

CCAC Marine Black Carbon Emissions: Identifying Research Gaps Session 6 – Future Research

Identifying areas of focus for CCAC emissions testing

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Discussion to this point

- Background and institutional overview
- Definition and measurement approaches
- Existing research and inventories
- Control strategies
- Emission testing gaps

Objective for the session

Identifying areas of focus for CCAC emissions testing

- *Where?*
 - *what ship/engine type(s) to target*
 - *on board, test bed, lab testing (on surrogate aerosols)*
- *What?*
 - *diagnostics and sampling methods*
 - *improved emission factor inventories*
 - *emission reduction strategies*
- *When?*
 - *fitting the timeframe of the funding*
 - *establish timelines for activities*

Where?

what ship/engine types to target

- *some strategy needed to maximize benefit of limited funds*
- *consultation with inventory specialists?*
- *what ship/engine types are available?*

Where?

on board testing

- *great opportunity to test many engine classes*
- *must negotiate access to ships and secure agreement to run alternative fuels, operating strategies, reduction strategies*
 - *challenges of bringing advanced diagnostics and sample conditioning to the ship*
 - *short and shifting time windows for testing*

test bed

- *greatest opportunity for controlled tests*
- *availability of/access to facilities for engine classes of interest*
- *availability of engines*
- *fuel/operating costs*

lab testing

- *well suited to compare diagnostics and sample conditioning*
- *relevancy of surrogate aerosols to real marine engine emissions*

What?

diagnostics and sampling methods

- *Diagnostics: photo acoustic, LII, FSN, others?*
- *Sample conditioning: raw, diluted, dilution tunnel, denuders/strippers, other?*

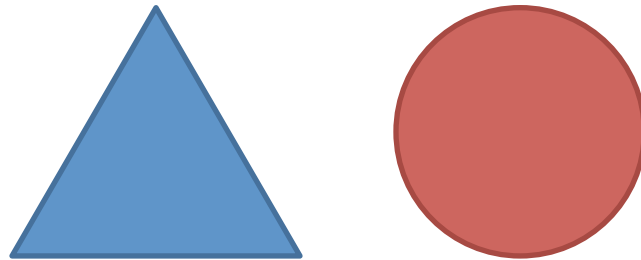
improved emission factor inventories

- *Study of the impact of fuel type*
- *Study of other parameters which can add value/specificity to modelling using AIS data*
- *Study at NOx Tier III test points*

emission reduction strategies

- *slow steaming*
- *fuel switching*
- *scrubbing*

Things to consider



Which Symbol is Different?

It is difficult to interpret a comparison of two diagnostics

- *can compare three or more methods and look for consistency amongst some or all methods*
- *can establish a gold standard (thermal optical, ??) and calibrate other methods against standard before ship testing*

Things to consider

Developing standard measurement protocols

- sample extraction, conditioning, measurement
- instrument calibration

Possibility of leveraging recent activities of Civil Aviation

- technical committee established by ICAO (SAE-E31)
- campaigns with international invitations for participation
- development of best practices in Aerospace Information Report (AIR 6241)
- funded by governments bodies responsible to ICAO (TC, FAA, EASA, FOCA)
- measurement system modelled on the AIR 6241 system?
- use mobile Civil Aviation system for marine tests?

Thank you

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