

Supplement of Atmos. Chem. Phys., 17, 9869–9883, 2017
<https://doi.org/10.5194/acp-17-9869-2017-supplement>
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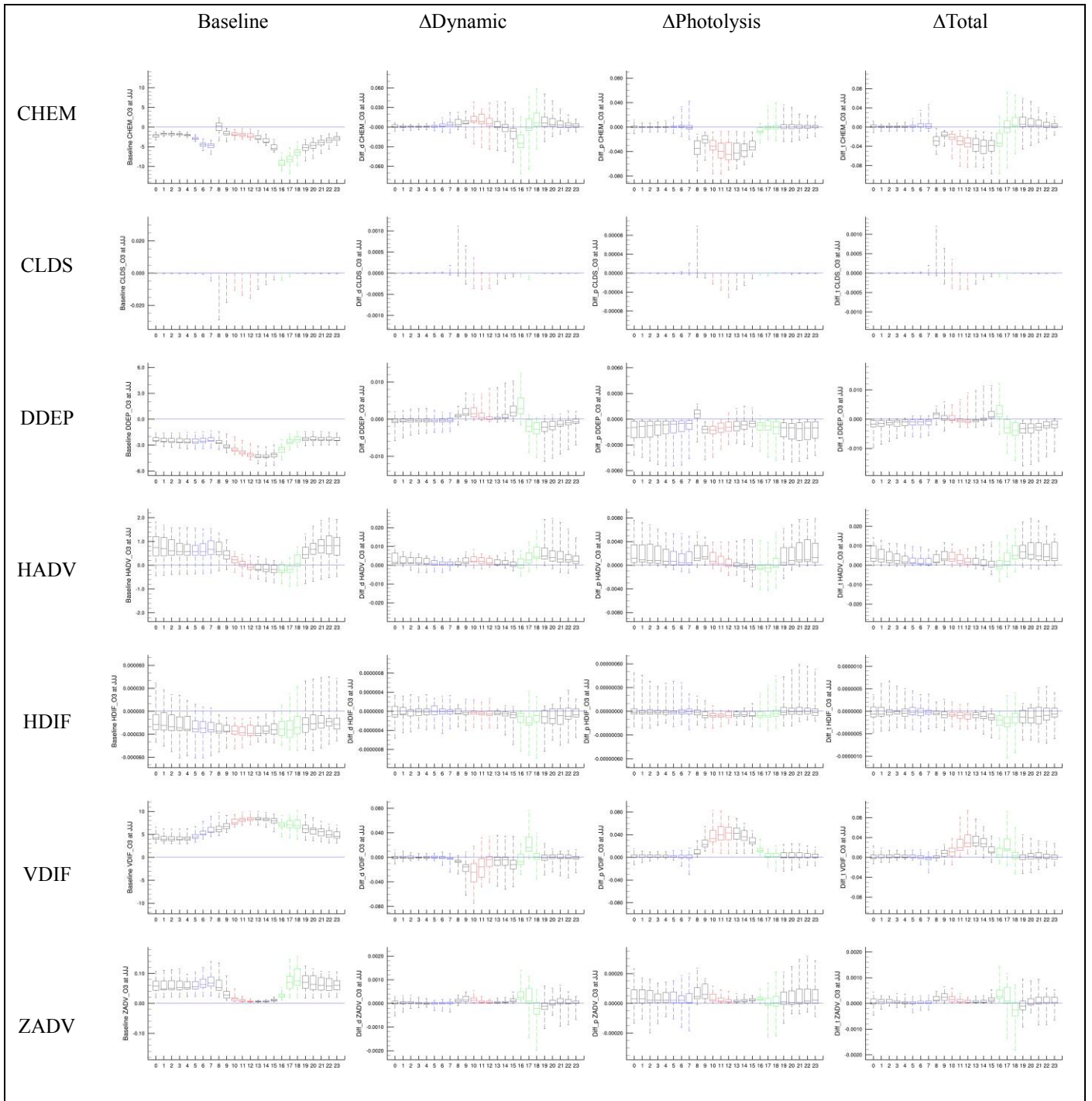
Supplement of

Impacts of aerosol direct effects on tropospheric ozone through changes in atmospheric dynamics and photolysis rates

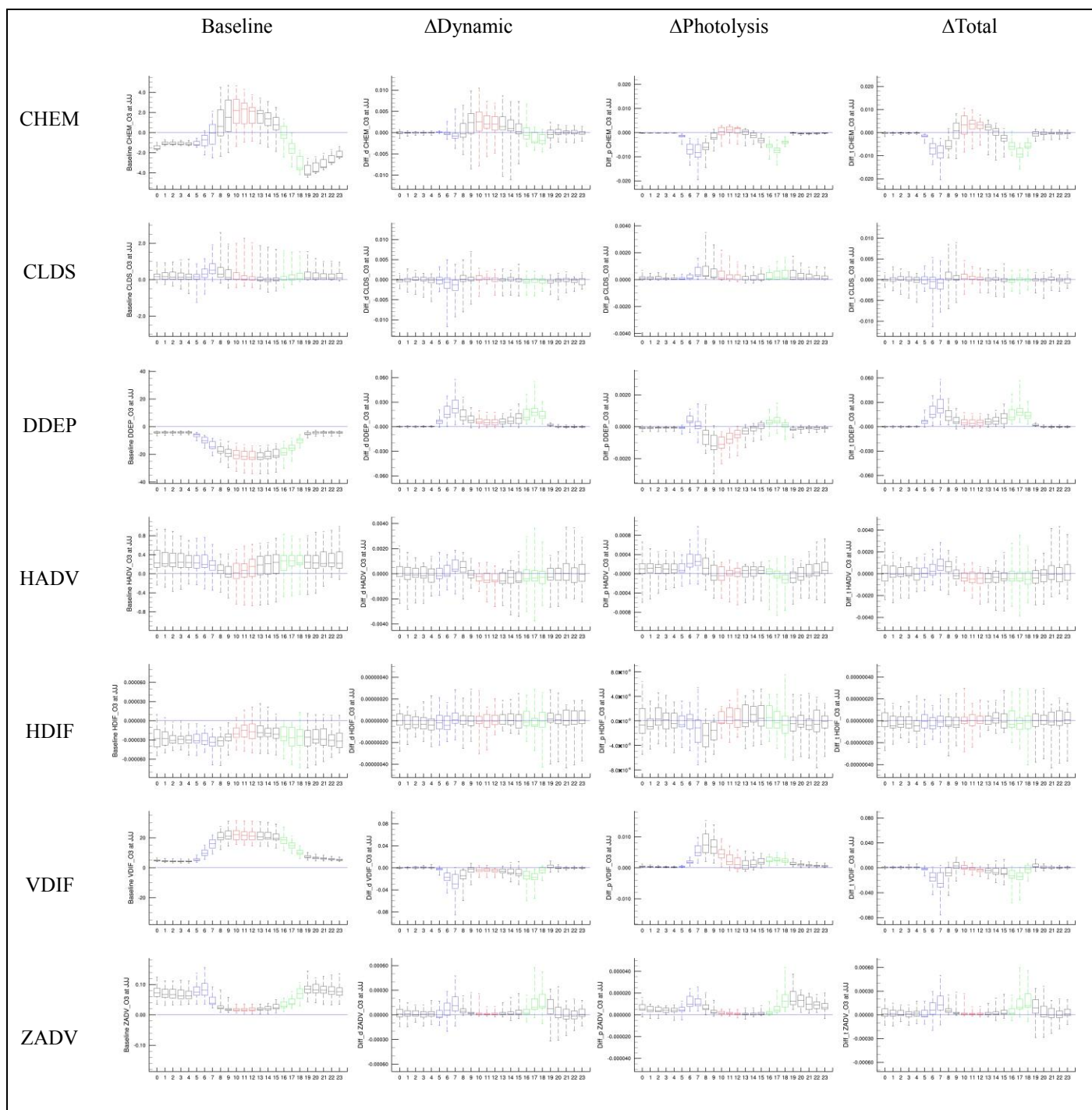
Jia Xing et al.

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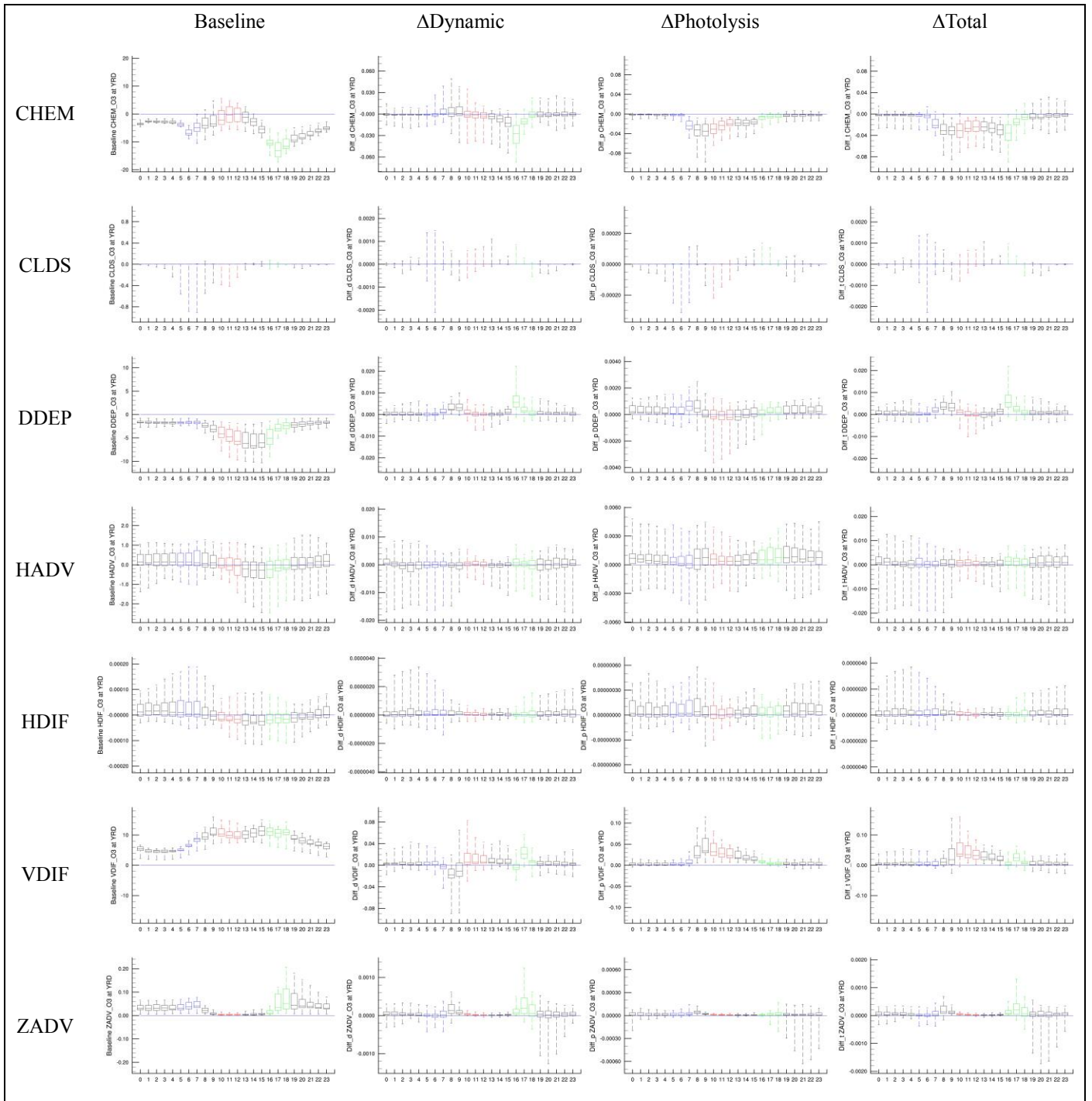


