



wwPDB EM Validation Summary Report ⓘ

Mar 19, 2026 – 10:41 PM UTC

PDB ID : 6WUB / pdb_00006wub
EMDB ID : EMD-21909
Title : 30S subunit (head) of 70S Ribosome *Enterococcus faecalis* MultiBody refinement
Authors : Jogl, G.; Khayat, R.
Deposited on : 2020-05-04
Resolution : 3.20 Å (reported)
Based on initial models : 5LI0, 4YBB

This is a wwPDB EM Validation Summary 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:

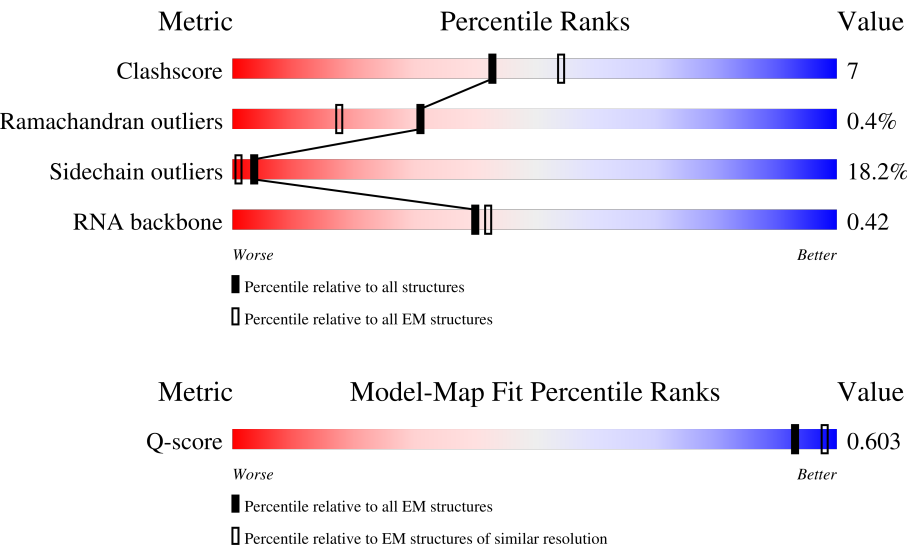
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 3.20 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	15020 (2.70 - 3.70)

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	a	1548	20% 50%19%28%
2	d	201	16% 60%31%9%
3	e	163	66%30%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
4	f	97	
5	h	131	
6	k	117	
7	l	136	
8	o	88	
9	p	89	
10	q	83	
11	r	66	
12	t	82	

2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 33949 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 RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	a	1121	Total	C	N	O	P	0	0
			24077	10736	4434	7786	1121		

- Molecule 2 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	d	201	Total	C	N	O	S	0	0
			1620	1016	303	297	4		

- Molecule 3 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	e	163	Total	C	N	O	S	0	0
			1204	759	222	221	2		

- Molecule 4 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	f	97	Total	C	N	O	S	0	0
			795	501	137	154	3		

- Molecule 5 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	h	131	Total	C	N	O	S	0	0
			1041	662	184	193	2		

- Molecule 6 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	k	117	Total	C	N	O	S	0	0
			863	533	165	161	4		

- Molecule 7 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	l	136	Total	C	N	O	S	0	0
			1065	661	214	188	2		

- Molecule 8 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	o	88	Total	C	N	O	S	0	0
			741	455	152	133	1		

- Molecule 9 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	p	89	Total	C	N	O	S	0	0
			708	448	131	127	2		

- Molecule 10 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	q	83	Total	C	N	O	S	0	0
			681	427	127	124	3		

- Molecule 11 is a protein called 30S ribosomal protein S18.

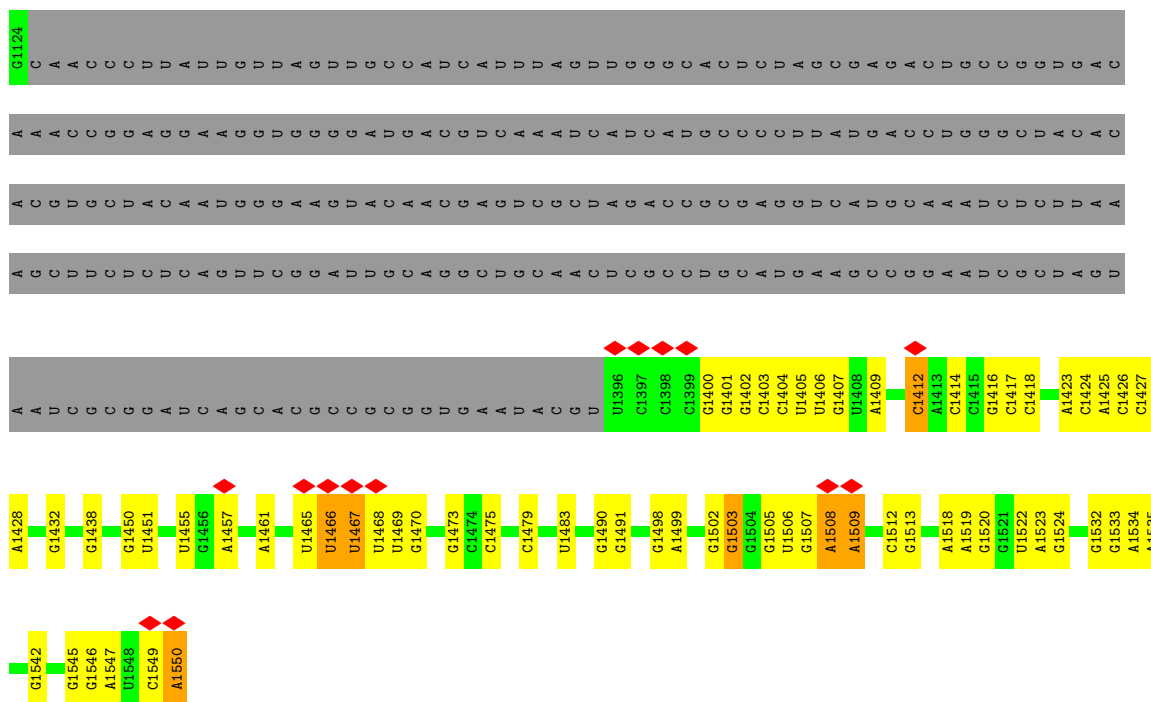
Mol	Chain	Residues	Atoms					AltConf	Trace
11	r	66	Total	C	N	O	S	0	0
			537	343	99	94	1		

- Molecule 12 is a protein called 30S ribosomal protein S20.

