



An assessment of reliability in climate projections of CMIP5 models: A cloud variation perspective

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This study examines cloud simulations by the Coupled Model Intercomparison Project Phase 5 (CMIP5) models and evaluates the reliability of climate change projections based on the cloud feedback known to play a critical role in determining the modeled climate sensitivity. The observed relationships between cloud cover and large-scale meteorological variables provide a realistic metric for the model validation. The performance of the models in reproducing the observed cloud-meteorology correlation was evaluated in terms of their annual-mean climatology, seasonal, and interannual variations, respectively. The evaluation metrics mostly consist of global and regional coefficients of spatial pattern correlation and root-mean-squared errors between the observed and the simulated. The model diagnostics indicate a large spread across the models in the global mean sea temperature change, to a large extent, proportional to the modeled cloud-radiation feedback. The model spread is substantially reduced by carefully applying the evaluation metric and selecting most reliable models. Remaining models show a good agreement in the sign and the magnitude of the cloud radiation feedback and the geographical pattern of total cloud cover reduction in the future climate. The results of this study address how much we can reduce the uncertainty in global climate temperature projections through the confidence in cloud feedback.