Full wwPDB EM Validation Report

Dec 31, 2024 – 12:19 PM JST

PDB ID	:	9J1L
EMDB ID	:	EMD-61075
Title	:	Side fiber of monocin
Authors	:	Wang, J.W.; Gu, Z.W.
Deposited on	:	2024-08-05
Resolution	:	3.28 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:

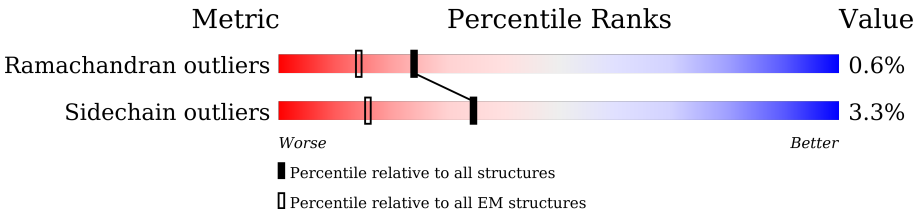
EMDB validation analysis	:	0.0.1.dev113
MolProbity	:	4.02b-467
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 3.28 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	207382	16835
Sidechain outliers	206894	16415

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	1	191	96%
1	N	191	96%
1	n	191	96%
2	2	178	96%
2	A	178	47% 93% 6%
2	B	178	53% 97%
2	C	178	46% 95%
2	I	178	58% 96%
2	P	178	97%

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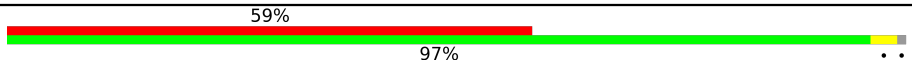
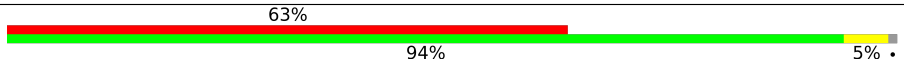
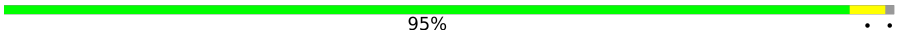
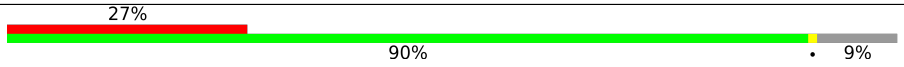
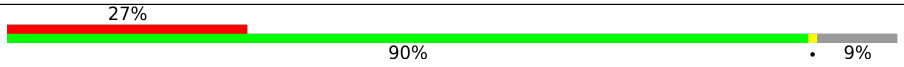
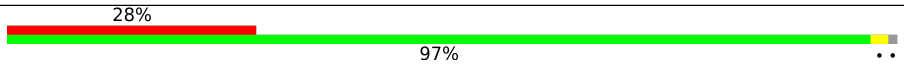
Mol	Chain	Length	Quality of chain
2	Q	178	
2	R	178	
2	p	178	
3	3	159	
3	o	159	
4	O	146	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 20288 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 Alpha-amylase.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	190	Total	C	N	O	S	0	0
			1515	951	254	304	6		
1	N	190	Total	C	N	O	S	0	0
			1515	951	254	304	6		
1	n	190	Total	C	N	O	S	0	0
			1515	951	254	304	6		

- Molecule 2 is a protein called FtbP.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	2	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	A	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	B	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	C	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	I	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	P	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	Q	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	R	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		
2	p	177	Total	C	N	O	S	0	0
			1383	878	228	272	5		

- Molecule 3 is a protein called FtbO.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	3	145	Total	C	N	O	S	0	0
			1098	682	183	231	2		

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Mol	Chain	Residues	Atoms					AltConf	Trace
3	o	145	Total	C	N	O	S	0	0
			1098	682	183	231	2		

- Molecule 4 is a protein called FtbO.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	O	145	Total	C	N	O	S	0	0
			1098	682	183	231	2		

- Molecule 5 is FE (III) ION (three-letter code: FE) (formula: Fe) (labeled as "Ligand of Interest" by depositor).

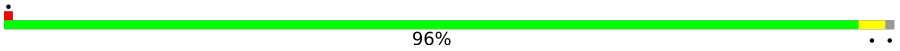
Mol	Chain	Residues	Atoms		AltConf
5	3	1	Total	Fe	0
			1	1	
5	o	1	Total	Fe	0
			1	1	

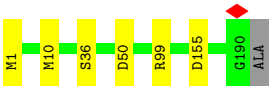
3 Residue-property plots (i)

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: Alpha-amylase

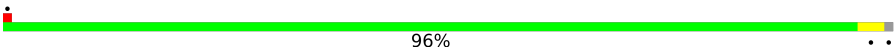
Chain 1:

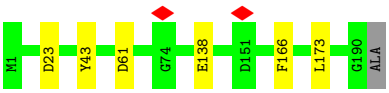




• Molecule 1: Alpha-amylase

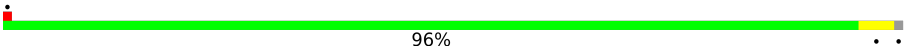
Chain N:





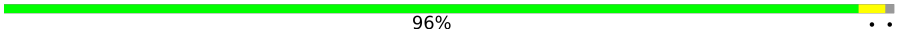
• Molecule 1: Alpha-amylase

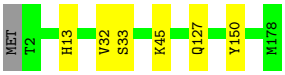
Chain n:



• Molecule 2: FtbP

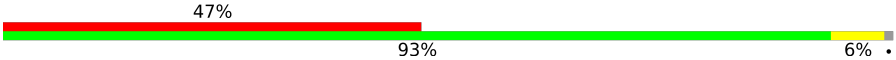
Chain 2:

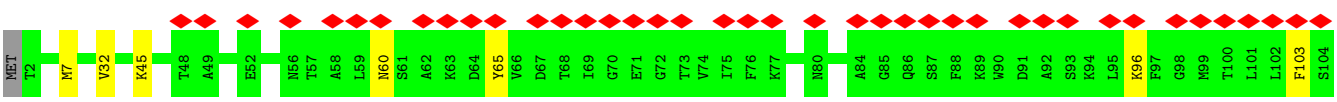


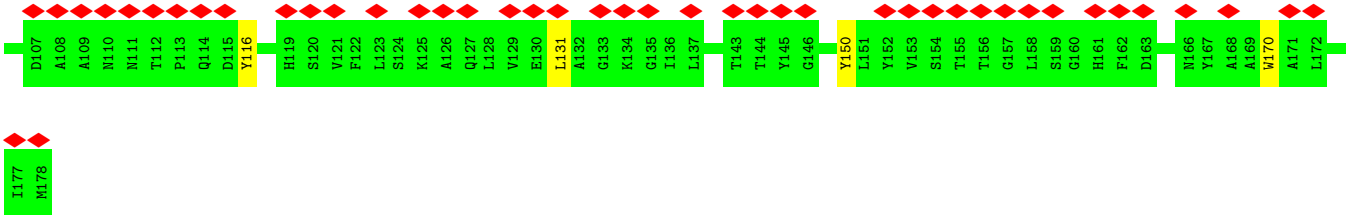


• Molecule 2: FtbP

Chain A:

