



## **Climate change scenarios for the Indian summer monsoon**

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This study discusses projections of the Indian summer monsoon (ISM) for the time period 1960-2100 by the regional climate model COSMO-CLM. The COSMO-CLM simulations follow four different future greenhouse gas emission scenarios (SRES A2, A1B, B1 and commitment) and are driven by the global atmosphere-ocean model ECHAM5/MPIOM. To investigate the future evolution of the ISM, the all-Indian monsoon rainfall (AIMR) index and two vertical wind shear indices are considered.

The COSMO-CLM simulations show significantly decreasing future ISM trends in all indices for the scenarios A2, A1B and B1. Parts of north-western India are projected to face a decrease in rainfall during the monsoon season of over 70% within this century. For the wind shear indices, the projected decrease is shown to be mainly due to changes in the upper troposphere winds at 200 hPa. The ECHAM5/MPIOM shows similar results for the wind shear indices but not the AIMR. Here, the ECHAM5/MPIOM shows an increase in all scenarios. While in the COSMO-CLM more stable conditions are the main reason for lower precipitation amounts, the ECHAM5/MPIOM is dominated by the increasing land-ocean temperature gradient resulting in more precipitation. Although this wind-precipitation paradox can not be seen in the COSMO-CLM simulations, a similar behaviour for the intensity of precipitation appears.