wwPDB EM Validation Summary Report (i)

Mar 20, 2024 – 12:19 PM JST

PDB ID	:	7CHA
EMDB ID	:	EMD-30373
Title	:	Cryo-EM structure of P.aeruginosa MlaFEBD with AMPPNP
Authors	:	Zhou, C.; Shi, H.; Zhang, M.; Huang, Y.
Deposited on	:	2020-07-05
Resolution	:	3.90 Å(reported)

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 (i) 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 (i)) were used in the production of this report:

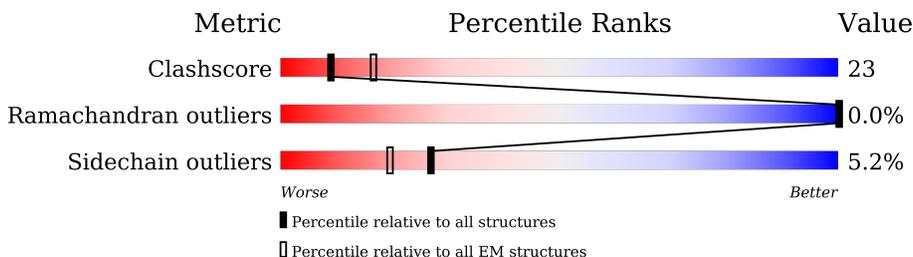|		
EMDB validation analysis	:	0.0.1.dev70
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.90 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	Percentile Ranks	Value
Clashscore		23
Ramachandran outliers		0.0%
Sidechain outliers		5.2%

Worse   *Better*

█ Percentile relative to all structures
▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
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 <=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	157	64% 52% 40% • 6%
1	B	157	57% 48% 45% • 7%
1	C	157	71% 54% 39% 7%
1	D	157	66% 49% 45% 6%
1	E	157	73% 47% 47% • 5%
1	F	157	64% 52% 39% • 8%
2	G	265	19% 60% 36% • •
2	H	265	19% 60% 36% • •

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	I	269	21% / 58% / 38%
3	J	269	23% / 55% / 41%
4	K	102	67% / 31% / 54% / 10%
4	L	102	63% / 30% / 54% / 11%

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 16231 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 MlaD domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	147	Total 1085	C 689	N 180	O 215	S 1	0	0
1	B	146	Total 1076	C 684	N 178	O 213	S 1	0	0
1	C	146	Total 1076	C 684	N 178	O 213	S 1	0	0
1	D	147	Total 1082	C 687	N 179	O 215	S 1	0	0
1	E	149	Total 1098	C 697	N 182	O 218	S 1	0	0
1	F	145	Total 1068	C 680	N 176	O 211	S 1	0	0

- Molecule 2 is a protein called Probable permease of ABC transporter.

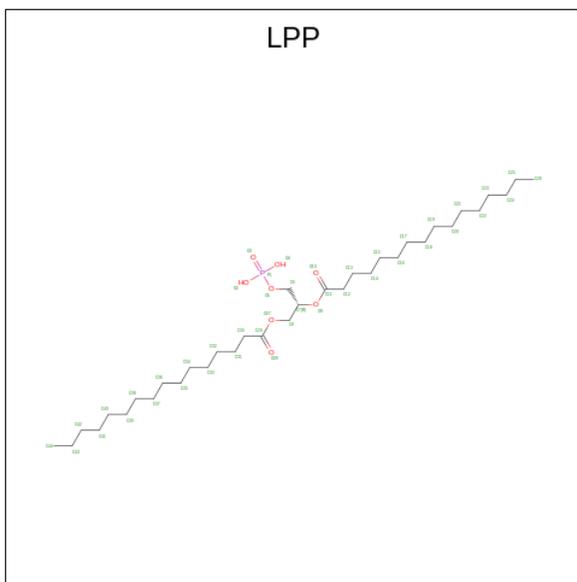| Mol	Chain	Residues	Atoms					AltConf	Trace
2	G	258	Total 1939	C 1270	N 317	O 343	S 9	0	0
2	H	258	Total 1939	C 1270	N 317	O 343	S 9	0	0

- Molecule 3 is a protein called Probable ATP-binding component of ABC transporter,P.aeruginosa Mla F.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	262	Total 2028	C 1296	N 359	O 365	S 8	0	0
3	J	262	Total 2028	C 1296	N 359	O 365	S 8	0	0

- Molecule 4 is a protein called STAS domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	K	98	Total	C	N	O	S	0	0
			721	448	132	139	2		
4	L	98	Total	C	N	O	S	0	0
			721	448	132	139	2		

- Molecule 5 is 2-(HEXADECANOYLOXY)-1-[(PHOSPHONOOXY)METHYL]ETHYL HEXADECANOATE (three-letter code: LPP) (formula: $C_{35}H_{69}O_8P$) (labeled as "Ligand of Interest" by depositor).
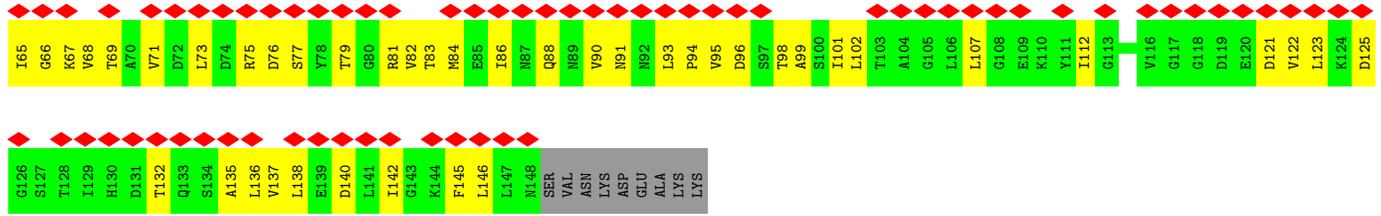

LPP

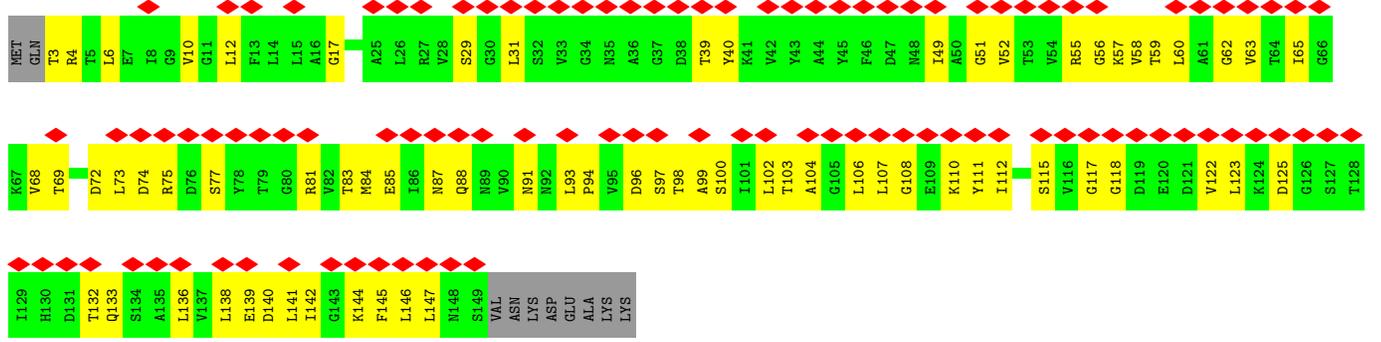| Mol	Chain	Residues	Atoms				AltConf
5	G	1	Total	C	O	P	0
			44	35	8	1	
5	G	1	Total	C	O	P	0
			44	35	8	1	
5	G	1	Total	C	O	P	0
			44	35	8	1	
5	G	1	Total	C	O	P	0
			44	35	8	1	
5	H	1	Total	C	O	P	0
			44	35	8	1	
5	H	1	Total	C	O	P	0
			44	35	8	1	
5	H	1	Total	C	O	P	0
			44	35	8	1	

