



## Full wwPDB EM Validation Report ⓘ

Apr 7, 2026 – 02:52 PM JST

PDB ID : 9X2C / pdb\_00009x2c  
EMDB ID : EMD-66477  
Title : Cryo-EM structure of PsoA in apo state (PsoA-PKS-I)  
Authors : Sun, L.; Bai, L.  
Deposited on : 2025-10-04  
Resolution : 2.99 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](mailto: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>.

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

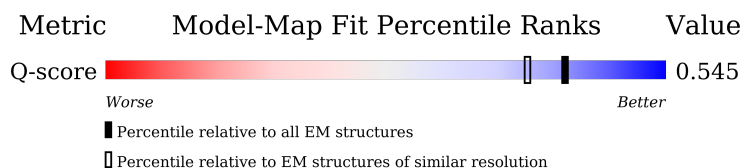
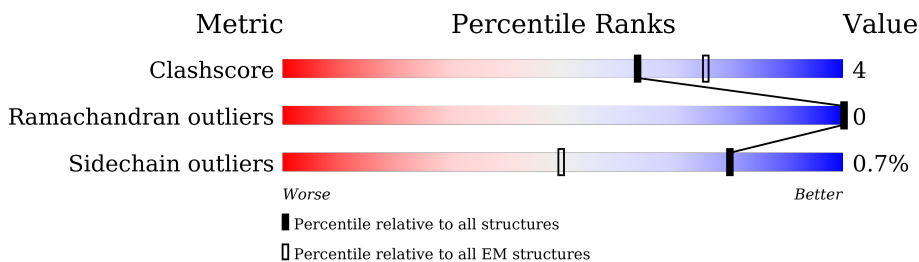
EMDB validation analysis : 0.0.1.dev132  
MolProbity : 4-5-2 with Phenix2.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.48.1

# 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 2.99 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	13287 ( 2.49 - 3.49 )

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  $\geq 3$ , 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	4007	
1	B	4007	

## 2 Entry composition i

There is only 1 type of molecule in this entry. The entry contains 38110 atoms, of which 18890 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 PKS-NRPS hybrid synthetase psoA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	1262	19061	6055	9445	1672	1841	48	0	0
1	B	1261	19049	6046	9445	1671	1839	48	0	0

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	462	ARG	THR	conflict	UNP Q4WAZ9
A	589	ARG	GLY	conflict	UNP Q4WAZ9
A	1602	MET	VAL	conflict	UNP Q4WAZ9
A	2070	GLN	ARG	conflict	UNP Q4WAZ9
A	2137	PRO	LEU	conflict	UNP Q4WAZ9
A	2787	PRO	SER	conflict	UNP Q4WAZ9
A	3073	ARG	LYS	conflict	UNP Q4WAZ9
A	3107	GLU	ASP	conflict	UNP Q4WAZ9
A	3421	THR	ALA	conflict	UNP Q4WAZ9
A	3428	LEU	PHE	conflict	UNP Q4WAZ9
A	3672	ILE	LEU	conflict	UNP Q4WAZ9
A	3707	VAL	ILE	conflict	UNP Q4WAZ9
A	3717	ILE	VAL	conflict	UNP Q4WAZ9
A	3728	SER	ASN	conflict	UNP Q4WAZ9
B	462	ARG	THR	conflict	UNP Q4WAZ9
B	589	ARG	GLY	conflict	UNP Q4WAZ9
B	1602	MET	VAL	conflict	UNP Q4WAZ9
B	2070	GLN	ARG	conflict	UNP Q4WAZ9
B	2137	PRO	LEU	conflict	UNP Q4WAZ9
B	2787	PRO	SER	conflict	UNP Q4WAZ9
B	3073	ARG	LYS	conflict	UNP Q4WAZ9
B	3107	GLU	ASP	conflict	UNP Q4WAZ9
B	3421	THR	ALA	conflict	UNP Q4WAZ9
B	3428	LEU	PHE	conflict	UNP Q4WAZ9
B	3672	ILE	LEU	conflict	UNP Q4WAZ9
B	3707	VAL	ILE	conflict	UNP Q4WAZ9

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<b>Chain</b>	<b>Residue</b>	<b>Modelled</b>	<b>Actual</b>	<b>Comment</b>	<b>Reference</b>
B	3717	ILE	VAL	conflict	UNP Q4WAZ9
B	3728	SER	ASN	conflict	UNP Q4WAZ9









MET	VAL	TYR	T4	T16	R19	D39	V44	T69	L103	L104	E105	T106	V107	T140	D144	T154	G155	T156	S157	F168	S177	V178	V189	H189	F564	L191	V206	R232	S233	A240	R272	R281	T282	Q283	G284	S309	I318	T323	G324				
R350	V355	T365	A369	V399	E443	K457	PRO	LYS	GLU	MET	ARG	GLN	VAL	PRO	ASN	GLY	VAL	A470	R491	S157	F499	R510	G548	E563	F564	D565	H566	V567	R568	R569	Q582	M591	V600	I601	M624	K628	R631	E634	L639				
E682	R692	K706	G707	M709	I710	F714	M725	E726	A735	S739	P740	K741	S742	V743	T744	L745	V752	L758	V768	L771	Y775	H776	S777	P778	L788	S808	D812	N814	M817	A820	K831	D832	R837	V838	L839	G851	E860						
E873	H877	K878	Y885	D894	D895	L899	S900	L908	L910	Q914	P935	N958	K959	Y960	Y961	H962	H963	P977	R988	P989	E993	L998	V1003	Q1004	M1017	C1026	Q1032	L1047	R1061	M1067	K1068	K1089	L1080	A1103	P1107								
S1108	S1109	F1110	P1111	N1112	G1113	P1114	R1115	L1116	T1117	E1118	L1119	D1120	L1121	L1138	S1141	M1147	M1150	K1151	R1152	N1155	V1156	A1159	D1166	A1187	R1193	A1200	I1230	T1231	D1232	F1233	Y1237	M1252	T1255	M1256	I1262	L1271	S1274	E1275	K1276				
ARG	PHE	TYR	GLN	ASN	VAL	TRP	GLY	LEU	SER	LEU	ALA	CYS	VAL	ALA	ALA	VAL	VAL	PRO	THR	THR	GLY	ILE	ASP	THR	CYS	GLU	LYS	VAL	VAL	THR	ALA	ALA	GLY	GLY	LEU	ASP	GLN	TRP	ALA	ASP			
LYS	ASN	PRO	LEU	GLY	LEU	LEU	LEU	ASN	GLN	ASP	TRP	ILE	GLU	ALA	ILE	PRO	GLU	VAL	GLN	GLY	GLY	GLU	ILE	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	THR			
PRO	SER	PRO	GLY	MET	GLY	LEU	ILE	SER	ARG	GLY	ASP	THR	GLY	PHE	ALA	VAL	SER	GLN	GLY	GLY	GLY	HIS	ILE	ASN	LEU	ASN	LEU	ARG	ILE	VAL	ALA	GLY	LEU	VAL	VAL	VAL	VAL	VAL	VAL	GLY			
ARG	SER	LEU	GLU	MET	TYR	THR	LEU	ILE	VAL	VAL	ASP	GLY	GLU	GLY	LEU	ASP	GLN	GLN	LEU	LEU	ARG	ALA	ALA	ASP	ASN	GLY	ASN	GLY	ILE	ALA	GLY	PHE	THR	THR	THR	THR	THR	THR	THR	THR			
ALA	PHE	THR	GLN	VAL	THR	THR	LEU	ALA	LEU	THR	VAL	THR	GLY	PHE	GLY	ASP	GLN	THR	THR	THR	THR	PHE	THR	THR	LEU	MET	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR		
ALA	GLU	THR	HIS	ASP	LEU	THR	ARG	GLY	VAL	ASP	THR	LEU	ALA	ASP	LEU	LYS	HIS	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR		
LEU	VAL	VAL	GLY	ASP	PHE	THR	ALA	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	
ASP	VAL	ARG	ALA	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR
LEU	ASP	GLY	VAL	GLU	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR
LEU	ASN	ALA	LEU	VAL	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR
GLU	PRO	VAL	ILE	PRO	ASP	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR
LEU	ARG	ASN	ILE	GLU	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	69203	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	200	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	1.422	Depositor
Minimum map value	-0.938	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.08	Depositor
Map size ( $\text{\AA}$ )	426.24, 426.24, 426.24	wwPDB
Map dimensions	576, 576, 576	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.74, 0.74, 0.74	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	0.16	0/9841	0.36	1/13380 (0.0%)
1	B	0.15	0/9828	0.33	0/13362
All	All	0.15	0/19669	0.34	1/26742 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	256	THR	OG1-CB-CG2	5.52	120.35	109.30

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	9616	9445	9451	75	0
1	B	9604	9445	9442	83	0
All	All	19220	18890	18893	152	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 4.

