EnvSeis Newsletter

Summer 2025 –

Editor:

Aiswarya Padmadas (aiswarya@post.bgu.ac.il),
Ben Gurion University of the Negev, Israel

Special thanks:

Sophia Laporte
Umeå University, Umeå, Sweden

Overview

"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them."

EnvSeis Workshop

In April, we met for the last EnvSeis workshop in Vindeln, Sweden. We spent a week discussing our projects, stakeholder involvement, media partner projects, and starting to

organise our last EnvSeis conference next year. The weather allowed for a field visit to Vindeln river and to Sävarån, a subarctic river Instrumented with geophones. We also had the opportunity to see a DAS installation, investigating river-ice break-up dynamics. This workshop was a great opportunity to meet up together again and engage in interesting discussions. Finally, we were very luck to see northern lights, making this week very magical!

Follow-up on the individual ESRs projects

<u>ESR01 – Stefania Ursica</u>
GFZ, Potsdam, Germany

<u>ESR02 – Sibashish Dash</u>
GFZ, Potsdam, Germany

I had the opportunity to present my research as a talk at EGU 2025, which was an incredible platform for both networking and receiving valuable feedback. The response to my presentation was very positive.
Following EGU, I participated in the AI4Seismology Training School (May 5–8, 2025), which focused on the intersection of Artificial Intelligence and Seismology. It was a great experience to learn, exchange ideas, and sharpen my skills in this evolving field.
Since then, I've been primarily focused on improving my manuscript. In parallel, I've been preparing for active collaboration with our stakeholder partner on a rockfall test site and ensuring the timely maintenance of seismic stations in Brienz.

ESR03 – Aiswarya Padmadas

BGU, Beer-Sheba, Isreal

Since the last newsletter, quite a few exciting developments have taken place.

We've recently dismantled a site in Israel that had been active for over 30 years and are now redeploying instruments at a new location in the country. I had the opportunity to present some of my findings at EGU—an amazing experience filled with insightful discussions and great networking.

After AGU, I headed to Austria for fieldwork, where we conducted a seismic refraction survey in the Drau region. The instruments remained in Drau for monitoring for a while, and have now been moved to Vent for continued monitoring at a new site.

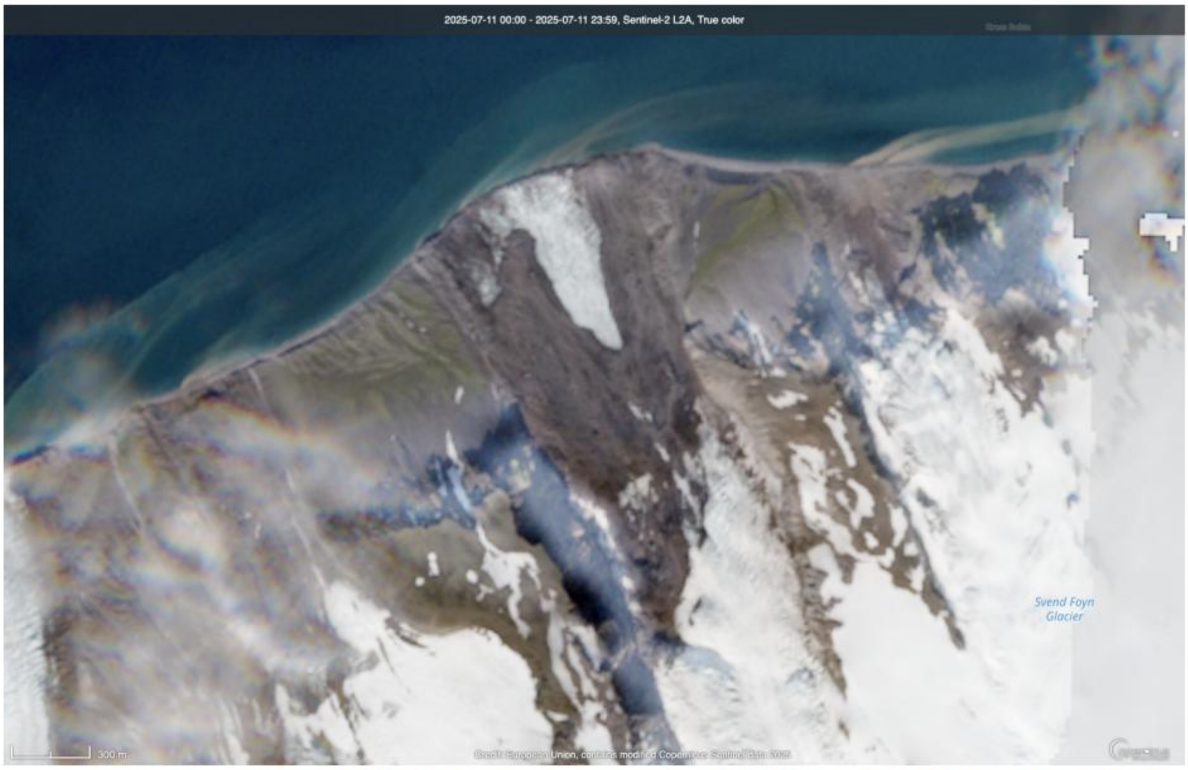
Remote fieldwork efforts are also ongoing in both Japan and New Mexico, and preparations for the upcoming season in Israel are well underway.

