



Full wwPDB EM Validation Report ⓘ

Oct 24, 2022 – 07:25 PM EDT

PDB ID : 8CXB
EMDB ID : EMD-24276
Title : Human PA28-20S (PA28-4a3b)
Authors : Zhao, J.; Makhija, S.; Huang, B.; Cheng, Y.
Deposited on : 2022-05-20
Resolution : 2.90 Å (reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

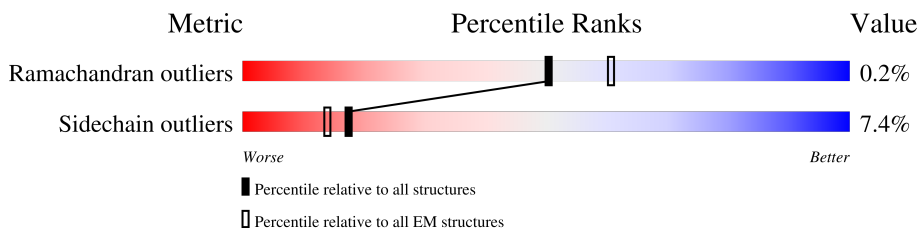
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	c	239	85% 10%
1	e	239	84% 5% 11%
1	g	239	89% 10%
2	d	249	81% 15%
2	f	249	78% 18%
2	h	249	80% 5% 15%
2	i	249	78% 6% 15%
3	A	234	93% 5%
3	O	234	94%


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Mol	Chain	Length	Quality of chain
4	B	261	89% 7% 5%
4	P	261	92% 5% .
5	C	248	89% 6% 5%
5	Q	248	90% 5% 5%
6	D	241	95% 5%
6	R	241	91% 7% .
7	E	263	86% 5% 9%
7	S	263	85% 5% 10%
8	F	255	87% 7% 6%
8	T	255	89% 5% 6%
9	G	246	89% 8% .
9	U	246	93% 6% .
10	H	277	74% 5% 20%
10	V	277	74% 6% 20%
11	I	205	89% 10%
11	W	205	93% 7%
12	J	201	93% 5% .
12	X	201	92% 5% .
13	K	263	72% . 24%
13	Y	263	70% 6% 24%
14	L	241	83% 5% 12%
14	Z	241	85% . 12%
15	M	264	77% . 19%
15	a	264	76% 6% 19%
16	N	239	81% . 15%

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Mol	Chain	Length	Quality of chain
16	b	239	 82% 15%

2 Entry composition [i](#)

There are 16 unique types of molecules in this entry. The entry contains 57967 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Proteasome activator complex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	c	214	Total	C	N	O	S	0	0
			1666	1080	281	301	4		
1	e	213	Total	C	N	O	S	0	0
			1661	1077	280	300	4		
1	g	214	Total	C	N	O	S	0	0
			1666	1080	281	301	4		

- Molecule 2 is a protein called Proteasome activator complex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	d	211	Total	C	N	O	S	0	0
			1634	1054	281	295	4		
2	f	204	Total	C	N	O	S	0	0
			1590	1025	274	287	4		
2	h	211	Total	C	N	O	S	0	0
			1636	1058	283	289	6		
2	i	211	Total	C	N	O	S	0	0
			1630	1053	282	289	6		

- Molecule 3 is a protein called Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	229	Total	C	N	O	S	0	0
			1696	1101	294	295	6		
3	O	229	Total	C	N	O	S	0	0
			1678	1089	290	293	6		

- Molecule 4 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	B	249	Total	C	N	O	S	0	0
			1793	1146	318	319	10		

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Mol	Chain	Residues	Atoms					AltConf	Trace
4	P	251	Total	C	N	O	S	0	0
			1843	1174	328	331	10		

- Molecule 5 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	C	235	Total	C	N	O	S	0	0
			1703	1082	314	302	5		
5	Q	236	Total	C	N	O	S	0	0
			1723	1095	320	303	5		

- Molecule 6 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	D	241	Total	C	N	O	S	0	0
			1751	1116	301	322	12		
6	R	235	Total	C	N	O	S	0	0
			1693	1076	292	314	11		

- Molecule 7 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	E	239	Total	C	N	O	S	0	0
			1810	1144	331	324	11		
7	S	237	Total	C	N	O	S	0	0
			1759	1119	329	301	10		

- Molecule 8 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	F	240	Total	C	N	O	S	0	0
			1785	1145	313	316	11		
8	T	239	Total	C	N	O	S	0	0
			1784	1143	314	317	10		

- Molecule 9 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	G	239	Total	C	N	O	S	0	0
			1769	1133	305	319	12		
9	U	242	Total	C	N	O	S	0	0
			1789	1146	307	323	13		

- Molecule 10 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	H	222	Total 1609	C 1023	N 276	O 299	S 11	0	0
10	V	222	Total 1612	C 1023	N 274	O 304	S 11	0	0

- Molecule 11 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	I	204	Total 1564	C 1003	N 264	O 278	S 19	0	0
11	W	204	Total 1559	C 1000	N 264	O 277	S 18	0	0

- Molecule 12 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	J	197	Total 1544	C 998	N 265	O 272	S 9	0	0
12	X	196	Total 1535	C 990	N 264	O 273	S 8	0	0

- Molecule 13 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	K	200	Total 1525	C 968	N 273	O 275	S 9	0	0
13	Y	200	Total 1532	C 970	N 272	O 281	S 9	0	0

- Molecule 14 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	L	213	Total 1599	C 1022	N 279	O 288	S 10	0	0
14	Z	213	Total 1593	C 1022	N 281	O 280	S 10	0	0

- Molecule 15 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	M	215	Total 1643	C 1043	N 289	O 299	S 12	0	0
15	a	215	Total 1624	C 1034	N 288	O 290	S 12	0	0


- Molecule 16 is a protein called Proteasome subunit beta type-6.

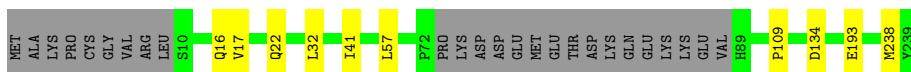
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	N	202	Total 1491	C 939	N 258	O 282	S 12	0	0
16	b	202	Total 1478	C 934	N 258	O 274	S 12	0	0

3 Residue-property plots [i](#)


These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

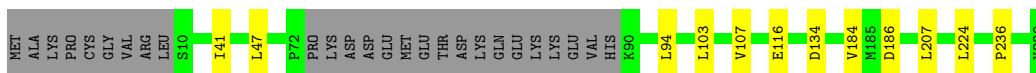
- Molecule 1: Proteasome activator complex subunit 2

Chain c:  85% 10%




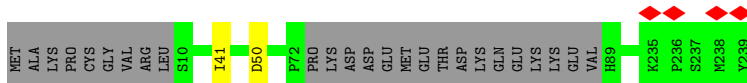
- Molecule 1: Proteasome activator complex subunit 2

Chain e:  84% 5% 11%




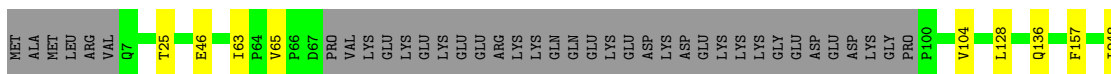
- Molecule 1: Proteasome activator complex subunit 2

Chain g:  89% 10%




- Molecule 2: Proteasome activator complex subunit 1


Chain d:  81% 15%



Y249


- Molecule 2: Proteasome activator complex subunit 1

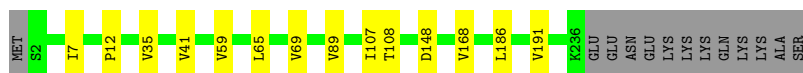
Chain f:  78% 18%

Chain P:  92% 5%




- Molecule 5: Proteasome subunit alpha type-7

Chain C:  89% 6% 5%



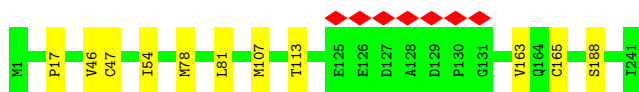
- Molecule 5: Proteasome subunit alpha type-7

Chain Q:  90% 5% 5%




- Molecule 6: Proteasome subunit alpha type-5

Chain D:  95% 5%




- Molecule 6: Proteasome subunit alpha type-5

Chain R:  91% 7%




- Molecule 7: Proteasome subunit alpha type-1

Chain E:  86% 5% 9%




- Molecule 7: Proteasome subunit alpha type-1

Chain S:  85% 5% 10%




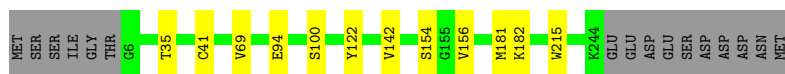
- Molecule 8: Proteasome subunit alpha type-3

