

Integrative Structure Validation Report ?

October 09, 2025 - 04:38 PM PDT

The following software was used in the production of this report:

IHMValidation Version 3.0
Python-IHM Version 2.5
MolProbity Version 4.5.2
EMDB validation analysis Version 0.0.1.dev127
ChimeraX Version 1.9
Chimera Version 1.19
MapQ Version 1.8.1

PDB ID	9A0K pdb_00009a0k
PDB-Dev ID	PDBDEV_00000056
Structure Title	A structural model of the endogenous human SWI/SNF (BAF) complex bound to the nucleosome informs disease mechanisms
Structure Authors	Mashtalir N; Suzuki H; Farrell DP; Sankar A; Luo J; Filipovski M; D'Avino AR; St.Pierre R; Valencia AM; Onikubo T; Roeder RG; Han Y; He Y; Ranish JA; DiMaio F; Walz T; Kadoch C
Deposited on	2020-08-24

This is a PDB-IHM Structure Validation Report.

We welcome your comments at helpdesk@pdb-ihm.org

A user guide is available at https://pdb-ihm.org/validation_help.html with specific help available everywhere you see the ? symbol.

List of references used to build this report is available [here](#).

1. Overview ?

1.1. Summary ?

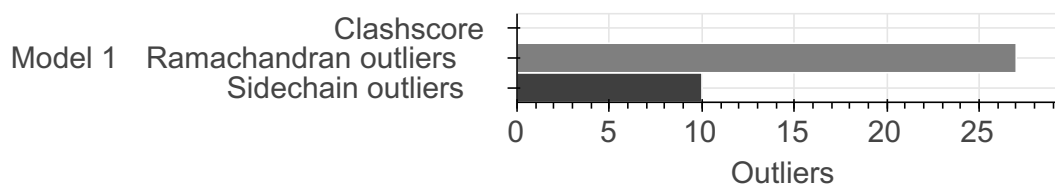
This entry consists of 1 model(s). A total of 49 dataset(s) were used to build this entry.

Name	Type	Count
3DEM volume	Experimental data	3
Crosslinking-MS data	Experimental data	1
Comparative model	Starting model	21
Experimental model	Starting model	22
De Novo model	Starting model	2

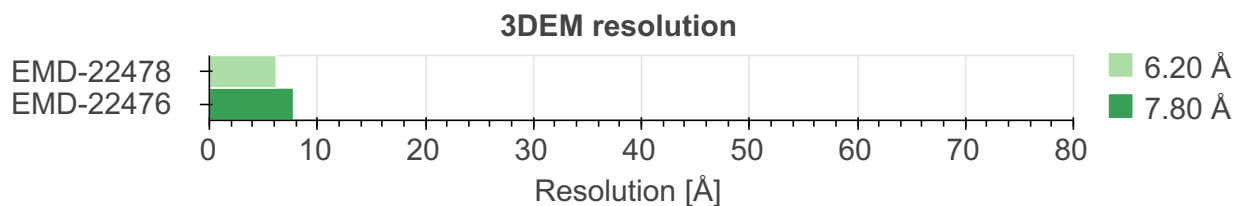
1.2. Overall quality ?

This validation report contains model quality assessments for all structures, data quality and fit to model assessments for SAS and crosslinking-MS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

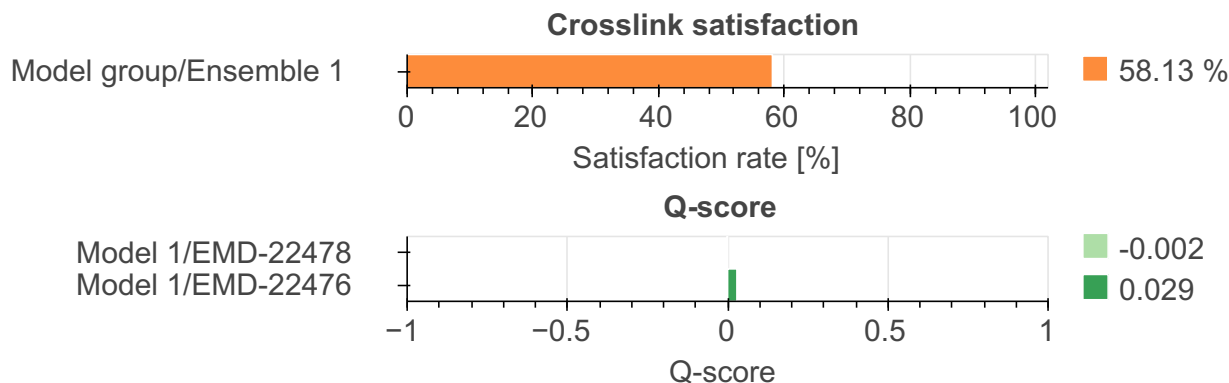
Model Quality: MolProbity Analysis ?



Data Quality ?



Fit to Data Used for Modeling ?



2. Model Details ?

2.1. Ensemble information ?

This entry consists of 0 distinct ensemble(s).

2.2. Representation ?

This entry has 1 representation(s).

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1	7	SMARCC1	1	1105	1-1105	-	100.00 / 100.00	Atomic
		8	SMARCC2	2	1214	1-1214	-	100.00 / 100.00	Atomic
		5	SMARCA4	4	1647	1-1647, 1-1647, 1-1647	-	100.00 / 100.00	Atomic
		2	ACTL6A	6	429	1-429	-	100.00 / 100.00	Atomic
		3	ARID1A	A	2285	1-2285	-	100.00 / 100.00	Atomic
		1	ACTB	B	375	1-375	-	100.00 / 100.00	Atomic
		9	SMARCD1	D	515	1-515	-	100.00 / 100.00	Atomic
		10	SMARCE1	E	411	220-298	-	19.22 / 100.00	Atomic
		4	DPF2	P	391	1-88	-	22.51 / 100.00	Atomic
		11	H2A	V	130	1-130	-	100.00 / 100.00	Atomic
				v					
		12	H2B	W	126	1-126	-	100.00 / 100.00	Atomic
				w					
		13	H3	X	136	1-136	-	100.00 / 100.00	Atomic
				x					
		14	H4	Y	103	1-103	-	100.00 / 100.00	Atomic
				y					
		6	SMARCB1	b	385	1-385, 1-385	-	100.00 / 100.00	Atomic
		15	601 dna fwd	p	196	1-196	-	100.00 / 100.00	Atomic
		16	601 dna rev	q	196	1-196	-	100.00 / 100.00	Atomic

2.3. Datasets used for modeling ?

There are 49 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	3DEM volume	Zenodo	10.5281/zenodo.3998811
2	Crosslinking-MS data	PRIDE	PXD020992
3	Comparative model	Zenodo	10.5281/zenodo.3998811
4	Comparative model	Zenodo	10.5281/zenodo.3998811
5	Comparative model	Zenodo	10.5281/zenodo.3998811
6	Comparative model	Zenodo	10.5281/zenodo.3998811
7	Comparative model	Zenodo	10.5281/zenodo.3998811
8	Comparative model	Zenodo	10.5281/zenodo.3998811
9	Comparative model	Zenodo	10.5281/zenodo.3998811
10	Comparative model	Zenodo	10.5281/zenodo.3998811
11	Comparative model	Zenodo	10.5281/zenodo.3998811
12	Comparative model	Zenodo	10.5281/zenodo.3998811
13	Comparative model	Zenodo	10.5281/zenodo.3998811
14	Comparative model	Zenodo	10.5281/zenodo.3998811
15	Comparative model	Zenodo	10.5281/zenodo.3998811
16	Comparative model	Zenodo	10.5281/zenodo.3998811
17	Comparative model	Zenodo	10.5281/zenodo.3998811
18	Comparative model	Zenodo	10.5281/zenodo.3998811
19	Comparative model	Zenodo	10.5281/zenodo.3998811
20	Comparative model	Zenodo	10.5281/zenodo.3998811
21	Comparative model	Zenodo	10.5281/zenodo.3998811
22	Comparative model	Zenodo	10.5281/zenodo.3998811
23	Comparative model	Zenodo	10.5281/zenodo.3998811
24	De Novo model	Zenodo	10.5281/zenodo.3998811
25	De Novo model	Zenodo	10.5281/zenodo.3998811
26	Experimental model	PDB	pdb_00006uxv
27	Experimental model	PDB	pdb_00006uxv
28	Experimental model	PDB	pdb_00006uch
29	Experimental model	PDB	pdb_00006uxv
30	Experimental model	PDB	pdb_00005x0y
31	Experimental model	PDB	pdb_00005x0y
32	Experimental model	PDB	pdb_00005x0y
33	Experimental model	PDB	pdb_00006uxv

ID	Dataset type	Database name	Data access code
34	Experimental model	PDB	pdb_00005x0y
35	Experimental model	PDB	pdb_00005x0y
36	Experimental model	PDB	pdb_00006uxv
37	Experimental model	PDB	pdb_00004i6m
38	Experimental model	PDB	pdb_00005x0y
39	Experimental model	PDB	pdb_00006uxv
40	Experimental model	PDB	pdb_00004i6m
41	Experimental model	PDB	pdb_00005x0y
42	Experimental model	PDB	pdb_00005x0y
43	Experimental model	PDB	pdb_00006uxv
44	Experimental model	PDB	pdb_00005x0y
45	Experimental model	PDB	pdb_00005x0y
46	Experimental model	PDB	pdb_00004i6m
47	Experimental model	PDB	pdb_00005x0y
48	3DEM volume	EMDB	EMD-22476
49	3DEM volume	EMDB	EMD-22478

2.4. Methodology and software ?

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Production sampling	Monte Carlo	Not available	Not available	False	False
2	1	trRosetta	trRosetta	Not available	Not available	False	False
3	1	Rosetta Hybridize	Rosetta Hybridize	Not available	Not available	False	False

There are 3 software packages reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	Rosetta	Rosetta version unknown:ff8ee24ee5f65423d5064cba818ede41d012fa87 2020-08-10 10:39:53 -0700 from git@github.com:RosettaCommons/main.git	RosettaCM/hybridize and unpublished 'complex assembly'	https://www.rosettacommons.org/
2	trRosetta	1.0.0	trRosetta	https://github.com/gjoni/trRosetta
3	HHpred	website	protein homology detection	https://toolkit.tuebingen.mpg.de/hhpred

3. Data quality ?

3.2. Crosslinking-MS

At the moment, data validation is only available for crosslinking-MS data deposited as a fully [compliant](#) dataset in the [PRIDE Crosslinking](#) database. Correspondence between crosslinking-MS and entry entities is established using [pyHMMER](#). Only residue pairs that passed the reported threshold are used for the analysis. The values in the report have to be interpreted in the context of the experiment (i.e. only a minor fraction of in-situ or in-vivo dataset can be used for modeling).

