

Emission inventory for charcoal production, use and truck transport in Africa

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Charcoal supply chain



Charcoal production

Transport



Trucks

Cities



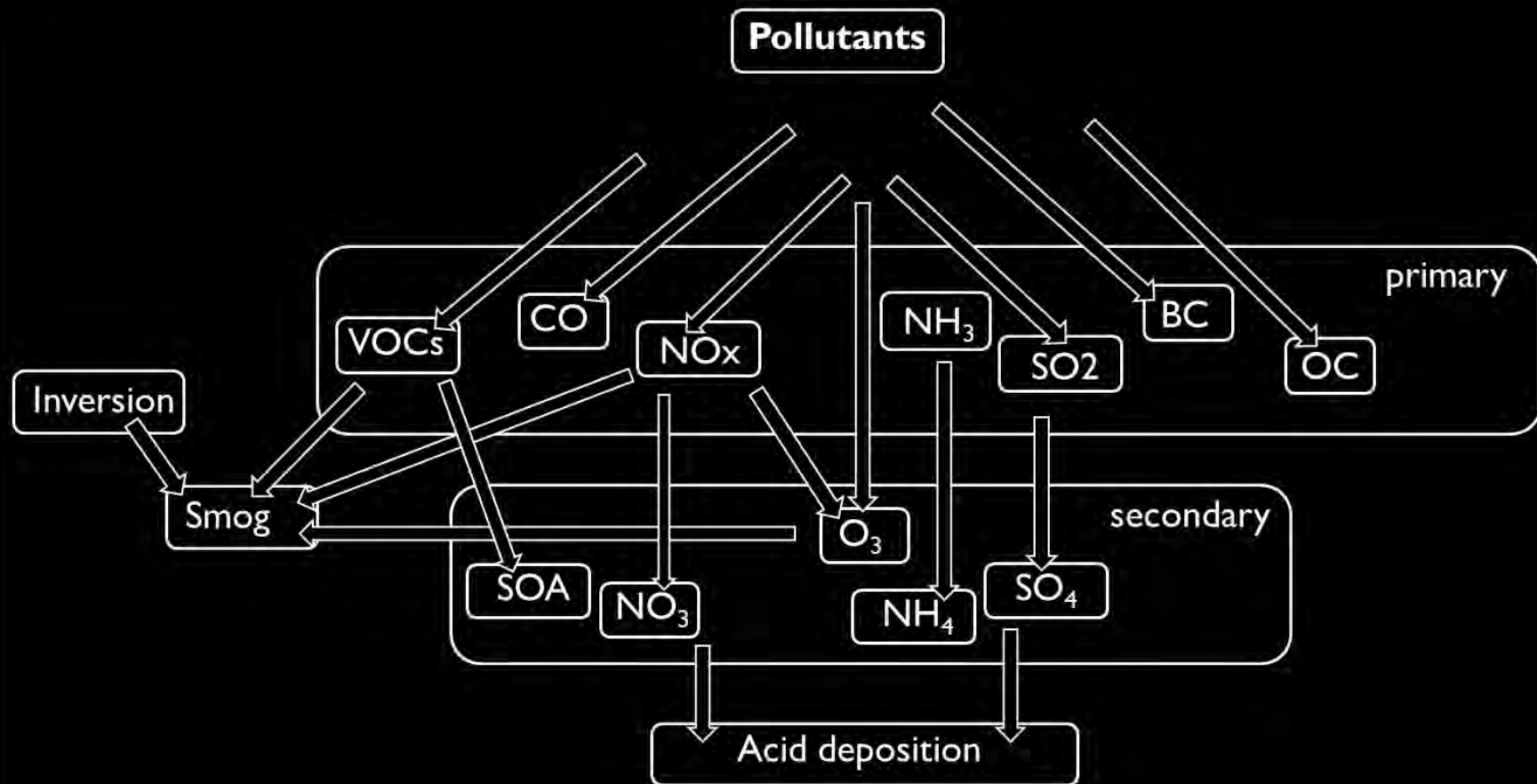
Use

Export



Shipping

Charcoal pollutants



BC = black carbon
OC = organic carbon
CO = carbon monoxide

NO_x = nitrogen oxide
SO₂ = sulphur dioxide
VOC = volatile organic compound

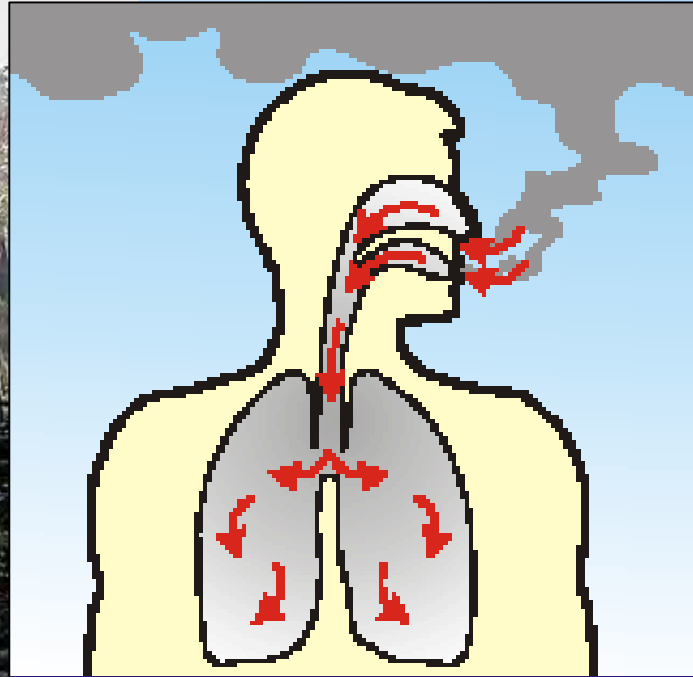
HNO₃ = nitric acid
H₂SO₄ = sulphuric acid



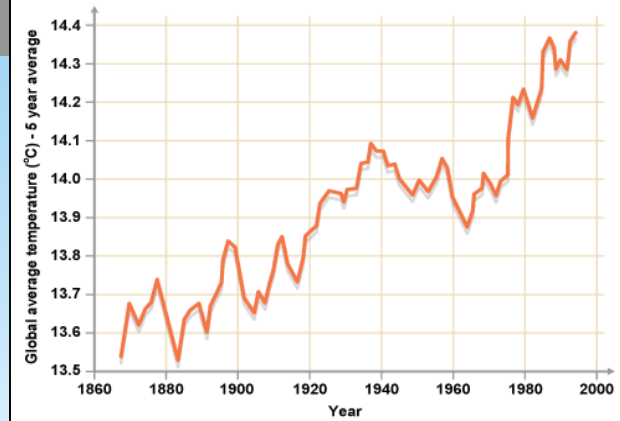
Consequences of charcoal production, use and truck transport



