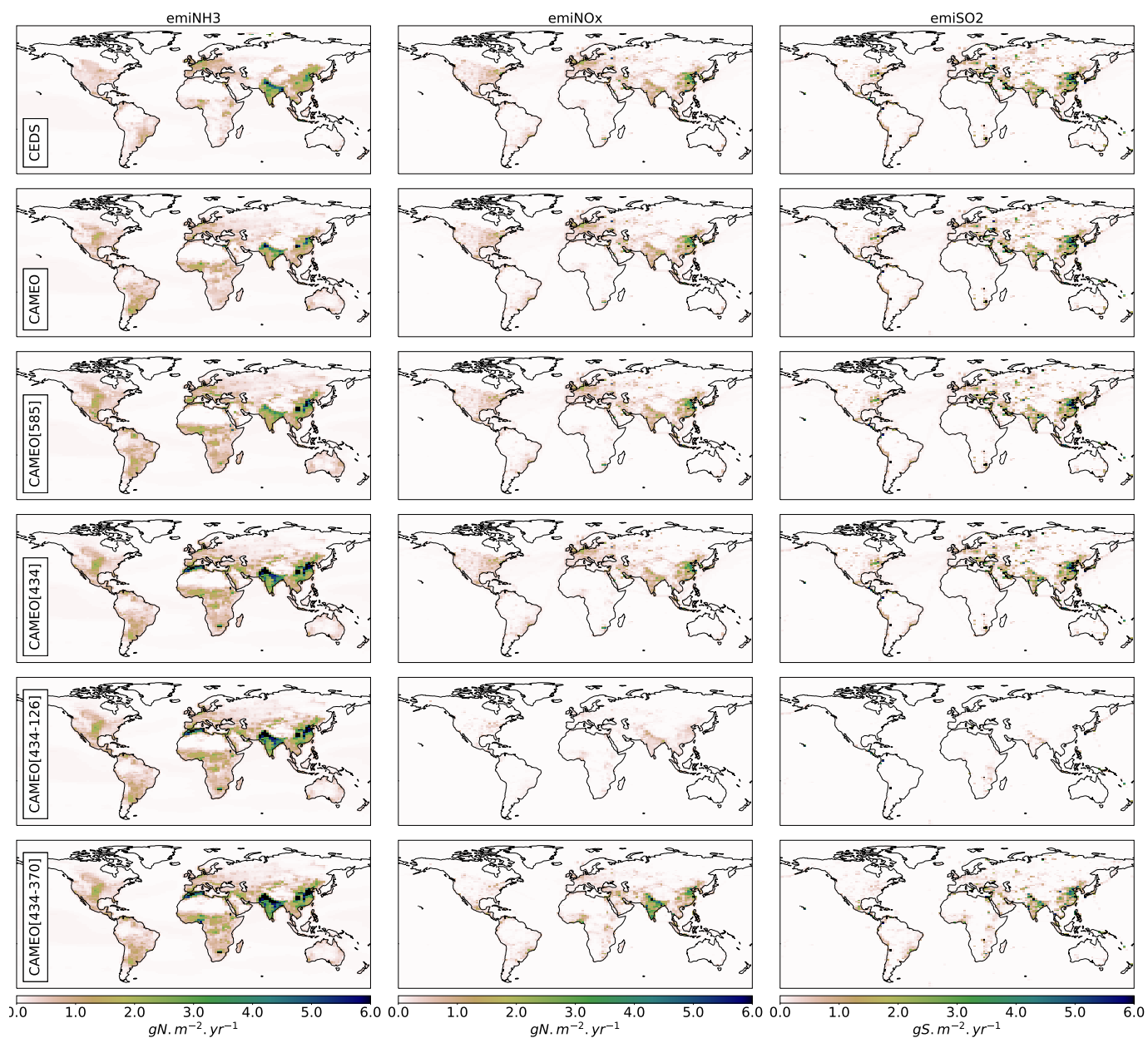Figure S1. Annual emissions of NH$_3$ (first column), NO$_x$ (second column), SO$_2$ (third column) (gNm^{-2}yr^{-1}, gSm^{-2}yr^{-1}) taken in the different LMDz-INCA simulations (emissions from year 2014 are shown for CAMEO and CEDS simulations and from year 2100 for CAMEO[585], CAMEO[434] and CAMEO[434-SSPi] simulations).
