



wwPDB EM Validation Summary Report ⓘ

Nov 10, 2025 – 09:54 PM JST

PDB ID : 9VAN / pdb_00009van
EMDB ID : EMD-64902
Title : Cryo-EM structure of human full length KICSTOR complex (state 2)
Authors : Su, M.-Y.
Deposited on : 2025-06-03
Resolution : 2.90 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.dev129
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) : 2.46

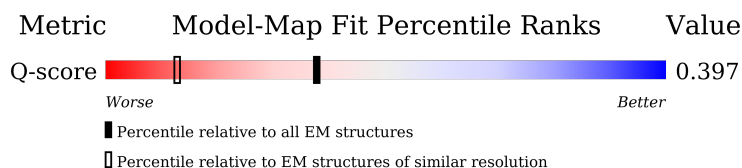
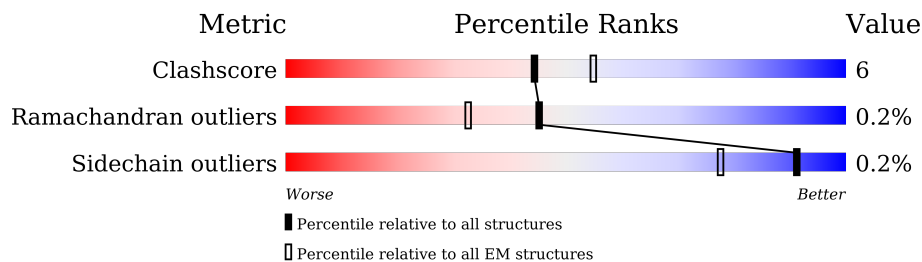
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 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	13054 (2.40 - 3.40)

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	3432	 5% 28% 69%
2	B	447	 70% 15% 14%
3	C	436	 74% 18% 8%
4	D	445	 54% 87% 12%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 14526 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 KICSTOR complex protein SZT2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1061	Total	C	N	O	S	0	0
			6569	4173	1206	1175	15		

- Molecule 2 is a protein called KICSTOR complex protein ITFG2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	384	Total	C	N	O	S	0	0
			2933	1867	498	549	19		

- Molecule 3 is a protein called KICSTOR complex protein kaptin.

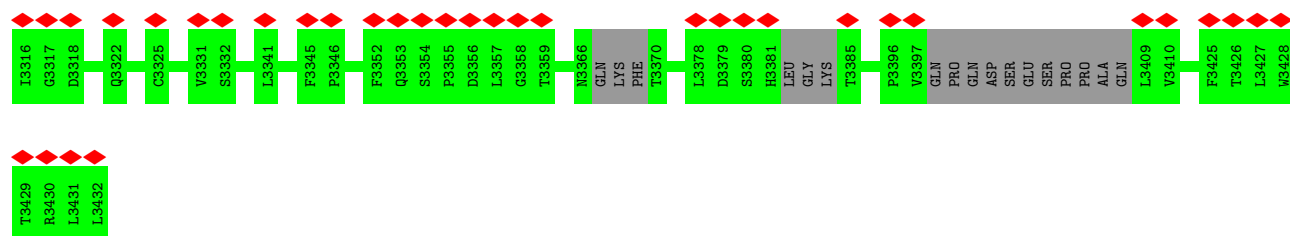
Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	400	Total	C	N	O	S	0	0
			3042	1944	517	571	10		

- Molecule 4 is a protein called KICSTOR subunit 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	D	393	Total	C	N	O	0	0
			1982	1196	393	393		



SER	SER	ARG	THR	LEU	SER	LYS	ALA	L2245	ALA	SER
SER	SER	ILE	PRO	SER	GLY	ALA	P2353	L2249	LEU	ASP
GLY	F3163	MET	ALA	ARG	ALA	GLY	W2360	L2249	SER	TYR
SER	D3164	GLY	THR	GLU	GLN	ARG	W2360	P2252	ARG	ALA
PRO	Y2923	GLN	+	GLY	ARG	SER	W2364	P2252	GLN	ALA
GLY	S926	GLN	+	ARG	P2504	PHE	W2364	P2268	GLU	ASP
ALA	+	ALA	Y2849	ARG	+	TRP	E2372	P2269	PRO	GLU
VAL	S937	VAL	M2854	LEU	V2521	MET	R2379	GLN	ILE	CYS
ASN	+	ASN	+	GLY	+	+	+	GLY	TYR	SER
ALA	+	ALA	P2558	SER	+	LEU	+	LEU	SER	ALA
PRO	ALA	PRO	ALA	SER	A2526	LYS	I2386	P2274	GLU	PRO
ARG	ARG	ARG	ALA	ARG	Q2527	THR	I2387	+	GLU	ARG
GLU	SER	GLY	TRP	GLY	R2528	GLU	L2391	Y2279	ALA	G2023
ALA	THR	LEU	LEU	GLY	W2529	CYS	L2392	L2280	SER	Y2024
PRO	SER	HIS	HIS	GLY	M2530	GLY	P2393	GLY	GLY	L2025
GLY	ARG	GLY	PRO	GLY	+	ASP	+	PRO	PRO	L2026
PRO	PRO	PRO	PRO	LEU	M2543	LEU	L2396	G2290	ARG	A2026
ARG	ARG	GLU	PRO	PRO	+	GLY	CYS	+	SER	A2027
ALA	ALA	GLU	GLU	LEU	V2541	THR	+	+	PRO	A2027
GLU	GLU	GLU	GLU	LEU	T2553	THR	+	+	LEU	T2028
MET	MET	ASP	THR	ASP	L2554	ASP	+	+	ASP	T2028
ALA	ALA	ALA	SER	PHE	T2554	LYS	+	+	MET	M2029
HIS	HIS	PRO	GLY	+	T2567	THR	+	+	VAL	L1951
VAL	LEU	PRO	PRO	P2763	+	THR	+	+	THR	Q1952
LEU	GLY	PRO	PRO	+	L2659	THR	+	+	SER	Q1953
+	THR	ASP	ASP	D2769	+	ASP	+	+	ALA	F2031
ALA	THR	GLY	GLY	R2770	T2663	ASP	+	+	ALA	V2032
GLY	GLY	GLN	GLN	I2771	GLY	ILE	+	+	SER	V2032
ARG	ARG	ARG	ARG	THR	G2675	VAL	+	+	SER	V2033
GLY	GLY	ARG	ARG	ALA	+	LEU	+	+	PRO	G2034
PRO	SER	PRO	HIS	ALA	V2679	LEU	+	+	ASP	F2031
LEU	PHE	ARG	ARG	ALA	+	ASP	+	+	ALA	H2035
ILE	ARG	GLU	PRO	GLU	Q2685	GLY	+	+	ALA	F2037
GLU	SER	GLU	GLU	ALA	+	PRO	+	+	ARG	S2037
ALA	CYS	GLU	GLU	SER	+	LEU	+	+	PRO	C2038
PRO	PRO	SER	SER	SER	L2692	ASP	+	+	PRO	D2039
LYS	LYS	LYS	GLY	VAL	P2693	THR	+	+	VAL	V2040
THR	THR	THR	SER	LEU	C2694	ARG	+	+	GLY	V2041
THR	THR	GLY	GLY	GLY	+	GLY	+	+	GLN	+
ASP	ASP	ARG	ARG	PRO	S2697	SER	+	+	VAL	+
GLY	GLY	GLU	ALA	VAL	+	ALA	+	+	VAL	+
ALA	SER	ALA	ALA	PRO	L2700	ARG	GLY	H2164	D2156	L2052
GLY	PRO	GLY	PRO	ARG	+	HIS	ARG	+	+	+
GLY	PRO	GLY	PRO	ARG	H2704	LYS	ALA	G2165	G2055	G2055
PRO	LYS	PRO	THR	PRO	H2705	THR	ALA	V2166	+	+
SER	SER	SER	SER	D2788	+	GLU	THR	+	+	+
THR	THR	THR	CYS	P2789	+	SER	PHE	G2170	+	+
GLU	GLU	GLU	GLU	V2790	+	LEU	PRO	P2171	+	+
SER	SER	SER	SER	+	+	GLY	PRO	+	+	+
PRO	PRO	PRO	LEU	E2799	+	PRO	PRO	E2176	+	+
ASP	ASP	ASP	ASP	+	ARG	THR	ALA	L2177	+	+
VAL	VAL	VAL	VAL	L2808	ASP	GLY	VAL	+	+	+
LEU	LEU	LEU	SER	E2815	GLU	GLY	GLY	C2182	CYS	S2102
ASP	L2996	L2996	PRO	+	LYS	ALA	GLU	+	ASP	+
SER	A2997	A2997	PRO	+	GLU	GLU	GLU	L2185	ASP	+
GLY	F2998	F2998	GLY	V2819	PRO	ARG	PRO	+	ARG	+
LEU	+	+	ALA	+	THR	ALA	VAL	P2218	PRO	D1992
GLU	V3005	V3005	ARG	Q2822	GLY	L2608	THR	+	TRP	L1993
ALA	GLU	GLU	GLU	GLN	+	L2609	GLY	W2239	ALA	W1994
ALA	ARG	ARG	GLU	+	L2723	L2610	PRO	+	LYS	R1995
PRO	HIS	HIS	ARG	+	P2739	+	PRO	+	GLY	R1995
GLY	+	+	SER	+	+	F2615	SER	+	ASP	S1996
									GLU	GLU
									ALA	ALA
									LEU	LEU
									PRO	PRO
									PRO	PRO
									PRO	PRO
									GLN	GLN
									ALA	ALA
									ARG	ARG
									ALA	ALA
									PRO	PRO
									LEU	LEU