DEFORESTATION



DISEASE



CLIMATE CHANGE

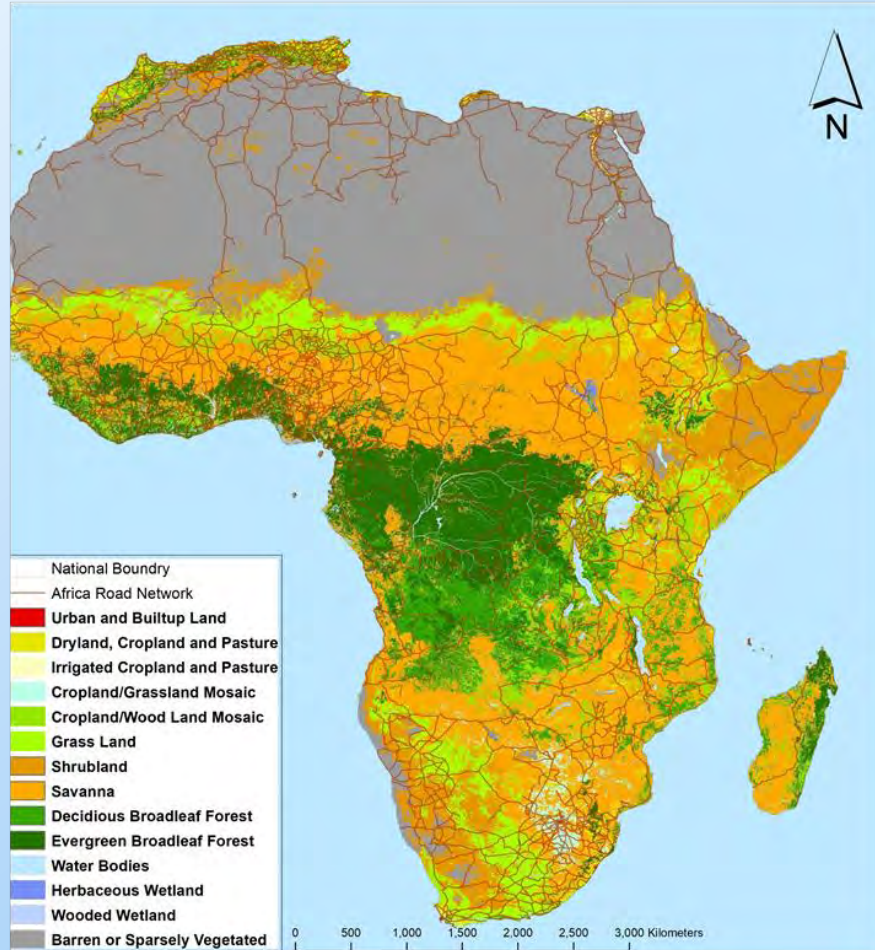


Developing emission inventory

$$\text{Emission} = \text{Activity Data} \times \text{Emission Factor}$$

Mapping production zones

Landcover + OpenStreetMap (OSM) Roads

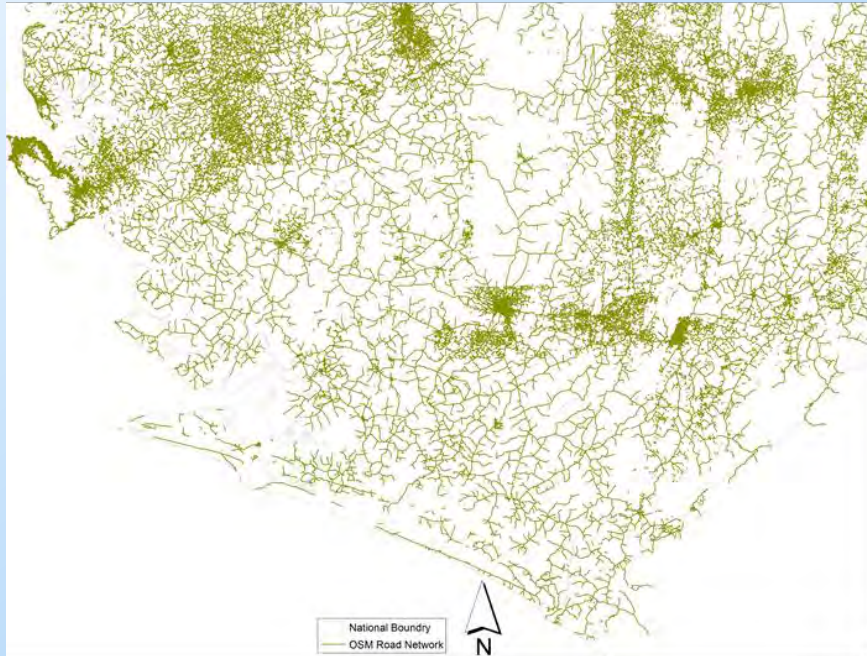


Production locations

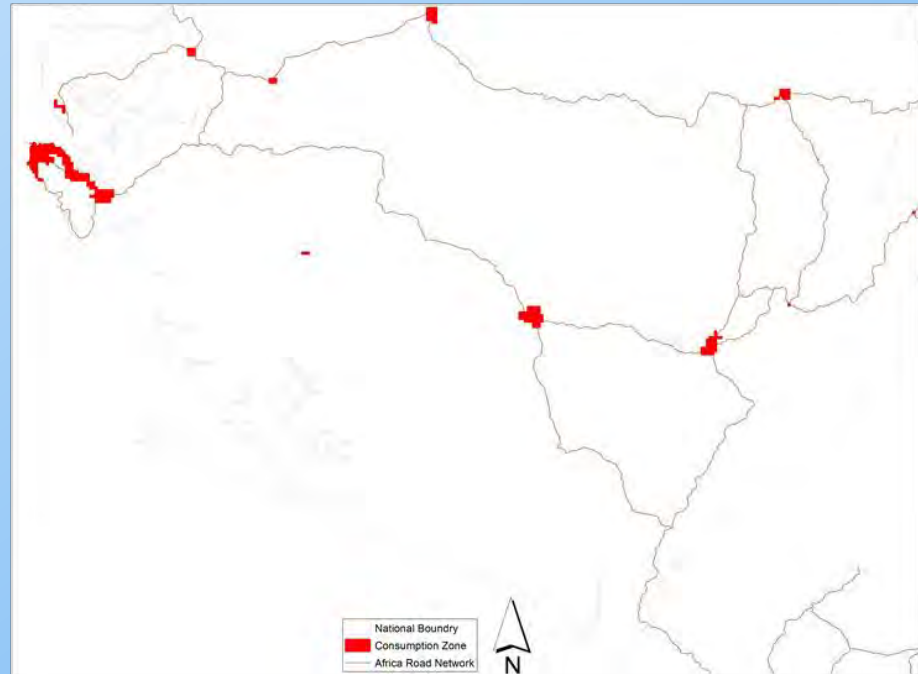


Mapping consumption zones

OpenStreetMap Roads (Sierra Leone)



