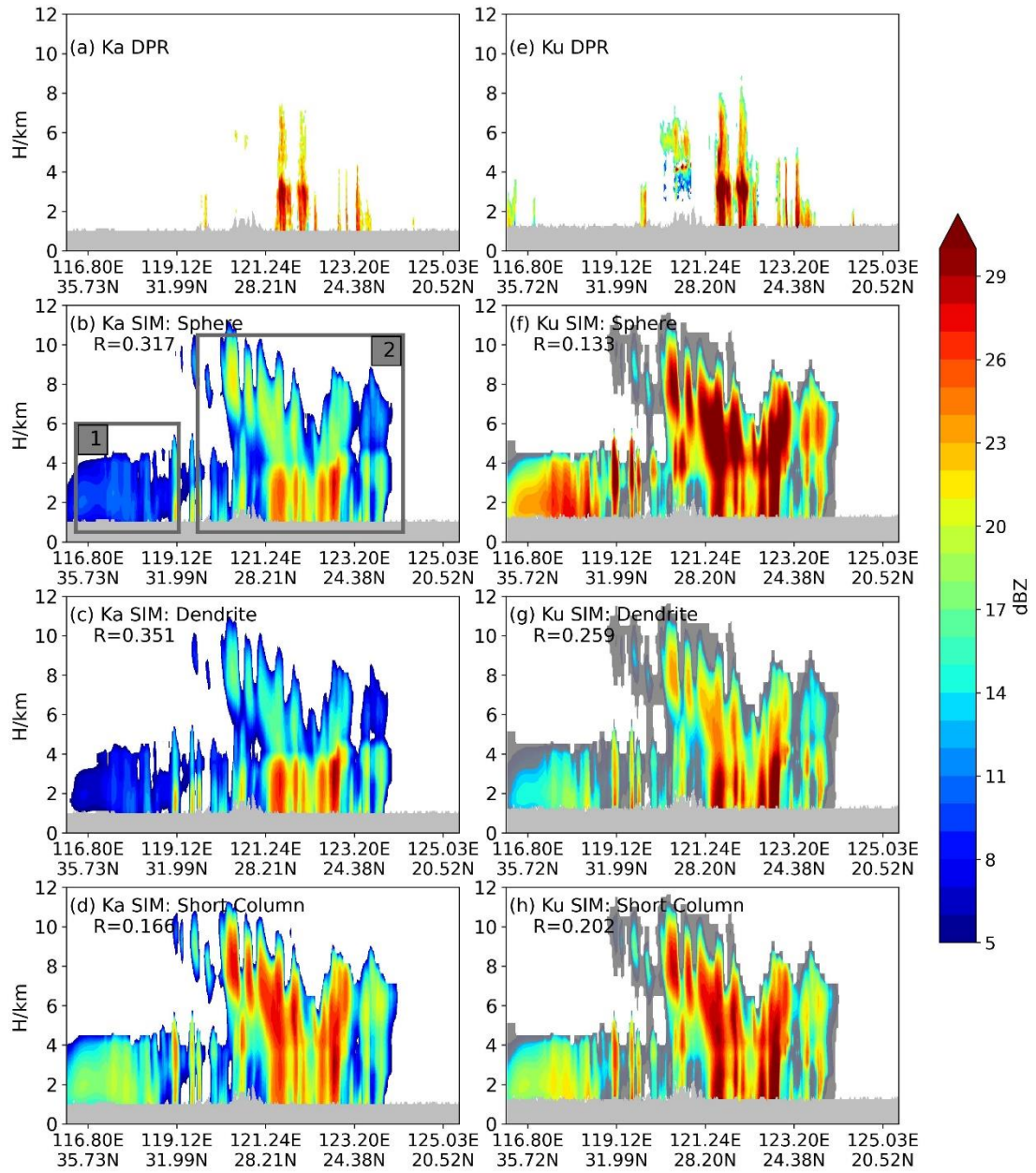
