Semantic Reconstruction: Reconstruction of Semantically Segmented 3D Meshes via Volumetric Semantic Fusion

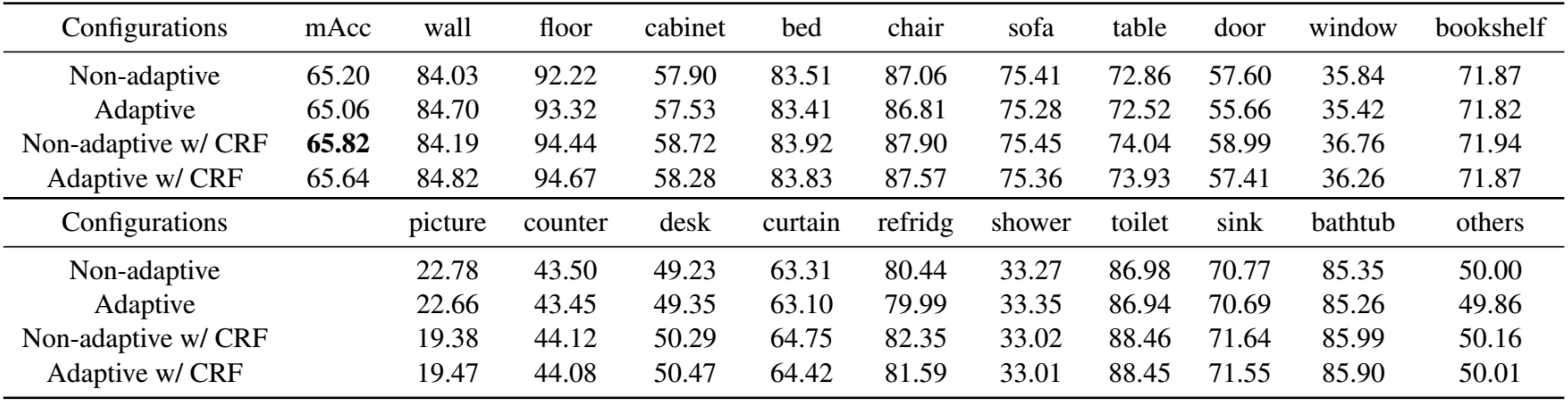
Supplementary Material

Junho Jeon, Jinwoong Jung, Jungeon Kim, Seungyong Lee
POSTECH

Contents

- mAcc and mIOU with Accuracy and IOU of each category
- Additional segmentation results
- Single-image segmentation vs. projected results of our 3D segmentation
- Scene modification results

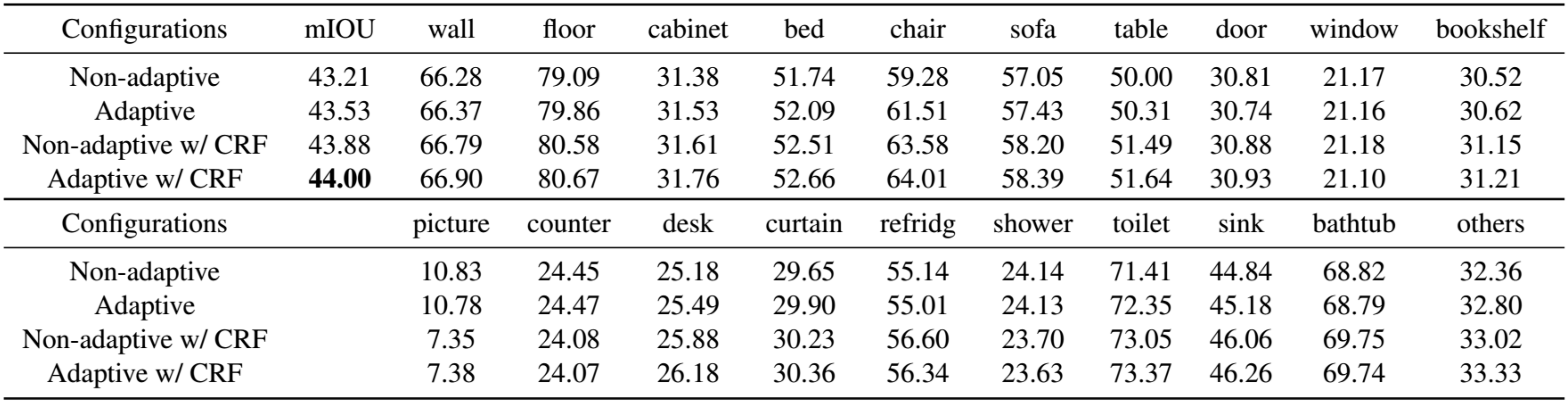
mAcc and Accuracy of each category



Configurations	mAcc	wall	floor	cabinet	bed	chair	sofa	table	door	window	bookshelf
Non-adaptive	65.20	84.03	92.22	57.90	83.51	87.06	75.41	72.86	57.60	35.84	71.87
Adaptive	65.06	84.70	93.32	57.53	83.41	86.81	75.28	72.52	55.66	35.42	71.82
Non-adaptive w/ CRF	**65.82**	84.19	94.44	58.72	83.92	87.90	75.45	74.04	58.99	36.76	71.94
Adaptive w/ CRF	65.64	84.82	94.67	58.28	83.83	87.57	75.36	73.93	57.41	36.26	71.87

Configurations		picture	counter	desk	curtain	refridg	shower	toilet	sink	bathtub	others
Non-adaptive		22.78	43.50	49.23	63.31	80.44	33.27	86.98	70.77	85.35	50.00
Adaptive		22.66	43.45	49.35	63.10	79.99	33.35	86.94	70.69	85.26	49.86
Non-adaptive w/ CRF		19.38	44.12	50.29	64.75	82.35	33.02	88.46	71.64	85.99	50.16
Adaptive w/ CRF		19.47	44.08	50.47	64.42	81.59	33.01	88.45	71.55	85.90	50.01

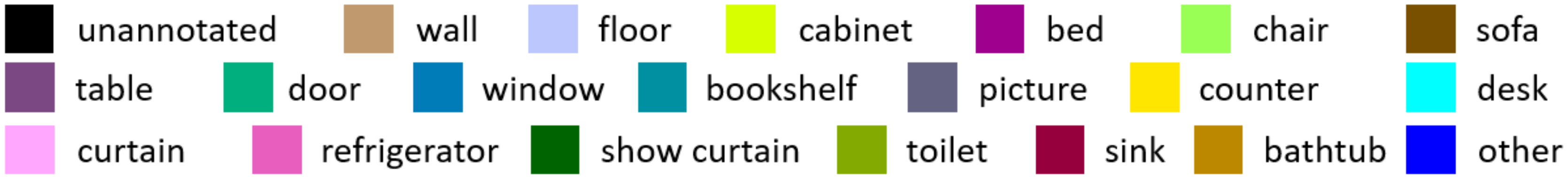
mIOU and IOU of each category



Configurations	mIOU	wall	floor	cabinet	bed	chair	sofa	table	door	window	bookshelf	picture	counter	desk	curtain	refridg	shower	toilet	sink	bathtub	others
Non-adaptive	43.21	66.28	79.09	31.38	51.74	59.28	57.05	50.00	30.81	21.17	30.52	10.83	24.45	25.18	29.65	55.14	24.14	71.41	44.84	68.82	32.36
Adaptive	43.53	66.37	79.86	31.53	52.09	61.51	57.43	50.31	30.74	21.16	30.62	10.78	24.47	25.49	29.90	55.01	24.13	72.35	45.18	68.79	32.80
Non-adaptive w/ CRF	43.88	66.79	80.58	31.61	52.51	63.58	58.20	51.49	30.88	21.18	31.15	7.35	24.08	25.88	30.23	56.60	23.70	73.05	46.06	69.75	33.02
Adaptive w/ CRF	**44.00**	66.90	80.67	31.76	52.66	64.01	58.39	51.64	30.93	21.10	31.21	7.38	24.07	26.18	30.36	56.34	23.63	73.37	46.26	69.74	33.33

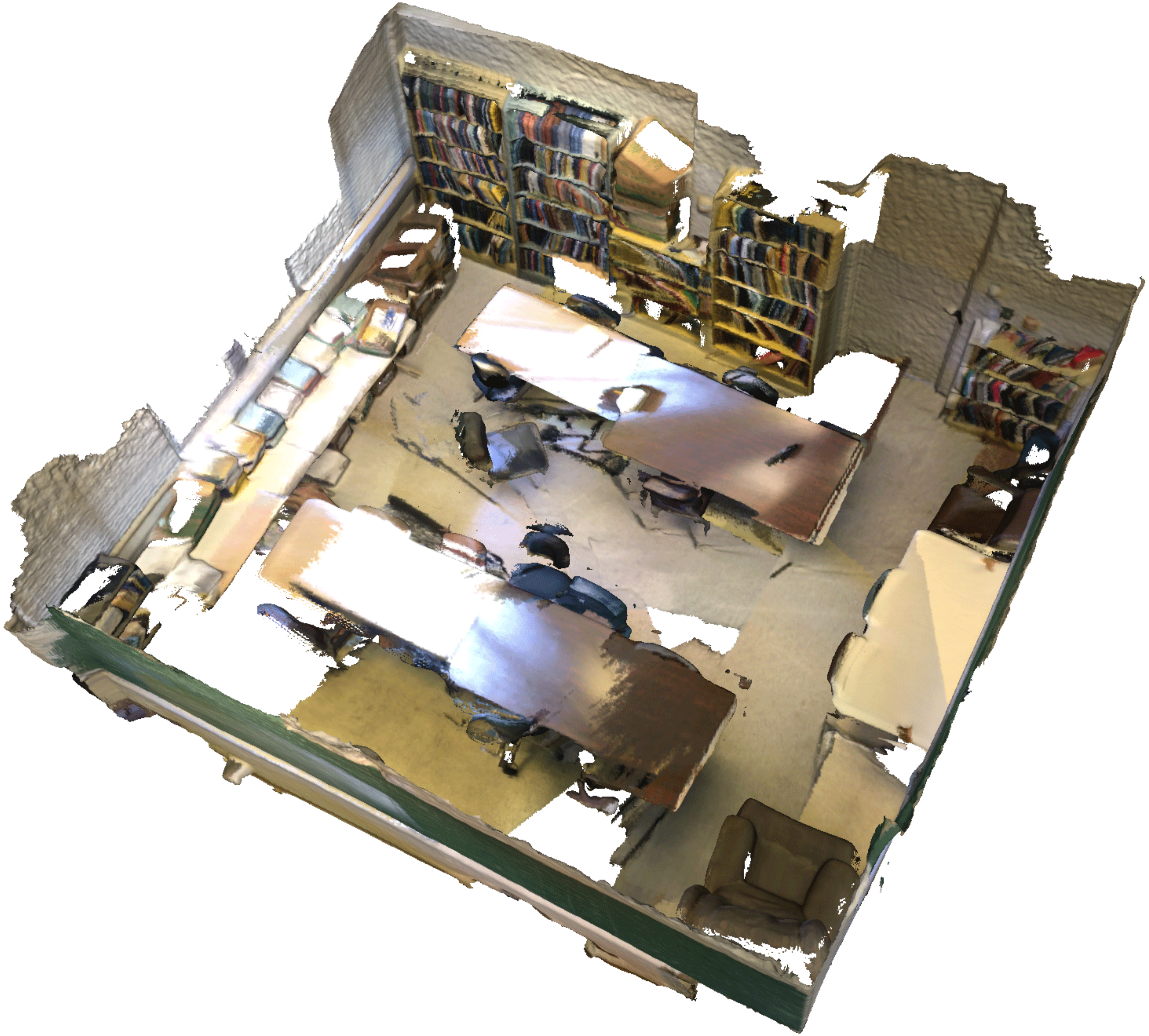
Additional Segmentation Results

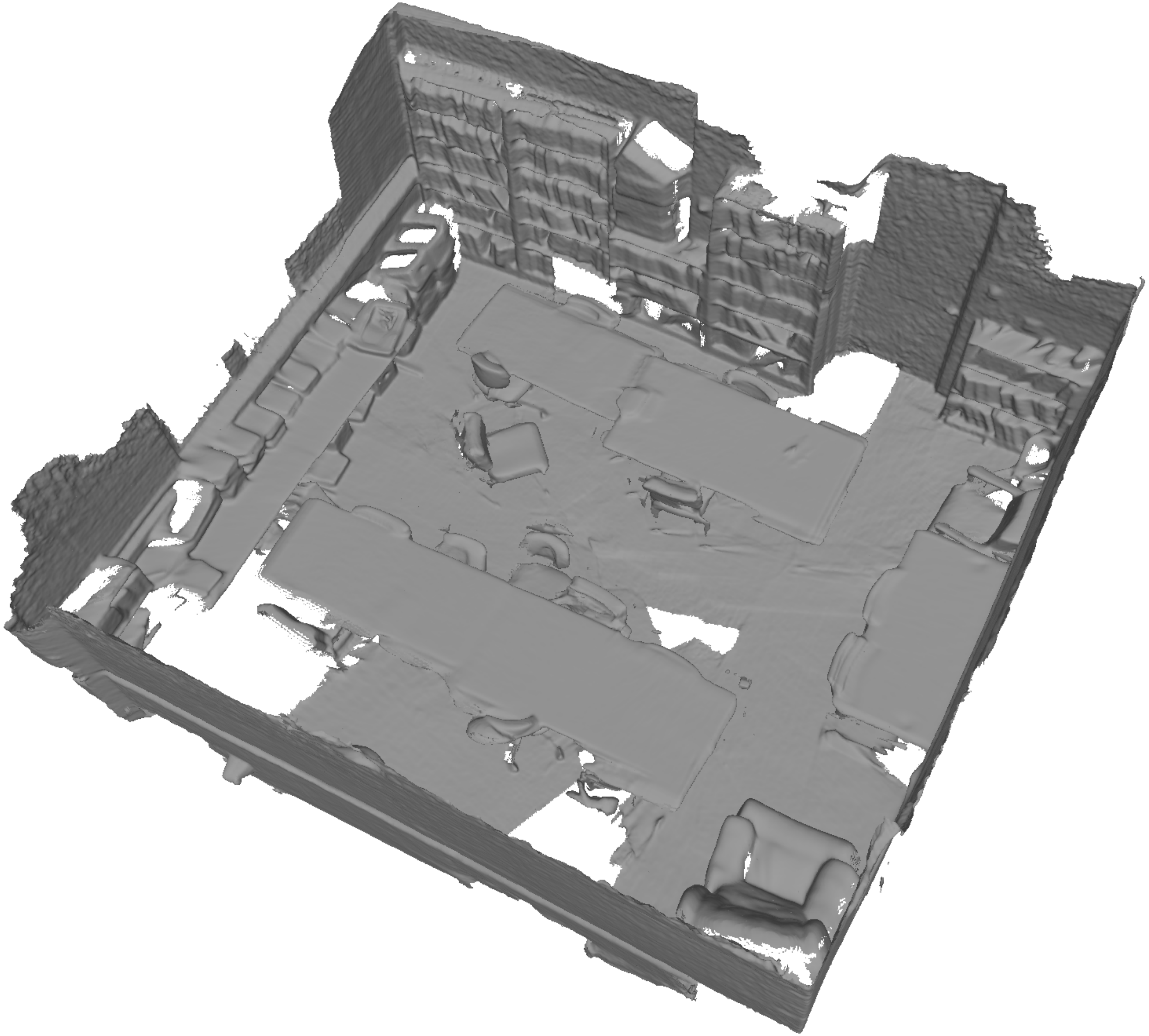
- Semantic reconstruction results for ours test scenes (ScanNet)
  - Input Scene (color)
  - Input Scene (shading)
  - Segmentation Result (w/ pseudo coloring)

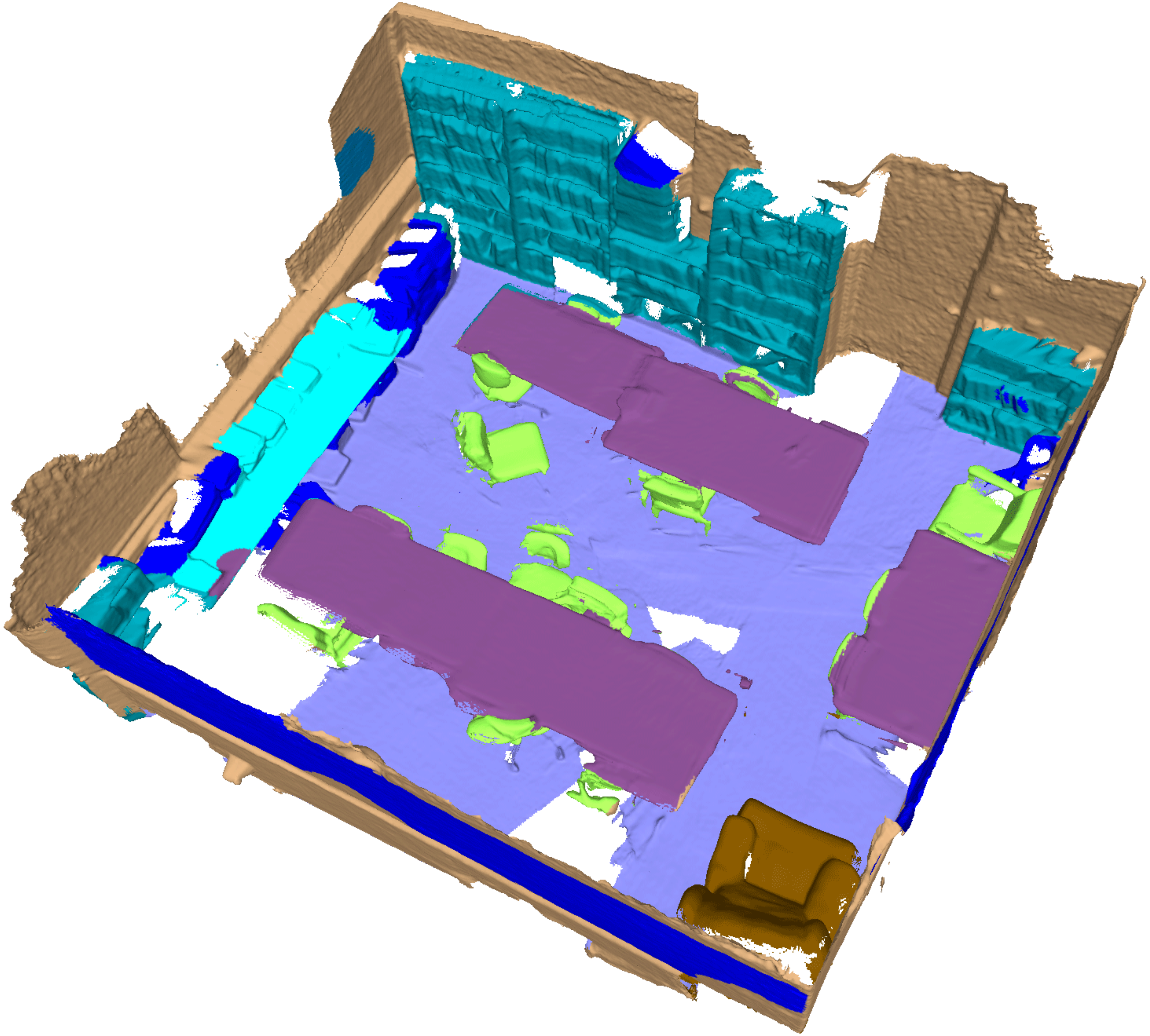


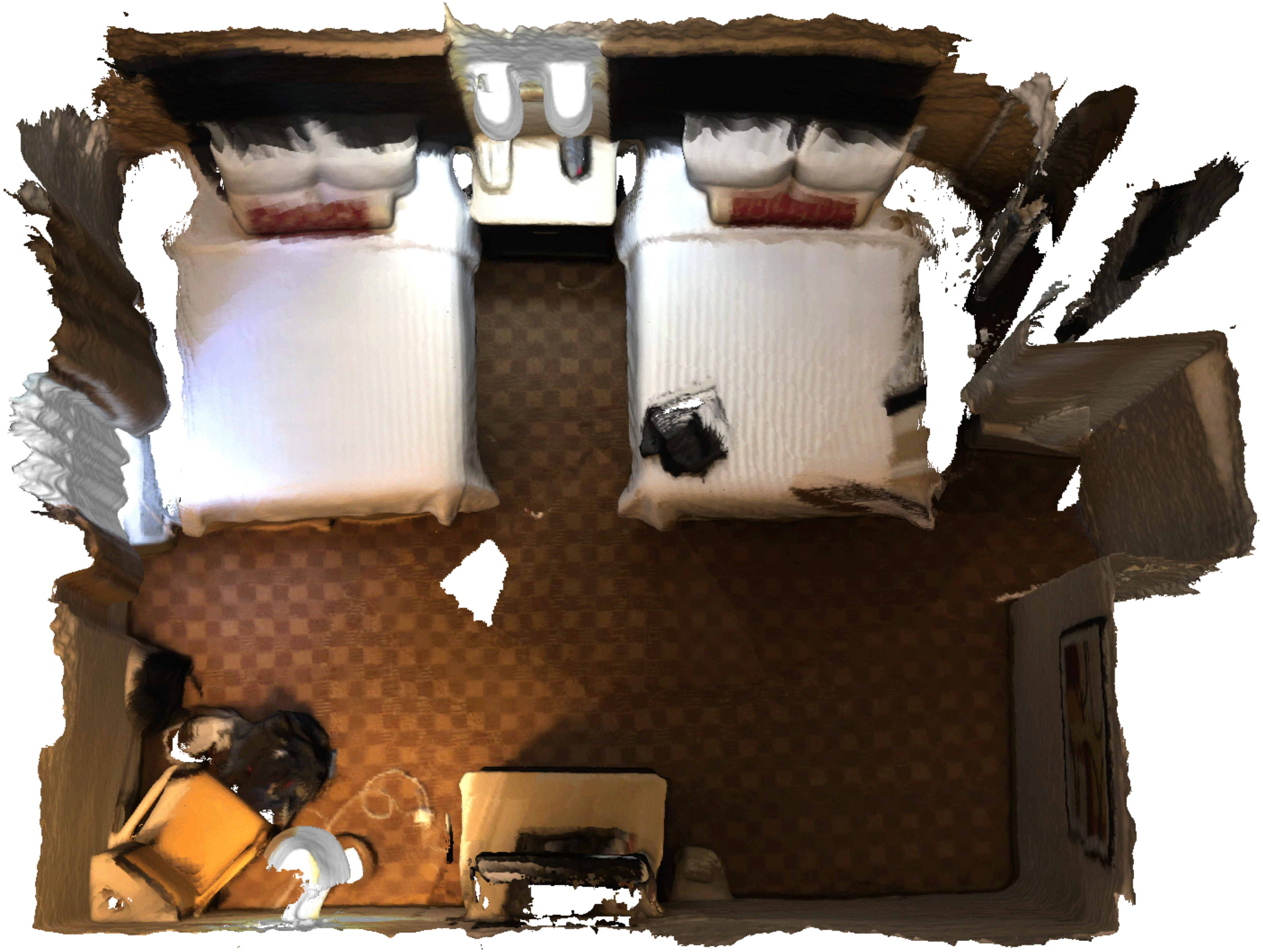
⬛ unannotated	🟫 wall	🟦 floor	🟨 cabinet	🟪 bed	🟩 chair	🟫 sofa
🟪 table	🟩 door	🟦 window	🟦 bookshelf	⬛ picture	🟨 counter	🟦 desk
🟪 curtain	🟪 refrigerator	🟩 show curtain	🟩 toilet	🟥 sink	🟧 bathtub	🟦 other

