



Multi-scale **t**ransport and **e**xchange processes in the **a**tmosphere over **m**ountains – programme and **e**xperiment

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on behalf of the TEAMx Coordination and Implementation Group

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What is TEAMx?

Multi-scale **Transport and **E**xchange Processes in the **A**tmosphere over **M**ountains Programme and **e**xperiment**

- ▲ TEAMx is a bottom-up financed research program on weather, climate, and air pollution in mountain areas.
- ▲ TEAMx follows in the footsteps of previous international mountain meteorology programs (ALPEX, PYREX, MAP).
- ▲ A Programme Coordination Office (PCO) at UIBK is financed through institutional crowd funding.

TEAMx news

Project Coordination Office

- ▲ During the reporting period (2023): Stephanie Westerhuis
- ▲ Since Feb 2024: Manuela Lehner
- ▲ Administrative support since Feb 2024: Doris Fischer (UIBK)



New CIG (Coordination and Implementation Group) members:

- ▲ Elisa Palazzi is replaced with Nikolina Ban (UIBK) and Sven Kotlarski (MCH) representing the mountain-climate community
- ▲ Günther Zängl (DWD)

Objectives, Goals & Accomplishments

Goals for 2023

- ▲ Organize a TEAMx Workshop in connection with the ICAM (International Conference on Alpine Meteorology) in June 2023.
- ▲ Update the plan for the TEAMx Observational Campaign (TOC) taking place autumn 2024 – autumn 2025 and produce a full first version of the TEAMx Numerical Modelling Plan (NMP).
- ▲ Develop a data management strategy for both observational and modelling data.

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3rd TEAMx Workshop (2023)

- ▲ Zürich, Switzerland
- ▲ 15-16 June 2023
- ▲ 60+ onsite and 30 online participants



- ▲ Collecting feedback from the TEAMx community on
 - ▲ the Numerical Modelling Plan
 - ▲ a first draft of the Implementation Plan
- ▲ Task Team and Working Group Meetings

TEAMx Online Community Event (Jan 2024)

▲ 19 January 2024

▲ > 100 participants

Updating the community on

▲ the Implementation of the TEAMx Observational Campaign

▲ the Data Management Strategy

▲ the Numerical Modeling Plan

▲ planned projects

▲ ongoing activities in the Working Groups



Objectives, Goals & Accomplishments

Goals for 2023

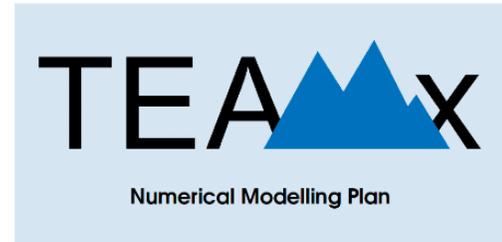
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TEAMx Numerical Modeling Plan

- ▲ The 1st version of the Numerical Modeling Plan (NMP) was presented at the 3rd TEAMx Workshop in June 2023.
- ▲ The NMP was revised by the Numerical Modeling Committee based on the feedback received from the community.
- ▲ The final version was published in May 2024.

The NMP contains

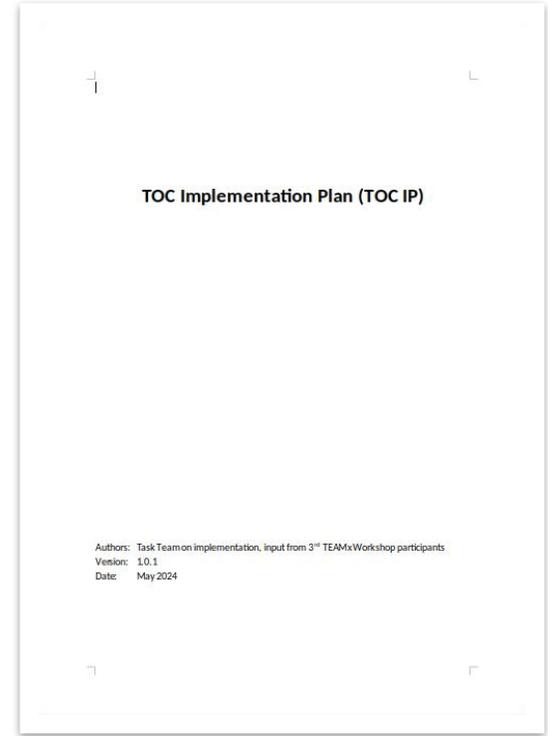
- ▲ a literature review identifying known model challenges over complex terrain
- ▲ a summary of ongoing and planned TEAMx model intercomparison studies
- ▲ a summary of the planned NWP runs during the TEAMx Observational Campaign
- ▲ guidelines and best practices



