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De  
Ondergrondse  
dispuut Geo-Engineering

PostNL  
Port Betaald

# de MOL

Magazine of Dispuut Geo-Engineering "De Ondergrondse"

CRUX



Witteveen Bos



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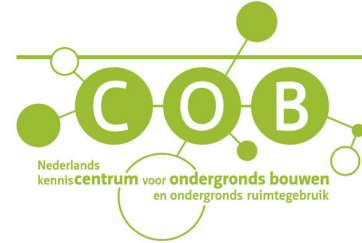
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De Ondergrondse has been working together with the Dutch engineering association "KIVI Geotechniek" for quite some time now. In order to make this cooperation even better, KIVI Geotechniek is offering the students of the Geo-Engineering section the possibility to join the activities hosted by KIVI Geotechniek. These activities include excursions to conferences and more! For most activities you need to be a member of KIVI Geotechniek and most are organized in Dutch.

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# From the Board

By Steve van Adrichum

Dear students, staff, alumni and other readers,

The last time I wrote this article we just took over as board. Many successful activities have already taken place within our master section. I am actually writing this article inside our 'hok' and the people who walked by have perhaps already noticed that the interior has changed.

Not only is there a new table, there are many pictures on the wall of last period's activities. The one which jumps to mind is a picture of the New Year's dinner in 'Het Postkantoor', where not only many students were present, but also many staff members and PhD'ers. It is very good to see that the section is so actively involved with the Ondergrondse. Another big activity was the Geodrink which was popular as well, as it has always been. Last times the Geo talks were held just before the Geodrink. I would

recommend all students to join and listen to what the trending topics and ongoing researches are within our Geo Engineering section.

In the meantime, we are not sitting still. The GETA committee is organising the summer trip and the short day abroad is organized as well on the 20th of April. From last year there are still some happy pictures on the wall of our hok and I hope to add some more pictures of great memories to make in the coming period.

Lastly, I want to thank the committee members of the MOL for making their first magazine of the year and I wish them luck in making the following versions!

Hope to see you all around!

# Editorial

By Bart Verstijnen

Dear readers,

As of the beginning of the new year, we are proud to call ourselves the new editors of the Mol magazine! As the new committee, Jurren, Coco and myself (Bart) do our best to put together the many interesting stories that surround the Geo-Engineering section. A new team means new ideas. Some of them can be found in this edition and some will come in the following editions. The magazine had some great articles which we kept of course. We were surprised that we found so many fellow students that were happily willing to share their experiences and stories. As always, this edition contains the career path of one of the international student and a multi disciplinary project.

As some of you may already know, this edition will also be the first one where Dr. Mol will make his appearance, we gave him a separate section at the end. Another first is a creative crossword, combining geology, creativity and puzzling skills.

We hope you enjoy this edition of the Mol!





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**NEW**  
Win a prize by  
completing the  
geo-crossword

16



# Excursion Liège

Friday 12th of October – Saturday 13th of October 2018

By Rinse-Jan Donker

As part of the study program for the first year's masters course 'Engineering Geology', a small field excursion was organized back in October to get our Geo-Engineering fresh-man's feet wet. In the course of fewer than two days, we visited among other nice things a sluice, a mine, several outcrops/roadcuts and possibly some Belgian pubs in between. All in all to learn as much as possible about the Ardennes regional geology, culture and the engineering solutions found therein. As the writer, I recognize that a recollection of events like this might easily turn into a slog to read of "then this and then that" statements but it was actually quite hard to write something about such a fascinating excursion. You're invited to be your own judge.

The first points of interest were the locks of Klein Ternaaien (en français les écluses de Lanaye). After the long journey in the bus from Delft to the Maastrichtian-Belgian border, we could finally catch a break there. After a detailed review of local geology and some information on the construction of the two newest sluices, we got our first-hand look at the jumbo-sized waterlogged structures.

The locks are the link between the Meuse and Albertcanal. To reduce the vulnerability of the single lock a larger second one was constructed. Weeks before we visited,



the upper door of the old lock was damaged beyond repair due to improper closing of the door. As if to illustrate the usefulness of a second lock, the old lock will be closed for months.

