

# SnowHydro 2020

## International Conference on Snow Hydrology

### Challenges in Mountain Areas

28<sup>th</sup> – 31<sup>st</sup> January 2020, Bolzano/Bozen, Italy



Website: <https://snowhydro.eurac.edu/>

Email: [earth.observation@eurac.edu](mailto:earth.observation@eurac.edu)

#### Responsible organizers

Claudia Notarnicola – Eurac Research (Italy) – Scientific coordinator

Giacomo Bertoldi – Eurac Research (Italy) – Scientific advisor

María José Polo – University of Córdoba (Spain) – Scientific advisor

Lucas Menzel – University of Heidelberg (Germany) – Scientific advisor

Paola Winkler - Eurac Research (Italy) – Project manager

#### Venue

Eurac, lecture room “Auditorium”. Arrival directions and map: last pages



## Monday, January 27<sup>th</sup>

16.00 – 18.00 Registration –Eurac main entrance

## Tuesday, January 28<sup>th</sup>

08.00 – 09.00 Registration and poster set-up

Lecture room “Auditorium”

09.00 – 09.10	<b>Welcome and introduction</b> Claudia Notarnicola, Institute for Earth Observation, Eurac Research
09.10 – 09.20	<b>Welcome address</b> Roland Psenner, Eurac Research President
09.20 – 09.30	<b>Welcome address</b> Roberto Dinale, Civil Protection Agency, Autonomous Province of Bolzano – South Tyrol

09.30 – 10:00	<b>Keynote lecture</b> <b>“Monitoring snow using satellite data”</b> Thomas Nagler, <i>Enveo IT (Austria)</i>
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<b>Snow Remote Sensing</b> <b>Session 1: Snow cover dynamics - temporal and spatial variability</b> Chairperson: Jeffrey S. Deems	
10.00 – 10.15	<b>Estimation of temporal changes of snow water equivalent by SAR interferometry using Sentinel-1 data in a snowfield in Trentino</b> Delia Marzari et al.
10.15 – 10.30	<b>Homogenization and analysis of mean seasonal snow depth time series</b> Gabriele Chiogna & Giorgia Marcolini
10.30 – 10.45	<b>Combining COSMO-SkyMed data and machine learning for SWE monitoring in alpine areas</b> Emanuele Santi et al.

10.45 – 11.15	Coffee break, foyer Auditorium
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<b>Session 2: Snow cover dynamics- temporal and spatial variability</b> Chairperson: Rafael Pimentel	
11.15 – 11.30	<b>Multi-sensor wet snow mapping using wide-area radar backscatter composites</b> David Small et al.
11.30 – 11.45	<b>Monitoring snow cover and snow phenology dynamics in global mountain areas by using MODIS images from 2000 to 2018</b> Claudia Notarnicola
11.45 – 12.00	<b>Changes in Andes snow cover from MODIS data, 2000–2016</b> Freddy Saavedra et al.
12.00 – 12.15	<b>Snow cover analysis integrating satellite and terrestrial imageries over a decade</b> Roberto Salzano et al.
12.15 – 12.30	<b>A combined Terra/Aqua MODIS snow-cover product for the High Mountain Asia between 2002 and 2018</b> Sher Muhammad

