Topic for discussion groups	Breakout rooms with moderator

Video tutorials / presenter:

- Effusive eruptions – use of photogrammetry for TADR / Birgir V. Óskarsson, Joaquin Beloz & Gro B.M. Pedersen (Part 1: Birgir – In the Field) (Part 2: Joaquin & Gro – Processing Data).
- Volcanic gas monitoring 1: DOAS-traversing / Melissa Pfeffer & Talfan Barnie (Part 1: In the field) (Part 2: Plume height) (Part 3 :Process data)
- Volcanic gas monitoring 1: Drone-based observations / Melissa Pfeffer & Yves Moussallam (Part 1) (Part 2:)

27. Sept. 2021

Day 5: Volcanic hazards, use of observations to estimate effects and mitigation (I)

Time (UTC)	Title	Lecturer
09:00 – 09:40	Detection, analysis and role of seismic tremor in volcano monitoring	Chris Bean
09:40 – 10:20	Monitoring of associated hazards: lahars, glaciers, lakes	Matthew Roberts
10:20 – 11:00	Tephra hazards	Simona Scollo
11:00 – 11:30	BREAK	
11:30 – 13:00	Discussion session 5 Topic for discussion groups	Breakout rooms with moderator

Video tutorials / presenter:

- Eruption monitoring: IMO control room / Kristín Jónsdóttir and Sara Barsotti
- Seismic monitoring, volcanic tremor / Kristín Jónsdóttir
- Aircraft monitoring – volcanic activity in glaciers / Magnús Tumi Gudmundsson
- Radar monitoring of eruption plumes / Baldur Bergsson and Elín Björg Jónasdóttir
- Volcanic plumes – the basics / Tobias Dürig

28. Sept. 2021

Day 6: Volcanic hazards, use of observations to estimate effects and mitigation (II)

Time (UTC)	Title (not final)	Lecturer
09:00 – 09:40	Lava hazards	Annalisa Cappello
09:40 – 10:20	Gas hazards	Evgenia Ilyinskaya
10:20 – 11:00	Lahar hazards	Marta Calvache
11:00 – 11:30	BREAK	
11:30 – 13:00	Discussion session 6	Breakout rooms with moderator

Video tutorials / presenter:

- Lava field observations / Thorvaldur Thordarson
- Effusive eruptions – use of photogrammetry for TADR / Birgir V. Óskarsson, Joaquin Beloz & Gro B.M. Pedersen (Part 1: Birgir – In the Field) (Part 2: Joaquin & Gro – Processing Data).
- Eruption monitoring: IMO control room / Kristín Jónsdóttir and Sara Barsotti
- Seismic monitoring, volcanic tremor / Kristín Jónsdóttir
- Aircraft monitoring – volcanic activity in glaciers / Magnús Tumi Gudmundsson

29. Sept. 2021

Day 7: Case histories of recent eruption and close of school

Programme – all events online:
Session 7. 08:40 UTC

Time (UTC)	Title (not final)	Lecturer
09:00-09:10	Introduction to final session	Magnús T. Guðmundsson, Sara Barsotti, Rikke Pedersen
09:10 – 09:30	Case histories 1: Etna 2021	Giuseppe Salerno
09:30 – 09:50	Case histories 3: Nyiragongo	Patrick Allard
09:50 – 10:10	Case histories 4: Krakatau 2018	Thomas Walter
10:10 – 10:30	Case histories 5: Mayotte 2018-2019	Lise Retailleau
10:30 – 10:50	Case histories 2: Carribean eruptions	Richard Robertson
10:50 – 11:10	Questions and answers – closing address	Magnús T. Guðmundsson, Sara Barsotti, Rikke Pedersen

Appendix 2: List of speakers

Speaker	Affiliation
Alexa Van Eaton	USGS
Annalisa Cappello	INGV
Bergrún A. Óladóttir	Icelandic Meteorological Office
Chris Bean	Dublin Institute for Advanced Studies
Domenico Doronzo	INGV
Evgenia Ilyinskaya	Leeds University
Frances Beckett	UK Met Office
Giuseppe Salerno	INGV
Gro B.M. Pedersen	University of Iceland
Lise Retailleau	Institut de Physique du Globe de Paris
Magnús T. Gudmundsson	University of Iceland
Marta Calvache	Servicio Geológico Colombiano
Matthew Roberts	Icelandic Meteorological Office
Patrick Allard	Institut de Physique du Globe de Paris
Richard Robertson	University of the West Indies
Rikke Pedersen	University of Iceland
Sara Barsotti	Icelandic Meteorological Office
Simon Carn	Michigan Technological University
Simona Scollo	INGV
Thomas Walter	GFZ Potsdam
Thorvaldur Thordarson	University of Iceland
Tobias Dürig	University of Iceland

Appendix 3: Participation in lectures and discussion sessions

Date	Lecture	Discussion session
20 Sept	91-95	73
21 Sept	84-88	68
22 Sept	76-77	58
23 Sept	61-74	48
27 Sept	68-72	45
28 Sept	63-70	40
29 Sept	61-70	no session