



wwPDB EM Validation Summary Report ⓘ

Sep 23, 2026 – 04:33 pm BST

PDB ID : 9IBD / pdb_00009ibd
EMDB ID : EMD-52809
Title : Kinetoplastid ATP-dependent RNA helicase PRP22/DHX8 in open conformation
Authors : Nadenoen, T.; Vanden Broeck, A.
Deposited on : 2025-02-12
Resolution : 3.69 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.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

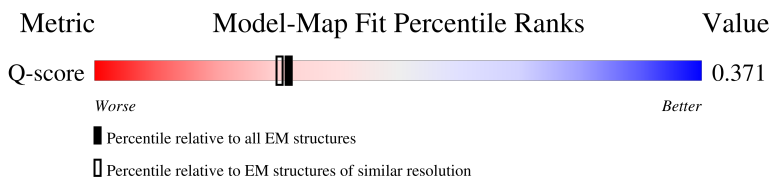
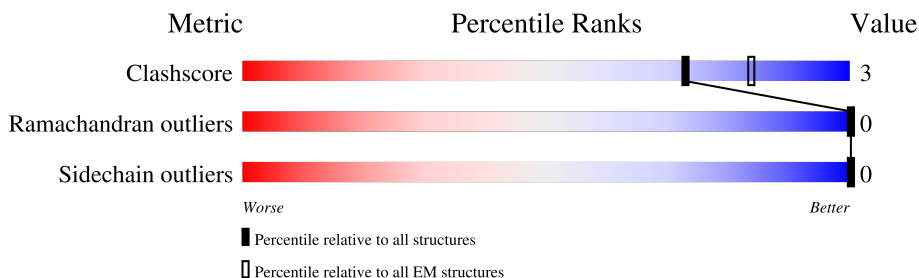
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.69 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	-
Q-score	-	25397	11284 (3.19 - 4.18)

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	LF	706	14% 36% 60%
2	LV	1087	17% 70% 6% 24%
3	LZ	403	5% 10% 90%
4	TN	1181	96%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9227 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 Splicing factor Cactin C-terminal domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	LF	283	Total	C	N	O	S	0	0
			2224	1402	398	413	11		

- Molecule 2 is a protein called RNA helicase.

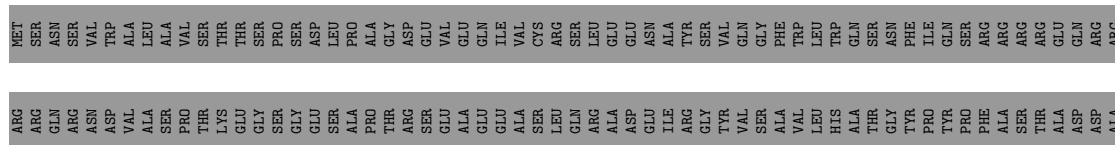
Mol	Chain	Residues	Atoms					AltConf	Trace
2	LV	825	Total	C	N	O	S	0	0
			6453	4046	1143	1223	41		

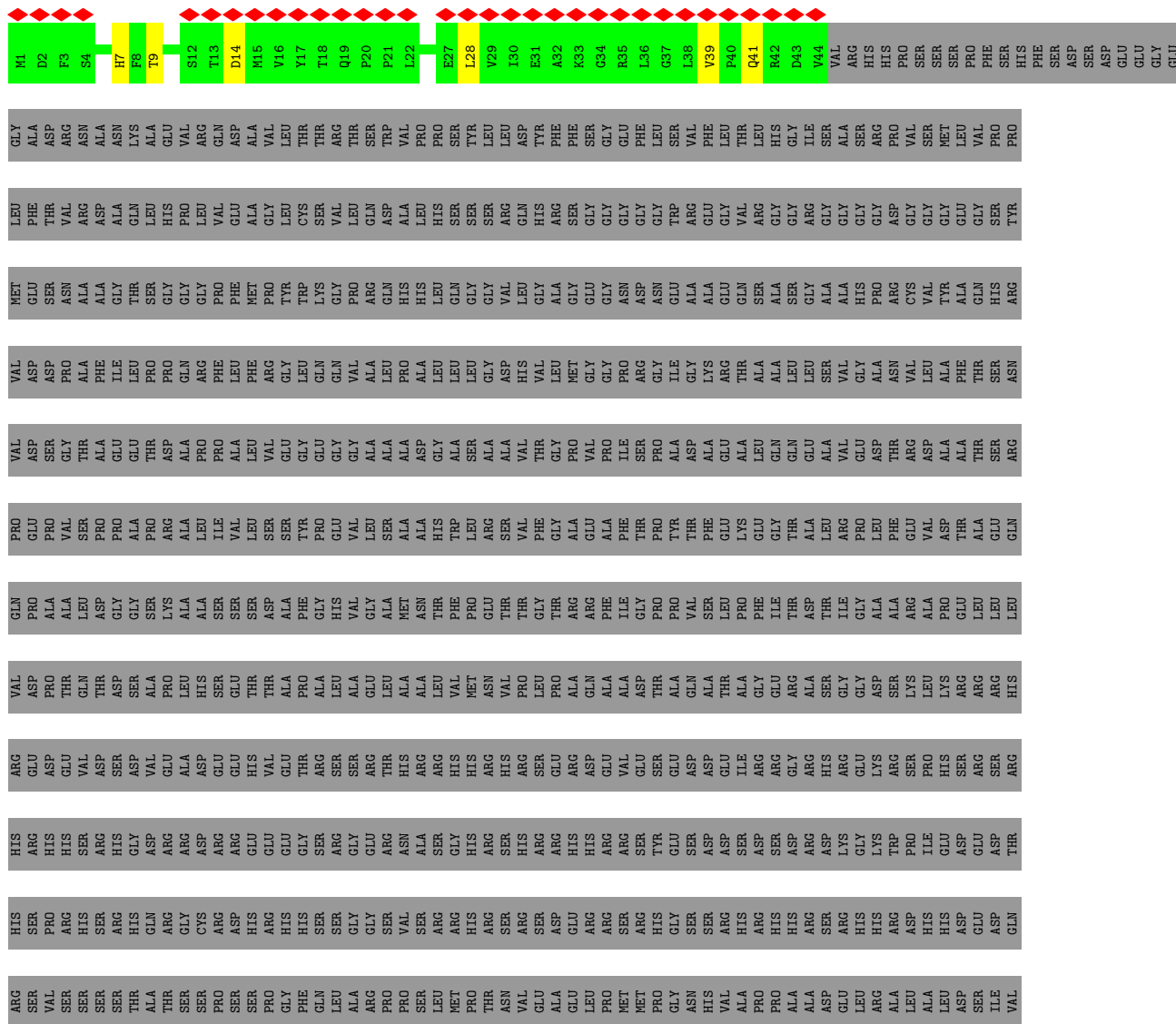
- Molecule 3 is a protein called NF-kappa-B-activating protein C-terminal domain-containing protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	LZ	40	Total	C	N	O	0	0
			199	119	40	40		

