Supplement of Atmos. Chem. Phys., 15, 10955–10964, 2015
http://www.atmos-chem-phys.net/15/10955/2015/
doi:10.5194/acp-15-10955-2015-supplement

Atmospheric Chemistry and Physics Open Access

Supplement of

A study of the impact of synoptic weather conditions and water vapor on aerosol–cloud relationships over major urban clusters of China

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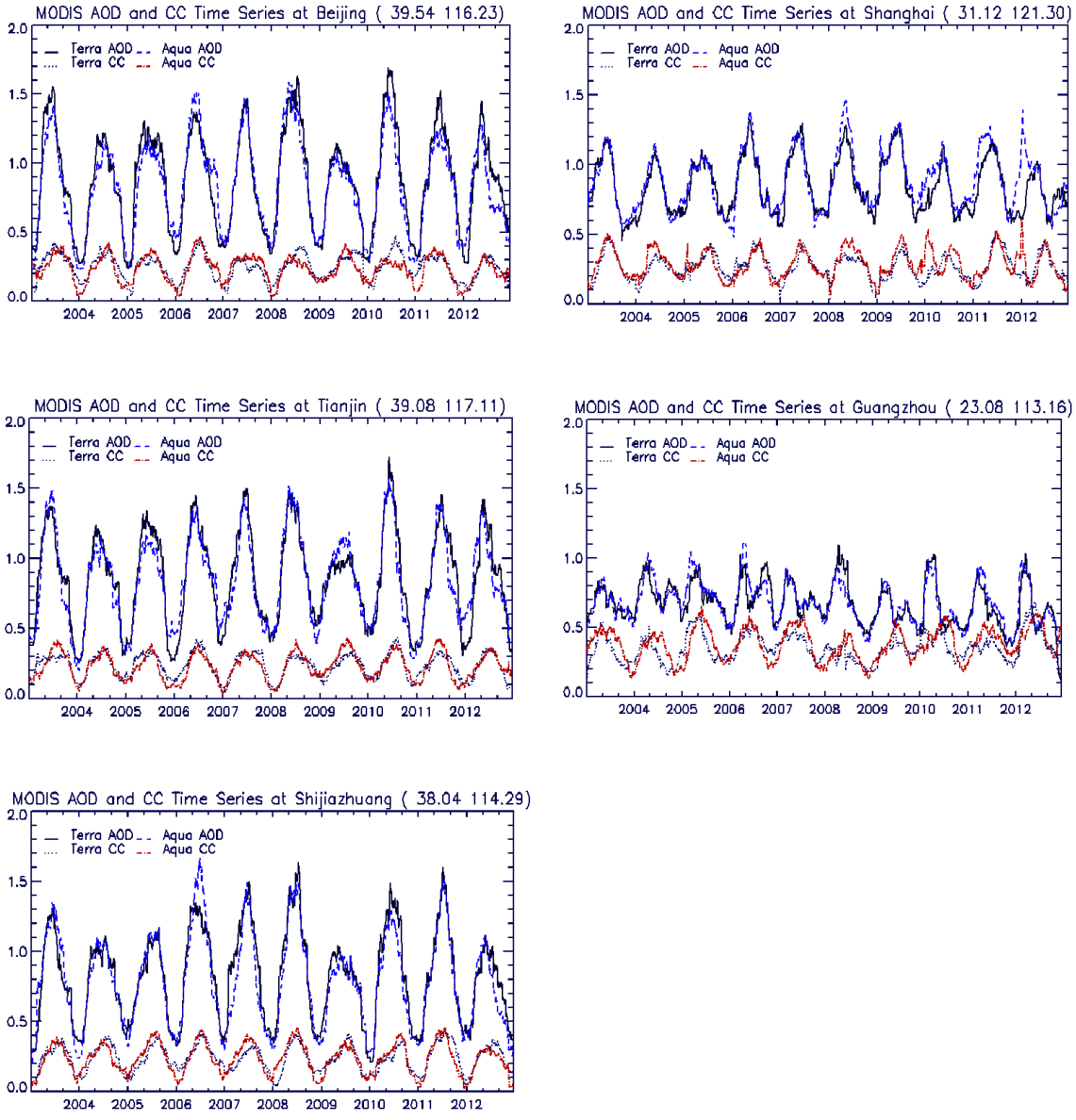

Figure S1. AOD and CC timeseries from TERRA and AQUA satellites at Beijing (upper left), Shanghai (upper right), Tianjin (middle left), Guangzhou (middle right) and Shijiazhuang (lower left), for the time period 2003 - 2013. The three cities on the left are within the BTH cluster, Shanghai lies within the YRD cluster and Guangzhou lies within the PRD cluster. Values are daily values, smoothed with a 20-day moving average.

