

ENIGMA Innovative Training Network: European training Network for In situ imaGing of dynaMic processes in heterogeneous subsurfAce environments

Sixth ENIGMA ITN Network Meeting

Meeting report

Leipzig, 06-08 November 2019

Leipzig, Germany

At the UFZ- Helmholtz-Zentrum für Umweltforschung
Permoserstrasse 15, 04318 Leipzig





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Program

Wednesday 06/11

12 :30 – 13 :30	Lunch
13 :30 – 14 :00	Welcome Session Damien Jougnot & Frederic Nguyen
14 :00 – 15 :15	Scientific session I Surface water – groundwater exchanges and processes Chairman: Jan Fleckenstein Presentations (2*20min) by ESR 2 Guilherme Nogueira and ESR3 Alvaro Pardo-Alvarez Followed by a scientific discussion and collaboration (45min)
15:15-15:45	Coffee break
15 :45 – 17:30	Scientific session II Heat and solute tracers Chairman: Olivier Bour Presentations (3*20min) by ESR6 Behzad Pouladi, ESR11 Richard Hoffmann 's supervisor Pascal Goderniaux, ESR7 Joel Tirado-Conde Followed by a scientific discussion and collaboration (45min)
17:30 – 18:30	Organization of the Copenhagen Conference Chairman: Majken Looms Zibar Progress Report Presentation by the Organization Committee + Q&A

Thursday 7/11

9:00 – 11:00	Network meeting <ul style="list-style-type: none"> • Supervisory Board: (chairman: Philippe Davy) <ul style="list-style-type: none"> ○ Next milestones deliverables – reporting reminders ○ Amendments, modification in consortium • Experimental Infrastructure Board Meeting (chairman: Tanguy Le Borgne) <ul style="list-style-type: none"> ○ Summary of experimental plans of PhD students & opportunities for joined experiments ○ Data storage plans & dissemination
11:00 – 11:10	Coffee break
11:10 – 12:30	Scientific session III Hydrogeophysical monitoring of subsurface flow and transport Chairman: Niklas Linde Presentations (4*20min) by ESR4 Justine Molron, ESR5 Lara Blazevic, ESR8 Anne-Karin Cooke, ESR10 Peleg Haruzi's supervisor Sander Huisman
12:30 – 13:30	Lunch
13:30 – 14:30	Scientific session III (continued) Chairman: Niklas Linde Scientific discussion and collaboration (60min)

14:30 – 15:15	Scientific session IV Hydrogeophysical signatures of mixing and reaction from model experiments Chairman: Sander Huisman Presentations (3*20min) by ESR1 Kevin de Vriendt, ESR12 Satoshi Izumoto, ESR9 Alejandro Fernandez Scientific discussion and collaboration (45min)
15:15 – 15:30	Coffee Break
15:30 – 16:30	Scientific session IV (continued)
16:30 – 17:30	Data archiving and dissemination Chairman: Tanguy Le Borgne Progress report on data storage and final choice of database for all ESR H+ database: ESR5, ESR6, ESR8, ESR11, (ESR14), ESR15, ESR4 HOBE database: ESR7 (TERENO database: ESR10) CAMPOS database: ESR13 Final choice for ESR2 and ESR3 Database dissemination for lab studies ESR1, ESR9, ESR12
20:00	Dinner in town at OSKAR Bar & Restaurant Harkortstrasse 21, 04107 Leipzig

Friday, 8/11

9:00– 9:45	Common Publications and focused reviews Chairman: Tanguy Le Borgne Additional discussion on ENIGMA White paper
9:45 – 10:45	Scientific session V Hydrogeophysical inversion Chairman: Frederic Nguyen Presentations (3*20min) by ESR13 Veronika Rieckh, ESR15 Jorge Lopez-Alvis
10:45-11:00	Coffee break
11:00 – 11:45	Scientific session V (continued) Chairman: Frederic Nguyen Scientific discussion and collaboration (45min)
11:45 – 12:30	Training and Tutoring Committee Chairman : Frederic Nguyen
12:30 – 13:30	Lunch

List of Participants (31)

