

Course analysis GEON09

Global Environmental Change from a Geological Perspective

Spring term 2023

General:

The course was taught for the second time in 2023. Nine students completed the course, of which seven responded to the course evaluation (appended below). Just like last year, the students had a variety of backgrounds and/or specialisations; four from geology (of which two focussing on bedrock geology within their MSc. education), two from physical geography, two from aquatic ecology and one from archaeology. Although this was challenging to some extent regarding the level of some of the learning activities, the variety of backgrounds of the students certainly contributed to fruitful discussions and a favourable setting for addressing the learning objectives, particularly the ones focussing on sustainability and geosystem services. The evaluation results are generally favourable, and it seems that the learning outcomes have been well fulfilled to a large extent. In the following, some specific comments and concerns brought forward by the respondents are summarised, and modifications intended to generate improved learning during next year's course are highlighted.

Summarised comments and potential improvements:

1. The question "Did the course fulfil your expectations?" received a score of 4.6 (scale 1-5) as compared to 3.6 last year, and the corresponding scores for the question "Did the course increase your interest in the subject?" were 4.7 and 4.1, respectively. This must be seen as a result of appreciation of the course in general, and it probably also reflects some degree of development and increased experience with the course structure and content among the teachers.
2. Similarly, substantial increases were recorded for the scores relating to course literature and information on Canvas, which demonstrates that there is no need to make any substantial changes to these aspects of the course.
3. There was a slight increase in the focus on pre-Quaternary climate history as compared to last year (in response to course evaluation comments). However, that part was considered a little difficult to follow by some respondents, possibly because of too little time allocated for the content and/or level provided. As these aspects of the course seem to be highly relevant and valued, ***we will retain its extent but re-structure the seminar on pre-Quaternary climate history and revise the related literature next year.***
4. The topical seminars were generally highly appreciated, and their extent (four seminars) seems to be well balanced, which indicates that they should be retained. The same applies to the one-day excursion (A glaciated landscape and its uses).
5. The exercise on climate sensitivity also seems to be appropriate, but ***we will make sure to have a back-up plan in case problems arise with the web-based tool Climate Explorer again next year.***
6. The invited guest lectures by Mette Bendixen and Emma Rehnström were appreciated and will be retained if possible.
7. The format of the home-based examination was somewhat modified as compared to last year in response to course evaluation comments (two instead of three full days and

slightly fewer questions), which resulted in an increased score on its functionality (from 3.8 to 4.7). Seven of the nine students passed the exam (before the second attempt), four with distinction, as compared to 11 of 13 (four with distinction) last year. The revised format of the exam will be retained but ***the rapid development of generative artificial intelligence systems recently means that we must develop clear strategies and instructions related to this next year. This applies to the home-based examination as well as to other written assignments within the course.***

8. The fieldtrip was generally highly appreciated (top scores for both instructions/preparations and relevance/time utilization), which provides good grounds for retaining its overall format and focus. One comment concerned ***the inclusion of a visit at a hydroelectric powerplant, which will be considered when planning next year's fieldtrip. We will also consider including some reading or other content related to future energy production.***
9. In response to course evaluation comments, the post-fieldtrip laboratory and synthesis activities were expanded slightly as compared to last year, which seems to have been a successful modification.
10. The individual written report was given generally favourable ratings (score 4.9 as compared to 4.5 last year). but its inclusion of analytical work after the fieldtrip generated some comments. At least one respondent was concerned about insufficient time for inclusion of empirical data in the report after the fieldtrip. ***We are aware of this problem, which is difficult to address for logistical reasons as the scheduling of the fieldtrip is constrained by snow-cover conditions in the mountains of Dalarna.***
11. Just like last year, the evaluation of transferrable skills (discussion of scientific articles, written communication in English, oral communication in English) was generally positive (scores of 4.1, 4.7 and 4.9, as compared to 4.6, 4.2 and 4.4 last year). However, one respondent commented on the lack of detailed feedback on the written report. ***We will consider providing more systematic feedback on the report next year, perhaps aided by modified instructions for the student peer review process.***



Dan Hammarlund
Course coordinator



Mette-Louise Linneberg
Student representative



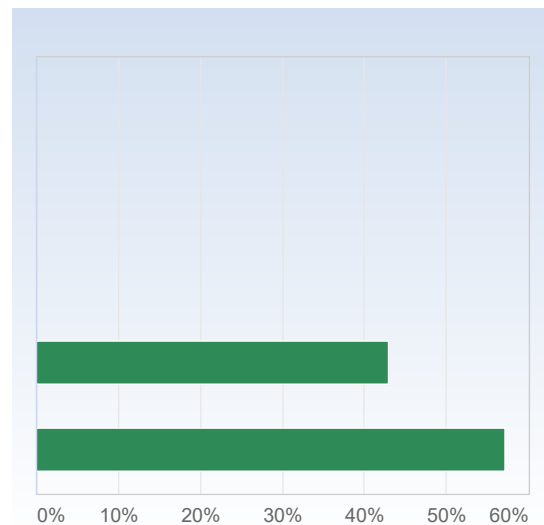
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Course evaluation GEON09 2023

Respondents: 9
Answer Count: 7
Answer Frequency: 77,78 %

GENERAL: Did the course fulfil your expectations?

