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The Mediterranean Basin (MB) is at the crossroad of pollutant emissions from Western and Central Europe and of major dust sources from Sahara and Arabian deserts and thus sensitive to climate change and air quality. Several studies (Formenti et al.,J. Geophys. Res., 2002; Ancellet et al., Atmos. Chem. Phys., 2016) also show the impact on the MB of long-range transport of polluted air masses. However, most of the studies have been dedicated to biomass burning aerosols. The aim of the present study is to show trace gases impact on the MB coming from long-range transport of biomass burning.

The Gradient in Longitude of Atmospheric constituents above the Mediterranean basin (GLAM) campaign in August 2014, as part of the Chemistry-Aerosol Mediterranean Experiment (ChArMEx) project, aimed at studying the tropospheric chemical variability of gaseous pollutants and aerosols along a West-East transect above the MB. During the GLAM campaign, several instruments onboard the Falcon-20 aircraft (SAFIRE, INSU / Météo-France) were deployed including an infrared laser spectrometer (SPIRIT, LPC2E) able to detect weak variations in the concentration of pollutants.

During two flights on 6 and 10 August, increases in CO, O_3 and aerosols were measured over Sardinia at 5000 and 9000 m asl, respectively. To assess the origin of the air masses, 20-day backward trajectories with a nested-grid regional scale Lagrangian particle dispersion model (FLEXPART, Stohl et al., Atmos. Chem. Phys., 2005) were calculated. Combined with emissions coming from the Global Fire Assimilation System (GFAS) inventory (Kaiser et al., Biogeosciences, 2012), this leads to CO biomass burning contribution to aircraft measured values. Biomass burning emissions located in Siberia in the first case and in northern America in the second case were identified as the cause of this burden of pollutants in the mid and upper troposphere over the MB. By adjusting the injection height of the model and amplifying emissions, FLEXPART was able to reproduce the contribution of those fires to CO enhancements.

Our results show that long-range transport of biomass burning induces, at local scale, an increase by a factor ranging from 1.7 to 3.7 with respect to O_3 and CO backgrounds of $\sim$25 and $\sim$70 ppb, respectively. To assess the biomass burning effect on ozone level at regional scale over the MB, its tropospheric increase is estimated by using the chemical transport model MOCAGE.