Evaluating Global Warming Potentials (GWPs) - An Application of ACC2 Inverse Calculation

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Global Warming Potentials (GWPs) are evaluated as proxies of the historical temperature by applying them to convert historical CH_4 and N_2O emissions to equivalent CO_2 emissions. Our GWP analysis is based on the historical Earth system evolution obtained from the inverse calculation for the Aggregated Carbon Cycle, Atmospheric Cycle, and Climate Model (ACC2). Indices higher than the Kyoto GWPs are required to reproduce the historical temperature. The GWP for N_2O, in particular, does not approximate the historical temperature with any time horizon because the GWP definition and calculations assume a background system different from the ACC2 inversion results. In addition, indices have to be progressively updated upon the acquisition of new measurements and/or the change in our understanding on the Earth system processes.