12.30 – 13.30	Lunch, foyer Auditorium
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<b>Poster session – Room: Conference hall</b> <b>Snow remote sensing &amp; experimental research</b> Chairperson: Mattia Callegari	
13.30 – 14.00	<p>Poster presentation (2 min for each poster)</p> <p><b>Snow cover evolution in the Swiss Alps using Earth Observation Data Cube</b> Charlotte Poussin</p> <p><b>Standardized Snow Pack Index (SSPI) in the Piave river basin</b> Mauro Valt &amp; Giovanni Onofrio</p> <p><b>Modelling spatio-temporal dynamics of snow depth and large herbivore’s winter habitat selection</b> Emanuele Cordano et al.</p> <p><b>Snow bias in EURO-CORDEX regional climate models and its dependence on topography mismatch and cold bias in the European Alps</b> Michael Matiu et al.</p> <p><b>Estimating Multiscale Snow Cover Variability in the South of Western Siberia: SSSC Project framework</b> Dmitry Pershin</p> <p><b>Hom4Snow: Homogenization of snow measurements for robust socio-economic Snow climate indicators in the Alps</b> Gernot Resch et al.</p> <p><b>Monitoring the snow pack internal stress by lineament domain analysis</b> Paola Cianfarra &amp; Mauro Valt</p> <p><b>Theia Snow collection: high-resolution operational snow cover maps from Sentinel-2 and Landsat-8 data</b> Simon Gascoin et al.</p> <p><b>GNSS-based monitoring of snow water equivalent and snow liquid water content in different regions and altitudes and potential (snow)hydrological applications</b> Franziska Koch et al.</p> <p><b>Evaluating the trends of the Degree-Day Factors in the high-altitude regions</b> Muhammad Fraz Ismail et al.</p> <p><b>A seasonal field campaign on the Hochjochferner glacier (South Tyrol) exploiting ablation stakes and the Terrestrial Laser Scanner. Challenges, benefits and comparison with modelling</b> Nicola Di Marco et al.</p>
14.00 – 15.00	Poster session. All authors are available at poster location for discussion.

<b>Session 3: Remote Sensing of Snow Properties</b> Chairperson: Gabrielle J.M. De Lannoy	
15.00 – 15.15	<b>Enabling the next generation of water management with the Airborne Snow Observatory</b> Jeffrey Deems et al.
15.15 – 15.30	<b>Multi-platform, multi-sensor snow surface properties for energy balance and model validation</b> Karl Rittger
15.30 – 15.45	<b>Monitoring snow properties and snowmelt using thermal inertia</b> Roberto Colombo et al.
15.45 – 16.00	<b>Development of a novel approach for snowmelt monitoring in alpine areas by using multi-temporal and multi-sensor remote sensing imagery</b> Valentina Premier et al.
16.00 – 16.15	<b>A new era of remote sensing to constrain physically-based snow hydrologic modeling: Imaging spectroscopy of snow physical properties</b> Thomas Painter

16.15 – 16.45	Coffee break, foyer Auditorium
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<b>Session 4: Remote Sensing of Snow Properties</b> Chairperson: Emanuele Santi	
16.45 – 17.00	<b>Snow parameters estimation through new data fusion approaches involving a hydrological model and remote sensing products</b> Ludovica De Gregorio et al.
17.00 – 17.15	<b>Monitoring snow water in mountain areas of Northern Sweden: performance evaluation of satellite/modelled snow products and exploration of microwave brightness temperature for characterizing snow accumulation/ablation</b> Jie Zhang et al.
17.15 – 17.30	<b>Snow depth variability in the Northern Hemisphere mountains observed from space</b> Gabrielle J.M. De Lannoy et al.
17.30 – 17.45	<b>Suitable digital elevation model spatial resolutions for structure-from-motion snow depth mapping in mountain areas</b> Jason Goetz & Alexander Brenning

18.00 – 19.15	Icebreaker (Eurac) - foyer Auditorium
19.15 – 20.15	Guided city tour: we start from Eurac for a stroll through the historic city center

## Wednesday, January 29<sup>th</sup>

Lecture room "Auditorium"

08.30 – 09.00	<b>Keynote lecture</b> <b>"Snow hydrological modelling and observations for the hydropower industry in the deregulated Nordic energy market"</b> Jan Magnusson, <i>Statkraft AS, Oslo (NO)</i>
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<b>Snow Hydrology and Modelling</b> <b>Session 1: Progress in simulating snow processes and model evaluation</b> Chairperson: Tobias Jonas	
09.00 – 09.15	<b>Snow management with physically based snowpack models for Alpine ski resorts: the PROSNOW project</b> Carlo Carmagnola et al.
09.15 – 09.30	<b>Process-based simulation of snow cover evolution in ski resorts with AMUNDSEN: first results from the PROSNOW project</b> Florian Hanzer et al.
09.30 – 09.45	<b>Sensitivity of snow models to the accuracy of meteorological forcings in mountain environment</b> Silvia Terzago et al.
09.45 – 10.00	<b>Efficient multi-objective calibration and uncertainty analysis of distributed snow simulations in rugged alpine terrain</b> James Thornton et al.
10.00 – 10.15	<b>Snow water equivalents exclusively from snow heights and their day-to-day changes</b> Michael Winkler et al.

