



Accurate Measurements of Aircraft Engine Soot Emissions Using a CAPS PM_{ss} Monitor

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We present results of aircraft engine soot emissions measurements during the VARIAnT2 campaign using CAPS PM_{ss} monitors. VARIAnT2, an aircraft engine non-volatile particulate matter (nvPM) emissions field campaign, was focused on understanding the variability in nvPM mass measurements using different measurement techniques and accounting for possible nvPM sampling system losses. The CAPS PM_{ss} monitor accurately measures both the optical extinction and scattering (and thus single scattering albedo and absorption) of an extracted sample using the same sample volume for both measurements with a time resolution of 1 second and sensitivity of better than 1 Mm⁻¹. Absorption is obtained by subtracting the scattering signal from the total extinction. Given that the single scattering albedo of the particulates emitted from the aircraft engine measured at both 630 and 660 nm was on the order of 0.1, any inaccuracy in the scattering measurement has little impact on the accuracy of the determined absorption coefficient. The absorption is converted into nvPM mass using a documented Mass Absorption Coefficient (MAC). Results of soot emission indices (mass soot emitted per mass of fuel consumed) for a turbojet engine as a function of engine power will be presented and compared to results obtained using an EC/OC monitor.