



wwPDB EM Validation Summary Report ⓘ

Oct 14, 2024 – 07:18 AM EDT

PDB ID : 7UK4
EMDB ID : EMD-26574
Title : KS-AT di-domain of mycobacterial Pks13 with endogenous KS ligand bound
Authors : Kim, S.K.; Dickinson, M.S.; Finer-Moore, J.S.; Rosenberg, O.S.; Stroud, R.M.
Deposited on : 2022-03-31
Resolution : 1.94 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 ⓘ 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) : 2.39

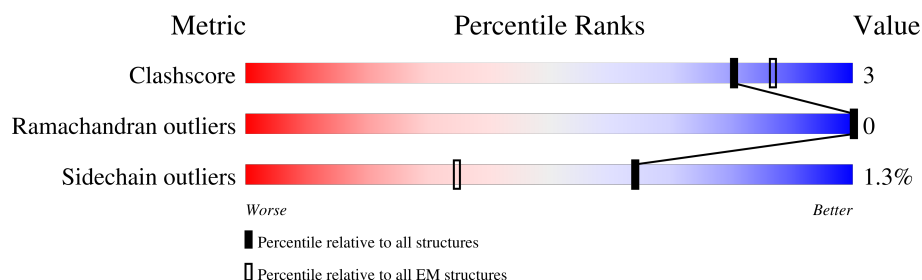
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 1.94 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	210492	15764
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 $\leq 5\%$. 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	1852	
1	B	1852	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14487 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 Polyketide synthase PKS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	928	Total	C	N	O	S	0	0
			7031	4418	1241	1352	20		
1	B	928	Total	C	N	O	S	0	0
			7028	4415	1241	1352	20		

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1817	SER	-	insertion	UNP I7FMV0
A	1818	LYS	-	insertion	UNP I7FMV0
A	1819	SER	-	insertion	UNP I7FMV0
A	1820	THR	-	insertion	UNP I7FMV0
A	1821	SER	-	insertion	UNP I7FMV0
A	1822	GLU	-	insertion	UNP I7FMV0
A	1823	ASN	-	insertion	UNP I7FMV0
A	1824	LEU	-	insertion	UNP I7FMV0
A	1825	TYR	-	insertion	UNP I7FMV0
A	1826	PHE	-	insertion	UNP I7FMV0
A	1827	GLN	-	insertion	UNP I7FMV0
B	1817	SER	-	insertion	UNP I7FMV0
B	1818	LYS	-	insertion	UNP I7FMV0
B	1819	SER	-	insertion	UNP I7FMV0
B	1820	THR	-	insertion	UNP I7FMV0
B	1821	SER	-	insertion	UNP I7FMV0
B	1822	GLU	-	insertion	UNP I7FMV0
B	1823	ASN	-	insertion	UNP I7FMV0
B	1824	LEU	-	insertion	UNP I7FMV0
B	1825	TYR	-	insertion	UNP I7FMV0
B	1826	PHE	-	insertion	UNP I7FMV0
B	1827	GLN	-	insertion	UNP I7FMV0

- Molecule 2 is UNKNOWN LIGAND (three-letter code: UNL) (formula:).

Mol	Chain	Residues	Atoms			AltConf
2	A	1	Total	C	O	0
			19	18	1	
2	B	1	Total	C	O	0
			19	18	1	

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		AltConf
3	A	196	Total	O	0
			196	196	
3	B	194	Total	O	0
			194	194	

[illegible]

- Molecule 1: Polyketide synthase PKS13

Chain B: 46% 50%

VAL	ARG	ASP	GLN	ALA	VAL	L914	H688	GLU	LYS	F140	SER	LEU	MET
ARG	ASN	GLU	ASP	ARG	ILE	L921	P689	LYS	SER	F140	SER	SER	ASP
ASN	LEU	THR	VAL	GLU	THR	A707	A707	GLU	GLU	I146	ARG	ARG	ASN
ARG	ALA	THR	PRO	SER	PHE	P926	R714	ASP	ASP	E148	ALA	ALA	SER
VAL	GLY	THR	ARG	THR	THR	H951	L720	VAL	VAL	K164	ALA	VAL	ASP
GLU	ALA	GLY	GLY	LEU	LEU	R961	L720	THR	THR	D182	ALA	ALA	ASN
ASP	THR	THR	THR	VAL	VAL	H962	W730	VAL	VAL	D182	ALA	LEU	LEU
ASP	THR	THR	THR	THR	THR	S963	W730	GLY	GLY	Y236	GLY	ASP	PRO
LEU	ALA	LEU	ALA	ASP	ALA	D756	D756	VAL	VAL	Y236	ILE	GLY	GLY
PRO	ILE	ALA	ALA	ALA	ALA	R970	D759	ARG	ARG	T265	GLU	THR	THR
PRO	VAL	VAL	LEU	VAL	VAL	R971	D759	MET	MET	A266	ASP	ASP	GLU
ILE	ALA	VAL	VAL	ALA	ALA	L984	Q777	ASP	ASP	C267	LEU	PRO	PRO
GLN	ARG	ARG	LYS	ARG	ARG	L984	Q777	GLU	GLU	G284	THR	ALA	ALA
LEU	ALA	ALA	ASP	ALA	ALA	L991	E782	TYR	TYR	E286	GLY	GLY	ARG
THR	ASN	GLY	ALA	ASN	ALA	L991	E782	GLY	GLY	A286	THR	VAL	GLY
ASN	GLY	GLY	ALA	GLY	ALA	T997	T819	PHE	PHE	P300	LEU	ALA	PRO
VAL	SER	GLY	ALA	ALA	ALA	T997	T819	ILE	ILE	P300	THR	ALA	PRO
ARG	GLY	GLY	GLN	GLY	GLY	S1000	H825	ASP	ASP	I319	ARG	ALA	ARG
GLU	GLY	VAL	VAL	VAL	VAL	S1000	H825	ASP	ASP	I319	THR	THR	THR
ASP	GLU	VAL	VAL	VAL	VAL	F1038	E837	GLY	GLY	L409	PRO	GLU	GLU
VAL	LEU	VAL	LEU	ALA	ALA	F1038	E837	GLY	GLY	L409	ASN	ASN	ASN
VAL	VAL	VAL	LEU	ALA	ALA	E1018	F835	GLU	GLU	T408	HIS	GLU	GLU
ASN	ILE	ALA	PRO	ALA	ALA	T1011	M833	ASP	ASP	T408	THR	THR	MET
LEU	GLY	LEU	ASP	LEU	PHE	K1047	L834	ASP	ASP	G419	ILE	ARG	ARG
GLY	ILE	ALA	PHE	ALA	ALA	G1048	L834	ASP	ASP	G419	GLU	GLU	ARG
ILE	VAL	GLY	GLY	GLY	GLY	L1049	D850	TYR	TYR	K424	LEU	LEU	TRP
GLY	VAL	VAL	GLN	VAL	VAL	A1050	D850	PRO	PRO	K424	ALA	ALA	ARG
ALA	ALA	VAL	ARG	ALA	ALA	G1051	R853	SER	SER	H443	THR	THR	ASN
VAL	SER	SER	ALA	VAL	VAL	A1052	R853	TYR	TYR	L444	VAL	VAL	TRP
PRO	GLY	GLY	VAL	GLY	GLY	W1069	F856	ASP	ASP	A448	ILE	ILE	VAL
ALA	ASP	ASP	ALA	ASP	ALA	W1069	S857	GLU	GLU	E481	GLY	GLY	ASN
GLY	VAL	VAL	ASP	VAL	ALA	F1074	L862	SER	SER	E481	GLY	GLY	ALA
GLY	GLY	GLY	ARG	GLY	ARG	THR	E863	GLU	GLU	E483	PRO	PRO	THR
LEU	GLY	GLY	LEU	GLY	LEU	GLY	E864	LEU	LEU	E483	GLY	GLY	GLY
GLN	ALA	VAL	VAL	ALA	VAL	ASP	W867	PRO	PRO	G509	GLU	GLU	SER
TRP	ILE	TRP	THR	THR	THR	SER	W867	GLY	GLY	F510	PRO	PRO	GLN
GLU	ALA	GLU	THR	ALA	ALA	ALA	T873	ILE	ILE	F510	ASP	ASP	ALA
SER	VAL	THR	THR	SER	THR	VAL	T873	THR	THR	E529	TYR	ALA	ALA
PRO	VAL	THR	THR	VAL	THR	MET	T873	ARG	ARG	E529	ASP	ILE	ILE
GLN	ILE	LEU	LEU	ILE	ILE	GLY	W882	HIS	HIS	PRO	GLY	GLY	GLY
LYS	GLY	GLY	HIS	GLY	GLY	PRO	W882	GLY	GLY	E606	ASP	ASP	ASP
GLY	ASP	GLY	ARG	ASP	ASP	GLY	E606	PRO	PRO	E606	GLY	GLY	SER