10.15 – 10.45	Coffee break, foyer Auditorium
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<b>Session 2: Progress in simulating snow processes and model evaluation</b> Chairperson: Giacomo Bertoldi	
10.45 – 11.00	<b>Validation of ERA-5 snow water equivalent reanalysis over the Upper Adige River Basin (Italy)</b> Susen Shrestha et al.
11.00 – 11.15	<b>Monitoring and simulating snow accumulation on the lowest perennial ice field of the Alps</b> Michael Warscher et al.
11.15 – 11.30	<b>Multi-level spatiotemporal validation of hydroclimatological modeling results in mountain areas: method and data collection</b> Ulrich Strasser et al.
11.30 – 11.45	<b>Parameter uncertainty assessment for a conceptual hydrological model in a snow-dominated catchment combining streamflow records and MODIS snow cover maps</b> Nicola Di Marco et al.
11.45 – 12.00	<b>SNOW4 - An Operational Model for Precipitation Supply Forecasts</b> Uwe Böhm & Gerold Schneider

12.00 – 13.00	Lunch, foyer Auditorium
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**Poster session – Room: Conference hall**

**Progress in simulating snow processes and model evaluation & Snow-Atmosphere Interface**

Chairperson: Carlo Marin

13.00 – 13.30	<p>Poster presentation (2 min for each poster)</p> <p><b>The effects of forest cover on snow water equivalent-Results from the “5<sup>th</sup> SWE intercomparison”</b> Rudi Nadalet et al.</p> <p><b>Snow duration in forests after low to moderate severity burn: Does tree size matter?</b> Michaela Teich et al.</p> <p><b>Snow Cover Area (SCA) changes over semi-arid region using CMIP5 Multi-model Ensemble (Case study: Uremia lake basin, Iran)</b> Maral Habibi et al.</p> <p><b>Multi-year evaluation of a distributed data-assimilation snow model (S3M v 3.1) and implications for hydropower-hydrologic modeling</b> Francesco Avanzi et al.</p> <p><b>Assimilation of snow depth maps from satellite photogrammetry in Crocus in distributed geometry</b> César Deschamps-Berger et al.</p> <p><b>Exploiting machine learning techniques for monthly runoff prediction in a mountain basin in the Andes range</b> Sofia Teverovsky et al.</p> <p><b>Water availability forecasting of the Tien-Shan Rivers for different periods using remote sensing data</b> Olga Kalashnikova &amp; Abror Gafurov</p> <p><b>Does a shift in precipitation from snow towards rain lead to a decrease in mean streamflow? - Comparison of MOPEX Dataset and CAMELS Dataset</b> Lina Wang &amp; Ross Woods</p> <p><b>Quantification and vizualization of changes in runoff timing and changes in runoff seasonality in snow-dominated river basins</b> Erwin Rottler et al.</p> <p><b>Historical reanalysis of the snow water equivalent in Trentino</b> Paolo Tranquillini et al.</p> <p><b>Past and future trends in snow water equivalent along an alpine slope</b> Reinhard Fromm et al.</p> <p><b>Towards a high-resolution long-term snow climatology for Germany</b> Uwe Böhm &amp; Gerold Schneider</p>
13.30 – 14.30	Poster session. All authors are available at poster location for discussion

<b>Session 3: Cryospheric processes - observations and modelling</b>	
Chairperson: Ulrich Strasser	
14.30 – 14.45	<b>The state of Art of Modelling Permafrost and Freezing Soil</b> Niccolò Tubini & Riccardo Rigon
14.45 – 15.00	<b>Canopy structure controls on energy fluxes to the forest snowpack: observations and modelling</b> Tobias Jonas et al.
15.00 – 15.15	<b>Impact of snowfall distribution on the assimilation of passive microwave data in a snowmelt runoff prediction model</b> David Gustafsson et al.
15.15 – 15.30	<b>The influence of snow patch size on local-scale advection of sensible heat towards a patchy snow cover</b> Luuk van der Valk et al.