- Molecule 4 is a protein called Probable RNA helicase.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	TN	44	Total	C	N	O	S	0	0
			351	227	59	63	2		





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

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	115573	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)	500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	64000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.432	Depositor
Minimum map value	-0.304	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.0666	Depositor
Map size (Å)	426.00003, 426.00003, 426.00003	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.065, 1.065, 1.065	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	LF	0.15	0/2259	0.32	0/3062
2	LV	0.15	0/6568	0.33	0/8890
3	LZ	0.16	0/198	0.35	0/275
4	TN	0.16	0/359	0.30	0/486
All	All	0.15	0/9384	0.33	0/12713

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	LF	2224	0	2237	18	0
2	LV	6453	0	6332	42	0
3	LZ	199	0	89	1	0
4	TN	351	0	361	6	0
All	All	9227	0	9019	60	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 60 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:LV:702:ASN:ND2	2:LV:705:GLU:OE1	2.22	0.72
1:LF:57:ALA:O	1:LF:61:VAL:HG23	1.93	0.69
2:LV:902:GLU:HB2	2:LV:906:LEU:HD12	1.80	0.64
1:LF:89:ASN:ND2	2:LV:535:GLN:OE1	2.30	0.63
2:LV:634:VAL:HG22	2:LV:715:TYR:HB2	1.82	0.62

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	LF	275/706 (39%)	274 (100%)	1 (0%)	0	100	100
2	LV	819/1087 (75%)	803 (98%)	16 (2%)	0	100	100
3	LZ	38/403 (9%)	38 (100%)	0	0	100	100
4	TN	42/1181 (4%)	39 (93%)	3 (7%)	0	100	100
All	All	1174/3377 (35%)	1154 (98%)	20 (2%)	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	LF	238/584 (41%)	238 (100%)	0	100	100
2	LV	682/940 (73%)	682 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	TN	40/953 (4%)	40 (100%)	0	100	100
All	All	960/2477 (39%)	960 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	LF	457	HIS
2	LV	850	GLN
2	LV	932	HIS

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.

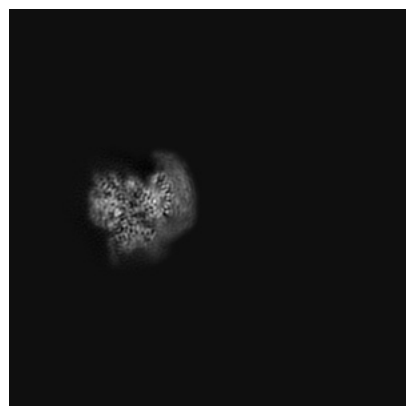
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-52809. These allow visual inspection of the internal detail of the map and identification of artifacts.

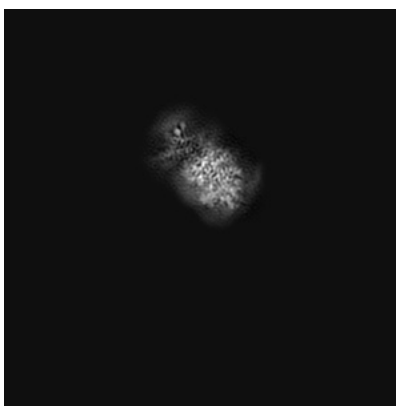
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