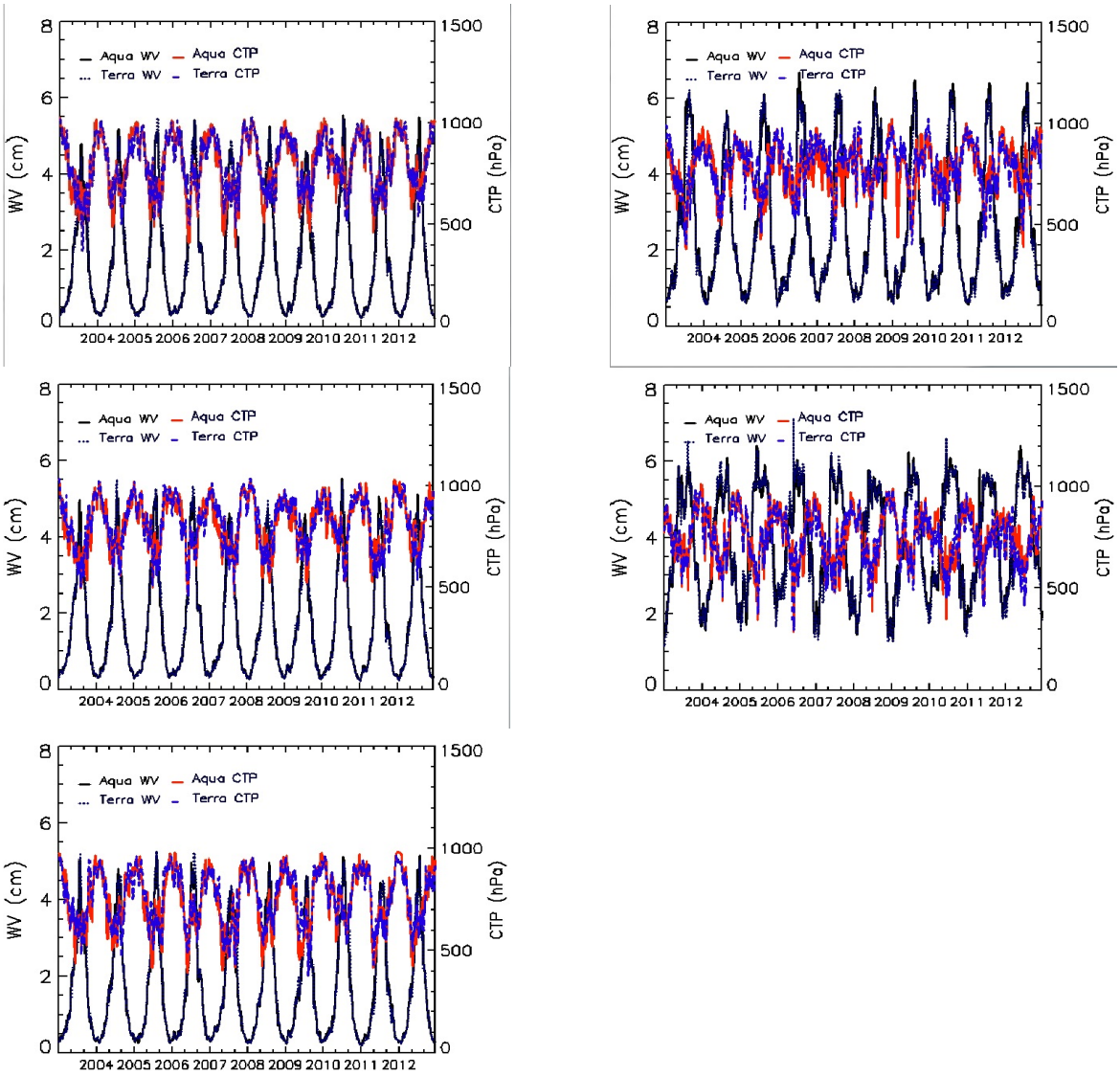

Figure S2. WV and CTP timeseries from TERRA and AQUA satellites at Beijing (upper left), Shanghai (upper right), Tianjin (middle left), Guangzhou (middle right) and Shijiazhuang (lower left), for the time period 2003-2013. The three cities on the left are within the BTH cluster, Shanghai lies within the YRD cluster and Guangzhou lies within the PRD cluster. Values are daily values, smoothed with a 20-day moving average.