All (152) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1150:MET:HE1	1:A:1187:ALA:HB1	1.51	0.93
1:B:993:GLU:N	1:B:993:GLU:OE2	2.08	0.86
1:A:733:THR:OG1	1:A:837:ARG:NH2	2.14	0.81
1:B:563:GLU:N	1:B:563:GLU:OE1	2.15	0.79
1:B:860:GLU:OE1	1:B:885:TYR:OH	2.03	0.76
1:A:1232:ASP:OD2	1:A:1233:PHE:N	2.19	0.76
1:B:741:LYS:O	1:B:741:LYS:HD2	1.85	0.76
1:B:491:ARG:NH2	1:B:548:GLY:O	2.20	0.75
1:A:882:GLU:N	1:A:882:GLU:OE1	2.21	0.74
1:A:813:ASP:O	1:A:846:ARG:NH1	2.22	0.72
1:B:309:SER:O	1:B:350:ARG:NH2	2.23	0.72
1:A:218:TYR:O	1:A:222:THR:OG1	2.08	0.71
1:A:860:GLU:OE1	1:A:885:TYR:OH	2.09	0.70
1:B:233:SER:OG	1:B:323:THR:O	2.10	0.70
1:B:1232:ASP:OD1	1:B:1233:PHE:N	2.24	0.69
1:B:564:PHE:O	1:B:569:ARG:NH2	2.27	0.68
1:A:233:SER:OG	1:A:323:THR:O	2.13	0.66
1:B:894:ASP:OD1	1:B:895:ASP:N	2.29	0.65
1:B:910:LEU:HD13	1:B:914:VAL:HG11	1.77	0.65
1:A:894:ASP:OD1	1:A:895:ASP:N	2.29	0.65
1:B:566:HIS:O	1:B:568:ARG:N	2.30	0.65
1:B:1150:MET:HE1	1:B:1187:ALA:HB1	1.80	0.63
1:B:812:ASP:O	1:B:814:ASN:ND2	2.32	0.62
1:A:987:ARG:NH2	1:B:144:ASP:OD1	2.33	0.61
1:A:309:SER:O	1:A:350:ARG:NH2	2.34	0.60
1:B:960:ASN:ND2	1:B:977:PRO:O	2.35	0.59
1:B:19:ARG:NH2	1:B:105:GLU:OE1	2.36	0.58
1:B:739:SER:OG	1:B:873:GLU:OE1	2.19	0.58
1:A:1150:MET:CE	1:A:1187:ALA:HB1	2.31	0.57
1:A:168:PHE:O	1:B:281:ARG:NH1	2.38	0.57
1:B:318:ILE:HG23	1:B:355:VAL:HG23	1.86	0.56
1:A:760:ASP:OD1	1:A:766:ASN:ND2	2.38	0.56
1:B:631:ARG:NE	1:B:634:GLU:OE2	2.38	0.56
1:A:281:ARG:NH2	1:B:168:PHE:O	2.40	0.55
1:B:739:SER:OG	1:B:740:PRO:HD2	2.07	0.55
1:A:499:GLU:OE2	1:A:499:GLU:C	2.50	0.55
1:A:965:VAL:HG22	1:A:965:VAL:O	2.08	0.54
1:B:283:GLN:N	1:B:283:GLN:OE1	2.41	0.54
1:A:210:ASN:ND2	1:A:246:GLY:O	2.38	0.54
1:B:735:ALA:N	1:B:744:THR:O	2.30	0.54
1:A:867:LEU:O	1:A:871:THR:HG22	2.08	0.53
1:B:998:LEU:HD21	1:B:1047:LEU:HD11	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:748:ASP:O	1:A:752:VAL:HG23	2.09	0.52
1:B:103:LEU:O	1:B:107:VAL:HG23	2.09	0.52
1:B:682:GLU:OE1	1:B:682:GLU:N	2.38	0.52
1:A:705:LYS:NZ	1:A:750:ASP:OD1	2.43	0.52
1:A:735:ALA:N	1:A:744:THR:O	2.35	0.52
1:B:240:ALA:HB1	1:B:324:GLY:O	2.09	0.52
1:B:624:MET:HE3	1:B:624:MET:HA	1.92	0.52
1:B:178:VAL:HG21	1:B:191:LEU:CD1	2.40	0.52
1:B:639:LEU:HD23	1:B:692:ARG:HG2	1.91	0.52
1:A:158:ARG:NH2	1:B:156:THR:O	2.44	0.51
1:A:1061:ARG:CZ	1:B:1061:ARG:HD3	2.41	0.51
1:A:1061:ARG:O	1:A:1061:ARG:HG2	2.09	0.51
1:A:741:LYS:HD2	1:A:741:LYS:C	2.36	0.50
1:B:156:THR:O	1:B:156:THR:HG22	2.12	0.50
1:B:282:THR:OG1	1:B:284:GLY:O	2.29	0.49
1:B:1262:ILE:HD12	1:B:1262:ILE:N	2.27	0.49
1:B:499:GLU:OE1	1:B:499:GLU:C	2.55	0.49
1:A:662:MET:HG3	1:A:805:ALA:HB3	1.95	0.49
1:A:910:LEU:HD13	1:A:914:VAL:HG11	1.94	0.49
1:B:399:VAL:HG12	1:B:399:VAL:O	2.12	0.49
1:A:1061:ARG:HD3	1:B:1061:ARG:CD	2.43	0.49
1:A:711:ALA:HB2	1:A:769:LEU:HD11	1.93	0.48
1:A:812:ASP:O	1:A:814:ASN:ND2	2.46	0.48
1:B:878:LYS:HD2	1:B:878:LYS:O	2.13	0.48
1:B:44:VAL:HG23	1:B:69:THR:O	2.15	0.47
1:B:988:ASN:OD1	1:B:989:PHE:N	2.47	0.47
1:B:908:LEU:HD23	1:B:908:LEU:O	2.14	0.47
1:A:848:LEU:HD11	1:A:875:ILE:HG23	1.96	0.47
1:B:1147:MET:HE3	1:B:1159:ALA:HB1	1.96	0.47
1:B:1150:MET:CE	1:B:1187:ALA:HB1	2.45	0.47
1:B:1026:CYS:SG	1:B:1026:CYS:O	2.74	0.46
1:A:755:ALA:O	1:A:756:LYS:C	2.57	0.46
1:B:1032:GLN:HG3	1:B:1103:ALA:HB2	1.97	0.46
1:B:739:SER:HB3	1:B:742:SER:HB2	1.98	0.46
1:B:743:VAL:HG23	1:B:745:LEU:HD21	1.97	0.46
1:A:1184:THR:HA	1:A:1187:ALA:HB3	1.98	0.46
1:A:121:MET:HE1	1:A:203:ILE:HD13	1.98	0.45
1:A:732:LEU:C	1:A:732:LEU:HD13	2.40	0.45
1:A:1258:LEU:HD23	1:A:1259:GLN:N	2.31	0.45
1:A:272:ARG:NH1	1:A:443:GLU:OE2	2.43	0.45
1:A:766:ASN:OD1	1:A:766:ASN:C	2.59	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1026:CYS:SG	1:A:1026:CYS:O	2.75	0.45
1:B:272:ARG:NH1	1:B:443:GLU:OE2	2.50	0.45
1:B:758:LEU:O	1:B:758:LEU:HD23	2.16	0.45
1:A:832:ASP:O	1:A:836:GLY:N	2.44	0.45
1:B:510:ARG:NH2	1:B:935:PRO:O	2.50	0.45
1:B:777:SER:HB2	1:B:778:PRO:HD2	1.99	0.44
1:A:565:ASP:O	1:A:569:ARG:NH1	2.50	0.44
1:A:714:PHE:CZ	1:A:764:VAL:HG21	2.52	0.44
1:A:1138:LEU:HD23	1:A:1140:TYR:OH	2.17	0.44
1:B:831:LYS:HG3	1:B:832:ASP:N	2.32	0.44
1:B:1138:LEU:HD11	1:B:1200:ALA:HB1	1.98	0.44
1:A:491:ARG:NH2	1:A:548:GLY:O	2.51	0.44
1:A:752:VAL:HG11	1:A:768:VAL:HG13	2.00	0.44
1:B:39:ASP:OD1	1:B:232:ARG:NH1	2.50	0.44
1:B:771:LEU:HD21	1:B:775:TYR:CE2	2.53	0.44
1:B:998:LEU:HD21	1:B:1047:LEU:CD1	2.48	0.44
1:B:1121:LEU:HD22	1:B:1152:ARG:C	2.42	0.44
1:B:714:PHE:O	1:B:742:SER:N	2.50	0.44
1:B:1017:MET:CE	1:B:1080:LEU:HD22	2.48	0.44
1:B:140:THR:HG23	1:B:958:ASN:OD1	2.17	0.44
1:B:708:GLY:O	1:B:752:VAL:HG21	2.18	0.44
1:B:837:ARG:HD2	1:B:839:LEU:HD21	2.00	0.44
1:A:748:ASP:OD2	1:A:748:ASP:N	2.50	0.44
1:A:1032:GLN:HG3	1:A:1103:ALA:HB2	1.98	0.44
1:A:709:MET:HG3	1:A:771:LEU:HD12	1.99	0.43
1:A:1048:ASP:OD1	1:A:1049:GLU:N	2.51	0.43
1:A:1233:PHE:C	1:A:1233:PHE:CD1	2.95	0.43
1:A:1155:ASN:O	1:A:1156:VAL:HG23	2.18	0.43
1:A:358:VAL:HG22	1:A:362:ILE:HG12	2.00	0.43
1:B:154:THR:HG22	1:B:157:SER:HB3	2.00	0.43
1:B:1230:ILE:HD13	1:B:1230:ILE:N	2.33	0.43
1:A:103:LEU:O	1:A:107:VAL:HG23	2.18	0.43
1:A:750:ASP:O	1:A:754:GLU:HG3	2.19	0.43
1:A:993:GLU:N	1:A:993:GLU:OE2	2.52	0.43
1:A:282:THR:OG1	1:A:284:GLY:O	2.37	0.42
1:A:1255:THR:O	1:A:1255:THR:HG22	2.18	0.42
1:A:510:ARG:NH2	1:A:935:PRO:O	2.52	0.42
1:A:607:ALA:CB	1:A:683:VAL:HG12	2.49	0.42
1:A:876:ARG:HB2	1:A:876:ARG:HH11	1.84	0.42
1:B:1003:VAL:HG12	1:B:1004:GLN:HG3	2.00	0.42
1:A:703:ASP:OD1	1:A:703:ASP:N	2.52	0.42