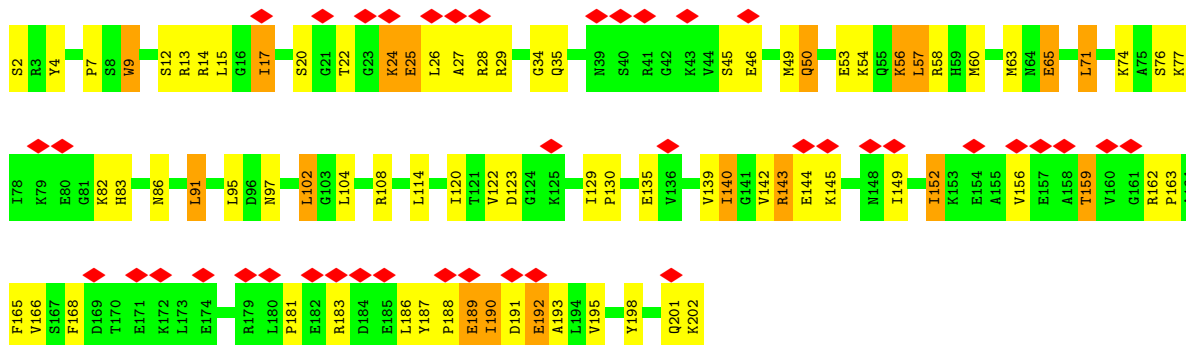
Mol	Chain	Residues	Atoms					AltConf	Trace
12	t	82	Total	C	N	O	S	0	0
			617	377	120	118	2		

- Molecule 1: 16S rRNA

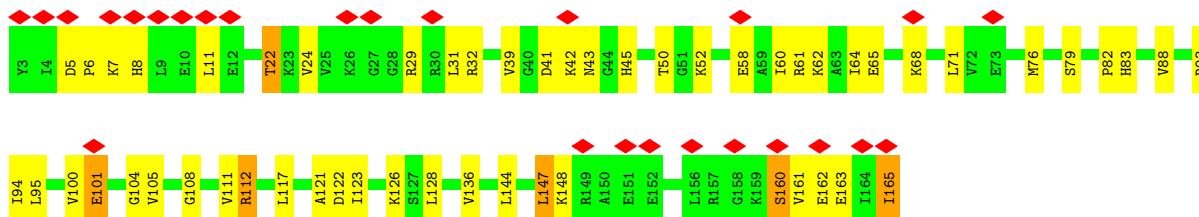




• Molecule 2: 30S ribosomal protein S4

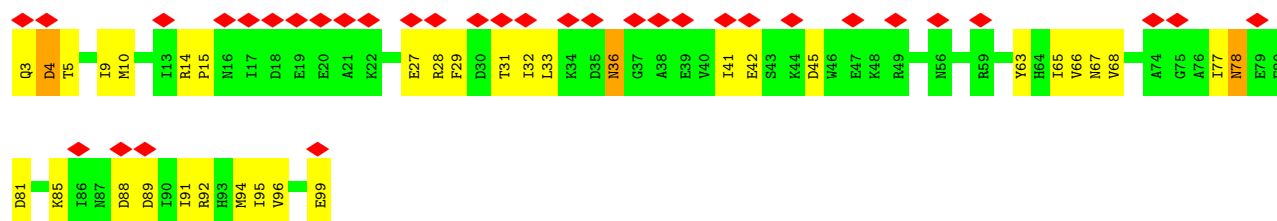


• Molecule 3: 30S ribosomal protein S5

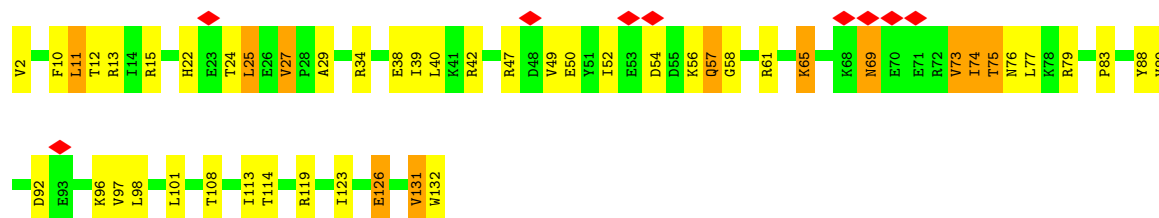


• Molecule 4: 30S ribosomal protein S6

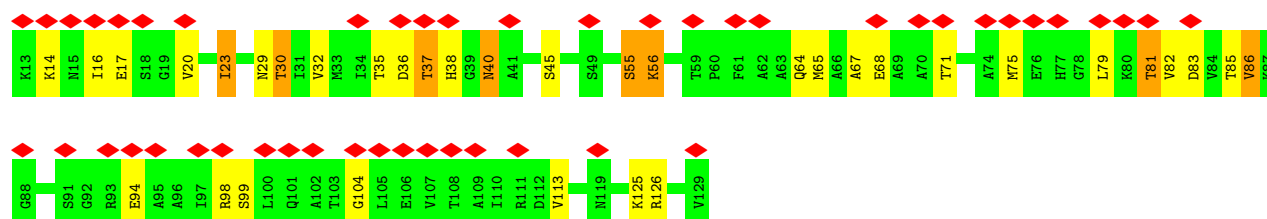
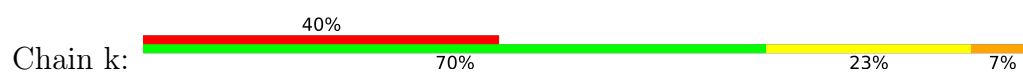