- Molecule 6 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (three-letter code: ANP) (formula: $C_{10}H_{17}N_6O_{12}P_3$).
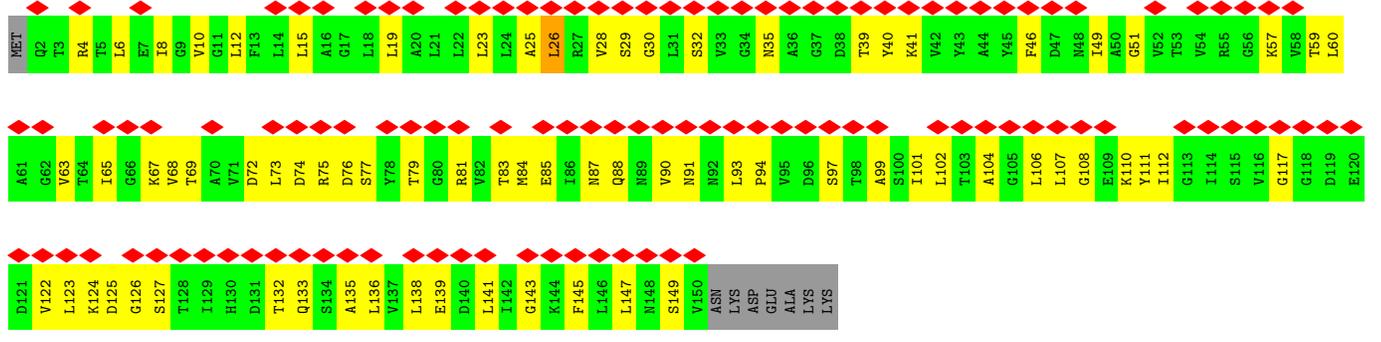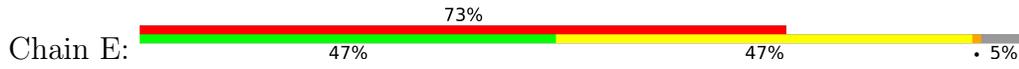
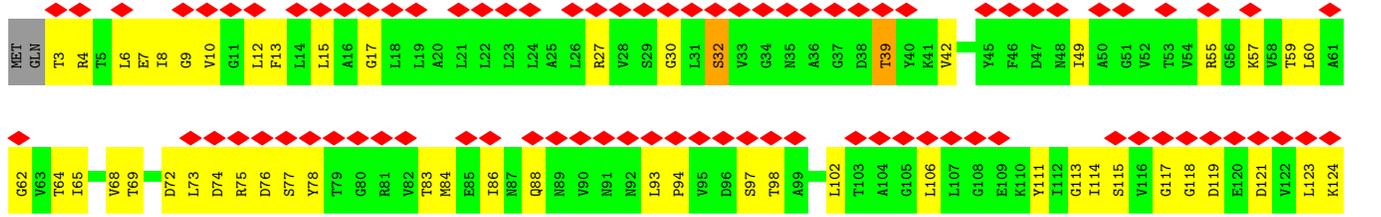| Mol	Chain	Residues	Atoms					AltConf
6	I	1	Total	C	N	O	P	0
			31	10	6	12	3	
6	J	1	Total	C	N	O	P	0
			31	10	6	12	3	

3 Residue-property plots ⓘ

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: MlaD domain-containing protein

Chain A:

- Molecule 1: MlaD domain-containing protein

Chain B:

- Molecule 1: MlaD domain-containing protein
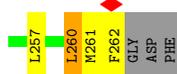
Chain C:

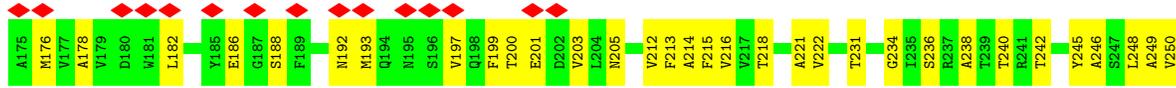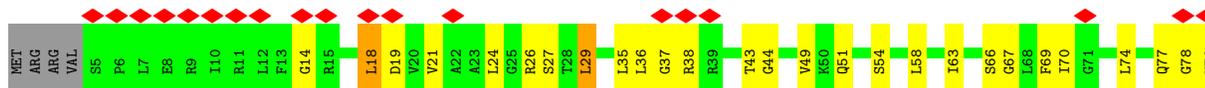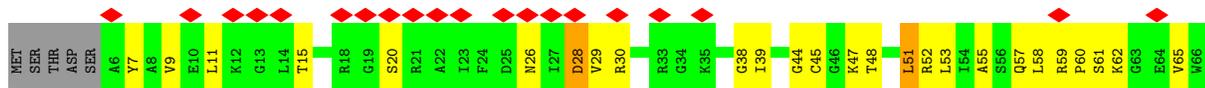• Molecule 1: MlaD domain-containing protein

Chain D:

• Molecule 1: MlaD domain-containing protein

Chain E:

• Molecule 1: MlaD domain-containing protein

Chain F:

D125 G126 S127 T128 I129 H130 D131 T132 Q133 S134 A135 L136 V137 L138 E139 D140 L141 I142 G143 K144 F145 L146 L147 ASN SER VAL ASN LYS ASP GLU ALA LYS LYS

• Molecule 2: Probable permease of ABC transporter

19%

Chain G:

60% 36%

MET ARG ARG VAL S5 P6 L7 E8 R9 I10 R11 G14 R15 A16 G17 L18 D19 V20 V21 A22 A23 L24 S27 T28 L29 L35 L36 G37 R38 R39 T43 G44 V49 K50 Q51 S54 L58 I63 S66 G67 I70 L74 Q77 G78 Y79 N80 I81 L82

I83 S84 Y85 G86 S87 E88 Q89 A90 Q93 M94 I97 T98 L99 L100 R101 E102 L103 G104 P105 L111 F112 A113 S118 A119 L120 T121 A122 E123 I124 Q132 L133 S134 M138 K145 P150 R151 G155 F156 L161 L162 F166 S167 G170 M176 V177 A178 V179

