



Multi-scale transport and exchange processes in the atmosphere over mountains – Programme and experiment

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on behalf of the TEAMx *Coordination and Implementation Group*

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WWRP SSC meeting 2021, Sept 30

- Activity in the past year
- Relating it to the 'Connections between TEAMx and the WWRP Implementation Plan'

Key words: ,WWRP – TEAMx'

R1:improve the accuracy and reliability of weather forecasts and climate simulations [over mountains]

R2: international and interdisciplinary

R3: seamless Prediction

R4: early career scientists

R5: High-Impact Weather

R6: Water

R7: Urbanisation

R8: evolving technology

R6

Activity - Achievements

→ TEAMx becomes Crosscutting Project within the GEWEX Hydroclimatology Panel (GHP)



R2 R6

R2

→ many new signatories of the TEAMx MoU



TEAMx projects (selection)

R1

→ CROSSINN campaign (PI Bianca Adler, KIT [CIRES]): analysis

R1

→ ASTER: Sfc Atm exchange in numerical models: EUREGIO project between UIBK [PI Manuela Lehner], U Trento, U Bolzano

R1

R3

→ kmMountains, PRACE (PI Nikolina Ban, UIBK)

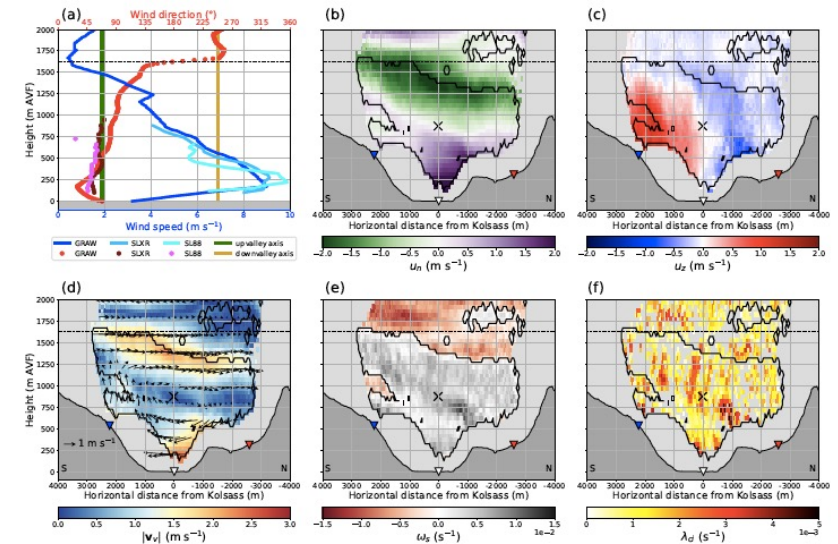
R1

→ Unicorn (ERC Consolidator Grant, PI Ivana Stiperski)

R1

→ EUREGIO: SEB in complex Terrain, [PI Lorenzo Giovannini (U Trento) with EURAC and UIBK

→



Babic et al 2021, QJ



Activities

- publication of the White Paper (now in paper form...)
- establishment of working groups
→ many early/mid-career scientists
- establishment of committees:
Field Observations and Numerical Modeling
- TEAMx-US,
UK activities
'project consortia'
- 2nd TEAMx workshop (online event)
May 10-12 (3 hrs each day)

