



wwPDB EM Validation Summary Report ⓘ

Aug 9, 2026 – 08:45 PM JST

PDB ID : 26KA / pdb_000026ka
EMDB ID : EMD-80707
Title : Cryo-EM structure of Crimean-Congo hemorrhagic fever virus RNA polymerase in complex with the 5' vRNA promotor from the 5'/3' vRNA dual-promoter dataset
Authors : Ma, J.; Yang, K.; Wu, H.; Liu, X.; Liang, Z.
Deposited on : 2026-05-04
Resolution : 3.03 Å (reported)
Based on initial model : .

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.dev133
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
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) : 2.50

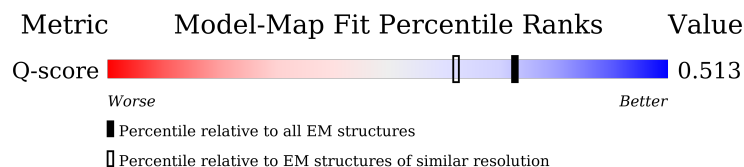
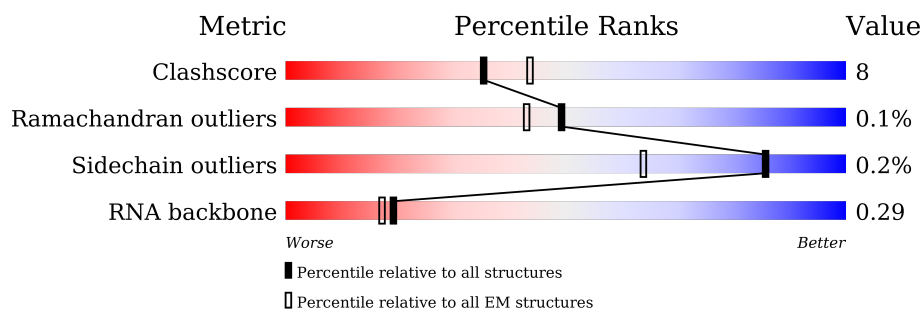
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.03 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	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	13929 (2.53 - 3.53)

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	3974	
2	B	15	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11752 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 RNA-directed RNA polymerase L.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1497	Total	C	N	O	S	0	0
			11537	7313	1967	2172	85		

There are 29 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3946	TRP	-	expression tag	UNP Q6TQR6
A	3947	SER	-	expression tag	UNP Q6TQR6
A	3948	HIS	-	expression tag	UNP Q6TQR6
A	3949	PRO	-	expression tag	UNP Q6TQR6
A	3950	GLN	-	expression tag	UNP Q6TQR6
A	3951	PHE	-	expression tag	UNP Q6TQR6
A	3952	GLU	-	expression tag	UNP Q6TQR6
A	3953	LYS	-	expression tag	UNP Q6TQR6
A	3954	GLY	-	expression tag	UNP Q6TQR6
A	3955	SER	-	expression tag	UNP Q6TQR6
A	3956	SER	-	expression tag	UNP Q6TQR6
A	3957	GLY	-	expression tag	UNP Q6TQR6
A	3958	GLY	-	expression tag	UNP Q6TQR6
A	3959	SER	-	expression tag	UNP Q6TQR6
A	3960	SER	-	expression tag	UNP Q6TQR6
A	3961	GLY	-	expression tag	UNP Q6TQR6
A	3962	SER	-	expression tag	UNP Q6TQR6
A	3963	SER	-	expression tag	UNP Q6TQR6
A	3964	GLY	-	expression tag	UNP Q6TQR6
A	3965	GLY	-	expression tag	UNP Q6TQR6
A	3966	ALA	-	expression tag	UNP Q6TQR6
A	3967	TRP	-	expression tag	UNP Q6TQR6
A	3968	SER	-	expression tag	UNP Q6TQR6
A	3969	HIS	-	expression tag	UNP Q6TQR6
A	3970	PRO	-	expression tag	UNP Q6TQR6
A	3971	GLN	-	expression tag	UNP Q6TQR6
A	3972	PHE	-	expression tag	UNP Q6TQR6
A	3973	GLU	-	expression tag	UNP Q6TQR6

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Chain	Residue	Modelled	Actual	Comment	Reference
A	3974	LYS	-	expression tag	UNP Q6TQR6

- Molecule 2 is a RNA chain called 5' vRNA promoter.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	B	10	Total	C	N	O	P	
			211	95	37	69	10	0

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
3	A	2	Total	Zn	
			2	2	0

- Molecule 4 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Mn	
			1	1	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

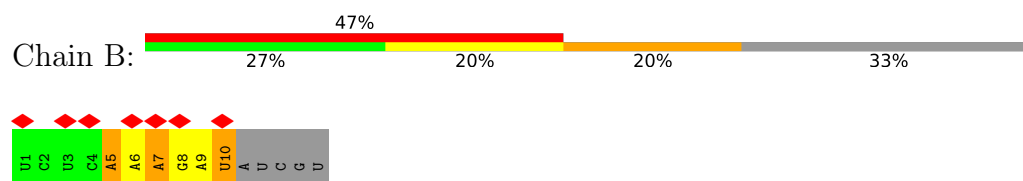
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Mg	
			1	1	0





