Table 1: Speedup of UPCG solver GPGPU simulations relative to CPU simulations for the same UPCG preconditioner. Speedup values in **bold** typ[illegible] dicate simulations that did not converge within 50 outer iterations with up to 1,000 inner iterations.

	Speedup		
Columns × Rows × Layers	Jacobi	MILU0	GLSPOLY
200 × 200 × 1	1.513	0.990	2.972
500 × 500 × 1	9.536	1.699	16.315
1000 × 1000 × 1	18.871	1.404	26.786
2000 × 2000 × 1	24.453	1.938	33.615
4000 × 4000 × 1	**26.918**	1.936	35.154
200 × 200 × 2	3.234	1.517	6.146
500 × 500 × 2	13.420	1.742	18.665
1000 × 1000 × 2	19.877	1.322	25.420
2000 × 2000 × 2	23.871	1.861	29.516
200 × 200 × 3	5.234	1.517	9.231
500 × 500 × 3	15.848	1.769	20.843
1000 × 1000 × 3	22.444	1.265	27.658
2000 × 2000 × 3	25.171	1.870	30.760
200 × 200 × 10	11.552	1.715	17.564
500 × 500 × 10	20.806	1.833	25.826
1000 × 1000 × 10	24.981	1.889	29.888

Table 2: Speedup of UPCG solver GPGPU simulations relative to simulations performed using the PCG solver with the modified incomplete Cholesky (MIC) preconditioner. CPU times for the PCG solver with the MIC preconditioner are in seconds. Speedup values in **bold** type indicate simulations that did not converge within 50 outer iterations with up to 1,000 inner iterations.

	CPU Time	Speedup		
Columns × Rows × Layers	MIC	Jacobi	MILU0	GLSPOLY
200 × 200 × 1	0.6826875	0.487	1.101	0.841
500 × 500 × 1	10.27194	1.675	1.543	2.294
1000 × 1000 × 1	75.64222	3.241	1.239	2.957
2000 × 2000 × 1	536.2608	1.891	1.438	2.754
4000 × 4000 × 1	3891.683	**1.357**	1.696	2.839
200 × 200 × 2	1.683125	1.081	1.330	1.633
500 × 500 × 2	24.66269	3.156	1.534	3.497
1000 × 1000 × 2	175.7042	4.111	1.156	3.532
2000 × 2000 × 2	1058.137	1.967	1.590	2.837
200 × 200 × 3	3.040594	1.875	1.487	2.349
500 × 500 × 3	38.59184	3.908	1.530	4.075
1000 × 1000 × 3	315.6253	5.105	1.130	4.428
2000 × 2000 × 3	1962.365	2.560	1.634	3.562
200 × 200 × 10	18.50184	5.344	1.524	4.921
500 × 500 × 10	218.9169	8.683	1.598	7.643
1000 × 1000 × 10	1621.158	9.299	1.621	8.633

Table 3: Speedup of UPCG solver OpenMP simulations, with 4, 7, and 14 threads, relative to simulations performed using the PCG solver with the modified incomplete Cholesky (MIC) preconditioner. Speedup values in **bold** type indicate simulations that did not converge within 50 outer iterations with up to 1,000 inner iterations.

	Speedup – 4 / 7 /14 Threads		
Columns × Rows × Layers	Jacobi	MILU0	GLSPOLY
200 × 200 × 1	1.166/0.614/0.614	2.446/1.511/1.423	1.185/0.779/1.241
500 × 500 × 1	0.447/0.332/0.357	1.637/1.197/1.164	0.571/0.364/0.535
1000 × 1000 × 1	0.409/0.419/0.359	1.488/1.463/1.194	0.313/0.323/0.309
2000 × 2000 × 1	0.185/0.182/0.151	1.691/1.622/1.286	0.225/0.272/0.198
4000 × 4000 × 1	**0.111/0.099/0.108**	1.619/1.523/1.670	0.222/0.241/0.245
200 × 200 × 2	1.113/1.090/1.004	1.954/2.258/1.567	1.171/1.147/1.626
500 × 500 × 2	0.536/0.567/0.460	1.500/1.521/1.151	0.525/0.625/0.556
1000 × 1000 × 2	0.527/0.472/0.411	1.543/1.474/1.227	0.396/0.295/0.335
2000 × 2000 × 2	0.211/0.198/0.168	1.401/1.693/1.418	0.237/0.313/0.244
200 × 200 × 3	0.872/1.067/0.897	1.433/1.901/1.300	0.827/1.080/1.346
500 × 500 × 3	0.577/0.482/0.527	1.444/1.417/1.328	0.548/0.579/0.598
1000 × 1000 × 3	0.593/0.562/0.479	1.519/1.590/1.377	0.389/0.340/0.385
2000 × 2000 × 3	0.245/0.246/0.215	1.746/1.478/1.544	0.313/0.286/0.295
200 × 200 × 10	1.066/1.059/1.215	1.503/1.574/1.426	0.858/0.899/1.186
500 × 500 × 10	0.970/1.014/1.019	1.563/1.604/1.400	0.780/0.799/0.913
1000 × 1000 × 10	0.835/0.968/0.928	1.720/1.734/1.651	0.815/0.798/0.914