Crosslinking-MS dataset is not available in the [PRIDE Crosslinking](#) database.

3.3. 3DEM ?

This section describes quality of the 3DEM datasets

[EMD-22476](#)

3.3.1. Experimental information ?

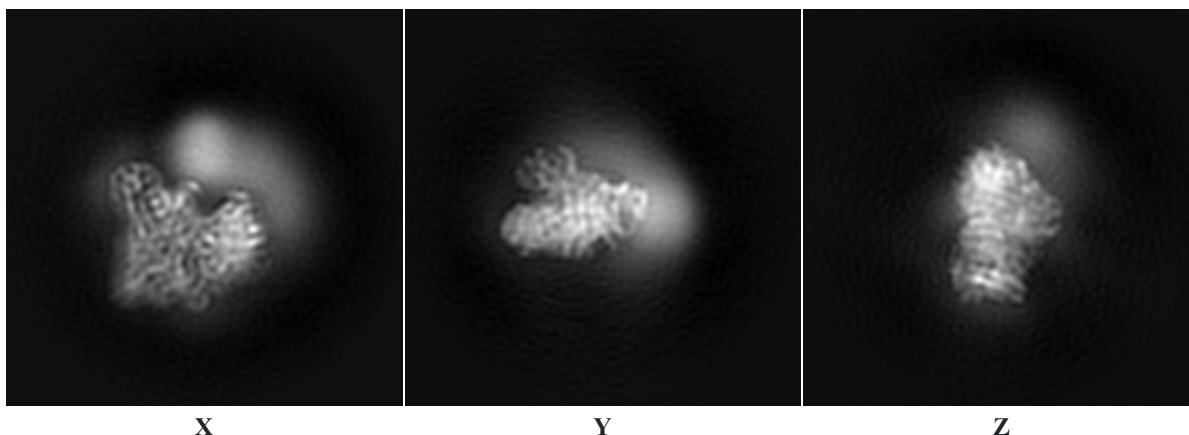
EM reconstruction method:	SINGLE PARTICLE		
Resolution:	7.80 Å		
Recommended level:	0.024		
Estimated volume:	567.46 nm ³		
Specimen preparation:	Preparation ID	1	Vitrification
Map-only validation report:	wwPDB validation report		

3.3.2. Map visualisation ?

This section contains visualisations of the EMDB entry EMD-22476. These allow visual inspection of the internal detail of the map and identification of artifacts. Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

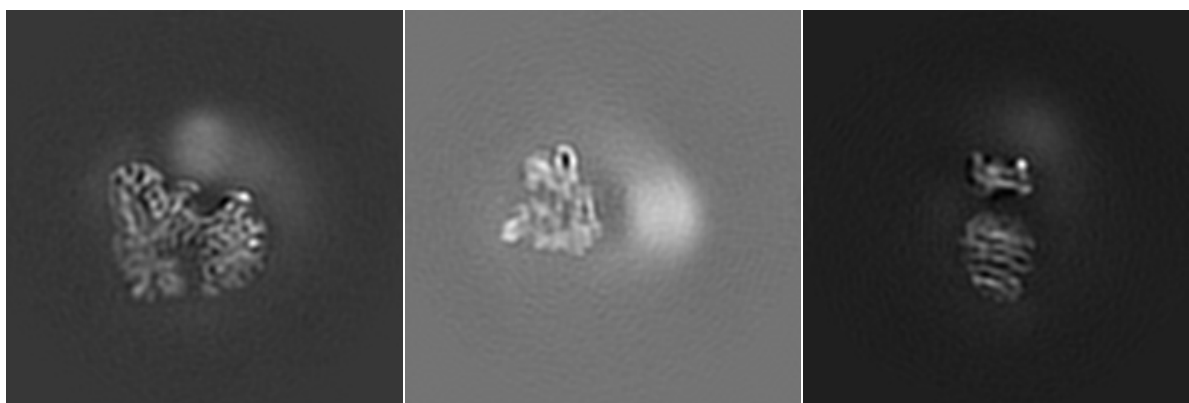
3.3.2.1. Orthogonal projections ?

[Primary map](#)



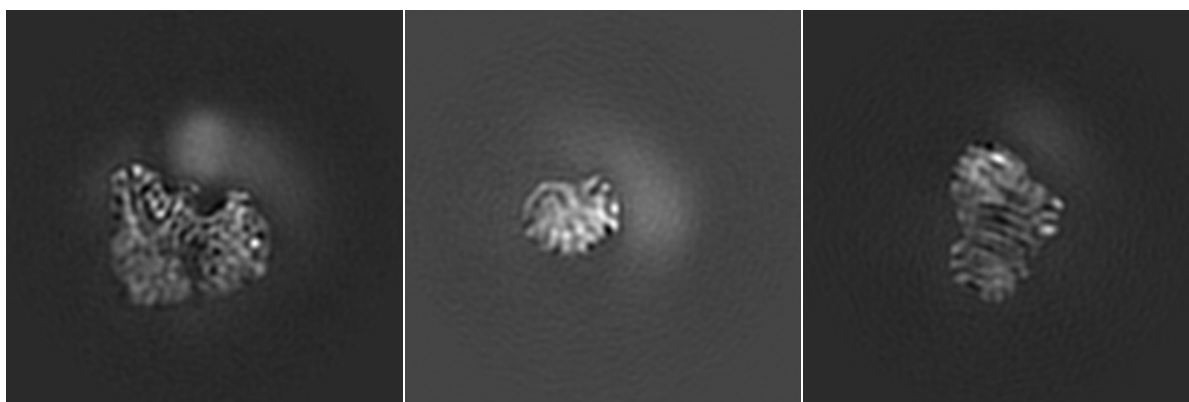
The images above show the map projected in three orthogonal directions.

3.3.2.2. Central slices ?

Primary map**X Index: 130****Y Index: 130****Z Index: 130**

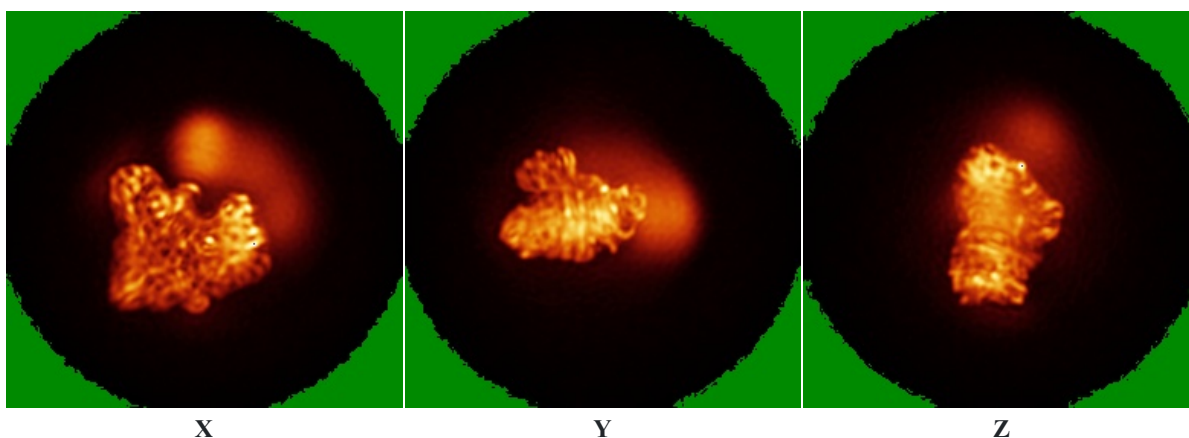
The images above show central slices of the map in three orthogonal directions.

3.3.2.3. Largest variance slices

Primary map**X Index: 127****Y Index: 153****Z Index: 107**

The images above show the largest variance slices of the map in three orthogonal directions.

