AeroCom semi-direct aerosol effect intercomparison exercise

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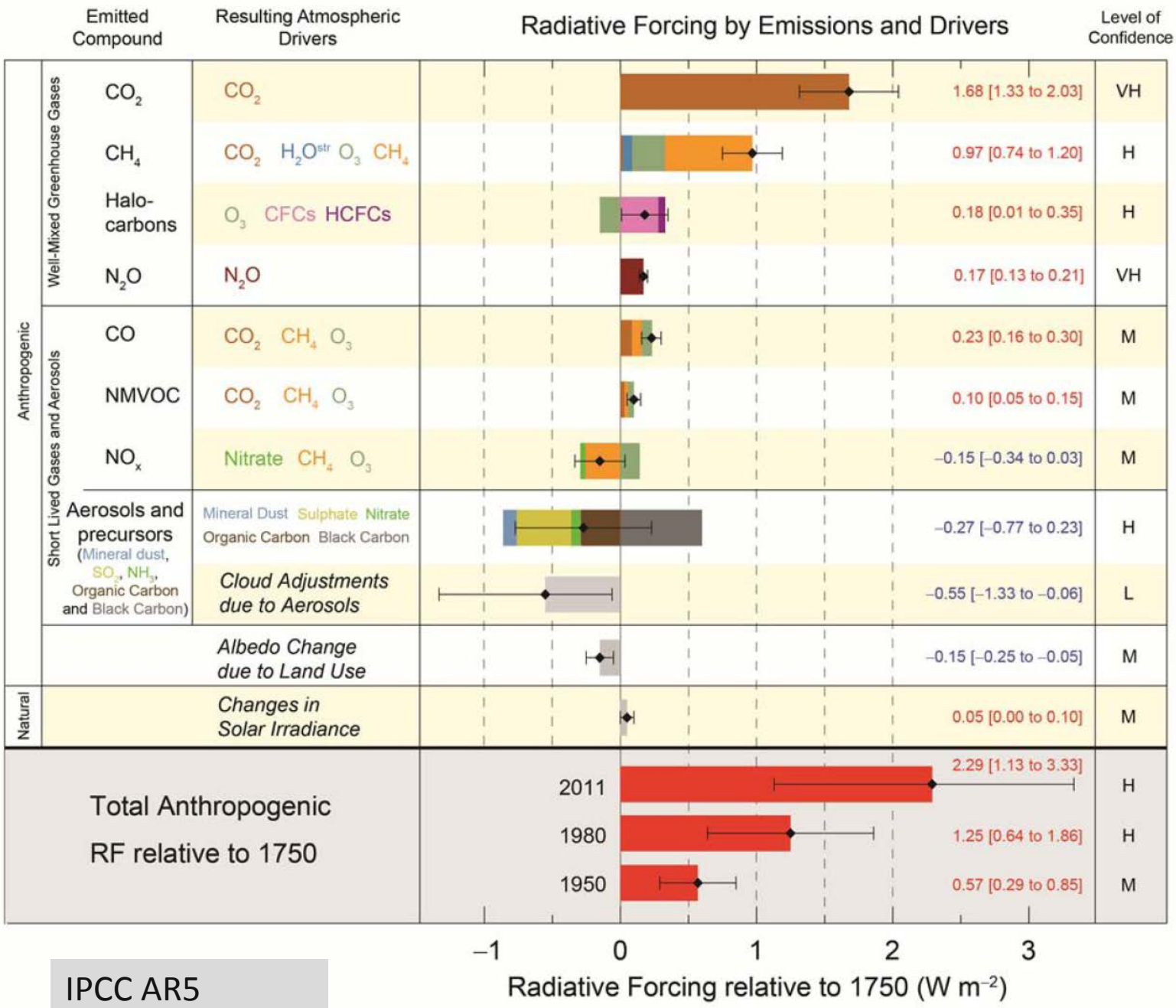
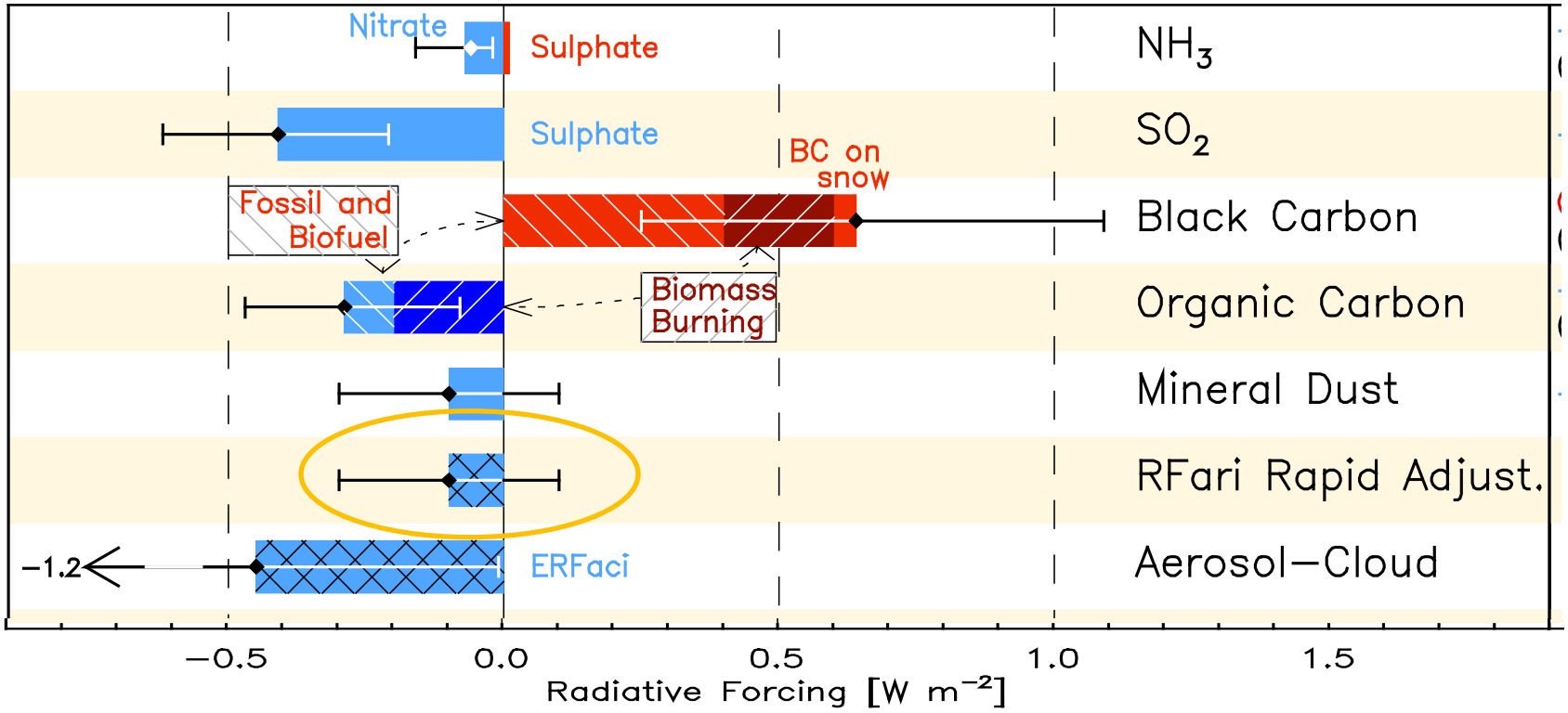


