



*Supplement of*

**Trends in peroxyacetyl nitrate (PAN) in the upper troposphere and lower stratosphere over southern Asia during the summer monsoon season: regional impacts**

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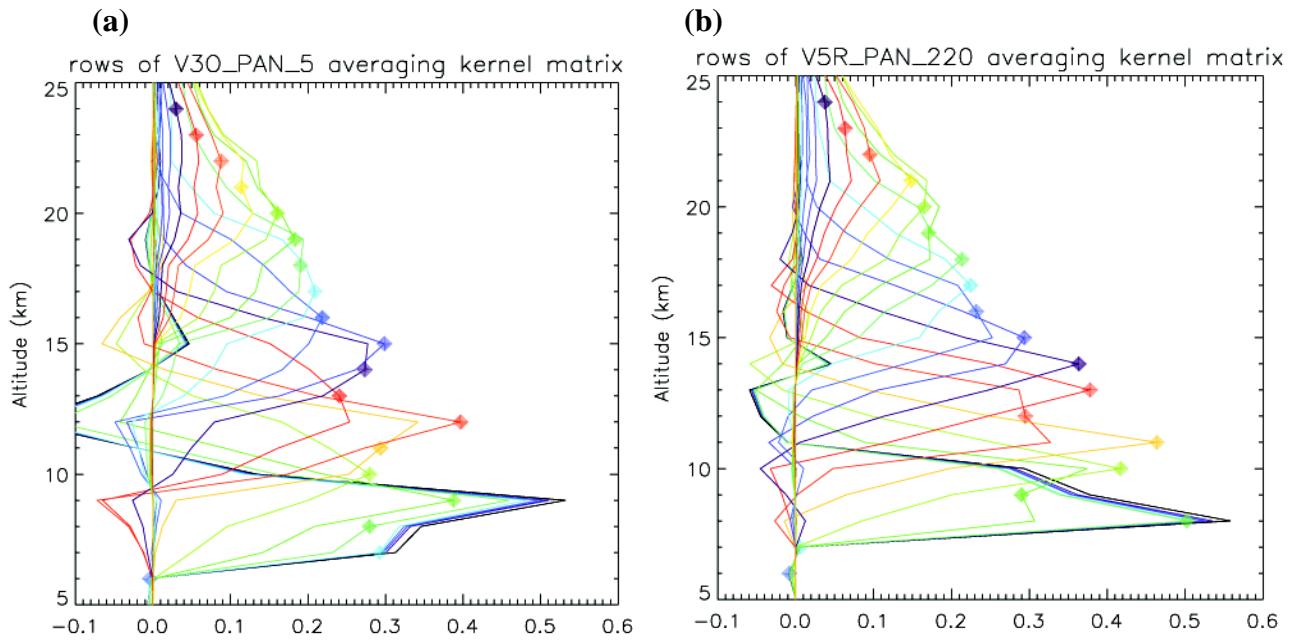


Figure S1: The averaging kernel rows of (a) V3O\_PAN\_5 at the location  $26^{\circ}$  N and  $81^{\circ}$  E and (b) V5R\_PAN\_220 at the location  $28^{\circ}$  N and  $85^{\circ}$  E. Diamonds indicate the respective nominal altitudes of the retrieval grid.