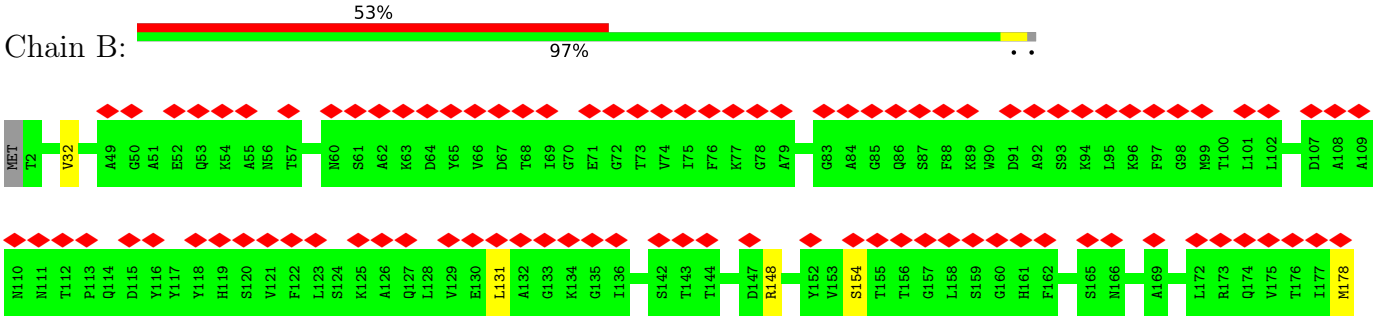






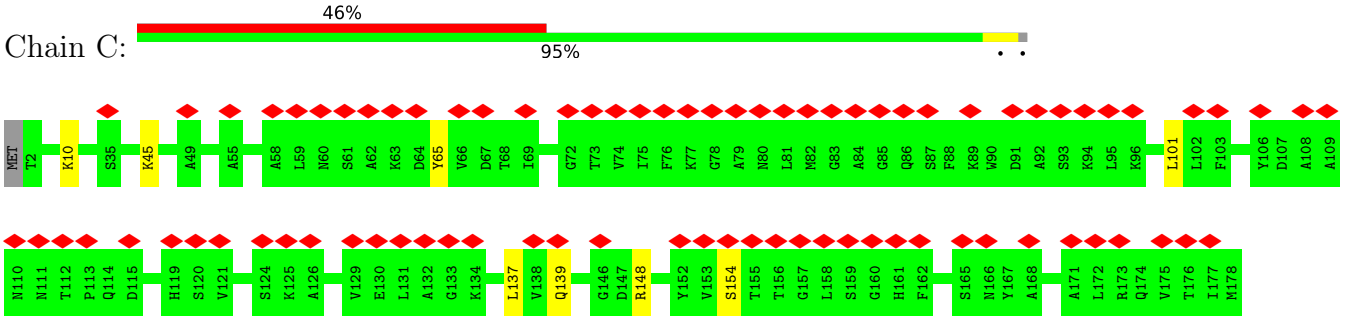
• Molecule 2: FtbP

Chain B:



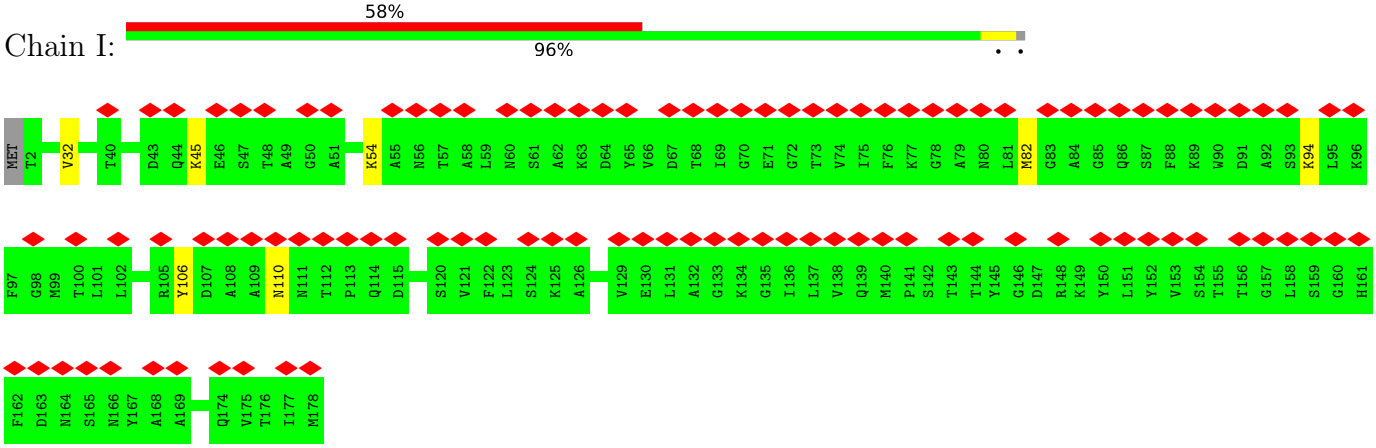
• Molecule 2: FtbP

Chain C:



• Molecule 2: FtbP

Chain I:

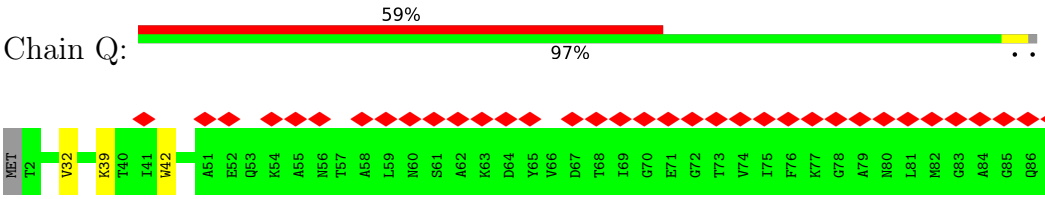


• Molecule 2: FtbP

Chain P:

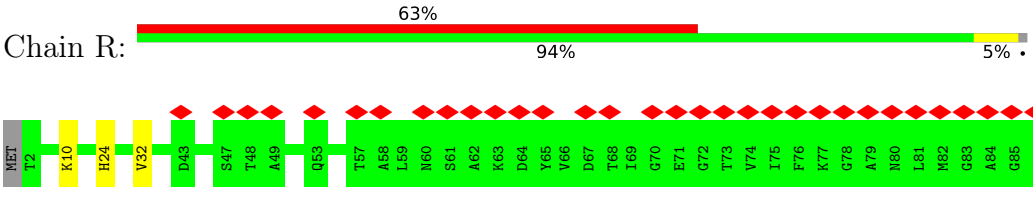
• Molecule 2: FtbP

Chain Q:



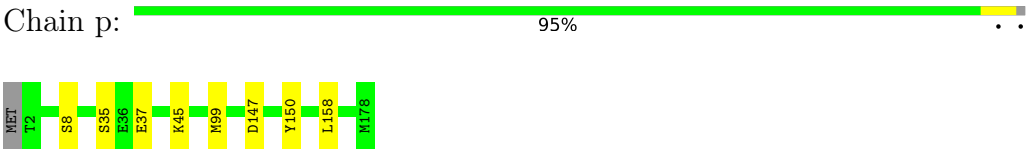
• Molecule 2: FtbP

Chain R:



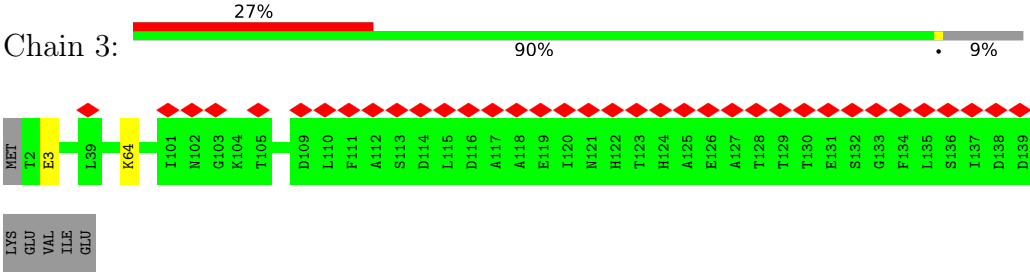
• Molecule 2: FtbP

Chain p:



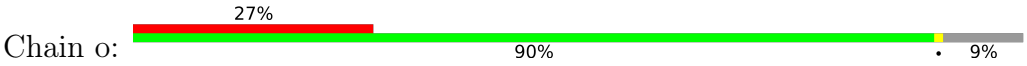
• Molecule 3: FtbO

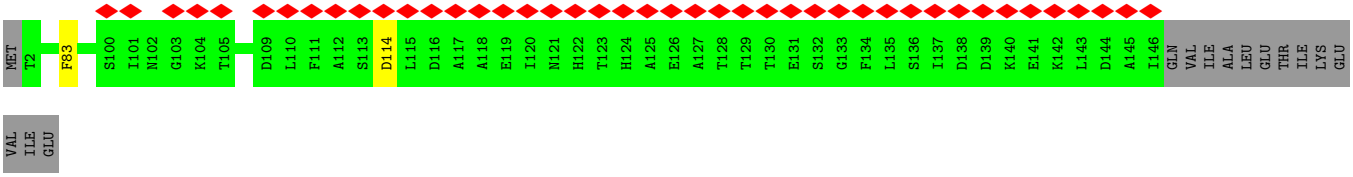
Chain 3:



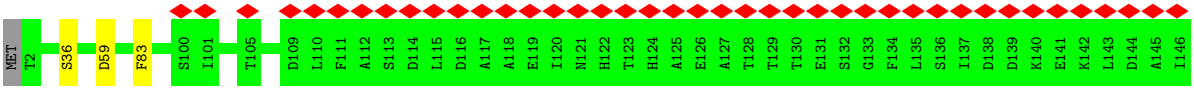
• Molecule 3: FtbO

Chain o:





• Molecule 4: FtbO



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	43630	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	2.705	Depositor
Minimum map value	-1.588	Depositor
Average map value	0.014	Depositor
Map value standard deviation	0.103	Depositor
Recommended contour level	0.3	Depositor
Map size (Å)	274.9952, 274.9952, 274.9952	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.0742, 1.0742, 1.0742	Depositor

5 Model quality

5.1 Standard geometry

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

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	1	0.26	0/1536	0.49	0/2073
1	N	0.26	0/1536	0.51	0/2073
1	n	0.25	0/1536	0.48	0/2073
2	2	0.28	0/1412	0.46	0/1908
2	A	0.30	0/1412	0.51	0/1908
2	B	0.31	0/1412	0.49	0/1908
2	C	0.31	0/1412	0.60	3/1908 (0.2%)
2	I	0.25	0/1412	0.46	0/1908
2	P	0.26	0/1412	0.47	0/1908
2	Q	0.27	0/1412	0.46	0/1908
2	R	0.25	0/1412	0.47	0/1908
2	p	0.26	0/1412	0.48	0/1908
3	3	0.31	1/1114 (0.1%)	0.48	0/1508
3	o	0.25	0/1114	0.47	0/1508
4	O	0.25	0/1114	0.46	0/1508
All	All	0.27	1/20658 (0.0%)	0.49	3/27915 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	3	3	GLU	CD-OE2	-5.94	1.19	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	137	LEU	CB-CG-CD2	-7.98	97.44	111.00
2	C	148	ARG	NE-CZ-NH1	6.70	123.65	120.30
2	C	148	ARG	NE-CZ-NH2	-6.52	117.04	120.30

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	1	188/191 (98%)	177 (94%)	11 (6%)	0	100	100
1	N	188/191 (98%)	166 (88%)	21 (11%)	1 (0%)	25	56
1	n	188/191 (98%)	180 (96%)	7 (4%)	1 (0%)	25	56
2	2	175/178 (98%)	162 (93%)	11 (6%)	2 (1%)	12	40
2	A	175/178 (98%)	162 (93%)	11 (6%)	2 (1%)	12	40
2	B	175/178 (98%)	165 (94%)	9 (5%)	1 (1%)	22	52
2	C	175/178 (98%)	156 (89%)	18 (10%)	1 (1%)	22	52
2	I	175/178 (98%)	167 (95%)	6 (3%)	2 (1%)	12	40
2	P	175/178 (98%)	166 (95%)	7 (4%)	2 (1%)	12	40
2	Q	175/178 (98%)	168 (96%)	6 (3%)	1 (1%)	22	52
2	R	175/178 (98%)	163 (93%)	11 (6%)	1 (1%)	22	52
2	p	175/178 (98%)	163 (93%)	11 (6%)	1 (1%)	22	52
3	3	143/159 (90%)	134 (94%)	9 (6%)	0	100	100
3	o	143/159 (90%)	136 (95%)	7 (5%)	0	100	100
4	O	143/146 (98%)	134 (94%)	9 (6%)	0	100	100
All	All	2568/2639 (97%)	2399 (93%)	154 (6%)	15 (1%)	24	52

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	2	45	LYS
2	A	45	LYS
2	I	45	LYS
2	P	45	LYS
2	Q	32	VAL
2	p	45	LYS
2	C	45	LYS
1	N	138	GLU
2	I	32	VAL
1	n	166	PHE
2	2	32	VAL
2	B	32	VAL
2	A	32	VAL
2	P	32	VAL
2	R	32	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	1	170/170 (100%)	164 (96%)	6 (4%)	31	57
1	N	170/170 (100%)	165 (97%)	5 (3%)	37	62
1	n	170/170 (100%)	164 (96%)	6 (4%)	31	57
2	2	146/147 (99%)	142 (97%)	4 (3%)	40	65
2	A	146/147 (99%)	137 (94%)	9 (6%)	15	41
2	B	146/147 (99%)	142 (97%)	4 (3%)	40	65
2	C	146/147 (99%)	141 (97%)	5 (3%)	32	58
2	I	146/147 (99%)	141 (97%)	5 (3%)	32	58
2	P	146/147 (99%)	143 (98%)	3 (2%)	48	70
2	Q	146/147 (99%)	142 (97%)	4 (3%)	40	65
2	R	146/147 (99%)	138 (94%)	8 (6%)	18	45
2	p	146/147 (99%)	139 (95%)	7 (5%)	21	50
3	3	121/134 (90%)	120 (99%)	1 (1%)	79	87

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
3	o	121/134 (90%)	119 (98%)	2 (2%)	56 74
4	O	121/122 (99%)	118 (98%)	3 (2%)	42 66
All	All	2187/2223 (98%)	2115 (97%)	72 (3%)	35 59

All (72) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	1	1	MET
1	1	10	MET
1	1	36	SER
1	1	50	ASP
1	1	99	ARG
1	1	155	ASP
2	2	13	HIS
2	2	33	SER
2	2	127	GLN
2	2	150	TYR
3	3	64	LYS
2	A	7	MET
2	A	60	ASN
2	A	65	TYR
2	A	96	LYS
2	A	103	PHE
2	A	116	TYR
2	A	131	LEU
2	A	150	TYR
2	A	170	TRP
2	B	131	LEU
2	B	148	ARG
2	B	154	SER
2	B	178	MET
2	C	10	LYS
2	C	65	TYR
2	C	101	LEU
2	C	139	GLN
2	C	154	SER
2	I	54	LYS
2	I	82	MET
2	I	94	LYS
2	I	106	TYR
2	I	110	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	N	23	ASP
1	N	43	TYR
1	N	61	ASP
1	N	166	PHE
1	N	173	LEU
4	O	36	SER
4	O	59	ASP
4	O	83	PHE
2	P	26	GLU
2	P	43	ASP
2	P	167	TYR
2	Q	39	LYS
2	Q	42	TRP
2	Q	122	PHE
2	Q	150	TYR
2	R	10	LYS
2	R	24	HIS
2	R	90	TRP
2	R	101	LEU
2	R	115	ASP
2	R	124	SER
2	R	159	SER
2	R	178	MET
1	n	48	LYS
1	n	83	ASP
1	n	123	MET
1	n	137	SER
1	n	158	LEU
1	n	169	ASN
3	o	83	PHE
3	o	114	ASP
2	p	8	SER
2	p	35	SER
2	p	37	GLU
2	p	99	MET
2	p	147	ASP
2	p	150	TYR
2	p	158	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	56	ASN
2	B	60	ASN
2	I	18	GLN
2	I	164	ASN
2	P	161	HIS
3	o	86	GLN

5.3.3 RNA (i)

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.