PHE	GLU	ALA	LEU	ILE	CYS	ASP	ARG
GLY	VAL	LEU	SER	VAL	LYS	ARG	GLU
LYS	ARG	VAL	VAL	VAL	ALA	ASN	LYS
GLY	PRO	ASN	ASN	ARG	VAL	THR	THR
SER	SER	CYS	CYS	ARG	LYS	VAL	ASN
SER	ALA	LYS	LYS	ASN	GLU	LYS	LYS
GLY	THR	MET	MET	ASN	LEU	SER	VAL
GLY	VAL	GLU	GLU	GLU	ILE	GLU	VAL
SER	GLN	ASN	ASN	LEU	ASN	LEU	ILE
SER	PHE	PHE	PHE	GLY	SER	LEU	LYS
GLY	VAL	GLU	GLU	ASP	THR	TRP	ASP
SER	HIS	GLY	GLY	VAL	GLY	LYS	ASN
SER	GLY	GLN	GLN	SER	LEU	PHE	LEU
GLY	ASP	GLU	GLU	LEU	SER	THR	GLU
GLY	GLU	CYS	CYS	LYS	ASP	LEU	GLN
ALA	GLN	PHE	PHE	VAL	LEU	ASP	GLY
TRP	TRP	CYS	GLU	ASN	GLU	THR	VAL
SER	GLN	PHE	PHE	ILE	LEU	ASN	GLU
HIS	GLU	THR	THR	VAL	GLU	VAL	GLU
PRO	PRO	ILE	ILE	VAL	SER	SER	ILE
GLN	ILE	VAL	LEU	VAL	LEU	THR	GLU
PHE	PHE	SER	LYS	PRO	SER	THR	GLU
GLU	LEU	ASP	ASP	LEU	THR	SER	PHE
LYS	ASP	ASP	ASN	LYS	LEU	THR	CYS
		LEU	SER	ASP	LEU	ILE	ASN
	LEU	ALA	ALA	MET	CYS	LYS	ASN
	MET	ARG	ARG	SER	PHE	ASP	LYS
	ALA	LEU	LEU	LYS	TYR	VAL	THR
	ASN	ASP	ASP	PRO	PHE	ARG	LYS
	ASP	TYR	TYR	LYS	GLN	THR	THR
	THR	ASN	ASN	SER	SER	LEU	VAL
	VAL	LYS	LYS	GLU	GLU	VAL	SER
	THR	THR	LEU	GLU	CYS	GLU	GLU
	ASP	ILE	ILE	VAL	SER	TYR	ASN
	PHE	ASP	ASP	VAL	LYS	VAL	PRO
	PRO	HIS	HIS	MET	ARG	SER	LEU
	ASP	CYS	CYS	ALA	ASP	THR	PRO
	ARG	VAL	VAL	ARG	GLU	GLU	THR
	GLU	GLU	ASP	ARG	PRO	THR	SER
	ALA	ALA	MET	SER	ARG	ILE	CYS
	GLU	GLU	GLY	LEU	CYS	PRO	TRP
	ALA	LYS	LYS	ASN	SER	LYS	SER
	LEU	ARG	HIS	ASN	PHE	GLU	GLU
	THR	LYS	ALA	ALA	ALA	LEU	VAL
	THR	GLU	GLU	SER	LEU	GLN	ASN
	GLY	ALA	LEU	SER	LEU	ALA	ASN
	ASN	VAL	VAL	MET	LEU	PHE	TYR
	LEU	ARG	ARG	LEU	SER	LEU	ILE
	GLY	ALA	ALA	PHE	LEU	LEU	GLU
	PHE	VAL	VAL	ILE	ILE	TYR	ASP
	ASN	GLU	GLU	ASP	GLY	GLU	ILE
	THR	TRP	ASP	GLU	GLY	GLU	ASP
	ASP	ASP	LEU	MET	ASP	VAL	PHE
	SER	SER	ILE	SER	TRP	LEU	ASN
	ASP	ASP	LEU	LEU	GLN	LEU	ASN
	TRP	TRP	MET	PRO	ARG	MET	ASN
	SER	SER	MET	GLU	LYS	ASN	VAL
	HIS	HIS	THR	LEU	GLY	LEU	VAL
	PRO	PRO	GLY	LYS	LYS	ILE	VAL
	GLN	GLN	ASP	SER	ASN	GLN	THR

- Molecule 2: 5' vRNA promoter



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	33620	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.561	Depositor
Minimum map value	-0.311	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.07	Depositor
Map size (Å)	280.32, 280.32, 280.32	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.73, 0.73, 0.73	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, MN, MG

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	0.13	0/11729	0.28	0/15883
2	B	0.26	0/235	0.39	0/363
All	All	0.13	0/11964	0.29	0/16246

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

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	11537	0	11303	181	0
2	B	211	0	108	4	0
3	A	2	0	0	0	0
4	A	1	0	0	0	0
5	A	1	0	0	0	0
All	All	11752	0	11411	182	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 8.

The worst 5 of 182 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:2694:LEU:HB3	1:A:3046:LEU:HD21	1.72	0.70
1:A:1323:LEU:HD22	1:A:1420:ILE:HG12	1.73	0.69
1:A:1295:ILE:HD12	1:A:1412:LEU:HD21	1.78	0.66
1:A:1452:GLU:OE2	1:A:1456:ARG:NH1	2.29	0.65
1:A:2602:SER:O	1:A:2603:VAL:HG22	1.97	0.65

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	1463/3974 (37%)	1409 (96%)	52 (4%)	2 (0%)	48 78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2603	VAL
1	A	1376	SER

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	1275/3623 (35%)	1272 (100%)	3 (0%)	87 90

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1401	ASN
1	A	2442	ASP
1	A	2858	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2560	GLN
1	A	2857	ASN
1	A	1425	GLN
1	A	1519	ASN
1	A	1540	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	B	9/15 (60%)	5 (55%)	0

All (5) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	B	5	A
2	B	6	A
2	B	7	A
2	B	8	G
2	B	10	U

There are no RNA pucker outliers to report.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 4 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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

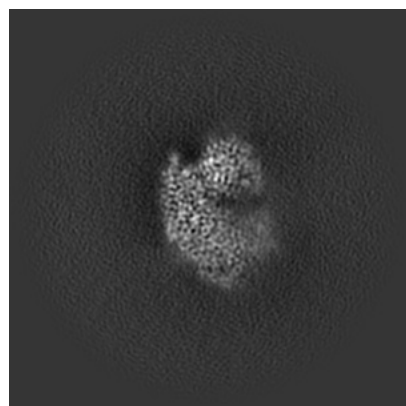
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-80707. These allow visual inspection of the internal detail of the map and identification of artifacts.

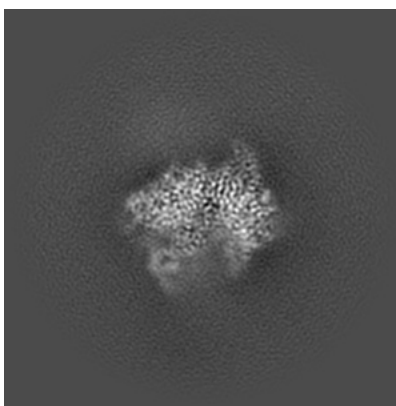
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