D180 W181 L182 G183 V184 Y185 E186 G187 S188 F189 N192 N195 S196 V197 Q198 F199 T200 E201 D202 V203 L204 N205 K209 V212 F213 A214 F215 V216 V217 T218 W219 I220 A221 V222 T231 G234 I235 S236 R237 A238 T239 T240 R241 T242 A246 S247 L248 A249 V250 L251 G252 L253 D254

L257 L260 M261 F262 GLY ASP PHE

• Molecule 2: Probable permease of ABC transporter

19%

Chain H:

60% 36%

MET ARG ARG VAL S5 P6 L7 E8 R9 I10 R11 L12 F13 G14 R15 L18 D19 V20 V21 A22 A23 L24 G25 R26 S27 T28 L29 L35 L36 G37 R38 R39 T43 G44 V49 K50 Q51 S54 L58 I63 S66 G67 L68 F69 I70 G71 L74 Q77 G78 Y79

N80 I81 L82 I83 S84 Y85 G86 S87 E88 Q89 A90 Q93 M94 I97 T98 L99 L100 R101 E102 L103 G104 P105 L110 A113 S118 A119 L120 T121 A122 E123 I124 S134 S135 L136 E137 M138 D142 K145 P150 R151 G155 F156 L161 L162 F166 S167 G174

A175 M176 V177 A178 V179 D180 W181 L182 Y185 E186 G187 S188 F189 N192 M193 Q194 N195 S196 V197 Q198 F199 T200 E201 D202 V203 L204 N205 V212 F213 A214 F215 V216 V217 T218 A221 V222 T231 G234 I235 S236 R237 A238 T239 T240 R241 T242 Y245 A246 S247 L248 A249 V250 L251

G252 L253 D254 L257 L260 M261 F262 GLY ASP PHE

• Molecule 3: Probable ATP-binding component of ABC transporter,P.aeruginosa Mla F

21%

Chain I:

58% 38%

MET SER THR ASP SER A6 Y7 A8 V9 E10 L11 K12 G13 L14 T15 R18 G19 S20 R21 A22 I23 F24 D25 N26 I27 D28 V29 R30 R33 G34 K35 G38 I39 G44 C45 G46 K47 T48 L51 R52 L53 I54 A55 S56 Q57 L58 R59 P60 S61 K62 G63 E64 V65 W66 V67
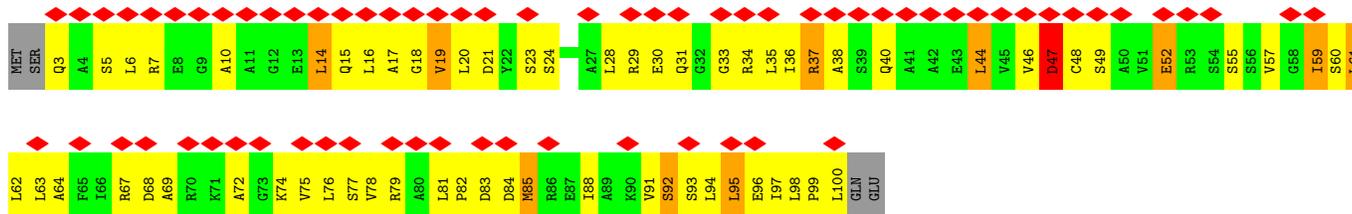
• Molecule 3: Probable ATP-binding component of ABC transporter,P.aeruginosa Mla F

Chain J:

• Molecule 4: STAS domain-containing protein

Chain K:

• Molecule 4: STAS domain-containing protein

Chain L:

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	419046	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 $(e^-/\text{Å}^2)$	60	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	0.132	Depositor
Minimum map value	-0.072	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.0299	Depositor
Map size (Å)	266.24, 266.24, 266.24	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.04, 1.04, 1.04	Depositor

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ANP, LPP

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	0.34	0/1094	0.53	0/1486
1	B	0.32	0/1085	0.55	0/1474
1	C	0.31	0/1085	0.56	0/1474
1	D	0.33	0/1091	0.55	0/1482
1	E	0.32	0/1107	0.58	1/1504 (0.1%)
1	F	0.35	0/1077	0.51	0/1463
2	G	0.51	0/1977	0.58	0/2691
2	H	0.51	0/1977	0.58	0/2691
3	I	0.47	0/2066	0.54	0/2798
3	J	0.47	0/2066	0.54	0/2798
4	K	0.39	0/725	0.66	2/976 (0.2%)
4	L	0.39	0/725	0.66	2/976 (0.2%)
All	All	0.42	0/16075	0.57	5/21813 (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
1	F	0	2
4	K	0	1
4	L	0	1
All	All	0	4

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	L	47	ASP	CB-CG-OD1	5.71	123.44	118.30

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	K	47	ASP	CB-CG-OD1	5.65	123.38	118.30
1	E	26	LEU	CA-CB-CG	5.20	127.25	115.30
4	L	14	LEU	CA-CB-CG	-5.07	103.64	115.30
4	K	14	LEU	CA-CB-CG	-5.07	103.64	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	F	32	SER	Peptide
1	F	39	THR	Peptide
4	K	92	SER	Peptide
4	L	92	SER	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	1085	0	1124	60	0
1	B	1076	0	1116	64	0
1	C	1076	0	1116	49	0
1	D	1082	0	1121	61	0
1	E	1098	0	1138	58	0
1	F	1068	0	1110	59	0
2	G	1939	0	2013	80	0
2	H	1939	0	2013	86	0
3	I	2028	0	2084	92	0
3	J	2028	0	2084	97	0
4	K	721	0	759	66	0
4	L	721	0	759	65	0
5	G	176	0	258	21	0
5	H	132	0	199	27	0
6	I	31	0	12	5	0
6	J	31	0	12	4	0
All	All	16231	0	16918	765	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 23.

The worst 5 of 765 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:C:56:GLY:H	1:C:68:VAL:HG12	1.33	0.93
3:J:265:LEU:HD21	4:K:63:LEU:HD21	1.56	0.85
3:J:123:ASP:OD1	4:L:67:ARG:NH1	2.12	0.83
3:J:45:CYS:SG	3:J:47:LYS:NZ	2.54	0.80
1:F:93:LEU:O	1:F:123:LEU:N	2.14	0.80

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	
1	A	145/157 (92%)	109 (75%)	35 (24%)	1 (1%)	22	60
1	B	144/157 (92%)	117 (81%)	27 (19%)	0	100	100
1	C	144/157 (92%)	121 (84%)	23 (16%)	0	100	100
1	D	145/157 (92%)	123 (85%)	22 (15%)	0	100	100
1	E	147/157 (94%)	122 (83%)	25 (17%)	0	100	100
1	F	143/157 (91%)	125 (87%)	18 (13%)	0	100	100
2	G	256/265 (97%)	229 (90%)	27 (10%)	0	100	100
2	H	256/265 (97%)	229 (90%)	27 (10%)	0	100	100
3	I	260/269 (97%)	228 (88%)	32 (12%)	0	100	100
3	J	260/269 (97%)	228 (88%)	32 (12%)	0	100	100
4	K	96/102 (94%)	79 (82%)	17 (18%)	0	100	100
4	L	96/102 (94%)	79 (82%)	17 (18%)	0	100	100
All	All	2092/2214 (94%)	1789 (86%)	302 (14%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	146	LEU