GENERAL: Did the course fulfil your expectations?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	3 (42,9%)
	4 (57,1%)
Total	7 (100,0%)



	Mean	Standard Deviation
GENERAL: Did the course fulfil your expectations?	4,6	0,5

Comment

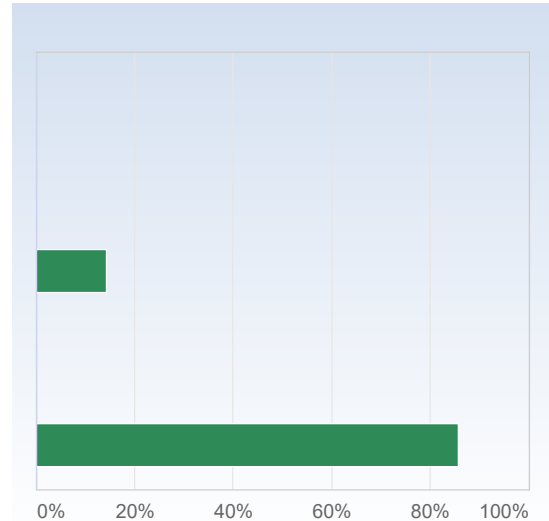
less geology than expected
The course content was broader than expected
It exceeded them
Yes



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GENERAL: Did the course increase your interest in the subject?

GENERAL: Did the course increase your interest in the subject?	Number of responses
	0 (0,0%)
	0 (0,0%)
	1 (14,3%)
	0 (0,0%)
	6 (85,7%)
Total	7 (100,0%)



GENERAL: Did the course increase your interest in the subject?	Mean	Standard Deviation
	4,7	0,8

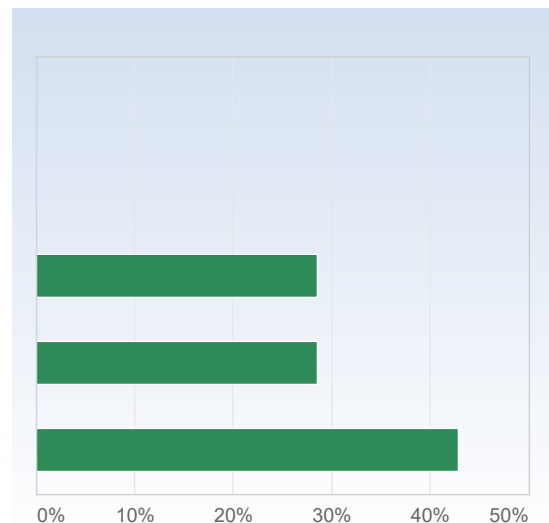
Comment

I gained enormous knowledge in a different aspect of geological phenomenon interact with various other natural processes, even its bit new for me.

Yes , projects , presentations and practical work make my concepts clear which increased the interest for this course.

GENERAL: Did the course give you valuable knowledge and skills for your continued studies and career?

GENERAL: Did the course give you valuable knowledge and skills for your continued studies and career?	Number of responses
	0 (0,0%)
	0 (0,0%)
	2 (28,6%)
	2 (28,6%)
	3 (42,9%)
Total	7 (100,0%)



GENERAL: Did the course give you valuable knowledge and skills for your continued studies and career?	Mean	Standard Deviation
	4,1	0,9



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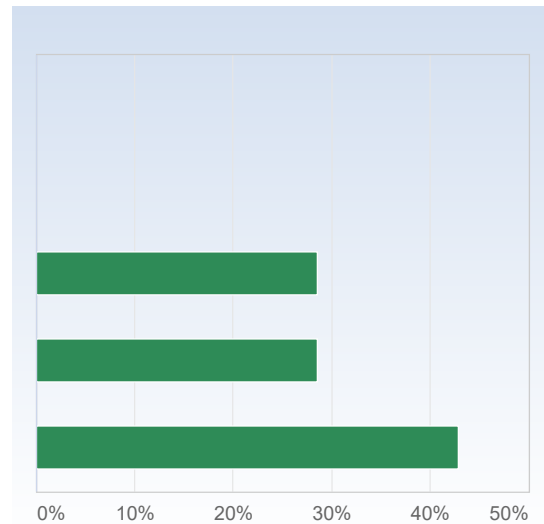
Comment

good presentation exercises

Well , it was bit unclear for me , where can i use these techniques and methods in practical career , or what kind of jobs can i secure with this knowledge, i think this course was mostly researched based

GENERAL: Was your basic knowledge of the subject sufficient for the course?

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	0 (0,0%)
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	3 (42,9%)
Total	7 (100,0%)



	Mean	Standard Deviation
GENERAL: Was your basic knowledge of the subject sufficient for the course?	4,1	0,9

Comment

Im bit lack of initial knowledge for the area which covers in the course.

When you are not a geologist it was a bit hard to follow some of the first lessons about earth history, but it was no problem as soon as we got in to the quaternary period.

No it wasn't but with articles and presentation its cleared my confusions

GENERAL: Overall positive criticism:

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good spectrum of topics throughout the lectures, great fieldtrip

It a good way to improve our presentation, communication skills, while have a fun in snow.