On a personal note, I've completed my first defense and am now gearing up to write my first article.

ESR04 – Guilherme de Melo

GEOMAR Helmholtz Centre of Ocean Research, Kiel, Germany

Since the last report sent in April of 2025, Guilherme has worked in the publication of the manuscript about the investigation of the seismogenic zone behavior at the St. Paul transform system (SPTS). Guilherme used surface waveform to identify the focal depths and compare the seismogenesis of SPTS with other oceanic transform faults. The manuscript was submitted to EGU Solid Earth journal, and it is in review process. At the second week of April, Guilherme traveled to Trondheim, Norway, where he stayed working in his secondment with Reginald Hermanns (Geological Survey of Norway/Norwegian University of Science and Technology), also part of the EnvSeis project, for three months (April/July 2025), approximately. Along the secondment time, Guilherme worked in investigations of the environmental impact caused by the March 2025 Mw 6.5 strike-slip earthquake occurred at the Jan Mayen Transform Fault (JMTF), with epicenter located ~5 km of the Jan Mayen Island (JMI). The strong mainshock ruptured the JMTF for ~40 km long and crossing the north zone of the JMI, indicating the potential for local hazard effects. Local GNSS sensors indicated that JMI moved ~2.4 cm in WNW-ESE direction during the rupture process, corroborating with the ESE rupture direction identified by apparent duration of regional P-waves, and the local epicenter distribution of the >1500 relocated aftershocks. An infrasound array located in northern Norway identified a signal arriving ~3 min after the mainshock, with the source of the signal coming with backazimuth in direction of the Kjerulf Glacier. Guilherme analyzed the infrasound signals using the same approach applied to identify the T-wave sources on his manuscript published at Geophysical Research Letter. Additionally, Guilherme identified that the ambient seismic noise cross-correlation of three local stations, located ~3-16 km distance from the glacier, revealed subsurface velocity perturbations during ~30 min and starting ~3 min after the mainshock. Then, using Sentinel-2 and high-resolution (50 cm) MAXAR satellite images, Guilherme confirmed that the infrasound signal and seismic noise perturbations were generated by a large volume of basaltic rock that detached and collapsed in the slope located in south wall of the Kjerulf Glacier, minutes after the mainshock occurred. Guilherme used the MAXAR images to estimate the total mass volume. It is the second longest glacier around the stratovolcano Mt. Beerenberg. The collapse triggered a rock avalanche that scattered debris along the glacier surface and covered most of the ice toward the border of the sea. It may take several years before the glacier surface covered with rock material returns to its previous state. Guilherme is already working in manuscript about the environmental impacts at JMI, in which he intends to submit at Nature Communications journal.



Sentinel 2 image took in 11/07/2025 showing the Kjerulf Glacier covered by debris after the collapse caused by the Mw 6.5 earthquake with their epicenter located just 5.4 km away of the glacier.

<u>ESR05 – Sophia Laporte</u>

Umeå University, Umeå, Sweden

In March, I participated in field work on Sävarån using DAS to investigate river-ice cracking signals with Keith, Fabian and Felix from WSL. It was very interesting to work with them and learn how to deploy a DAS on the field. Keith stayed for 2 months at Umeå University after that, which was great - finally a seismic buddy in Umeå !

In April was the last EnvSeis workshop in Vindeln, Sweden, where we presented our research and discussed stakeholder involvement, media partners and more. Our PhD group also started to establish the plan for the EnvSeis conference organization next June in Kiel. Since then, our working group for the conference has been working well, I’m learning a lot from being one of the coordinators of the organization team and I’m enjoying it a lot.

In May I attended EGU in Vienna, where I presented my research in the Environmental Seismology poster session, about identifying pressurized flows from seismic data in the flume experiment we set up during my secondment in Grenoble last autumn. This was a great way for me to get feedback and engage in interesting discussions. Furthermore, I attended several sessions on various topics and met up with many people which inspired me.

Following EGU, I spent a week in Grenoble to welcome and train a master student for a 2-month internship working on the flume. Under the joint supervision of my co-supervisor Florent, Alexis the technician from INRAE and me, Alix successfully carried out several additional flume runs using seismic and hydraulic data in different configurations, and contributed a lot in fixing the velocity sensor to obtain velocity profiles. Following these last two months, it's now officially the end of the flume lab work and time for me to add this new data into the ongoing analyses. I enjoyed learning from this distance-supervising experience, and generally, seeing this project evolve and working these great people !