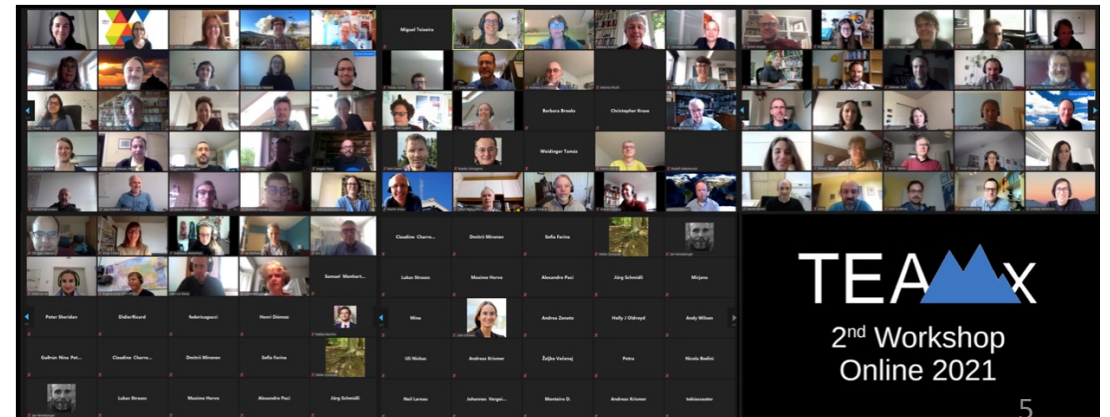
R4

R1

R2



Serafin et al 2020,
ISBN 978-3-99106-003-1



2nd TEAMx workshop

Programme for the Second TEAMx Workshop

Mon 10 - Wed 12 May 2021, 16:00-19:00 CEST [UTC+2]

Time	Mon 10 May	Tue 11 May	Wed 12 May
15:45	<i>Connection and coffee</i>		
16:00	1.1 Welcome and Introduction (Mathias Rotach) 1.2 Overview of the TEAMx Observational Campaign (TOC) (Helen Ward)	2.1 Welcome (Mathias Rotach) 2.2 TOC plan and WG needs: summary report (Norbert Kalthoff)	3.1 Welcome (Mathias Rotach) 3.2 Observations: summary report (Christoph Wittman)
16:15		2.3 TOC plan and WG needs: further discussion <i>Chair: Marco Arpagaus, co-chair: Brigitta Goger</i>	3.3 Observations: further discussion <i>Chair: Vanda Grubišić, co-chair: Ivana Stiperski</i>
16:30	1.3 Target Area (TA) tours <i>Chair: Helen Ward, co-chair: Stefano Serafin</i> ▲ Adige Valley Target Area (Dino Zardi)	2.4 Keynote presentation ▲ Towards a more scale-aware orographic gravity wave drag parametrization (Annelize van Niekerk)	3.4 Keynote presentation ▲ Atmospheric dispersion of pollutants in complex terrain: understanding and modelling (Silvia Trini)

R8

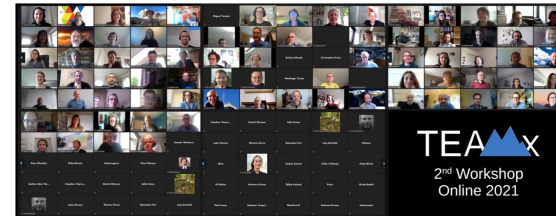
The focus of the workshop is on the [draft plan](#) for the [TEAMx Observational Campaign \(TOC\)](#)

