

Oslo, 30 December 2018

LATICE – annual letter 2018

Dear all,

2018 is coming to an end and it is time to thank you all for your contribution to making it yet another exciting and successful LATICE year. This year a major effort has been put into further advancing the LATICE eco-hydrological observatory at Finse, involving a range of disciplines and people along with an integrated modelling effort, notable using the land surface model CLM; activities that will lay the basis for novel research in years to come. Our international engagement is increasing and our close contact with NCAR has facilitated several research visits for our team, which is greatly appreciated. Details of the LATICE project, the research group and its activities can be found at mn.uio.no/latice.

Some highlights and activities from 2018 (our fourth year) are presented below:

LATICE Ecohydrological observatory at Finse

The Finse eco-hydrological observatory (FINSE-ECHO), encompassing various infrastructure and field investigations in the area around Finse, is now well recognized as a key research site nationally and becoming so internationally, notable due to the eddy-covariance (EC) measurements. The permanent station is operational since fall 2016, transmitting data real-time to a specially developed database at UiO, and is since fall 2018 part of the global Fluxnet community. The station worked for most of 2018, but unfortunately we lost parts of the growing season due to a defect light source in the gas analyser. The similar EC system on the mobile tower was moved from the river valley to the nearby Finse wetland in February, showing, among other things, that this ecosystem is a strong carbon sink. The same site was used to test the snow radar developed by IFI, as well as a GPS system measuring snow water equivalent based on the signal attenuation through the snowpack.

We made good progress in the development of our wireless sensor network (LATICE WSN), which includes a custom-made suite of sensors, a dedicated communication protocol, and a database management system. We will improve the collection of spatially distributed data with our network significantly when we deploy ten new stations early next year, before exporting a similar system to a project on Svalbard. We have also started collaboration with the Department of Technology Systems (ITS) at UiO to further improve our WSN capabilities.

In collaboration with UiB and the NFR-funded Snowspace project, we installed a water vapour isotope lab at Finse, continuously measuring the isotopic signatures of the ambient atmospheric air. Other hydrological measurements include groundwater level, river discharge, and distributed water temperature data. Our regular drone flights yield high-resolution maps of the area, and since recently also temperature and gas concentration profiles of the lower boundary layer.

To assess spatial snow distributions and their interactions with the vegetation cover in tundra ecosystems, LATICE developed a protocol for airborne observations using drones. The vegetation mapping around the flux tower, using the NHM system "Nature in Norway" (NiN), was completed this year, and another nearby field, with detailed snow depth measurements, was mapped in the

same manner. Preliminary analyses show an immense potential for groundbreaking studies on snow-vegetation interactions.

Last year LATICE (application led by John Burkhart) achieved funding for an Experimental Chamber (climate container) to be purchased in 2019. The Finse flux site and the new climate container are both unique - also in an international context - and are expected to provide novel insights to high-latitude processes, including dedicated snow-vegetation experiments.

Many interesting master theses studying eco-hydrological processes supplement our activities, including additional measurements. A complete overview is given at our website under Publications.

New team members

The LATICE Innovation Postdoc started this year (1 October) and we are pleased to welcome Olga Silantyeva to the group. The position is a 4-year postdoc position focusing on development of the Shyft modeling framework toward new applications. The LATICE group now consists of five PhDs and two Postdocs funded by the Faculty. In addition, there are several other Postdocs and PhDs involved in the LATICE project, many of them contributing with important field work at Finse and in Finnmark (permafrost site). New PhD students this year include Eva L. Eriksen at NHM, and Elin C. R. Aas and Marius Lambert, both at UiO-Geo (MetOs). We are pleased to have you all as part of the LATICE team.

Proposals and new projects

In June, the Faculty invited all (15) Strategic Research Initiatives (SRIs) to apply for an extension with deadline in September. The applications were evaluated with respect to their achievements as well as research plan for the next four years, funding two (possible three) faculty positions. In mid-December we were informed that LATICE-X (X for Extension) was positively evaluated and granted two PhD (2019) and one Postdoc position (2020). This is great news for our initiative allowing LATICE to further grow and consolidate its position both nationally and internationally.

