Potential economic benefit of reduced SO_2 emissions during the South Asian monsoon

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The economies of India and other South Asian countries are negatively affected by atmospheric sulphur dioxide (SO_2) via the SO_2's diminishing effect on monsoon rainfall. We assess the effects of changes in Asian monsoon precipitation patterns resulting from changing SO_2 emissions and present a preliminary analysis of the economic benefits that could result from reduced emissions of SO_2 in South Asia. Our analysis rests on two relationships: SO_2 (South Asian emissions and background) causes diminished South Asian monsoon rainfall, and the Indian economy is strongly dependent on its agricultural sector and hence on monsoon rainfall. We use literature estimates (Guo et al., 2016; Gadgil and Gadgil, 2006) of the size of these factors to quantify the potential magnitude of this effect, and we estimate that the marginal economic benefit to the agricultural sector of reducing annual SO_2 emissions from South Asia is about US$810 per tonne of SO_2. If the calculation is limited to the 3-4 month period of the monsoon, the marginal benefit is commensurately higher. The major source of the SO_2 is the combustion of coal in India, and so India would be the prime beneficiary of any reductions. A levy on SO_2 emissions from Indian coal (or some equivalent measure) would thus seem to be economically efficient just based on the agricultural impact. Uncertainties in this preliminary calculation include the assumption that there is a linear relationship between SO2 emissions and rainfall, the economic scaling factor given the rapid recent growth in the Indian economy, and the equal effectiveness of the location of the emissions.

Key words: South Asian Monsoon, sulphate aerosols, cost

References

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