Change in energy flux caused by natural or anthropogenic drivers of climate change (in W m^{-2})

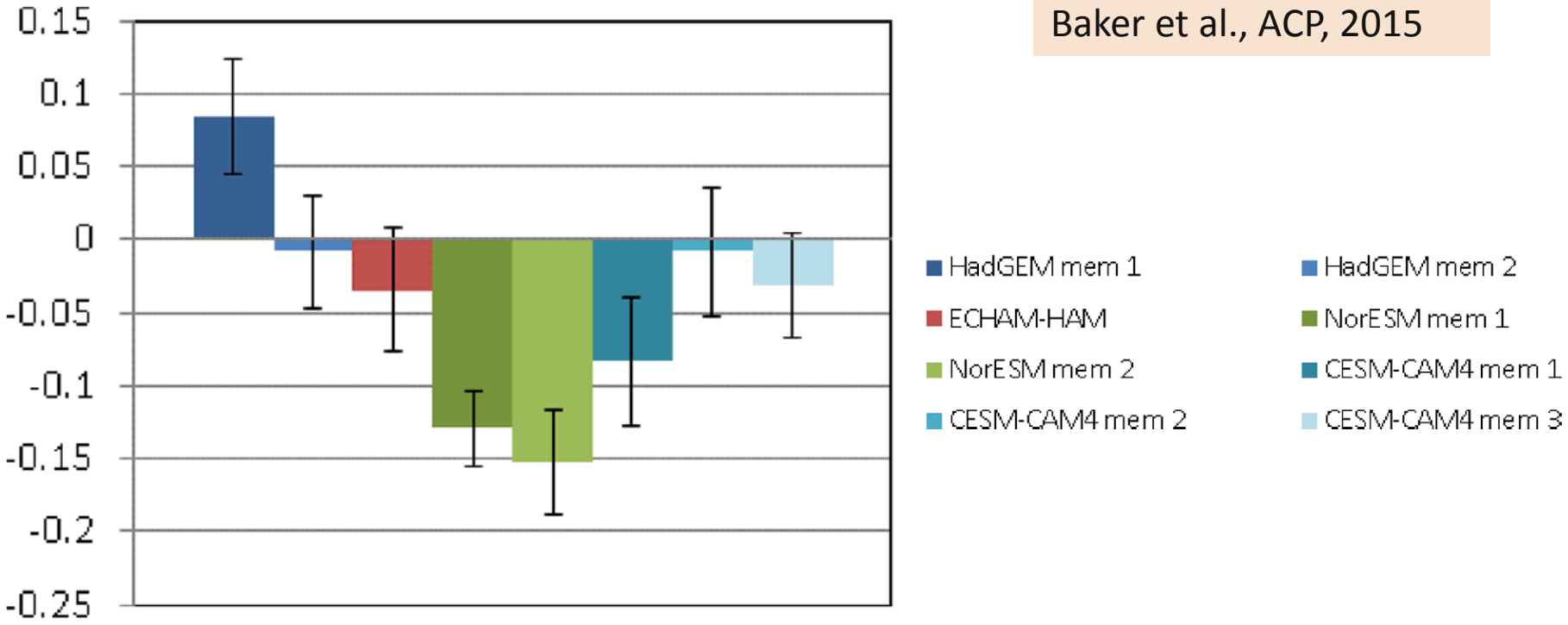
IPCC AR5
Figur SPM.5

Semi-direct aerosol effect IPCC AR5



IPCC, AR5, Fig 7 Technical Summary

(b) Surface temperature change in BC ensemble members



Baker et al., ACP, 2015

Decomposition of aerosol RF

Toward a Minimal Representation of Aerosols in Climate Models: Comparative Decomposition of Aerosol Direct, Semidirect, and Indirect Radiative Forcing

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$$\text{DIRECT} = \Delta(S - S_{\text{clean}}),$$

$$\text{SW INDIRECT} = \Delta S_{\text{noanthrad,clean}},$$

$$\text{SW SEMIDIRECT} = \Delta S - \text{DIRECT} - \text{SW INDIRECT},$$

$$\text{LW INDIRECT} = \Delta(L_{\text{noanthrad}} - L_{\text{noanthrad,clear}}),$$

and

$$\text{LW SEMIDIRECT} = \Delta(L - L_{\text{clear}}) - \text{LW INDIRECT},$$

S and L: Net TOA shortwave and longwave radiative flux

S_{clean}: Shortwave flux at TOA for all-sky conditions with cloud absorption and scattering included and aerosol absorption and scattering excluded

L_{clear}: Longwave flux at TOA for clear-sky conditions with cloud absorption and scattering excluded and with aerosol absorption and scattering included

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ARTICLE

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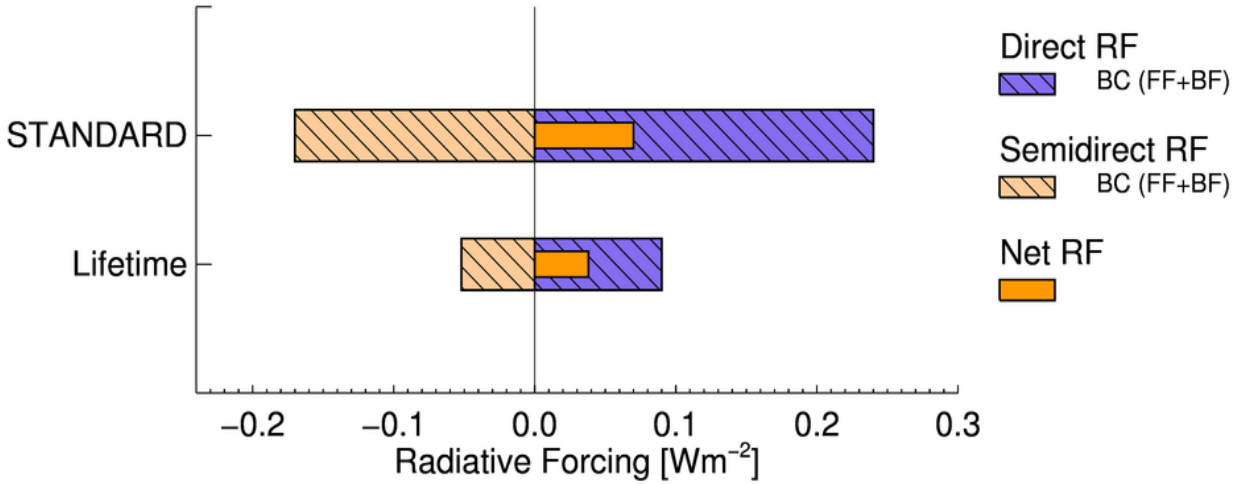
How shorter black carbon lifetime alters its climate effect

