



wwPDB EM Validation Summary Report ⓘ

Nov 13, 2023 – 03:24 am GMT

PDB ID : 8PBX
EMDB ID : EMD-17587
Title : Single particle cryo-EM of the P140-P110 heterodimer of Mycoplasma genitalium at 3.3 Angstrom resolution.
Authors : Sprankel, L.; Scheffer, M.P.; Frangakis, A.S.
Deposited on : 2023-06-09
Resolution : 3.30 Å (reported)
Based on initial models : 6R3T, 6RUT

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.dev70
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) : 2.36

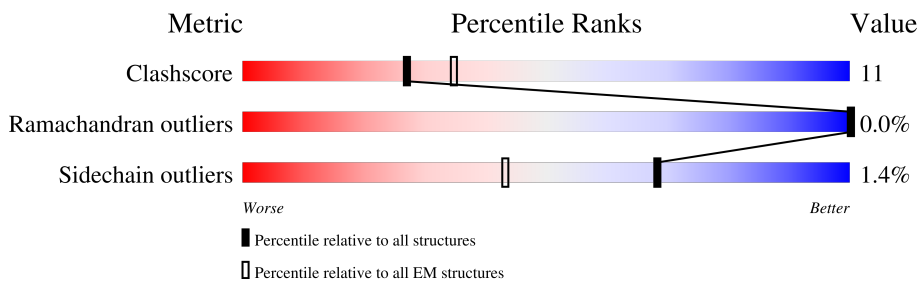
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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)
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 $\leq 5\%$. 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	1059	
2	B	1444	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 33448 atoms, of which 16455 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 Mgp-operon protein 3.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	902	13661	4350	6717	1165	1423	6	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1053	HIS	-	expression tag	UNP P22747
A	1054	HIS	-	expression tag	UNP P22747
A	1055	HIS	-	expression tag	UNP P22747
A	1056	HIS	-	expression tag	UNP P22747
A	1057	HIS	-	expression tag	UNP P22747
A	1058	HIS	-	expression tag	UNP P22747

- Molecule 2 is a protein called Adhesin P1.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	B	1285	19787	6365	9738	1699	1971	14	0	0

• Molecule 2: Adhesin P1



MEU	Y68	D179	K292	Y387	W530	K649	SER	N924	A1083	I1211	V1316	PHE
HIS	T69	M180	K293	N388	F531	P655	S789	D931	S1090	T1226	R1917	ASP
PRO	N72	I183	M294	A389	V534	P656	L795	E945	G1227	L1318	R1918	LEU
LVS	N73	K186	N293	R390	P535	F796	F796	E945	S1091	V1228	E1319	SER
ARG	F75	I187	K298	N391	R536	L661	F961	L951	T1092	V1229	F1320	ASN
LEU	I80	P299	K299	L392	V542	Y662	V603	E956	T1093	S1230	K1321	LVS
ALA	E83	L300	L300	Q395	V545	L666	T616	L960	Y1094	L1236	Q1324	VAL
LVS	N84	S194	K303	T396	V545	N671	V819	Y961	D1095	T1243	F1328	VAL
SER	P85	Q193	S306	G398	L549	F682	F820	N962	N1096	D1247	L1322	THR
TRP	G86	L200	Y201	F399	V550	Y683	T630	A963	S1103	L1247	L1332	LVS
ALA	S87	F202	V309	M401	T662	N684	G633	A964	K1113	K1250	F1343	ALA
PHE	F88	V203	K310	R403	E685	E685	G633	L965	L1113	G1250	Q1344	VAL
LEU	G89	L204	R403	R404	R565	N686	Y634	L966	V1128	N1257	P1345	GLY
THR	L90	L207	L311	R404	L566	N686	R835	H967	V1129	Q1258	F1346	SER
ALA	V91	P207	L324	E407	L571	A689	W636	T968	D1129	I1259	M1347	PHE
LEU	N97	K208	L325	E416	L577	Q637	Q637	Y969	A1130	D1260	Q1348	LVS
THR	I100	A210	L211	A416	L577	L698	Q641	T976	T1131	F1261	W1349	GLU
GLY	V103	E212	E333	E448	Q637	D701	L645	N977	M1137	N1262	ALA	ALA
THR	M106	Y213	G337	F451	E587	L702	T645	S978	L1140	R1263	ASP	ASN
GLY	D109	E217	A338	A452	Q637	L706	P646	I983	L1141	L1264	TYR	ARG
VAL	L112	M217	T339	M453	Q650	D707	F647	G984	L1142	L1265	VAL	THR
GLY	V106	V220	V340	N457	N659	D708	E648	D1008	L1143	F1266	LEU	GLY
GLY	N106	S224	V341	N467	N660	I710	Q649	L1144	L1144	L1266	LEU	LEU
TYR	F128	A229	V342	F467	R601	E715	V850	M1148	M1144	Y1269	LEU	ASN
PHE	R131	T230	F343	F472	D602	N716	K851	L1011	L1011	T1270	VAL	ALA
LEU	R132	Q231	Y344	A473	L609	R725	P858	L1012	L1012	E1271	THR	PRO
ASN	Y133	S233	D345	A475	M613	L729	D865	V1013	V1013	E1272	VAL	LVS
LVS	N136	F234	A346	K475	H620	L732	T679	V1014	V1014	P1275	VAL	LEU
GLN	G137	R239	S349	T478	F622	L732	L887	D1017	D1017	N1276	VAL	VAL
GLN	R138	S244	H352	T479	N625	L743	L887	L1024	L1024	I1277	VAL	VAL
VAL	Y141	K247	T353	M480	P626	Y746	N901	I1029	I1029	T1278	LEU	THR
SER	D142	E268	A354	M484	D627	V746	K902	L1042	L1042	F1279	SER	THR
ASN	N150	E268	F355	R488	I628	D757	Q906	G1043	G1043	D1282	THR	PRO
PHE	P151	H361	G366	D493	Q629	T760	R907	T1044	T1044	Q1283	LEU	THR
ALA	S152	H362	H360	D493	Q630	F761	N908	L1046	L1046	Y1284	LEU	THR
TYR	T153	N369	H362	D493	W633	F764	Q909	S1063	S1063	P1286	GLY	THR
GLN	V154	N369	N369	D493	N633	L765	L910	Y1068	Y1068	L1287	THR	PRO
PRO	P162	W374	N369	D493	N633	D766	L911	L1069	L1069	L1288	THR	LVS
LEU	P166	L508	W374	D493	N633	F767	L912	L1069	L1069	G1289	PRO	PRO
VAL	F167	L520	L508	D493	N633	S782	L915	T1074	T1074	I1300	THR	VAL
LVS	K168	L640	L520	D493	N633	S782	L916	K1076	K1076	R1301	ASN	VAL
HIS	T173	I641	L640	D493	N633	S782	L916	S1077	S1077	S1191	LVS	GLN
GLN	G174	S642	I641	D493	N633	S782	L921	L1078	L1078	L1192	ALA	GLN
GLN	M175	D648	S642	D493	N633	S782	L921	W1079	W1079	L1197	LEU	GLN
								D1080	D1080	D1202	ALA	GLN
										M1207	GLY	
										E1210	GLY	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	149542	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	130000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	2.600	Depositor
Minimum map value	-1.664	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.077	Depositor
Recommended contour level	0.4	Depositor
Map size (Å)	315.0, 315.0, 315.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	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	A	0.31	0/7088	0.48	0/9641
2	B	0.32	0/10303	0.48	0/14029
All	All	0.31	0/17391	0.48	0/23670

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	6944	6717	6714	141	0
2	B	10049	9738	9727	231	0
All	All	16993	16455	16441	365	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 11.

