ENB IDP M³OCCA

Research Seminar Program Winter 2024/25

When: Tuesday 14-16 (or as announced)
Where: via ZOOM or Besprechungszimmer 03.145, Wetterkreuz 15, 91058 Erlangen
https://fau.zoom.us/j/64136087779?pwd=ckNJR3dtTVRmWHArOFR5QVcvU3lnZz09

Date	Topic	Lecturer
19.11.2024 15:00 Besprechungs-zimmer 03.145 Wetterkreuz 15	**Icy Oscillators: Understanding glacier surges** Glacier surges are important but often misunderstood glacier accelerations, which have been observed in many parts of the Arctic, High Mountain Asia, and a few other areas of the world. In this talk, Professor Benn will discuss the geographical distribution of surge-type glaciers and its relationships with climate and glacier geometry. He will go on to show how these patterns can be understood using enthalpy balance theory, a new unifying framework for modelling glacier dynamics. The talk will conclude with a discussion of unsolved problems and possible new directions for research.	Doug Benn University of St. Andrews
26.11.2024 14:00 Zoom	**Multi-century Legacy of Glacier Loss with Delayed Mitigation: Putting an Ice Cost to Our Greenhouse Gas Emissions** Glaciers exhibit a delayed response to climate change. Consequently, glacier mass loss is expected to persist long after greenhouse gas (GHG) emissions cease as they gradually adjust to a new equilibrium. In this presentation, I will present glacier projections produced using a glacier model driven by an intermediate complexity climate model. This climate model, in turn, were driven by a wide array of synthetic greenhouse gas emission scenarios, organized based on the year when annual anthropogenic emissions peak before declining to net-zero. This novel model chain allows us to directly link GHG emissions with global and regional glacier responses, effectively calculating the 'ice cost' (not economic cost) of our emissions.	Fabien Maussion University of Bristol
03.12.2024 14:00 Zoom	**Imagining the Greenland ice sheet from top to bottom with ice-penetrating radar** Ice-penetrating radar is an invaluable tool for investigating the subsurface properties of ice sheets and glaciers. In this talk, we will present examples of how radar has been used on the Greenland ice sheet. We will show how radar may give insights into the heterogeneity of the firn, how layers in radar data can reveal past snow accumulation and snow patterns, and how radar surveys have given us unprecedented (if occasionally misleading) information on the properties of the ice sheet's bed.	Nanna Karlsson & Anja Rutishauser Geological Survey of Denmark and Greenland

	We will also dive into the first radar surveys conducted in the 1970s.	
10.12.2024 14:00 Besprechungs-zimmer 03.145 Wetterkreuz 15	**An introduction to neural operators and their applications in glaciology** In recent years, machine learning and AI in general, have garnered traction within the scientific community, solving problems that once were thought infeasible or too difficult. Among one of the most recent developments consists of a new paradigm shift within scientific machine learning (SciML) called Neural Operators (NO). Despite it sounding quite similar to Neural Networks, this new framework opens up new research avenues as it allows researchers to use generalize machine learning models in a more mathematically robust way. This talk serves as an introduction to these so-called NOs, explains the motivation and departure from other current models, such as Physics-Informed Neural Networks (PINNs) and highlights the prospective research avenues one can pursue. Since this field is quite recent, the applications provided serve to show the opportunity to use these models within the field of glaciology. It aims to cover broad applications such as iceflow modeling, forecasting weather events, and modelling hydraulic behavior. In the end, both theory and applications of NOs are presented and attempt to expose researchers to this new, and very exciting, addition to the domain of SciML.	Brandon Finley University of Lausanne
28.01.2025 14:00 Zoom	**Exploiting and Calibrating Radar Propagation Effects in Ice Sheets, Glaciers, and Snow Covers: Applications for Future SAR Missions** Synthetic aperture radar (SAR) imaging plays a vital role in monitoring snow cover and understanding the extent and dynamics of glaciers and ice sheets. Beyond traditional SAR imagery, advanced techniques such as SAR interferometry (InSAR) and tomography (TomoSAR) offer unparalleled capabilities for observing Earth's cryosphere. Upcoming Earth Observation (EO) SAR missions aim to leverage these technologies by incorporating innovative features, including: i) operation at lower frequencies (e.g., P- and L-bands) enabling significant signal penetration into snow and ice covers, ii) provision of very-high spatial resolution, and iii) deployment as satellite constellations to facilitate multi-aspect observations. The capability of radar to penetrate snow and ice layers enables imaging of structures and processes within or beneath these covers. However, this penetration introduces challenges caused by the impact of snow and ice dielectric properties on SAR signal	Andreas Benedikter DLR, FAU

	propagation. These effects result in signal delays and alter the direction of the radar echoes, leading to potential shifts and defocusing of SAR image features, and additional biases, distortions, and decorrelation in interferometric and tomographic SAR products. In this seminar, multiple approaches for exploiting and calibrating SAR signal propagation effects are discussed, with the goal of enhancing SAR, InSAR, and TomoSAR observations of snow cover, glaciers, and ice sheets. These methods are particularly suited to upcoming SAR missions, such as ESA's 10th Earth Explorer, Harmony, which operates as a satellite constellation to deliver multi-aspect observations. A brief overview of the Harmony mission is provided, and it serves as a case study to evaluate the performance of the proposed concepts.	