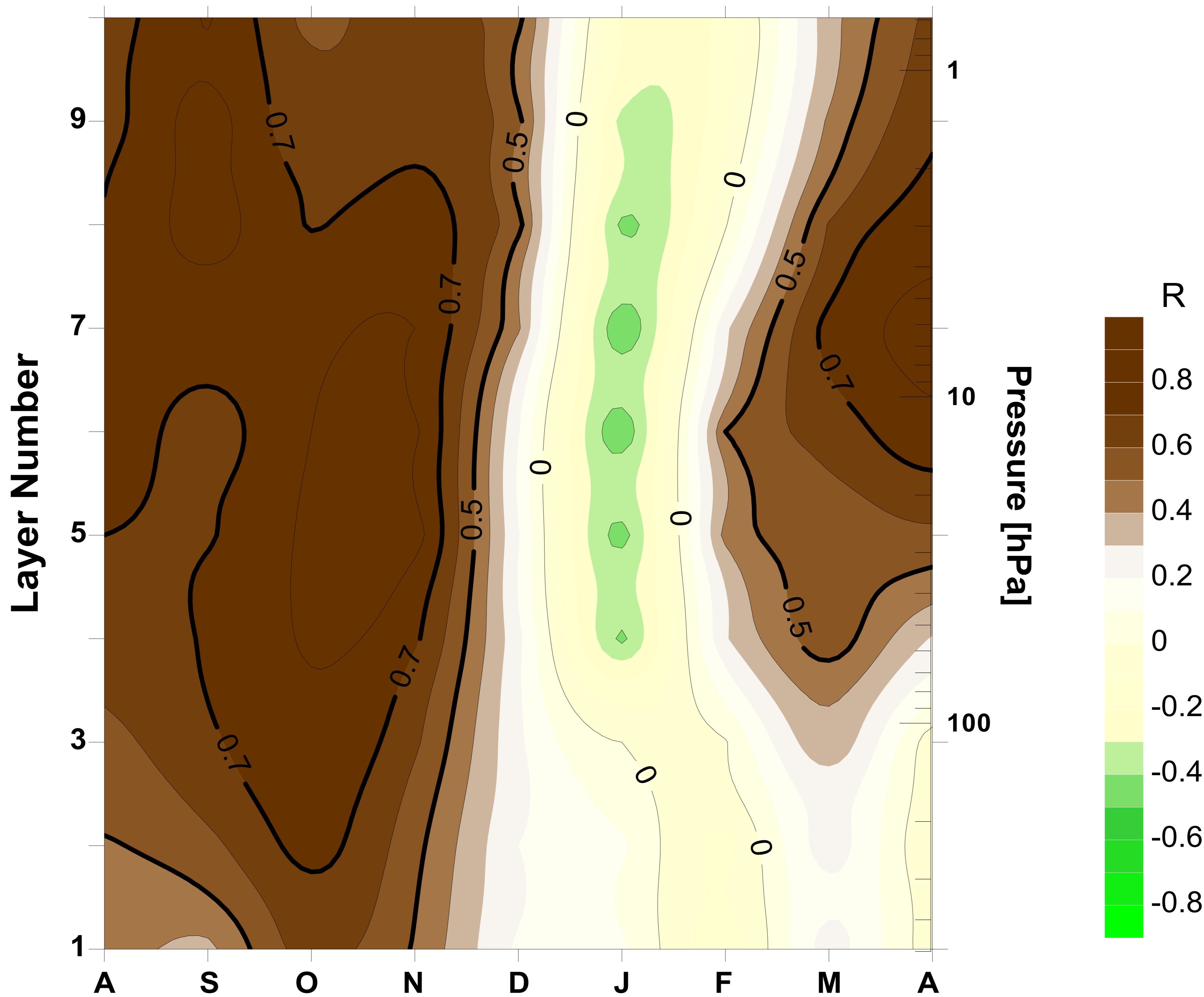


Supplement Fig. S1, Plots show correlation (R) between ozone and the mean EqLat 1300 K as function of altitude (Umkehr layers) and month. Results are shown as function of month and altitude (Umkehr layers). Time period of analysis is between 1979 and 2011.