Chain F:  87% 7% 6%




• Molecule 8: Proteasome subunit alpha type-3

Chain T:  89% 5% 6%



• Molecule 9: Proteasome subunit alpha type-6

Chain G:  89% 8% 3%



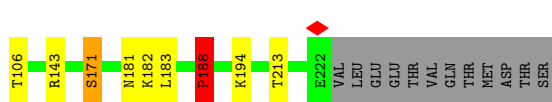
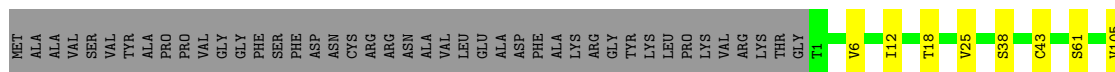
• Molecule 9: Proteasome subunit alpha type-6

Chain U:  93% 6% 1%



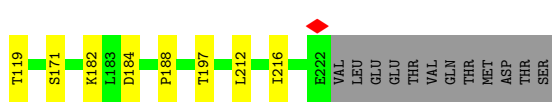
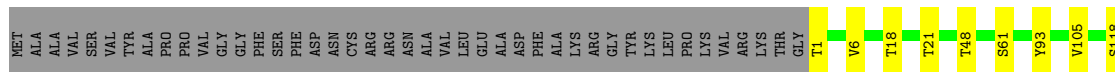
• Molecule 10: Proteasome subunit beta type-7

Chain H:  74% 5% 20%

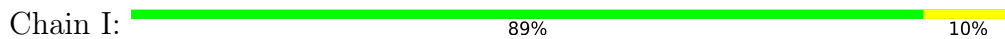


• Molecule 10: Proteasome subunit beta type-7

Chain V:  74% 6% 20%



• Molecule 11: Proteasome subunit beta type-3



- Molecule 11: Proteasome subunit beta type-3



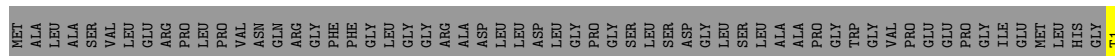
- Molecule 12: Proteasome subunit beta type-2



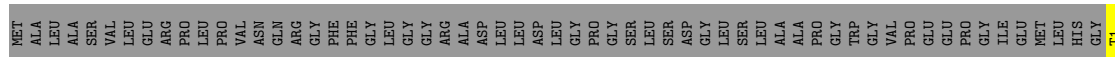
- Molecule 12: Proteasome subunit beta type-2



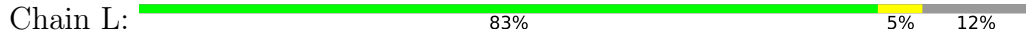
- Molecule 13: Proteasome subunit beta type-5

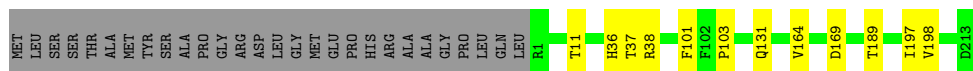


- Molecule 13: Proteasome subunit beta type-5

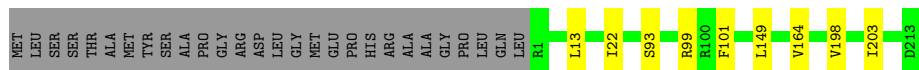
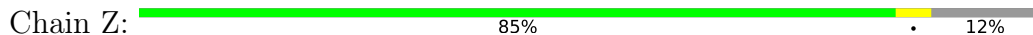


- Molecule 14: Proteasome subunit beta type-1

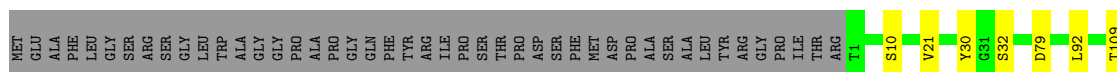
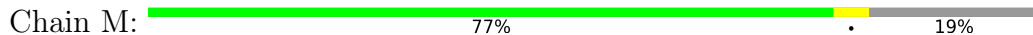




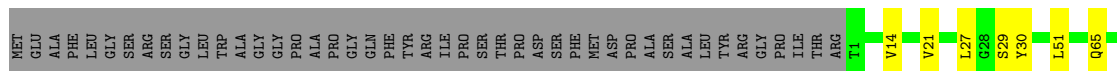
● Molecule 14: Proteasome subunit beta type-1



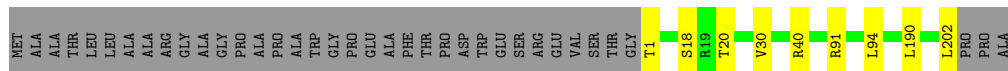
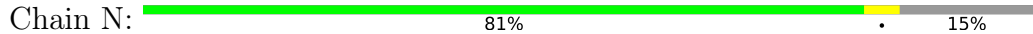
● Molecule 15: Proteasome subunit beta type-4



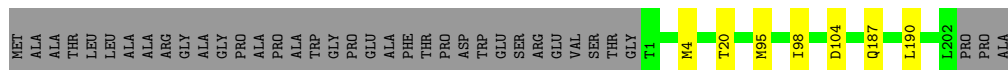
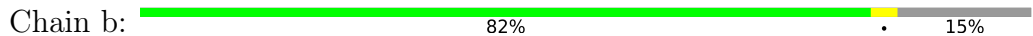
● Molecule 15: Proteasome subunit beta type-4



● Molecule 16: Proteasome subunit beta type-6



● Molecule 16: Proteasome subunit beta type-6



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	135937	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	43	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	26.106	Depositor
Minimum map value	-10.669	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	4.0	Depositor
Map size (Å)	388.992, 388.992, 388.992	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.2156, 1.2156, 1.2156	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	c	0.54	0/1700	0.78	0/2310
1	e	0.54	0/1695	0.79	0/2303
1	g	0.54	0/1700	0.76	0/2310
2	d	0.52	0/1665	0.82	1/2258 (0.0%)
2	f	0.53	0/1620	0.80	0/2196
2	h	0.52	0/1667	0.79	0/2258
2	i	0.53	0/1661	0.78	0/2251
3	A	0.63	0/1735	0.86	1/2362 (0.0%)
3	O	0.61	0/1717	0.83	1/2339 (0.0%)
4	B	0.61	0/1821	0.87	1/2477 (0.0%)
4	P	0.59	0/1872	0.83	0/2541
5	C	0.61	0/1729	0.85	1/2356 (0.0%)
5	Q	0.59	0/1749	0.82	0/2380
6	D	0.65	0/1780	0.86	1/2417 (0.0%)
6	R	0.61	0/1720	0.79	0/2336
7	E	0.64	0/1845	0.84	0/2504
7	S	0.63	0/1794	0.86	0/2437
8	F	0.64	0/1820	0.82	0/2464
8	T	0.64	0/1819	0.81	1/2463 (0.0%)
9	G	0.62	0/1802	0.86	1/2449 (0.0%)
9	U	0.59	0/1823	0.82	0/2478
10	H	0.65	0/1636	0.91	2/2223 (0.1%)
10	V	0.64	0/1639	0.85	1/2228 (0.0%)
11	I	0.61	0/1593	0.87	0/2149
11	W	0.62	0/1588	0.88	0/2144
12	J	0.60	0/1577	0.86	0/2138
12	X	0.61	0/1567	0.84	0/2124
13	K	0.65	0/1556	0.86	0/2104
13	Y	0.63	0/1563	0.84	0/2115
14	L	0.66	0/1629	0.88	2/2201 (0.1%)
14	Z	0.65	0/1623	0.87	1/2192 (0.0%)
15	M	0.63	0/1676	0.87	0/2272
15	a	0.66	0/1657	0.86	1/2250 (0.0%)
16	N	0.67	0/1517	0.86	0/2056

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
16	b	0.65	0/1504	0.86	1/2038 (0.0%)
All	All	0.61	0/59059	0.84	16/80123 (0.0%)

There are no bond length outliers.

