PROSNOW NEWS

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Edito

After its General Assembly held in Innsbruck, our project entered its second year of existence full speed ahead. Several workflows are run in parallel. The integration of different sources, for the production for snow and snowpack predictions, is very challenging and will lead to advances in snow research. The understanding of the economics of climate change and of the demand of snow professionals for decision-making tools is improving. The interfaces and demonstrators are being developed. This first half of this second year will also be the moment were all this work implemented in the background, will become visible: the first interactive visualizations of our service, so far based on sample data, are about to be presented to our pilot ski resorts. Even if we cannot yet help them take operational decisions based on real-time forecasts (this is for next year), we can collect their feedback and understand if PROSNOW is fit for purpose. Those already informed found the visualization very exciting! Finally, we must also actively pursue our initial thoughts on the future exploitation of PROSNOW, with the three keywords: sustain, protect, exploit.

Ghislain Dubois, PROSNOW co-coordinator

Attended events

PROSNOW 2nd General Assembly, 5-6 October, Innsbruck.

PROSNOW consortium at Innsbruck for the project 2nd General Assembly ©C.Carmagnola

The PROSNOW 2nd General Assembly was hosted by University of Innsbruck on October 5 and 6, 2018. The entire consortium gather for 1.5 days to present and discuss the latest advances in each work packages, and refine the way forward. In particular, the involvement of PROSNOW industrial partners was particularly useful in helping the project making decisions about the implementation of the PROSNOW demonstrator. Bi- and multilateral discussions helped projects partners better understand the various dimensions of PROSNOW and collectively build a shared vision. The General Assembly was a key occasion to stocktacke on project advance and sustain the strong momentum of the project. The organization of the GA alongside with a snow or climate services conference (in this case, the International Snow Science Workshop) is a good practice, as it allows communication and dissemination activities while minimizing the carbon footprint of the project.

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In the press

PROSNOW as an emerging climate service

Ghislain Dubois, project co-coordinator, recently answered the questions of Michel Merle for myclimateservices.eu, the outbound service of the CLARITY project.

Will there be snow the coming winter?

Michel Déqué and Samuel Morin, from Météo-France, wrote a scientific communication article about seasonal prediction of snow in mountain regions, including a description on how PROSNOW intends to tackle the low atmospheric predictability, based on alternative information from the starting snowpack state. [In French]

Ongoing Preparation of the IPCC Special Report on Ocean and Cryosphere in a Changing Climate

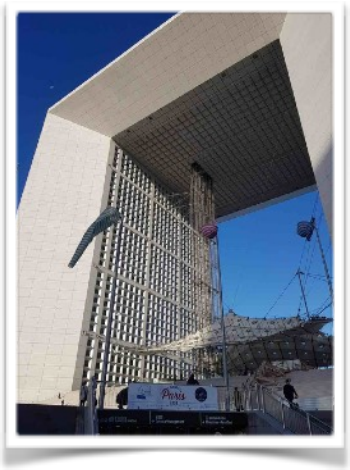
The Intergovernmental Panel on Climate Change (IPCC) has been tasked to prepare a Special Report on Ocean and Cryosphere in a Changing Climate #SROCC, which includes a chapter on High Mountains Areas. Although long term climate change is not handled specifically within PROSNOW, it is of clear relevance to the project objectives to better manage snow as declining resource in alpine ski resorts and reduce their environmental footprint. Samuel Morin, coordinator of PROSNOW, is one the 15 lead authors of the "High Mountain Chapters" of this special report. The Second Order Draft (SOD) has been released for expert and government review on November 16, 2018. Is open for expert review until January 11, 2019 (the DL for registration is on January 4). Full information on the review process and how to access the draft can be found online.

Styrian Climate and Energy Forum 5 September, Schladming, Austria.

On 5 September 2018, a new edition of the Styrian Climate and Energy Forum with the theme *"Challenges of a Tourism Region under Climate Change"* took place in Schladming (Austria), the venue of the Alpine World Ski Championships in 1982 and 2013. In her talk on *"Climate Change and Tourism: From the Costs of Inaction to the Benefits of Climate Services"*, Judith Köberl also presented some glimpses into the service currently developed within PROSNOW. Representatives from the region's communes (mayors, members of the local councils, etc.), tourism associations, ski areas, and accommodation establishments followed attentively the presentation of existing and new climate services for the tourism sector. The Styrian Climate and Energy Forum is a series of information and discussion events related to the topics climate and energy, organized by the Province of Styria and the Climate Change Center Austria. Aim of the events is to disseminate climate knowledge to the interested public and thus support adaptation to climate change.

Domaines Skiables de France Annual Congress, 1-2 October, Paris

The annual meeting of "Domaines Skiables the France - DSF", the association of all French ski-resorts, took place on October 1st and 2nd in Paris. This year DSF celebrated its 80th anniversary with a spectacular party at the world famous Lido on the Champs-Elysées. Several presentations and round-table discussions on the national and international state of the ski market were held at the Defense Congress Center. Carlo Carmagnola (Météo-France) attended this meeting to represent the PROSNOW consortium. A good occasion to network with key stakeholders of the sector and introduce the PROSNOW concept.