(EqLat850K)

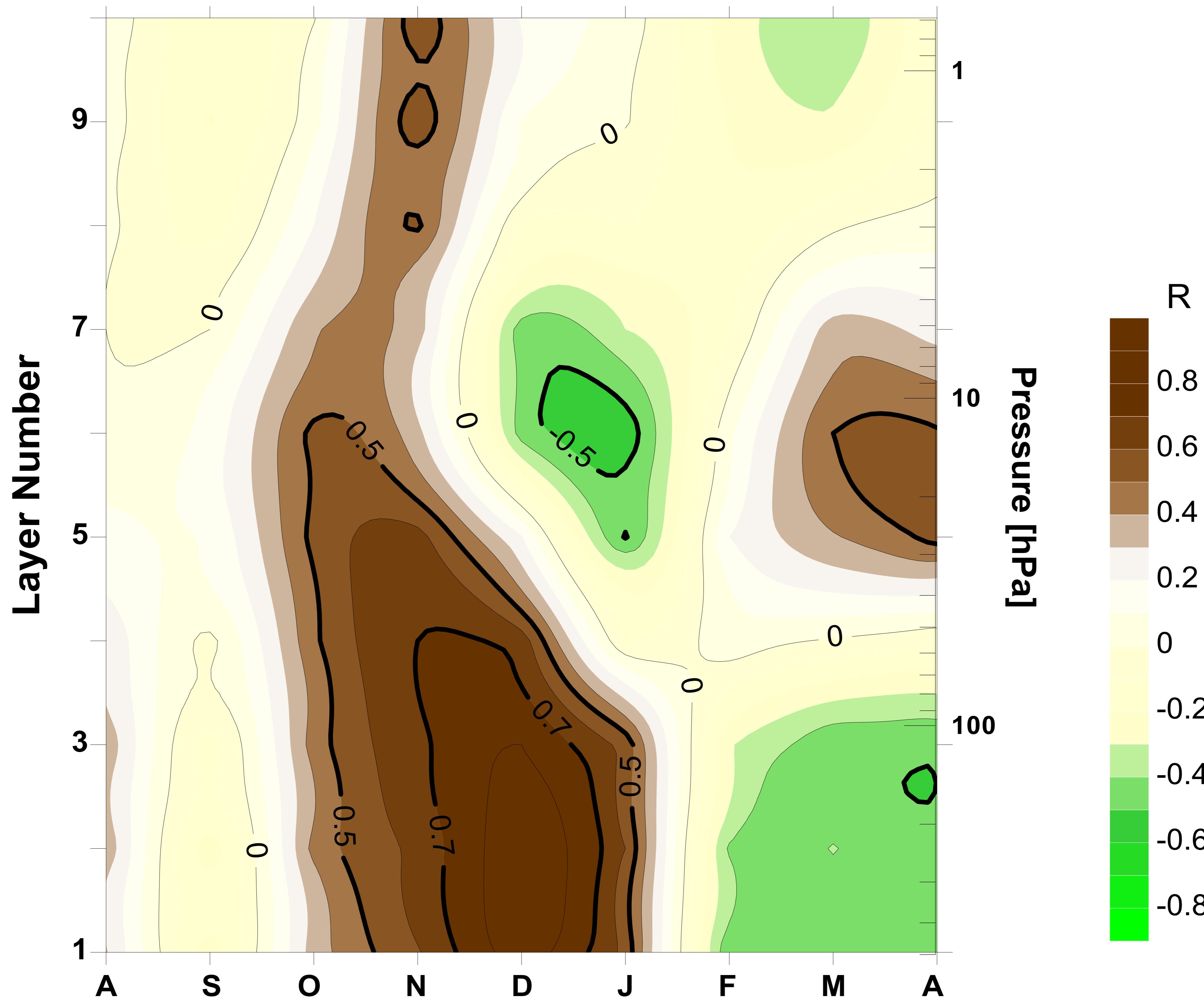
ALL



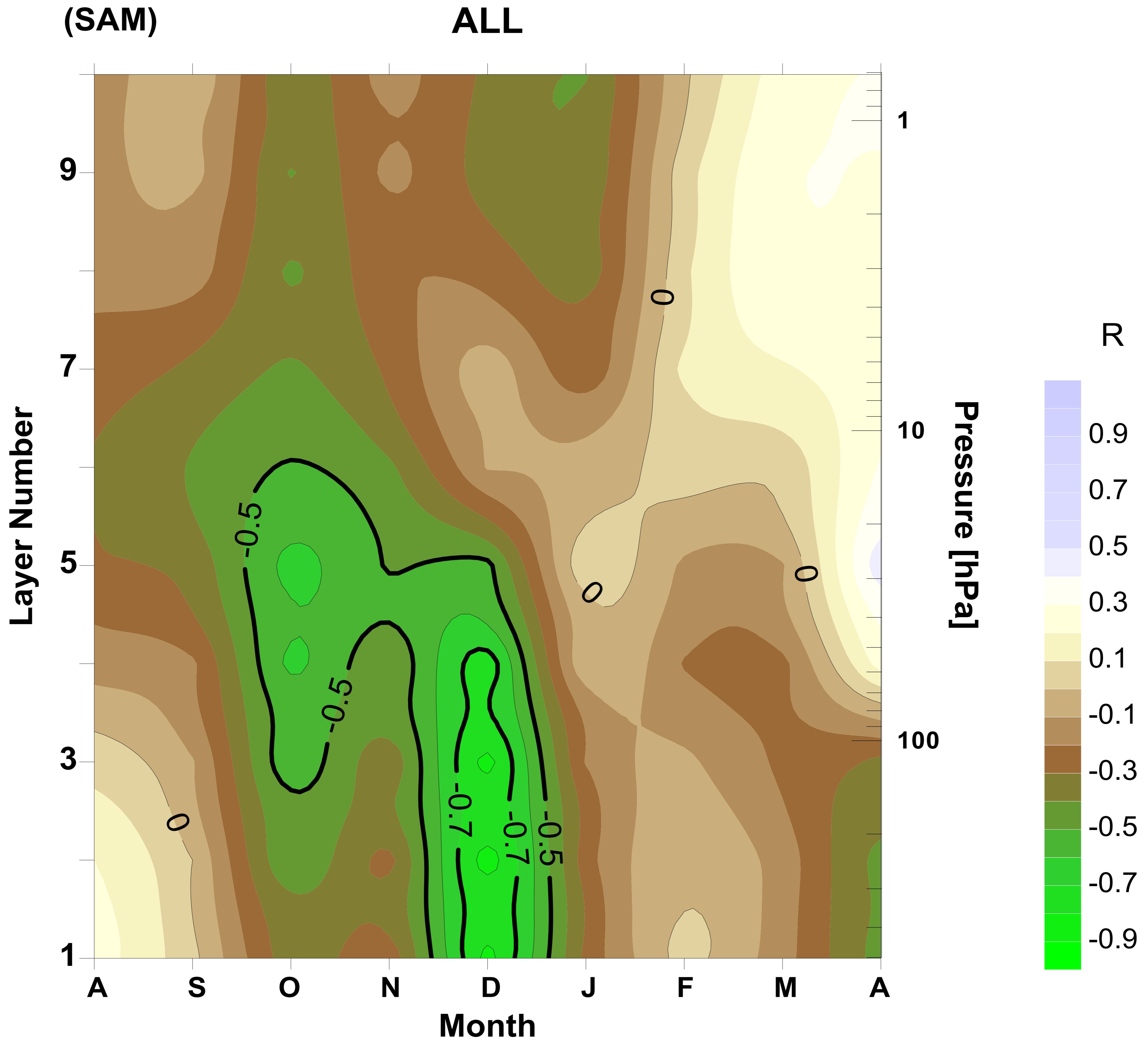
Supplement Fig. S2, the same as Fig.1 but the correlation of EqLat 850K and ozone

(EqLat520K)

