Supplemental Document

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Two-dimensional peripheral refraction in adults: supplement

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Supplementary materials

Table 1 Comparisons of Averaged RPR between peripheral zones and MZ2 in G1(n=6)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	-1.0017	0.44991	-0.99000	0.33100	-1.33736	-0.64264	-7.326	0.001
UZ2	-0.4033	0.98358	-0.39167	0.82858	-1.26120	0.47787	-1.158	0.299
UZ3	-0.3517	0.84253	-0.34000	0.75797	-1.13544	0.45544	-1.099	0.322
MZ1	-0.7183	0.16192	-0.70667	0.14692	-0.86085	-0.55248	-11.781	0.000
MZ2	-0.0117	0.17383	_	_	_	_	_	_
MZ3	-0.4017	0.67585	-0.39000	0.62469	-1.04557	0.26557	-1.529	0.187
LZ1	-0.8433	0.75320	-0.83167	0.71990	-1.58716	-0.07618	-2.830	0.037
LZ2	-0.5667	0.33980	-0.55500	0.35987	-0.93267	-0.17733	-3.778	0.013
LZ3	-1.1550	0.87548	-1.14333	0.88518	-2.07227	-0.21439	-3.164	0.025

Table 2 Comparisons of Averaged RPR between peripheral zones and MZ2 in G2(n=26)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	-0.6762	0.65394	-0.64577	0.59582	-0.88643	-0.40511	-5.526	0.000
UZ2	-0.4135	0.42107	-0.38308	0.35636	-0.52701	-0.23914	-5.481	0.000
UZ3	-0.4431	0.63957	-0.41269	0.57838	-0.64631	-0.17908	-3.638	0.001
MZ1	-0.4850	0.38913	-0.45462	0.35004	-0.59600	-0.31323	-6.622	0.000
MZ2	-0.0304	0.11152	_	_	_	_	_	_
MZ3	-0.3188	0.53598	-0.28846	0.47386	-0.47986	-0.09707	-3.104	0.005
LZ1	-0.5088	0.50562	-0.47846	0.45750	-0.66325	-0.29367	-5.333	0.000
LZ2	-0.2827	0.32435	-0.25231	0.26961	-0.36121	-0.14341	-4.772	0.000
LZ3	-0.6288	0.59616	-0.59846	0.53291	-0.81371	-0.38321	-5.726	0.000

Table 3 Comparisons of Averaged RPR between peripheral zones and MZ2 in G3(n=83)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	-0.0831	0.77624	-0.16819	0.71396	-0.32409	-0.01229	-2.146	0.035
UZ2	-0.1292	0.42058	-0.21422	0.37116	-0.29526	-0.13317	-5.258	0.000
UZ3	0.2292	0.66267	0.14410	0.68203	-0.00483	0.29302	1.925	0.058
MZ1	0.0677	0.58102	-0.01735	0.50594	-0.12782	0.09313	-0.312	0.756
MZ2	0.0851	0.20516	_	_	_	_	_	_
MZ3	0.3430	0.63315	0.25795	0.64329	0.11749	0.39842	3.653	0.000
LZ1	0.2307	0.66906	0.14566	0.61159	0.01212	0.27921	2.170	0.033
LZ2	0.0349	0.40812	-0.05012	0.34857	-0.12623	0.02599	-1.310	0.194
LZ3	0.0528	0.61897	-0.03229	0.62194	-0.16809	0.10352	-0.473	0.637

Table 4 Comparisons of Averaged RPR between peripheral zones and MZ2 in G4(n=81)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	0.7383	0.85097	0.56716	0.81368	0.38724	0.74708	6.273	0.000
UZ2	0.2120	0.65785	0.04086	0.60927	-0.09386	0.17558	0.604	0.548
UZ3	1.1037	0.87426	0.93259	0.83710	0.74750	1.11769	10.027	0.000
MZ1	0.7011	0.62996	0.53000	0.59922	0.39750	0.66250	7.960	0.000
MZ2	0.1711	0.17515	_	_	_	_	_	_
MZ3	1.1015	0.74206	0.93037	0.68651	0.77857	1.08217	12.197	0.000
LZ1	0.8827	0.71384	0.71160	0.66003	0.56566	0.85755	9.703	0.000
LZ2	0.0670	0.51401	-0.10407	0.42537	-0.19813	-0.01002	-2.202	0.031
LZ3	0.6528	0.83133	0.48173	0.75574	0.31462	0.64884	5.737	0.000