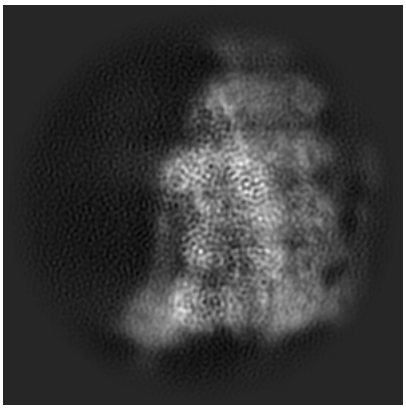
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-61075. These allow visual inspection of the internal detail of the map and identification of artifacts.

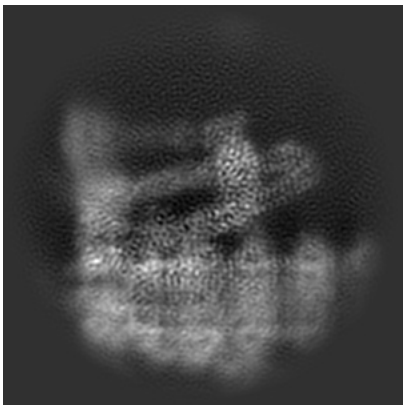
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

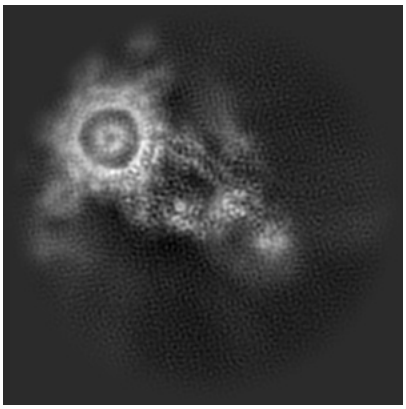
6.1.1 Primary map



X

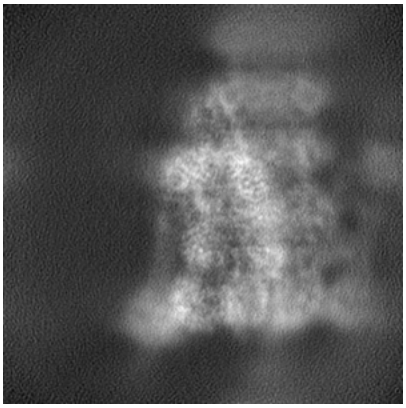


Y

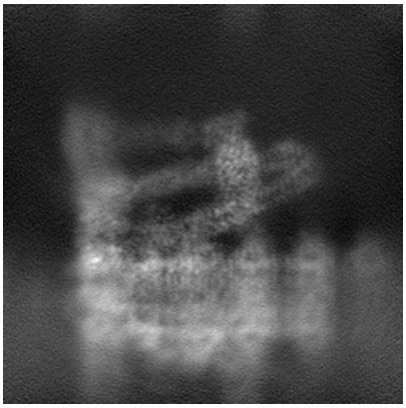


Z

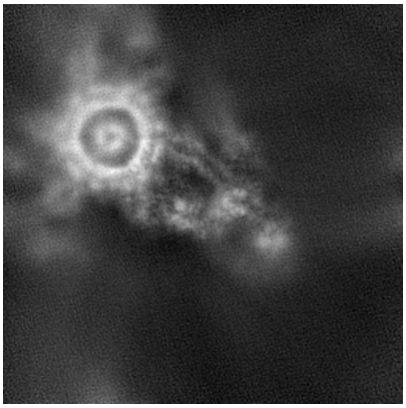
6.1.2 Raw map



X



Y

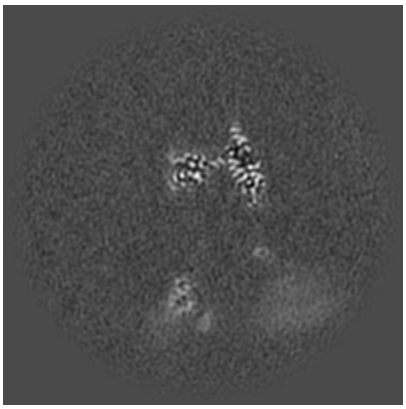


Z

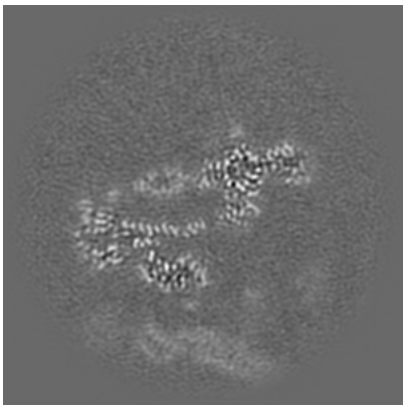
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

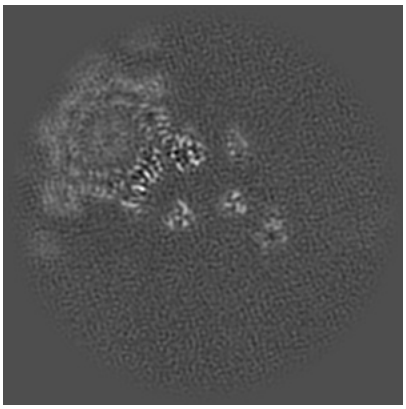
6.2.1 Primary map



X Index: 128

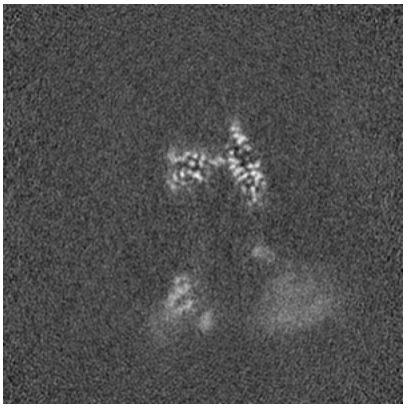


Y Index: 128

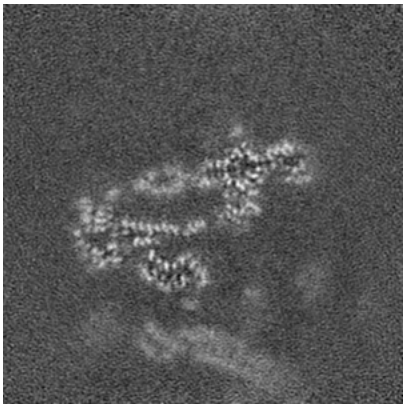


Z Index: 128

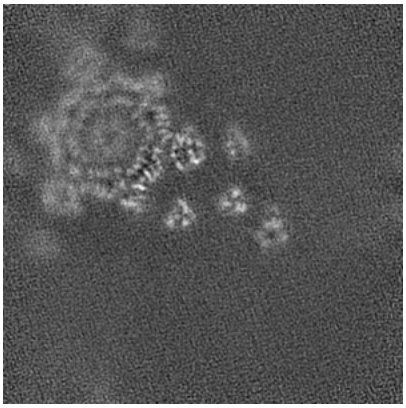
6.2.2 Raw map



X Index: 128



Y Index: 128

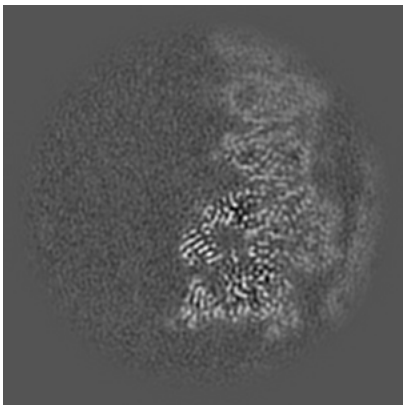


Z Index: 128

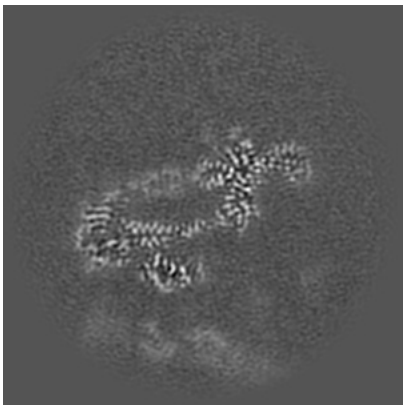
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

