

**From measurements in the field to
physically based modelling:
the Rofental**

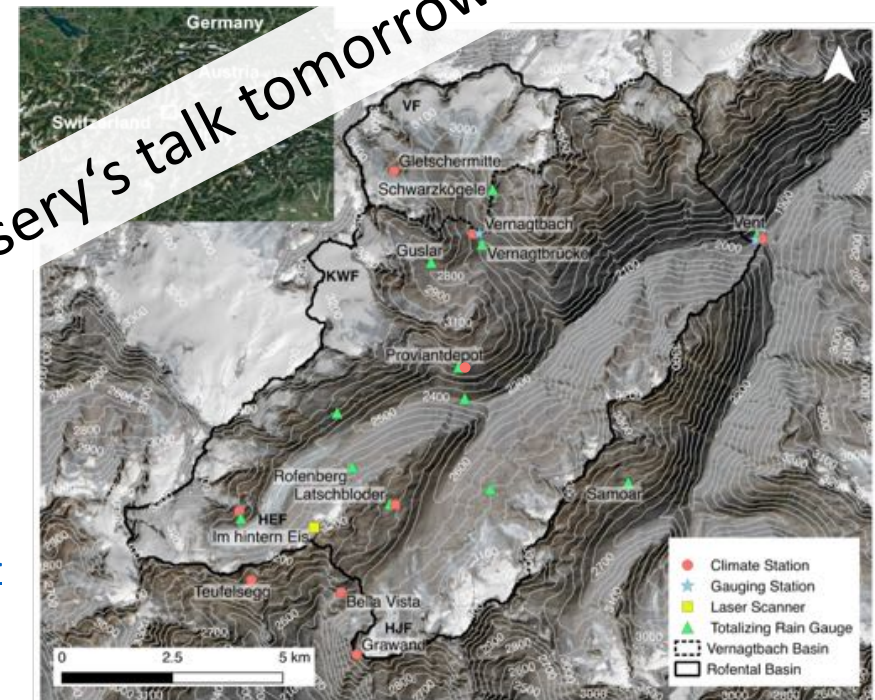
**Ulrich Strasser, Michael Warscher, Florian Hanzer
University of Innsbruck**

Research Basin Rofental

- Ötztal Alps, 1.890 to 3.770 m a.s.l., 98.1 km²
- Joint effort of several institutions and many people, monitoring since 1884
- Data collection available at Pangaea:
<https://www.pangaea.de/?q=%40ref104365> and
<https://doi.org/10.1594/PANGAEA.876120>

Part of international research initiatives:

- GEWEX INARCH <https://www.usask.ca/inarch/>
- LTSER platform Tyrolean Alps with LTER Austria, LTER Europe and ILTER <http://lter.econ.cam.ac.uk/ta-tyrolean-alps>
- EU Horizon 2020 INTERACT research stations <https://eu-interact.org/focus-sites/station-hintereis/>
- ERB Euro-Mediterranean Network of Experimental and Representative Basins <http://erb-network.simdif.com>
- UNESCO IHP <http://en.unesco.org/themes/water-security/hydrology>



Rofental cooperation: Academy of Sciences, Munich

BAW | BEFUGTE AKADEMIE DER WISSENSCHAFTEN

Geodesy and Glaciology

The project

- Research >
- Work areas >
- Vernagtferner Digital** v
- Webcam
- Weather data
- Mass balance
- Maps
- Photo Gallery

Young scientists

- History >
- Advisory board
- Project committee
- Research staff
- Publications >
- Meridianline

Vernagtferner Digital



Vernagtferner in September 2014

Geography

Country	Austria
State	Tyrol
Geographic coordinates	10°49' East, 46° 52' North

Rofental cooperation: ACINN, University of Innsbruck



Hintereisferner – an Open Air Laboratory



Hintereisferner (HEF) is a valley glacier located in the inner Ötztal Alps, Austria. It is the key research site for glaciological studies carried out at the Institute of Atmospheric and Cryospheric Sciences of the University of Innsbruck (ACINN) for many decades. In historical documents, the glacier is mentioned in 1601 for the first time, which is in the context of the formation of an ice dammed lake in front of the glacier (Figure 1).