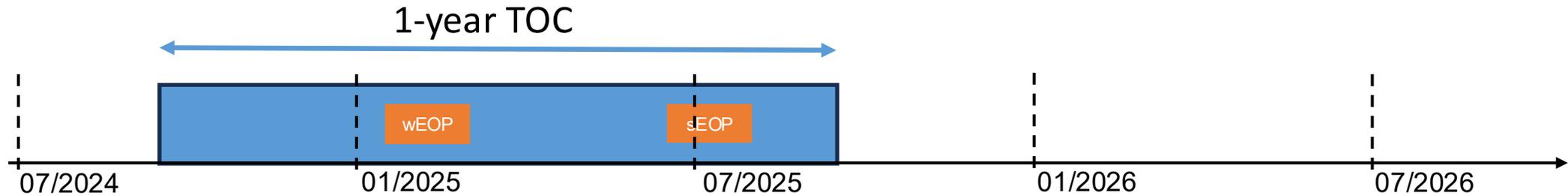
https://www.teamx-programme.org/files/TEAMx_NumericalModellingPlan_final_22may2024.pdf

TEAMx Experimental Plan

- ▲ A new Task Team was formed in 2023 to develop an Implementation Plan for the TEAMx Observational Campaign (TOC), including
 - ▲ the distribution of the available observational resources to best meet the TEAMx research goals
 - ▲ the decision process for the planning of Intensive Observational Periods (IOPs) during daily planning meetings
 - ▲ daily weather forecasts during the TOC
 - ▲ a strategy for making optimal use of the NWP products produced specifically for the TOC by multiple operational weather centers
- ▲ Feedback on a 1st outline of the Implementation Plan was collected during the 3rd TEAMx Workshop.
- ▲ A 1st version of the Implementation Plan is currently written by the Task Team.



TEAMx Observational Campaign (TOC)



TOC: 1 year between Sep 2024 and Sep 2025

- ▲ operational and semi-operational sites

- ▲ additional instrumentation deployed (e.g., wind lidars, T/RH profiler, EC station)

Winter Extended Operations Period (wEOP) – 6 weeks in January/February and

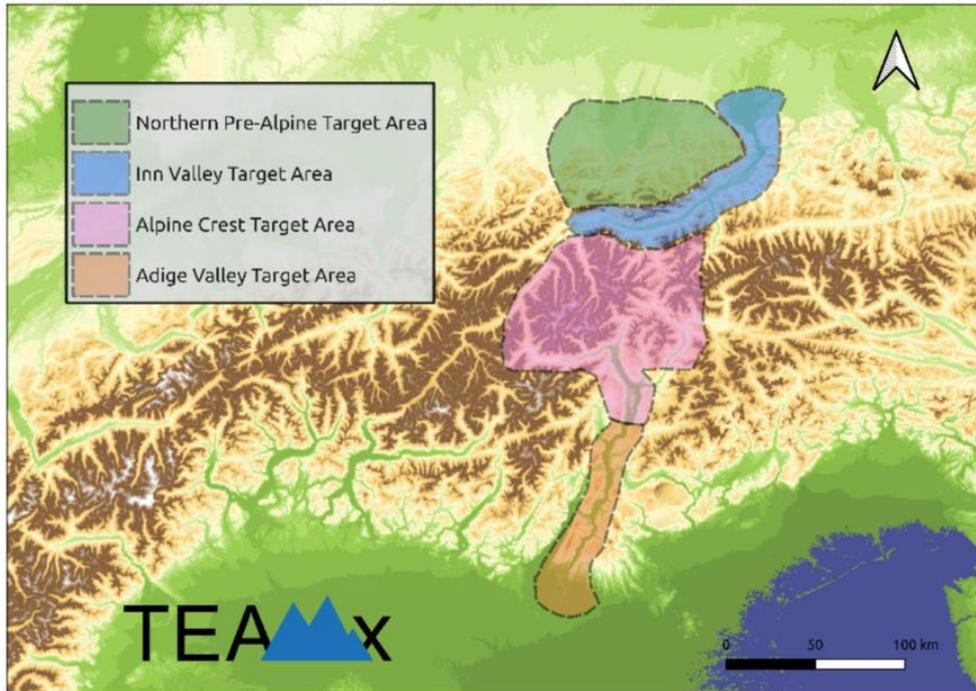
Summer Extended Operations Period (sEOP) – 6 weeks in June/July