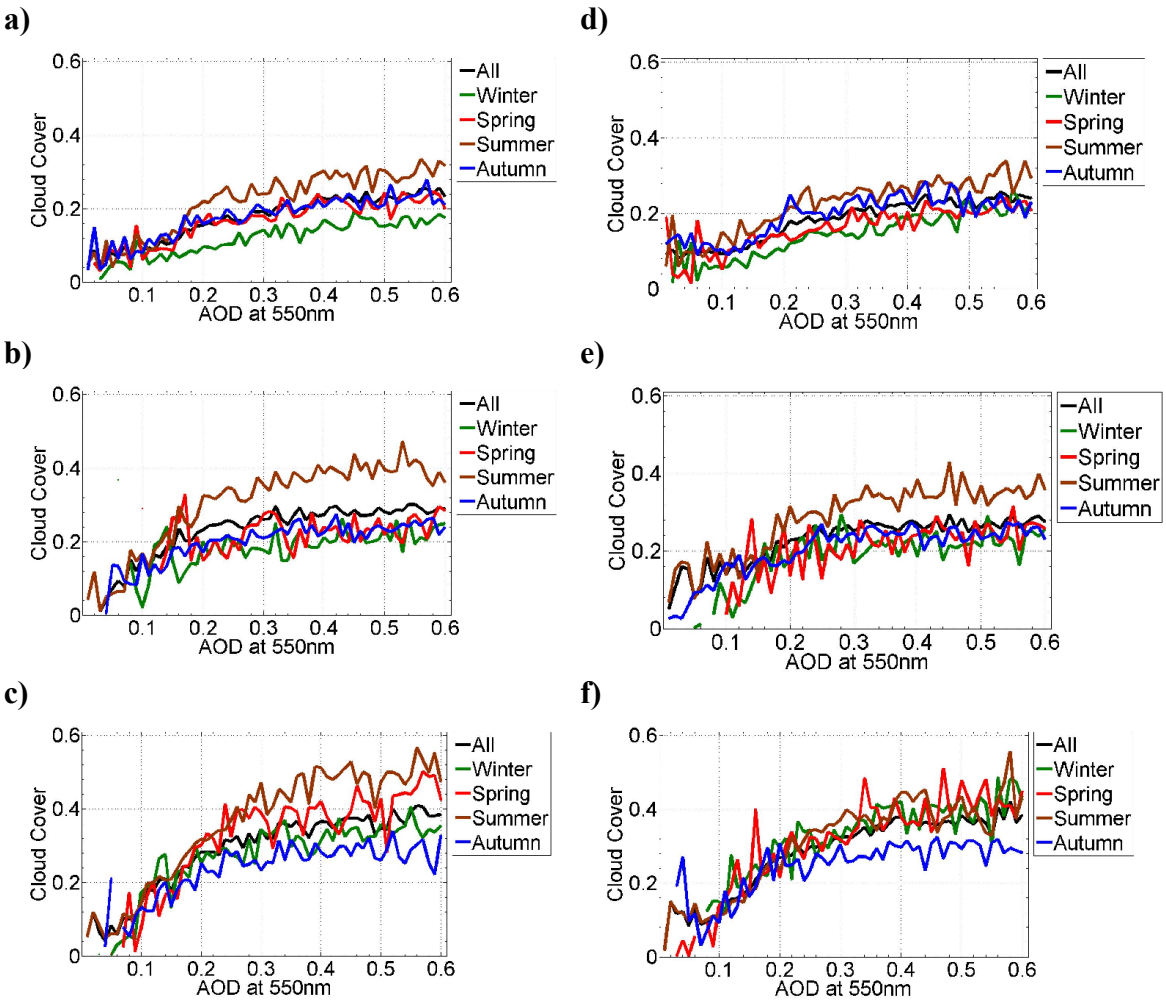

Figure S3. Annual and seasonal AOD as a function of CC over BTH (a,d), YRD (b,e) and PRD (c,f) from AQUA (a-c) and TERRA (d-f) satellites for the time period 2003-2013.