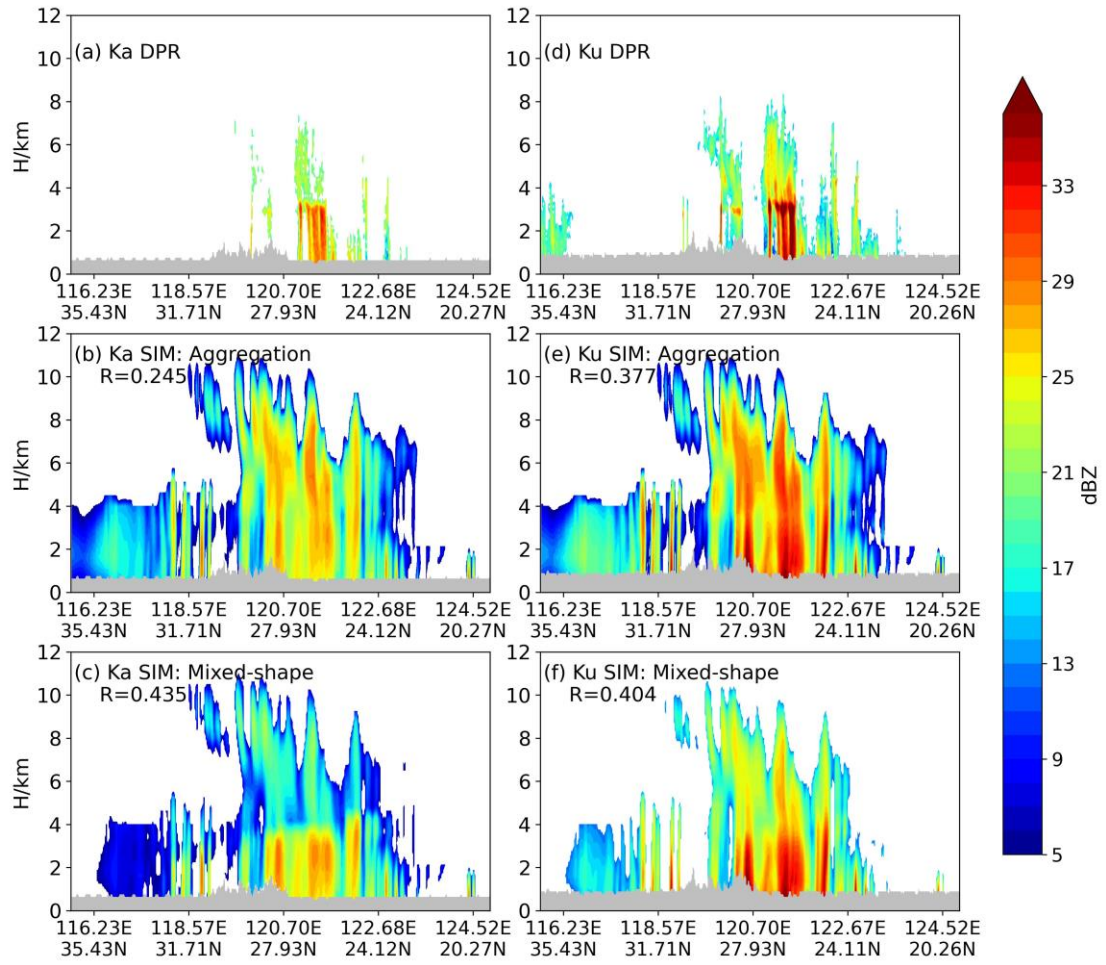


