

## SPRING CONDITIONS IN SAVOIE

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**Key words :** Climate projections, Mid-century, Tourism, Mountains, Savoie, Temperature, Precipitation, Snow, Radiation

### Target groups

- **Tourism operators**
- **Professional organisations and federations**
- **local and regional authorities**

### Relevance to the Case-Study Requirements

In the future, the spring season could become a more popular season than the summer season for some outdoor activities (if conditions are optimal in terms of sunshine, temperature etc.). Changing practices are already being observed. This can pose problems for tourism operators (in terms of logistics for camping places and mountain refuges, for instance), who are not currently prepared to operate in the spring season. Having access to climate projections on spring conditions (temperature, sunshine and snowfall) would allow institutional actors to develop a strategic vision for such changing conditions, and help actors in the field prepare themselves and improve organisation for any significant increases in clients during spring.

### The Approach

Simulations of climate change over mountainous regions have been carried out within the ANR/SCAMPEI project ([http://www.cnrm.meteo.fr/scampeipresentation\\_scampeipresentation/index.php](http://www.cnrm.meteo.fr/scampeipresentation_scampeipresentation/index.php)). They project the climatic response over mountainous regions following the A1B greenhouse gas emissions scenario. The simulations were carried out by the LMD, LGGE and CNRM modelling groups at Météo France using high-resolution regional climate models at a 12 km horizontal resolution. Afterwards, statistical analysis is applied to take into account the complex orography in mountainous regions. The simulations were run over three different periods: the present period (1961-1990), the near future (2021-2050) and the far future (2071-2100).

The SCAMPEI simulations are available on the project webpage ([http://www.cnrm.meteo.fr/scampeipresentation\\_scampeipresentation/index.php](http://www.cnrm.meteo.fr/scampeipresentation_scampeipresentation/index.php)) as well as through the DRIAS portal (<http://www.drias-climat.fr/>). Using this data base, the model outputs corresponding to specific user needs in terms of parameters (mean-max-min temperature, snow fall, precipitation, solar radiation) and spatial scale (Savoie) have been processed to make them relevant and usable by stakeholders. Here, we consider the Savoie region for all altitude ranges. A major issue was to represent in a simple way the trend of future temperature, precipitation, snow fall and solar radiation together with the range of uncertainty around this trend.

### The Product

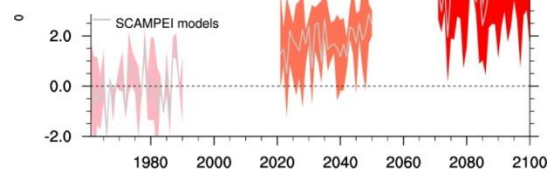
Here, we present the change in maximum and minimum temperature, snow fall, precipitation and solar radiation during the spring season in Savoie. The spring season is defined as the average over the months of March, April and May. Minimum and maximum temperatures are projected to increase in the future with the increase stronger in the far future. Maximum temperature increases more than minimum temperature. By the end of the century, the increase is on average 3.5°C for minimum temperature and 3.9°C for maximum temperature. The positive temperature trend is associated with a decrease in snow fall during the spring season by the end of the century.

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## Savoie

Maximum Temperature anomalies  
from 1961-1990 average

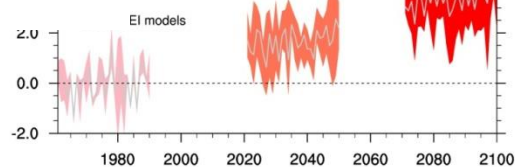
°C	T <sub>min</sub>	T <sub>mean</sub>	T <sub>max</sub>
2021-2050	0.6	1.8	3.1
2051-2100	2.1	3.9	5.5



## Savoie

Minimum Temperature anomalies  
from 1961-1990 average

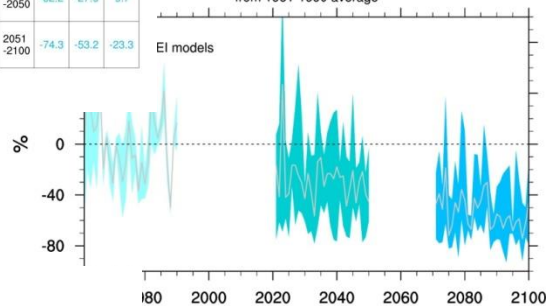
°C	T <sub>min</sub>	T <sub>mean</sub>	T <sub>max</sub>
2021-2050	0.6	1.7	2.7
2051-2100	2.0	3.4	4.5



## Savoie

snow fall anomalies  
from 1961-1990 average

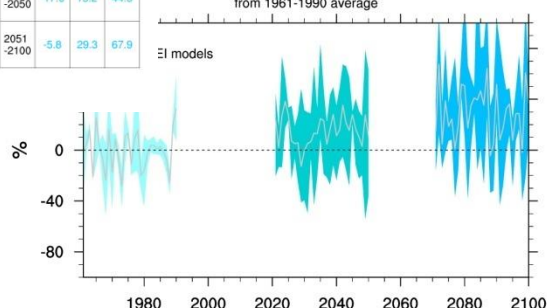
%	SN <sub>min</sub>	SN <sub>mean</sub>	SN <sub>max</sub>
2021-2050	-62.2	-27.6	9.7
2051-2100	-74.3	-53.2	-23.3



## Savoie

precipitations anomalies  
from 1961-1990 average

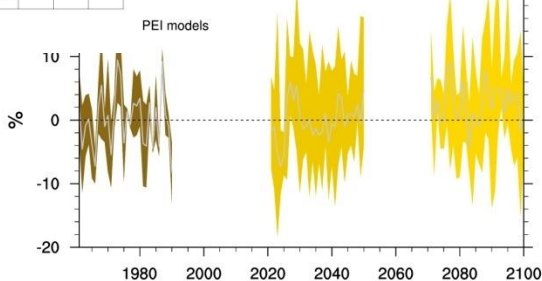
%	P <sub>min</sub>	P <sub>mean</sub>	P <sub>max</sub>
2021-2050	-17.6	15.2	44.3
2051-2100	-5.8	29.3	67.9



## Savoie

solar anomalies  
from 1961-1990 average

%	SW <sub>min</sub>	SW <sub>mean</sub>	SW <sub>max</sub>
2021-2050	-7.6	-0.0	9.5
2051-2100	-6.5	2.7	19.5



Projections of maximum and minimum temperature, snowfall, precipitation and solar radiation over the Savoie region for spring. White lines show the average of the three models and the shaded area the range across the models. The tables give the maximum/minimum model changes as well as the mean change. The range of temperature increase across the models is 2 to 5°C (see tables). This trend is associated with a decrease of 50% on average for snowfall and an increase in liquid precipitation of 30% by 2100. Solar radiation shows a small increase.

## Making the Product Usable

This product could be integrated in the DRIAS portal, where figures with the mean trend and the associated uncertainties are useful for stakeholders. Recommendations will be addressed to them in terms of improvements of the representation (in graphs and maps) of model outputs. This product will be useful in the hands of policy makers and professional organizations in order to raise awareness of future climate change. To make the product usable for professional operators would require work on the development of seasonal forecasts and decadal predictions.

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