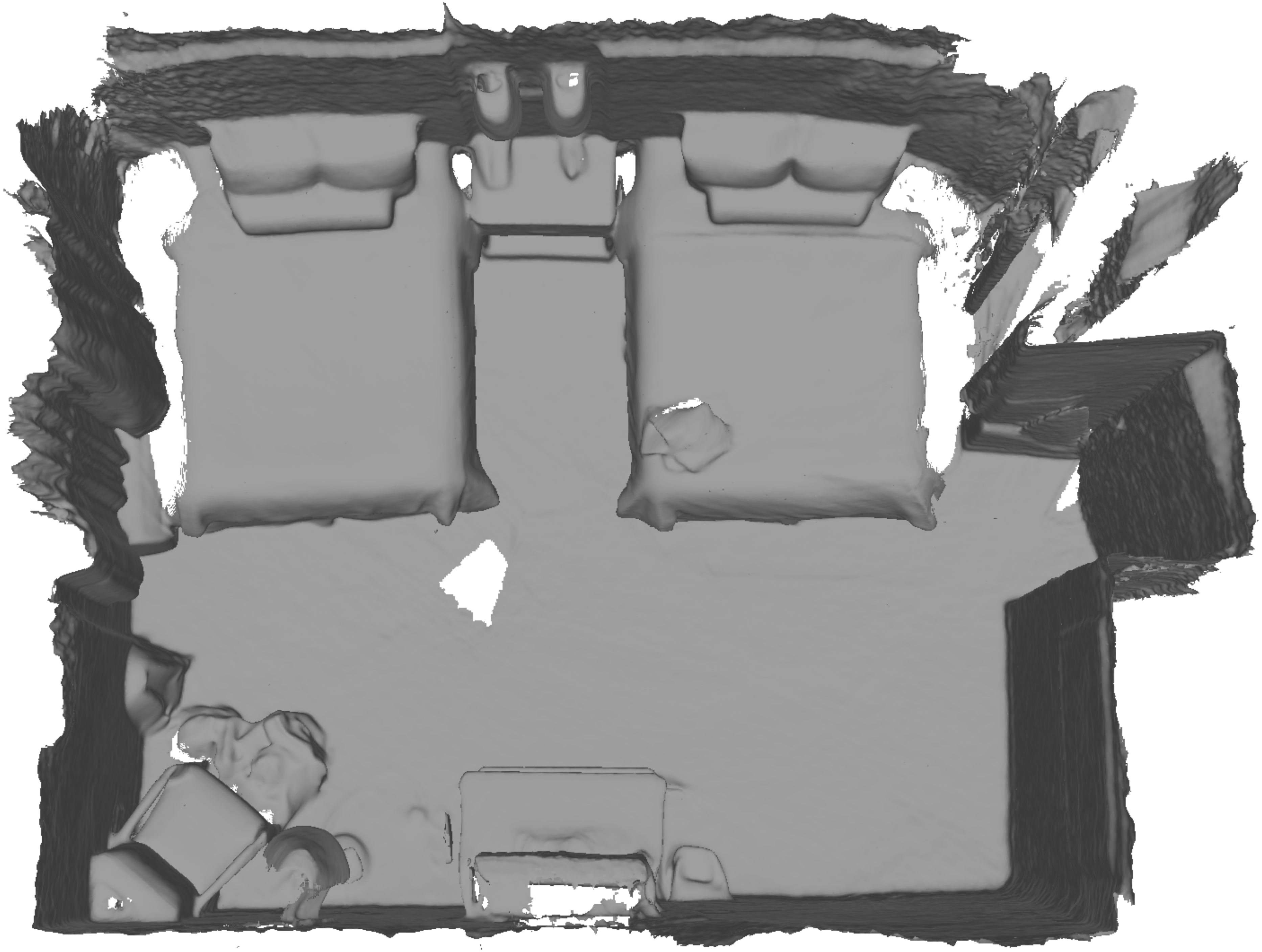
Pseudo colors for visualization

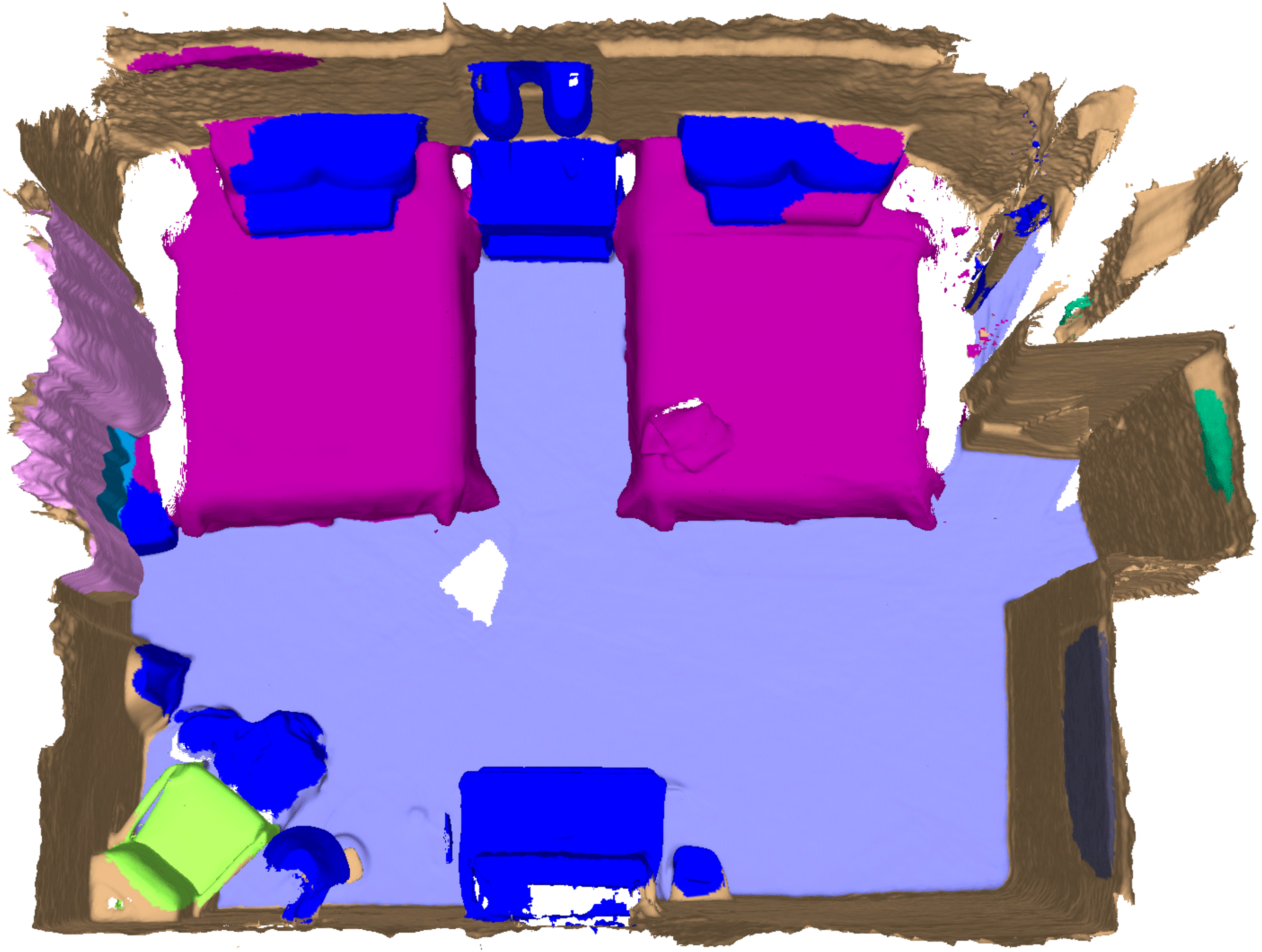


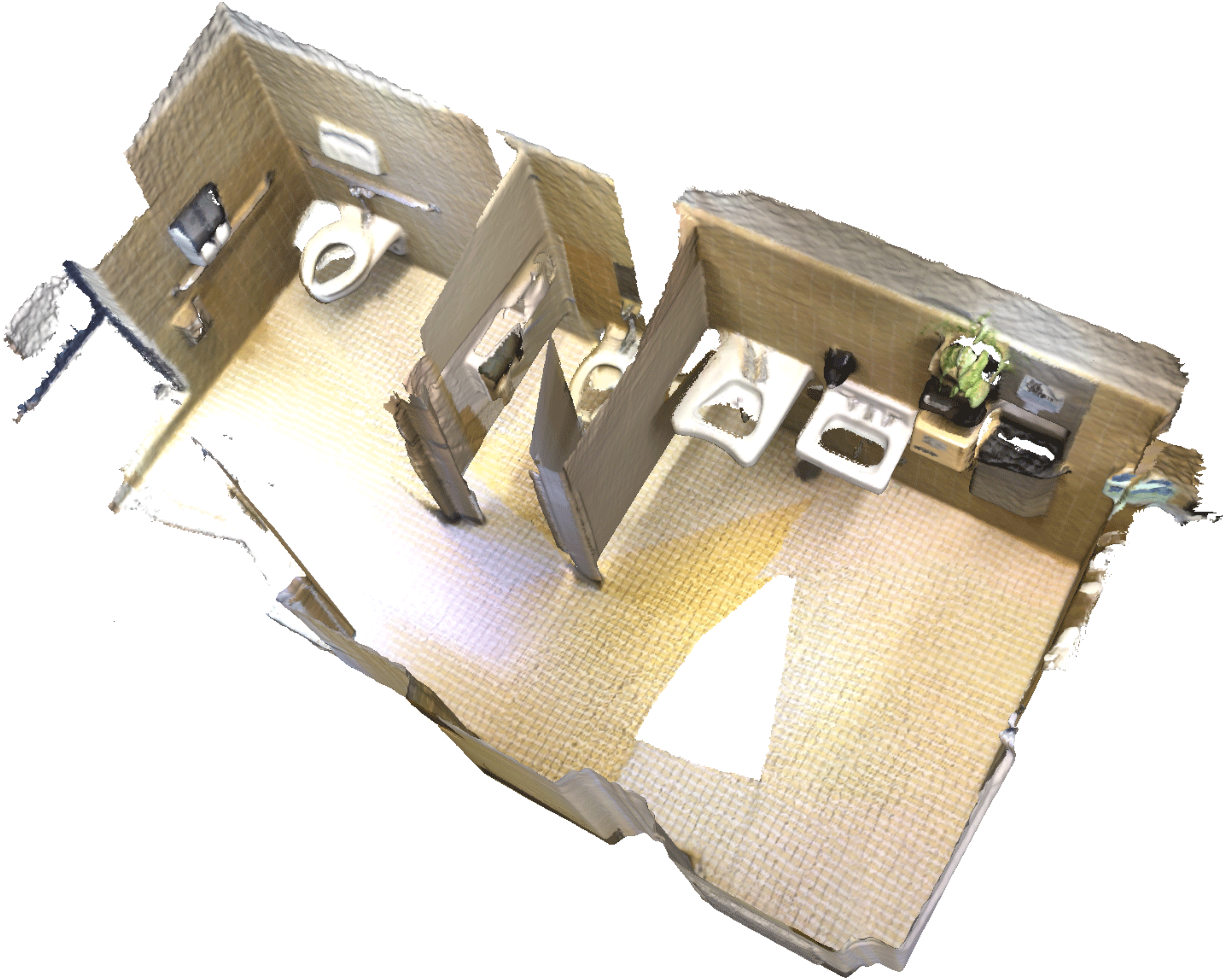


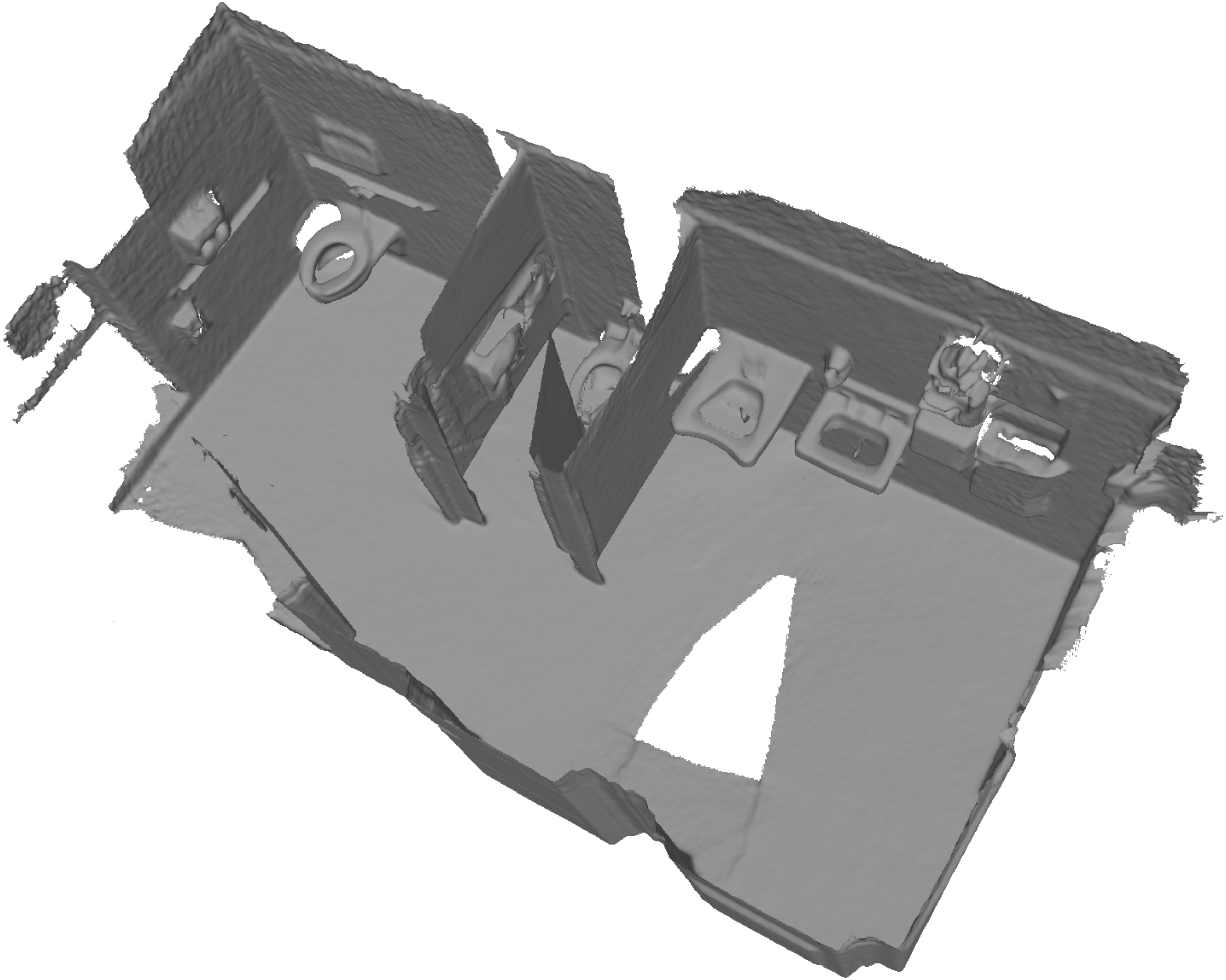


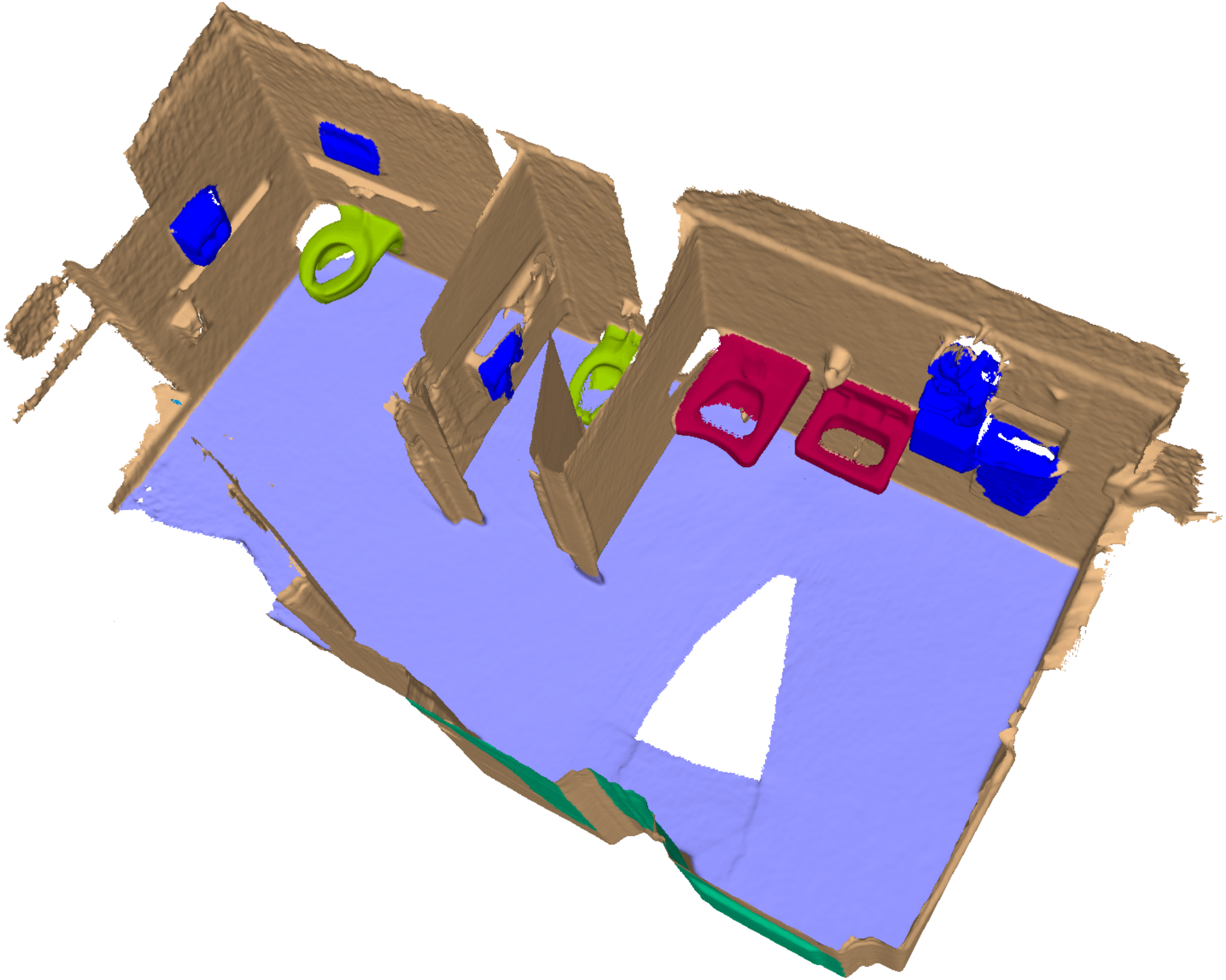


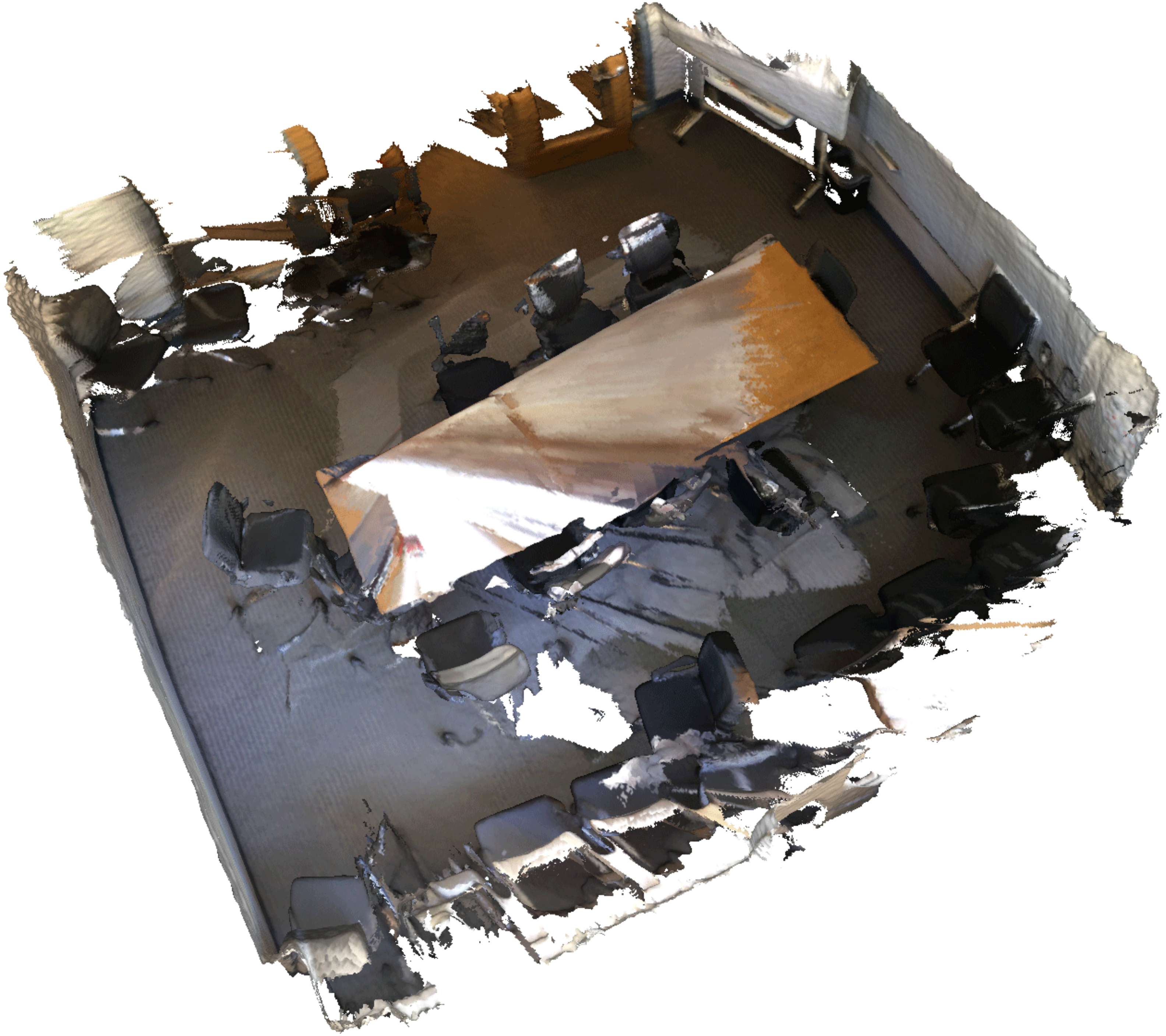


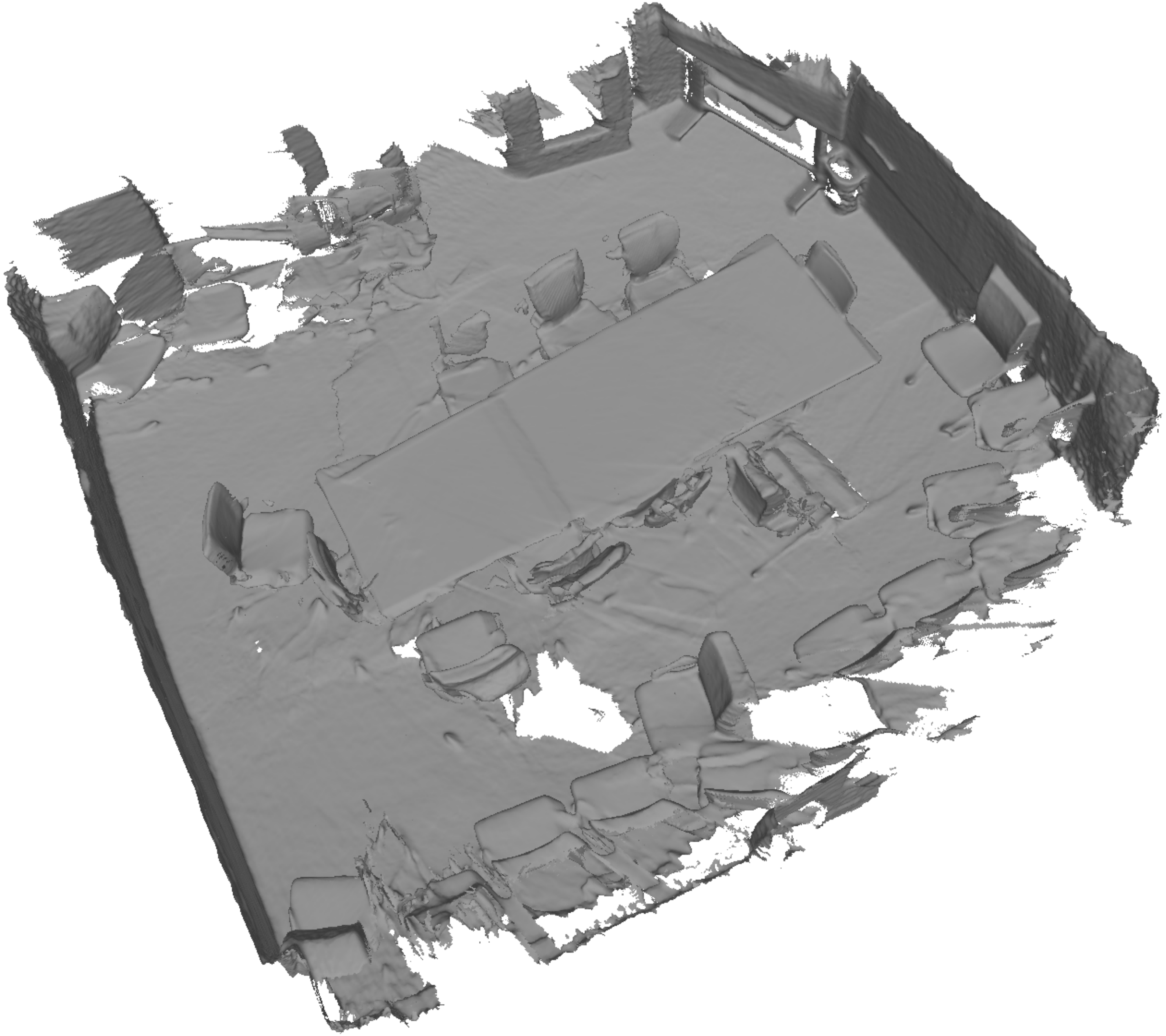


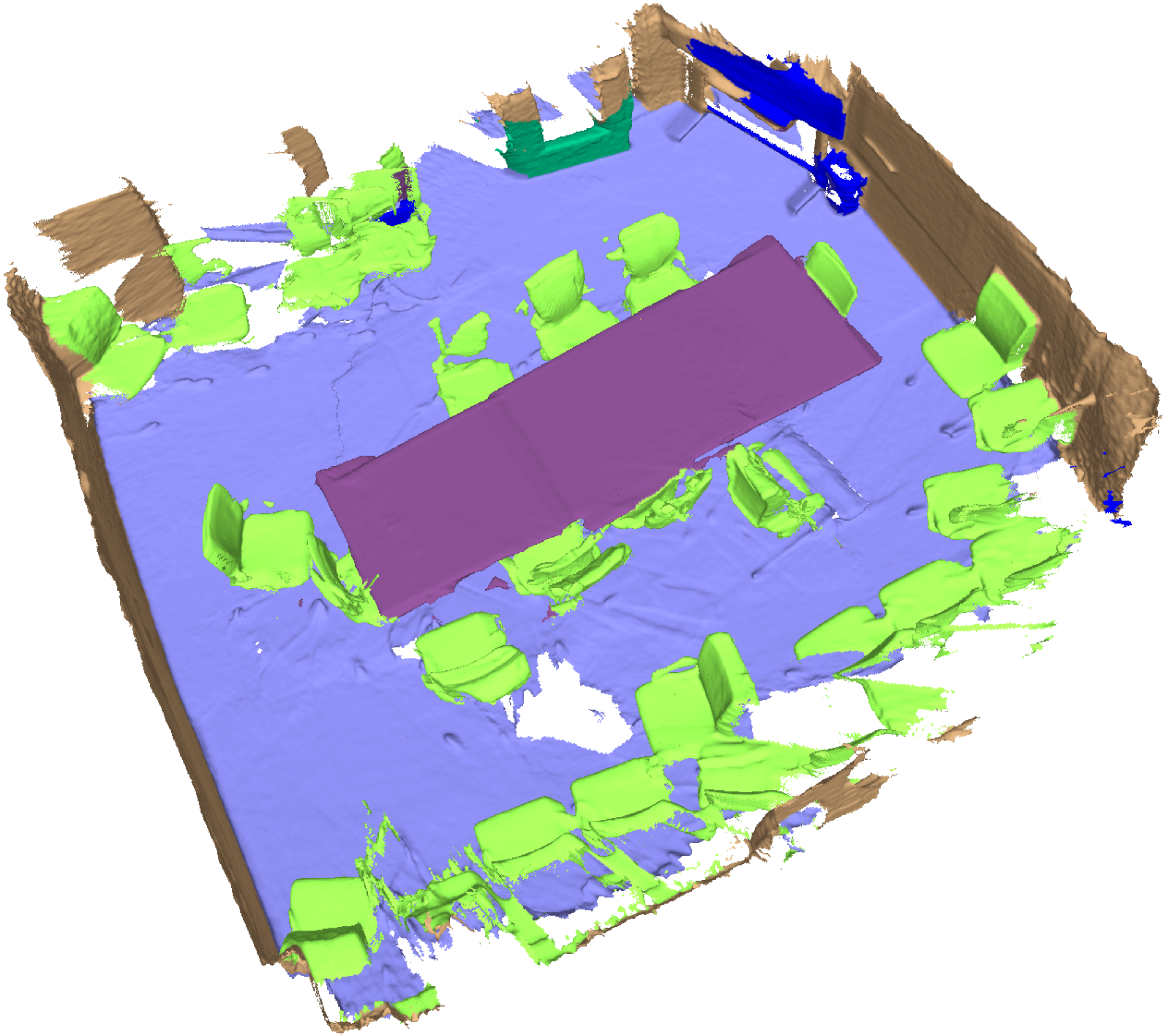


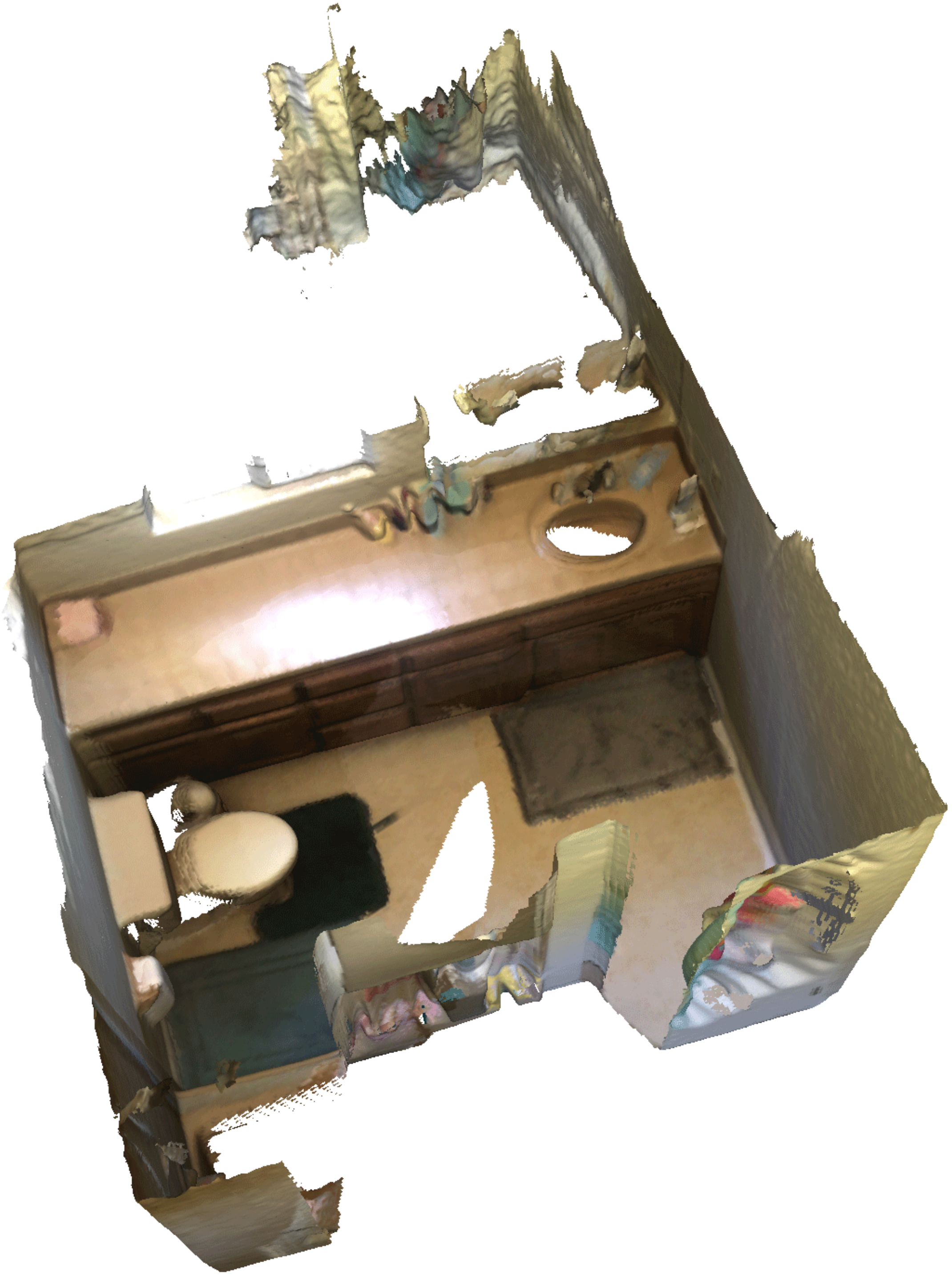


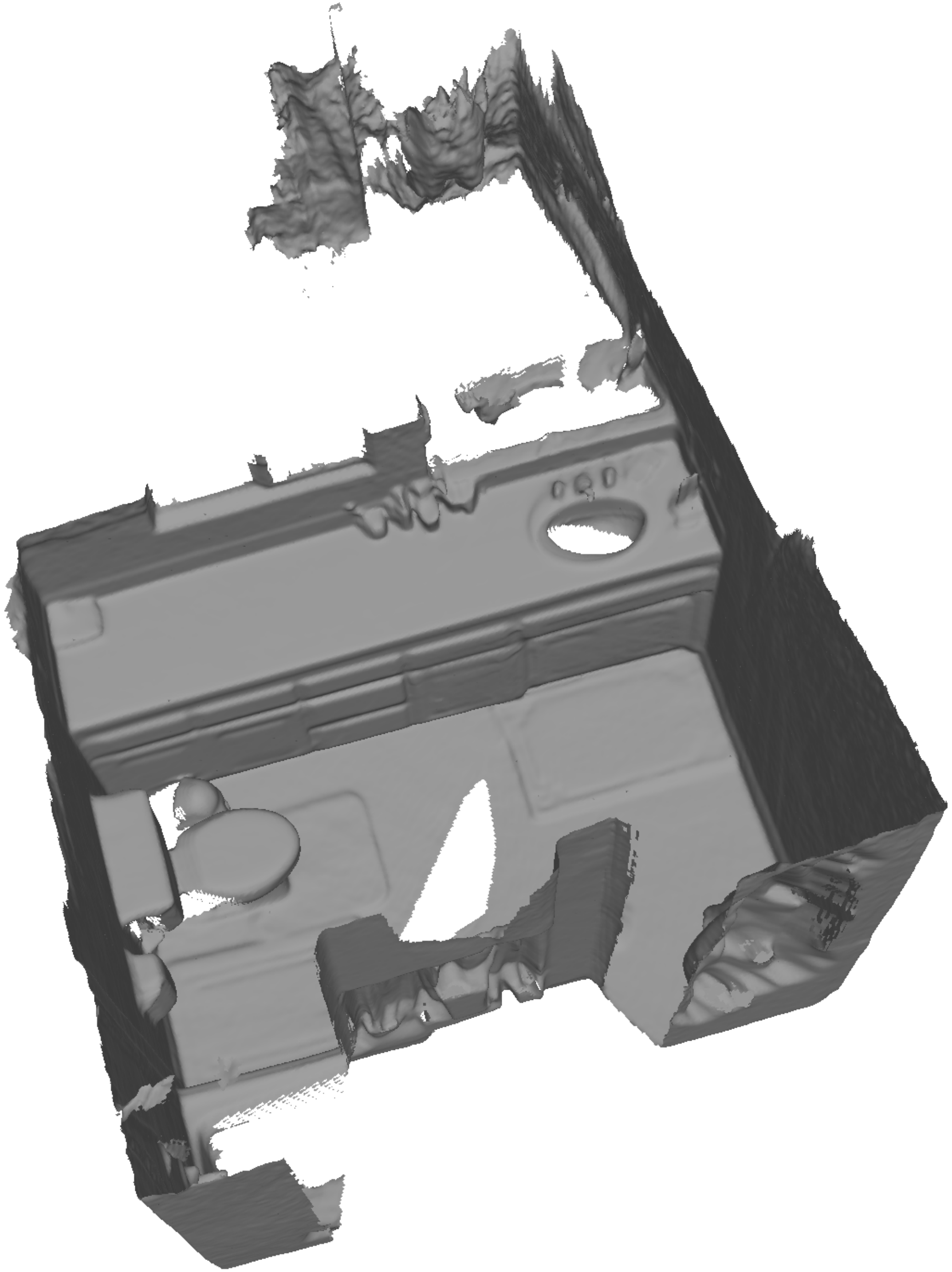