The worst 5 of 365 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)
2:B:396:THR:OG1	2:B:401:ASN:ND2	2.00	0.95
2:B:631:ASN:O	2:B:656:TYR:OH	1.90	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:529:ARG:NH2	2:B:729:LEU:O	2.10	0.84
2:B:173:THR:OG1	2:B:175:ASN:OD1	1.97	0.83
2:B:1074:THR:OG1	2:B:1171:GLN:OE1	1.95	0.83

There are no symmetry-related clashes.

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	A	896/1059 (85%)	837 (93%)	58 (6%)	1 (0%)	51 81
2	B	1281/1444 (89%)	1197 (93%)	84 (7%)	0	100 100
All	All	2177/2503 (87%)	2034 (93%)	142 (6%)	1 (0%)	100 100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	120	ILE

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	A	787/920 (86%)	777 (99%)	10 (1%)	69 82
2	B	1122/1267 (89%)	1106 (99%)	16 (1%)	67 82

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1909/2187 (87%)	1883 (99%)	26 (1%)	68 82

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	362	ASP
2	B	536	ARG
2	B	1097	ASN
2	B	535	PRO
2	B	662	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	135	ASN
2	B	401	ASN
2	B	590	GLN
2	B	903	ASN
2	B	1257	ASN

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 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.

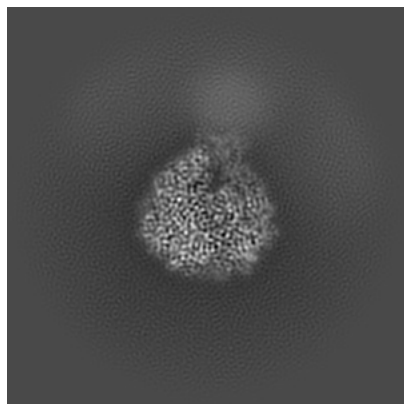
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-17587. These allow visual inspection of the internal detail of the map and identification of artifacts.

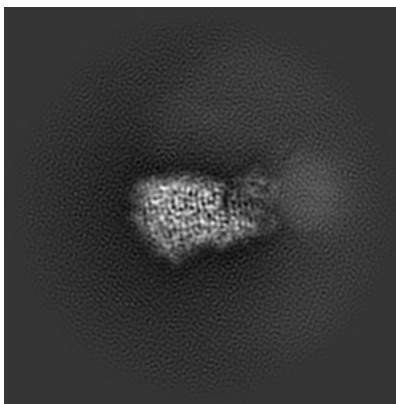
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

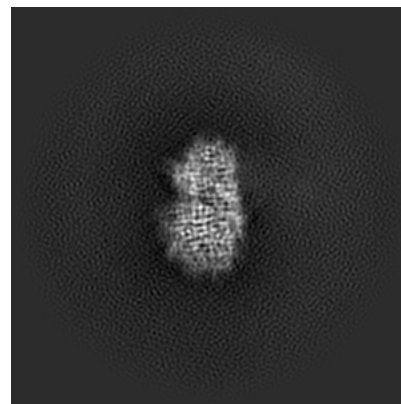
6.1.1 Primary map



X

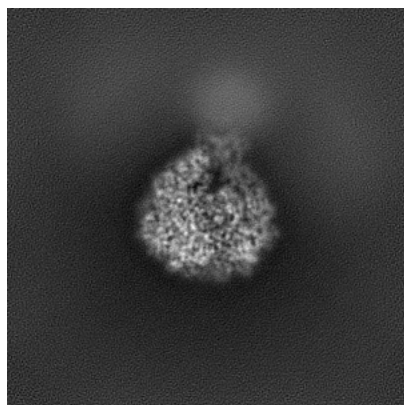


Y

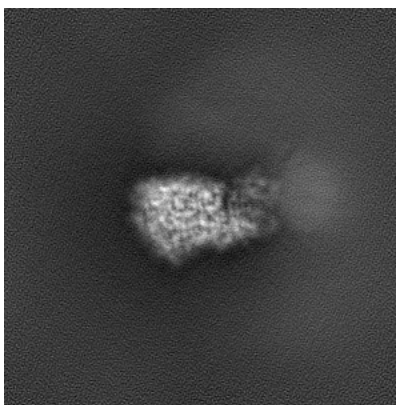


Z

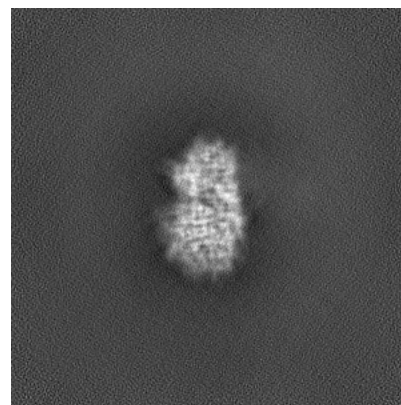
6.1.2 Raw map



X



Y

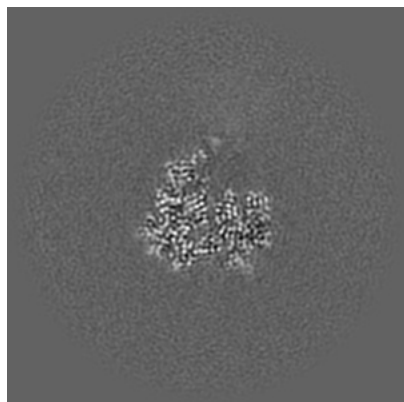


Z

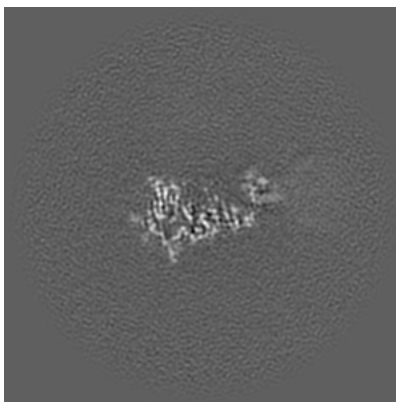
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

