TEAMx

Multi-scale **t**ransport and **e**xchange processes in the **a**tmosphere over **m**ountains – Programme and e**x**periment

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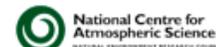www.teamx-programme.org

TEAMx Working Group report 2021

➢ TEAMx in a nutshell

➢ Working Group **Objectives**, **Goals** & **Accomplishments** during Reporting Period

➢ Working Group **Activities** during Reporting Period

➢ **Science Issues** and Collaboration during Reporting Period

TEAMx in a nutshell

Multi-scale Transport and

Exchange Processes in the

Atmosphere over

Mountains

Programme and experiment

➢ ...a bottom-up financed research program on weather, climate & air pollution in mountain areas

➢ Programme Coordination Office (*PCO* - @ UIBK): TEAMx Coordinator Helen Ward

➢ supported by

TEAMx Science Plan

| Objective	Primary Focus	Target
Process understanding	Micro- and meso-scale processes within and above the *mountain boundary layer* (MoBL); Interaction between scales.	Quantitative understanding of momentum, energy and mass exchange over mountainous terrain
TEAMx Joint Experiment(s)	Collaborative use of multi-platform instrumentation to sample the spatial heterogeneity of turbulence and mesoscale circulations over and near mountains	Quality-controlled observational data pool, available for process investigation, high-resolution model verification, parameterization development
Improving Weather and Climate Models	*Models right for the right reason*, i.e., identification and reduction of model biases and uncertainties over complex terrain	Weather forecasts and climate simulations over mountains as good as over flat terrain, and less reliant on model output post-processing
Support to Weather and Climate Service Providers	Air pollution, hydrology, climate change scenarios (e.g., elevation-dependent climate change).	Smaller uncertainty of impact models, due to reduced errors in weather and climate information.

Serafin et al. 2020

Objectives, Goals & Accomplishments during Reporting Period

Goals for 2021:

1) Definition of the TEAMx experimental plan
   (joint field experiment in 2023/24): TOC

   2024-2025

➤ prepared by the Field Observations Committee (v0):
   → defining overall experimental design
   → existing infrastructure
   → defining additional needs