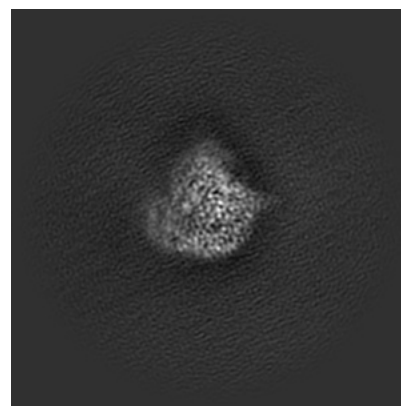
6.1.1 Primary map



X

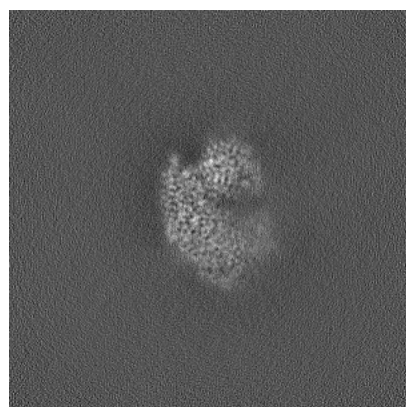


Y

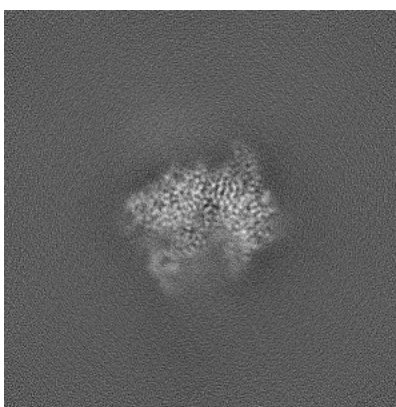


Z

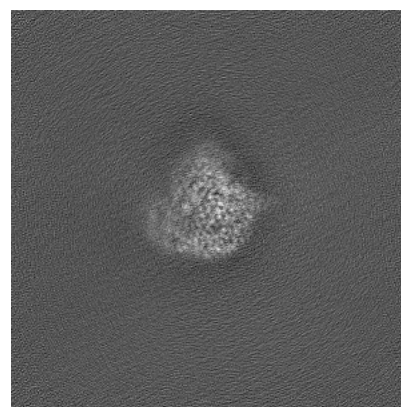
6.1.2 Raw map



X



Y

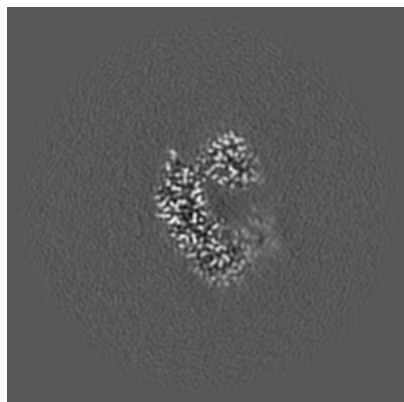


Z

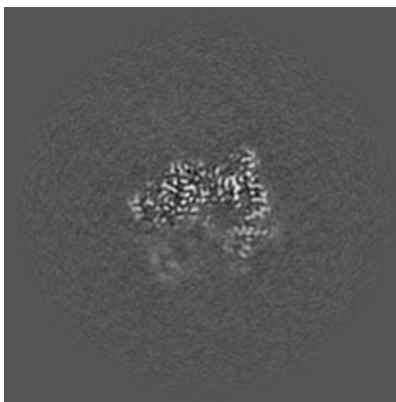
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

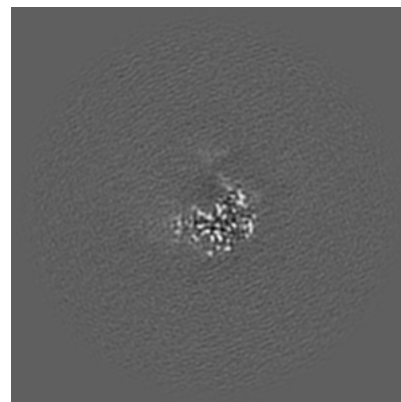
6.2.1 Primary map



X Index: 192

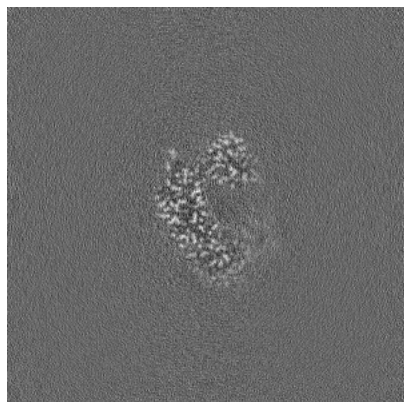


Y Index: 192

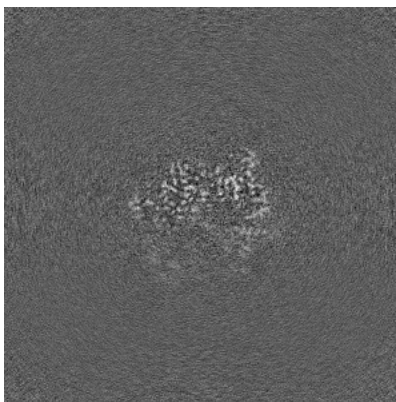


Z Index: 192

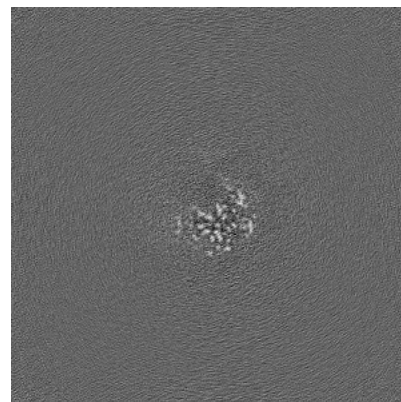
6.2.2 Raw map



X Index: 192



Y Index: 192

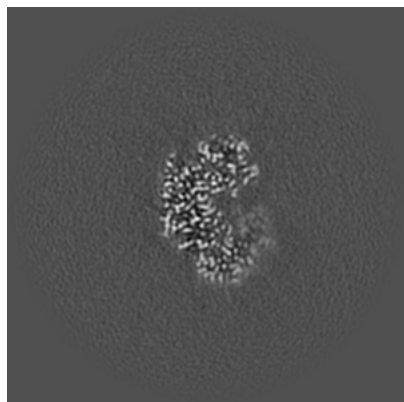


Z Index: 192

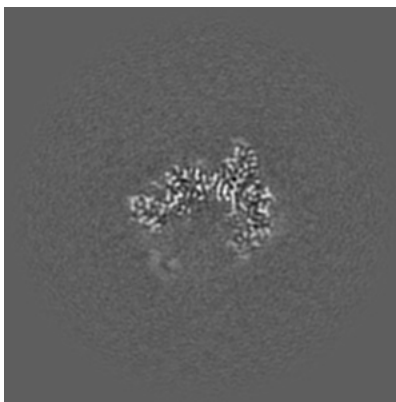
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

