

Fig. 1: Daily averaged accumulated precipitation (in mm) over Europe simulated by Meso-NH (top) and WRF/CHEM (bottom) right to left for 3 March 2009, for 26 June 2010 and for 18 September 2008. Wind direction is represented by black vector in m.s^{-1} at 850 hPa at 12:00 UTC. Accumulated precipitation (in mm) is daily averaged and represented by colours.

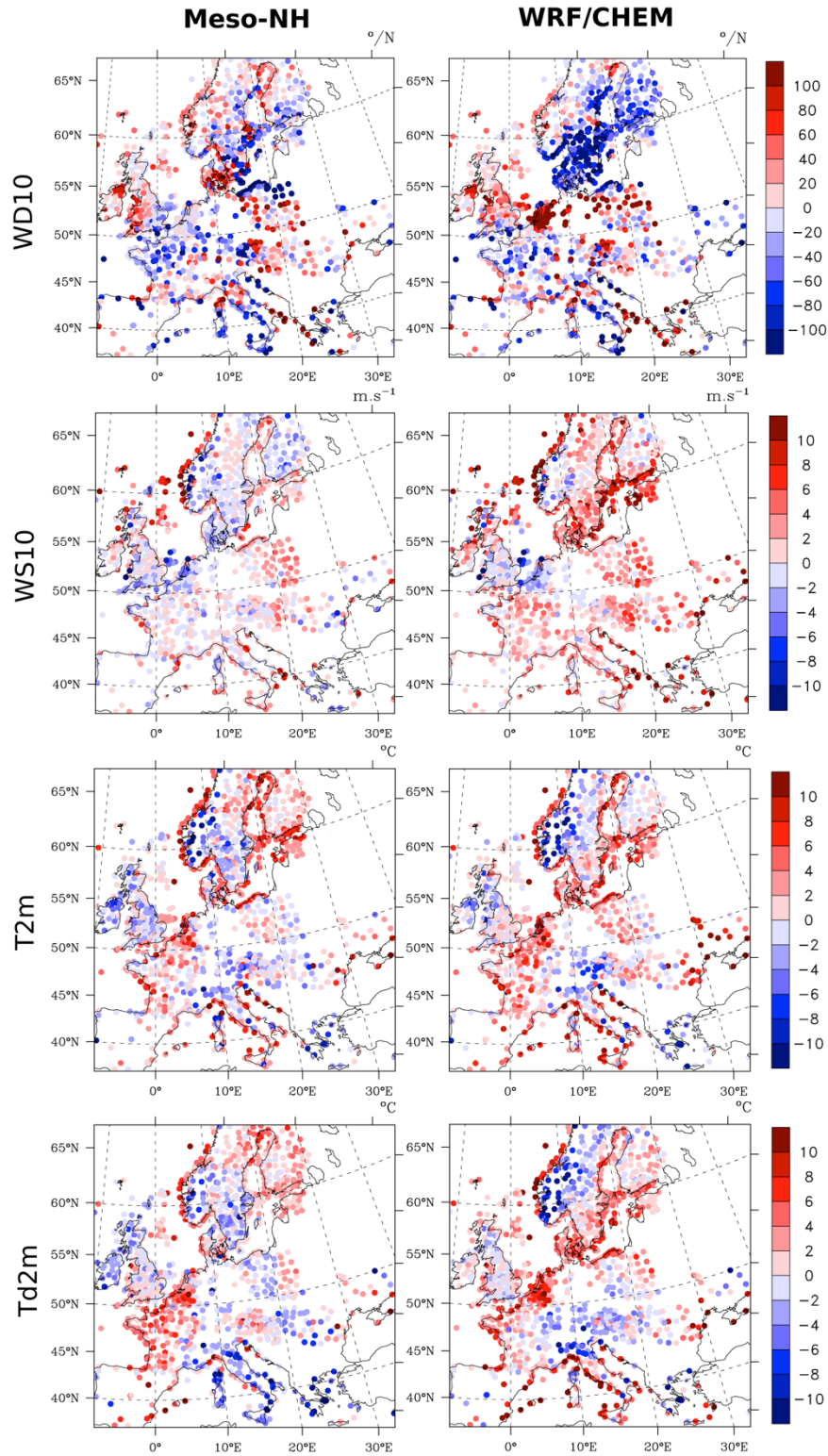


Fig. 2. Simulated daily biases for 18 September 2008 between models and observations at NOAA stations. Wind direction ($^{\circ}$ /N) and wind speed (m.s^{-1}) at 10 m, and temperature ($^{\circ}\text{C}$) and dewpoint ($^{\circ}\text{C}$) at 2 m are represented for Meso-NH and WRF/CHEM respectively top to bottom and right to left.