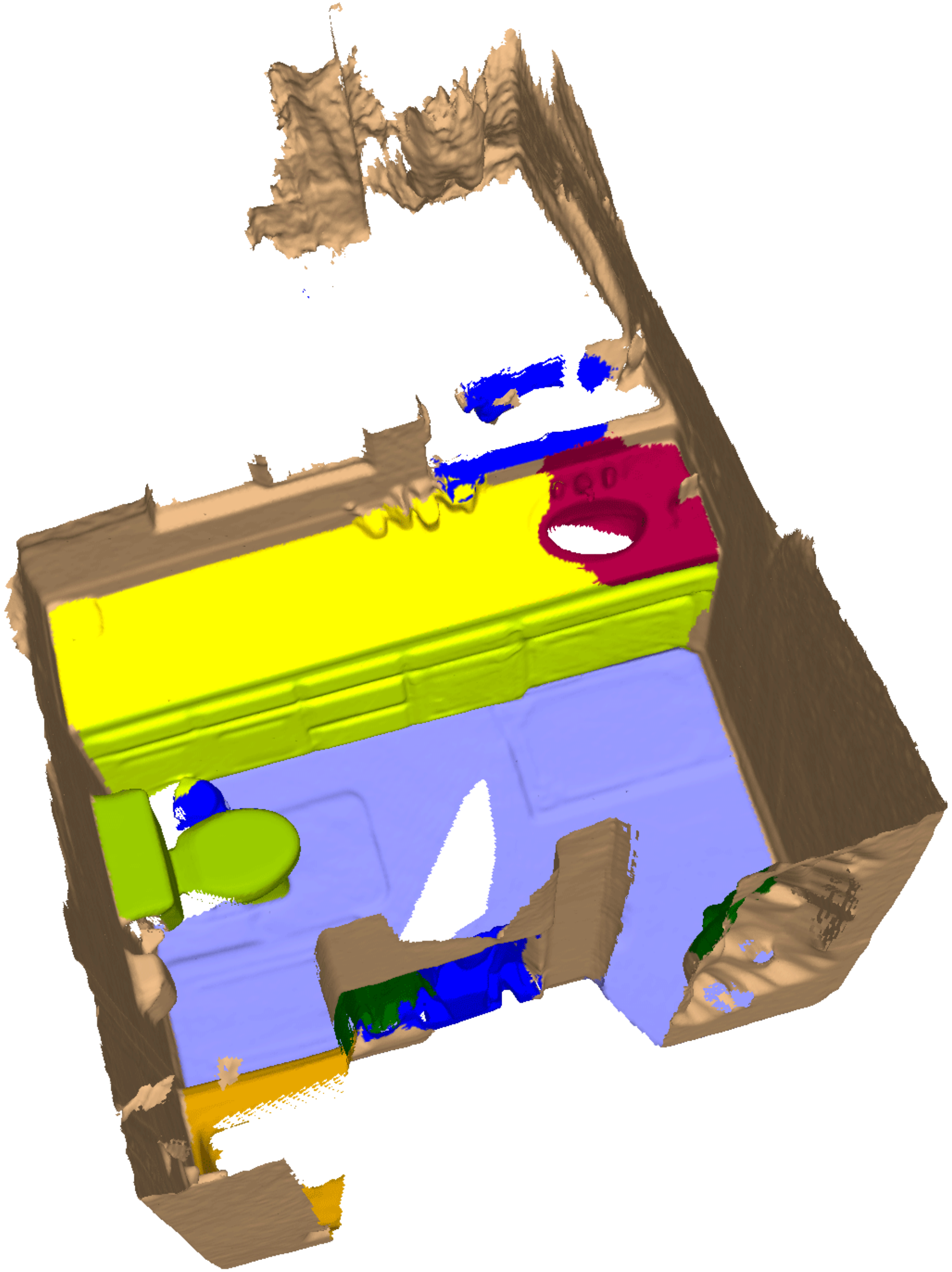


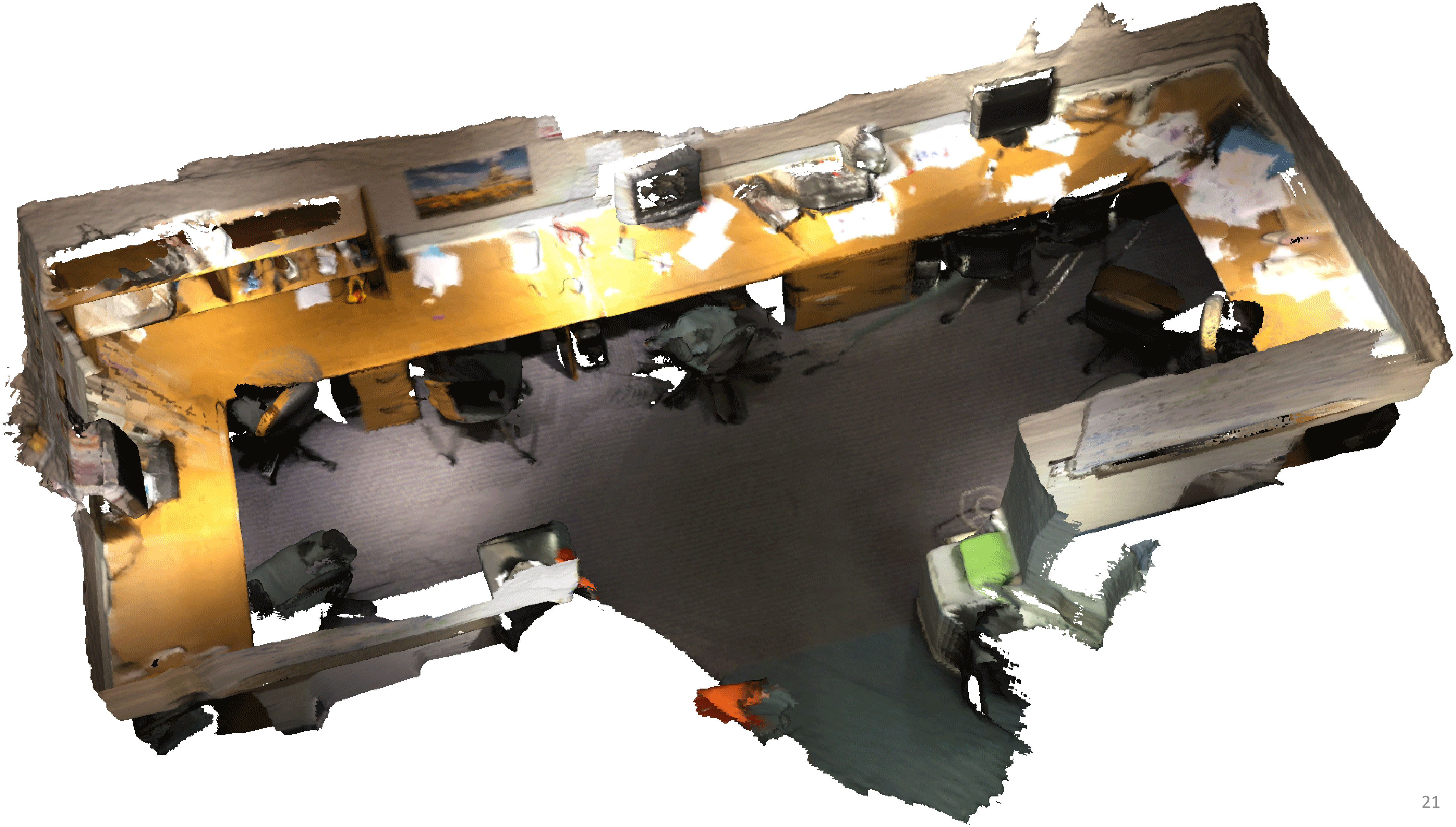


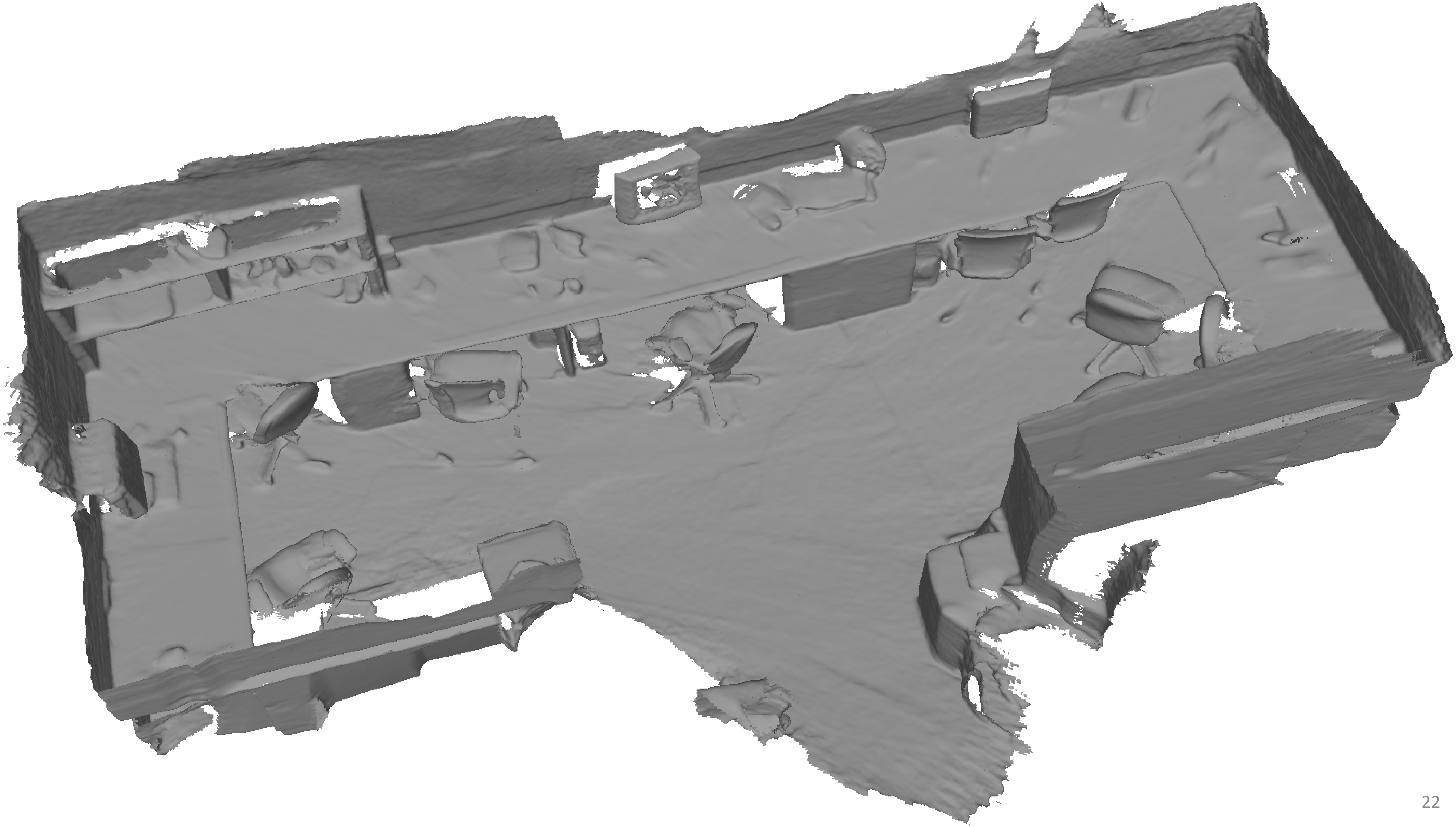


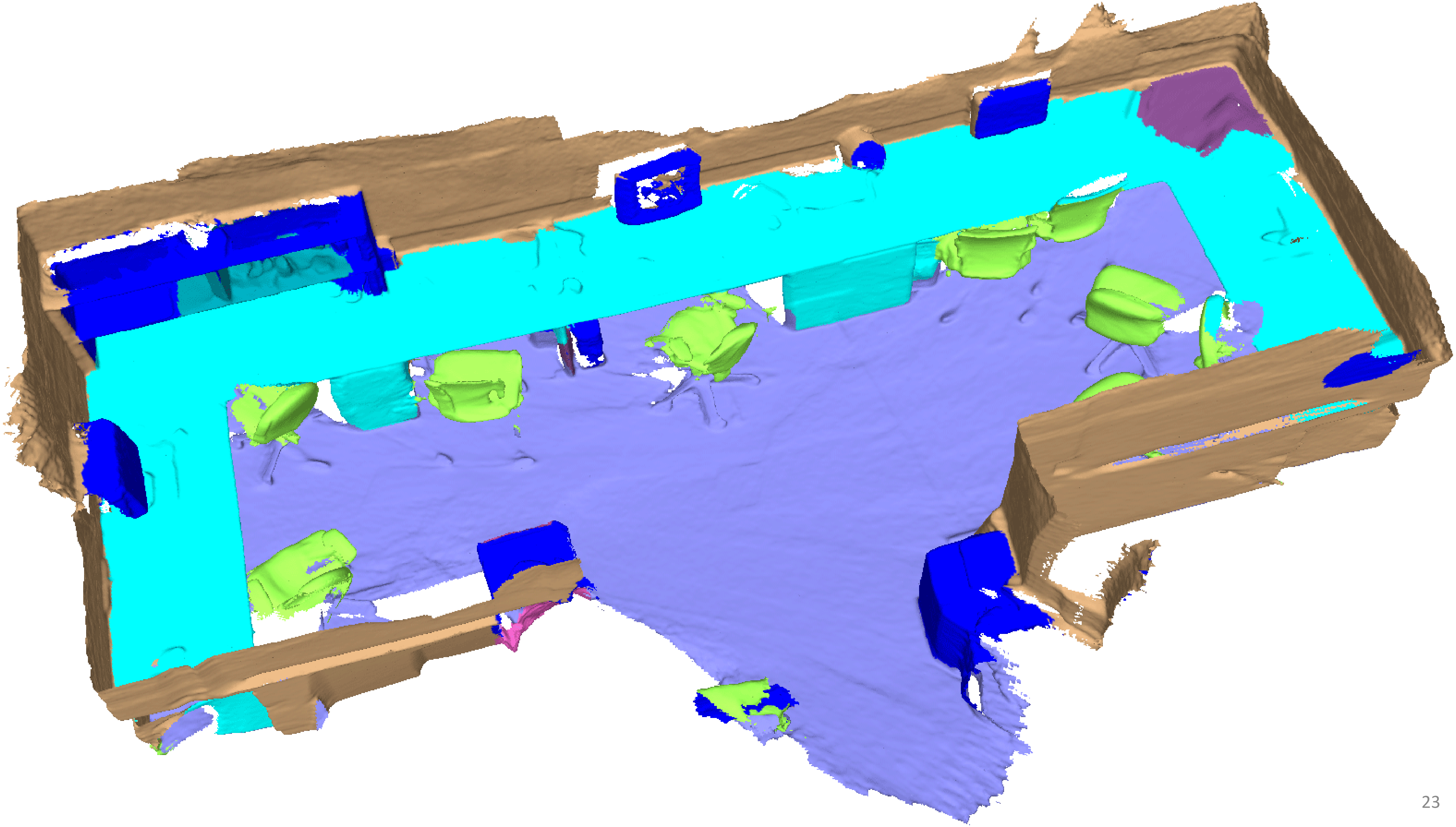


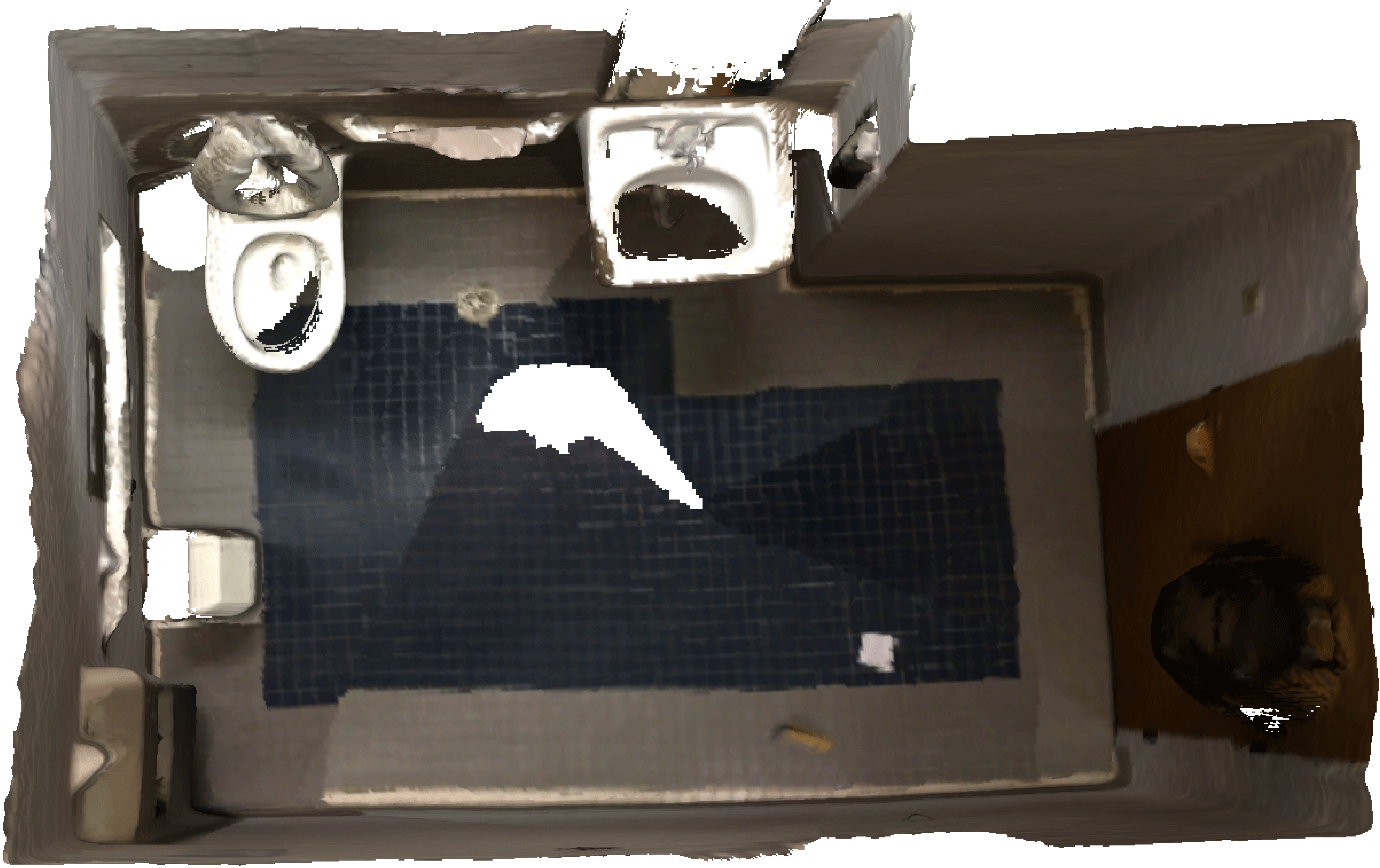


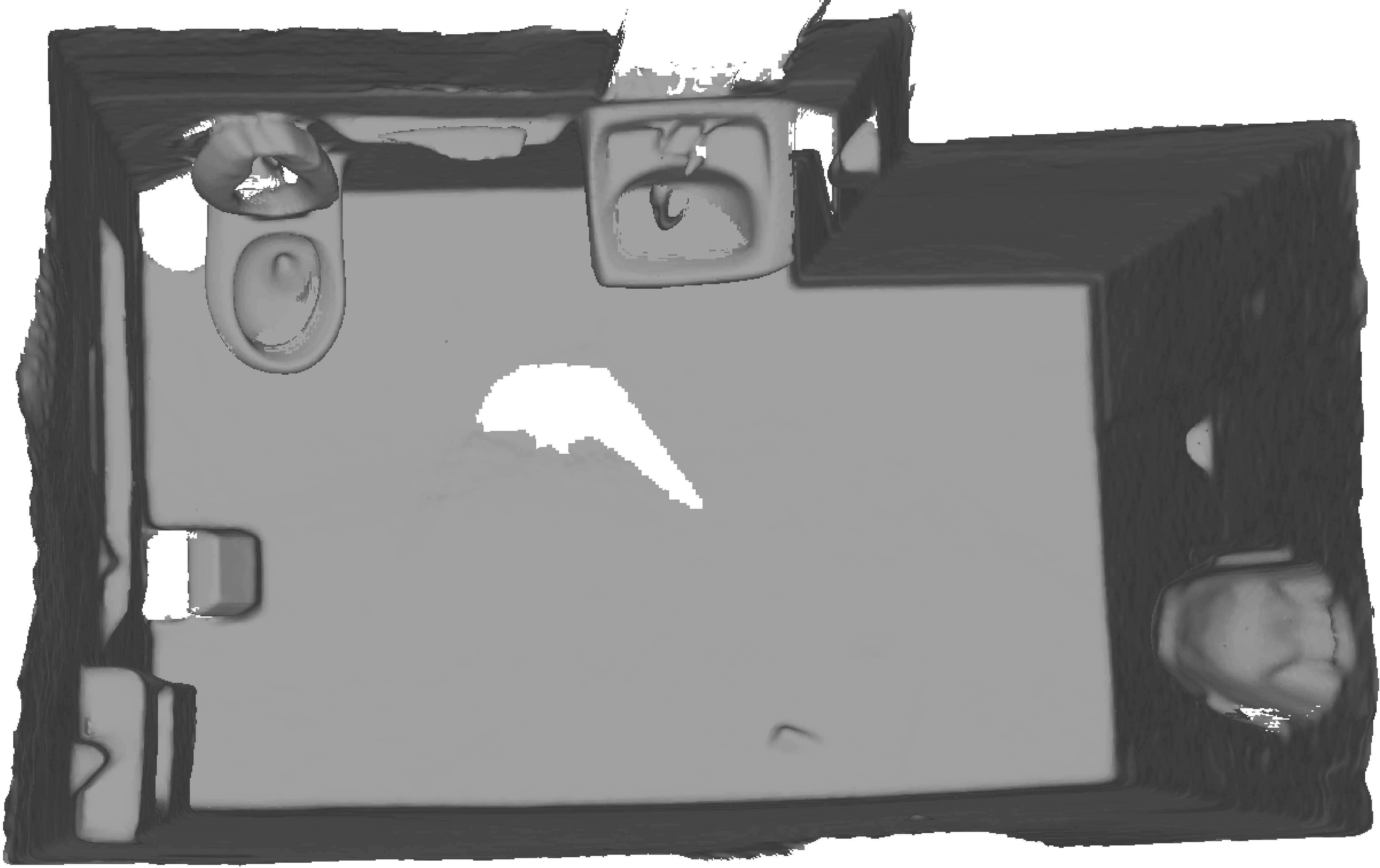


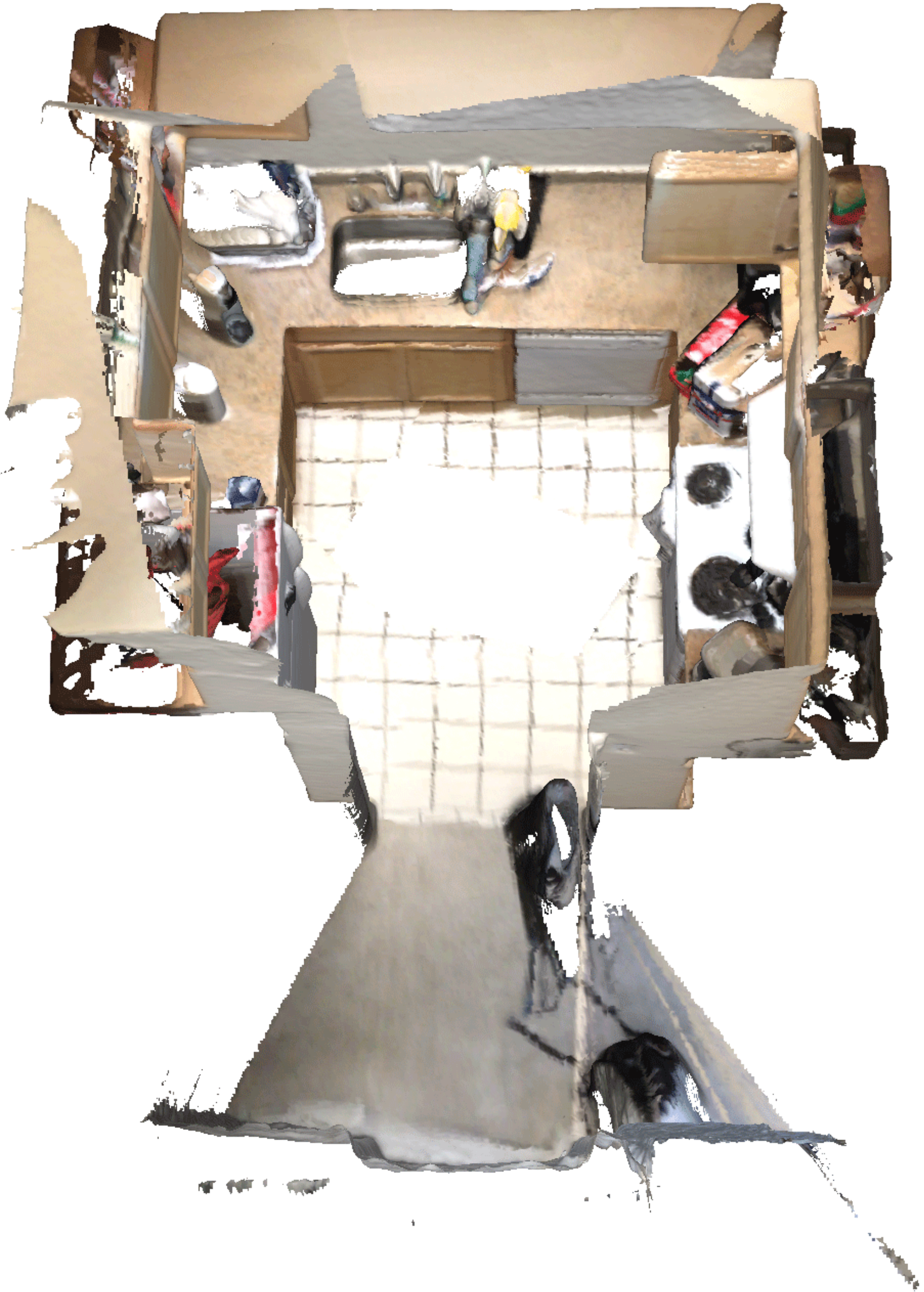


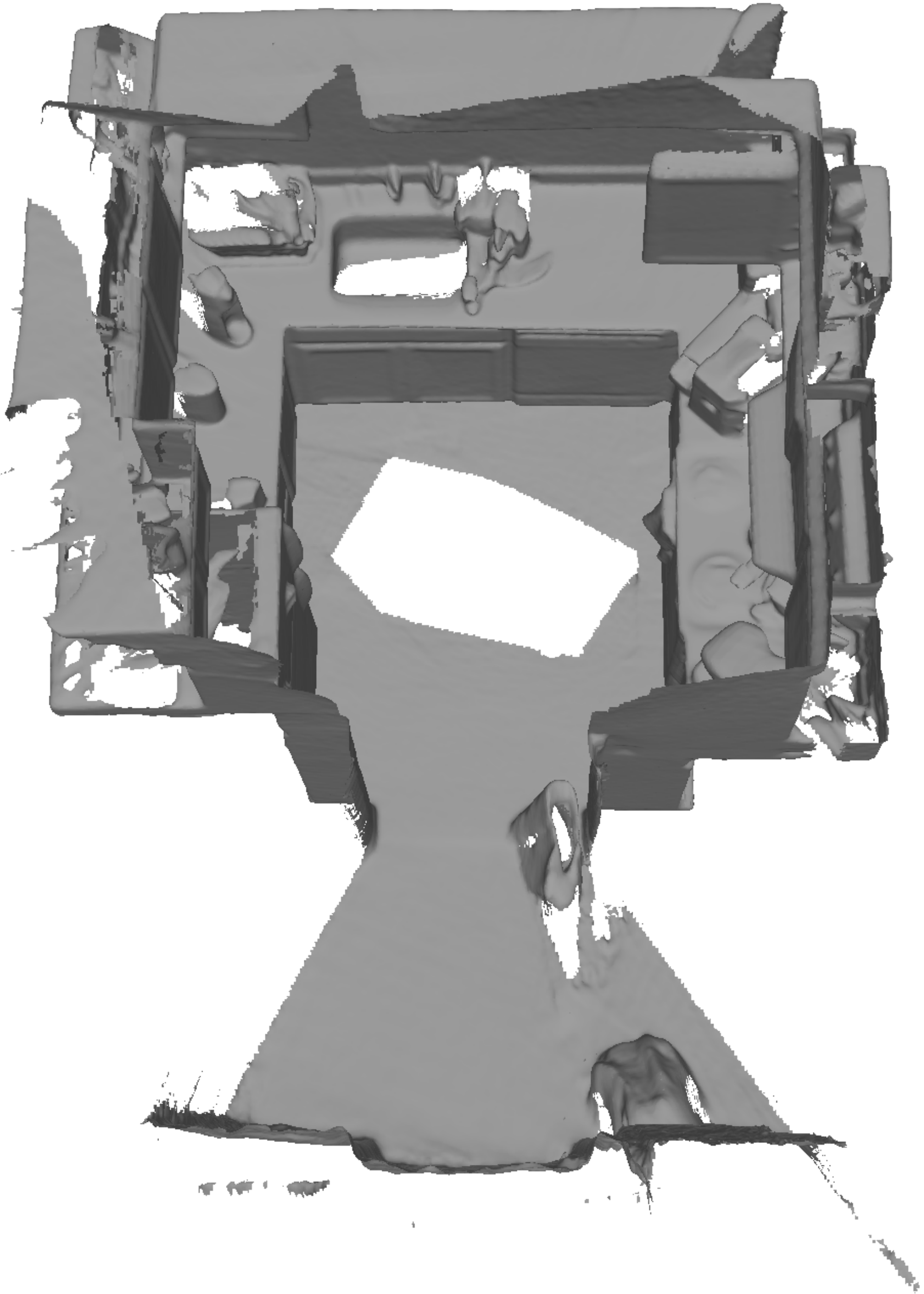


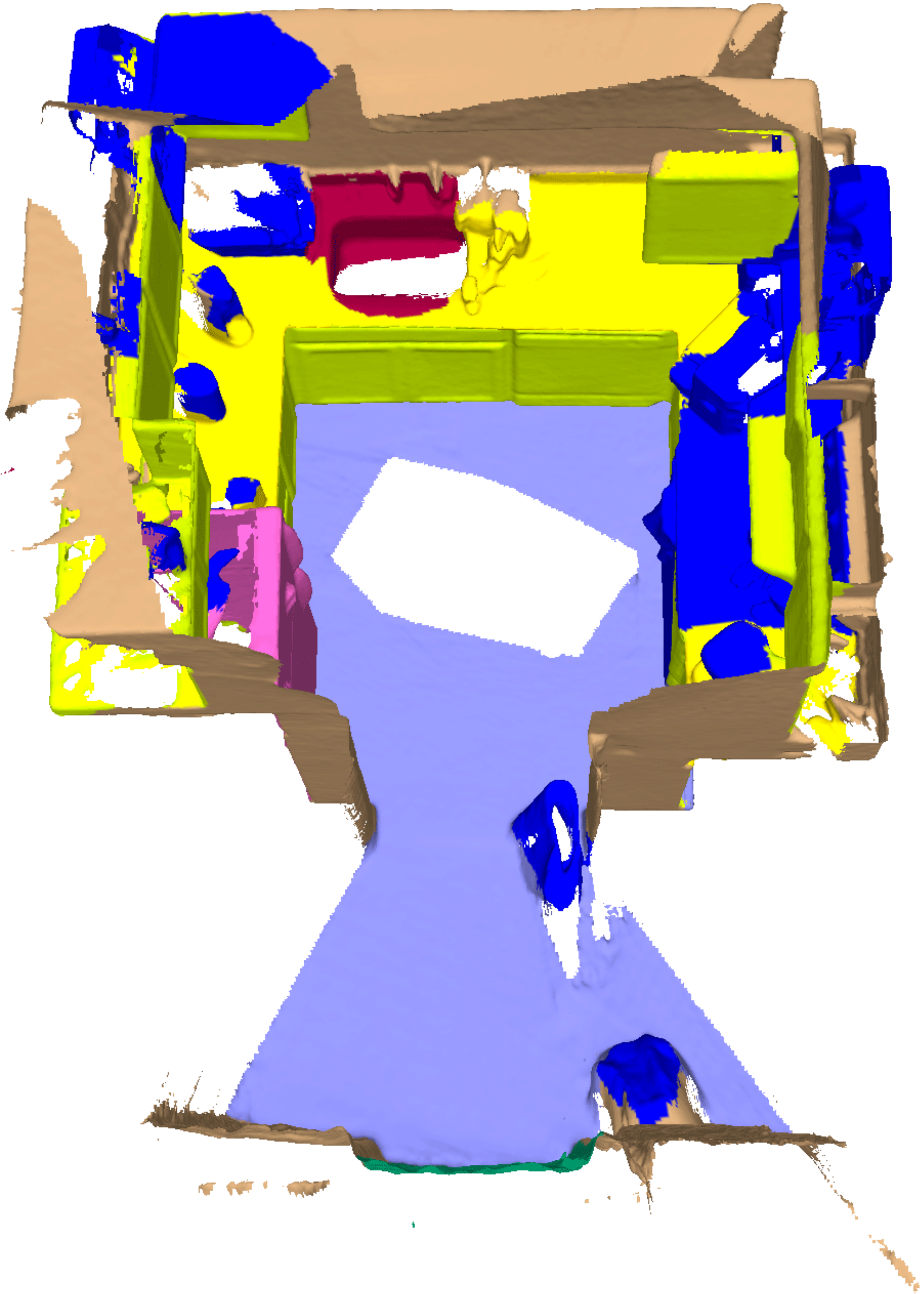


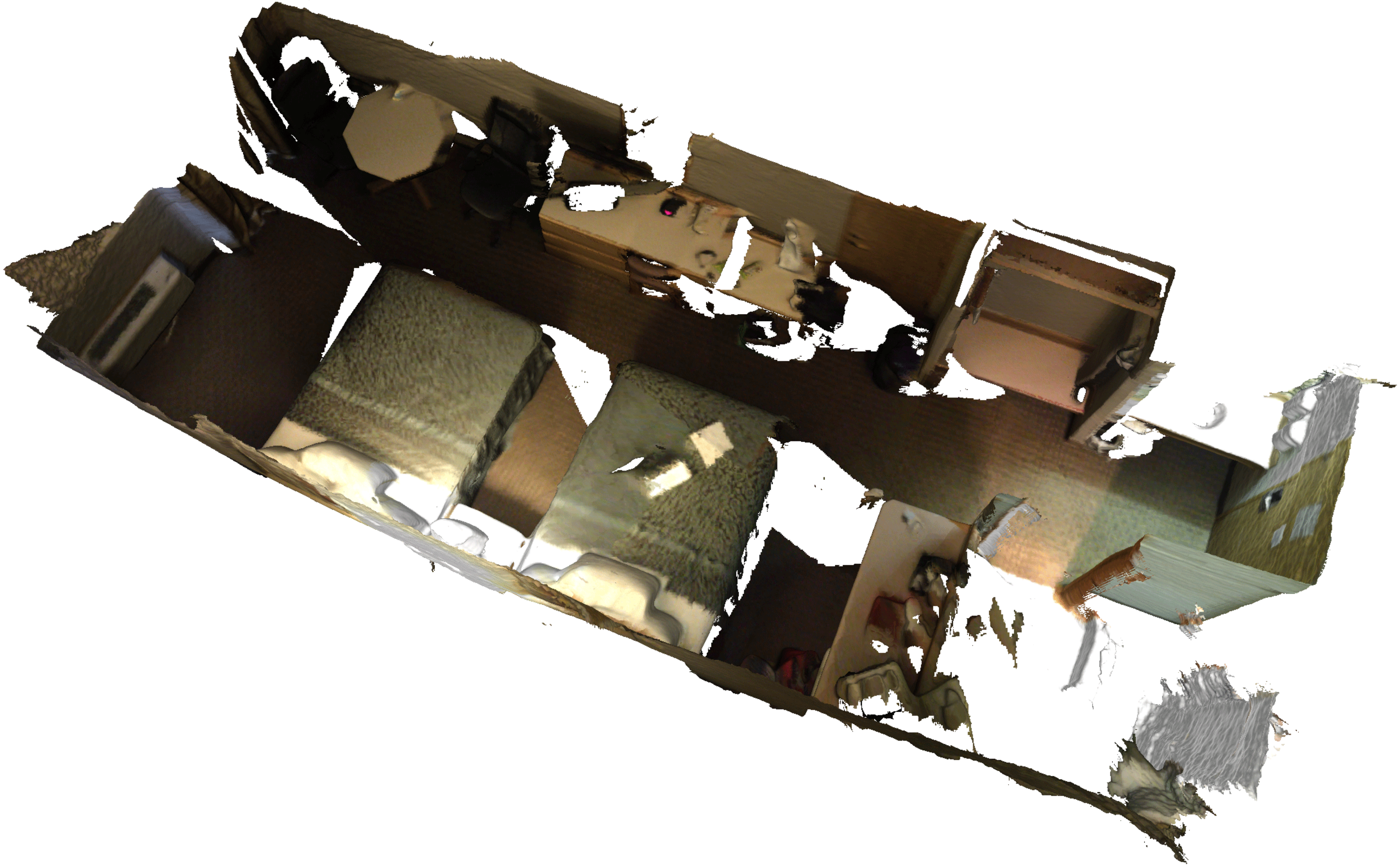