[illegible]

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	1200000	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 ($e^-/\text{\AA}^2$)	45.8	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.550	Depositor
Minimum map value	-0.262	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.040	Depositor
Recommended contour level	0.333	Depositor
Map size (Å)	322.31, 322.31, 322.31	wwPDB
Map dimensions	386, 386, 386	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.835, 0.835, 0.835	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.29	0/7174	0.51	1/9738 (0.0%)
1	B	0.29	0/7171	0.51	1/9734 (0.0%)
All	All	0.29	0/14345	0.51	2/19472 (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	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	182	ASP	CB-CG-OD1	5.54	123.28	118.30
1	B	182	ASP	CB-CG-OD1	5.47	123.23	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	265	THR	Peptide
1	B	265	THR	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	7031	0	6911	36	0
1	B	7028	0	6902	34	0
2	A	19	0	0	0	0
2	B	19	0	0	0	0
3	A	196	0	0	1	0
3	B	194	0	0	1	0
All	All	14487	0	13813	70	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 3.

The worst 5 of 70 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:707:ALA:O	1:A:777:GLN:NE2	2.23	0.72
1:B:707:ALA:O	1:B:777:GLN:NE2	2.23	0.70
1:A:444:LEU:O	1:A:448:ALA:N	2.32	0.62
1:B:444:LEU:O	1:B:448:ALA:N	2.33	0.61
1:B:714:ARG:NH2	1:B:756:ASP:OD2	2.34	0.61

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	924/1852 (50%)	897 (97%)	27 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	924/1852 (50%)	897 (97%)	27 (3%)	0	100	100
All	All	1848/3704 (50%)	1794 (97%)	54 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	723/1446 (50%)	714 (99%)	9 (1%)	67	61
1	B	722/1446 (50%)	712 (99%)	10 (1%)	62	55
All	All	1445/2892 (50%)	1426 (99%)	19 (1%)	64	58

5 of 19 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	481	GLU
1	B	825	HIS
1	B	1038	PHE
1	B	640	SER
1	A	1038	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	248	ASN
1	A	909	GLN
1	B	248	ASN
1	B	909	GLN

5.3.3 RNA ⓘ

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 unknown - 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.

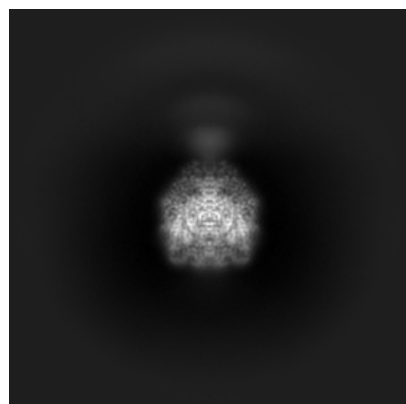
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-26574. These allow visual inspection of the internal detail of the map and identification of artifacts.

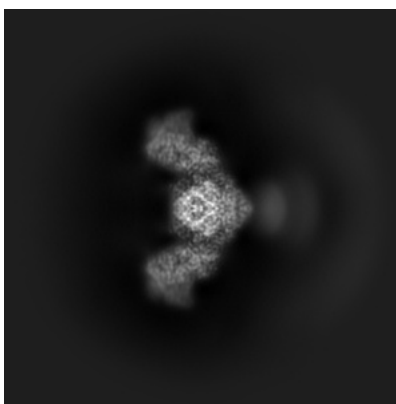
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