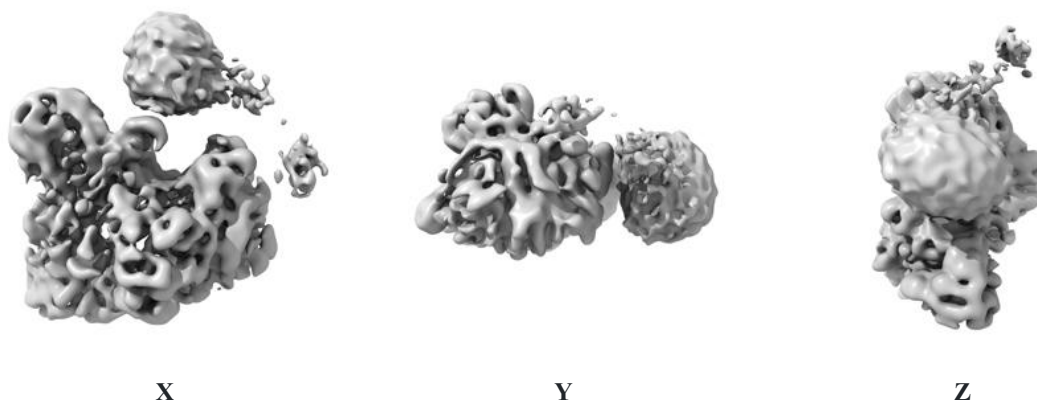
3.3.2.4 Orthogonal standard-deviation projections (false-color)

Primary map**X****Y****Z**

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

3.3.2.5. Orthogonal surface views

Primary map

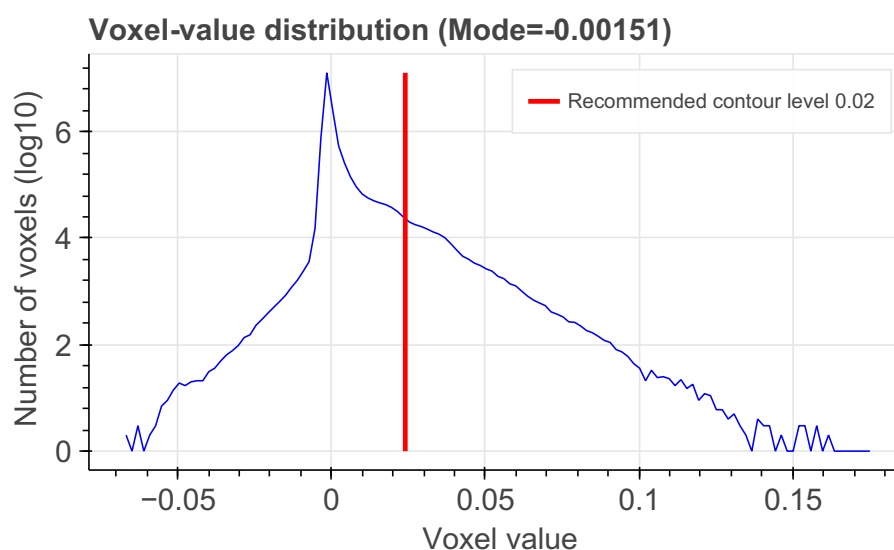


The images above show the 3D surface view of the map at the recommended contour level 0.024 . These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

3.3.3. Map analysis ?

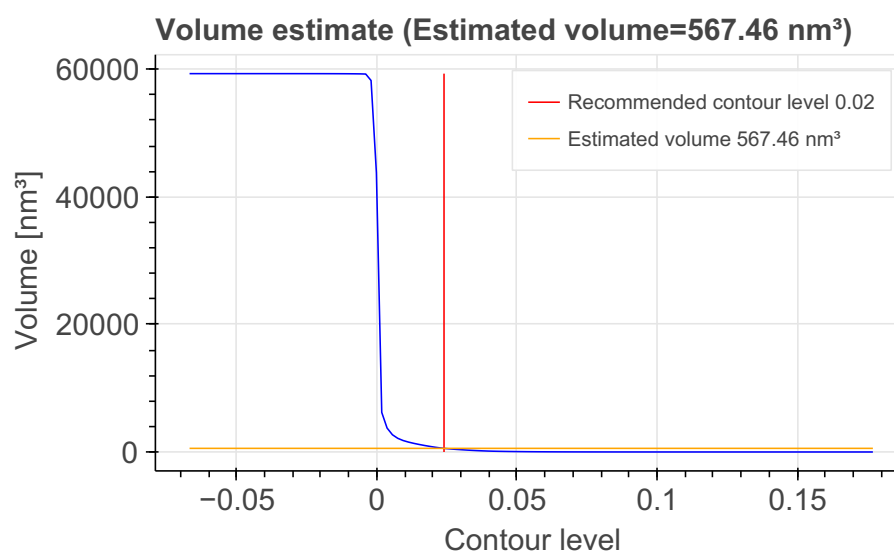
This section contains the results of statistical analysis of the map.

3.3.3.1. Map-value distribution ?



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

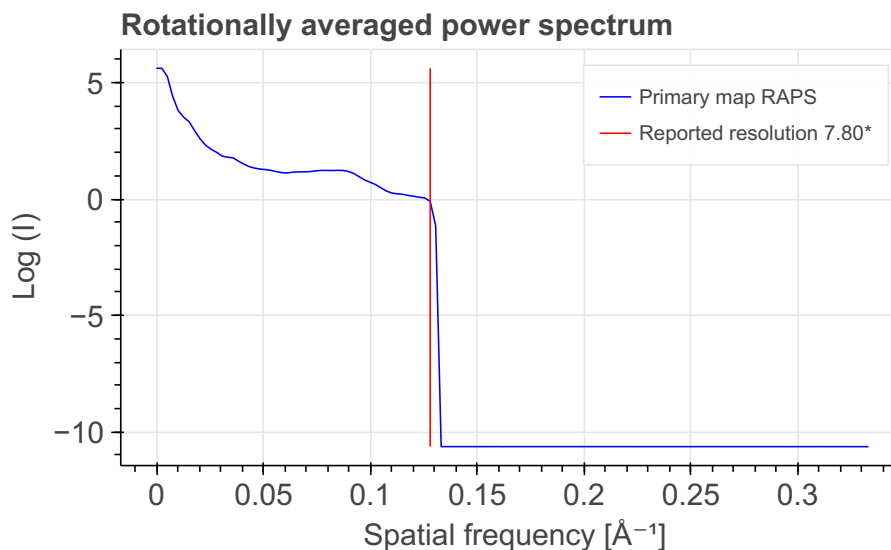
3.3.3.2. Volume estimate ?



The volume at the recommended contour level is 567.46 nm³.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

3.3.3.3. Rotationally averaged power spectrum



*Reported resolution corresponds to spatial frequency of 0.128 Å⁻¹

3.3.4. Fourier-Shell correlation

3.3.4.2. Resolution estimates

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	7.80	-	-
Author-provided FSC curve	7.72	9.18	8.02

EMD-22478

3.3.1. Experimental information

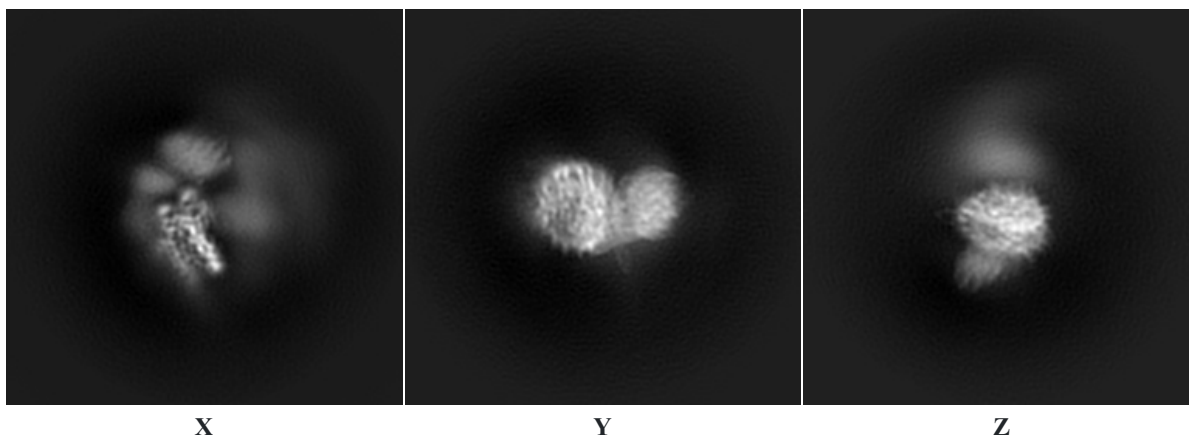
EM reconstruction method:	SINGLE PARTICLE		
Resolution:	6.20 Å		
Recommended level:	0.032		
Estimated volume:	283.69 nm ³		
Specimen preparation:	Preparation ID	1	Vitrification
Map-only validation report:	wwPDB validation report		

3.3.2. Map visualisation

This section contains visualisations of the EMDB entry EMD-22478. These allow visual inspection of the internal detail of the map and identification of artifacts. Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

3.3.2.1. Orthogonal projections ?

Primary map



X

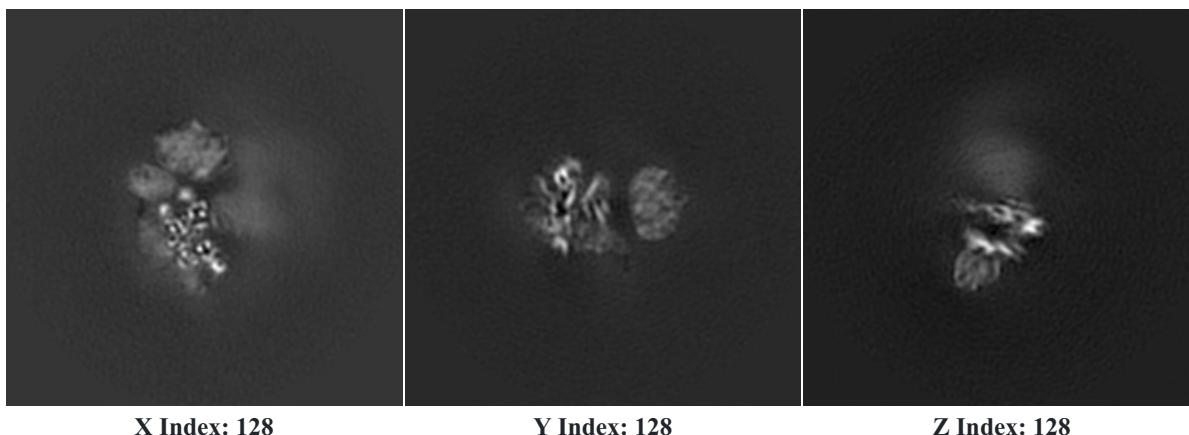
Y

Z

The images above show the map projected in three orthogonal directions.