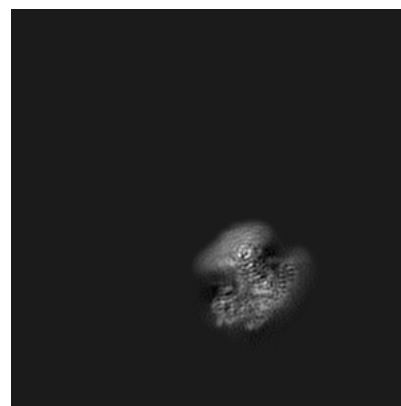
6.1.1 Primary map



X

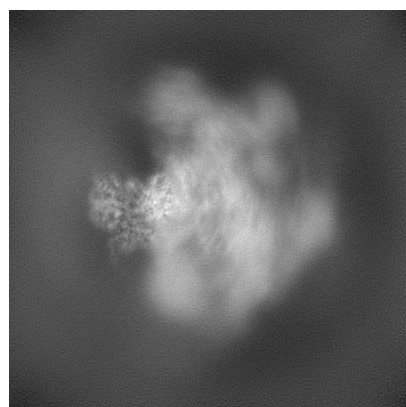


Y

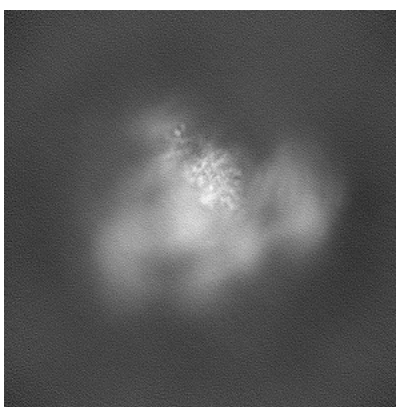


Z

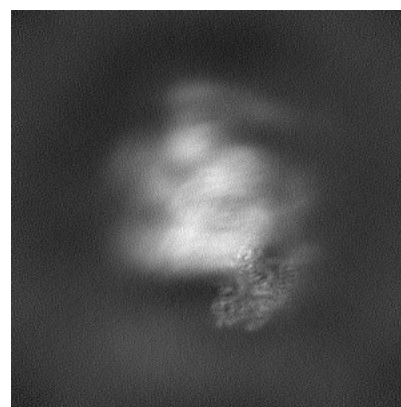
6.1.2 Raw map



X



Y

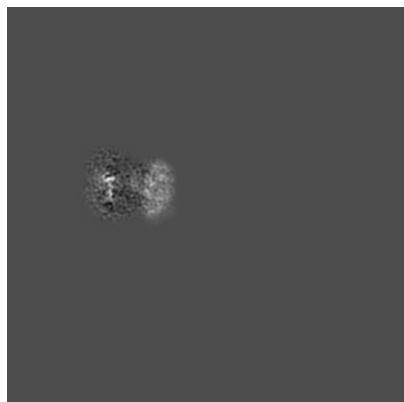


Z

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

6.2 Central slices [i](#)

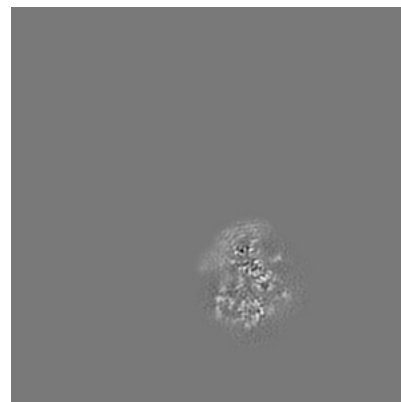
6.2.1 Primary map



X Index: 200

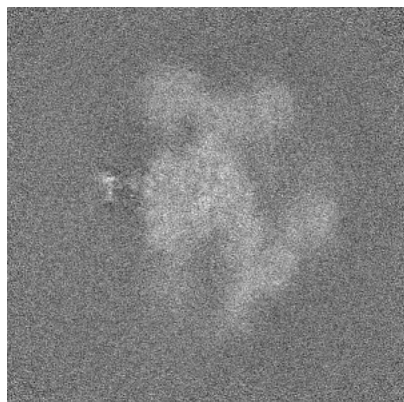


Y Index: 200

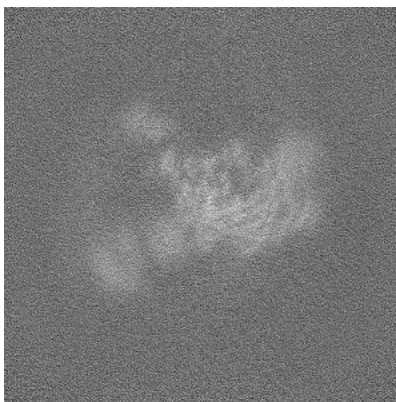


Z Index: 200

6.2.2 Raw map



X Index: 200



Y Index: 200

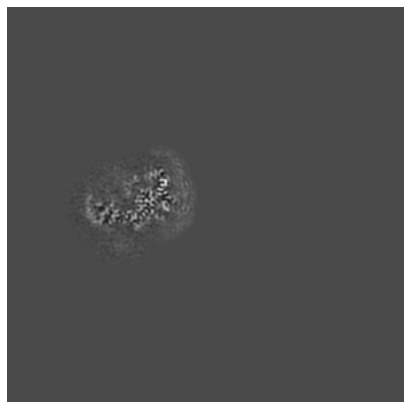


Z Index: 200

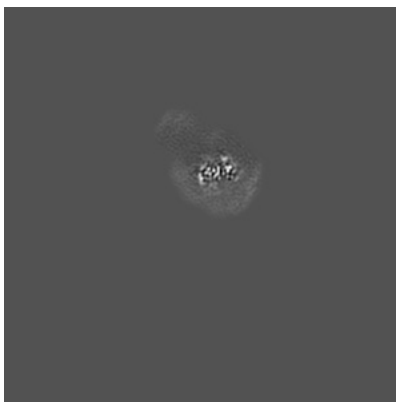
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

