



Hydrological Response Under CO₂ Forcing: A Process Based Assessment of CMIP5 models.

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The hydrological response of CMIP-5 models under increased concentrations of CO₂ is investigated. Initial focus is on the annual global-mean hydrological response for the Abrupt4xCO₂ and 1cptCO₂ experiments when compared to pre-industrial control values. Quantification of the effective climate sensitivity and hydrological response for the above experiments is presented and discussed. The hydrological sensitivity (percentage change in precipitation per degree warming) for each model is calculated from the Abrupt4xCO₂ experiment. Such hydrological sensitivities are then combined with results from the 1cptCO₂ experiment, using an energy balance approach to identify the physical processes which are responsible for spread in the inter-model hydrological response. Full details of the approach and results are presented. The contribution of energy balance constraints on the spread of large-scale regional precipitation responses is also discussed.