Exciting lectures and seminar topics.

Good teaching, the topics were well explained.

Good guidance with the report

Excursions were useful to confirm knowledge

Helpful feedback

Nice course. Liked the excursions and fieldwork.

It was nice to approach climate change from several angles.

We were unable to experience climate explorer as it was not working due to some kind of technical issue ,I hope next time it can be improved or preplanned



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GENERAL: Overall negative criticism:

GENERAL: Overall negative criticism:

- sometimes a little repetitiv in the lectures due to different teachers
- there were some repetition from previous geology courses
- Readings before the lectures were sometimes harder to understand as the topic were not introduced yet
- The two parts of the course field a bit separated.
- A bit too fast paced lectures in the beginning.
- I don't think so...

GENERAL: What would you suggest us to change?

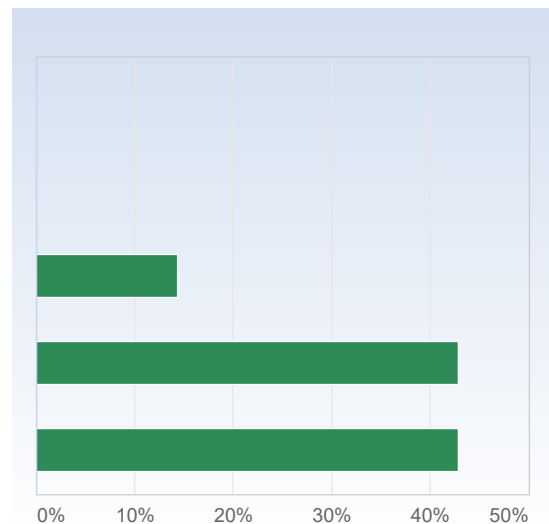
GENERAL: What would you suggest us to change?

- Maybe one more lecture or seminar on future developments including more geoengineering and possibly energy sources.
- More time for processing data and writing on the individual report for those who report was heavily dictated by collecting data in the field
- Earlier and more briefings for tasks and excursions.
- Don't think I have any suggestions
- For me

GENERAL: Was the introductory information correct and satisfactory (aims, structure, content etc.)?

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	Number of responses
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	3 (42,9%)
Total	7 (100,0%)



	Mean	Standard Deviation
GENERAL: Was the introductory information correct and satisfactory (aims, structure, content etc.)?	4,3	0,8

Comment

- A guideline or an overview in the beginning would be helpful so it's easier to add the different puzzle pieces
- Yes



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GENERAL: Did you attain the learning outcomes reasonably well?
(please comment below if needed):

Following active participation in the course, the student shall:

=> account for the fundamental features of and causes behind Earth's long-term climate and glaciation development, with an emphasis on changes during the Cenozoic (the last 66 million years)

=> account for the glaciation dynamics during the Quaternary (the last 2.6 million years) and its consequences in the form of environmental changes, with an emphasis on Scandinavia during the last glacial cycle

=> describe the most important geological resources (geosystem services) for humanity, with an emphasis on previously glaciated regions, explain their formation and development in a geological perspective, and account for how they are influenced by human activity and today's global environmental changes

=> prepare a basic field study of subject-relevant environmental changes in a selected region based on literature and existing monitoring series, and select and adapt field and laboratory methods to the assignment

=> independently and in a reflecting way acquire, analyse and interpret field-based data related to the ongoing climate change in the perspective of past glacial dynamics and environmental changes since the last deglaciation

=> draw conclusions about local and regional glaciation dynamics based on Quaternary stratigraphies, sediments and landforms

=> apply fundamental quantitative methods to achieve advanced



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understanding of
the most important processes that lead to changes in climate and
related
environmental responses

=> critically assess and discuss scientific primary publications within
the subject area,
and based on such material summarise a given current research
issue

=> communicate scientifically in writing and speaking in English and
in a
balanced way utilize scientific terminology associated with the topic

=> evaluate ongoing global and regional environmental and climatic
changes as well
as future scenarios in the perspective of natural variations during
geological time

=> identify geosystem services in glacially influenced landscapes
and critically discuss
societal adaptations in relation to past, ongoing and future changes
in climate
and glaciation patterns

=> evaluate the dependency and use of geosystem services in
modern society in
relation to the limitations of the planet



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GENERAL: Did you attain the learning outcomes reasonably well? (please comment below if needed):

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=> describe the most important geological resources (geosystem services) for humanity, with an emphasis on previously glaciated regions, explain their formation and development in a geological perspective, and account for how they are influenced by human activity and today's global environmental changes

=> prepare a basic field study of subject-relevant environmental changes in a selected region based on literature and existing monitoring series, and select and adapt field and laboratory methods to the assignment