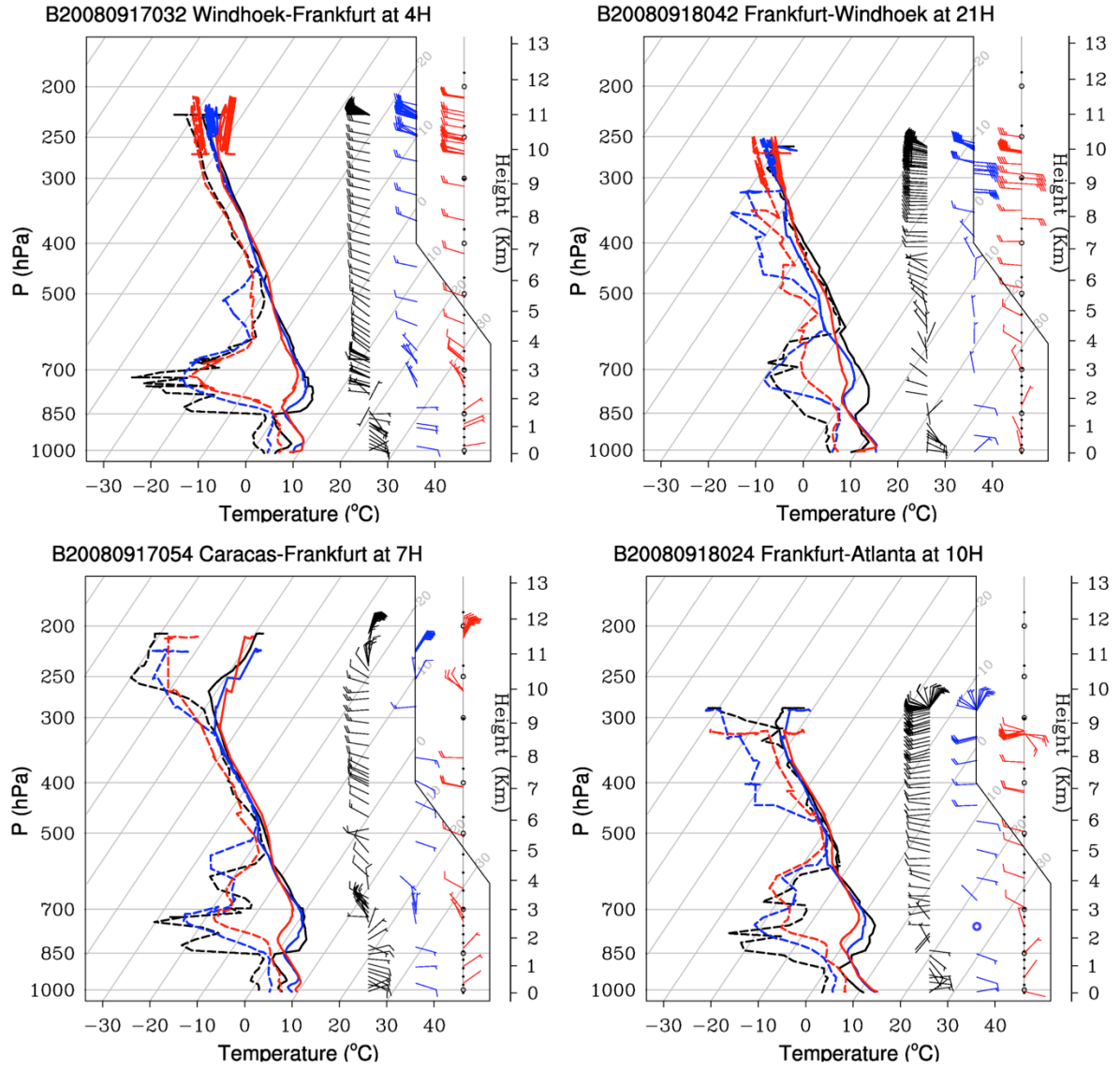


Fig. 3: Simulated (blue and red lines, for Meso-NH and WRF/CHEM respectively) and observed (black line) skew-T plots for temperature (solid lines), dewpoint (dashed lines), wind speed and wind direction (staffs and attached barbs). Observed vertical profiles were collected during take-off and landing of MOZAIC-IAGOS aircraft at Frankfurt