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Supplement of

Enhanced trans-Himalaya pollution transport to the Tibetan Plateau by cut-off low systems

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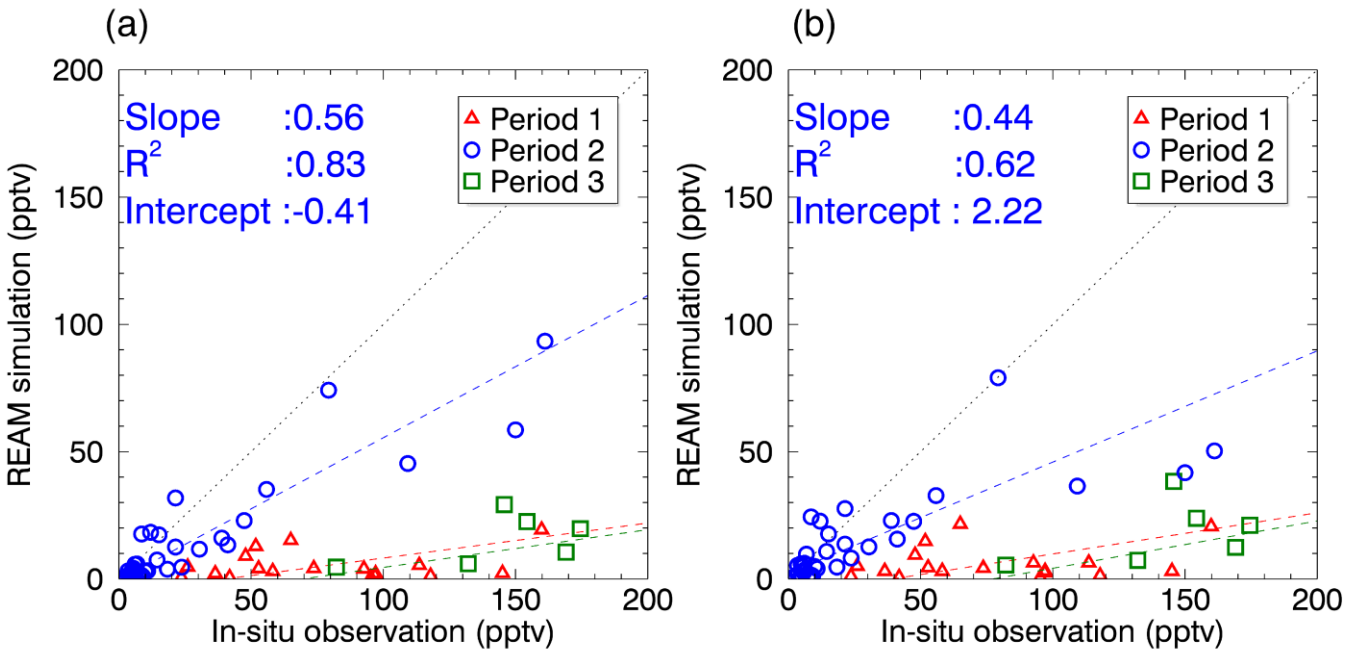

Figure S1: Comparisons between REAM simulated and in-situ observed reactive aromatics concentrations with (a) and without (b) INTEX-B aromatics emissions for countries excluding China.