Our second and final stop of the first day was the former underground calcarenite/limestone mine turned museum at the Hill of mount Sint Pieter (Yes, that is the name and not a pleonasm). With eleven degrees Celsius year-round, you better not have forgotten your jacket.. Not as much pure geology here as pretty art but nevertheless a cool and unique experience. Truly recommended to and for everyone.

For the night we stayed in a Youth Hostel in Luik (en français Liège). No better place for tired students (and staff) to do nothing else but to sleep (see picture below) after such a long and especially draining day.







The departure of the bus the following morning came a tad bit early; we were all really grateful that we had a professional cabbie and did not have to drive ourselves. As a simple Earth Sciences exchange student from Amsterdam who also did his Bachelor's introduction fieldwork in the Ardennes the second day was like a family reunion but with a twist (the engineering kind of way). We visited many roadcuts, outcrops of vistas throughout the day. It was lovely. For some this was their first time with a geological hammer or compass in their hands, for others this was a chance to educate their peers. Keywords here are anticlines, train stations, sinkholes, pizza at Bonnelles, and buttresses.



Looking around in the bus heading back to Delft that afternoon, you could definitely see that, despite the short duration of the trip its intensity exhausted over half the population to the point of certain collapse. More certainly, I can conclude that it was an overwhelmingly successful introduction into the field of Engineering Geology. I feel very strongly that excursions like these are unequivocally vital to the programs that we use to educate and to train our geo-professionals.

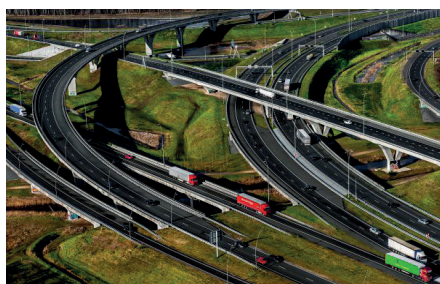
We came back a little tired and poorer, yes, but at the same time also more experienced and therefore all the much richer.





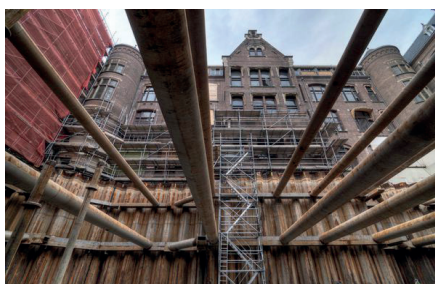
## Geotechniek

Grondonderzoek  
Funderingen en grondconstructies  
Bouwkuipen  
Boortunnels en sleufloze technieken  
State-of-the-art dijktoetsing  
Zettingsarme of -vrije systemen  
Dynamica en aardbevingen



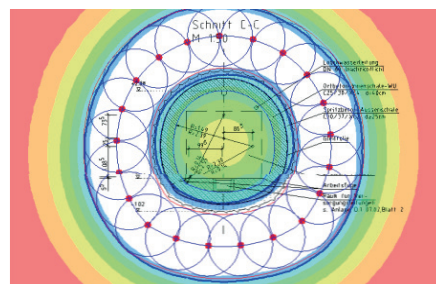
## Omgeving

Belendingsonderzoek  
Trillingspredicties  
Vervormingsanalyses  
Schadepredicties  
Monitoringsplannen  
Monitoring en begeleiding  
Schadeonderzoek



## Grondverbetering

Bodeminjectie  
Jetgrouting  
Mixed-in-Place  
Compensation grouting (compaction)  
Compensation grouting (fracture)  
Grondbevriezing



## Geohydrologie

Bemalingen  
Modelstudies  
Statistiek grondwaterstanden  
Toetsing geohydrologische effecten  
Duurzame energie (WKO)  
Pompproeven



## Bodem

Milieuhygiënisch bodemonderzoek  
Toepasbaarheid grond en bouwstoffen  
Werken in verontreinigde grond  
Milieukundige begeleiding  
Adviesgeving asbestsanering



## Stage/afstuderen

In de afgelopen jaren heeft CRUX altijd meerdere stage/afstudeerplaatsen beschikbaar (en ingevuld!) gehad op het gebied van geotechniek en constructies.