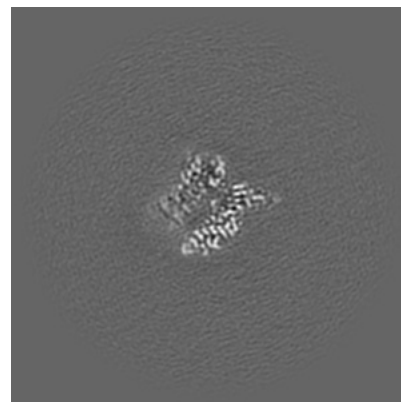
6.3.1 Primary map



X Index: 199

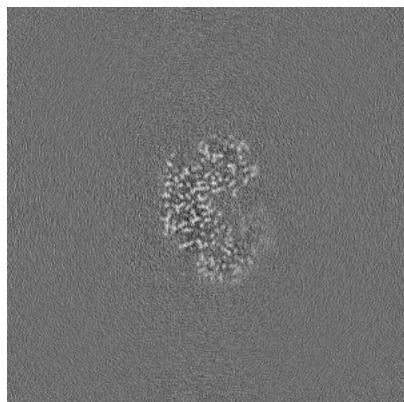


Y Index: 197

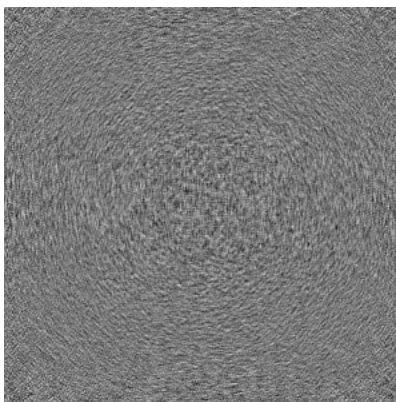


Z Index: 227

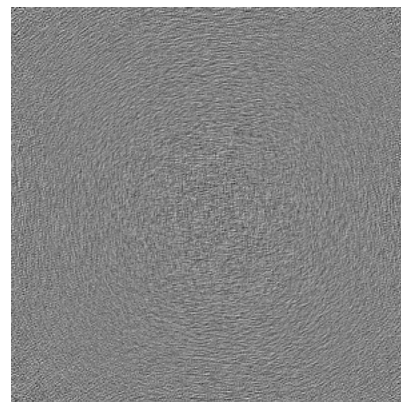
6.3.2 Raw map



X Index: 199



Y Index: 0

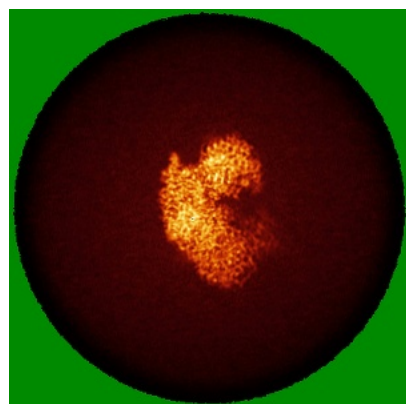


Z Index: 0

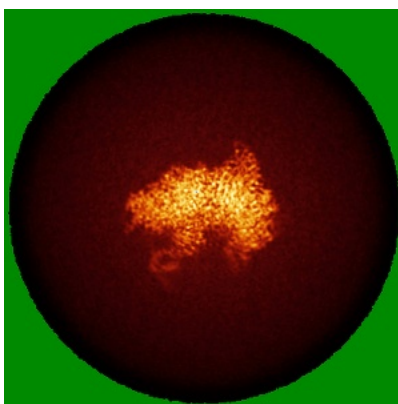
The images above show the largest variance slices of the map in three orthogonal directions.

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

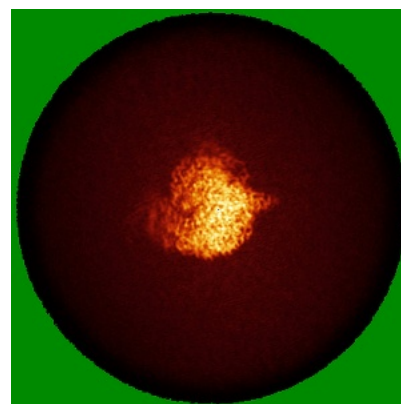
6.4.1 Primary map



X

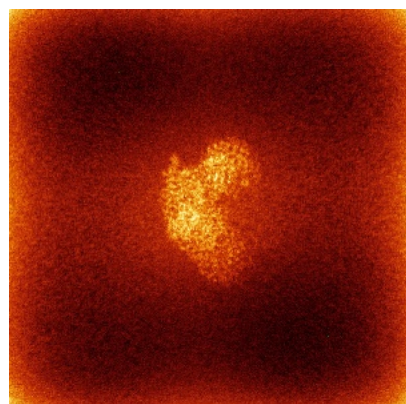


Y

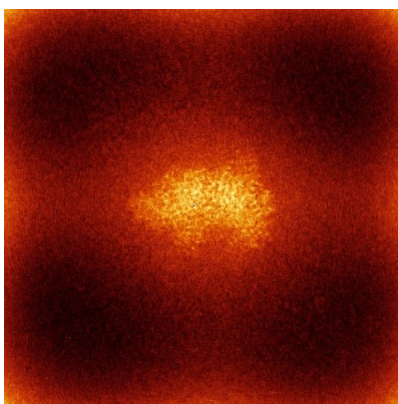


Z

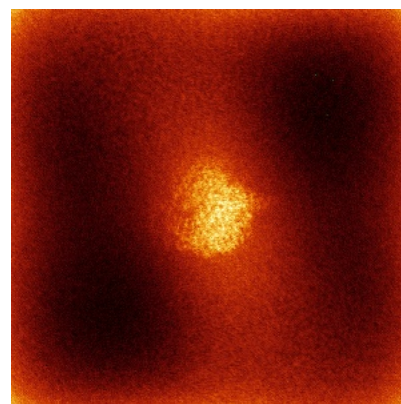
6.4.2 Raw map



X



Y

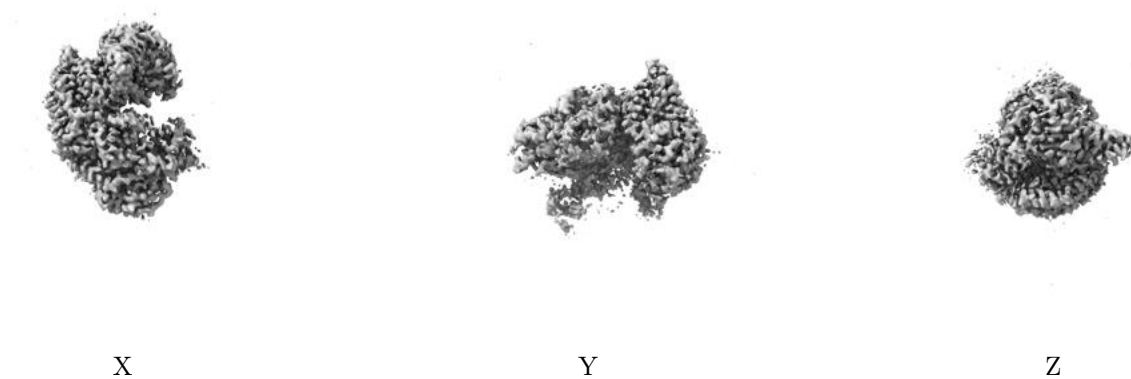


Z

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.