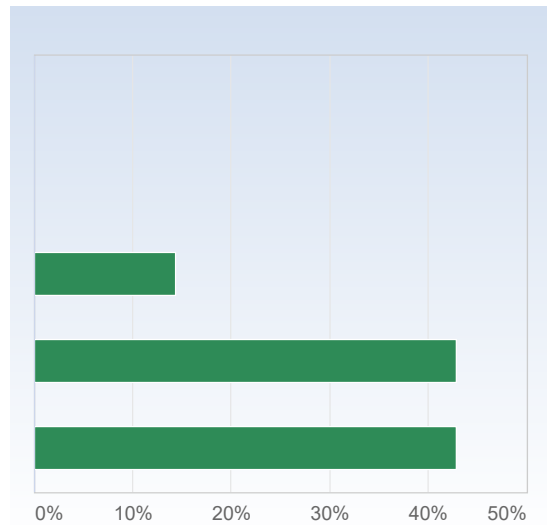
=> independently and in a reflecting way acquire, analyse and interpret field-based data related to the ongoing climate change in the perspective of past glacial dynamics and environmental changes since the last deglaciation

=> draw conclusions about local and regional glaciation dynamics based on Quaternary stratigraphies, sediments and landforms

=> apply fundamental quantitative methods to achieve advanced understanding of the most important processes that lead to changes in climate and related environmental responses

=> critically assess and discuss scientific primary publications within the subject area, and based on such material summarise a given current research issue

=> communicate scientifically in writing and speaking in English and in a balanced way utilize scientific terminology associated with the





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topic

=> evaluate ongoing global and regional environmental and climatic changes as well as future scenarios in the perspective of natural variations during geological time

=> identify geosystem services in glacially influenced landscapes and critically discuss societal adaptations in relation to past, ongoing and future changes in climate and glaciation patterns

=> evaluate the dependency and use of geosystem services in modern society in relation to the limitations of the planet

	Number of responses
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	Mean	Standard Deviation
<p>GENERAL: Did you attain the learning outcomes reasonably well? (please comment below if needed):</p> <p>Following active participation in the course, the student shall:</p> <p>=> account for the fundamental features of and causes behind Earth's long-term climate and glaciation development, with an emphasis on changes during the Cenozoic (the last 66 million years)</p> <p>=> account for the glaciation dynamics during the Quaternary (the last 2.6 million years) and its consequences in the form of environmental changes, with an emphasis on Scandinavia during the last glacial cycle</p> <p>=> describe the most important geological resources (geosystem services) for humanity, with an emphasis on previously glaciated regions, explain their formation and development in a geological perspective, and account for how they are influenced by human activity and today's global environmental changes</p> <p>=> prepare a basic field study of subject-relevant environmental changes in a selected region based on literature and existing monitoring series, and select and adapt field and laboratory methods to the assignment</p> <p>=> independently and in a reflecting way acquire, analyse and interpret field-based data related to the ongoing climate change in the perspective of past glacial dynamics and environmental changes since the last deglaciation</p> <p>=> draw conclusions about local and regional glaciation dynamics based on Quaternary stratigraphies, sediments and landforms</p> <p>=> apply fundamental quantitative methods to achieve advanced understanding of the most important processes that lead to changes in climate and related environmental responses</p> <p>=> critically assess and discuss scientific primary publications within the subject area, and based on such material summarise a given current research issue</p> <p>=> communicate scientifically in writing and speaking in English and in a balanced way utilize scientific terminology associated with the topic</p> <p>=> evaluate ongoing global and regional environmental and climatic changes as well as future scenarios in the perspective of natural variations during geological time</p> <p>=> identify geosystem services in glacially influenced landscapes and critically discuss societal adaptations in relation to past, ongoing and future changes in climate and glaciation patterns</p> <p>=> evaluate the dependency and use of geosystem services in modern society in relation to the limitations of the planet</p>	4,3	0,8



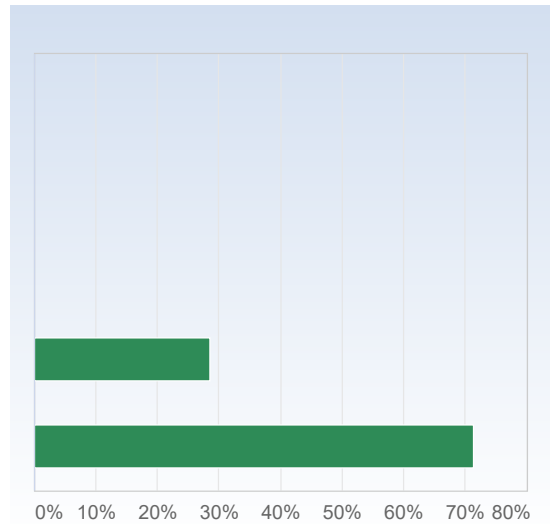
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Comment

Again the climate history before quaternary is a bit difficult to remember because I didn't have a fundamental understanding of earth's different eras. It was therefore a bit difficult to have it in a content. Maybe use time on walking us a bit slower through this part.

GENERAL: Was there clear coherence between expected learning outcomes, learning activities and examination?