Ben jij een enthousiaste en gedreven student Civiele Techniek of Constructieve Bouwkunde en heb je interesse in een stage/afstudeerplaats bij CRUX? Stuur dan jouw CV en motivatie naar [info@cruxbv.nl](mailto:info@cruxbv.nl).



# GETA

By Zeid Bitar

The GETA (Geo-Engineering Trip Abroad) committee organizes an annual study trip for the master programme of Geo-Engineering in TU Delft. The study trip combines educational activities such as visiting companies or project sites as well as social activities so that all fellow geo-engineers can take a breath and relax!

This year, we have chosen to take our Geo-engineers up North through Scandinavia. Starting in the beautiful city of Hamburg, to the hustle and bustle of Gothenburg, with many other destinations in mind, this year's trip will be surely one to remember! The committee is currently in a step-by step process to provide an interesting destination plan at the end of the academic year. The trip is scheduled to start on the 4th of July and returning on the 14th, so add this to your summer plans!

We are motivated to provide an action-packed schedule and will keep everyone informed about the upcoming plans. Stay tuned on our Facebook page, as we will provide all the details of the trip soon. We would love to have everyone join us on this once and lifetime trip, so hope to see you there!



Starting from the bottom left to top: Matthias Hauth, Zeid Bitar, Louis-James Woudstra, Jilles van der Werf, Munta de Boorder, Siavash Honardar

# Symposium Peter Verhoef

By Mitch Frissen

On the 23rd of November a symposium by Ingeokring was organized to say farewell to one of the most experienced engineering geologists of the Netherlands. The program of the symposium was composed by Peter Verhoef himself. Besides an interesting list of speakers, every self-respecting symposium needs a host to shortly introduce the speakers. Dr. Ir. Dominique Ngan-Tillard was asked to do this with her French charm. This actually was one of the main reasons that I was the last person to leave the symposium, as I was asked to help her during the afternoon to set up the borrel and clean it afterwards. Because I stayed long after the presentation, I got the opportunity to get in contact with a variety of people which all had great stories about the geology world and their work with Peter.

As a geo-engineer in the making, the presentations were very interesting. For example, I didn't

know that there was so much research going on in the field of dredging technology. I also did not know the size of some of the project geologist get to work on. The thing that most stood out, was that Peter Verhoef is a very well-known and respected person inside the engineering geology scene.

After the last presentation, there was a small network borrel with a touch of French influences, a couple of nice special beers and hearty food that was prepared by Dominique. For me and the other students present, this was the opportunity to get in touch with people from the work field and extend our network.

Unfortunately, good parties also have to end and sometimes a little bit earlier than expected. Nonetheless, I hope Peter enjoyed the symposium and I wish him luck with his plans for the future!



# Multidisciplinary Project

By Florentine Steijlen

In November of 2017, a friend asked me if I wanted to do a multidisciplinary project (MDP) with him. Since I did not have any international experiences yet and I heard some amazing stories about past MDP's, it did not take long to make a choice about what to do with the 10 elective credits. We immediately started looking for more group members. After the speed mate session of PS (het Gezelschap Practische Studie) and some messages in master app groups, our group was complete. With two Hydraulic Engineering students, one Water Management, one Remote Sensing and a Geo-Engineering student, with two different Bachelor degrees, three guys and two girls, we had a large variety within the group.

After completing the group, it was time to find a project. We went by some lecturers and asked for project possibilities abroad. There are a lot of lecturers who have contacts abroad and know some ongoing projects. Oswaldo Morales, one of the lecturers of probabilistic design, convinced us to go to Ciudad del Carmen in Mexico, to contribute to the research about Terminos Lagoon of ICML (Instituto de Ciencias del mar y Limnología), which is a research institute of the UNAM (National Autonomous University of

Mexico). We chose this project because of the data availability, possibility to join fieldwork trips, interesting nature of Terminos Lagoon and of course the Mexican culture.

Then the hardest part started, which was writing the project proposal. The first time our project proposal was rejected, because the topic was not within the highest-interest of the research center in Mexico. We had several Skype meetings with our local supervisor which resulted in an approval of the project proposal by the research center. However, it was still vague which data was exactly available and what had already been investigated. Fortunately, this became clear when we were working in Ciudad del Carmen.