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	H	188	PRO	CA-N-CD	-7.59	100.87	111.50
14	Z	101	PHE	CB-CA-C	7.23	124.87	110.40
2	d	157	PHE	CB-CA-C	-6.87	96.67	110.40
5	C	12	PRO	N-CA-C	-6.79	94.46	112.10
10	H	188	PRO	N-CA-CB	-6.50	95.45	102.60
16	b	104	ASP	CB-CA-C	-6.47	97.46	110.40
6	D	17	PRO	N-CA-C	-6.26	95.83	112.10
4	B	14	PRO	N-CA-C	-6.19	96.02	112.10
3	A	14	PRO	N-CA-C	-6.09	96.27	112.10
14	L	101	PHE	CB-CA-C	5.70	121.80	110.40
8	T	122	TYR	CB-CA-C	5.43	121.25	110.40
10	V	93	TYR	CB-CA-C	5.28	120.95	110.40
14	L	103	PRO	N-CA-C	5.27	125.81	112.10
3	O	75	TYR	CB-CA-C	-5.15	100.10	110.40
15	a	178	TYR	CB-CA-C	-5.11	100.19	110.40
9	G	9	PHE	CB-CA-C	5.07	120.54	110.40

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	c	210/239 (88%)	209 (100%)	1 (0%)	0	100	100
1	e	209/239 (87%)	206 (99%)	2 (1%)	1 (0%)	29	61
1	g	210/239 (88%)	210 (100%)	0	0	100	100
2	d	207/249 (83%)	204 (99%)	3 (1%)	0	100	100
2	f	200/249 (80%)	197 (98%)	3 (2%)	0	100	100
2	h	207/249 (83%)	204 (99%)	2 (1%)	1 (0%)	29	61
2	i	207/249 (83%)	205 (99%)	2 (1%)	0	100	100
3	A	227/234 (97%)	224 (99%)	3 (1%)	0	100	100
3	O	227/234 (97%)	226 (100%)	1 (0%)	0	100	100
4	B	247/261 (95%)	241 (98%)	6 (2%)	0	100	100
4	P	249/261 (95%)	245 (98%)	3 (1%)	1 (0%)	34	66
5	C	233/248 (94%)	230 (99%)	3 (1%)	0	100	100
5	Q	234/248 (94%)	232 (99%)	2 (1%)	0	100	100
6	D	239/241 (99%)	231 (97%)	8 (3%)	0	100	100
6	R	233/241 (97%)	232 (100%)	1 (0%)	0	100	100
7	E	237/263 (90%)	233 (98%)	4 (2%)	0	100	100
7	S	235/263 (89%)	230 (98%)	5 (2%)	0	100	100
8	F	238/255 (93%)	238 (100%)	0	0	100	100
8	T	237/255 (93%)	236 (100%)	1 (0%)	0	100	100
9	G	237/246 (96%)	232 (98%)	4 (2%)	1 (0%)	34	66
9	U	240/246 (98%)	239 (100%)	1 (0%)	0	100	100
10	H	220/277 (79%)	215 (98%)	3 (1%)	2 (1%)	17	48
10	V	220/277 (79%)	217 (99%)	1 (0%)	2 (1%)	17	48
11	I	202/205 (98%)	197 (98%)	5 (2%)	0	100	100
11	W	202/205 (98%)	198 (98%)	3 (2%)	1 (0%)	29	61
12	J	195/201 (97%)	191 (98%)	3 (2%)	1 (0%)	29	61
12	X	194/201 (96%)	189 (97%)	4 (2%)	1 (0%)	29	61
13	K	198/263 (75%)	196 (99%)	2 (1%)	0	100	100
13	Y	198/263 (75%)	196 (99%)	2 (1%)	0	100	100
14	L	211/241 (88%)	209 (99%)	2 (1%)	0	100	100
14	Z	211/241 (88%)	208 (99%)	3 (1%)	0	100	100
15	M	213/264 (81%)	209 (98%)	3 (1%)	1 (0%)	29	61

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
15	a	213/264 (81%)	205 (96%)	7 (3%)	1 (0%)	29	61
16	N	200/239 (84%)	196 (98%)	4 (2%)	0	100	100
16	b	200/239 (84%)	197 (98%)	3 (2%)	0	100	100
All	All	7640/8589 (89%)	7527 (98%)	100 (1%)	13 (0%)	50	78

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	e	236	PRO
10	H	171	SER
10	H	188	PRO
10	V	171	SER
2	h	247	MET
15	M	10	SER
12	X	122	ALA
9	G	11	ARG
12	J	122	ALA
11	W	29	ILE
15	a	214	MET
10	V	188	PRO
4	P	59	VAL

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	c	172/212 (81%)	162 (94%)	10 (6%)	20	50
1	e	172/212 (81%)	161 (94%)	11 (6%)	17	45
1	g	172/212 (81%)	170 (99%)	2 (1%)	71	91
2	d	168/224 (75%)	160 (95%)	8 (5%)	25	58
2	f	166/224 (74%)	156 (94%)	10 (6%)	19	49
2	h	170/224 (76%)	158 (93%)	12 (7%)	14	40

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	i	168/224 (75%)	152 (90%)	16 (10%)	8	26
3	A	158/191 (83%)	147 (93%)	11 (7%)	15	41
3	O	155/191 (81%)	148 (96%)	7 (4%)	27	61
4	B	159/221 (72%)	142 (89%)	17 (11%)	6	20
4	P	171/221 (77%)	160 (94%)	11 (6%)	17	45
5	C	152/211 (72%)	139 (91%)	13 (9%)	10	30
5	Q	157/211 (74%)	145 (92%)	12 (8%)	13	36
6	D	173/203 (85%)	163 (94%)	10 (6%)	20	50
6	R	164/203 (81%)	148 (90%)	16 (10%)	8	24
7	E	181/224 (81%)	168 (93%)	13 (7%)	14	39
7	S	169/224 (75%)	156 (92%)	13 (8%)	13	35
8	F	167/212 (79%)	150 (90%)	17 (10%)	7	22
8	T	168/212 (79%)	157 (94%)	11 (6%)	17	45
9	G	175/210 (83%)	157 (90%)	18 (10%)	7	22
9	U	177/210 (84%)	163 (92%)	14 (8%)	12	34
10	H	165/228 (72%)	148 (90%)	17 (10%)	7	22
10	V	166/228 (73%)	152 (92%)	14 (8%)	11	31
11	I	164/174 (94%)	143 (87%)	21 (13%)	4	13
11	W	162/174 (93%)	149 (92%)	13 (8%)	12	33
12	J	156/171 (91%)	146 (94%)	10 (6%)	17	45
12	X	156/171 (91%)	146 (94%)	10 (6%)	17	45
13	K	146/202 (72%)	135 (92%)	11 (8%)	13	37
13	Y	147/202 (73%)	130 (88%)	17 (12%)	5	16
14	L	161/199 (81%)	151 (94%)	10 (6%)	18	47
14	Z	160/199 (80%)	152 (95%)	8 (5%)	24	57
15	M	166/215 (77%)	156 (94%)	10 (6%)	19	49
15	a	160/215 (74%)	147 (92%)	13 (8%)	11	33
16	N	149/181 (82%)	140 (94%)	9 (6%)	19	49
16	b	145/181 (80%)	139 (96%)	6 (4%)	30	64
All	All	5717/7216 (79%)	5296 (93%)	421 (7%)	17	38

All (421) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	c	16	GLN
1	c	17	VAL
1	c	22	GLN
1	c	32	LEU
1	c	41	ILE
1	c	57	LEU
1	c	109	PRO
1	c	134	ASP
1	c	193	GLU
1	c	238	MET
2	d	25	THR
2	d	46	GLU
2	d	63	ILE
2	d	65	VAL
2	d	104	VAL
2	d	128	LEU
2	d	136	GLN
2	d	248	ILE
1	e	41	ILE
1	e	47	LEU
1	e	94	LEU
1	e	103	LEU
1	e	107	VAL
1	e	116	GLU
1	e	134	ASP
1	e	184	VAL
1	e	186	ASP
1	e	207	LEU
1	e	224	LEU
2	f	11	GLN
2	f	21	LEU
2	f	29	LEU
2	f	39	GLU
2	f	46	GLU
2	f	63	ILE
2	f	136	GLN
2	f	144	ASP
2	f	159	LEU
2	f	241	ARG
3	A	5	TYR
3	A	19	VAL
3	A	43	VAL
3	A	44	VAL

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Mol	Chain	Res	Type
3	A	64	VAL
3	A	73	LEU
3	A	126	VAL
3	A	136	CYS
3	A	187	ILE
3	A	207	ILE
3	A	218	ARG
4	B	6	ASP
4	B	9	THR
4	B	21	VAL
4	B	28	ILE
4	B	33	THR
4	B	35	LEU
4	B	44	LEU
4	B	61	PHE
4	B	76	VAL
4	B	105	ILE
4	B	128	ARG
4	B	134	LEU
4	B	177	GLN
4	B	216	LEU
4	B	217	THR
4	B	223	THR
4	B	224	VAL
5	C	7	ILE
5	C	35	VAL
5	C	41	VAL
5	C	59	VAL
5	C	65	LEU
5	C	69	VAL
5	C	89	VAL
5	C	107	ILE
5	C	108	THR
5	C	148	ASP
5	C	168	VAL
5	C	186	LEU
5	C	191	VAL
6	D	46	VAL
6	D	47	CYS
6	D	54	ILE
6	D	78	MET
6	D	81	LEU

