

Radiative effects due to tropospheric ozone and carbonaceous aerosol enhancements caused by Asian wildfires during Spring, 2008.

Murali Natarajan, R. Bradley Pierce, Todd Schaack, Allen Lenzen, Jassim Al-Saadi, Amber Soja, Thomas Charlock, and Fred Rose

Long-range transport of ozone precursor species and carbonaceous aerosols emitted by wildfires may affect the atmospheric composition and regional climate far away from the location of the fires. Major outbreaks of fires occurred in 3 areas of Asia, Kazakhstan, Siberia, and Thailand, during the spring of 2008. Satellite and aircraft-based observations and trajectory studies have identified the transit of the plumes from these fires across the Pacific. We have conducted simulations of the effects of these fires on the atmospheric composition using the Real-time Air Quality Modeling System (RAQMS). RAQMS is a global scale meteorological and chemical modeling system with unified (stratosphere/troposphere) chemistry module. Model results, for example, indicate that increases of 10 ppbv in upper tropospheric ozone at 180W longitude and northern mid-latitudes in April, 2008 could be attributed to these fires. Large increases in aerosol optical depth due to carbonaceous aerosols are also seen nearer the fire location. Both tropospheric ozone and carbonaceous aerosols influence the atmospheric energy balance and climate. We use an off-line radiative transfer model along with the RAQMS chemical and aerosol analyses to calculate the direct radiative forcing during April, 2008, due to Asian wildfire emissions. Arctic indirect radiative forcing due to these emissions are evaluated using RAQMS aerosol extinction analyses in conjunction with MODIS retrievals of cloud liquid water and effective radius. We will discuss the radiative forcing results and the relative influences of the different fire events.