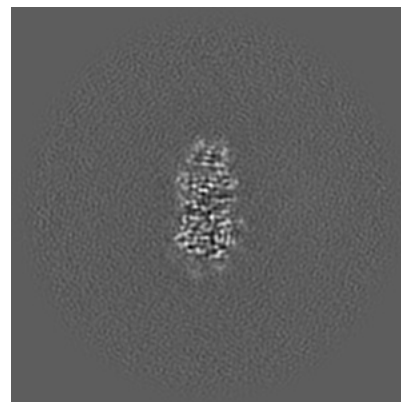
6.2.1 Primary map



X Index: 150

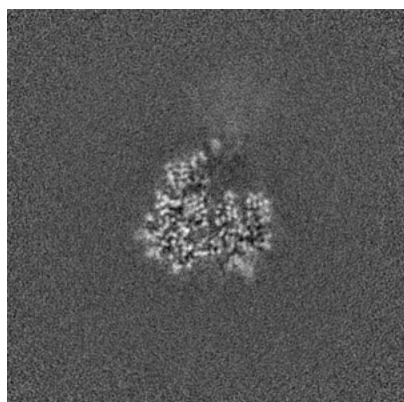


Y Index: 150

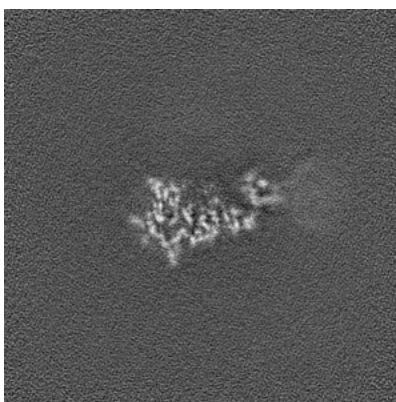


Z Index: 150

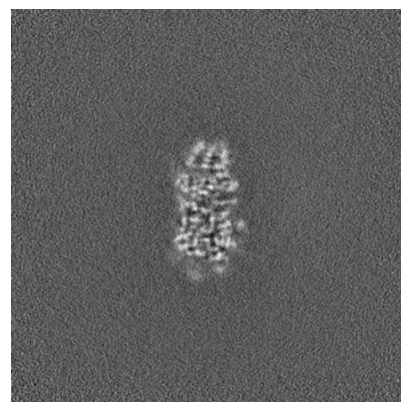
6.2.2 Raw map



X Index: 150



Y Index: 150

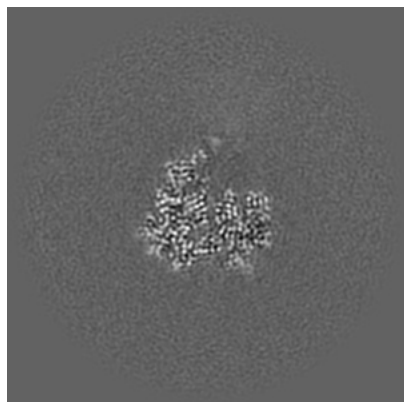


Z Index: 150

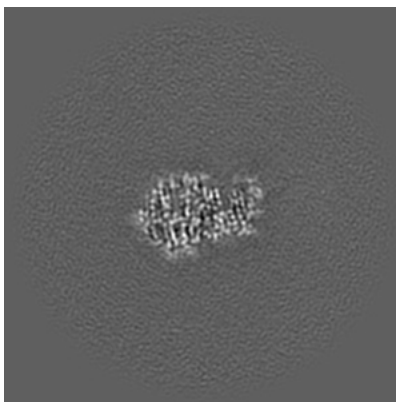
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