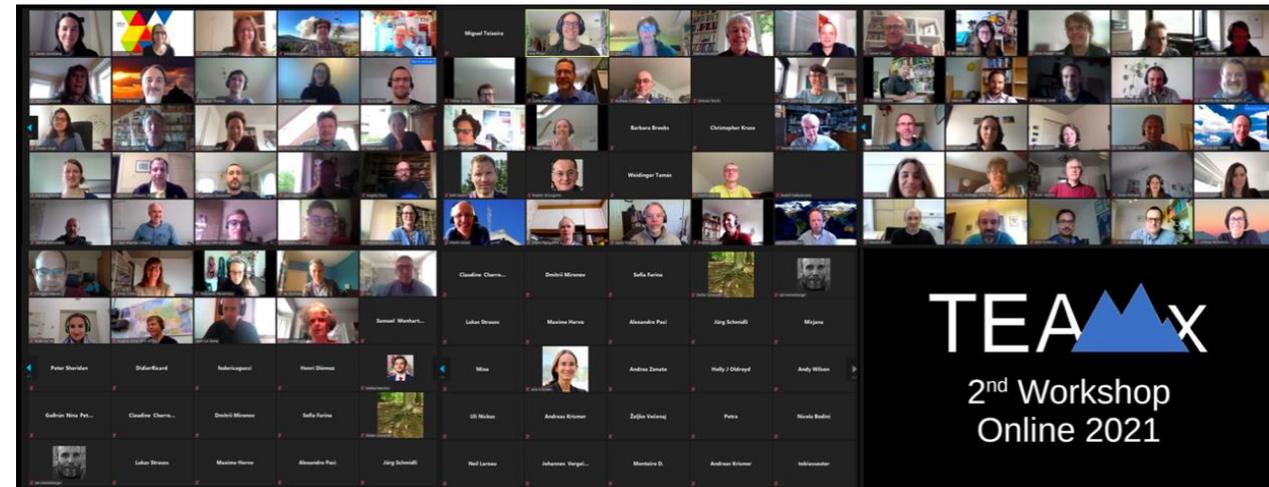➤ In review (CIG) → WGs → workshop (4/2021)
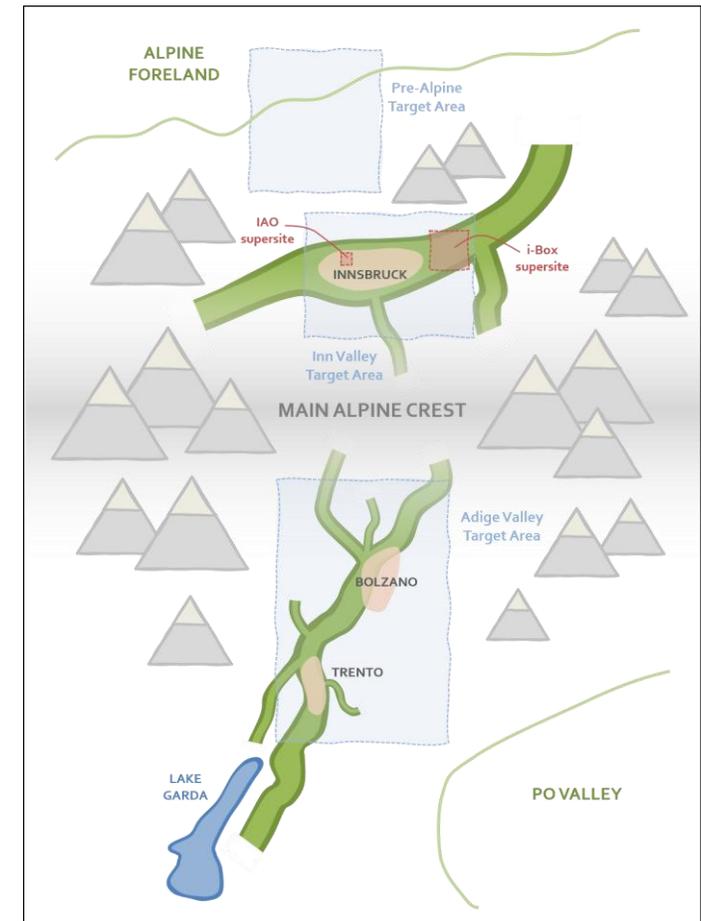
Draft figure – needs graphical update

Objectives, Goals & Accomplishments during Reporting Period

Goals for 2021:

1) Definition of the TEAMx experimental plan
    (joint field experiment in 2023/24): TOC
    2024-2025

  → step 1: draft (v0) by Field Obs
       Committee
  → step 2: online workshop
       (May 10-12, 2021)
  → over 180 registered participants

2nd TEAMx workshop

- ➤ >180 (online!) participants
- ➤ Online resources:

The document, … (draft, v0)

Marketplace (observational resources)

TEAMx marketplace for observational resources

This 'marketplace' has been established to communicate the observational resources from various groups that are available (or potentially available) during the TEAMx Observational Campaign.

Scuola di Ingegneria – Università della Basilicata Lidar(s)

Prof. Paolo Di Girolamo, Scuola di Ingegneria – Università della Basilicata (SI-UNIBAS)
[paolo.digirolamo@unibas.it]

Instrumentation/facilities

- BASIL (multi-wavelength Raman lidar for water vapour, temperature and aerosol profiling)
- (Optional) CONCERNING (multi-wavelength Raman lidar for water vapour, temperature and aerosol profiling)
- (Optional) wind lidar (Leosphere)

Research Interests

- Convective initiation, orographic forcing

Current status

- No specified plans yet. SI-UNIBAS instrument which will be deployed during TEAMx.