Blazevic	Lara	ESR5	CNRS
Bour	Olivier	Supervisor ESR6	CNRS
Brunner	Philip	Supervisor ESR3	UNINE
Cooke	Anne-Karin	ESR8	U. Montpellier
Dassargues	Alain	Supervisor ESR11	ULG Liège
Davy	Philippe	Coordinator	CNRS
De Vriendt	Kevin	ESR1	CSIC Barcelona
Dentz	Marco	Supervisor ESR1	CSIC Barcelona
Fernandez Visentini	Alejandro	ESR 9	UNIL
Fleckenstein	Jan	Beneficiary ESR2	UFZ
Gautier	Patricia	Coordinator	CNRS
Goderniaux	Pascal	Supervisor ESR11	UMons
Goesch	Viviane	Beneficiary ESR2	UFZ
Hermans	Thomas	Supervisor ESR11	UGhent
<i>Hoffmann</i>	<i>Richard</i>	<i>ESR11</i>	<i>ULG Liège</i>
Huisman	Johan Alexander	Supervisor ESR10	Jülich
Izumoto	Satoshi	ESR12	Jülich
Jougnot	Damien	Coordinator	CNRS
<i>Klotzsche</i>	<i>Anja</i>	<i>Supervisor ESR10</i>	<i>Jülich</i>
Le Borgne	Tanguy	Coordinator	CNRS
Leven	Carsten	Beneficiary ESR13	Tübingen
Linde	Niklas	Supervisor ESR9	UNIL
Looms	Majken	Supervisor ESR7	UPCH
Lopez Alvis	Jorge	ESR15	ULG Liège
Molron	Justine	ESR4	ITASCA
Nguyen	Frederic	Supervisor ESR15	ULG Liège
Nogueira	Guilherme	ESR2	UFZ
Pardo Alvarez	Alvaro	ESR3	UNINE
Pouladi	Behzad	ESR6	CNRS
Rieckh	Veronika	ESR13	Tübingen
Schmidt	Christian	Supervisor ESR2	UFZ
Simon	Nataline	PhD student	CNRS
Tirado-Conde	Joel	ESR7	UPCH

Note:

ESR10 Peleg Haruzi did not attend the meeting because of health issues.

ESR 11 Richard Hoffmann and ESR10 supervisor Anja Klotzsche cancelled their participation at the last minute due to illness.

Yves Méheust (CNRS) participated to some sessions on 6/11 and 7/11 through visioconference.

Sessions

Session: Organization of the Copenhagen Conference (Wednesday 6/11, 17:30 – 18:30)

CHAIRMAN: MAJKEN LOOMS ZIBAR

First, Majken thanked the ESR for their very good job. Progress was made in the last months: there is now a conference webpage (<https://enigma-itn.sciencesconf.org/>), a scientific committee, keynote speakers, some visuals and a detailed program.

On publicity of the conference

How to advertise our conference and make people come? The organizing committee decided there will be no fee for external participants, to motivate young researchers to come. However, if there is no fee, then people can register and then not come. This can lead to difficulties to calculate what we need for coffee breaks.

A solution proposed by ESR is to target people and accept applications until a certain number, to make an impression of exclusivity. We would restrict the conference to PhD students as well as post-docs. However, the conference will not have the same prestige of others, and this exclusivity effect might not work. Still, the ESR asked again **everyone from the ENIGMA network to invite colleagues or students** in a targeted way.

Also, in respect with the scope of our conference (only one occurrence), it was proposed to **focus publicity on local universities**, from which students could come for the day to attend the conference: Netherlands, Sweden, north of Germany, Denmark. It could also interest professionals from the Copenhagen area, and be a cheap way of getting nice people to attend, and therefore attract students.

Finally, the title of the conference lacks reference to “water” and therefore might be misleading. If we want to attract people from outside, calling it “ENIGMA final conference” gives an image of network-gathering, maybe not the image we want to have.

On the program and aims of the conference

There should be an **interest for external people to come**: maybe propose **more slots for external presentations**. A proposition is to reduce the time allotted to each presentation from 20+10 minutes Q&A to 15+5Q&A. It would allow more than 4 slots for external students, and give them a fair/real chance to have a presentation. At the end, we should be prepared to be flexible and modify the plan according to number of participants.

We still need to discuss the **place given to industrial partners of ENIGMA**, in a conference that should offer a transition from academic to industrial worlds. This is the reason of the “Discussion on EU Water directives” session: explain why the research done within ENIGMA is important for the society. Frederic proposes to merge the time for posters presentations with industrial partners’ presentation, for example by having a show-room where industrial partners can meet people.



The **keynote speakers are all chosen**, except for Session II where there is an uncertainty on the participation of DELTARES representatives. If DELTARES representatives finally don't come, we can invite ENIGMA industrial partners. The ESR have asked the keynote speakers to introduce the session, and not specifically present their works.