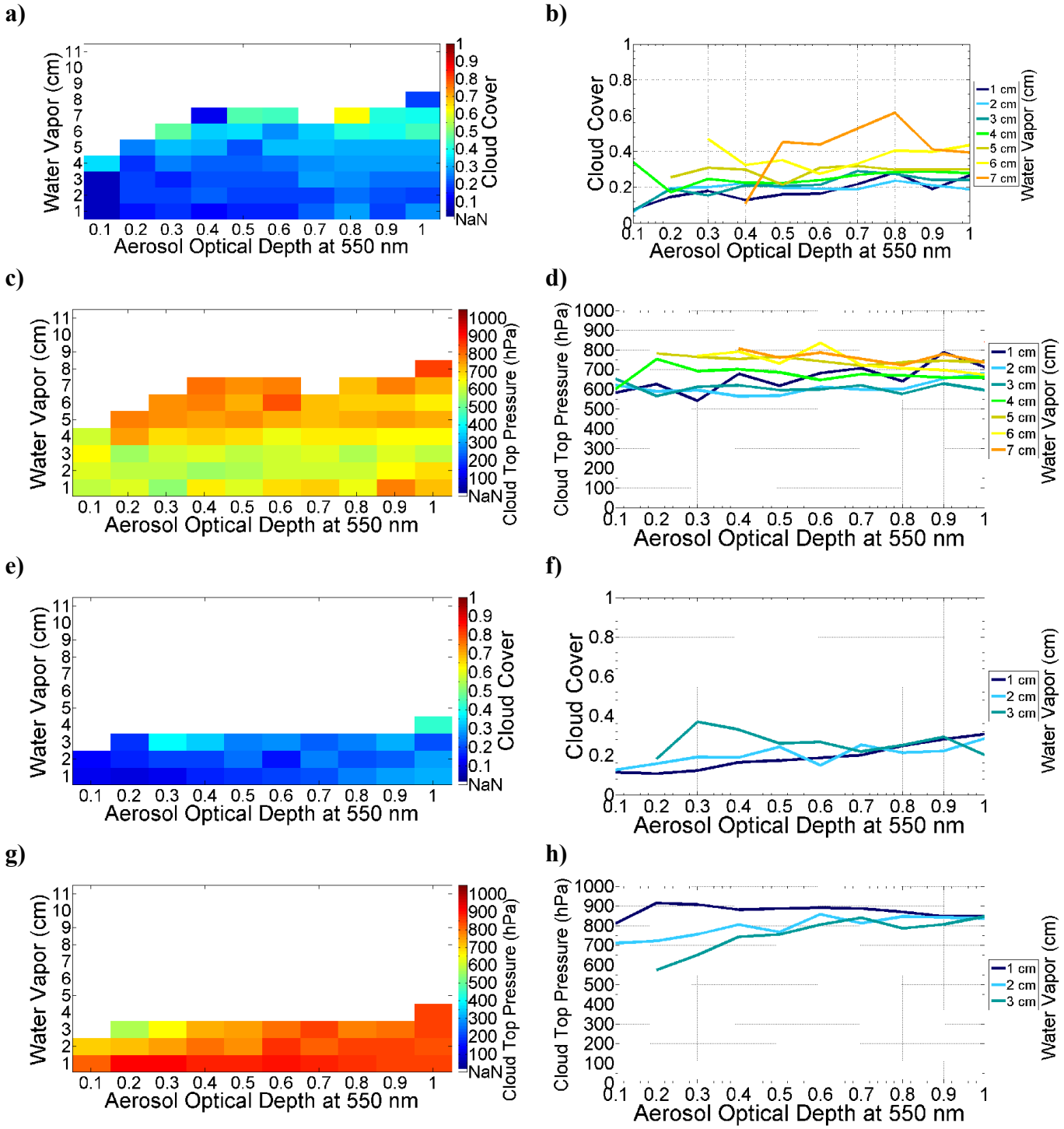

Figure S4. MODIS TERRA, Beijing-Tianjin-Hebei (BTH) urban cluster, 2003-2013, AOD-WV-CC (a-b), AOD-WV-CTP (c-d) for SLP <1008 hPa, and AOD-WV-CC (e-f), AOD-WV-CTP (g-h) for SLP>1017 hPa. NaN at the cloud data color bar denote no values or less than 6 values in this bin. Figures on the left present average CC and CTP values in 1cm WV and 0.1 AOD bins while figures on the right present results as line graphs. The line graph CC-AOD and CTP-AOD relations were calculated by averaging CC and CTP within 0.1 AOD bins for several 1cm WV classes.

