# Platform LéXPLORE

## Annual report July 2019 to June 2020


## Summary

During the reporting period, we further improved the exploitation of LéXPLORE platform and managed to resolve all the technical challenges. This period was interrupted by the COVID-19 sanitary crisis. Despite the crisis, most of the core data collection could be maintained and 11 scientific projects successfully acquired data in parallel. On 13th November 2019, the first scientific workshop was a great success with over 50 participants from different disciplines, and provided excellent opportunities for networking and future collaborations. The data flow within DATALAKES system was setup so that data from the core dataset will soon be available online. The communication around LéXPLORE was fruitful with several articles in the media, and the new website www.lexplore.info was created, which is now more attractive to researchers.


## 1. Administration

The LéXPLORE Steering Committee (SC) held 5 meetings on the following dates: 20th August 2019, 4th December 2019, 29th January 2020, 20th March 2020, and 7th May 2020. During these meetings, the SC monitored the implementation of the exploiting phase. In addition, the SC validated 9 project applications and organized the first LéXPLORE scientific workshop on 13th November 2019. The SC also accepted a simplified procedure for special requests, such as for visits, additional instrumentation, or minor project changes (prolongations or additions).

The SC agreed on the proposed optimization of the Technical Pool, and the necessity to have a Chief Technical Officer at 100%. Since May 2020, each Technical Officer took additional responsibilities as Specialist Officer, where he/she is responsible for a specific domain. In addition, EPFL hired a new technician since mid-March 2020, and Eawag increased the percentage of his technical officer and allocated a new technician for the automation. This new organization should allow to operate LéXPLORE at its full potential and to respond to the technical challenges of the installations.

In 2020, the exploitation costs are still estimated to 60'000 CHF. On a letter signed on 28.05.2020, all the members of the SC agreed that each Swiss partner pays an institutional rate of 13'000 CHF per year. CARRTEL rate remains at 7'000 EURO as stated in its agreement. These rates will replace the contributions paid by each research project in 2019. We hope that this solution will simplify the access of projects from the partner institutions. The SC also defined daily rates for project from external institution, which was adapted for the first project from ETH Zürich.

## 2. Exploitation

The reported period was interrupted by the COVID-19 sanitary crisis. We had to implement new safety measures on 20th March (2 persons max), 11th May (3 persons max), 10th June (6 persons max), and 7th July (8 persons max). We implemented the safety recommendations given by the OFSP. This crisis generated delays in the scientific projects and on the work from the Technical Pool.

The Limnology Center managed the day-to-day exploitation of LéXPLORE that included: to organize major maintenance works (black waters, generator, reparation of the protection circle; see finances), to process the project applications, to coordinate the scientific projects, to respond to special requests, and to manage the finances.

For the data management, Damien Bouffard and his project collaborators developed the online system DATALAKES (www.datalakes-eawag.ch), which provides in-situ data, lake simulations and remote sensing images of Swiss lakes. This open system will store the LéXPLORE core dataset and the collected data from the projects.

The Technical Pool worked intensively to solve all the technical problems, to install safely the equipment for the scientific projects, to maintain LéXPLORE (4th December 2019, 12th March 2020), to install the chemical laboratory hood, to build an office space, and to optimize the storing capacity. Two transversal chain lines were installed across the safety perimeter to increase the capacity and to better secure the moorings. The team improved the set-up of the instrumentations for the core dataset, so that most of the data are uploaded automatically onto the DATALAKES system. In addition, the Idronaut profiler was successfully installed in June 2020.

The logbook continuously registered the staff presence and the use of LéXPLORE per project. From 1st July 2019 to 30th June 2019, the platform was used at 150 occasions during 95 days, representing 38% of the total working days. During 40 days, the projects worked often in parallel (from 2 up to 6 teams per day). The number of days per projects were distributed as follows: Primary Production (53), LéXPLORE (21), PP & CARBOGEN mooring (14), CARBOGEN (12), Rhône mixing (12), Corona maintenance (9), Microplastic (8), Visits - media, students (7), LéWalk (7), LAC (7), Wind fields (3), Submule (1) and Quagga mussels (1).