ALL



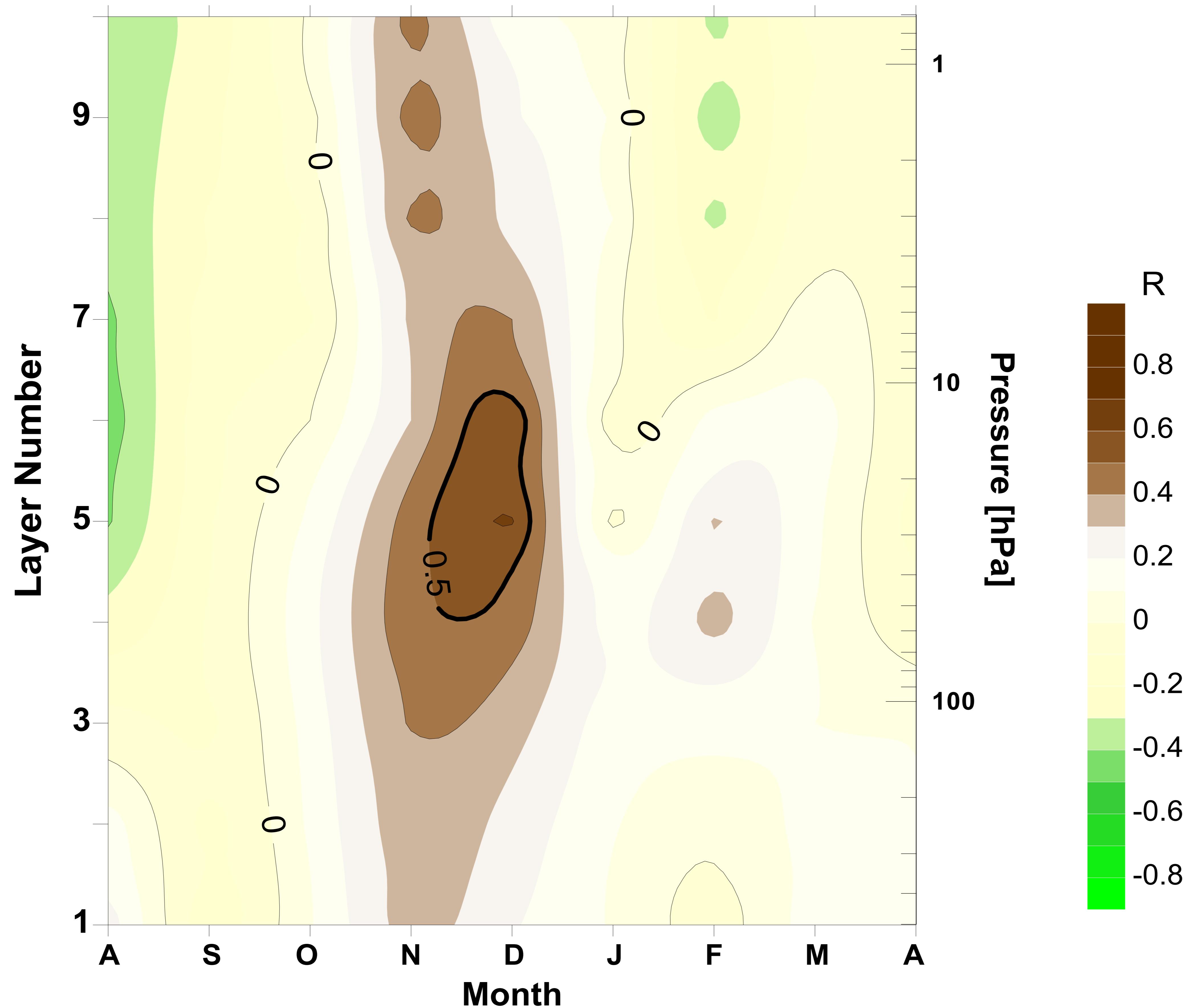
Supplement Fig. S3, the same as Fig.1 but the correlation of EqLat 520K and ozone



Supplement Fig. S4, the same as Fig.1 but the correlation of Southern Annular Mode (SAM) and ozone

(ENSO)