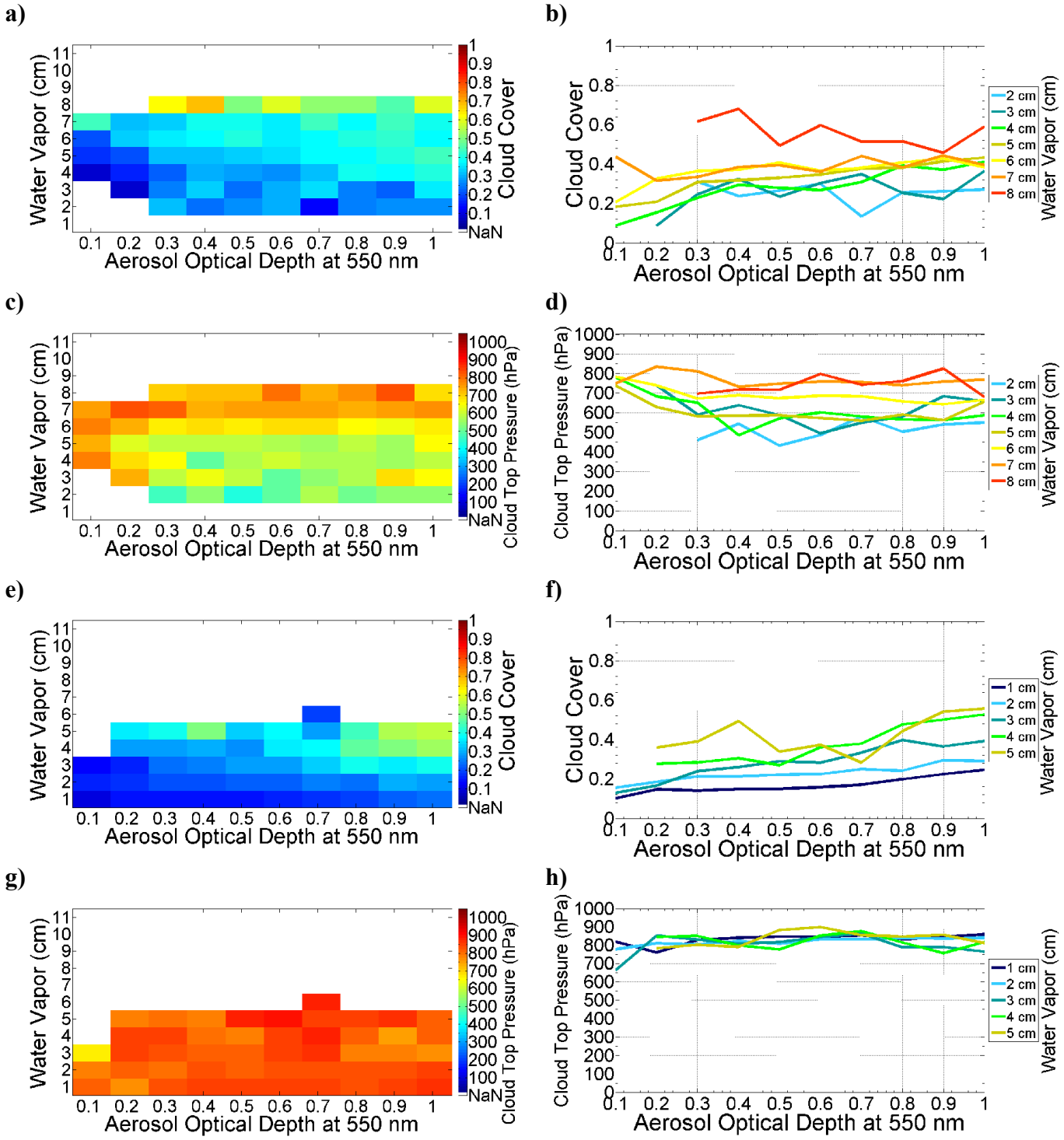

Figure S5. As in Fig. S4, but for the Yangtze River Delta (YRD) urban cluster.

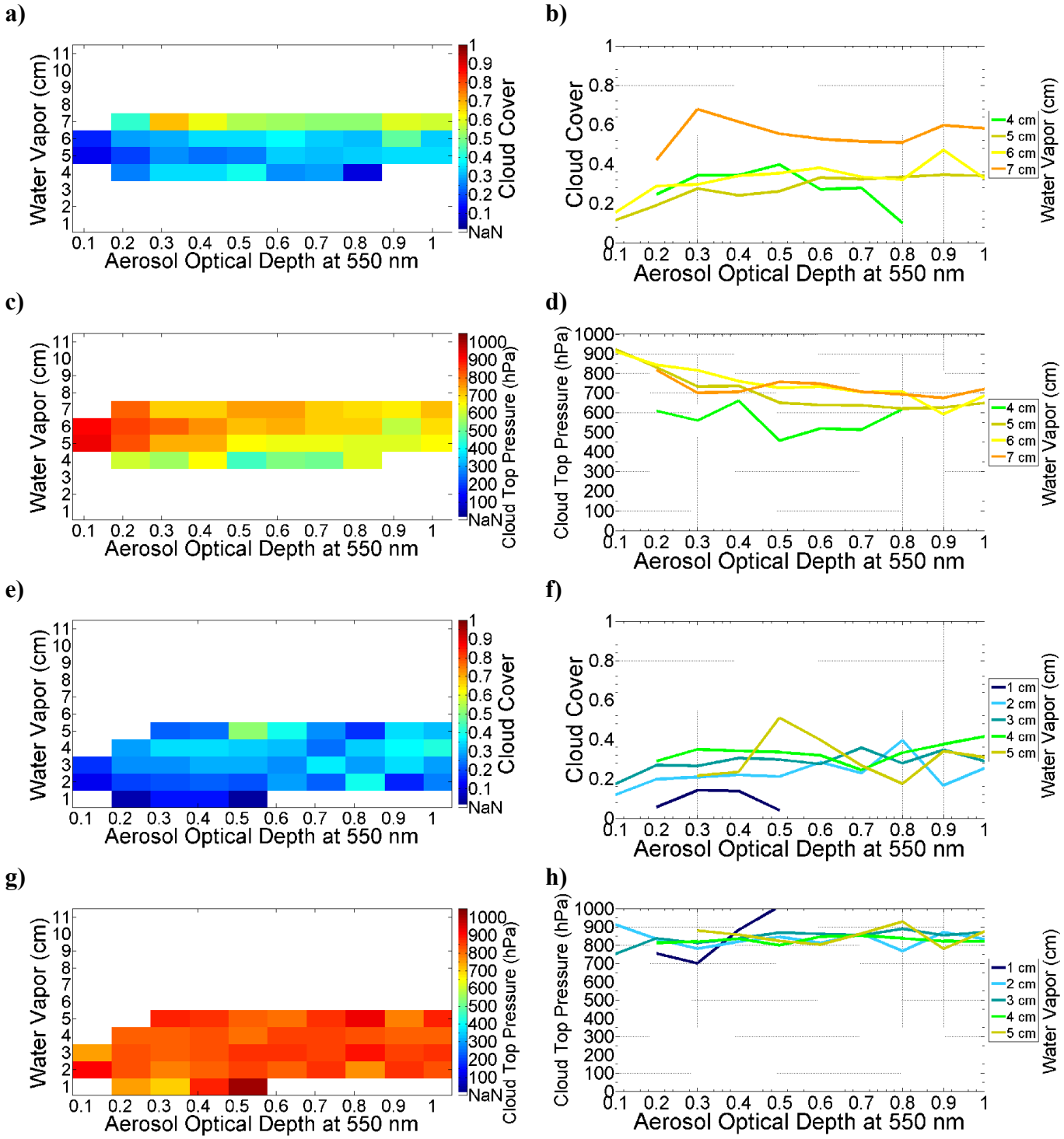

Figure S6. As in Fig. S4, but for the Pearl River Delta (PRD) urban cluster.