- ▲ IOPs (aircraft, UAS, radiosoundings, ...)

- ▲ additional instrumentation deployed to meet the goals of individual TEAMx projects

TEAMx Observational Campaign (TOC)

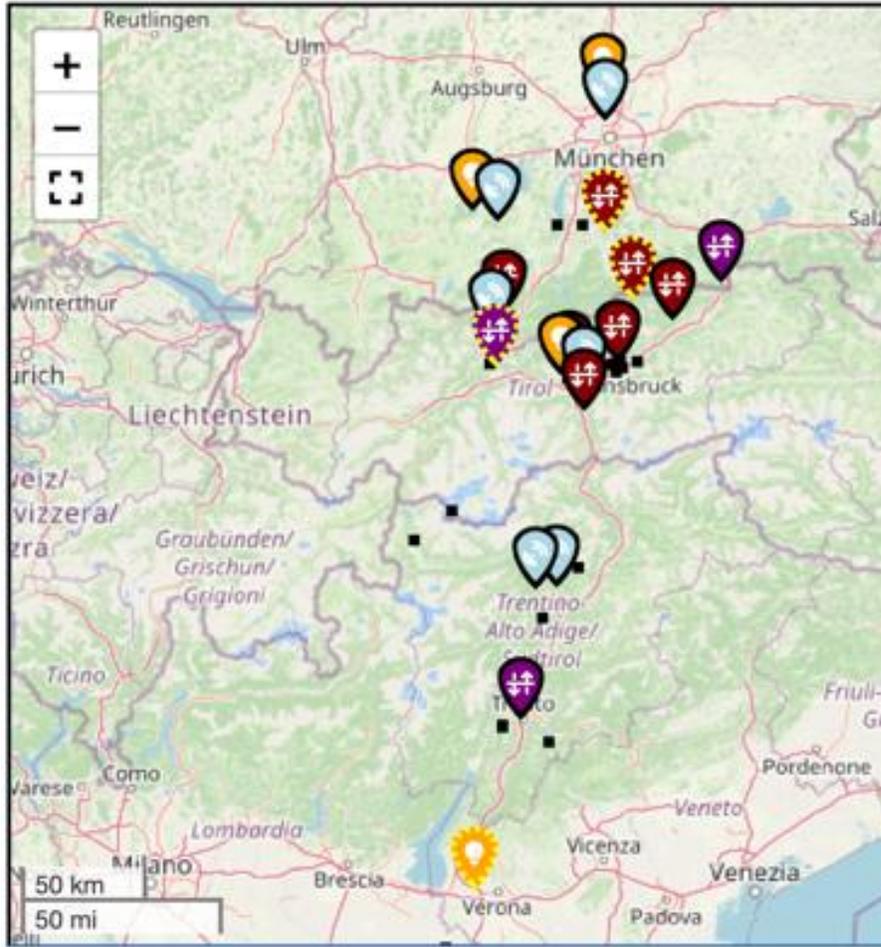
Four target areas in a north-south transect through the Alps