From end of May until end of June, I was able to settle in Umeå for a bit, which was necessary to recharge energy and advance on courses from my home university. In July I spent some days in Göttingen to work with Micha and his PhD student Laura on seismic bedload inversion from my field data. In the summer I will have several weeks of field work in northern Sweden, shared between my project and those of my geomorphologist colleagues from Umeå.

ESR06 – Selina Wetter
IPGP, Paris, France

Over the past few months, I successfully calculated the surface wave magnitude for all events in my catalogue, following the approach of Ekström (2006). The magnitudes range from 4.1 to 5.4. In comparison, the merged catalogue by Tsai and Ekström (2007), Veitch and Nettles (2012), and Olsen and Nettles (2017) lists events between magnitude 4.6 and 5.1.

A clear relationship emerges when comparing event magnitudes with the distance to the farthest recording station. While smaller events ($M < 4.7$) are typically only detected at short distance, larger events ($M > 4.9$) reach a detection plateau, limited primarily by the geographic extent of Greenland. These larger, more widely recorded events are independent of station coverage and therefore well suited for spatio-temporal analysis. While smaller events dominate the overall catalogue and illustrate the broader seismic activity, the trend over time shows a noticeable increase in the number of large-magnitude events, especially in East Greenland. The reason for this regional increase is not yet fully understood. I am currently investigating potential correlations with environmental factors such as sea ice extent, tides, sea surface temperature, and atmospheric forcing. To build a better understanding of local drivers, I have started by focusing on individual glaciers. This part of the analysis is being developed during my current secondment in Lausanne, where I am collaborating with Stuart Lane and his team.

In addition, I had the chance to present my latest results, including the magnitude calculations and spatio-temporal trends, at the 25th General Assembly of the European Geosciences Union. Sharing my work with a broad scientific audience was a great experience and led to insightful feedback and new perspectives.

ESR07 – Juliane Starke
ISTerre, Grenoble, France

Juliane continued her work with the acoustic recordings of the limestone cliff she is investigating. She observed that the sonic velocity of the surface layer drops after heavy rainfall - likely due to the opening of micro-fractures. This link between rainfall and crack formation in field data is a valuable insight into rock erosion processes. She has now started a two-month secondment at GFZ Potsdam to work on publishing these findings.

ESR08 – Samidha V. Revankar

IGE, Grenoble, France

Over the past couple of months, I successfully presented my 2 years of progress to my thesis review committee, where I also submitted a review of fluvial seismology. With my research set in La Severaisse river, I made substantial progress in utilizing dense seismic arrays for frequency-resolved source tracking, and in developing strategies for array deployment tailored to river settings, aiming to enable more process-focused seismic observations.

I also implemented a robust framework for localization uncertainty quantification using array response functions and synthetic benchmarks, and began combining seismic results with orthorectified timelapse imagery to track river channel dynamics. I am currently writing my first paper—a methods-focused contribution titled *A Generalized Method for Frequency-Resolved Seismic Source Tracking Using Dense Arrays: Application to Fluvial Settings*, which aims to formalize this approach and make it transferable to other natural environments.

ESR09 – Amandine Missana

NTNU, Trondheim, Norway

ESR10 – Gwendal Léger

University of Seville, Seville, Spain

Since the last nesletter I finally solved all of my model's problems (untile I find new ones...), notably after a very productive week in Paris at IPGP working with Anne and Enrique.

I have done some tests to validate my model, one of them being the subcritical flow. In this test, we consider a flat bottom with an obstacle and we impose the discharge entering the domain and the fluid depth leaving the domain, such that the Froude number is less than 1. The analytical solution is presented in the first figure, with the brown line representing the bottom, the dashed line the fixed interface between the two coordinate systems (cartesian above it and tangential & normal to the bottom below it), the dotted lines the interfaces between the cartesian fluid layers and the solid blue line the free surface. We can recognise the characteristic "dip" of subcritical flows above the obstacle. The second figure shows a comparison of computed free surfaces with different fixed interface's shapes. It seems that some curves are far away from the analytical solution but in fact they are only far from the analytical solution that is plotted, which is the Saint Venant one, because the analytical solution has a dependency to the fixed interface's shape as its height appears in the formula. This is illustrated by figure 3, that shows the different analytical solutions. Even though they are close, the fixed interface is arbitrary and should not change the analytical solution, so this seems to be a limitation of the model.

Now that this part of the work is done, I started writing the article describing the model and working on the non-hydrostatic model.