*Continued on next page...*

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1129:PHE:CE1	1:A:1133:MET:HE2	2.55	0.42
1:B:710:ILE:HG22	1:B:745:LEU:O	2.19	0.42
1:B:1155:ASN:O	1:B:1156:VAL:HG23	2.20	0.42
1:A:136:ASP:O	1:A:214:ASN:ND2	2.53	0.42
1:B:710:ILE:CD1	1:B:768:VAL:HG22	2.49	0.42
1:A:631:ARG:NE	1:A:634:GLU:OE2	2.46	0.42
1:B:1262:ILE:N	1:B:1262:ILE:CD1	2.83	0.41
1:B:788:LEU:O	1:B:788:LEU:HD23	2.20	0.41
1:B:582:GLN:O	1:B:582:GLN:NE2	2.54	0.41
1:B:877:HIS:ND1	1:B:877:HIS:C	2.78	0.41
1:B:962:ARG:O	1:B:963:HIS:C	2.63	0.41
1:B:1255:THR:O	1:B:1255:THR:HG22	2.19	0.41
1:B:808:SER:OG	1:B:817:MET:HE1	2.19	0.41
1:A:602:GLU:OE2	1:A:603:VAL:N	2.54	0.41
1:A:1252:ASN:O	1:A:1256:ASN:N	2.43	0.41
1:A:732:LEU:HD13	1:A:733:THR:N	2.36	0.41
1:B:591:MET:CE	1:B:601:ILE:HG21	2.51	0.41
1:B:725:MET:O	1:B:726:GLU:HB3	2.20	0.41
1:A:818:THR:HG22	1:A:819:SER:N	2.36	0.41
1:B:1252:ASN:O	1:B:1256:ASN:N	2.45	0.41
1:A:586:MET:HE2	1:A:632:LEU:HD21	2.02	0.41
1:A:662:MET:HE1	1:A:847:ALA:O	2.21	0.41
1:A:723:CYS:SG	1:A:733:THR:HA	2.61	0.41
1:A:965:VAL:O	1:A:965:VAL:CG2	2.69	0.40
1:A:785:ALA:HB3	1:A:786:PRO:HD3	2.03	0.40
1:A:710:ILE:HD12	1:A:710:ILE:HA	1.95	0.40
1:B:189:VAL:HG22	1:B:206:VAL:HG21	2.03	0.40
1:B:365:THR:O	1:B:369:ALA:HB2	2.22	0.40

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	1258/4007 (31%)	1222 (97%)	36 (3%)	0	100	100
1	B	1257/4007 (31%)	1223 (97%)	34 (3%)	0	100	100
All	All	2515/8014 (31%)	2445 (97%)	70 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	1029/3340 (31%)	1022 (99%)	7 (1%)	81	91
1	B	1028/3340 (31%)	1021 (99%)	7 (1%)	81	91
All	All	2057/6680 (31%)	2043 (99%)	14 (1%)	80	91

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	SER
1	A	111	MET
1	A	139	ASP
1	A	382	ARG
1	A	1020	GLU
1	A	1031	VAL
1	A	1212	SER
1	B	16	THR
1	B	177	SER
1	B	600	VAL
1	B	628	LYS
1	B	899	LEU
1	B	900	SER
1	B	1141	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	5	HIS
1	A	113	ASN
1	A	390	GLN
1	A	437	ASN
1	A	550	ASN
1	A	582	GLN
1	A	963	HIS
1	B	214	ASN
1	B	390	GLN
1	B	582	GLN
1	B	727	GLN
1	B	958	ASN
1	B	1183	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](#)

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.

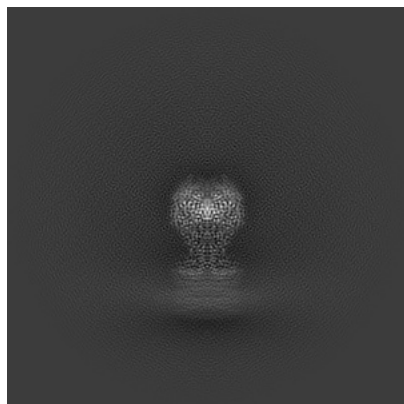
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-66477. These allow visual inspection of the internal detail of the map and identification of artifacts.

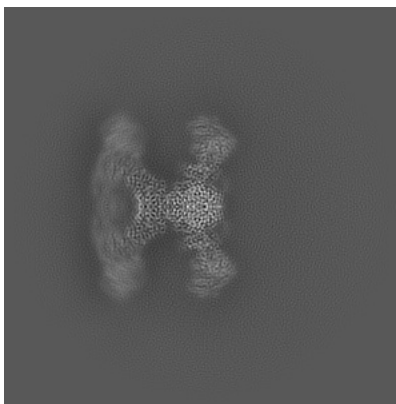
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