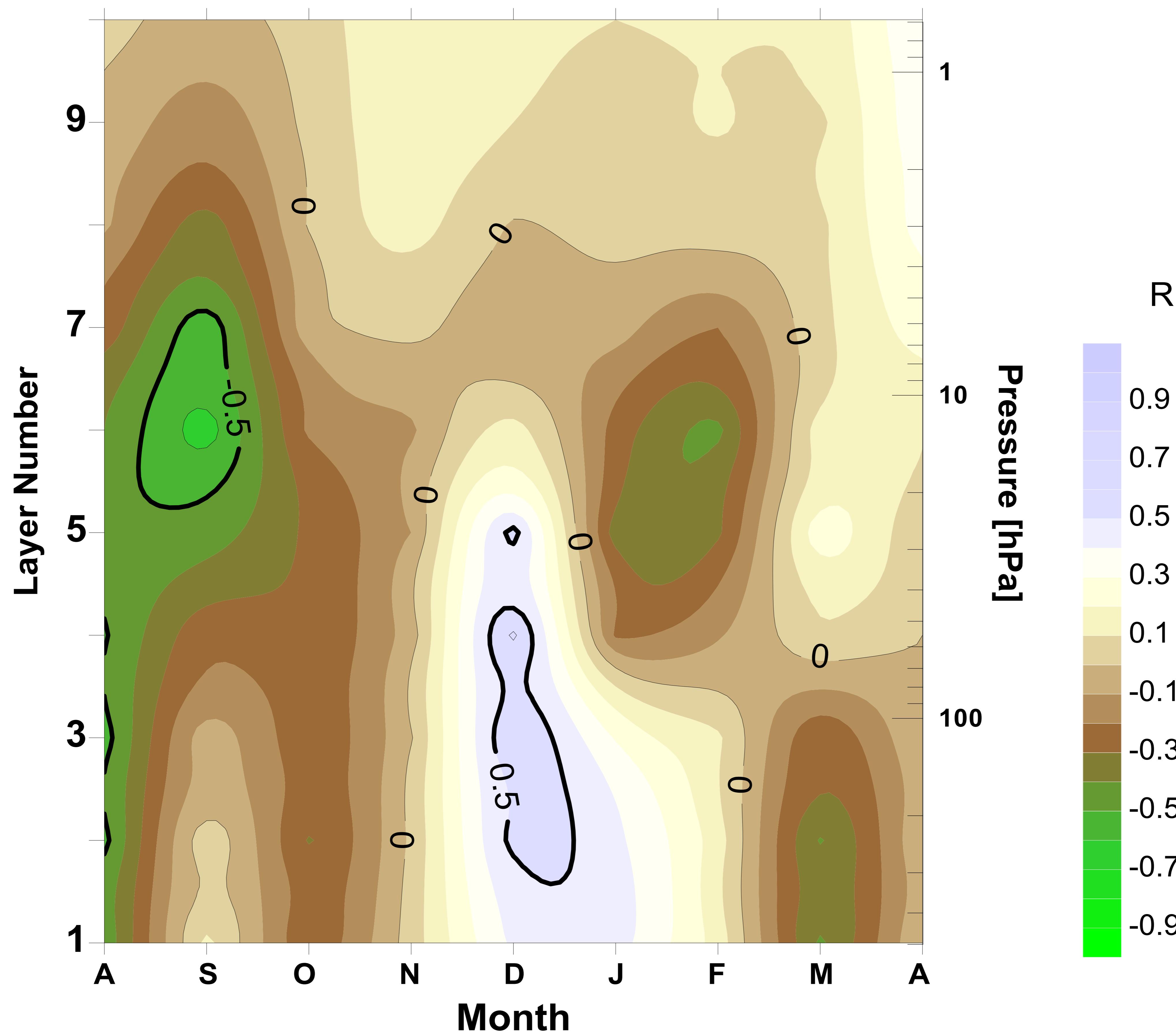
ALL



Supplement Fig. S5, the same as Fig.1 but the correlation of ENSO and ozone

(HF10)