Backbone infrastructure defined in 2023
consisting of existing and already
certain/funded

- ▲ Doppler wind lidar sites
- ▲ T/RH profiler sites
- ▲ radiosonde sites
- ▲ eddy-covariance stations

TEAMx Observational Campaign (TOC)



Backbone infrastructure
Winter EOP



Wind lidar and/or T/RH profiler



Radiosonde

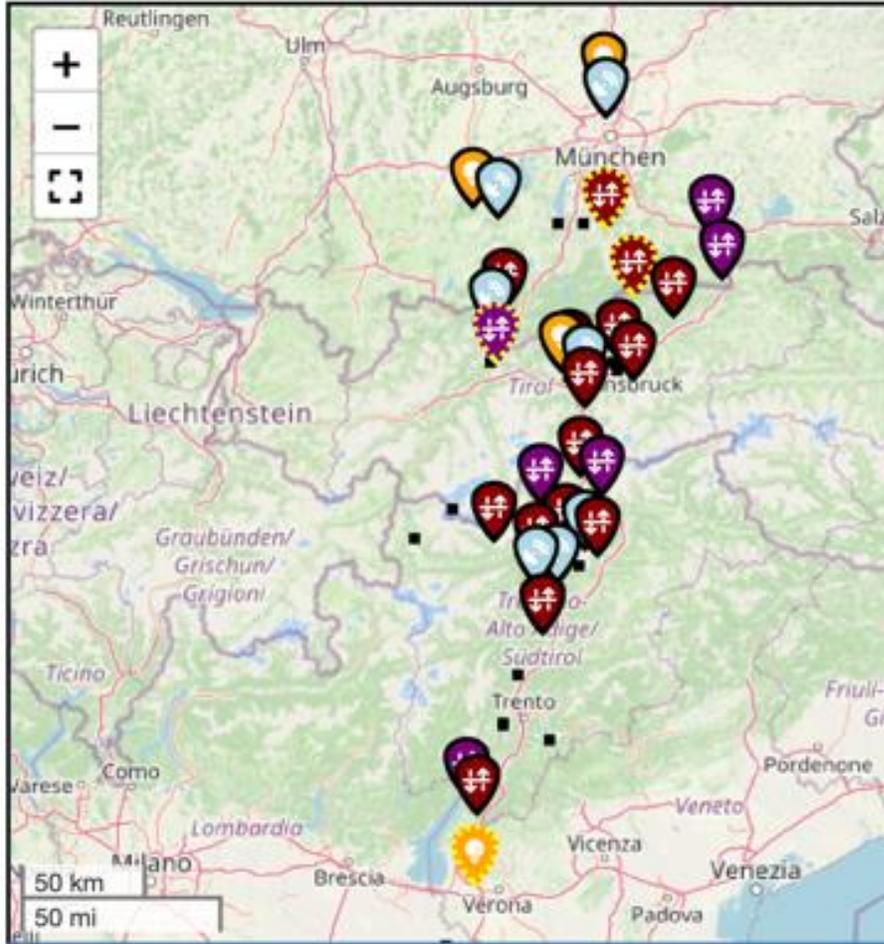


Surface flux site



Gap identified in the backbone infrastructure. Ongoing attempts to attract further research groups to fill these gaps.

TEAMx Observational Campaign (TOC)