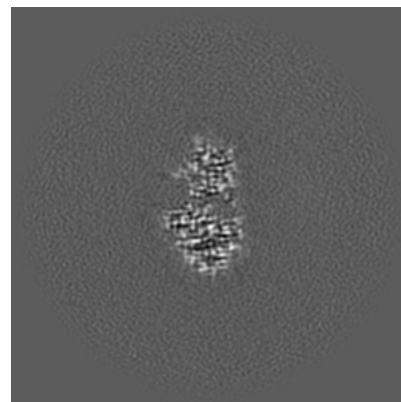
6.3.1 Primary map



X Index: 150

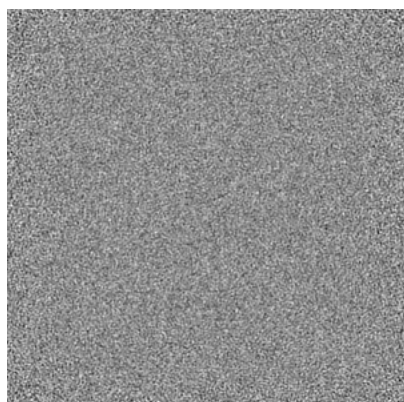


Y Index: 138

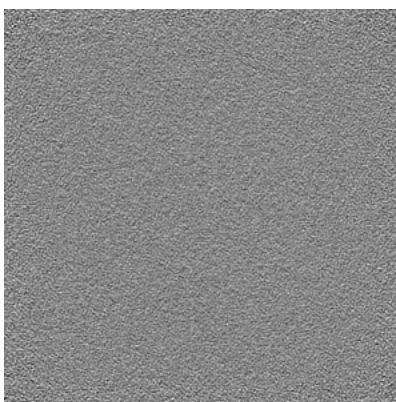


Z Index: 134

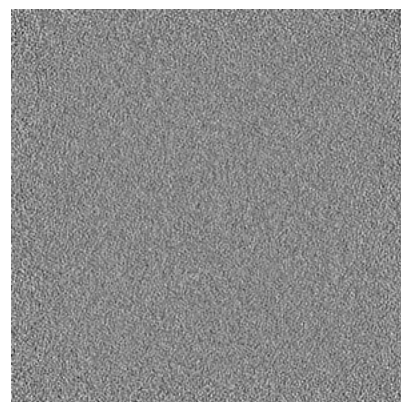
6.3.2 Raw map



X Index: 0



Y Index: 0

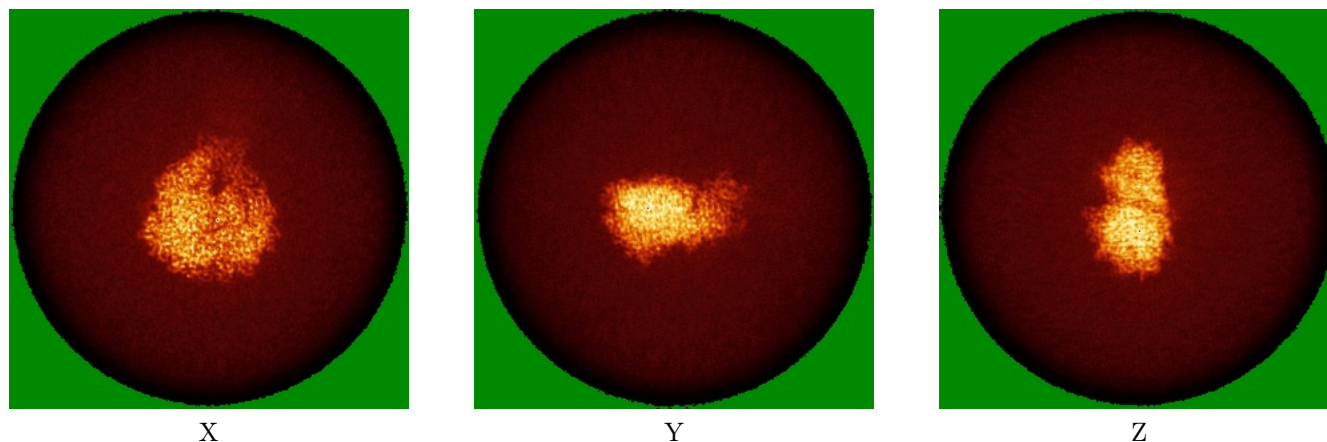


Z Index: 0

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

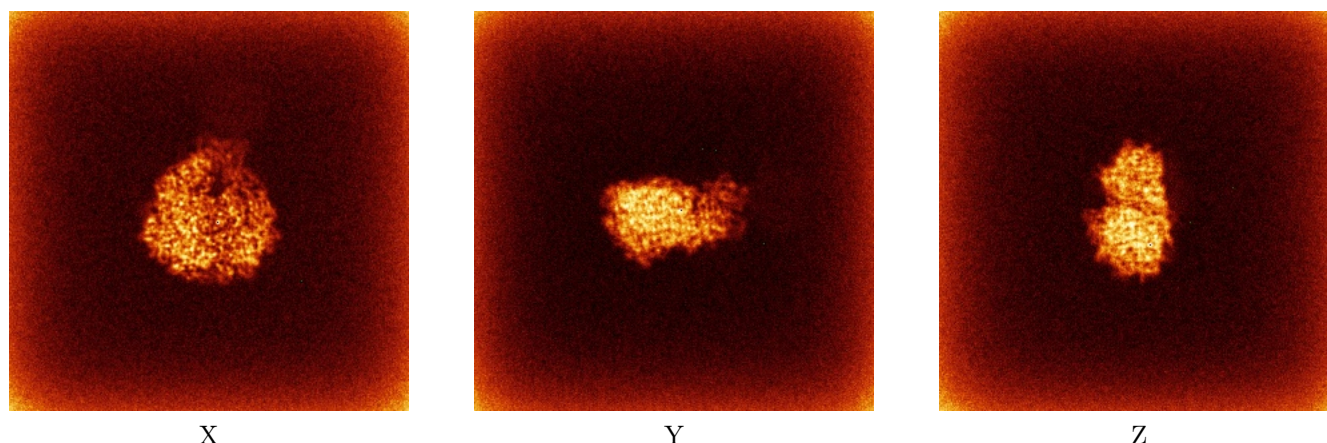


X

Y

Z

6.4.2 Raw map



X

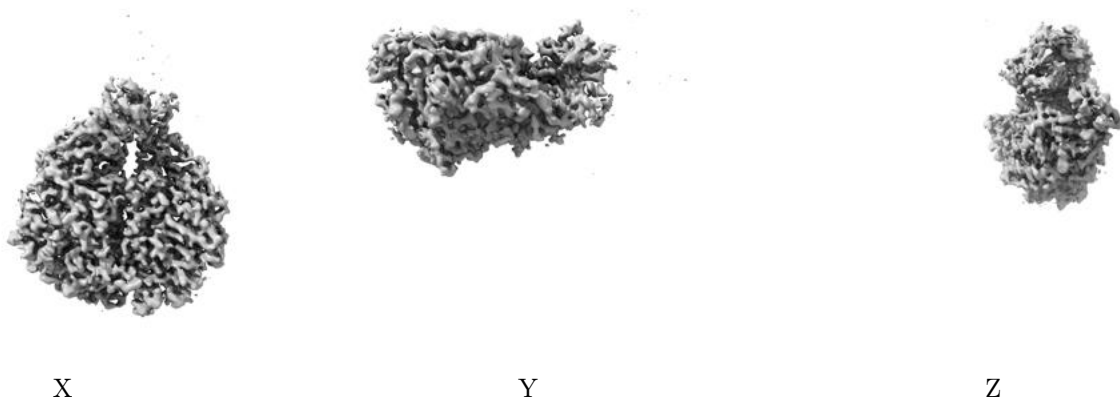
Y

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.

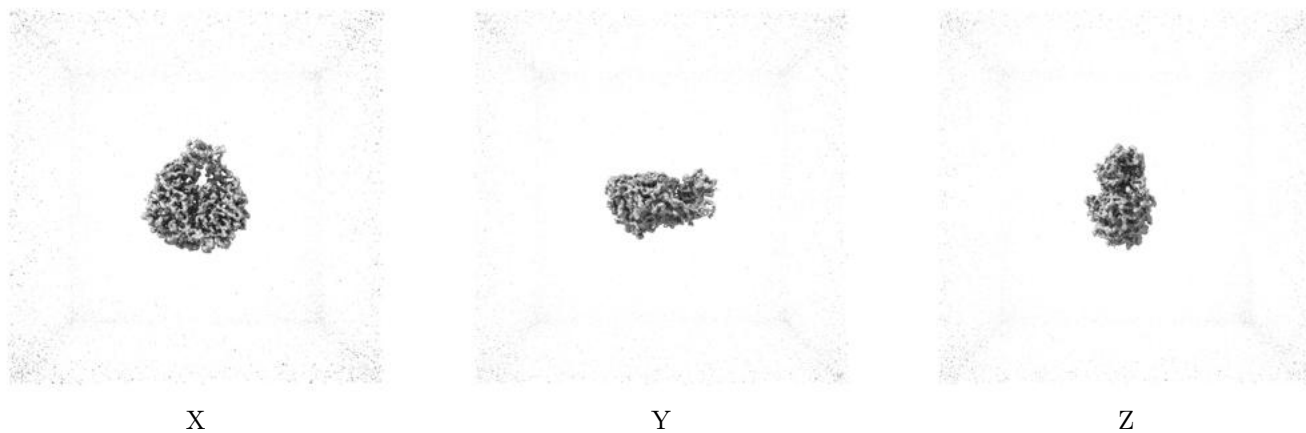
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.4. 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



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.