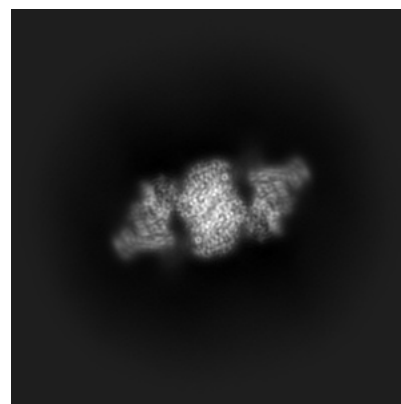
6.1.1 Primary map



X

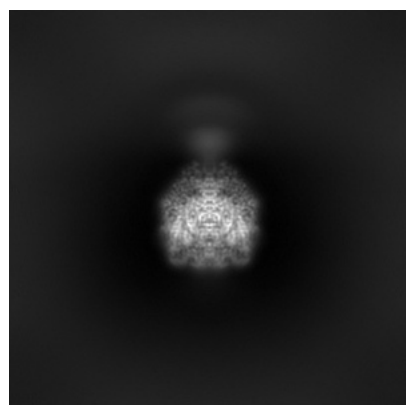


Y

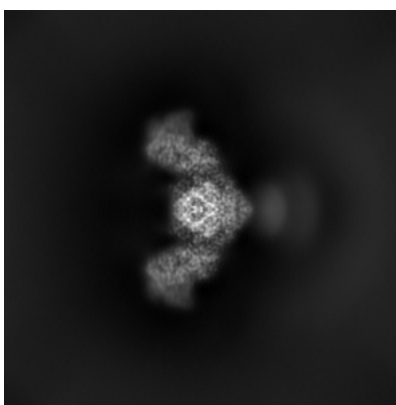


Z

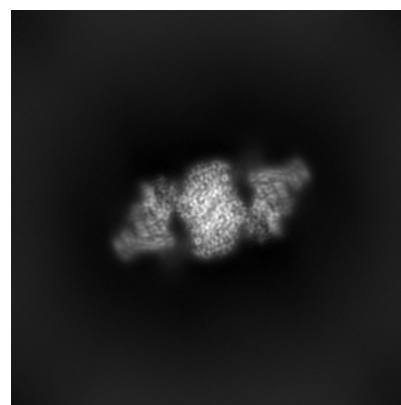
6.1.2 Raw map



X



Y

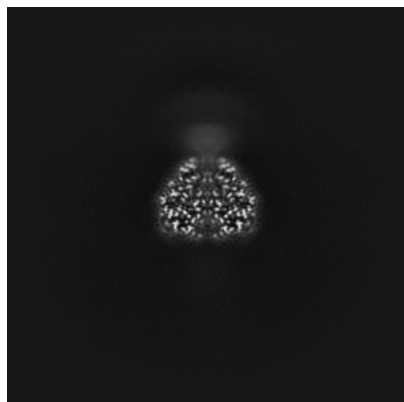


Z

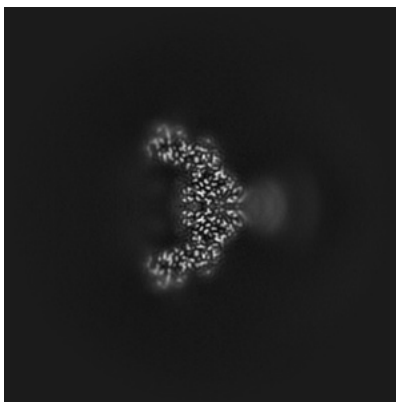
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

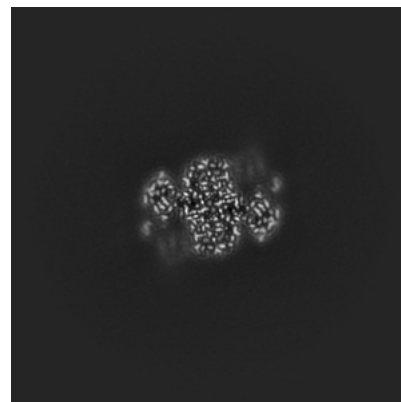
6.2.1 Primary map



X Index: 193

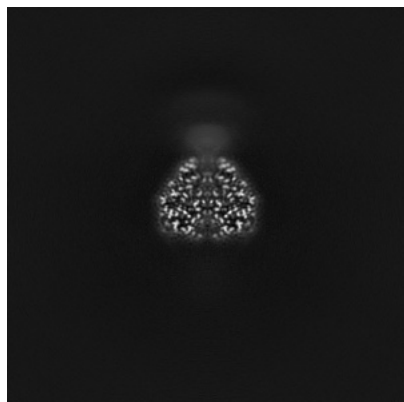


Y Index: 193

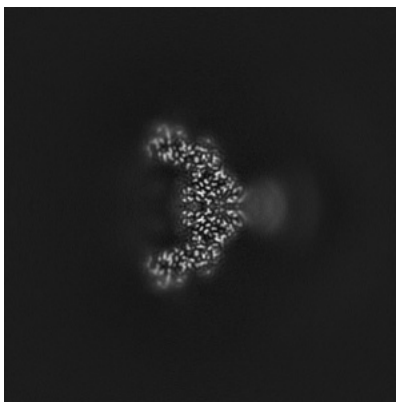


Z Index: 193

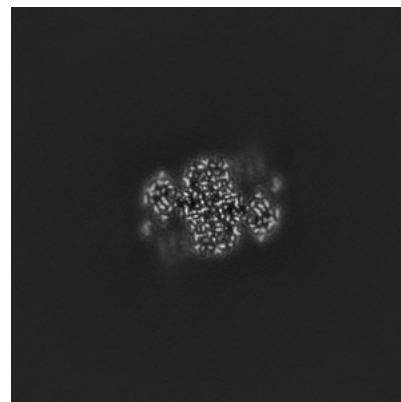
6.2.2 Raw map



X Index: 193



Y Index: 193

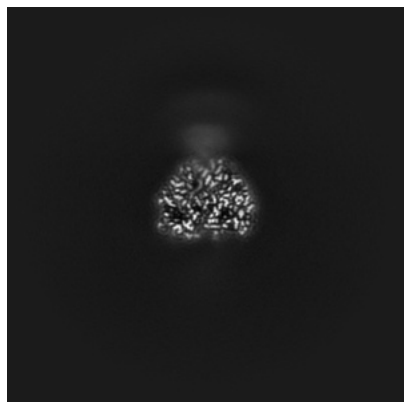


Z Index: 193

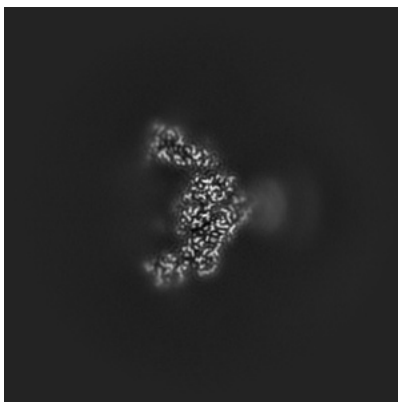
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