Backbone infrastructure
Summer EOP



Wind lidar and/or T/RH profiler



Radiosonde



Surface flux site

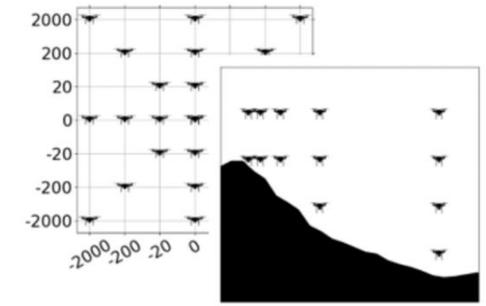


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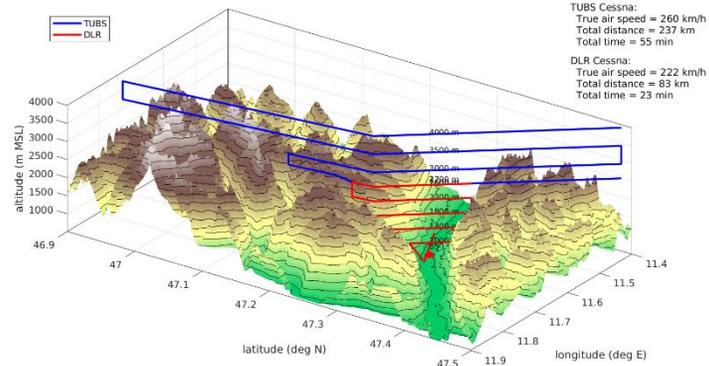
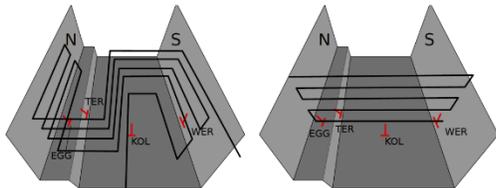
TEAMx Observational Campaign (TOC)

IOP activities

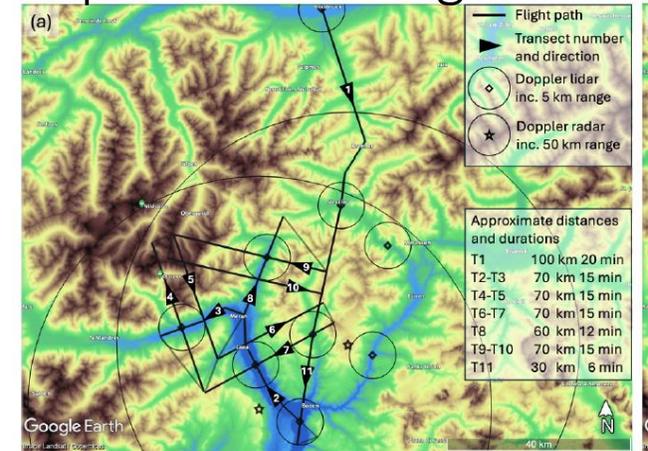
- ▲ Aircraft flights
- ▲ Uncrewed aerial systems (UAS)
- ▲ Radiosoundings
- ▲ Other personnel-intensive measurements