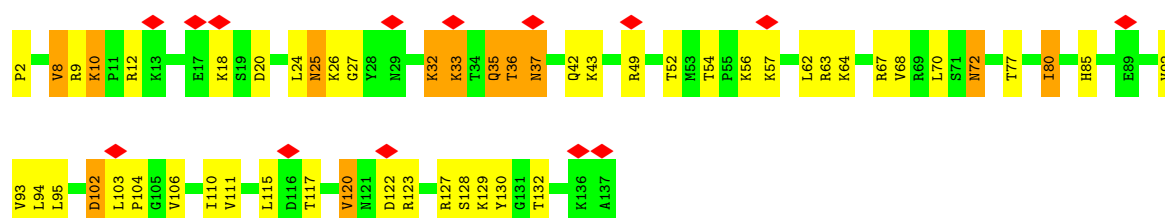
- Molecule 5: 30S ribosomal protein S8



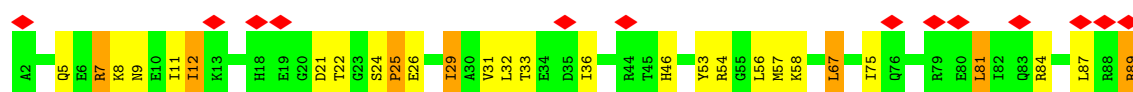
- Molecule 6: 30S ribosomal protein S11



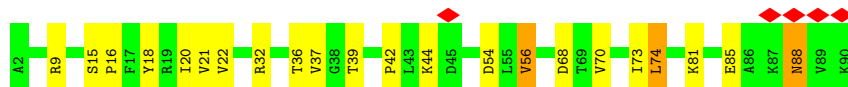
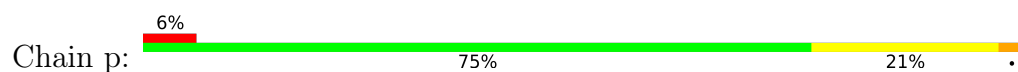
- Molecule 7: 30S ribosomal protein S12



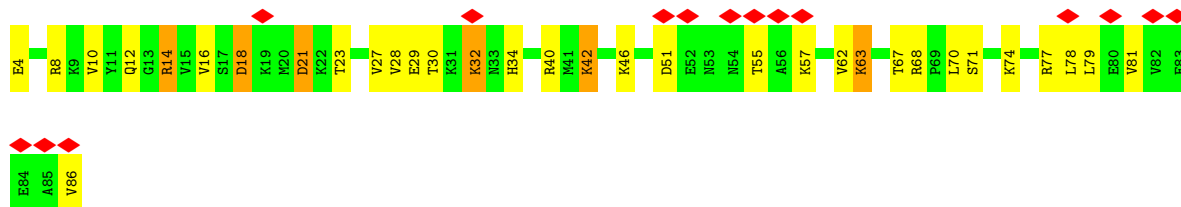
- Molecule 8: 30S ribosomal protein S15



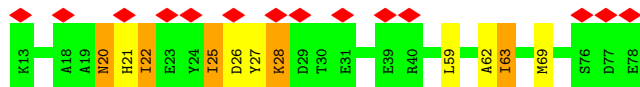
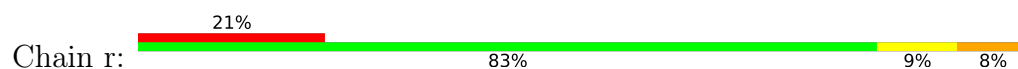
- Molecule 9: 30S ribosomal protein S16



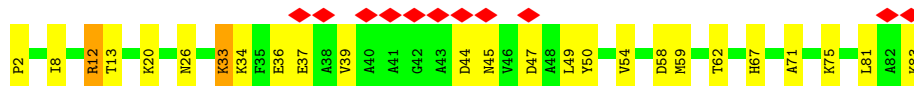
- Molecule 10: 30S ribosomal protein S17



- Molecule 11: 30S ribosomal protein S18



- Molecule 12: 30S ribosomal protein S20



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	335675	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	25	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.176	Depositor
Minimum map value	-0.068	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.035	Depositor
Map size (Å)	482.68, 482.68, 482.68	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.097, 1.097, 1.097	Depositor

5 Model quality

5.1 Standard geometry

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	a	0.49	0/26962	0.47	2/42059 (0.0%)
2	d	0.37	0/1650	0.56	0/2217
3	e	0.36	0/1217	0.55	0/1641
4	f	0.31	0/807	0.49	0/1087
5	h	0.42	0/1054	0.54	0/1417
6	k	0.29	0/878	0.55	0/1185
7	l	0.43	0/1082	0.62	0/1453
8	o	0.36	0/751	0.54	0/1001
9	p	0.47	0/720	0.59	0/966
10	q	0.40	0/689	0.55	0/920
11	r	0.41	0/544	0.50	0/728
12	t	0.37	0/620	0.54	0/829
All	All	0.46	0/36974	0.49	2/55503 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
5	h	0	1
7	l	0	1
All	All	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	a	34	U	O3'-P-O5'	5.99	112.98	104.00
1	a	34	U	P-O3'-C3'	-5.74	111.59	120.20

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	h	22	HIS	Peptide
7	l	37	ASN	Peptide

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	a	24077	0	12112	158	0
2	d	1620	0	1641	48	0
3	e	1204	0	1280	27	0
4	f	795	0	789	18	0
5	h	1041	0	1092	26	0
6	k	863	0	882	19	0
7	l	1065	0	1133	33	0
8	o	741	0	756	17	0
9	p	708	0	746	11	0
10	q	681	0	719	18	0
11	r	537	0	572	11	0
12	t	617	0	648	13	0
All	All	33949	0	22370	369	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

The worst 5 of 369 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:a:858:U:O2	1:a:860:C:N4	2.03	0.92
3:e:61:ARG:NH1	3:e:65:GLU:OE2	2.12	0.82
1:a:151:G:H22	1:a:183:G:H1	1.31	0.78
1:a:428:G:O2'	1:a:443:G:N2	2.18	0.76
10:q:8:ARG:NH1	10:q:67:THR:O	2.18	0.76

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	
2	d	199/201 (99%)	168 (84%)	29 (15%)	2 (1%)	12	45
3	e	161/163 (99%)	146 (91%)	15 (9%)	0	100	100
4	f	95/97 (98%)	82 (86%)	13 (14%)	0	100	100
5	h	129/131 (98%)	115 (89%)	14 (11%)	0	100	100
6	k	115/117 (98%)	94 (82%)	21 (18%)	0	100	100
7	l	134/136 (98%)	110 (82%)	24 (18%)	0	100	100
8	o	86/88 (98%)	74 (86%)	11 (13%)	1 (1%)	10	42
9	p	87/89 (98%)	75 (86%)	12 (14%)	0	100	100
10	q	81/83 (98%)	69 (85%)	12 (15%)	0	100	100
11	r	64/66 (97%)	52 (81%)	11 (17%)	1 (2%)	7	36
12	t	80/82 (98%)	76 (95%)	3 (4%)	1 (1%)	9	40
All	All	1231/1253 (98%)	1061 (86%)	165 (13%)	5 (0%)	31	62