3.3.2.2. Central slices ?

Primary map



X Index: 128

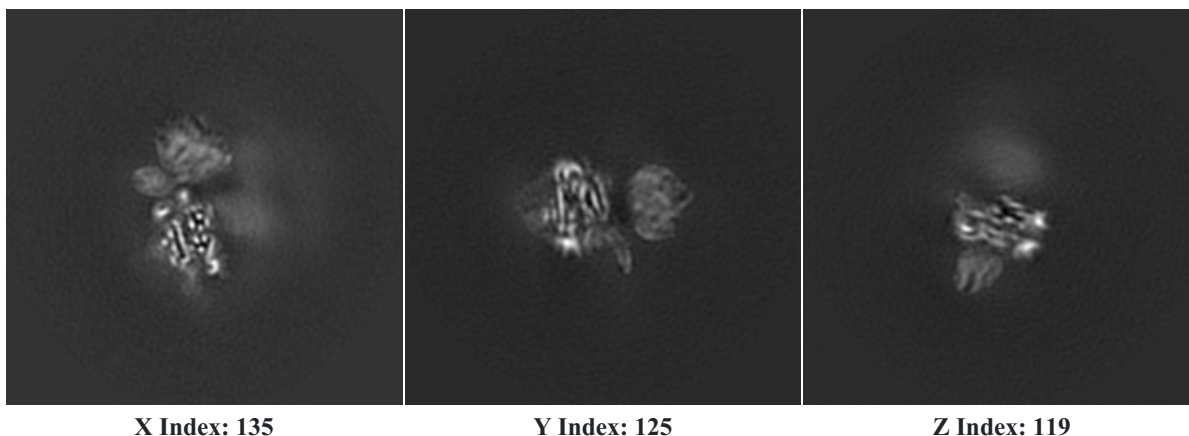
Y Index: 128

Z Index: 128

The images above show central slices of the map in three orthogonal directions.

3.3.2.3. Largest variance slices ?

Primary map



X Index: 135

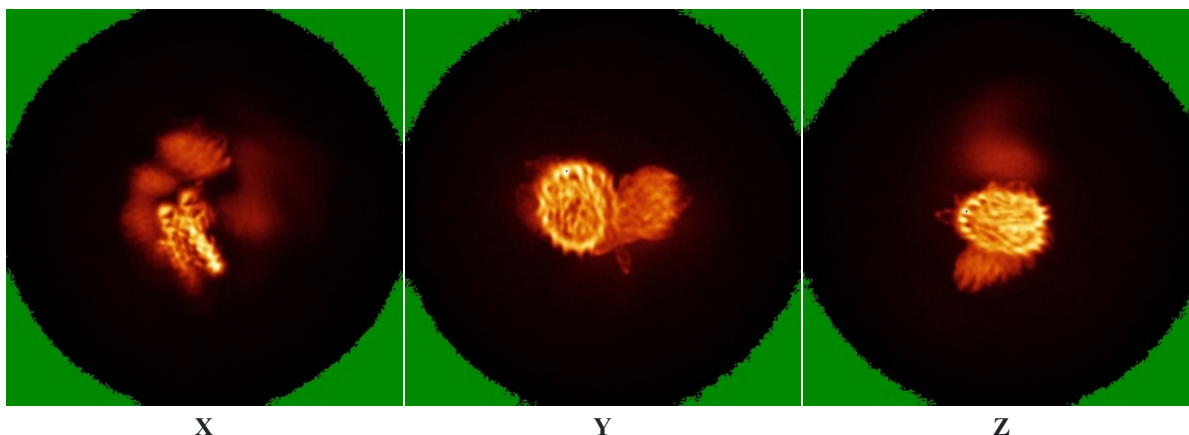
Y Index: 125

Z Index: 119

The images above show the largest variance slices of the map in three orthogonal directions.

3.3.2.4 Orthogonal standard-deviation projections (false-color) ?

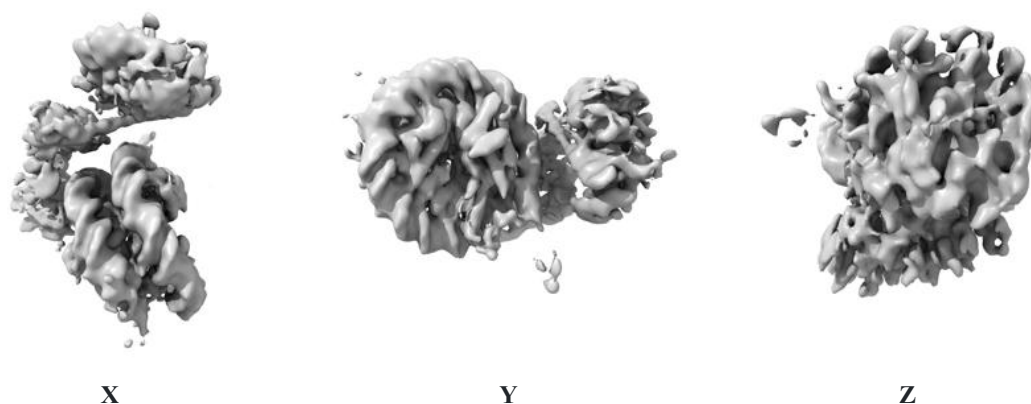
Primary map



The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

3.3.2.5. Orthogonal surface views ?

Primary map

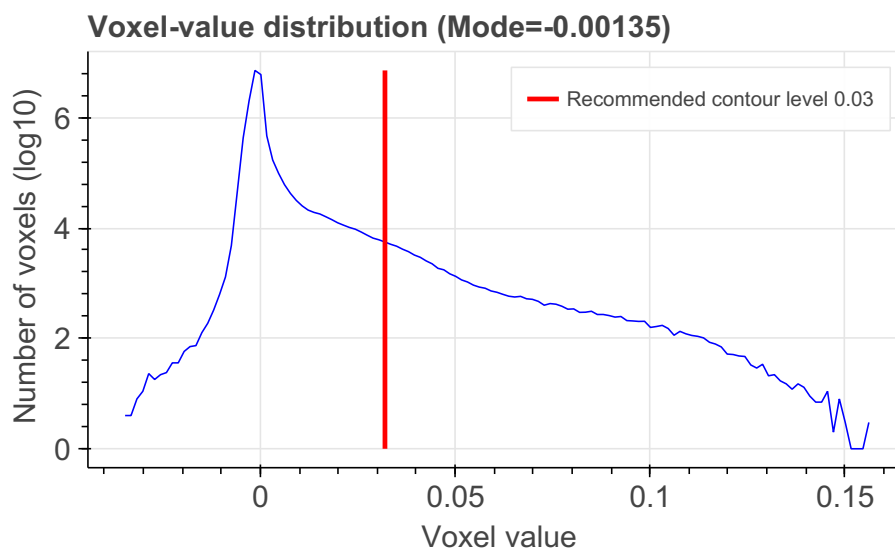


The images above show the 3D surface view of the map at the recommended contour level 0.032. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

3.3.3. Map analysis ?

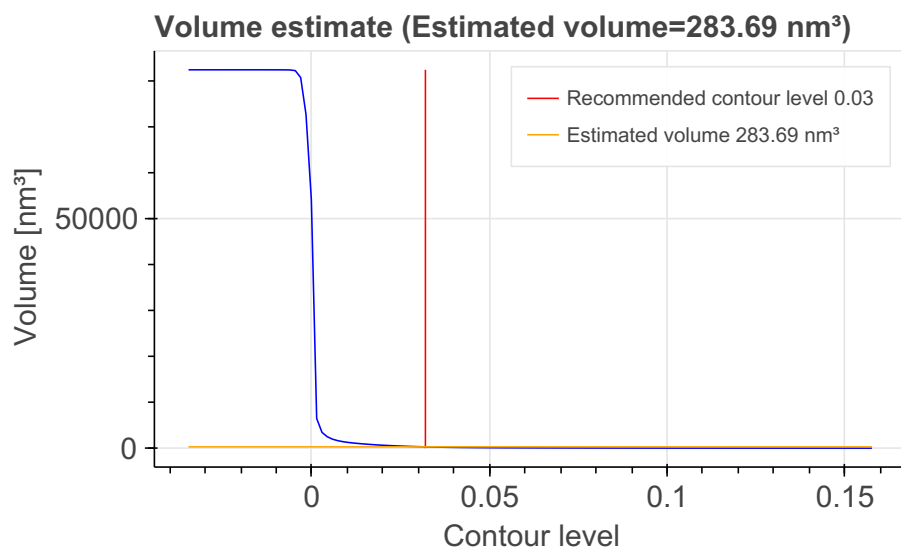
This section contains the results of statistical analysis of the map.

3.3.3.1. Map-value distribution ?



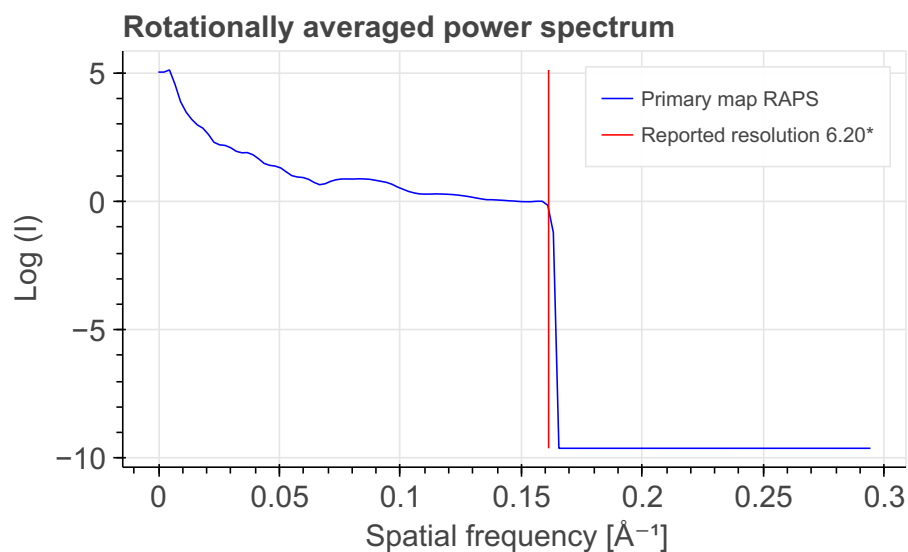
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

3.3.3.2. Volume estimate ?



The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

3.3.3.3. Rotationally averaged power spectrum ?



3.3.4. Fourier-Shell correlation ?

3.3.4.2. Resolution estimates ?

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	6.20	-	-
Author-provided FSC curve	6.20	7.56	6.38

4. Model quality ?

For models with atomic structures, MolProbity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

4.1b. MolProbity Analysis

Excluded volume satisfaction for the models in the entry are listed below. The Analysed column shows the number of particle-particle or particle-atom pairs for which excluded volume was analysed.