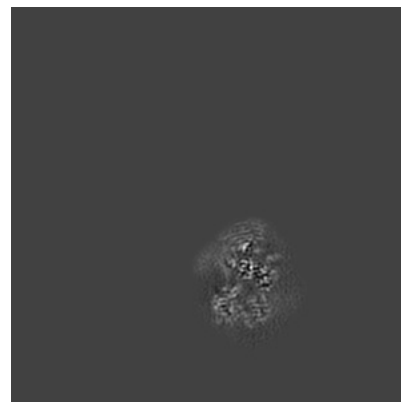
6.3.1 Primary map



X Index: 239

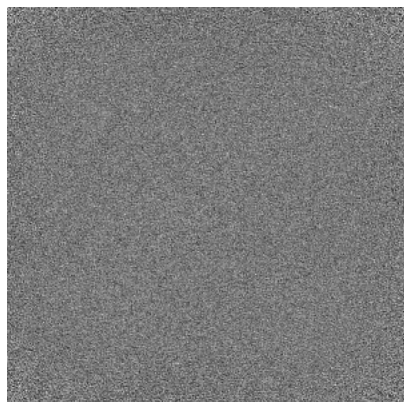


Y Index: 158

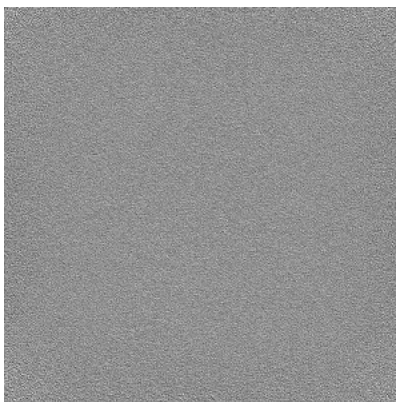


Z Index: 206

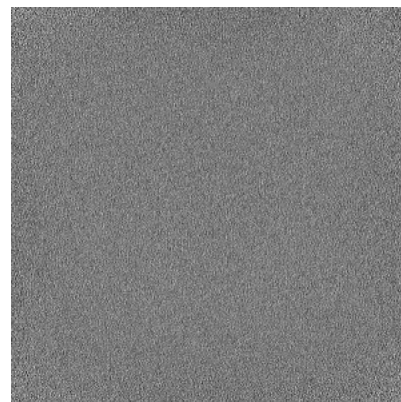
6.3.2 Raw map



X Index: 0



Y Index: 0

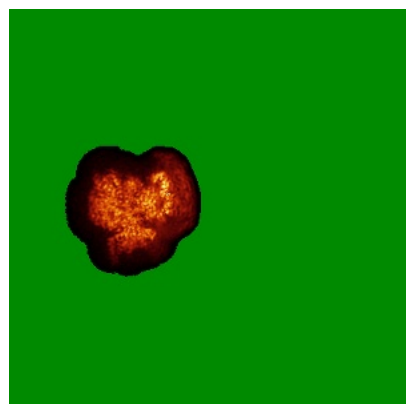


Z Index: 0

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

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

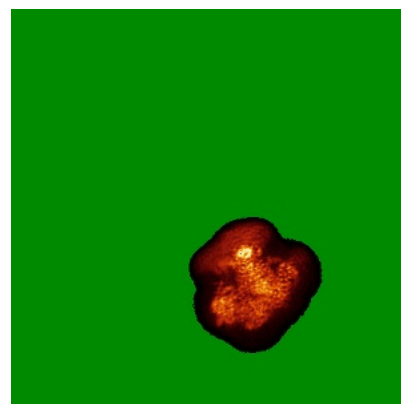
6.4.1 Primary map



X

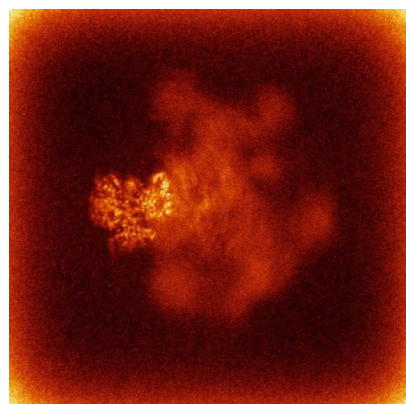


Y

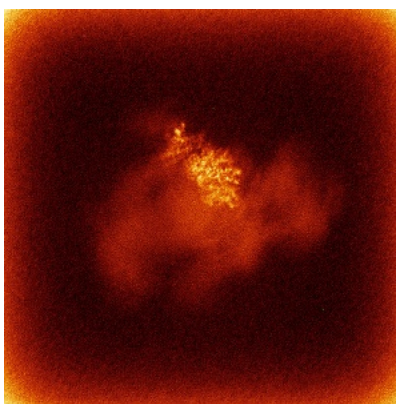


Z

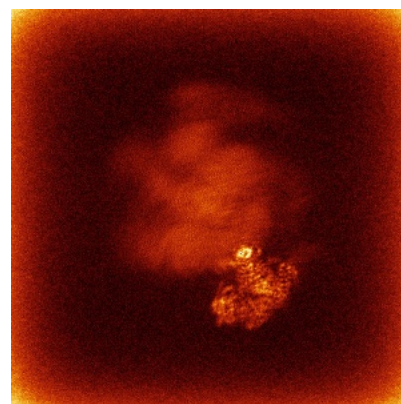
6.4.2 Raw map



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.

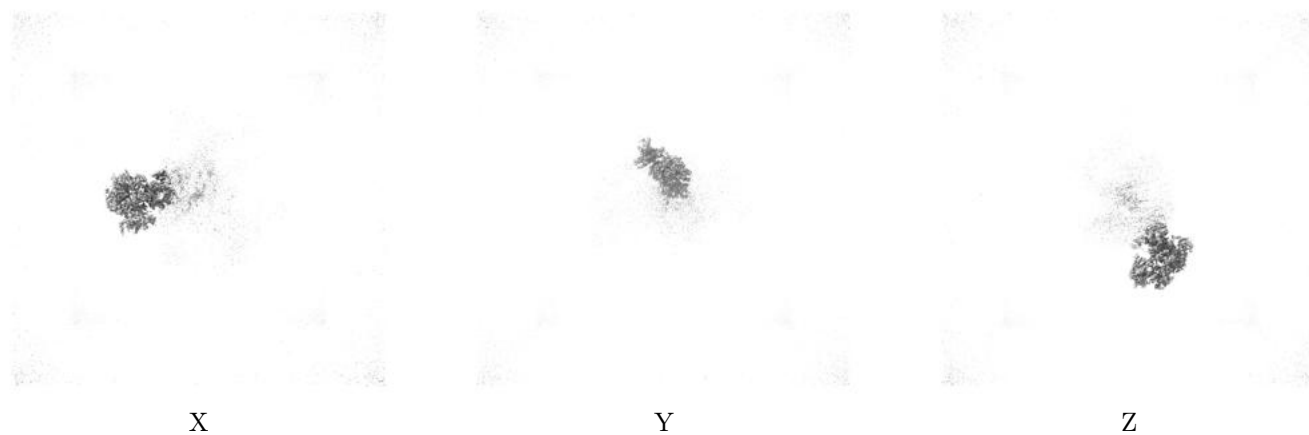
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0666. 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.

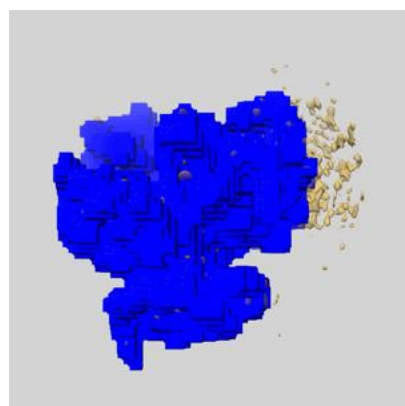
6.6 Mask visualisation [i](#)

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

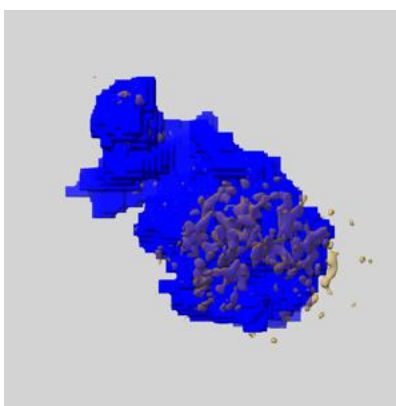
A mask typically either:

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

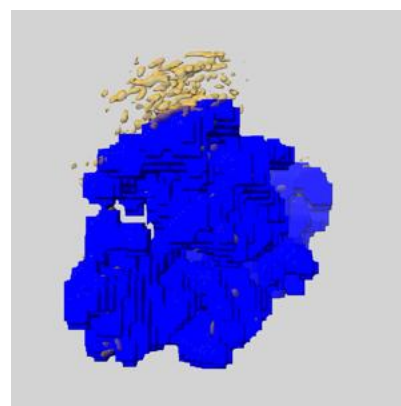
6.6.1 emd_52809_msk_1.map [i](#)