Table 5 Comparisons of Averaged RPR between peripheral zones and MZ2 in G5(n=97)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	1.3877	1.02269	1.13969	1.00060	0.93803	1.34136	11.218	0.000
UZ2	0.5187	0.70793	0.27062	0.67199	0.13518	0.40605	3.966	0.000
UZ3	1.8101	1.03698	1.56206	1.00614	1.35928	1.76484	15.291	0.000
MZ1	1.1803	0.77807	0.93227	0.74672	0.78177	1.08277	12.296	0.000
MZ2	0.2480	0.20757	_	_	_	_	_	_
MZ3	1.5716	0.92753	1.32361	0.89040	1.14415	1.50306	14.641	0.000
LZ1	1.4001	0.98626	1.15206	0.94655	0.96129	1.34283	11.987	0.000
LZ2	0.0631	0.50349	-0.18495	0.43155	-0.27193	-0.09797	-4.221	0.000
LZ3	0.8674	0.95309	0.61938	0.91858	0.43425	0.80452	6.641	0.000

Table 6 Comparisons of Averaged RPR between peripheral zones and MZ2 in G6(n=186)

					Dif 95% CI			
	Mean	SD	Dif M	Dif SD	Lower limit	Upper limit	t	P
UZ1	1.6089	1.21404	1.40495	1.17077	1.23559	1.57431	16.366	0.000
UZ2	0.6503	0.72855	0.44634	0.66699	0.34986	0.54283	9.127	0.000
UZ3	2.0348	1.21158	1.83091	1.16444	1.66247	1.99936	21.444	0.000
MZ1	1.2923	0.91815	1.08833	0.86099	0.96378	1.21288	17.239	0.000
MZ2	0.2039	0.21733	_	_	_	_	_	_
MZ3	1.7232	1.06534	1.51930	1.01668	1.37223	1.66637	20.381	0.000
LZ1	1.5222	1.05248	1.31828	0.99924	1.17373	1.46283	17.993	0.000
LZ2	0.1872	0.47809	-0.01677	0.41242	-0.07643	0.04288	-0.555	0.580

LZ3	1.1899	1.03358	0.98602	0.98728	0.84320	1.12884	13.621	0.000

SD=standard deviation

Dif M= difference of M $_{(peripheral\ zone\text{-}MZ2)}$, Dif SD= difference of SD $_{(peripheral\ zone\text{-}MZ2)}$

Table 7 ANOVA analysis of 4 annular regions in each group

Group	Zone	Mean	SD	95% Confidence Interval for Mean		F	P	linear F	linear P
				Lower Bound	Upper Bound				
(0.5,5] D	CAR1	0.0317	0.05492	-0.026	0.0893	2.514	0.088	6.806	0.017
	CAR2	0.015	0.19947	-0.1943	0.2243				
	CAR3	-0.17	0.36775	-0.5559	0.2159				
	CAR4	-0.3933	0.44473	-0.8601	0.0734				
(-0.5,0.5] D	CAR1	0.0054	0.06015	-0.0189	0.0297	17.682	0	48.958	0
	CAR2	-0.025	0.11745	-0.0724	0.0224				
	CAR3	-0.1465	0.18284	-0.2204	-0.0727				
	CAR4	-0.3158	0.27238	-0.4258	-0.2058				
(-2, -0.5] D	CAR1	0.0466	0.14274	-0.0155	0.0778	1.412	0.239	1.004	0.317
	CAR2	0.0912	0.21551	-0.0441	0.1383				
	CAR3	0.0624	0.25177	-0.0074	0.1174				
	CAR4	0.0176	0.30318	-0.0486	0.0838				
(-4, -2] D	CAR1	0.071	0.11839	-0.0448	0.0972	7.608	0	22.173	0
	CAR2	0.1512	0.19491	-0.1081	0.1943				
	CAR3	0.1796	0.26161	-0.1218	0.2375				
	CAR4	0.2552	0.35521	-0.1766	0.3337				
(-6, -4] D	CAR1	0.1072	0.15301	-0.0764	0.1381	21.53	0	63.962	0
	CAR2	0.2162	0.2374	-0.1683	0.264				
	CAR3	0.2935	0.285	-0.2361	0.3509				
	CAR4	0.4265	0.40498	-0.3449	0.5081				
(-12, -6] D	CAR1	0.0625	0.15274	-0.0404	0.0846	81.272	0	239.258	0
	CAR2	0.1775	0.24585	-0.142	0.2131				
	CAR3	0.3114	0.30269	-0.2676	0.3552				
	CAR4	0.5156	0.41387	-0.4558	0.5755				