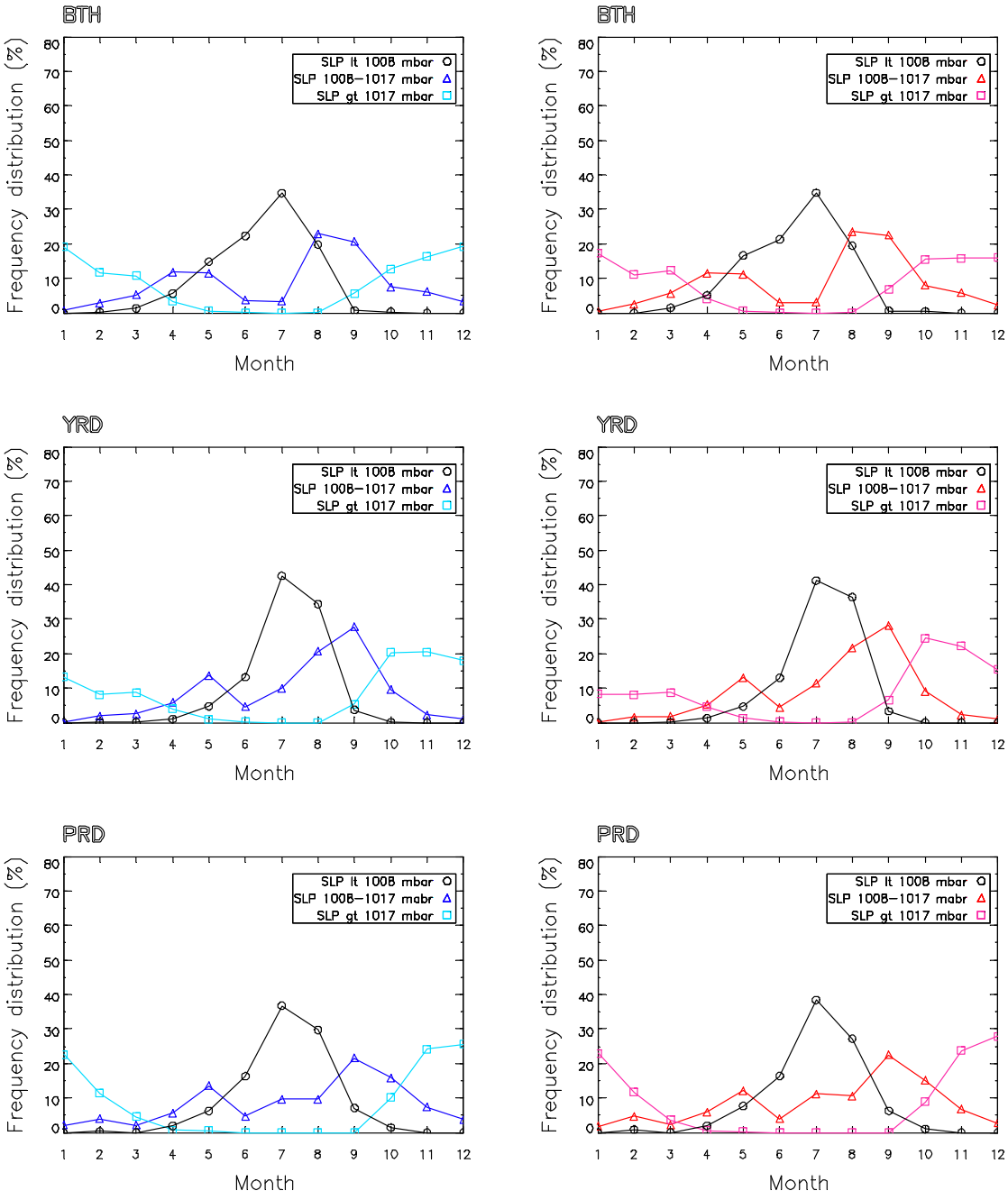

Figure S7. Frequency distribution of the AOD-CC values for different SLP levels (AOD<0.6). Left: AQUA, right: TERRA.