During the first ten days we had time to acclimatize and to get to know the Mexican culture. At the beginning of September, we arrived at Ciudad del Carmen and started the project on location. Our local supervisor was very helpful and gave us a lot of recommendations: from how to become a famous researcher to the best tequila of Mexico. Our accommodation was located near the laboratories and harbor where the fieldwork boats are. We knew that it was







located near the lagoon and near the mangrove forest. However, we did not expect the large number of mosquitos. If we knew that there were that many, we would have packed our luggage differently, with a lot of long sleeve shirts and thick trousers. At our accommodation we got in contact with other Mexican students, who helped us with all our questions; from calling taxi's to a good place to take salsa lessons. We even went on a weekend trip with them to Calakmul, an old Maya village and to some beautiful sinkholes, which they call cenotes in Mexico.

The project was about the influences of hydrodynamic and hydrological processes on different parameters of the lagoon, like water temperature, salinity, sediment distribution, and Secchi depth. We went on a fieldwork trip to do measurements and used imagery and an available Delft-3D flow model to look into the influences of hydrodynamic and hydrological processes. This information is needed to investigate the current state of Terminos Lagoon in order to

protect its ecosystem in the future. Over the years, a decrease in species is visible and loss of species could change the ecosystem. Our project is just the first step to protect the lagoon and a lot more research needs to be done.

I would advise Geo-engineering students to do a multidisciplinary project because they will learn skills that are not taught in the TU courses. Not only do you learn about working together in a multidisciplinary team within a different culture, but also about academic writing, communication and planning, which are useful for a graduation thesis as well.

Maurits Groenewegen	Hydraulic engineering
Luuk Jordans	Hydraulic engineering
Charlotte Mekel	Watermanagement
Florentine Steijlen	Geo-engineering
Fokke Dijkstra	Geoscience and Remote Sensing







By Carolina Machado Borges

Let me tell you a little bit about the working experience I had in Brazil before moving to the Netherlands. In Brazil, the civil engineering university is a 5-year course. Once you graduate, it is necessary to be part of an association called CREA, to be able to work as a civil engineer. They provide a number related to your diploma and only then you are able to practice as an engineer. This system is flawed because no experience nor an examination is required. However, it is necessary to pay an annual fee to the CREA every year in order to maintain your number.

In my journey through university, besides parties and soccer games, I got my first internship when I was in 4th year, in 2014. I started working for a consortium named Heleno e Fonseca & TIISA which was responsible for the construction of two subway stations, Eucaliptos and Moema, for the new line 5 Lilac in Sao Paulo. This line was using a slurry TBM of 10.5 m in diameter and a weight of roughly 1500 ton. I was working in the Eucaliptos station which was already excavated 40 meter deep, 170 meter long and 30 meter wide. In order to reach these dimensions, diaphragm walls were used in combination with multiple layers of anchors and

struts. The internal structure was constructed together with a 1.8 meter thick concrete floor to sustain the weight of the TBM machine. The concrete floor was divided into five segments and I participated with the concrete pouring of two of those. Each of the segments was done in the evening, because trucks were not allowed to drive in Sao Paulo during weekdays from 7h till 22h due to the high amount of traffic. Therefore, in order to be pumping non-stop, the process started around 22h on a Friday and had a duration of about 12 hours with more than 130 concrete-mixer trucks of 8 m<sup>3</sup>. Moema station was still in the excavation phase where I monitored anchor installation and the lowering of the ground water level. The elevation of this project was around 740 meter above sea level, which is very different from the Netherlands.

After six months of working there I realized I wanted to be at the construction site every day, managing all the operations. Therefore, I started working for a construction company called Even that works with residential and commercial buildings. I participated in the construction of a 16 story commercial building and I was responsible for the 3 garage floors and the reception floor. All the planning, management and supervision of the

International

Geo-Corner



work related to the contractors, which sometimes could be around 15 at the same time, were in my hands and I stayed there for one and a half year. In this company, the intern was really part of the team with real responsibilities and there I could grow much faster as a civil engineer.

