



## **Analysis of future climate change projections for the Italian Region from the IPCC AR4 simulations**

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The goal of this study is to survey the most recent projections of climate change for the Italian Region (with particular attention to the Alpine portion of the region) provided by the latest state of art AOGCMs in the PCMDI-IPCC archive.

We analyzed historical and future simulations of monthly-mean surface air temperature (T) and total precipitation (P) from an ensemble of 20 AOGCMs under three emission scenarios (A2, A1B and B1). In addition, we examined the evolution of sea surface temperature and sea level pressure to gain further insight into the projections.

We first compared simulated monthly-mean T and P from the IPCC models with Northern Italy observations for the period 1951-2000. We calculated bias indices for each model's performance at the annual timescale over the area covered by the observational dataset. A separate set of bias indices were calculated by also considering orographic information to distinguish mountain grid points from flat ones.

Using these bias indices, and different ensemble averaging methods, we then examined future climate change projections for this region under the three different emissions scenarios. Our analysis shows that the emissions pathway chosen has a greater impact on future simulated climate than the criteria used to obtain the ensemble means. Annual-mean T is projected to increase by about 2-4°C over the period 1990-2100, with roughly 5 °C in summer. Annual-mean P is projected to decrease during the 21st century, though with a likely wintertime increase. In spite of this light increase in winter, however, snowfall is expected to decline consistently over the century because of the warming, with serious impact on Alpine Glaciers.