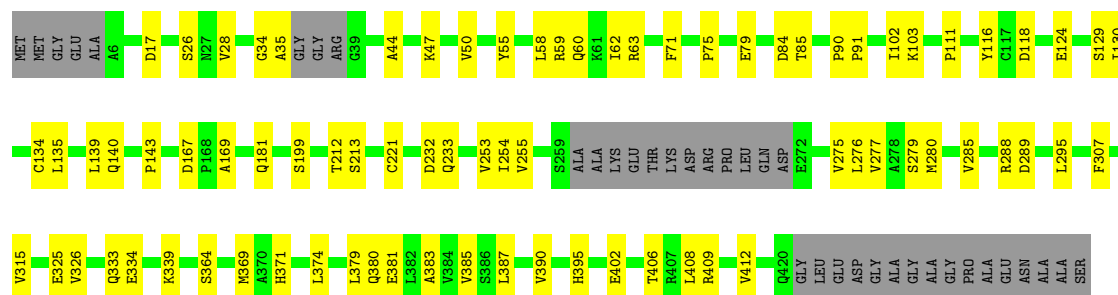
• Molecule 2: KICSTOR complex protein ITFG2

Chain B: 70% 15% 14%



• Molecule 3: KICSTOR complex protein kaptein

Chain C: 74% 18% 8%



• Molecule 4: KICSTOR subunit 2

Chain D: 54% 87% 12%





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	280444	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE, NONE, NONE, NONE	Depositor
Microscope	TFS KRIOS, TFS KRIOS, TFS KRIOS, TFS KRIOS	Depositor
Voltage (kV)	300, 300, 300, 300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	54.74, 53.88, 52.4, 59.61	Depositor
Minimum defocus (nm)	1200, 1200, 1200, 1200	Depositor
Maximum defocus (nm)	1800, 1800, 1800, 1800	Depositor
Magnification	Not provided, Not provided, Not provided, Not provided	Depositor
Image detector	GATAN K3 (6k x 4k), GATAN K3 (6k x 4k), GATAN K3 (6k x 4k), GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.860	Depositor
Minimum map value	-0.604	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.0718	Depositor
Map size (Å)	612.0, 612.0, 612.0	wwPDB
Map dimensions	720, 720, 720	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.85, 0.85, 0.85	Depositor

5 Model quality

5.1 Standard geometry

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	0.18	0/6686	0.45	4/9204 (0.0%)
2	B	0.25	0/2991	0.38	0/4070
3	C	0.27	0/3105	0.36	0/4228
4	D	0.10	0/1994	0.25	0/2790
All	All	0.21	0/14776	0.40	4/20292 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2617	GLN	N-CA-C	-6.33	106.53	114.56
1	A	2325	LEU	CA-C-N	5.82	132.65	121.54
1	A	2325	LEU	C-N-CA	5.82	132.65	121.54
1	A	2527	GLN	N-CA-C	-5.58	108.26	114.62

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	6569	0	4830	73	0
2	B	2933	0	2829	44	0
3	C	3042	0	2961	53	0
4	D	1982	0	962	2	0
All	All	14526	0	11582	161	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 6.

The worst 5 of 161 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)
3:C:34:GLY:O	3:C:35:ALA:CB	2.29	0.81
1:A:2720:ASN:HD22	1:A:2723:LEU:HG	1.51	0.75
2:B:207:TYR:OH	2:B:295:ASP:OD2	2.05	0.74
2:B:1:MET:O	2:B:343:ARG:NH2	2.21	0.73
1:A:2325:LEU:O	1:A:2326:ARG:NH1	2.23	0.71

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	1005/3432 (29%)	930 (92%)	73 (7%)	2 (0%)	44	73
2	B	374/447 (84%)	351 (94%)	21 (6%)	2 (0%)	25	56
3	C	394/436 (90%)	369 (94%)	24 (6%)	1 (0%)	37	66
4	D	387/445 (87%)	380 (98%)	7 (2%)	0	100	100
All	All	2160/4760 (45%)	2030 (94%)	125 (6%)	5 (0%)	45	73

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2324	PRO
2	B	291	MET
2	B	249	ILE
3	C	59	ARG
1	A	2326	ARG

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	366/2957 (12%)	366 (100%)	0	100	100
2	B	312/387 (81%)	311 (100%)	1 (0%)	91	97
3	C	325/370 (88%)	324 (100%)	1 (0%)	91	97
4	D	15/389 (4%)	15 (100%)	0	100	100
All	All	1018/4103 (25%)	1016 (100%)	2 (0%)	91	98

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	288	MET
3	C	295	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	426	HIS
3	C	176	ASN
3	C	180	HIS
1	A	2796	GLN
2	B	62	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.