airport on 18 September 2008 at four different times of day.

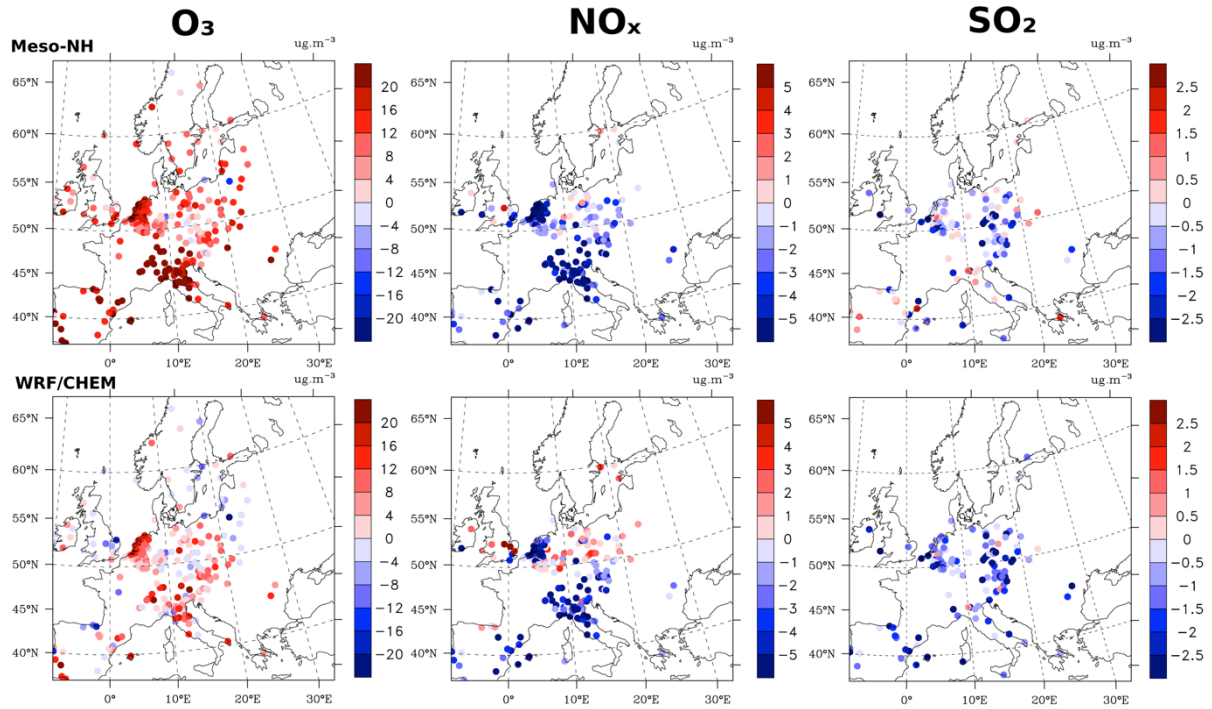


Fig. 4: Simulated daytime biases of mixing ration (in $\mu g.m^{-3}$) for 18 September 2008 between models and observations at “background” and “rural” AIRBASE stations. O_3 , NO_x and SO_2 are represented for Meso-NH and WRF/CHEM respectively left to right and top to bottom.