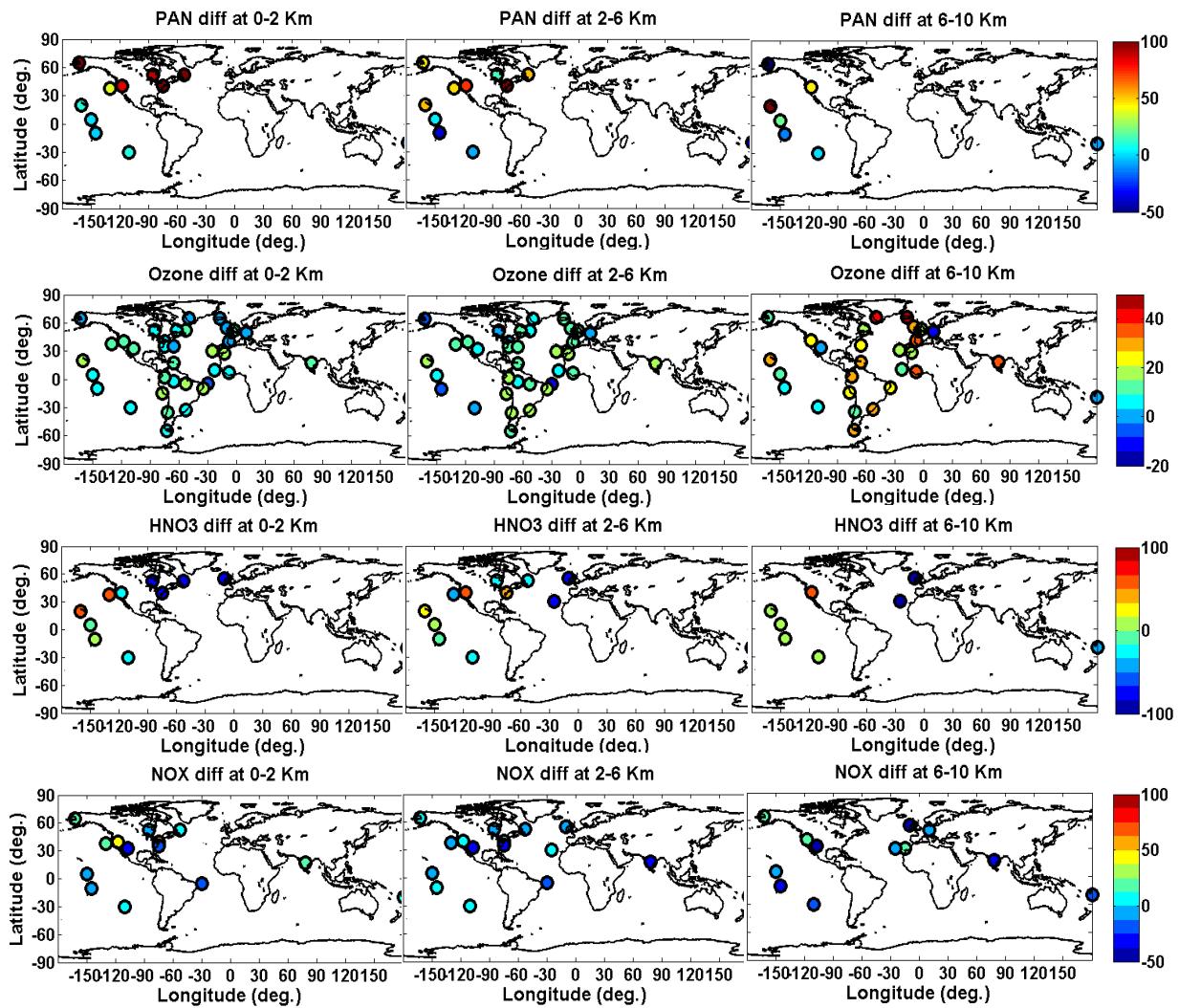


Figure S2: Global distribution of bias (ECHAM5-HAMMOZ – aircraft observations) in PAN (ppt), ozone (ppb), HNO<sub>3</sub> (ppt), NO<sub>x</sub> (ppt) averaged for the monsoon season and altitude ranges.