Standard geometry: bond outliers

There are 278 bond length outliers in this entry (0.69% of 40116 assessed bonds). A summary is provided below. The output is limited to 100 rows.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
p	39	DG	N9-C4	26.60	0.85	1.38	1	1
q	28	DA	N9-C4	21.04	0.96	1.38	1	1
4	1371	SER	C-N	19.68	1.05	1.33	1	1
p	66	DA	N9-C8	17.97	1.73	1.37	1	1
q	158	DC	C2-O2	17.47	0.89	1.24	1	1
p	71	DG	N9-C8	16.54	1.70	1.37	1	1
q	160	DG	C5-C6	16.09	1.09	1.42	1	1
p	39	DG	C5-C6	15.92	1.10	1.42	1	1
p	39	DG	C2-N3	15.65	1.64	1.33	1	1
q	160	DG	N7-C5	14.65	1.68	1.39	1	1
q	126	DC	N1-C2	14.46	1.11	1.40	1	1
q	157	DA	N9-C8	14.31	1.65	1.37	1	1
q	158	DC	C4'-O4'	13.89	1.73	1.45	1	1
q	126	DC	N3-C4	13.85	1.61	1.33	1	1
p	40	DT	N3-C4	13.69	1.66	1.38	1	1
p	65	DC	N1-C6	13.15	1.10	1.36	1	1
p	40	DT	C4-C5	13.14	1.70	1.44	1	1
q	160	DG	N9-C4	13.13	1.11	1.38	1	1
p	40	DT	C2-N3	13.06	1.11	1.37	1	1
p	66	DA	C5-C6	13.01	1.15	1.41	1	1
p	37	DC	N3-C4	12.98	1.59	1.33	1	1
q	164	DT	N1-C2	12.93	1.12	1.38	1	1
p	39	DG	C2'-C1'	12.90	1.27	1.52	1	1
q	132	DG	N9-C8	12.71	1.63	1.37	1	1
p	37	DC	C4-C5	12.58	1.68	1.43	1	1
q	160	DG	C8-N7	12.43	1.06	1.30	1	1
p	71	DG	N9-C4	12.42	1.13	1.38	1	1
q	28	DA	C1'-N9	11.74	1.69	1.46	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
p	37	DC	C5-C6	11.72	1.10	1.34	1	1
q	158	DC	N3-C4	11.46	1.56	1.33	1	1
q	158	DC	C5-C6	11.43	1.11	1.34	1	1
q	158	DC	C4-C5	11.33	1.65	1.43	1	1
q	126	DC	C4-C5	10.86	1.64	1.43	1	1
p	39	DG	N3-C4	10.84	1.57	1.35	1	1
p	37	DC	N1-C2	10.67	1.19	1.40	1	1
q	126	DC	C2-N3	10.64	1.14	1.36	1	1
q	164	DT	C5-C6	10.60	1.13	1.34	1	1
4	1191	HIS	CB-CG	10.54	1.35	1.50	1	1
p	37	DC	N1-C6	10.46	1.15	1.36	1	1
p	65	DC	C4-C5	10.38	1.63	1.43	1	1
p	39	DG	C5-C4	10.26	1.17	1.38	1	1
p	66	DA	C6-N6	10.19	1.13	1.34	1	1
4	445	GLN	C-N	10.14	1.47	1.33	1	1
q	157	DA	C5-C6	10.12	1.21	1.41	1	1
p	66	DA	C8-N7	10.02	1.11	1.31	1	1
p	33	DA	N9-C8	10.02	1.57	1.37	1	1
q	159	DC	C4-N4	9.93	1.14	1.34	1	1
p	65	DC	N1-C2	9.85	1.20	1.40	1	1
p	39	DG	O4'-C1'	9.81	1.61	1.41	1	1
p	169	DT	N1-C6	9.50	1.19	1.38	1	1
q	158	DC	C2-N3	9.48	1.17	1.36	1	1
p	169	DT	C4-C5	9.43	1.63	1.44	1	1
p	169	DT	N1-C2	9.35	1.19	1.38	1	1
p	65	DC	N3-C4	9.32	1.52	1.33	1	1
l	538	GLN	CG-CD	9.27	1.28	1.52	1	1
q	159	DC	C4-C5	9.26	1.61	1.43	1	1
q	160	DG	C5-C4	9.24	1.19	1.38	1	1
p	41	DC	N1-C2	9.13	1.22	1.40	1	1
P	86	HIS	CB-CG	8.94	1.62	1.50	1	1
q	131	DT	N1-C6	8.93	1.20	1.38	1	1
b	163	THR	C-N	8.62	1.45	1.33	1	1
p	33	DA	C8-N7	8.52	1.14	1.31	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
q	28	DA	N9-C8	8.48	1.54	1.37	1	1
q	157	DA	C8-N7	8.34	1.15	1.31	1	1
p	65	DC	C2-N3	8.23	1.19	1.36	1	1
4	1073	LEU	CG-CD2	8.22	1.25	1.52	1	1
p	38	DG	N1-C2	8.18	1.21	1.38	1	1
q	28	DA	N7-C5	8.15	1.22	1.39	1	1
A	1816	ILE	CB-CG2	8.12	1.25	1.52	1	1
p	40	DT	N1-C2	8.09	1.22	1.38	1	1
p	39	DG	C6-N1	8.01	1.23	1.39	1	1
p	71	DG	C8-N7	7.94	1.15	1.30	1	1
p	39	DG	C6-O6	7.94	1.08	1.24	1	1
6	283	PRO	N-CD	7.78	1.36	1.47	1	1
q	131	DT	N1-C2	7.78	1.22	1.38	1	1
p	39	DG	N1-C2	7.74	1.53	1.38	1	1
q	160	DG	O4'-C1'	7.70	1.26	1.41	1	1
p	33	DA	N9-C4	7.64	1.22	1.38	1	1
p	40	DT	C2-O2	7.54	1.07	1.22	1	1
p	71	DG	N7-C5	7.50	1.24	1.39	1	1
b	164	PHE	N-CA	7.49	1.60	1.46	1	1
4	1212	GLU	CG-CD	7.40	1.33	1.52	1	1
4	1085	LEU	CB-CG	7.29	1.38	1.53	1	1
q	28	DA	O4'-C1'	7.28	1.56	1.41	1	1
p	169	DT	N3-C4	7.20	1.53	1.38	1	1
X	67	PRO	N-CD	7.09	1.37	1.47	1	1
p	71	DG	C5-C4	7.06	1.52	1.38	1	1
B	8	LEU	CB-CG	6.97	1.67	1.53	1	1
A	1818	GLN	CA-C	6.85	1.67	1.52	1	1
A	2049	TRP	CD2-CE3	6.79	1.51	1.40	1	1
4	918	LEU	CB-CG	6.77	1.67	1.53	1	1
l	537	TYR	CB-CG	6.60	1.66	1.51	1	1
V	27	PRO	N-CD	6.54	1.38	1.47	1	1
q	28	DA	C8-N7	6.54	1.18	1.31	1	1
q	132	DG	N9-C4	6.53	1.25	1.38	1	1
q	159	DC	C2-O2	6.49	1.11	1.24	1	1
b	385	TRP	CZ2-CH2	6.46	1.49	1.37	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
v	27	PRO	N-CD	6.45	1.38	1.47	1	1
p	38	DG	C5-C4	6.42	1.51	1.38	1	1
b	385	TRP	CD2-CE3	6.41	1.50	1.40	1	1

Standard geometry: angle outliers ?

There are 547 bond angle outliers in this entry (0.99% of 55397 assessed bonds). A summary is provided below. The output is limited to 100 rows.