17:30	1.5 TOC plan and WG needs: presentations and discussion <i>Chair: Marco Arpagaus, co-chair: Brigitta Goger</i> <i>Rapporteur: Norbert Kalthoff</i>	<i>Rapporteur: Christoph Wittman</i> ▲ FAAM aircraft (Stephen Mobbs) ▲ SAFIRE fleet (Jean-Christophe Canonici) ▲ UW King Air (Bart Geerts) ▲ NSF/NCAR aircraft (Vanda Grubišić) ▲ DLR (Sonja Gisinger) ▲ KIT/TU Braunschweig (Philipp Gasch) Discussion [30 min]	▲ Waves and Dynamics WG (Andy Elvidge) ▲ Orographic Convection WG (Dan Kirshbaum) ▲ Mountain Climate WG (Nikolina Ban) Discussion [30 min]
17:45	▲ Mountain Boundary Layer WG (Manuela Lehner) ▲ Surface-atmosphere Ex. WG (Lorenzo Giovannini) ▲ Atmospheric Chemistry WG (M Graus/M Hirtl) Discussion [30 min]		
18:00			▲ Atmospheric Chemistry WG (M Graus/M Hirtl) ▲ Surface-atmosphere Exchange WG (Helen Ward) ▲ Mountain Boundary Layer WG (Stefano Serafin) Discussion [30 min] → research plans and ideas slides
18:15	▲ Mountain Climate WG (Sven Kotlarski) ▲ Orographic Convection WG (M. Marcello Miglietta) ▲ Waves and Dynamics WG (Annelize van Niekerk) Discussion [30 min]	2.6 Observations (major facilities): pres. and discussion <i>Chair: Vanda Grubišić, co-chair: Ivana Stiperski</i> <i>Rapporteur: Christoph Wittman</i> ▲ KITcube (Andreas Wieser) ▲ TEAMx-US/North America (Stephan De Wekker) ▲ TEAMx-UK (Barbara Brooks) Discussion [15 min] → ‘marketplace’ of observational resources	
18:30			
18:45			3.6 Summary and close (Helen Ward, Mathias Rotach)
19:00	<i>Close</i>	<i>Close</i>	<i>Close</i>

2nd TEAMx workshop

R2

- >150 (online!) participants
- Online 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.

→ **The document** [draft plan for observational experimentation]

R8

→ **Marketplace** [observational resources]

Scuola di Ingegneria – Università della Basilicata Lidar(s)

Prof. Paolo Di Girolamo, Scuola di Ingegneria – Università della Basilicata (SI-UNIBAS)
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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

Status	Ong.
	Funded
	Sub.
	In prep.
	Available

Target Area	AVTA
	IVTA
	PATA
	Other

Period	Pre-TOC
	Summer
	Winter
	All year
	Longer

Working Group	Chem
	Clim
	MoBL
	Conv
	Sfc Ex
	W & D

Type	AWS
	Flux
	AQ
	Chem
	Cello
	TRH pro
	Wind pro
	Radar
	RaSo



2nd TEAMx workshop

- >150 (online!) participants
- Online resources

→ **The document** [plan for observational experimentation]

→ **Marketplace** [observational resources]

→ **Research plans & ideas**

R1 R5

R6 R7

TEAMx research plans and ideas

As part of the Second TEAMx Workshop, these one-slide summaries have been submitted by working group members to communicate the research plans and ideas for TEAMx. The aim is to facilitate collaboration across TEAMx and ensure that the range of TEAMx projects is well balanced across the programme goals. There will be the opportunity to ask questions on these resources during the workshop.

Atmospheric exchanges due to low-level mountain gravity wave processes and associated flows

Andrew Elvidge, Ian Renfrew, ...
University of East Anglia
a.elvidge@uea.ac.uk

Aims

- Observe and characterise the low-level redistributions of momentum, heat and moisture due to mountain gravity waves and embedded flows e.g. foehn.
- Establish their role in dictating flow characteristics.
- Assess the capacity of high resolution numerical models to reproduce these redistributions and how this varies with model resolution.

Tools:

- Upwind profiles: sonde, aircraft
- Leeside 4-D sampling of bulk fields: ground stations; aircraft profiles / sawtooth legs; remote sensing of winds (doppler radar / LIDAR / wind profilers).
- Leeside turbulence and fluxes: aircraft straight and level flux legs; doppler radar
- NWP and Lagrangian modelling

Funding: TBD
mountain waves, foehn, turbulence, turbulent fluxes

Chen et al. (2007, JAS)

Aircraft observations of heat exchanges in the lee of an Icelandic Peninsula in stably stratified flow (preliminary results); and (bottom left) strong wind perturbations in high resolution models are underrepresented in coarse resolution models even with an "optimally tuned" orographic drag scheme.