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	t	67	HIS
2	d	144	GLU
2	d	4	TYR
8	o	25	PRO
11	r	27	TYR

5.3.2 Protein sidechains

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	
2	d	175/175 (100%)	139 (79%)	36 (21%)	1	7
3	e	126/126 (100%)	104 (82%)	22 (18%)	2	10
4	f	86/86 (100%)	71 (83%)	15 (17%)	2	10
5	h	112/112 (100%)	89 (80%)	23 (20%)	1	7
6	k	91/91 (100%)	76 (84%)	15 (16%)	2	12
7	l	118/118 (100%)	91 (77%)	27 (23%)	1	5
8	o	78/78 (100%)	67 (86%)	11 (14%)	3	17
9	p	79/79 (100%)	68 (86%)	11 (14%)	3	17
10	q	76/76 (100%)	59 (78%)	17 (22%)	1	5
11	r	57/57 (100%)	52 (91%)	5 (9%)	9	35
12	t	63/63 (100%)	52 (82%)	11 (18%)	2	10
All	All	1061/1061 (100%)	868 (82%)	193 (18%)	3	9

5 of 193 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
7	l	24	LEU
8	o	56	LEU
7	l	35	GLN
7	l	102	ASP
9	p	22	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
7	l	39	ASN
8	o	37	ASN
10	q	53	ASN
7	l	125	GLN
8	o	42	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	a	1117/1548 (72%)	217 (19%)	0

5 of 217 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	a	4	G
1	a	5	A
1	a	6	G
1	a	13	A
1	a	19	G

There are no RNA pucker outliers to report.

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 oligosaccharides 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.

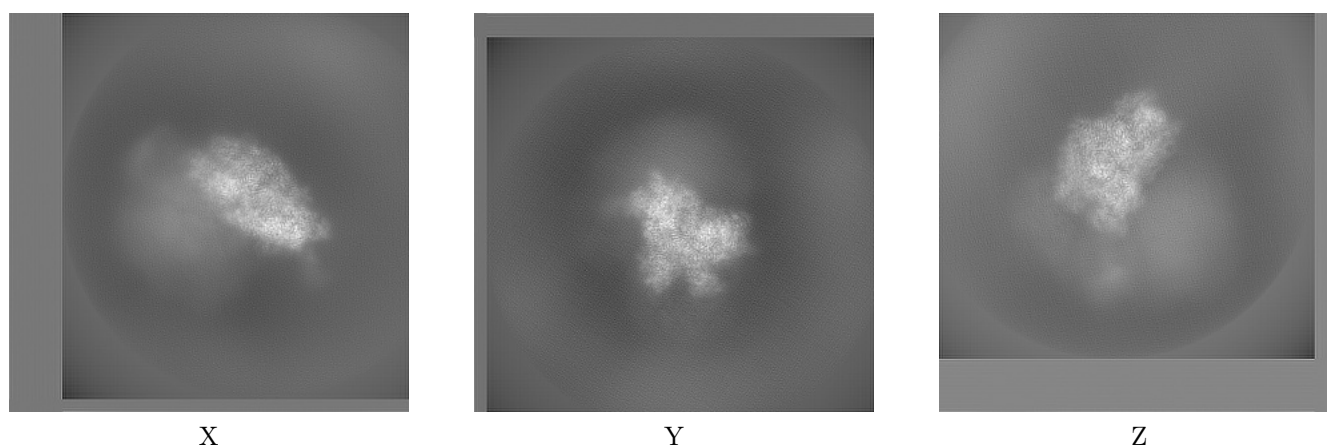
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21909. 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](#)

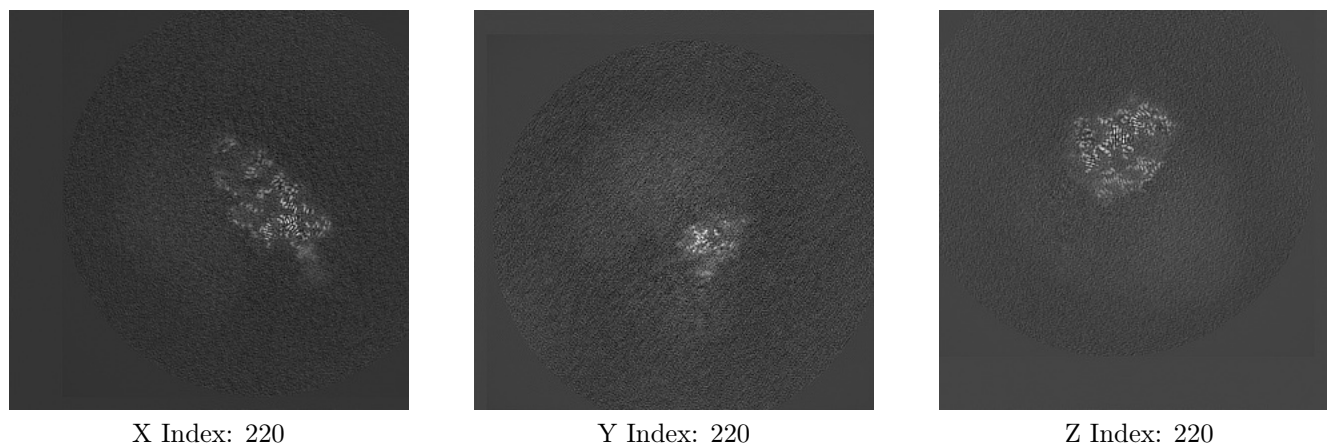
6.1.1 Primary map



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

6.2 Central slices [i](#)

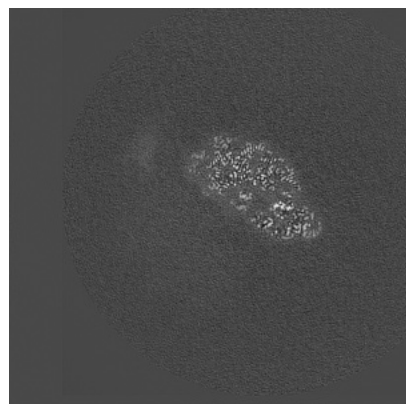
6.2.1 Primary map



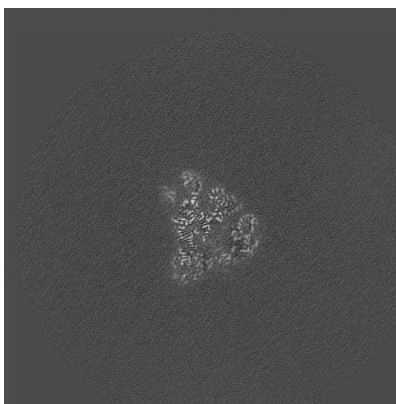
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