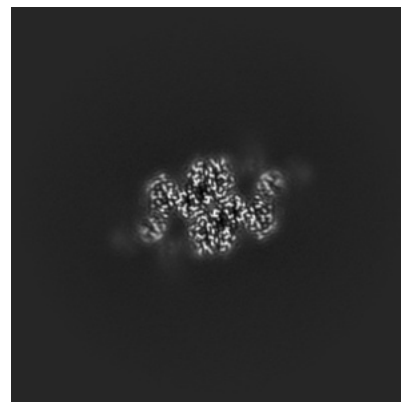
6.3.1 Primary map



X Index: 188

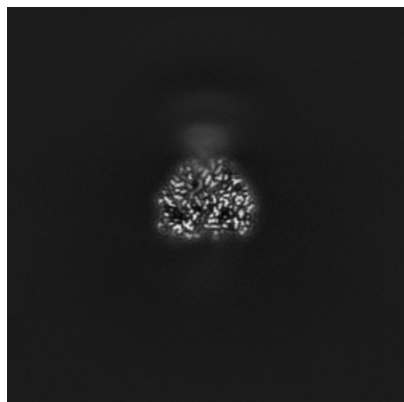


Y Index: 197

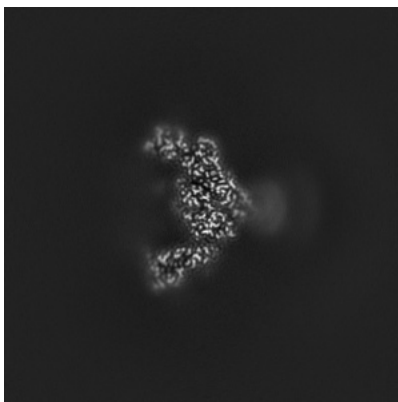


Z Index: 185

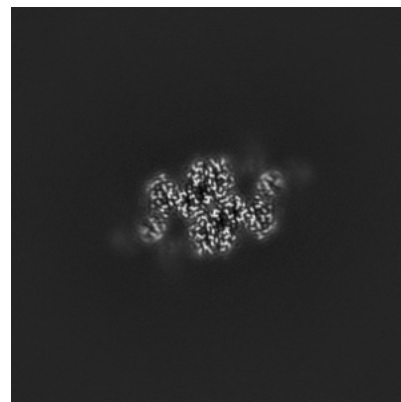
6.3.2 Raw map



X Index: 188



Y Index: 189

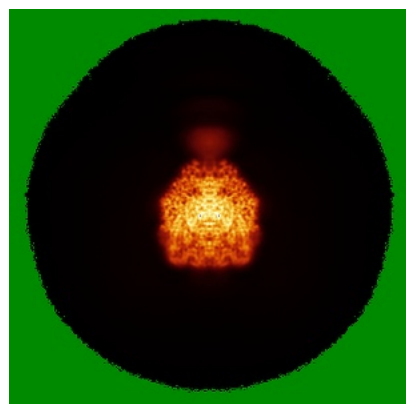


Z Index: 185

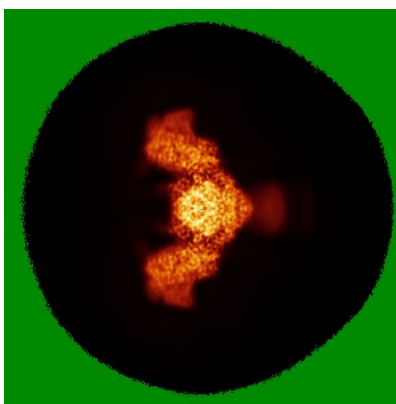
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



X

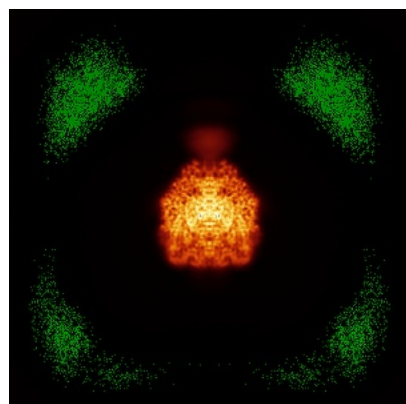


Y

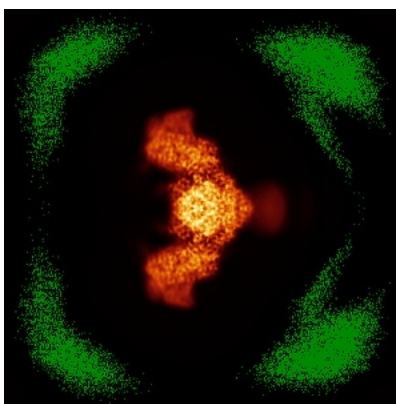


Z

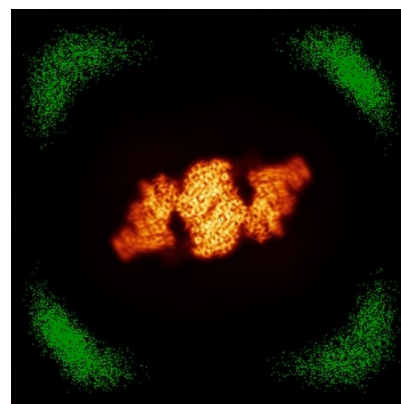
6.4.2 Raw map



X



Y

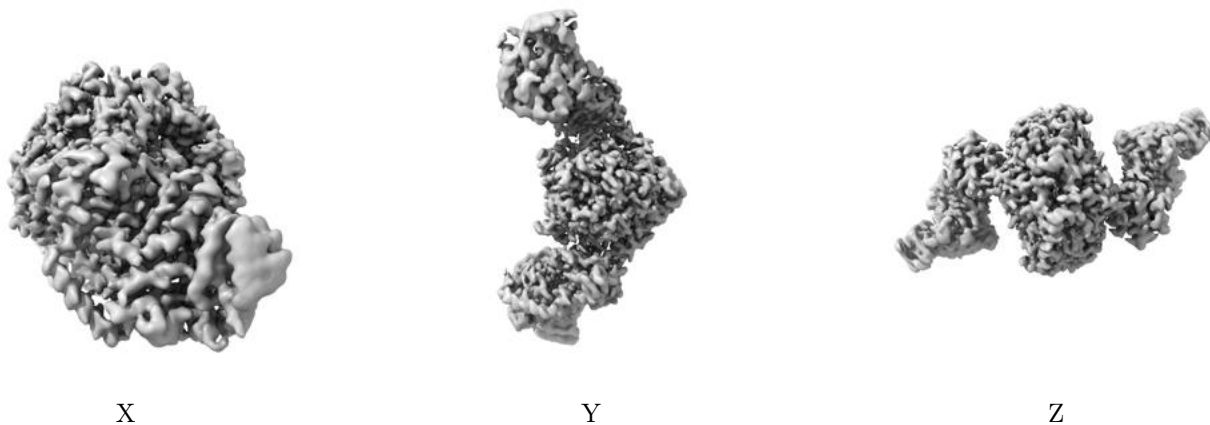


Z

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.