The **“Discussion on EU Water directives” session** has not been yet actively discussed. Damien and Guilherme proposed to invite two EU representatives they met at the Cluster Event “Clean Water” in Girona on 22/10/2019: Daniela Buzica (DG ENV C.1) and Anna Marczak (DG ENV C.2).

Others

- As done in other conferences, abstracts will be abstracts online on the conference website.
- Not every ESR must do a presentation.
- Industrial partners will be invited on the coordination budget.
- The next ENIGMA network meeting will take place after the conference on Friday 17th April, during the morning.

Session: Supervisory Board (Thursday 7/11, 9:00- 11:00)

CHAIRMAN: PHILIPPE DAVY (WITH THE HELP OF PATRICIA GAUTIER)

The last updates on the activity of the consortium include:

- The termination of Muquans als beneficiary (June 2019). University of Montpellier was added as beneficiary and hosts from June 2019 ESR8 Anne-Karin Cooke
- Amphos 21 SL was added as partner organization, to allow a one-month secondment for ESR1 Kevin de Vriendt
- The prolongation of the project duration due to ESR14 Andrea Palacios maternity leave is agreed by all beneficiaries; the PO was contacted for this matter and we are waiting for the procedure to begin (amendment)

Overview on the upcoming meetings

Dates & Location	Title & concerned event if relevant
9 th – 13 th December 2019, San Francisco (USA)	AGU ENIGMA people present: list to be confirmed
14 th – 16 th April 2020, Copenhagen, Denmark	Final Conference in Copenhagen (ENIGMA meeting n°7)
17 th April 2020, Copenhagen Denmark	Network meeting (ENIGMA meeting n°8)
29 th September – 1 st October 2020, Strasbourg, France	OZCAR – TERENO joint meeting Session co-chaired by Damien Jougnot
TBD – November 2019 – January 2020	Network meeting (ENIGMA meeting n°9) <i>to discuss a new proposal and further joint work</i> <i>Note: the date is to be confirmed during the Network meeting in Copenhagen, and will be determined in regard of a future joint proposal.</i>

Reminders: deliverables and milestones

Due Date	Title	Persons in charge (main ESR & senior managers)
Dec 2019	D3.1 Validated prototype of a portable absolute gravimeter for large scale water content distribution	Anne-Karin Cooke, Cédric Champollion (Bruno Desruelles)
Dec 2019	D4.1 Laboratory facility: geophysical millifluidic lab for testing geophysical monitoring of transport and reactions	Alejandro Fernandez Visentini , Satoshi Izumoto, Kevin de Vriendt Yves Méheust
Dec 2019	D4.3 Report on process-based geophysical methodologies to monitor subsurface processes	Peleg Haruzi , Alejandro Fernandez Visentini, Richard Hoffmann, Satoshi Izumoto Niklas Linde
<i>Milestone: Data archiving (February 2020)</i>		

April 2020	D6.10 ENIGMA final conference	Patricia Gautier
April 2020	D6.11 Career Development Plan	Frederic Nguyen
<i>Milestone: Final conference held (April 2020)</i>		
June 2020	D6.1 Progress report from trainees	Frederic Nguyen
<i>Milestone : Year 3 Report (June 2020)</i>		
	D2.1 In situ datasets on space and time patterns of fluxes and reactivity in mixing interfaces	Kevin de Vriendt , Guilherme Nogueira, Alvaro Pardo Alvarez Jan Fleckenstein, Philipp Brunner
	D2.2 In situ datasets on flow distributions and transport patterns in fractured media	Justine Molron , Lara Blazevic Laurent Longuevergne, Philippe Davy
	D2.3 Report on the added value of in situ experimentation for understanding and quantifying coupled flow, transport and reaction processes in critical areas of the subsurface	Guilherme Nogueira , Kevin de Vriendt, Alvaro Pardo Alvarez, Justine Molron Jesus Carrera, Marco Dentz, Sander Huisman
	D4.2 In situ datasets that couple tracer experiments and geophysical monitoring available	Richard Hoffmann , Peleg Haruzi, Veronika Rieckh, Andrea Palacios, Justine Molron Sander Huisman, Majken Looms Zibar
December 2020	D7.1 Networks meetings	Patricia Gautier
December 2020	D7.4 Publications in peer-reviewed journals	Patricia Gautier
December 2020	D7.5 Public Engagement	Patricia Gautier
December 2020	D7.6 Outreach to the policy community	BRGM, SKB
December 2020	D7.9 Minutes of progress meetings	Patricia Gautier
December 2020	D7.10 ENIGMA White paper	Thomas Hermans, Patricia Gautier
<i>Milestone: Publication of white paper (December 2020)</i>		

Communication and dissemination as an EU obligation

Communication is a key element of our obligations towards the EU: it is not only communications in the scientific community but also participation to public engagement activities and outreach to the policy community. This will constitute deliverables D7.5 and D7.6 to be delivered in December 2020.