(a) January

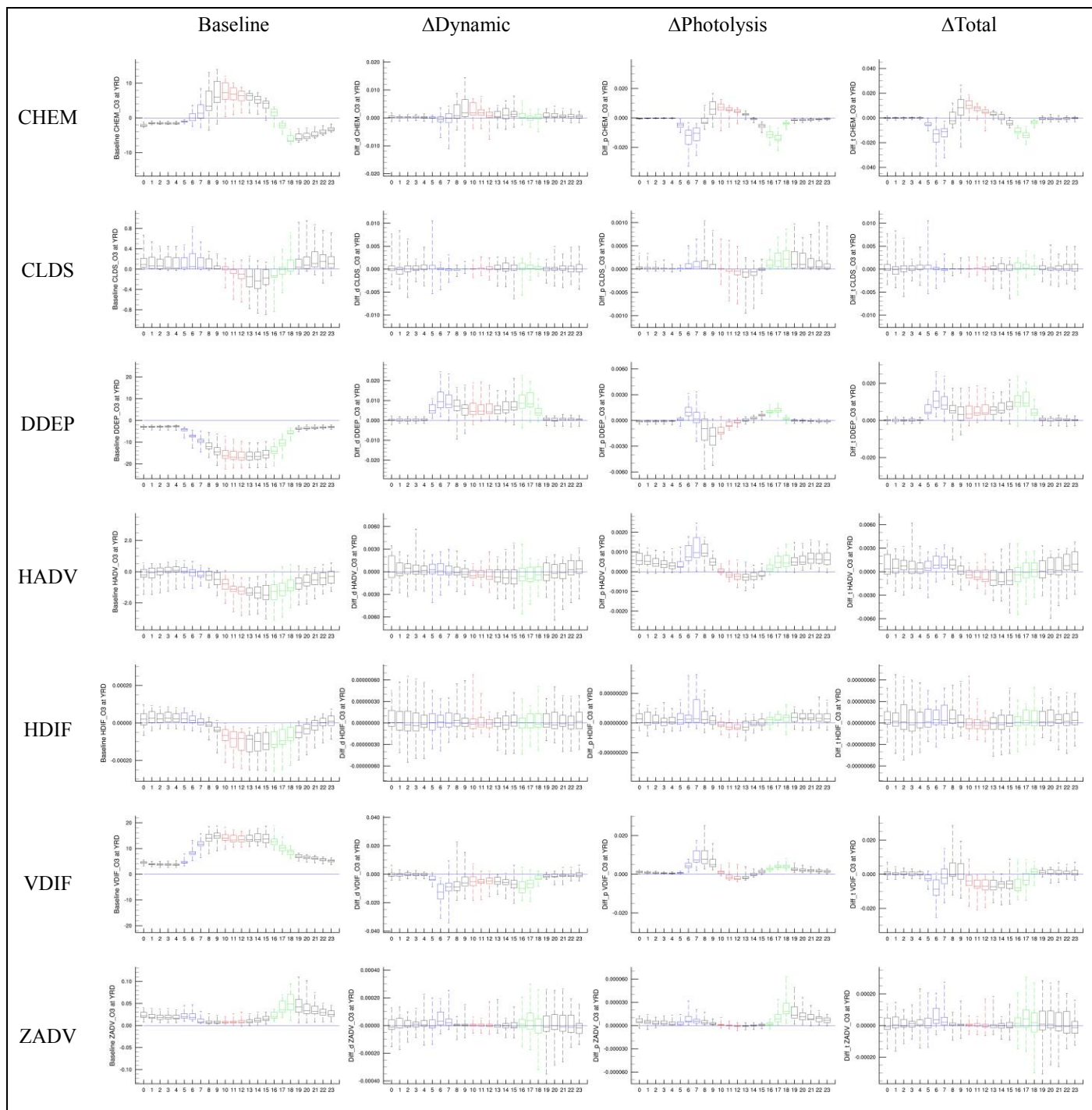


(b) July

Figure S1 Diurnal variation of integrated process contributions to surface O₃ concentration in JJJ (a: January; b: July; The calculation is based on the average of grid cells in JJJ; a. Baseline is the simulated O₃ in SimBL, unit: ppb hr⁻¹; b. ΔDynamic is the difference in normalized IPRs between SimSF and SimNF, unit: hr⁻¹; d. ΔPhotolysis is the difference in normalized IPRs between SimNF and SimBL, unit: hr⁻¹; c. ΔTotal is the difference in normalized IPRs between SimSF and SimBL, unit: hr⁻¹, colored bars represent three periods of early morning (blue), noon (red), and late afternoon (green))

