AGU: Journal of Geophysical Research, Atmospheres

Editors' Highlight

Intertwined feedback loops between atmospheric chemistry and climate

Accurately predicting climate change involves a thorough knowledge of how perturbations in the Earth's radiation balance feed back to influence temperature and other climate variables. These feedbacks alter the Earth's capability to absorb incoming solar radiation, and they involve water vapor, clouds, and ice and snow effects. Traditionally, changes in atmospheric chemistry induced by changes in climate have not been fed back into climate models to further change the climate itself. Thus, studies that evaluate the effect of reducing emissions typically assume a constant climate state rather than an evolving one, neglecting the effects of how changing atmospheric compositions influence climate. Noting that climate models, though increasingly sophisticated, have not yet successfully coupled feedbacks between climate and atmospheric chemistry in a comprehensive way, *Raes et al.* et al. (2010) developed a framework to help models better fuse these interrelated concepts together. When applying this framework to a specific model, they found that although atmospheric chemistry has only a small effect on climate sensitivity on a planetary scale, locally atmospheric chemistry can influence climate sensitivity by 20–30%. Further, climate processes can significantly amplify the relationship between emissions and burdens of air pollutants. As a result, climate, through feedback processes, exacerbates air pollution.

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Published: 26 June 2010

Citation: Raes, F., H. Liao, W.-T. Chen, and J. H. Seinfeld (2010), **Atmospheric chemistry-climate feedbacks**, J. Geophys. Res., 115, D12121, doi:10.1029/2009JD013300.