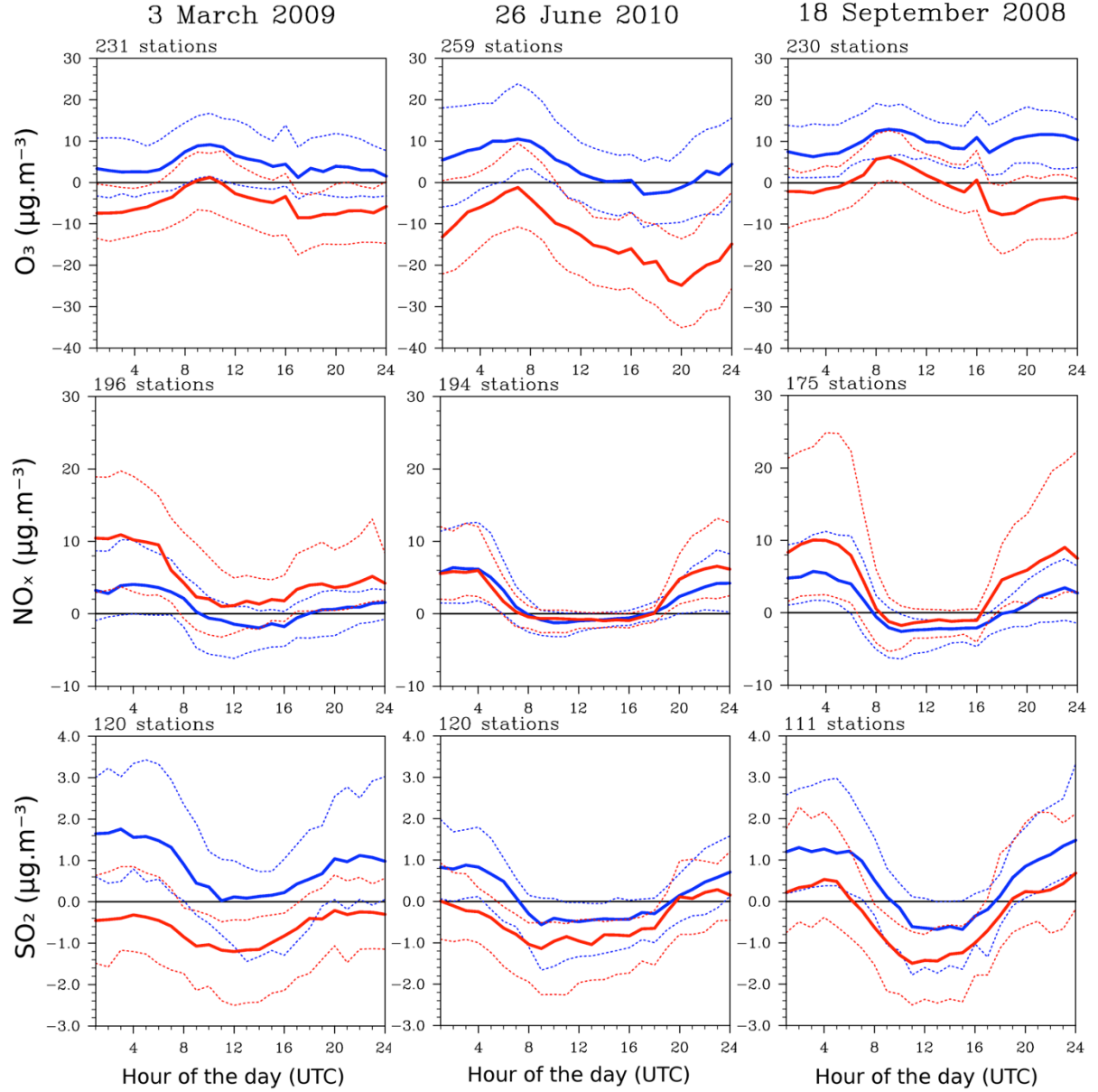


Fig. 5: Diurnal cycle of median bias of mixing ratio of O_3 , NO_x and SO_2 between simulated and observed values on the Airbase stations with mention “Background” and “rural”. The left column is for 3 March 2009, the middle one is for 26 June 2010 and the right one is for 18 September 2008. On each plot, the blue and red colours are for Meso-NH and WRF/CHEM respectively. Solid lines represent median, and dashed lines 25th and 75th percentiles. Black solid line separates negative from positive values.