Similar references date from 1678, 1774, 1770, and 1816. More systematic observations, mainly referring to length changes, began in 1847 and the first regional maps were produced in 1870 and 1888. The first detailed map of HEF dates from 1894, followed by a long series of maps from terrestrial surveys (Figure 2) and since 2001 upgraded by one or two airborne LIDAR surveys per year for geodetic determination of ice volume changes (Figure 3).

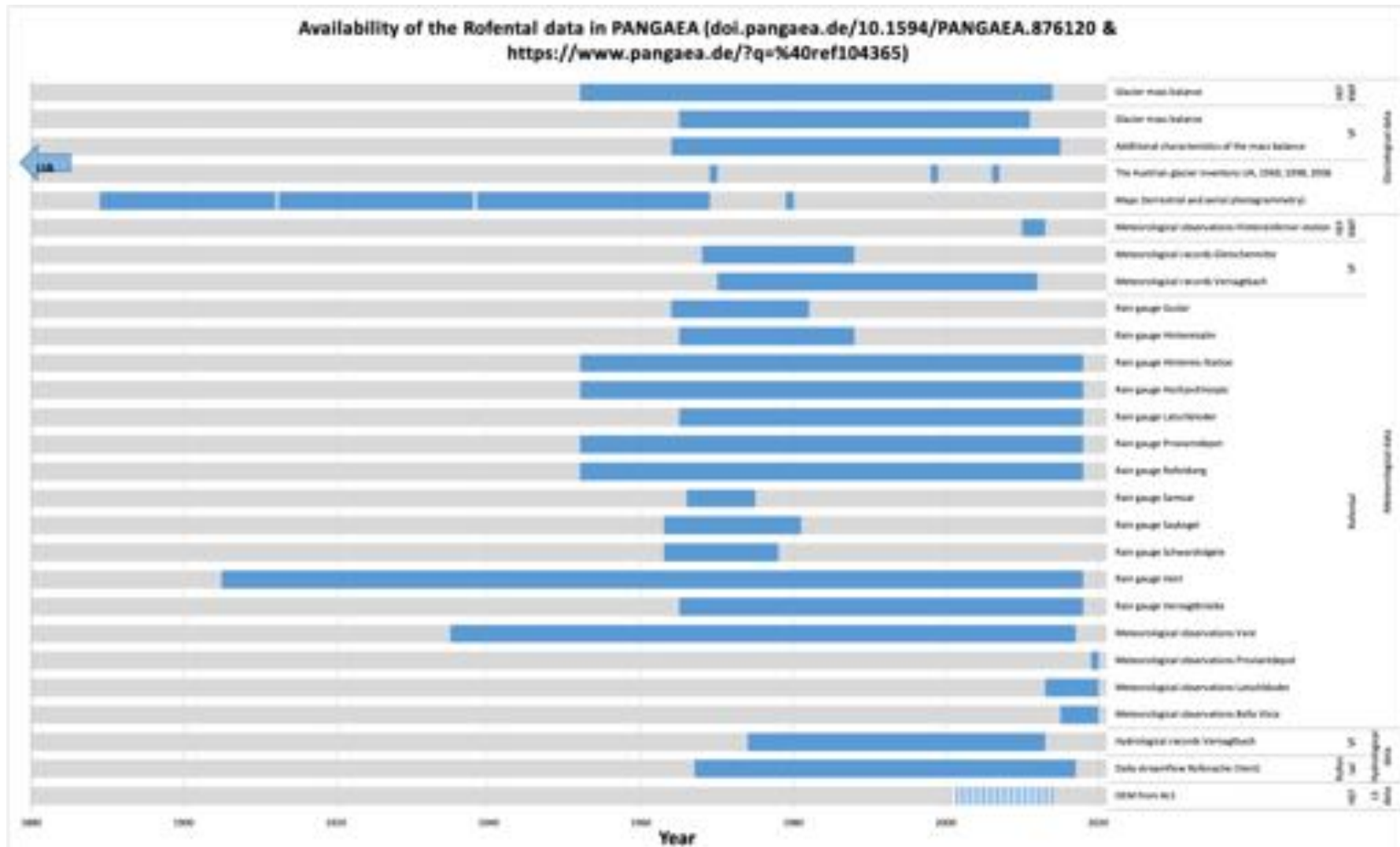
contributions by Brigitta Goger and Rainer Prinz