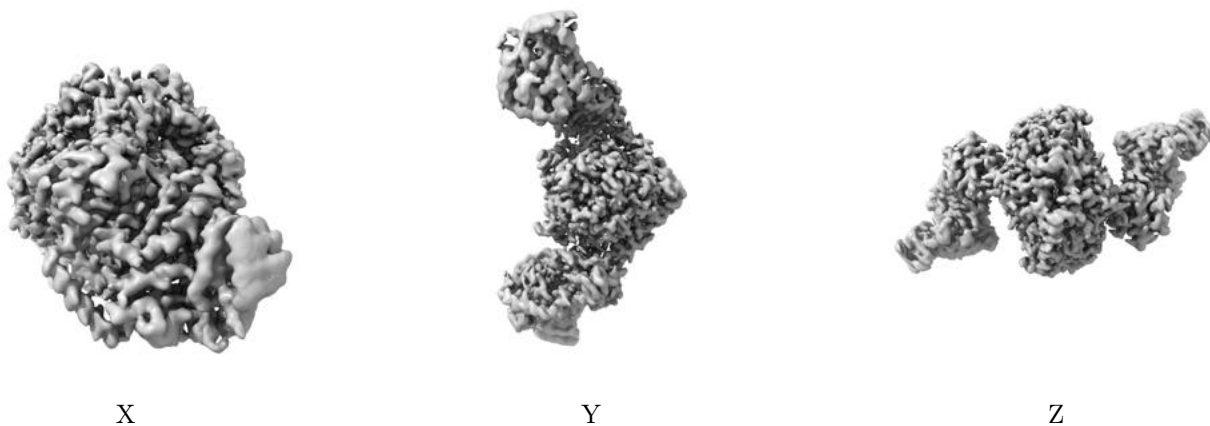
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.333. 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.

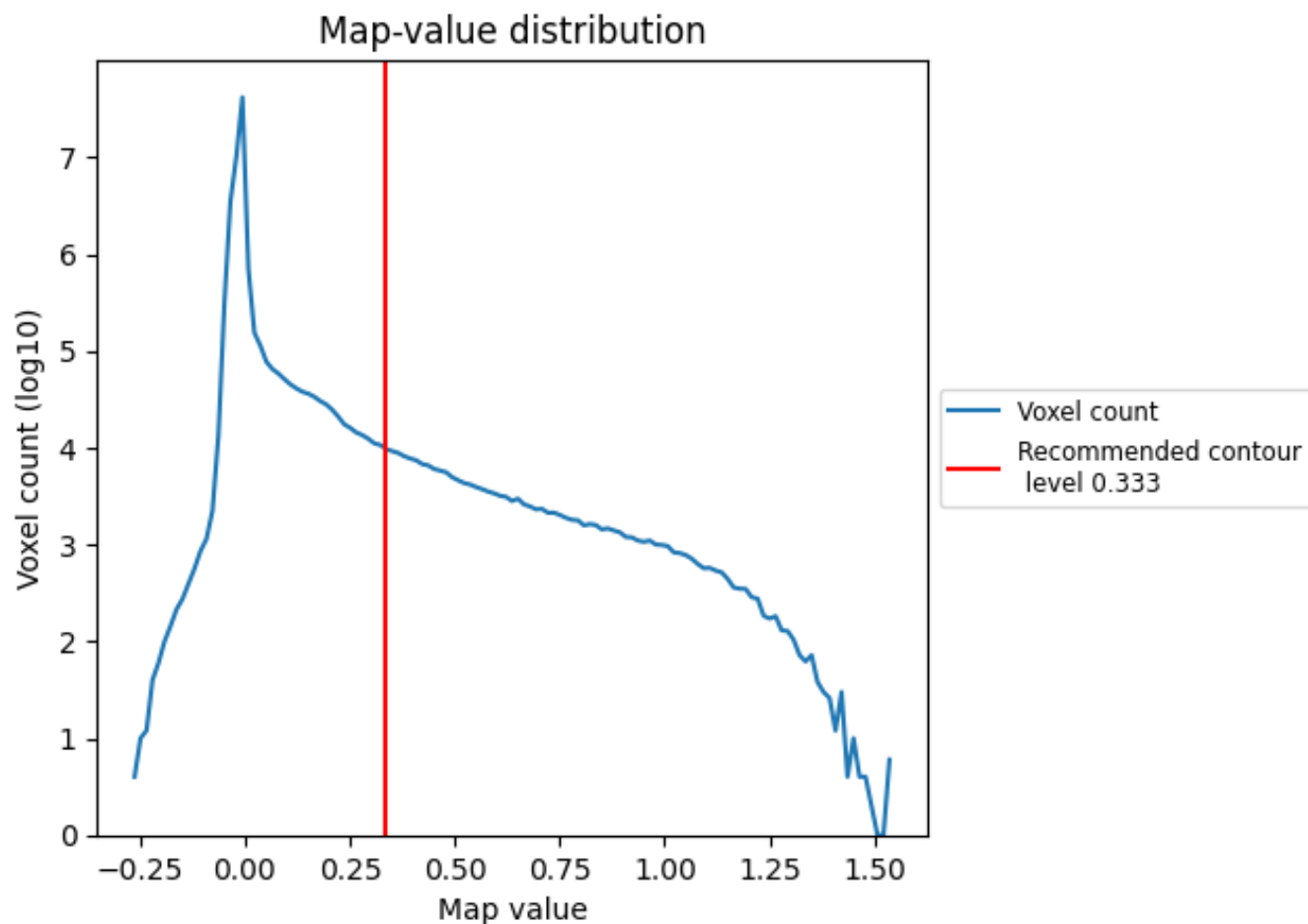
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

