Geophysical Research Abstracts, Vol. 8, 08270, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08270

Constraints on climate sensitivity from temperature reconstructions of the last millennium

G. Hegerl (1), **T. Crowley** (1), W. Hyde (1), and D. Frame (2)
(1) Duke University, USA, (2) Oxford University, UK (hegerl@duke.edu/919-684-667)

The magnitude and impact of future global warming depends on the sensitivity of the climate system to changes in greenhouse gases. The commonly accepted range for the equilibrium global mean temperature change in response to a doubling of the atmospheric carbon dioxide concentration is 1.5˚C to 4.5˚C. However, a number of studies leave open the possibility of significantly higher sensitivities, yielding observational upper 95% limits on climate sensitivity of 7.7˚C to above 9.0˚C. Here we demonstrate that observational estimates of climate sensitivity can be tightened if reconstructions of northern hemispheric temperature over the last several centuries are considered. We simulate the temperature response to past volcanic, solar and greenhouse gas forcing and determine which climate sensitivities yield simulations that are in agreement with proxy reconstructions. After accounting for the uncertainty in reconstructions and estimates of past external forcing, we find an independent estimate of climate sensitivity that is very similar to those from instrumental data. If the latter are combined with the result from all proxy reconstructions, then the 5-95% range shrinks to 1.5 to 6.2˚C, and tighter than that based on a reconstruction starting in AD 1500. This result substantially reduces the probability of climate sensitivity being outside the range explored by present climate models.