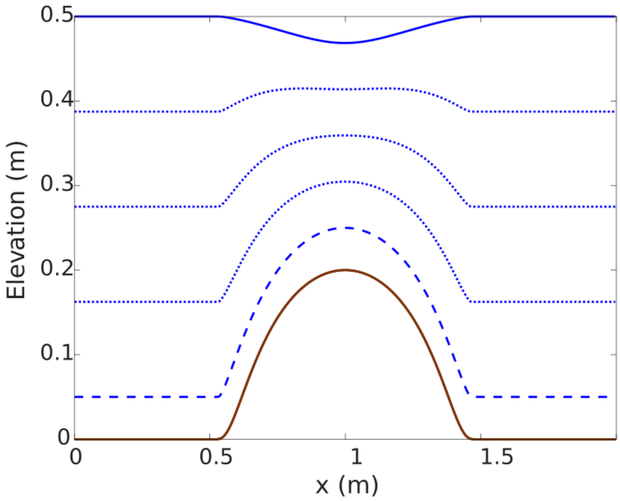


Figure 1

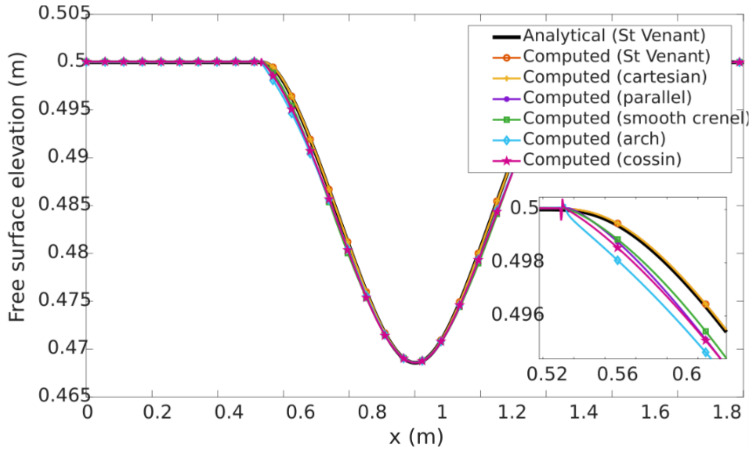


Figure 2

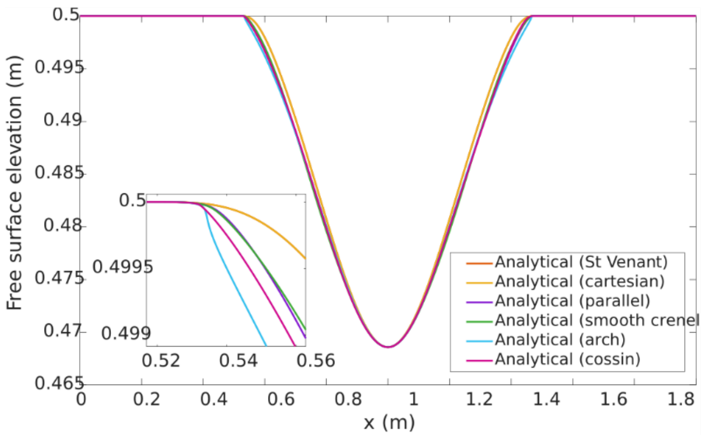


Figure 3

<u>ESR11 – Eva Wolf</u>

UNIL, Lausanne, Switzerland

The last three months started with our EnvSeis workshop in Umea, Sweden, where all doctoral students and PIs discussed their projects in detail and the organization of the final conference of the doctoral network in 2026 was initialized.

After the workshop and EGU in Vienna, we came back to the offices. I started working on finalizing my results of the first study of my project. The detection of the subglacial streams of Otemma glacier using seismic nodes gave interesting results using two different analysis methods. Figure 1 shows the results of the beamforming analysis. Three seismic arrays recorded different dominant backazimuths. For each array, we can see a pattern of change throughout 24 hours. During the day, the dominant noise sources have mostly a clear direction for array one and three, whilst noise in array two is more diffuse. In either array, during the early morning hours, when air temperature and therefore discharge are at their lowest, the direction of noise changes from one dominant backazimuth to a big variety of directions. This ensures that the noise sources we record during the day relate to the discharge of the glacier.