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Mol	Chain	Res	Type
6	D	107	MET
6	D	113	THR
6	D	163	VAL
6	D	165	CYS
6	D	188	SER
7	E	14	SER
7	E	30	LYS
7	E	101	ARG
7	E	122	ARG
7	E	123	TYR
7	E	139	ASP
7	E	147	THR
7	E	150	SER
7	E	173	GLU
7	E	174	ARG
7	E	184	LEU
7	E	222	THR
7	E	237	GLU
8	F	9	LEU
8	F	35	THR
8	F	37	ILE
8	F	53	VAL
8	F	66	LEU
8	F	69	VAL
8	F	71	ARG
8	F	80	LEU
8	F	96	SER
8	F	142	VAL
8	F	151	ILE
8	F	174	THR
8	F	179	LEU
8	F	181	MET
8	F	186	CYS
8	F	192	GLU
8	F	215	TRP
9	G	13	ILE
9	G	17	SER
9	G	61	LEU
9	G	66	VAL
9	G	78	CYS
9	G	112	ASP
9	G	115	CYS

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Mol	Chain	Res	Type
9	G	120	ASP
9	G	124	VAL
9	G	126	THR
9	G	128	ASN
9	G	131	MET
9	G	137	CYS
9	G	154	CYS
9	G	166	THR
9	G	170	VAL
9	G	173	THR
9	G	217	VAL
10	H	6	VAL
10	H	12	ILE
10	H	18	THR
10	H	25	VAL
10	H	38	SER
10	H	43	CYS
10	H	61	SER
10	H	105	VAL
10	H	106	THR
10	H	143	ARG
10	H	171	SER
10	H	181	ASN
10	H	182	LYS
10	H	183	LEU
10	H	188	PRO
10	H	194	LYS
10	H	213	THR
11	I	19	VAL
11	I	33	MET
11	I	36	THR
11	I	52	LEU
11	I	57	THR
11	I	70	LEU
11	I	79	ARG
11	I	85	THR
11	I	98	ARG
11	I	104	THR
11	I	121	CYS
11	I	126	ILE
11	I	134	ASP
11	I	136	VAL

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Mol	Chain	Res	Type
11	I	145	MET
11	I	158	ASP
11	I	177	ASP
11	I	182	MET
11	I	184	VAL
11	I	190	GLU
11	I	196	THR
12	J	26	VAL
12	J	74	GLU
12	J	76	SER
12	J	78	THR
12	J	96	THR
12	J	102	LEU
12	J	118	MET
12	J	144	ASP
12	J	145	ARG
12	J	148	THR
13	K	1	THR
13	K	29	GLN
13	K	42	LEU
13	K	80	SER
13	K	99	THR
13	K	102	CYS
13	K	104	TRP
13	K	114	VAL
13	K	116	SER
13	K	182	ASP
13	K	187	VAL
14	L	11	THR
14	L	36	HIS
14	L	37	THR
14	L	38	ARG
14	L	131	GLN
14	L	164	VAL
14	L	169	ASP
14	L	189	THR
14	L	197	ILE
14	L	198	VAL
15	M	21	VAL
15	M	30	TYR
15	M	32	SER
15	M	79	ASP

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Mol	Chain	Res	Type
15	M	92	LEU
15	M	109	THR
15	M	141	TYR
15	M	147	GLN
15	M	191	THR
15	M	205	THR
16	N	1	THR
16	N	18	SER
16	N	20	THR
16	N	30	VAL
16	N	40	ARG
16	N	91	ARG
16	N	94	LEU
16	N	190	LEU
16	N	202	LEU
3	O	43	VAL
3	O	44	VAL
3	O	50	LYS
3	O	73	LEU
3	O	131	VAL
3	O	135	ILE
3	O	155	PHE
4	P	9	THR
4	P	25	MET
4	P	44	LEU
4	P	64	LYS
4	P	123	GLN
4	P	132	VAL
4	P	150	SER
4	P	185	THR
4	P	190	LEU
4	P	217	THR
4	P	223	THR
5	Q	23	GLN
5	Q	27	LYS
5	Q	54	GLN
5	Q	67	ASP
5	Q	77	THR
5	Q	83	VAL
5	Q	103	THR
5	Q	107	ILE
5	Q	172	LEU

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Mol	Chain	Res	Type
5	Q	191	VAL
5	Q	206	ILE
5	Q	225	ILE
6	R	10	ARG
6	R	46	VAL
6	R	47	CYS
6	R	54	ILE
6	R	58	LEU
6	R	59	MET
6	R	91	LYS
6	R	108	THR
6	R	119	LEU
6	R	121	LEU
6	R	139	VAL
6	R	156	MET
6	R	165	CYS
6	R	190	THR
6	R	210	LEU
6	R	234	LEU
7	S	5	GLN
7	S	16	GLN
7	S	18	ARG
7	S	35	THR
7	S	39	LYS
7	S	60	GLN
7	S	64	LEU
7	S	120	THR
7	S	130	VAL
7	S	133	LEU
7	S	150	SER
7	S	222	THR
7	S	228	ASP
8	T	35	THR
8	T	41	CYS
8	T	69	VAL
8	T	94	GLU
8	T	100	SER
8	T	142	VAL
8	T	154	SER
8	T	156	VAL
8	T	181	MET
8	T	182	LYS

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Mol	Chain	Res	Type
8	T	215	TRP
9	U	49	VAL
9	U	66	VAL
9	U	73	THR
9	U	78	CYS
9	U	80	MET
9	U	81	THR
9	U	84	THR
9	U	90	GLN
9	U	112	ASP
9	U	131	MET
9	U	170	VAL
9	U	173	THR
9	U	200	THR
9	U	215	ILE
10	V	1	THR
10	V	6	VAL
10	V	18	THR
10	V	21	THR
10	V	48	THR
10	V	61	SER
10	V	105	VAL
10	V	118	SER
10	V	119	THR
10	V	182	LYS
10	V	184	ASP
10	V	197	THR
10	V	212	LEU
10	V	216	ILE
11	W	2	ILE
11	W	19	VAL
11	W	57	THR
11	W	70	LEU
11	W	98	ARG
11	W	131	VAL
11	W	134	ASP
11	W	136	VAL
11	W	137	VAL
11	W	141	CYS
11	W	176	ARG
11	W	186	VAL
11	W	195	THR

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Mol	Chain	Res	Type
12	X	13	VAL
12	X	15	VAL
12	X	20	VAL
12	X	26	VAL
12	X	31	ASP
12	X	38	MET
12	X	39	SER
12	X	54	VAL
12	X	73	TYR
12	X	96	THR
13	Y	1	THR
13	Y	30	THR
13	Y	40	TYR
13	Y	41	LEU
13	Y	44	THR
13	Y	58	LEU
13	Y	97	MET
13	Y	102	CYS
13	Y	104	TRP
13	Y	107	ARG
13	Y	119	ASN
13	Y	121	ILE
13	Y	133	VAL
13	Y	138	VAL
13	Y	179	VAL
13	Y	187	VAL
13	Y	194	ASP
14	Z	13	LEU
14	Z	22	ILE
14	Z	93	SER
14	Z	99	ARG
14	Z	149	LEU
14	Z	164	VAL
14	Z	198	VAL
14	Z	203	ILE
15	a	14	VAL
15	a	21	VAL
15	a	27	LEU
15	a	29	SER
15	a	30	TYR
15	a	51	LEU
15	a	65	GLN

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Mol	Chain	Res	Type
15	a	100	ARG
15	a	110	MET
15	a	137	LEU
15	a	148	PRO
15	a	169	VAL
15	a	191	THR
16	b	4	MET
16	b	20	THR
16	b	95	MET
16	b	98	ILE
16	b	187	GLN
16	b	190	LEU
2	h	21	LEU
2	h	50	ASN
2	h	61	LEU
2	h	63	ILE
2	h	65	VAL
2	h	116	ARG
2	h	128	LEU
2	h	144	ASP
2	h	159	LEU
2	h	185	VAL
2	h	191	GLN
2	h	248	ILE
2	i	21	LEU
2	i	28	LEU
2	i	50	ASN
2	i	61	LEU
2	i	63	ILE
2	i	65	VAL
2	i	109	LYS
2	i	128	LEU
2	i	136	GLN
2	i	144	ASP
2	i	155	LYS
2	i	157	PHE
2	i	159	LEU
2	i	191	GLN
2	i	213	ARG
2	i	248	ILE
1	g	41	ILE
1	g	50	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (77) such sidechains are listed below:

Mol	Chain	Res	Type
1	c	38	GLN
1	c	45	GLN
1	c	126	GLN
1	c	151	ASN
2	d	138	GLN
2	d	147	ASN
2	f	138	GLN
2	f	147	ASN
3	A	122	GLN
4	B	146	GLN
4	B	149	GLN
4	B	230	GLN
6	D	13	ASN
6	D	227	HIS
7	E	31	GLN
7	E	68	ASN
9	G	24	GLN
9	G	53	GLN
9	G	128	ASN
11	I	17	ASN
12	J	87	ASN
12	J	168	GLN
13	K	10	HIS
13	K	29	GLN
13	K	162	GLN
14	L	77	HIS
14	L	80	ASN
15	M	81	HIS
15	M	147	GLN
15	M	157	GLN
15	M	188	GLN
15	M	213	HIS
16	N	66	HIS
16	N	106	GLN
16	N	110	GLN
3	O	108	GLN
3	O	168	ASN
4	P	109	GLN
4	P	123	GLN
4	P	230	GLN
5	Q	54	GLN

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Mol	Chain	Res	Type
6	R	182	GLN
6	R	227	HIS
7	S	16	GLN
7	S	68	ASN
9	U	24	GLN
9	U	53	GLN
9	U	147	GLN
10	V	80	ASN
11	W	6	ASN
12	X	82	ASN
12	X	87	ASN
12	X	132	HIS
13	Y	29	GLN
13	Y	119	ASN
14	Z	80	ASN
14	Z	108	ASN
14	Z	131	GLN
14	Z	152	GLN
14	Z	157	ASN
15	a	81	HIS
16	b	193	GLN
2	h	27	ASN
2	h	138	GLN
2	h	147	ASN
2	h	191	GLN
2	i	11	GLN
2	i	27	ASN
2	i	138	GLN
2	i	147	ASN
2	i	173	GLN
2	i	191	GLN
2	i	199	GLN
1	g	16	GLN
1	g	38	GLN
1	g	126	GLN
1	g	127	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

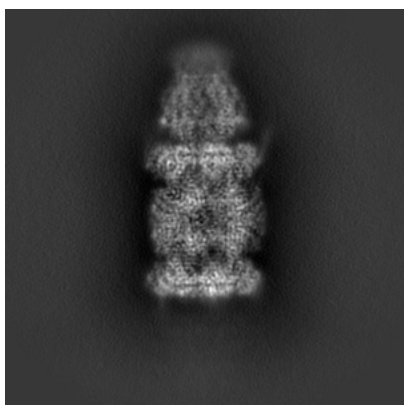
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-24276. These allow visual inspection of the internal detail of the map and identification of artifacts.

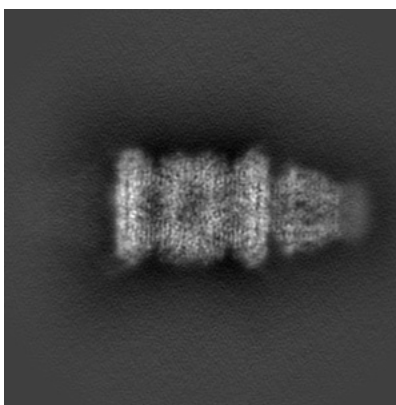
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

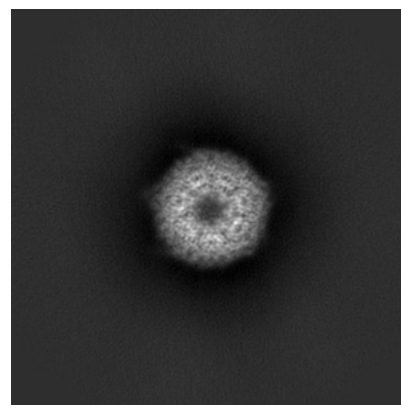
6.1.1 Primary map



X



Y

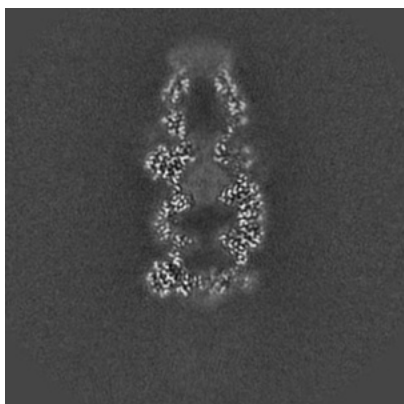


Z

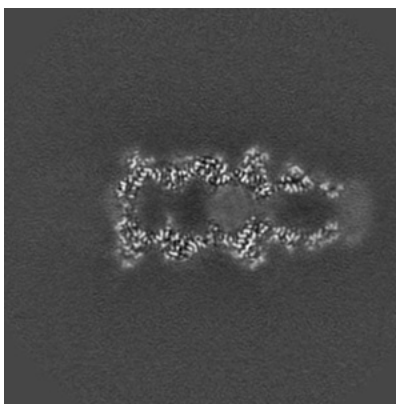
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

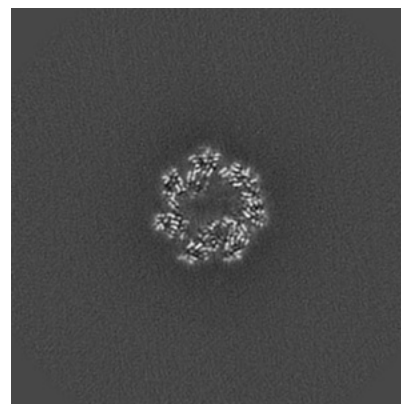
6.2.1 Primary map



X Index: 160



Y Index: 160

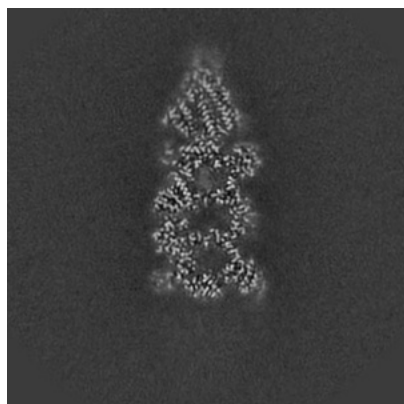


Z Index: 160

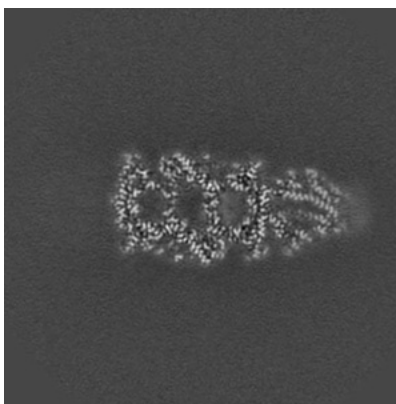
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

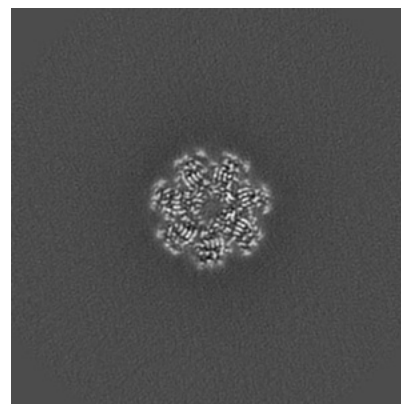
6.3.1 Primary map



X Index: 176



Y Index: 145

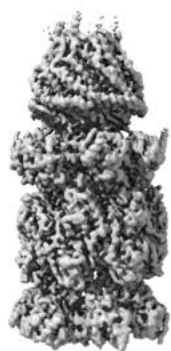


Z Index: 197

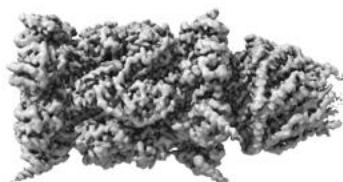
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