Inn Valley Target Area



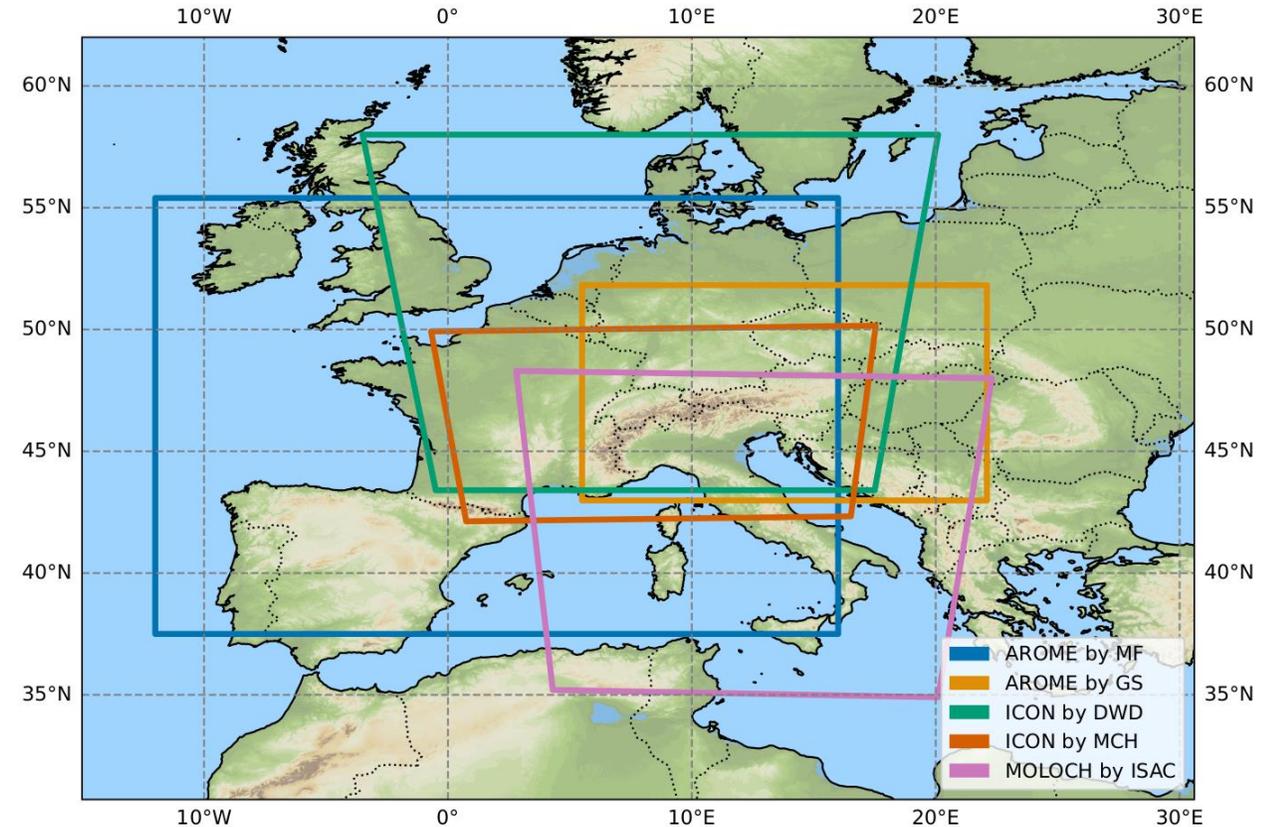
Alpine Crest Target Area



TEAMx Observational Campaign (TOC)

High-resolution (0.5 – 2.5 km) NWP forecast runs will be provided during the TOC to guide IOP planning.

- ▲ CNR ISAC (MOLOCH)
- ▲ DWD (ICON)
- ▲ GeoSphere Austria (AROME)
- ▲ Météo-France (AROME)
- ▲ MeteoSwiss (ICON)
- ▲ UK Met Office (UM)



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TEAMx Data Management Plan

- ▲ The Task Team Data Management was re-established in 2023.
- ▲ A first draft of the Data Management Plan (DMP) was produced by the end of 2023 and presented to the community at the Online Community Event in Jan 2024.
- ▲ The final version of the DMP is currently being reviewed and approved by the CIG.
- ▲ The DMP summarizes all provisions regarding
 - ▲ the near real-time data exchange during the TOC
 - ▲ the long-term storage and access of TEAMx data
- ▲ Long-term storage will be provided by the Earth Data Portal hosted and maintained by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research.

V2.02 - June 2024

TEAMx Data Management Plan

Authors

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TEAMx (Multi-scale transport and exchange processes in the atmosphere over mountains - Programme and experiment) is an international research programme focused on improving our understanding of transport and exchange processes in the atmosphere over mountains. The goals of TEAMx are summarized in a *Memorandum of Understanding*, while the scientific objectives are described in the *TEAMx White Paper* and an *Experimental Plan*, consisting of a *Field Observations Plan* and a *Numerical Modeling Plan*. The practical implementation of the *TEAMx Observational Campaign (TOC)* is described in the *TEAMx Implementation Plan*. This *Data Management Plan* summarizes all

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Further science highlights and accomplishments

Further highlights and accomplishments

Pre-Campaign 2022 (PC22) paper published

- ▲ Preliminary campaign in the Inn Valley in 2022 to test new instrumentation and measurement locations.
- ▲ Datasets have been published on zenodo.
- ▲ A joint publication was written in 2023, which has been accepted for publication in Meteorologische Zeitschrift in 2024.