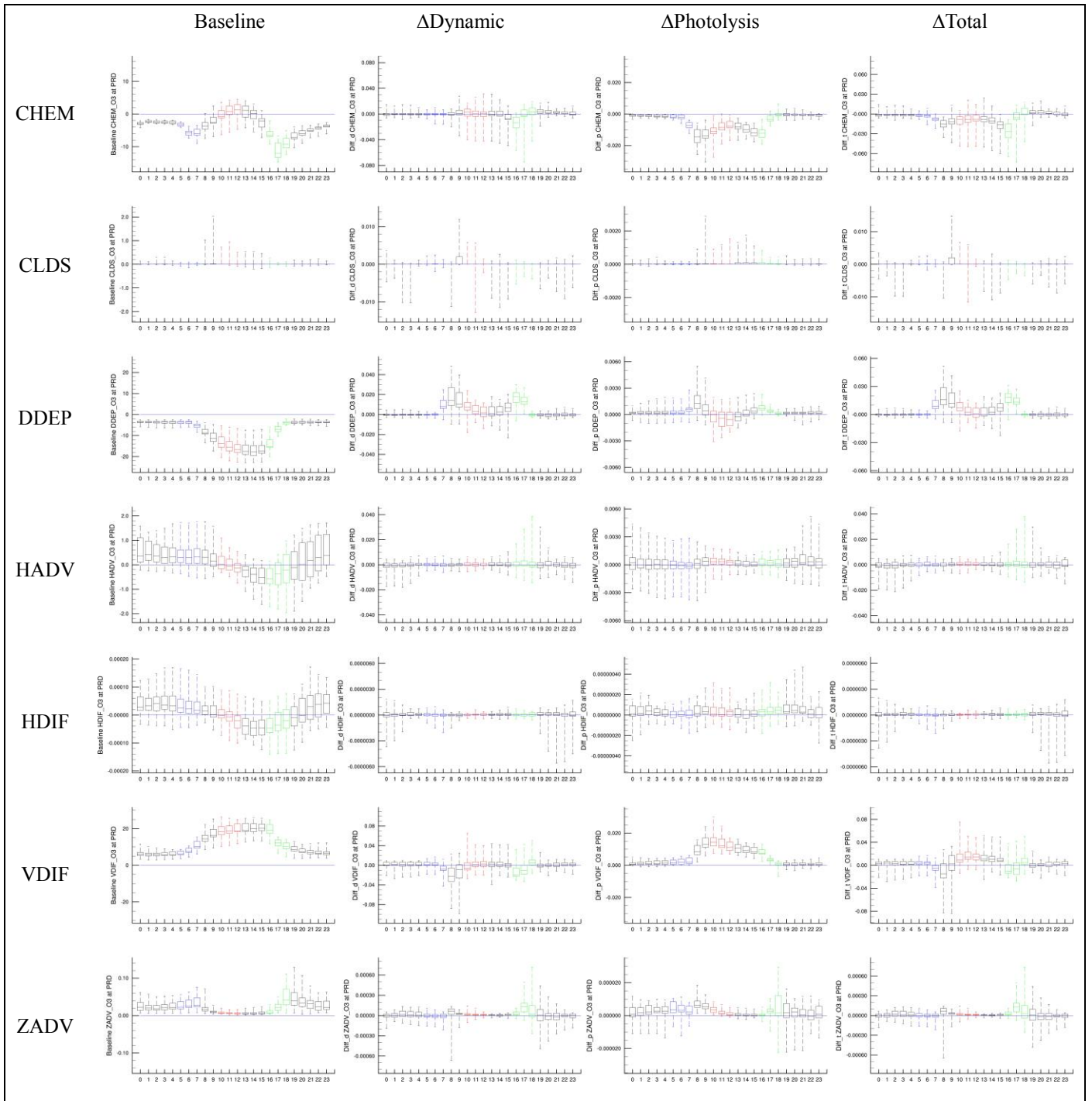


(a) January

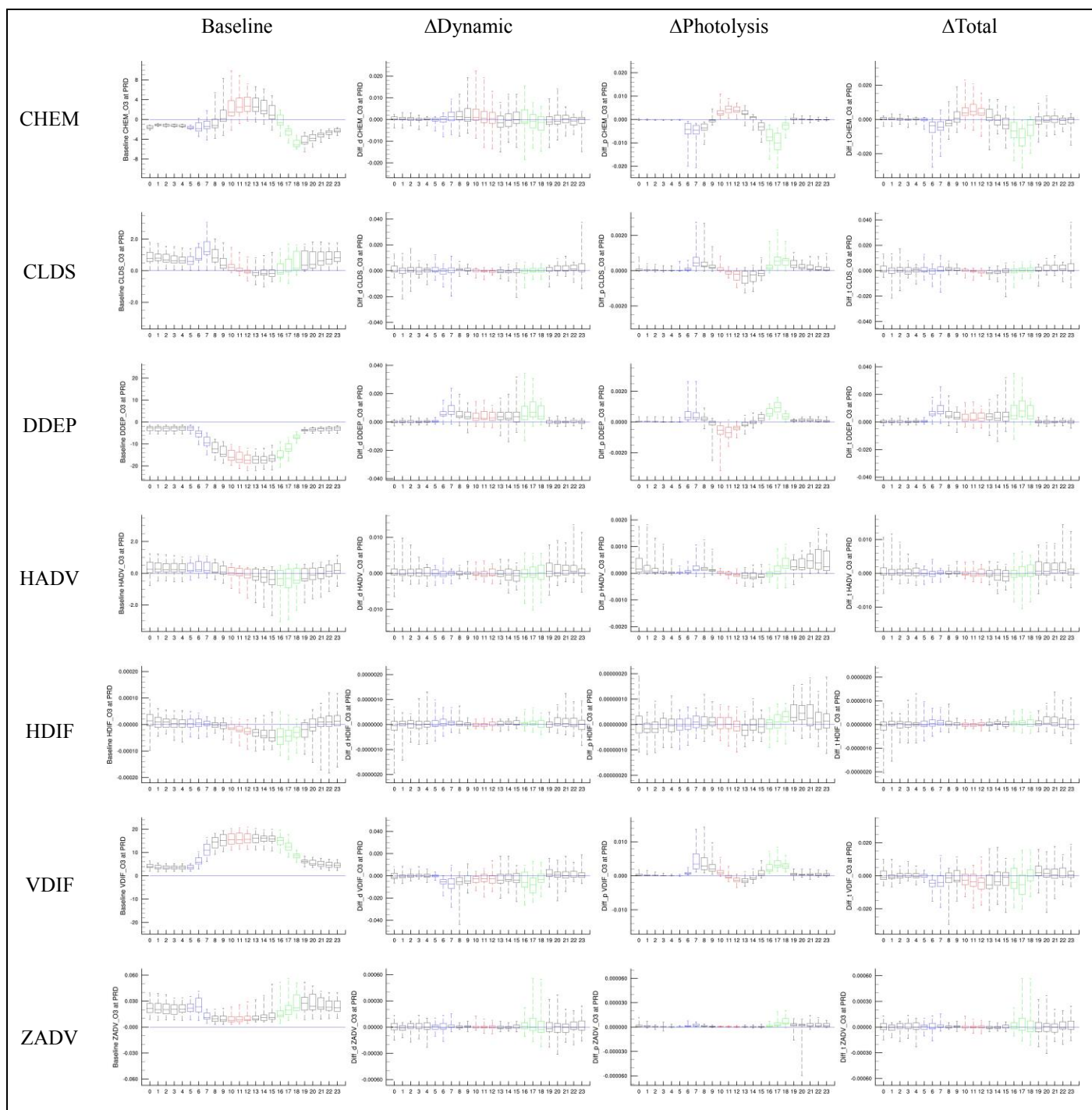


(b) July

Figure S2 same as Figure S1, but in YRD

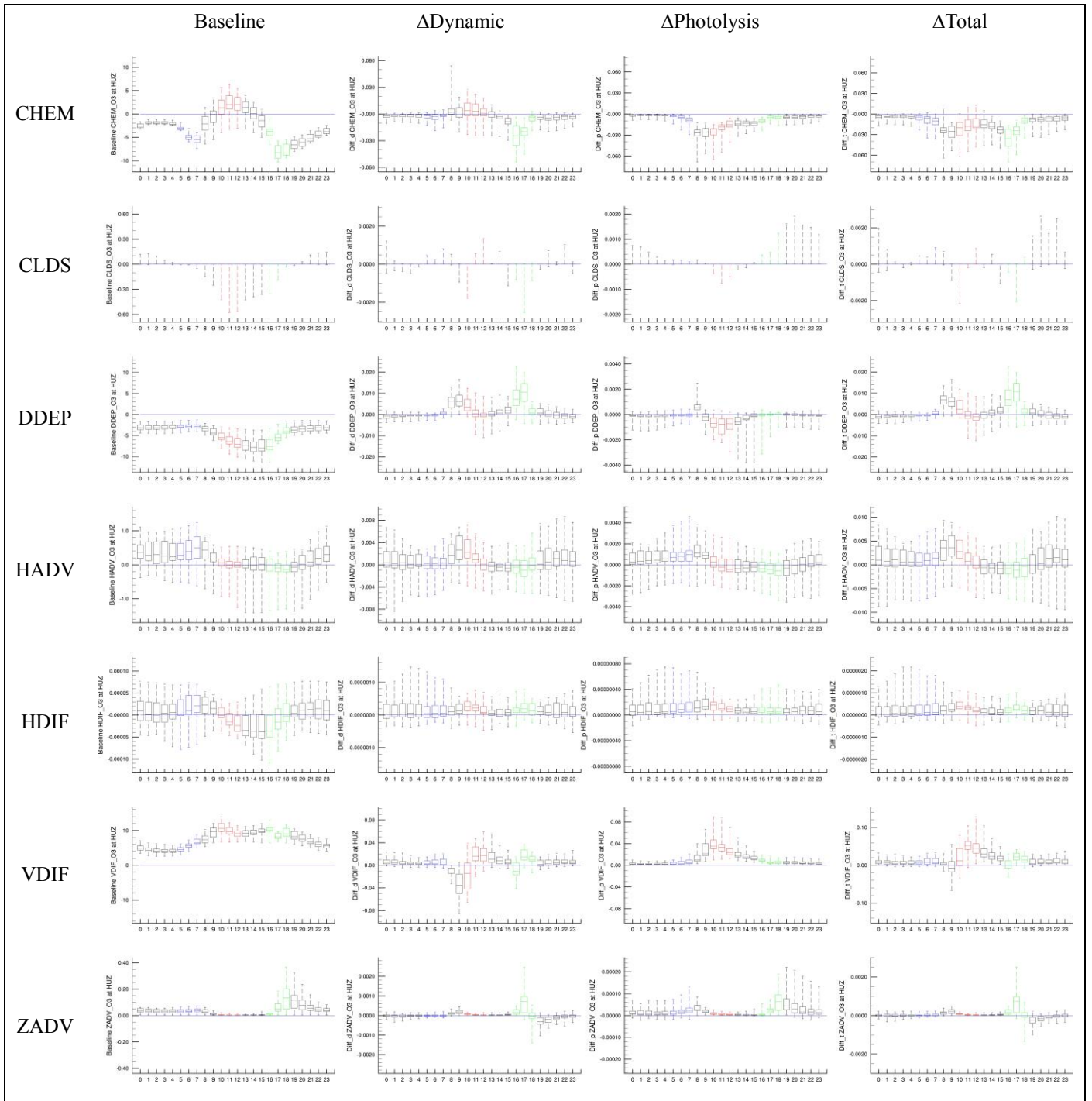


(a) January

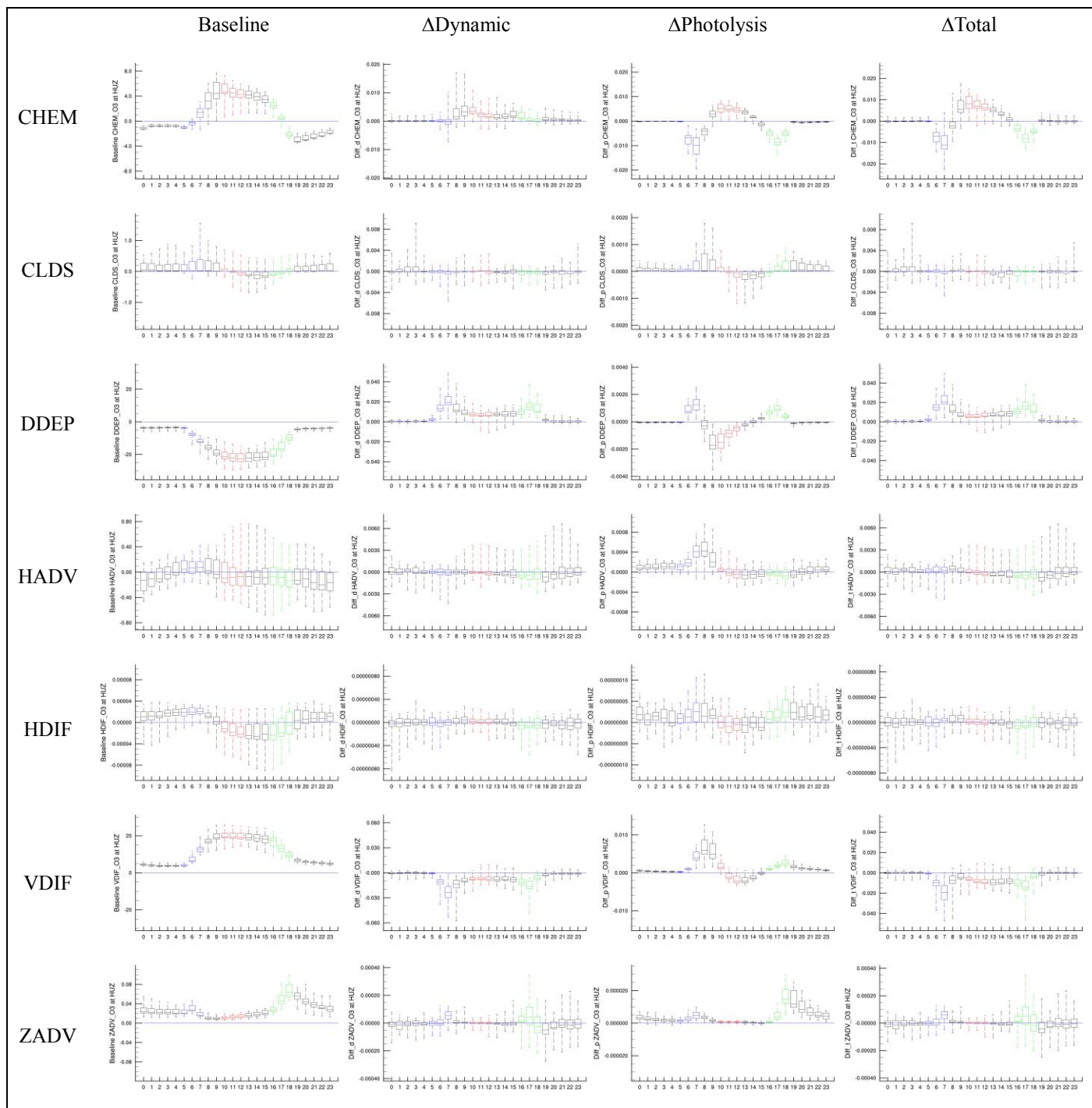


(b) July

Figure S3 same as Figure S1, but in PRD

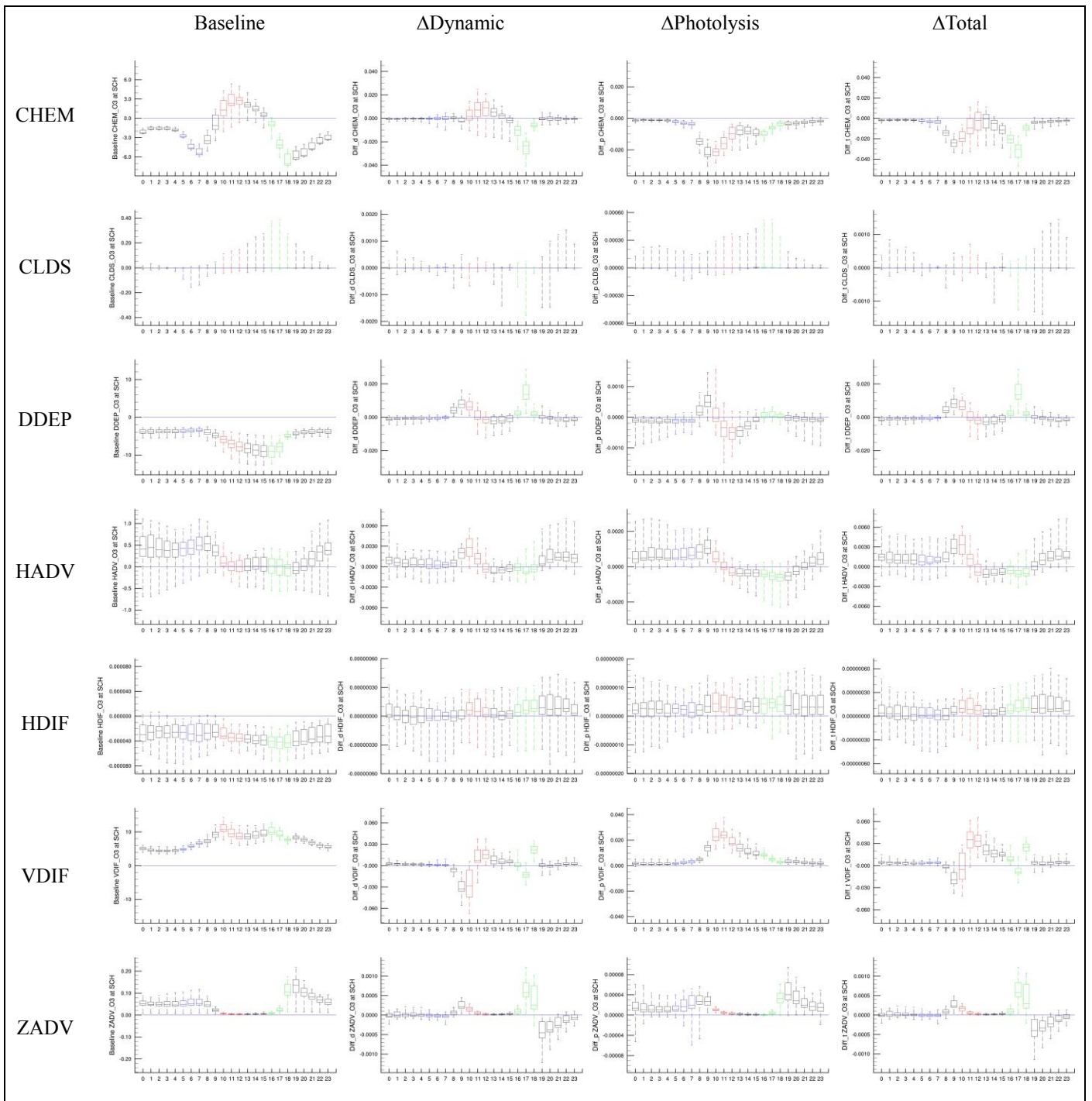


(a) January