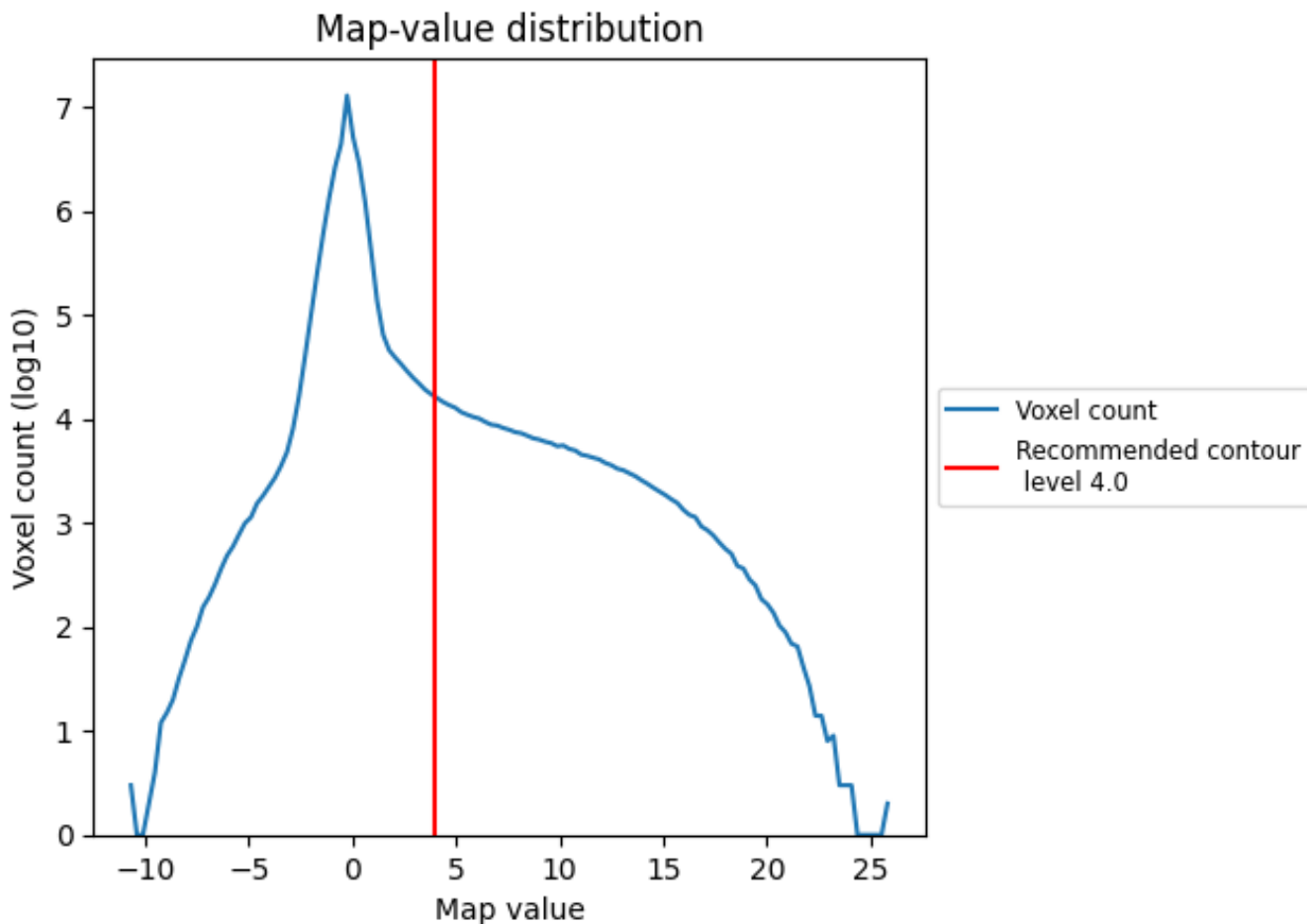
6.5 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

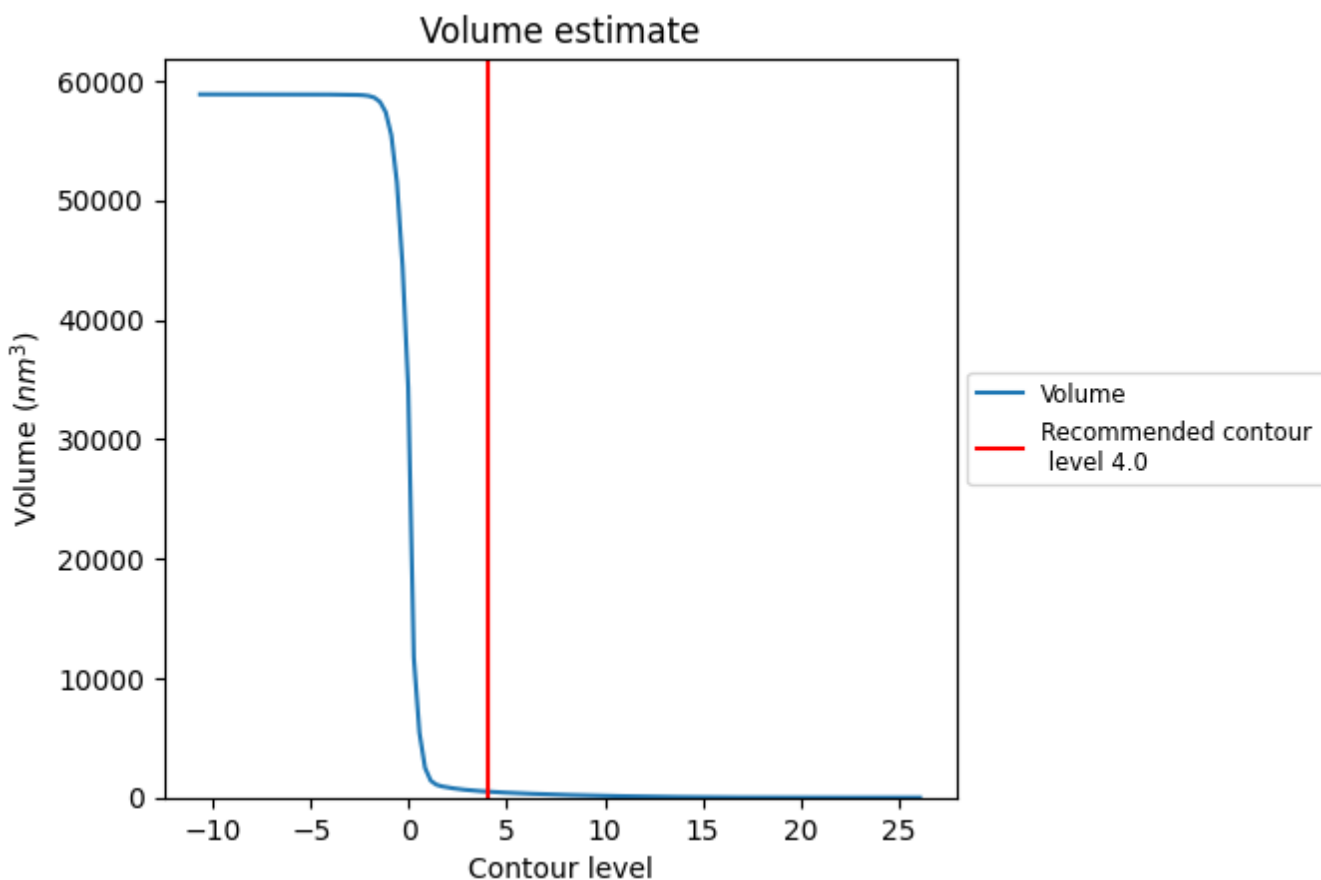
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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.