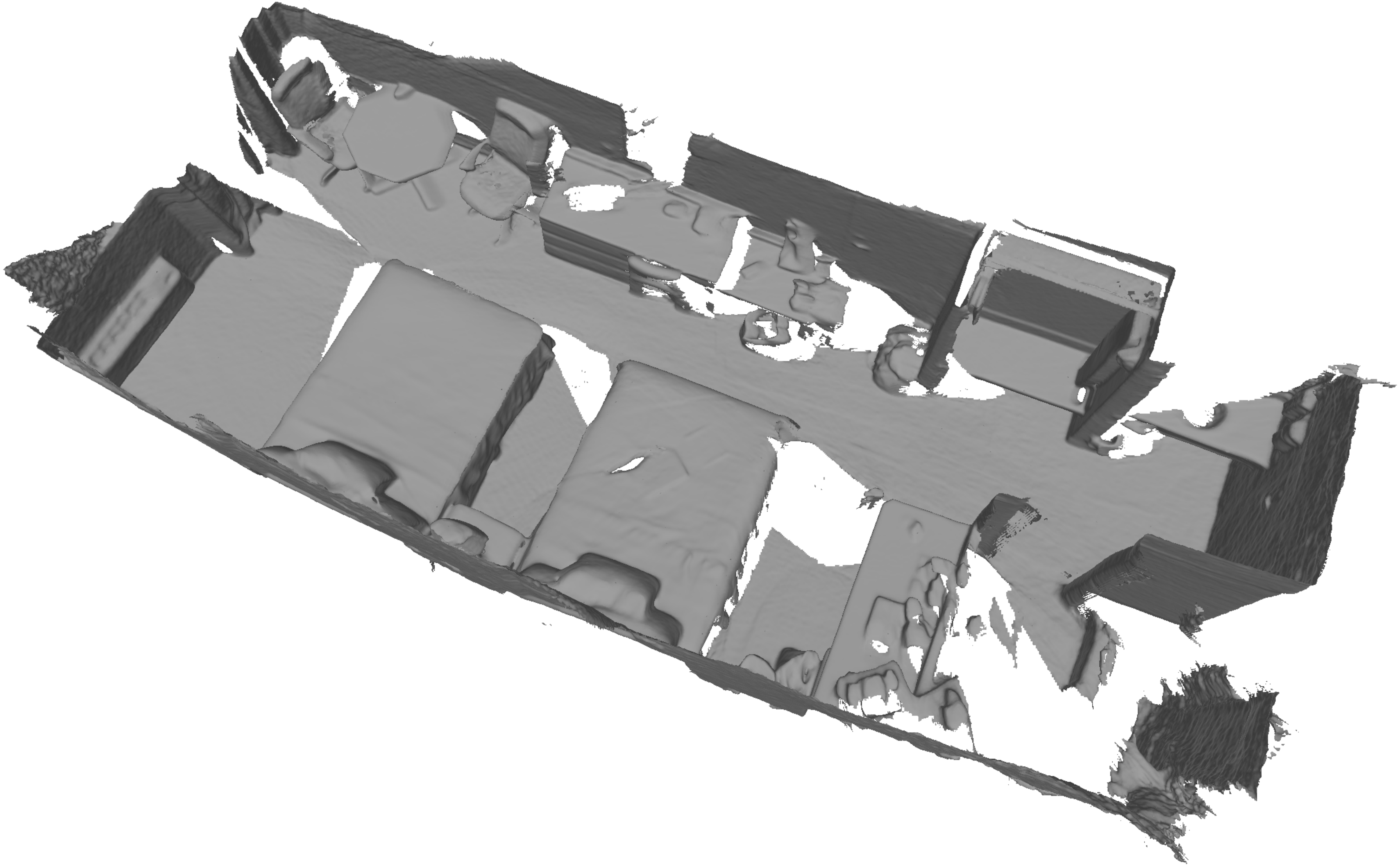


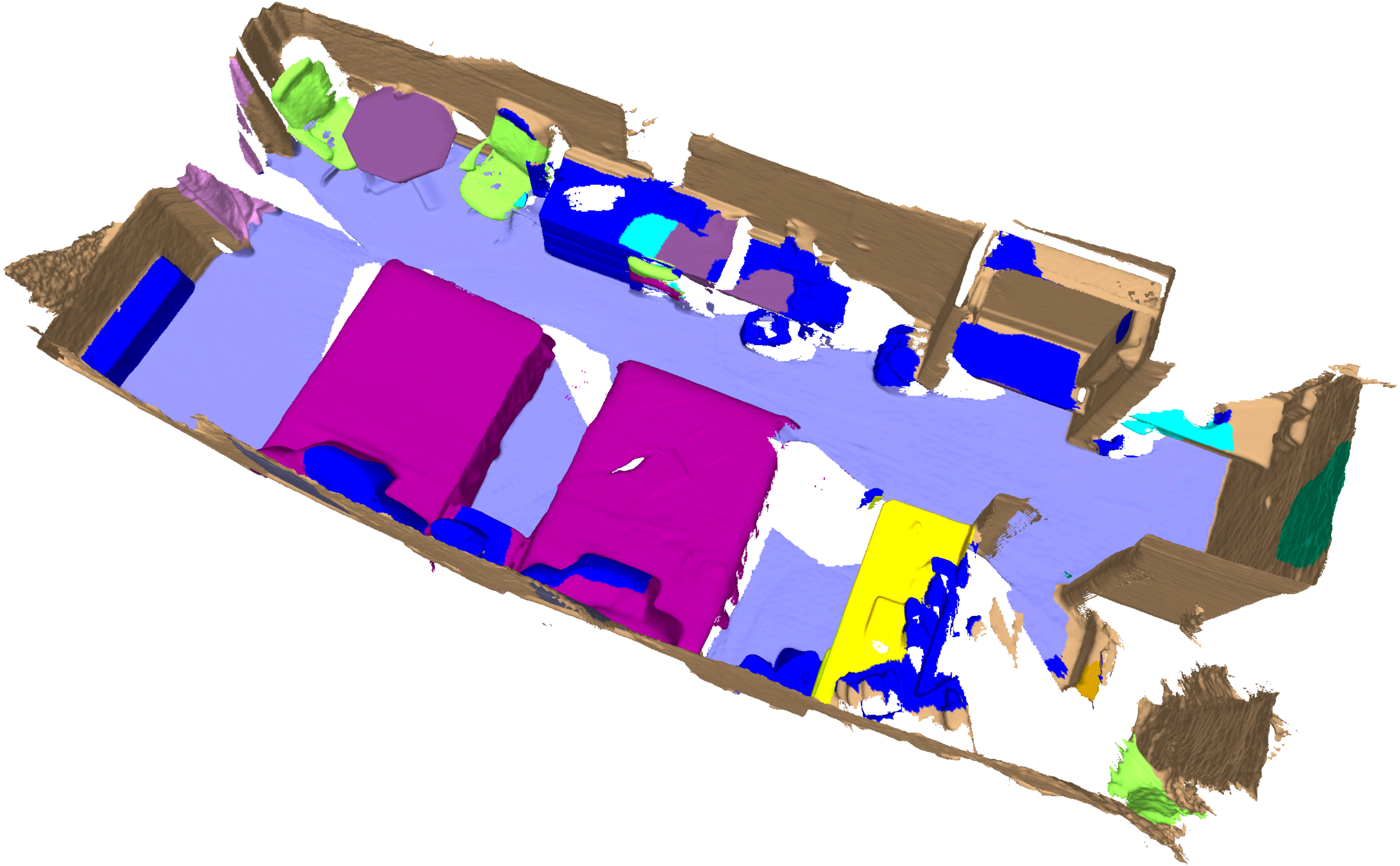


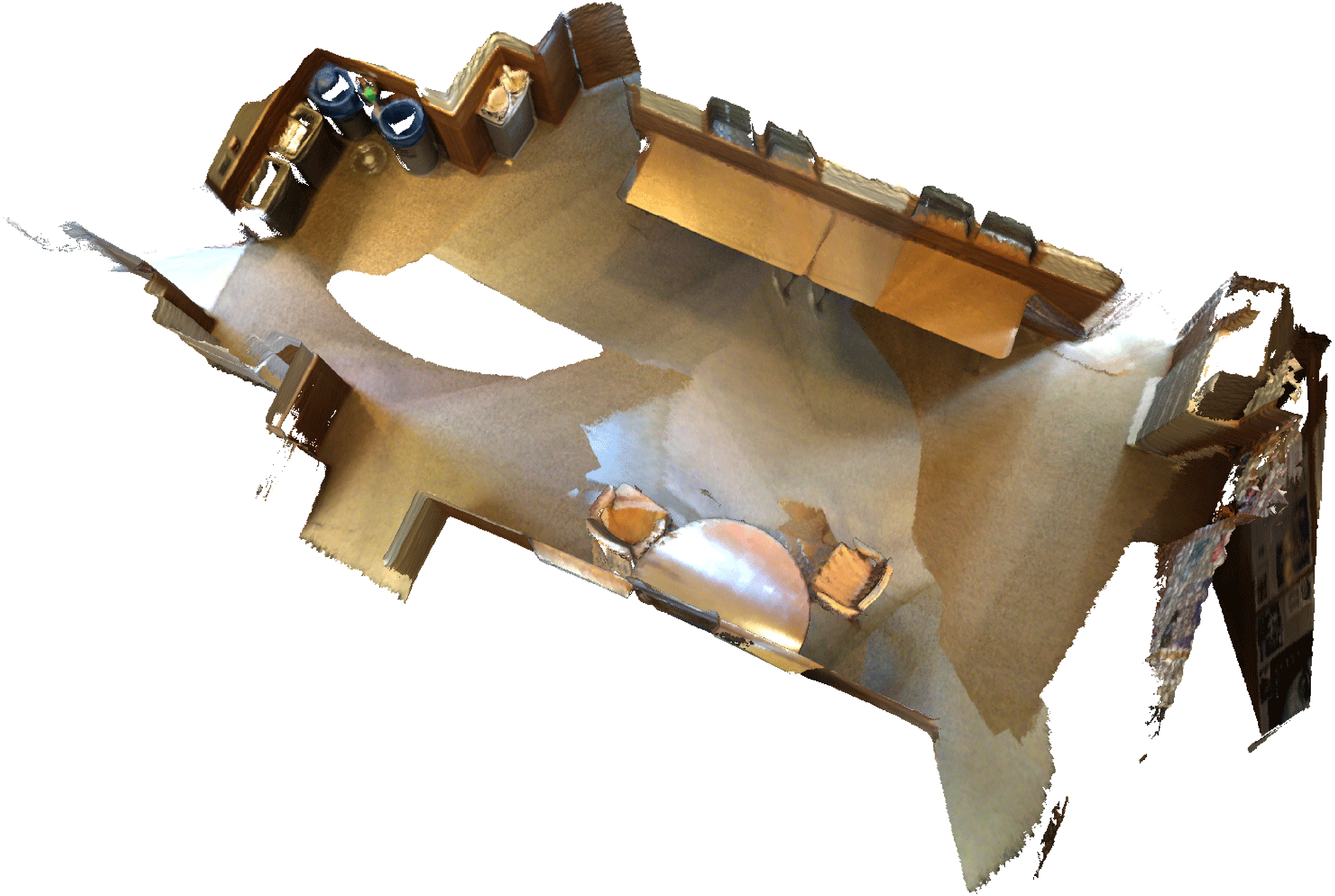


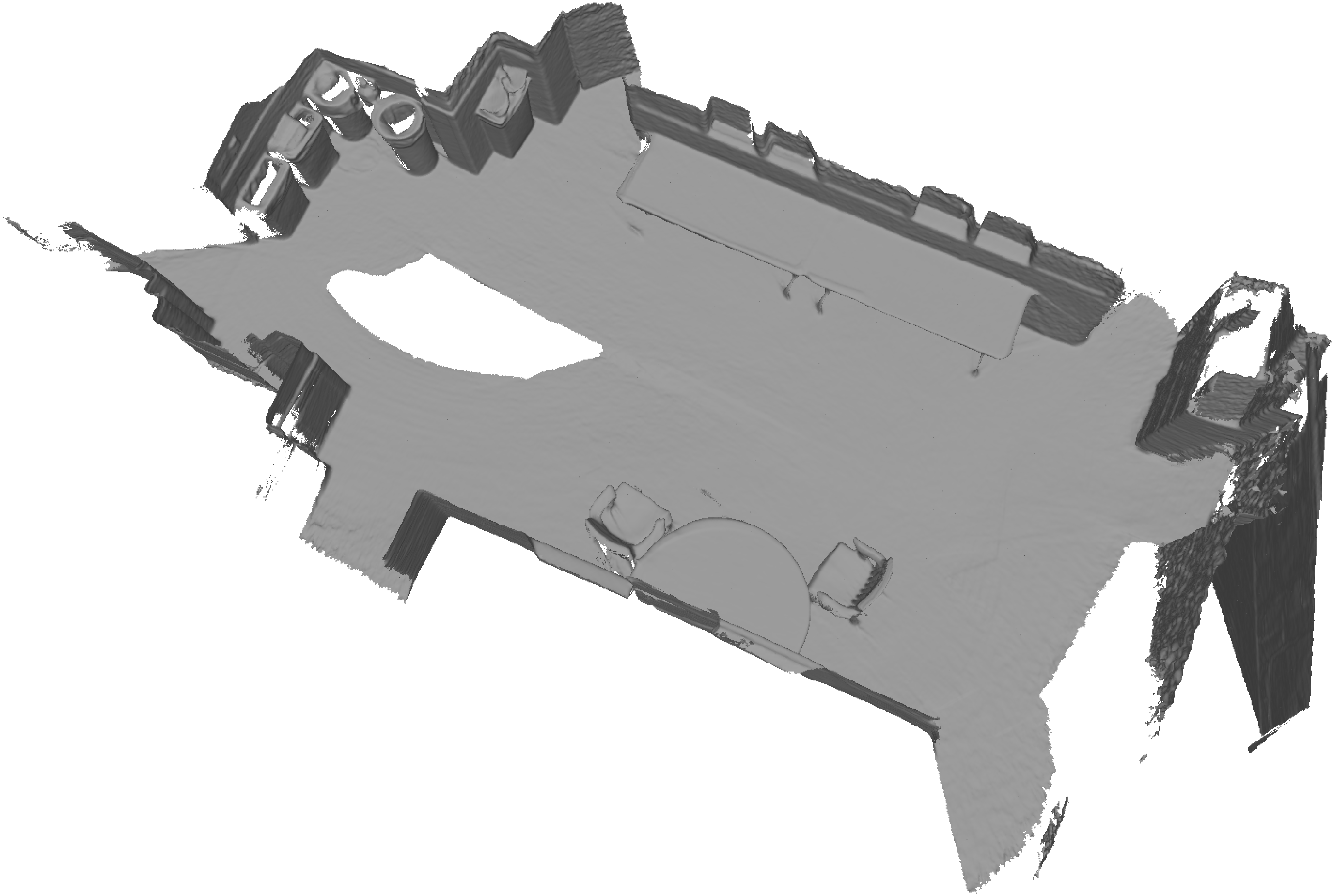


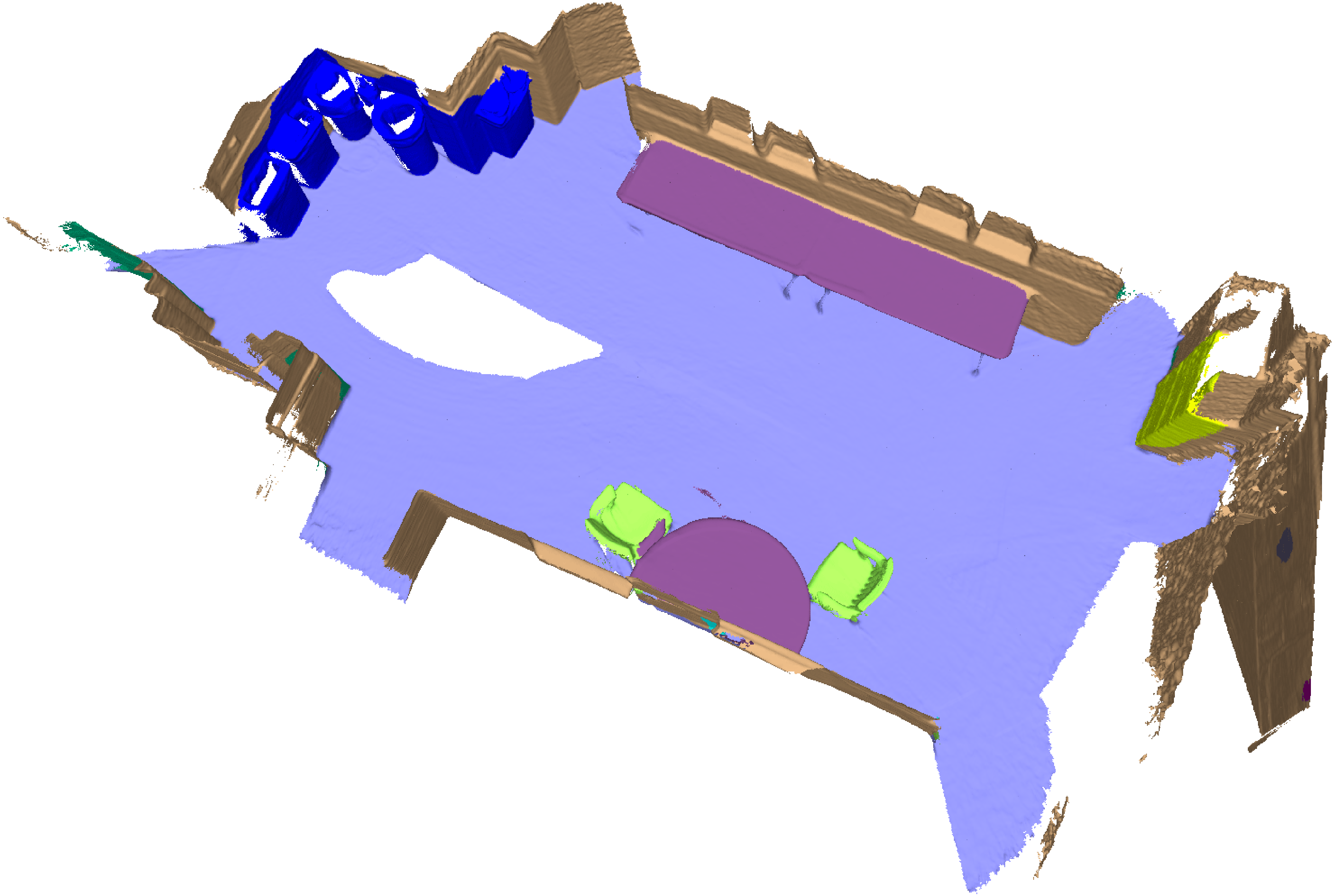


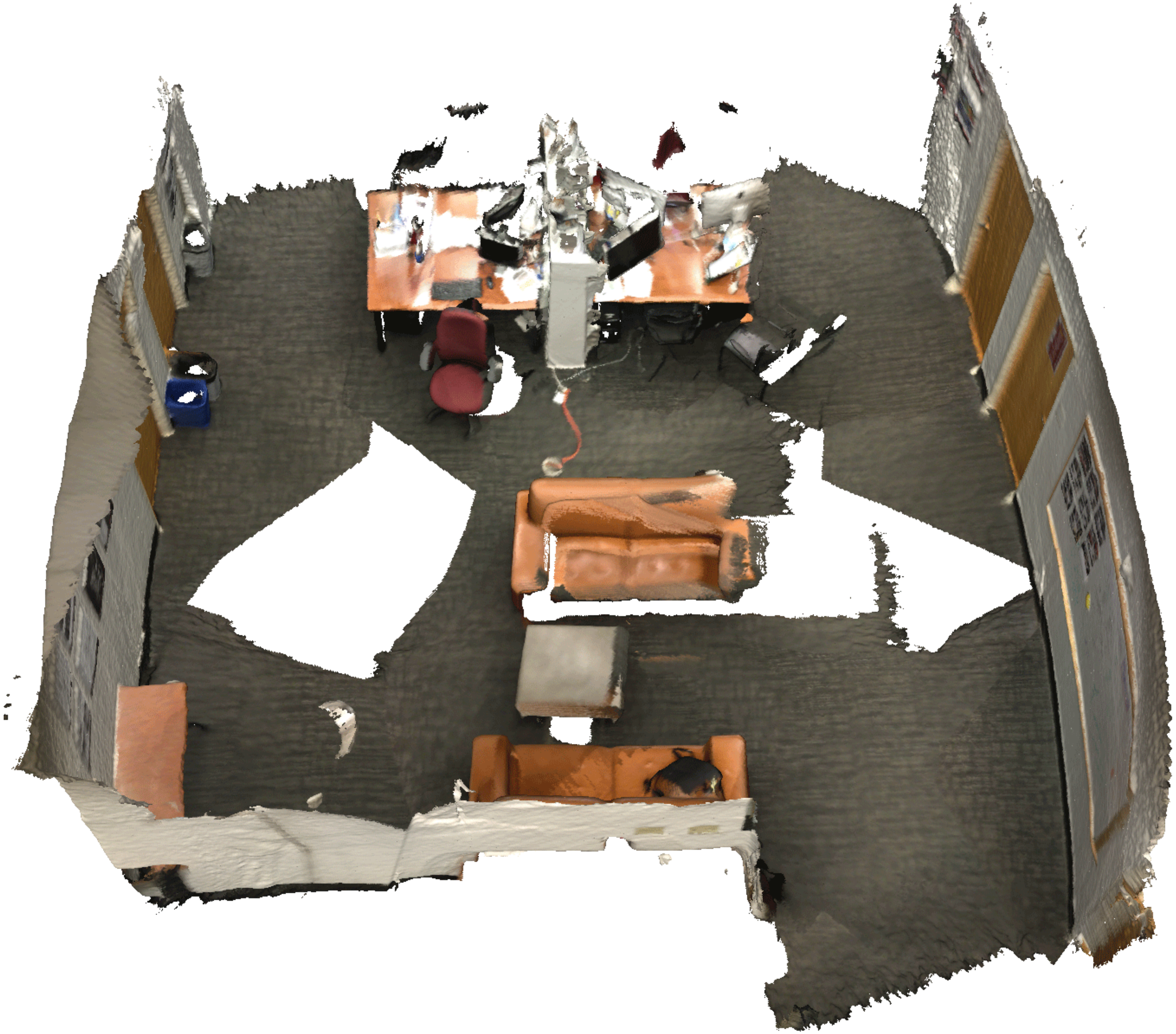


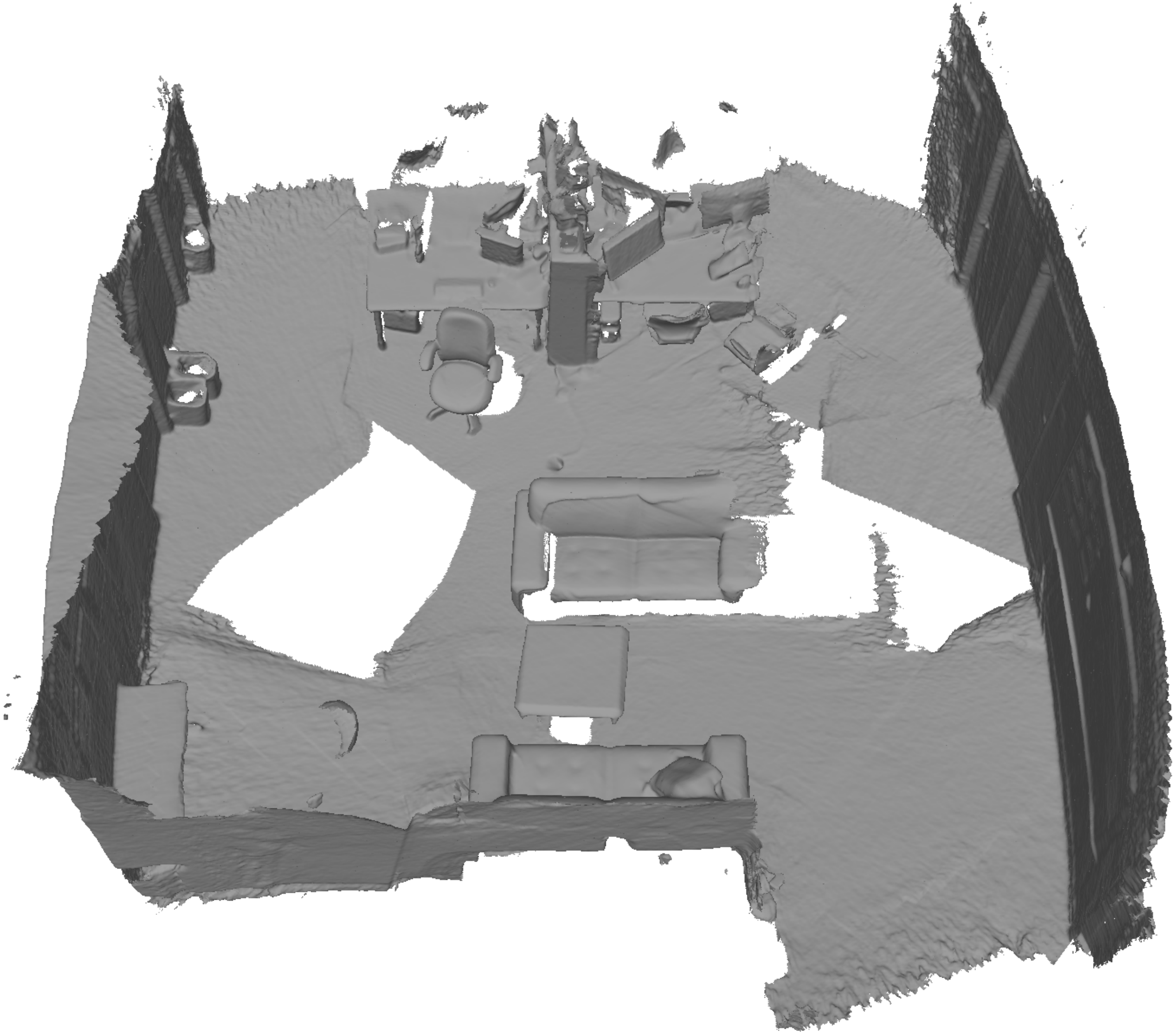


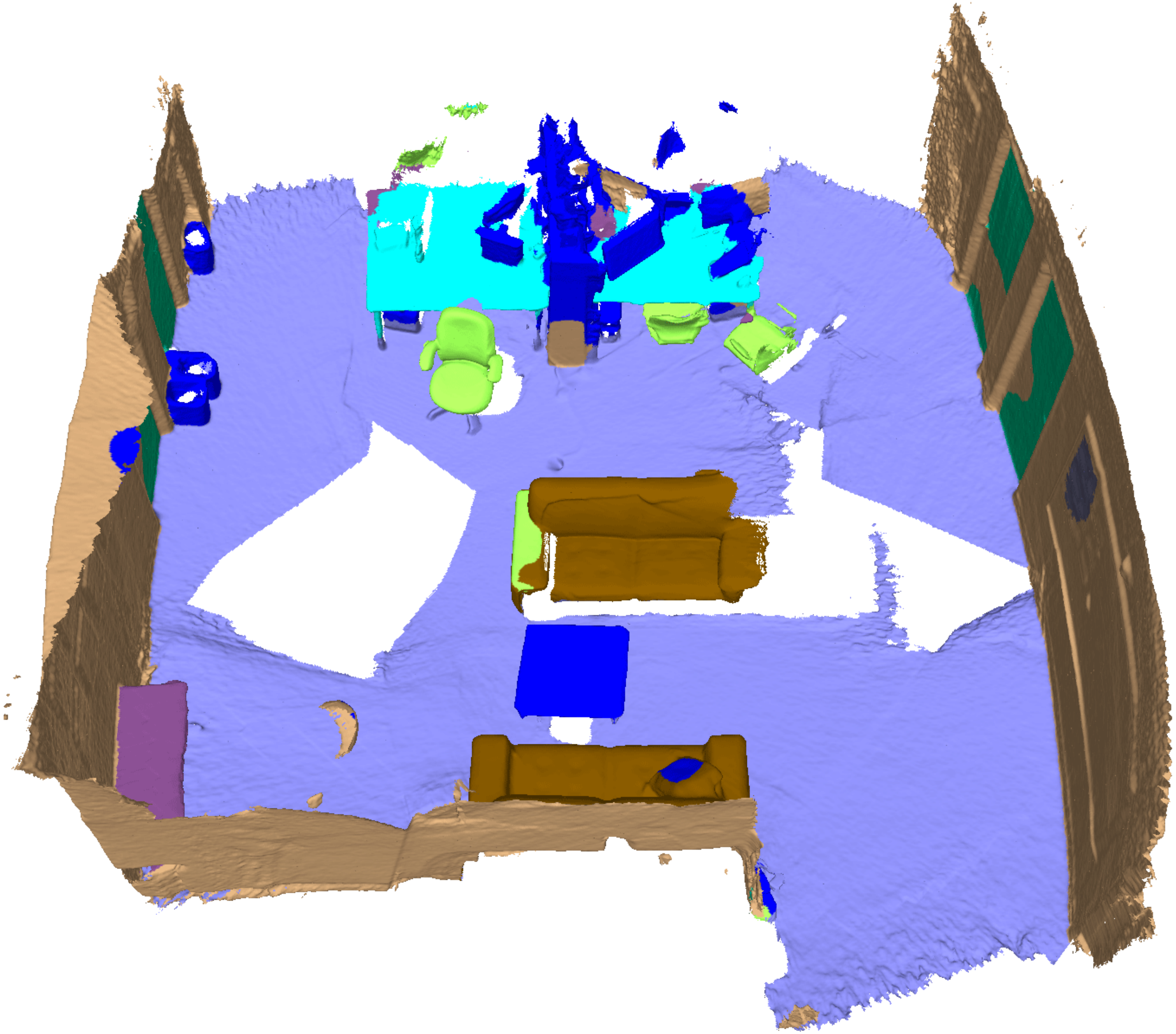


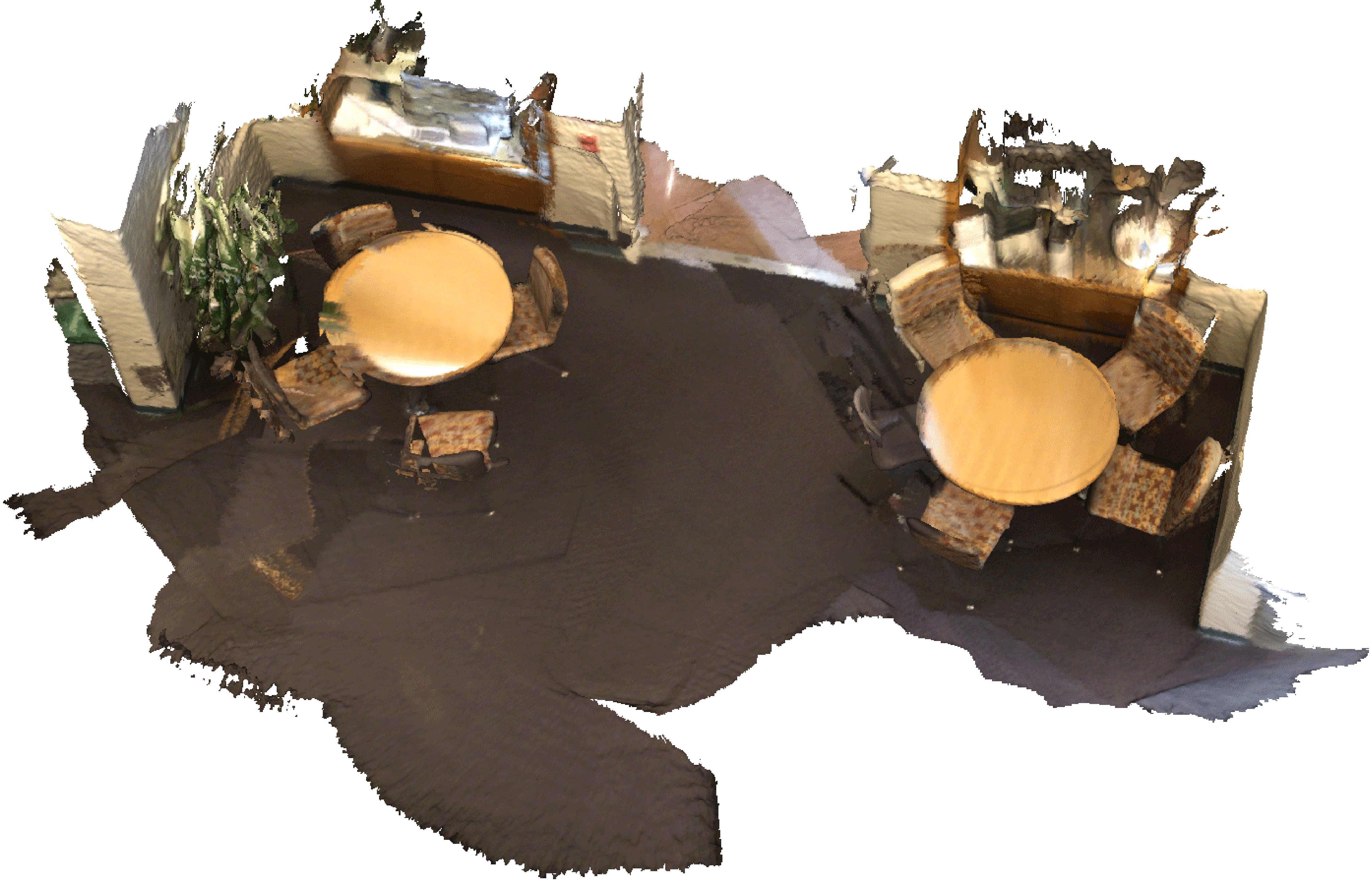


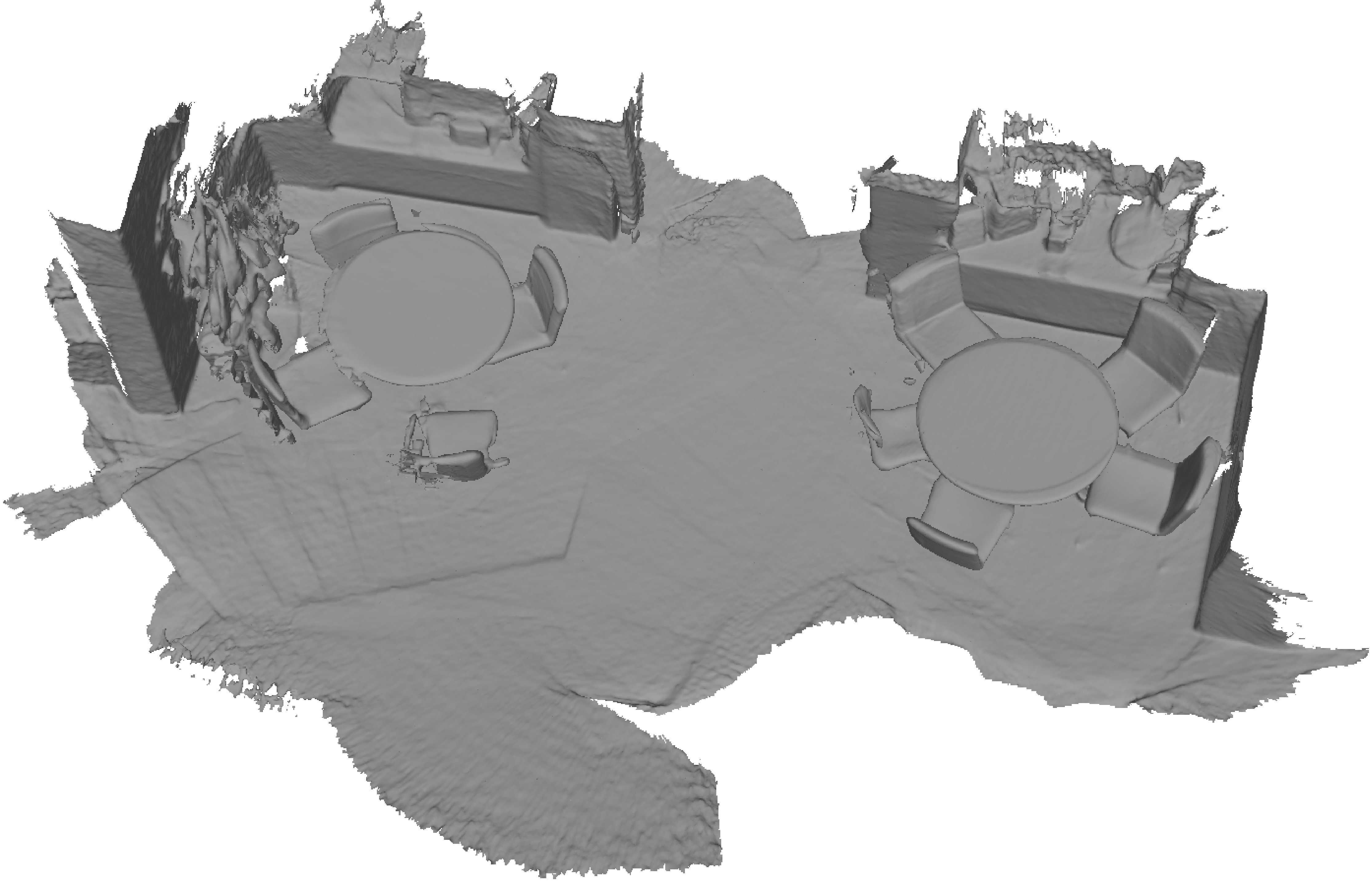


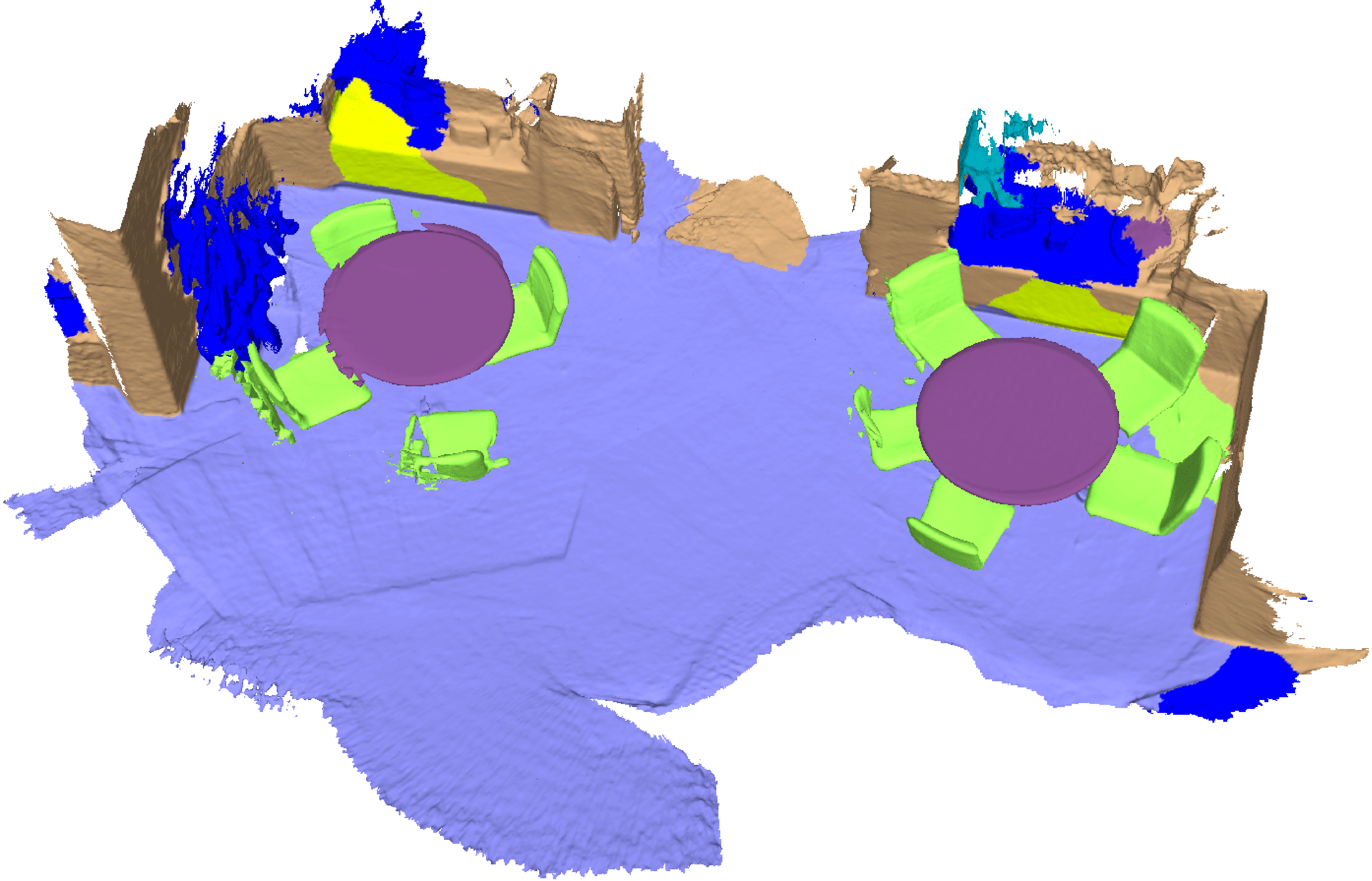


