Geophysical Research Abstracts,
Vol. 11, EGU2009-8162, 2009
EGU General Assembly 2009

Projections of extreme events using imperfect models

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It is well known that systematic biases of GCMs and RCMs are an integrated part of these models; we continuously work towards their elimination. Within the European ENSEMBLES projects emerging evidence suggests that some of these systematic biases have a clear tendency of influencing the interpretation of climate change signals in experiments focusing on anthropogenic induced climate change. Here we demonstrate that individual models have a distinct systematic bias relating temperature and precipitation bias to observed values, with a model dependent non-linear dependency on the observed quantity. Furthermore, we demonstrate that the common assumption of bias cancellation (invariance) in climate change projections can have significant limitations when temperatures in the warmest months exceed 4–6 °C above present day conditions. We then explore the implications of this finding, when it comes to the projections of temperature and precipitation extremes in a changing climate.