Background & Objectives

Background

- India is undergoing rapid industrialization.
- High aerosol concentrations and AOD values have been observed, indicated by both ground- and satellite-based measurements.
- Aerosols are high in sulfate, nitrate, BC, and OC and are mostly from anthropogenic emissions.
- Increasing emissions have modified the regional climate through the direct and indirect radiative effects of aerosols.
- Energy consumption has increased substantially since 1990. However, few works estimate recent-year emissions.

Objectives

- Develop a new inventory of gaseous (SO2, NOx, and NMVOC) and primary carbonaceous aerosol (BC and OC) emissions from India in 2010.
- Support the GVAX campaign, which is designed to characterize aerosols, regional transport, and cloud-aerosol interactions in the Ganges Valley region of India.

Methodology

- The values in the parentheses indicate the 95% CI around the mean.
- Monthly statistics of... Power generation
- Power generation
- Industrial production
- Passenger & freight volume
- Transport
- Domestic
- Technology divisions
- Agriculture
- Population
- Monthly emissions by sector
- Transportation
- State fuel use data
- EDGAR 4.1 for NOx and NMVOC
- Emissions factors, controls
- National SO2, BC and OC emissions
- Indian official statistics, etc.
- EDGAR 4.1 for NOx and NMVOC
- GAINS-Asia model
- EDGAR 4.1
- Monthly emissions by sector
- EDGAR 4.1 for NOx and NMVOC
- Plant-wise emissions
- National SO2, BC and OC emissions
- State-wise emissions
- Monthly fuel use data
- IBA energy statistics
- Fuel use data
- Fuel use in more than 120 sector/activity/technology combinations
- National SO2, BC and OC emissions
- Indian official statistics, etc.

SO2, BC and OC Emissions

<table>
<thead>
<tr>
<th>SO2</th>
<th>BC</th>
<th>OC</th>
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<tbody>
<tr>
<td>Power generation</td>
<td>5236</td>
<td>14</td>
</tr>
<tr>
<td>Industry</td>
<td>2784</td>
<td>214</td>
</tr>
<tr>
<td>Domestic</td>
<td>583</td>
<td>1946</td>
</tr>
<tr>
<td>Transportation</td>
<td>144</td>
<td>111</td>
</tr>
<tr>
<td>Subtotal</td>
<td>874</td>
<td>2228</td>
</tr>
<tr>
<td>Forest &amp; savanna burning</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Agricultural waste burning</td>
<td>44</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>8807</td>
<td>1015</td>
</tr>
</tbody>
</table>

Gridded Emissions @ 0.1° × 0.1°

- Monthly statistics of...
- Power generation
- Power generation
- Industrial production
- Passenger & freight volume
- Transport
- Domestic

Seasonality of Emissions

- Monthly statistics of...
- Power generation
- Power generation
- Industrial production
- Passenger & freight volume
- Transport
- Domestic

Conclusions

- SO2, BC, and OC emissions for India in 2010 are 8.81 Tg, 1.02 Tg, and 2.74 Tg, respectively, and the 95% confidence intervals for these estimates are -16% to 17% for SO2, -41% to 80% for BC, and -44% to 92% for OC.
- Coal-fired power plants and traditional cookstoves are the main sources of SO2 and carbonaceous aerosols, respectively.
- The major contributors to emissions uncertainty in India are coal sulphur content for SO2 (65%) and fuelwood emission factors of traditional cookstoves for BC (56%) and OC (65%).

References


Acknowledgments

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