



WFSC Newsletter Issue 12 | January 2020

## World Food System Center News

### Center News

#### ETH GLOBE Magazine

The recent ETH GLOBE magazine focused on research from the World Food System Center that harnesses new technologies to produce food more sustainably. Many WFSC members and projects were highlighted.

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#### Executive Office Staff

At the end of 2019, we said goodbye to colleagues Anna K. Gilgen and Eduardo Pérez. We are grateful to both for their service to the Center as project managers and wish them luck in their new endeavors. We also welcomed a new team member: Braida Thom. She joined the Center as Project Manager in November 2019. In her role, Braida manages the research programs of the Center, including the Future Food Fellowship. She completed her bachelor studies in Agricultural Science at ETH Zurich and her master studies in Agricultural Economics at ETH Zurich and Boku Vienna. Please see the [Executive Office page](#) on the Center website to learn more about our team.

#### Connect!

Keep up to date on all Center news, events, member research, and more by following us @ethzWFSC on [Twitter](#) and [Facebook](#). And, you can now also follow us on our new [LinkedIn public company page](#). Videos from the Center can be viewed on our [YouTube channel](#).

#### Welcome to our New Members

We welcome Rachael Garrett, Sebastian Dötterl, and Christian Wolfrum as new members. Prof. Rachael Garrett leads the group of Environmental Policy. The group examines the drivers and impacts of land changes related to food systems and the effectiveness of existing policies and practices to ameliorate these impacts. The aim is to provide solutions to achieve zero-deforestation and zero-forest degradation globally, while scaling up more sustainable land use practices and restoration of degraded ecosystems.



Prof. Sebastian Dötterl heads the group Soil Resources. The group studies environmental processes related to soil development and biogeochemical cycles. The aim is to raise awareness for the limitations, dynamics, and services of soil resources in order to improve their preservation and to better sustain human nutrition.

Prof. Christian Wolfrum leads the Laboratory of Translational Nutrition Biology. The group's research aims to identify how adipose tissue proliferation and differentiation as well as function impacts the development of metabolic misbalance, such as obesity and diabetes. In doing so, the work helps to identify nutrition-based strategies to prevent and treat obesity-associated metabolic disorders.

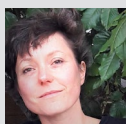


## Future Food Initiative

The next call of the Future Food Initiative is now open. The Future Food Fellowship is a postdoctoral program for exceptionally qualified young researchers who propose projects targeting future food issues, such as nutrition, production, packaging, and digital health. The fellowship provides personal research funds for three years, enabling fellows to work on their projects and collaborate with Swiss industry partners. Although the call is open to any outstanding proposal, the following topics are prioritized in 2020: plant-based proteins, digital technologies for food design, sustainable packaging, and microbiome. The deadline for submission of applications is 31 March 2020.

### We are happy to present the Future Food Fellows 2019

Dr. Marianna Fenzi is analysing the relationship between plant genetic resources conservation and their use in breeding programs. She will look at ex situ (gene banks) and in situ (natural environment) conservation approaches.



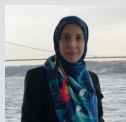
Host: [Prof. Jérôme Baudry at EPFL](#)

Dr. Joan Onate Narciso is looking at kabog millet, an ancient crop from the Philippines. She will be exploring its potential as an alternative to rice by analysing the nutritional quality and by finding novel uses of the grain.



Host: [Prof. Laura Nyström at ETH Zurich](#)

Dr. Niloufar Sharif is working with intelligent packaging technologies. Her goal is to develop a sensing platform on food packaging using carbon nanotubes that allows to precisely identify which products are spoiled.



Host: [Prof. Ardemis Boghossian at EPFL](#)

Dr. Chunyan Wu is looking at obesity prevention. She will screen different plant extracts to find bioactive properties with ameliorating effects on obesity that can be integrated into our food as a natural method of obesity prevention.



Host: [Prof. Christian Wolfrum at ETH Zurich](#)

Find more information about the Future Food Initiative at [www.futurefoodtalents.org](http://www.futurefoodtalents.org).