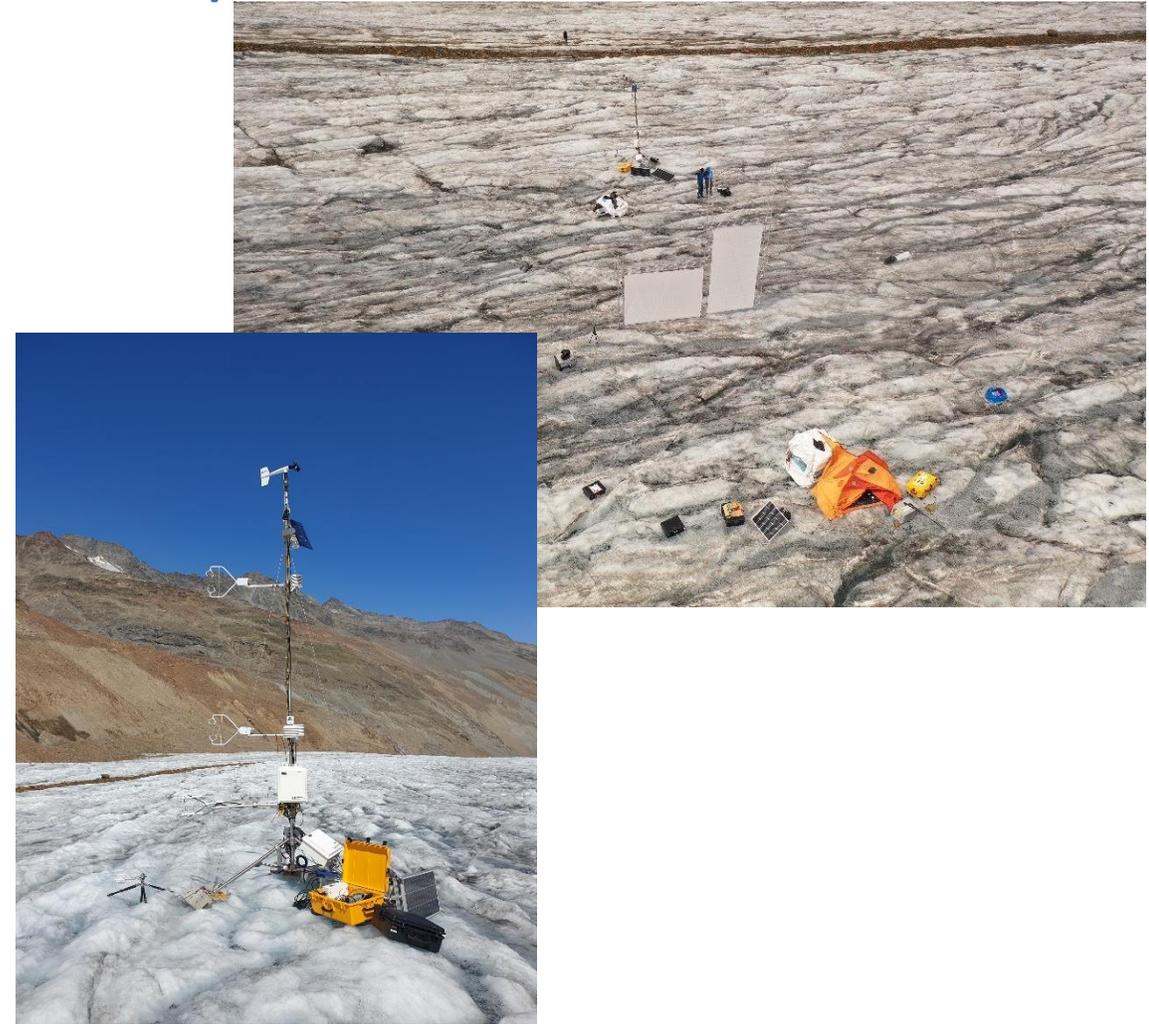
Preprint: Pfister et al. (2024): The TEAMx-PC22 Alpine field campaign – Objectives, instrumentation, and observed phenomena. <https://doi.org/10.48550/arXiv.2401.06500>