X



Y

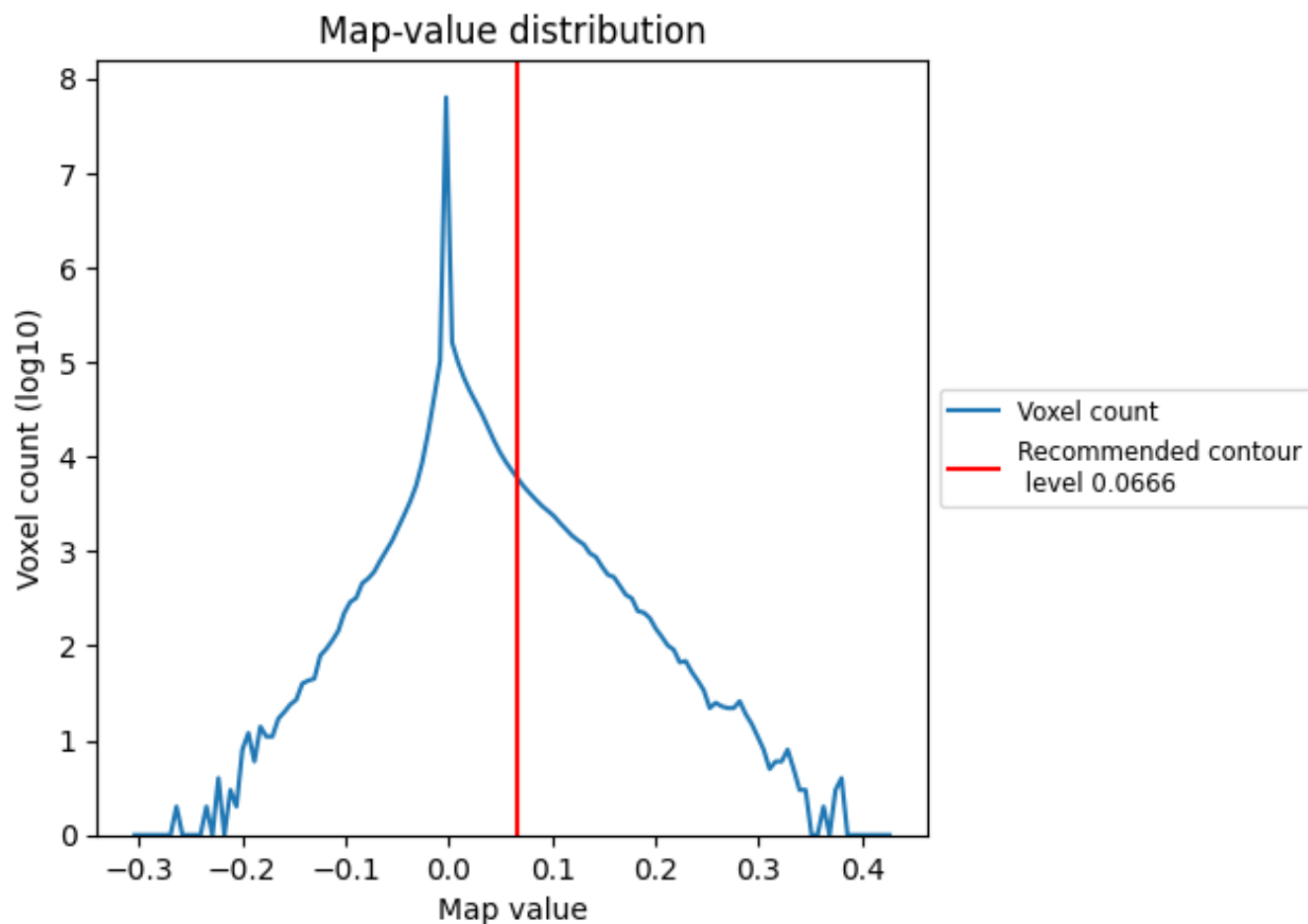


Z

7 Map analysis [i](#)

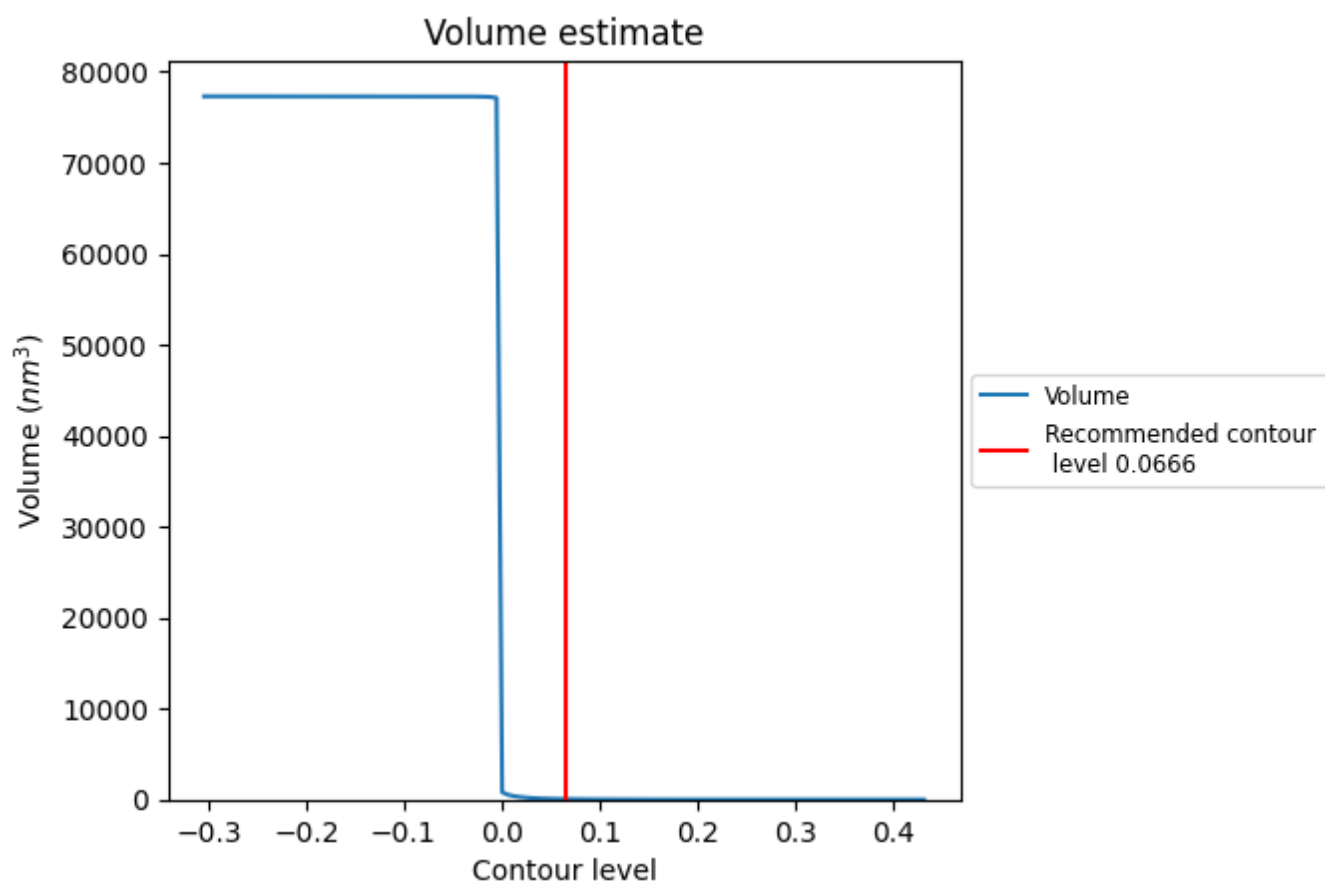
This section contains the results of statistical analysis of the map.