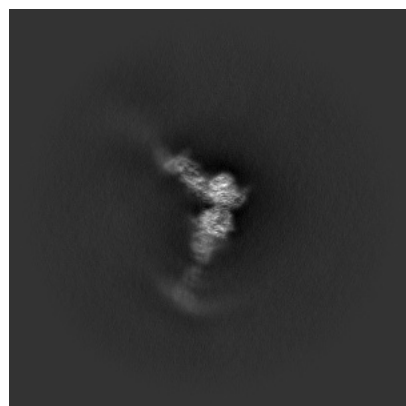
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-64902. These allow visual inspection of the internal detail of the map and identification of artifacts.

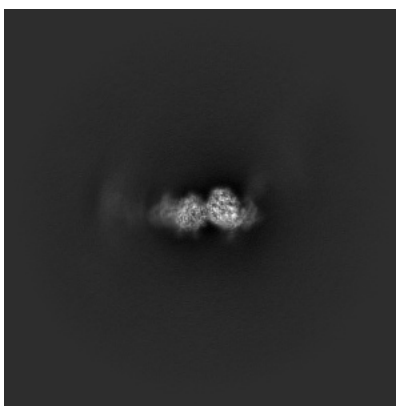
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

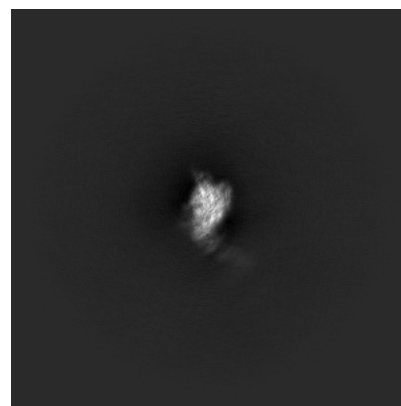
6.1.1 Primary map



X

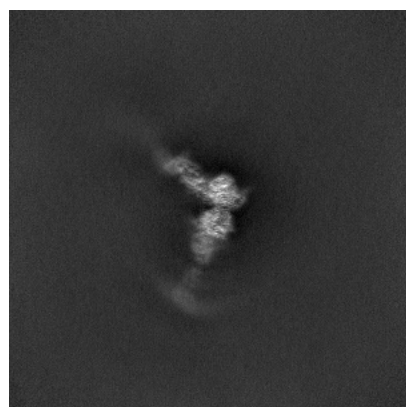


Y

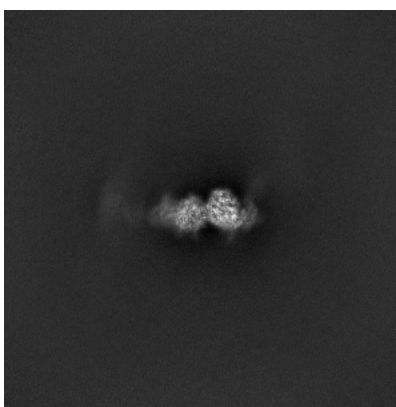


Z

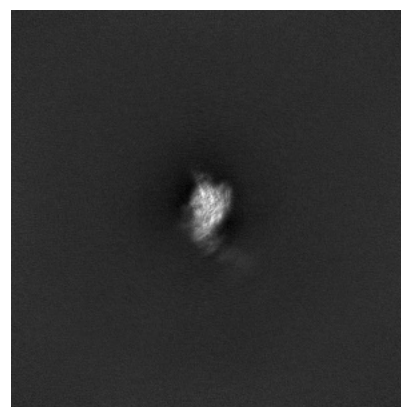
6.1.2 Raw map



X



Y

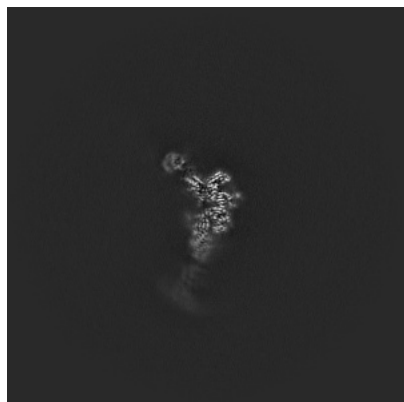


Z

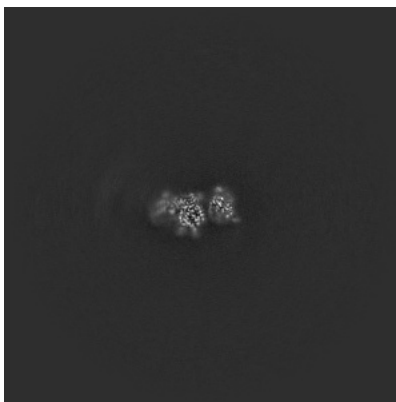
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

