Geophysical Research Abstracts
Vol. 13, EGU2011-2176, 2011
EGU General Assembly 2011

Global precipitation response to changing climate forcings since 1870

adeline bichet, martin wild, doris folini, and christoph schär
ETH Zürich, Switzerland (bichetadeline@yahoo.fr)

Predicting and adapting to changes in the hydrological cycle is one of the major challenges for the twenty-first century. To better estimate how the hydrological cycle will respond to future changes in climate forcings, it is crucial to understand how it has evolved in the past and why. In our study, we use an atmospheric global climate model with prescribed sea surface temperatures (SSTs) to investigate how changing external climate forcings have affected global land precipitation in the period 1870-2005. We show that prescribed SSTs (encapsulating other forcings) are the dominant forcing driving the decadal variability of land precipitation since 1870. On top of this SSTs forcing, we also find that increasing aerosol emissions results in a reduction of global land precipitation by up to 30 mm/year between about 1930 and 2000. Similarly, increasing greenhouse-gas concentration leads to an increase in global land precipitation by up to 10 mm/year between about 1950 and 2000. Finally, our results also suggest that between about 1950 and 1970, increasing aerosol emissions had a larger impact on the hydrological cycle than increasing greenhouse gases concentrations. This study particularly demonstrates the substantial impact of aerosol emissions and other forcings on global precipitation over decadal timescales and discusses the associated physical processes.