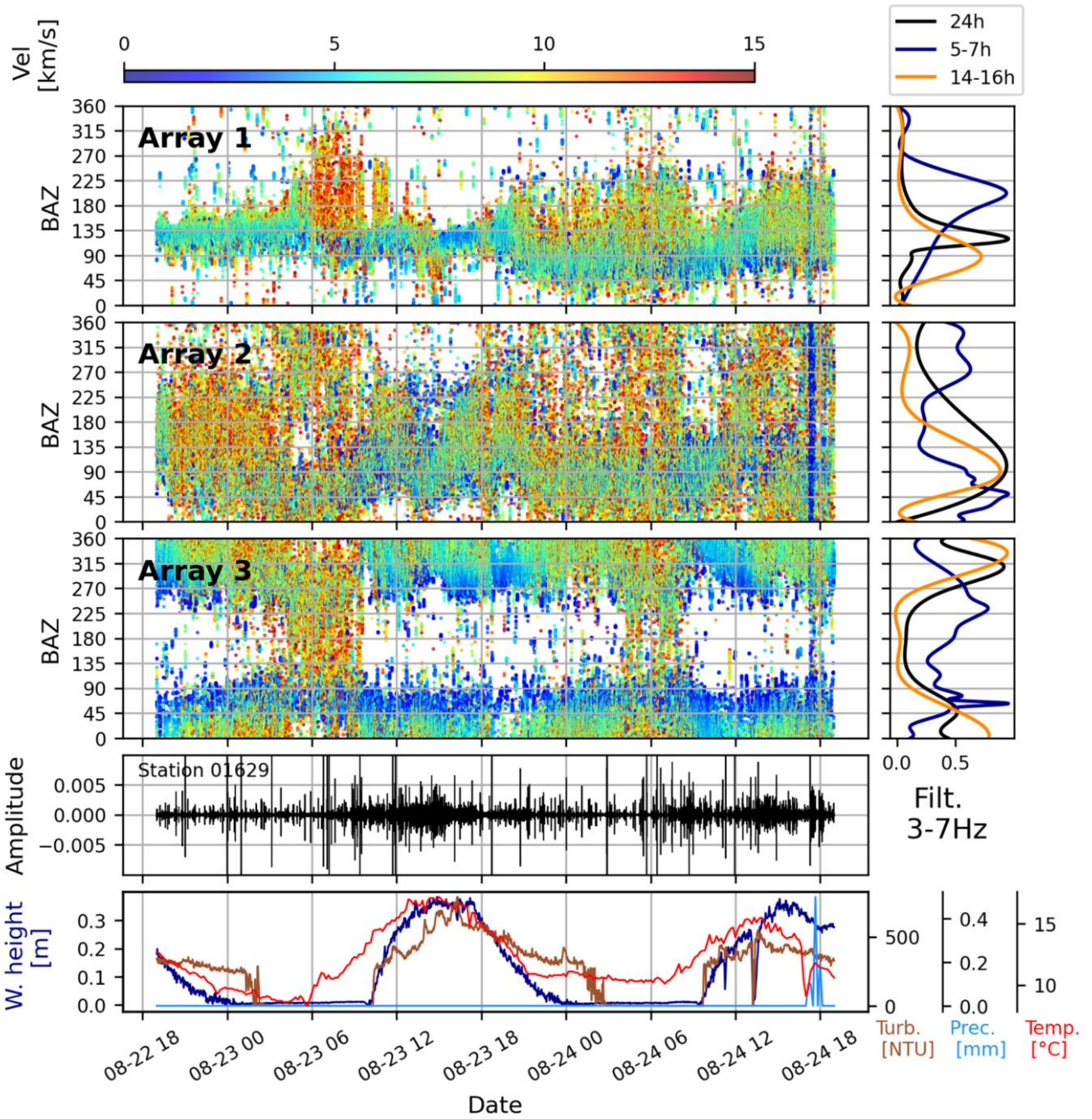


Figure 1: Dominant backazimuth on a 3-7 Hz frequency band for three seismic arrays on the glacier surface, the corresponding seismogram of seismometer 01629 (Array 2), water height and turbidity of the glacial river as well as precipitation and temperature of the closest meteorological station.

We transferred the results of the complementary method, the matched field processing, and the Shreve hydraulic potential onto the SwissTopo ortho-image of the glacier. These two methods' estimations of the location of the stream overlap on three locations. The strongest source density is found where the Shreve hydraulic potential indicates that the southern subglacial stream changes direction. The increasing stream turbulence at the turning point would result in stronger ground motion, which corresponds well to the pattern we found.