# 3. Scientific Projects

End June 2020, we had 11 running projects, 7 upcoming projects and 3 completed projects. For each project, the collaborators and the title are presented below.

Current running projects:

1. Wüest Johny, Fernandez-Castro Bieito, Ulloa Hugo, Minaudo Camille**,** Lavanchy Sébastien, Shubham Krishna, Piccolroaz Sebastiano, and Chmiel Hannah: **Primary production under oligotrophication in lakes**
2. Perga Marie-Elodie, Perolo Pascal, Lambert Thibault, and Escoffier Nicolas: **CARBOGEN: carbon cycling in Lake Geneva**
3. Bouffard Damien, Fotis Georgatos, Bouillet Eric, Perez Cruz Fernando, Minaudo Camille, Lavanchy Sébastien, Šukys Jonas, Safin Artur, Tran-Khac Viet, and Runnalls James: **Datalakes - Heterogeneous data platform for operational modelling and forecasting of Swiss lakes**
4. Müller Beat and Kathriner Patrick: **In-situ pursuit of whitening events applying on-site analysis and profiling**
5. Odermatt Daniel: **Whitening detection and optical characterization (W-DOC)**
6. Breider Florian, Vernez Karine, Coudret Sylvain, and Loizeau Jean-Luc**: Deposition and Accumulation of Microplastics in Lake Sediments (Microsed)**
7. Joost Stéphane, Carratala Anna, Elia Vajana, Guillaume Annie, Martinoli Alcherio, Quraishi Anwar, Kohn Tamar, **local adaptation of bacteria communities to environmental conditions (LAC)**
8. Fernandez-Castro Bieito, Gil Coto Miguel, Lavanchy Sébastien, and Bouffard Damien: **LéWalk: autonomous turbulence profiling**
9. Bahr Alexander, Schill Felix, Lavanchy Sébastien and Guillaume Cunillera: **SUBMULE – easy access to submerged data**
10. Piet Spaak, Dennis Stuart and Haltiner Linda: **Life in the deep: colonisation by Dreissena along a depth gradient**
11. Andrew Barry, Mehrshad Foroughan, and Fernando Porté-Agel: **Spatio-temporal analysis of wind field characteristics over Lake Geneva**

Upcoming projects:

1. Gallorini Andrea and Loizeau Jean-Luc: **MetOxiC : Methylmercury in Oxic water Column**
2. Lattaud Julie**: Variability in stable isotopic composition of long-chain diols as a proxy for environmental conditions in lakes**
3. Kristin Schirmer, Maner Jenny, and Renaud Philippe: **Rainbow$_{flow}$ chip$_{online}$: Fishcell biosensor for automated water quality testing**
4. Bastiaan Ibelings, Mridul Thomas, Suarez Ena, Fillion Roxane: **Plankton in Lake Geneva : you can't have it both ways**
5. Bastiaan Ibelings, Julio Alegre Stelzer, Jorrit Mesman, Roxane Fillion, and Ena Suarez: **Winter Blitz**
6. Yves Bellouard, Arabadzhiev Ivo, Ibelings Bastiaan, Isles Petr, Pomati Francesco, Ribi Sebastiano and Manon Tardif, **PhytoWaveTaxa: Geneva Lake microalgae monitoring**
7. Jean Guillard, Tran-Khac Viet and Goulon Chloé: **LéXfish: monitoring fish presence below LéXPLORE**

Completed projects:

1. Damien Bouffard, Ulloa Hugo, Ramon Casañas Cintia, and Doda Tomy: **Buoyancy driven nearshore flows in lakes (Thermal Syphon**)

2. Torsten Vennemann and Gabriel Cotte, **Mixing of Rhône River in Lake Geneva**
3. Troy Cary, Castro Fernandez Bieito and Chmiel Hannah, **Surface Turbulence and $CO_2$ Lake Exchange Experiment ($CO_2$LEX)**

During this period, the primary production project organized four 24h work-campaigns on 27-28 August 2019, 20-21 September 2019, 30-31 October 2019, and on 20-21 February 2020.