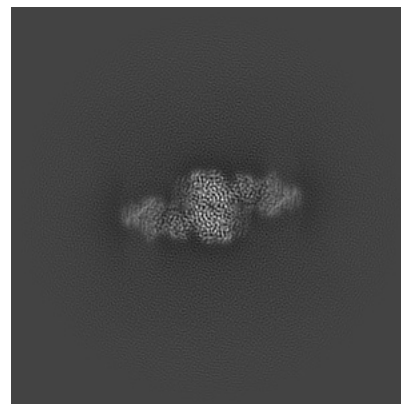
#### 6.1.1 Primary map



X

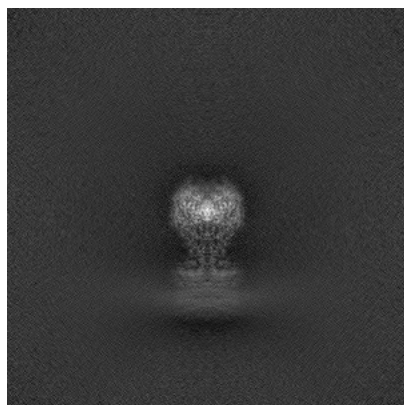


Y

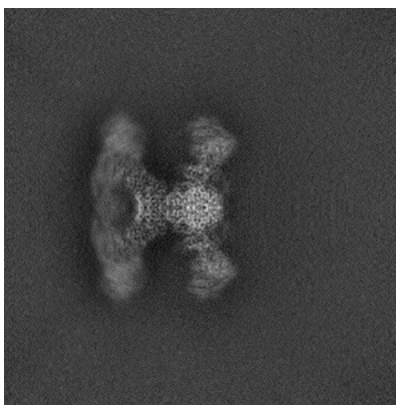


Z

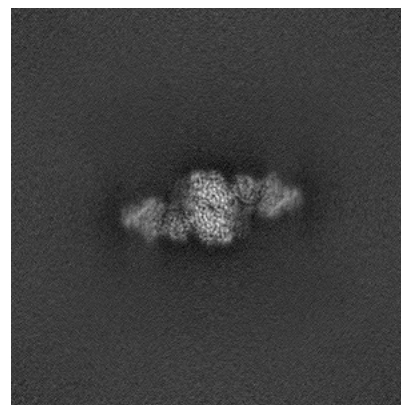
#### 6.1.2 Raw map



X



Y

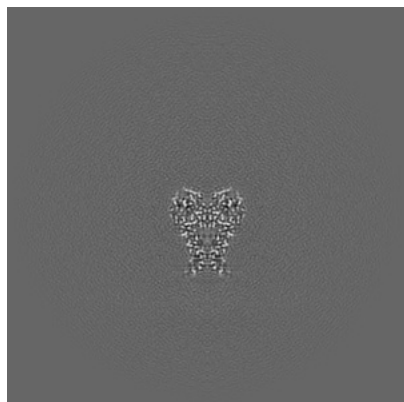


Z

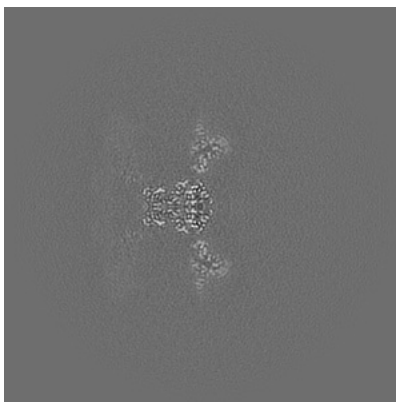
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

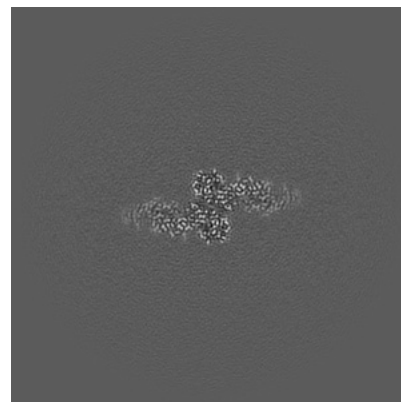
### 6.2.1 Primary map



X Index: 288

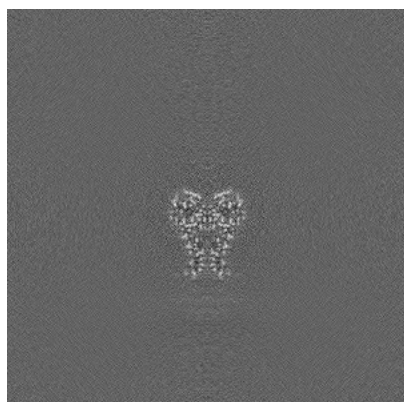


Y Index: 288

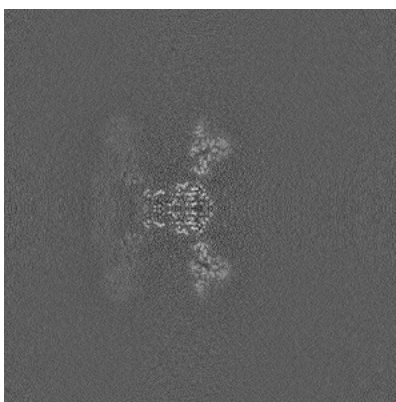


Z Index: 288

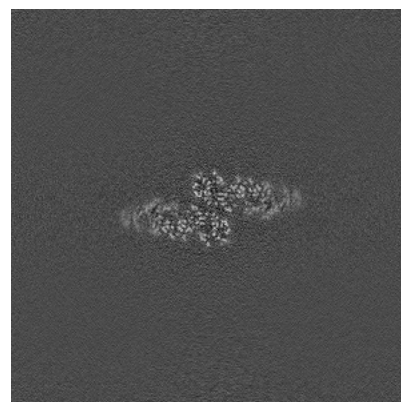
### 6.2.2 Raw map



X Index: 288



Y Index: 288

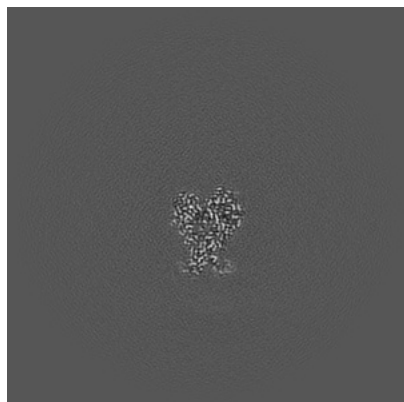


Z Index: 288

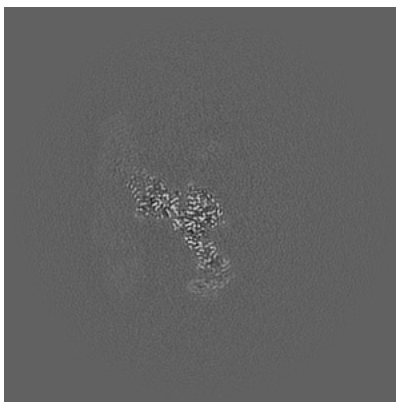
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