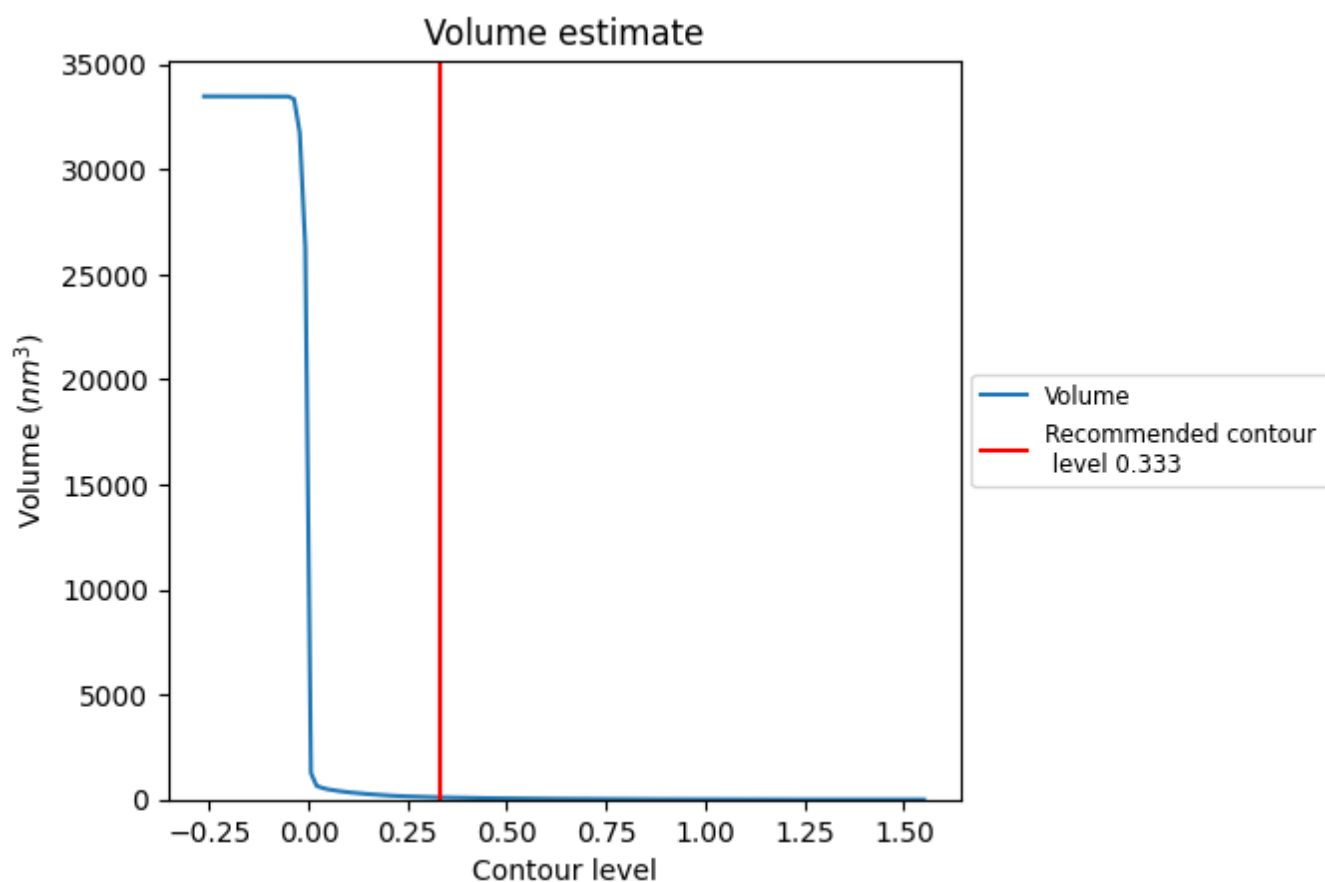
This section contains the results of statistical analysis of the map.

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.

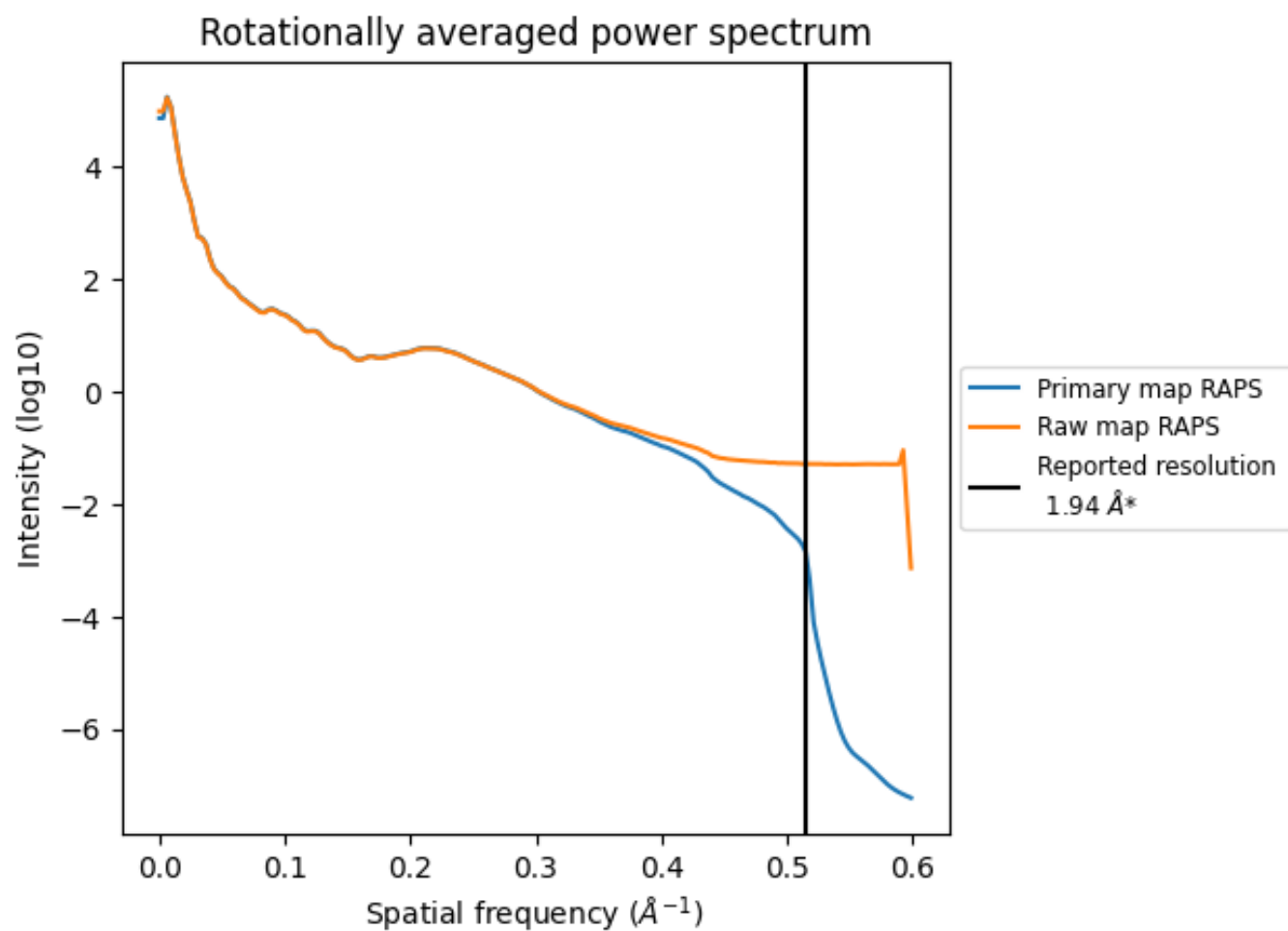
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 104 nm^3 ; this corresponds to an approximate mass of 94 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 ⓘ