# 4. Communication

The following communication outcomes took place during the reported period:

- Since 30th June 2020, the new website www.lexplore.info is functional. This website is now dedicated to researchers, and available in French and in English. Natacha Tofield-Pasche created it with the help of a consultant (see finances)
- 13th or 27th May 2020: The public visits were postponed, until the situation is back to normality after to the COVID-19 sanitary crisis
- Since 13th March 2020, 4 planned conferences were postponed due to COVID sanitary crisis
- 22nd January 2020: Installation of the second information panel near Pully's swimming pool
- 19th October 2019: Neue Zürcher Zeitung, Das Forschungfloss vom Genfersee
- 13th October 2019: Jean Guillard presented LéXPLORE during the open lab day of the CARRTEL
- 2nd October 2019: 150 participants registered for the public visits organized on LéXPLORE. Unfortunately, we had to cancel the visits due to strong winds.
- 25th September 2019: Natacha Tofield-Pasche presented LéXPLORE at DGE-BIODIV for the fishing guards
- 3rd September 2019: Marie-Elodie Perga presented LéXPLORE at Union Nautique Ouchy-Lausanne
- 27th August 2019 : Radiotelevisone svizzera, Léxplore svela i misteri del Lemano, 3.2 min
- 26th August 2019 : Radio Télevision Suisse CQFD, Un labo flottant pour comprendre le Léman, 21 min
- 22nd August 2019: le Temps, un laboratoire flottant pour récolter un < big data du Léman >
- 25th July 2019: Echo Magazine, une plateforme flottante ausculte le Léman
- 23rd July 2019: Terre et Nature, un véritable laboratoire flottant pour percer les secrets du lac Léman
- 11th July 2019: Le Courrier de Lavaux-Oron : Un laboratoire de recherche flotte au large de Pully

