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Major Weather Research Initiative in the Alps

From 16 June to 25 July, an international team led by meteorologists from the University of Innsbruck is conducting extensive measurements in the Inn and Adige valleys, the Sarntal Alps, and the Bavarian Alpine foothills. The data will help deepen our understanding of air exchange processes over mountainous terrain and the links between local, regional, and global weather processes. As part of a year-long observational campaign data are also collected using research aircraft.

Mountain weather often defies forecasts — a reality familiar to anyone planning outdoor activities in alpine regions. This unpredictability stems partly from the complexity of the terrain, which significantly affects local air flows. But broader atmospheric dynamics, including large-scale and planetary air circulations, also play a role. To better understand how air exchange functions in mountainous regions, researchers need a detailed data foundation — one that spans phenomena from small-scale turbulence to regional weather systems and global jet streams, over short to long timescales. In meteorology, this approach is known as multi-scale research.
The international research consortium TEAMx is applying this approach through a large-scale, year-long observational campaign called the TEAMx Observational Campaign (TOC). The TOC aims to bridge data collected in the Alps with large-scale meteorological phenomena and is being coordinated by Manuela Lehner and Mathias Rotach from the Institute of Atmospheric and Cryospheric Sciences at the University of Innsbruck.

Improved Climate Models and Long-Term Forecasts

More than 25 institutions and over 200 scientists are contributing to the campaign — including academic research groups and several national and international weather services, which are providing additional data. In the long term, TEAMx aims to improve climate models and forecasting capabilities for mountainous regions.
“In May, media outlets reported a potentially record-breaking summer with temperatures reaching 40°C across Europe,” says programme coordinator Manuela Lehner. “But how accurate these forecasts are for alpine regions depends heavily on how well these areas are represented in the underlying models. The same applies to long-term assessments of severe weather risks. At present, we lack the necessary data.”
In short, the campaign addresses far more than just tomorrow’s hiking forecast.

15 Sites – Two Intensive Phases

This campaign — only conducted at this scale about once every 25 years — began in September 2024. In four target areas (the Inn Valley, the Adige Valley, the Alpine crest between them, and the Bavarian foothills), various remote sensing systems have been recording atmospheric profiles of wind, temperature, and humidity at multiple locations throughout the year.
The campaign also includes two intensive observation phases. Following the first in winter, the second will begin on 16 June, with measurements at over 15 sites across the Inn Valley, Adige Valley, and the Sarntal Alps, continuing until 25 July.

“With three research aircraft from Germany and the UK, along with drones and weather balloons, we’re collecting crucial additional data — for instance, on how cloud cover and precipitation develop due to moisture transport along mountain slopes,” explains Manuela Lehner.
Another focus lies on understanding interactions between different wind systems in mountain valleys, such as slope and valley winds, and their effect on atmospheric stratification and variability. These, in turn, influence how pollutants and moisture are exchanged in the valley atmosphere.
The data processing and quality control efforts will continue long after the measurement flights conclude. Eventually, the dataset will also be made available to scientists outside the TEAMx network.
“The scale and significance of this campaign are evident not only in the number of research groups involved, but also in the participation of several weather services,” says Mathias Rotach. TEAMx is further supported by the World Meteorological Organization (WMO) and is funded through numerous third-party research initiatives.

Institutions involved
- Austro Control (Austria)
- Autonome Provinz Bozen – Südtirol – Amt für Meteorologie und Lawinenwarnung (Italy)
- BOKU University (Austria)
- British Antarctic Survey (United Kingdom)
- Consiglio Nazionale delle Ricerche – Istituto di metodologie per l’analisi ambientale (Italy)
- Consiglio Nazionale delle Ricerche - Istituto di Scienze dell’Atmosfera e del Clima (Italy)
- Consiglio Nazionale delle Ricerche - Istituto di Scienze Marine (Italy)
- Consiglio Nazionale delle Ricerche - Istituto di Scienze Polari (Italy)
- DLR – Deutsches Zentrum für Luft- und Raumfahrt (Germany)
- DWD – Deutscher Wetterdienst (Germany)
- Eberhard Karls Universität Tübingen (Germany)
- Eurac Research (Italy)
- Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (Italy)
- GeoSphere Austria (Austria)
- Karlsruher Institut für Technologie (Germany)
- Land Tirol – Abteilung Waldschutz (Austria)
- Leonardo Spa (Italy)
- Fondazione Links (Italy)
- Ludwig-Maximilians-Universität München (Germany)
- Met Office (United Kingdom)
- Federal Office of Meteorology and Climatology MeteoSchweiz (Switzerland)
- Météo-France (France)
- National Centre for Atmospheric Science (United Kingdom)
- Politecnico di Torino (Italy)
- Scuola Universitaria Superiore Pavia (Italy)
- Technische Universität Braunschweig (Germany)
- Umweltbundesamt (Germany)
- Umweltforschungsstation Schneefernerhaus (Germany)
- Università degli Studi della Basilicata (Italy)
- Università degli Studi di Milano (Italy)
- Università degli Studi di Trento (Italy)
- Università di Bologna (Italy)
- Università di Genova (Italy)
- Università di Padova (Italy)
- Universität Basel (Switzerland)
- Universität Innsbruck (Austria)
- Universität Wien (Austria)
- Universität zu Köln (Germany)
- Université Grenoble Alpes (France)