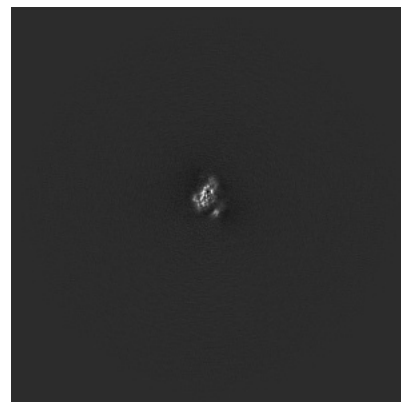
6.2.1 Primary map



X Index: 360

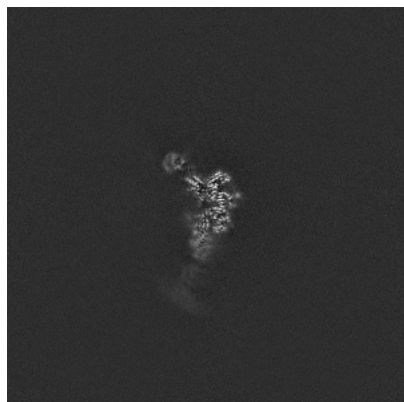


Y Index: 360

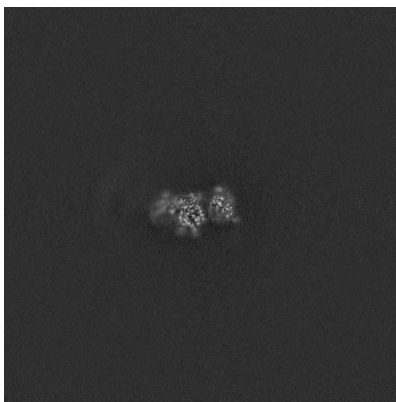


Z Index: 360

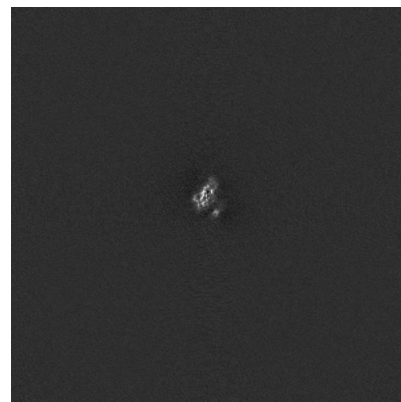
6.2.2 Raw map



X Index: 360



Y Index: 360

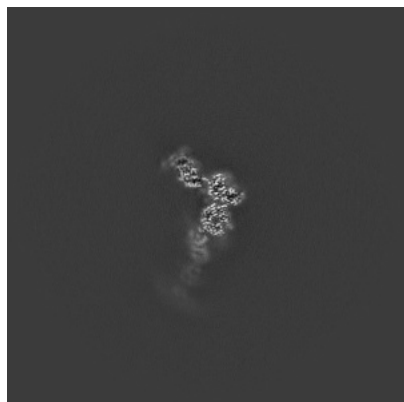


Z Index: 360

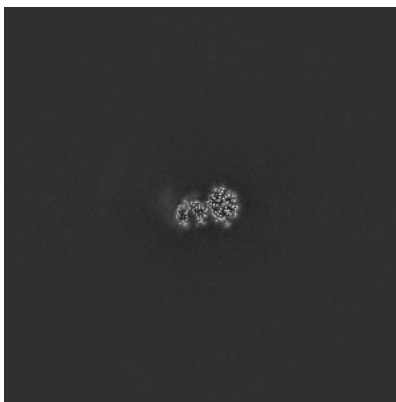
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

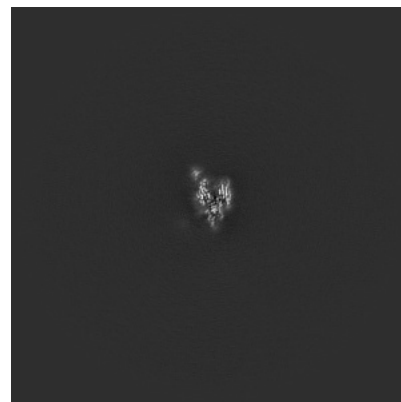
6.3.1 Primary map



X Index: 347

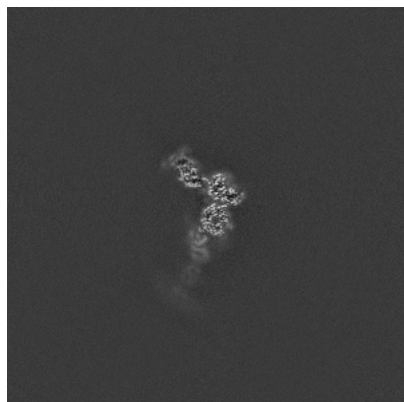


Y Index: 378

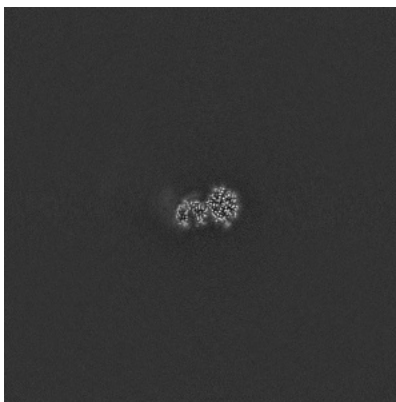


Z Index: 390

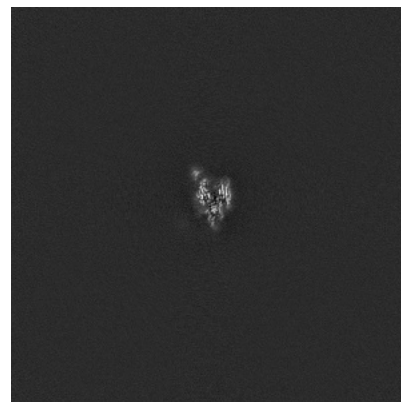
6.3.2 Raw map



X Index: 347



Y Index: 378



Z Index: 390

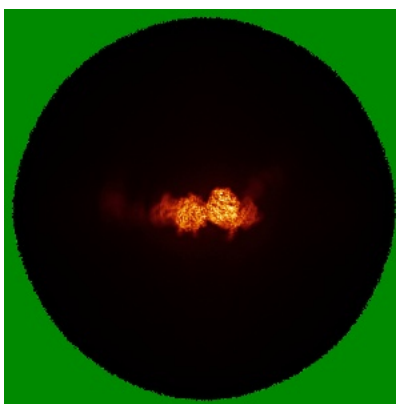
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