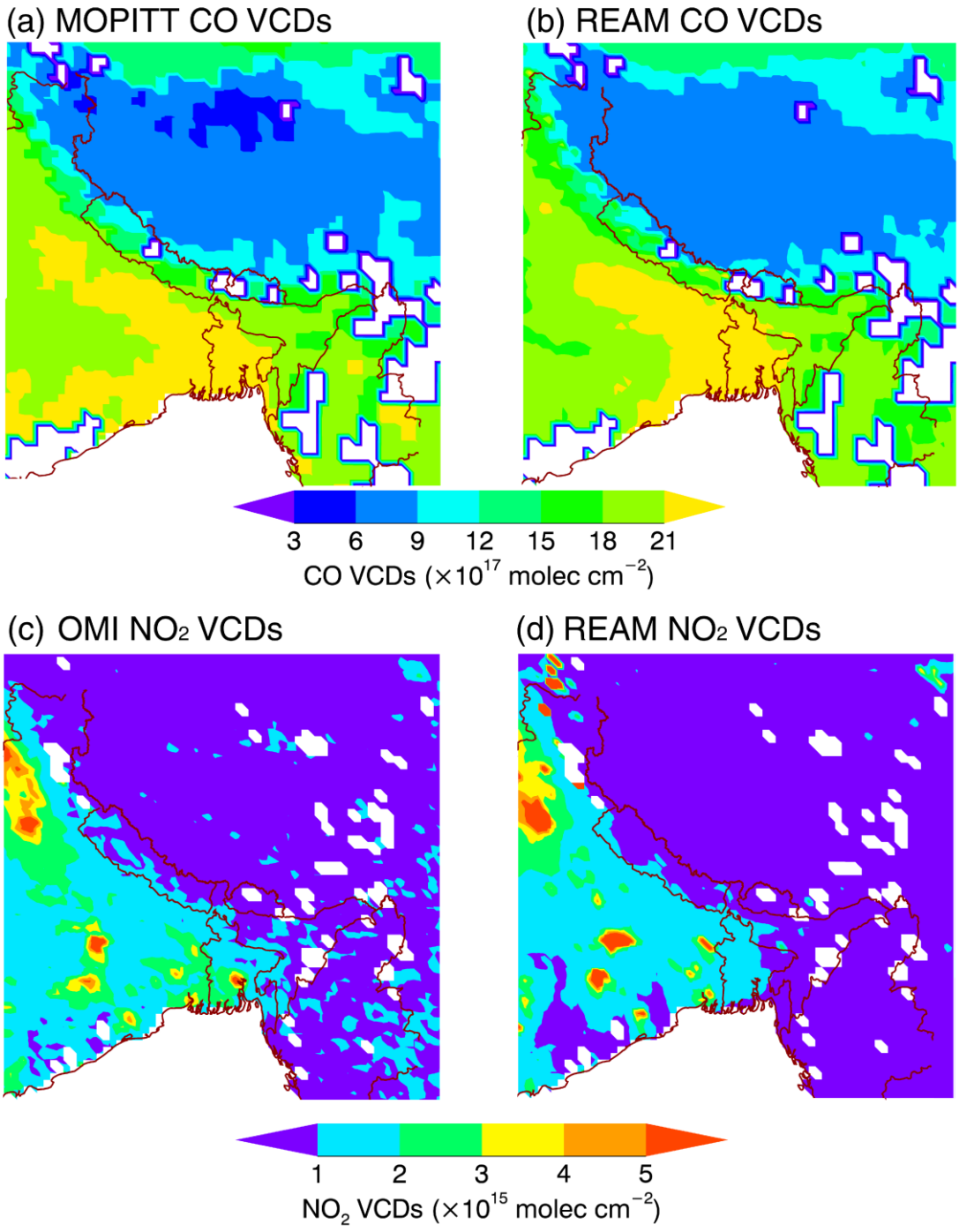

Figure S2: MOPITT retrieved (a) and REAM simulated (b) monthly averaged total CO VCDs during October 2010. OMI retrieved (c) and REAM simulated (d) monthly averaged tropospheric NO_2 VCDs during October 2010. White areas denote missing data. MOPITT data are from http://www.acom.ucar.edu/mopitt/MOPITT/. OMI data are from http://www.temis.nl/airpollution/no2col/. Averaging kernels are applied to the model results.