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	
1	A	118/127 (93%)	116 (98%)	2 (2%)	60	78
1	B	117/127 (92%)	116 (99%)	1 (1%)	78	87
1	C	117/127 (92%)	116 (99%)	1 (1%)	78	87
1	D	118/127 (93%)	117 (99%)	1 (1%)	81	89
1	E	120/127 (94%)	119 (99%)	1 (1%)	81	89
1	F	116/127 (91%)	116 (100%)	0	100	100
2	G	203/209 (97%)	190 (94%)	13 (6%)	17	47
2	H	203/209 (97%)	190 (94%)	13 (6%)	17	47
3	I	217/224 (97%)	204 (94%)	13 (6%)	19	49
3	J	217/224 (97%)	204 (94%)	13 (6%)	19	49
4	K	76/80 (95%)	61 (80%)	15 (20%)	1	9
4	L	76/80 (95%)	61 (80%)	15 (20%)	1	9
All	All	1698/1788 (95%)	1610 (95%)	88 (5%)	27	53

5 of 88 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	J	265	LEU
4	K	85	MET
4	K	30	GLU
4	K	59	ILE
4	L	37	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	195	ASN
4	K	3	GLN
3	I	86	GLN
3	J	113	HIS
3	I	26	ASN

5.3.3　RNA ⓘ

There are no RNA molecules in this entry.

5.4　Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5　Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6　Ligand geometry ⓘ

9 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
5	LPP	G	304	-	43,43,43	0.90	2 (4%)	47,48,48	1.10	2 (4%)
5	LPP	H	303	-	43,43,43	0.90	4 (9%)	47,48,48	0.93	2 (4%)
5	LPP	G	302	-	43,43,43	0.90	3 (6%)	47,48,48	1.04	2 (4%)
5	LPP	H	302	-	43,43,43	0.89	4 (9%)	47,48,48	1.04	2 (4%)
5	LPP	G	301	-	43,43,43	0.92	4 (9%)	47,48,48	0.99	2 (4%)
6	ANP	I	301	-	29,33,33	1.13	4 (13%)	31,52,52	1.19	4 (12%)
5	LPP	G	303	-	43,43,43	0.89	4 (9%)	47,48,48	0.97	2 (4%)
6	ANP	J	301	-	29,33,33	1.13	4 (13%)	31,52,52	1.19	4 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	LPP	H	301	-	43,43,43	0.91	4 (9%)	47,48,48	1.01	2 (4%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	LPP	G	304	-	-	27/45/45/45	-
5	LPP	H	303	-	-	25/45/45/45	-
5	LPP	G	302	-	-	30/45/45/45	-
5	LPP	H	302	-	-	21/45/45/45	-
5	LPP	G	301	-	-	31/45/45/45	-
6	ANP	I	301	-	-	4/14/38/38	0/3/3/3
5	LPP	G	303	-	-	26/45/45/45	-
6	ANP	J	301	-	-	4/14/38/38	0/3/3/3
5	LPP	H	301	-	-	27/45/45/45	-

The worst 5 of 33 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	I	301	ANP	PB-O3A	-2.77	1.55	1.59
6	J	301	ANP	PB-O3A	-2.77	1.55	1.59
6	J	301	ANP	PB-O1B	2.74	1.50	1.46
6	I	301	ANP	PB-O1B	2.71	1.50	1.46
5	G	302	LPP	O9-C7	-2.65	1.40	1.46

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	G	304	LPP	O9-C11-C12	5.30	122.93	111.50
5	H	301	LPP	O9-C11-C12	4.48	121.16	111.50
5	H	302	LPP	O9-C11-C12	4.40	120.98	111.50
5	G	301	LPP	O9-C11-C12	4.37	120.92	111.50
5	G	302	LPP	O9-C11-C12	4.23	120.63	111.50

There are no chirality outliers.

5 of 195 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	G	301	LPP	C6-O5-P1-O2
5	G	301	LPP	C6-O5-P1-O4
5	G	301	LPP	C12-C11-O9-C7
5	G	302	LPP	C6-O5-P1-O2
5	G	302	LPP	C6-O5-P1-O4

There are no ring outliers.

9 monomers are involved in 52 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	G	304	LPP	8	0
5	H	303	LPP	4	0
5	G	302	LPP	5	0
5	H	302	LPP	19	0
5	G	301	LPP	4	0
6	I	301	ANP	5	0
5	G	303	LPP	4	0
6	J	301	ANP	4	0
5	H	301	LPP	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand LPP G 304

Bond lengths   Bond angles

Torsions   Rings

Ligand LPP H 303

Bond lengths

Bond angles

Torsions

Rings

Ligand LPP G 302

Bond lengths

Bond angles

Torsions

Rings

Ligand LPP H 302

Bond lengths

Bond angles

Torsions

Rings

Ligand LPP G 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ANP I 301

Bond lengths

Bond angles

Torsions

Rings

Ligand LPP G 303

Bond lengths	Bond angles
Torsions	Rings

Ligand ANP J 301

Bond lengths	Bond angles
Torsions	Rings

Ligand LPP H 301	
Bond lengths	Bond angles
Torsions	Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-30373. 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 |
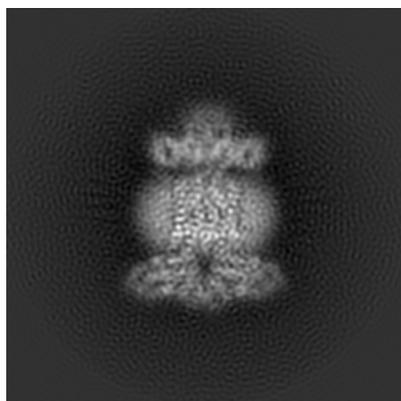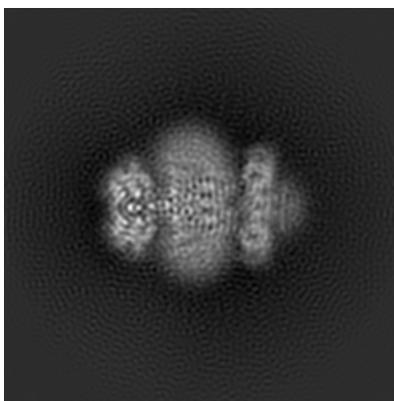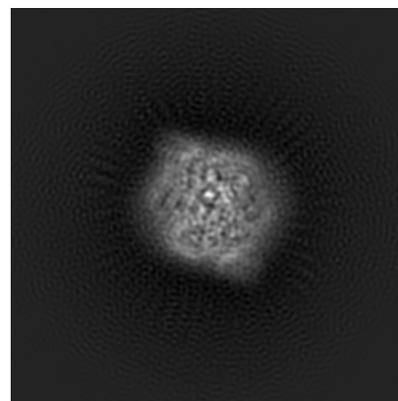
The images above show the map projected in three orthogonal directions.