Also, peer-reviewed publications are to be registered on the EU portal: don't hesitate to contact Patricia if you need help to do the manipulation.



On the updated website

The website has been updated and a new section was added: “Works and Outputs”. It aims to help the ENIGMA community to know more about the work of each other, to have access to communications and datasets stored in different databases. It should also highlight the added-value of such a consortium.

ESR 5 Lara encouraged other ESR to be active regarding the content put for their project on the website.

Session: Data archiving and dissemination (Thursday 7/11, 16:30- 17:30)

CHAIRMAN: TANGUY LE BORGNE

This session acted as session of the experimental and infrastructure committee. At the beginning of the ENIGMA project, the EIC discussed more on field test and test design. Now the work continues on data management. An important asset of ENIGMA is the work based on long-term infrastructures. The overarching aim of the project is to make the data available beyond the duration of ENIGMA, in line with European “FAIR” objectives.

Objectives of the EIC to complete by the end of the ENIGMA project are:

- Develop interactions between PhD students, experimental infrastructures, measurements devices and modelling tools within the network.
- Provide advice and help for experimental campaigns (joint experiments to come)
- Archive and document the data
- Provide access to the data and visibility to the results of field campaigns
- Link papers to datasets

On the H+ database:

Tanguy took the example of ESR 14 Andrea, ESR4 Justine, ESR11 Richard data inserted in the H+ database. It is possible to visualize it via Google Earth and download datasets and metadata (see figures, example of Argenton site). Aim it to **keep the database simple but accessible and visible**.

Niklas asked if the “FAIR” principles are also taken into account, mentioning the issue of DOI. It is, but there is not yet DOI due to technical difficulties.

Thomas asked if there is a specific format, thinking about geophysics. There is not, however it would be nice to have one, to be consistent and create a norm.

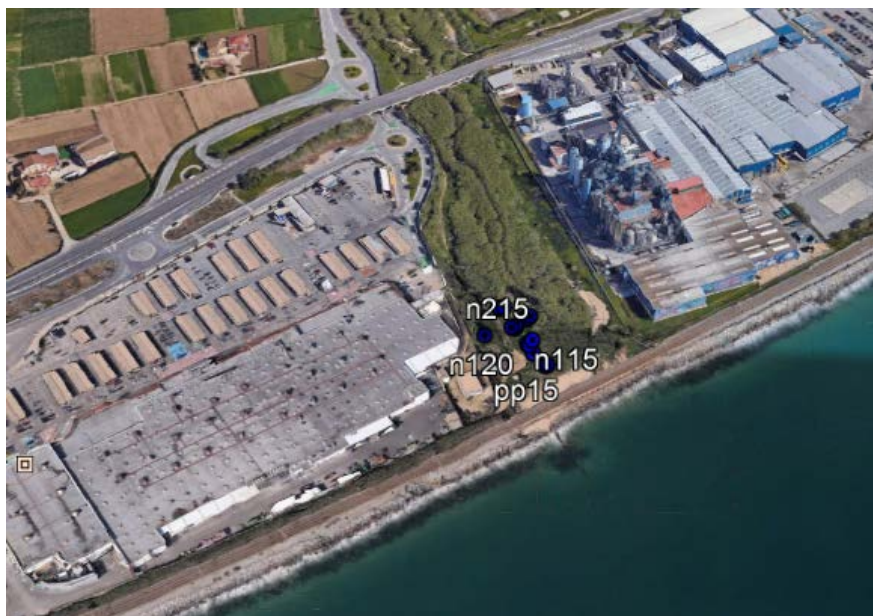


Figure 1 Localize data in Google Earth (Argenton Site)