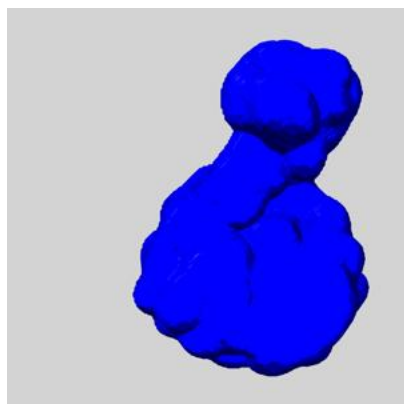
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

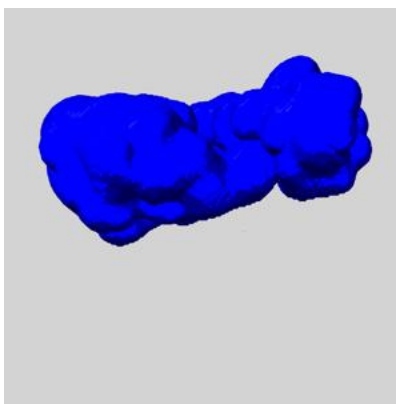
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

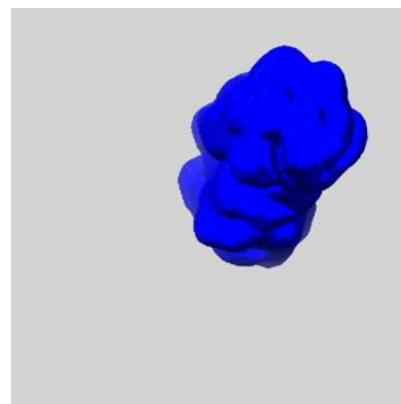
6.6.1 emd_17587_msk_1.map [i](#)



