



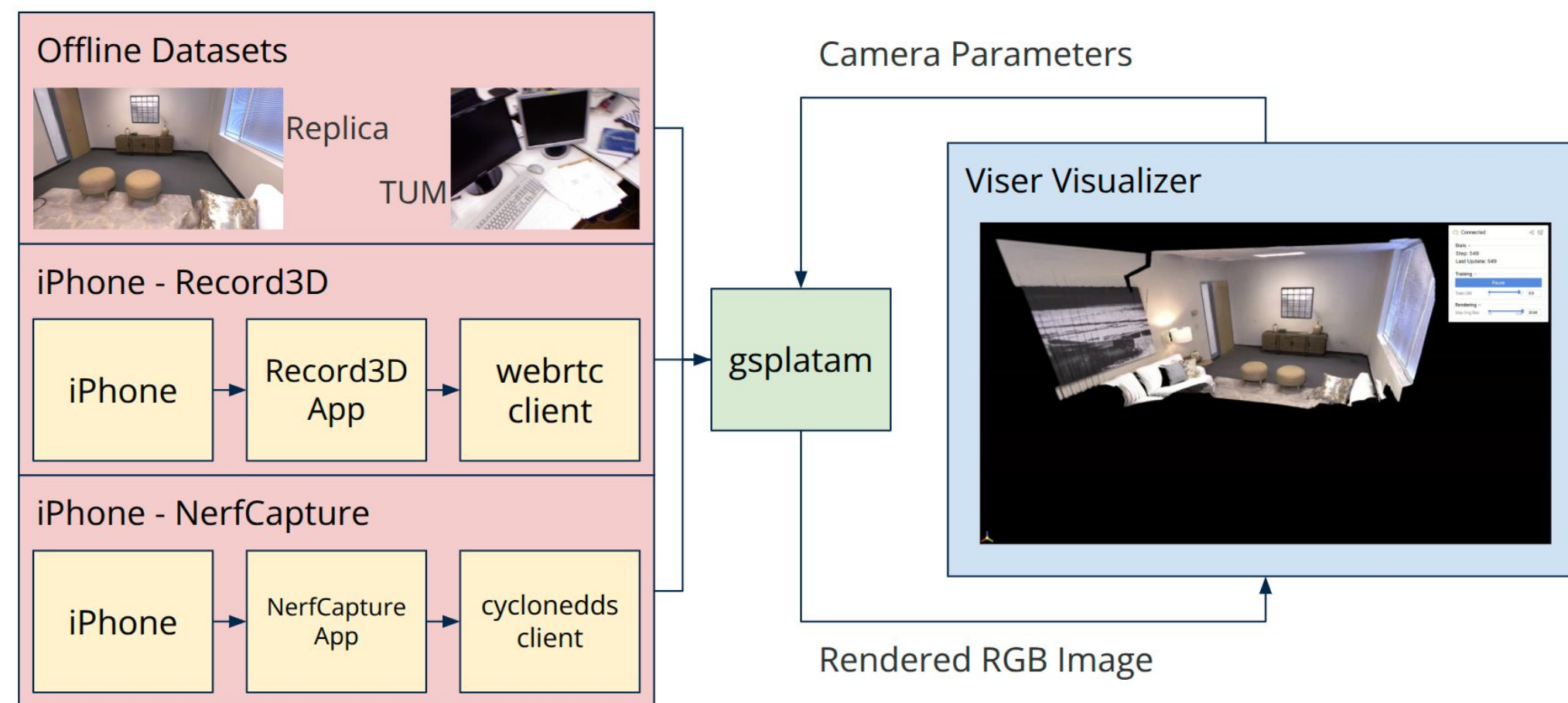
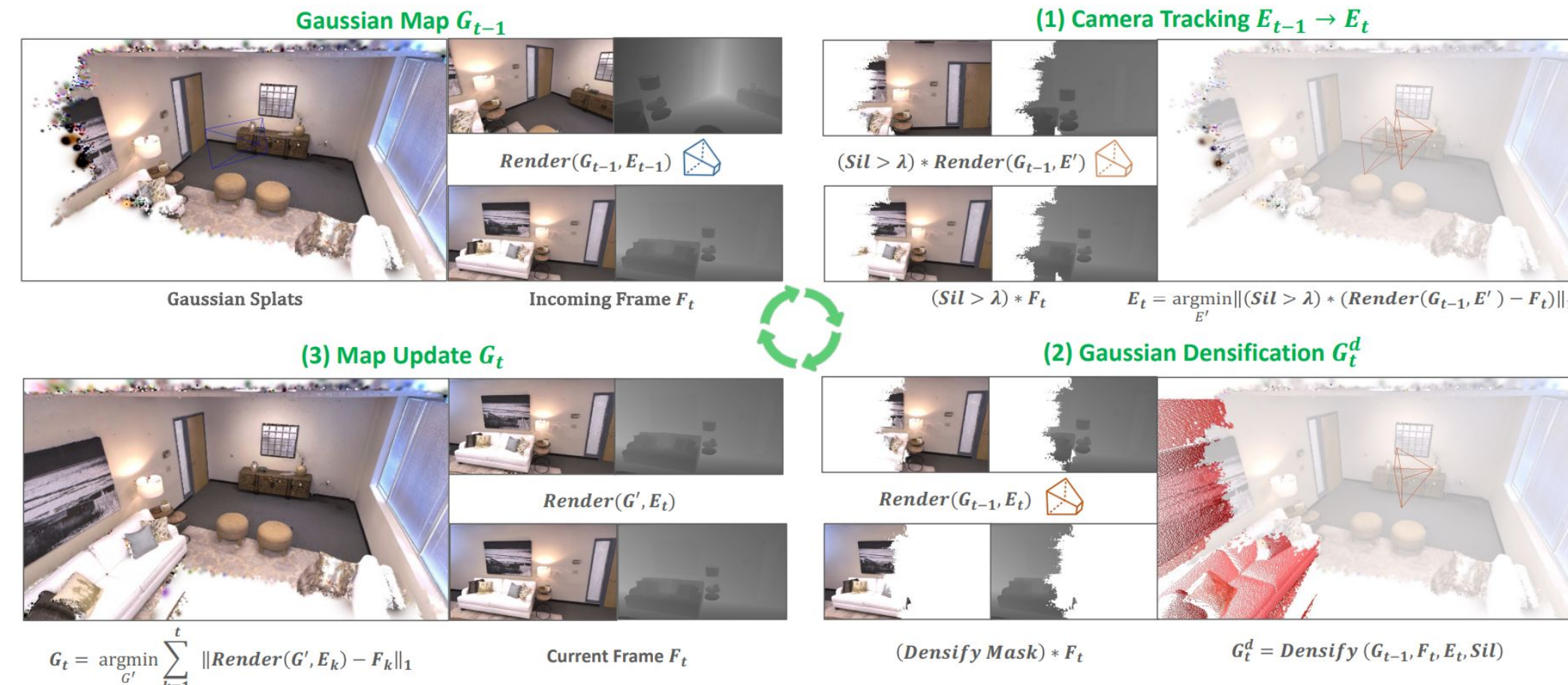
# gsplatam: Real-time Splat, Track, and Map with gsplat

