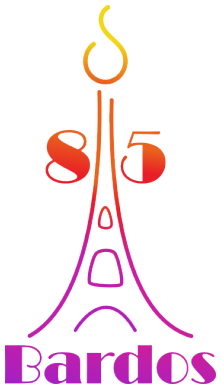
Kinetic equations and turbulence

The Mathematics of Earth's Greenhouse Effect

Olivier Pironneau

Starting from the change in extinction coefficient due to CO_2 (or other greenhouse gas (GHG)) we analyse the Vector Radiative Transfer Equations for Rarth's atmosphere. An iterative method called Iterations on the Source is shown to be monotone and convergent, leading to an existence of solution and an efficient numerical algorithm. The analysis is extended to varying and also discontinuous refraction index (Fresnel's conditions) to analyse clouds and air-ocean interface. All numerical simulations show an increase of temperature due to GHG near the Earth surface but a cooling at high temperature.



In honor of Claude Bardos's 85th birthday