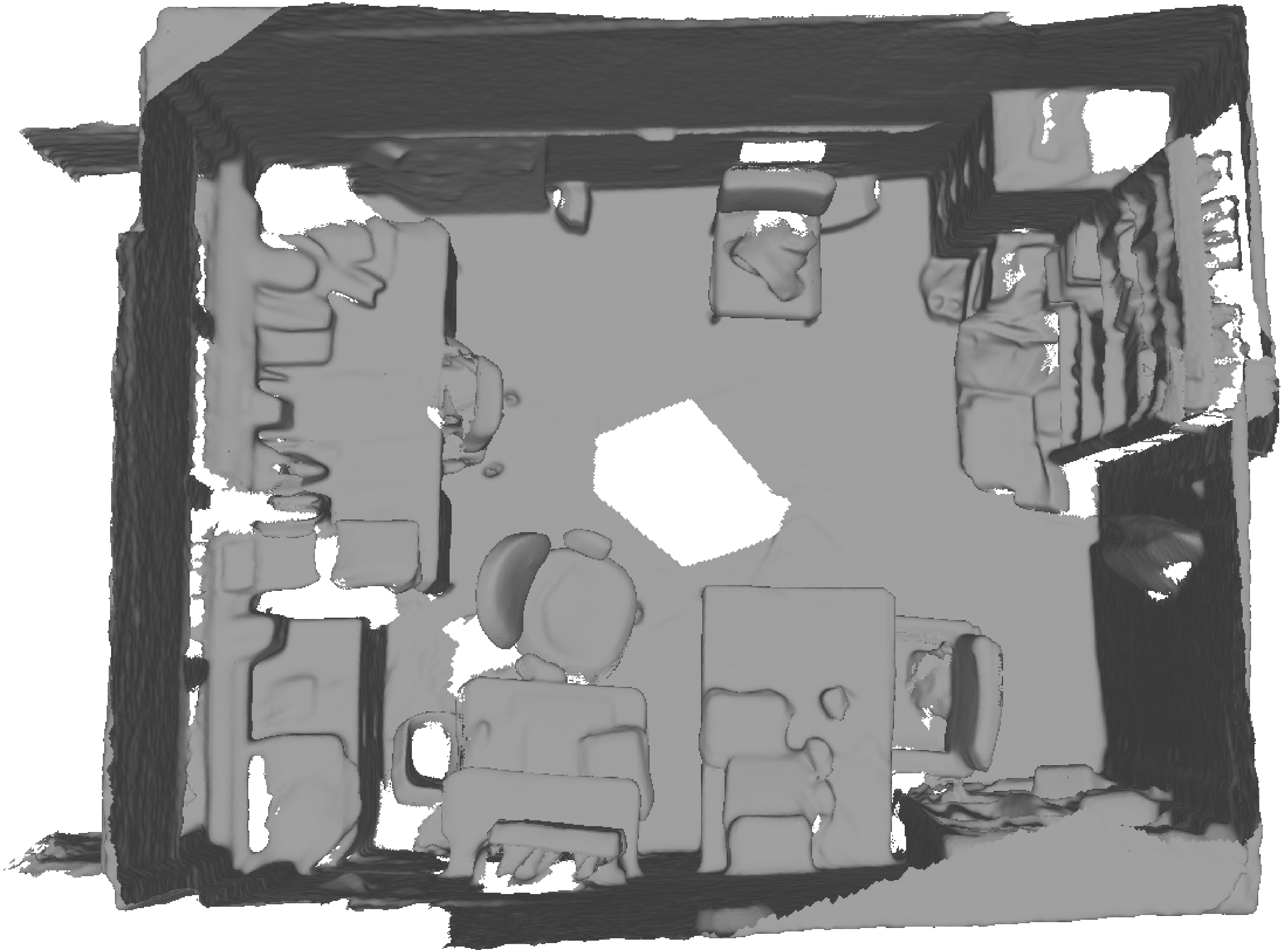


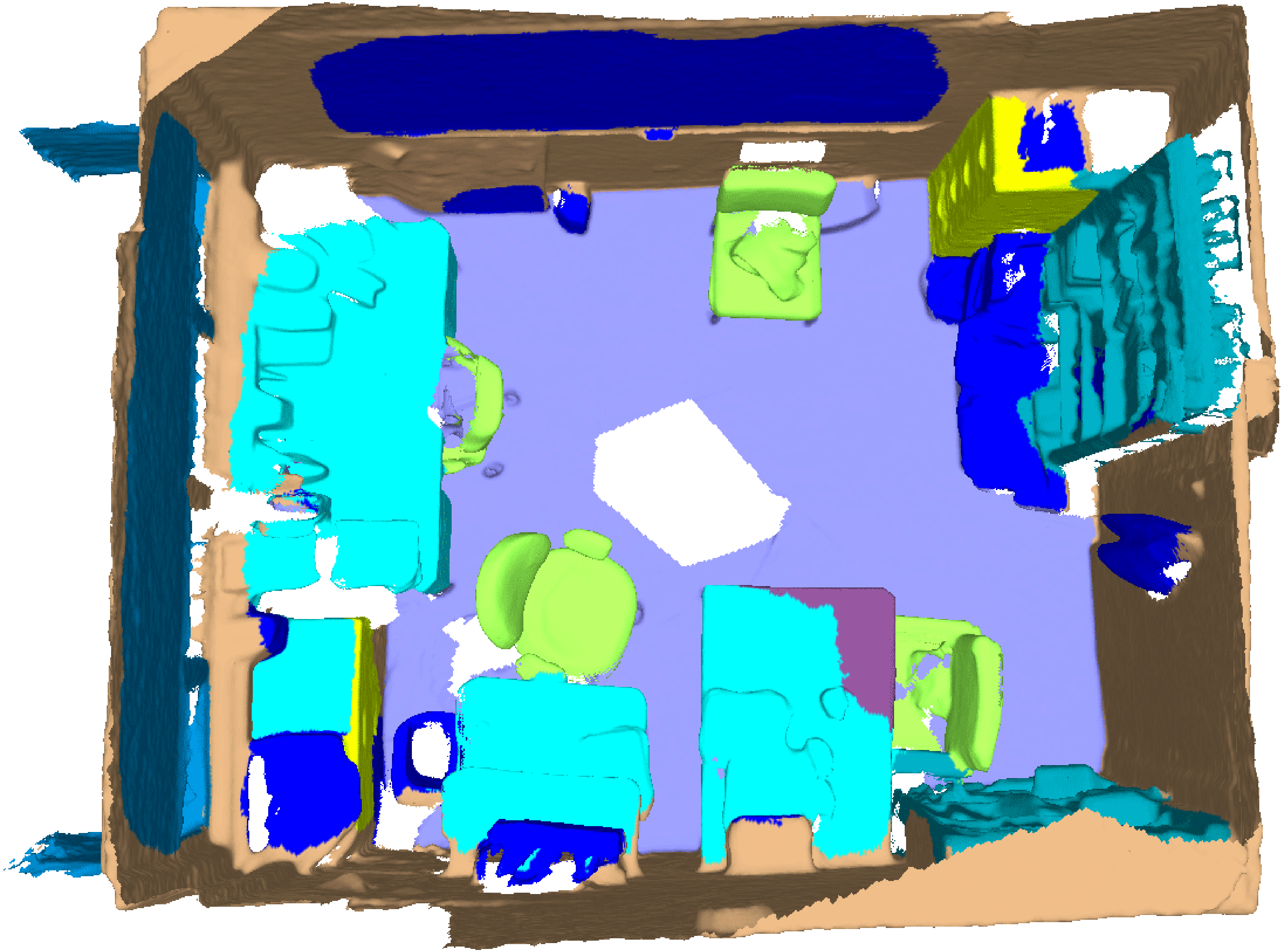


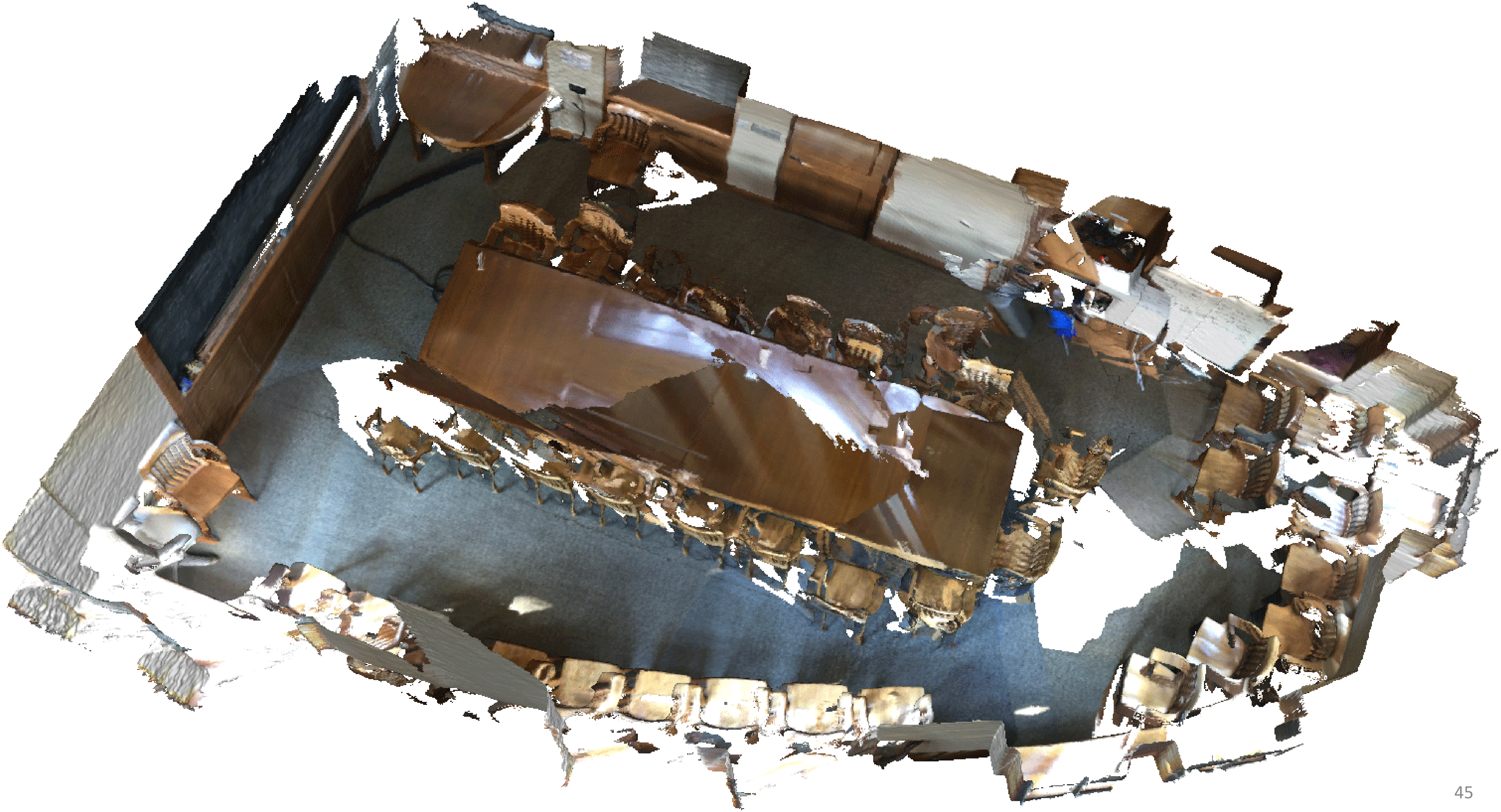


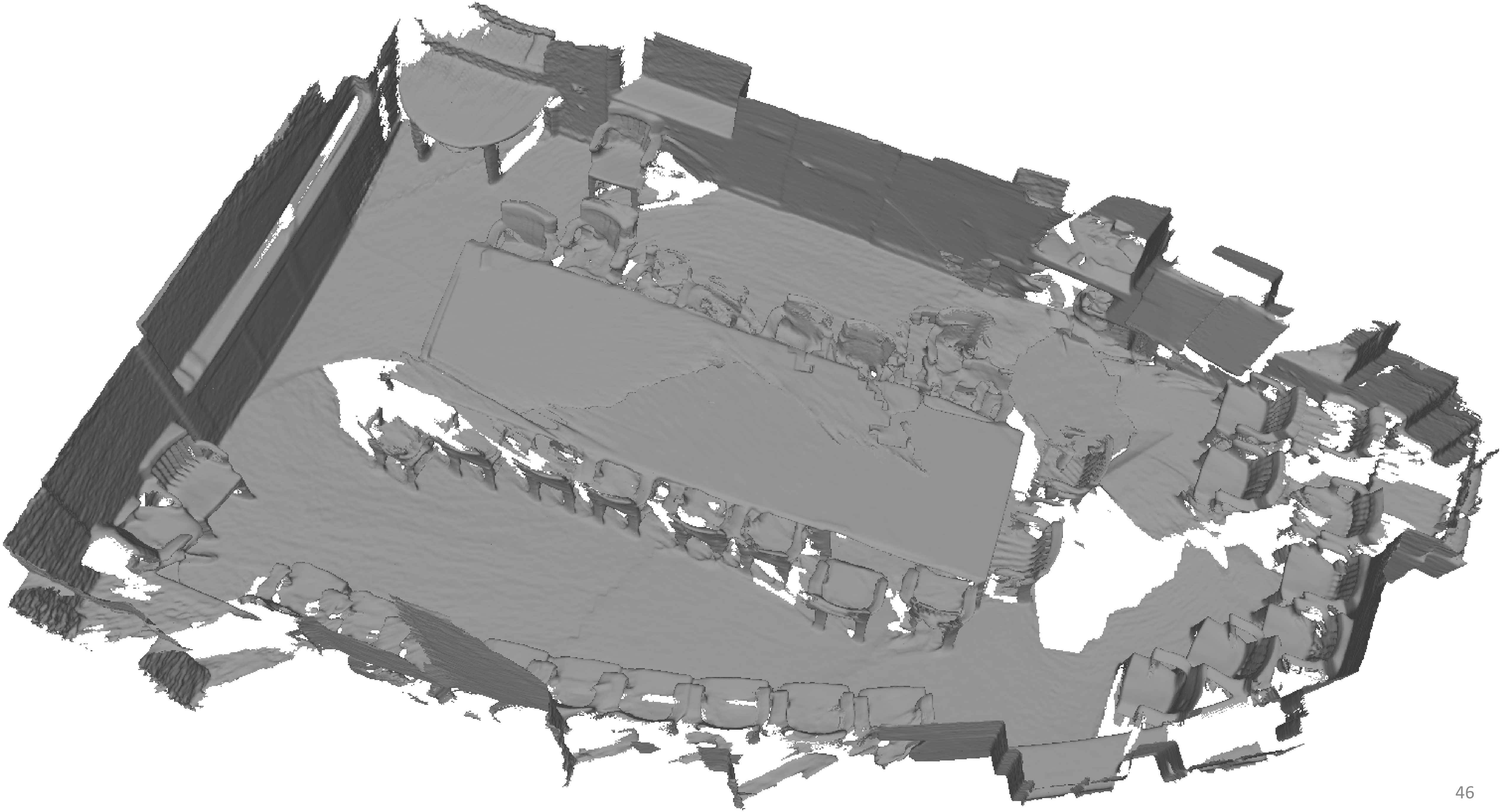


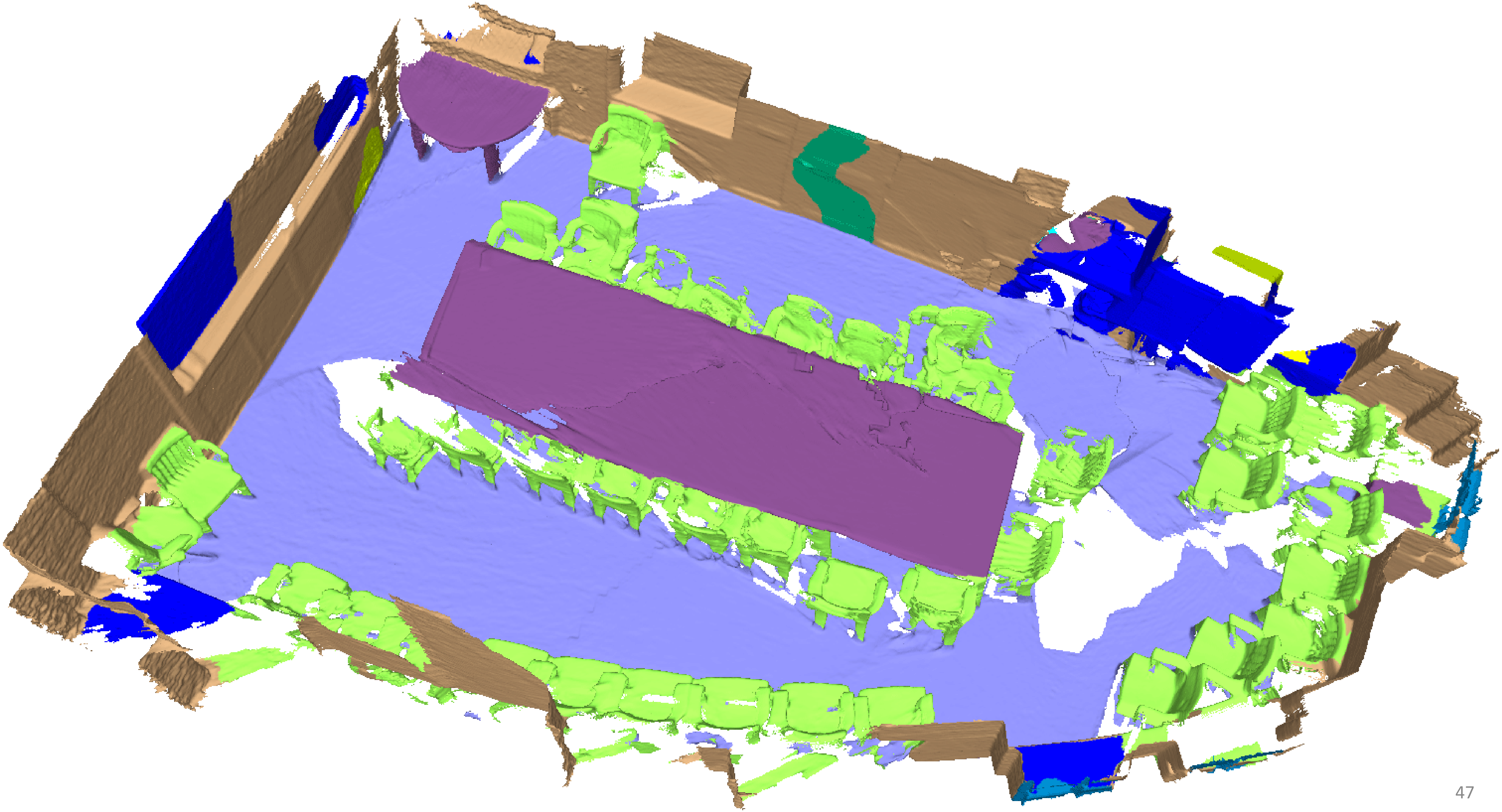


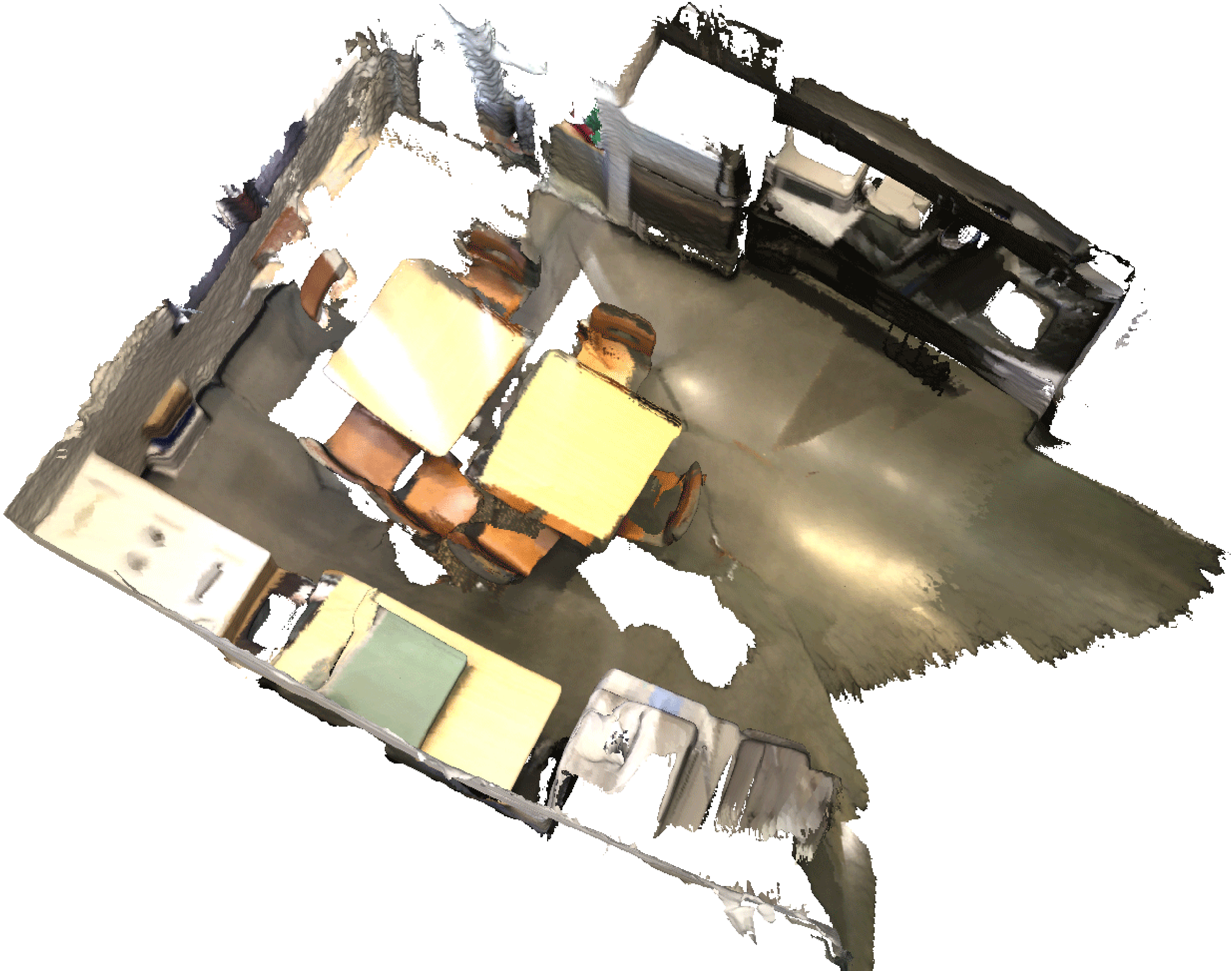


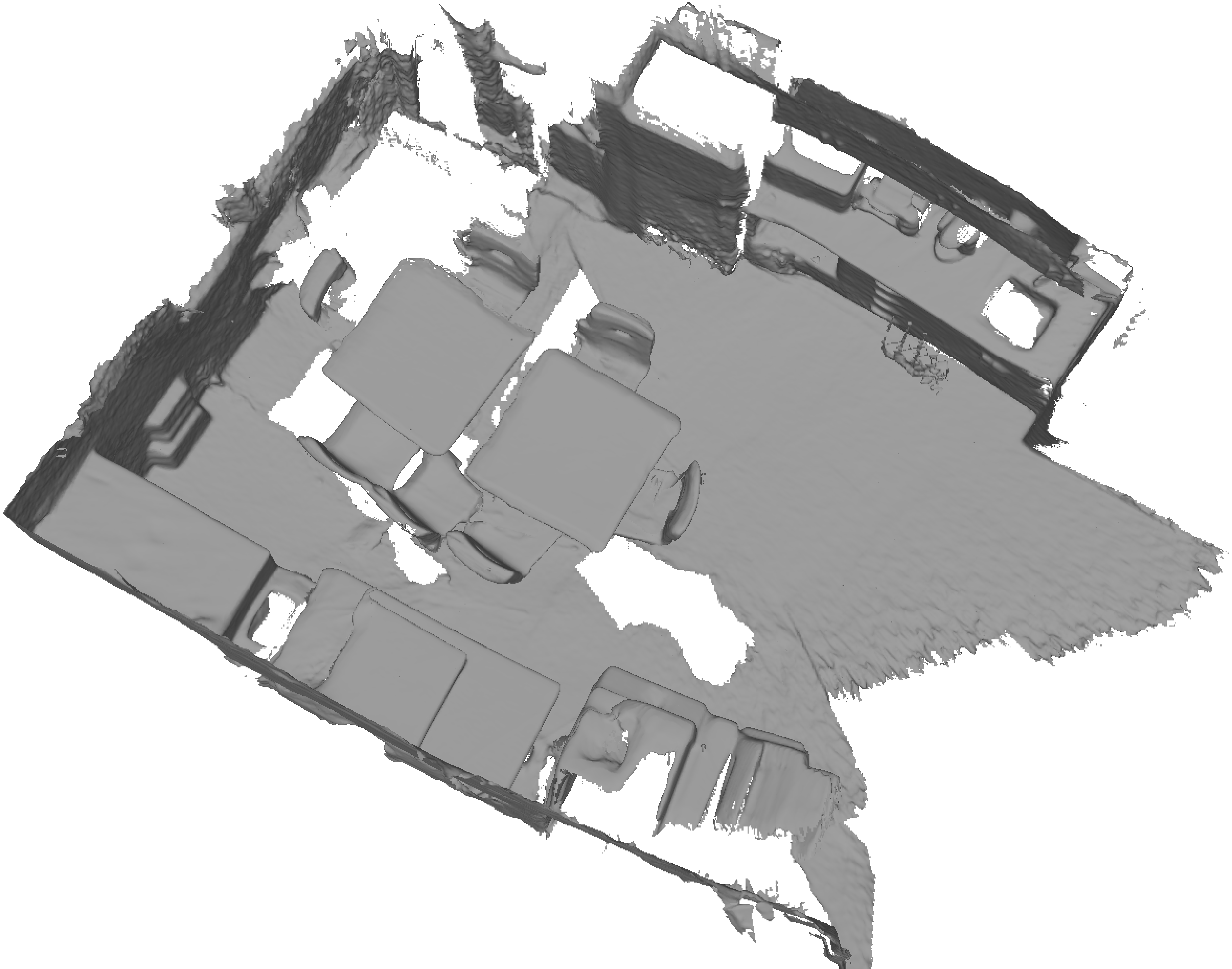


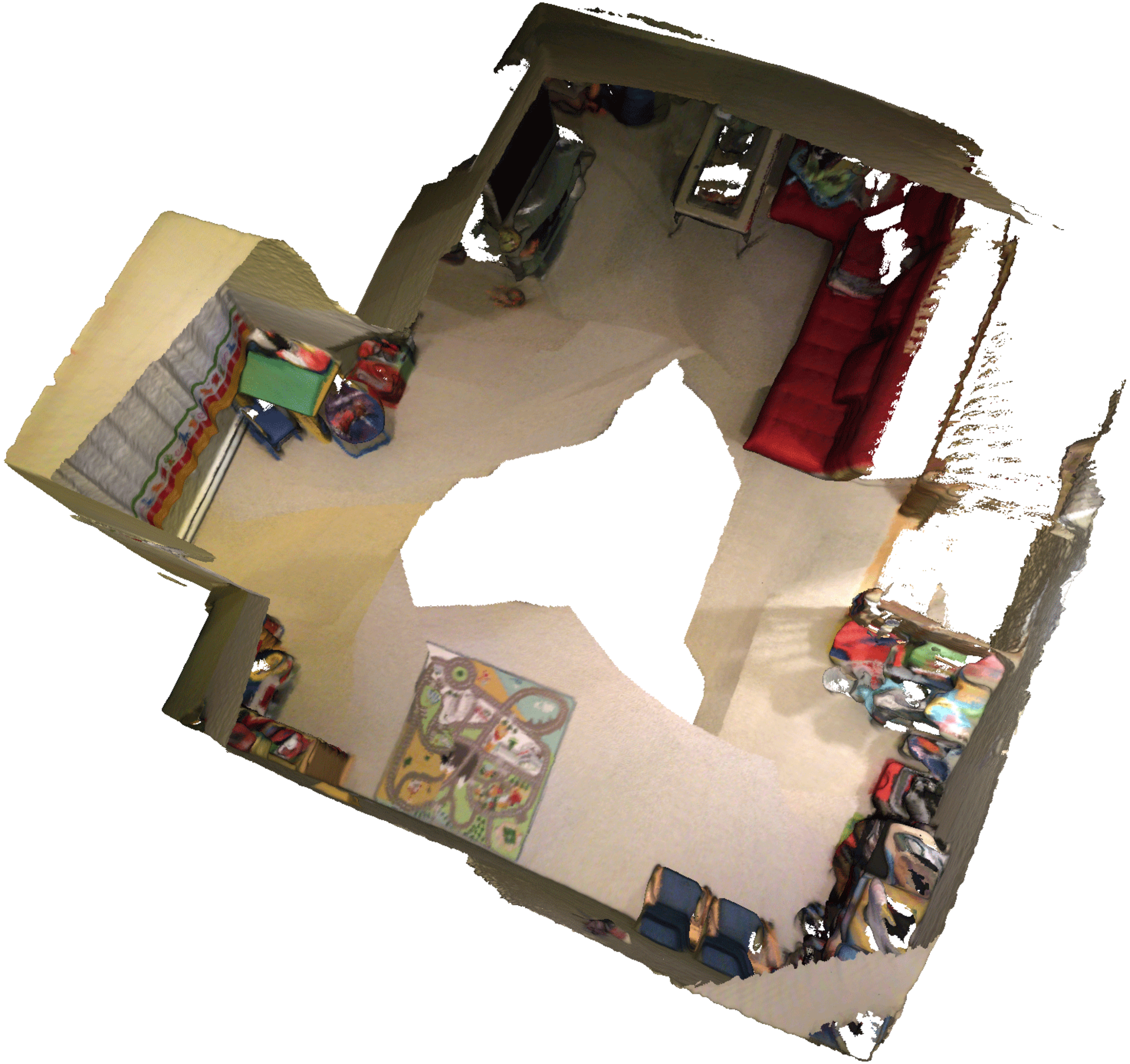


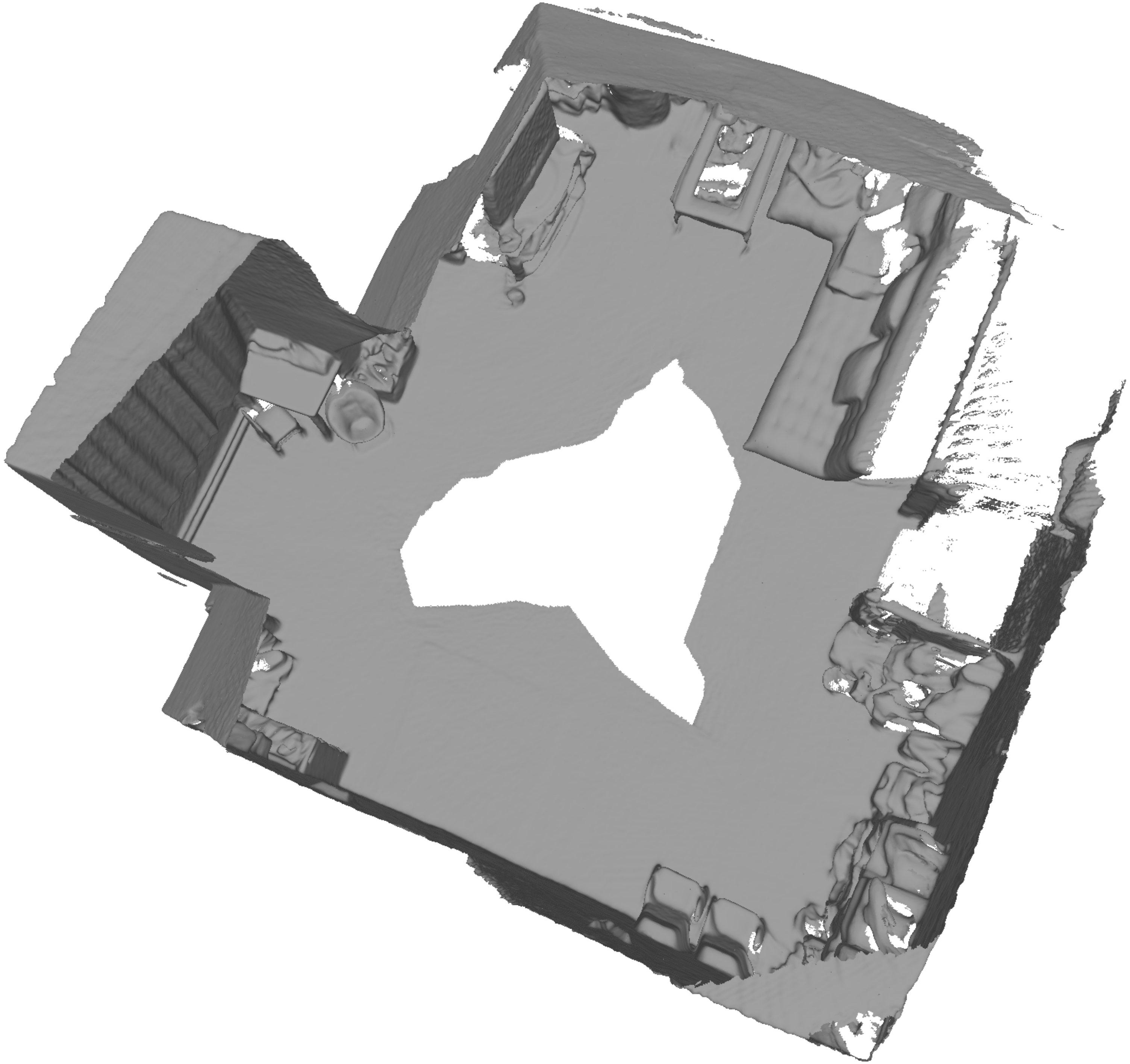


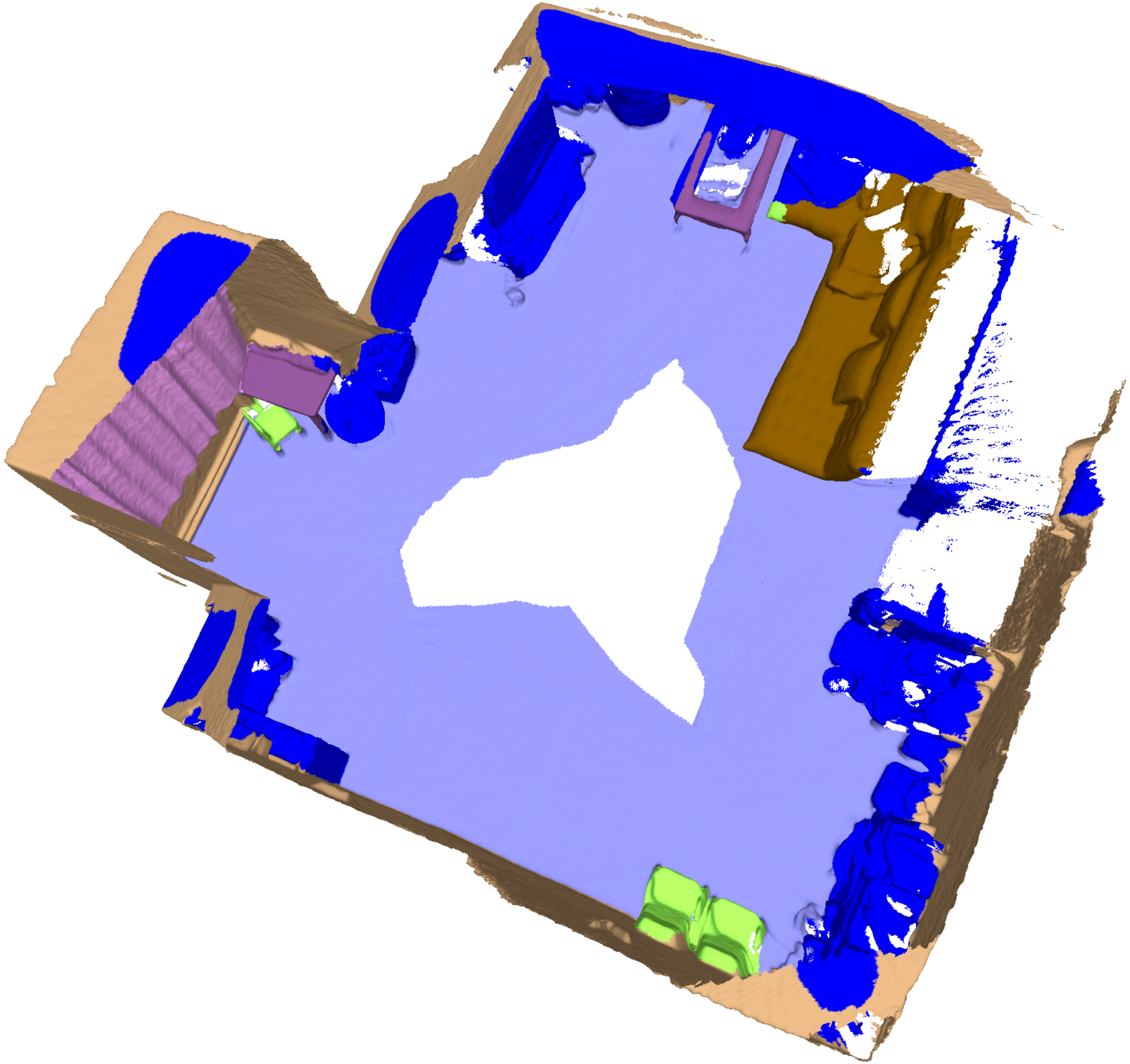