GENERAL: Was there clear coherence between expected learning outcomes, learning activities and examination?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	2 (28,6%)
	5 (71,4%)
Total	7 (100,0%)



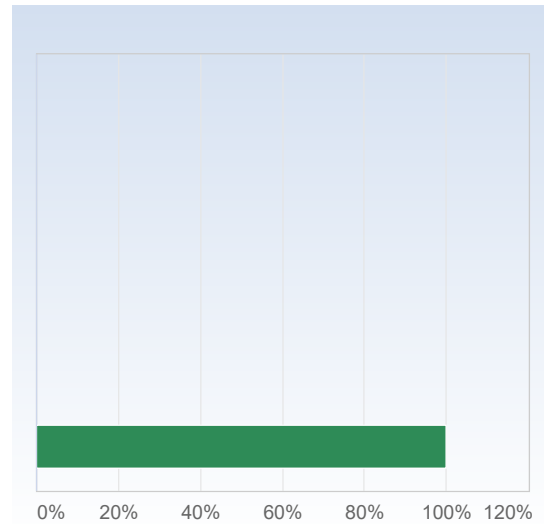
	Mean	Standard Deviation
GENERAL: Was there clear coherence between expected learning outcomes, learning activities and examination?	4,7	0,5



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GENERAL: Were the teachers engaged and helpful, and did they provide relevant feedback during the course when suggestions and ideas were brought forward?

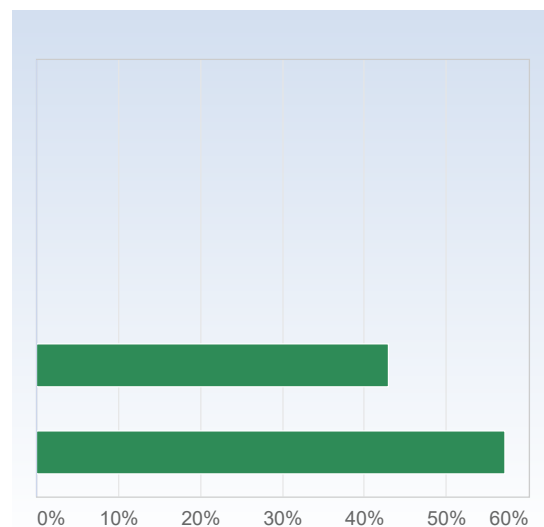
GENERAL: Were the teachers engaged and helpful, and did they provide relevant feedback during the course when suggestions and ideas were brought forward?	Number of responses
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	0 (0,0%)
	0 (0,0%)
	7 (100,0%)
Total	7 (100,0%)



GENERAL: Were the teachers engaged and helpful, and did they provide relevant feedback during the course when suggestions and ideas were brought forward?	Mean	Standard Deviation
	5,0	0,0

GENERAL: Was the information on Canvas useful? If not, how could it be improved?

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	0 (0,0%)
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	0 (0,0%)
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	4 (57,1%)
Total	7 (100,0%)



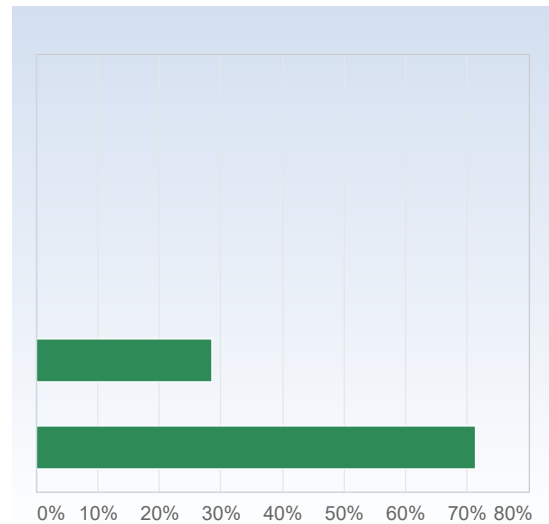
GENERAL: Was the information on Canvas useful? If not, how could it be improved?	Mean	Standard Deviation
	4,6	0,5



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THEORETICAL PART: Was the text book appropriate for the course?

THEORETICAL PART: Was the text book appropriate for the course?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	2 (28,6%)
	5 (71,4%)
Total	7 (100,0%)



	Mean	Standard Deviation
THEORETICAL PART: Was the text book appropriate for the course?	4,7	0,5

Comment

Again maybe the first article could be something very simple about earth's development just to provide a fundamental understanding before building on some more difficult climate history

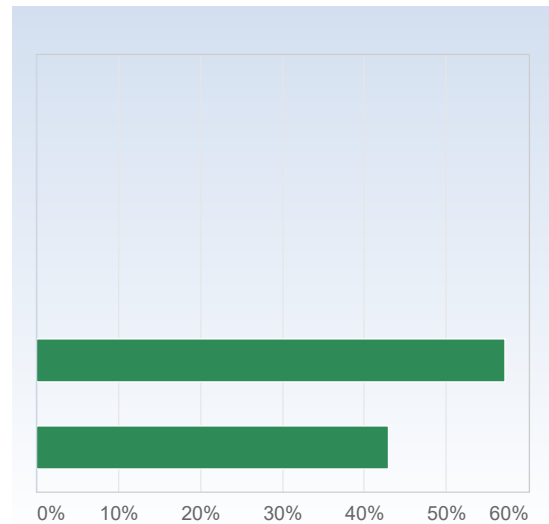
Honestly speaking I didn't read any of them but the article and presentation was appropriate



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THEORETICAL PART: Was the additional literature (list of articles) appropriate for the course?