Further information

2nd TEAMx workshop

➤ >150 (online!) participants
➤ Online resources

The document,... (draft, v0)

Research plans & ideas

2nd TEAMx workshop - outcome

➤ closer to Version 1.0 of the experimental plan – backed by the TEAMx community

➤ key outcomes
→ spring '24 – spring '25 confirmed
→ summer / winter EOPs
→ 3 Target Areas

➤ additional needs identified

additional sites, instruments, data sources, …. required.
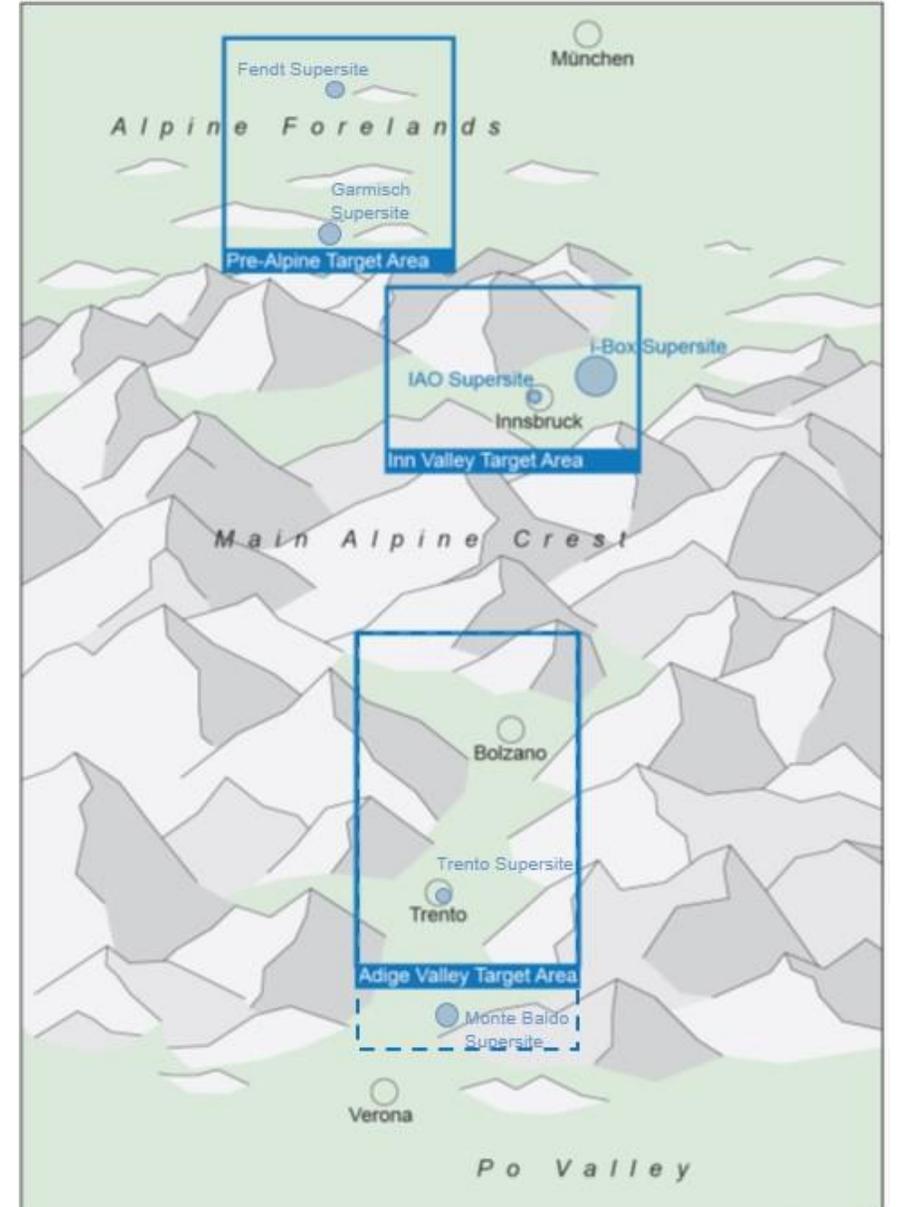
Objectives, Goals & Accomplishments during Reporting Period

Goals for 2021:

1) Refine the TEAMx experimental plan
   → TEAMx Observational Campaign (TOC)
   → add component on numerical experimentation

2) Establish a network of mountain weather and climate
   research projects to promote collaboration and data sharing
   → following the INARCH example for hydrological projects
   → 'cross-cutting' …

Objectives, Goals & Accomplishments during Reporting Period

Goals for 2021:

2) Establish a network of mountain weather and climate research
  projects to promote collaboration and data sharing
    → following the INARCH example for hydrological projects
    → 'cross-cutting' …

    → Workshop as the 1st step (mostly Europe)
    → will extend to other areas in the world (2022)
    → need to define format and 'structure' (only loose information gathered so far)

Objectives, Goals & Accomplishments during Reporting Period

Other Science Highlights :

➢ A BAMS Essay paper has been submitted (October 2021) providing an overview of the motivation behind TEAMx and the aims of the programme.