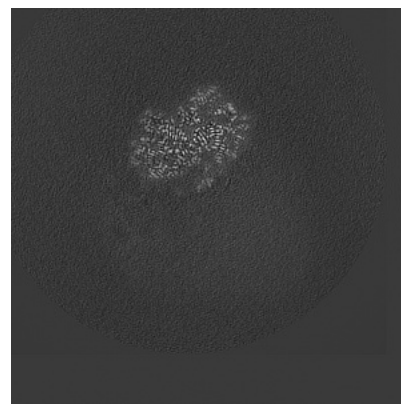
6.3.1 Primary map



X Index: 196



Y Index: 297

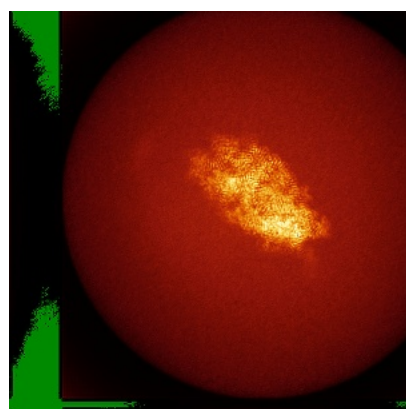


Z Index: 206

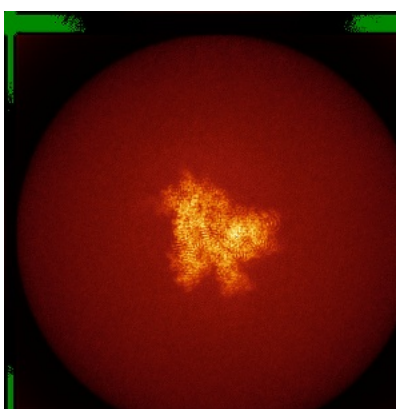
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

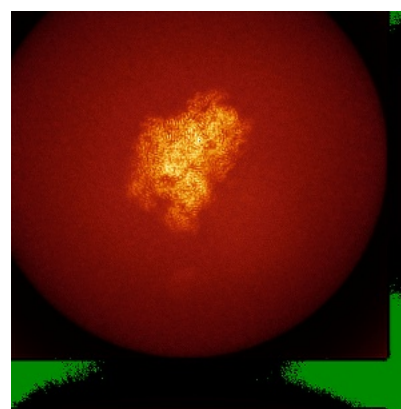
6.4.1 Primary map



X



Y

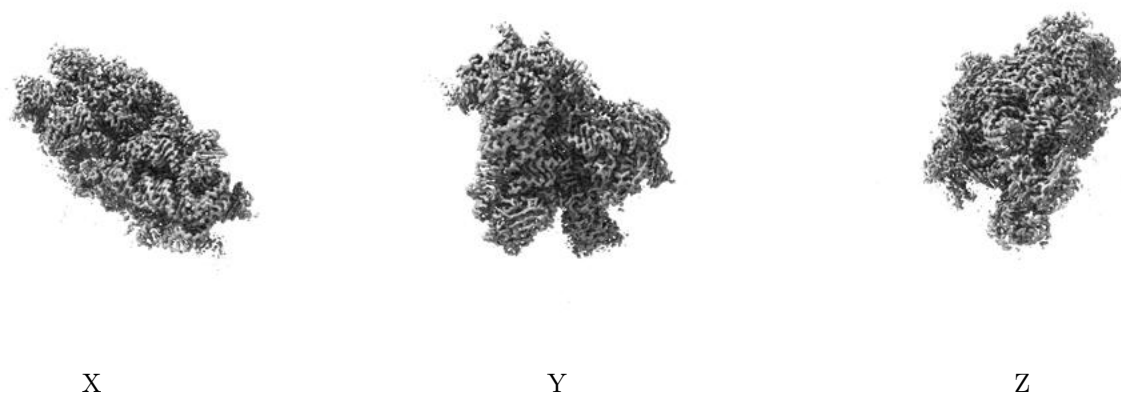


Z

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.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

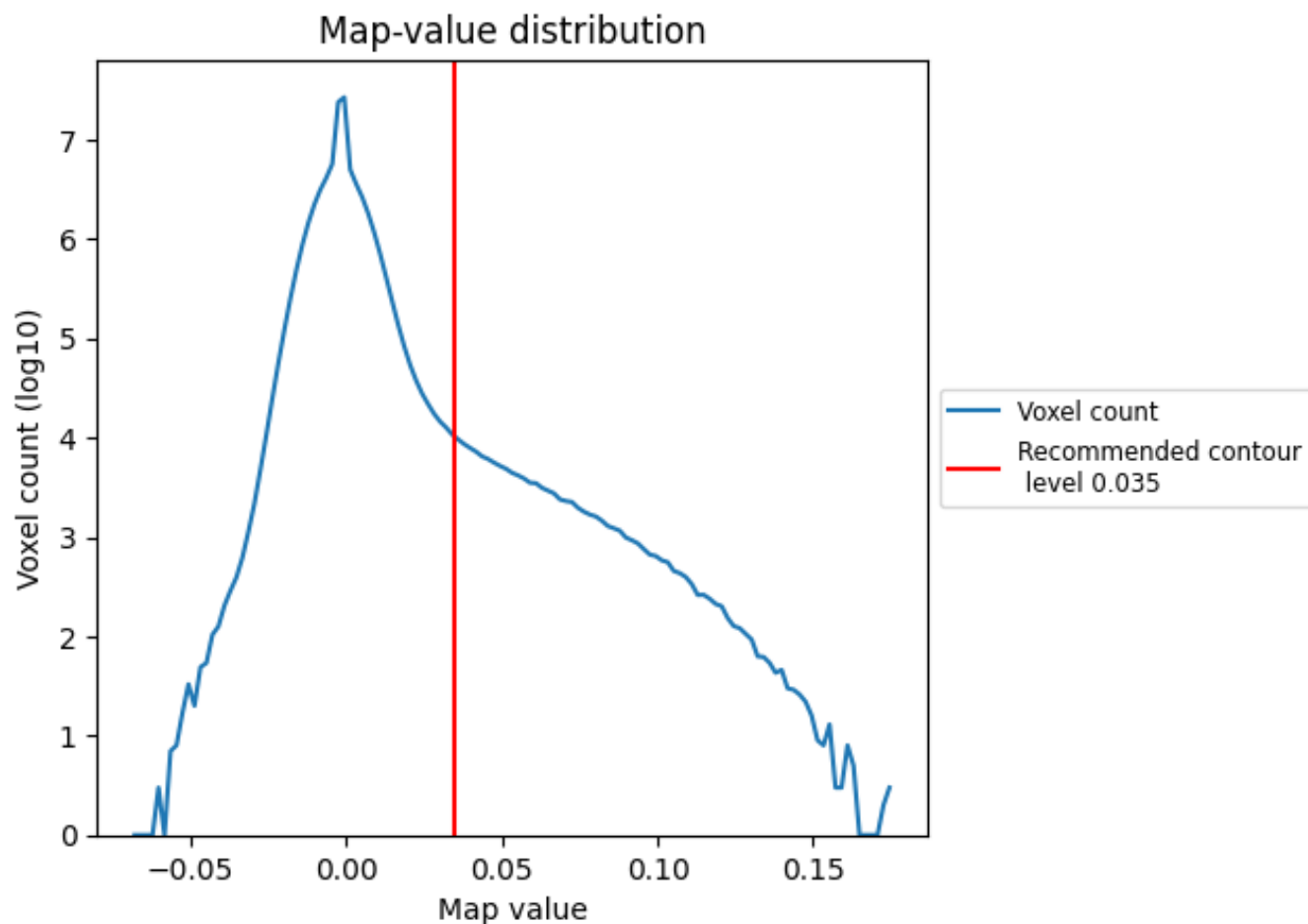
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