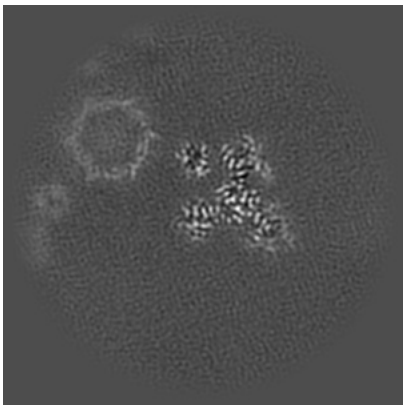
6.3.1 Primary map



X Index: 91

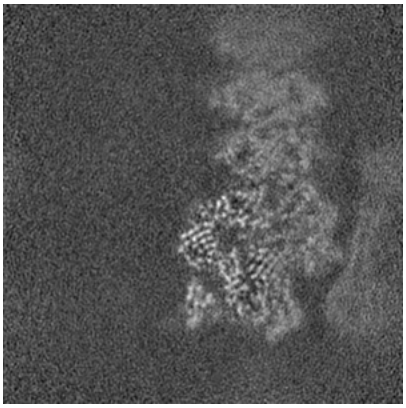


Y Index: 126

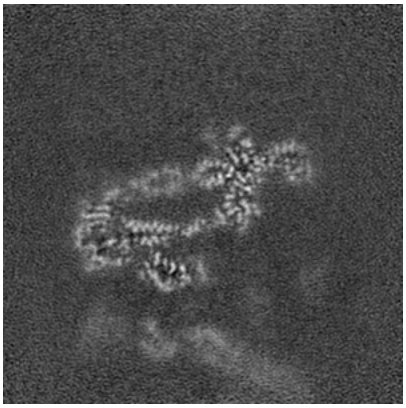


Z Index: 146

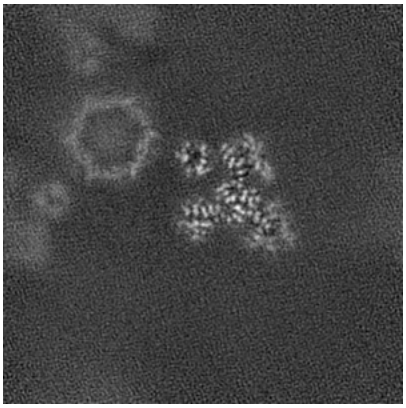
6.3.2 Raw map



X Index: 89



Y Index: 126

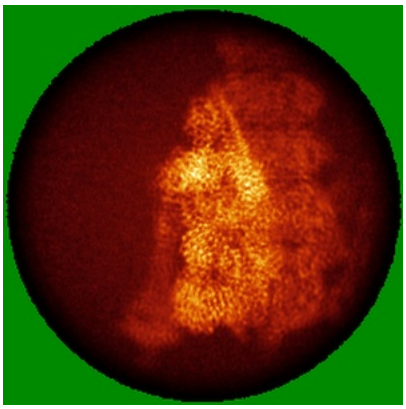


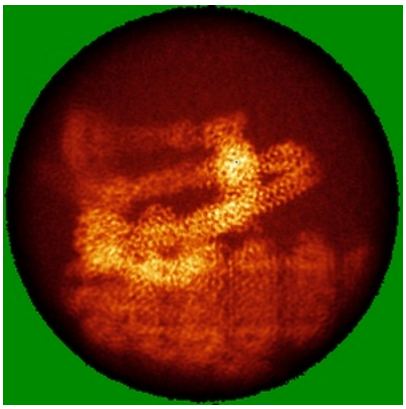
Z Index: 146

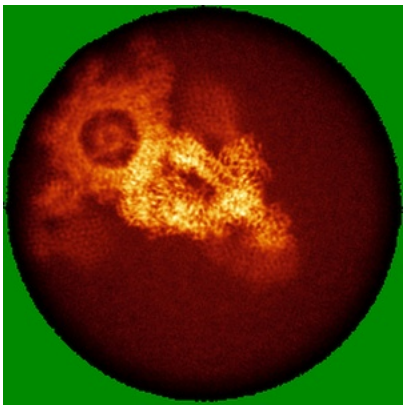
The images above show the largest variance slices of the map in three orthogonal directions.

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

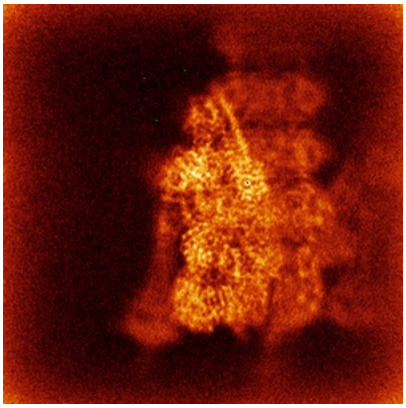
6.4.1 Primary map

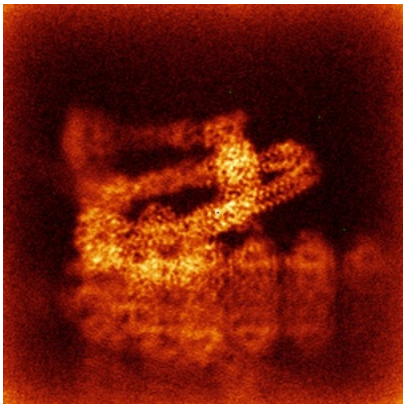

X

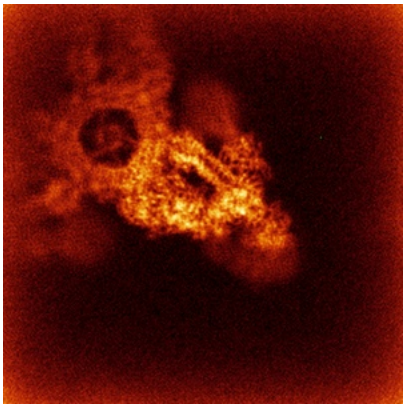

Y


Z

6.4.2 Raw 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

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.3. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