6.2   Central slices (i)

6.2.1   Primary map
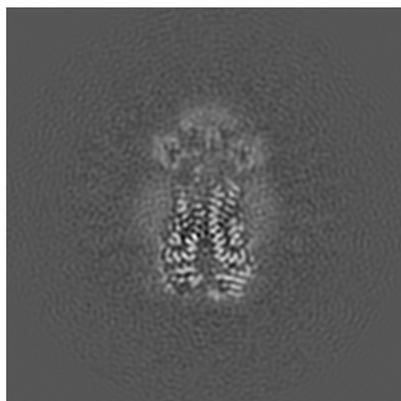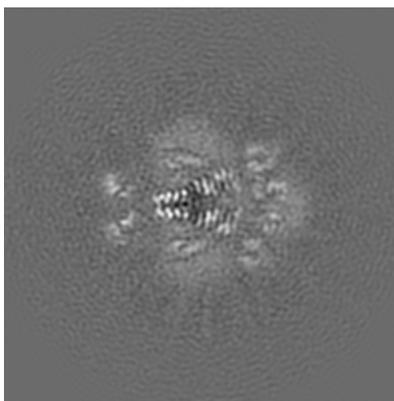
| X Index: 128 | Y Index: 128 | Z Index: 128 |
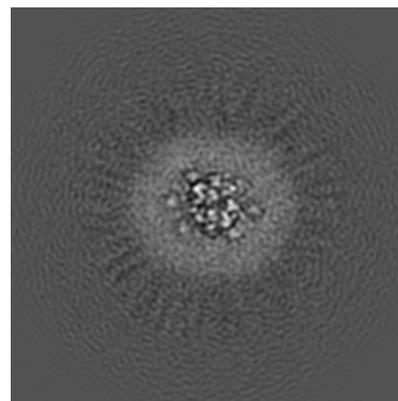
The images above show central slices of the map in three orthogonal directions.

6.3   Largest variance slices ⓘ
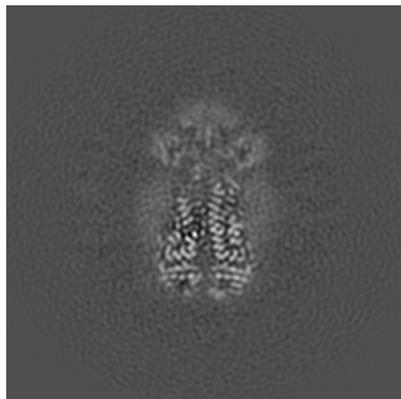
6.3.1   Primary map
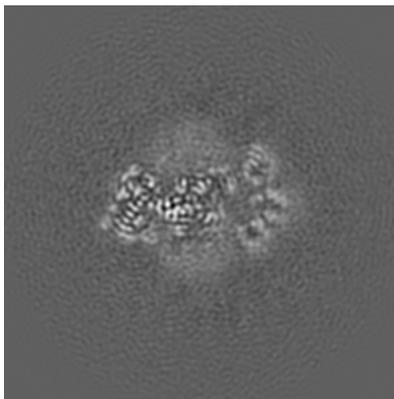
| X Index: 127 | Y Index: 117 | Z Index: 110 |
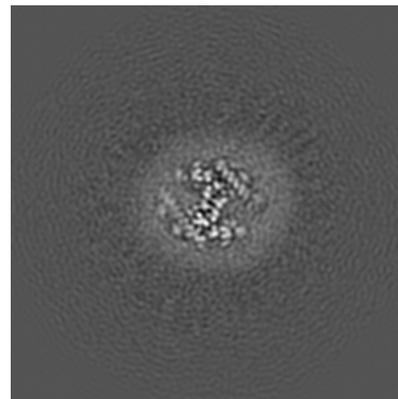
The images above show the largest variance slices of the map in three orthogonal directions.

6.4   Orthogonal standard-deviation projections (False-color) ⓘ

6.4.1   Primary map

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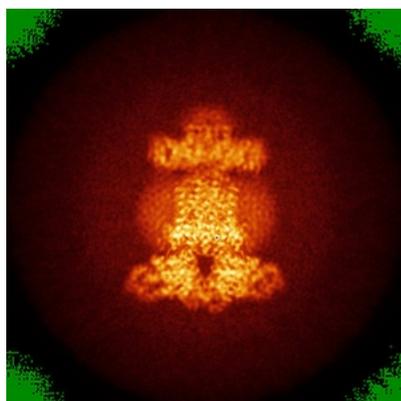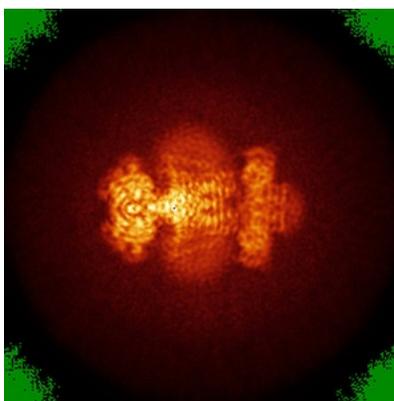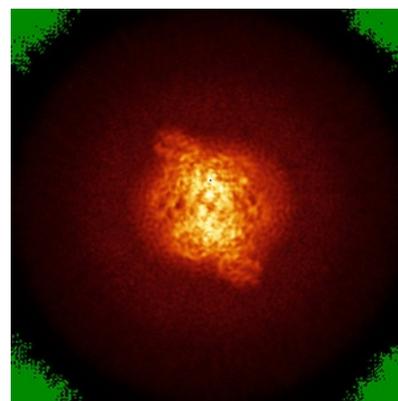
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ
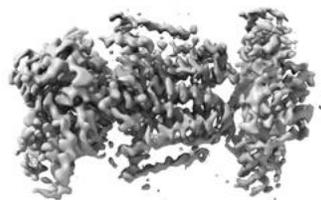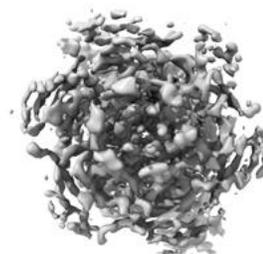
6.5.1 Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.0299. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.6 Mask visualisation ⓘ

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

7 Map analysis ⓘ

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

7.1 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.