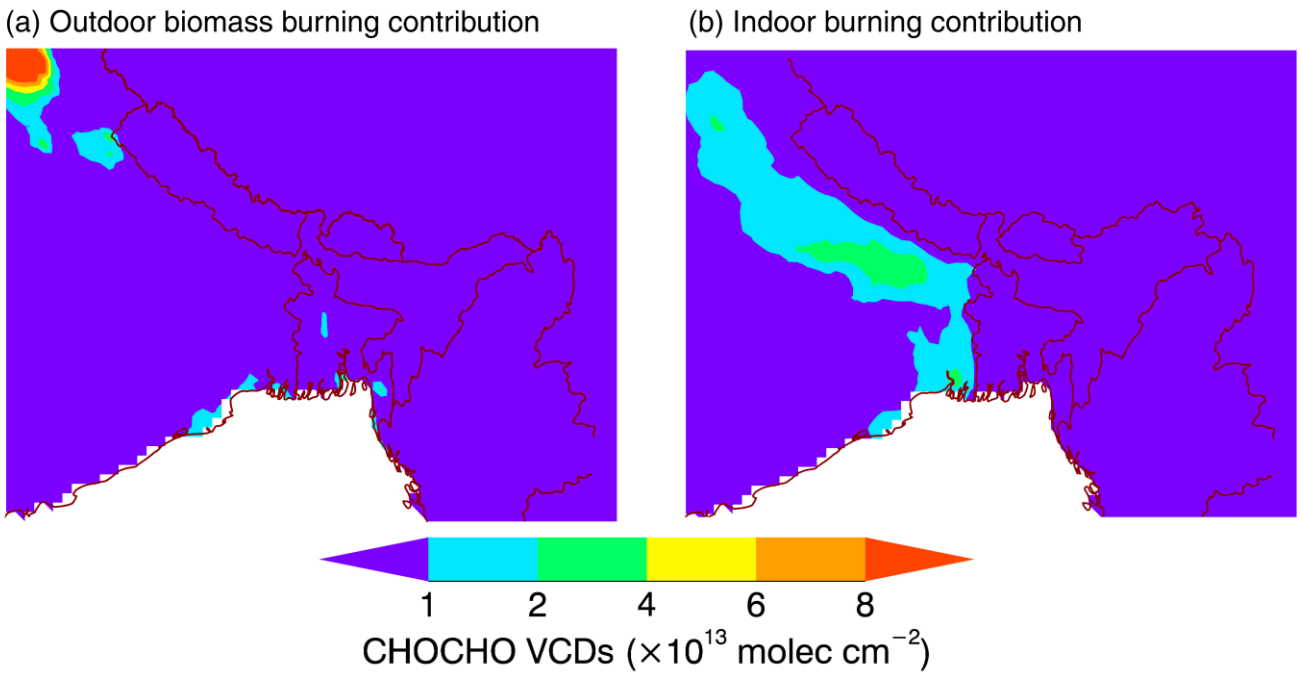

Figure S3: Contributions to CHOCHO VCDs from outdoor biomass burning (a) and indoor burning (b) emissions for October 2010.

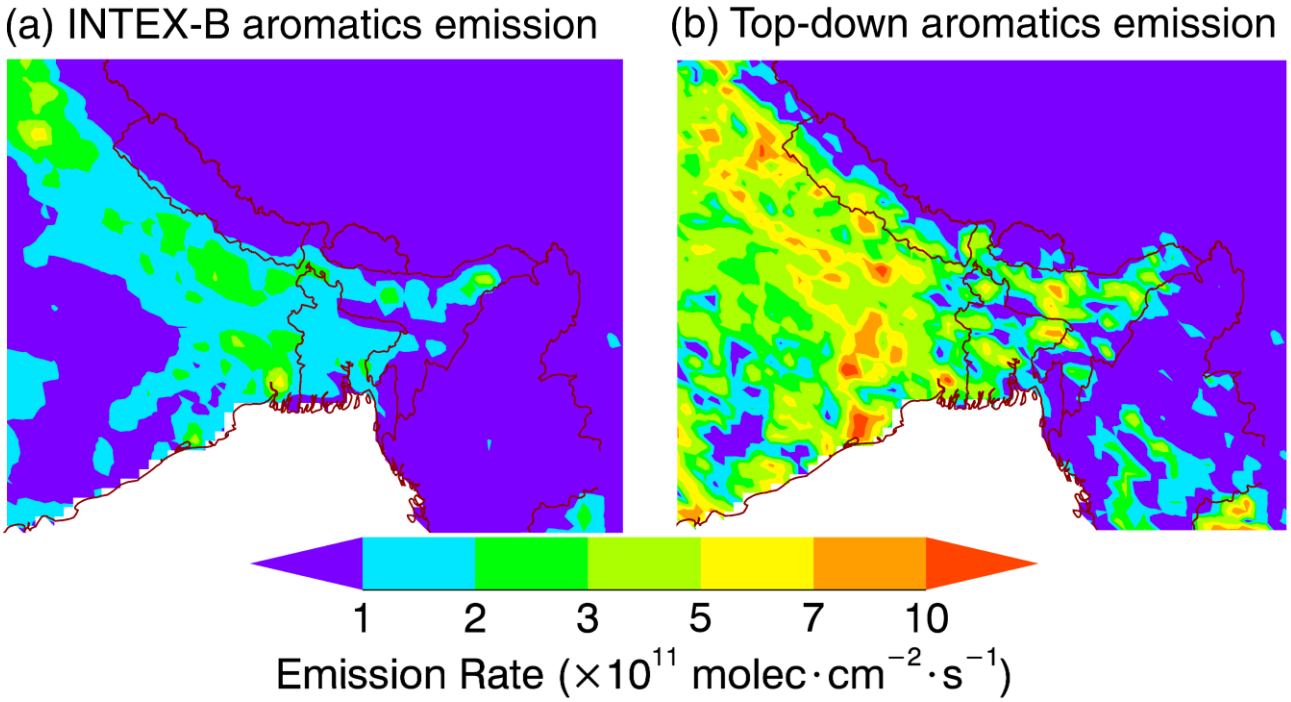

Figure S4: INTEX-B aromatics emissions (a) and top-down aromatics emissions (b).

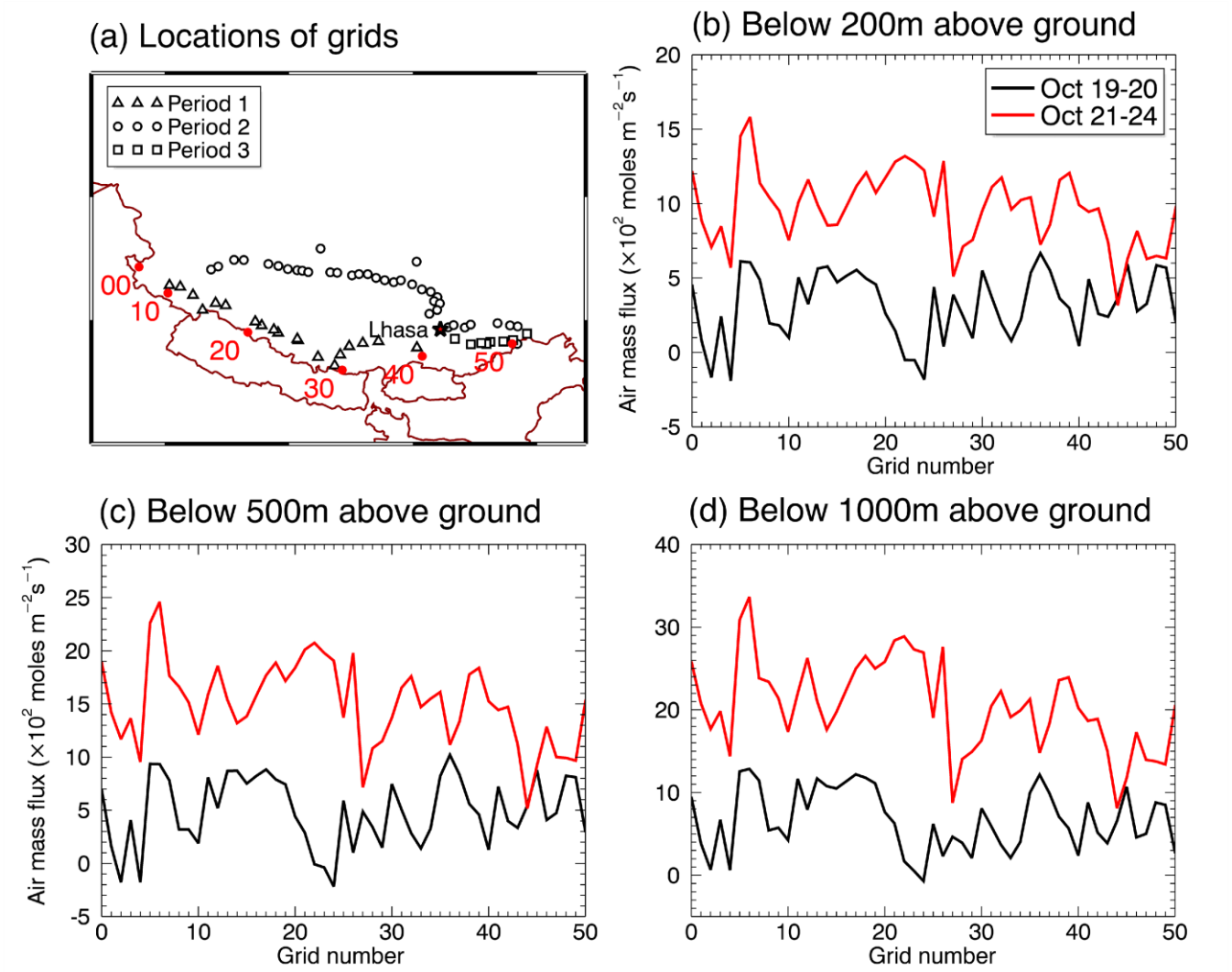

Figure S5: Trans-Himalaya air mass fluxes (positive towards Tibet) during October 19-20 (black line) and October 21-24 (red line) in the lower atmosphere below 200m (b), 500m (c) and 1000m (d). Red dots in panel (a) denote numbered grid cell locations for computed air mass fluxes; they are used as the x-axis in the other panels.