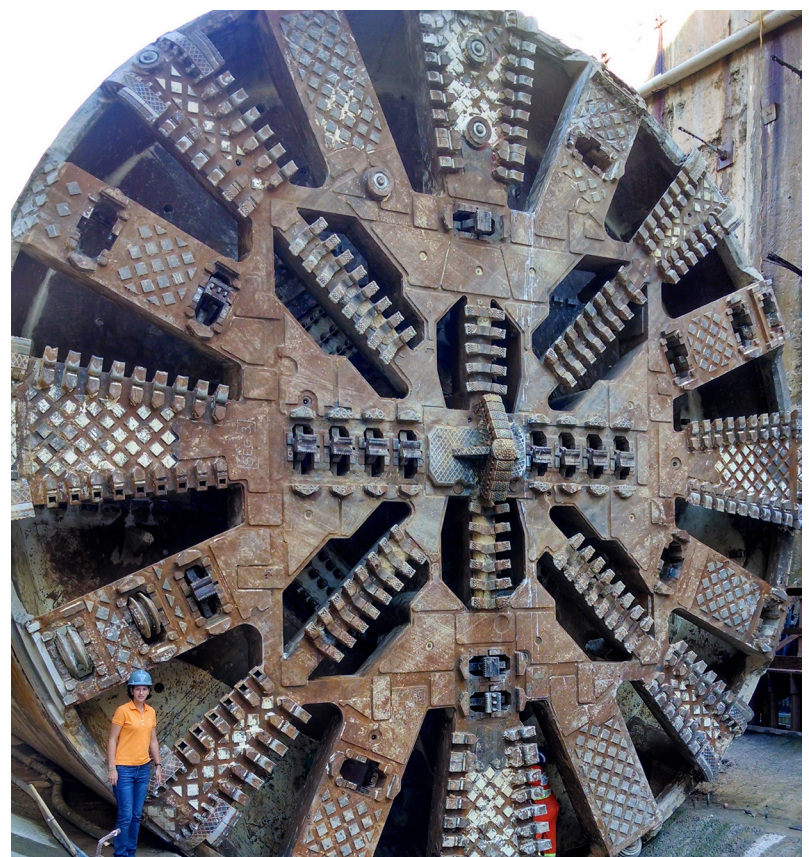
In Brazil the manual labor is very cheap compared to the Netherlands; for example, when a sidewalk has to be constructed in Sao Paulo, we hire around 3 to 5 people, where in Delft I saw the same job being done with 2 people and a machine. These small details are very interesting to notice because it applies to a lot of different situations.

When I was graduating at the end of 2015, the biggest economic and political crisis had happened in Brazil. A lot of people lost their jobs, big companies went bankrupt and in this wave I was one of them. Luckily I was able to find a job before my graduation at a financial consultancy called Management Solutions. I worked there for a year. Meanwhile, I was trying to find a job in the civil engineering field. It was in this period that I started doing research to study and live abroad because I was tired of the busy life style that Sao Paulo demands with long working hours, heavy traffic and pollution. I applied to universities in the Netherlands and Denmark, countries where I thought I would have a higher quality of life than in Sao Paulo. I was accepted in all 6 universities and, of course, TU Delft was on the top of my list, so I moved here in August of 2017.

I applied at TU Delft in the Building Engineering master track due to my background in construction and the mindset as a Brazilian. I will explain, in Brazil when we graduate we only want a job, in any company or any field, we don't have the power of choice because the unemployment rates are high. This means that if you refuse a job opportunity by low salary or long working hours, there are hundreds of other people that are ready to fill the same spot. Coming from a place like this, I chose Building because it was, in my

thoughts, a broader track and I could find a job more easily in different companies and sectors afterwards. However, once I started, I realized it was completely different than what I was expecting and what Building Engineering is in Brazil. Here in the Netherlands, Building is more related to architecture than engineering and I really disliked that. I realized that in the Netherlands I could specialize in what I really liked and I would be able to find a job in the area of my study. Therefore, I changed my master track to Geo-engineering in the second quarter and it was the best choice I could have made because I was always fascinated about the foundation of structures and what is holding it into the ground.