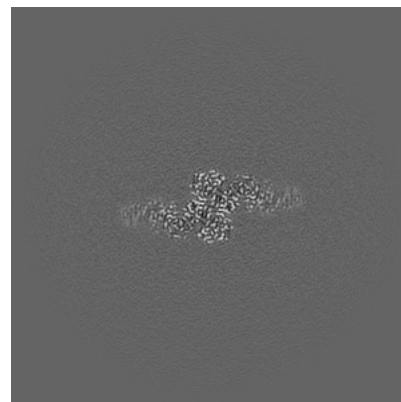
### 6.3.1 Primary map



X Index: 297

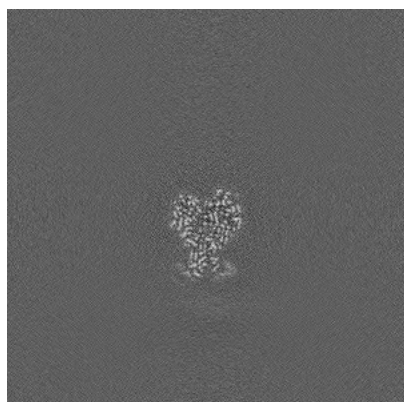


Y Index: 273

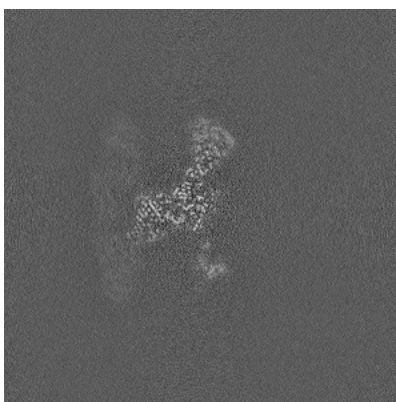


Z Index: 284

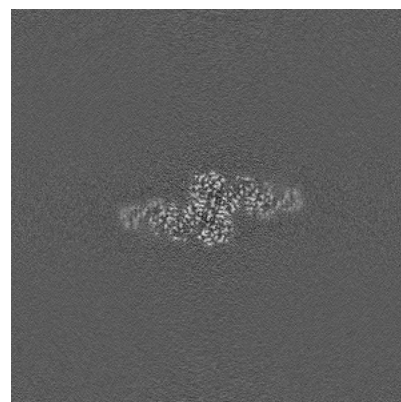
### 6.3.2 Raw map



X Index: 298



Y Index: 297

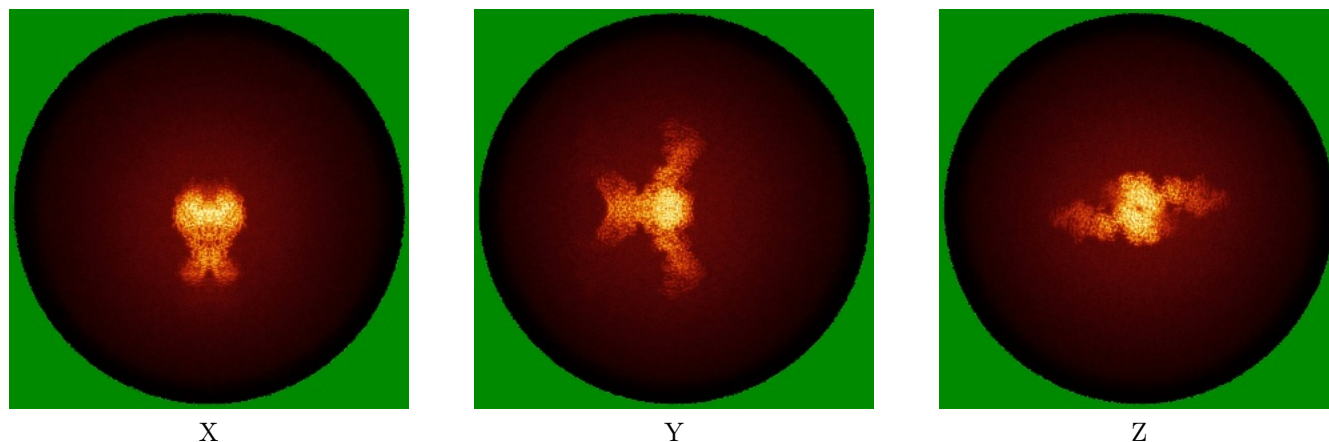


Z Index: 284

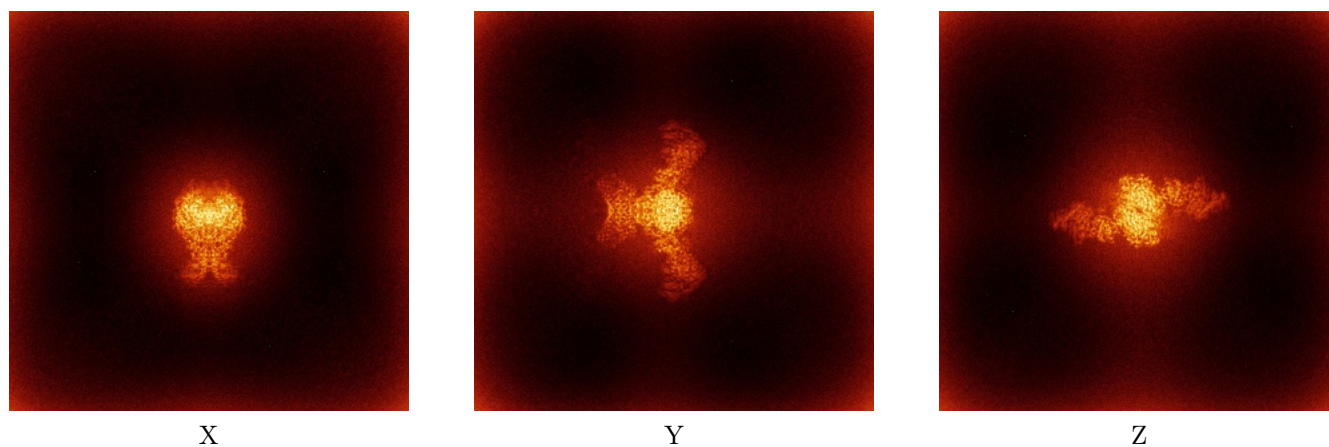
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



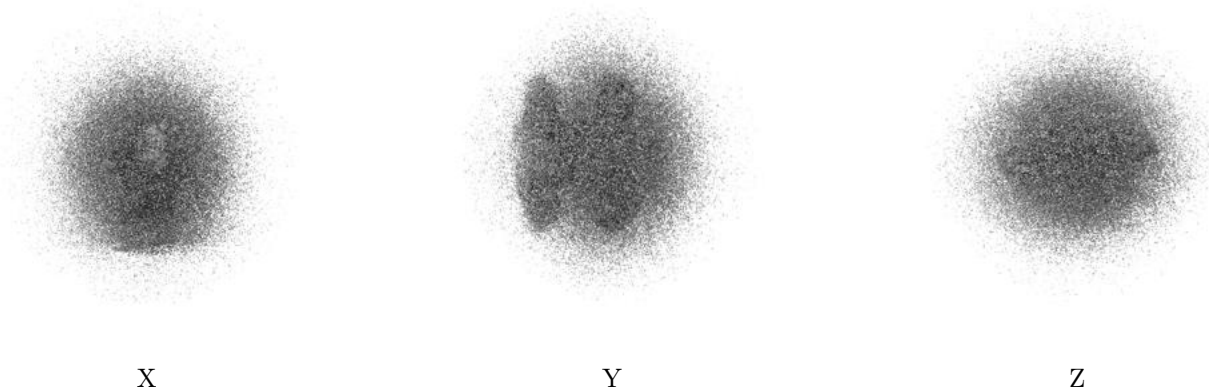
### 6.4.2 Raw map



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.

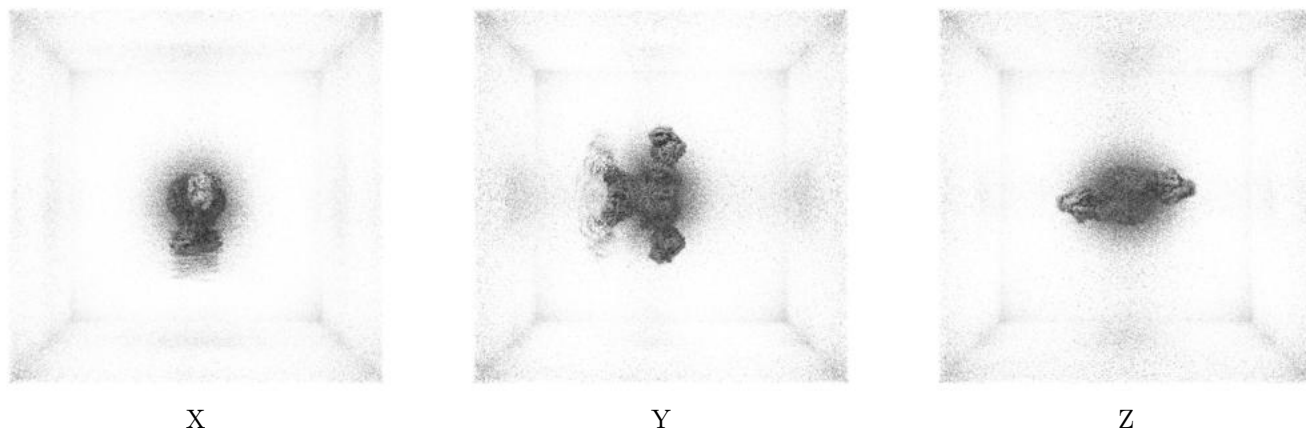
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.08. 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.