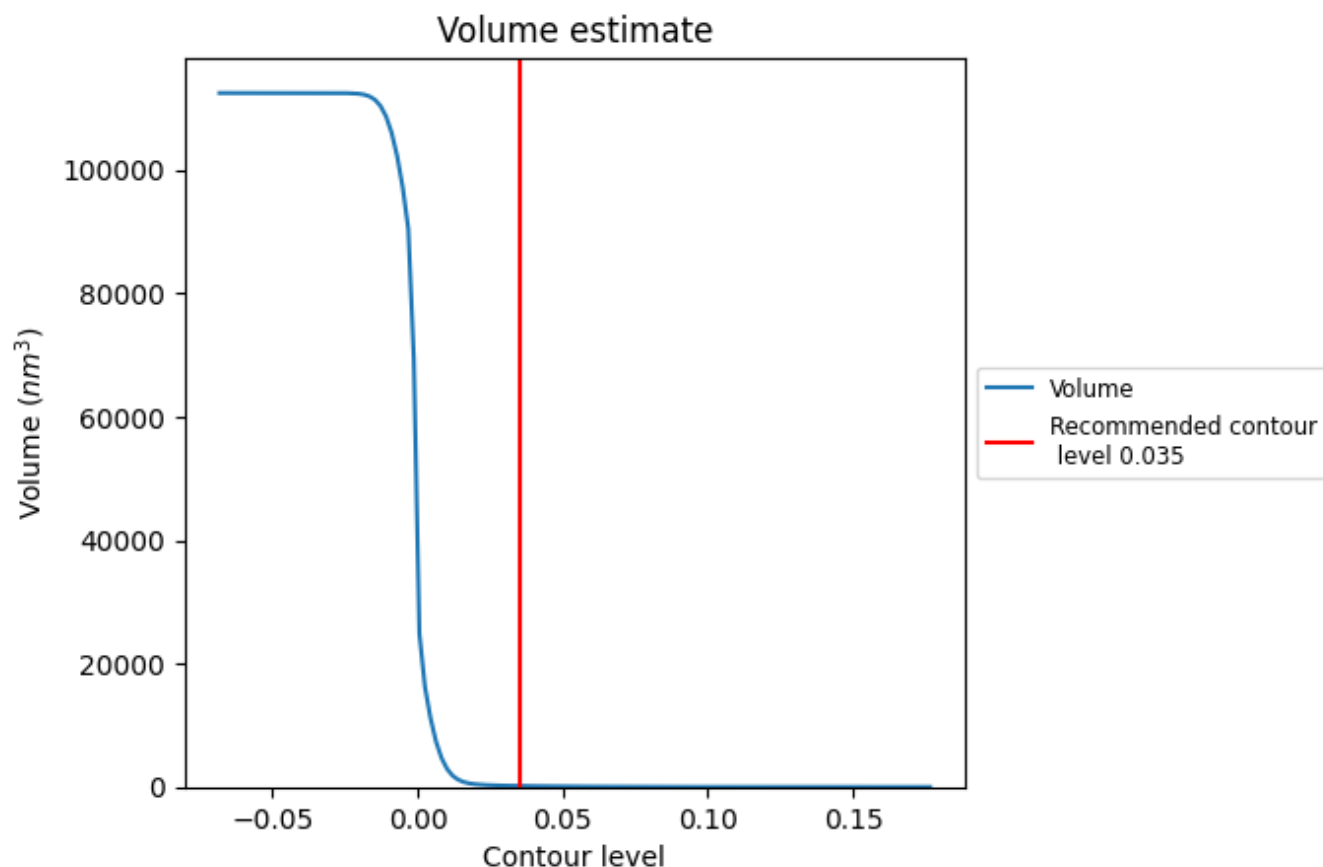
This section contains the results of statistical analysis of the map.

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.