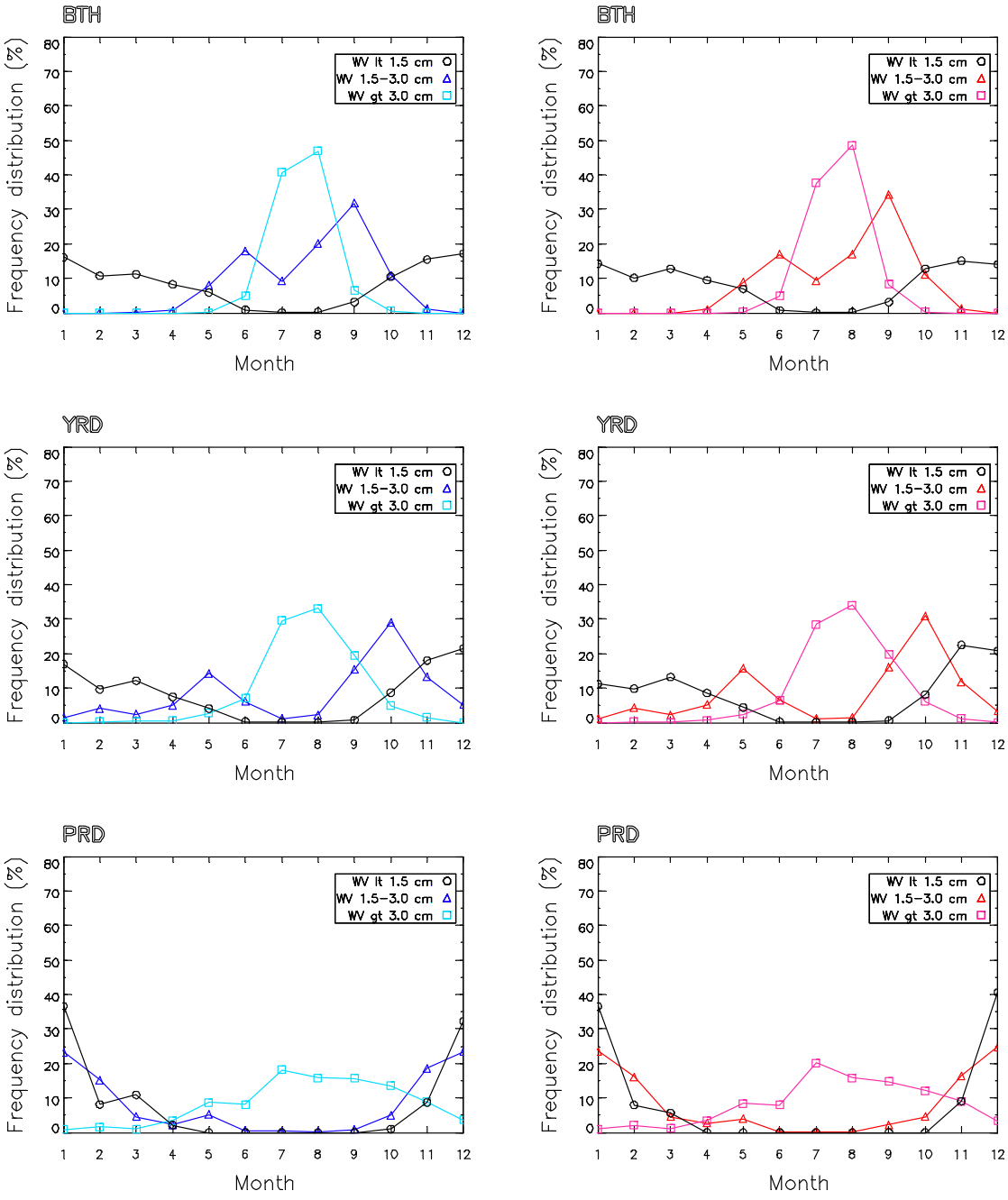

Figure S8. Frequency distribution of the AOD-CC values for different WV levels (AOD<0.6). Left: AQUA, right: TERRA.

Table S1. AOD-CC slopes for 0-0.22 AOD over BTH, YRD and PRD from AQUA and TERRA satellites for the time period 2003-2013. The values in parentheses represent R^2 coefficients. The asterisks denote statistically significant values at the 95% confidence level (p = 0.05).

	Aqua				
	All Seasons	**Winter**	**Spring**	**Summer**	**Autumn**
BTH	0.51(0.83)*	0.31(0.50)*	0.55(0.60)*	0.85(0.83)*	0.56(0.61)*
YRD	1.02(0.87)*	-0.06(0.001)	-0.52(0.08)	1.43(0.88)*	0.75(0.65)*
PRD	1.21(0.92)*	1.62(0.78)*	1.87(0.82)*	1.42(0.93)*	0.89(0.58)*
	Terra				
BTH	0.36(0.73)*	0.28(0.28)*	0.33(0.21)*	0.60(0.63)*	0.40(0.39)*
YRD	0.64(0.70)*	1.34(0.81)*	0.76(0.16)	0.80(0.60)*	0.77(0.80)*
PRD	1.00(0.82)*	1.30(0.67)*	1.62(0.77)*	0.98(0.77)*	0.78(0.35)*

Table S2. AOD-CC slopes for 0.23-0.6 AOD over BTH, YRD and PRD from AQUA and TERRA satellites for the time period 2003-2013. The values in parentheses represent R^2 coefficients. The asterisks denote statistically significant values at the 95% confidence level (p = 0.05).