- ACINN
- News and Events
- Research
 - Atmospheric Dynamics
 - Atmos. Physics and Chemistry
 - Ice and Climate
 - Atmospheric Turbulence
- Studies
- People
- Graduate Seminar
- Papers and Books
- Theses
- Open Research Data

Rofental cooperation: Hydrographic Service of Tyrol



Data collection Rofental



PANGAEA

ALL TOPICS

8 datasets found on search for #ref1

1. Strasser, U; Warscher, M (2020): Co...
 Related to: Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 667921 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91868>

2. Strasser, U; Warscher, M (2020): Co...
 Related to: Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 879119 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91869>

3. Warscher, M; Strasser, U (2020): Co...
 Related to: Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 668723 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91866>

4. Niedertscheider, K; Warscher, M; S...
 Related to: Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 18263 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91865>

5. Strasser, U; Warscher, M (2020): Co...
 Related to: Strasser, U; Marke, T (2017): Co...
 Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 645131 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91867>

6. Warscher, M; Strasser, U (2020): Co...
 Related to: Strasser, U; Warscher, M; et al.: Installed stations and extension of
 Size: 628258 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91894> - Score: 1.0

7. Marke, T; Strasser, U; Warscher, M (2020): Meteorological and snow measurements at station Proviandtepot in 2019
 Related to: Strasser, U; Warscher, M; et al.: Latest developments in the high Alpine research basin Rofental (1890-3770 m a.s.l.) in the Ötztal Alps (Austria): newly
 installed stations and extension of 150 years of hydrometeorological and glaciological datasets (working title). Earth System Science Data Discussions
 Size: 256628 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91324> - Score: 1.0

8. Warscher, M; Strasser, U (2020): Continuous meteorological observations and snow measurements from Latschbloder 2019
 Related to: Strasser, U; Warscher, M; et al.: Latest developments in the high Alpine research basin Rofental (1890-3770 m a.s.l.) in the Ötztal Alps (Austria): newly
 installed stations and extension of 150 years of hydrometeorological and glaciological datasets (working title). Earth System Science Data Discussions
 Size: 682547 data points
<https://doi.pangaea.de/10.1584/PANGAEA.91897> - Score: 1.0

Coverage:

Latitude: 46.782840 * Longitude: 10.791380

Date/Time Start: 2019-02-06T12:00:00 * Date/Time End: 2019-12-31T23:50:00

Minimum HEIGHT above ground: 2 m * Maximum HEIGHT above ground: 2 m

Event(s):

Bella_Vista * Latitude: 46.782840 * Longitude: 10.791380 * Elevation: 2805.0 m * Location: Ötztal, Tyrolian Alps, Austria
 Automatic weather station (AWS)

Parameter(s):