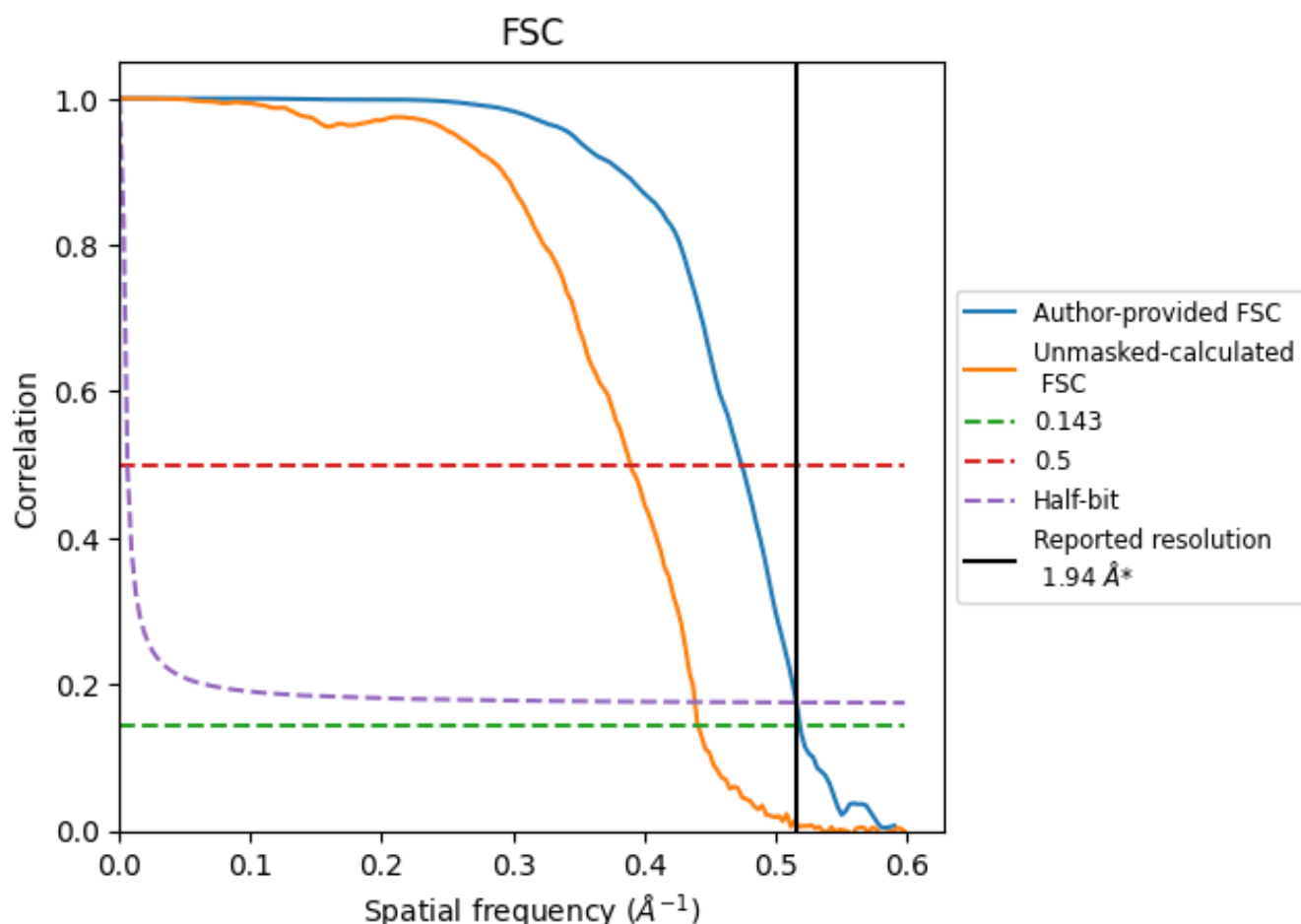


*Reported resolution corresponds to spatial frequency of 0.515 \AA^{-1}

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 0.515 Å⁻¹

8.2 Resolution estimates [i](#)

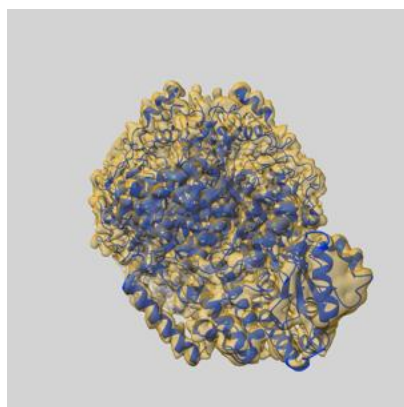
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	1.94	-	-
Author-provided FSC curve	1.93	2.11	1.94
Unmasked-calculated*	2.27	2.57	2.28

*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 2.27 differs from the reported value 1.94 by more than 10 %

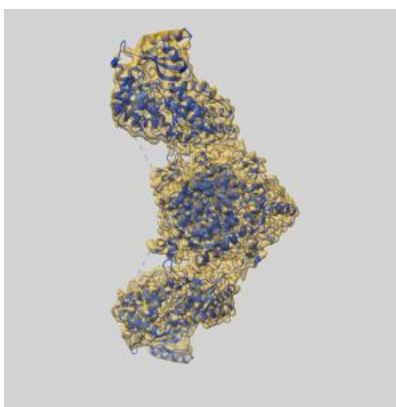
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-26574 and PDB model 7UK4. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

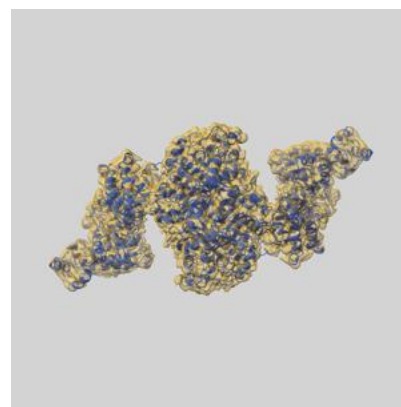
9.1 Map-model overlay [i](#)