15.30– 16.00	Coffee break, foyer Auditorium
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<b>Session 4: Snow in semi-arid environment</b>	
Chairperson: Lucas Menzel	
16.00 – 16.15	<b>A 55-yr trend analysis of snow torrentiality and aridity in a Mediterranean mountain range, Sierra Nevada, Spain</b> María José Pérez-Palazón et al.
16.15 – 16.30	<b>Process-oriented streamflow characterization in mountain rivers of semiarid areas: Sierra Nevada, Spain</b> Pedro Torralbo et al.
16.30 – 16.45	<b>Can we learn from "snow islands" about future trends in different snow regions in the world?</b> María J. Polo et al.

18.00 – 19.00	Public event with the participation of the meteorologist Luca Mercalli (Auditorium)
19.30 –	Conference dinner (Eurac) - foyer Auditorium

## Thursday, January 30<sup>th</sup>

Lecture room "Auditorium"

08.30 – 09.00	<b>Keynote lecture</b> <b>"The effect of changes in snow seasonality on hydropower"</b> Miriam Jackson, <i>Norwegian Water Resources &amp; Energy Directorate (NO)</i>
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<b>Snow-Atmosphere Interface</b> <b>Session 1: Prediction of snow melt and run-off</b> Chairperson: María J. Polo	
09.00 – 09.15	<b>Comparison of SWE at basin scale with measured discharge at basin outlet by separating the contribution of rainfall and snowfall</b> Matteo Dall'Amico et al.
09.15 – 09.30	<b>Protective function of the snowpack during rain-on-snow events</b> Roman Juras et al.
09.30 – 09.45	<b>A physics-based approach for efficiently parameterizing turbulent heat fluxes during rain-on-snow in support of operational, probabilistic melt forecasts</b> Adam Winstral & Tobias Jonas
09.45 – 10.00	<b>Influence of input data sources on SRM seasonal snowmelt runoff prediction</b> Wolfgang Bogacki & Muhammad Fraz Ismail
10.00 – 10.15	<b>Qualification of an operational snowmelt model against a composite dataset</b> Jean-Loup Hannebicq et al.

10.15 – 10.45	Coffee break, foyer Auditorium
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<b>Session 2: Prediction of snow melt and run-off</b> Chairperson: Miriam Jackson	
10.45 – 11.00	<b>Understanding runoff generation processes in meltwater-dominated catchments by means of stable water isotopes</b> Giulia Zuecco & Daniele Penna
11.00 – 11.15	<b>The role of snowmelt to stream flow: a tracer-based hydrograph separation of the Sulfen River in South Tyrol</b> Michael Engel et al.
11.15 – 11.30	<b>Challenges for the use of seasonal forecasts in Mediterranean mountain areas</b> Javier Herrero et al.
11.30 – 11.45	<b>SWE modelling for the optimisation of hydropower production in alpine catchments</b> Paolo Pogliotti et al.
11.45 – 12.00	<b>Assessment of water resources of the Amudarya river zone of runoff formation by remote sensing methods</b> Jafar Niyazov et al.

12.00 – 13.00	Lunch, foyer Auditorium
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<b>Poster session – Room: Conference hall</b>	
13.00 – 14.00	Poster session. All authors are available at poster location for discussion



<b>Session 3: Climate change, snow conditions and water supply</b>	
Chairperson: Marc Zebisch	
14.00 – 14.15	<b>Changes in snow cover over Central European low mountain ranges</b> Lucas Menzel & Chunyu Dong
14.15 – 14.30	<b>Snow cover dynamics in the Pamir and Tianshan mountains and its attribution to climate change</b> Abror Gafurov et al.
14.30 – 14.45	<b>Widespread and accelerated decrease of mean and extreme snow depth over Europe</b> Adrià Fontrodona-Bach et al.
14.45 – 15.00	<b>Can climate models represent the snow occurrence in semiarid areas? The example of Sierra Nevada Mountain Range</b> Rafael Pimentel et al.
15.00 – 15.15	<b>Snow precipitation trends in the Adige valley: a citizen's science dataset</b> Giacomo Bertoldi et al.