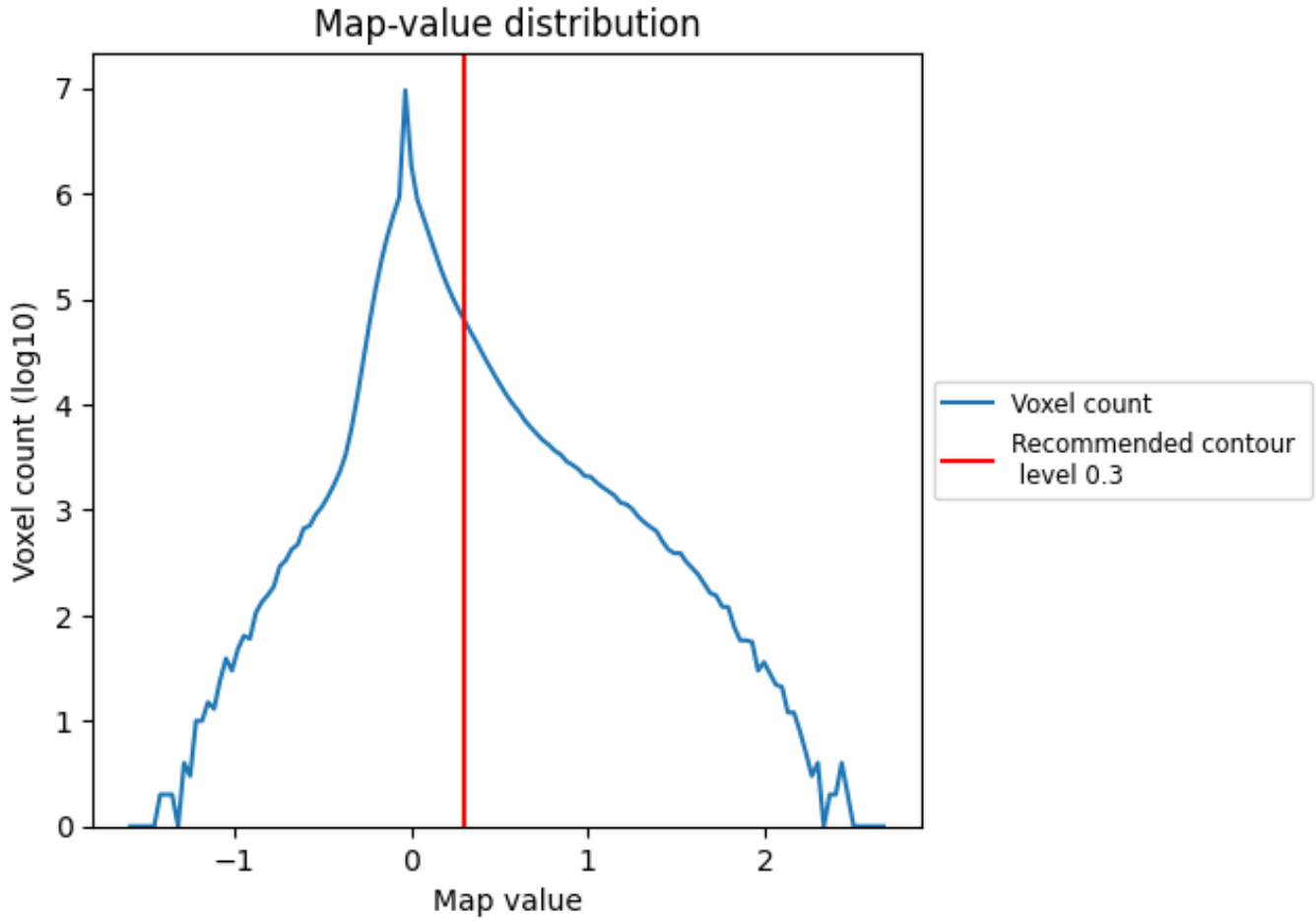
6.6 Mask visualisation (i)

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

7 Map analysis

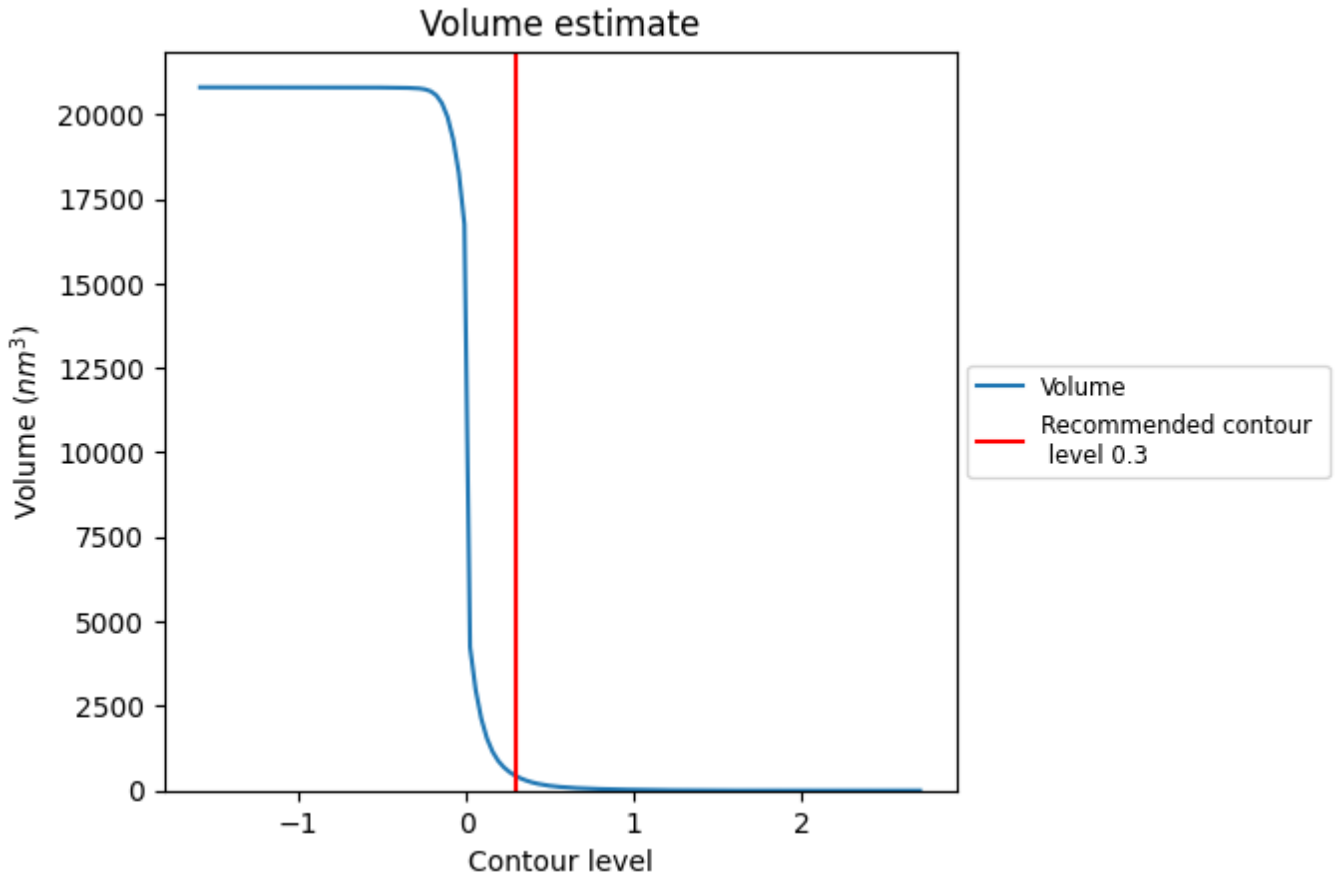
This section contains the results of statistical analysis of the map.

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.