#	Name	Short Name	Unit	Principal Investigator	Method/Device	Comment
1	DATE/TIME	DATE/TIME		Strasser, Ulrich		Geocode
2	HEIGHT above ground	HEIGHT	m	Strasser, Ulrich		Geocode
3	Temperature, air	TTT	°C	Strasser, Ulrich	High precision humidity and temperature probe, E+E Elektronik, EE08	
4	Humidity, relative	RH	%	Strasser, Ulrich	High precision humidity and temperature probe, E+E Elektronik, EE08	
5	Precipitation	Precip	mm/10 min	Strasser, Ulrich	Weighing rain gauge, Ott Pluvio ³ L 200 with wind shelter	
6	Short-wave downward (GLOBAL) radiation	SWD	W/m ²	Strasser, Ulrich	Net radiometer, Kipp & Zonen, CNR 4	
7	Short-wave upward (REFLEX) radiation	SWU	W/m ²	Strasser, Ulrich	Net radiometer, Kipp & Zonen, CNR 4	
8	Long-wave downward radiation	LWD	W/m ²	Strasser, Ulrich	Net radiometer, Kipp & Zonen, CNR 4	
9	Long-wave upward radiation	LWU	W/m ²	Strasser, Ulrich	Net radiometer, Kipp & Zonen, CNR 4	
10	Wind speed	ff	m/s	Strasser, Ulrich	Wind-Sensor, Kroneis, Model 262	mean

Strasser, U., Marke, T., Braun, L., Escher-Vetter, H., Juen, I., Kuhn, M., Maussion, F., Mayer, C., Nicholson, L., Niedertscheider, K., Sailer, R., Stötter, J., Weber, M. and Kaser, G. (2018): The Rofental: a high Alpine research basin (1890 m – 3770 m a.s.l.) in the Ötztal Alps (Austria) with over 150 years of glaciological and hydro-meteorological observations. Earth Syst. Sci. Data, 10, 151-171, <https://doi.org/10.5194/essd-10-151-2018>.

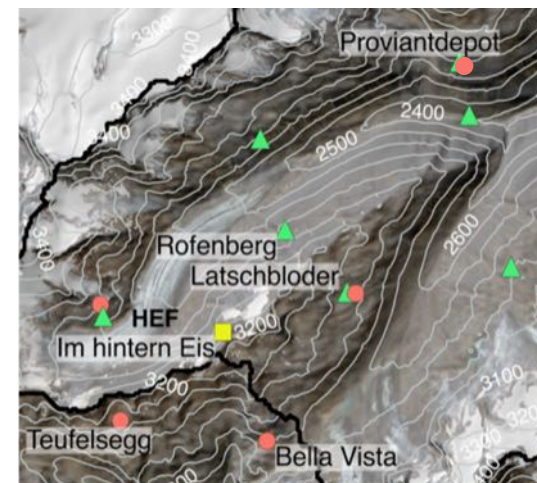
Snow monitoring Rofental

Meteorological data:

Temperature, humidity, wind speed and direction, air pressure, precipitation, radiative fluxes (short- and longwave, up and down)