THEORETICAL PART: Was the additional literature (list of articles) appropriate for the course?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	4 (57,1%)
	3 (42,9%)
Total	7 (100,0%)



	Mean	Standard Deviation
THEORETICAL PART: Was the additional literature (list of articles) appropriate for the course?	4,4	0,5

Comment

sometimes the articles where a bit hard to read / not the best research

Mostly yes, but the discussions afterwards helped

Yes

THEORETICAL PART: General comments on the lecture series:

THEORETICAL PART: General comments on the lecture series:

No complaints

The first ones a bit too fast, and the later ones a bit too slow. Maybe find a more substantial common theme that can be referred to in all the lectures.

THEORETICAL PART: General comments on the guest lectures by Emma Rehnström and Mette Bendixen:

THEORETICAL PART: General comments on the guest lectures by Emma Rehnström and Mette Bendixen:

exciting topics

Mette's was really fascinating

Did not attend.

THEORETICAL PART: Was the seminar on Pre-Quaternary climate history useful?

THEORETICAL PART: Was the seminar on Pre-Quaternary climate history useful?

Yes

Yes, it gave a really good perspective on things.

yes

Yes

Yes



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THEORETICAL PART: Was the seminar on Global change case studies useful?

THEORETICAL PART: Was the seminar on Global change case studies useful?

Yes

Yes!

yes

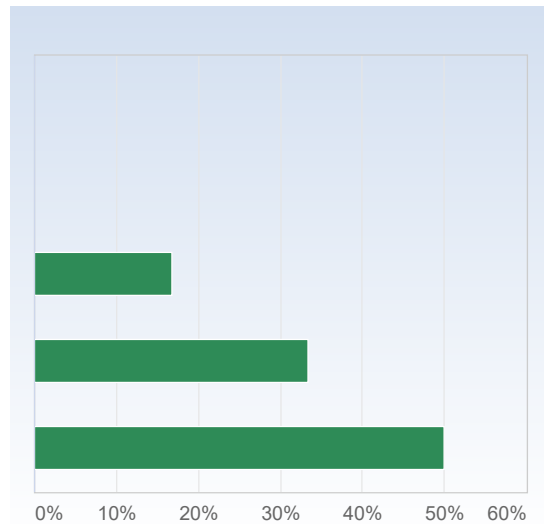
Yes

Yes

THEORETICAL PART: Was the seminar on Ice-sheet reconstruction, MIS3 case study useful?

THEORETICAL PART: Was the seminar on Ice-sheet reconstruction, MIS3 case study useful?

	Number of responses
	0 (0,0%)
	0 (0,0%)
	1 (16,7%)
	2 (33,3%)
	3 (50,0%)
Total	6 (100,0%)



	Mean	Standard Deviation
THEORETICAL PART: Was the seminar on Ice-sheet reconstruction, MIS3 case study useful?	4,3	0,8

Comment

Yes

Yes

THEORETICAL PART: Was the exercise on Climate sensitivity useful?

THEORETICAL PART: Was the exercise on Climate sensitivity useful?

yes, to some degree

Yes

Yes

Barely

THEORETICAL PART: Was the seminar on Geosystem services useful?

THEORETICAL PART: Was the seminar on Geosystem services useful?

Yes

yes

Yes

Yes

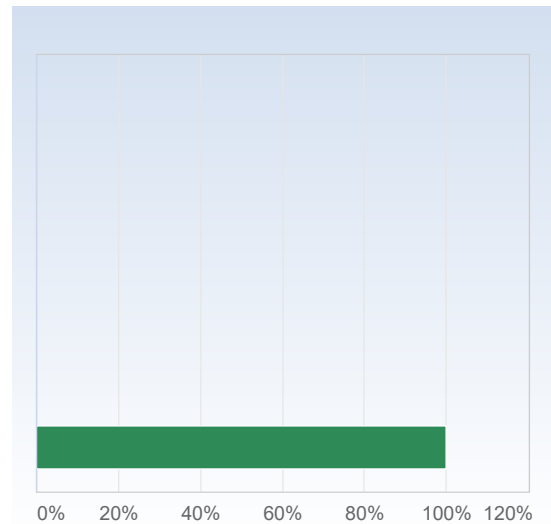
Yes



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THEORETICAL PART: Was the excursion (A glaciated landscape and its uses) useful?

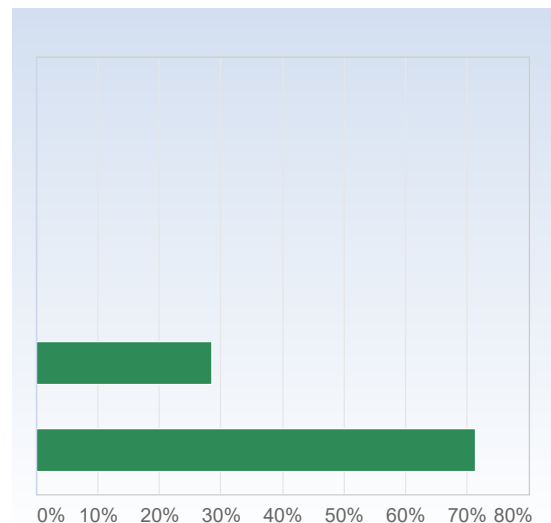
THEORETICAL PART: Was the excursion (A glaciated landscape and its uses) useful?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	5 (100,0%)
Total	5 (100,0%)



	Mean	Standard Deviation
THEORETICAL PART: Was the excursion (A glaciated landscape and its uses) useful?	5,0	0,0
Comment		
Yes		

THEORETICAL PART: Was the home-based examination satisfactory?

