Tino Redemann et al., J Earth Sci Clim Change 2017, 8:10(Suppl)
DOI: 10.4172/2157-7617-C1-036

Mathematical model to calculate the sensitivity of anthropogenic CO_2 on global earth temperature

Tino Redemann[1], **Eckehard Specht**[1] and **Roman Weber**[2]
[1]Otto von Guericke University Magdeburg, Germany
[2]Clausthal University of Technology, Germany

There are countless climate models, which predict the impacts of the anthropogenic CO_2 emissions on the global earth temperature. Because of the large number of influencing parameters used, these models are mostly very complex, so the influences of the particular parameter can hardly be comprehended, i.e. the CO_2 concentration in the atmosphere. Due to this fact, the greenhouse effect is described with simple analytical resolvable equations. Therefore, a simplified uniform surface temperature of the earth is assumed. The radiation exchange between earth, clouds, space and the layers of gas between is calculated with these equations, which were developed for the analogue radiation exchange in industrial furnaces. With this model, the temperature profile in the atmosphere can be described relatively well. The CO_2 in the atmosphere acts as a radiation shield, which increases the heat resistance against the outgoing long-wave radiation from the earth surface. The known average temperature of the Earth was used to validate this model. When the CO_2 in the atmosphere is doubled, the absorptivity increases slightly. Because of this increase, the temperature of the earth surface has to increase about 0.4 Kelvin to compensate the increased heat transport resistance. Since 1860, the Earth's temperature has already risen due to anthropogenic CO_2 emissions by 0.2 Kelvin. The measured increase of about 0.9 Kelvin is attributed to side effects caused by the CO_2 related temperature increase. Therefore, a temperature increase of more than 0.4 Kelvin is predicted for the future. Without CO_2, the temperature of the Earth would be 4 K colder.

Biography

Tino Redemann belongs to the Institute of Fluid Dynamics and Thermodynamics at the Otto-von-Guericke-University Magdeburg and to the Institute for Energy Process Engineering and Fuel Technology at the Clausthal University of Technology in Germany and conduct research in the field of heat radiation in industrial kilns.

tino.redemann@ovgu.de

Notes: