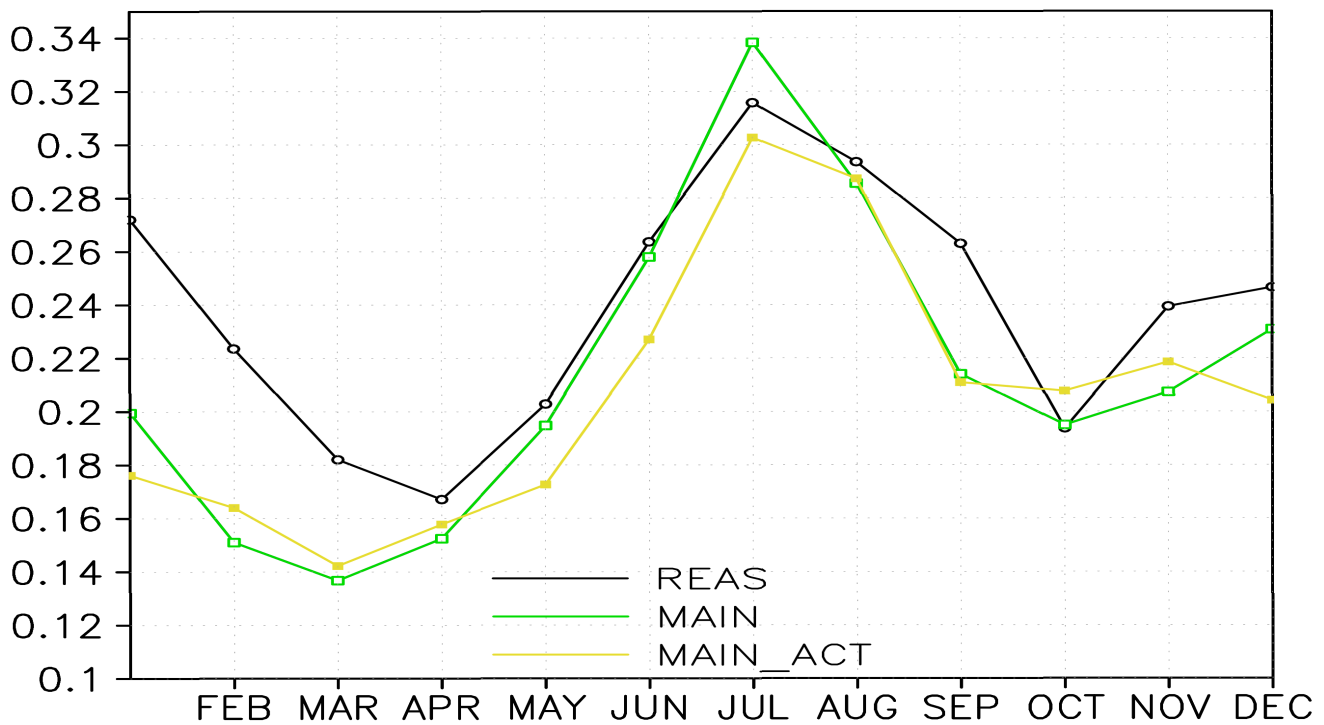
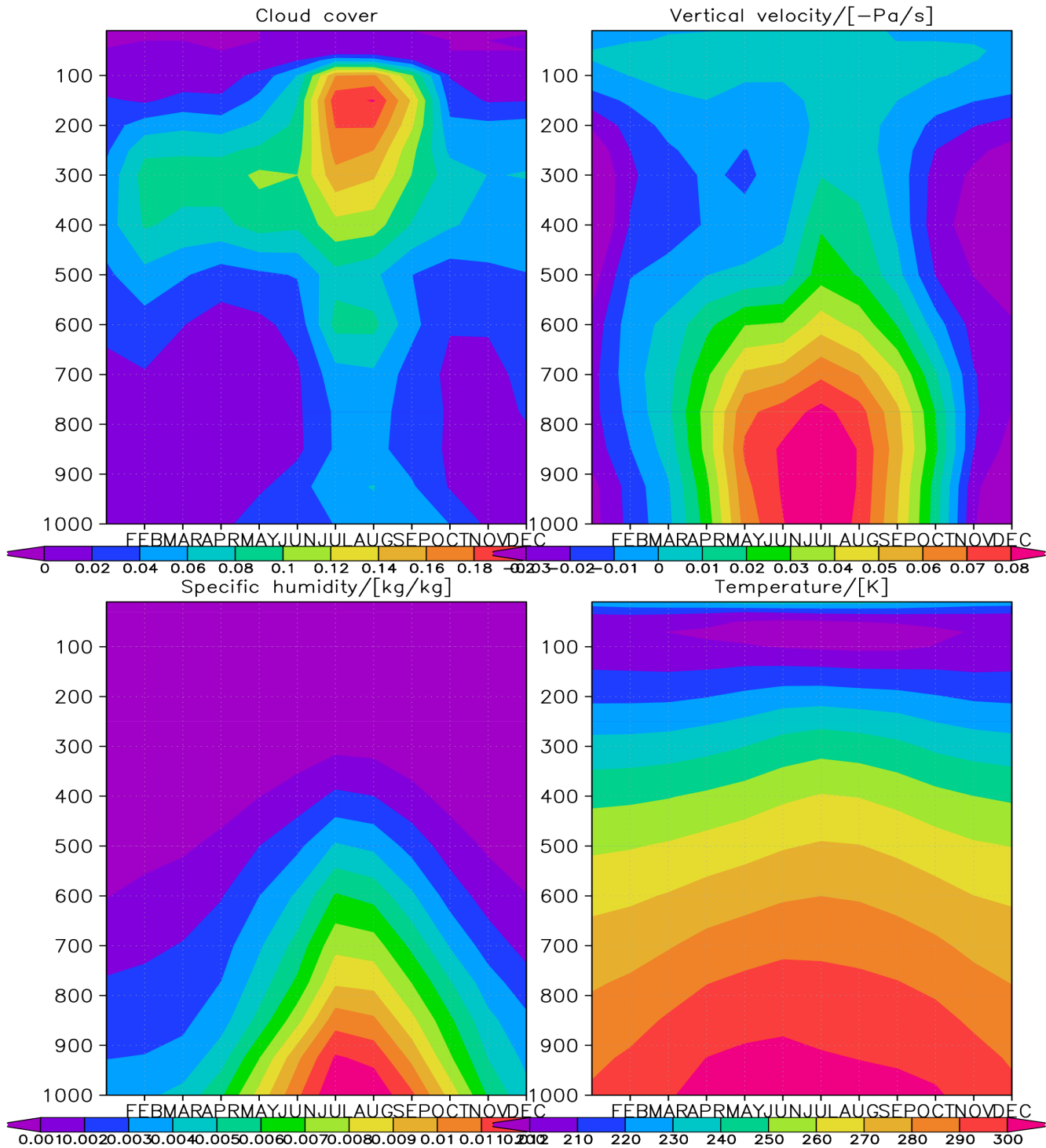


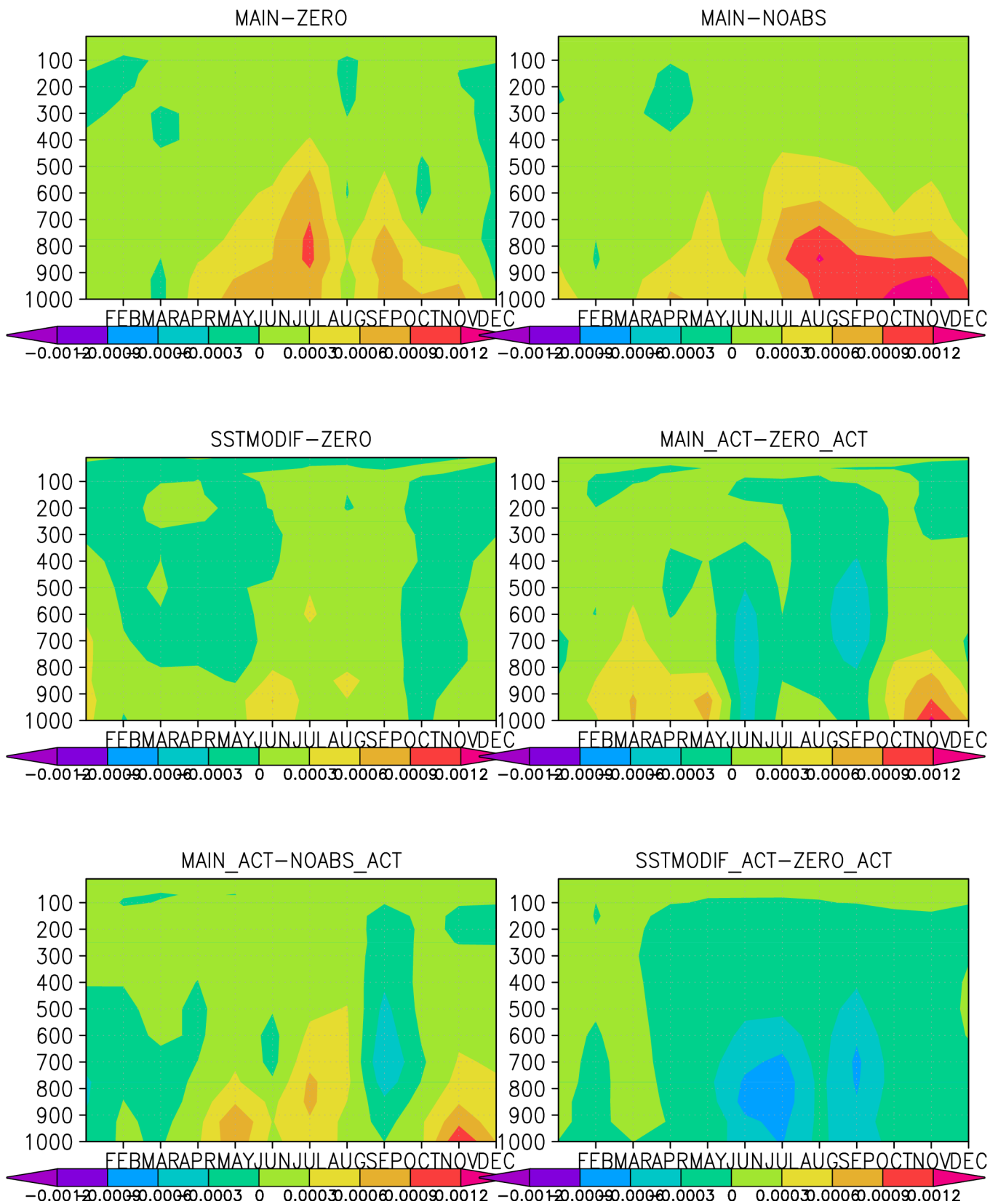
Supplementary Figure 1a. Columnar BC burden (in microg / m²) in MAIN simulation during different seasons.



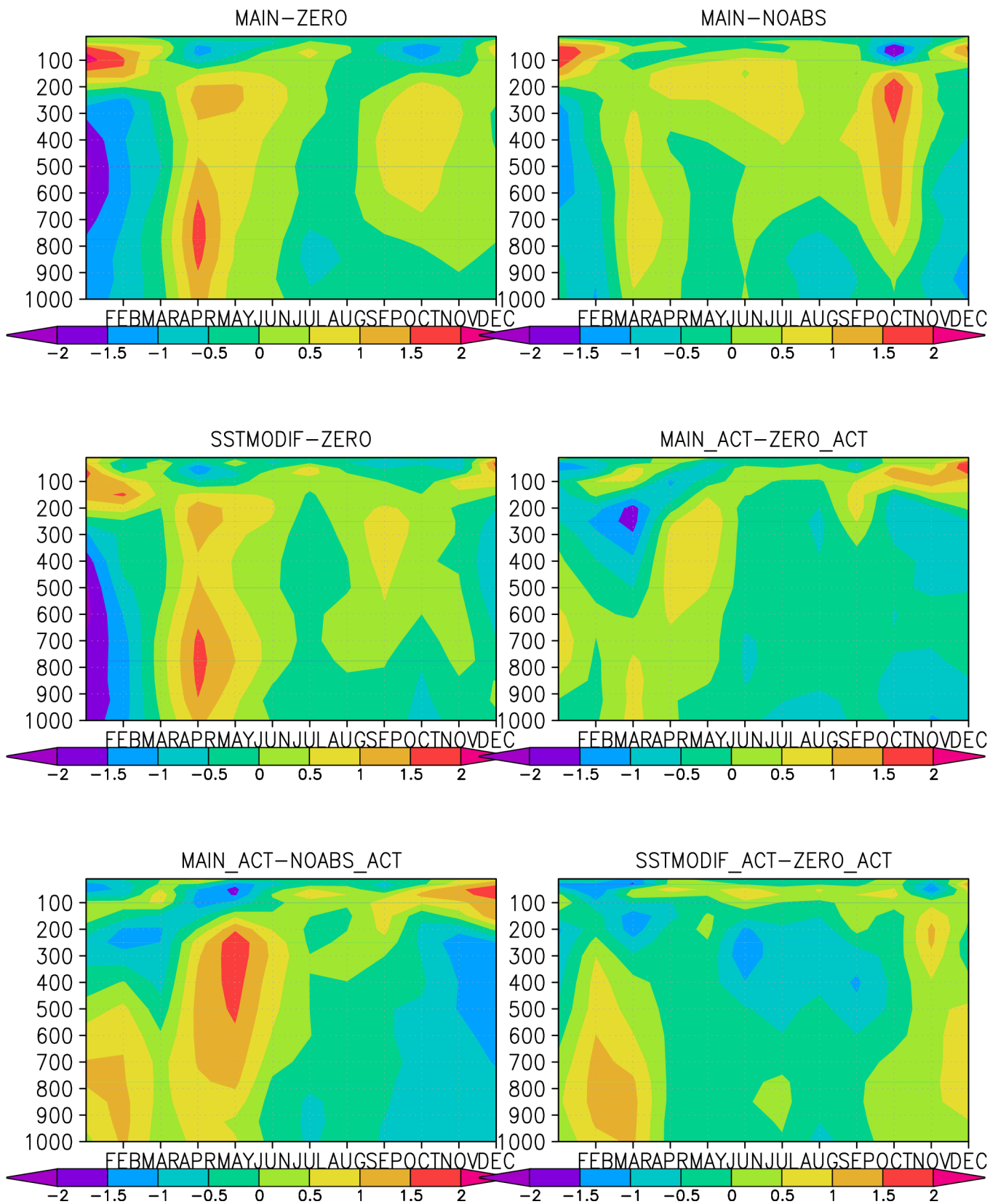
Supplementary Figure 1b. Comparison of mean AOD in simulation with REAS emissions (Henriksson et al., 2011) and new simulations with GAINS emissions, multi-year monthly means.



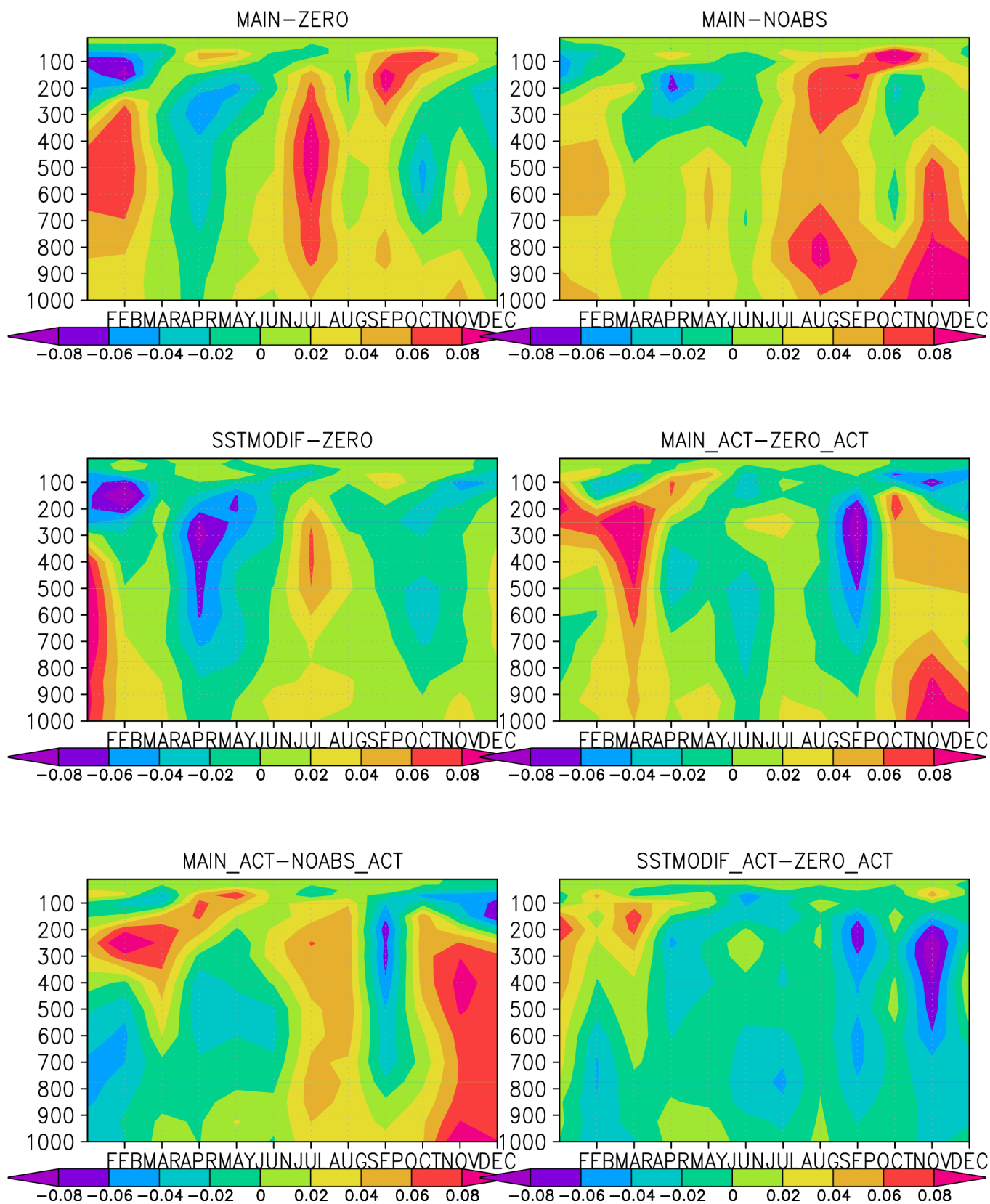
Supplementary Figure 2. Cloud cover, vertical velocity, specific humidity and temperature in the area (20-35 N, 65-90 E) in the ZERO simulation.



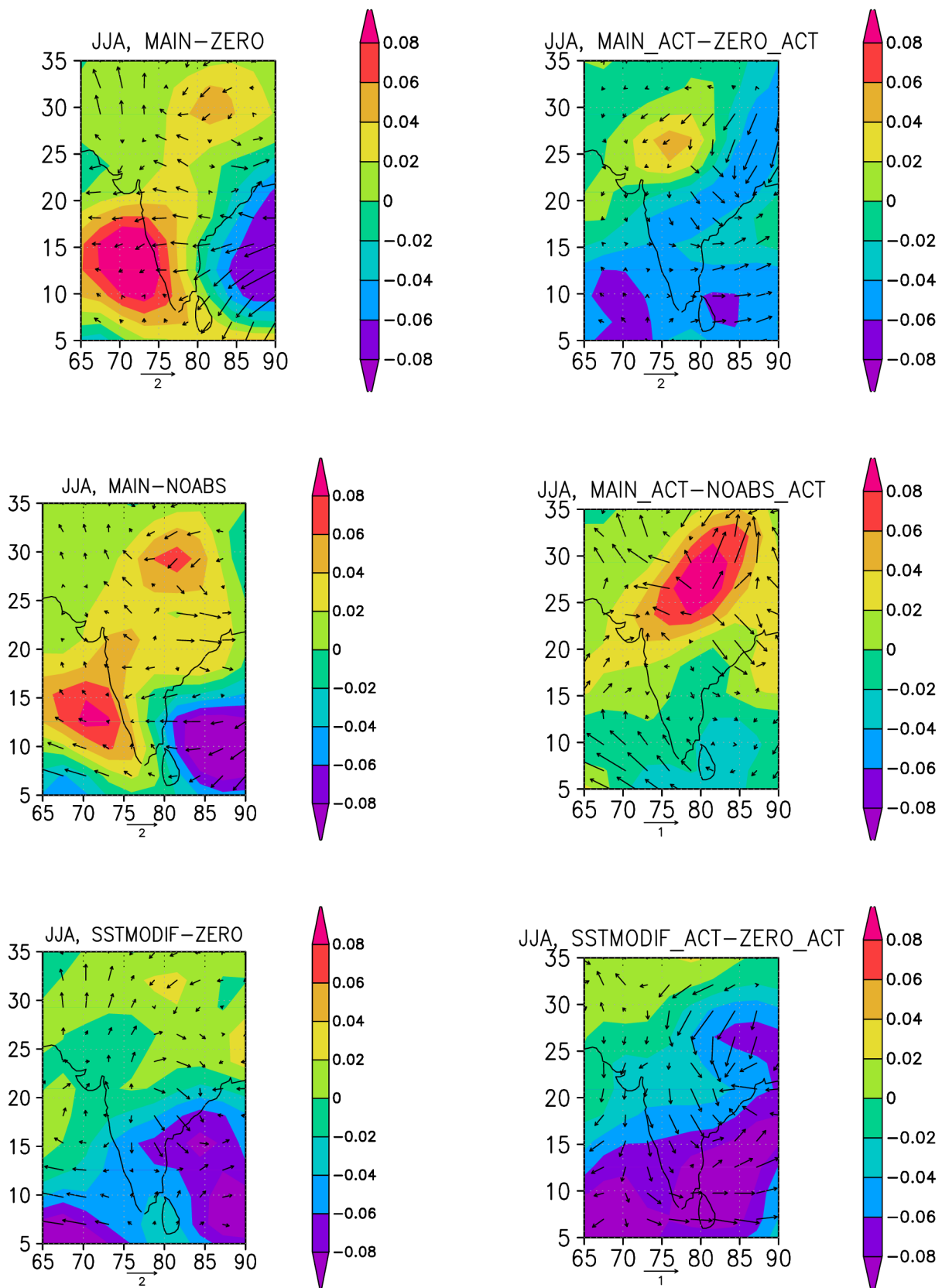
Supplementary Figure 3. Specific humidity anomalies (kg/kg) in the area (20-35 N, 65-90 E) in the different simulations.



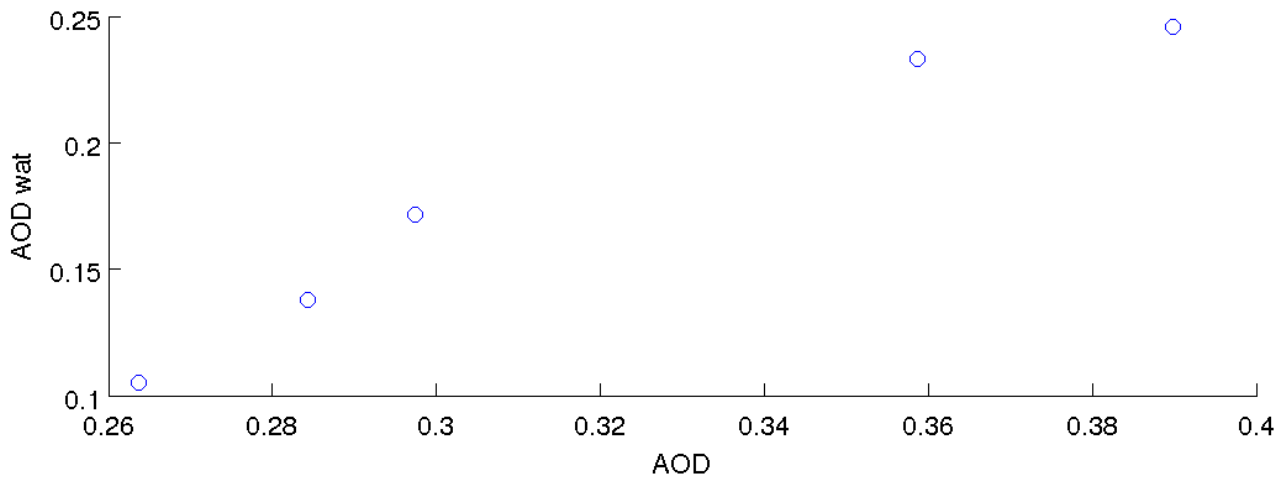
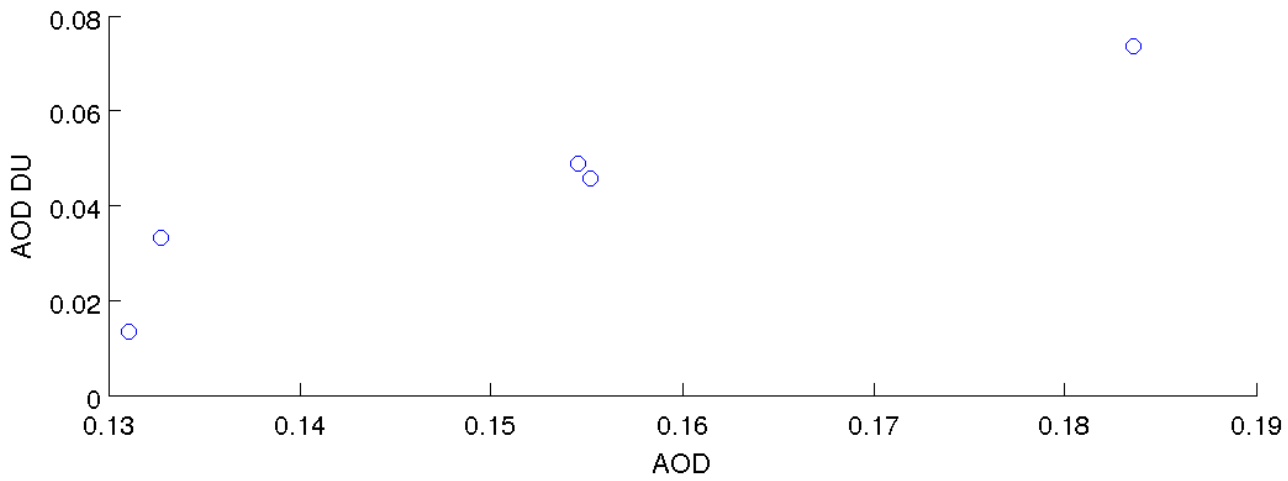
Supplementary Figure 4. Temperature anomalies (K) in the area (20-35 N, 65-90 E) in the different simulations.



Supplementary Figure 5. Relative humidity anomalies (kg/kg) in the area (20-35 N, 65-90 E) in the different simulations.



Supplementary Figure 6. Wind anomalies at the surface and cloud cover anomalies at 200 hPa in the months June-August in the different simulations.



Supplementary Figure 7. Interannual variability of a) Total AOD and AOD due to mineral dust in May and b) total AOD and AOD due to aerosol water. MAIN_ACT simulation. Region in both subfigures: 20-35 N, 65-90 E.

	Global emissions			India emissions		
Gg a-1 in 2005	BC	OC	SO2	BC	OC	SO2
Energy production and distribution	519	448	58838	12	12	3729
Industrial combustion and processes	395	467	25880	104	156	1712
Residential and commercial combustion	2957	9793	6350	401	1522	366
Transport	1016	1001	2162	75	1922	76
Agricultural waste burning	308	1194	156	47	171	17
Waste treatment and disposal	96	748	63	12	90	4
Other	0	0	2142	0	0	0
Total	5292	13650	95592	650	3873	5905
International shipping	141	150	13050			

Supplementary Table 1. The anthropogenic emissions used.