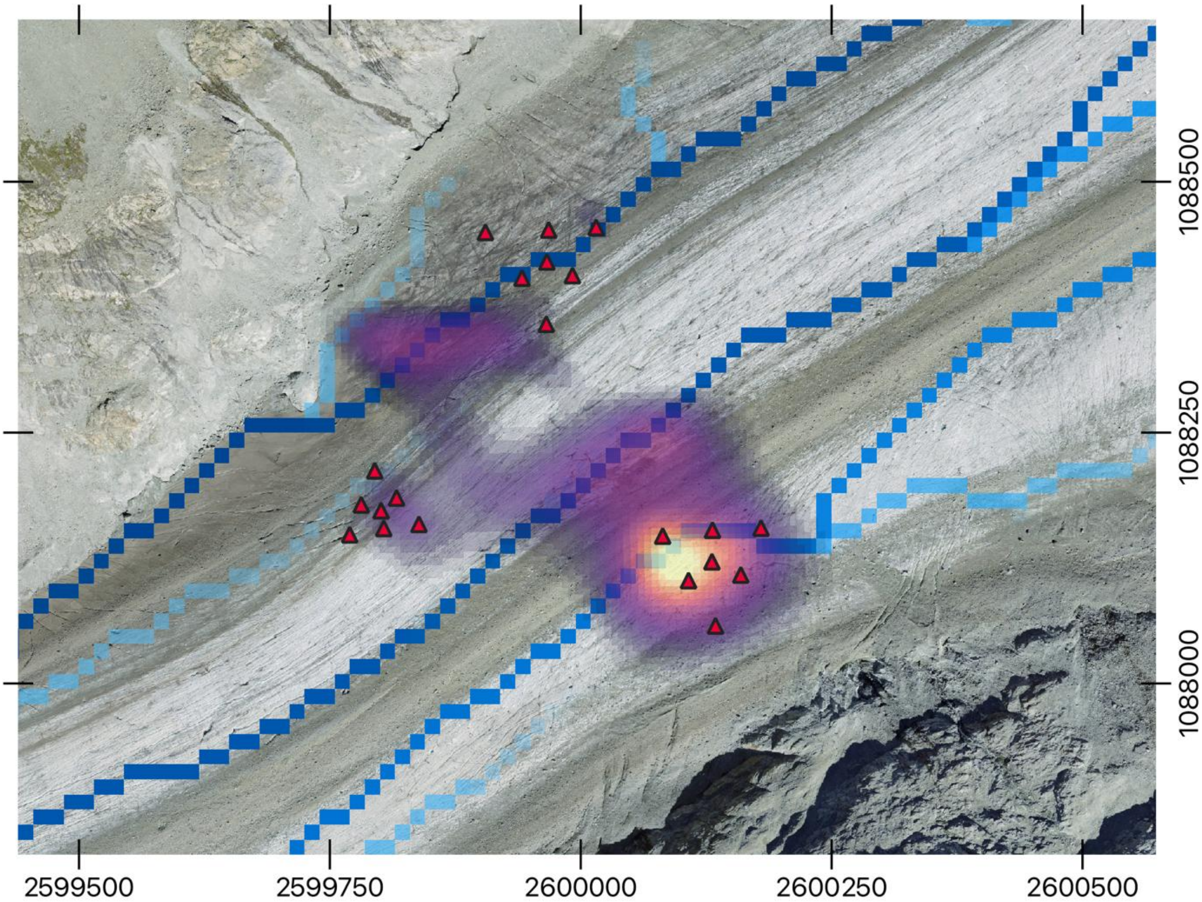


Figure 2: The density of dominant seismic source location of the matched field processing method applied on the glacier surface. The blue lines correspond to the Shreve hydraulic potential.

In the upcoming period, we are going to analyze the seismic records of the fiber optic cable. It is providing a lot more data points than conventional geophones, so we are testing its accuracy to detect the subglacial stream.

ESR12 – Jiahui Kang
WSL, Zurich, Switzerland

Between March and June, I took the secondment at Umeå University in northern Sweden, where I had the opportunity to collaborate with Sophia on the River Ice Project. Our aim was to monitor the mechanical and thermal evolution of river ice during the breakup period using Distributed Acoustic Sensing (DAS). The study site was the Sävarån River.

Our deployment consisted of a ~1-km fiber along a partially frozen river reach, split between a straight section and a sawtooth geometry (Fig. 1). The DAS monitoring continued for 5 days, during which we captured the entire river ice breakup processes.

We identified hundreds of icequakes. Using seismic interferometry, we performed cross-correlations of these signals to derive empirical Green's functions between channels along the fiber (Fig. 2). These virtual shot gathers enabled us to track seismic wave phase velocities and dispersion characteristics, which we inverted to estimate ice thickness and elastic properties.

