Geophysical Research Abstracts, Vol. 8, 10527, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10527

Evaluating GWPs as a proxy for radiative forcing based on historical data

K. Tanaka (1,2), D. Rokityanskiy (3)

(1) Unit of Sustainability and Global Change, University of Hamburg, (2) International Max Planck Research School on Earth System Modelling, Hamburg, (3) International Institute for Applied Systems Analysis (IIASA) (tanaka@dkrz.de / Fax: +49 (40) 4117 3298)

Robustness and vulnerability of Global Warming Potential (GWP) is evaluated as a proxy for the radiative forcing. GWPs of the major non-CO_2 Greenhouse Gases (GHGs) (CH_4, N_2O, CFC-11, CFC-12, and SF_6) were applied for scaling CO_2 radiative efficiency to calculate the radiative forcings based on the past emissions associated GHGs. Similar evaluations have been performed by Wigley (1998), Reilly et al. (1999), O'Neill (2000), Smith and Wigley (2000), Fuglestvedt et al. (2003), and Shine et al. (2005); however, our study is the first attempt to evaluate GWP by using historical data. It was found that the time horizons of 20, 100, and 500 years selected arbitrary in IPCC are all too long to reflect the radiative forcing history. Furthermore, continuing use of GWP with the 100 years time horizon as implemented in Kyoto Protocol would significantly underestimate the future radiative forcing in all the SRES cases. We numerically demonstrated that the optimum time horizon depends on the time perspective and the composition of GHGs. All of the evidences suggest a need for devising a dynamic mechanism that updates GWP as a proper conversion coefficient to be used in policy considerations progressively as new information on GHG concentrations and radiative forcing is acquired in the future.

References

Fuglestvedt et al. (2003) *Climate Change*, **58**, 267-331; O'Neill (2000) *Climatic Change*, **44**, 427-443; Reilly et al. (1999) *Nature*, **401**, 549-555; Shine et al. (2005) *Climatic Change*, **68**, 281-302; Smith et al. (2000) *Climatic Change*, **44**, 445-457; Wigley (1998) *Geophysical Research Letters*, **25**, 2285-2288.