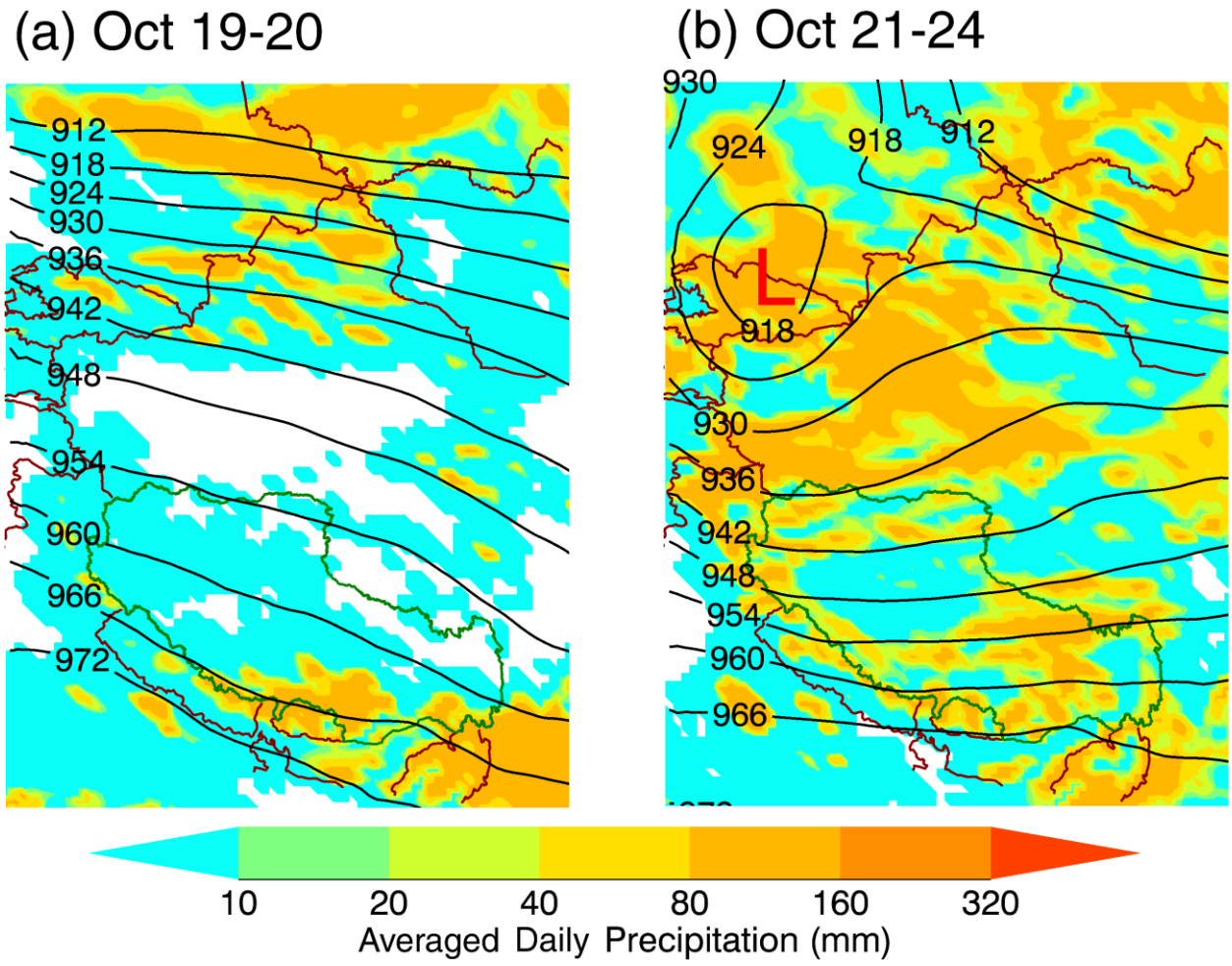

Figure S6: WRF simulated averaged daily precipitation for October 19-20 (a) and October 21-24 (b), respectively.