X



Y

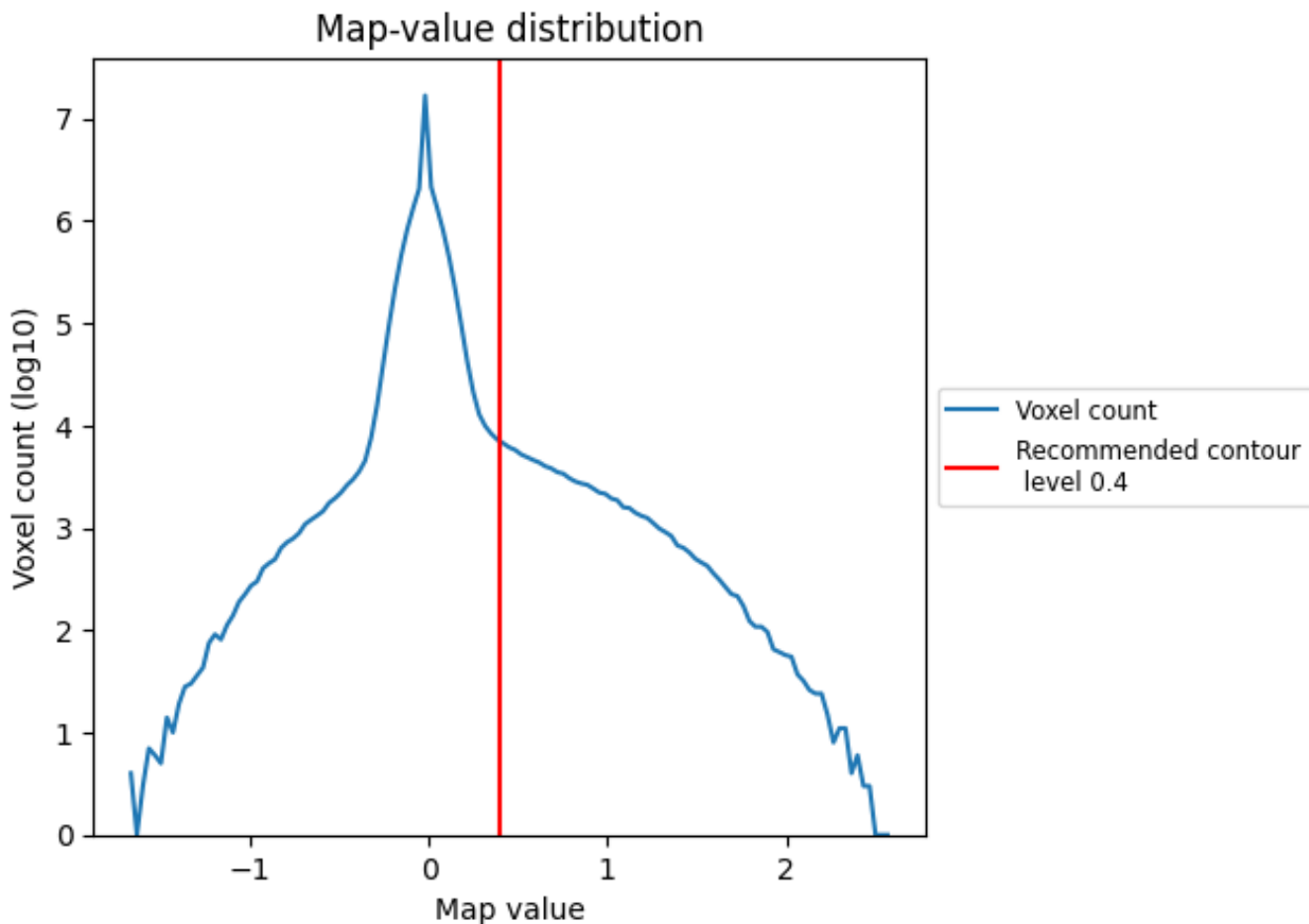


Z

7 Map analysis [i](#)

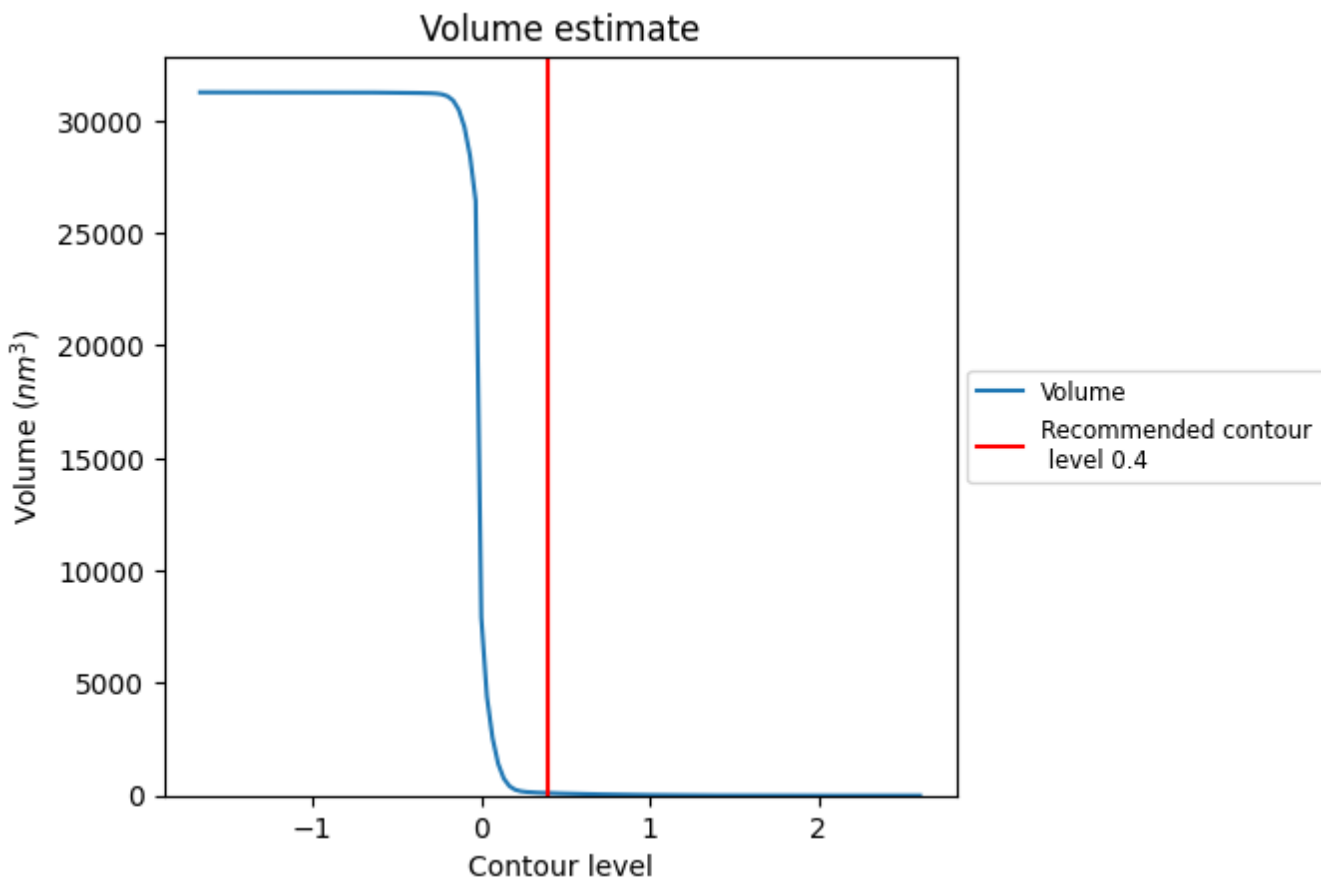
This section contains the results of statistical analysis of the map.

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.

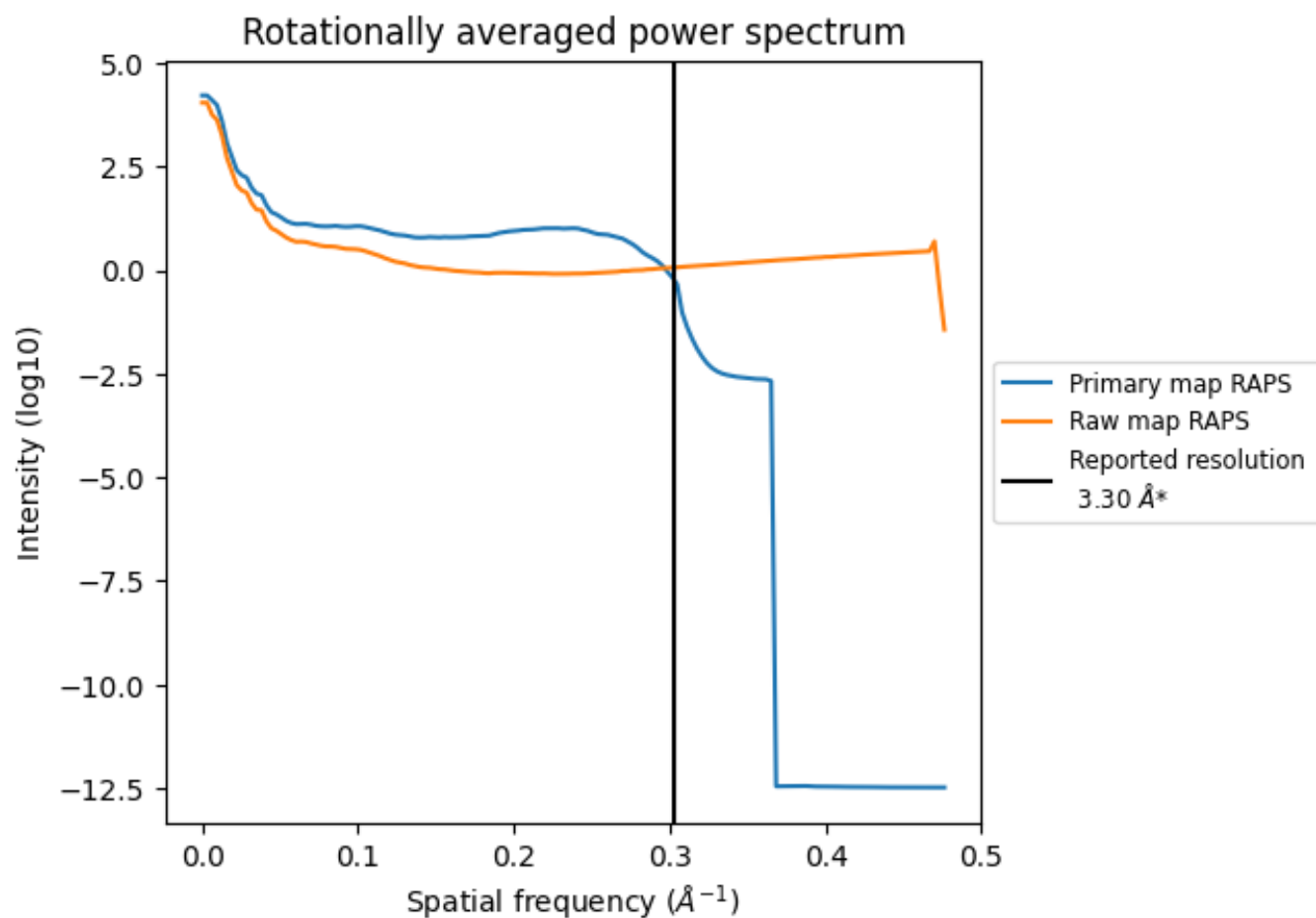
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 109 nm³; this corresponds to an approximate mass of 99 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](#)