A few days later, we learned that yet another major research proposal, EMERALD, was funded; this time by the Research Council of Norway through the KLIMAFORSK call. EMERALD is a national coordinated project that builds on LATICE and the wider network created through the two national seminars on terrestrial vegetation ecological climatology organized at NHM at Tøyen in 2017 and 2018. EMERALD has a focus on terrestrial ecosystem-climate interactions and their representations in ESMs. In addition to LATICE partners at UiO-Geo and NHM, it involves UiO-Bio and groups in Bergen, Tromsø, Ås and at UNIS. The project is coordinated by Frode Stordal and Lena Tallaksen. LATICE further helped developing the basis for a new BioGeoChemistry Centre at the University of Oslo and one KD funded PhD allocated to the center is linked to LATICE.

LATICE also contributed to a Danish consortium that was recently awarded funding by the Norwegian Environment Agency to monitor greenhouse gas emissions from restored wetlands. Here, our task will be to apply our expertise and infrastructure to operate two EC flux towers with CO₂ and methane analysers. We look forward to provide details of these and other projects and discuss among others how they best can be integrated with LATICE when we meet at Sundvolden, 20-21 March 2019.

Thanks to you all for your contribution to the success of these initiatives and a special thanks to those who have put a lot of effort into proposals that unfortunately not got funded this year. Many got good evaluations and we may consider resubmitting some of these next year.

Interdisciplinary teaching and training

GEO9915/5915 Ecological climatology was taught for the first time in the spring semester 2018. It was led by Anders Bryn and Frode Stordal. The course gathered five students from Biosciences and five from Geosciences. The mix between master and PhD students was also five plus five. Several specialists, many from the LATICE community, contributed with lectures in their fields of scientific specialty. The course was centered around relationships between climate and ecology, with focus on climate related feedbacks within boreal, alpine and arctic terrestrial ecosystems. Teaching was organized in two intensive weeks, the first at Blindern and the second in Drøbak, with strong involvement of the students. The course is taught again in the spring semester 2019.

Dissemination and Communication

The group has also been active in dissemination and communicating the LATICE project and our research at various conferences and events, such as EGU, AGU as well as at more targeted events, e.g. SnowHydro 2018 – an international conference on snow in Heidelberg, Germany in February, the International Conference on Ozone and Plant Ecosystems, Florence, Italy in May, and the Nordic Hydrological Conference in Bergen in August. Our monthly LATICE seminar is well established and attended also from outside the LATICE group, and our publication list is growing.

The LATICE project "Natur i endring" (with Den Norske Turistforening) a Citizen Science project on vegetation migration in Norway, has created a novel mobile application (App) for registration of forest- and treelines. The project is coordinated by the group at NHM (Anders Bryn) and has received a lot of attention in the media. It has its own website (in Norwegian) and you are all encouraged to sign up and contribute with data through the App: <https://www.naturiendring.no/>

We have started preparing for our 2019 annual meeting, which will take place at Sundvolden from 20-21 March. At Sundvolden we look forward to meet our advisory board again, Roy Rasmussen (NCAR) and Eleanor Blyth (CEH), along with our invited speakers. We will learn and discuss details of the progress being made since last time and present the key concepts of LATICE-X as well as new projects linking closely with LATICE such as EMERALD. Specifically, the activity plan for 2019 will be discussed, including coordinated field work. As last year, all external members are welcome and encouraged to participate, but have to cover their own costs. More details will follow soon.

We look forward to continue our community effort in what I am sure will be another motivating LATICE year with exciting new research results and initiatives being taken. The friendly and open atmosphere that characterizes LATICE makes it a great project to coordinate and be part of, so thanks to you all for making it so.

With our best wishes for the New Year - Godt Nyttår!

Lena, Frode and Norbert/John

LATICE coordination team