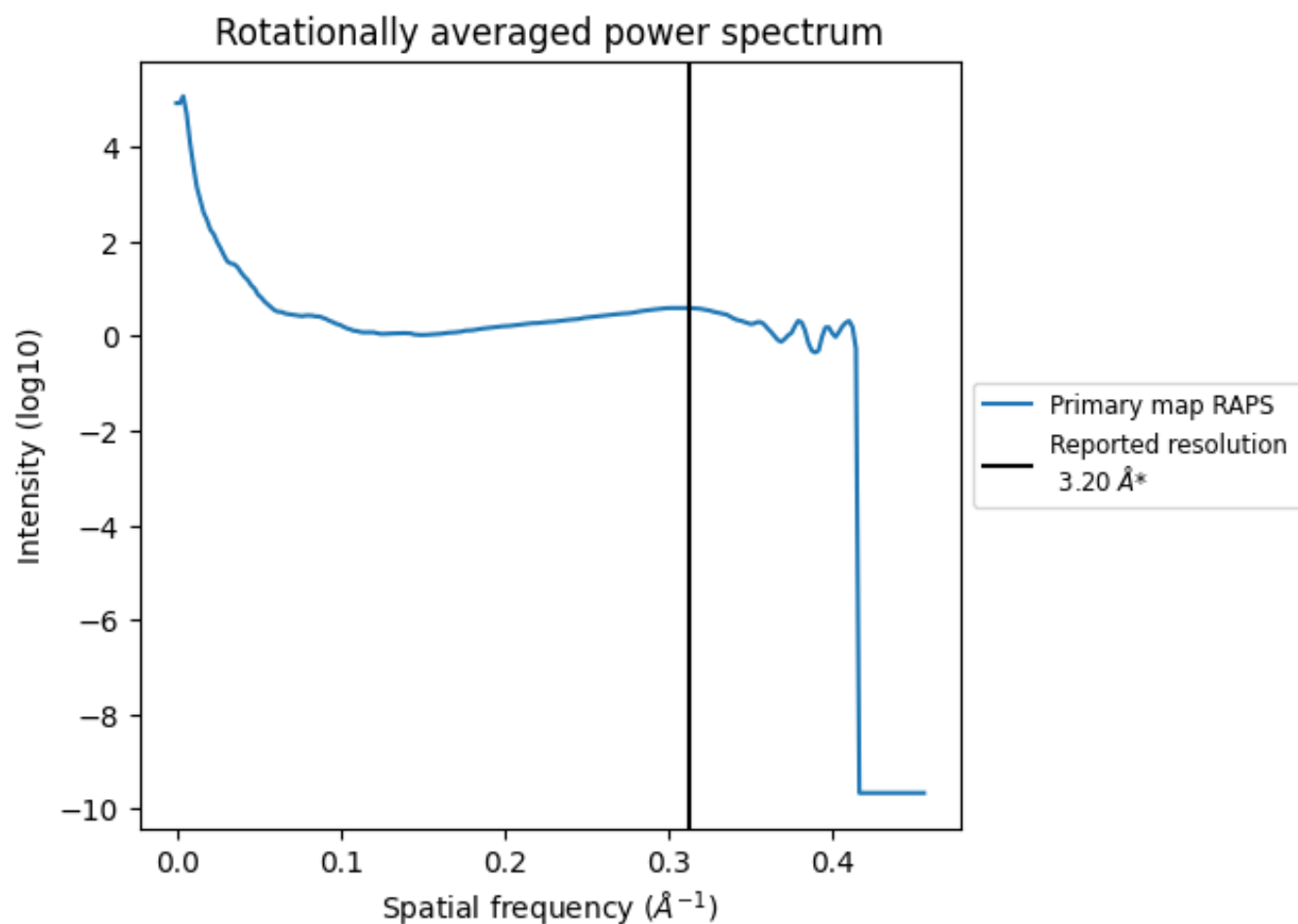
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 163 nm³; this corresponds to an approximate mass of 148 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.312 Å⁻¹

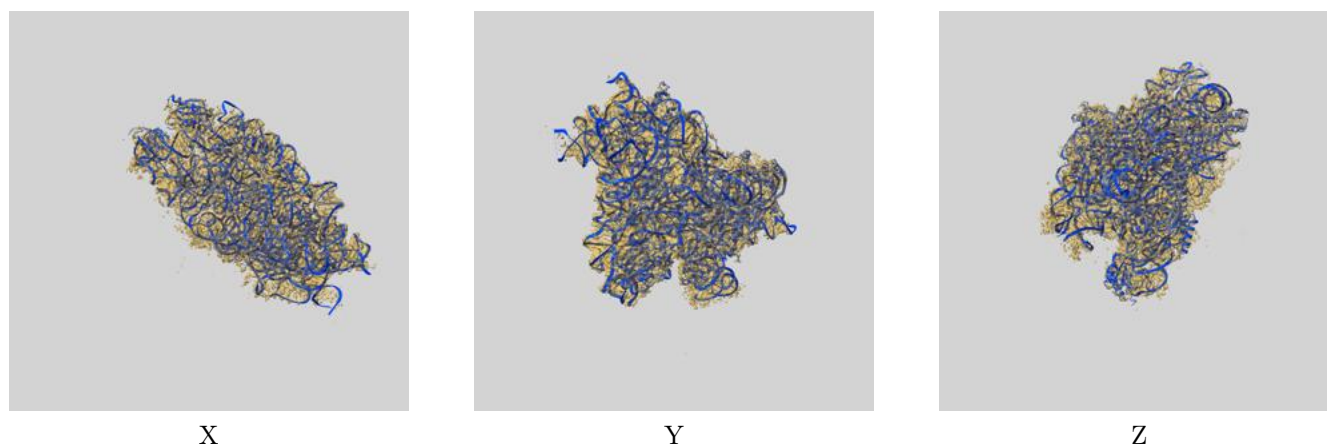
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

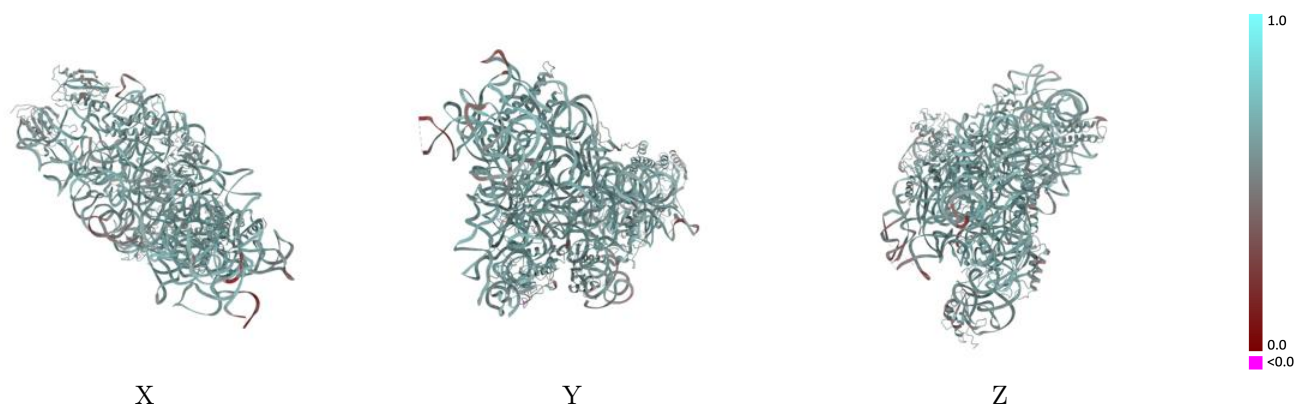
This section contains information regarding the fit between EMDB map EMD-21909 and PDB model 6WUB. Per-residue inclusion information can be found in [section 3](#) on [page 6](#).