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## Motivation: SplatAM [1]

- + High Quality Reconstruction
- + Simple
- Lack of Online Gaussian Visualization
- Slow
- 3D Gaussians Geometrically Inaccurate



## Interactive Visualization

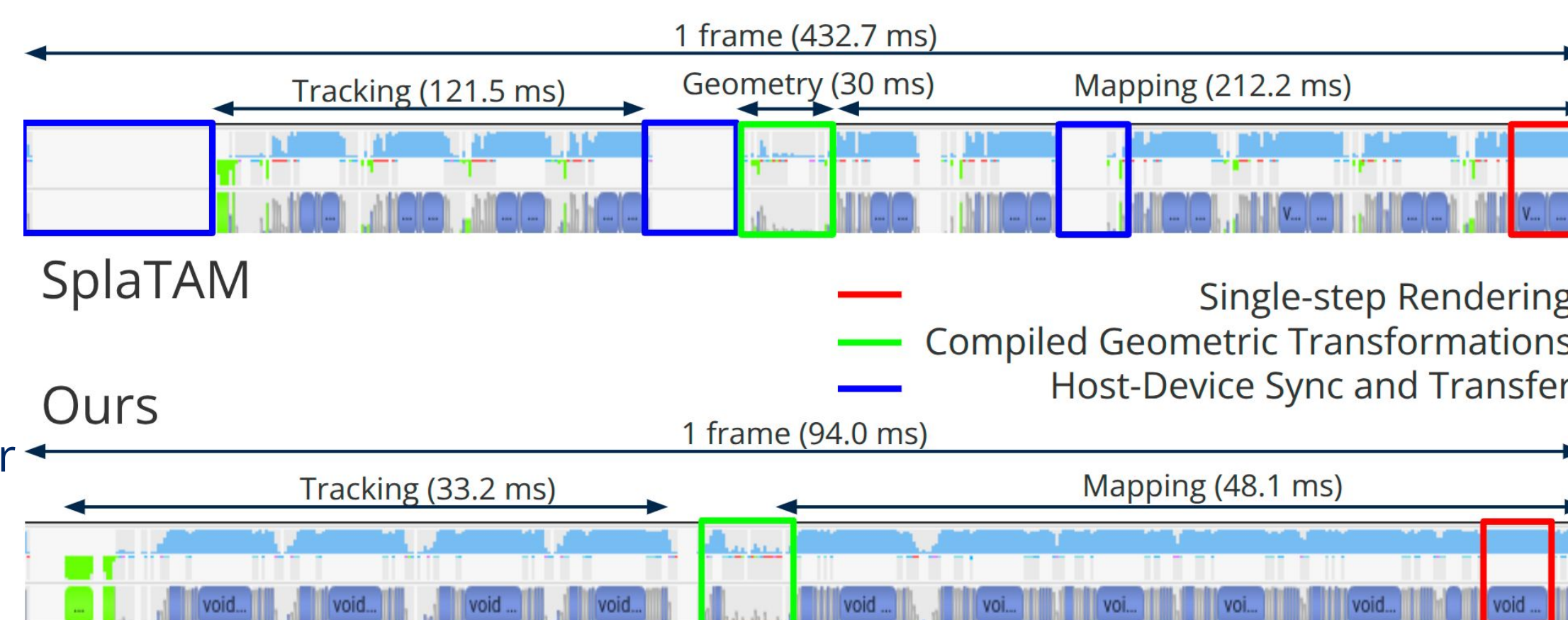
SplatAM provides point cloud visualization