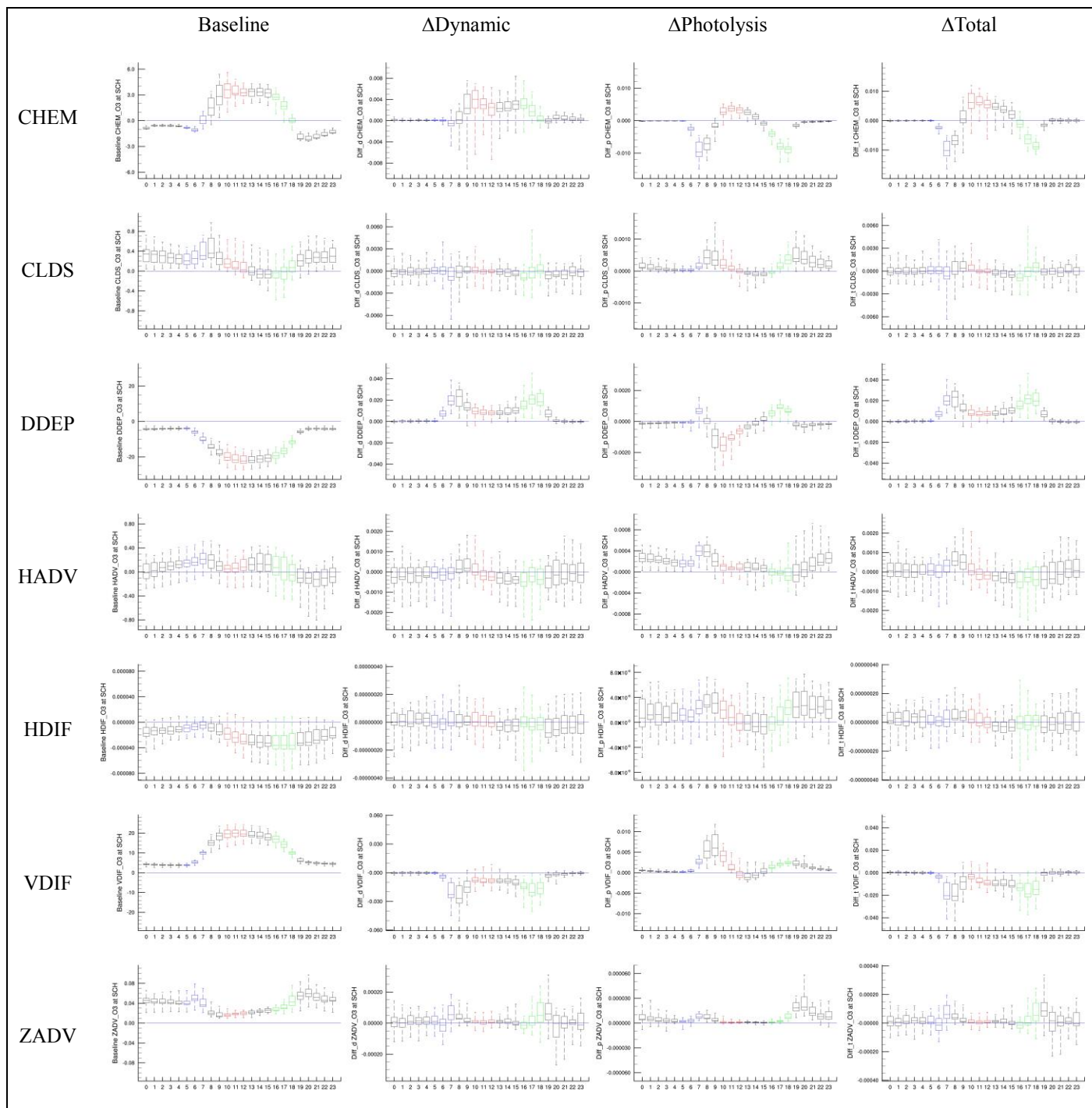


(b) July

Figure S4 same as Figure S1, but in HUZ



(a) January



(b) July

Figure S5 same as Figure S1, but in SCH

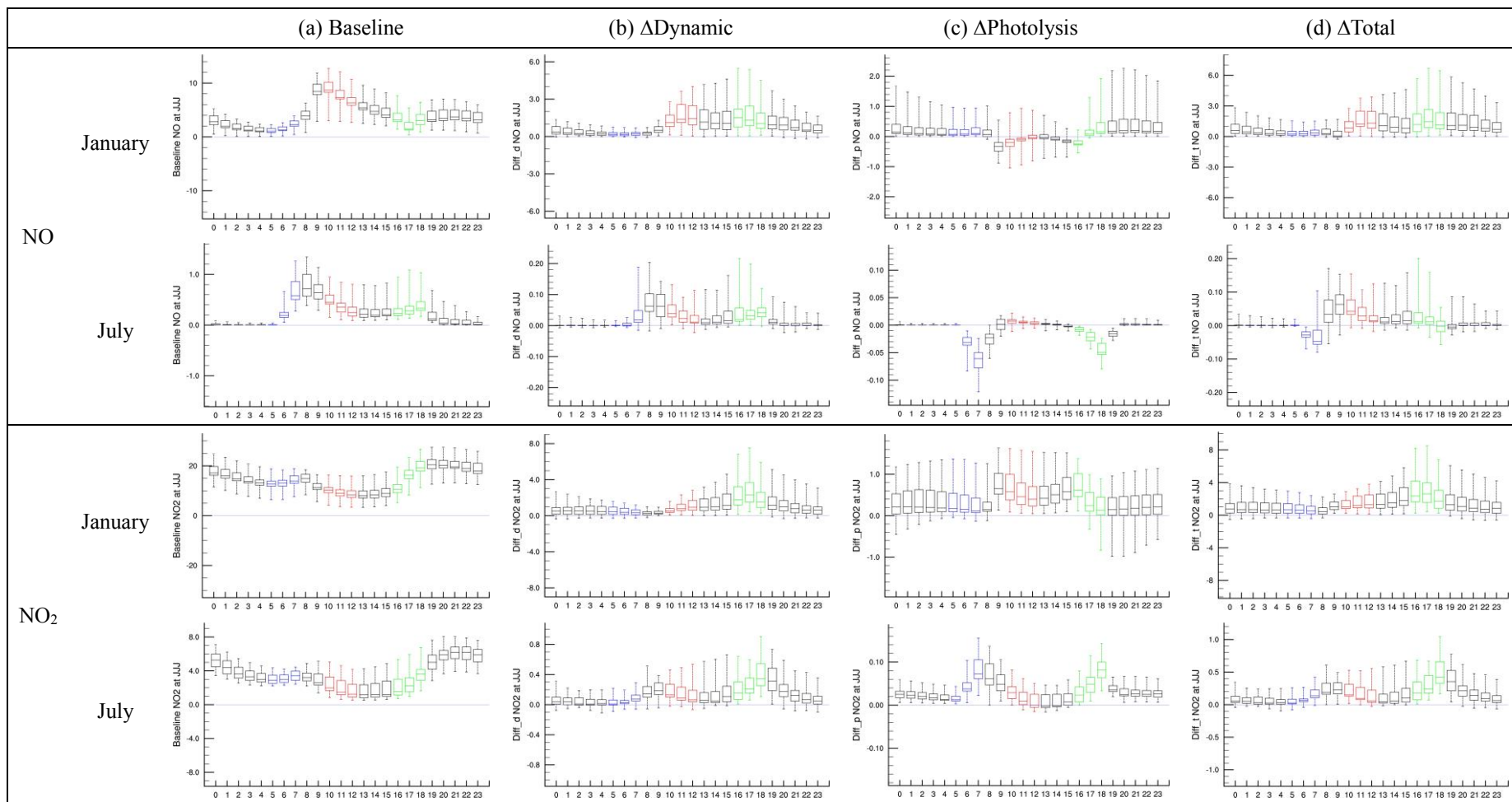
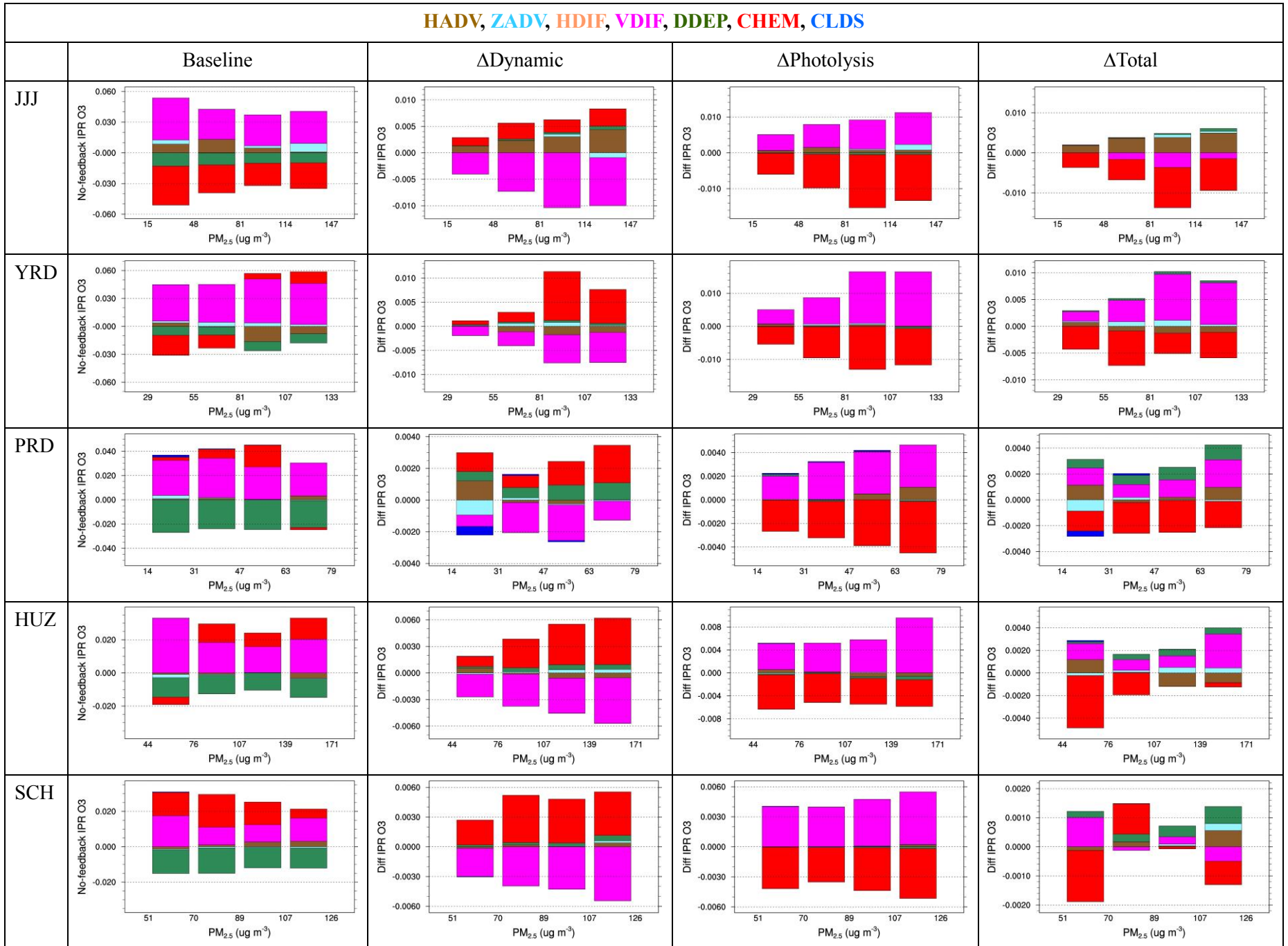


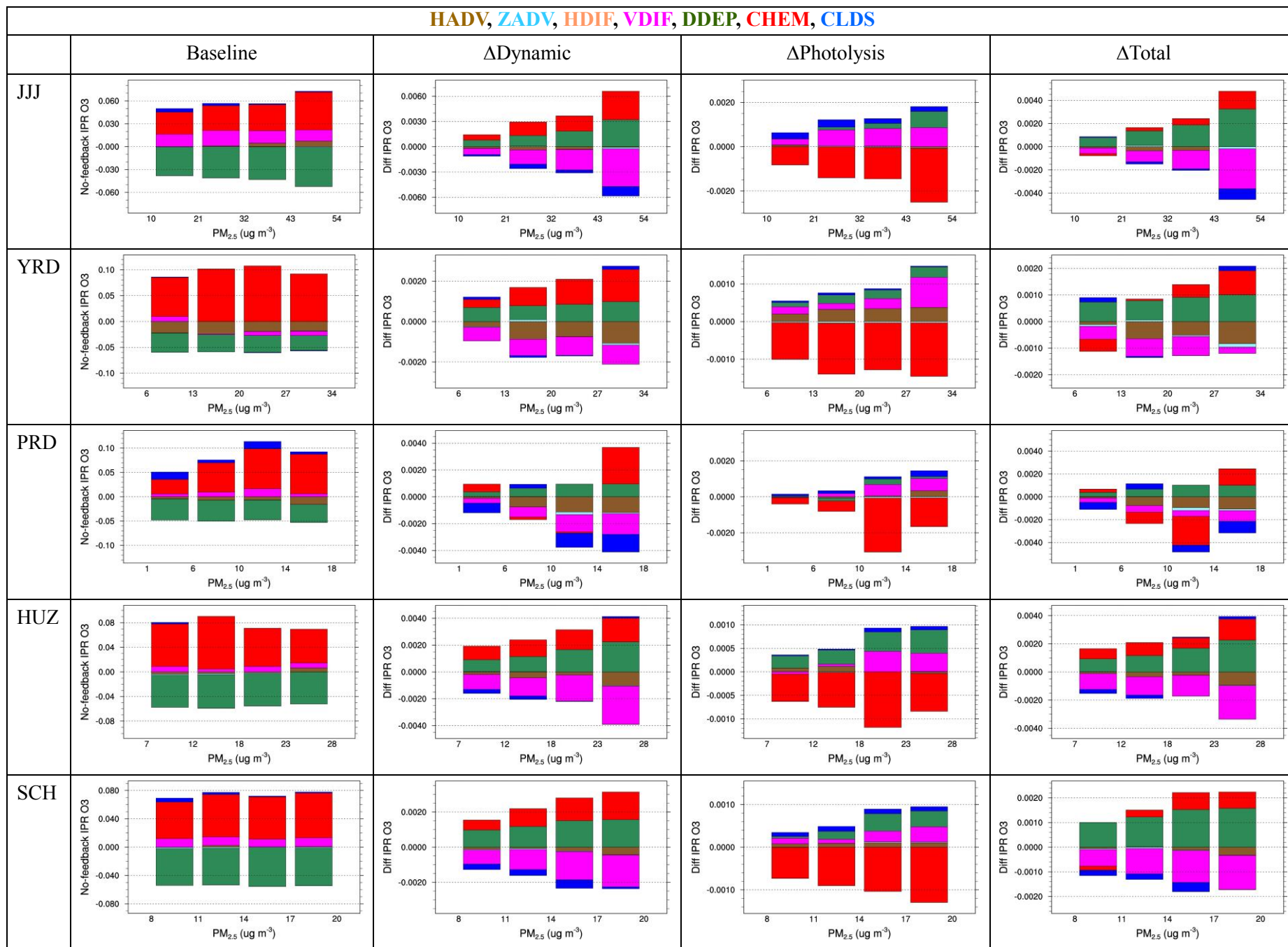
Figure S6 Diurnal variation of surface NO and NO₂ concentrations and their response to ADE in JJJ (Baseline is the simulated NO_x in SimBL, unit: ppb; b. Δ Dynamic is the difference in the NO_x concentration between SimSF and SimNF, unit: ppb; c. Δ Photolysis is the difference in the NO_x concentration between SimNF and SimBL, unit: ppb; d. Δ Total is the difference in the NO_x concentration between SimSF and SimBL, unit: ppb)