15.15 – 15.45	Coffee break, foyer Auditorium
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<b>Session 4: Climate change, snow conditions and water supply</b>	
Chairperson: Abror Gafurov	
15.45 – 16.00	<b>Long-term (1900-2100) SWE and Hydrometeorological reconstructions in the French Southern Alps (Durance watershed and Mercantour Natural Parc)</b> Thibault Mathevet
16.00 – 16.15	<b>The impact of climate-change induced alteration of snow and glacier processes on solar-hydropower complementarity in Alpine basins</b> Handriyanti Diah Puspitarini et al.
16.15 – 16.30	<b>Snow reliability and alpine ski sport in Germany</b> Uwe Böhm et al.
16.30 – 16.45	<b>Snow Monitoring for Water Availability and Irrigation – contributions within H2020 Extreme Earth</b> Florian Appel
16.45 – 17.15	<b>Main highlights of the conference - IPCC contribution</b> Claudia Notarnicola
17.15 – 17.30	<b>Conclusive remarks &amp; Winner announcement</b>

### **Main highlights from the conference - IPCC Contribution: “Mountain perspectives on snow: combining ground observations and remote sensing with modelling and scenarios of future climate”**

The main aim of this contribution is to provide an overview of the conference highlights in terms of the main scientific advances and knowledge gaps. This contribution will be made available to all participants. If feasible, a publication, in peer-reviewed scientific journal(s), can be considered as a further development, taking particular care to note the IPCC WGII's cut-off dates for submission (1<sup>st</sup> July 2020) and accepted (1<sup>st</sup> May 2021) publications ([www.ipcc.ch](http://www.ipcc.ch)).

**Friday, January 31<sup>st</sup>**

**07.30 – 18.30**

## **Excursion**



The excursion will take place in Sesto - Alta Pusteria/Sexten - Hochpustertal in the 3 Zinnen Dolomites ski resort, embedded in the UNESCO World Heritage Dolomites.

The excursion will include a visit to an automatic snow station and a reservoir for artificial snow production with its pumping station. After lunch, a visit to a gauging station for the monitoring of water resources and sediment transport is scheduled.

The participation fee includes the transfer by bus, cable car, a hot drink and a typical pastry on arrival and a late lunch in a mountain hut.

**The excursion is fully booked.** Participants are advised to bring very warm and rainproof clothes as well as rough, functional shoes suitable for a walk on snow at 1900 m asl!



## Oral presentations

The duration allowed for oral presentations is **12 minutes plus 3 minutes** for questions and discussion.

## Poster presentations

Posters will be displayed for the whole duration of the conference. Poster boards are in a portrait format, and authors can make use of the full dimensions of ca. 85 cm width x 120 cm height (e.g. portrait A0 posters as an often-used format fit perfectly). All the material necessary for attaching the poster to the poster board is available. There are assistants to help authors put up or take down their posters. Poster presenters are advised to bring a ppt-slide for a short presentation (**2 minutes**) during their respective scientific session as indicated in the program.

## Best Poster Award

**All posters will be eligible for this award provided they meet the requirements listed below:**

- \* The presentations should consist of well-prepared visual materials about the research.
- \* The author is registered at the SnowHydro conference and presents the paper with the 2 min talk.

### The award:

\* Each award consists of a Skipass for two days, season 2019-2020 for the Dolomiti Superski areas (<https://www.dolomitisuperski.com/en/Experience/Ski-areas>) kindly sponsored by Dolomiti Superski.

\* The awards will be given during the closing session on Thursday 30<sup>th</sup> January 2020. Thus, it is recommended that the authors will attend that session. A certificate stating the award name, the name of the presenting author, and title of the presentation will be sent to the award recipients after the conference.

\* The posters will be voted by the participants and by the scientific committee of the conference.  
\* Selections will be based on the level of the research, quality of the poster, and clarity of the presentation.

\* We will confer a maximum of three awards.

## Venue

Eurac Research, Viale Druso 1, lecture hall Auditorium

Less than 10 minutes' walk from the city center

Bus nr. 6, 9, 18, 131

[www.sasabz.it](http://www.sasabz.it)



# We gratefully acknowledge the support of our partners and sponsors



## Green Event

Sustainability is not just a modern term to use, but a responsibility. As we all have an impact on the environment, we want to provide you an event as green as possible. We are proud to tell you that the conference will be certified Green Events to keep the environmental impact as low as possible. We further encourage everyone to use public transportation. We recommend you to get a Mobilcard, which can be used, with all buses, trains and several cable cars. Ask for it in your hotel.