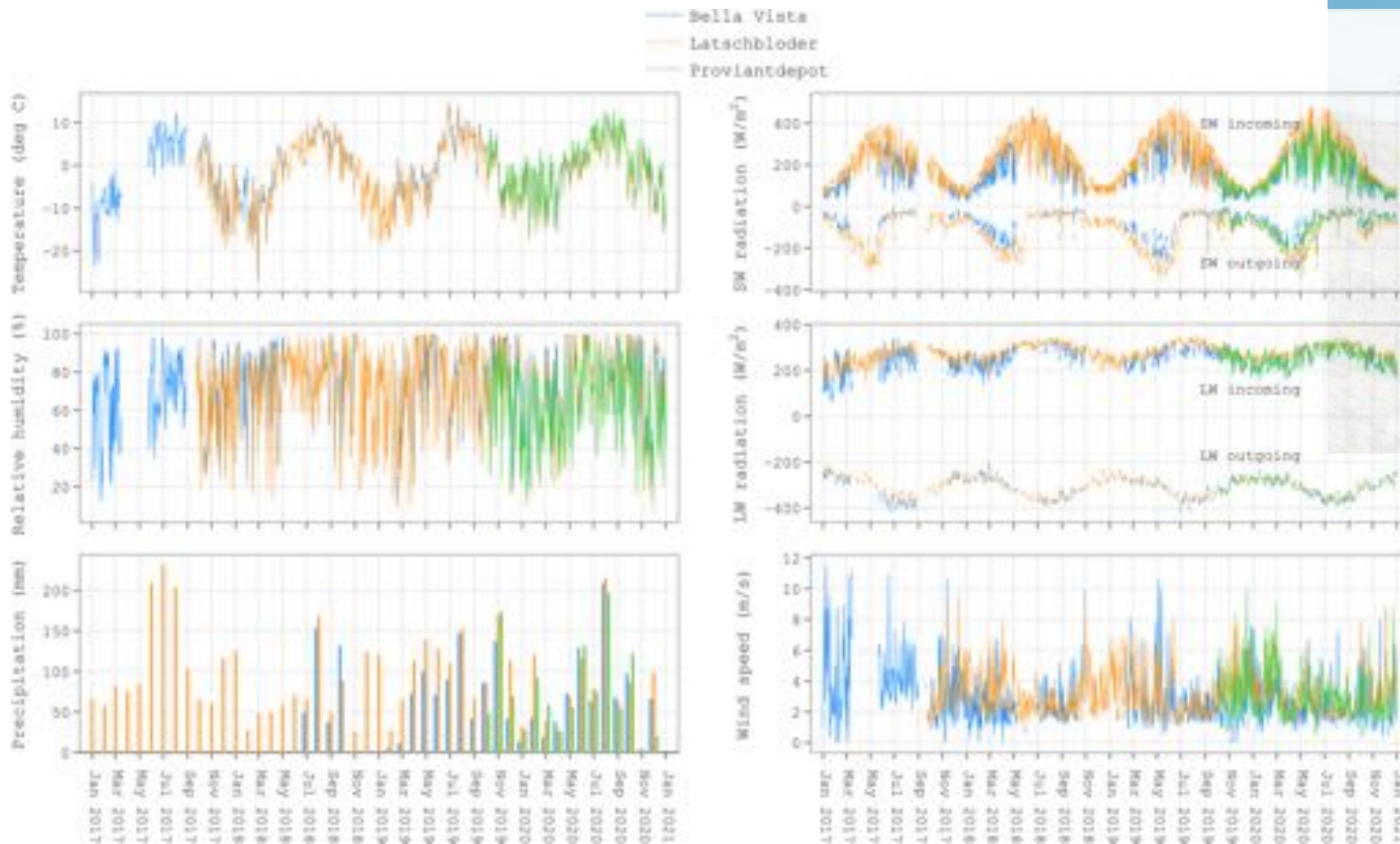
Snow data:

- Bella Vista (2805 m a.s.l.)
Pair of snow pillow/scale with ultrasonic snow depth, snow temperature profile, acoustic snow drift
- Latschbloder (2919 m a.s.l.)
Ultrasonic snow depth, snow temperature profile
- Proviantdepot (2737 m a.s.l.)
Surface temperature, snow depth, snow water equivalent, layered density and liquid water content (snow pack analyzer), snow temperature profile