HADV, ZADV, HDIF, VDIF, DDEP, CHEM, CLDS



(a) January

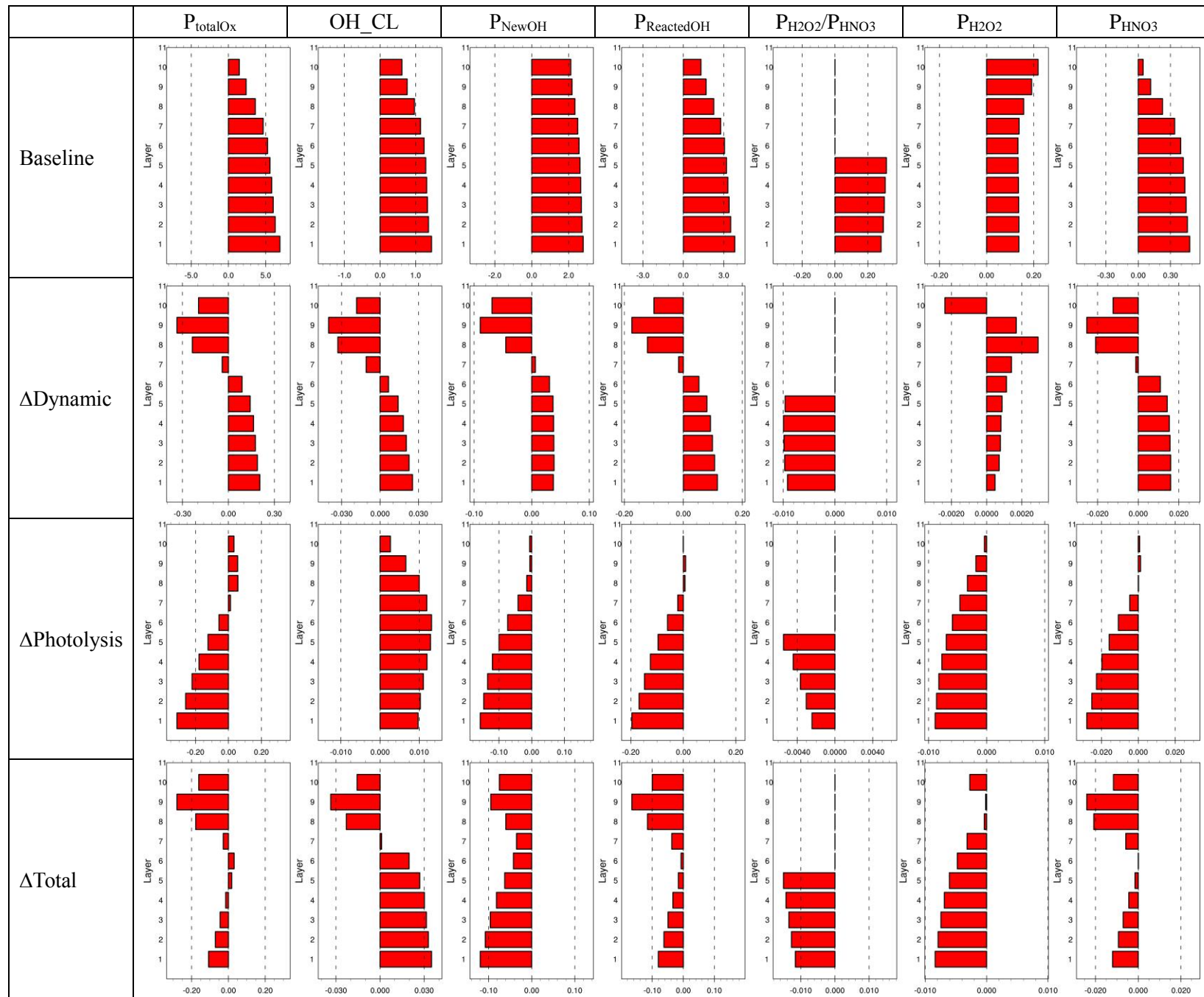
HADV, ZADV, HDIF, VDIF, DDEP, CHEM, CLDS



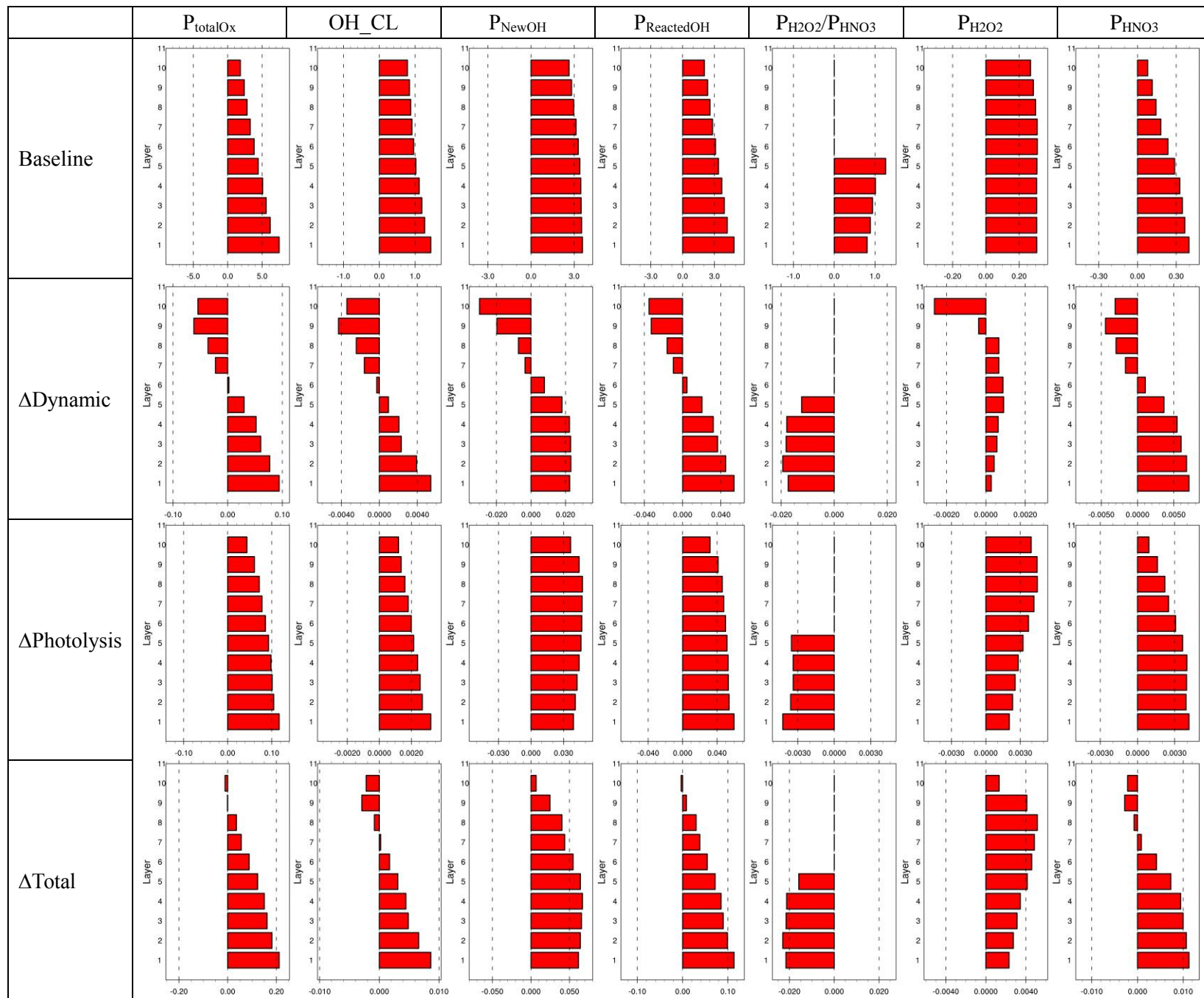
(b) July

Figure S7 Integrated process contributions to daytime near-ground-level O₃ under different PM_{2.5} level in 5 regions (between the ground and 350m

AGL, model layer 1-5; a. Baseline is the normalized IPRs in SimBL, unit: hr^{-1} ; b. $\Delta\text{Dynamic}$ is the difference in normalized IPRs between SimSF and SimNF, unit: hr^{-1} ; c. ΔTotal is the difference in normalized IPRs between SimSF and SimBL, unit: hr^{-1} ; d. $\Delta\text{Photolysis}$ is the difference in normalized IPRs between SimNF and SimBL, unit: hr^{-1})