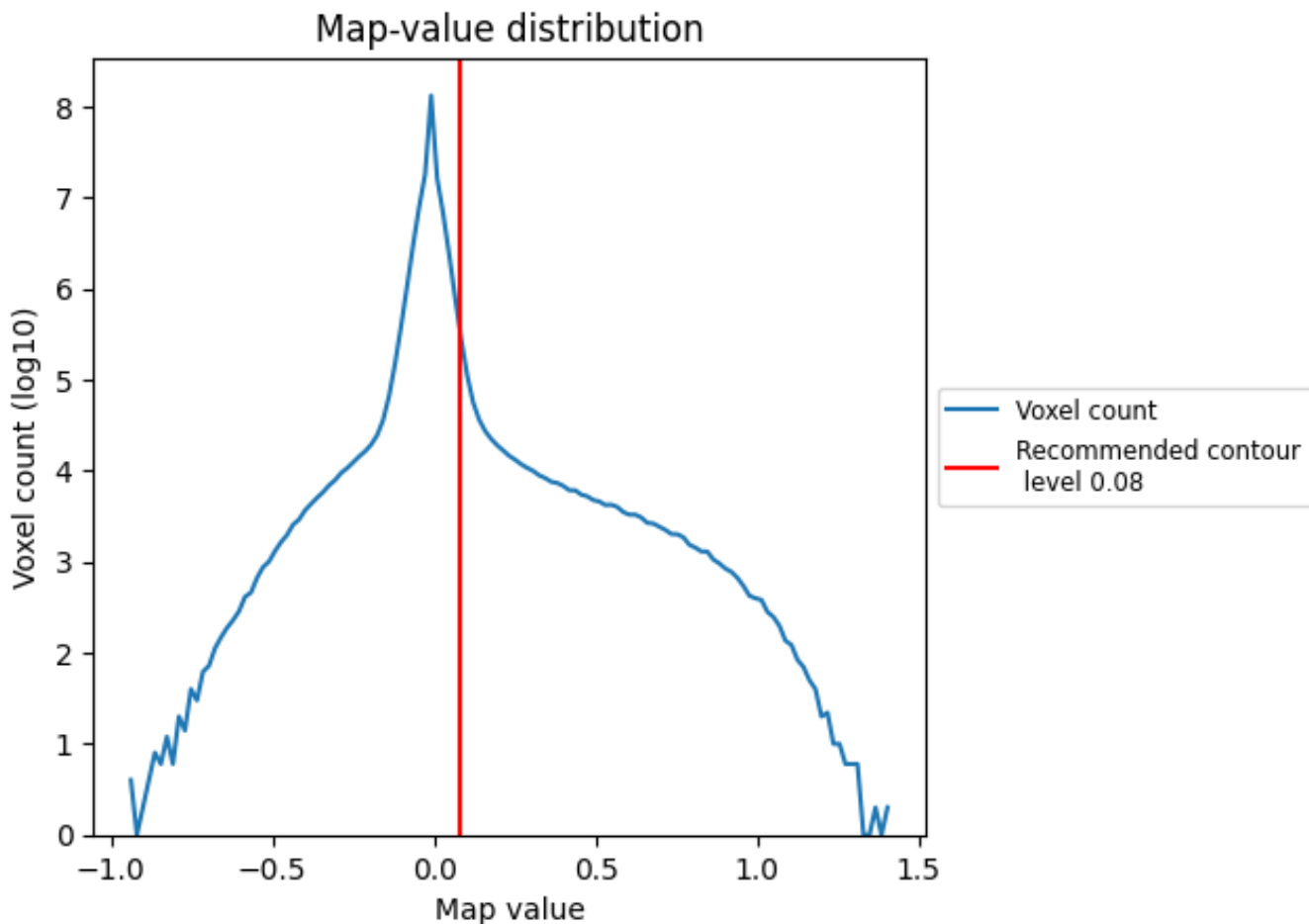
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

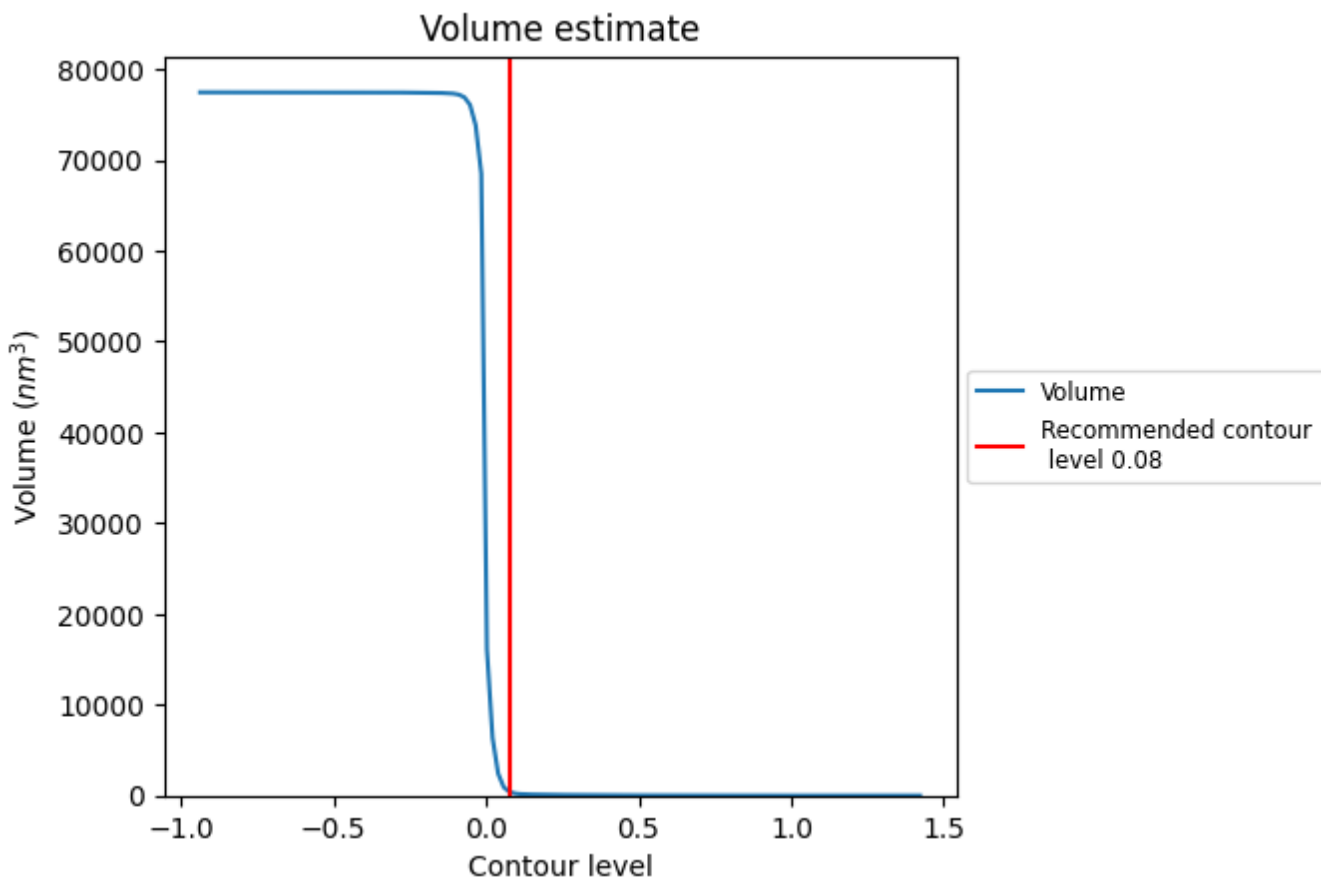
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