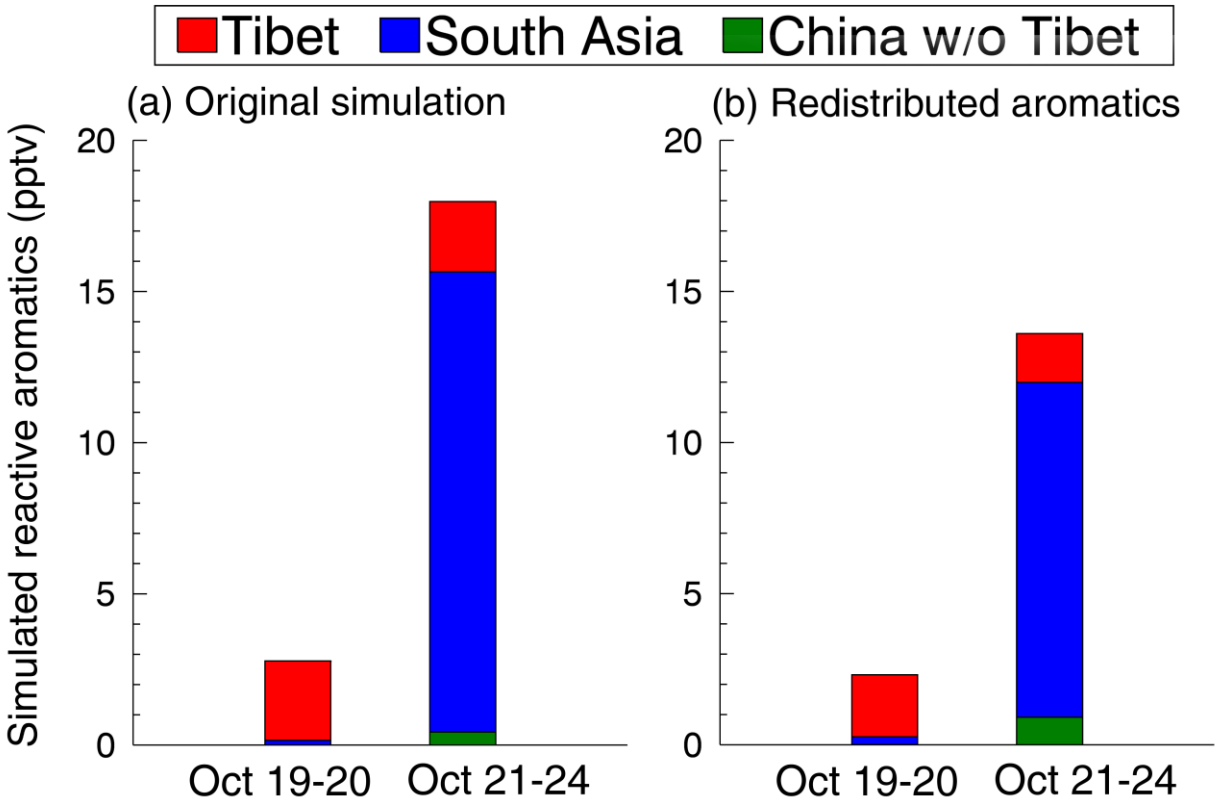

Figure S7: Averages of simulated reactive aromatics emitted from Tibet (red), India and nearby countries ("South Asia", blue) and China excluding Tibet ("China w/o Tibet", green) corresponding to in situ observations during October 19-20 and October 21-24. REAM simulations are conducted with original emissions (a) and the aromatics emissions redistributed following the BC emission distribution (b), respectively.