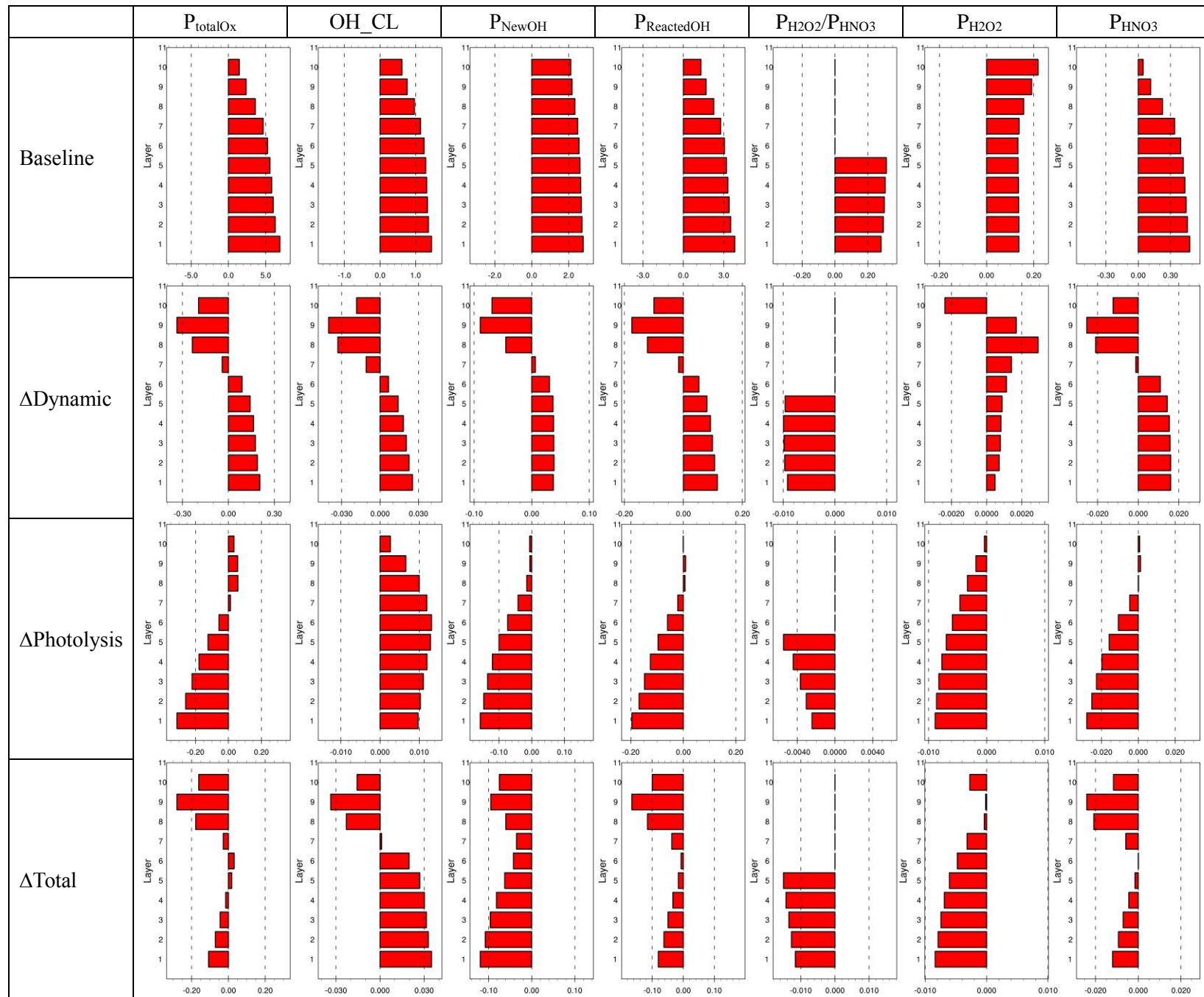


(a) January

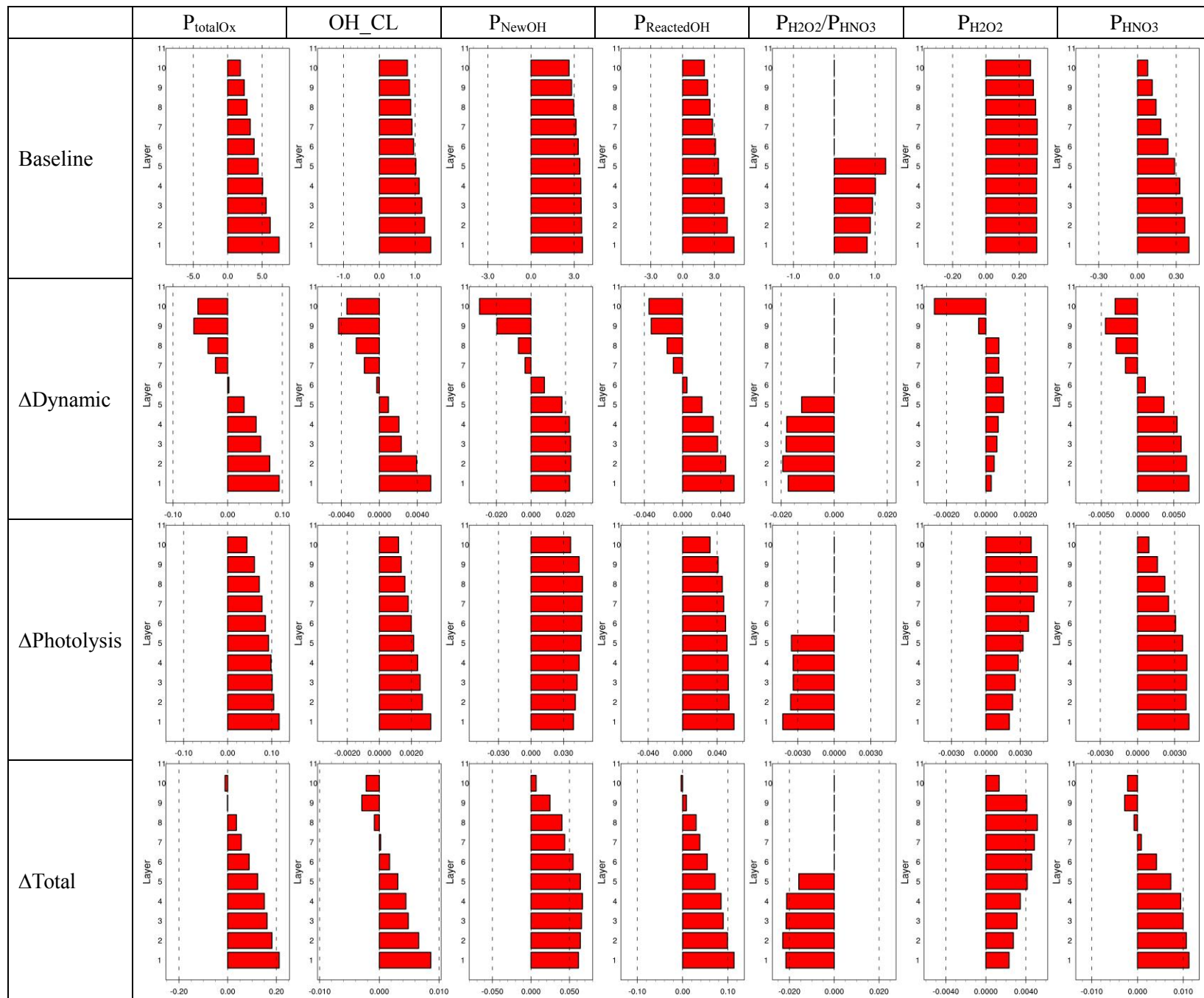


(b) July

Figure S8 Vertical profile of integrated reaction rates in YRD at noon (a: January; b: July; full-layer heights above ground are 40, 96, 160, 241, 355, 503, 688, 884, 1100, 1357m; Baseline is the simulation in SimBL; Δ Dynamic is the difference between SimSF and SimNF; Δ Photolysis is the difference between SimNF and SimBL; Δ Total is the difference between SimSF and SimBL; P_{totalO_x} is total O_x production rate, unit: ppb hr^{-1} ; OH CL is OH chain length; P_{NewOH} is the production rate of new OH, unit: ppb hr^{-1} ; $P_{\text{ReactedOH}}$ is the production rate of reacted OH, unit: ppb hr^{-1} ; $P_{\text{H}_2\text{O}_2}$ is the production rate of H_2O_2 , unit: ppb hr^{-1} ; P_{HNO_3} is the production rate of HNO_3 , unit: ppb hr^{-1} ; the ratio of $P_{\text{H}_2\text{O}_2}/P_{\text{HNO}_3}$ is only shown for layer 1-5)

