Geophysical Research Abstracts
Vol. 12, EGU2010-3383, 2010
EGU General Assembly 2010

Thermodynamics of Climate Change: Generalized Sensitivities

Valerio Lucarini (1,2), Klaus Fraedrich (3), and Frank Lunkeit (3)

(1) University of Reading, Department of Meteorology, Reading, United Kingdom (v.lucarini@reading.ac.uk), (2) University of Reading, Department of Mathematics, Reading, United Kingdom, (3) Meteorologisches Institut, Klima Campus, University of Hamburg, Grindelberg 5, 20144 Hamburg, Germany

Using a recent theoretical approach, we study how the impact of global warming of the thermodynamics of the climate system by performing experiments with a simplified yet Earth-like climate model. In addition to the globally averaged surface temperature, the intensity of the Lorenz energy cycle, the Carnot efficiency, the entropy production and the degree of irreversibility of the system are linear with the logarithm of the CO2 concentration. These generalized sensitivities suggest that the climate becomes less efficient, more irreversible, and features higher entropy production as it becomes warmer.