7.2　Volume estimate ⓘ
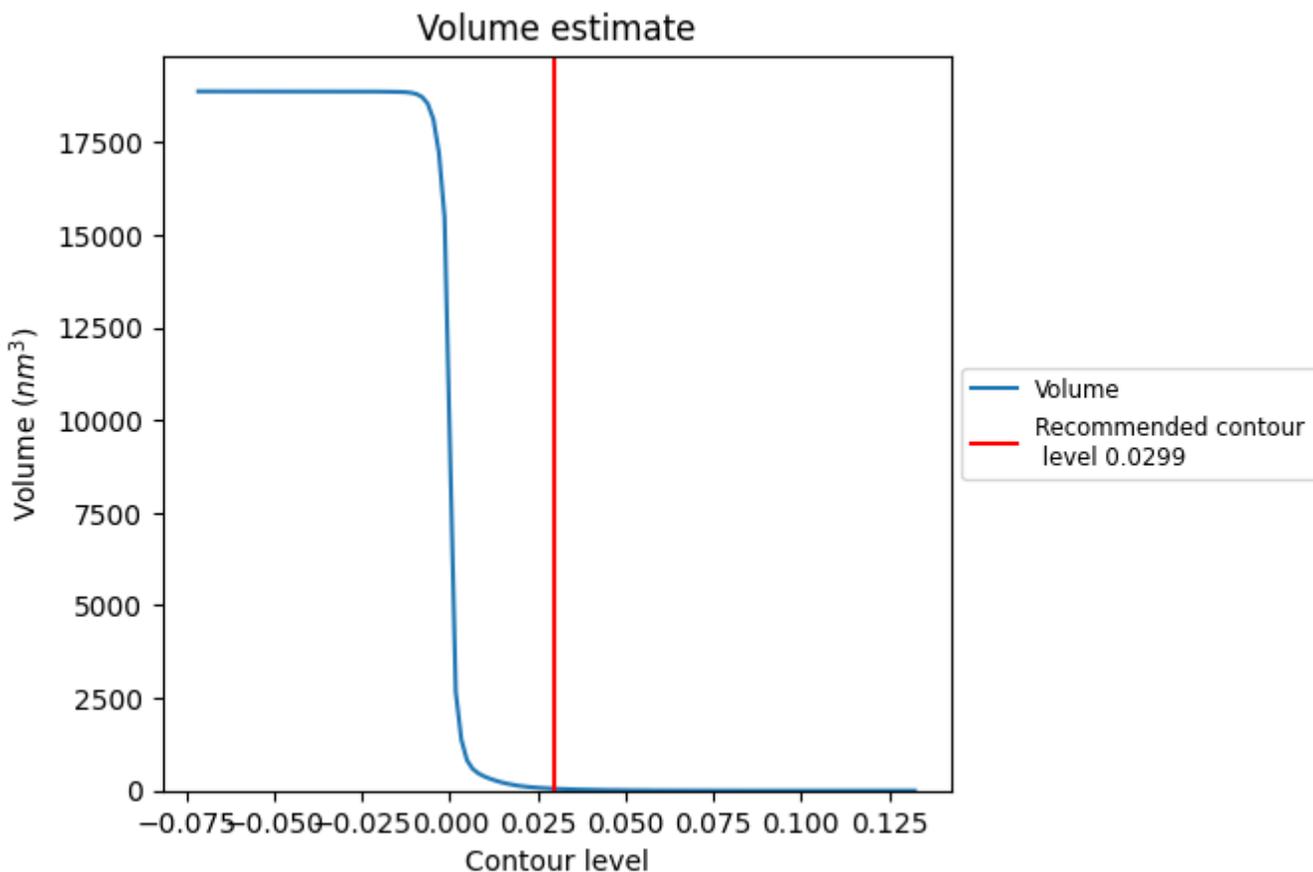
The volume at the recommended contour level is 52 nm^3; this corresponds to an approximate mass of 47 kDa.

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 ⓘ
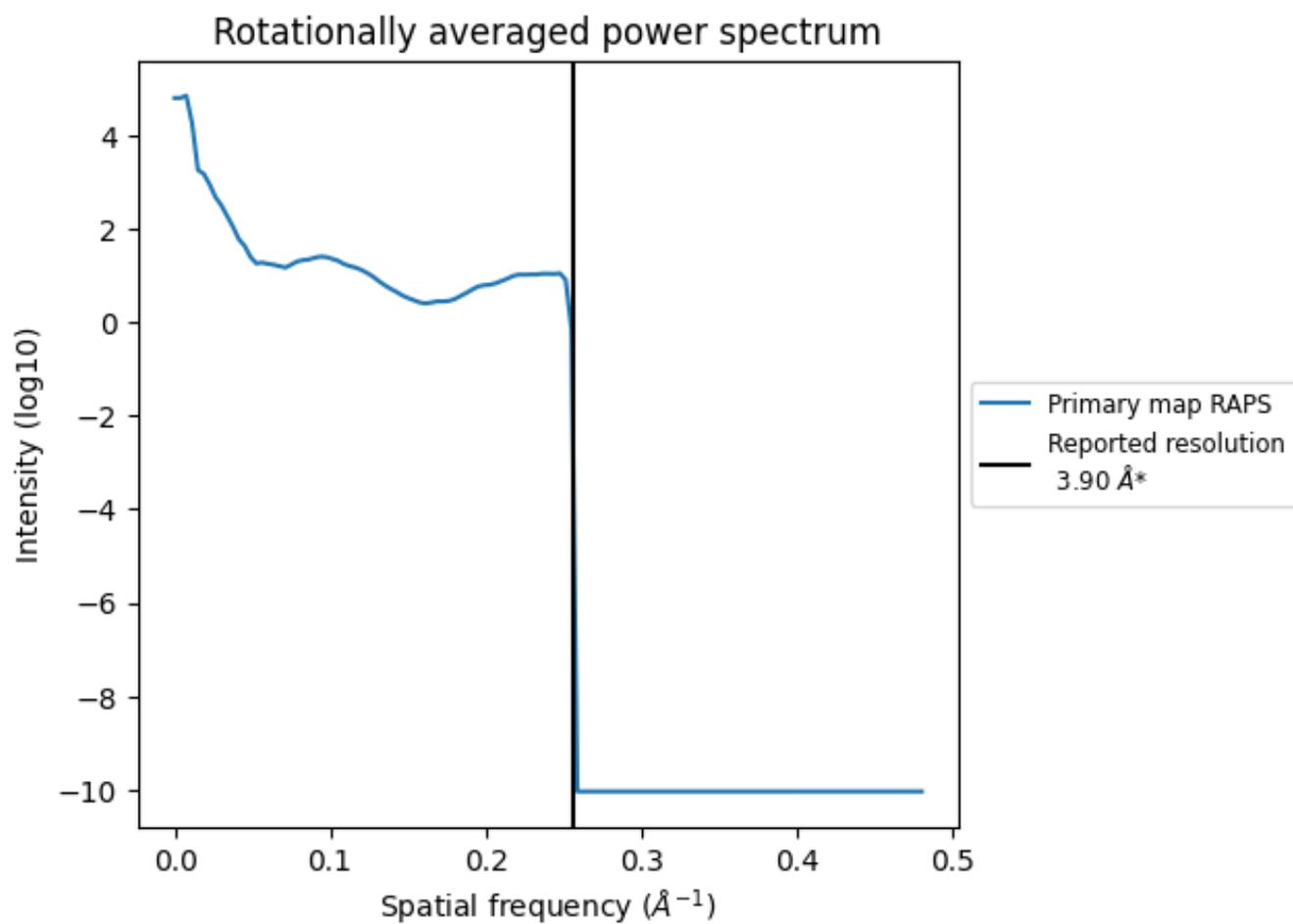
*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