- Universitetet i Bergen (Norway)
- University of Bath (United Kingdom)
- University of East Anglia (United Kingdom)
- University of Leeds (United Kingdom)
- University of Reading (United Kingdom)
- University of Virginia (USA)

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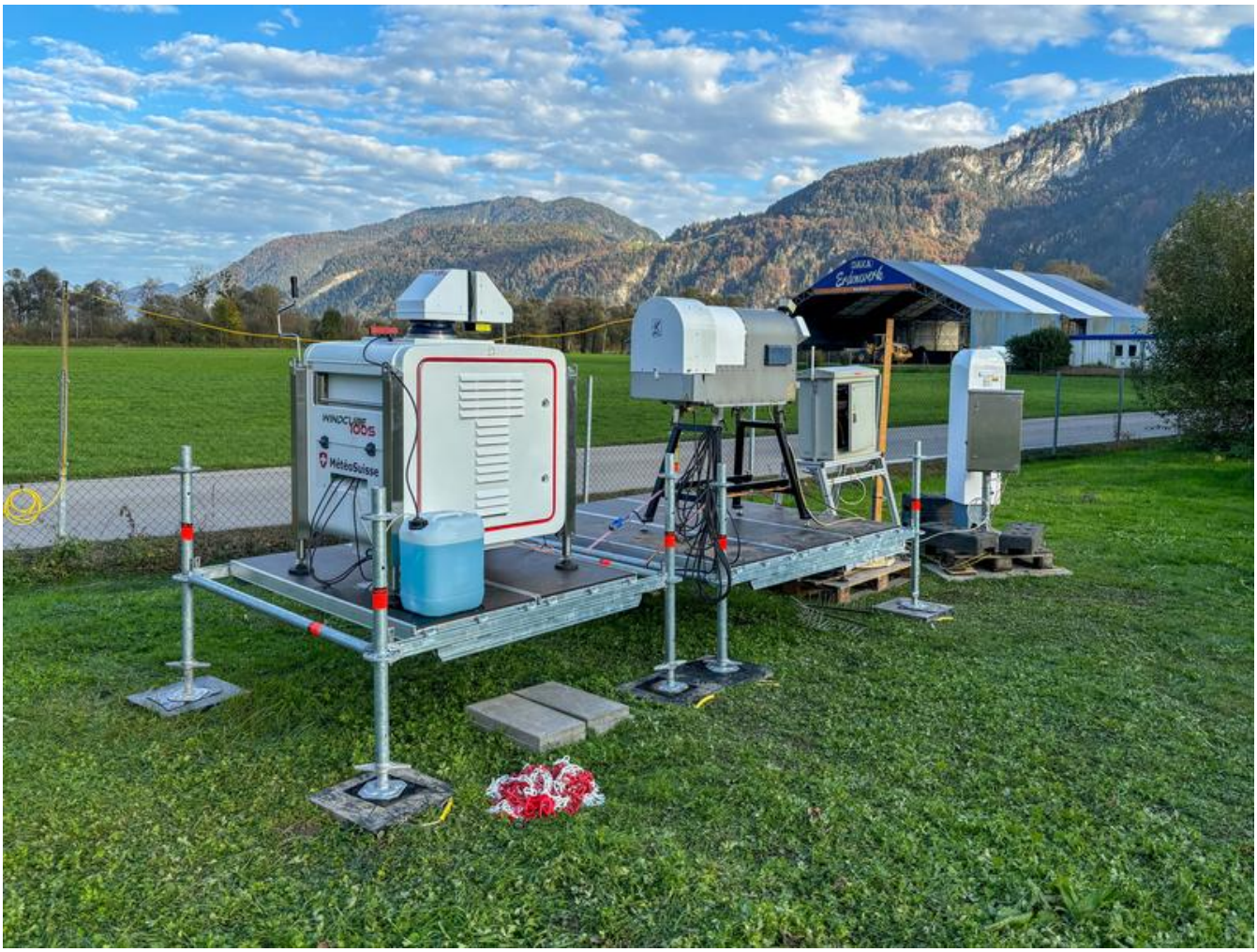
URL zur Pressemitteilung: https://www.teamx-programme.org/observational-campaign/

Inntal valley from the aeroplane during flight measurements in winter.
Beth Saunders
Beth Saunders



Measuring instruments in Radfeld (Tyrol/Austria)
Beth Saunders
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