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
p	40	DT	O2-C2-N3	80.76	0.86	122.00	1	1
p	33	DA	N9-C4-C5	61.76	13.06	105.70	1	1
q	160	DG	C8-N7-C5	58.32	16.72	104.20	1	1
q	158	DC	O2-C2-N3	56.52	37.13	121.90	1	1
p	66	DA	N9-C4-C5	51.59	28.32	105.70	1	1
p	37	DC	N1-C2-O2	51.12	42.51	119.20	1	1
p	71	DG	N9-C4-C5	50.43	29.96	105.60	1	1
q	132	DG	N9-C4-C5	50.29	30.16	105.60	1	1
p	37	DC	O2-C2-N3	50.07	46.80	121.90	1	1
q	157	DA	N9-C4-C5	50.00	30.70	105.70	1	1
q	158	DC	N1-C2-O2	49.96	44.26	119.20	1	1
p	65	DC	O2-C2-N3	49.69	47.36	121.90	1	1
p	169	DT	O2-C2-N3	48.98	48.54	122.00	1	1
q	160	DG	N9-C4-C5	47.98	33.63	105.60	1	1
q	126	DC	O2-C2-N3	47.11	51.23	121.90	1	1
p	169	DT	N1-C2-O2	46.98	52.73	123.20	1	1
q	126	DC	N1-C2-O2	44.96	51.76	119.20	1	1
q	131	DT	N1-C2-O2	44.06	57.11	123.20	1	1
q	28	DA	N9-C4-C5	43.94	39.79	105.70	1	1
q	131	DT	O2-C2-N3	43.88	56.18	122.00	1	1
q	164	DT	N1-C2-N3	42.13	51.60	114.80	1	1
p	39	DG	N9-C4-C5	41.68	43.08	105.60	1	1
p	39	DG	C8-N7-C5	39.91	44.34	104.20	1	1
q	28	DA	C8-N7-C5	39.08	45.28	103.90	1	1
p	65	DC	N1-C2-O2	38.12	62.03	119.20	1	1
p	39	DG	C8-N9-C4	37.94	49.09	106.00	1	1
q	160	DG	C1'-N9-C4	37.03	71.46	127.00	1	1
p	66	DA	C8-N9-C4	36.28	51.48	105.90	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
p	40	DT	N1-C6-C5	36.25	68.43	122.80	1	1
q	157	DA	C8-N9-C4	35.70	52.35	105.90	1	1
q	132	DG	C8-N9-C4	34.92	53.62	106.00	1	1
q	132	DG	C8-N7-C5	34.22	52.87	104.20	1	1
q	160	DG	N9-C4-N3	33.57	176.35	126.00	1	1
q	164	DT	O2-C2-N3	33.03	72.46	122.00	1	1
q	28	DA	C1'-N9-C4	32.82	176.28	127.05	1	1
q	157	DA	C1'-N9-C8	32.51	175.82	127.05	1	1
q	157	DA	C8-N7-C5	32.03	55.86	103.90	1	1
q	126	DC	N1-C6-C5	31.89	73.16	121.00	1	1
p	66	DA	C8-N7-C5	31.60	56.49	103.90	1	1
q	160	DG	C2-N3-C4	29.78	67.12	111.80	1	1
p	71	DG	C8-N9-C4	29.34	61.99	106.00	1	1
q	131	DT	C1'-N1-C6	29.12	75.68	119.35	1	1
p	65	DC	N1-C6-C5	28.67	77.99	121.00	1	1
p	39	DG	N9-C4-N3	28.15	83.78	126.00	1	1
p	169	DT	N1-C6-C5	27.95	80.88	122.80	1	1
p	71	DG	C8-N7-C5	27.85	62.42	104.20	1	1
q	28	DA	C8-N9-C4	27.85	64.13	105.90	1	1
p	169	DT	C2-N1-C6	27.80	162.99	121.30	1	1
q	131	DT	C1'-N1-C2	27.24	78.49	119.35	1	1
q	158	DC	N1-C6-C5	27.15	80.28	121.00	1	1
q	132	DG	C1'-N9-C8	26.74	86.90	127.00	1	1
p	37	DC	N1-C6-C5	26.59	81.11	121.00	1	1
p	33	DA	C8-N7-C5	25.34	65.89	103.90	1	1
q	158	DC	N1-C2-N3	25.01	81.38	118.90	1	1
p	65	DC	C2-N1-C6	24.86	157.89	120.60	1	1
p	33	DA	N9-C8-N7	24.68	76.78	113.80	1	1
q	126	DC	C2-N3-C4	22.87	85.70	120.00	1	1
q	131	DT	C2-N1-C6	21.91	154.17	121.30	1	1
p	40	DT	N1-C2-O2	21.13	91.51	123.20	1	1
p	40	DT	C2-N3-C4	21.02	95.47	127.00	1	1
p	39	DG	C1'-N9-C4	20.80	158.20	127.00	1	1
p	37	DC	C2-N3-C4	20.69	88.97	120.00	1	1
p	33	DA	C8-N9-C4	20.25	75.53	105.90	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
p	39	DG	N7-C5-C6	19.89	100.26	130.10	1	1
p	66	DA	C1'-N9-C4	19.74	97.44	127.05	1	1
p	37	DC	N1-C2-N3	19.72	89.31	118.90	1	1
p	66	DA	N9-C8-N7	19.59	84.41	113.80	1	1
q	28	DA	C5-C4-N3	19.54	156.21	126.90	1	1
p	71	DG	C1'-N9-C8	19.42	156.13	127.00	1	1
q	158	DC	C3'-O3'-P	19.36	149.24	120.20	1	1
p	65	DC	C2-N3-C4	19.32	91.02	120.00	1	1
q	164	DT	C2-N1-C6	19.30	150.25	121.30	1	1
D	471	GLY	C-N-CA	18.02	154.14	121.70	1	1
q	160	DG	N7-C5-C4	17.77	137.45	110.80	1	1
q	159	DC	C1'-N1-C6	17.66	146.19	119.70	1	1
q	160	DG	C8-N9-C4	17.65	79.52	106.00	1	1
p	65	DC	C1'-N1-C2	17.58	93.32	119.70	1	1
q	132	DG	N9-C4-N3	17.53	99.71	126.00	1	1
q	28	DA	N7-C5-C4	17.52	136.98	110.70	1	1
p	71	DG	N9-C8-N7	17.41	87.38	113.50	1	1
q	160	DG	N9-C8-N7	16.99	138.98	113.50	1	1
A	1923	THR	C-N-CA	16.96	152.23	121.70	1	1
q	157	DA	N9-C8-N7	16.79	88.62	113.80	1	1
q	160	DG	C6-C5-C4	16.76	93.96	119.10	1	1
q	164	DT	C4-C5-C6	16.52	94.42	119.20	1	1
p	38	DG	N9-C4-N3	16.44	150.65	126.00	1	1
D	350	GLN	C-N-CA	16.26	150.97	121.70	1	1
q	158	DC	C4'-O4'-C1'	16.09	85.57	109.70	1	1
q	160	DG	C1'-N9-C8	15.98	150.97	127.00	1	1
q	132	DG	N9-C8-N7	15.75	89.87	113.50	1	1
p	169	DT	C2-N3-C4	15.65	103.53	127.00	1	1
4	445	GLN	O-C-N	15.34	147.55	123.00	1	1
q	158	DC	C2-N3-C4	15.24	97.13	120.00	1	1
q	131	DT	N1-C6-C5	15.17	100.04	122.80	1	1
p	169	DT	C1'-N1-C2	15.15	96.62	119.35	1	1
p	40	DT	N1-C2-N3	14.95	92.37	114.80	1	1
4	445	GLN	CA-C-N	14.86	86.48	116.20	1	1
p	66	DA	C1'-N9-C8	14.58	148.92	127.05	1	1

Chain	Res	Type	Atoms	Z	Observed (Å)	Ideal (Å)	Model ID (Worst)	Models (Total)
q	160	DG	C5-C4-N3	14.41	150.02	128.40	1	1
p	39	DG	C5-C6-N1	14.18	132.97	111.70	1	1

Too-close contacts ?

The following all-atom clashscore is based on a MolProbity analysis. All-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The table below contains clashscores for all atomic models in this entry.

Model ID	Clash score	Number of clashes
1	0.00	0

There are no too-close contacts.

Torsion angles: Protein backbone ?

In the following table, Ramachandran outliers are listed. The Analysed column shows the number of residues for which the backbone conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	4036	3849	160	27

There are 27 unique backbone outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
4	718	TYR	1
4	957	ASN	1
4	984	VAL	1
4	1073	LEU	1
4	1289	PRO	1
4	1372	ARG	1
4	1382	SER	1
4	1383	LEU	1
6	71	ASP	1
A	1704	PHE	1
A	1823	PHE	1
A	1826	ASP	1
A	1935	GLU	1
A	2006	GLY	1
A	2074	SER	1
A	2211	SER	1
A	2222	PRO	1
P	75	PRO	1
b	132	VAL	1

Chain	Res	Type	Models (Total)
b	147	CYS	1
b	153	ARG	1
b	163	THR	1
b	168	PHE	1
b	257	GLN	1
b	303	LEU	1
b	330	GLU	1
b	355	THR	1

Torsion angles : Protein sidechains ?

In the following table, sidechain rotameric outliers are listed. The Analysed column shows the number of residues for which the sidechain conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	3557	3516	31	10

There are 10 unique sidechain outliers. Detailed list of outliers are tabulated below.

Chain	Res	Type	Models (Total)
1	537	TYR	1
4	1014	LYS	1
4	1074	ASP	1
4	1362	GLU	1
4	1367	PHE	1
4	1375	LYS	1
4	1376	GLU	1
4	1377	VAL	1
A	1834	VAL	1
A	2124	LYS	1

5. Fit to Data Used for Modeling Assessment ?

5.2. Crosslinking-MS ?

5.2.1. Restraint types ?

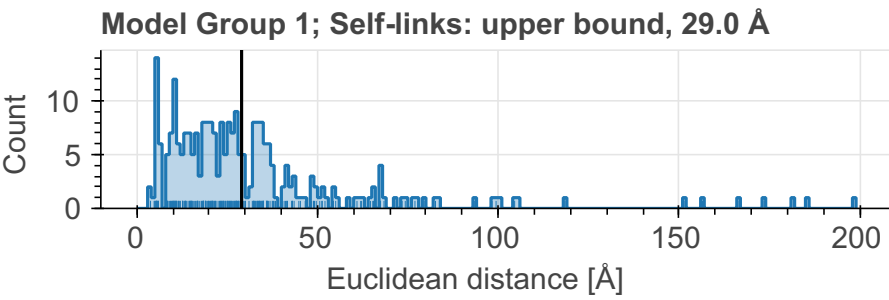
This table summarizes information about crosslinker(s) used for data generation, and how crosslinking information was translated into actual modeling restraints. Restraints assigned "by-residue" are interpreted as between CA atoms. Restraints between coarse-grained beads are indicated as "coarse-grained". *Restraint group* represents a set of crosslinking restraints applied collectively in the modeling.

There are 1321 crosslinking restraints combined in 1188 restraint groups.

