



The Impact of Fall Emissions of CO₂ and CH₄ in the Arctic

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The Arctic Boreal Region (ARB) is by all accounts a global carbon hot spot with rapidly changing temperatures, sea ice extent and length of summer seasons that have led to some surprising changes in the imprint that the Arctic has on the atmospheric CO₂ and CH₄. Our study takes advantage of the recently completed the NASA CARVE EV-1 suborbital mission as well as the long term NOAA ground and aircraft-based measurements of atmospheric CO₂ and CH₄ which show that fall and early wintertime emissions are a dominant part of the seasonal emissions observed in the Arctic. While CO₂ emissions do appear to be increasing over the last 40 years CH₄ emissions are not increasing suggesting that the anaerobic pathway degradation of organic carbon is not dominant. This finding provides an important driver for the large changes in amplitude of the CO₂ seasonal cycle, which is most pronounced over the Arctic, that has been observed but largely unexplained except through models which may be completely missing importance of wintertime emissions.