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.

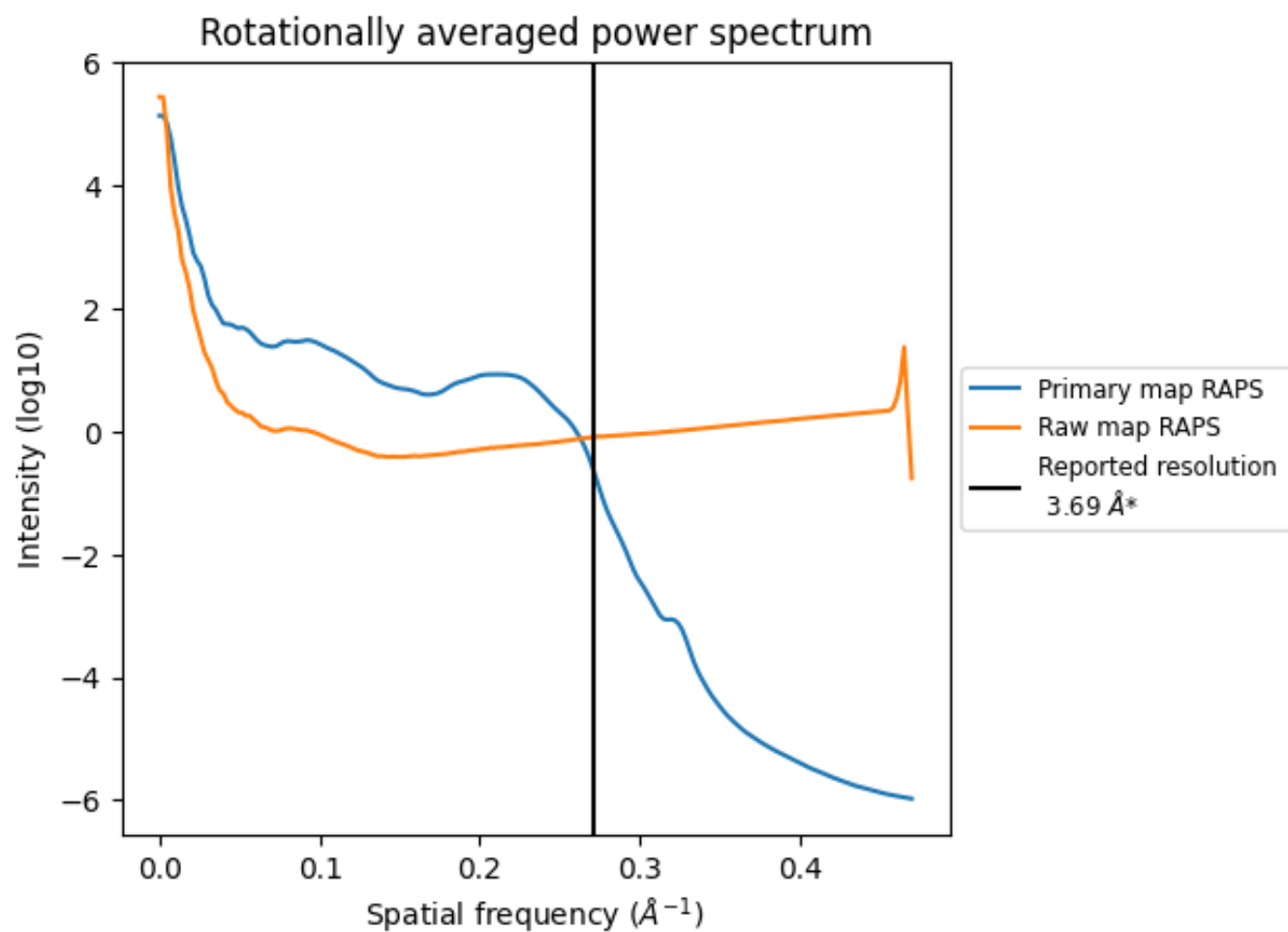
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 49 nm³; this corresponds to an approximate mass of 45 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 ⓘ