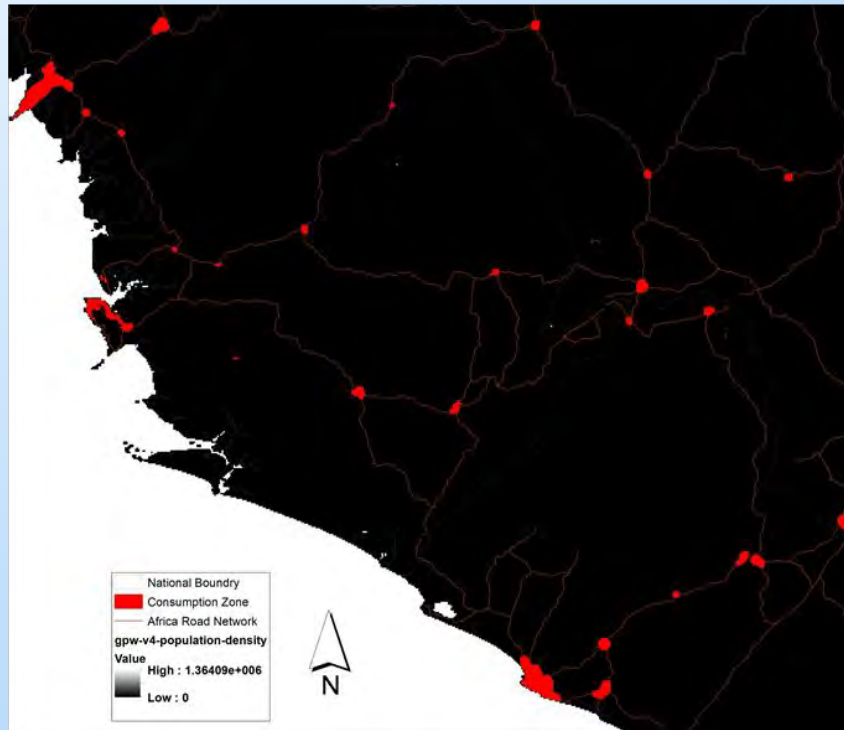
Consumption Locations = Cities



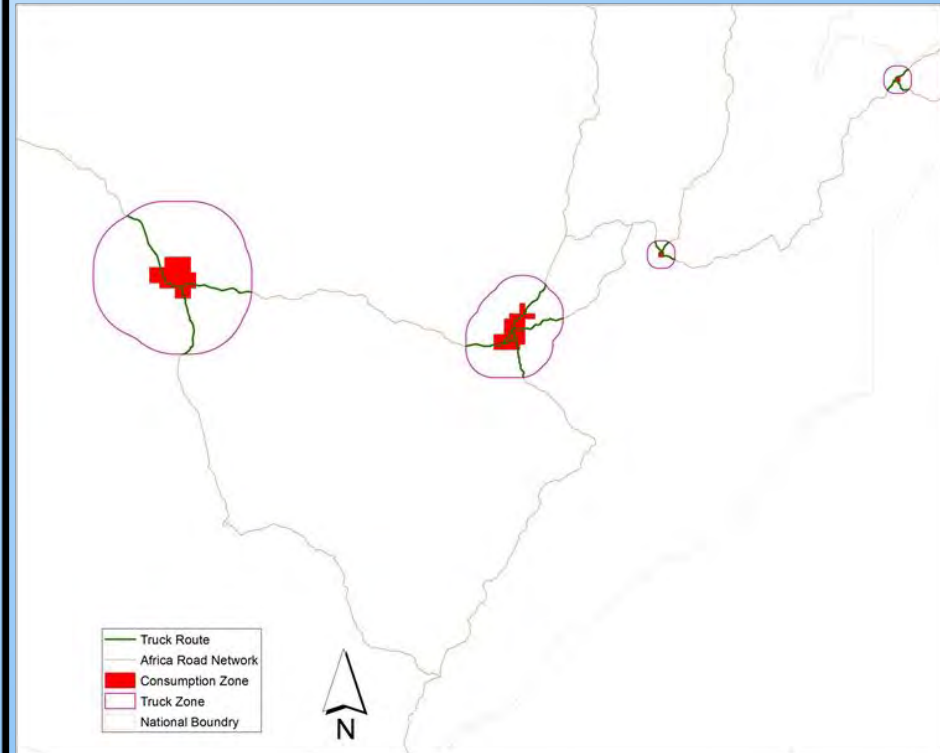


Mapping truck zones

OSM Roads + Population Density Grid



Truck Route





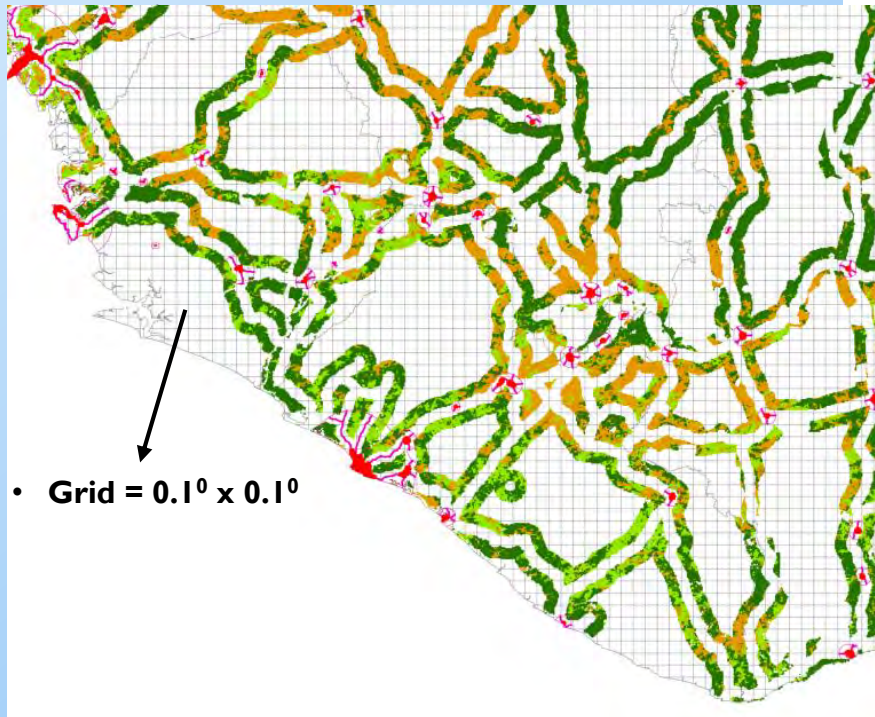
Gridding activity data

Activity Data Source

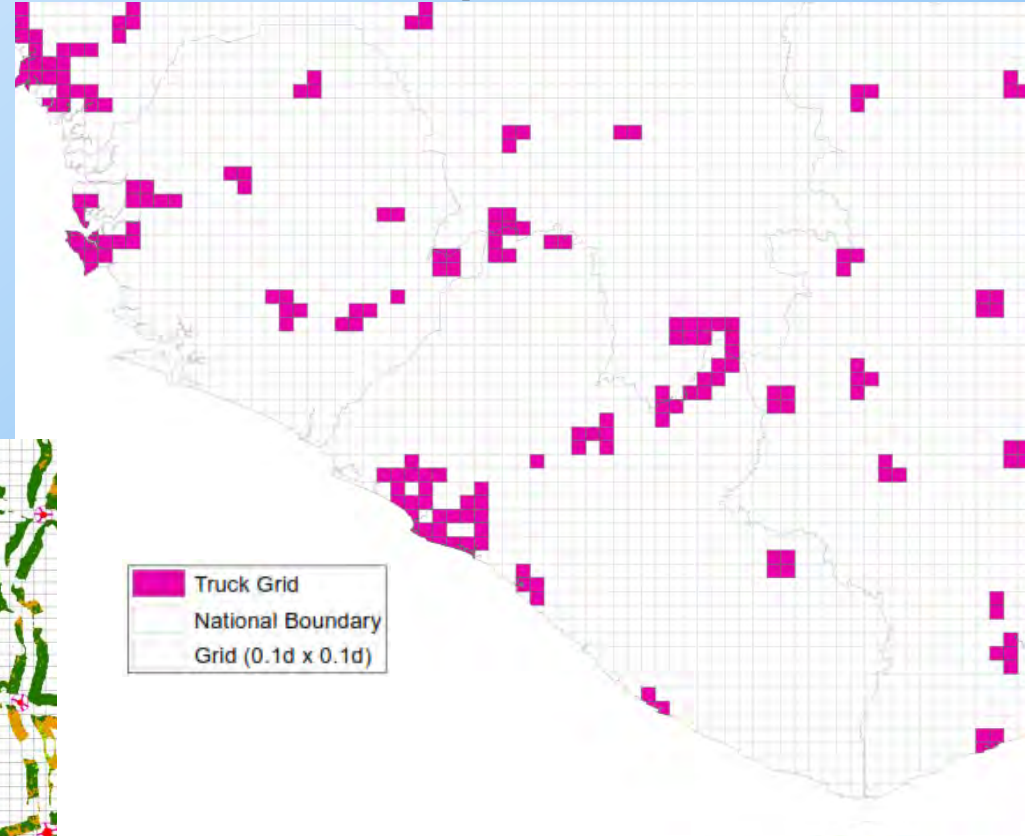
- **Production:**
United Nations Energy Statistics Database
- **Consumption:**
United Nations Energy Statistics Database
- **Truck Transport:**
Derived Using Consumption Data, City
Population and OSM Primary Road

Procedure

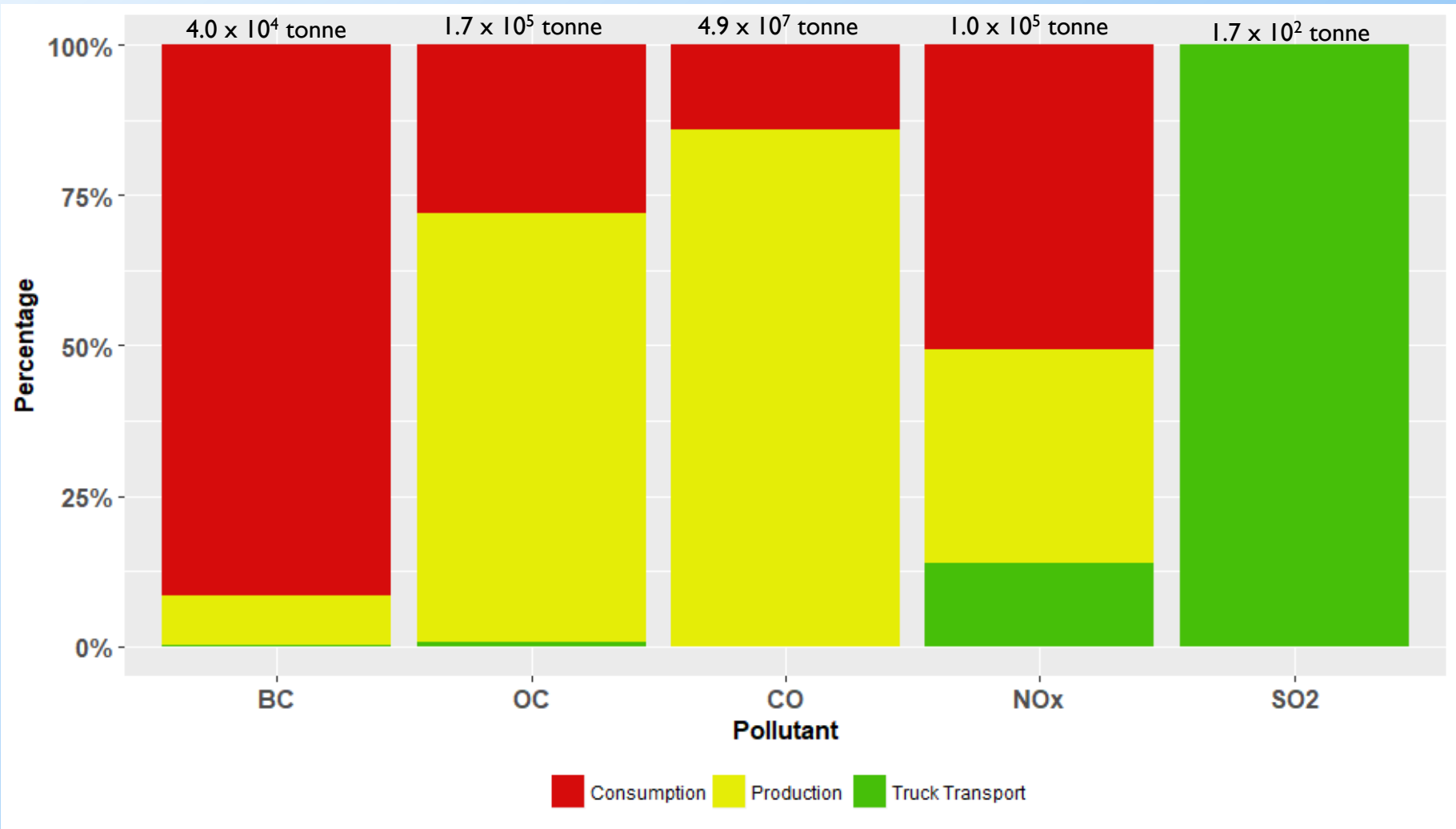
Intersect grid, activity zone and national