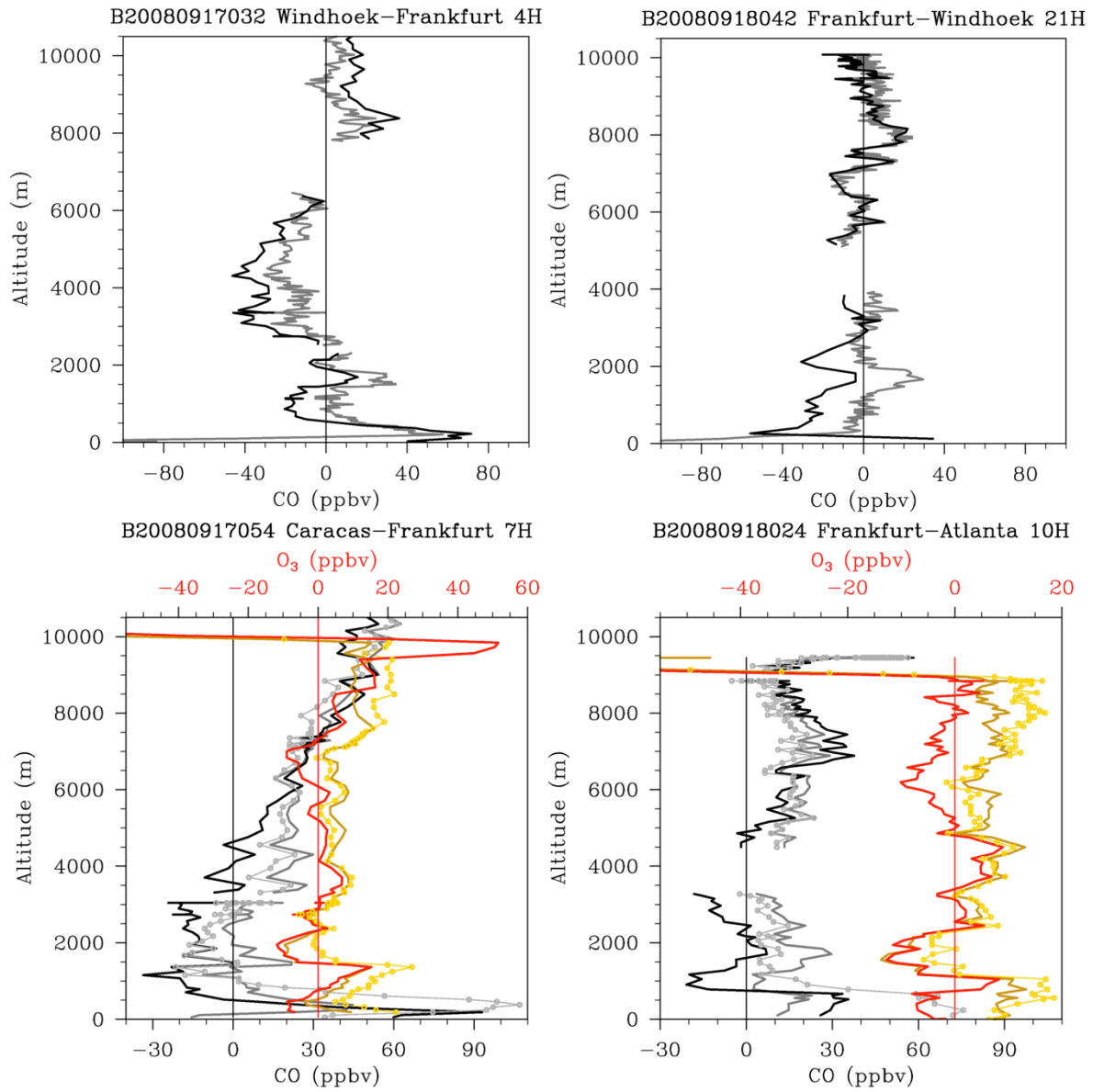


Fig. 6: Vertical profiles of CO and ozone mixing ratio biases (in ppbv) between models and observations from take-off and landing of IAGOS-MOZAIC aircraft at Frankfurt airport on 18 September 2008 at four different times of day: Meso-NH (CO dark grey, O₃ gold), WRF-Chem (CO black, O₃ red). CO and O₃ mixing ratio biases between MOZART model and observations at 06:00 and 12:00 UTC are superimposed on the 