AFRICA AS A REGIONAL AND GLOBAL SOURCE OF ATMOSPHERIC GASES AND PARTICULATES

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Abstract

The role of the continent of Africa as a source of gaseous and particulate emissions to the atmosphere is investigated in this study. Sources of gases and particulates from Africa include fossil fuel combustion, biomass burning, and biogenic soil emissions of nitric oxide. This study represents the first comprehensive database of gaseous and particulate emissions developed for the continent of Africa on a country by country basis and establishes the framework for country-by-country assessment of greenhouse gases emissions as required by the Kyoto Conference on Global Warming, which was attended by representatives from more than 100 countries.

Calculations of gases and particulates resulting from fossil fuel combustion were based on the Intergovernmental Panel on Climate Change (IPCC) guidelines. Calculations of gases and particulates resulting from biomass burning were based on fire counts obtained from the Defense Meteorological Satellite Program (DMSP) Block 5 satellites and emission ratios for various gaseous and particulate fire products obtained during the recent Southern African Fire-Atmosphere Research Initiative (SAFARI), an activity of the international Global Atmospheric Chemistry (IGAC) Project, part of the international Geosphere-Biosphere Program (IGBP). The calculations of biogenic soil emissions of nitric oxide were obtained with the NOAA Geophysical Fluid Dynamics Laboratory (GFDL) Biogenic Soil NOx Model.

Africa was found to be a significant global source of the following gases: carbon dioxide (CO2), carbon monoxide (CO), methyl chloride (CH3Cl), oxides of nitrogen (NOx), and carbon particulates. The results indicate that Africa is the world's single largest continental source of emissions due to biomass burning and that these emissions are likely to increase with time. The study established that on a global scale, Africa was the largest source of soil biogenic NOx. The importance of Africa as a key global source of trace gases and aerosols has been underestimated in the past. This research offers a new picture of gaseous and particulate emissions from Africa. Africa' s global significance as a source of atmospheric gases is very important, i.e., more than 11% of the world's total anthropogenic CO2 production results from biomass burning in Africa. Africa contributes nearly a third of the global anthropogenic CH3Cl, a third of the global anthropogenic NOx, and almost 20% to the world's global carbon particles anthropogenic budget.