Table 8 ANOVA linear terms of 4 annular regions between 6 groups

group	ANOVA		ANOVA linear term	
	F	P	F	P
CAR1	3.025	0.011	2.460	0.117
CAR2	6.920	0.000	10.547	0.001
CAR3	22.136	0.000	39.728	0.000
CAR4	41.335	0.000	71.826	0.000

Table 9 ANOVA analysis of four axisymmetric regions DAI in groups

group	axisymmetric zone	Mean	SD	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
(-0.5, 0.5] D	Up-down	0.287	0.1946	0.2084	0.3656	0.1	1
	S-I	0.3522	0.29127	0.2346	0.4699	0.09	1.52
	Tu-Td	0.2164	0.13241	0.1629	0.2698	0.07	0.57
	Nu-Nd	0.2168	0.11815	0.1691	0.2646	0.06	0.47
(-2, -0.5] D	Up-down	0.3167	0.19498	0.2742	0.3593	0.07	1.03
	S-I	0.4044	0.2774	0.3438	0.4649	0.06	1.39
	Tu-Td	0.2257	0.16323	0.1901	0.2614	0.03	1
	Nu-Nd	0.2175	0.11657	0.1921	0.243	0.05	0.64
(-4, -2] D	Up-down	0.445	0.37665	0.3617	0.5283	0.08	2.2
	S-I	0.575	0.53101	0.4576	0.6925	0.07	3.04
	Tu-Td	0.2843	0.22614	0.2343	0.3343	0.05	1.01
	Nu-Nd	0.3261	0.25837	0.269	0.3833	0.05	1.66
(-6, -4] D	Up-down	0.5129	0.30564	0.4513	0.5745	0.16	1.64
	S-I	0.6462	0.44296	0.557	0.7355	0.13	2.1
	Tu-Td	0.3166	0.19316	0.2776	0.3555	0.06	1.21
	Nu-Nd	0.424	0.27257	0.369	0.4789	0.08	1.4
(-12, -6] D	Up-down	0.526	0.35715	0.4744	0.5777	0.08	2.28
	S-I	0.6554	0.49023	0.5845	0.7263	0.08	3.06
	Tu-Td	0.3366	0.22522	0.304	0.3692	0.05	1.69
	Nu-Nd	0.4373	0.32173	0.3907	0.4838	0.05	1.81
ANOVA Linear	Up-down	F=8.731 P=0.000					
	S-I	F=6.709 P=0.000					
	Tu-Td	F=5.527 P=0.000					
	Nu-Nd	F=13.448 P=0.000					

Table 10 Paired t-test between axisymmetric and centrosymmetric DAI in S-I

group	Axisymmetric DAI		Centrosymmetric DAI		dif M	dif SD	95% Confidence Interval of the Difference		t	p
	Mean	SD	Mean	SD			Lower	Upper		
(-0.5,0.5] D	0.3527	0.29164	0.3700	0.28778	0.01731	0.02662	0.02806	0.00656	-3.316	0.003
(-2, -0.5] D	0.4043	0.27705	0.4458	0.27730	0.04145	0.08297	0.05956	0.02333	-4.551	0.000
(-4, -2] D	0.5752	0.53129	0.6178	0.52020	0.04259	0.08063	0.06042	0.02476	-4.754	0.000
(-6, -4] D	0.6469	0.44296	0.7007	0.45115	0.05381	0.16949	0.08797	0.01966	-3.127	0.002
(-12, -6] D	0.6558	0.49030	0.6927	0.47918	0.03694	0.08791	0.04965	0.02422	-5.730	0.000
ANOVA linear F	18.078		20.846							
ANOVA linear P	0.000		0.000							

Dif M= difference of M (Axisymmetric DAI -Centrosymmetric DAI), Dif SD= difference of SD (Axisymmetric DAI - Centrosymmetric DAI)

Two-dimensional peripheral maps of astigmatism and coma (J0, J45, and COMA-T, COMA-S) for each central refractive group.