ETH Zurich and EPFL launched the Future Food Initiative in 2018 together with Swiss food industry leaders Bühler, Givaudan, and Nestlé as the first partners on board, with

the possibility for additional partners to join in the near future. The goal of the initiative is to expand research and education in the area of food and nutrition sciences; the fellowship program within the initiative aims at bringing together competences from academic and industrial research in this field. The program is co-managed by the World Food System Center at ETH Zurich and the Integrative Food Science and Nutrition Center at EPFL.

## Flagship Project: Enhancing Resilience in Food Systems

During the second half of 2019, the RUNRES project (Rural-Urban Nexus: Establishing a nutrient loop to improve city region food system RESilience), kick-started in four countries: Democratic Republic of Congo, Ethiopia, Rwanda, and South Africa. In these four countries, different stakeholders from crop producers to waste processors came together several times to discuss possible innovations to build a circular economy. Based on small-scale food processing and recirculating of nutrients from bio and human-waste from urban settlements back to rural areas, such a circular economy would support sustainable and resilient local food systems.



RUNRES workshop participants in the Democratic Republic of Congo.

These workshops set the first steps towards public-private partnerships to co-finance suitable and sustainable innovations capable of supporting city-region food systems. This will be achieved through a transdisciplinary approach, coupled with innovation platforms where stakeholders will develop business plans to implement technologies to efficiently cycle nutrients across the rural-urban nexus. While the first half of 2020 will be spent identifying suitable innovations to be co-funded, the second half of 2020 will be spent implementing these innovations in pilot-projects until 2022.



The project **OrRes** (Assessing the role of organic value chains in enhancing food system resilience) completed a resilience assessment of organic and conventional smallholder banana producers in Dominican Republic to flooding caused by hurricanes. The recovery process was found to be the key aspect in determining the outcome for farmers affected by flooding in the Yaque del Norte drainage basin. The co-design of measures to enhance resilience of this system is now ongoing, with Master's student Bianca Curcio carrying out field research with banana producers and co-operatives.

A systemic approach to tomato farmers' resilience in the face of droughts and market variability was conducted in Morocco and Ghana. In Morocco, results from a survey conducted among 250 farmers and a simulation-based model highlight the importance of a sustainable water management in order to build farmer resilience in the long-term. The case study has been presented at the International Conference of the System Dynamics Society in July 2019. In Ghana, a resilience assessment of smallholder farmers in Ashanti and Upper East Region has been completed through a survey of 350 tomato farmers. A closer look is given to the power dynamics between the stakeholders of the tomato food system in the Upper East Region by the Master's student Laurence Jeangros through interviews with key stakeholders.

For many project reports and to learn more about this Flagship project, visit [www.resilientfoodsystems.ethz.ch](http://www.resilientfoodsystems.ethz.ch).



Kenza Benabderrazik in Morocco (l) and William Thompson in the Dominican Republic, both assessing resilience of smallholder farmers.

## WFSC Research Programs

Updates about projects funded through the Center's Research Programs can be found at [www.worldfoodsystem.ethz.ch/research](http://www.worldfoodsystem.ethz.ch/research).

## Flagship Project: Novel Proteins for Food and Feed

The WFSC Flagship project focusing on the topic of novel uses of alternative proteins for feed and food continues to produce food processing innovations. Recent publications include the study focusing on **extruded meat analogues based on yellow microalgae**, which shows the enhanced nutritional value as a result of microalgae incorporation into a soy-based protein product. Another explores **increasing the performance of biowaste treatment with black soldier fly larvae**, with the ultimate goal of larvae to be used as feed.

Principal Investigator Prof. Alexander Mathys attended the kick-off meeting in October 2019 of the EU Horizon 2020 project entitled **SUStainable INsect CHAIN**. It focuses on novel protein provision from insects for feed and food in Europe by overcoming the remaining barriers for increasing the economic viability of the insect value chain and opening markets. Doctoral student Daniela A. Peguero has joined the research group at ETH Zurich to work on the project.



Alexander Mathys and Daniela A. Peguero at kick-off meeting of Horizon 2020 SUSINCHAIN project on insect value chains in Europe.

The innovations of the flagship project have also been highlighted in Swiss media, including an episode of the radio program **Espresso** in July, focusing on microalgae as a promising source of protein.

## RESPONSE Fellowship Program

The call for research project proposals for the doctoral fellowship program called «**RESPONSE DP**» is open until 31 January. Doctoral students will benefit from the research environment of ETH Zurich, University of Zurich, and University of Basel and from the support of three involved competence centers: Zurich-Basel Plant Science Center, World Food System Center, and Energy Science Center. Principal investigators of the three universities are encouraged to apply.

