

Study of Future Atmospheric Concentrations of CO₂ and CH₄ on Global Heat Absorption and Retention

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Atmospheric greenhouse gas concentrations of both carbon dioxide (CO₂) and methane (CH₄) are increasing at a decennial rate of +34 parts per million for CO₂ and +70 parts per billion for CH₄. The purpose was to determine the severity of CO₂ versus CH₄ on temperatures using this trend. Six sealed boxes were built to contain specific concentrations of CO₂ and CH₄ to test their ability to absorb and retain heat. The testing chambers contained (control) current atmosphere air, (experiment 1) CO₂ concentration projected to year 2070, (experiment 2) CH₄ concentration projected to year 2070, (experiment 3) combined CO₂ and CH₄ concentrations projected to year 2070, (experiment 4) CO₂ concentration projected to year 2220, and (experiment 5) CH₄ concentration projected to year 2220. Test chambers were placed outside and subjected to various environmental conditions for equal amounts of time. Outside temperatures ranged from -2.8C to 20.0C under conditions from sun to fully overcast. Internal temperatures were recorded using calibrated thermometers inside each chamber. Every chamber showed significantly higher temperatures and net heat gain (Q) versus the control. Chamber 3 (combined CO₂ and CH₄ concentrations) showed the highest average net gain of heat at 15.40J compared to control at 10.12J, a 52.2% increase. The others averaged 24.1% to 46.6% higher than the control. CO₂ and CH₄ together contributed more to heat absorption than either one alone. Comparatively only very small concentrations of CH₄, 1/1000 times that of CO₂, caused similar warming and heat retention trends. Additional studies of the combined effects of these gases as well as the half-life of CH₄ in the atmosphere need to be conducted.