➢ An article for the GEWEX newsletter has been submitted and will appear in the November issue.

➢ Plans are being developed for **preliminary campaigns** in the Inn Valley in summer 2022 to allow for testing of instrumentation and exploration of flow phenomena in preparation for the main campaign in 2024-5.

CROSSINN-2019

Adler et al 2020, BAMS

Working Group Activities during Reporting Period

➢ Numerical Modelling Committee
  → numerical experimentation: numerical modeling plan

➢ new team of people involved in aircraft measurements as part of the TOC established

➢ Plus…… the usual 'committee activity'

Science Issues and Collaboration during Reporting Period

Data Sets

- New instrumentation is being tested and installed to extend the i-Box supersite for the TOC in the Inn Valley Target Area.
- Site visits have begun to help decide where to deploy instrumentation during the TOC.
- Publication of datasets for the Inn Valley as part of the TEAMx-endorsed CROSSINN project, e.g. Gohm et al. 2021 (https://doi.org/10.5281/zenodo.4585576)
  → Adler et al (2020), Babic et al (2021)
- Infrastructure grants of Inn Valley Target Area
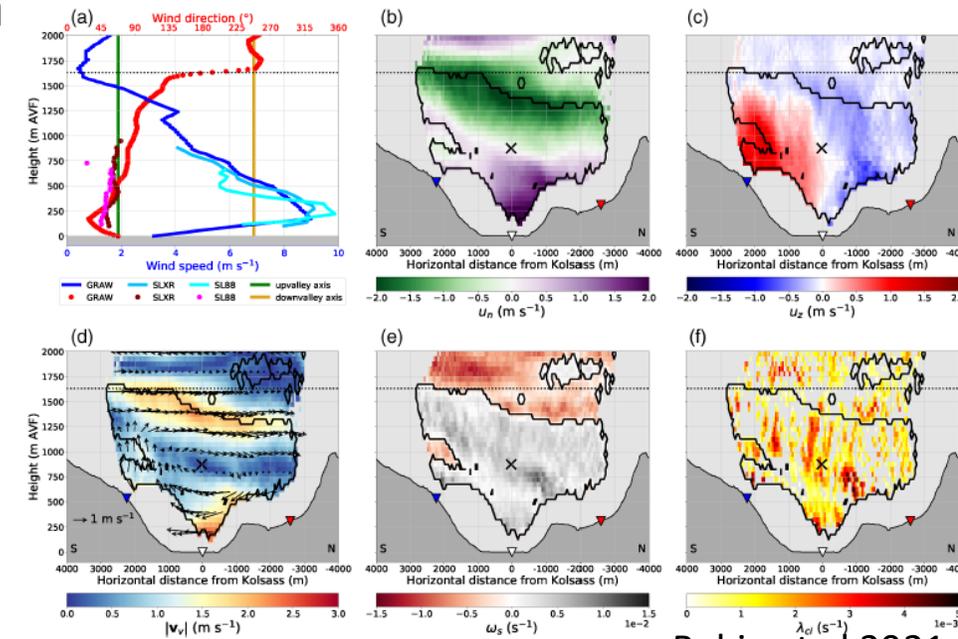
Babic et al 2021

Science Issues and Collaboration during Reporting Period

Analysis

- ➢ Publications, e.g. CROSSINN

- ➢ A TEAMx project, TExSMBL, (PI Manuela Lehner, UIBK)

- ➢ A TEAMx project, Unicorn (ERC consolidator Grant to PI Ivana Stiperski, UIBK), began in July 2021

- ➢ A TEAMx project, INTERFACE, funded by EUREGIO, starts in mid-2022.

  → energy balance under-closure across the TEAMx study region

  → additional flux stations for AVTA

  → PI Lorenzo Giovannini, U Trento; (partners Rotach, UIBK; Tondini, EURAC).

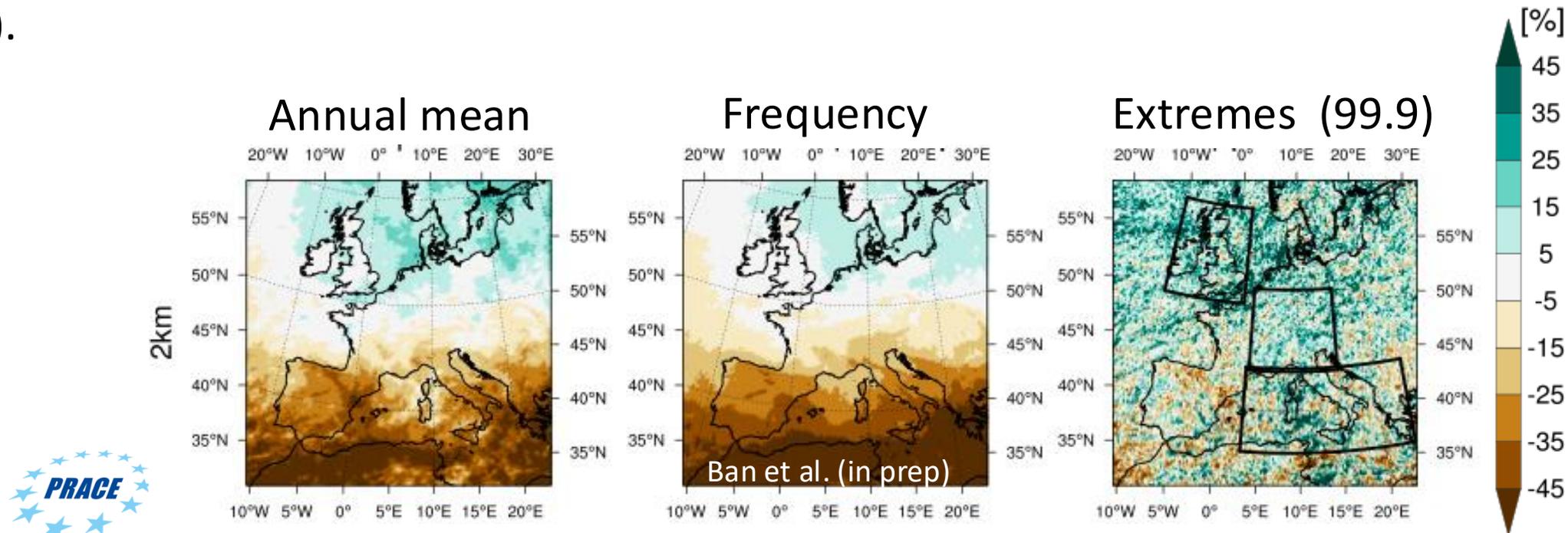# Science Issues and Collaboration during Reporting Period

Modeling: four TEAMx endorsed modeling projetcs

- ➤ ASTER (PI Manuela Lehner, University of Innsbruck)

- ➤ LAETITIA (PI Stefan Schneider, ZAMG)

- ➤ 'The Atmospheric Boundary Layer in NWP' (PI Jürg Schmidli, Goethe University Frankfurt)

Science Issues and Collaboration during Reporting Period

Modeling: four TEAMx endorsed modeling projetcs

➤ 'kmMountains' - Mountain Climate at the Kilometre-Scale Resolution (PRACE - Partnership For Advanced Computing In Europe, PI Nikolina Ban, UIBK).

Ban et al. (in prep)

Science Issues and Collaboration during Reporting Period

Capacity Building

➢ Endorsed project of WWRP as of early 2021

➢ The Project Coordination Office has provided several letters of endorsement for TEAMx projects.

➢ Members of the Field Observations Committee have submitted applications to use large observational facilities in the TEAMx Observational Campaign.
→ TEAMx-US, TEAMx-UK

➢ TEAMx has a student group led by two PhD students from the University of Innsbruck. They plan to gather TEAMx students together for an event at the next suitable opportunity alongside an in-person conference.

TEAMx Working Group report 2021

<u>....and all the rest is in the document....</u>