1.J0

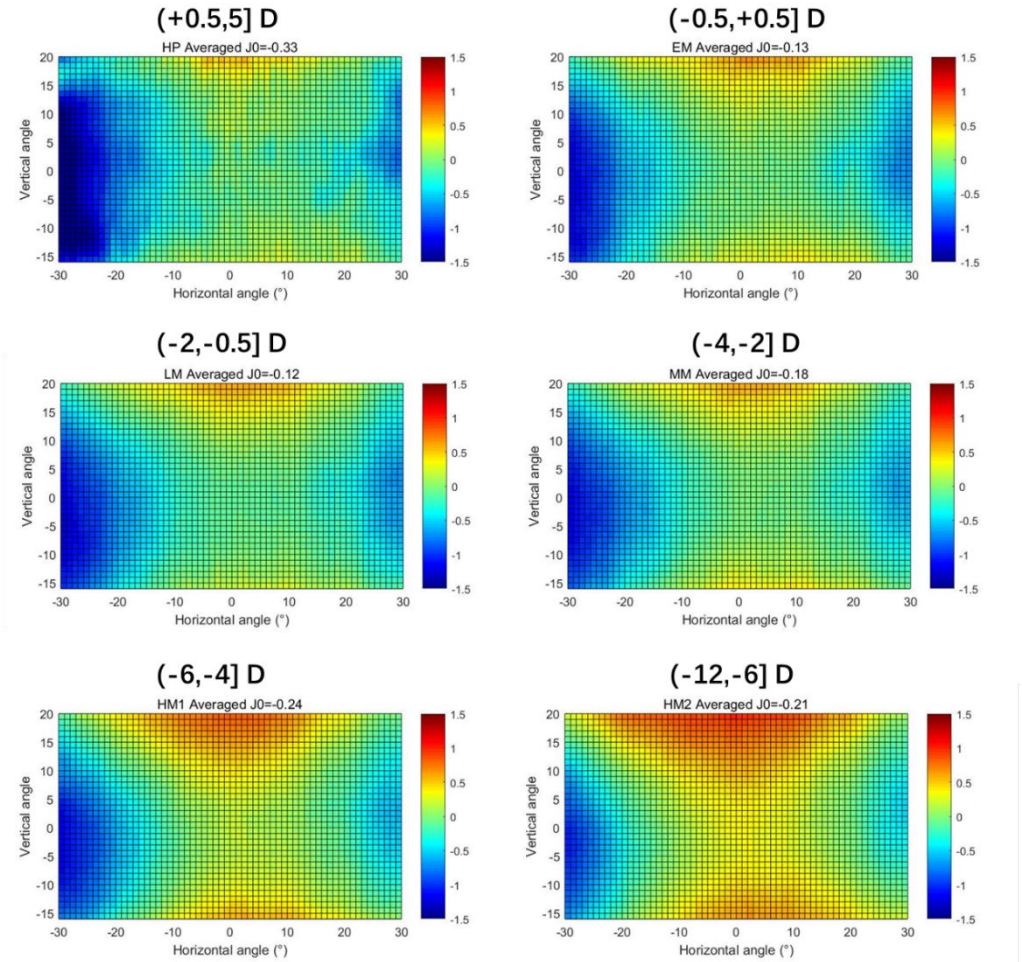

Figure 1. Distribution of J0 in different groups,
the color bar gives the diopter range from -1.5 to 1.5 D for each map.