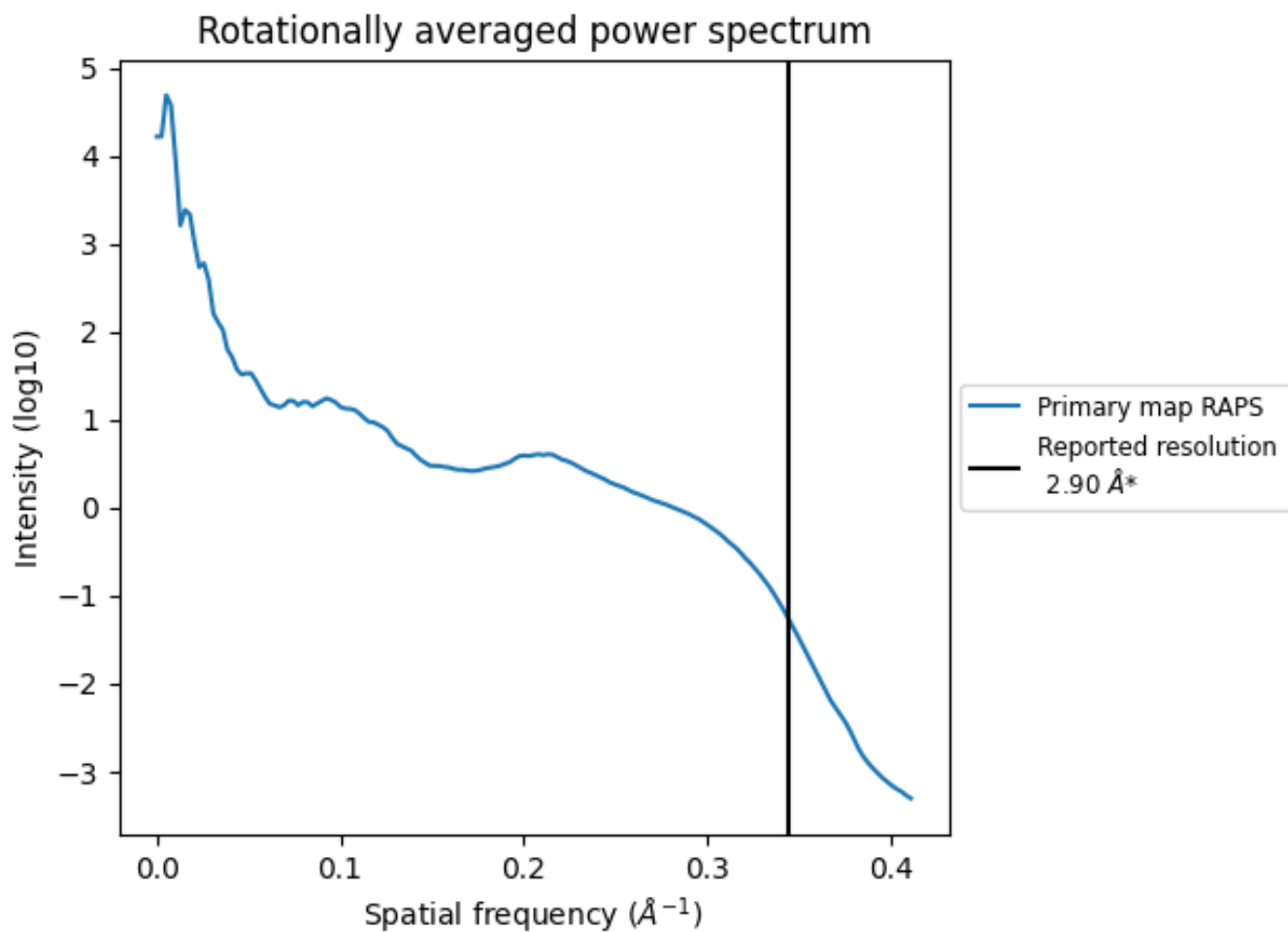
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 499 nm³; this corresponds to an approximate mass of 451 kDa.

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.

7.3 Rotationally averaged power spectrum i

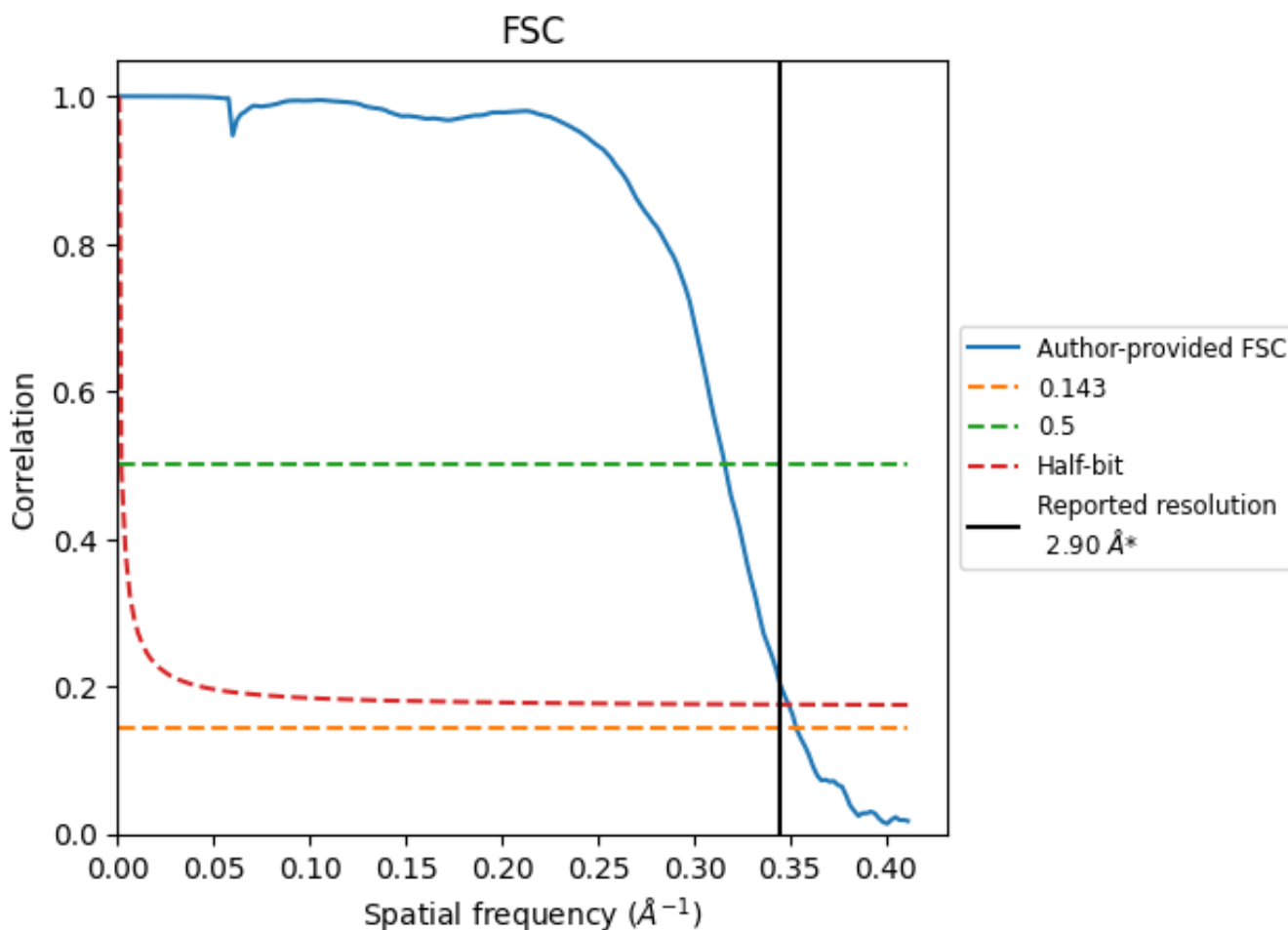


*Reported resolution corresponds to spatial frequency of 0.345 Å⁻¹

8 Fourier-Shell correlation [\(i\)](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [\(i\)](#)



*Reported resolution corresponds to spatial frequency of 0.345 Å⁻¹

8.2 Resolution estimates [i](#)

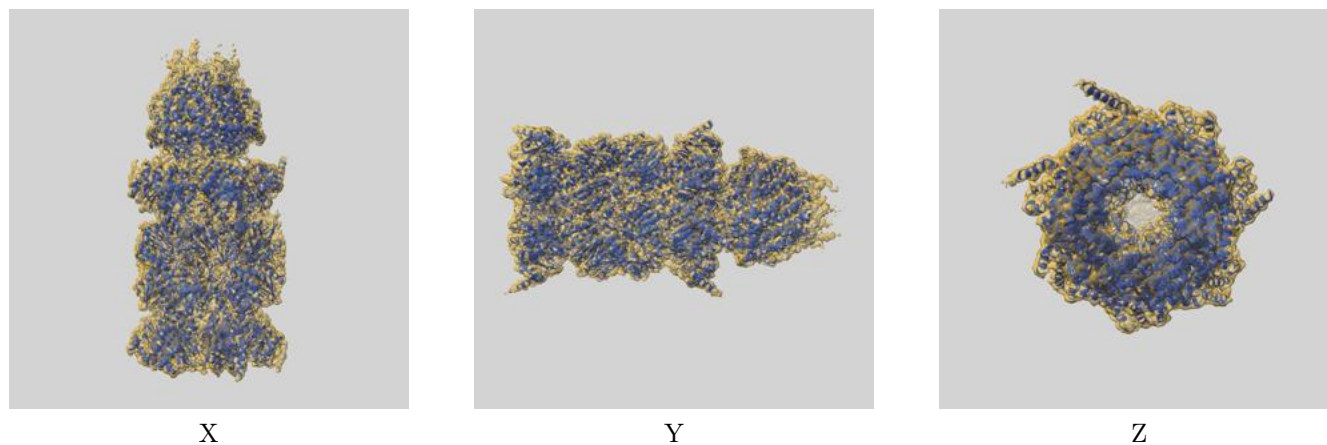
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	2.83	3.16	2.86
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