Gridded Activity

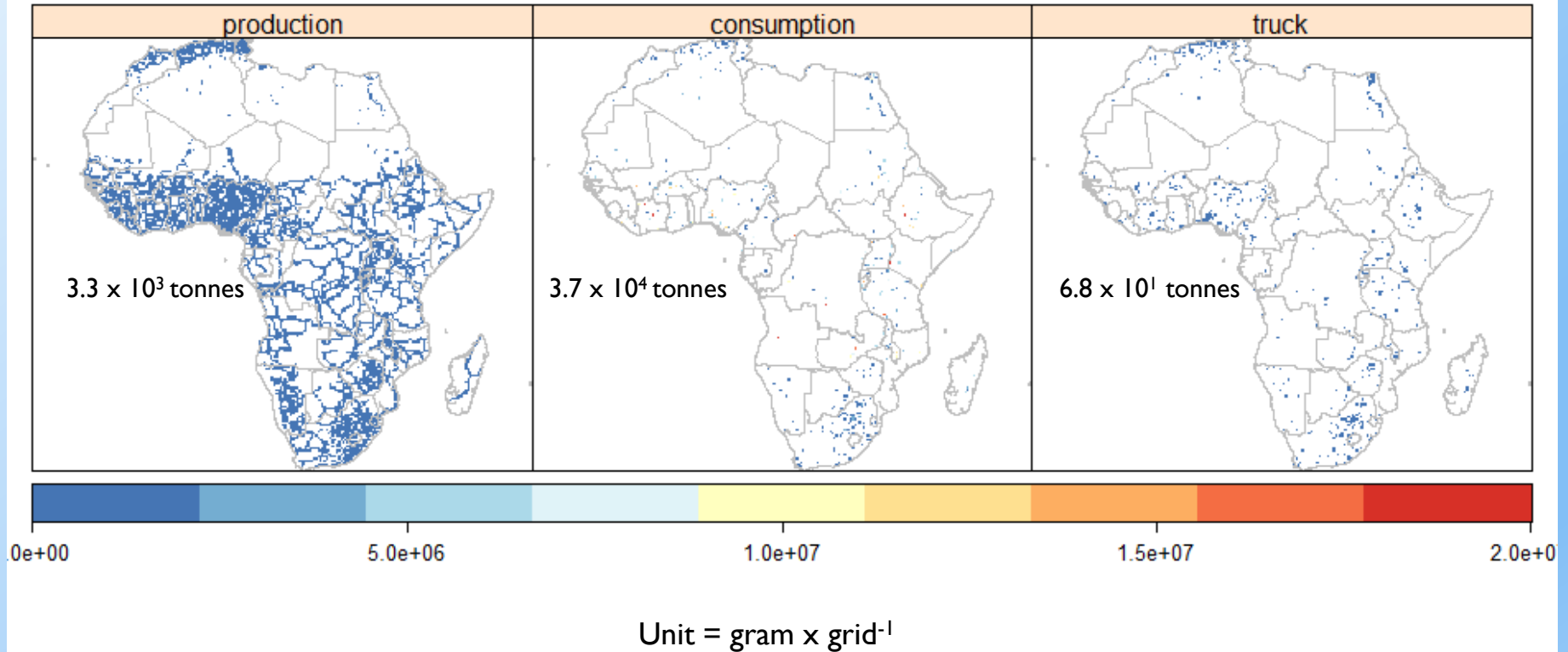


Calculated charcoal emissions



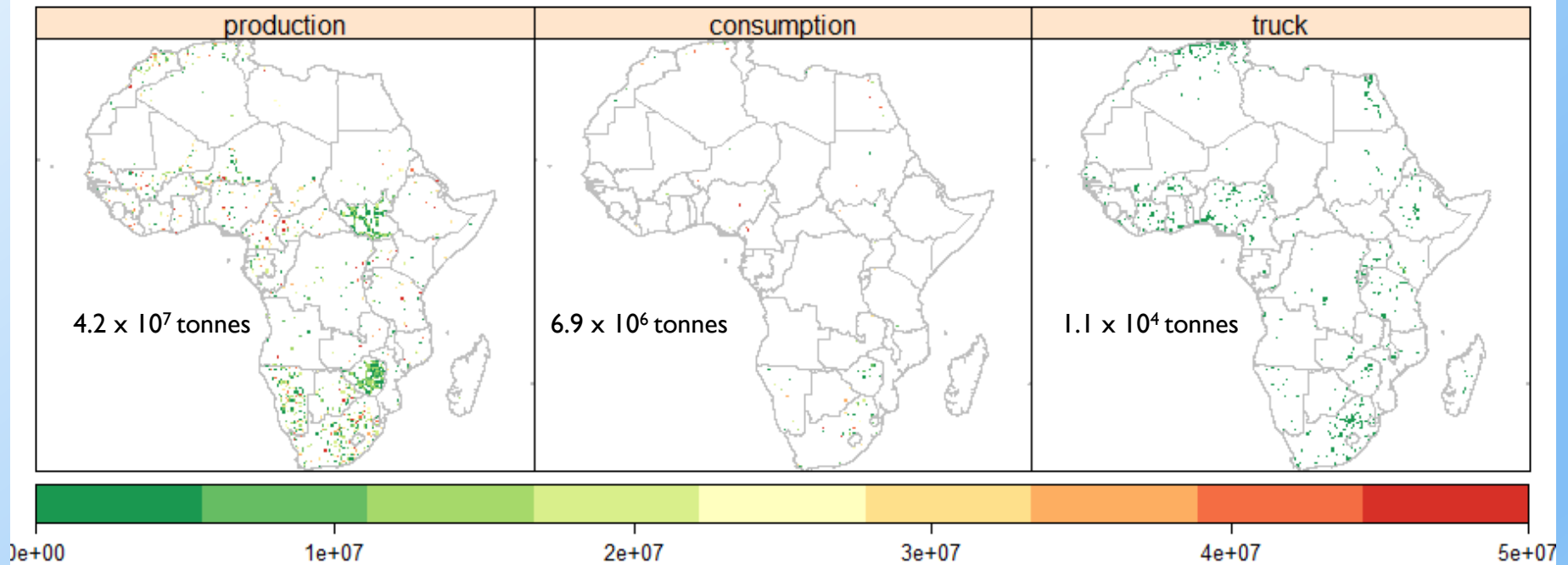
Gridded emissions ($0.1^\circ \times 0.1^\circ$)