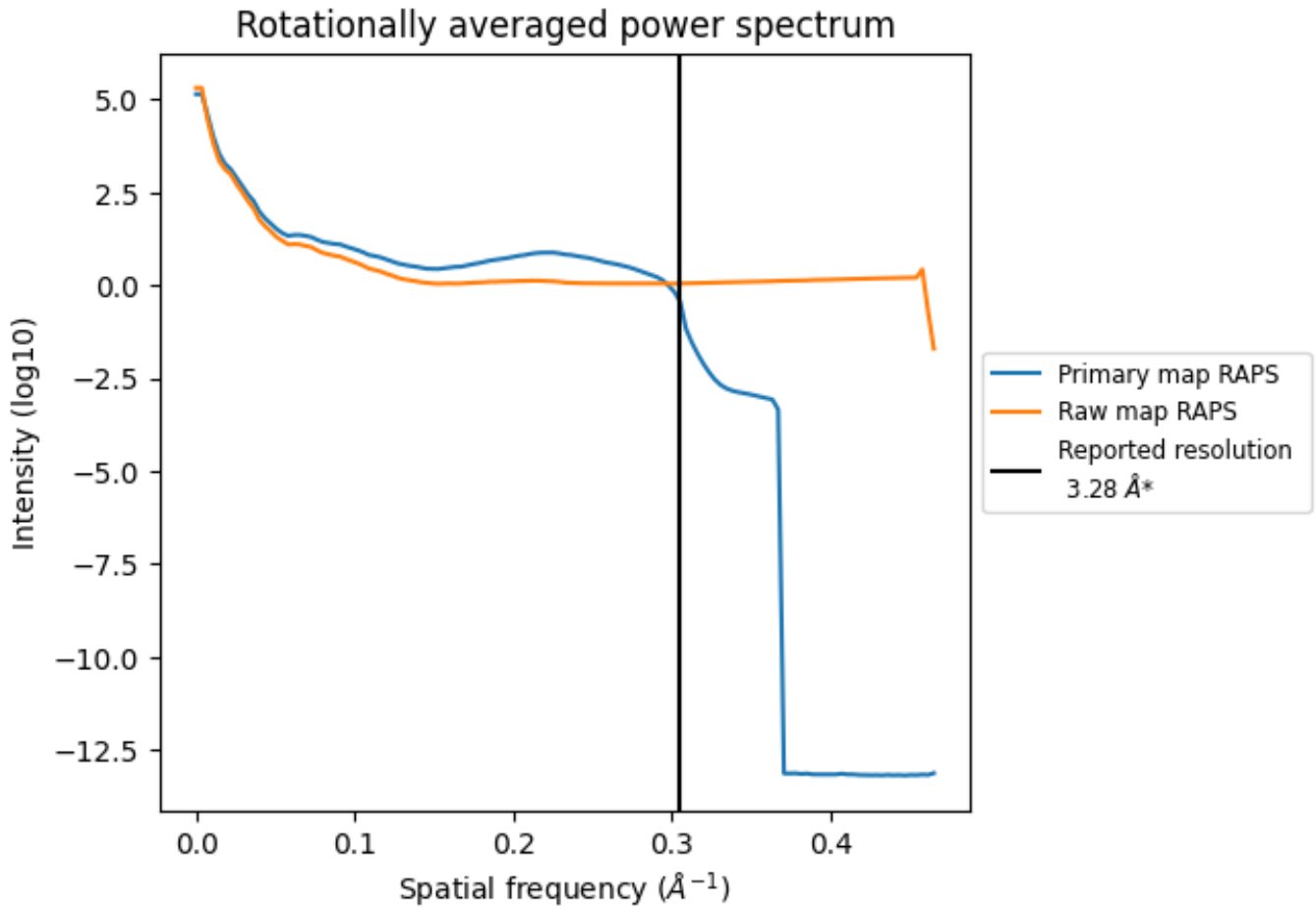
7.2 Volume estimate



The volume at the recommended contour level is 420 nm^3; this corresponds to an approximate mass of 380 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)

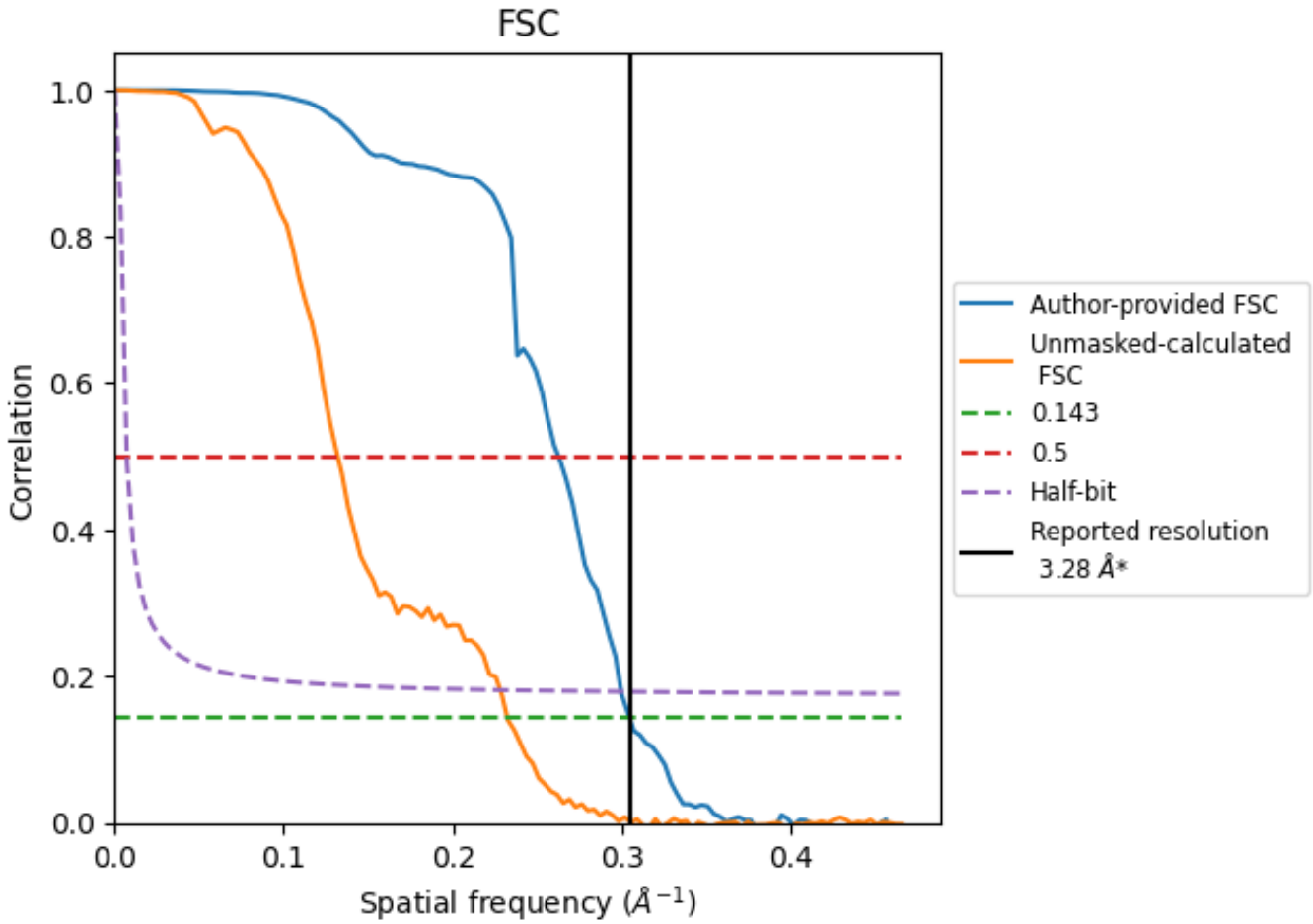


*Reported resolution corresponds to spatial frequency of 0.305 $Å^{-1}$

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.305 Å^{-1}

8.2 Resolution estimates (i)

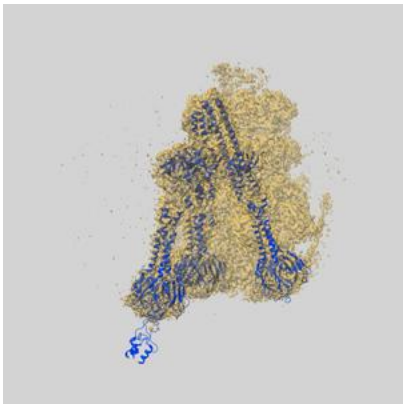
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.28	-	-
Author-provided FSC curve	3.28	3.81	3.34
Unmasked-calculated*	4.30	7.58	4.38

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.30 differs from the reported value 3.28 by more than 10 %

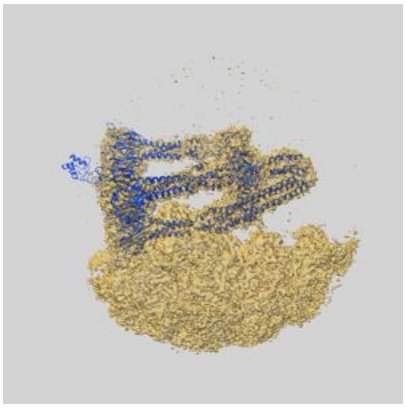
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-61075 and PDB model 9J1L. Per-residue inclusion information can be found in section 3 on page 6.