In the end of my first year here in Delft I had the opportunity to do an internship at Boskalis Subsea Cables & Flexibles at their geo department. Now, after 7 months working there I will start my master thesis within the company. The working environment in the Netherlands is very good, starting with the trust the employer has in its employees from the start, in Brazil this would take much longer. To conclude, moving to another country is a very big challenge but I am glad I had the courage to do it. My journey in the Netherlands has been really eye opening to a completely different reality and experiences.





# GEOTalks

After the two section seminars of November and December 2018, the Geo-Talks were successfully launched on 21 February 2019! The Geo-Talks is the new series of seminars organized by and for the Geo-engineering section. They are organized every month prior to the Geo-Drinks. During the Geo-Talks, a PhD student or a post-doc from the section presents their research work. Their presentation is preceded by a pitch given by a staff member.

The aim of the Geo-Talks is to learn from others, elicit discussion and strengthen the links between the different themes of the section.

The next Geo-Talks will be held on 21 March, from 16:30 to 17:30, in room 2.02. The speakers will be PhD candidate Varenya Duvvuru Mohanand and visiting professor Peter Verhoef.



# New Year's Dinner

By Pippi Eikhout

*On January 10th, De Ondergrondse organized the annual New Year's dinner to kick off 2019.*

Professors, PhD researchers and students of the Geo Engineering section got together in numerous amounts at Delfts restaurant 't Postkantoor. With an oriental platter as appetizer, multiple possible main courses and a private bar with unlimited drinks, the evening was bound to be great!

During this lovely meal, Steve van Adrichem shared some words of gratitude. Afterwards Timo Heimovaara inspired us all with his words as he spoke on behalf of the staff of the Geo Engineering section this year, due to Michael Hicks' absence. This made us all excited to continue our studies on the bumpy road to

becoming a real Geo Engineer.

Thereafter, the food and drinks continued which made it the perfect event to get to know the professors and your fellow students in an informal way. At the end of the evening, it was time for the professors to go home. For the students however, the night was still young. The real diehards ended the night with dancing and singing in café the Ruif.

For all that were present, thank you for this rocking evening. And I hope for all of you, that this year is the best one yet to come!





# GEODrinks

By Jorrit de Vries

The annual Christmas celebrations, in the form of a Geodrinks++, fell this year on the 20th of December.

Cheerfully dressed up as 'roetveegpieten', the Ondergrondse board welcomed everybody and the (non-) alcoholic drinks flowed generously. While enjoying the served pizza's, new friendships were forged and even the large map in the Geo-Corner was thoroughly studied to find, and give comments on, everyone's place of birth in the Netherlands.

At ten-ish, the time had come to move the party elsewhere. This to great disappointment of some of the old board members who took it upon themselves to replenish the nearly depleted beer supply. However, after a quick clean up, the Geo students found themselves in serious numbers in the Locus and ending in the Ruif. When the Ruif closed, everybody crawled to their beds or, in some cases, to a couch, for the first train to Hillegom would only leave in a couple of hours.

Overall, the Geodrinks++ Christmas edition was very successful and the board would like to thank you all for attending!







# We are looking for you!

Water Authority Drents Overijsselse Delta (WDODelta) is a government organization responsible for safe dikes, dry polders and sewage treatment.

We maintain and control approximately 240 kilometers of primary river levees and a lot of constructions in the area of West-Overijssel and South-West Drenthe.

A team of six enthusiastic flood control experts are working on dike reinforcement projects and safety assessments of the primary river levees in the area.

The department Research and Consultancy is looking for a master student for the following subjects:

- Internship: River levees reinforcement project
- Internship: Safety assessment of river levees
- Thesis: Piping in sand-on-sand river levees
- Thesis: Macro stability (outwards) of river levees
- Thesis: Time dependent groundwater flow in river levees
- Own research proposals are welcome



Look at our website [www.wdodelta.nl/stage](http://www.wdodelta.nl/stage) or the careerboard at the coffee corner for more information and the detailed description of the positions.