BC Emissions



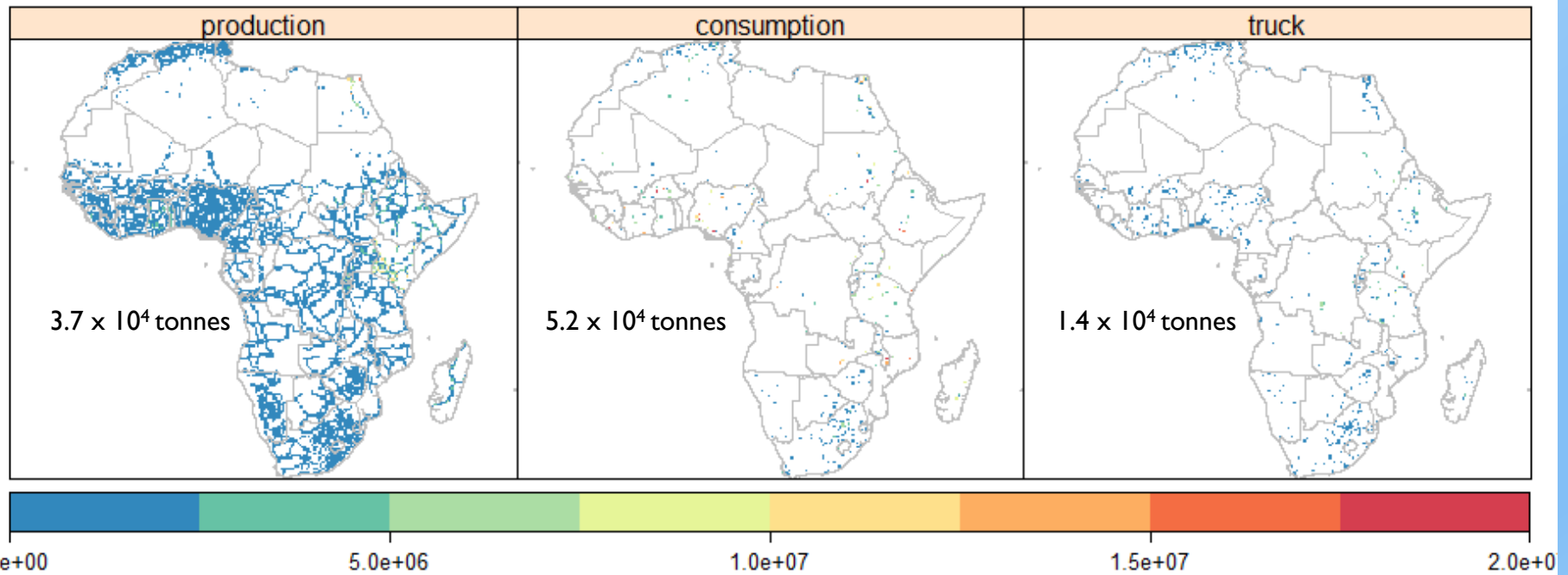


CO Emissions



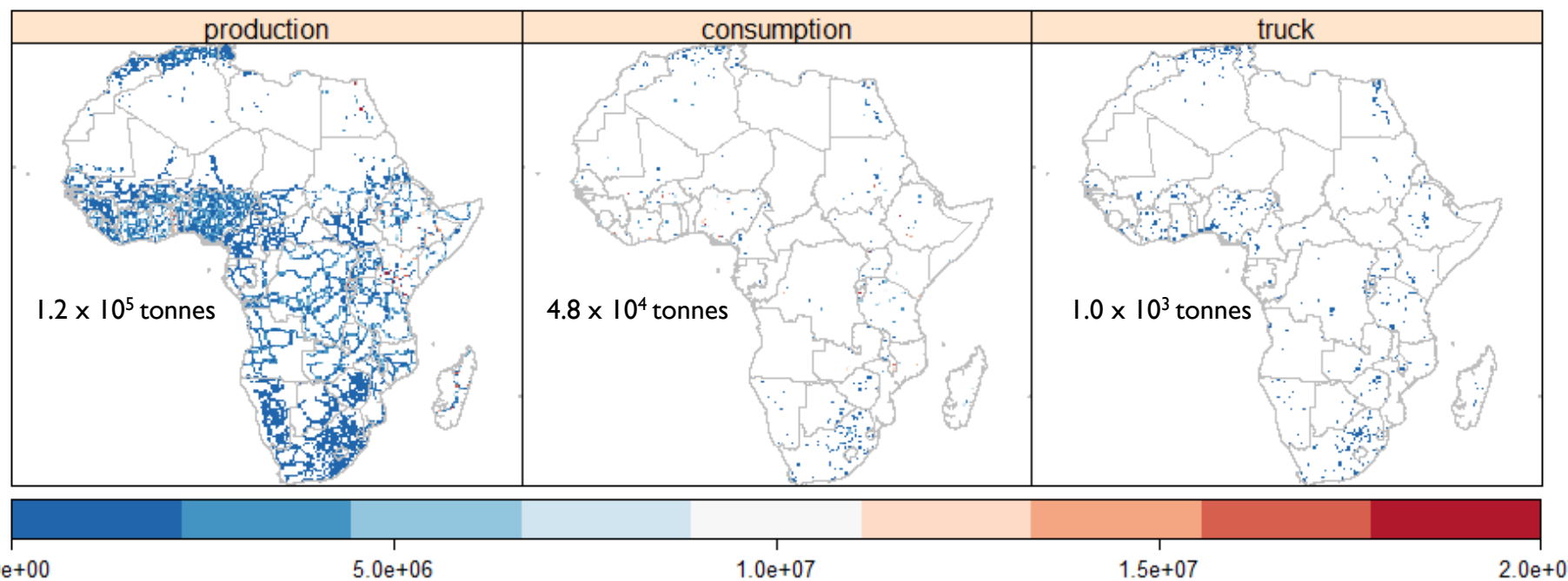


NOx Emissions



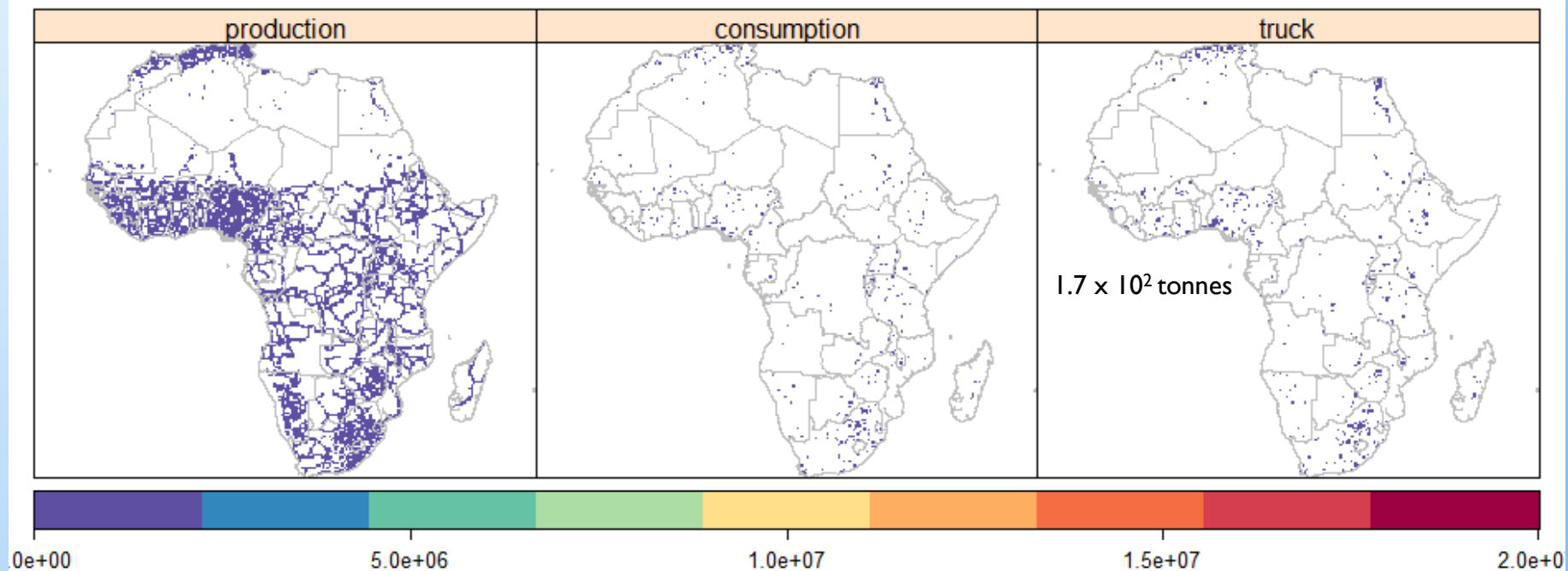


OC Emissions





SO₂ Emissions



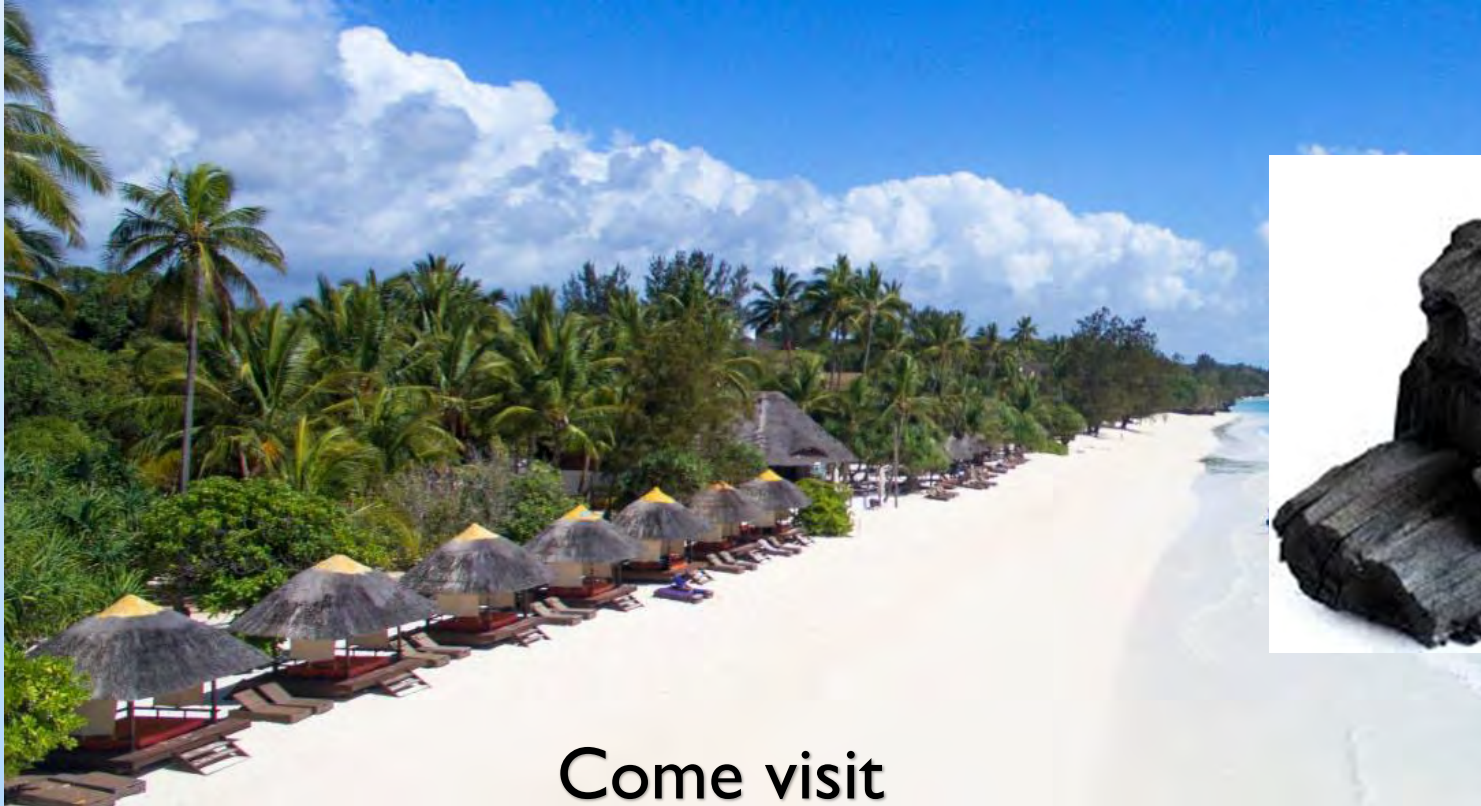


Future work

- **Assess long-term (14-year) trends of charcoal production and use in Africa and plausible future trends based on existing scenarios for Africa**
- **Use a state-of-the-science chemical transport model to estimate the impact of charcoal production on air quality and climate**
- **Sample Earth observations of leaf area index over charcoal production zones to identify whether charcoal production is contributing to deforestation and land-use change in Africa**