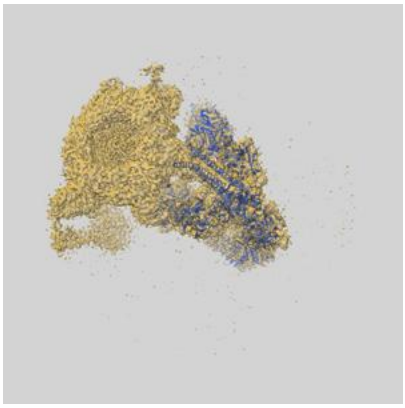
9.1 Map-model overlay



X



Y



Z

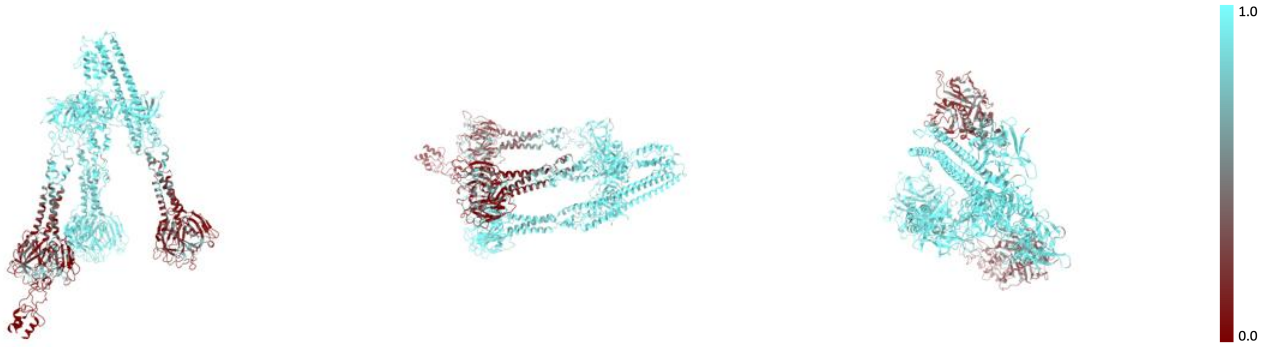
The images above show the 3D surface view of the map at the recommended contour level 0.3 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model (i)

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.

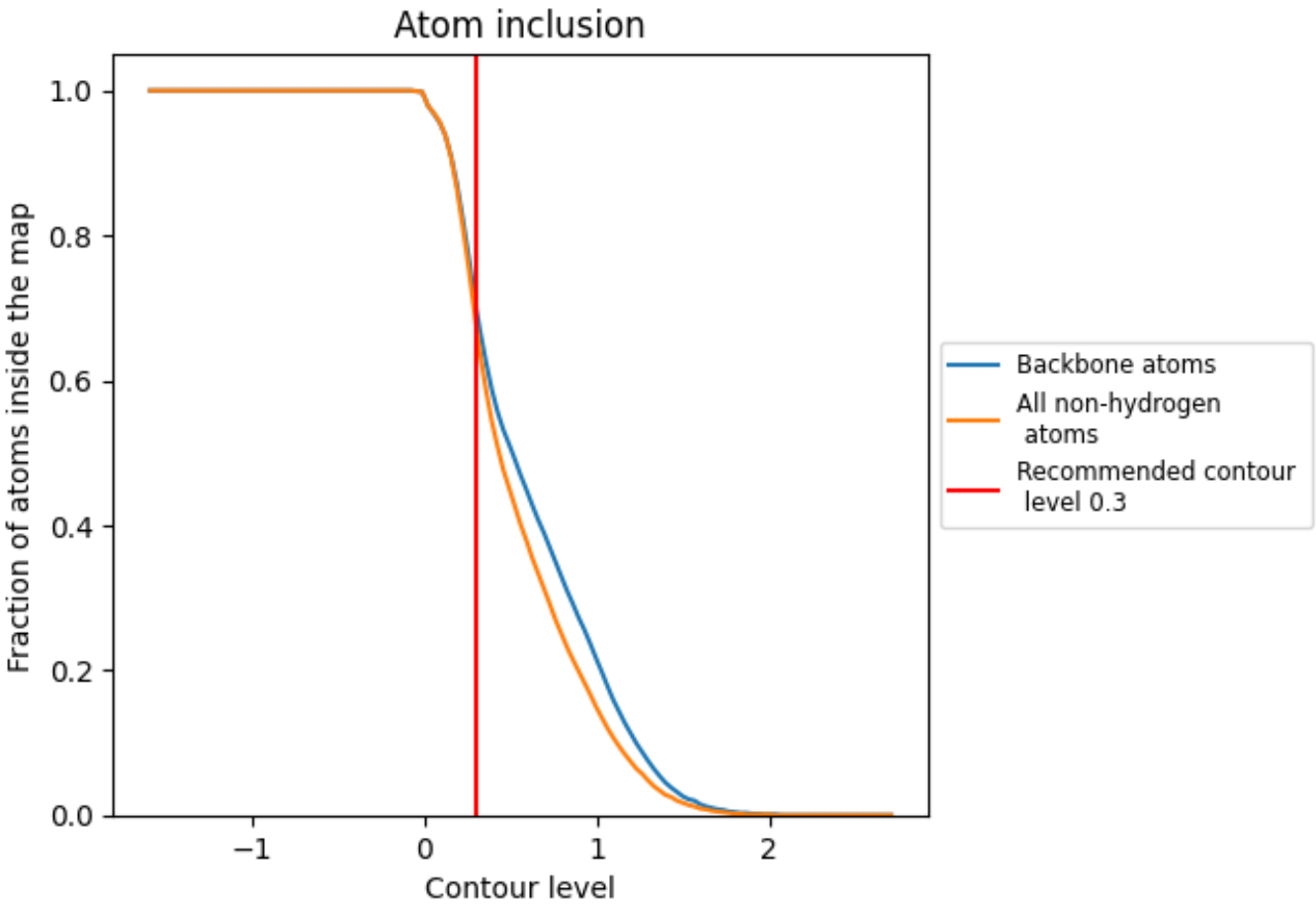
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.3).

9.4 Atom inclusion (i)



At the recommended contour level, 70% of all backbone atoms, 68% 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 (0.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6770	0.3470
1	0.9230	0.5060
2	0.9310	0.5070
3	0.6450	0.3260
A	0.4850	0.2040
B	0.4510	0.2080
C	0.4830	0.2010
I	0.4070	0.1850
N	0.9130	0.4910
O	0.6520	0.3360
P	0.9270	0.4960
Q	0.4080	0.1920
R	0.3600	0.1890
n	0.9210	0.5070
o	0.6450	0.3250
p	0.9220	0.4830