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)
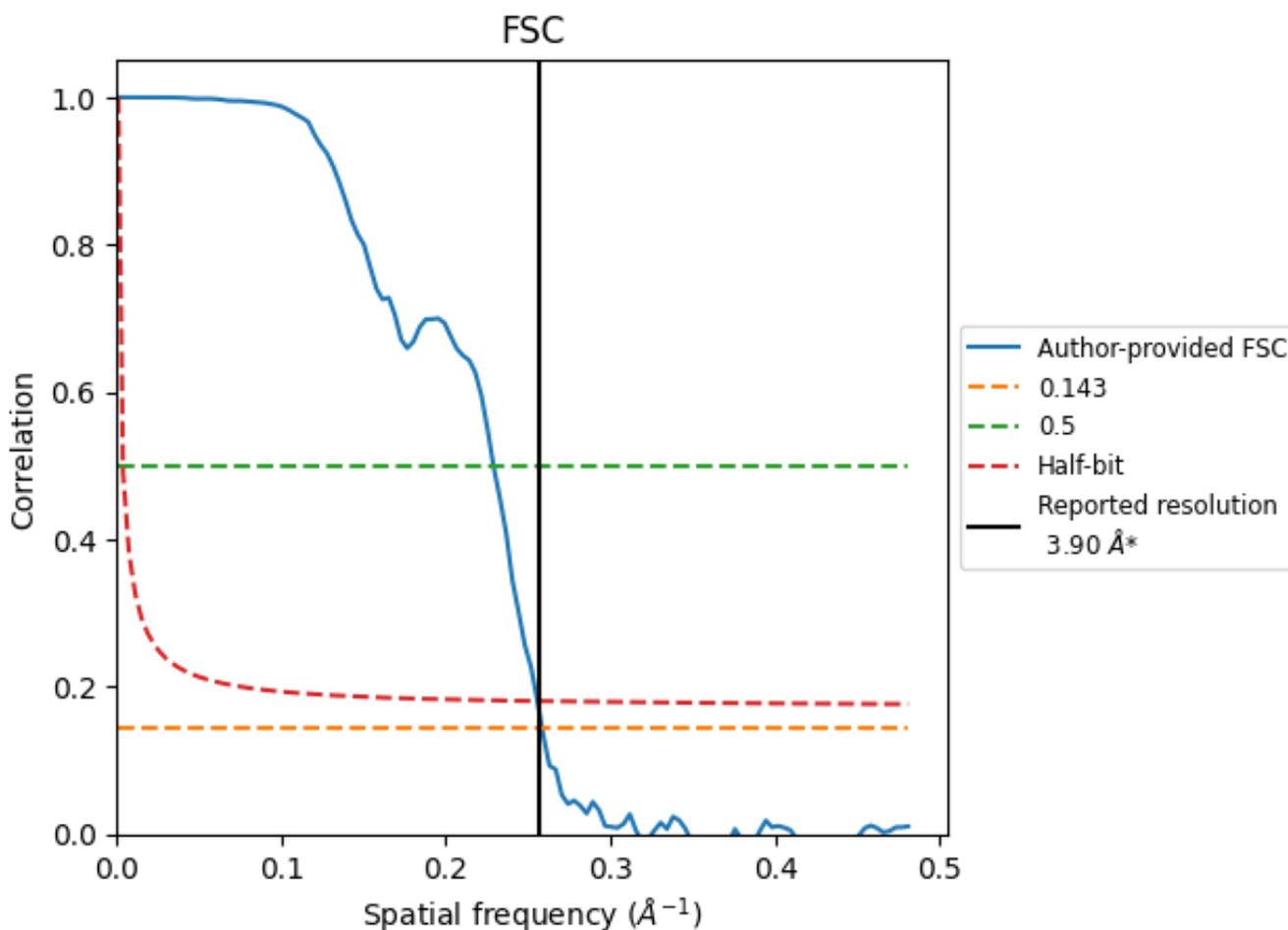
*Reported resolution corresponds to spatial frequency of 0.256 $Å^{-1}$

8.2   Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.87	4.37	3.91
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.
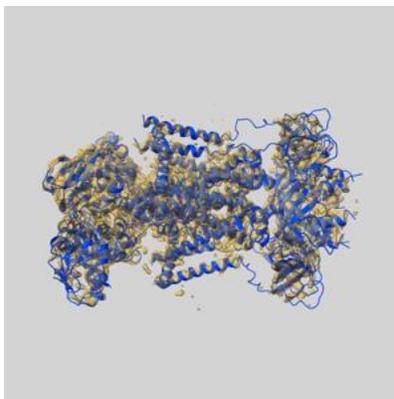
9   Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-30373 and PDB model 7CHA. Per-residue inclusion information can be found in section 3 on page 7.
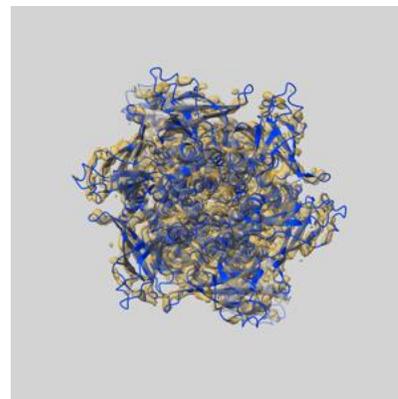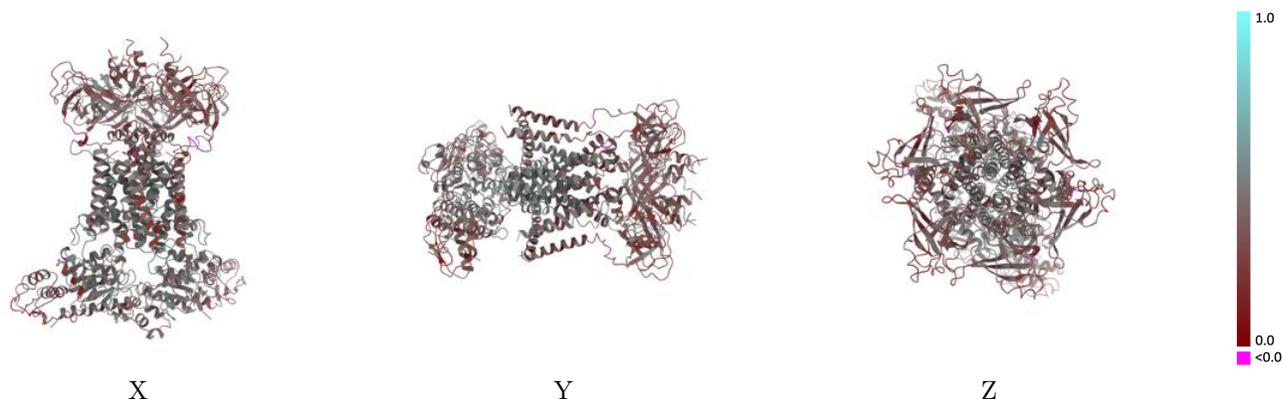
## 9.1   Map-model overlay (i)
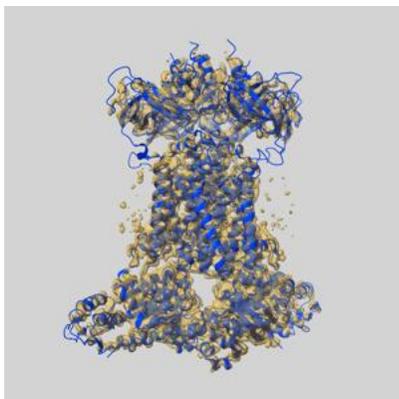
| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.0299 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 ⓘ