X

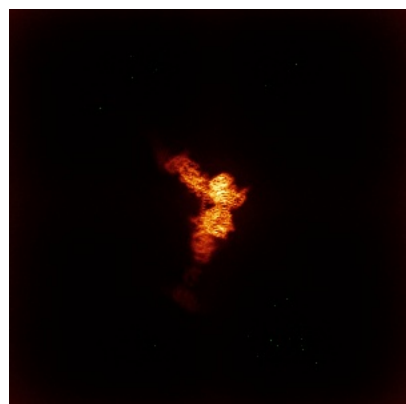


Y

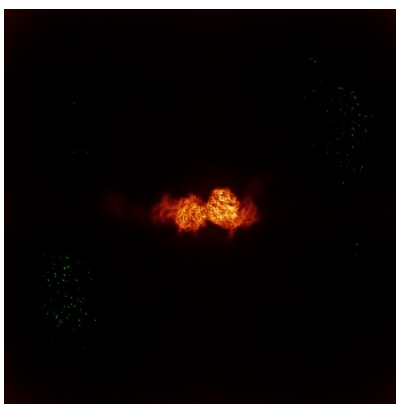


Z

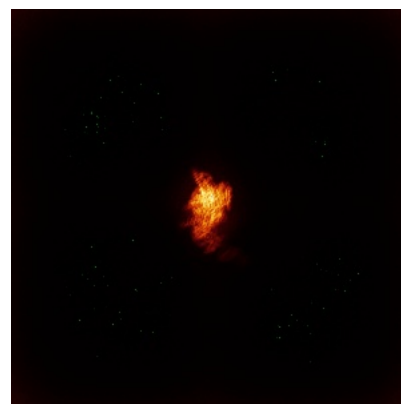
6.4.2 Raw map



X



Y

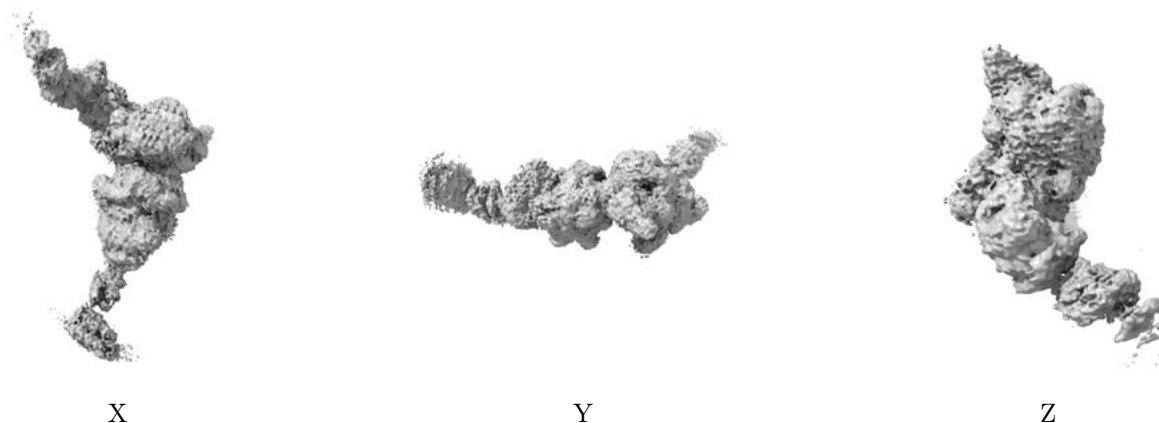


Z

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.

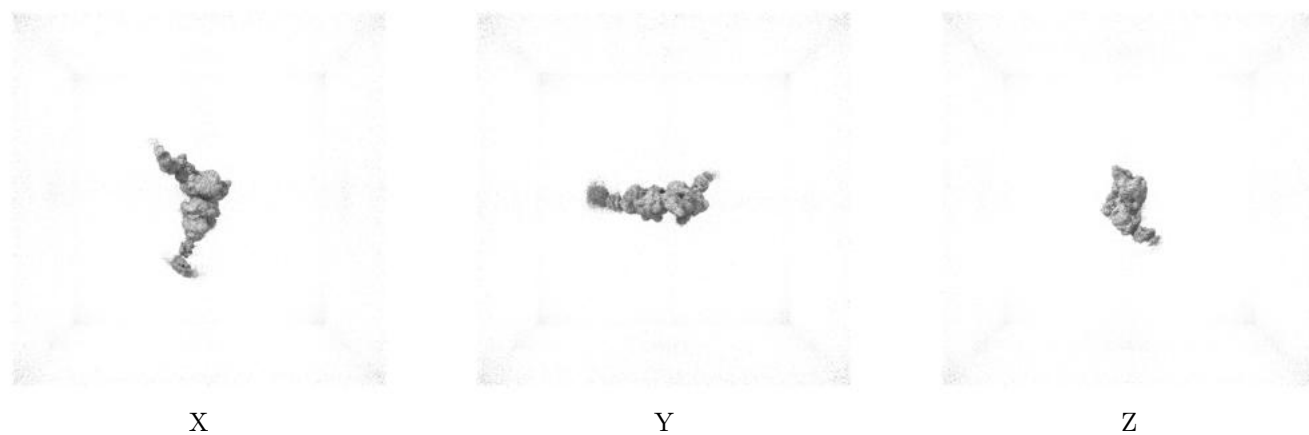
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0718. 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.

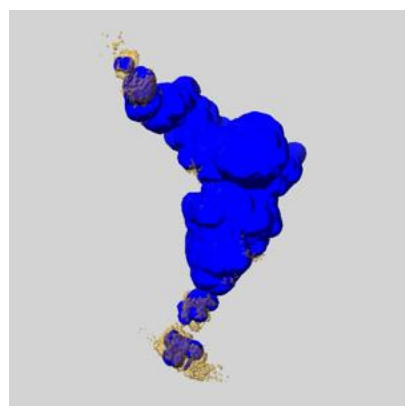
6.6 Mask visualisation [i](#)

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

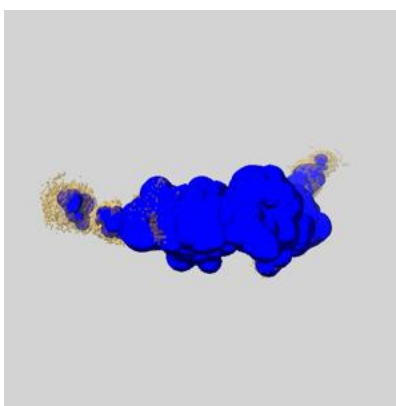
A mask typically either:

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

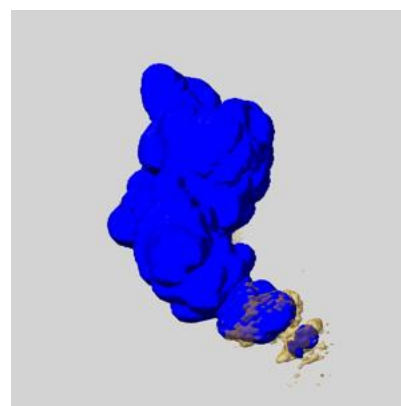
6.6.1 emd_64902_msk_1.map [i](#)