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Eau en Montagne, 18 October, Annecy

Carlo Carmagnola (Météo-France) introduced the PROSNOW concept and initial results at a public forum on the "Water in the Mountains", organized at Annecy's Castle (France) on October 18th. During this event, attended by more then 200

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New partnership UIBK/Obergurgl (AT)

On Monday, 22th of October a first meeting took place between the CEO (Werner Hanselitsch) and the responsible snow manager (Georg Fiegl), Michael Rothleitner (Schneezentrum Tyrol), Florian Hanzer and Ulrich Strasser (University of Innsbruck). They are now closely cooperating and trying to catch up with the project progress. Obergurgl is a one of Tirol's and the Alps' finest and snow-surest ski areas. The "Diamond of the Alps", as the secluded mountain village with international flair proudly calls itself, owes its great appeal to sun-flooded slopes between 1800 and 3080 meters above sea level.

New Partnership with Andorra

During the ISSW in Innsbruck (see above), several discussions between members of the PROSNOW consortium and Marc Pons (from Snow and Mountain Research Center of Andorra) led to the addition of a new Andorran pilot ski-resort to PROSNOW. This resort will be handled in the same way as the French pilot ski-resorts and will allow to test the results and the usefulness of the PROSNOW modeling chain in the Pyrenees mountain range. Work is currently in progress to ensure a smooth integration of the new Andorran resort within the framework of the other already-existing Local Working Groups.

people, several topics related to water issues in mountains were covered, from hydroelectricity, to ecosystem diversity, to water consumption for snowmaking.

ISSW, 7-12 October, Innsbruck

The ISSW (International Snow Science Workshop) is the world's largest conference on snow and avalanches and this year it took place in Innsbruck (Austria) from 7 to 12 of October.
Following the motto "A Merging of Theory and Practice", about 1,000 international participants, from experts to decision-makers and stakeholders, gathered to share current advances in snow and avalanche science, case studies and innovative technologies. In addition to several topics mainly related to avalanche accidents, dynamics and forecasting, this edition displayed, for the first time, an entire session dedicated to "Snow making and ski resort management", along with a training course on "Snow management and snow making in ski resorts" (organized by Michael Rothleitner) and a field trip "Water and snow management in modern ski resorts - excursion to Patscherkofel" (organized by Michael Rothleitner and Uli Strasser).
Four major PROSNOW-related contributions, whose proceedings are available online, were presented during the workshop:

- Morin et al., PROSNOW - Provision of a prediction system allowing for management and optimization of snow in alpine ski resorts.
- Carmagnola et al., Combination of climatological information and meteorological forecast for seamless prediction of alpine snow conditions.
- Hanzer et al., Simulating snow conditions in ski resorts with the physically based snowpack models AMUNDSEN, Crocus, and SNOWPACK/Alpine3D.
- Bavay et al., The MeteoIO Pre-Processing Library for operational applications.

Florian Hanzer (UIBK), presenting PROSNOW at ISSW ©C.Carmagnola

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Agenda

- Rencontres Météo Climat Montagne, 14-15/12/2018

Every year, the French ski resort stakeholders meet to discuss two days long about snow and science. This year, the event will be held in Les Menuires ski resort. For this specific event, the first visual PROSNOW output will be presented. This first step will open a new development phase for PROSNOW as specific data is currently collected in each ski resort to run this first version of the demonstrator interface with customized simulations. Carlo Carmagnola (Météo-France) and Hugues François (Irstea) will be there to show PROSNOW's latest results. The event has been announced, and will be widely covered by French media.

- Open-doors for high school students in Grenoble, including PROSNOW presentation

PROSNOW partners Irstea and Météo-France organize for a long time in Grenoble an annual dedicated one day event for high-school students with a school project on snow, avalanches and the mountain environment. This year, PROSNOW will be featured in this day (presentation by Carlo Carmagnola, Météo-France), organized on January 24, 2019 in Grenoble. This even is organized together with the French Snow and Avalanche Association ANENA. Deadline for registration: 20/12/2018

- ECCA conference, 29-31 May 2019

PROSNOW should be presented at this conference, in a more general session on Climate Services "Forefront climate services for climate adaptation and disaster risk reduction". Rather than presenting one project after the other, this session will mix projects (EU H2020, ERA4CS and Copernicus), in thematic presentations (water, infrastructure, etc.) demonstrating the advancement of climate services.

Visit of a ski resort during ISSW ©S.Morin

PROSNOW upcoming steps

The PROSNOW demonstrator

Frédéric Bray and Hugues François from IRSTEA developed the first version of the demonstrator's web interface.In the current version, it is possible to display the snow height and SWE values and for each SRU (Ski-resort Reference Unit, or ski slope sub-sector), for different dates and for different snow management. Each partner ski resort will have the opportunity to discuss the features of this version during meetings in January and this will allow PROSNOW partners to focus on the more useful features of the demonstrator for the rest of the development.