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	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
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Total	7 (100,0%)



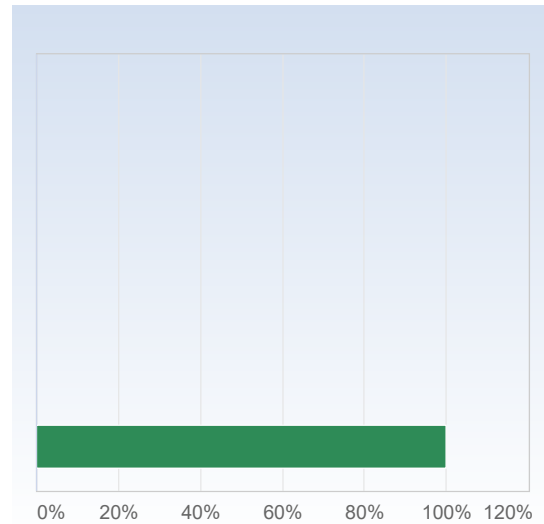
	Mean	Standard Deviation
THEORETICAL PART: Was the home-based examination satisfactory?	4,7	0,5
Comment		
Yes, but a few times not clear what was specifically asked (e.g. orbital forcings or feedback mechanism)		



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PROJECT PART: Were the instructions for the project work appropriate and the pre-fieldtrip period well spent for the literature review?

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	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	6 (100,0%)
Total	6 (100,0%)



	Mean	Standard Deviation
PROJECT PART: Were the instructions for the project work appropriate and the pre-fieldtrip period well spent for the literature review?	5,0	0,0

Comment

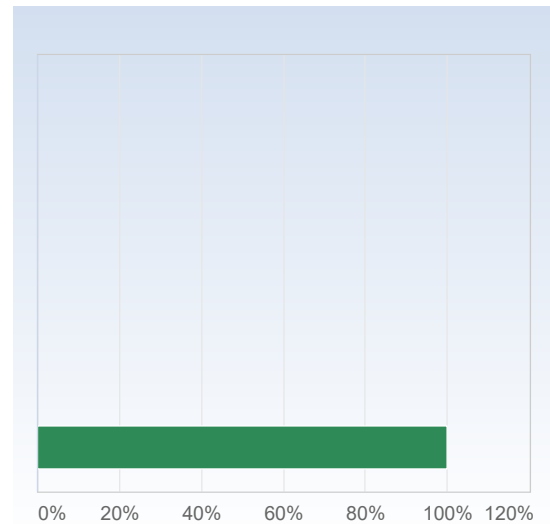
more time for processing data and writing on the individual report for those who report was heavily dictated by collecting data in the field
A bit much time before field trip compared to after, but hard to do something about that



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PROJECT PART: Was the fieldtrip relevant and the time well utilized?

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	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
Total	7 (100,0%)



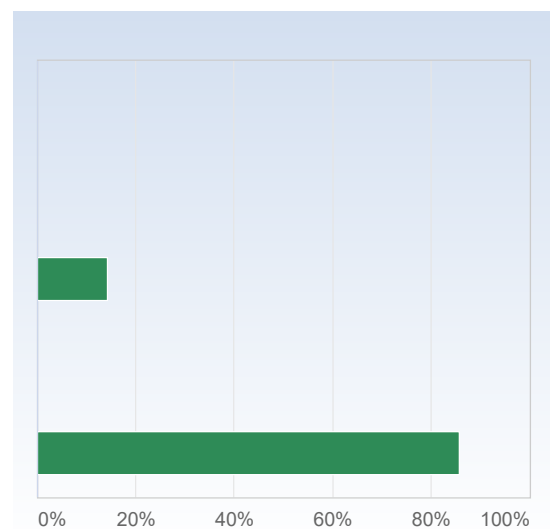
	Mean	Standard Deviation
PROJECT PART: Was the fieldtrip relevant and the time well utilized?	5,0	0,0

Comment

Maybe one stop at a hydroelectric power plant would be nice
Wonderful

PROJECT PART: Were the post-fieldtrip laboratory work and the following group-based presentations useful?

PROJECT PART: Were the post-fieldtrip laboratory work and the following group-based presentations useful?	Number of responses
	0 (0,0%)
	0 (0,0%)
	1 (14,3%)
	0 (0,0%)
Total	6 (85,7%)



	Mean	Standard Deviation
PROJECT PART: Were the post-fieldtrip laboratory work and the following group-based presentations useful?	4,7	0,8

Comment

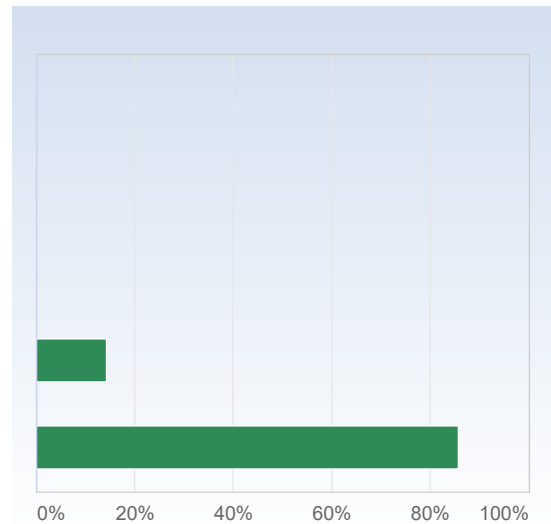
Very useful



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PROJECT PART: Was the individual written report relevant and useful?