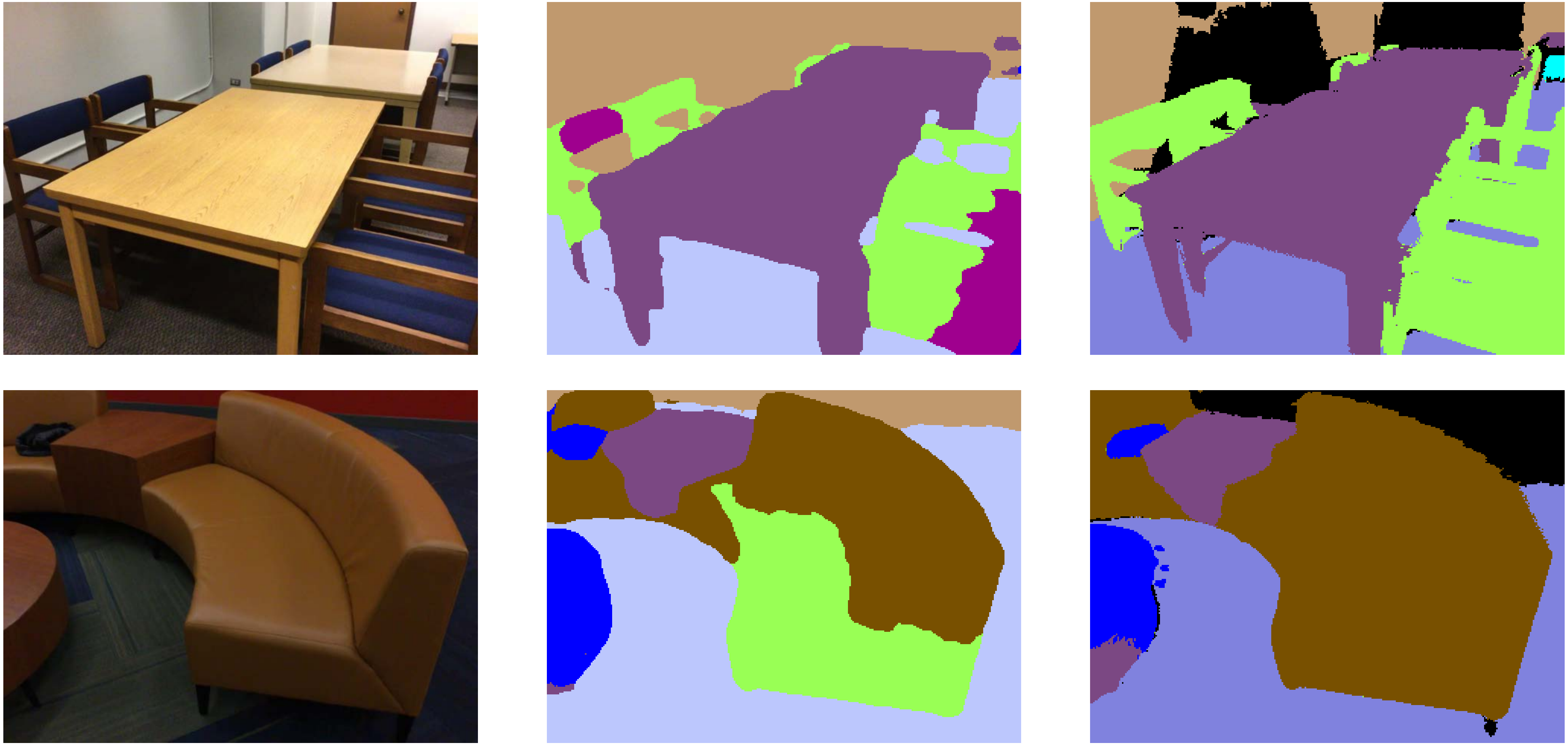


Single-image segmentation results vs. our projected results

- Single image segmentation
  - RDFNet [1] fine-tuned on ScanNet dataset [2]
- Ours projected results
  - 2D projection of our 3D semantically segmented meshes

⬛ unannotated	🟫 wall	🟦 floor	🟨 cabinet	🟪 bed	🟩 chair	🟫 sofa
🟪 table	🟩 door	🟦 window	🟦 bookshelf	⬛ picture	🟨 counter	🟦 desk
🟪 curtain	🟪 refrigerator	🟩 show curtain	🟩 toilet	🟥 sink	🟧 bathtub	🟦 other

