We compare nine emission inventories of nitrogen oxides including four satellite-derived NOx inventories and the following bottom-up inventories for East Asia: REAS (Regional Emission inventory in Asia), MEIC (Multi-resolution Emission Inventory for China), CAPSS (Clean Air Policy Support System) and EDGAR (Emissions Database for Global Atmospheric Research). Two of the satellite-derived inventories are estimated by using the DECSO (Daily Emission derived Constrained by Satellite Observations) algorithm, which is based on an extended Kalman filter applied to observations from OMI or from GOME-2. The other two are derived with the EnKF algorithm, which is based on an ensemble Kalman Filter applied to observations of multiple species using either the chemical transport model CHASER and MIROC.

**Introduction**

<table>
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<th>EDGAR v4.3.1</th>
<th>REAS v2.1 and v2.2</th>
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<td>Global inventory</td>
<td>Asian inventory</td>
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<td>Anthropogenic and biogenic emissions</td>
<td>v2.1: Anthropogenic and biogenic emissions; monthly data: 2000 to 2008</td>
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<tr>
<td>Yearly data: 2000 to 2010</td>
<td>v2.2: Anthropogenic and biogenic emissions; monthly data: 2005 to 2010</td>
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</table>

**Temporal analysis**

- Annual NOx emissions from eight inventories over Mainland China.
- Monthly variability in NOx emissions over Mainland China.

**Spatial analysis**

- Lateral distribution of total NOx emissions over land. The emissions are summed over a one degree longitudinal band above land.
- The distribution of urban grid cells (red) and rural grid cells (blue). Urban grid cells have an urban area (as defined in the GCLC data base) larger than 5% of the grid cell. Rural grid cells are 100% covered by vegetation.

**Conclusions and recommendations**

- The intercomparison of all inventories shows good agreement in total NOx emissions over Mainland China, especially for trends, with an average bias of about 20% for yearly emissions.
- All the inventories show the typical emission reduction of 10% during the Chinese New Year and a peak in December.
- Satellite-derived approaches using OMI show a summer peak due to strong emissions from soil and biomass burning in this season.
- Biases in NOx emissions and uncertainties increase quickly when the spatial scale decreases.
- The advantage of the satellite derived approach is that emissions are soon available after observation, while the strong point of the bottom-up inventories is that they include detailed information for each source category.