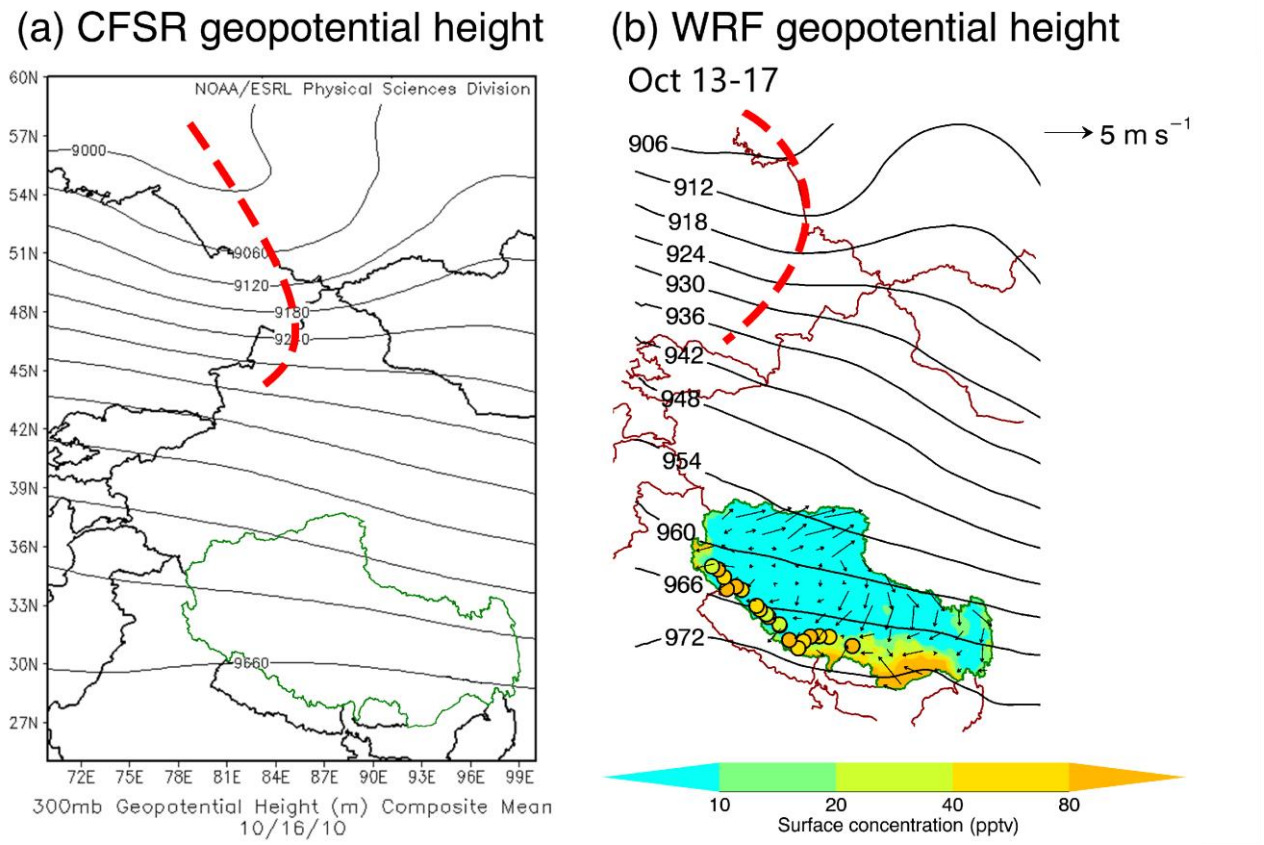

Figure S8: (a) CFSR reanalysis geopotential height at 300hpa on October 16, 2010 (available at http://www.esrl.noaa.gov/psd). (b) Same as Figure 5 for Period 1 (October 13-17). Red dashed line represents the trough in 300 hPa.