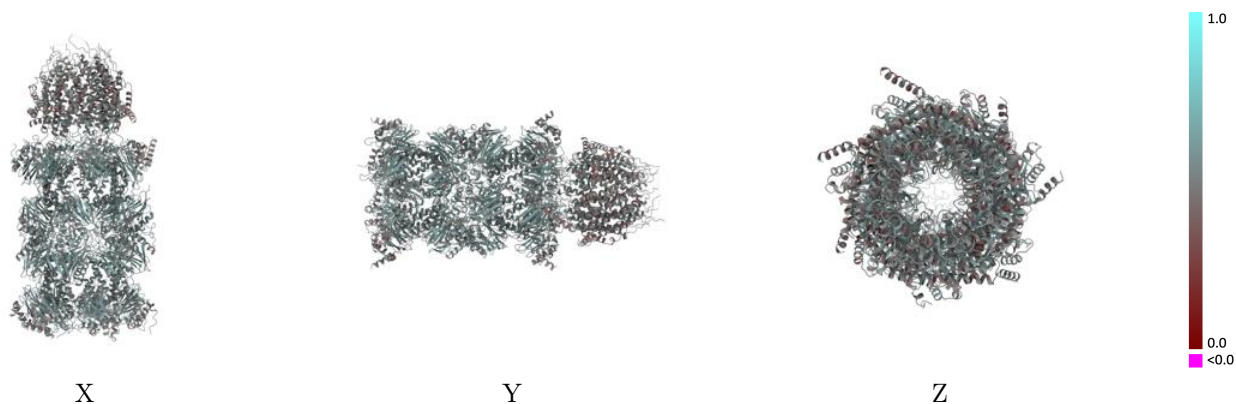
This section contains information regarding the fit between EMDB map EMD-24276 and PDB model 8CXB. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



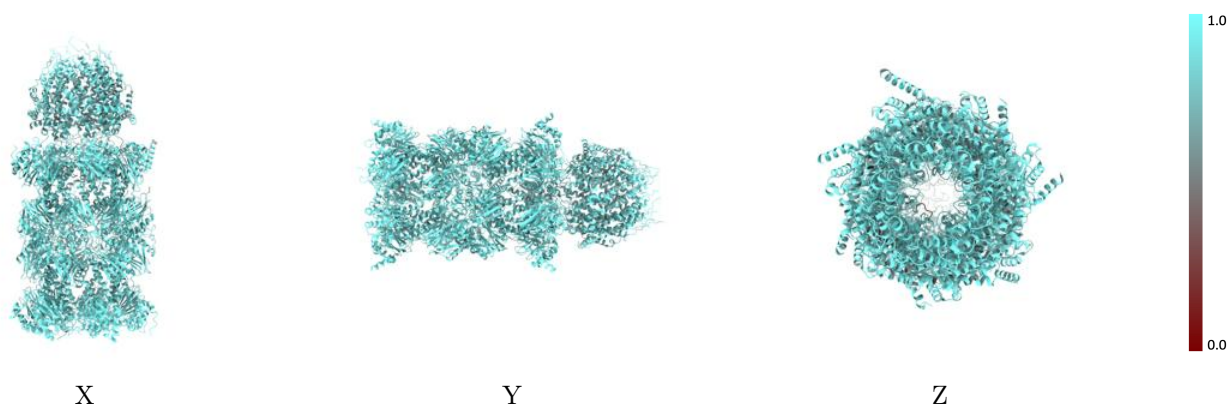
The images above show the 3D surface view of the map at the recommended contour level 4.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



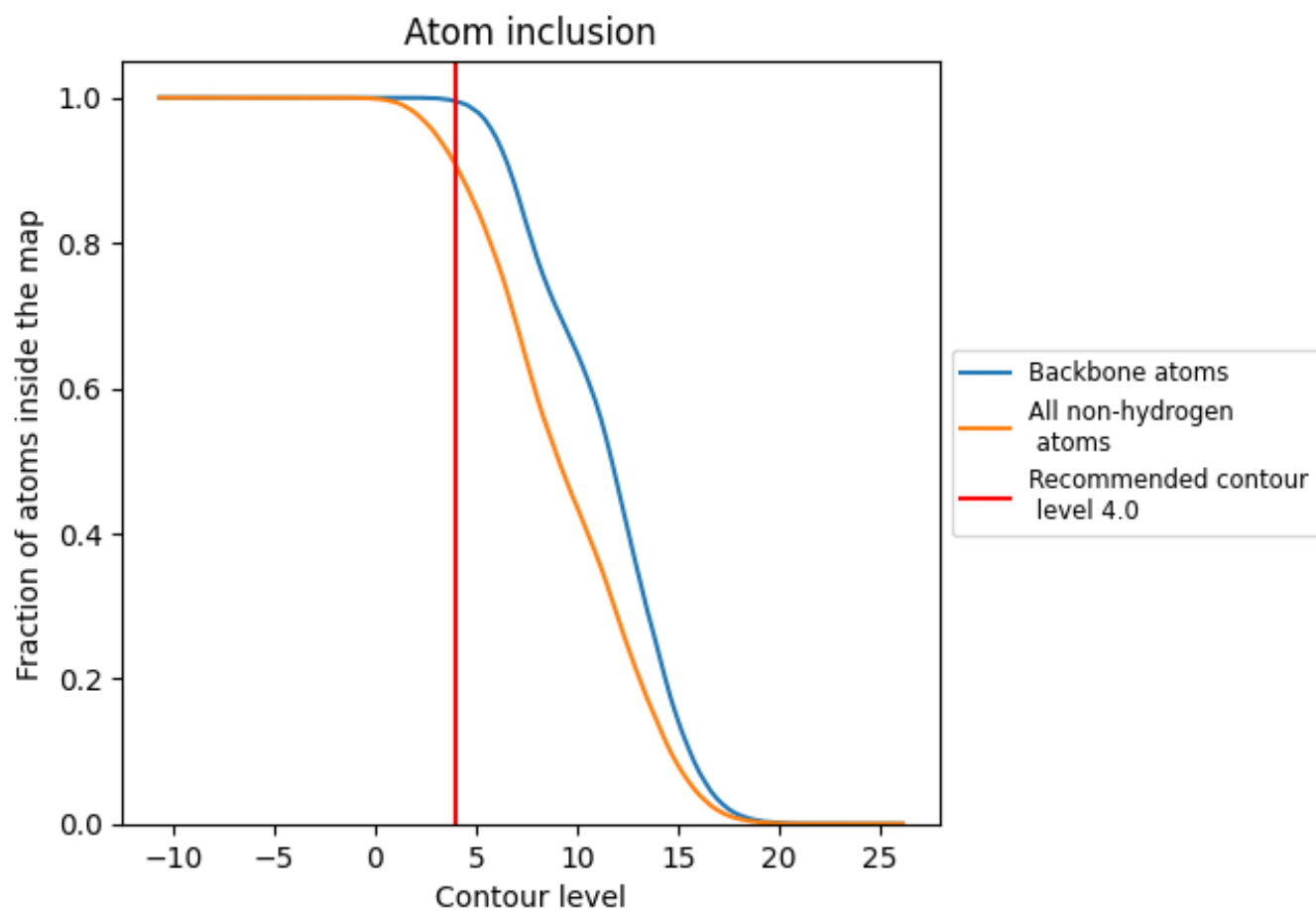
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (4.0).









































































9.4 Atom inclusion [i](#)



At the recommended contour level, 99% of all backbone atoms, 91% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (4.0) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9065	 0.5250
A	 0.9164	 0.5310
B	 0.9085	 0.5290
C	 0.9228	 0.5300
D	 0.8926	 0.5260
E	 0.9128	 0.5370
F	 0.9209	 0.5430
G	 0.9275	 0.5340
H	 0.9299	 0.5470
I	 0.9088	 0.5460
J	 0.9139	 0.5500
K	 0.9390	 0.5490
L	 0.9201	 0.5490
M	 0.9267	 0.5420
N	 0.9267	 0.5540
O	 0.9362	 0.5390
P	 0.9142	 0.5240
Q	 0.9219	 0.5140
R	 0.9058	 0.5210
S	 0.9341	 0.5280
T	 0.9357	 0.5290
U	 0.9306	 0.5330
V	 0.9238	 0.5430
W	 0.9301	 0.5550
X	 0.9180	 0.5500
Y	 0.9305	 0.5410
Z	 0.9333	 0.5530
a	 0.9392	 0.5550
b	 0.9315	 0.5530
c	 0.8327	 0.4640
d	 0.8420	 0.4700
e	 0.8518	 0.4670
f	 0.8422	 0.4710
g	 0.8260	 0.4660
h	 0.8366	 0.4650
i	 0.8466	 0.4680