**Figure S1.** The same as Figure 3, and the scatters show ground-based observed weather type.

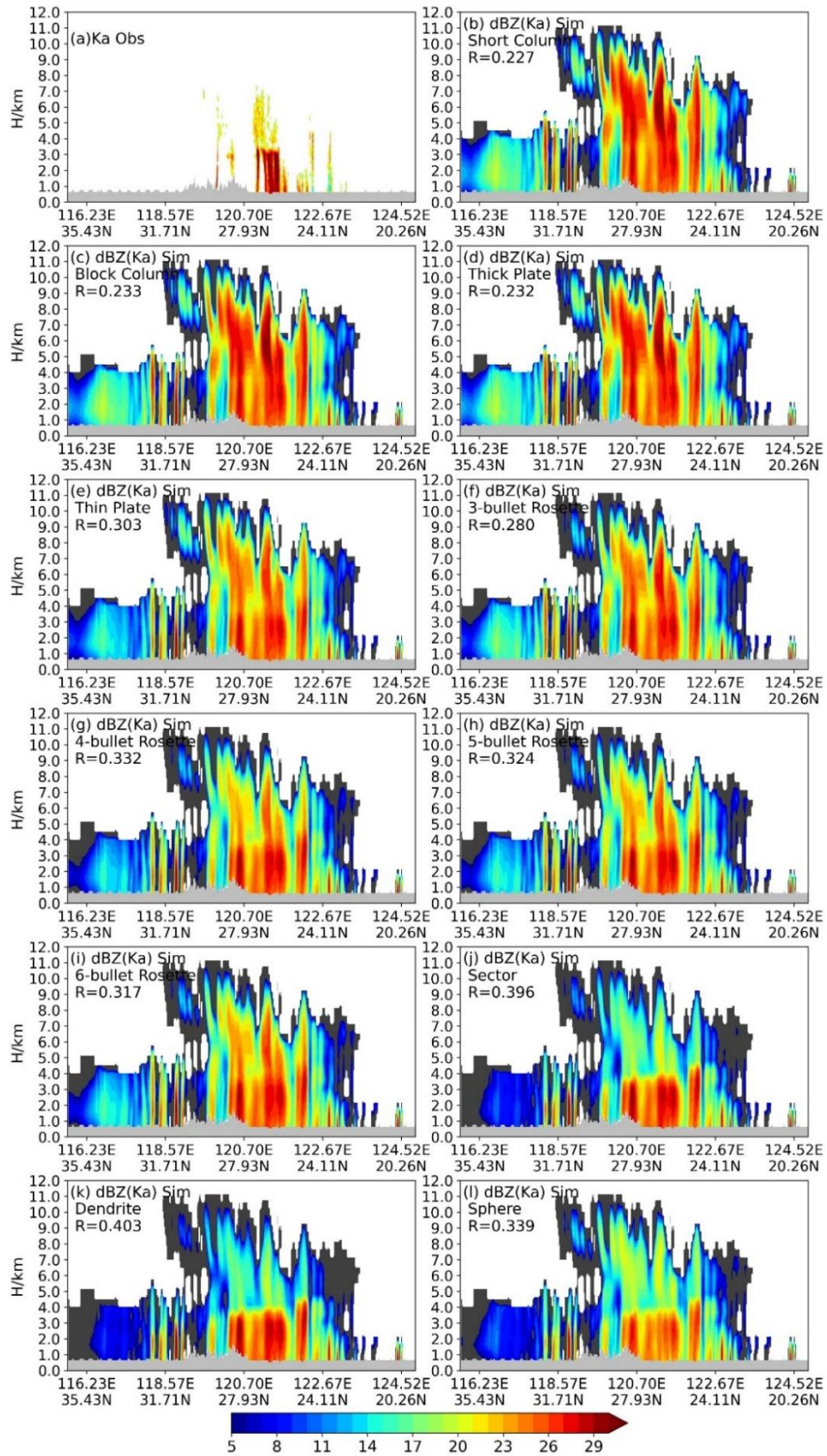


**Figure S2.** Same as Figure 5, but along the gray dashed line on the north side in Figure S1, and the darker gray area show reflectivity between 5 dBZ and 12 dBZ only for Ku-band.