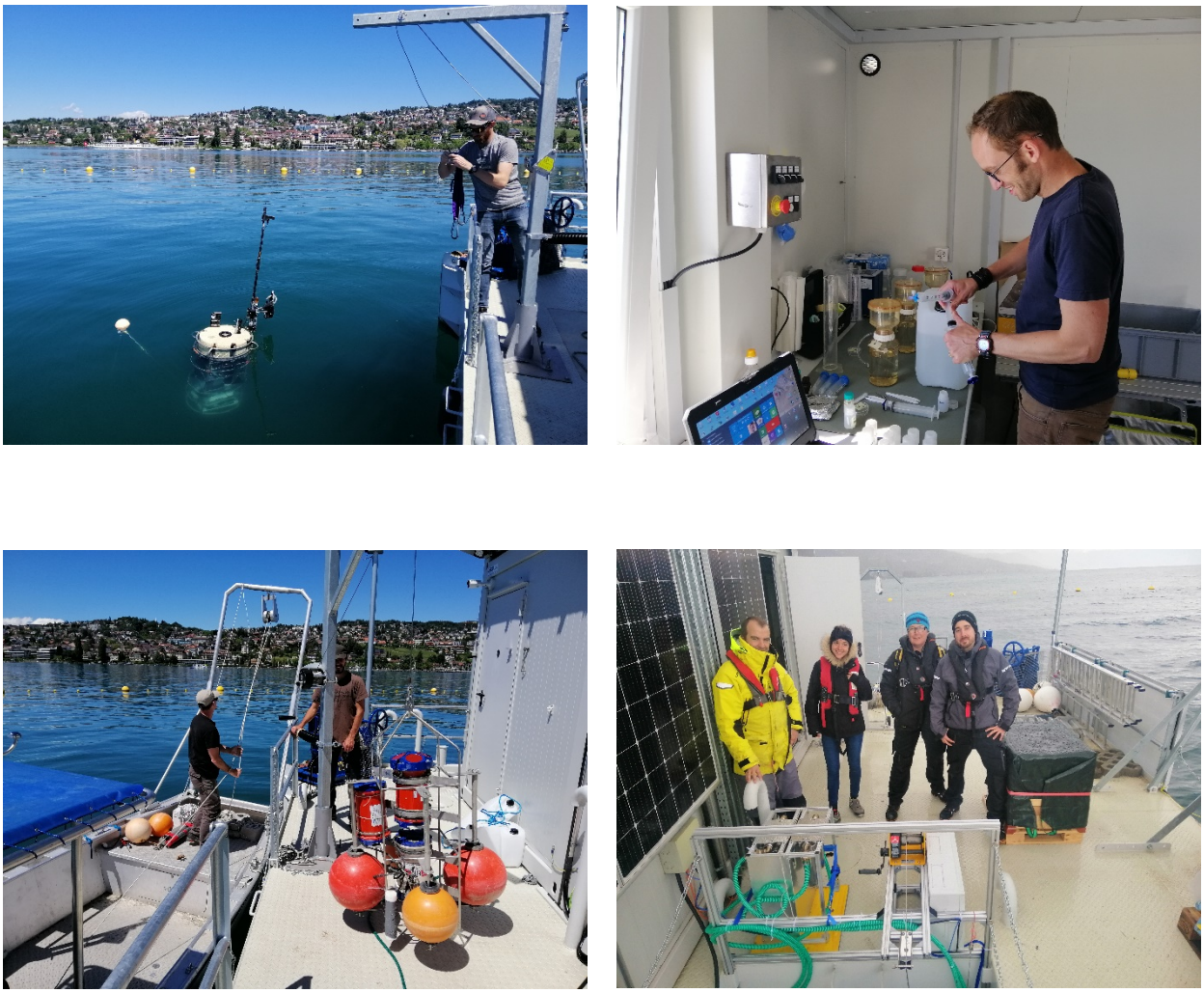
On 13th November 2019, the first LéXPLORE scientific workshop took place with over 50 participants at UNIL in Géopolis building. The 13 presented projects showed a vast range of multidisciplinary topics and promoted new technologies. Three discussion groups came up with propositions on data management, education and use of new technology. This conference was a great opportunity to network and to promote future collaborations.

# 5. Way forward

The next steps for LéXPLORE are the following:

- Install the scientific instruments for future projects, and ensure LéXPLORE maintenance.
- Ensure that the platform is fully operational and can be controlled remotely.
- Improve the functioning of the Technical Pool, to achieve an efficient technical organization.
- Provide to the researchers technical procedures on how to use LéXPLORE equipment and instrumentation in a consistent way.
- Finalize the data pipeline within the DATALAKES project and train researchers to use the web-portal. Prepare data and train researchers to upload the data collected for their projects. This work is in collaboration with CARRTEL's Research Engineer, Viet Tran-Khac who received a permanent position at CARRTEL.
- Present the first results on LéXPLORE and promote interdisciplinary exchanges at the Swiss Geoscience Meeting on 20$^{th}$ and 21$^{st}$ November 2020.
- Promote international scientific projects by presenting the unique scientific opportunities offered by LéXPLORE at international conferences and congresses.
- Publish a perspective article on LéXPLORE in a peered-reviewed journal

- Register officially LéXPLORE within the Global Lake Ecological Observatory Network (GLEON), and integrate data-driven studies (projects and global syntheses).
- Provide public presentations when requested, and organize two annual visits for the public, when the situation is back to normality after the COVID-19 sanitary crisis.
- Develop the possibilities to use LéXPLORE for summer schools and other educational purposes
- Promote collaborative projects around LéXPLORE by participating in writing large project proposals (for example, INTERREG Léman 2040)
- Engage navigators for a participatory science project in collaboration with the Association pour la Sauvegarde du Léman (ASL) in the next years.
- Prepare an exhibition on LéXPLORE for the 100 years of SIL in Berlin in 2022, as well as for the INTECOL meeting hosted at UniGe.



*Images from scientists at work on LéXPLORE platform*