## WFSC Research Symposium

This year's symposium focused on how current research contributes to sustainable food systems and supports reaching the Sustainable Development Goals (SDGs) of the UN Agenda 2030. The main program started with a keynote address on the Future Food Initiative by Detlef Günther, ETH Zurich VP Research and Corporate Relations. The presentation sessions then featured inputs from five concluding research projects focused on (1) Nutritious, Safe and Sustainable Food for All and (2) Healthy Soils, Improved Livelihoods: "New sustainable food formulations based on algae proteins ([NewAlgae](#))" by Leandro Buchmann; "Application of *Lactobacillus reuteri* to naturally prevent *Campylobacter* colonization of chicken ([CampyChick](#))" by Anna Greppi; "Towards nutritional security through organic management of soil fertility in orange-fleshed sweet potato systems in Mozambique ([ORMASP](#))" by Rafaela Feola Conz; "Microbial services for an environmentally and economically sustainable rooibos tea production ([EcoInt](#))" by Josep Ramoneda; "Nitrified urine fertilizer: A transdisciplinary approach to solutions-oriented community development ([NUFSOC](#))" by Ben Wilde.

The audience then interacted with researchers at the networking poster session showcasing 50 posters on food system research and Center initiatives. We congratulate the winners of the poster prizes awarded at the symposium: Best Overall Poster Prize: Consumer's knowledge gain through a cross-categorical environmental food label by Marius Dihr, Michael Siegrist, and Bernadette Sütterlin, and the Mercator Poster Prize: Why are there regional differences in the uptake of organic farming? by Marc Chautems, Robert Finger, and Robert Huber.

We thank all the presenters and contributors for making this networking event such a success! To find the [full proceedings](#) of the event and many of the presented posters, [visit our website](#).



WFSC Chair Michael Siegrist opening the symposium.

## The role of neighbors on our own decisions: Q&A with Marc Chautems, winner of the Mercator Poster Prize at the WFSC Research Symposium.



**Q.** What was the most important aspect of your project "Why are there regional differences in the uptake of organic farming?" that you shared with the public at the Research Symposium?

**A.** The interest of the public was very diverse. All in all, I think that the most important aspects were that (I) neighboring farms are clearly impacting the decision to convert to organic and (II) the importance of regional factors dramatically changed in the last 18 years - most conversions used to be in mountains and close to cities, but this is not the case anymore.

**Q.** How do you see this project contributing to the UN Sustainable Development Goals?

**A.** This project looked at why certain people take action and change toward a more sustainable farming system and others not. By highlighting the role of neighbors on your own decision, this project shows that the decision of individuals cannot be considered without taking into account the broader regional context.

**Q.** Has your research affected what you eat?

**A.** Having grown up on a farm, I try to be as close to the producer as possible when I am buying food, may it be organic or not. I love to know where my food comes from and how it was produced. I really like to discover regional specialties and hear the stories behind the food.

## Scientifica

The Center organized a public exhibit on sustainable food systems research at this year's ETH/UZH Scientifica in September. Our interactive exhibit "Food of the Future" brought together the groups of Crop Science (Prof. Achim Walter) and the Laboratory for Food Immunology (Prof. Emma Wetter Slack) as well as Center staff.



Emma Wetter Slack and Daniel Burga ready to play Pig Pong with Scientifica visitors, playfully introducing their innovative work on vaccines for livestock.

## Beacons of Hope

The WFSC was selected as a Beacon of Hope by the Global Alliance for the Future of Food. In the report "[Beacons of Hope: Accelerating Transformations to Sustainable Food Systems](#)", launched in August, 21 initiatives from across the world were showcased, all displaying a highly integrated approach and encouraging sustainability at the social, ecological, and economic level.



## World Food System Summer School

The World Food System Center Summer School recently took place from 17 August to 01 September in Rheinau, Switzerland with 24 students and young professionals from around the world participating. The two-week program included a mixture of theoretical inputs, participant led discussions, peer to peer learning, field work, case study work, design thinking approaches, and simulation games. A diverse range of faculty contributed inputs from different disciplines and sectors, adding to the rich learning experience. As the participants left the small farming town of Rheinau behind, they shared their enthusiasm for the path ahead. They now join the active alumni community comprised of 188 course participants from 54 different countries. Stay tuned to hear about the exciting initiatives they will create in the world!