Snow monitoring Rofental

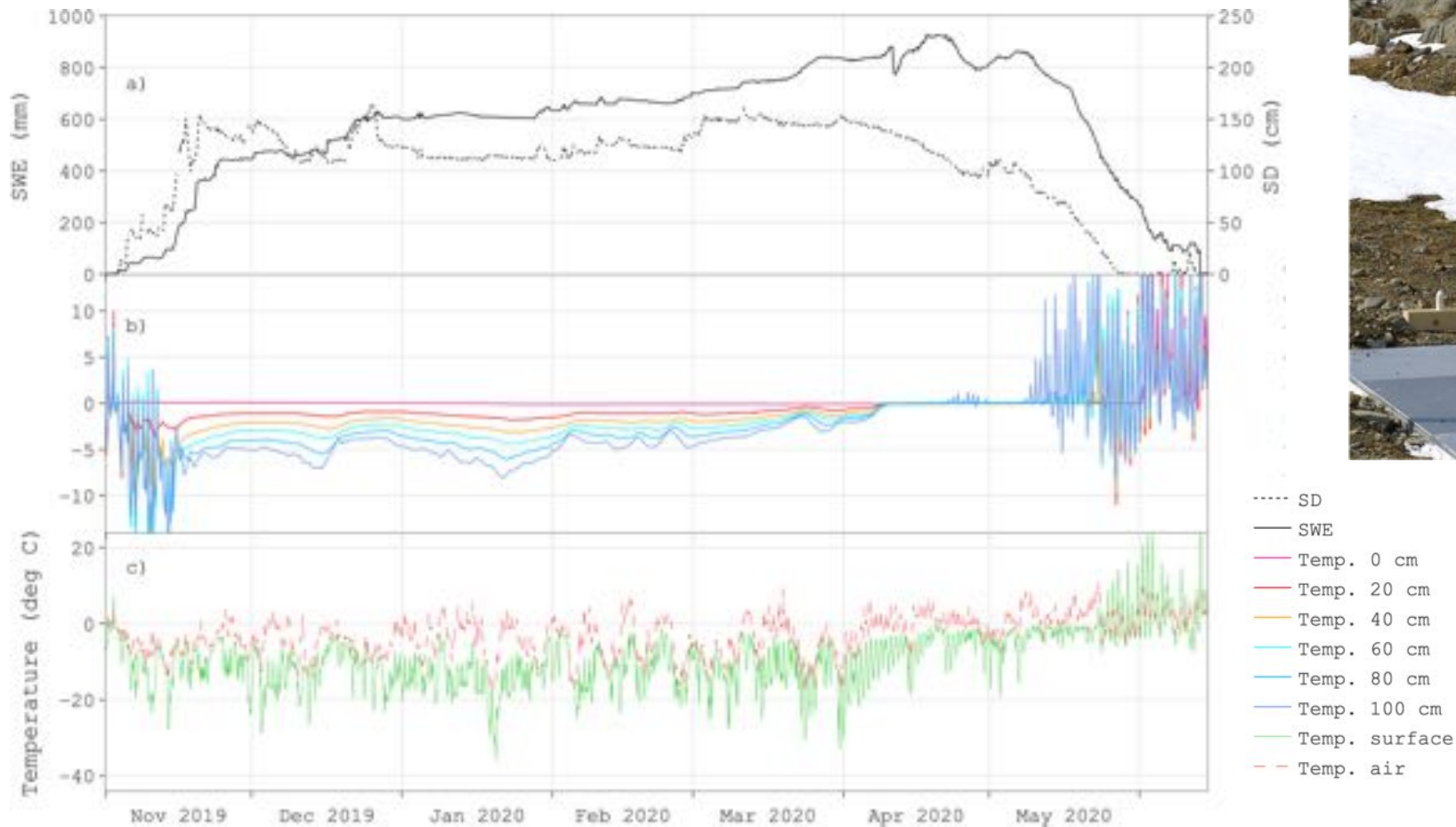
Meteorological data



Temperature, humidity, precipitation, wind speed, shortwave and longwave radiation