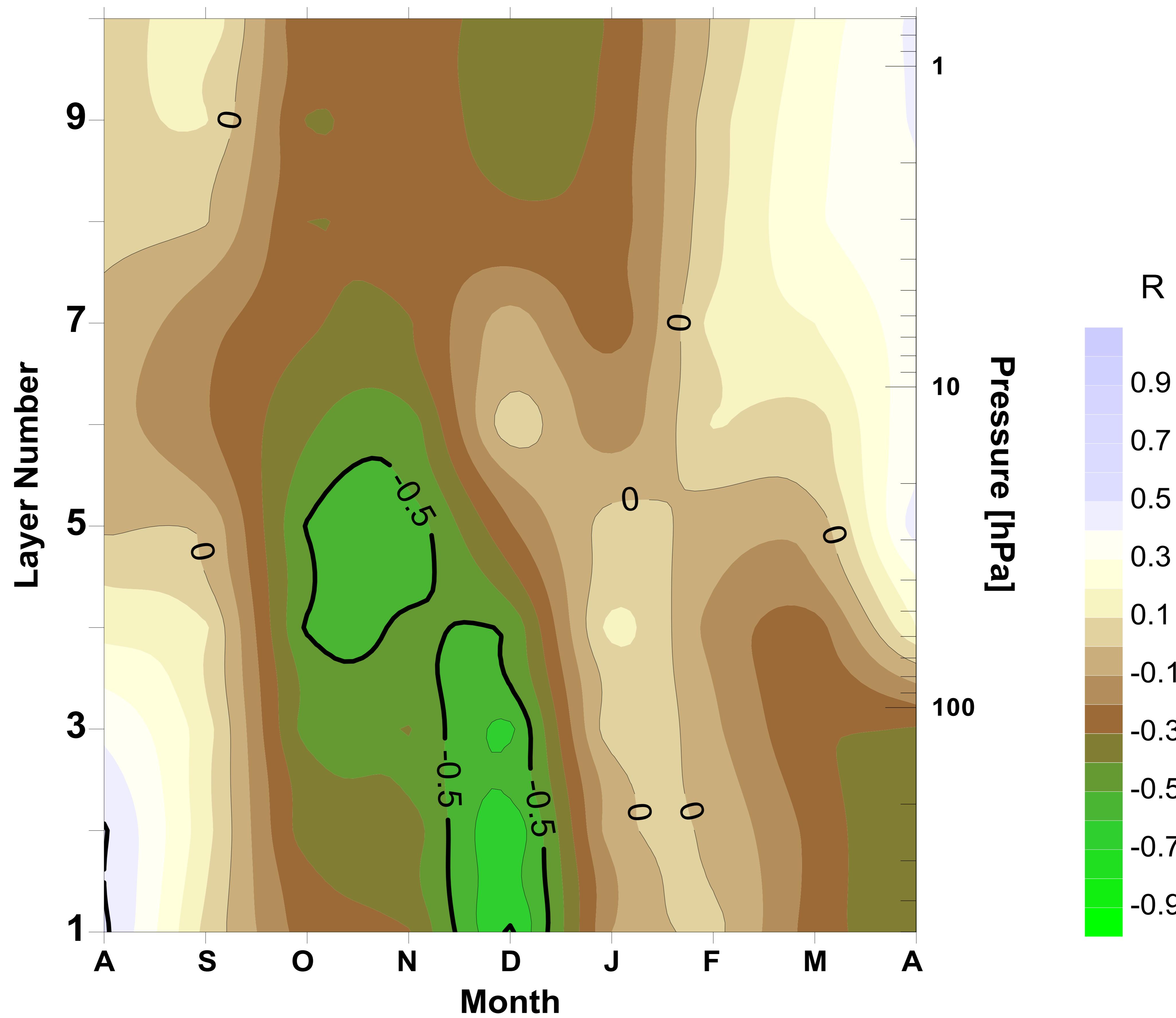
ALL



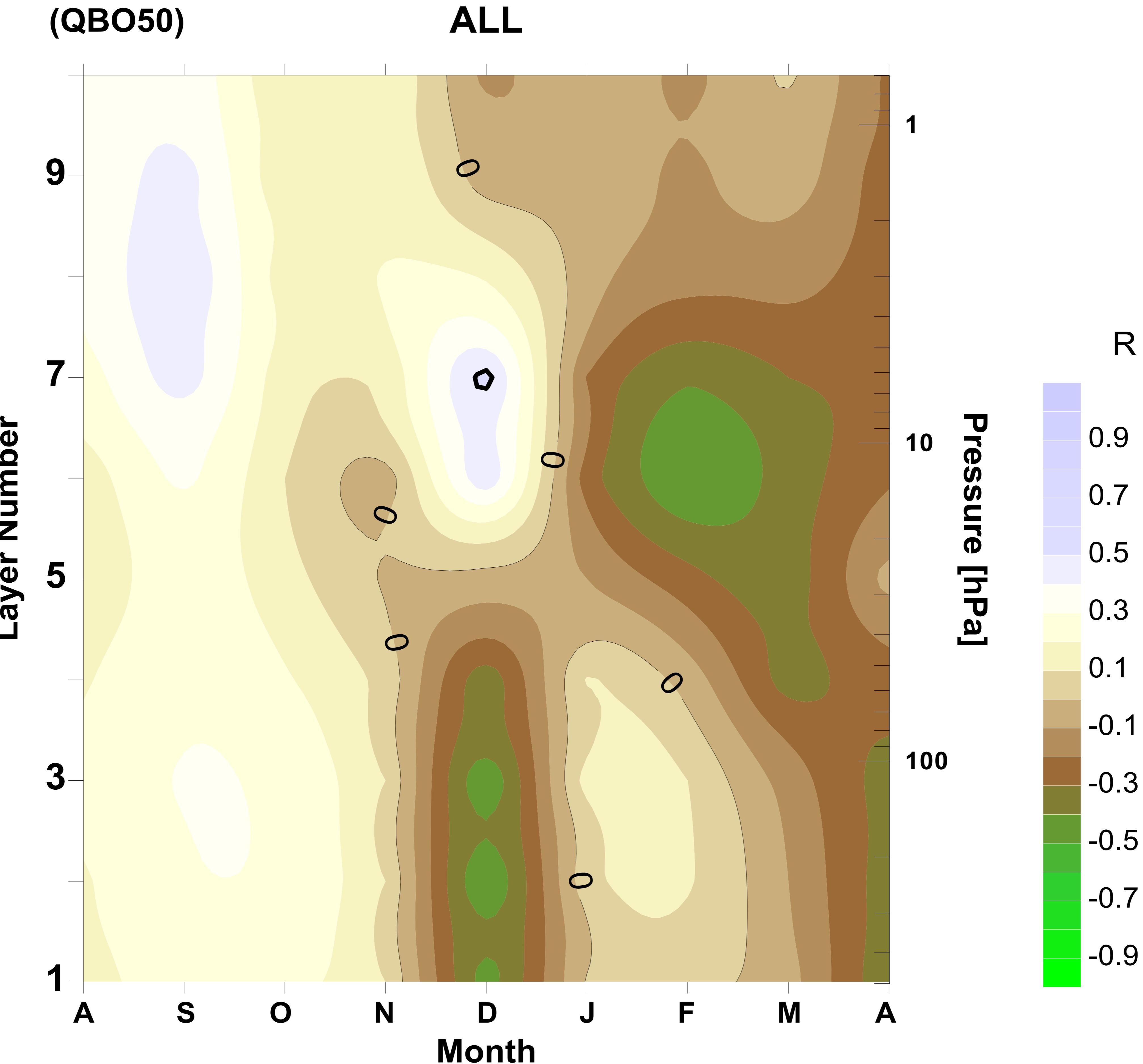
Supplement Fig. S6, the same as Fig.1 but the correlation of Heat flux (10 hPa) and ozone

(SAM*ENSO)

ALL



Supplement Fig. S7, the same as Fig.1 but the correlation of SAM*ENSO and ozone



Supplement Fig. S8, the same as Fig.1 but the correlation of QBO (50 hPa) and ozone