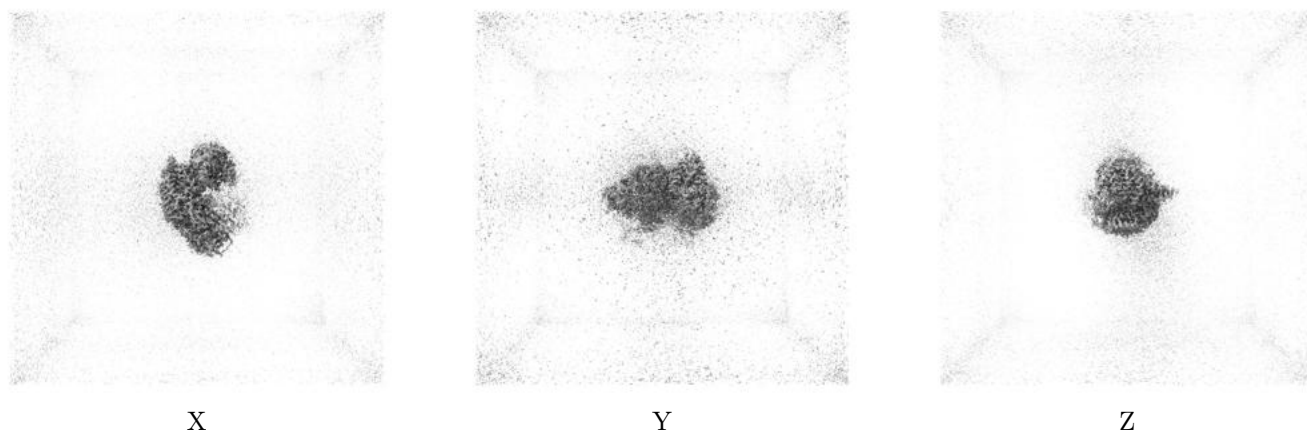
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.07. 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.

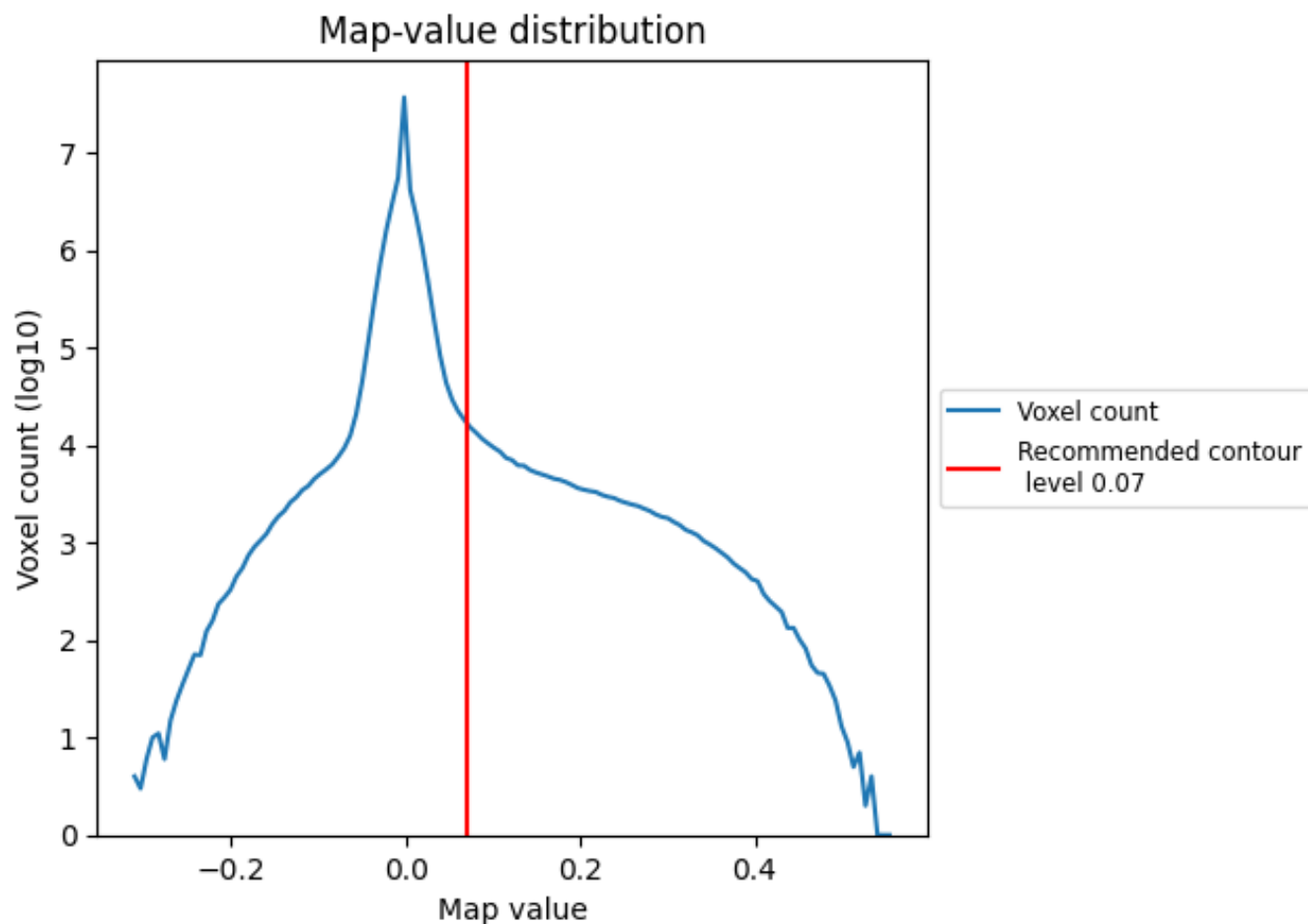
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