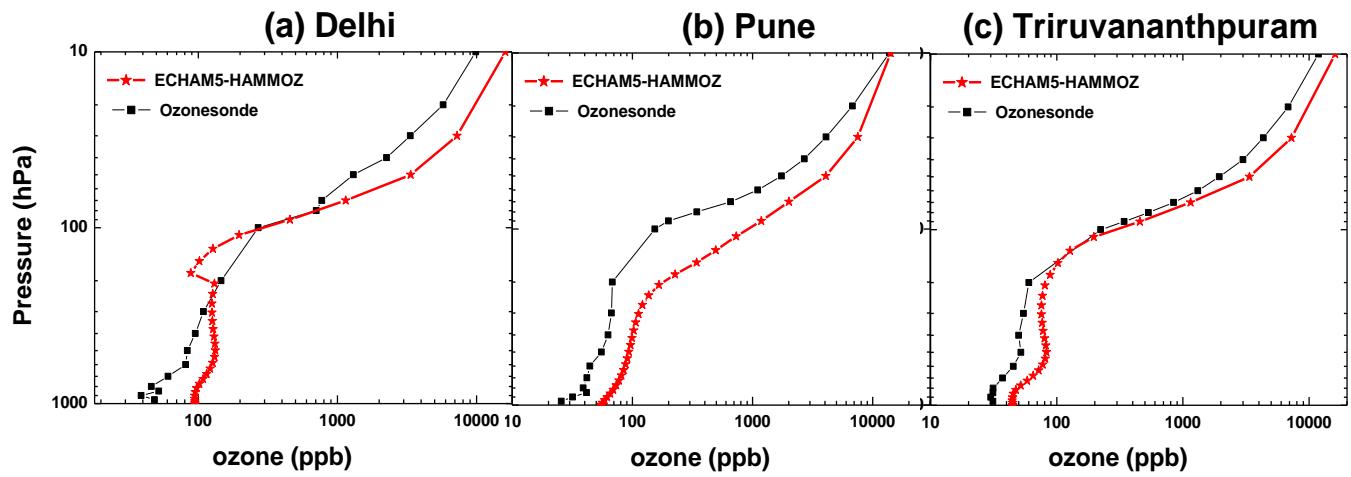


Figure S3: Vertical distribution of seasonal mean (June-September) ozone mixing ratios (ppb) as obtained from ozonesonde (during 2001-2009) and ECHAM5-HAMMOZ reference simulation.