your water authority  
connects living  
working and nature  
with water

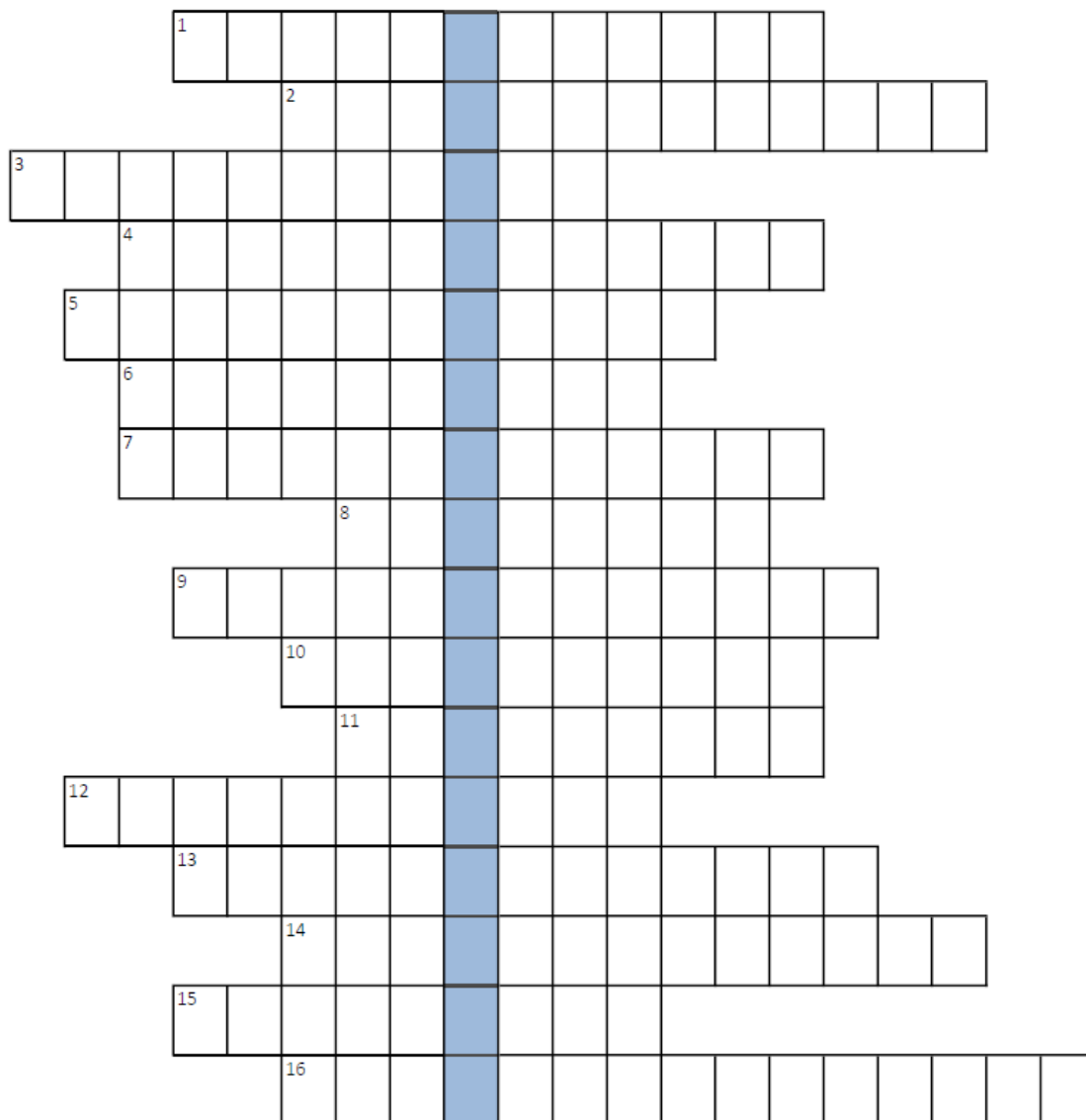


# Crossword

By Jurren Snijders Blok

New to this edition is the crossword with a twist, the puzzle shown below is called a 'Filippine' in dutch but does not have an English translation. The goal here is to find the words in the vertical blue column by finding the answers to the horizontal rows. To increase the fun and challenge we decided to use word combination that have to be found with a cryptic description. This time the theme is geology. For example: Hot music genre : Pyroclassical

The first to send in the completed puzzle (picture) to mol-ondergrondse@tudelft.nl wins a prize.