Further highlights and accomplishments

HEFEX-II field experiment 2023

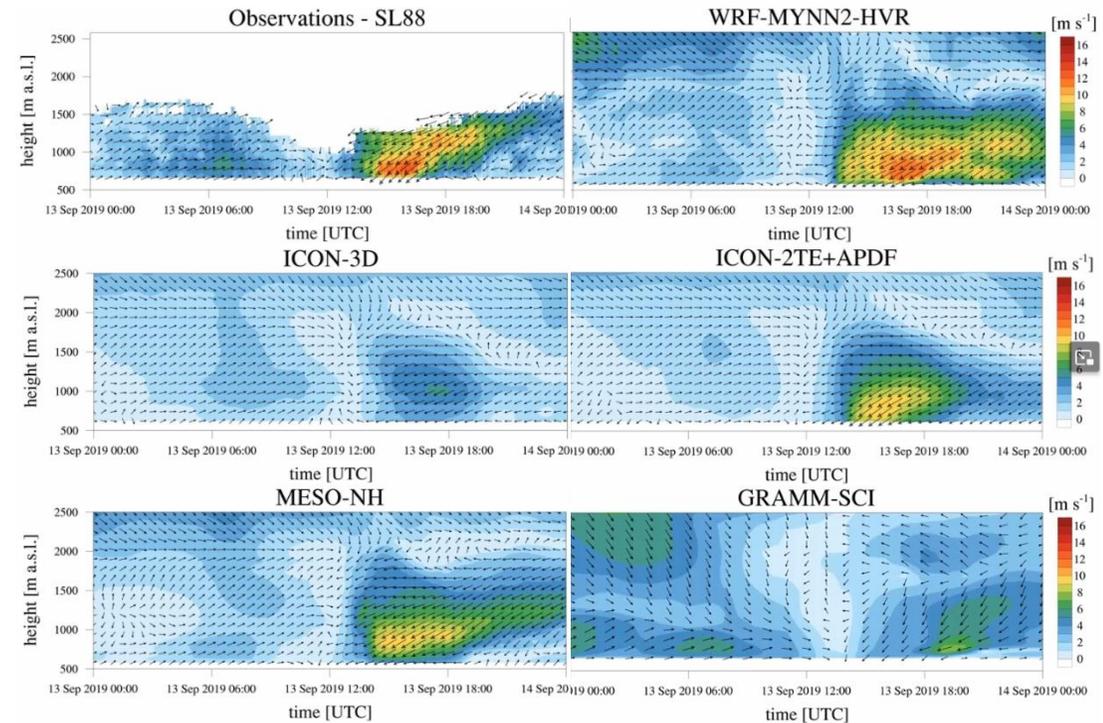
- ▲ Field campaign at the Hintereisferner glacier.
- ▲ Joint activity of a subgroup of the TEAMx WG on Surface-Atmosphere Exchange.
- ▲ Focus on the boundary layer and its characteristics over a glacier surface.



Further highlights and accomplishments

Ongoing model intercomparison studies

- ▲ Model intercomparison studies initiated within different TEAMx Working Groups.
- ▲ Work progresses on studies focusing on cold-air pools, thermally-driven flows and transport, and orographic convection.
- ▲ First results have been presented at ICAM 2023 and submitted to the EMS Annual Meeting 2024.



Giovannini et al. (2023), ICAM presentation

Further highlights and accomplishments

Newly funded and submitted projects

- ▲ 3 nationally and internationally funded TEAMx projects were completed successfully in 2023.
- ▲ 8 new TEAMx projects have started since the beginning of 2023, funded by national funding agencies, including 1 international collaborative project.
- ▲ >5 currently submitted TEAMx proposals are awaiting funding decisions, including 2 international collaborative proposals.

TEAMx Project report 2023

.... further details in the project report.



TEAMx - Discussion

- ▲ intensified interaction with INARCH
 - > potential connection points?
 - > joint activities?
- ▲ Other mountain-related research activities?