07:00 UTC and 10:00 UTC plots respectively (light grey for CO, light gold for O₃).

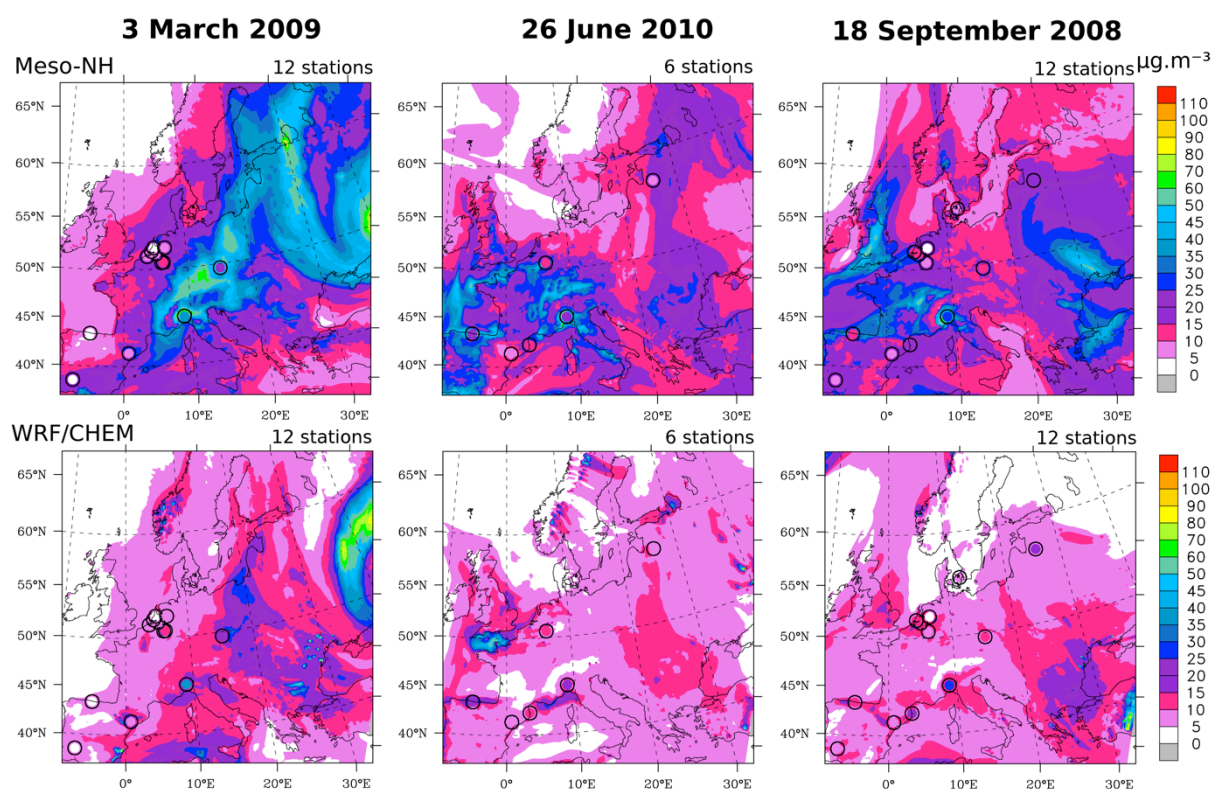


Fig. 7: Maps of daily mean PM_{2.5} mass concentration (in $\mu\text{g.m}^{-3}$) simulated by Meso-NH (top) and WRF/CHEM (bottom). Daily means from observations are represented by circles at “background” and “rural” AIRBASE stations for 3 March 2009 (left), for 26 June 2010 (middle) and for 18 September 2008 (right).