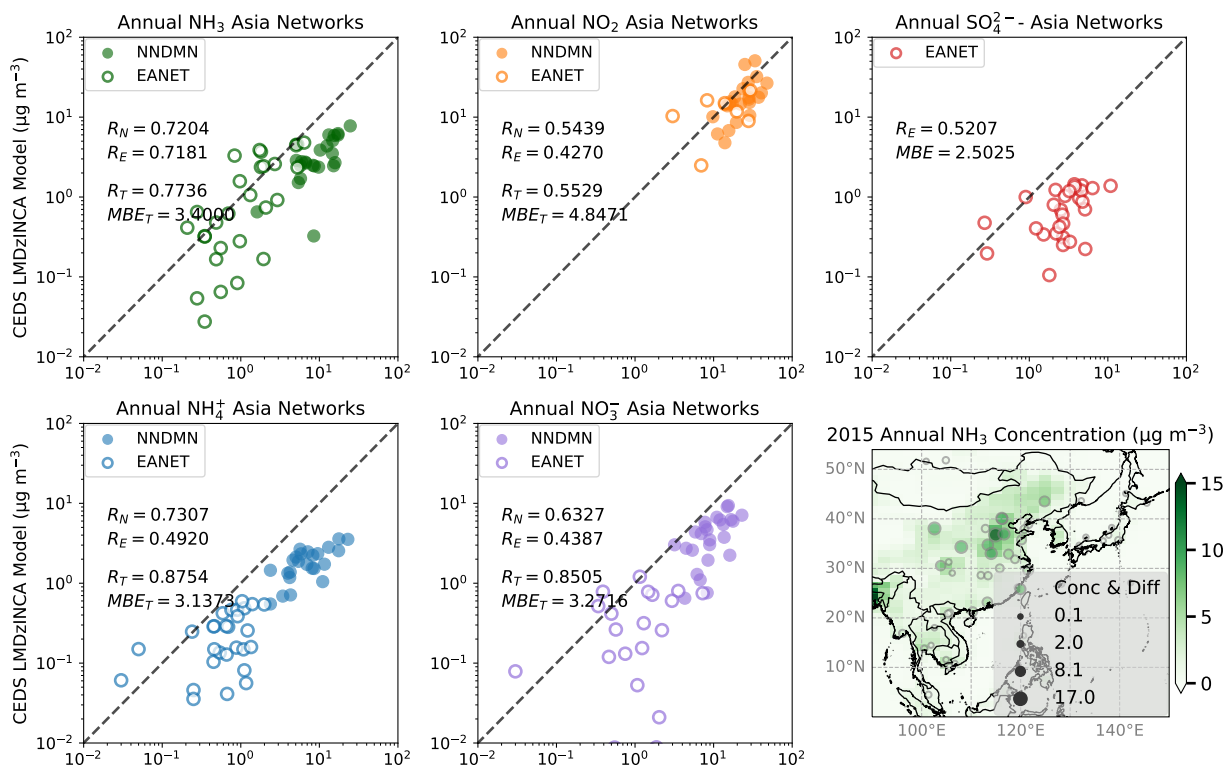
Figure S2. Scatter plots of annual mean modelled (CEDS run) and measured NH_3, NO_2, SO_4^{2-}, NH_4^+ and NO_3^- concentrations at East Asian and Southeast Asian monitoring network locations for 2015. In each plot, the dashed black line is the 1 : 1 line. RN is for NNDMN network. RE is for the EANET network. RT is the overall correlation coefficient between the model and all measurements shown. MBET is the overall Mean Bias Error between the model and all measurements shown. Note the log scale used in the plot. Annual surface NH_3 simulated concentrations are also shown along with the observation values mapped with circles. The size of the circle indicates the absolute difference with the modelled value. ($\mu g.m^{-3}$).