	Aqua				
	All Seasons	**Winter**	**Spring**	**Summer**	**Autumn**
BTH	0.21(0.81)*	0.17(0.59)*	0.17(0.48)*	0.22(0.55)*	0.16(0.50)*
YRD	0.11(0.50)*	0.15(0.27)*	0.13(0.14)*	0.19(0.38)*	0.09(0.27)*
PRD	0.22(0.64)*	0.18(0.35)*	0.28(0.33)*	0.38(0.56)*	0.09(0.11)*
	Terra				
BTH	0.18(0.74)*	0.26(0.71)*	0.18(0.56)*	0.19(0.48)*	0.04(0.03)
YRD	0.06(0.27)*	0.06(0.05)	0.15(0.20)*	0.15(0.28)*	0.03(0.03)
PRD	0.23(0.68)*	0.29(0.40)*	0.36(0.46)*	0.24(0.27)*	0.13(0.27)*

Table S3. AOD-CC and AOD-CTP slopes for different WV bins from Fig. 2 over the BTH region for SLP < 1008 and SLP > 1017 from AQUA for the time period 2003-2013. The values in parentheses represent R^2 coefficients. The asterisks denote statistically significant values at the 95% confidence level (p = 0.05).(~) denotes very small value.

	SLP < 1008		**SLP > 1017**	
WV class	**AOD-CC**	**AOD-CTP**	**AOD-CC**	**AOD-CTP**
1 cm	0.15(0.57)*	151.20(0.65)*	0.19(0.93)*	-7.67(0.01)
2 cm	0.19(0.89)*	28.36(0.13)	0.07(0.57)*	180.50(0.81)*
3 cm	0.15(0.76)*	35.97(0.12)	0.01(~)	132.30(0.65)*
4 cm	0.15(0.47)*	-38.72(0.17)	0.27(0.28)	-295.10(0.72)
5 cm	0.11(0.64)*	-23.01(0.05)	-	-
6 cm	0.14(0.25)	29.47(0.02)	-	-
7 cm	0.28(0.65)*	-151.90(0.43)	-	-
8 cm	0.38(0.23)	-181.9(0.83)	-	-
9 cm	-	-	-	-
10 cm	-	-	-	-

Table S4. AOD-CC and AOD-CTP slopes for different WV bins from Fig. 3 over the YRD region for SLP < 1008 and SLP > 1017 from AQUA for the time period 2003-2013. The values in parentheses represent R^2 coefficients. The asterisks denote statistically significant values at the 95% confidence level (p = 0.05).(~) denotes very small value.
[1]: This value represents a line of 2 points

	SLP < 1008		SLP > 1017	
WV class	**AOD-CC**	**AOD-CTP**	**AOD-CC**	**AOD-CTP**
1 cm	-	-	0.07(0.71)*	219.30(0.48)*
2 cm	0.43(0.67)*	-197.40(0.22)	0.21(0.82)*	-22.55(0.02)
3 cm	0.05(0.14)	161.60(0.92)*	0.18(0.88)*	44.28(0.45)*
4 cm	0.20(0.67)*	-82.04(0.19)	0.33(0.84)*	-5.73(~)
5 cm	0.28(0.75)*	-132.10(0.63)*	0.14(0.28)	-7.55(~)
6 cm	0.25(0.76)*	-207.10(0.84)*	-0.66(1)[1]	-
7 cm	0.11(0.57)*	-140.60(0.78)*	-	-
8 cm	0.18(0.42)	-20.77(0.02)	-	-
9 cm	-	-	-	-
10 cm	-	-	-	-

Table S5. AOD-CC and AOD-CTP slopes for different WV bins from Fig. 4 over the PRD region for SLP < 1008 and SLP > 1017 from AQUA for the time period 2003-2013. The values in parentheses represent R^2 coefficients. The asterisks denote statistically significant values at the 95% confidence level (p = 0.05).(~) denotes very small value.

	SLP < 1008		SLP > 1017	
WV class	**AOD-CC**	**AOD-CTP**	**AOD-CC**	**AOD-CTP**
1 cm	-	-	0.01(~)	915.00(0.70)
2 cm	-	-	0.03(0.03)	2.64(~)
3 cm	-	-	0.07(0.29)	36.62(0.23)
4 cm	-0.13(0.21)	-38.09(0.02)	0.08(0.32)	85.05(0.66)*
5 cm	0.18(0.34)	-242.70(0.71)*	0.07(0.06)	43.99(0.19)
6 cm	0.17(0.51)*	-175.90(0.87)*	-	-
7 cm	0.14(0.32)	-165.90(0.42)*	-	-
8 cm	-	-	-	-
9 cm	-	-	-	-
10 cm	-	-	-	-