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Massive ozone production from South American wild fires observed during SOUTHTRAC

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During the SOUTHTRAC mission, which took place in September and November 2019, the German research aircraft HALO performed several cross sections from the equator to the southern tip of south America. The flight legs were flown along the coast of Brazil at typical altitudes of 13-14 km. During the northbound flight on October, 7th 2019 massive enhancements of pollutants were observed at these altitudes. Notably, in-situ observations show continuously elevated CO values exceeding 200 ppbv over a flight distance of more than 1000 km. These massive enhancements were

accompanied by strongly elevated NO and NO_y as well as CO₂ and could be attributed to the large fires

in South America during this time. These fires occurred in conjunction with convection over Argentina and Brazil, which led to efficient vertical transport. Lagrangian and chemical model analysis

confirmed the potential impact of convection and biomass burning to the observed enhancements of

ozone and pollutants.

Comparing the tracer observations to previous flights in exactly the same region three weeks earlier,

we could estimate the ozone production due to the biomass burning. We

estimate an ozone production in the polluted air masses of almost 30%

of the observed ozone mixing ratio. Given the large extent of the polluted area over 15 degrees of latitude this may have an impact on the local energy budget of the tropopause region.