X



Y

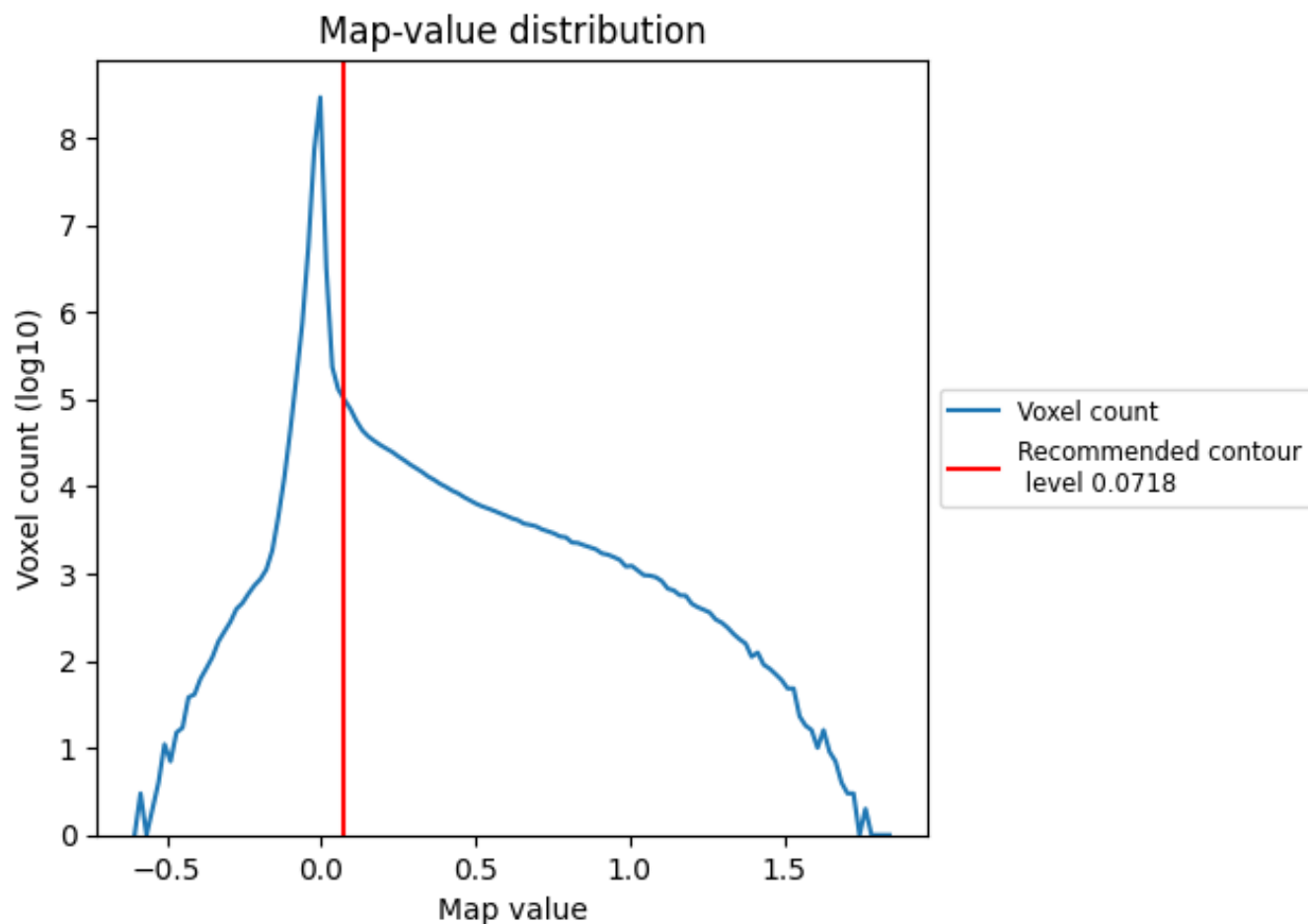


Z

7 Map analysis [i](#)

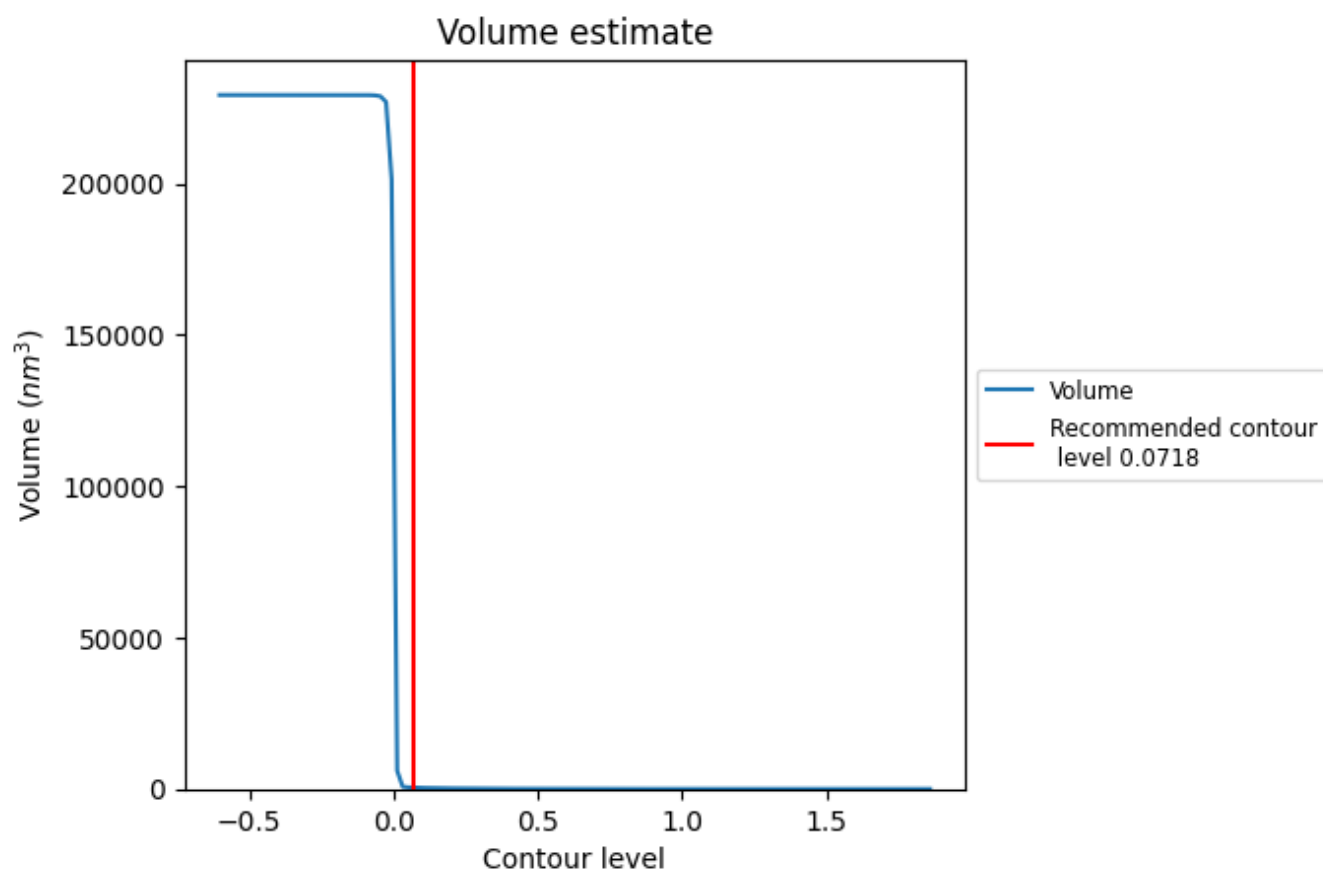
This section contains the results of statistical analysis of the map.

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.