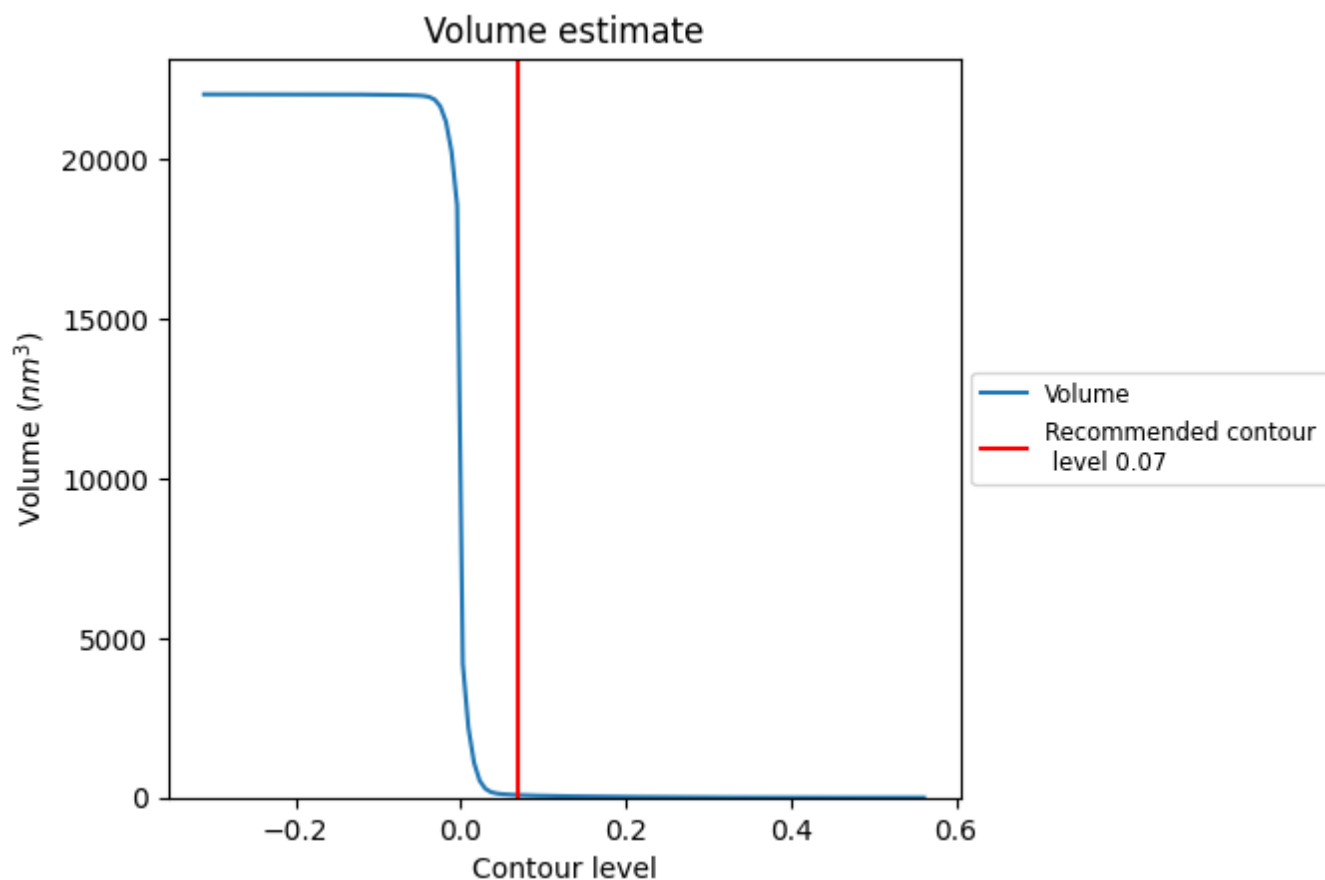
This section contains the results of statistical analysis of the map.

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.

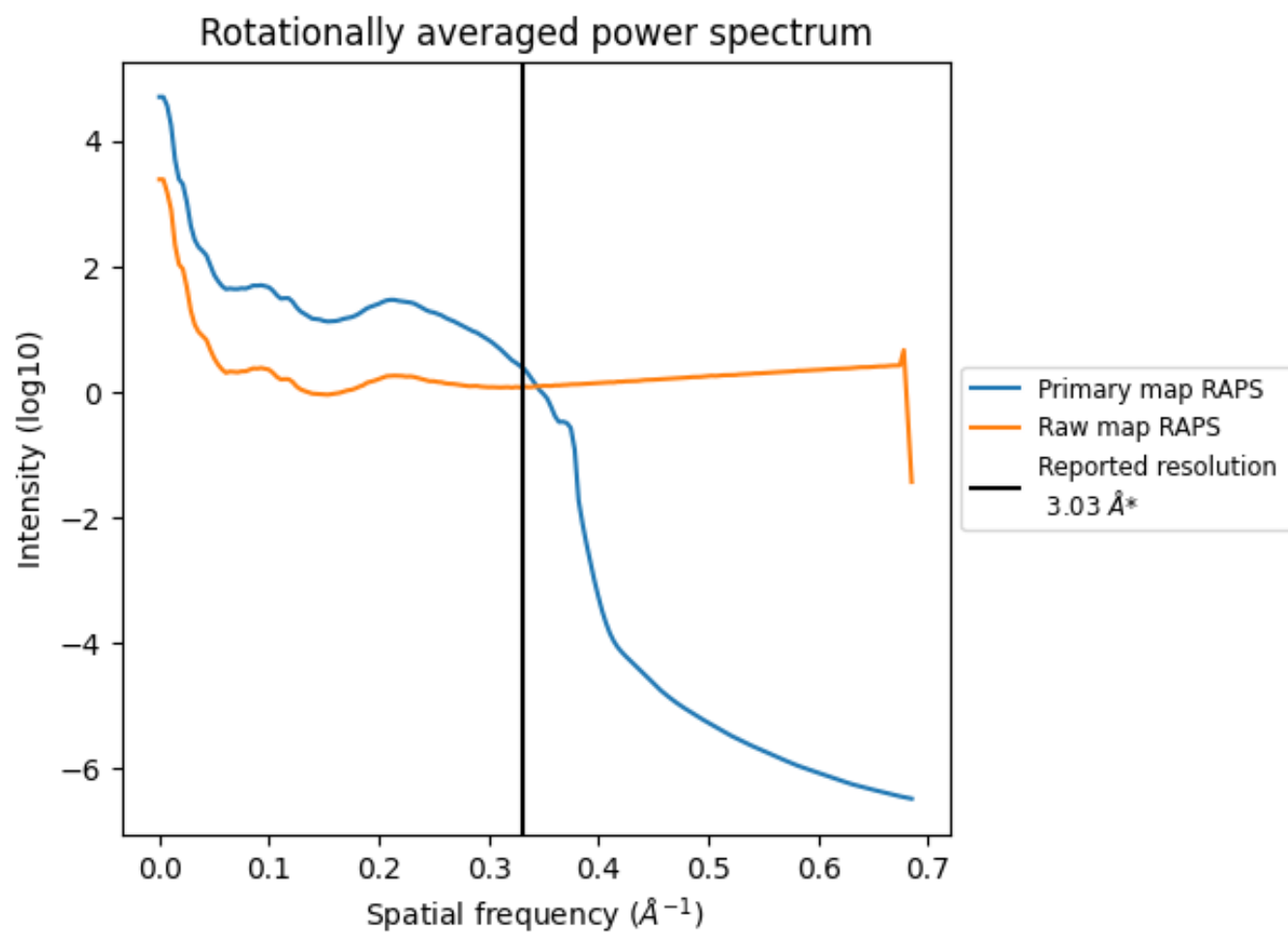
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 78 nm^3 ; this corresponds to an approximate mass of 70 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 ⓘ