X



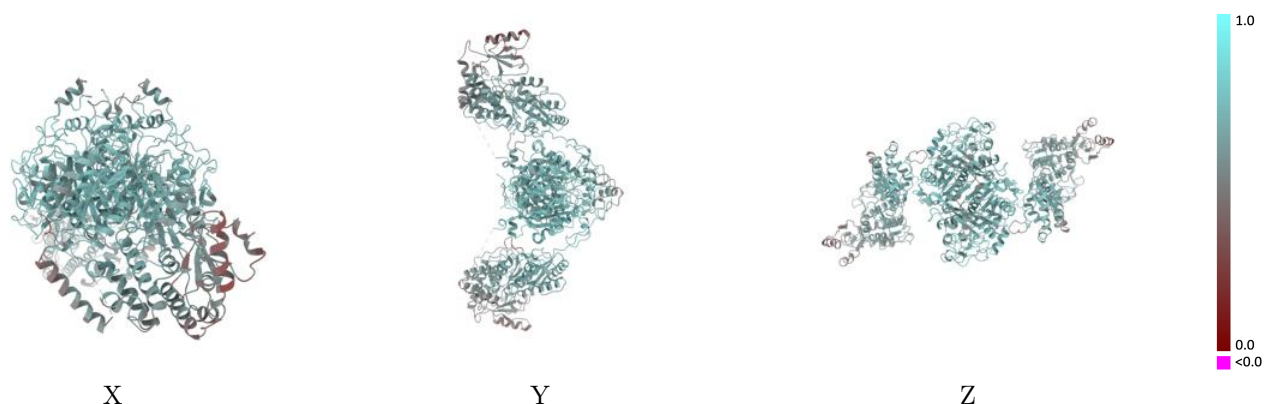
Y



Z

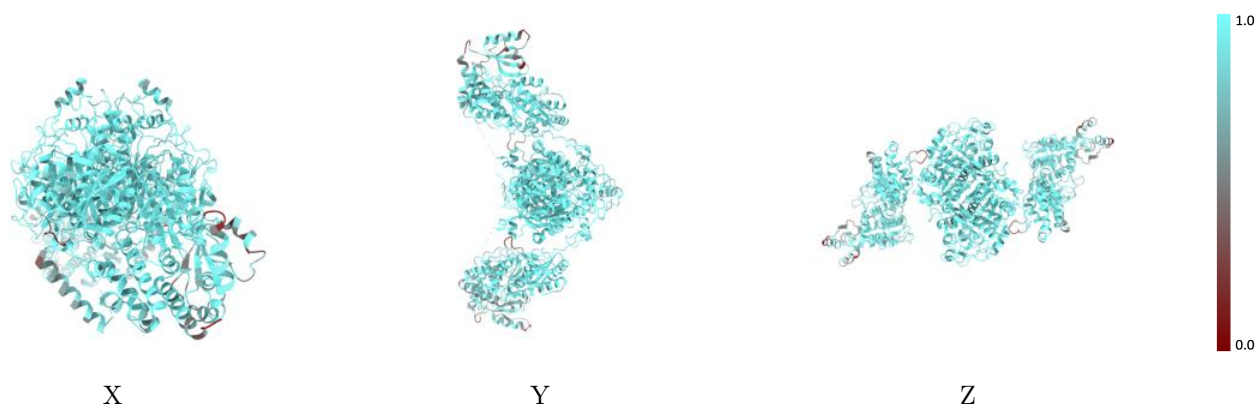
The images above show the 3D surface view of the map at the recommended contour level 0.333 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



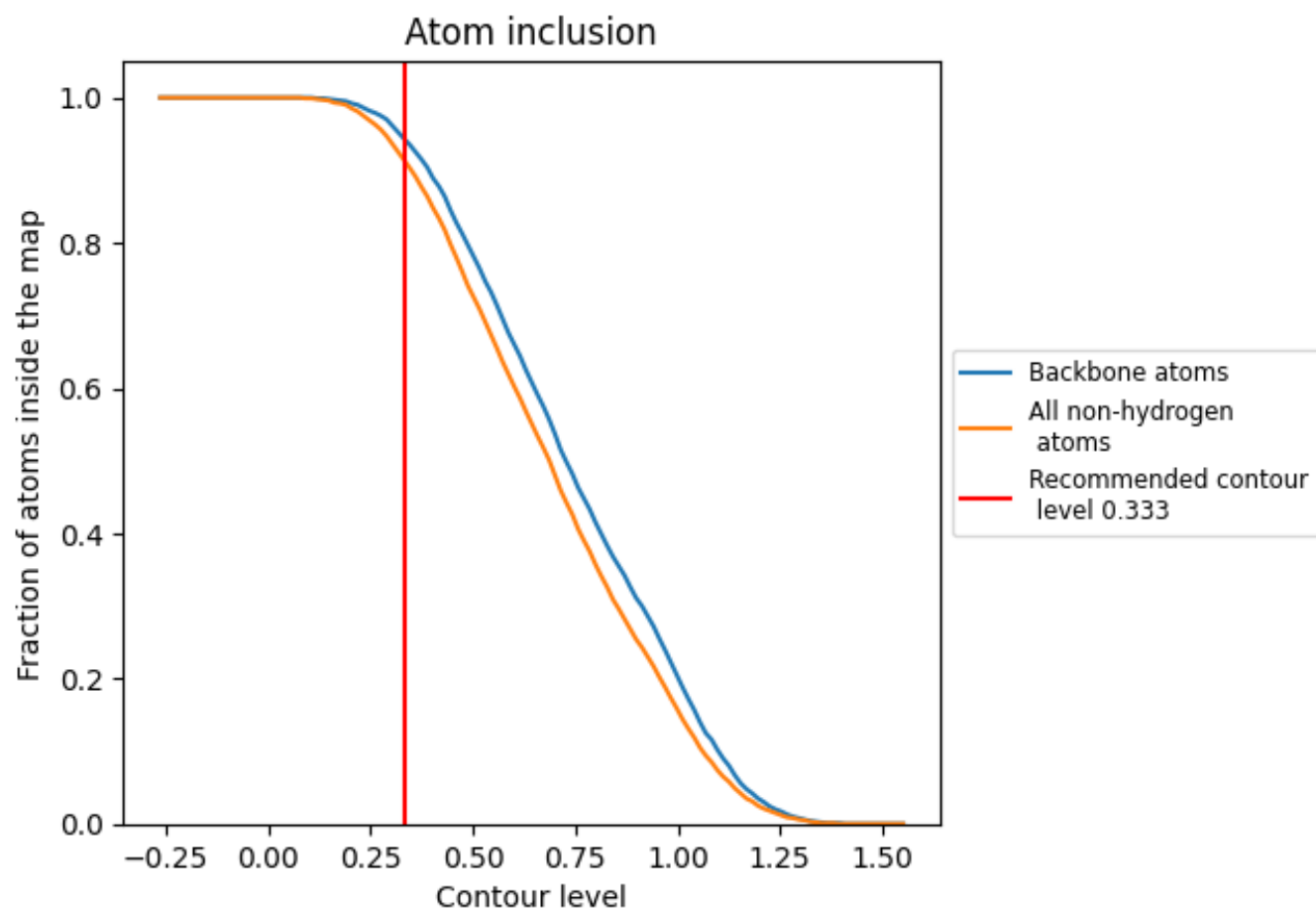
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.333).

9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 91% 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 (0.333) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.9140	<div></div> 0.6280
A	<div></div> 0.9150	<div></div> 0.6280
B	<div></div> 0.9150	<div></div> 0.6280