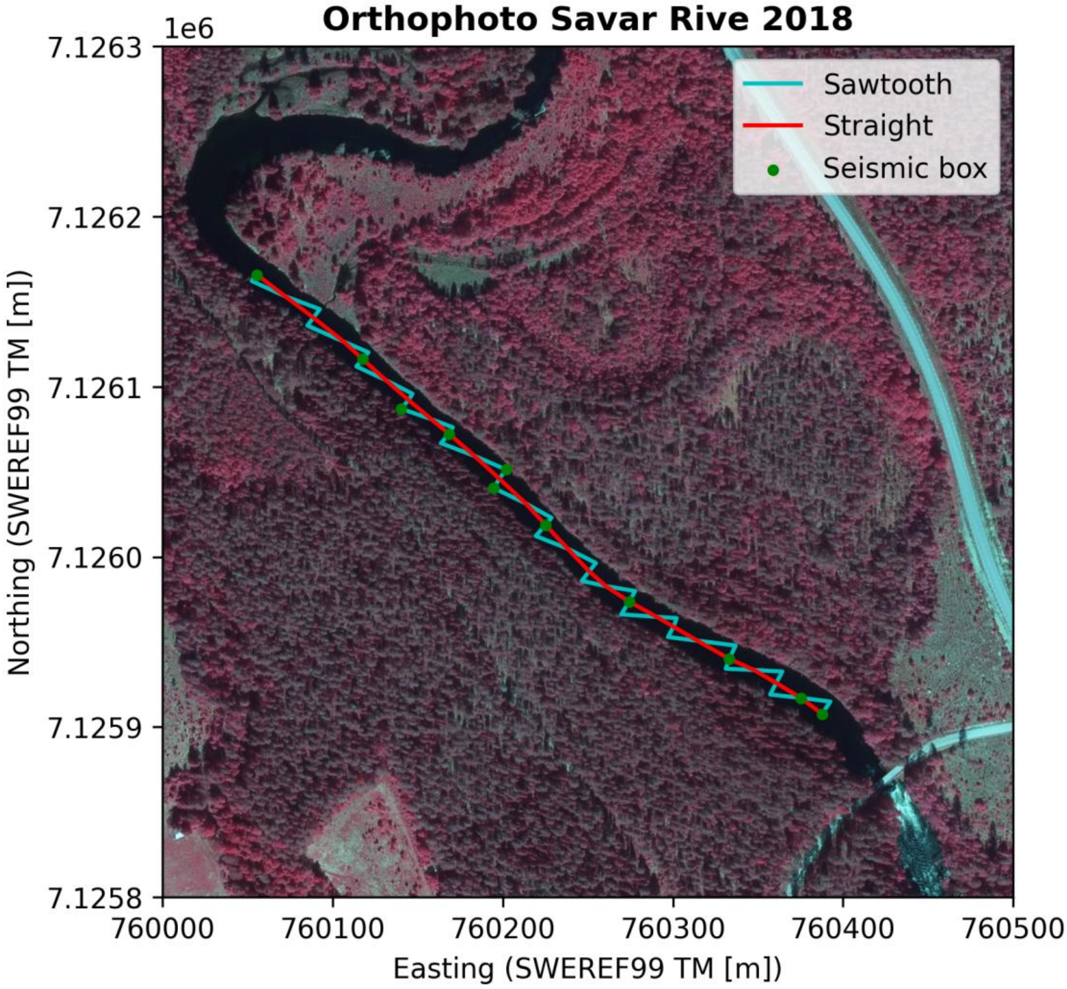


Figure 1. Field deployment geometry.