1. Metamorphic winter sports

2. Consolidation area

3. Ancient laptop part

4. Drainage squares or triangles

5. Organic race game

6. Slippery calcite rock

7. Part of soil with an identity crisis

8. Model that tricks you

9. Last ice age in the theatres

10. Psychological deposition of materials

11. Molten rolling ball

12. Layered sleeping under a soil cover

13. Limestone used in Formula 1

14. Pressurized hero

15. Layered period of time

16. Repetitive force from dutch commuters



# Dr. Mol

*As many of you have already heard, Dr. Mol\* has recently settled at the TUDelft to answer all the questions you can think of, ranging from geotopics, the board, dutch ways of living and working and the latest gossip. As a mole, he/she wants to remain underground, to contact him/her we made a questionnaire on the website ([www.ondergrondse.nl/dr-mol](http://www.ondergrondse.nl/dr-mol)). The answers to all the questions will be published in the magazine from now on. So, feel free to ask away.*

## **What is an annotation and how does it work?**

MSc students CEG can choose to earn an extra annotation in addition to their Master programme. A special certificate will be issued if conditions are met. Conditions vary per annotation and usually require to deepen your knowledge on the subject by studying a set of additional electives. The following annotations are possible. All annotations need prior approval by the board of examiners CE. The following annotations are possible for year 2018/2019. Please check the website for the most updated version:

- Technology in Sustainable Development
- Entrepreneurship
- Urban Planning and Engineering
- Integral Design Management
- Railway Systems
- Dynamics of Structures

## **How do the 20 EC free electives work?**

The 20 EC's of the MSc Geo-Engineering can be divided in two parts. 10 EC's need to be done within Civil Engineering at TUDelft, this can be in the form of courses starting with code CIE (in some cases it can also start with different codes), internship, MDP or an additional thesis. The other 10 EC can be done in the form of courses but these can be at other faculties or universities within the Netherlands or abroad, under the condition that the university has a contract with the TU Delft. The EC's can not be done through an additional thesis, MDP, JIP or internship. Please consult Article 3 of the Implementation Regulations Annex to the Teaching and Examination Regulations.

If you want to do more than 10 EC abroad (related to CE) it is also possible to have an individual study program. The individual study program has to be checked first with the MSc coordinator

\* Dr. Mol is not a real Dr.

and then with the Board of Examiners.

In case of any doubt, please contact your master coordinator.

## **Is Bart actually Geo-Jesus?**

He most definitely can not turn water into wine or walk on water, however he is able to walk (climb) upon steep rock faces of outcrops. This would make him somewhat of Geo-Jesus.

## **Are Sia and Jorrit ever going to write another poem together?**

The last poem was earned by being good students, so keep working hard. If Sia and Jorrit still get the feeling that everyone is working hard, the next poem will be read at the next Geodrinks++.

## **Why do the Dutch eat so much cheese?**

Cheese is rooted in the history of the Netherlands, this is due to a unique geography. The wet, soft soil which is found all over the Netherlands is perfect for growing grass fit for cows which made dairyproducts (including cheese) a basis of the dutch diet. With the invention of dikes and poldering, new land was gained and dewatering kept the areas dry. The population grew with the new areas and the need for dairyproducts rose. The dewatering oxidized the peat and the land subsided causing the need for more dewatering, which is kept economically viable by dairy farmers. Milk does not preserve well, so all the milk that was not consumed directly, got turned into butter and cheese. Butter and cheese can be stored longer, making them just as important as milk. The names of cheeses originate from the cities the cheese was sold. To show how big the industry actually is: 20% of dutch agriculture is dairy production, with 1.63 mln. cows producing 13.9 bln. kg of milk in 2018.

Dr. Mol 17



# Upcoming Activities



**24 Apr** Lunch Lecture | Fugro

**25 Apr** Geodrinks ++

**01 May** Lunch Lecture | GEO2

**11 May** Daytrip to Leiden

**15 May** Lunch Evaluation Q4

**23 May** Company Dinner

**13 Jun** Geodrinks

**4-14 Jul** GETA

Contact  
"De Ondergrondse"  
p/a Stevinweg 1, Room 0.0.43  
2628 CN Delft

T | 015-278 2778  
E | ondergrondse@tudelft.nl  
W | www.ondergrondse.nl

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Colophon