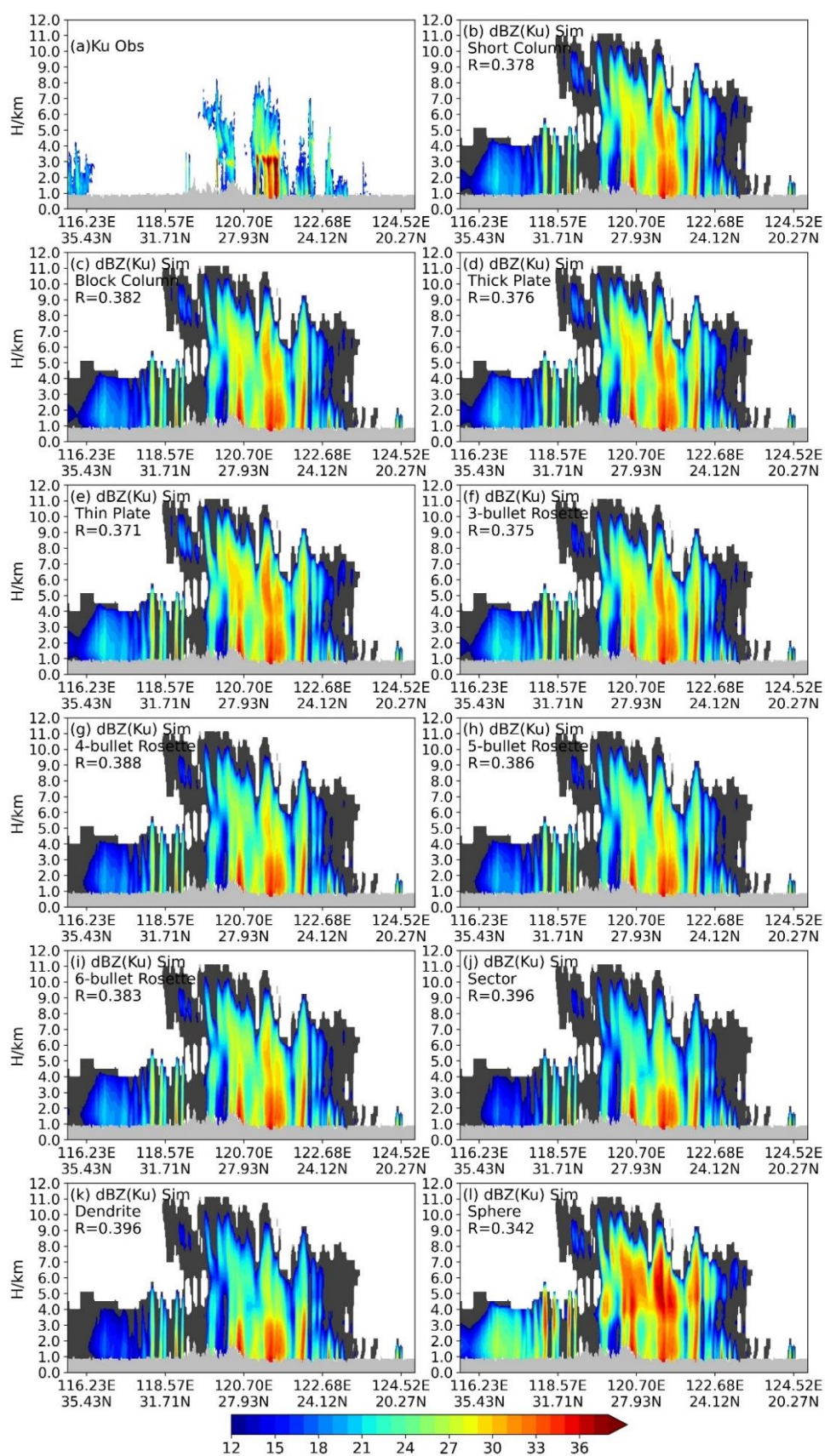


**Figure S3.** Same as Figure 5, but simulations are under the aggregation and the mixed-shape assumptions.





**Figure S4.** The cross sections of Ka-band reflectivity along the red line in Figure 3. (a) GPM DPR observation, (b-l) simulations using eleven shape assumptions separately, as their titles show. R means the correlation coefficient between simulation and observation for this cross section.



**Figure S5.** Same as Figure S4, but at Ku-band.

**Table S1.** Numbers of dBZ(2 km) within six ranges for observations and simulations under eleven shape assumptions.

dBZ Ranges		[5, 17)	[17, 20)	[20, 23)	[23, 25)	[25, 27)	[27, $\infty$ )
Observation		53	208	380	206	247	380
Simulation	Short Column	1409	457	751	642	868	351
	Block Column	1407	454	737	644	856	381
	Thick Plate	1409	462	750	645	877	335
	Thin Plate	1408	453	735	642	851	390
	3-bullet Rosette	1398	449	721	642	854	416
	4-bullet Rosette	1392	443	705	628	762	552
	5-bullet Rosette	1391	445	708	626	782	529
	6-bullet Rosette	1392	448	712	621	796	512
	Sector	1384	444	687	625	723	619
	Dendrite	1383	444	684	624	714	633
	Sphere	1431	466	835	780	832	133