Snow monitoring Rofental

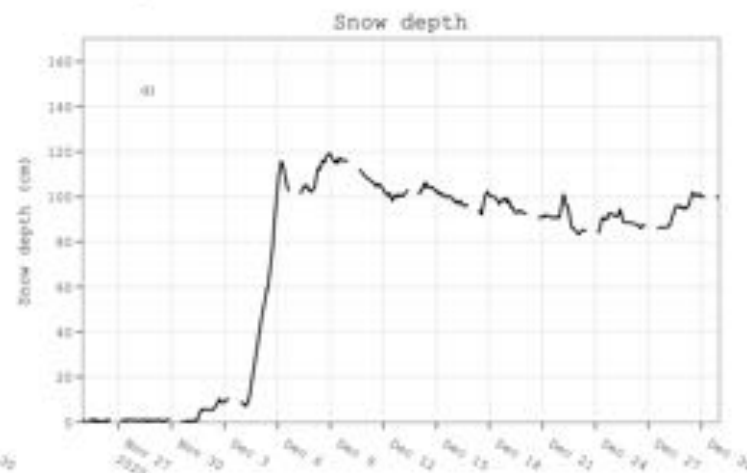
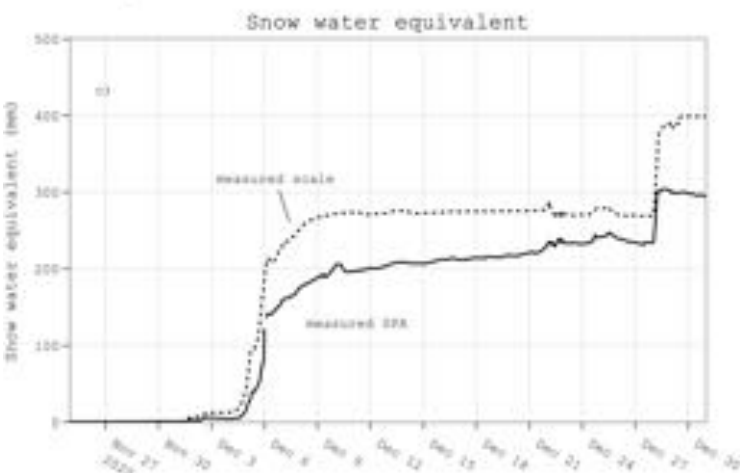
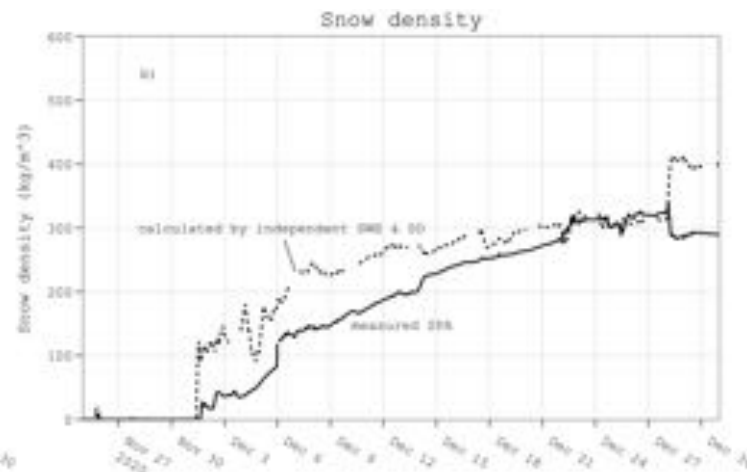
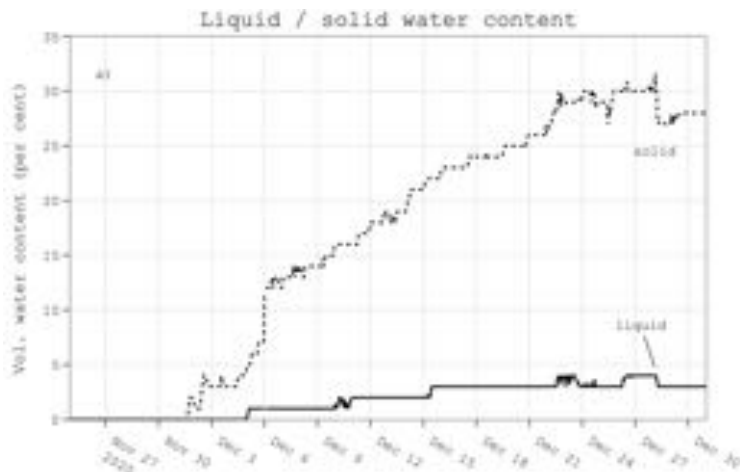
Snow data