Participants from WFS Summer School 2019.

## Alumni Network

The World Food System Center Alumni Network (WFSCAN) is now being formalized as a platform for alumni, by alumni, with three board members establishing the organization, setting up an online platform accessible to alumni, and coordinating learning and exchange activities both on- and offline. The website [www.wfscalumni.com](http://www.wfscalumni.com) launched in September. The website contains features such as a member database; the possibility to share articles, events, and job opportunities; and organization of 'knowledge seasons' on specific topics. On the topic of 'seed sovereignty,' seven alumni came together for the first WFSCAN community workshop, taking place in January on the organic farm of alum Neelam Dutta in Assam, India.

## Food System Stories

This creative blog space of the WFS alumni community offers a platform to share stories. Follow the blog at [www.foodsystemstories.org/](http://www.foodsystemstories.org/)

**Scientists have great responsibility: Q&A with Marius Dihr,** winner of the Best Overall Poster Prize at the WFS Research Symposium.



**Q.** What was the most important aspect of your project "Consumer's knowledge gain through a cross-categorical environmental food label" that you shared with the public at the Research Symposium?

**A.** The effort of each and everyone is needed to prevent the impending environmental crisis and guarantee future food security. My project showed that consumers lack the needed knowledge to make the right choices. But they are concerned about consumption impact and interested in an evidence-based guidance for consumption change.

**Q.** How do you see this project contributing to the UN Sustainable Development Goals?

**A.** Technically, it would be possible to feed the growing human population, but resources are wasted through the production of unsustainable food items. The western diet, dominated by an overconsumption of these products, is gradually adopted by the rest of the world. Changing consumption patterns in countries where food is available in abundance is one of the most efficient ways to prevent environmental damage and food scarcity.

**Q.** Has your research affected what you eat?

**A.** Yes, it has. With growing knowledge, it becomes more and more difficult not to change personal behaviour and stay true to yourself. Acting has always a bigger impact than preaching. And knowing the facts, scientists have great responsibility: It is crucial, that we act in line with our knowledge. If we can't, no one will.

## The Rich Picture Method

We are pleased to share new research published by Michelle Grant, Anna K. Gilgen, and Nina Buchmann in the journal *Sustainability*. The paper "[The Rich Picture Method: A Simple Tool for Reflective Teaching and Learning about Sustainable Food Systems](#)" looks at the efficacy of the tool to identify the knowledge gained by participants as the result of the WFS Summer School course. The paper concludes this is a very useful method that can be widely applied in sustainability or complex systems education.

## Course on Innovation in Smart Farming

ETH Zurich students had the opportunity for 10 weeks in fall 2019 to develop their own idea within the framework of digitalization of the AgroFood sector. The engagement of the students with agricultural issues and their creativity shined through prototypes that went from apps to help farmers with crop rotation management and reduction of food waste to a weeding robot. The course was an activity of ETH Studio AgroFood, led by Project Manager Eduardo Pérez and Prof. Achim Walter.

Many members were recognized as Highly Cited Researchers 2019 by the Web of Science, including **Nina Buchmann**, **Stephan Pfister**, **Sonia Seneviratne**, **Johan Six**, and **Michael Zimmermann**.

**Michelle Grant** was honored with the Advance Award for Food & Agriculture by the Advance organization of the Australian Government in October.

**Emma Wetter Slack** has received an [European Research Council Consolidator Grant](#), awarded to successful researchers to help them continue to build their own research groups.

Together with a group of colleagues from Côte d'Ivoire, Burkina Faso, and Sri Lanka, **Emmanuel Frossard** has received the 10th CSRS-Eremitage Award for Scientific Research in Partnership in West Africa at the Centre Suisse de Recherches Scientifiques in November.

**Consuelo De Moraes** received the 2019 Recognition Award by the Entomological Society of America in November.

Work of **Thijs Defreaye**, **Christian Schöb**, and **Michael Siegrist** featured in December issue of [Horizons](#), the Swiss Research Magazine.

**Lukas Böcker** from the Sustainable Food Processing group won 2nd place Student of the Year Award at the European Federation of Food Science and Technology International Conference in November.