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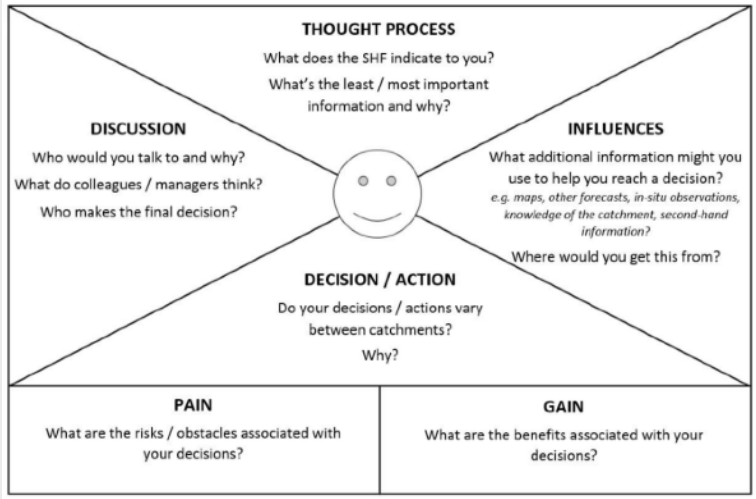
Journal Watch

Neumann, J. L., Arnal, L., Emerton, R. E., Griffith, H., Hyslop, S., Theofanidi, S., and Cloke, H. L.: Can seasonal hydrological forecasts inform local decisions and actions? A decision-making activity, *Geosci. Commun.*, 1, 35-57, https://doi.org/10.5194/gc-1-35-2018, 2018.

One key scientific question of PROSNOW, is to what extent forecasts at the scale of the entire snow seasons can help in the daily decision making process. This is an entirely new question in the snow management community, which can benefit from emerging experience from neighbouring fields. The new study by Neumann et al. introduces results from an hydrological forecasting project, based on seasonal forecasts from the European Center for Medium-range Weather Forecast (ECMWF). In particular, the study reports on the formal procedure to assess integration of this information for operational decision making process, using an exchange structure between research and operational stakeholders very similar to PROSNOW Local Working Groups. The authors have designed an "empathy" map (see below), used by all study participants, to assess the level of confidence and usefulness of seasonal forecasts (thought process, discussion, influences, decision/action, pain vs. gain). Great inspiration for PROSNOW further steps, from the EU Horizon 2020 project IMPREX.



Portraits of PROSNOW members

Franziska Koch, University of Natural Resources and Life Sciences, Vienna, (BOKU)

1) Hello Franzi, could you tell more about you?

I am a scientist working at the University of Natural Resources and Life Sciences (BOKU) in Vienna. My research focus is on deriving information on the amount of snow and its degree of wetness based on GPS signals. Moreover, I am interested in coupling measured snow-hydrological data with models and remote sensing products. If you don't find me in the office, I am most probably skiing, ski-touring, or climbing in the Alps.

2) What is you role in PROSNOW?

Together with Prof. Matthias Bernhardt at BOKU, I am in charge to simulate snow production and grooming processes in the German skiing resorts Garmisch Classic and Zugspitze with the snow model SNOWPACK/Alpine3D. Moreover, we develop visualization proposals to present the scientific results on meteorological and snow variables more practically to the ski resorts.

3) What are your expectations regarding PROSNOW?

PROSNOW develops a practical decision support system on snow management regarding different time scales of weather and climate forecasts. By coupling meteorological variables with snowpack models, I expect that PROSNOW will help to better estimate the amount and timing of snow production to avoid unnecessary energy consumption and to increase ski resort efficiency.

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Portraits of PROSNOW members (2)

1) Hello Paola, can you tell us more about yourself?

I am currently a Post Doc at Meteo France, in Toulouse. I am a statistician with a PhD in Climate Change. I work on statistical methods for the correction of biases of climate models and to downscale their predictions at finer spatial scales. I am also interested in the spatialization of meteorological fields, and all my work specifically focuses on mountainous areas.

2) What is your role in PROSNOW?

Together with Christian Viel, I provide the forecasts of the set of atmospheric variables (such as air temperature, precipitation, wind, ...), that will constitute the inputs of the snowpack models. As the forecasts are required on the distinct sites of each ski-resort, we need to resort to statistical methods to project or downscale on those locations the outputs of the climate models, which are originally produced on a coarser spatial grid. A very engaging aspect is that, for PROSNOW, we will provide the predictions combining weather, sub-seasonal and seasonal forecasts in a seamless approach.

3) What are your expectations regarding PROSNOW ?

I expect PROSNOW to develop a pilot climate service that is effectively built on the needs of snow management, and, at the same time, that relies on and stimulate state of the art forecasts products. In this sense, I believe it will constitute a practical and solid support for informing decisions on snow production and grooming, towards a more efficient and sustainable use of the natural resources.

Obituary

It is with great sadness that PROSNOW members have learnt the passing away of Michel Frison-Roche, manager of the Les Saisies ski resort, in October 2018. Michel was an early adopter of the concept of climate services in support of ski resort management, already involved in the PROSNOW precursor project EUPORIAS.