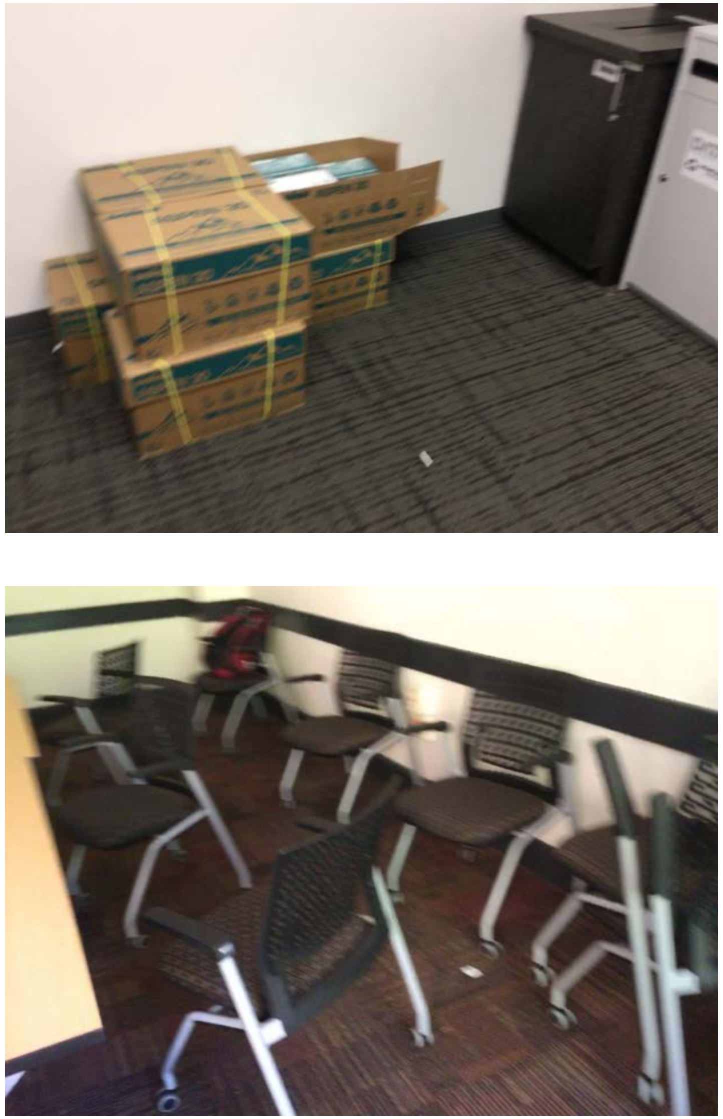
Pseudo colors for visualization



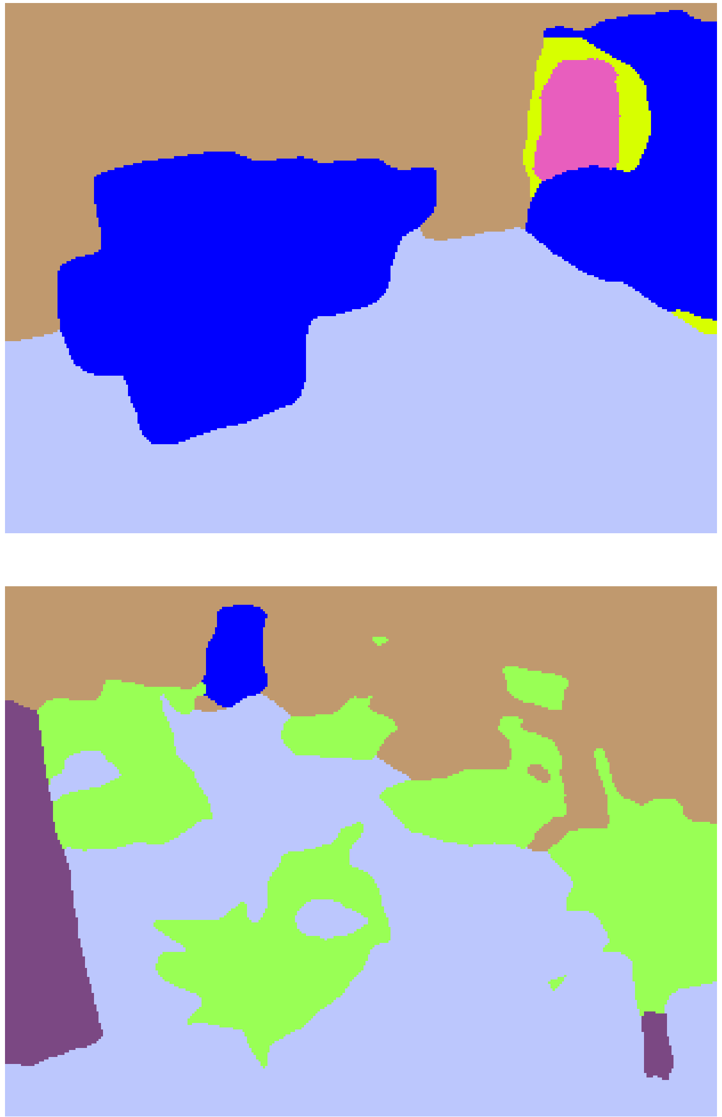
Input scene

Single image segmentation

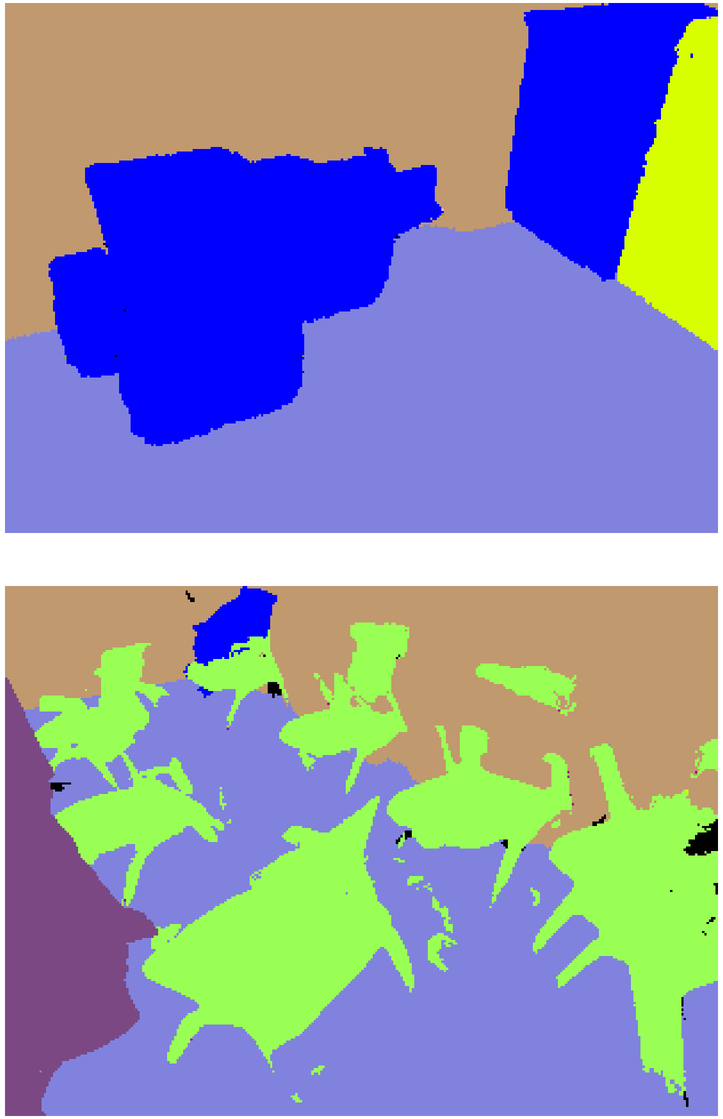
Projected segmentation



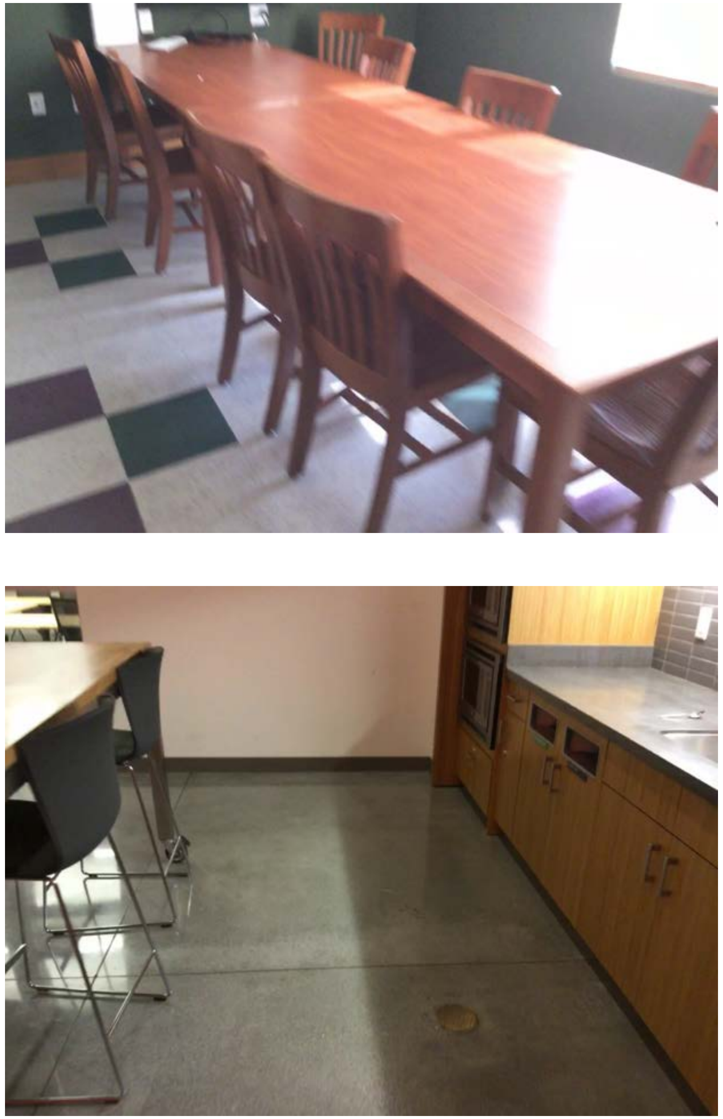
Input scene



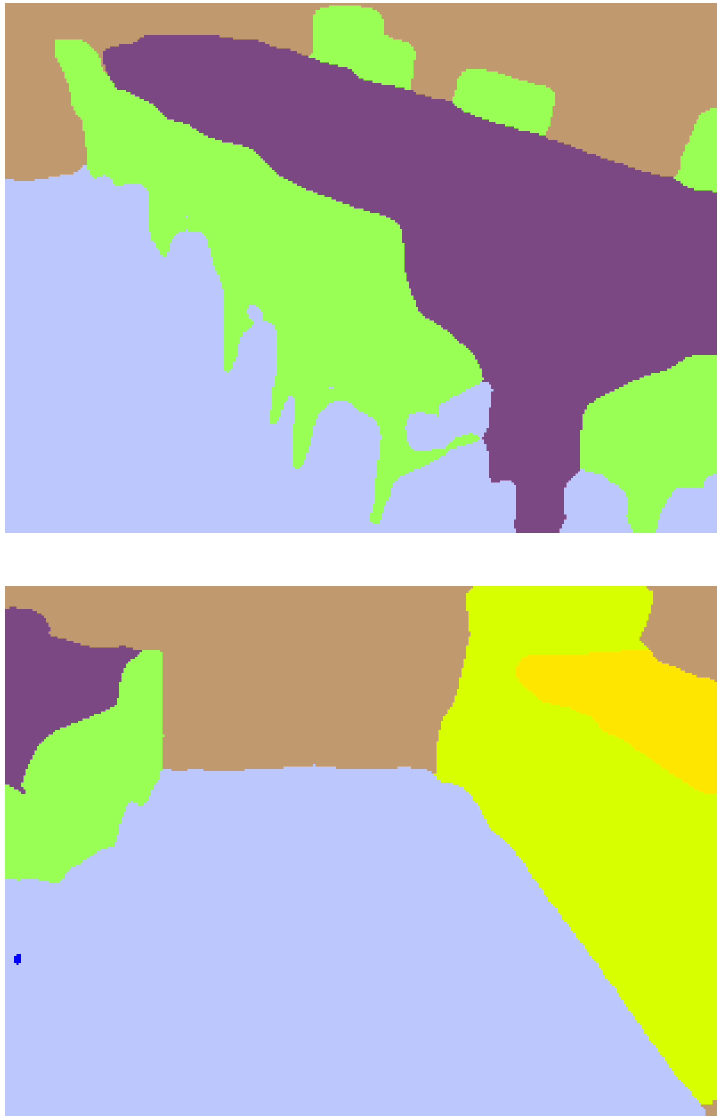
Single image segmentation



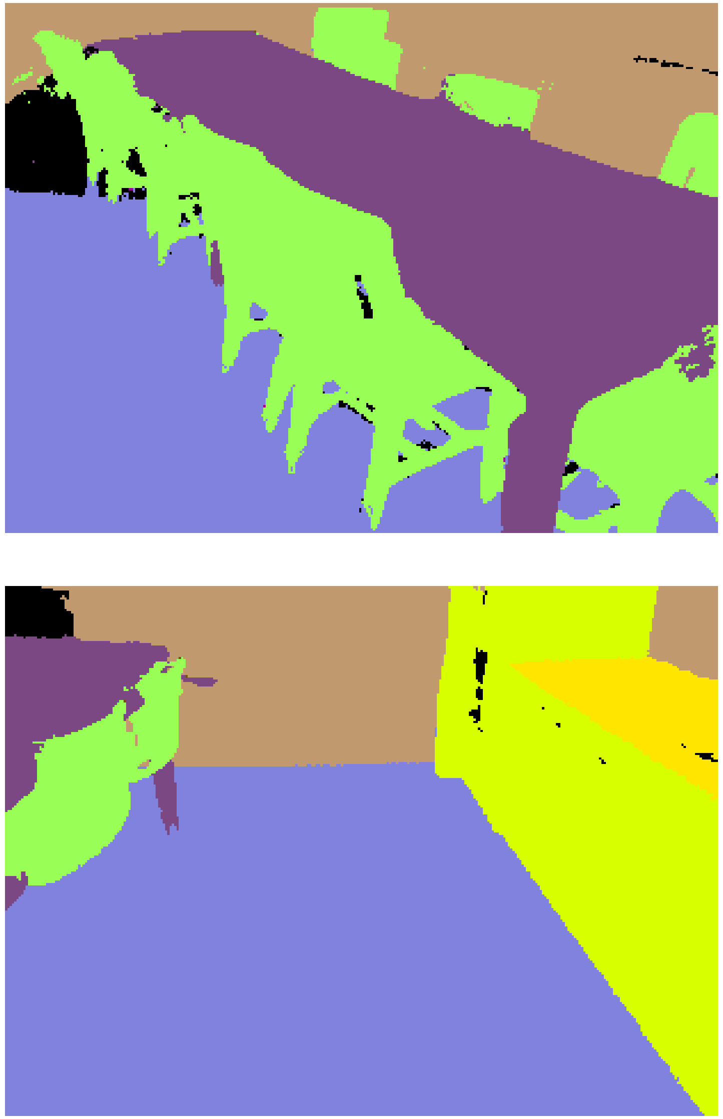
Projected segmentation



Input scene



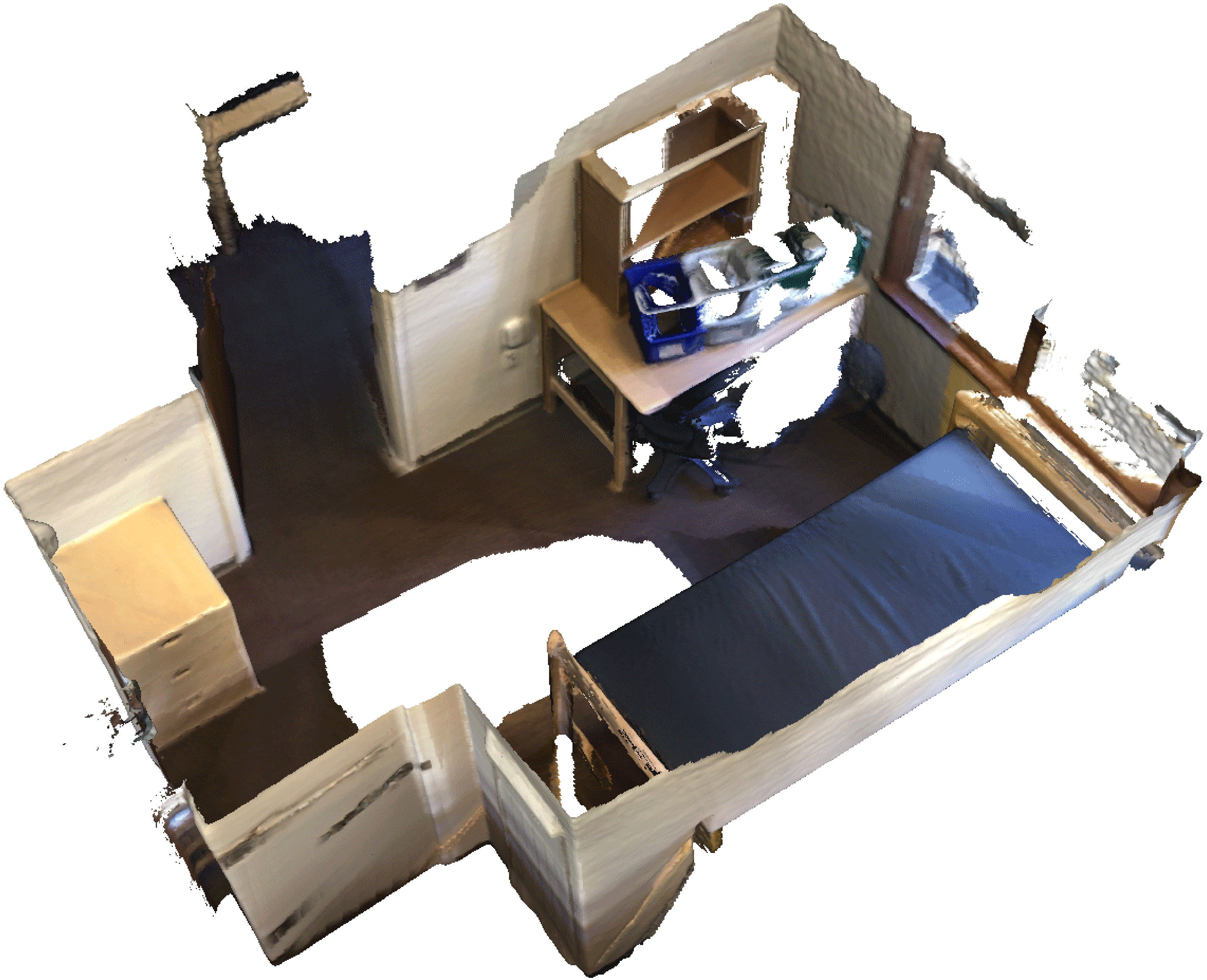
Single image segmentation

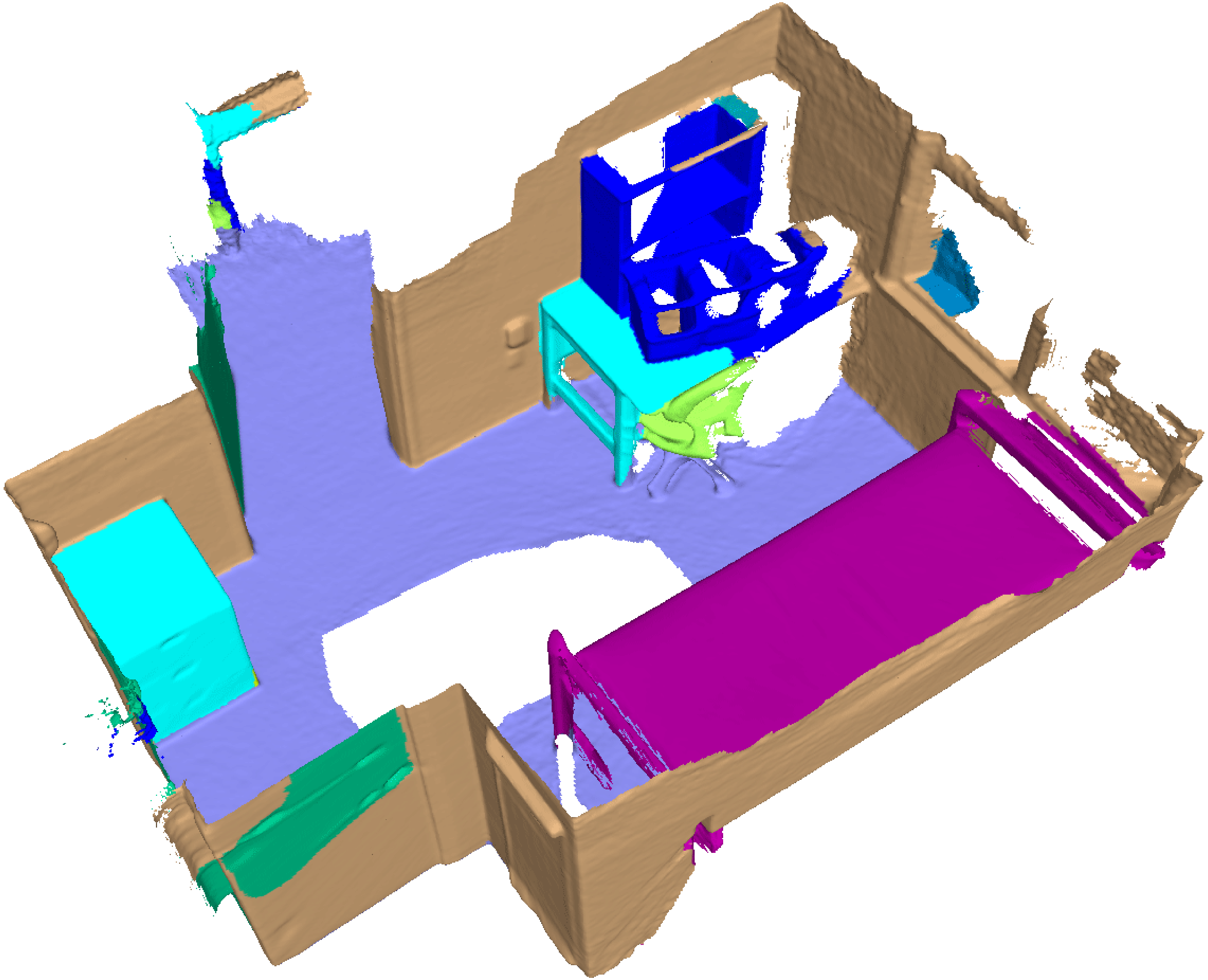


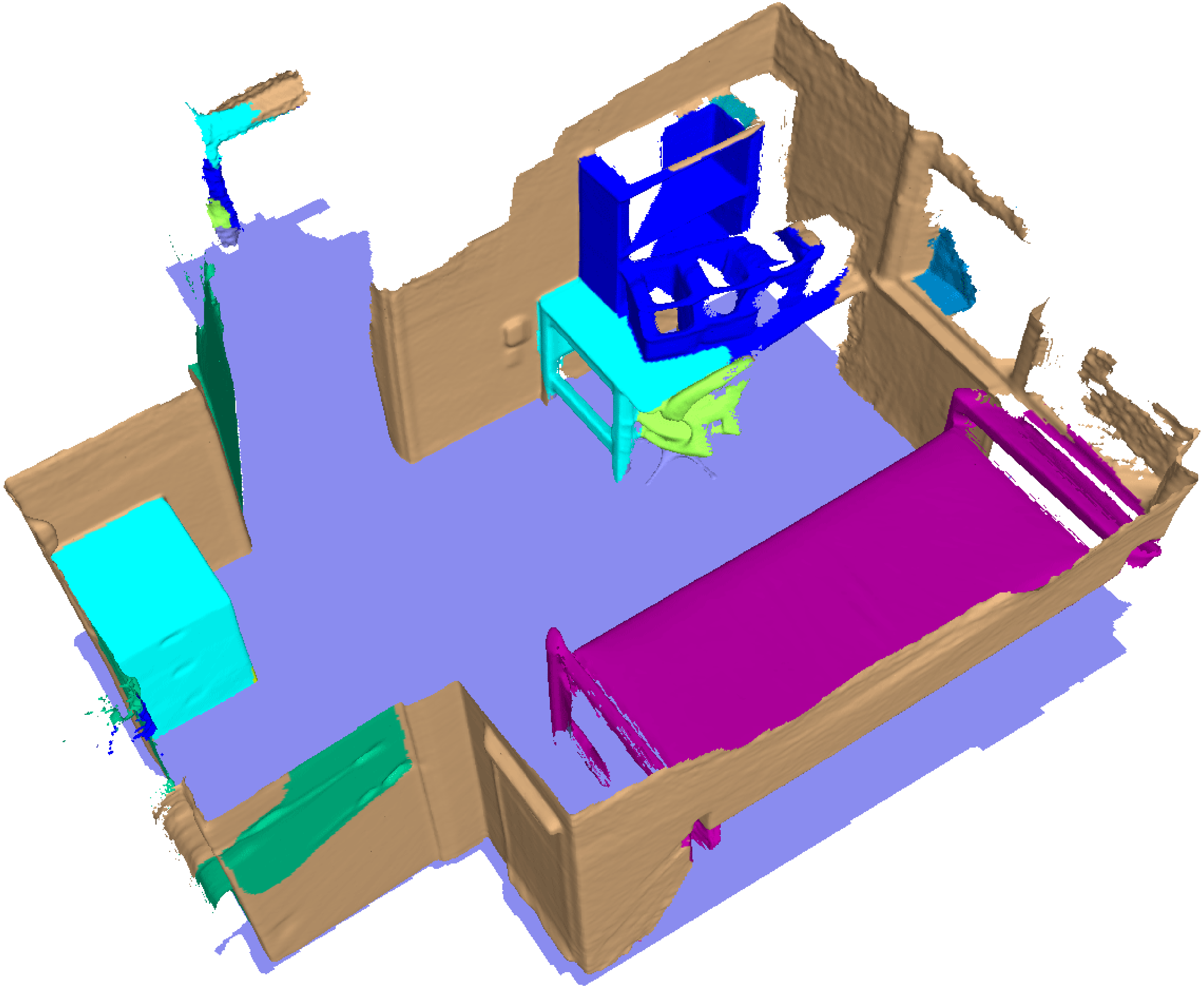
Projected segmentation

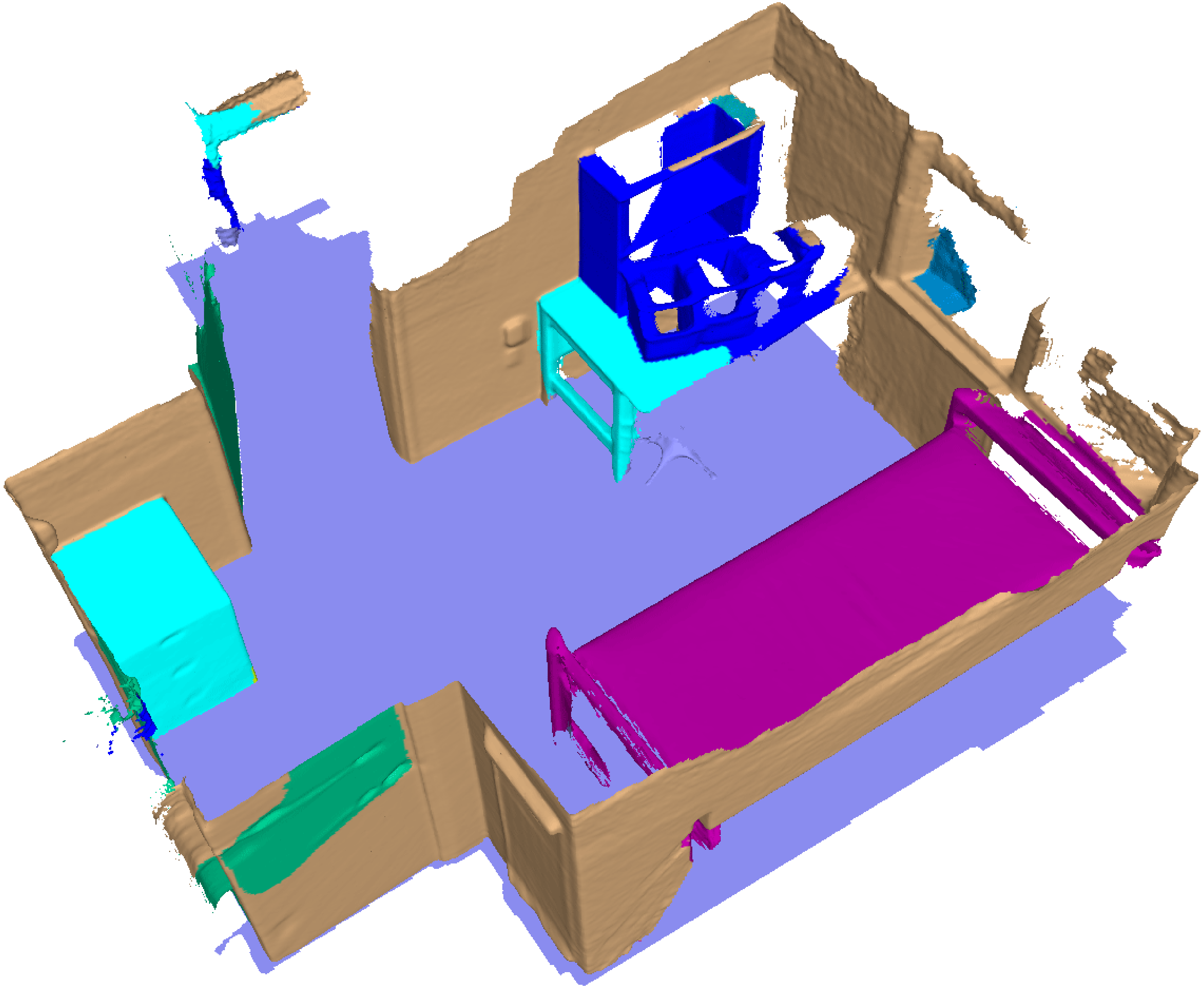
Scene Modification Results