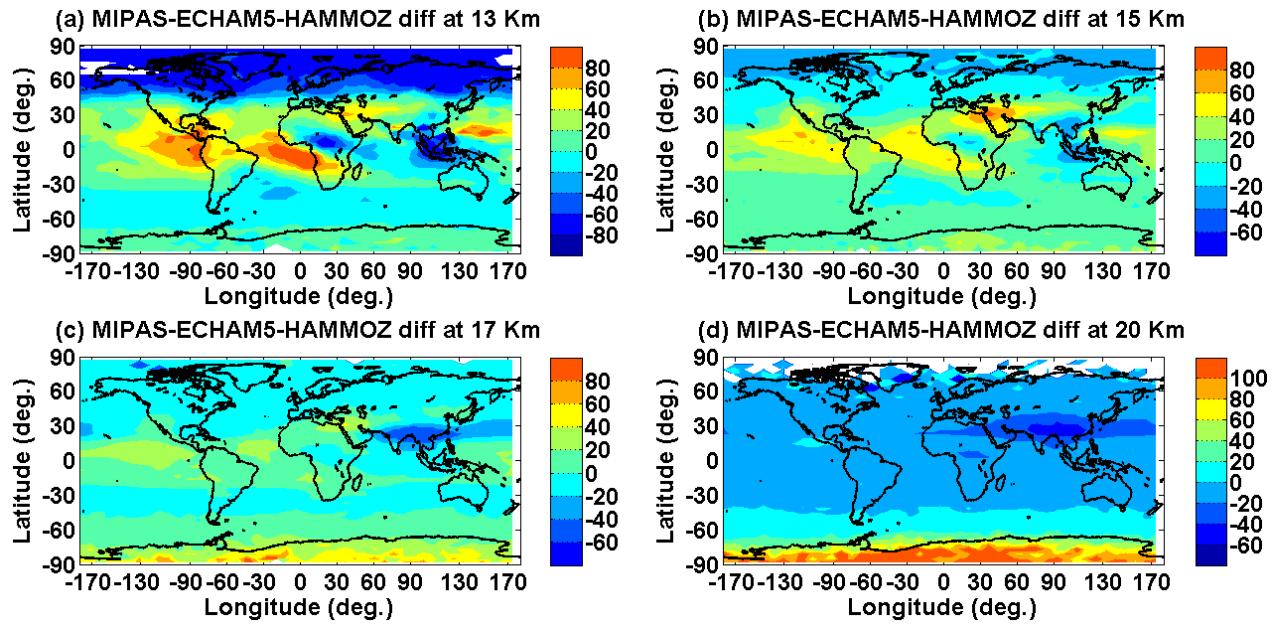


Figure S4: Difference between MIAPS observations (climatology 2002-2011) and ECHAM5-HAMMOZ reference simulation in PAN (ppt) averaged for the monsoon season (a) at 13km (b) 15km (c) 17 km and (d) 19km.

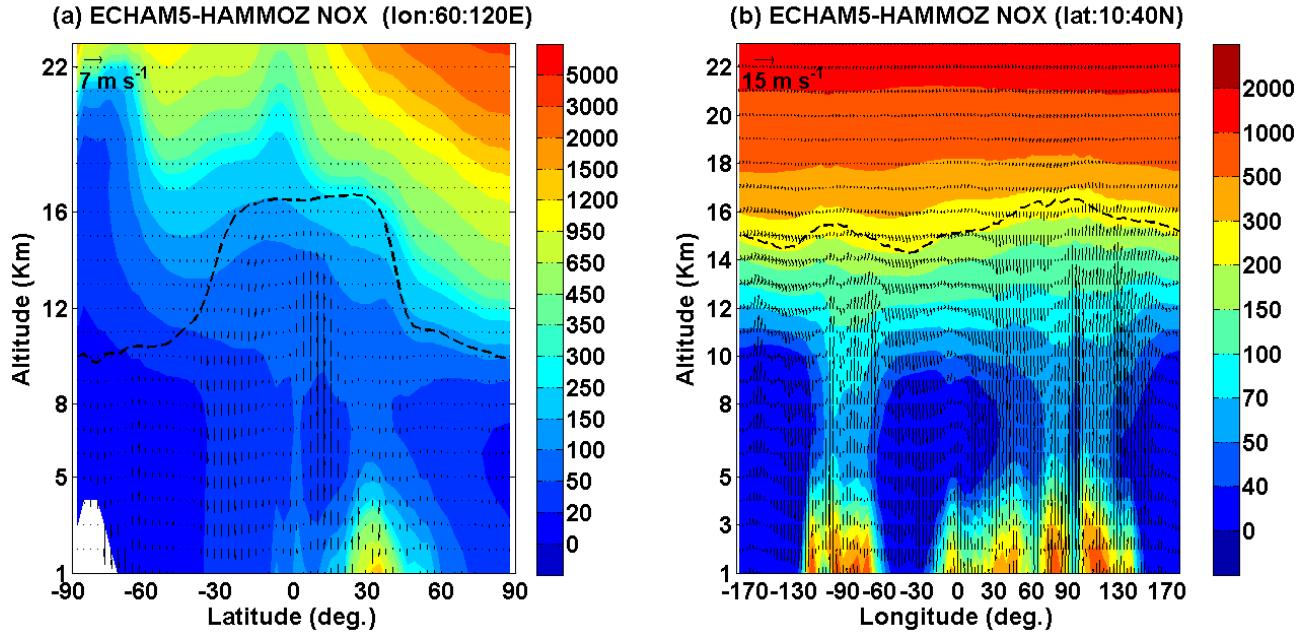


Figure S5. Latitude-pressure cross section of seasonal mean ECHAM5-HAMMOZ NOX (ppt) obtained from reference simulation (a) averaged for 60-120E (b) averaged for 12-40N. The black arrows indicate wind vectors. The vertical velocity field has been scaled by 300.