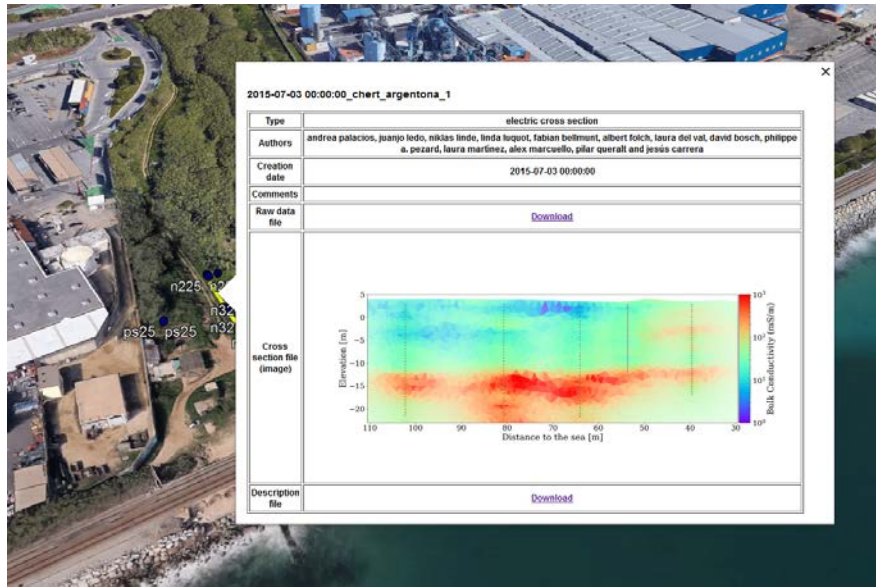


Figure 2 Visualize data and metadata (Argentona site example)

On the CAMPOS database (presentation by Carsten)

CAMPOS – Catchments as Reactors Collaborative Research Center at the University of Tübingen – database collects point information, profile data, time-resolved data and modeling outputs. Carsten presented the structure of the database as well as the insertion process. Then, he took the Lauswiesen site as an example.

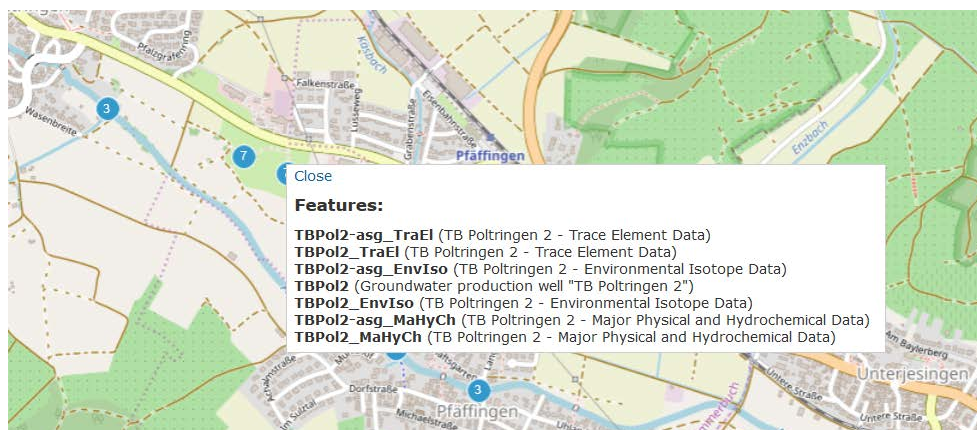


Figure 3 Access to data in the Campos database

The discussion led to the **proposition of a meeting to discuss format convergence** between databases H+, TERENO, CAMPOS during 2020, maybe close to the ENIGMA Conference in Copenhagen. Philippe stressed that joint work with other databases network was a strong point in the ENIGMA proposal. This joint meeting could be also the place to **discuss an evolution towards an integrated structure**.

Situation of each ESR

ESR	Chosen database	Status on 7.11.2019	To do before 20 th December 2019
1 Kevin	Specific storage	Meeting in Rennes on 19/11	Propose a solution for data archiving
2 Guilherme	TERENO	TERENO data manager has been contacted, Gui's waiting for a reply and then will insert	Have an established contact and begin data insertion
3 Alvaro	H+	Decision to insert in H+ database made during the session	Contact with Patricia and Jérôme, begin data insertion
4 Justine	H+	Data partially inserted	Insert hydraulic and tracer test data
5 Lara	H+	Data to be inserted	Contact with Patricia and Jérôme, begin data insertion
6 Behzad	H+	Data partially inserted	Insert fiber optic data
7 Joel	HOBE, if not possible H+	Joel has committed to insert data at his return in January in UCPH, needs to see what can be inserted in HOBE, and for the rest in H+	
8 Anne-Karin	H+	Difficulties to know what to insert because of nature of data (Test data): Insert gravity gradient data Connect H+ with OREME	Skype Meeting with Patricia and Jérôme to discuss these difficulties, begin data insertion
9 Alejandro	Specific storage	Meeting in Rennes on 19/11	Propose a solution for data archiving
10 Peleg	TERENO	Data will be published after publication of related papers (not before June 2020)	Prepare data for publication and store in a non-public repository
11 Richard	H+	Data partially inserted	Insert Hyderabad tracer data
12 Satoshi	Specific storage	Meeting in Rennes on 19/11	Propose a solution for data archiving
13 Veronika	CAMPOS	Data partially inserted	Give link with direct access to data to Patricia (for

			redirection from ENIGMA website)
14 Andrea	H+	Data partially inserted	Insert tracer data, head conductivity, temperature, salinity data
15 Jorge	H+, other	First part online on GitHub	Insert modelling code