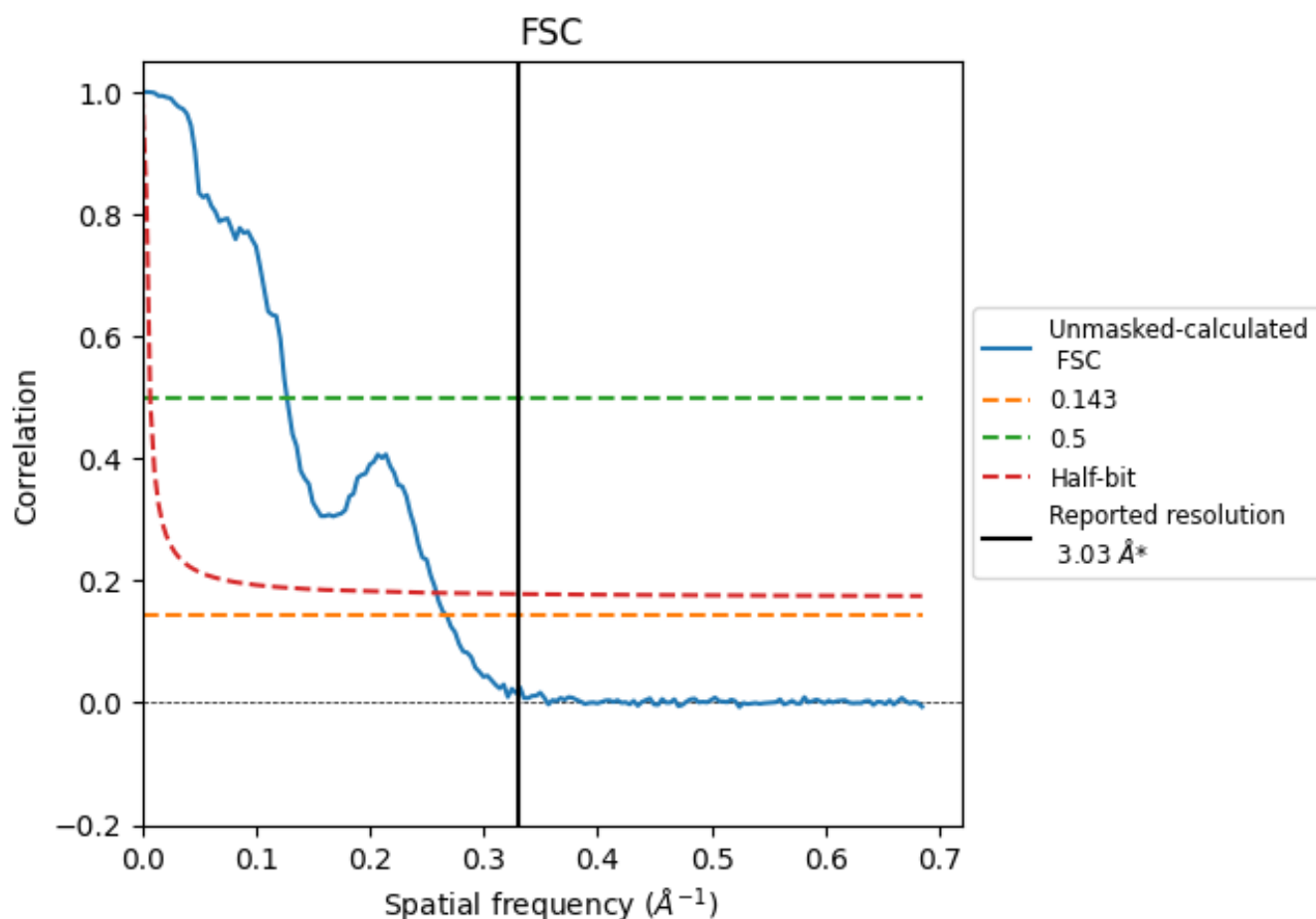


*Reported resolution corresponds to spatial frequency of 0.330 Å⁻¹

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 0.330 Å⁻¹

8.2 Resolution estimates [i](#)

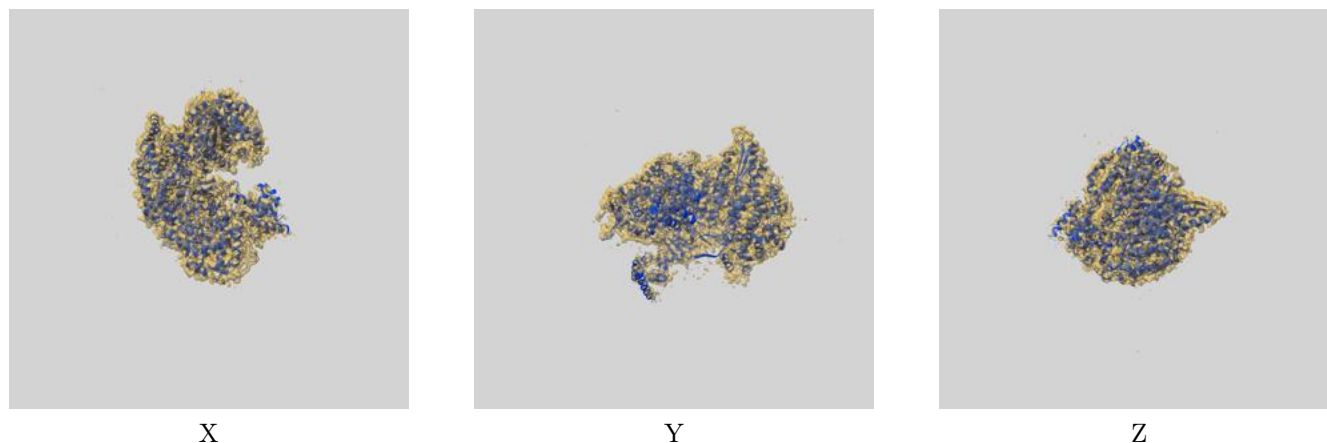
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.03	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.75	7.87	3.87