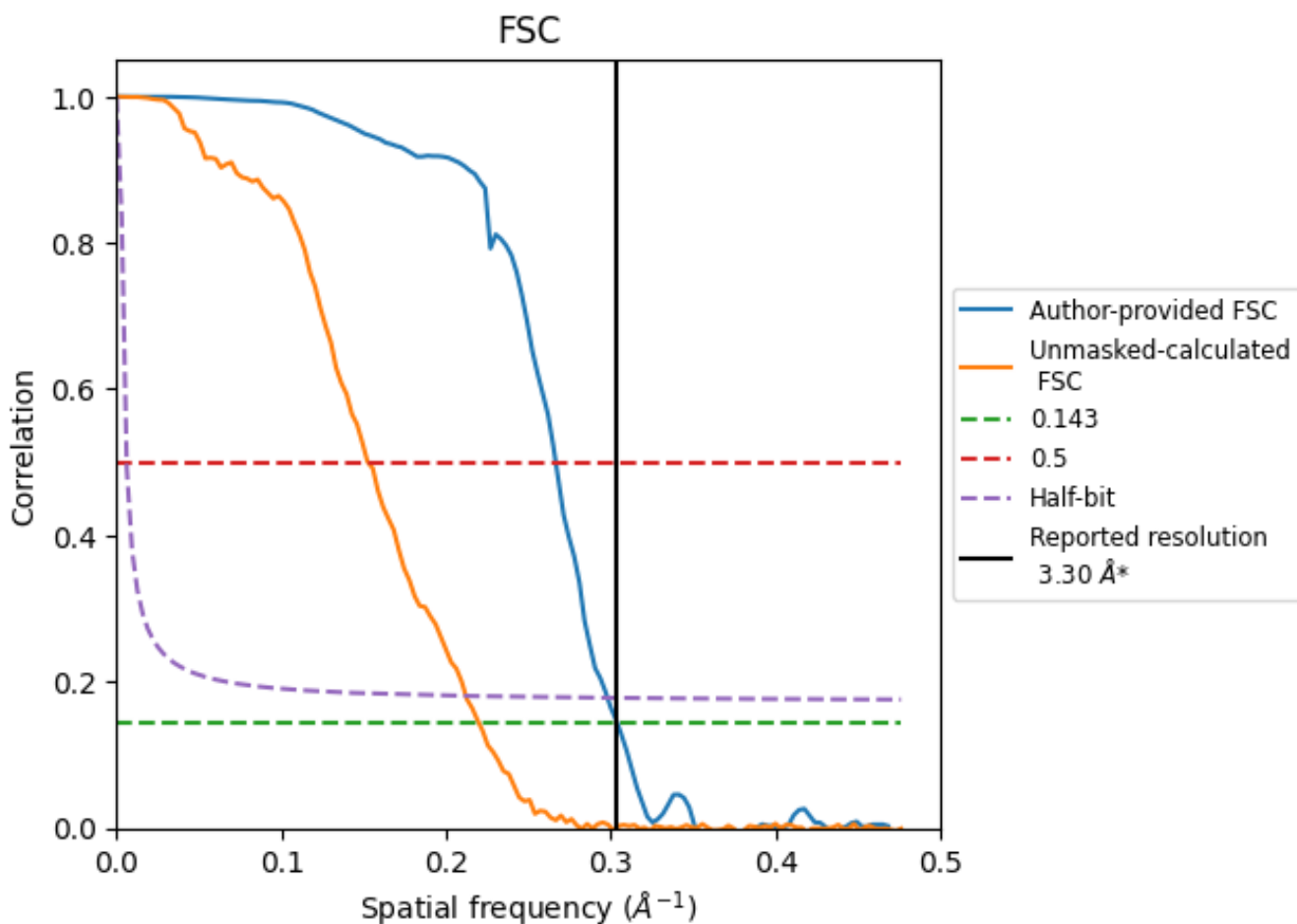


*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

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 0.303 Å⁻¹

8.2 Resolution estimates [i](#)

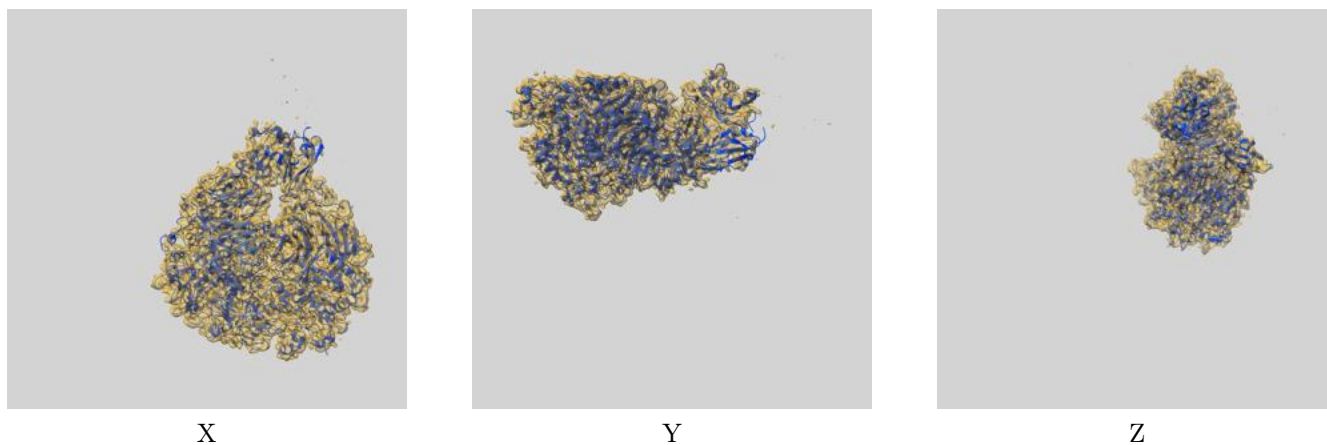
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.29	3.75	3.36
Unmasked-calculated*	4.54	6.55	4.71

*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 4.54 differs from the reported value 3.3 by more than 10 %

9 Map-model fit [i](#)

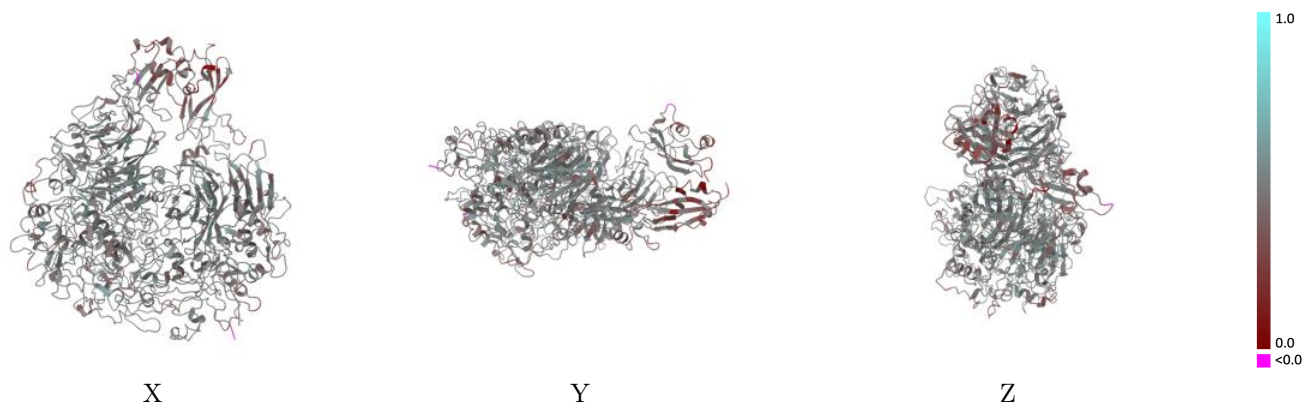
This section contains information regarding the fit between EMDB map EMD-17587 and PDB model 8PBX. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