**Sandra Pool**, working on the [IRRIWAM](#) project, received the best content poster award in the Hydrology/Limnology/Hydrogeology Session at the Swiss Geoscience Meeting.

The Laboratory of Toxicology started a new project led by **Hailey Gahlon** entitled "Genomic Biomarkers of Aging in Human Skin Cells" with partner M-Industry.

**Janine Steinmann** won the SFIAR Master Thesis Award for her thesis "Effect of Natural and Mucuna pruriens fallow on soil properties and crop performance in water yam based systems in Côte d'Ivoire & Burkina Faso," supervised by Emmanuel Frossard.

**Emmanuel Frossard** and **Astrid Oberson** organized the international workshop "Comparing organic and conventional agricultural cropping systems - What can be learned from the DOK and other long-term trials?" in Ascona, Switzerland in October.

## Putting phosphorus first? How to address current and future challenges



The IPW9 workshop was held in Zurich in July, jointly organized by groups at ETH Zurich, EPFL, and Eawag, including the member groups of Emmanuel Frossard and Christian Stamm.

Over 200 participants from natural, engineering, and social sciences discussed concepts for future research and use of the essential nutrient phosphorus. The event focused on agricultural and environmental aspects and recycling of phosphorus. Discussions showed the possibilities of recycling phosphorus from wastewater, liquid manure, and refuse have to be better coordinated with the needs of agriculture.

More: <https://plantnutrition.ethz.ch/ipw9.html>  
[Food System Story blog by Grace Crain about event](#)

**Jan Dirk Wegner** and the **Ecovision Lab** will organize the EarthVision workshop at the next International Conference of Computer Vision in Seattle.

**Christian Schöb** and **Johan Six** are organizing the session [Enhancing biodiversity to support sustainable crop production](#) at the next World Biodiversity Forum in February.

**Thijs Defreaye** is leading a new course this spring at ETH Zurich entitled Simulations and Sensors in Agri-Food Supply Chains.

Research from Agricultural Economics and Policy group of **Robert Finger** featured in ETH News in December: [What's driving erosion worldwide?](#)

Work of Laboratory of Food Microbiology of **Martin Loessner** featured in ETH News last November: [Synthetic phages with programmable specificity](#).

New *Nature* article of **Emma Wetter Slack** featured in ETH News in September: [Resistance can spread even without the use of antibiotics](#).

Research from **Thomas Van Boeckel** featured in ETH News in September: [Antimicrobial resistance is drastically rising](#).

Research from Molecular Plant Breeding group of **Bruno Studer** highlighted in ETH News in September: [Advanced breeding paves the way for disease-resistant beans](#).

**Many members** regularly contribute to the ETH Zukunftsblog. Read the recent features on food waste and partnerships to protect forests at [www.ethz.ch/en/news-and-events/zukunftsblog.html](http://www.ethz.ch/en/news-and-events/zukunftsblog.html).

Below is a selection of recent publications from WFSC members that highlight their work on food system topics.

Brütsch, L.; Stringer, F. J.; Kuster, S.; et al. Chia seed mucilage – a vegan thickener: isolation, tailoring viscoelasticity and rehydration. *Food Func.* **2019**. <https://doi.org/10.1039/c8fo00173a>

Buchmann, L.; Brändle, I.; Haberkorn, I.; et al. Pulsed electric field based cyclic protein extraction of microalgae towards closed-loop biorefinery concepts. *Bioresour. Technol.* **2019**. <https://doi.org/10.1016/j.biortech.2019.121870>

Cabernard, L.; Pfister, S.; Hellweg, S. A new method for analyzing sustainability performance of global supply chains and its application to material resources. *Sci. Tot. Environ.* **2019**. <https://doi.org/10.1016/j.scitotenv.2019.04.434>

Caporgno, M.P.; Haberkorn, I.; Böcker, L.; et al. Cultivation of *Chlorella protothecoides* under different growth modes and its utilisation in oil/water emulsions. *Bioresour. Technol.* **2019**. <https://doi.org/10.1016/j.biortech.2019.121476>

Ferré, M.; Müller, A.; Leifeld, J.; et al. Sustainable management of cultivated peatlands in Switzerland: insights, challenges, and opportunities. *Land Use Pol.* **2019**. <https://doi.org/10.1016/j.landusepol.2019.05.038>