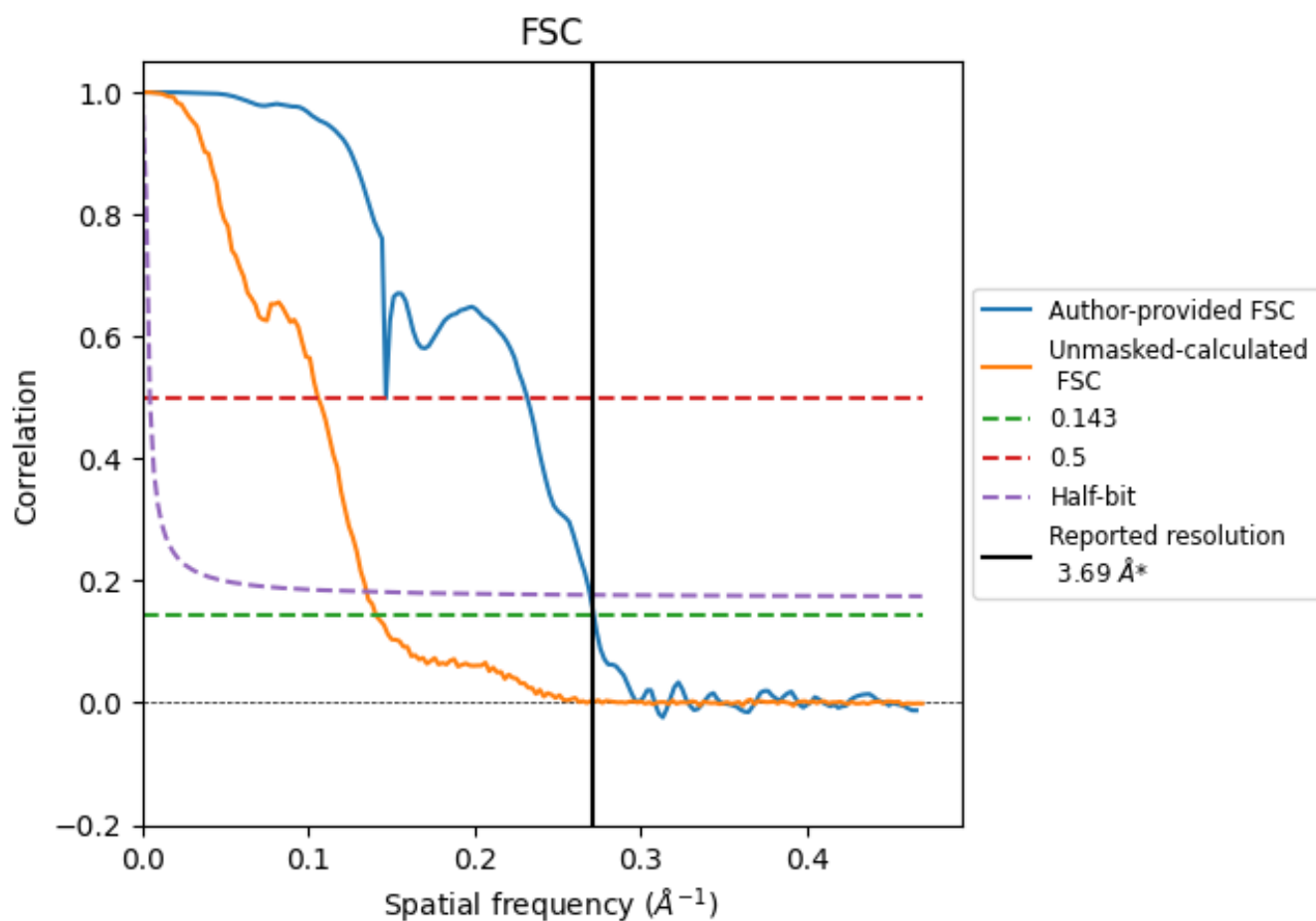


*Reported resolution corresponds to spatial frequency of 0.271 $\text{\AA}^{-1}$

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 $0.271 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

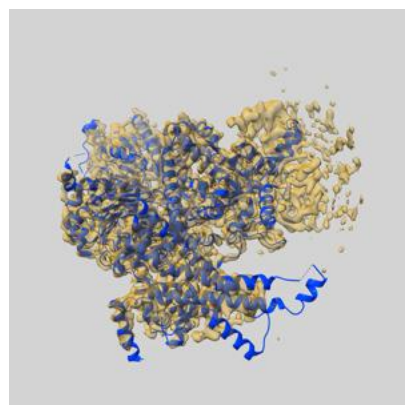
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.69	-	-
Author-provided FSC curve	3.68	6.82	3.71
Unmasked-calculated*	7.10	9.44	7.41

*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 7.10 differs from the reported value 3.69 by more than 10 %

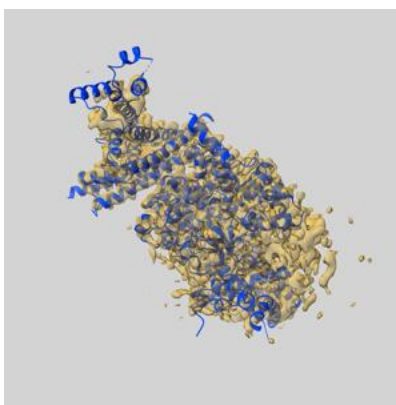
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-52809 and PDB model 9IBD. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

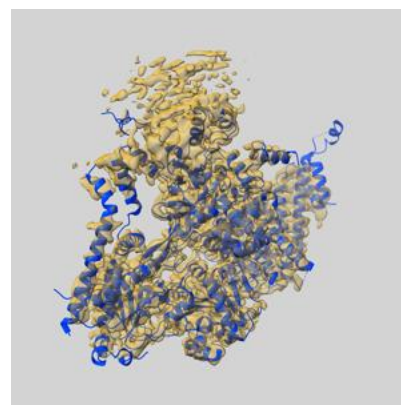
9.1 Map-model overlay [i](#)



