Development Of Gridded Ocean-going Vessel Emission Inventories

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2006 Emissions Inventory
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Port Emissions Impacts

- International or global in scope
- Regional for nonattainment of national standards
- Local (such as a facility or neighborhood) evaluation
Large Vessel Emissions

- Large Vessel Emissions
  - Cruise Mode; outside of pilot boarding zone and often outside of the region of interest
  - Reduced-speed zone between port and pilot pick-up point along ship channels usually within a metropolitan region
  - Hotelling and Maneuvering modes within short distance of each port
Superregional - Global

• Empirically derived shipping lane links
  – Ship positioning systems (weather and other observations)
  – Mapped to describe individual links
• Vessel traffic activity on links derived from port calls of entrances and exits and last and next ports.
Super Regional (Shipping Lanes)
Regional
(Air Basin)

- **Cruising**
  - At operating speed
  - Imposed speed reduction zones
- **Reduced speed zone (navigation challenges)**
- **Maneuvering**
  - In and out from berth
  - Shifts from one berth to another or to nearby port
- **Hotelling**
  - At berth
  - At anchor
Regional and County Level

- County boundary on shipping lane
- RSZ Designation
- Cruise Mode

Map showing Cook Inlet with various locations and labels.
Detailed Spatial Allocation

- Proximity to affected populations
- Local air quality modeling
  - Detailed placement of emission
    - Routes
    - Berths
  - Detailed activity types
    - Engine load $\propto (\text{vessel speed})^3$
Spatially Detailed Emission Inventories
Conclusion

• Type of spatial allocation depends upon use of inventory
  – Global impacts, regional air quality modeling, or local health risk assessments

• Activity modes and spatial allocation interrelated
  – Vessel speed
  – Engine load
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