We can see that **1)** J0 is negative in the horizontal meridian and positive in the vertical direction, and **2)** with the progress of central myopia, the value horizontal meridian and vertical direction all increases gradually, in other words, more positive, **3)** as the eccentricity increases, the absolute value increases, too, **4)** especially, J0 in temporal retina is more negative than nasal retina and values in superior retina is more positive than inferior retina.

2.J45

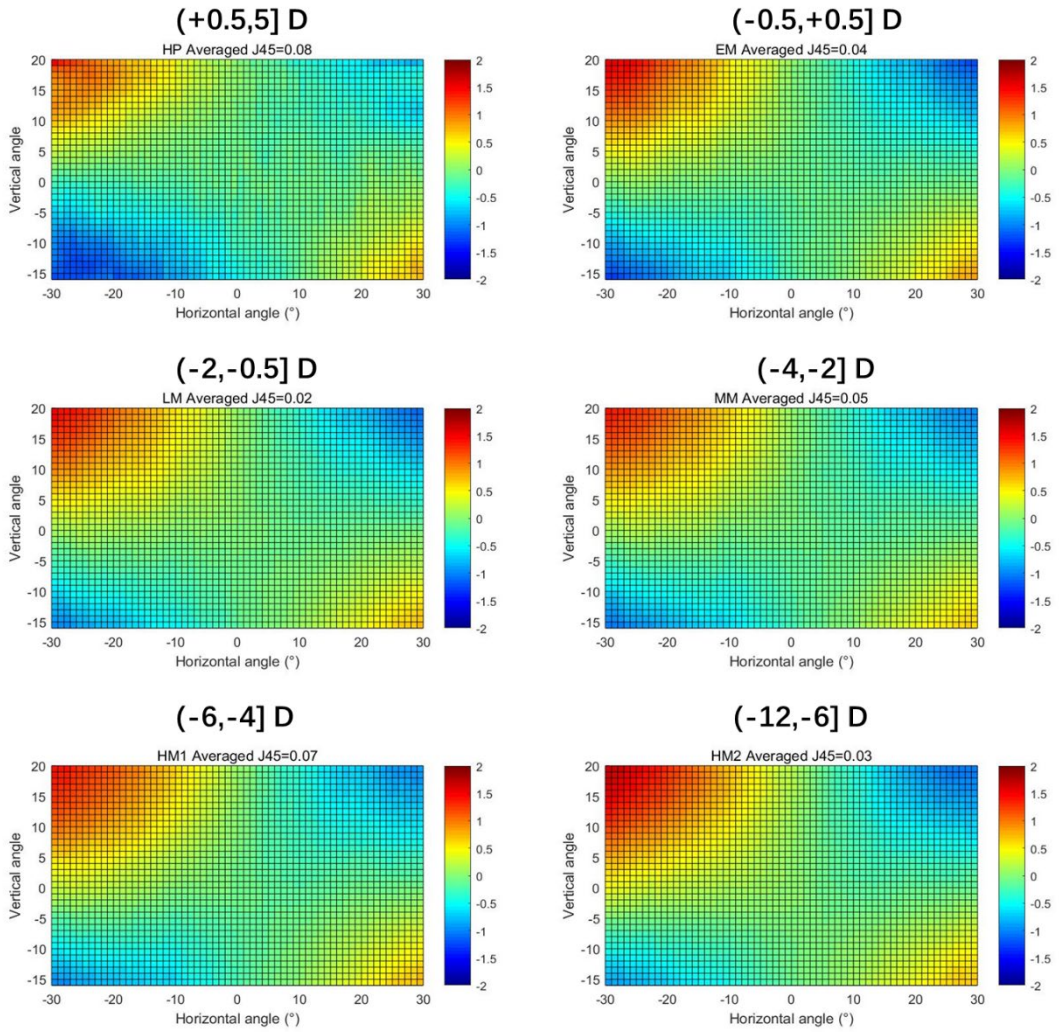

Figure 2. Distribution of J45 in different groups,
the color bar gives the diopter range from -2 to 2 D for each map.