Pressure [hPa]	LAYER							
	1000	250	62.5	31.2	15.6	7.8	3.9	3.9
SPRING (SON)	1	2+3	4	5	6	7	8	8+9+10
1.0)SEASONAL VARIANCE	0.60	0.70	0.71	0.65	0.42	0.51	0.65	0.65
1.1)SOR+QBO+AOD	0.72	0.78	0.79	0.73	0.57	0.76	0.86	0.86
2.1)SOR+QBO+AOD+EqL520K	0.75	0.82	0.82	0.75	0.56	0.74	0.83	0.82
2.2)SOR+QBO+AOD+EqL850K	0.69	0.78	0.80	0.69	0.27	0.60	0.80	0.80
2.3)SOR+QBO+AOD+EqL1300K	0.72	0.79	0.78	0.69	0.48	0.72	0.82	0.81
2.4)SOR+QBO+AOD+ENSO	0.70	0.78	0.78	0.72	0.56	0.76	0.86	0.85
2.5)SOR+QBO+AOD+SAM	0.72	0.81	0.84	0.81	0.57	0.75	0.85	0.85
2.6)SOR+QBO+AOD+HF10	0.71	0.78	0.79	0.71	0.43	0.72	0.85	0.85
3.1)SOR+QBO+AOD+EqL850K+ENSO	0.67	0.77	0.78	0.66	0.30	0.62	0.79	0.79
3.2)SOR+QBO+AOD+EqL850K+SAM	0.71	0.81	0.84	0.78	0.38	0.62	0.79	0.79
3.3)SOR+QBO+AOD+EqL850K+HF10	0.65	0.76	0.79	0.66	0.16	0.54	0.75	0.75
3.4)SOR+QBO+AOD+EqL520K+SAM	0.75	0.83	0.85	0.81	0.61	0.75	0.83	0.83
3.5)SOR+QBO+AOD+EqL1300K+SAM	0.77	0.85	0.86	0.82	0.63	0.75	0.84	0.84
SUMMER (JFM)	1	2+3	4	5	6	7	8	8+9+10
1.0)SEASONAL VARIANCE	0.24	0.18	0.02	0.01	0.24	0.73	0.73	0.72
1.1)SOR+QBO+AOD	0.16	0.09	0.03	0.00	0.36	0.77	0.79	0.79
2.1)SOR+QBO+AOD+EqL520K	0.14	0.09	0.03	0.00	0.37	0.77	0.78	0.78
2.2)SOR+QBO+AOD+EqL850K	0.16	0.09	0.02	0.02	0.50	0.82	0.81	0.81
2.3)SOR+QBO+AOD+EqL1300K	0.15	0.06	0.04	0.02	0.48	0.83	0.82	0.82
2.4)SOR+QBO+AOD+ENSO	0.17	0.08	0.09	0.00	0.33	0.77	0.80	0.80
2.5)SOR+QBO+AOD+SAM	0.16	0.08	0.06	0.00	0.36	0.77	0.79	0.79
2.6)SOR+QBO+AOD+HF10	0.16	0.08	0.03	0.00	0.36	0.77	0.79	0.79
3.1)SOR+QBO+AOD+EqL850K+ENSO	0.25	0.13	0.07	0.00	0.41	0.81	0.83	0.83
3.2)SOR+QBO+AOD+EqL850K+SAM	0.23	0.14	0.06	0.01	0.44	0.81	0.81	0.81
3.3)SOR+QBO+AOD+EqL850K+HF10	0.24	0.15	0.03	0.01	0.46	0.83	0.82	0.81
3.4)SOR+QBO+AOD+EqL520K+SAM	0.16	0.08	0.07	0.00	0.36	0.77	0.79	0.79
3.5)SOR+QBO+AOD+EqL1300K+SAM	0.17	0.05	0.08	0.02	0.50	0.84	0.83	0.83

[R2]

Supplemental table ST1

Supplemental table ST1 represents results of correlation (determination coefficient, or R2) between seasonal averages of ozone profile derived in 10 Umkehr layers (columns) and several statistical models (rows) that fit the Umkehr data time series. Umkehr layer 2+3 means that ozone from Umkehr layers 2 and 3 is combined in a single layer for analysis. Results are separated into spring (September, October, and November) and summer (January, February and March) seasons. Each statistical model includes parameters that represent seasonal mean ozone and the Effective Equivalent Stratospheric Chlorine (EESC Polar 2) time series. Models other than 1.0 include additional proxies (i.e Solar cycle or SOR, stratospheric aerosol load or AOD, quasi-biennial oscillation or QBO, etc.). All parameters of the statistical model are listed in the first column and separated by + sign (i.e model 1.1 includes seasonal, EESC Polar 2 curve, SOR, QBO, and AOD). The yellow highlighted areas indicate that the determination coefficient is higher than 0.8. The first row at the top of the ST1 Table provides atmospheric pressure (hPa) at the bottom of each Umkehr layer (Umkehr layer number is repeated at the top of each section).