We use viser to visualize rendered gaussians

We add a webRTC client for 15 fps mapping

## Runtime Optimization

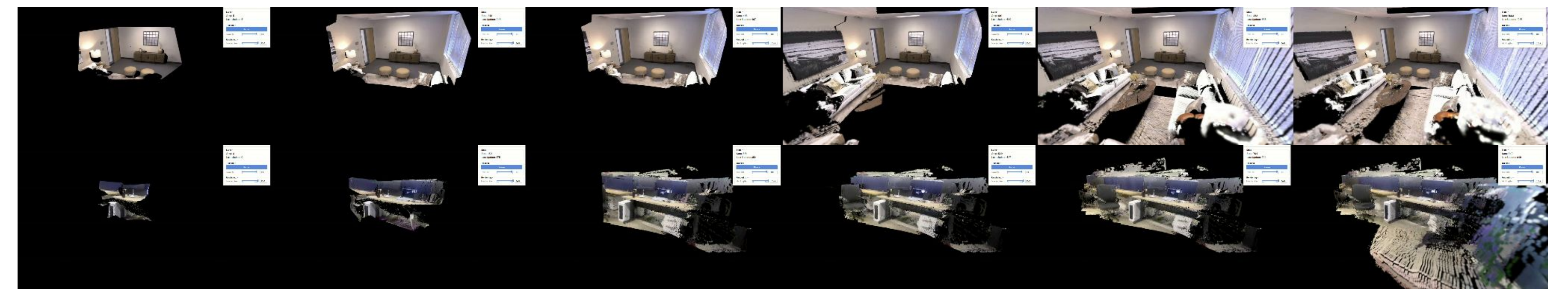
1. Single-step Rendering with Gsplat
2. Compiled Geometric Transformations
3. Remove Host-device Sync and Transfer
4. Decrease Number of Iterations



## Results: Replica Dataset

Setting	Methods	Track Time (s/frame) ↓	Map Time (s/frame) ↓	Total Time (s/frame) ↓	Num Gaussians ↓	ATE RMSE (cm) ↓	PSNR (db) ↑	Depth L1 (cm) ↓
base	reported	1.00	1.44	-	-	0.27	32.81	0.49
	reproduced	2.74	4.94	7.85	5,085,417	0.32	32.48	0.51
	ours	0.32	0.59	0.93	973,059	0.05	35.78	0.25
small	reported	0.19	0.33	-	-	0.39	-	-
	reproduced	0.27	0.45	0.84	931,214	0.52	29.29	0.83
	ours	0.08	0.14	0.24	1,101,708	0.28	30.44	0.55
tiny	reported	-	-	-	-	-	-	-
	reproduced	0.10	0.17	0.39	880,241	6.40	22.97	4.31
	ours	0.03	0.05	0.10	954,972	0.26	22.92	3.28

## Results: Rendered Gaussians



## Results: Comparison of Gaussians

Type	Covariance	Track Time (s/frame) ↓	Map Time (s/frame) ↓	Total Time (s/frame) ↓	Num Gaussians ↓	ATE RMSE (cm) ↓	PSNR (db) ↑	Depth L1 (cm) ↓
3D	Isotropic	0.03	0.05	0.10	984,531	0.26	23.17	2.58
3D	Anisotropic	0.03	0.05	0.10	954,972	0.26	22.92	3.28
2D	Isotropic	0.12	0.16	0.30	1,193,273	0.60	23.66	2.33
2D	Anisotropic	0.11	0.16	0.29	1,171,766	0.60	23.11	2.74