From figure 2, We find that **1)** J45 with axes at 45° (from inferior temporal to superior nasal retina) is negative and positive with axes at 135°(from inferior nasal to superior temporal retina), and **2)** with the progress of central myopia, the absolute value increases with axes 135° gradually, **3)** as the eccentricity increases, the absolute value increases, too, **4)** especially, J45 in superior temporal retina is more positive than inferior nasal retina with axes 135°, while values in axes 45° seems no such pattern, values in inferior temporal is more negative than superior nasal retina in group (0.5,5)D, and almost similar in group (-0.5,+0.5)D, and last, in myopia groups, values in superior nasal retina is more negative than inferior temporal retina.

3. Tangential COMA(COMA-T)

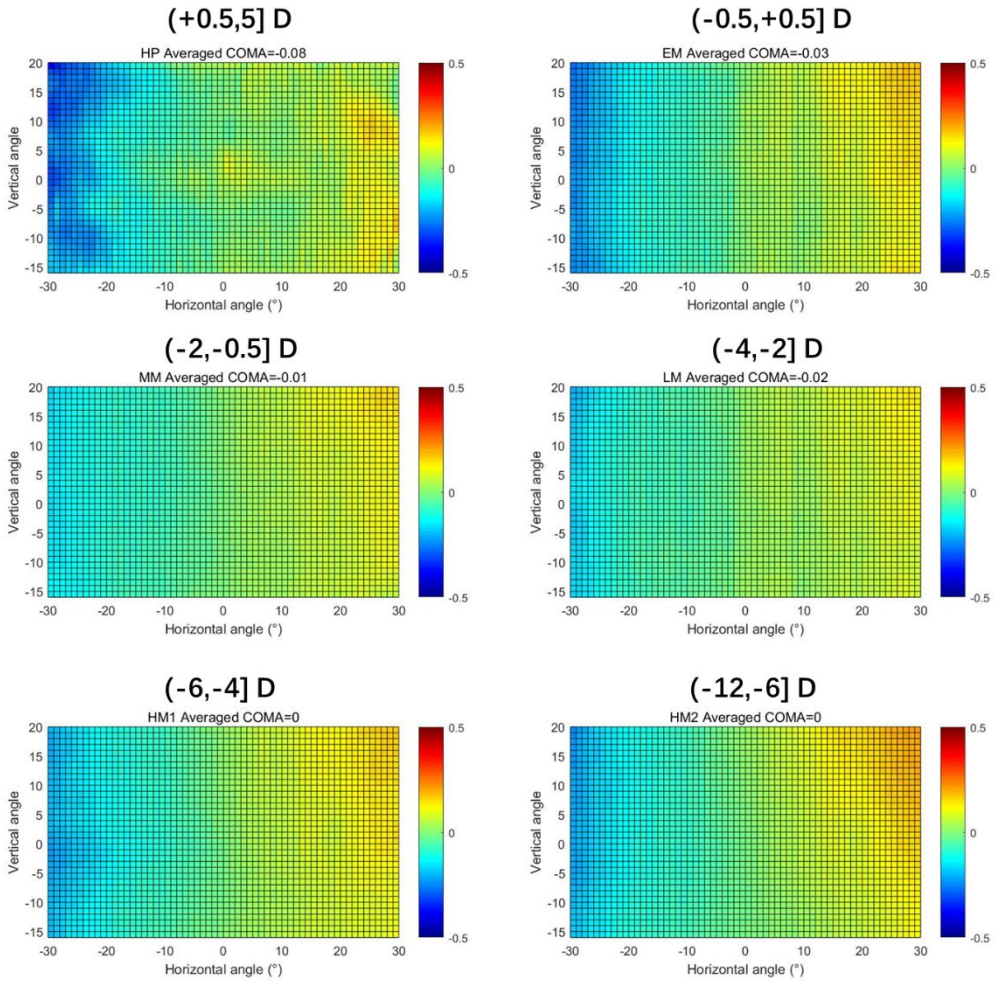

Figure 3. showed the distribution of COMA-T in different groups, the color bar gives the scale range from -0.5 to 0.5 μm for each map.

We can see that 1) COMA-T is negative in temporal retina but positive in nasal retina, and almost zero in central vertical meridian, 2) with the progress of central myopia, the value in temporal retina represents more negative and more positive in nasal retina, 3) as the eccentricity increases, the absolute value increases in both temporal and nasal retina.