Status	Ong.
	anded
	Sp
	Prep.
	Idea
Target Area	AVTA
	IVTA
	PATA
	Other
Period	Pre-TOC
	Summer
	Winter
	All year
	Longer
Working Group	Chem
	Clim
	MoBL
	Conv
	Sfc Ex
	W & D
Type	Obs
	Mod

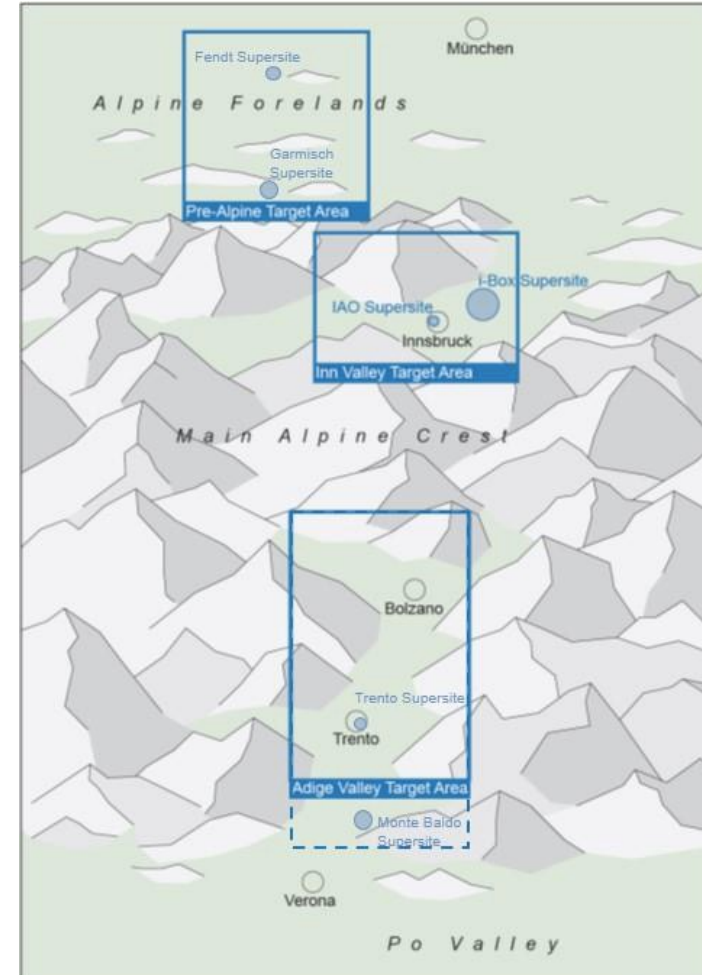


2nd workshop - outcome

- 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

R8

- additional needs identified
 - additional sites, instruments, data sources [e.g., need for accurate high-resolution surface (and sub-surface) information → EUMETSAT]



Activities ctd.

R1

- Numerical modeling plan (in progress)
[Num Modeling Committee]

R2

- Data policy (currently being developed by GIC)

R4

- TEAMx student group
 - led by two PhD students @UIBK
 - hampered by pandemic

#planfortheTEAMxObservationsCampaign_v5-00.docx

DRAFT Plan for the TEAMx Observational Campaign

Commented [NWS]: File content to be reviewed and...

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Activities ctd.

R1 R6 ➤ WG Convection: Climatology of CI over the Alps (→ MWR)

R1-R8 ➤ BAMS paper on TEAMx ('Essay')

➤ Terms of reference for committees
→ being developed by CIG

Overall

- Substantial progress in different areas
- Organizational
 - groups and committees
 - data policy / terms of reference
 - student group
- Growing TEAMx community
- Funding successes (individual projects)
 - but still missing a major 'TEAMx project' (like Horizon Europe)
 - TEAMx US prepare a joint NSF application, UK scientists plan coordinated effort, 'Rest of Europe' based on individual (institutional) and bi/tri/etc-lateral projects
 - major Italian project 'in the pipeline'



thank you very much for your attention