The Press Sometimes Gets it Wrong

New Study Finds Model's Impact Black Carbon Most Likely About Right

As Chair of the CCAC Scientific Advisory Panel, I am writing this comment to address any misconception of the results of the recent Hodnebrog *et al.* study, published in Nature Communications, due to recent reporting by the Guardian.

Black carbon is a powerful climate forcer and air pollutant, and an important target for climate protection, public and ecological health, and sustainable development. However, a recent article by the Guardian titled "Climate Impact of Black Carbon Severely Overestimated," has mischaracterized the results of the Hodnebrog study, calling into question the climate impact of this dangerous pollutant. The article's conclusions were based on extremely selective reporting on the results of the study and is based on a small subset of the model results that removed all black carbon (BC) at high altitudes (and are thus inconsistent with observations). A more comprehensive analysis might have concluded that the paper actually reported that "Climate Impact of Black Carbon may be Overestimated, or Perhaps Underestimated, but is Most Likely About Right."

For context, scientists have long known that there have been some outstanding discrepancies between composition models and observations regarding BC including: (1) the models having too little over much of Asia, and (2) models having too much BC out over the remote Pacific and at high altitudes. The former has led the scientific community to speculate that emissions of BC used in the models are underestimated in some regions, whereas the latter suggests that the modeled atmospheric lifetime of BC may be too long.

The new Hodnebrog *et al.* study shows that if one (somewhat arbitrarily) adjusts the models by increasing BC emissions by varying factors around the world (to "tune" the results in essence) while simultaneously reducing the atmospheric lifetime, the model results can be reconciled with both sets of observations. This is an interesting result, and the study could have been strengthened by including more detail on how the reduced lifetime affects the comparisons in the Arctic (it's been a puzzle that modeled BC in the remote Pacific seems too high, implying the lifetime might be too long, but it's too low in the remote Arctic implying the lifetime is too short).

The main result of the study, though, is that the direct radiative forcing from BC remains nearly unchanged despite these two changes. In fact, the direct forcing values reported in the paper are about the same or even a bit larger in their adjusted model studies than in their base experiment. Hence with one potential source of positive bias and one of negative bias, the net effect is minimal. It must be stressed that adjusting the model to account for either one of the potential biases alone would produce very unrealistic amounts of BC in either polluted or remote areas, so is not particularly useful except as a scientific sensitivity study.

Reference: Hodnebrog, O., Myhre, G. & Samset, B., *How shorter black carbon lifetime alters its climate effect*, NATURE COMM., doi: 10.1038/ncomms6065, 2014.