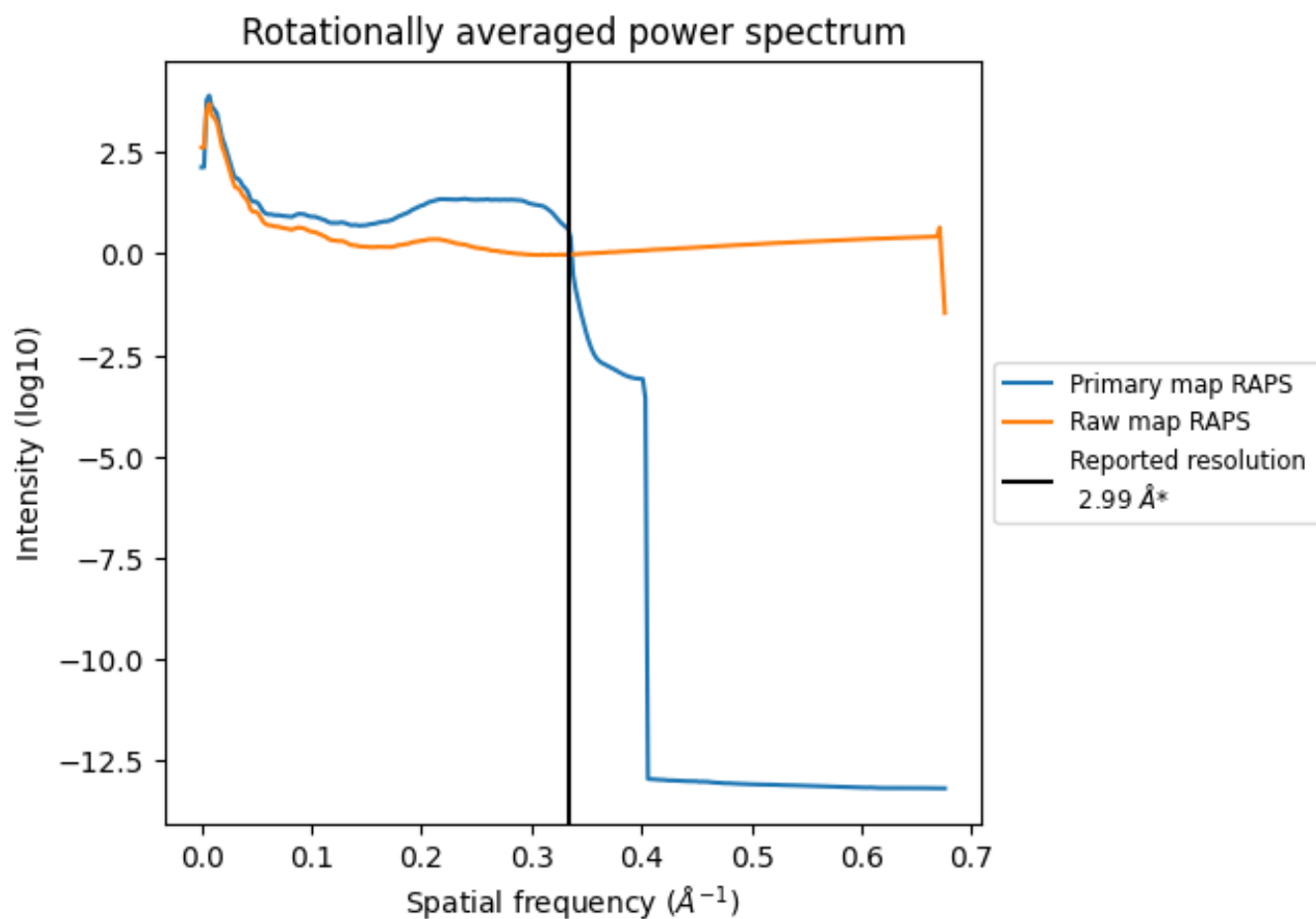
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 370 nm<sup>3</sup>; this corresponds to an approximate mass of 334 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](#)

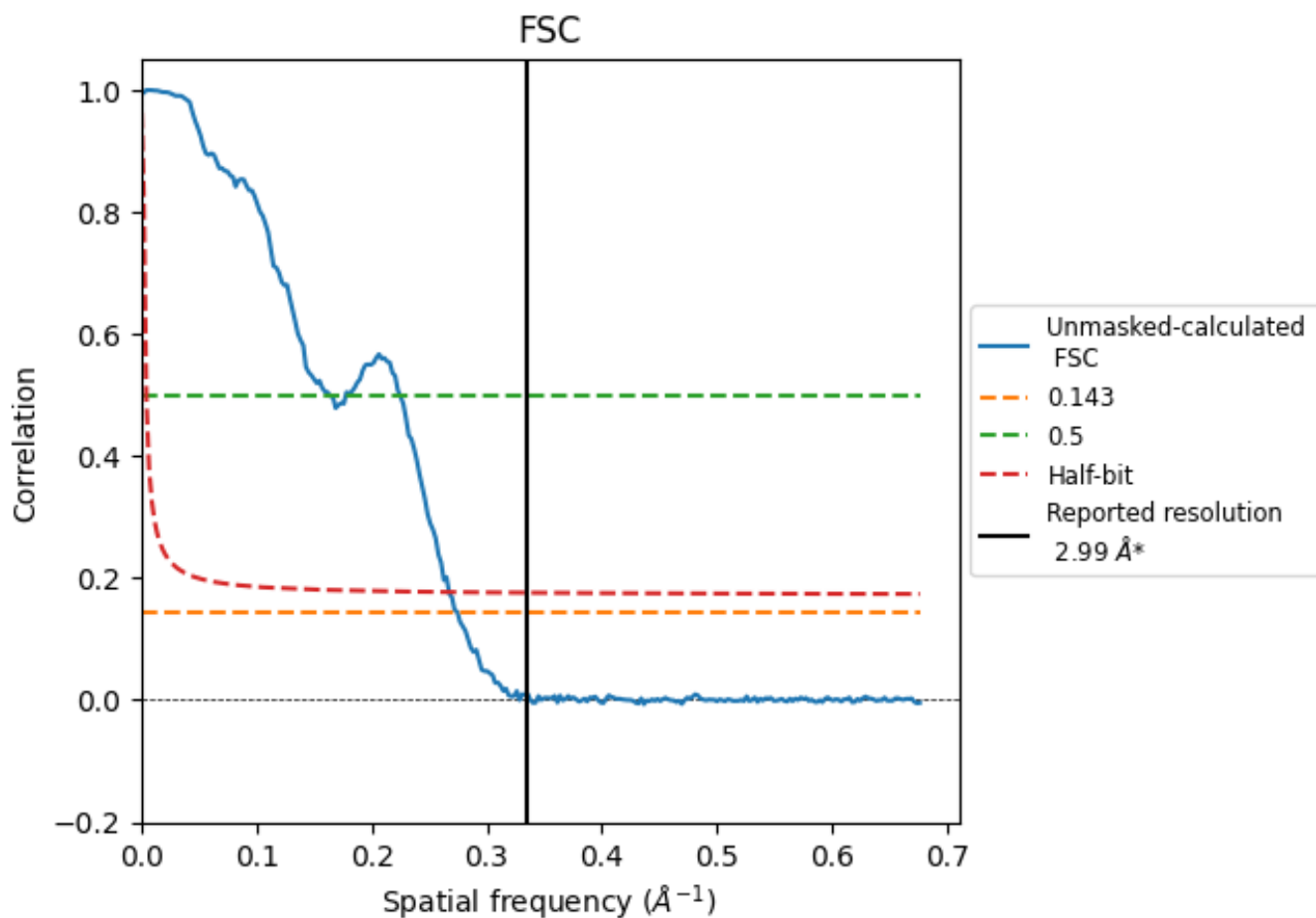


\*Reported resolution corresponds to spatial frequency of  $0.334 \text{ \AA}^{-1}$

## 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 0.334 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

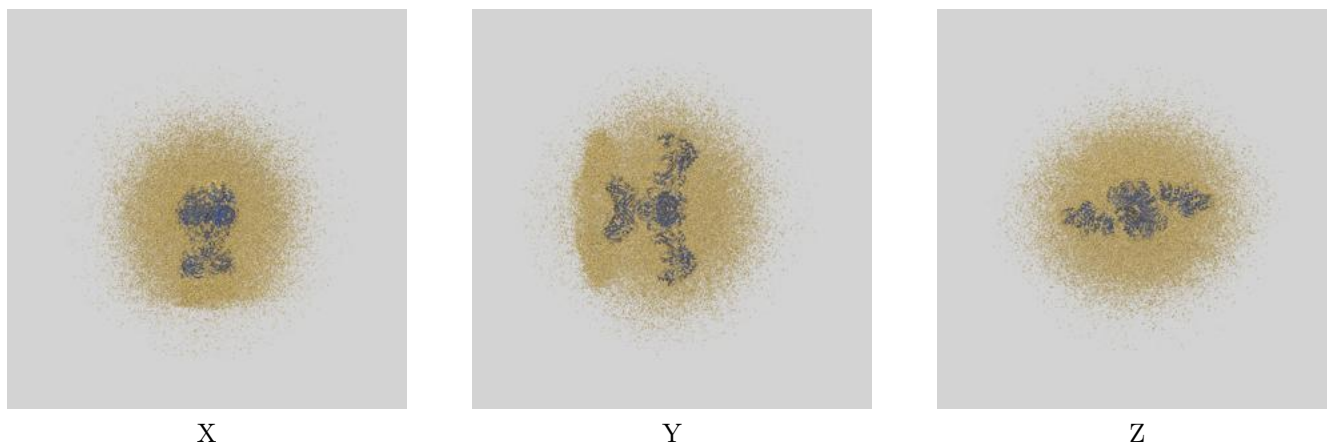
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.99	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.64	6.12	3.74