Linker	Residue 1	Atom 1	Residue 2	Atom 2	Restraint type	Distance, Å	Count
BS3	LYS	CA	LYS	CA	upper bound	29.00	1234
BS3	LYS	CA	MET	CA	upper bound	29.00	4
BS3	LYS	CA	VAL	CA	upper bound	29.00	4
BS3	ILE	CA	LYS	CA	upper bound	29.00	1
BS3	LYS	CA	PHE	CA	upper bound	29.00	13
BS3	ALA	CA	LYS	CA	upper bound	29.00	13
BS3	LYS	CA	PRO	CA	upper bound	29.00	13
BS3	GLY	CA	LYS	CA	upper bound	29.00	3
BS3	HIS	CA	LYS	CA	upper bound	29.00	2
BS3	LYS	CA	THR	CA	upper bound	29.00	1
BS3	GLU	CA	LYS	CA	upper bound	29.00	4
BS3	LYS	CA	SER	CA	upper bound	29.00	12
BS3	PRO	CA	SER	CA	upper bound	29.00	2
BS3	ALA	CA	MET	CA	upper bound	29.00	3
BS3	LEU	CA	LYS	CA	upper bound	29.00	1
BS3	GLY	CA	MET	CA	upper bound	29.00	1
BS3	THR	CA	VAL	CA	upper bound	29.00	1
BS3	ALA	CA	VAL	CA	upper bound	29.00	1
BS3	PHE	CA	VAL	CA	upper bound	29.00	1
BS3	HIS	CA	PRO	CA	upper bound	29.00	1
BS3	ALA	CA	THR	CA	upper bound	29.00	1
BS3	ALA	CA	PHE	CA	upper bound	29.00	1
BS3	PHE	CA	THR	CA	upper bound	29.00	1
BS3	THR	CA	THR	CA	upper bound	29.00	1
BS3	ASP	CA	SER	CA	upper bound	29.00	1
BS3	GLU	CA	SER	CA	upper bound	29.00	1

Distograms of individual restraints

Distograms (i.e., histogram plots of distances) provide an overview of distributions of distances between residues for which chemical crosslinks were identified. The shift of the distogram relative to the threshold value may indicate a poor model. Restraints with identical thresholds are grouped into one plot. Only the best distance per restraint per model group/ensemble is plotted. Inter- and intramolecular (including self-links) restraints are also grouped into one plot. Distance for a restraint between coarse-grained beads is calculated as a minimal distance between shells; if beads intersect, the distance will be reported as 0.0. A bead with the highest available resolution for a given residue is used for the assessment.



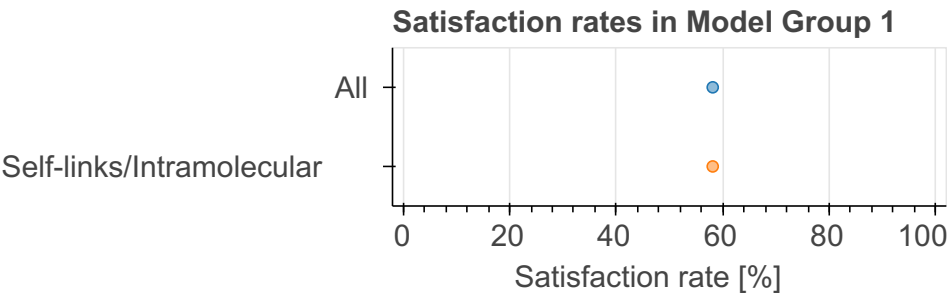
5.2.2. Satisfaction of restraints ?

Satisfaction of restraints is calculated on a *restraint group* (a set of crosslinking restraints applied collectively in the modeling) level. Satisfaction of a restraint group depends on satisfaction of individual restraints in the group and the conditionality (all/any). A restraint group is considered satisfied, if the condition was met in at least one model of the model group/ensemble. The number of measured restraints can be smaller than the total number of restraint groups if crosslinks involve non-modeled residues. Only deposited models are used for validation right now.

State group	State	Model group	# of Deposited models/Total	Restraint group type	Satisfied (%)	Violated (%)	Count (Total=1188)
1	1	1	1/1	All	58.13	41.87	246
				Self-links/Intramolecular	58.13	41.87	246

Per-model satisfaction rates in ensembles

Every point represents one model in a model group/ensemble. Where possible, boxplots with quartile marks are also plotted.



5.3. 3DEM

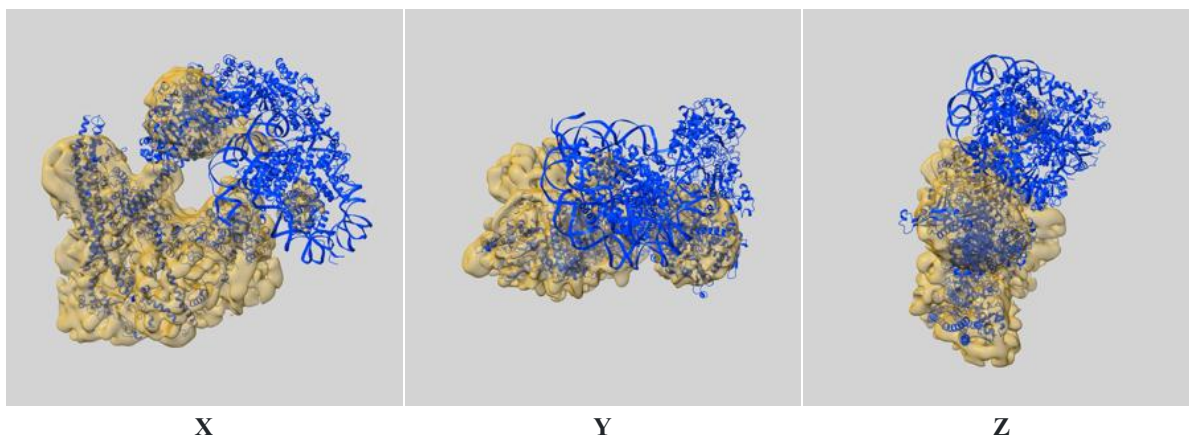
This section describes fit of models to the 3DEM data. Only results for the representative model, selected as a first model with the largest number of asymmetric units.

[EMD-22476](#)

5.3.1. Map-model fit ?

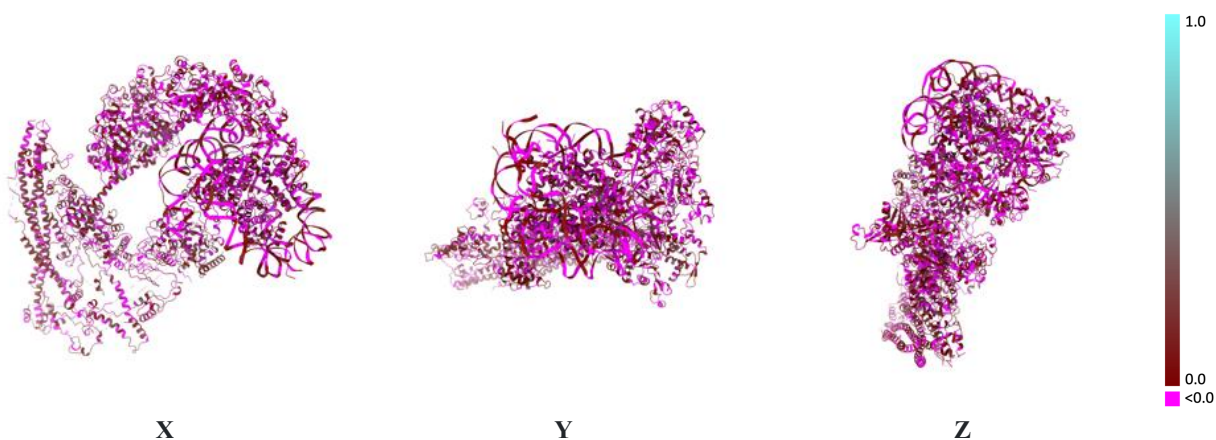
Only results for the representative Model 1 are shown.

5.3.1.1 Map-model overlay ?



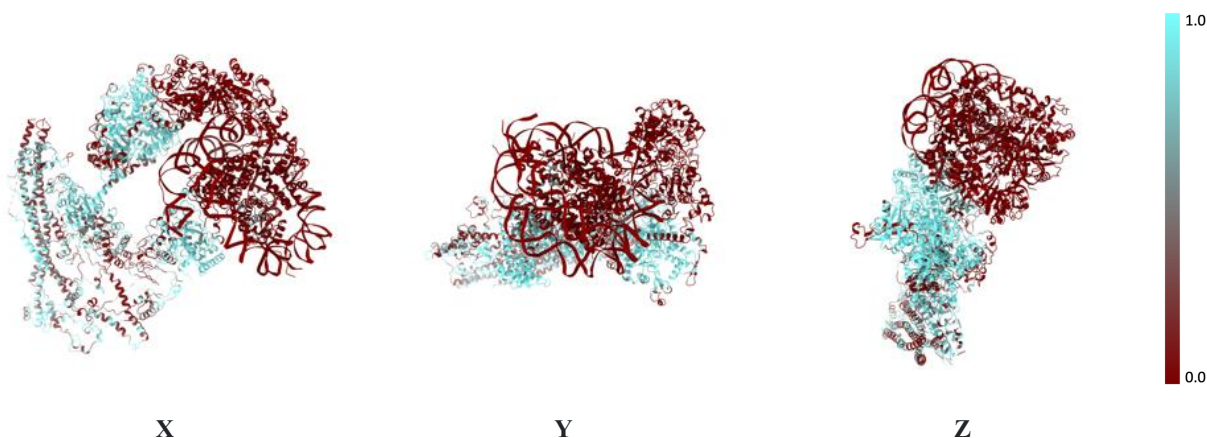
The images above show the 3D surface view of the map at the recommended contour level 0.024 at 50% transparency in yellow overlaid with a ribbon representation of the model colored in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

5.3.1.2. Q-score mapped to coordinate model ?



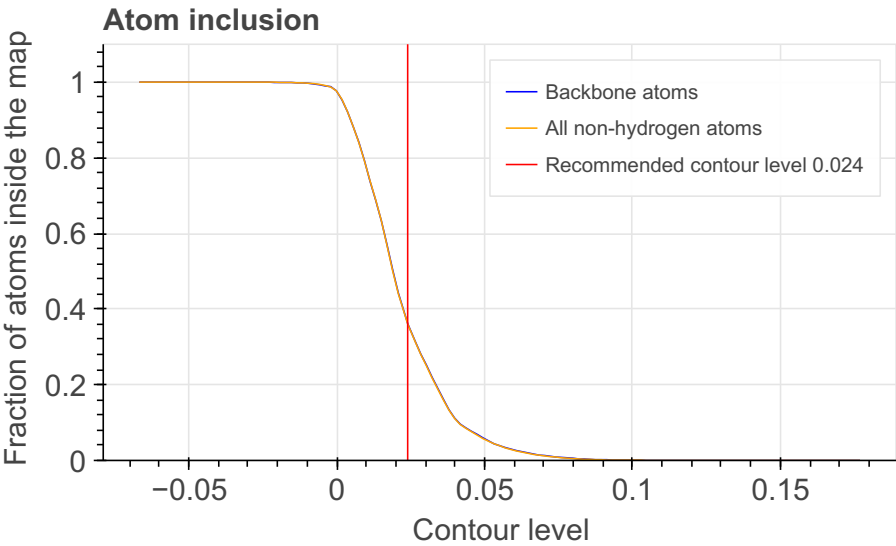
The images above show the model with each residue colored according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

5.3.1.3. Atom inclusion mapped to coordinate model ?



The images above show the model with each residue colored according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level 0.024 .