5

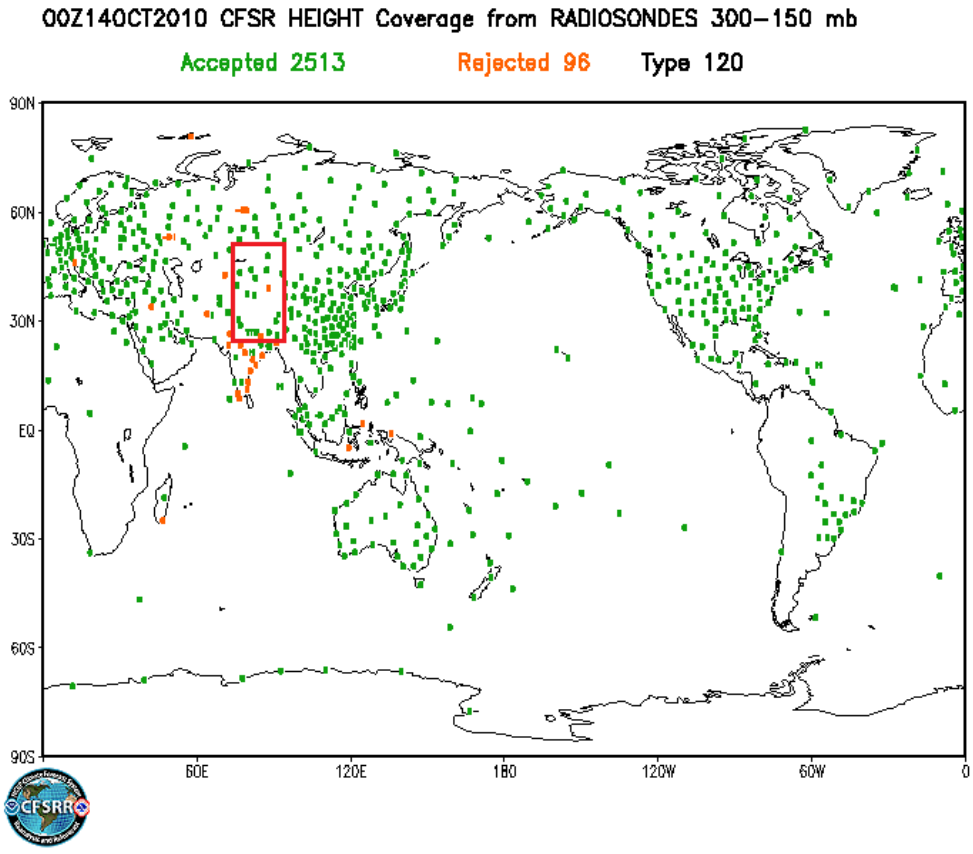

Figure S9: CFSR 300-150hPa observation coverage (http://cfs.ncep.noaa.gov/cfsr/atlas/) on October 14, 2010. The red frame indicates the domain of Figure 5 and Figure S5b.

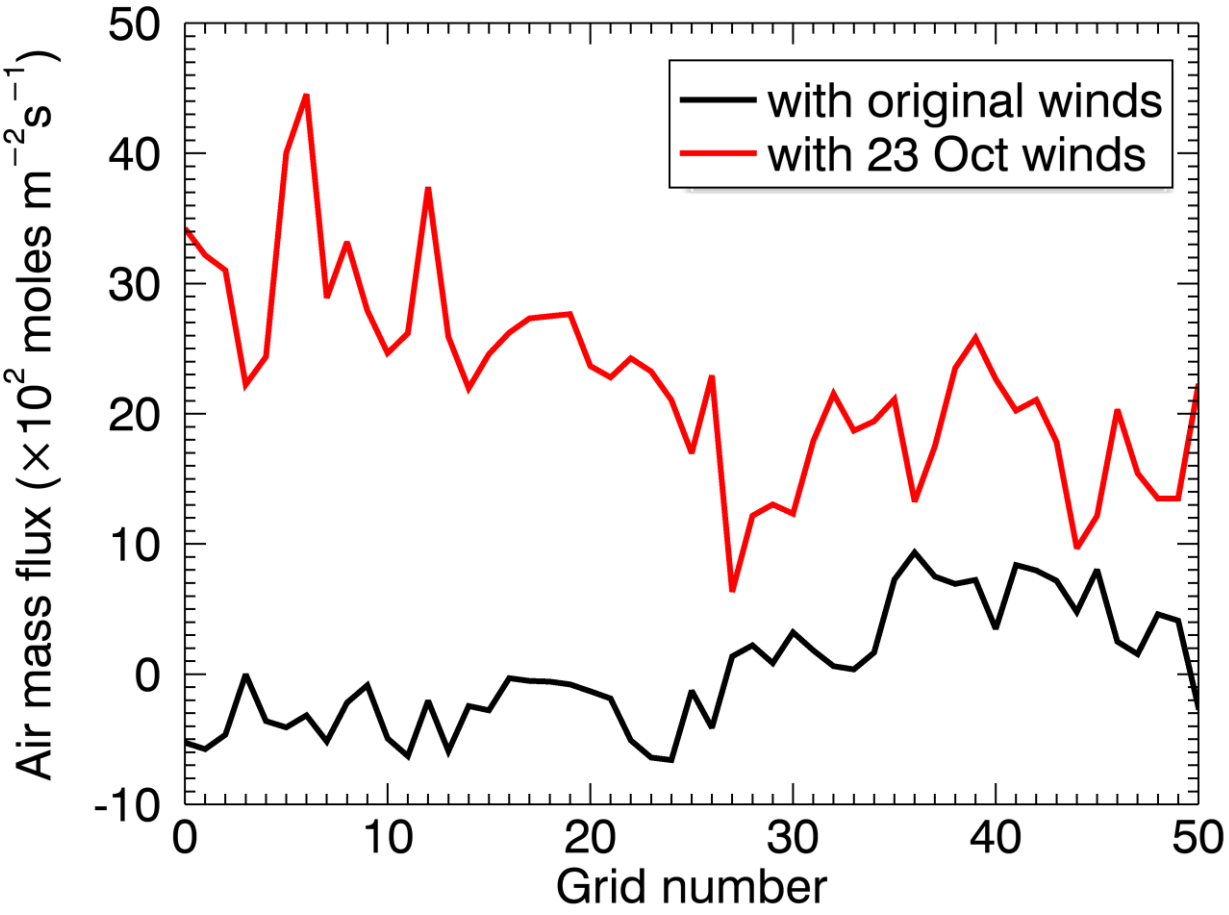

Figure S10: Same as Figure S4 but for ground-1 km air mass fluxes of Period 1 and on October 23 under a cut-off low system, colored as black and red respectively.