9.1 Map-model overlay [i](#)



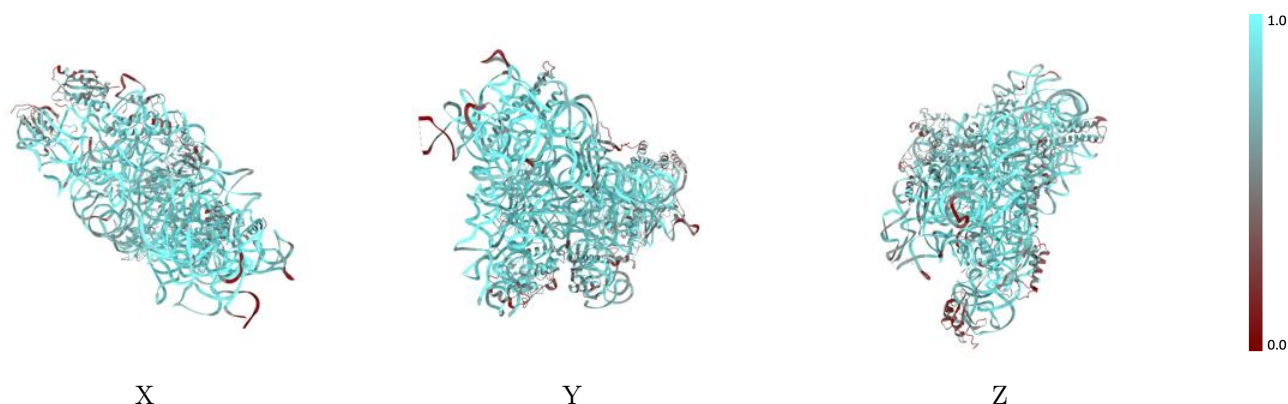
The images above show the 3D surface view of the map at the recommended contour level 0.035 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



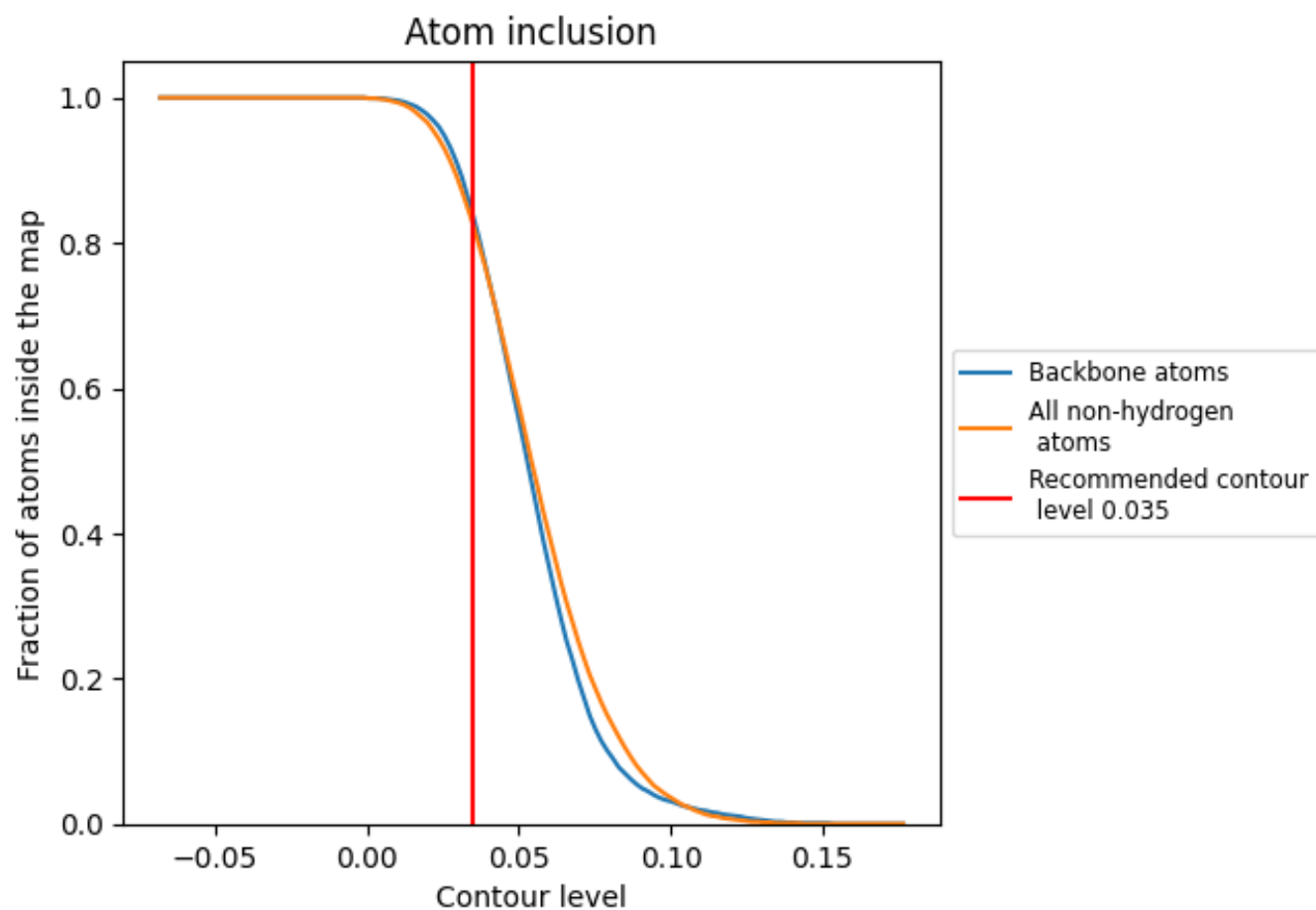
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.035).

9.4 Atom inclusion [i](#)



At the recommended contour level, 84% of all backbone atoms, 82% 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 (0.035) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8240	0.6030
a	0.8850	0.6100
d	0.6590	0.5690
e	0.6620	0.5850
f	0.5390	0.5640
h	0.7370	0.6090
k	0.4850	0.5400
l	0.7420	0.5810
o	0.6930	0.5820
p	0.7970	0.6130
q	0.6770	0.5990
r	0.6670	0.5930
t	0.7390	0.6050

1.0

0.0

<0.0