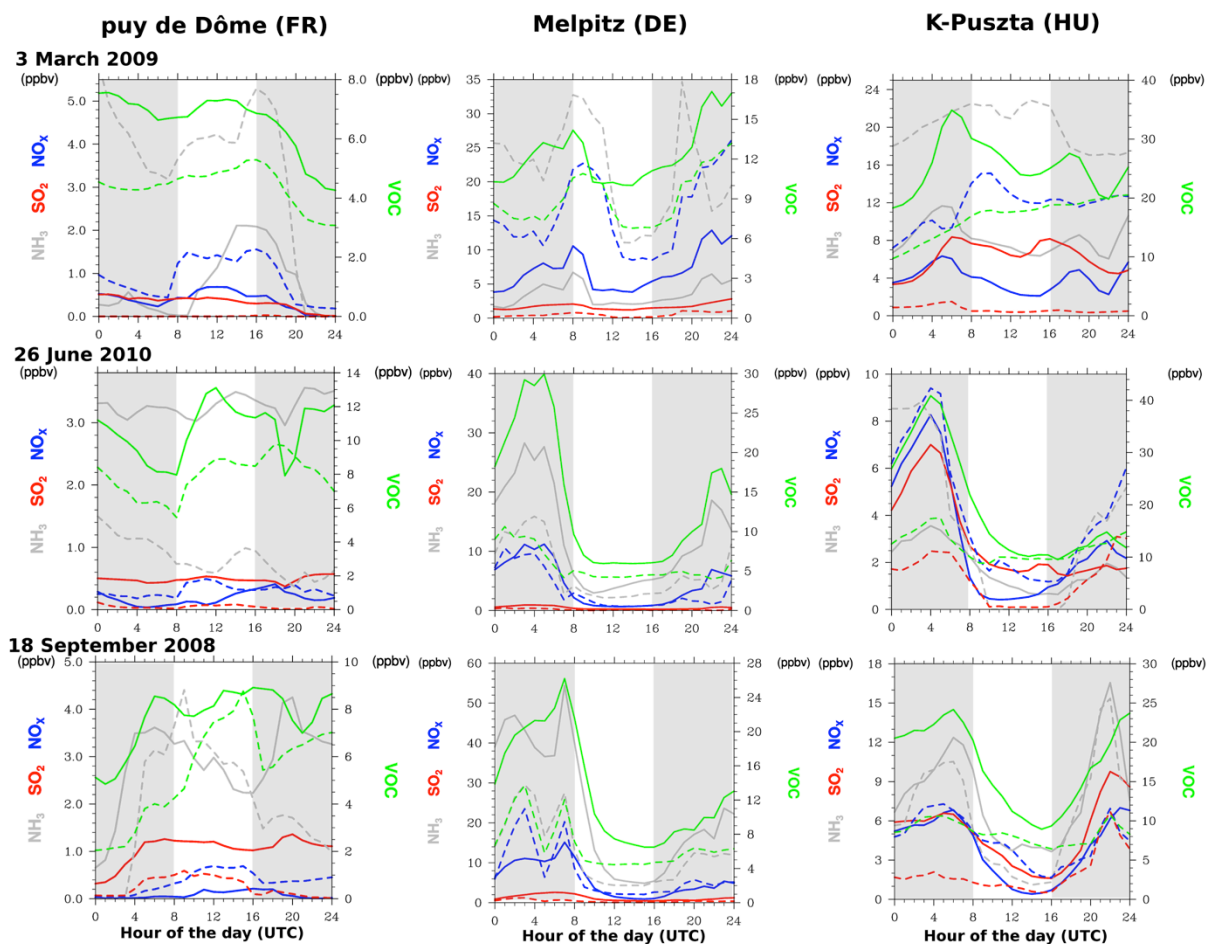


Fig. 8: Temporal evolution of mixing ratio of gas phase aerosol precursors simulated by Meso-NH (solid lines) and WRF/CHEM (dashed lines). Top to bottom for 3 March 2009, 26 June 2010 and 18 September 2008. Left to right at puy de Dôme, Melpitz and K-Pusztá stations. Precursors are represented with different colours: NH_3 (grey), SO_2 (red), NO_x (blue) (left Y axis) and VOCs (green) (right Y axis).

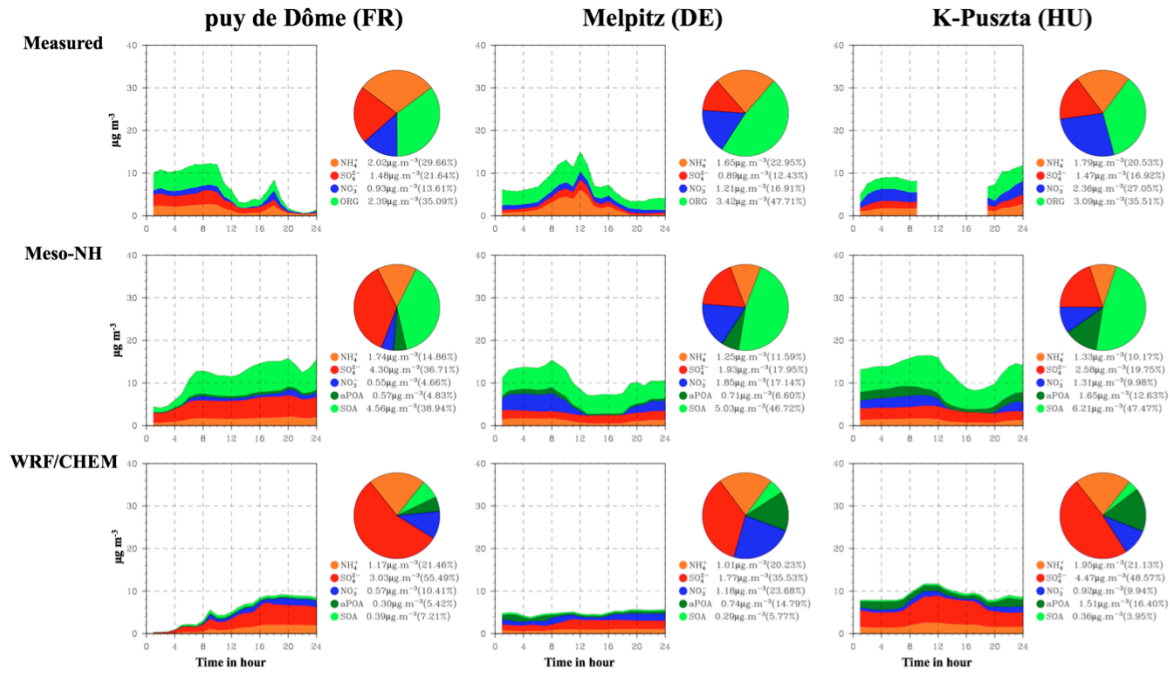


Fig. 9: Diurnal cycle of aerosol chemical composition in mass concentration ($\mu\text{g.m}^{-3}$) of NR-PM₁ on right (top: measured by AMS, middle: simulated by Meso-NH, bottom: simulated by WRF/CHEM) for 18 September 2008 at puy de Dôme, Melpitz and K-Pusztza stations. On the left, the corresponding daily averaged fractional mass composition is also indicated by pie charts. Percentages in parentheses correspond to the mass fraction of the total aerosol mass for each compound to. NR-PM₁ include NH_4^+ (orange), SO_4^{2-} (red), NO_3^- (blue) and ORG (green). Meso-NH and WRF/CHEM differentiate APOA (dark green) and SOA (light green) in OM.