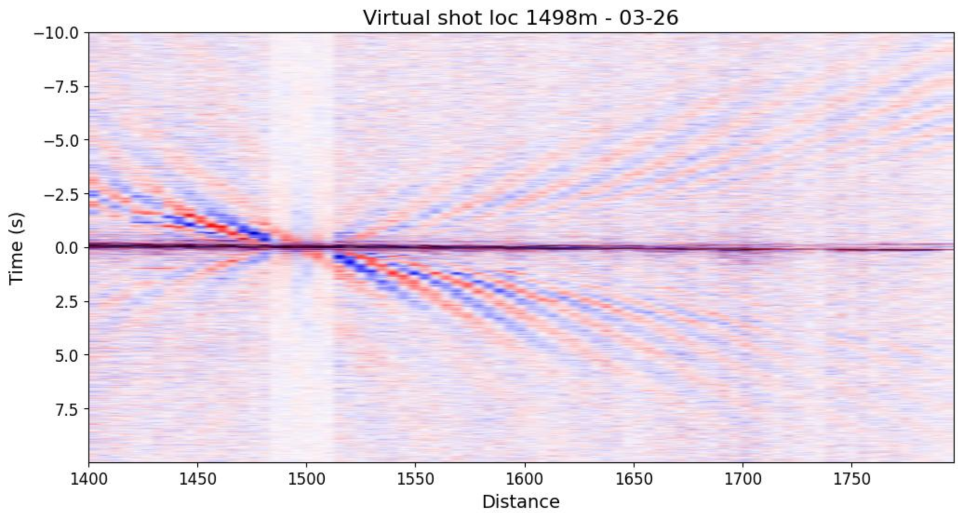


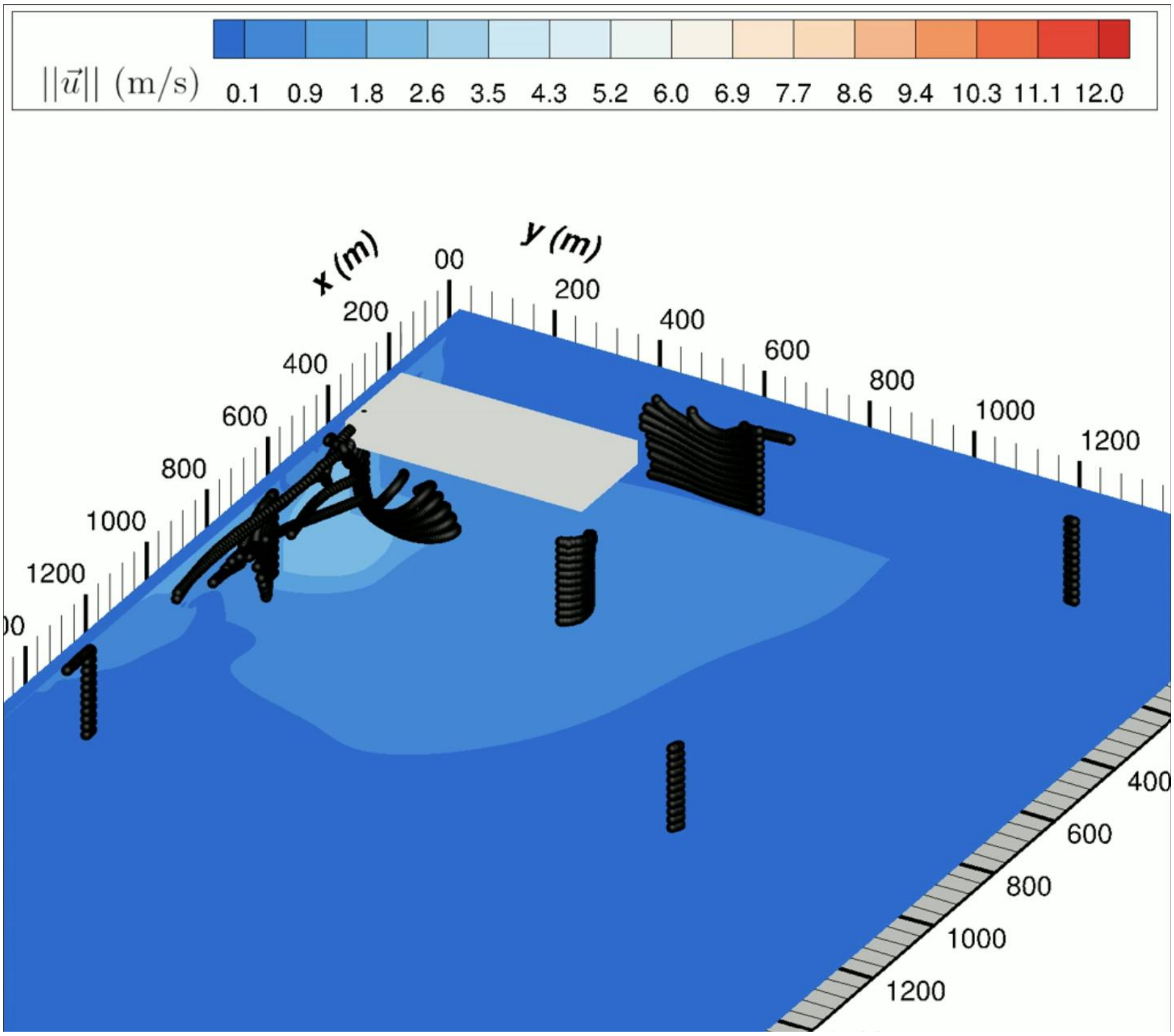
Figure 2. An example of virtual shot gathers.

Guest – Nicolas De Pinho Dias
IPGP, Paris, France

After a couple of exhausting months of conferences, I can joyfully do research again !

At EGU, I met Danish colleagues interested in the effect of iceberg capsize on the water density distribution. They conducted CTD (conductivity, temperature, depth) in the fjord of Hisinger glacier before and after an iceberg calving. They also have records an estimations of the iceberg geometry which we used to setup a model. Then we placed particles in the fjord and let the numerical iceberg capsize.

The snapshot shows the end of the simulation, the water velocity field in colors, the iceberg is the grey parallelepiped in the middle (here horizontal) and the dark dots show the trajectories of the particles. Complex trajectories are observed for particles close to the iceberg while the particles located far from the iceberg are barely affected. These results seem to match the measurements in terms of near-field mixing and unaffected far-field.



Conference updates

🚨 **BLOCK YOUR DATES!** 🚨

We're *seismically* excited to officially announce the upcoming **EnvSeis Conference**:
Shaking Boundaries: Environmental Seismology Across Disciplines and Methods 🌍 🌋

📅 **Dates**: 9–12 June 2026
📍 **Location**: GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany.

Mark your calendar and get ready for 4 days of science, collaborations- more info coming soon!