Objective: most data is stored and available before the conference in Copenhagen (at least a .zip file).

End of January 2020 there will be a skype meeting to discuss progress of the following ESR that did not had data inserted at the Leipzig meeting: ESR1 Kevin, ESR2 Guilherme, ESR3 Alvaro, ESR7 Joel, ESR8 Anne-Karin, ESR9 Alejandro, ESR12 Satoshi, ESR15 Jorge

If there is any delay of issue with inserting your data, please contact Patricia.

Reminder: for those storing on the H+ database, it is strongly encouraged to insert your data **before end of December 2019**, before the leave of the engineer in charge Jérôme de la Bernardie (jerome.delabernardie@univ-rennes1.fr)

On joint experiments (summary)

Krauthausen natural gradient tracer experiment (FZJ Jülich) – May June 2019
with Peleg Haruzi, Jan van der Kruk, Behzad Pouladi, Richard Hoffman, Jérôme de la Bernardie

SKB tracer test experiment – November 2018
with Justine Molron, Niklas Linde, Tanguy Le Borgne

ERT surveys in one of the Danish field sites (UPCH) – October 2018 – July 2019
with Andrea Palacios, Joel Tirado-Conde

Tracer Test experiment with drone imaging – December 2019
with Guilherme Nogueira, Joel Tirado-Conde

Chemiluminescent experiment – July 2019
with Kevin de Vriendt, Satoshi Izumoto

SP monitoring of saline intrusion – November 2019
with Kevin de Vriendt, Alejandro Fernandez

Session: Common publications and focused reviews (Friday 8 /11, 9:00-9:45)

CHAIRMAN: TANGUY LE BORGNE (WITH THE HELP OF THOMAS HERMANS)

The discussion was mainly around the deliverable D7.10 “Enigma white paper” (due in December 2020).

It was already tackled during the supervisory board meeting. A white paper is not a deliverable included by the EC, it was proposed following the example of other ITN. Jan mentioned his experience with another ITN, where they were too ambitious in writing a book.

There is several propositions to go for:

- A true white paper
- Tanguy mentioned the proposition of a special issue in *Frontiers*.

Thomas volunteered to coordinate the White Paper, but only starting next semester, with the help of Pascal.

Which **structure** to follow? The work packages of the ENIGMA project? It is also possible to follow the structure of the final conference, and make the deliverable an outcome of the conference, including for example the keynote speakers.

Niklas, mentioning his experience with other projects, warns about being too broad or trying to be exhaustive. A conference final paper is not a paper. **What is the real message we want to have in this document?** It can be the occasion to redefine the field, for example.

For Thomas, it can be also a place to mention all PhD unresolved questions.

For Jan, what we have learn. However we need to avoid a list of “we did this”.

For Frederic and Niklas, it can be the place to give some vision.

For Majken, the Copenhagen conference should reflect the vision in the White paper, for example in the PhD presentations.

Thomas: we should also identify a good place to publish: HESS, or Water Resources Research, for example.

What could we include in this White Paper?

- PhD unresolved questions
- Perspectives about applications, challenges seen by industrial partners
- Challenges for data archiving and chairing
- Discussion about field experiments > discuss the added values of field observatories

In relation with the Copenhagen conference

- Reflect the vision for the white paper in the PhD presentation
- Plan a panel discussion to discuss “lessons learned” with the keynote speakers.

Next steps:

- **Before the end of February 2020:** gather first elements from ESR



- ESR to write (in bullet points) a short text on the challenges and perspectives of their work.
- Reminders send by Thomas & Patricia
- Include the preparation of the white paper in the Copenhagen Conference

Finally, Damien mentioned the **TERENO-OZCAR meeting in Strasbourg (France) on 29/09 – 1/10/2020**. ENIGMA will be part of the meeting, with a dedicated session co-chaired by Damien. It is also a place to show our results.

End of Network Meeting Report