\*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 3.64 differs from the reported value 2.99 by more than 10 %

## 9 Map-model fit [i](#)

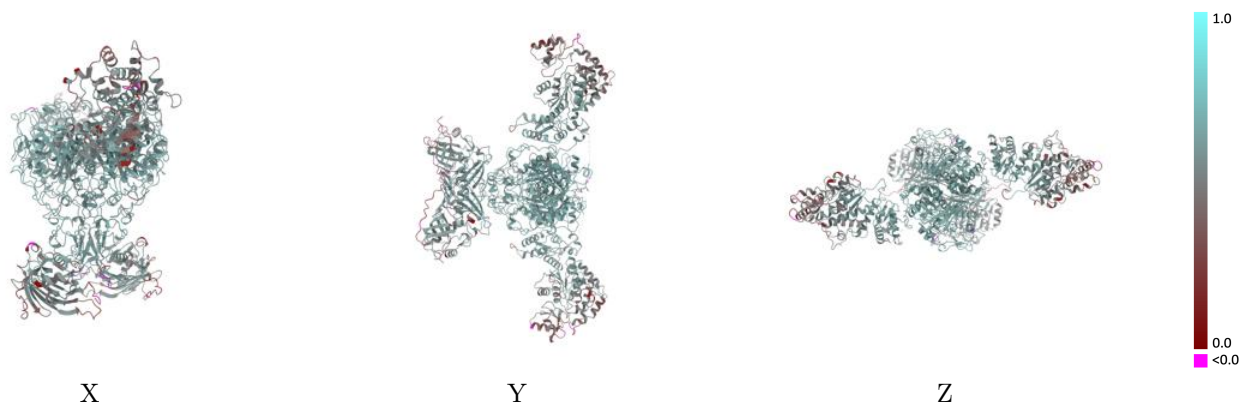
This section contains information regarding the fit between EMDB map EMD-66477 and PDB model 9X2C. Per-residue inclusion information can be found in section [3](#) on page [5](#).

### 9.1 Map-model overlay [i](#)



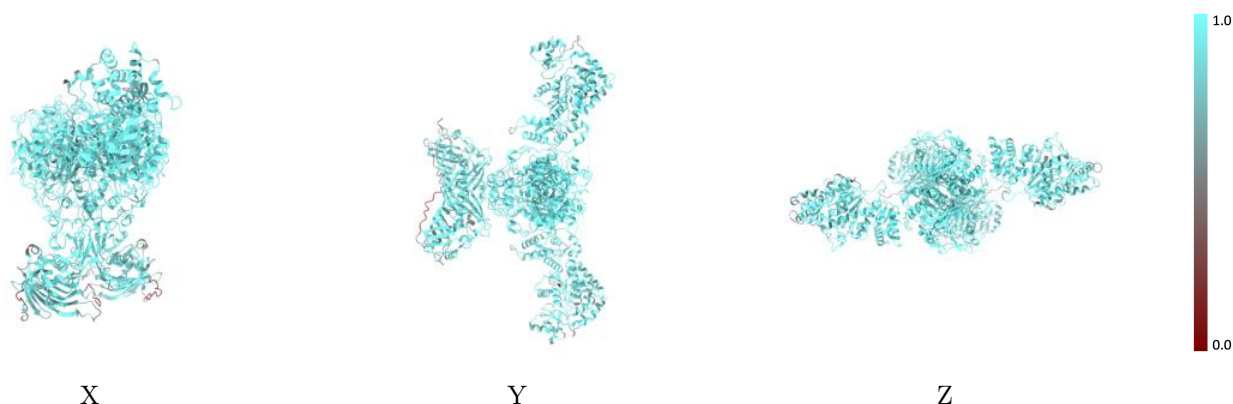
The images above show the 3D surface view of the map at the recommended contour level 0.08 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



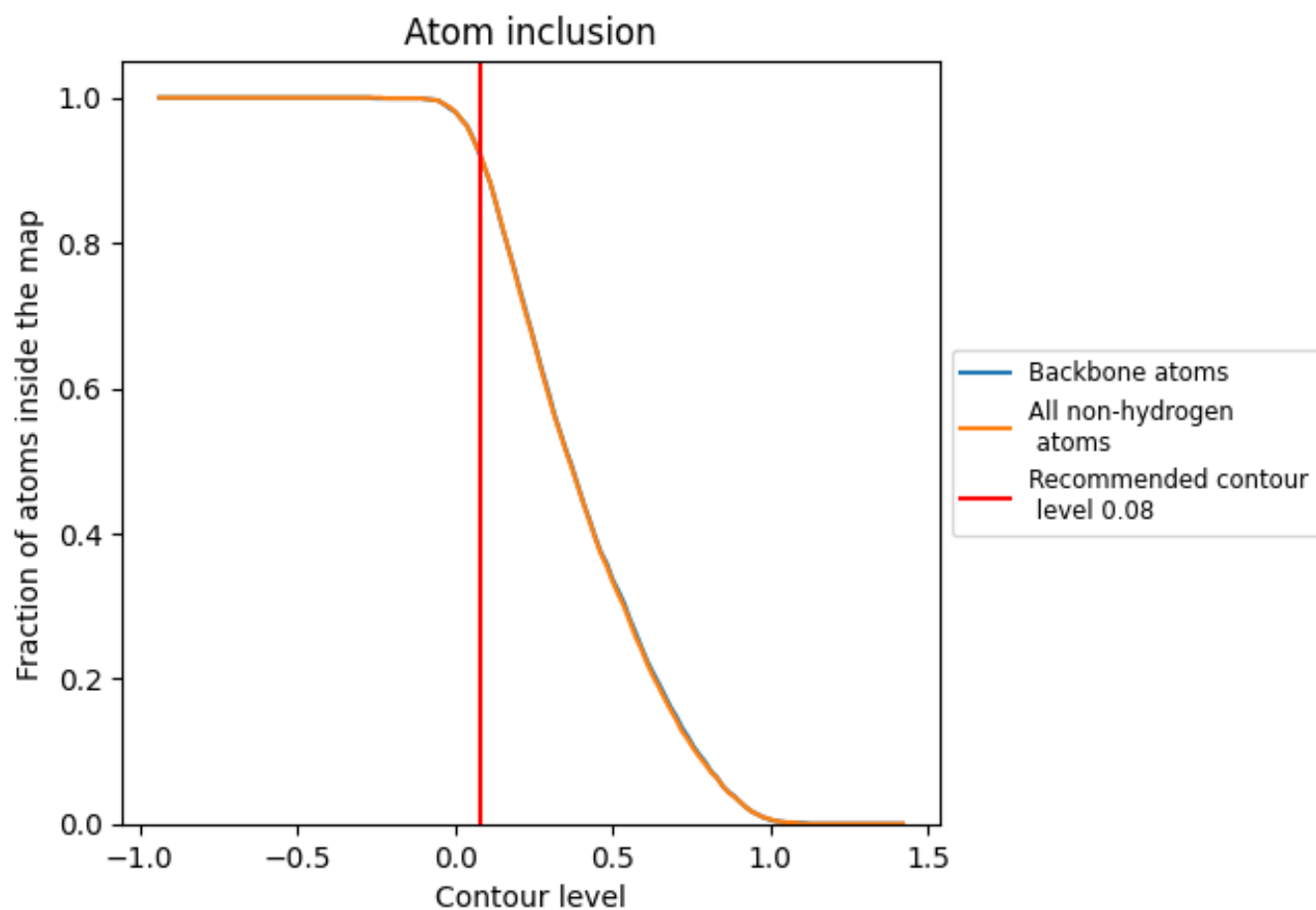
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.08).






## 9.4 Atom inclusion [i](#)



At the recommended contour level, 92% of all backbone atoms, 92% 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 (0.08) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9230	 0.5450
A	 0.9250	 0.5440
B	 0.9260	 0.5460