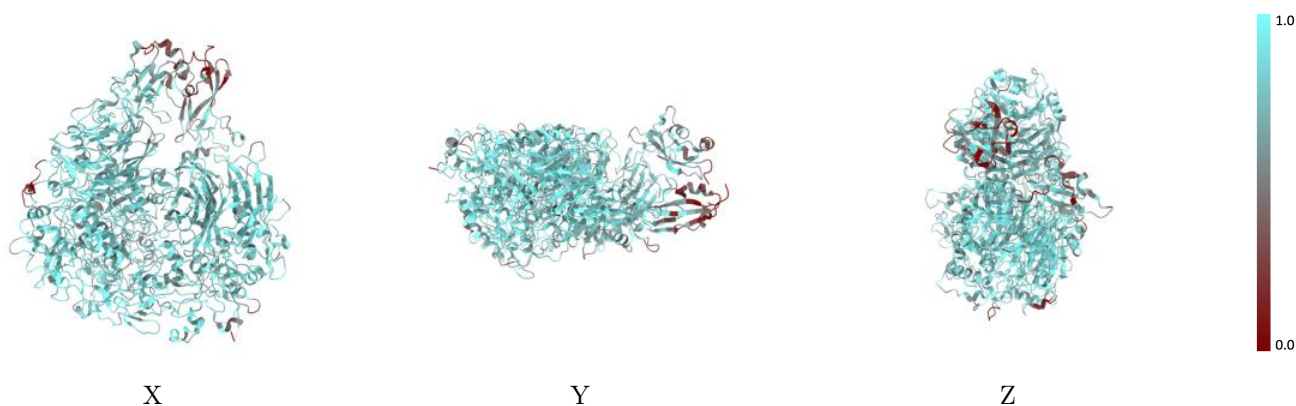
The images above show the 3D surface view of the map at the recommended contour level 0.4 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



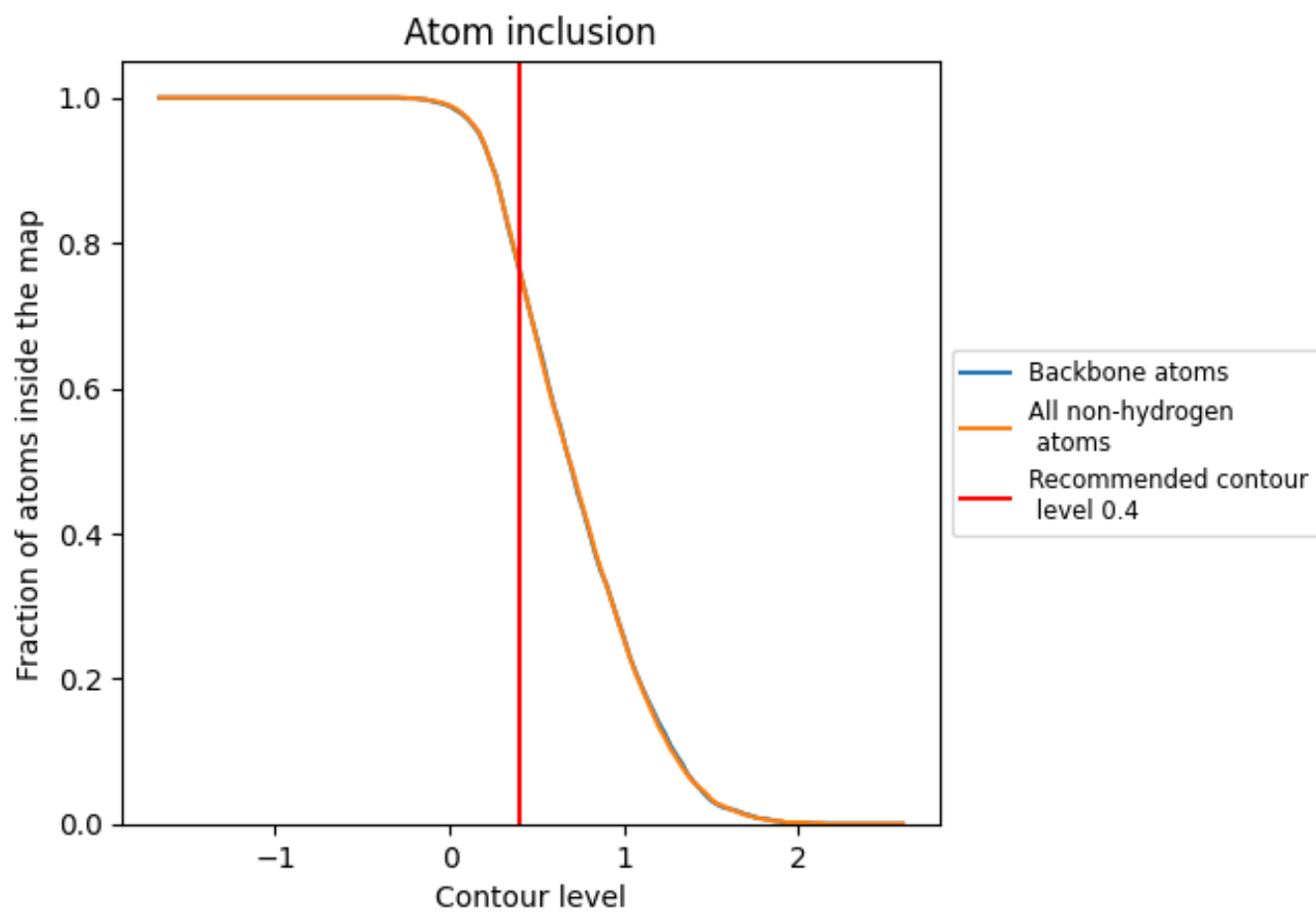
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.4).




9.4 Atom inclusion [i](#)



At the recommended contour level, 76% of all backbone atoms, 76% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7640	 0.4670
A	 0.7560	 0.4600
B	 0.7850	 0.4720