X



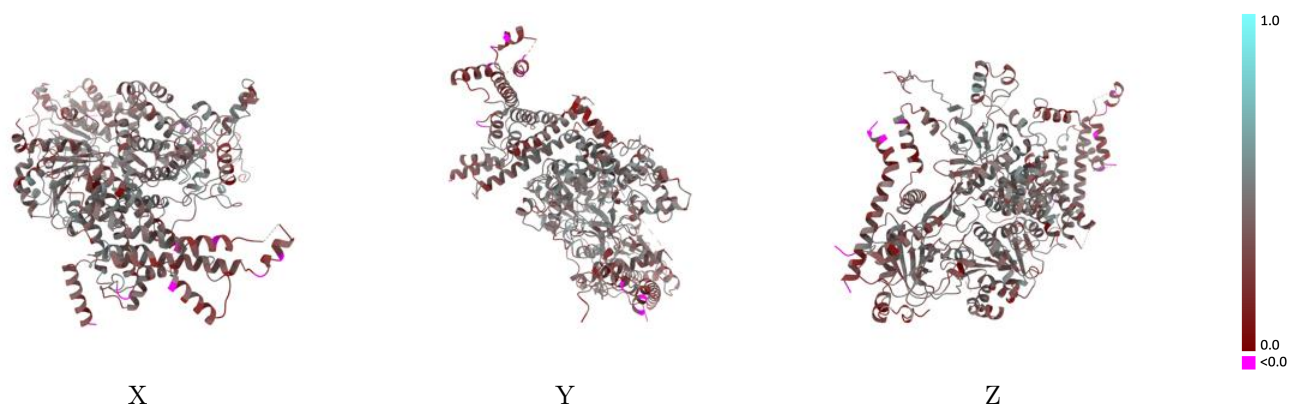
Y



Z

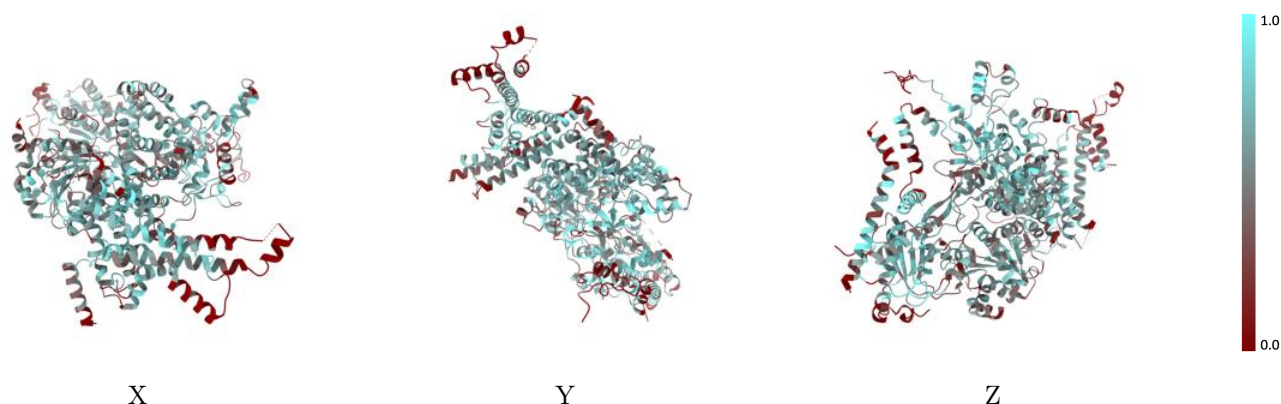
The images above show the 3D surface view of the map at the recommended contour level 0.0666 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



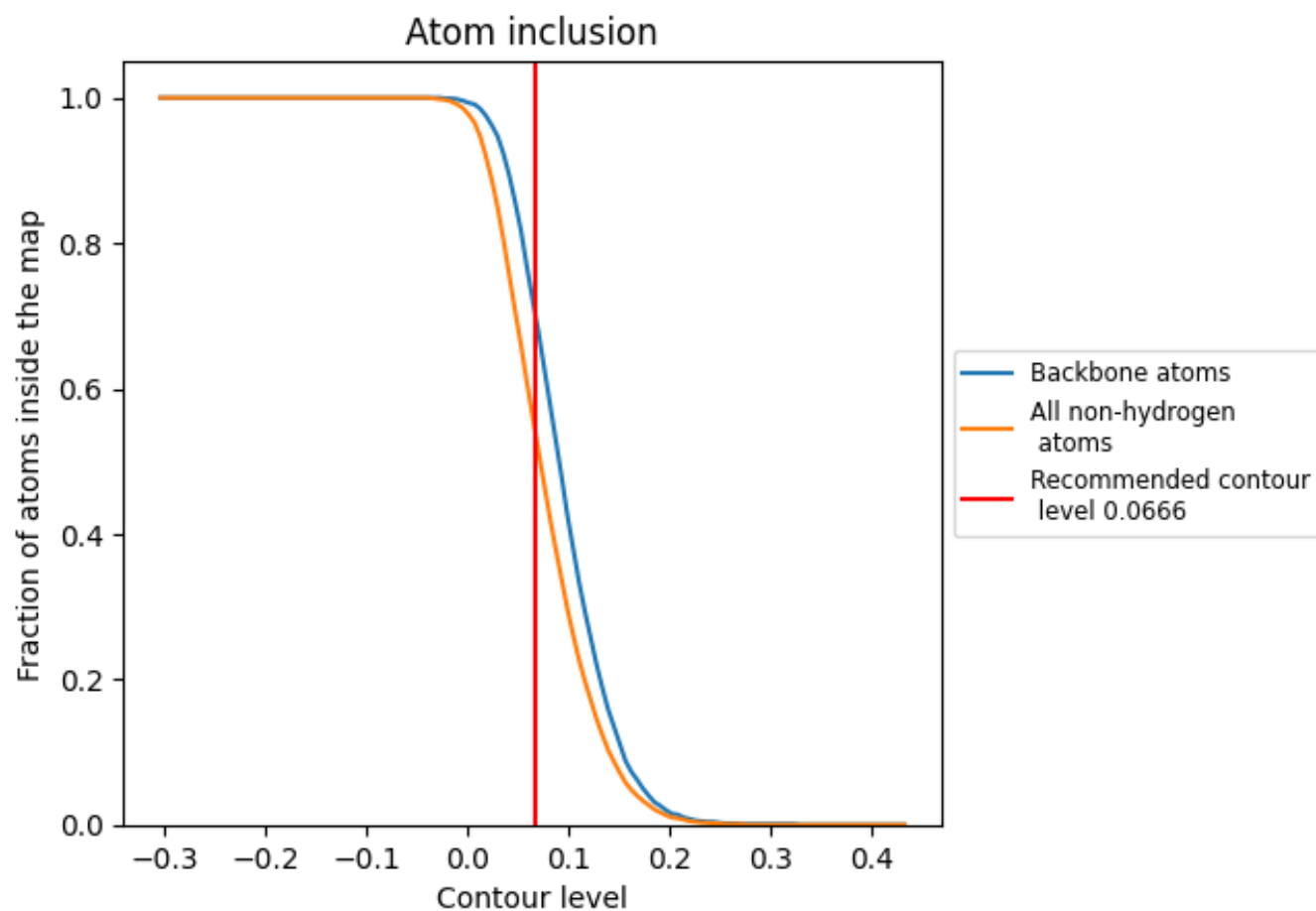
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0666).

9.4 Atom inclusion [i](#)



At the recommended contour level, 70% of all backbone atoms, 54% 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 (0.0666) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5410	0.3710
LF	0.4830	0.3310
LV	0.5790	0.3960
LZ	0.4420	0.2370
TN	0.2670	0.2390