PROJECT PART: Was the individual written report relevant and useful?	Number of responses
	0 (0,0%)
	0 (0,0%)
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Total	7 (100,0%)



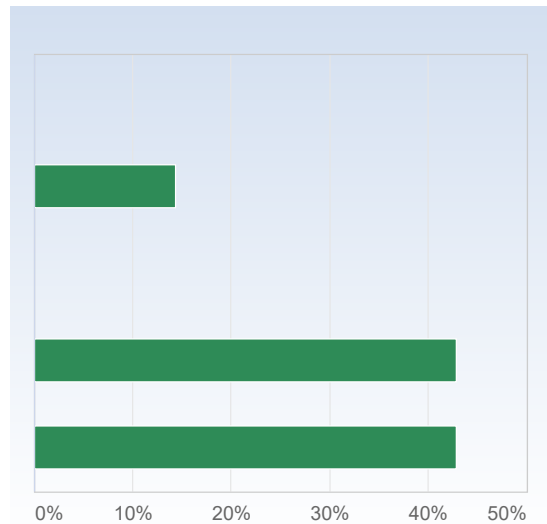
	Mean	Standard Deviation
PROJECT PART: Was the individual written report relevant and useful?	4,9	0,4
Comment		
Yes because you're able to tackle climate change with your own sense		



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TRANSFERABLE SKILLS: Did the course increase your ability to critically assess, summarize, and discuss scientific articles?

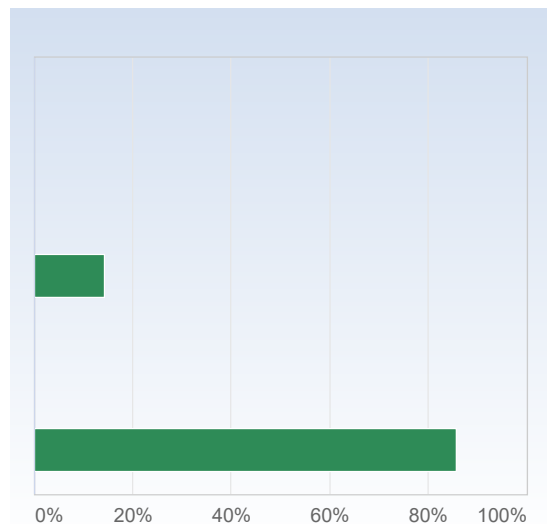
TRANSFERABLE SKILLS: Did the course increase your ability to critically assess, summarize, and discuss scientific articles?	Number of responses
	0 (0,0%)
	1 (14,3%)
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Total	7 (100,0%)



	Mean	Standard Deviation
TRANSFERABLE SKILLS: Did the course increase your ability to critically assess, summarize, and discuss scientific articles?	4,1	1,1

TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, written communication in English?

TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, written communication in English?	Number of responses
	0 (0,0%)
	0 (0,0%)
	1 (14,3%)
	0 (0,0%)
	6 (85,7%)
Total	7 (100,0%)



	Mean	Standard Deviation
TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, written communication in English?	4,7	0,8

Comment

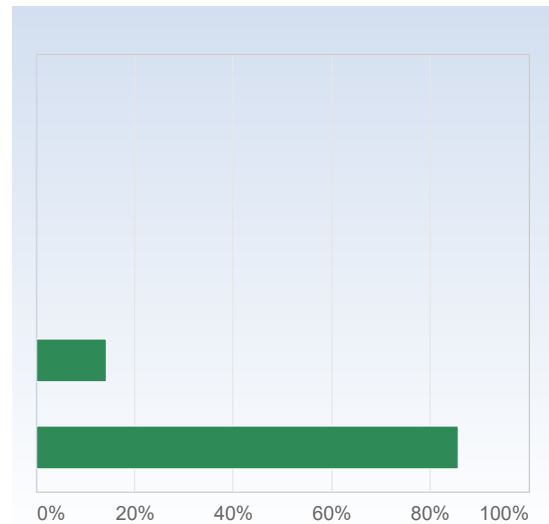
I haven't seen any feedback yet of the report?



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TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, oral communication in English?

TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, oral communication in English?	Number of responses
	0 (0,0%)
	0 (0,0%)
	0 (0,0%)
	1 (14,3%)
	6 (85,7%)
Total	7 (100,0%)



	Mean	Standard Deviation
TRANSFERABLE SKILLS: Did you get appropriate training in, and feedback on, oral communication in English?	4,9	0,4

Comment

Enormously..the course was letting a great opportunity.

Please provide any other comments on the course that you may have.