# Meteorologisk institutt



# **Climate projections over Poland. Assessment of** bias-corrected EURO-CORDEX simulations

# Summary

Simulations of one historical period (1971-2000) and two future horizons (2021-2050 and 2071-2100) assuming two representative concentration pathways (RCP4.5 and RCP8.5) were produced. They consist of projected daily mean, minimum and maximum air temperatures and precipitation totals of nine EURO-CORDEX regional climate model outputs bias corrected to a 5 km × 5 km grid.

# 1. Overall significant warming

Based on the multimodel ensemble mean or the individual simulations, climate projections show an overall warming in all parts of Poland and in all seasons.



-3.75 -3.00 -2.25 -1.50 -0.75 0.00 0.75 1.50 2.25 3.00 3.75 4.50 Ens. mean of absolute changes in mean temperature (2071-2100 w.r.t. 1971-2000) [° C]

Projected temperature changes (°C) for the far future (2071–2100) assuming the high concentration RCP8.5 scenario. Maps show annual and seasonal changes in the multi-model ensemble mean of absolute temperature (left) and relative precipitation (right) changes with regard to the control period (1971–2000). The legend "M-CC" means the areal mean change estimated from the gridded data.

4. References

5.25 6.00



# 2. Uncertain increase in precipitation

Based on the multi-model ensemble mean, climate projections show an overall uncertain increase in precipitation overall Poland except mountainous areas in the south where a decrease is also expected. However, individual model simulations showed a considerable discrepancy between the simulations suggesting large uncertainty in the projections







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Modeled regional temperature (°C) anomalies by the common subset of global climate models, i.e. GCMs used in the Euro-CORDEX simulations (red line and envelope) and the full set of CMIP5 global climate models (orange line and yellow envelope) assuming RCP4.5 emission scenario. All simulation are smoothed with a ten-years moving average. The boxplots show the average over 2071-2100 based on the actual 5th and 95th percentiles, i.e. without smoothing.

## 3. Underestimated warming!

When confronted to empirical-statistical downscaling of the full CMIP5 multi-model ensemble, results show that

- both methods agree well on the temperature increase based on same samples of used GCMs,

- ESD suggest that DD underestimate both the ensemble mean and the spread of possible temperature outlooks.