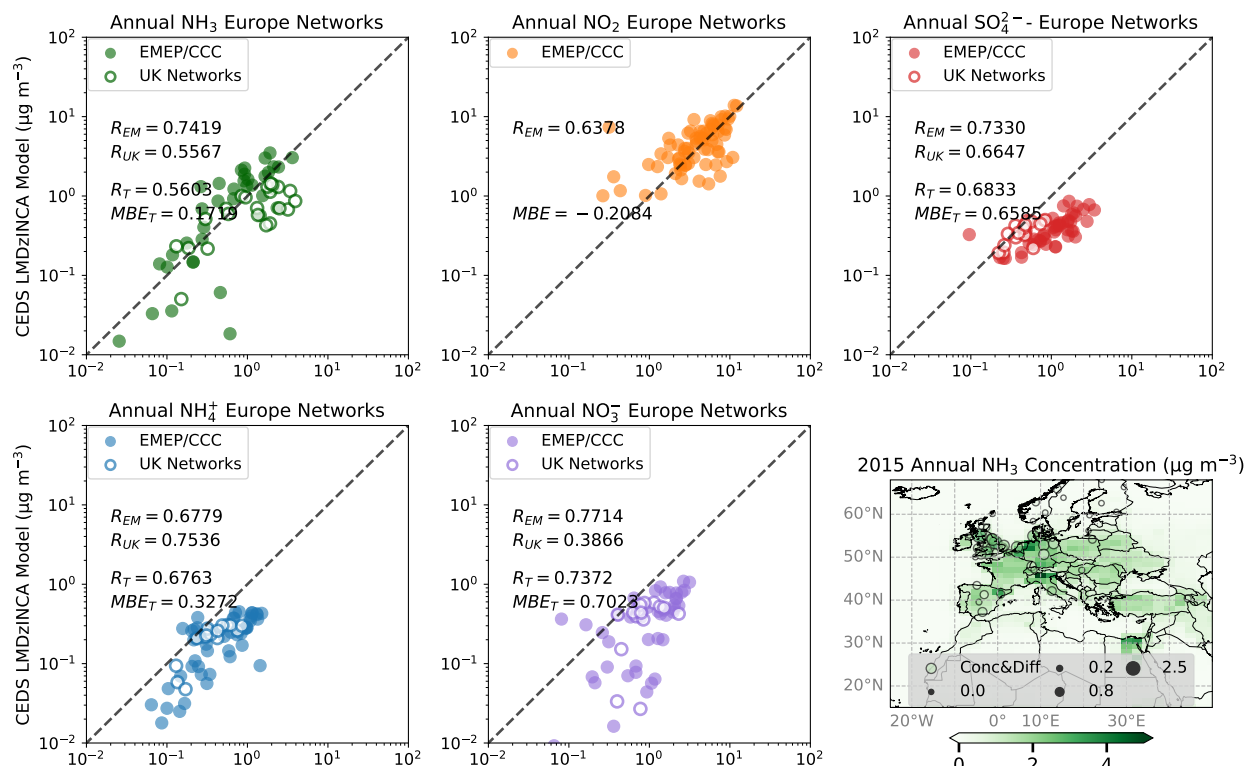
Figure S3. Scatter plots of annual mean modelled (CEDS run) and measured NH_3, NO_2, SO_4^{2-}, NH_4^+ and NO_3^- concentrations at European and UK monitoring network locations for 2015. In each plot, the dashed black line is the 1 : 1 line. REM is for EMEP/CCC network. RUK is for the UK network. RT is the overall correlation coefficient between the model and all measurements shown. MBET is the overall Mean Bias Error between the model and all measurements shown. Note the log scale used in the plot. Annual surface NH_3 simulated concentrations are also shown along with the observation values mapped with circles. The size of the circle indicates the absolute difference with the modelled value. ($\mu g.m^{-3}$).