*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 3.75 differs from the reported value 3.03 by more than 10 %

9 Map-model fit [i](#)

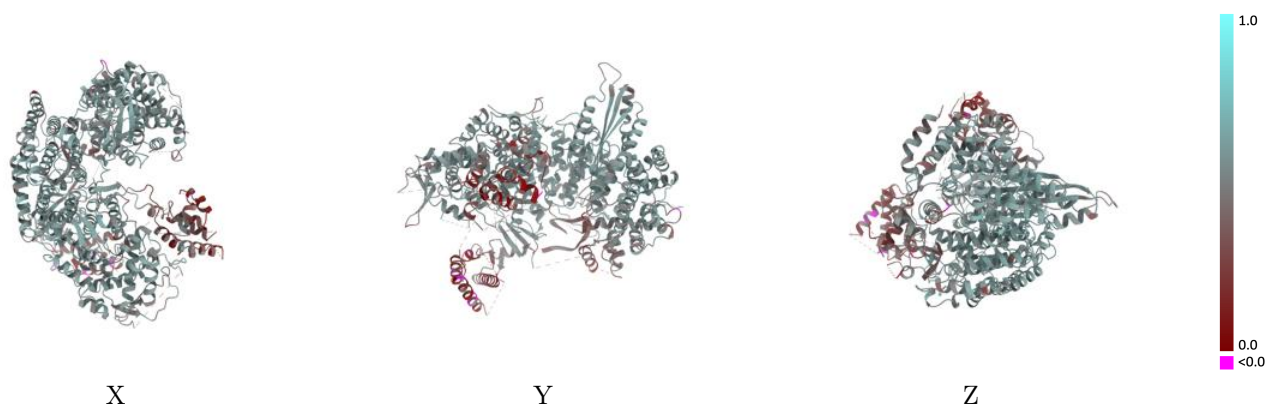
This section contains information regarding the fit between EMDB map EMD-80707 and PDB model 26KA. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.07 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](#)



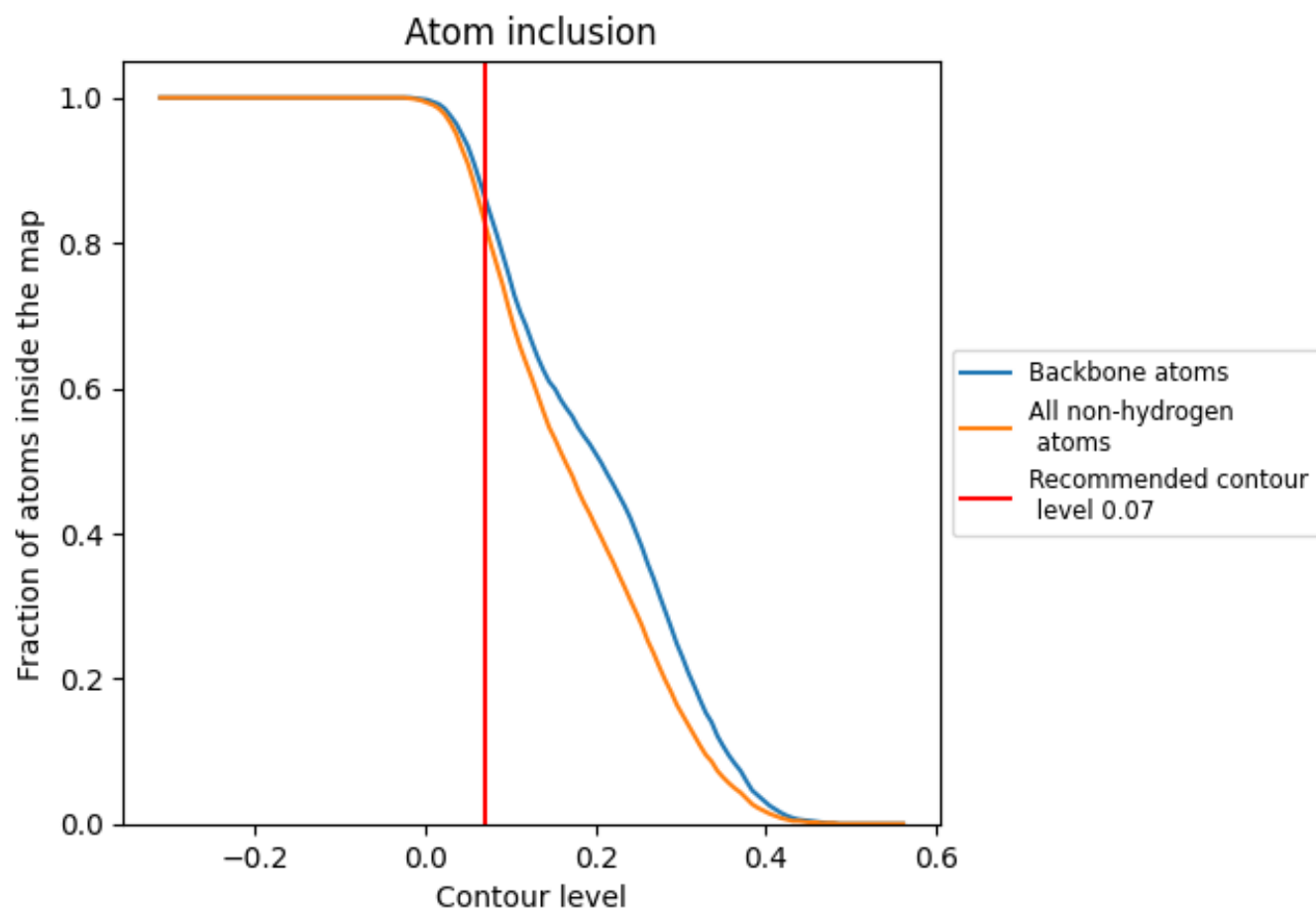
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.07).

9.4 Atom inclusion [i](#)



At the recommended contour level, 86% of all backbone atoms, 83% 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 (0.07) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8280	0.5130
A	0.8360	0.5160
B	0.3740	0.3800

