

When there are different types of smoke in the sky it changes how the sun light goes through the sky

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Abstract:

When the sky gets smoke in it, it can be more or less bright (white) than before. This is because the small smoke bits can change whether sun light gets through the sky to the ground, can change how much white sky water there is, and can change how the sky air moves around. If the smoke is blacker, it can make the sky warmer and if the smoke is whiter, it can make the sky (and the ground) cooler because the sun light doesn't get through. So we wanted to know whether the smoke is blacker or whiter over the big water far away from here, near where there are a lot of fires on the land.

We went to the big water place and watched the sky, the air, the sky smoke, and the white sky water. We did this by flying in the sky with our computers. We watched the smoke in a lot of different ways: we can look at the smoke from near the water and see what sun light gets through the sky, or from above and see how the sun light comes back up to space, or go right in the smoke with our flying computer eyes. Then we looked at whether the different ways of seeing showed that the same smoke was different (blacker or whiter) or the same. A lot of time they said it was the same, at least in some ways, but sometimes the smoke looked different and it changed a lot in different places over the big water.

We hope other people can put these answers into their computer studies, or into their computers that fly REALLY high, and then we can better understand how the sky gets warmer or cooler from smoke.

[This is modified from Pistone et al. 2019, with many thanks to my coauthors on that work: "Intercomparison of biomass burning aerosol optical properties from in situ and remote-sensing instruments in ORACLES-2016," Atmos. Chem. Phys., doi:10.5194/acp-19-9181-2019]