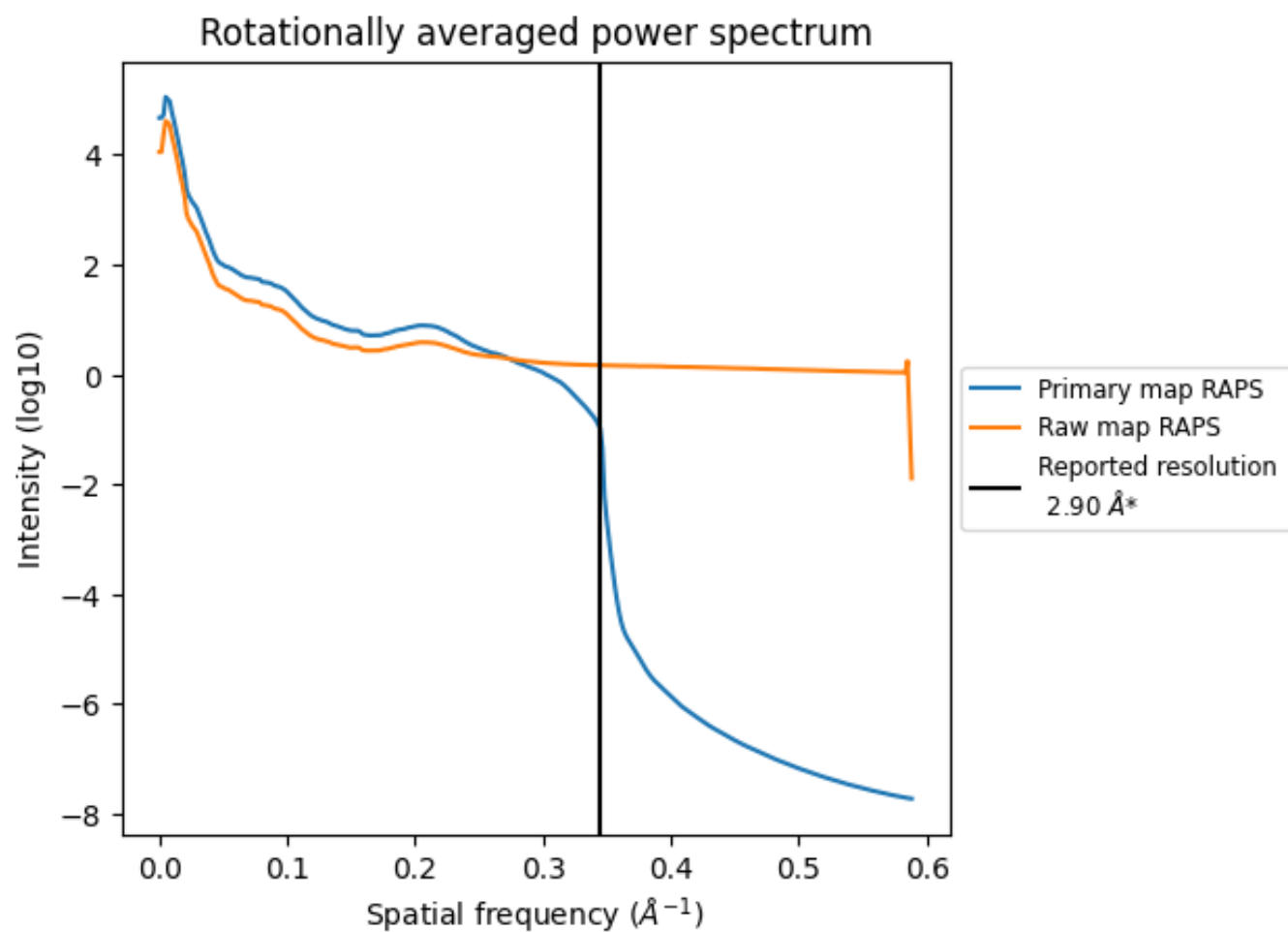
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 439 nm^3 ; this corresponds to an approximate mass of 397 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 ⓘ

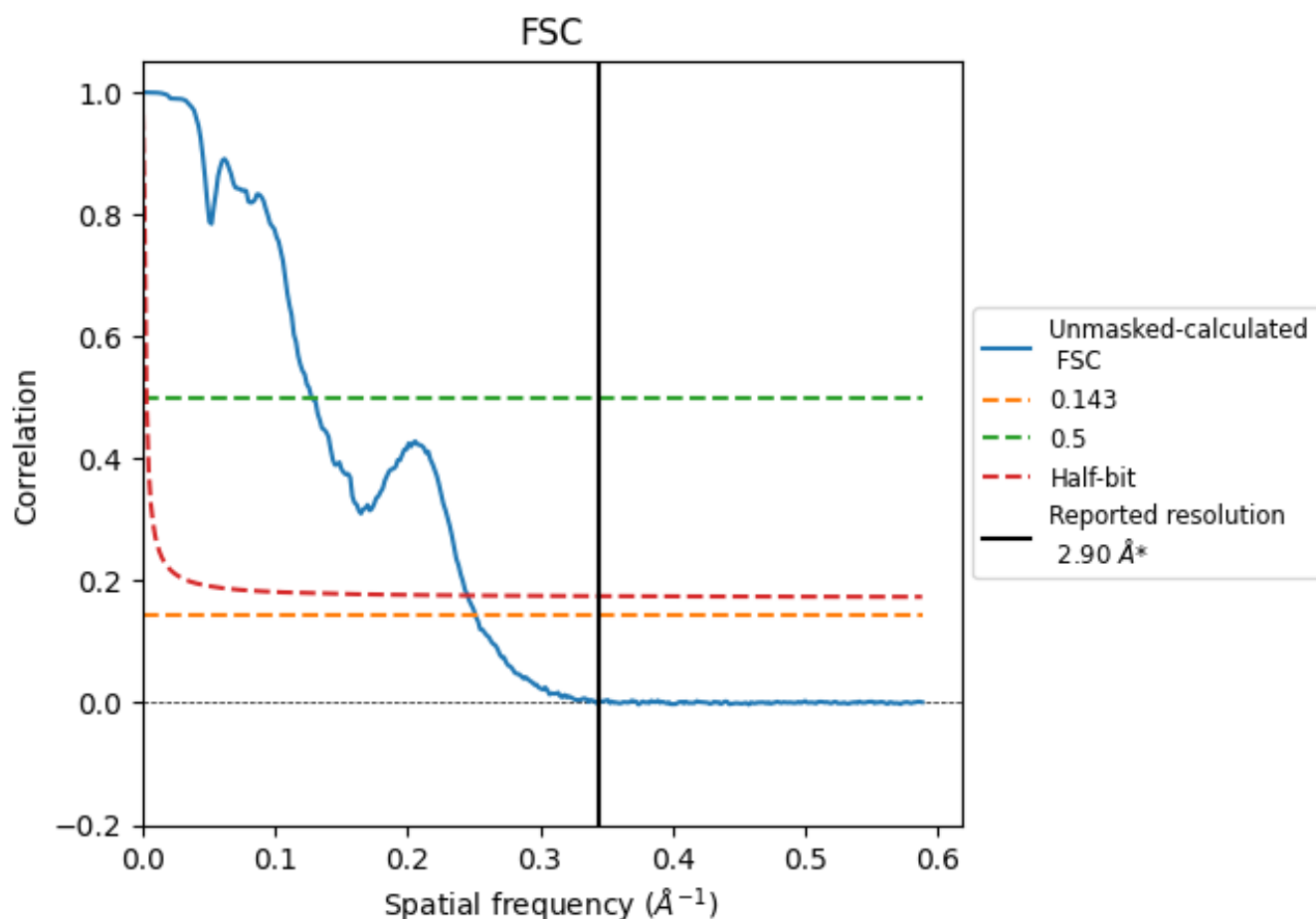


*Reported resolution corresponds to spatial frequency of 0.345 \AA^{-1}

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 0.345 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.98	7.82	4.08