SWE, SD, snow temperature profile, air and surface temperature

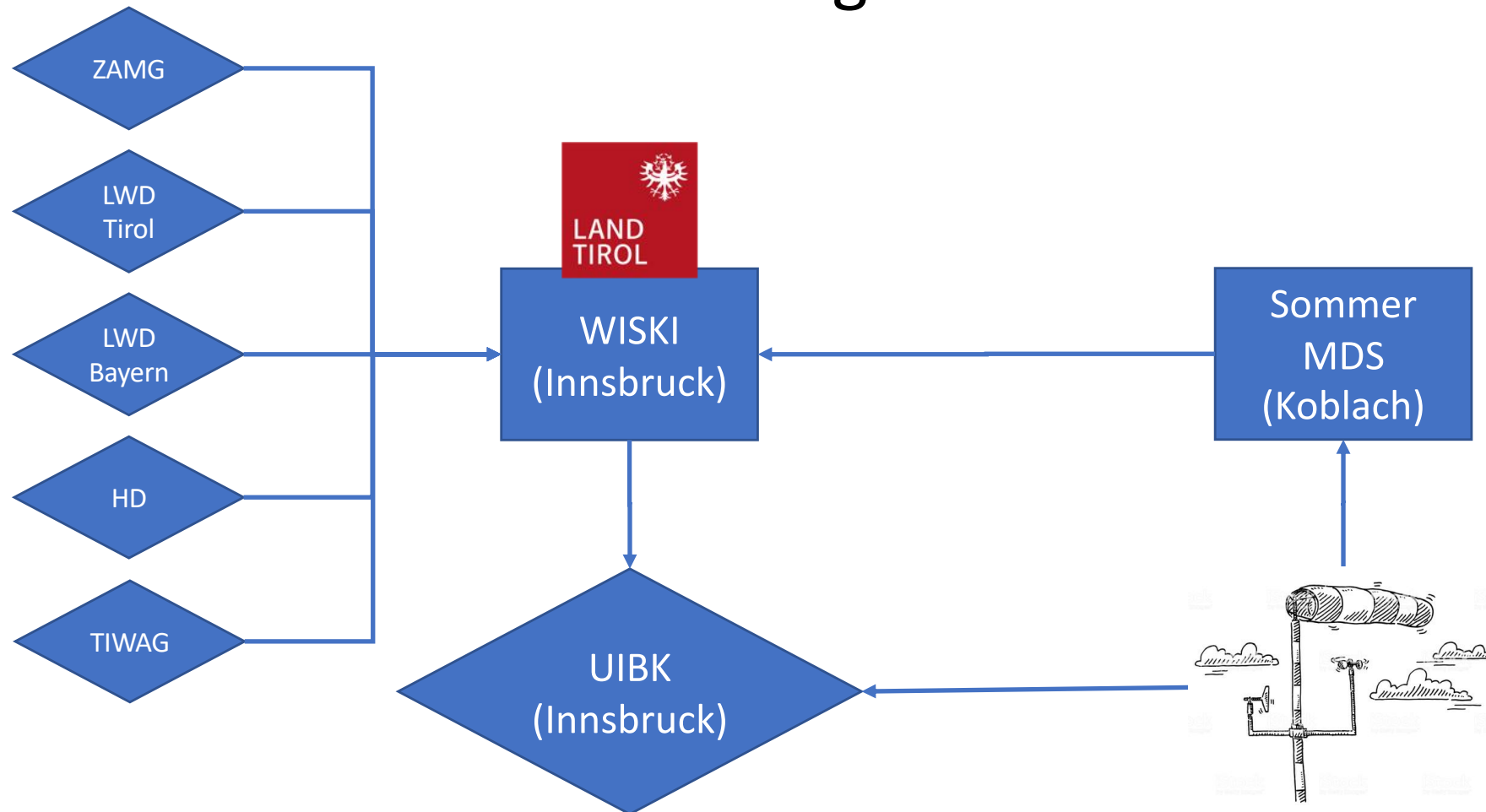
Snow monitoring Rofental

Snow data



Snow Pack Analyzer: Liquid / solid water content, snow density, SWE and SD

Snow monitoring Rofental



Data operationally used by European Avalanche Warning Services EAWS
(<https://avalanche.report/weather/measurements>, <https://www.lawis.at/station/>)



Thank you!