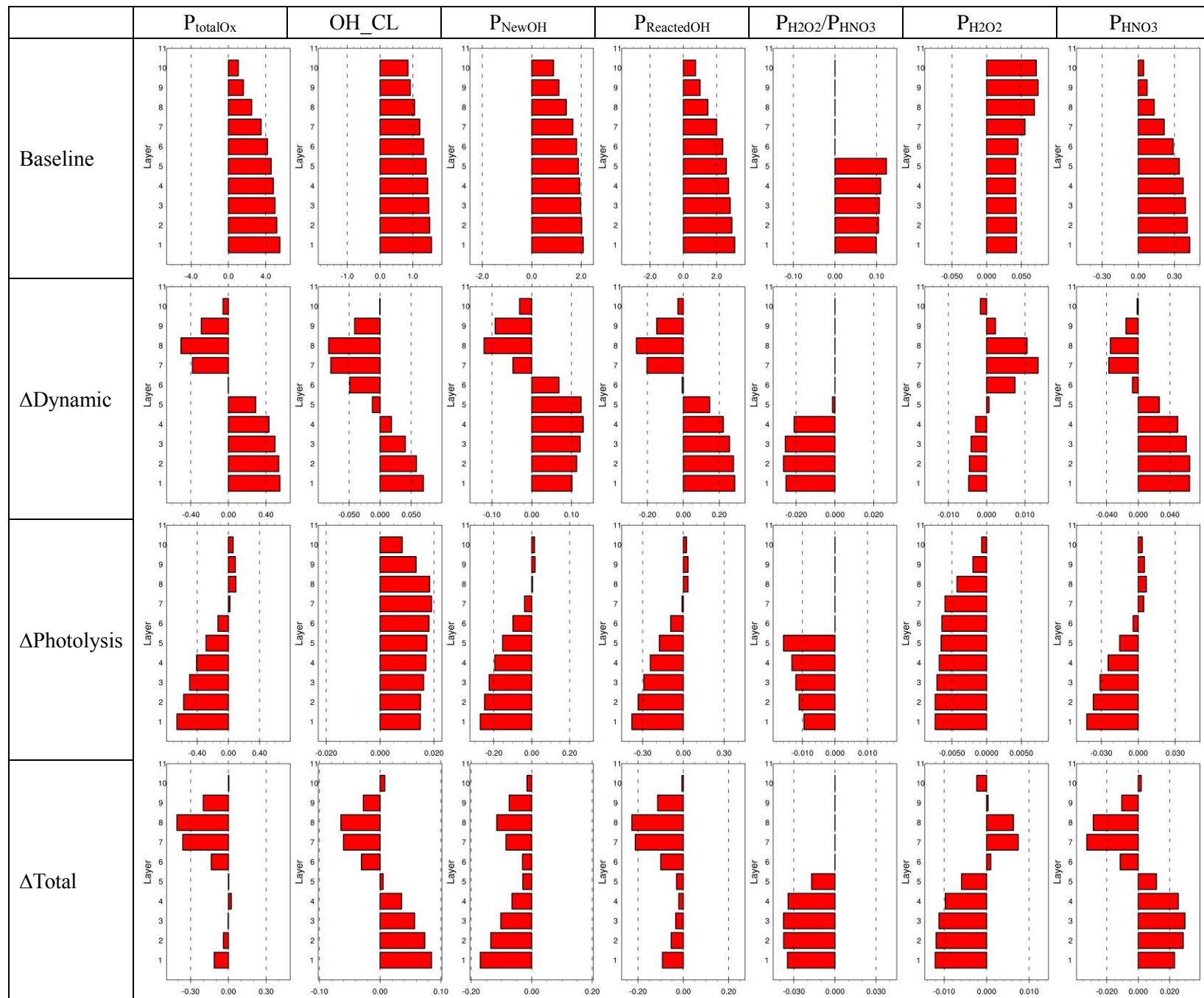


(a) January

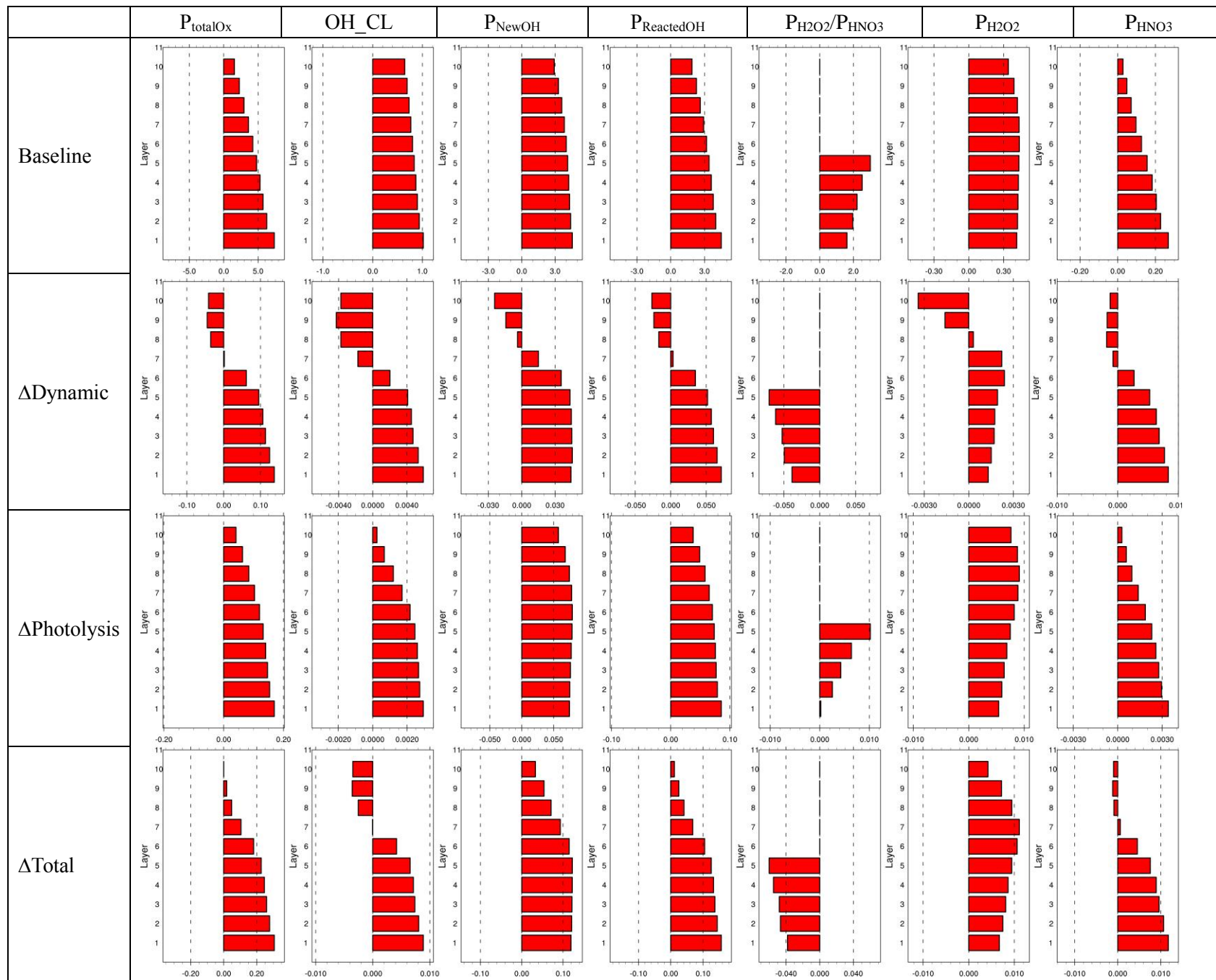


(b) July

Figure S9 Same as Figure S8, but in PRD

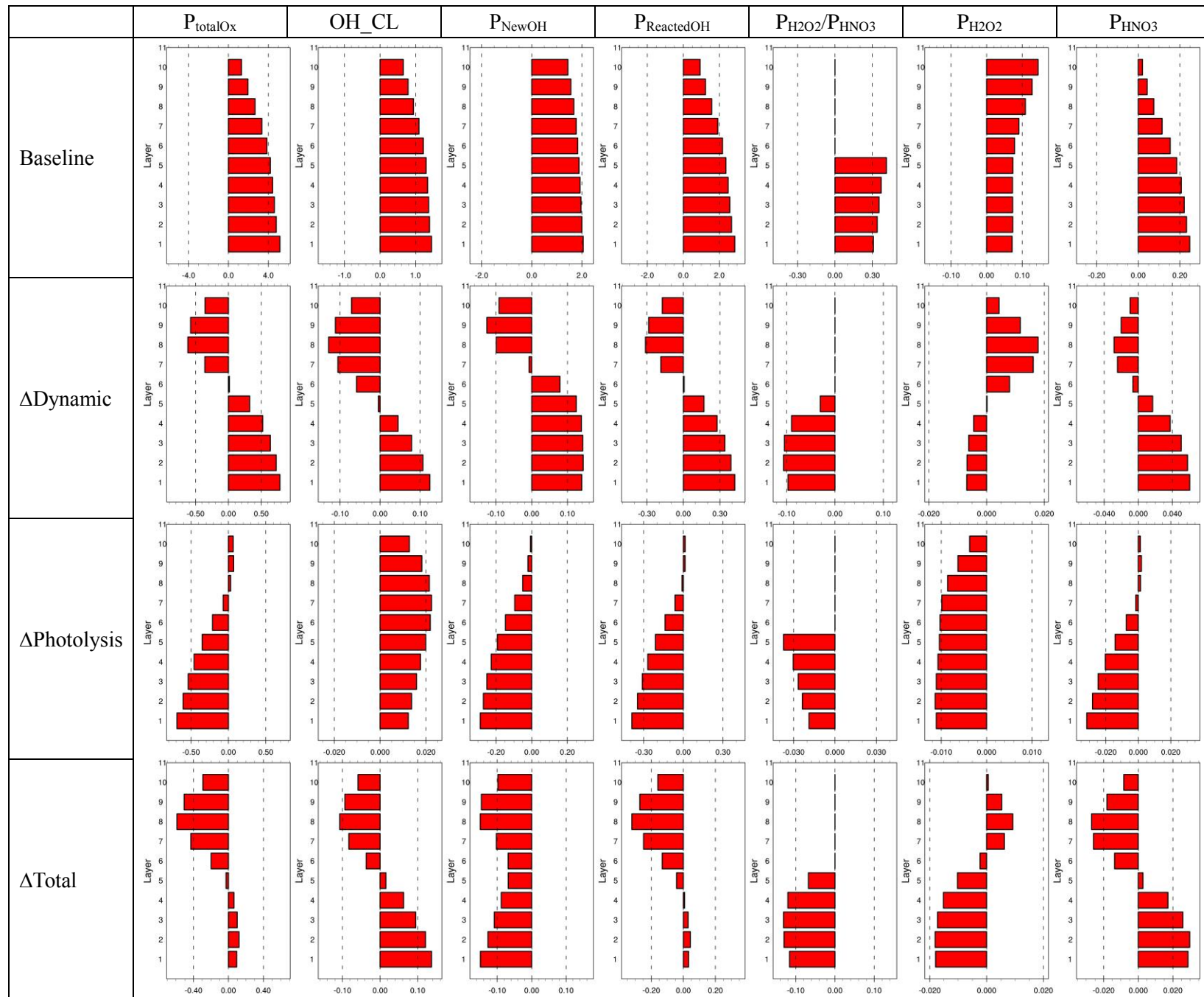


(a) January

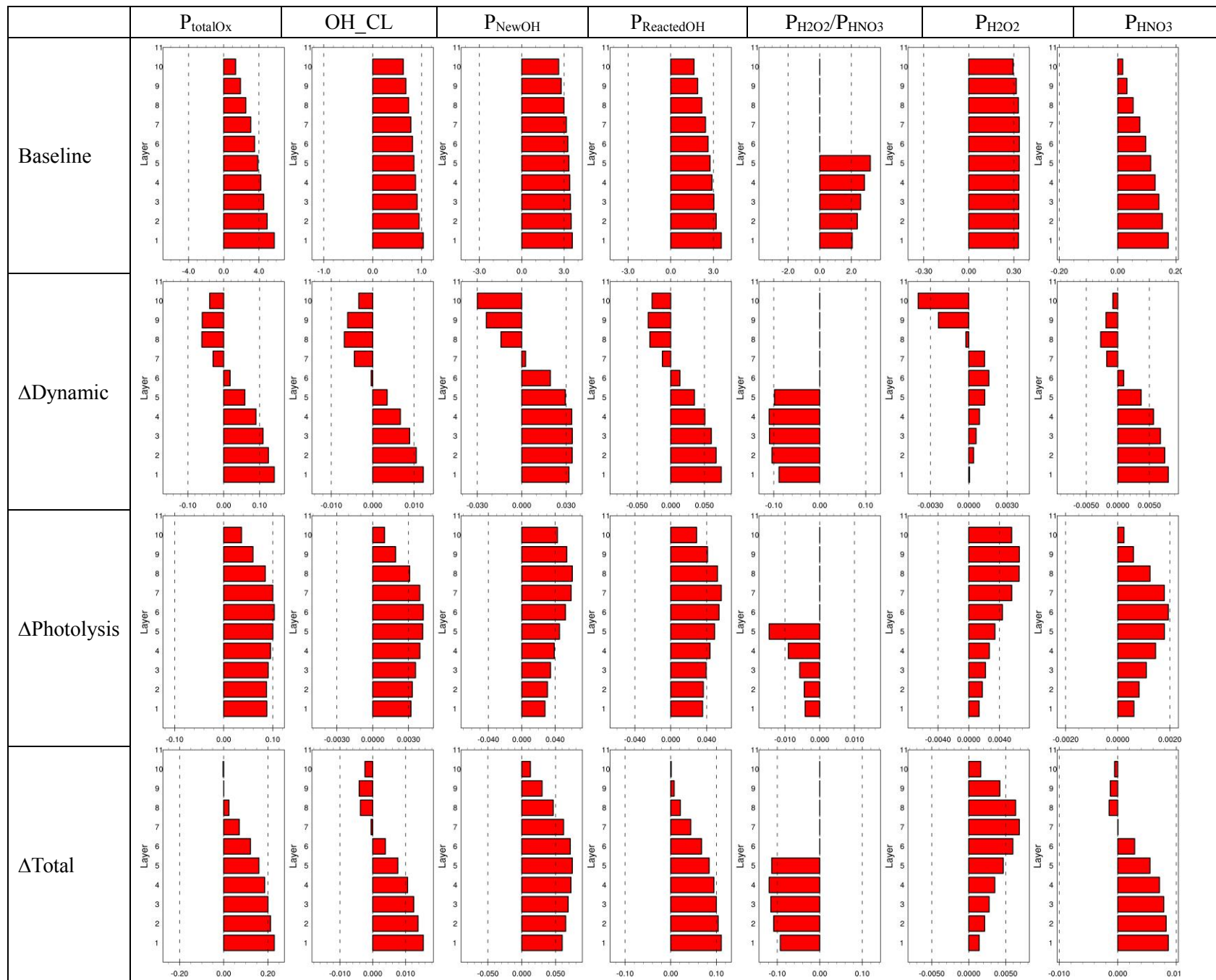


(b) July

Figure S10 Same as Figure S8, but in HUZ



(a) January



(b) July

Figure S11 Same as Figure S8, but in SCH