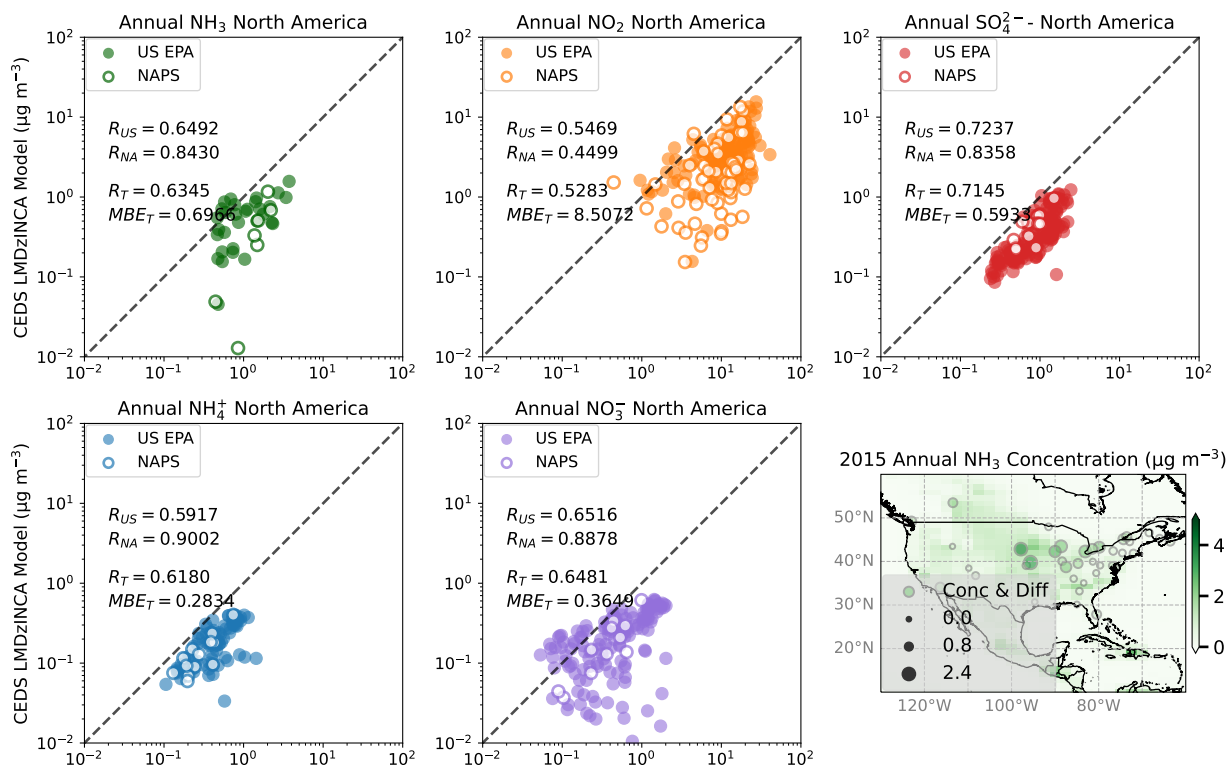**Figure S4.** Scatter plots of annual mean modelled (CEDS run) and measured NH_3, NO_2, SO_4^{2-}, NH_4^+ and NO_3^- concentrations at European and UK monitoring network locations for 2015. In each plot, the dashed black line is the 1 : 1 line. RUS is for the US/EPA network. RNA is for the NAPS network. RT is the overall correlation coefficient between the model and all measurements shown. MBET is the overall Mean Bias Error between the model and all measurements shown. Note the log scale used in the plot. Annual surface NH_3 simulated concentrations are also shown along with the observation values mapped with circles. The size of the circle indicates the absolute difference with the modelled value. ($\mu g.m^{-3}$).
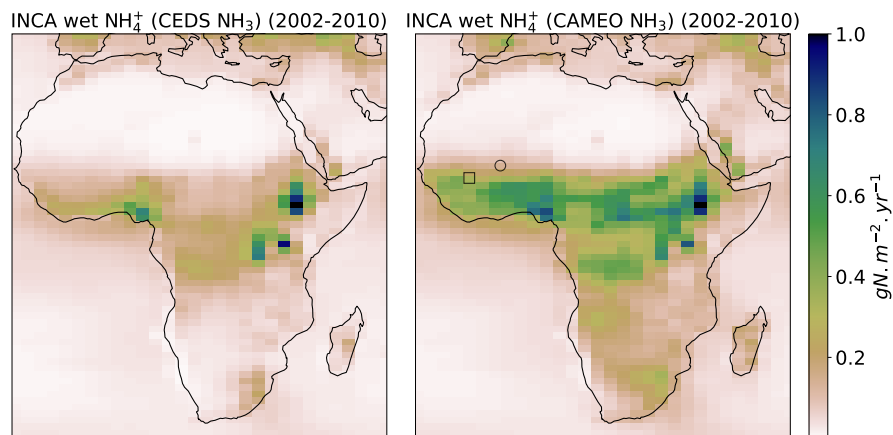
Figure S5. Annual mean wet NH_4^+ deposition simulated by LMD-INCA where CEDS (left) and CAMEO (right) emissions are prescribed for present-day conditions (2002-2010). The square represents the ground-observational station of Katibougou (12.93°N, 7.53°W) used in Figure S3. $(gNm^{-2}yr^{-1})$.