Finger, R.; Swinton, S.M.; El Benni, N.; et al. Precision farming at the nexus of agricultural production and the environment. *Ann. Rev. Resour. Econ.* **2019**. <https://doi.org/10.1146/annurev-resource-100518-093929>

Frehner, A.; Müller, A.; Schader, C.; et al. Methodological choices drive differences in recommendations for environmentally-friendly diets. *Glob. Food Secur.* **2020**. <https://doi.org/10.1016/j.gfs.2019.100333>

Hgaza K.V.; Oberson A.; Kiba, I.D.; et al. The nitrogen nutrition of yam (*Dioscorea spp.*). *J. Plant Nutr.* **2019**. <https://doi.org/10.1080/01904167.2019.1659315>

Jacobi J.; Llanque, A.; Bieri, S.; et al. Utilization of research knowledge in sustainable development pathways: Insights from a transdisciplinary research-for-development programme. *Environ. Sci. Pol.* **2020**. <http://doi.org/10.1016/j.envsci.2019.10.003>

Le Clec'h, S.; Finger, R.; Buchmann, N.; et al. Assessment of spatial variability of multiple ecosystem services in grasslands of different intensities. *J. Environ. Manag.* **2019**. <https://doi.org/10.1016/j.jenvman.2019.109372>

Liu, W.F.; Yang, H.; Folberth, C.; et al. Achieving high crop yields with low nitrogen emissions in global agricultural input intensification. *Environ. Sci. Technol.* **2019**. <https://doi.org/10.1021/acs.est.8b03610>

Meuwissen, M.P.M.; Feindt, P.H.; Spiegel, A.L.; et al. A framework to assess the resilience of farming systems. *Agric. Syst.* **2019**. <https://doi.org/10.1016/j.agsy.2019.102656>

Quezada, J.C.; Etter, A.; Ghazoul, J.; et al. Carbon neutral expansion of oil palm plantations in the Neotropics. *Sci. Advan.* **2019**. <https://doi.org/10.1126/sciadv.aaw4418>

Signorell, C.; Zimmermann, M.B.; Cakmak, I.; et al. Zinc absorption from agronomically biofortified wheat is similar to post-harvest fortified wheat and is a substantial source of bioavailable zinc in humans. *J. Nutr.* **2019**. <https://doi.org/10.1093/jn/nxy328>

van der Bom, F.J.T.; McLaren, T.I.; Doolette, A.L.; et al. Influence of long-term phosphorus fertilisation history on the availability and chemical nature of soil phosphorus. *Geoderma*. **2019**. <https://doi.org/10.1016/j.geoderma.2019.113909>

Verburg, R.; Rahn, E.; Ghazoul, J.; et al. An innovation perspective to climate change adaptation in coffee systems. *Environ. Soc. Pol.* **2019**. <https://doi.org/10.1016/j.envsci.2019.03.017>

Walker, C.; Gibney, E.R.; Mathers, J.C.; et al. Comparing environmental and personal health impacts of individual food choices. *Sci. Tot. Environ.* **2019**. <https://doi.org/10.1016/j.scitotenv.2019.05.404>

Wu, W.; Beretta, C.; Cronje, P.; et al. Environmental trade-offs in fresh-fruit cold chains by combining virtual cold chains with life cycle assessment. *App. Energy*. **2019**. <https://doi.org/10.1016/j.apenergy.2019.113586>

Zhuo, L.; Lou, Y.; Yang, H.; et al. Water for maize for pigs for pork: an analysis of inter-provincial trade in China. *Water Res.* **2019**. <https://doi.org/10.1016/j.watres.2019.115074>

**UPCOMING EVENTS:** <https://bit.ly/wfscevents>

**Inaugural Lectures of WFSC Members at ETH Zurich** (Spring 2020):  
24 February. Prof. Rachael Garrett, Ending deforestation and fires in the Brazilian Amazon  
26 February. Prof. Thomas Van Boeckel, Playing Chicken with Antibiotics  
06 April. Prof. Sebastian Dötterl, Soil resource dynamics in a changing world

**FOOD ZÜRICH** (07-17 May 2020): WFSC will host several events at the food festival in Zurich focused on the Culinary Future.

**WFS Summer School 2020** (August 2020) Our next course will take place in Rheinau, Switzerland. [Applications to open in February.](#)

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