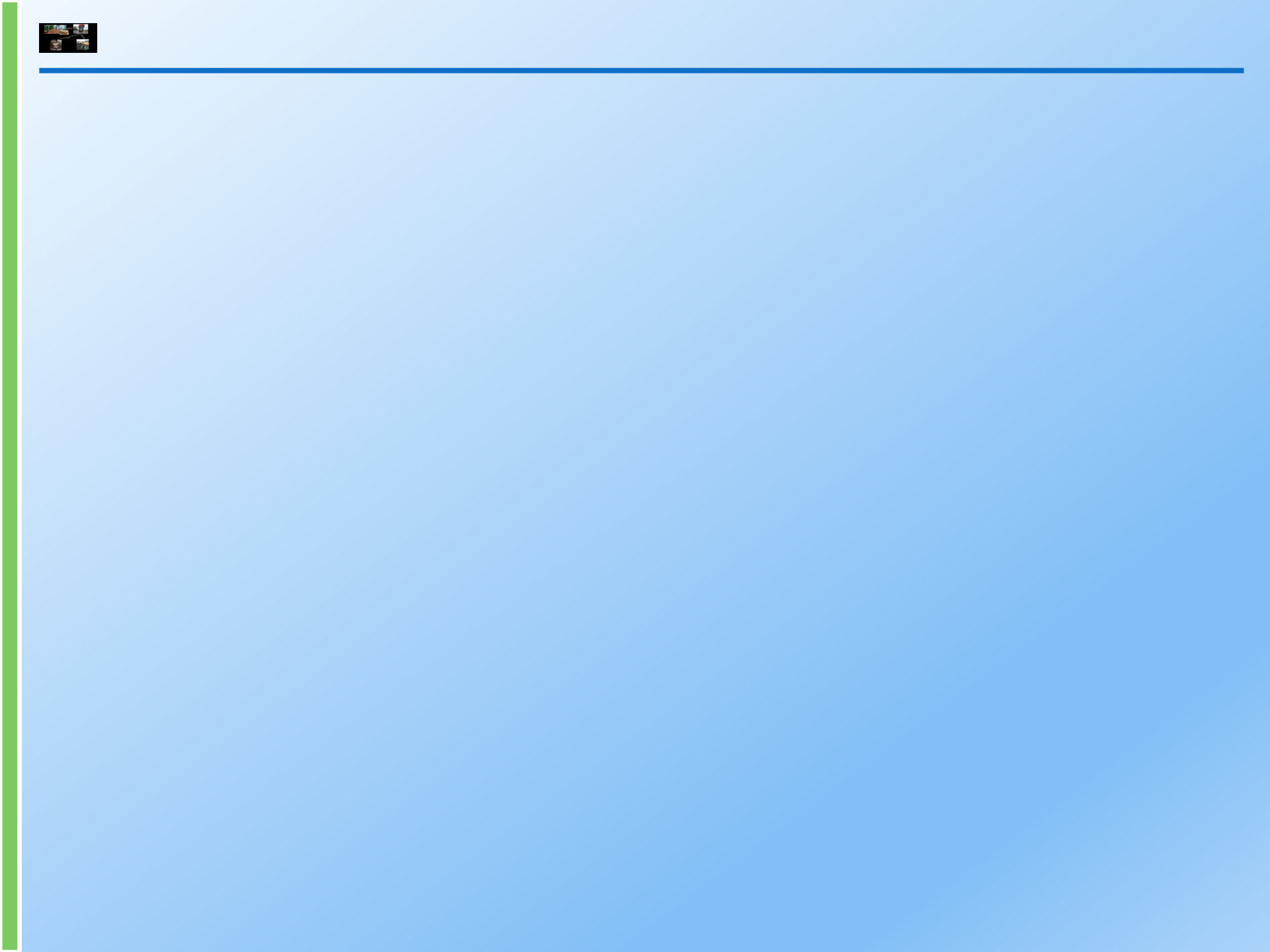


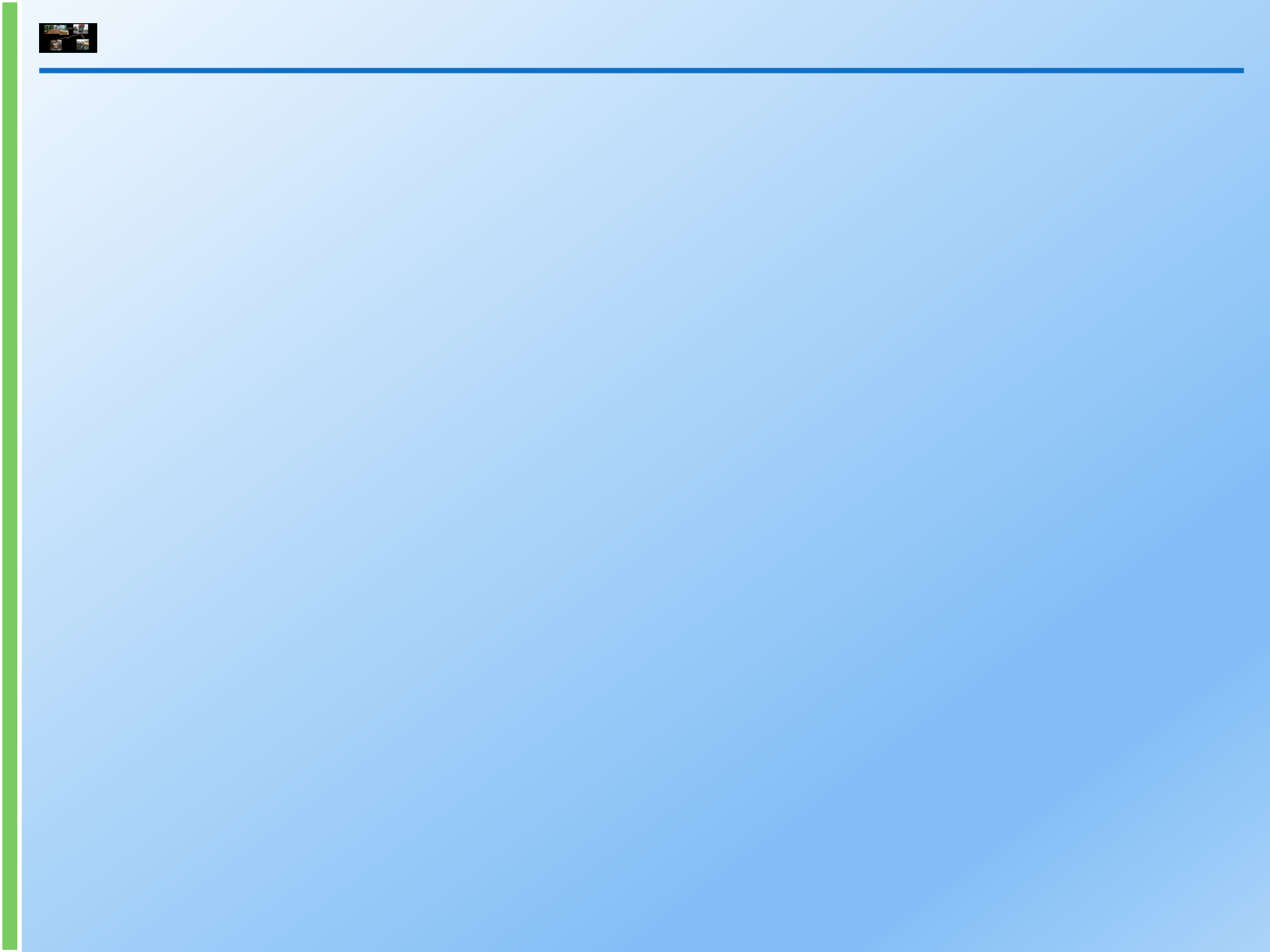
Thank You !!