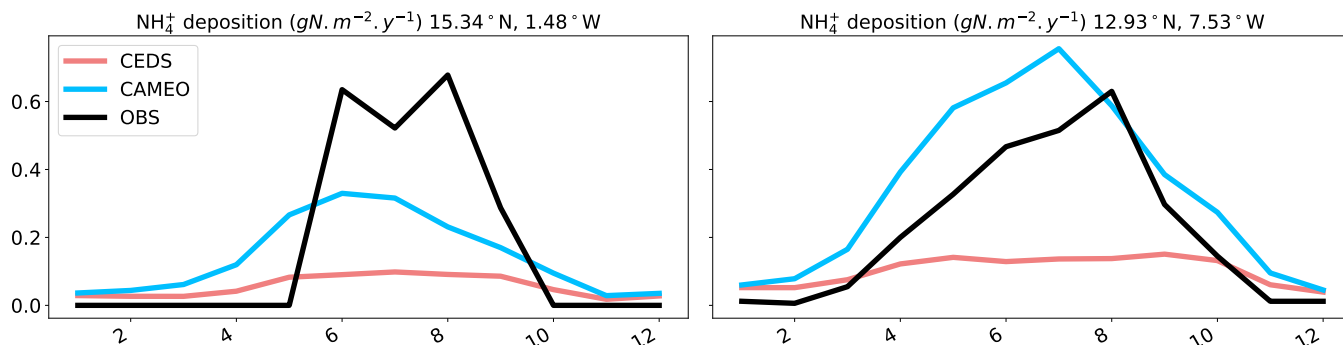

Figure S6. Simulated and observed wet deposition of ammonium in Agoufou and Katibougou (2002-2010). As in Vira et al. (2022), the simulated wet deposition includes both scavenged aerosol-phase ammonium and the dissolved gaseous ammonia. $(gNm^{-2}yr^{-1})$.
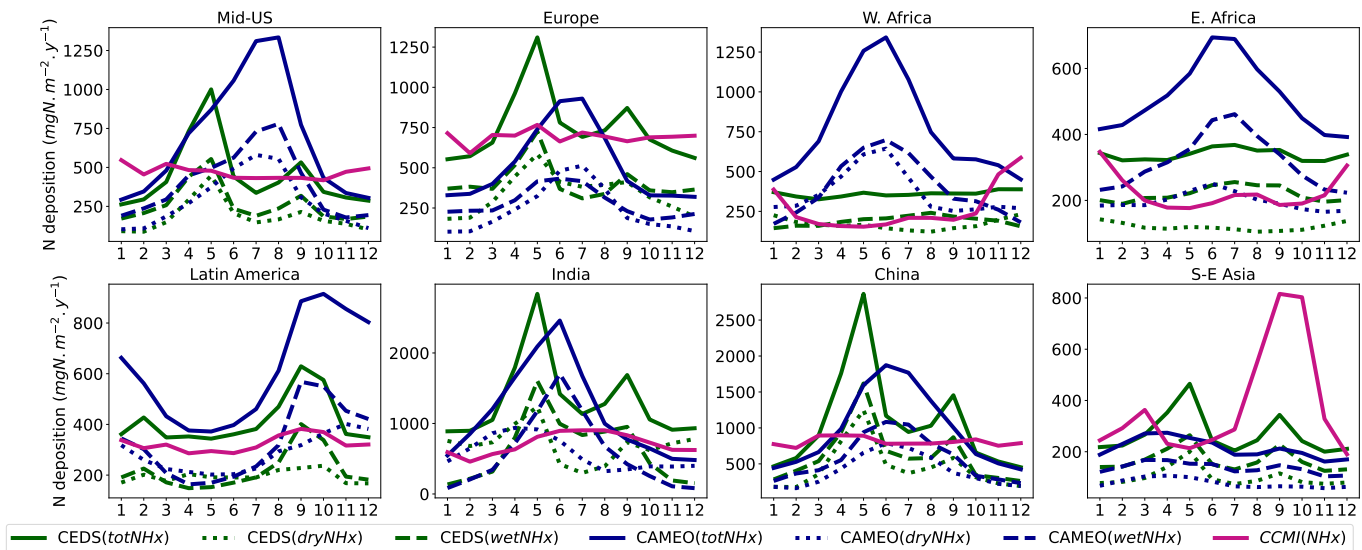
Figure S7. Regional monthly total NH_x deposition in $mgN.m^{-2}.yr^{-1}$ from CEDS and CAMEO simulations (green and blue respectively) and CCMI (in purple) for 2010-2014. Dry (dotted lines) and wet (dashed lines) NH_x deposition from INCA are also plotted. Regions are defined in Fig. 8
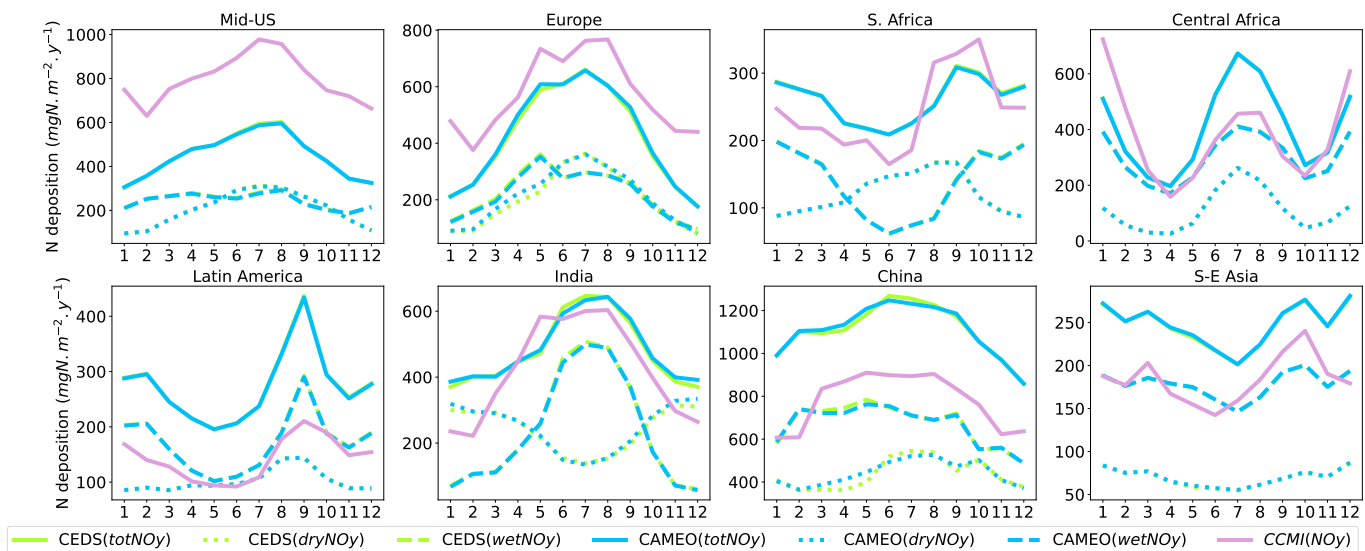
Figure S8. Regional monthly total NO_y deposition in $mgN.m^{-2}.yr^{-1}$ from CEDS and CAMEO simulations (green and blue respectively) and CCMI (in pink) for 2010-2014. Dry (dotted lines) and wet (dashed lines) NO_y deposition from LMDZ-INCA are also plotted. Please note that CEDS time series equal CAMEO in Latin America, Central Africa and South Africa. Regions are defined in Fig. 8

References

Vira, J., Hess, P., Ossohou, M., and Galy-Lacaux, C.: Evaluation of interactive and prescribed agricultural ammonia emissions for simulating atmospheric composition in CAM-chem, Atmospheric Chemistry and Physics, 22, 1883–1904, https://doi.org/10.5194/acp-22-1883-2022, 2022.

5