Øivind Hodnebrog[1], Gunnar Myhre[1] & Bjørn H. Samset[1]



Black carbon lifetime modified to have shorter lifetime

-Simulations performed with **STANDARD** BC lifetime and shorter BC **LIFETIME**

-Semi-direct effect is negative and reduces the total black carbon radiative forcing

-Model simulations indicate that the net of direct and semi-direct better constrained than their individual effect

AGU PUBLICATIONS

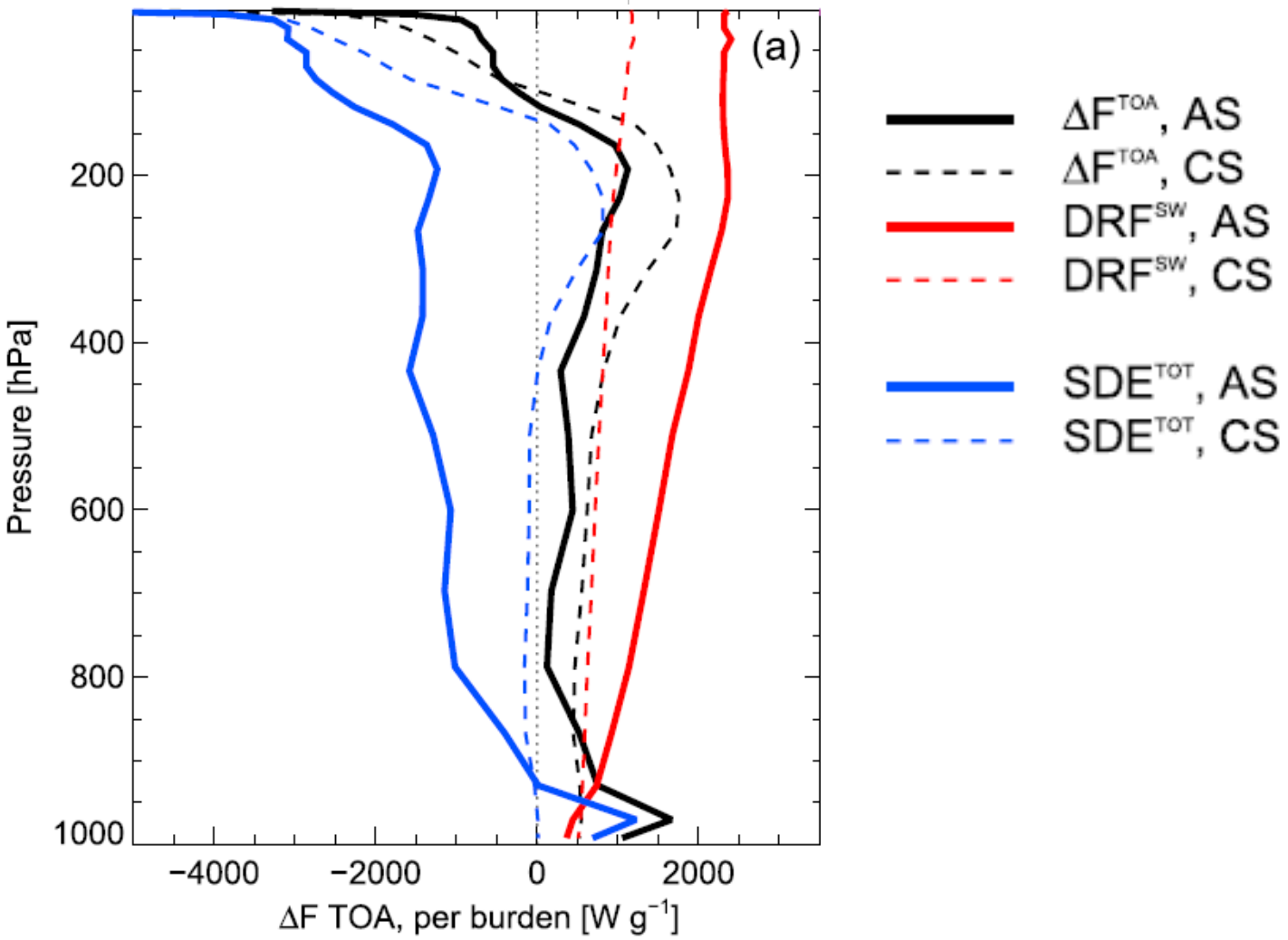
JGR

Journal of Geophysical Research: Atmospheres

RESEARCH ARTICLE
10.1002/2014JD022849

Climate response to externally mixed black carbon as a function of altitude

B. H. Samset[1] and G. Myhre[1]

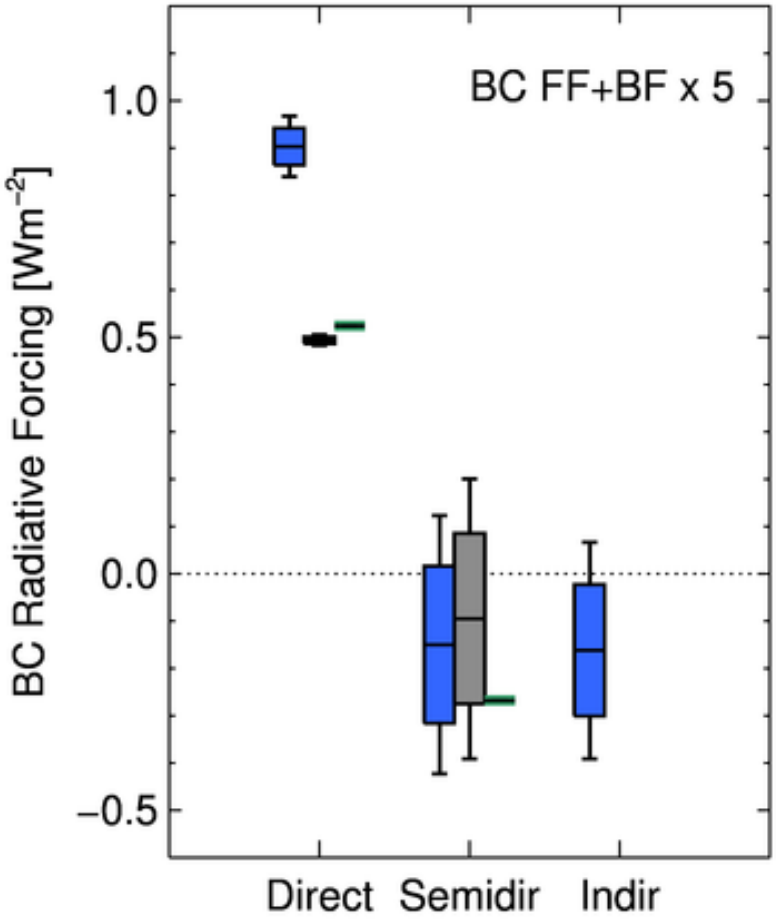


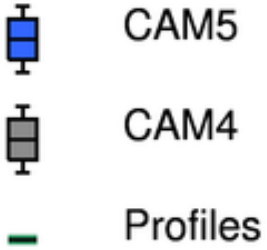
Design of semi-direct experiment

Four simulations			
All BC emissions	All BC emissions - BB	5 * All BC emissions	5 * (All BC emissions – BB)

BC fields		
BC fields from standard AeroCom BC lifetime	BC fields with lifetime in more agreement with HIPPO data	Driven by emissions

Comparison of semi-direct simulations





Preliminary simulations – longer runs needed

Summary and timeline

- An open initiative for AeroCom models and models outside AeroCom
- We will derive the sufficient length of the simulations before end of the year
- We will make a description on the AeroCom wiki page by end of the year
- Commitment from models first part of 2016
- Start simulations spring 2016
- Preliminary results ready by AeroCom 2016

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