



Summary of Discussion During Emission Inventory Breakout Session

Workshop on Short Lived Climate
Forcers

Chapel Hill, NC
March 3-4, 2010



Question 1: What do we understand well in this issue area that can help inform the selection of mitigation strategies?

- We have a good sense of the relative contributions of different source regions and source types that produce global BC emissions, though quantitative estimates have high uncertainty; U.S. emissions contributions are rather better known at $\sim 400 \pm 100$ Gg/yr. More work is needed on U.S. BC inventory.
- For precursors of tropospheric ozone we have good knowledge of sources.
- We are confident that diesel engines (on-road and nonroad) are a promising mitigation option, both domestically and globally.
 - High EC/OC ratios
 - Health co-benefits likely
 - Diesel also contributes to Arctic BC
- Continued tightening of PM emission reduction programs will likely continue to cause BC to be reduced in the U.S. and globally.
- Emission factors for residential wood stoves in the U.S. have recently been updated and are considered to be reliable estimates.



Question 2: What do we not understand well in this issue area; how might this uncertainty affect the selection of mitigation strategies; and can we place bounds on the magnitude and direction of this uncertainty?

- Speciation profiles for important BC source types
 - OC/EC splits for non-road applications
 - Compositing/aggregating of speciation profiles for certain source sectors
 - Availability of global profiles
 - Emissions testing from new technologies (biofuels)
- PM2.5 emission factors
 - How confident are we, by source sector, of PM2.5 estimates?
 - Which parts of the estimation procedure (emission factors, activity levels, etc.) are we most concerned about for the various sectors important to climate and health?
 - Can we provide qualitative uncertainty estimates for domestic emission estimates?
- Emissions from power plants (EGUs)
 - Are they really small sources of BC? Even w/ low NOx burners that increase unburned carbon? Are we underestimating BC/PM2.5 from this sector?
- Emissions in China/India
 - Do we really know the number of small industrial sources (coke ovens, brick kilns) that exist and how much emissions come from them?
 - We are likely underestimating emissions from these sources using current surrogates.
- Forecasting/projection abilities
 - Spatial changes of emissions/emission points in the future.
 - Penetration rates of new technologies and new regulations.
- Emission factors of high emitters (“superemitters”)
 - Need to better understand their emission factors by individual source measurements, “in use” if possible.
 - Need to conduct surveys to accurately characterize the fraction of superemitters in any source population.
- Some types of international sources that are important for Arctic deposition
 - C3 Marine engines
 - Oil and gas flaring activities
- Diesel retrofits: number and cost. How many retrofits exist in the field? What is the cost involved for retrofitting entire fleet?
- On the global side, strengths/weaknesses of individual country emission estimates. Are some sectors more certain than others?



Question 3: What research or analyses are needed to address these critical uncertainties?

- Verify/develop PM_{2.5}/BC inventory information.
 - Using ambient data, model output, remote sensing (e.g., LIDAR)
 - Via “top down” studies (e.g., inverse modeling against IMPROVE data)
- Mine domestic/global data and source testing information to understand what is measured and how, and how they compare across sources.
- Prioritize and undertake source testing programs as resources allow.
- Compile information by conducting surveys of key source types and technology distributions.
- Include use of IC/R emissions data from regulated community to supplement current inventories.
- Involve the user community more for SPECIATE review, input, and development. Strive to improve BC speciation for certain sources like nonroad.
- Conduct surveys to better characterize activity levels for certain sources (how many people burn household garbage, yard waste, what are the regional differences?).
- Attempt harmonization of existing inventories by sector and region.
- Measure/verify BC/OC/PM_{2.5} splits for emerging new technologies (e.g., modern biofuels), that will become increasingly important as time goes on.
- Investigate development of particle number emission inventories/better size-resolved inventories
 - Mass may be less important to BC-climate (especially with deposition on ice) than particle numbers
 - Initial efforts could involve “pulling together” of existing information on particle size and number from specific sources
- Explore how much uncertainty is introduced when sources are aggregated to broad sectors for emissions characterization. Investigate for which sources we need more sectoral detail.
- Survey other countries and regions for on-going efforts in EI development. Obtain data as possible.
- Work to introduce low-sulfur fuels in developing countries so they can use high-performance diesel technologies



Question 4: What immediate follow-ups to this workshop would you suggest (e.g., small group discussions, journal articles collaborative projects, specific research projects/analyses)?

- A couple of comments were made on the need to continue discussions, but nothing specific.
- Two people indicated in their handed-in sheets that a summary of the proceedings of the workshop would be useful.
- Several people suggested setting up a public WIKI or Google-Scholar webpage to continue discussions in this area and to share analyses/ideas/as well as actual data