X   Y   Z

The images above show the model with each residue coloured according 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 ⓘ

X   Y   Z
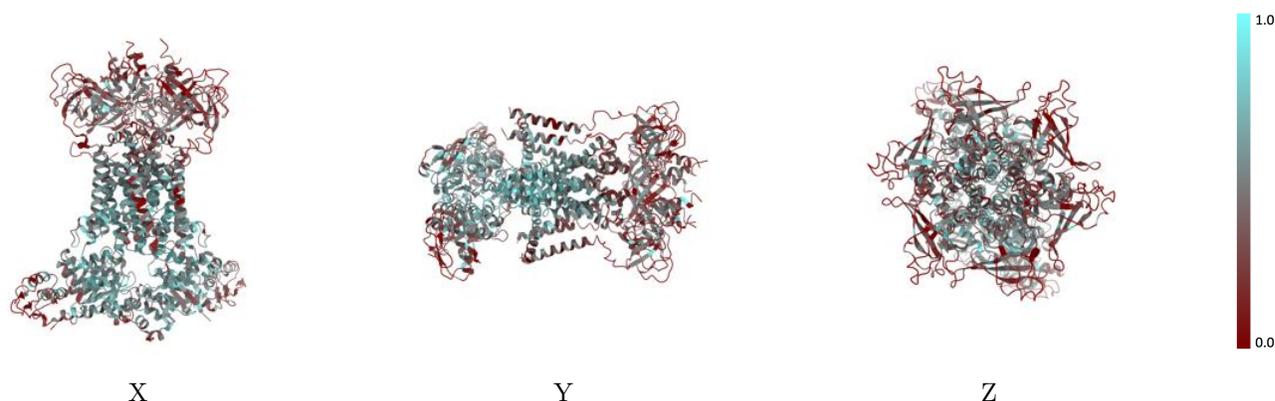
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0299).

9.4 Atom inclusion ⓘ
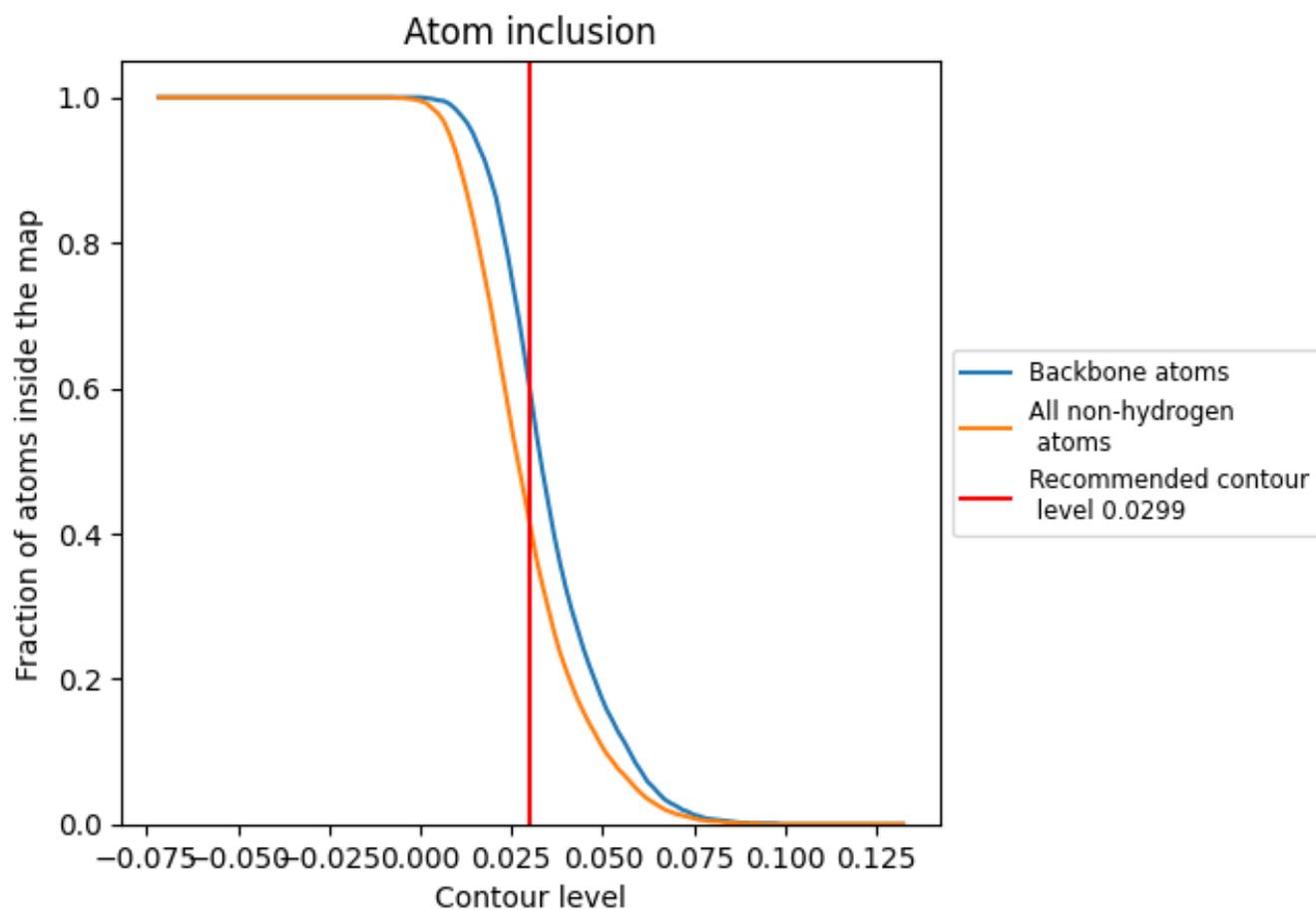
At the recommended contour level, 60% of all backbone atoms, 42% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.0299) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	▭ 0.4170	▭ 0.3860
A	▭ 0.2690	▭ 0.3200
B	▭ 0.3260	▭ 0.3580
C	▭ 0.2580	▭ 0.3100
D	▭ 0.2800	▭ 0.3430
E	▭ 0.2210	▭ 0.3200
F	▭ 0.2710	▭ 0.3420
G	▭ 0.5320	▭ 0.4400
H	▭ 0.5460	▭ 0.4450
I	▭ 0.5630	▭ 0.4380
J	▭ 0.5610	▭ 0.4320
K	▭ 0.3130	▭ 0.3210
L	▭ 0.2990	▭ 0.3310

1.0

0.0
<0.0