4.Sagittal COMA(COMA-S)

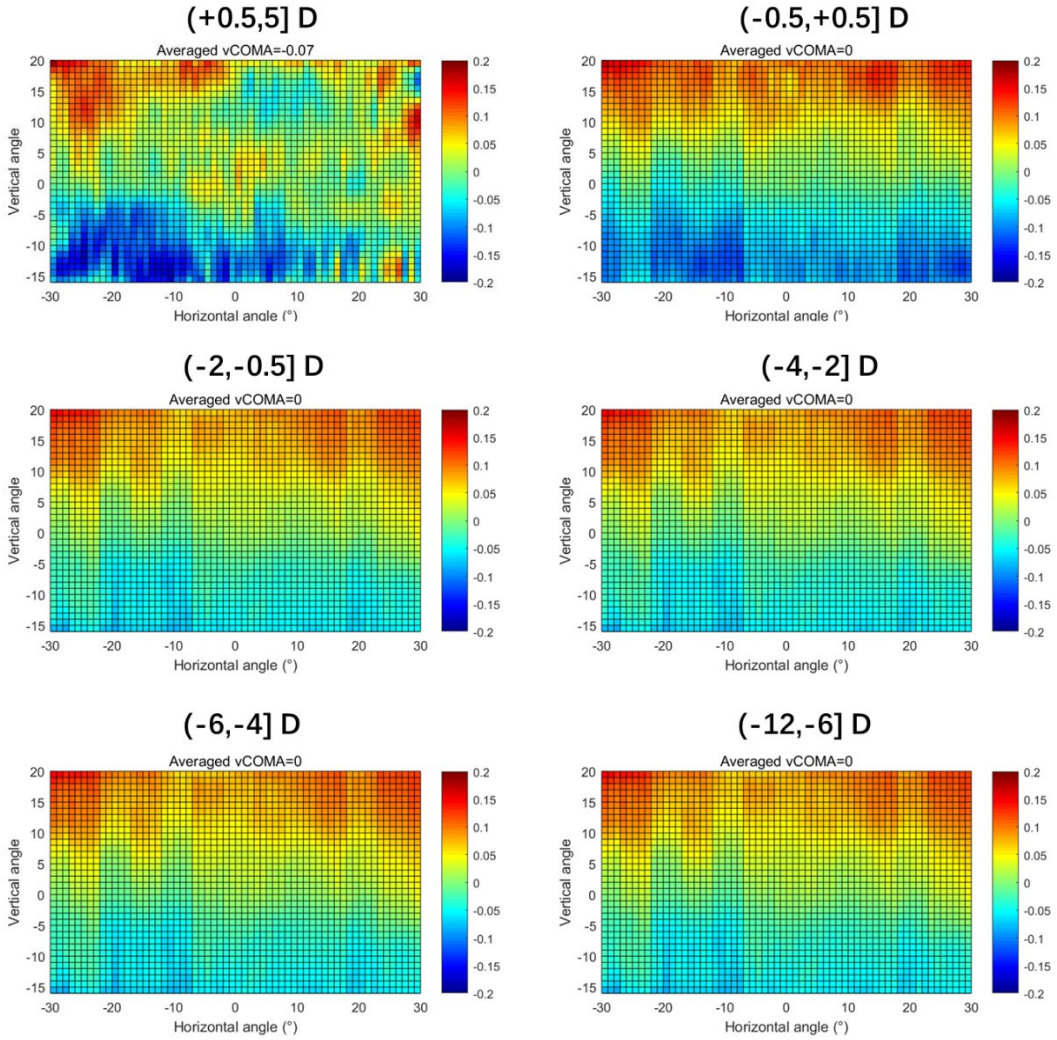

Figure 4. Distribution of COMA-S in different groups,
the color bar gives the scale range from -0.2 to 0.2 μm for each map.

We can see that 1) COMA-S is negative in inferior retina but positive in superior retina, and almost zero in horizontal meridian, 2) with the progress of central myopia, the values change not obviously in superior retina, while for inferior retina, it is more negative in hyperopic and emmetropic groups than myopic groups.