*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 3.98 differs from the reported value 2.9 by more than 10 %

9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-64902 and PDB model 9VAN. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

9.1 Map-model overlay [i](#)



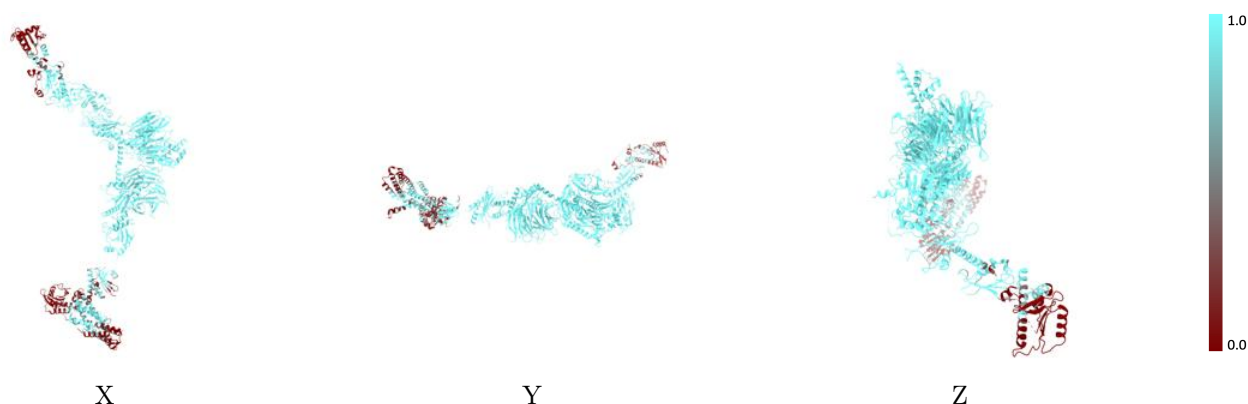
The images above show the 3D surface view of the map at the recommended contour level 0.0718 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



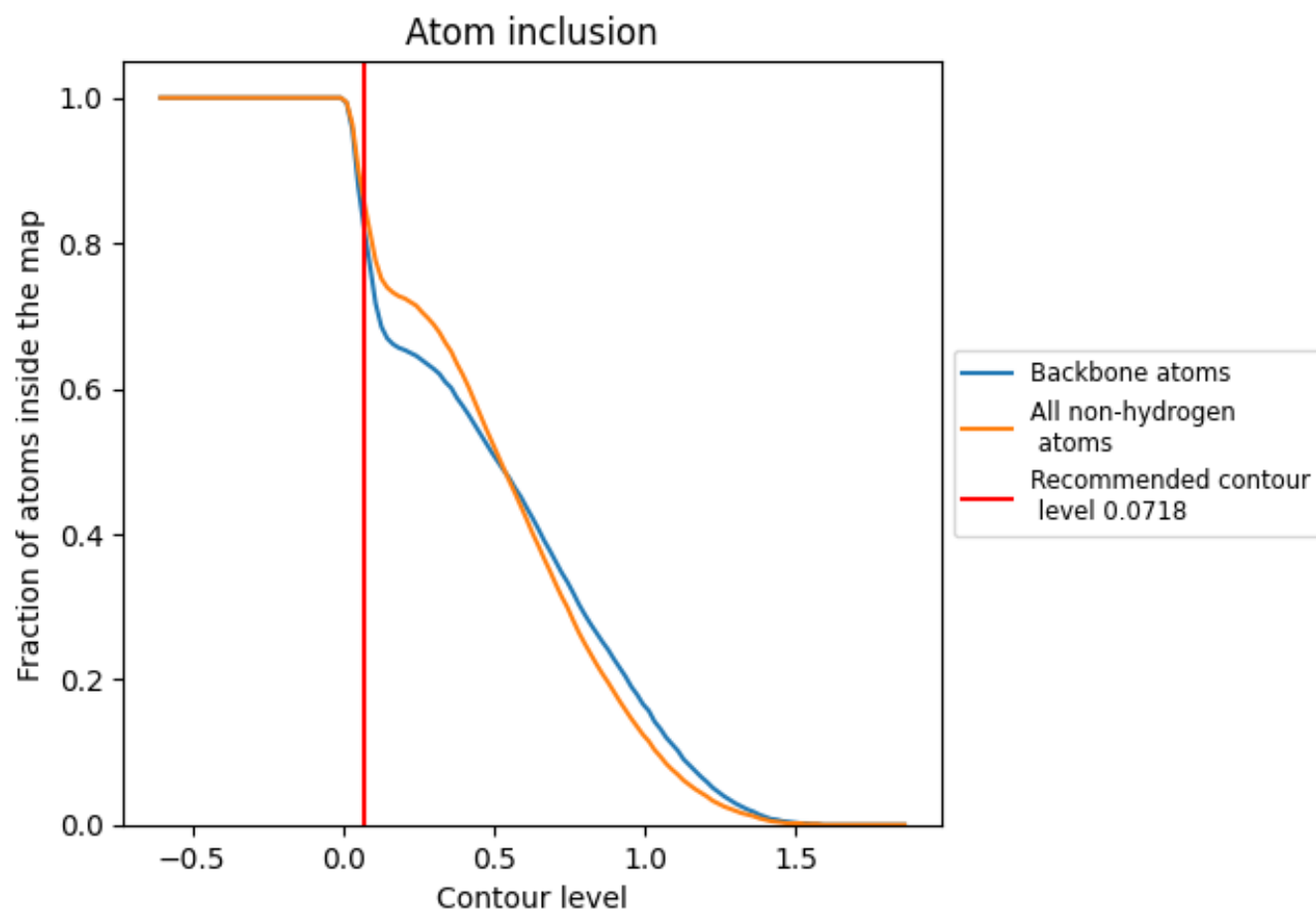
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0718).

9.4 Atom inclusion [i](#)



At the recommended contour level, 82% of all backbone atoms, 85% 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 (0.0718) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.8530	<div></div> 0.3970
A	<div></div> 0.8610	<div></div> 0.3570
B	<div></div> 1.0000	<div></div> 0.5490
C	<div></div> 1.0000	<div></div> 0.5570
D	<div></div> 0.3890	<div></div> 0.0560