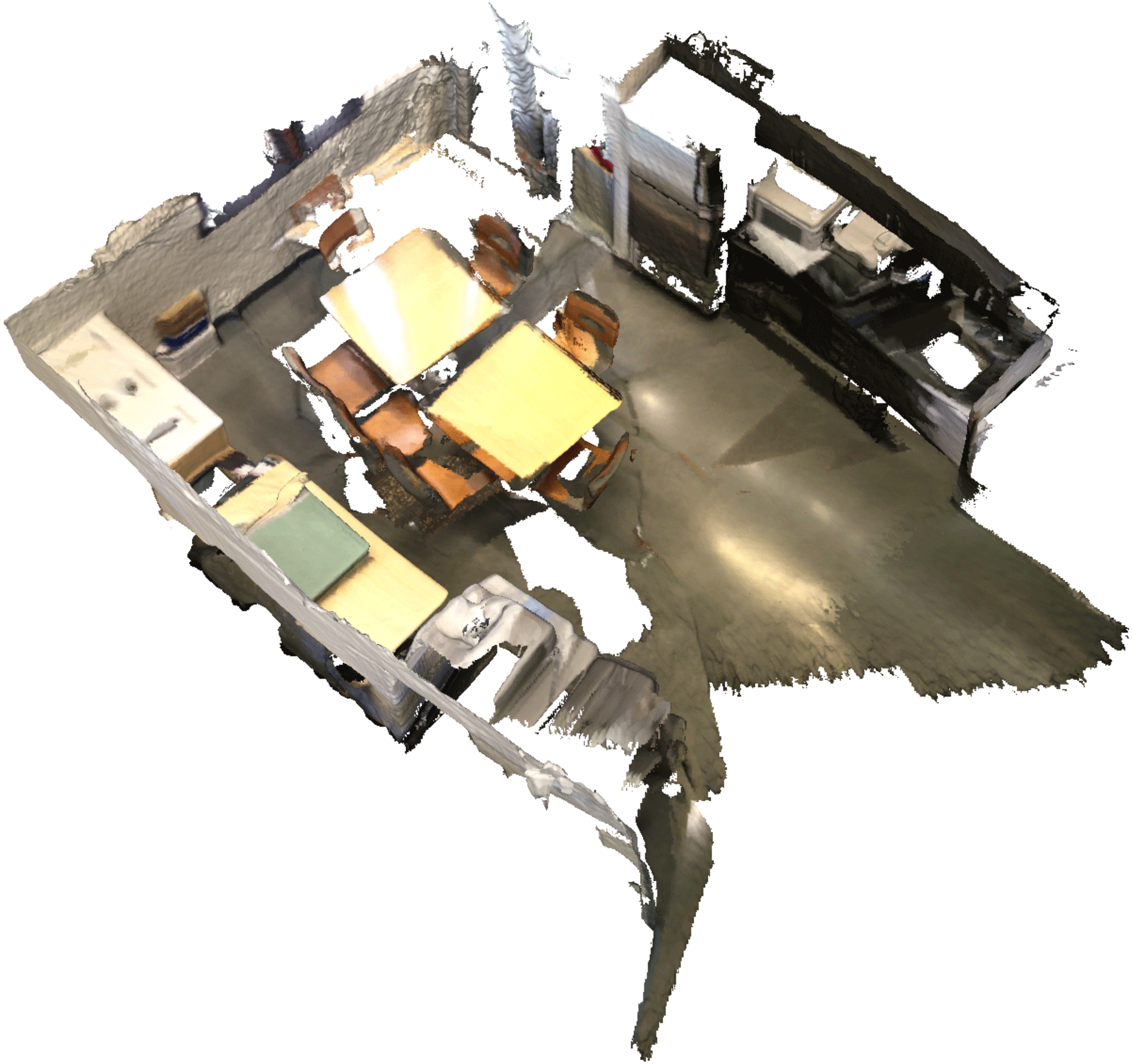
- Input scene
- Our segmentation result
- Completed scene
- Completed and manipulated scene

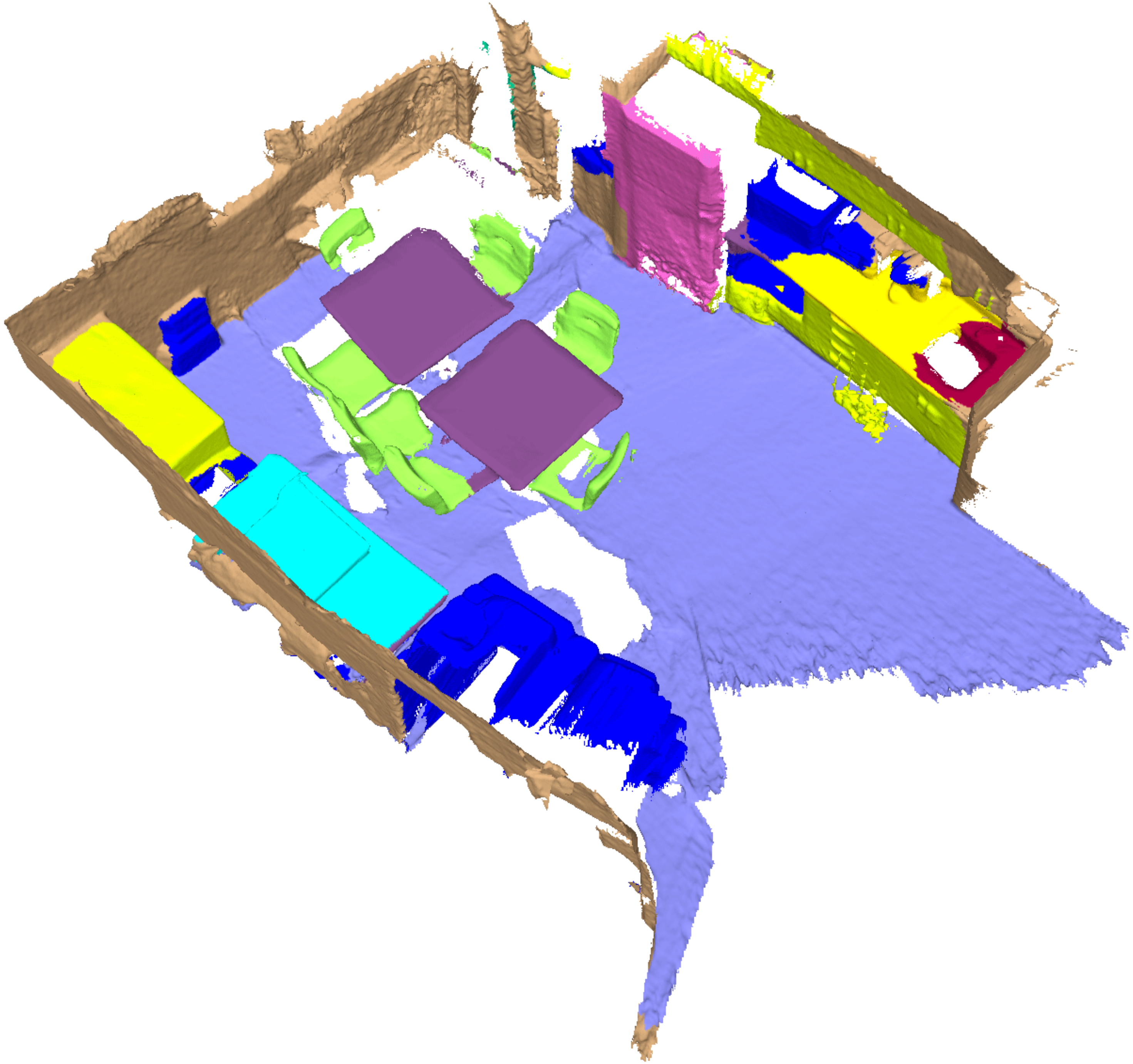


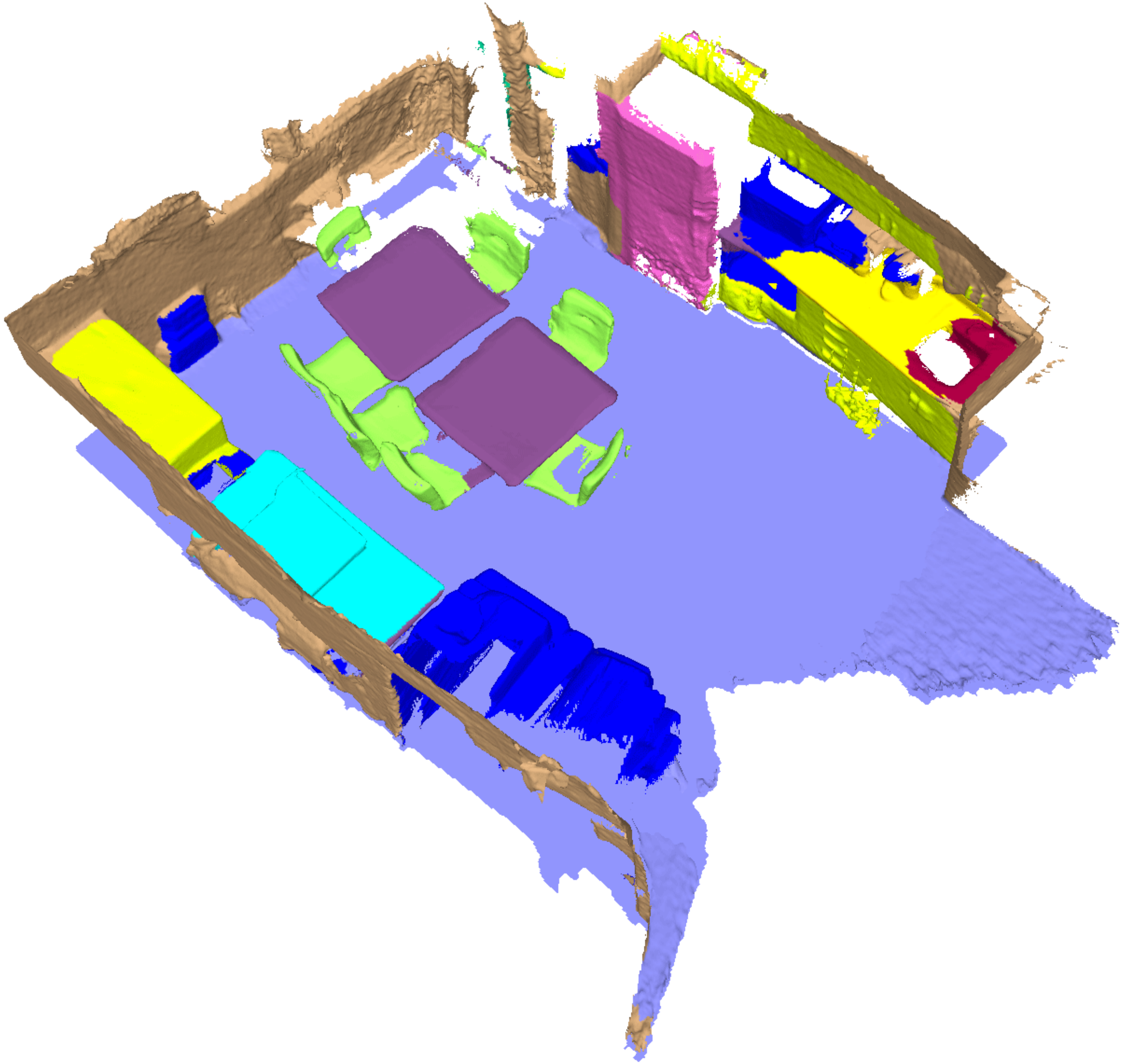


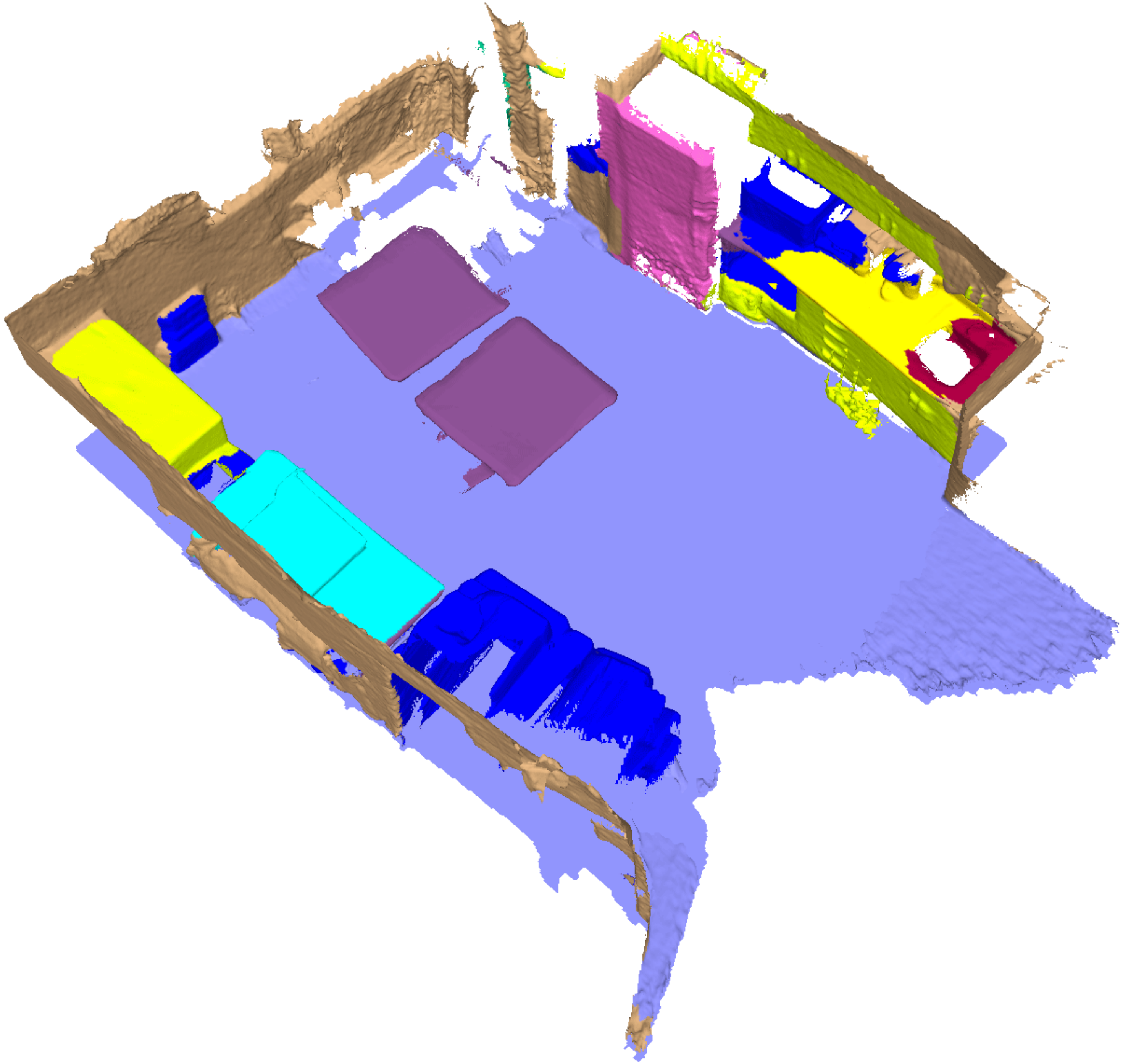












Reference

[1] PARK S.-J., HONG K.-S., LEE S.: Rdfnet: Rgb-d multi-level residual feature fusion for indoor semantic segmentation. In The IEEE International Conference on Computer Vision (ICCV) (2017).

[2] DAI A., CHANG A. X., SAVVA M., HALBER M., FUNKHOUSER T., NIESSNER M.: Scannet: Richly-annotated 3d reconstructions of indoor scenes. In IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (2017).