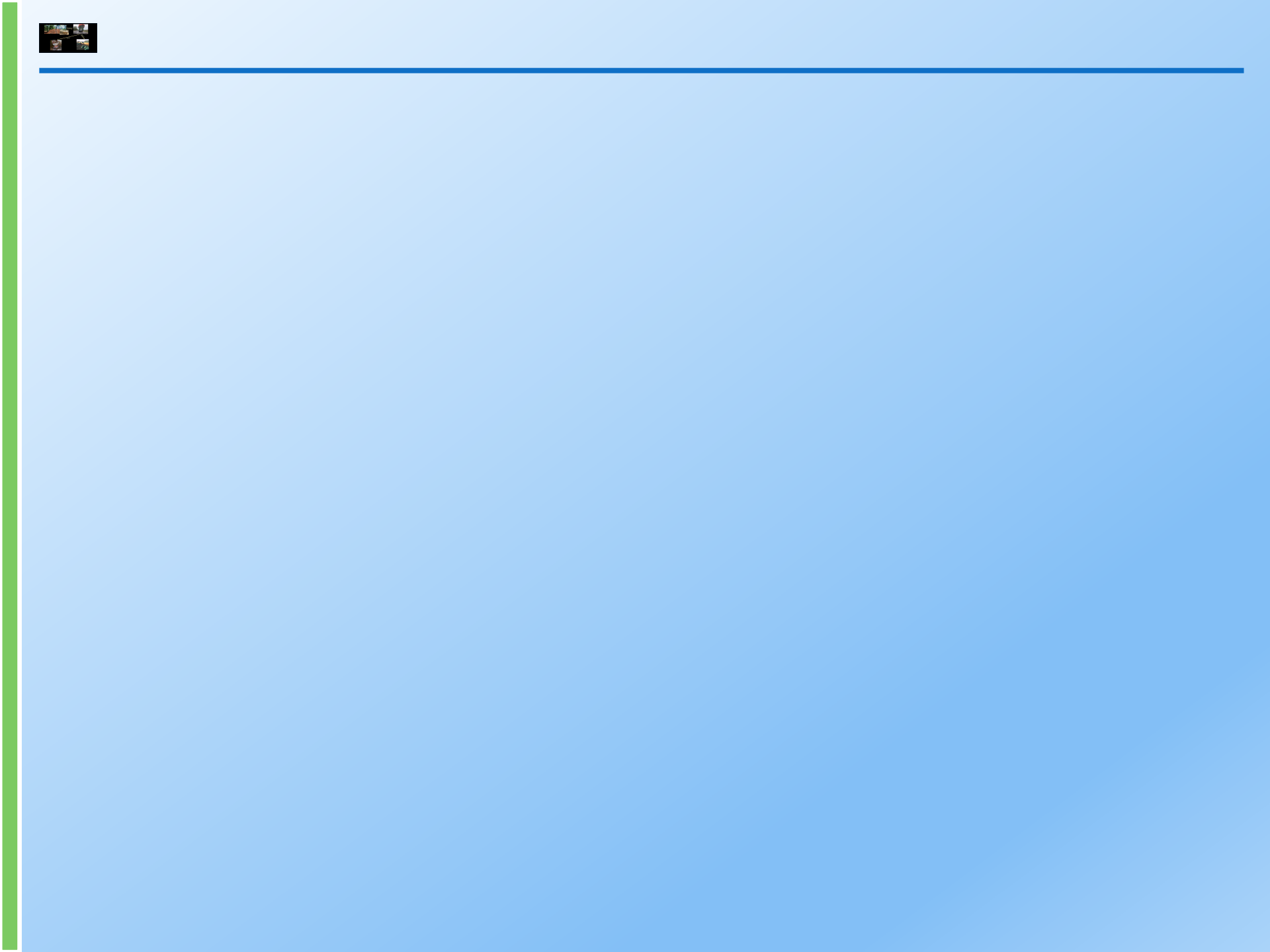


Come visit



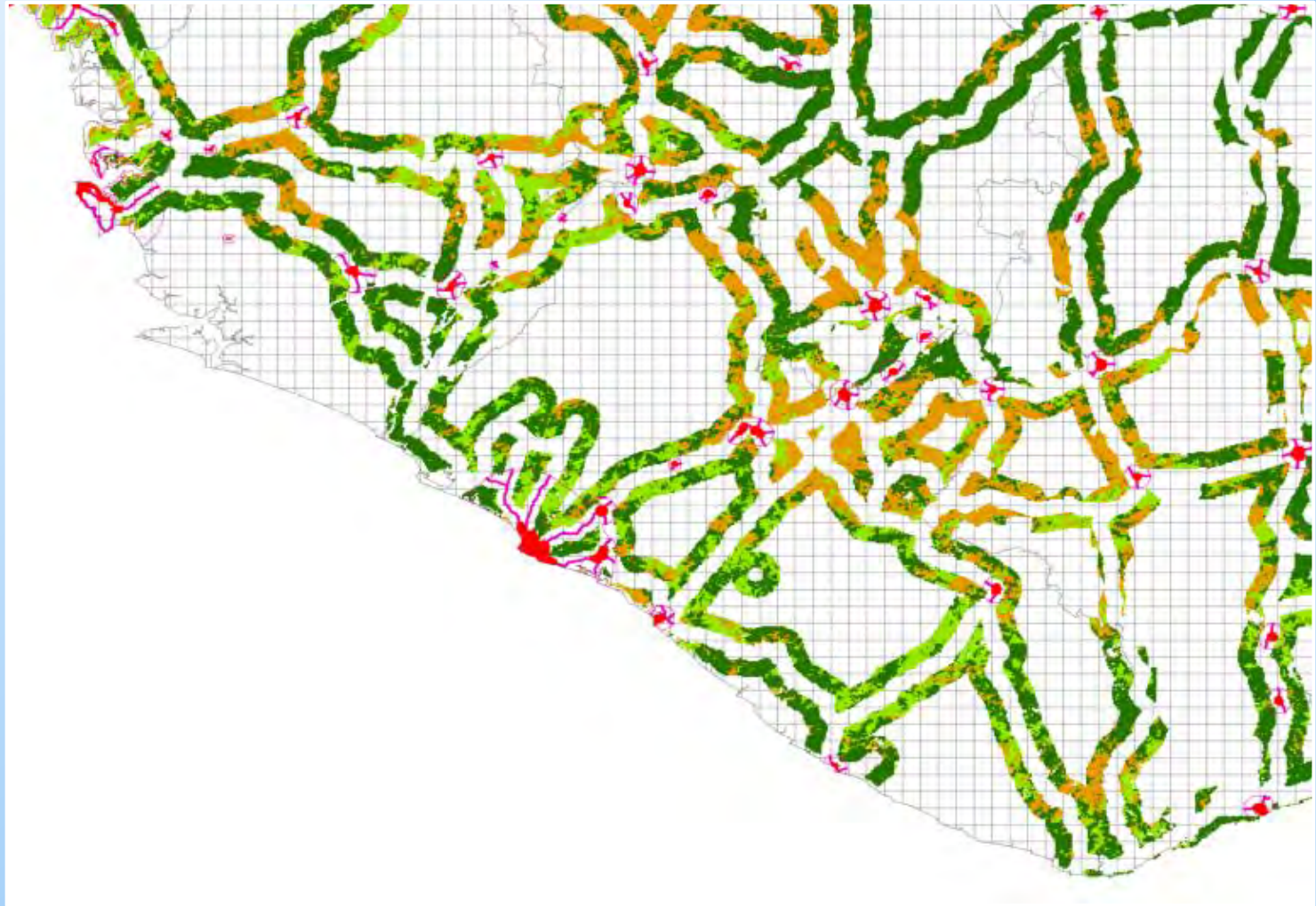








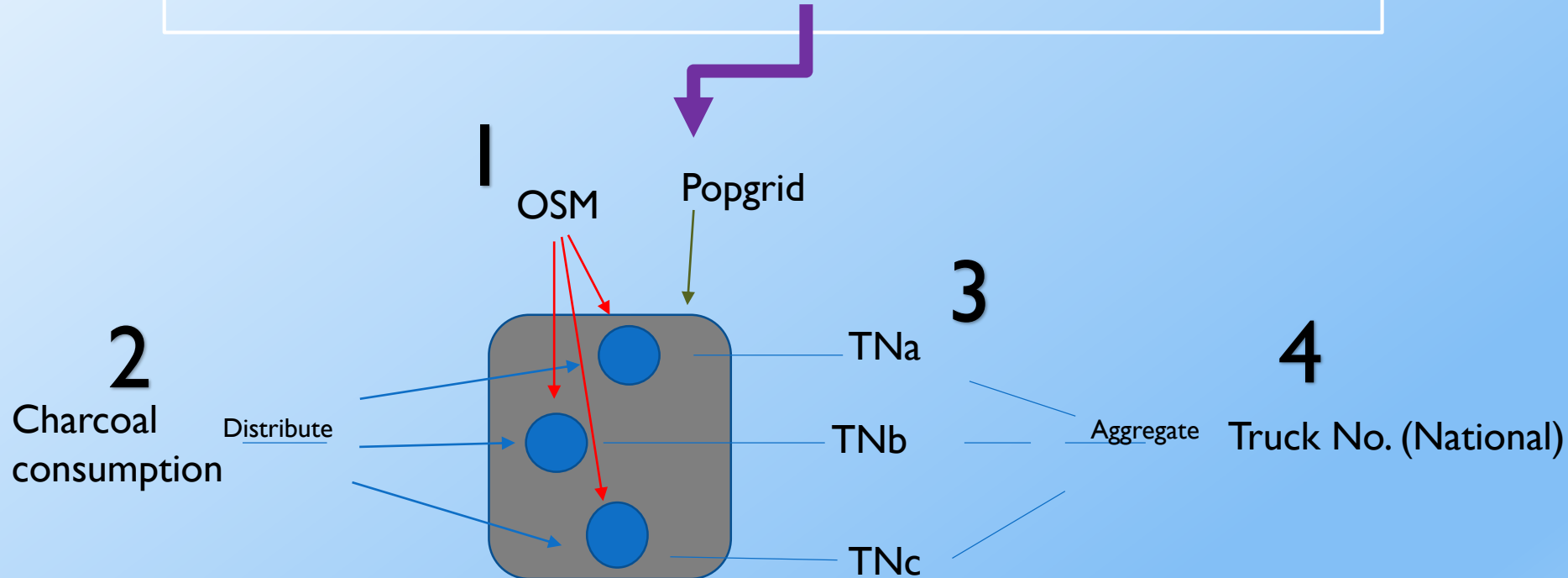
Developing emission inventory

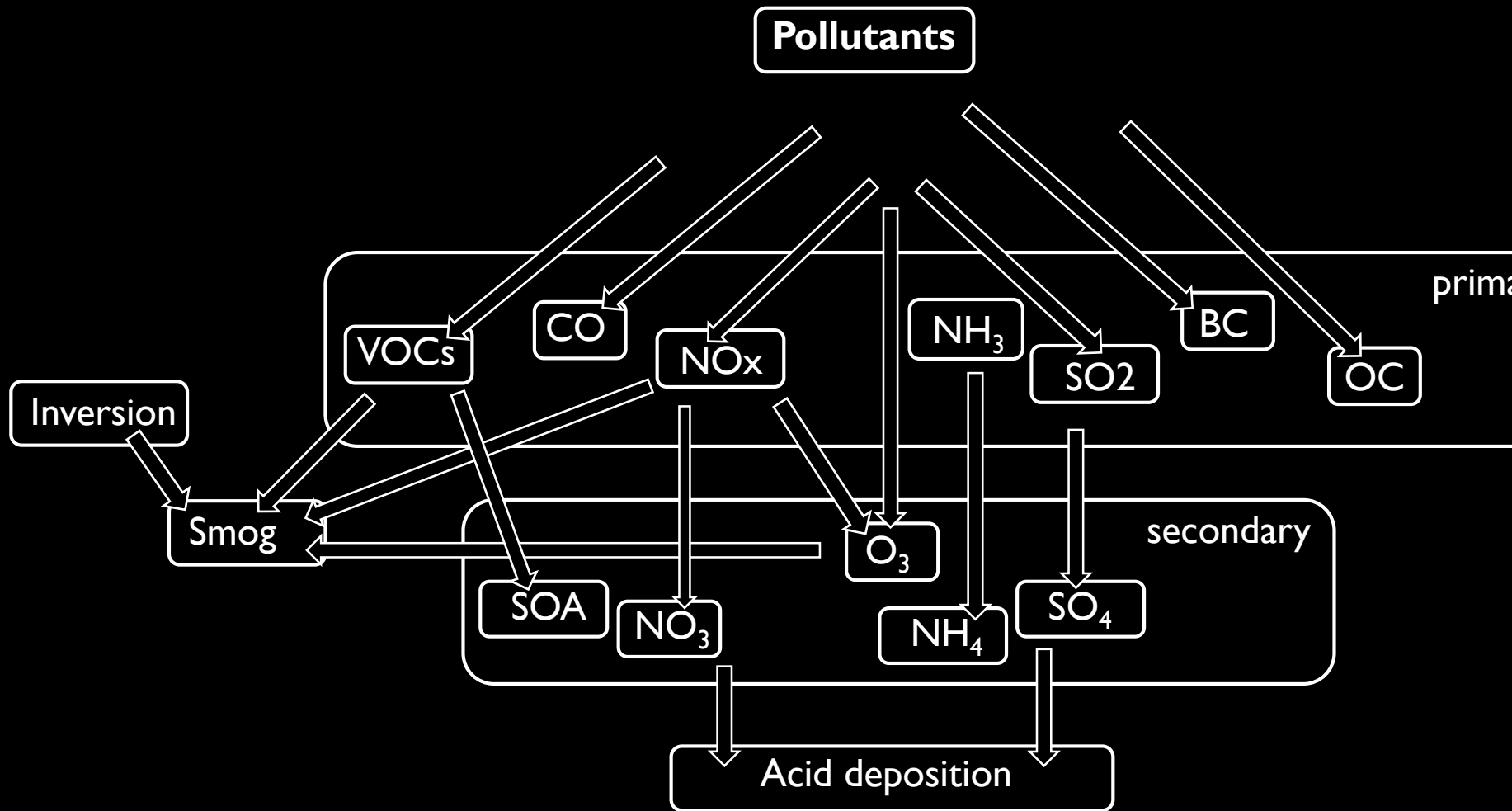




Collecting activity data

Charcoal production (Tg) —→ United Nations energy statistics
Charcoal consumption (Tg) —→ United Nations energy statistics
Truck transport (Truck-km) —→ ???





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NO_x = nitrogen oxide
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VOC = volatile organic compound

HNO₃ = nitric acid
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