5.3.1.4. Atom inclusion ?



At the recommended contour level, 36% of all backbone atoms, 36% of all non-hydrogen atoms, are inside the map.

5.3.1.5. Map-model fit summary ?

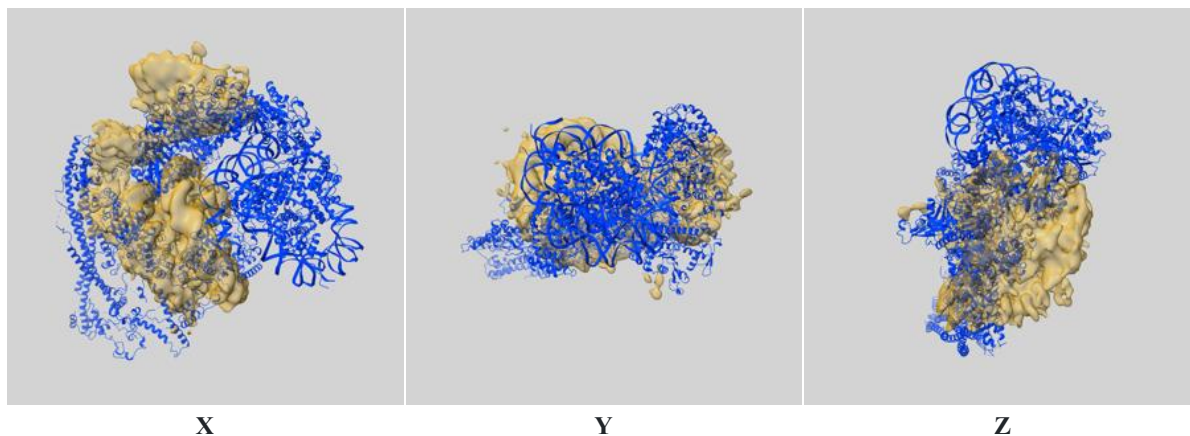
The table lists the average atom inclusion at the recommended contour level (0.024) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.361	0.029
1	0.451	0.025
2	0.698	0.063
4	0.118	0.014
6	0.642	0.018
A	0.592	0.044
B	0.871	0.035
D	0.545	0.062
E	0.462	0.063
P	0.915	0.135
V	0.011	0.040
W	0.000	-0.003
X	0.047	0.014
Y	0.000	0.038
b	0.711	0.062
p	0.007	0.002
q	0.011	0.007
v	0.004	-0.001
w	0.017	-0.001
x	0.086	0.023
y	0.036	0.040

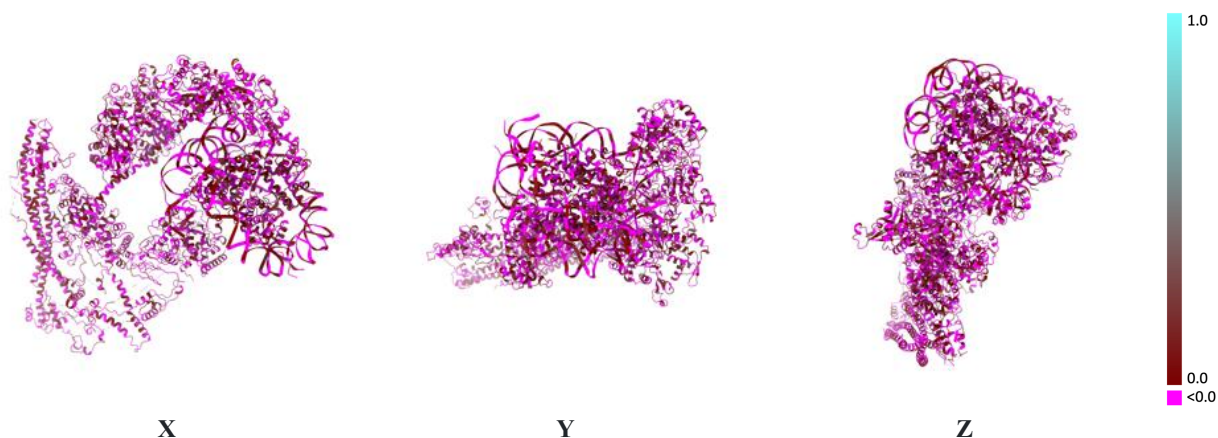


[EMD-22478](#)[5.3.1. Map-model fit](#)

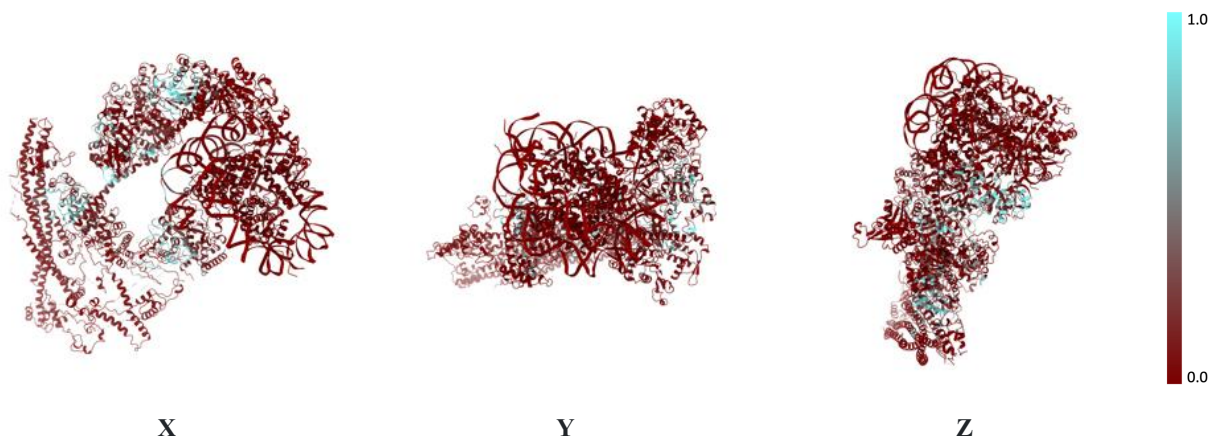
Only results for the representative Model 1 are shown.

[5.3.1.1 Map-model overlay](#)

The images above show the 3D surface view of the map at the recommended contour level 0.032 at 50% transparency in yellow overlaid with a ribbon representation of the model colored in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

[5.3.1.2. Q-score mapped to coordinate model](#)

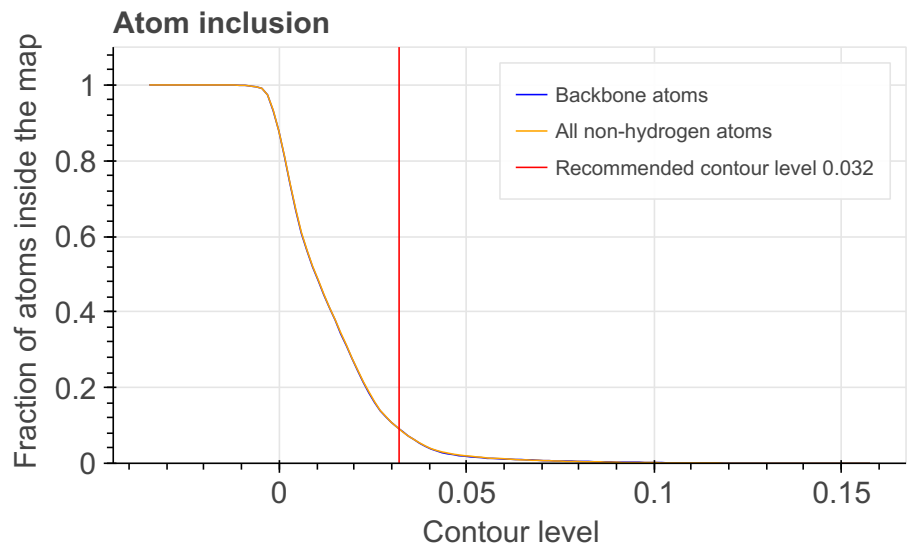
The images above show the model with each residue colored according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

[5.3.1.3. Atom inclusion mapped to coordinate model](#)

The images above show the model with each residue colored according to its atom inclusion. This shows to what extent they are inside

the map at the recommended contour level 0.032 .

5.3.1.4. Atom inclusion ?



At the recommended contour level, 9% of all backbone atoms, 9% of all non-hydrogen atoms, are inside the map.

5.3.1.5. Map-model fit summary ?

The table lists the average atom inclusion at the recommended contour level (0.032) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.091	-0.002
1	0.147	-0.009
2	0.010	-0.010
4	0.142	-0.002
6	0.145	-0.015
A	0.180	0.003
B	0.080	-0.006
D	0.030	0.002
E	0.003	-0.005
P	0.184	0.006
V	0.000	0.019
W	0.000	0.016
X	0.000	0.034
Y	0.000	0.023
b	0.155	-0.021
p	0.025	-0.001
q	0.014	0.001
v	0.011	0.001
w	0.000	0.017



Chain	Atom inclusion	Q-score
x	 0.000	 0.015
y	 0.000	 -0.004

6. Fit to Data Used for Validation Assessment

Validation for this section is under development.

Acknowledgments

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