



wwPDB EM Validation Summary Report ⓘ

Jun 5, 2024 – 04:17 PM JST

PDB ID : 8YF0
EMDB ID : EMD-39206
Title : Cryo-EM structure of human SV2A
Authors : Qu, Q.; Liu, S.; Zhou, Z.
Deposited on : 2024-02-23
Resolution : 3.49 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.dev92
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

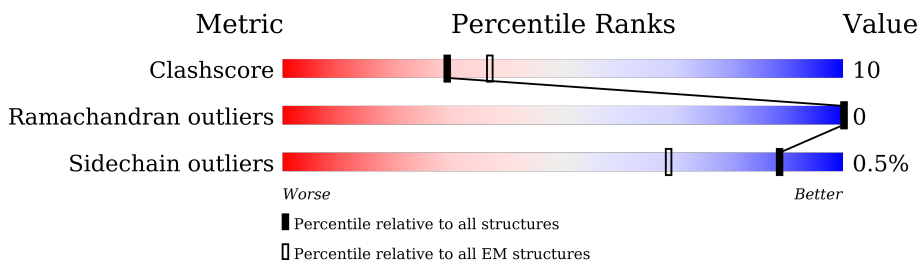
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.49 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	B	755	
1	C	755	

2 Entry composition i

There is only 1 type of molecule in this entry. The entry contains 9181 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 Synaptic vesicle glycoprotein 2A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	567	Total	C	N	O	S	0	0
			4505	2937	746	787	35		
1	C	592	Total	C	N	O	S	0	0
			4676	3052	773	816	35		

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	735	SER	-	expression tag	UNP Q7L0J3
B	736	ARG	-	expression tag	UNP Q7L0J3
B	737	LEU	-	expression tag	UNP Q7L0J3
B	738	GLU	-	expression tag	UNP Q7L0J3
B	739	GLU	-	expression tag	UNP Q7L0J3
B	740	GLU	-	expression tag	UNP Q7L0J3
B	741	LEU	-	expression tag	UNP Q7L0J3
B	742	ARG	-	expression tag	UNP Q7L0J3
B	743	ARG	-	expression tag	UNP Q7L0J3
B	744	ARG	-	expression tag	UNP Q7L0J3
B	745	THR	-	expression tag	UNP Q7L0J3
B	746	GLU	-	expression tag	UNP Q7L0J3
B	747	PRO	-	expression tag	UNP Q7L0J3
B	748	GLY	-	expression tag	UNP Q7L0J3
B	749	SER	-	expression tag	UNP Q7L0J3
B	750	LEU	-	expression tag	UNP Q7L0J3
B	751	GLU	-	expression tag	UNP Q7L0J3
B	752	VAL	-	expression tag	UNP Q7L0J3
B	753	LEU	-	expression tag	UNP Q7L0J3
B	754	PHE	-	expression tag	UNP Q7L0J3
B	755	GLN	-	expression tag	UNP Q7L0J3
C	735	SER	-	expression tag	UNP Q7L0J3
C	736	ARG	-	expression tag	UNP Q7L0J3
C	737	LEU	-	expression tag	UNP Q7L0J3
C	738	GLU	-	expression tag	UNP Q7L0J3
C	739	GLU	-	expression tag	UNP Q7L0J3

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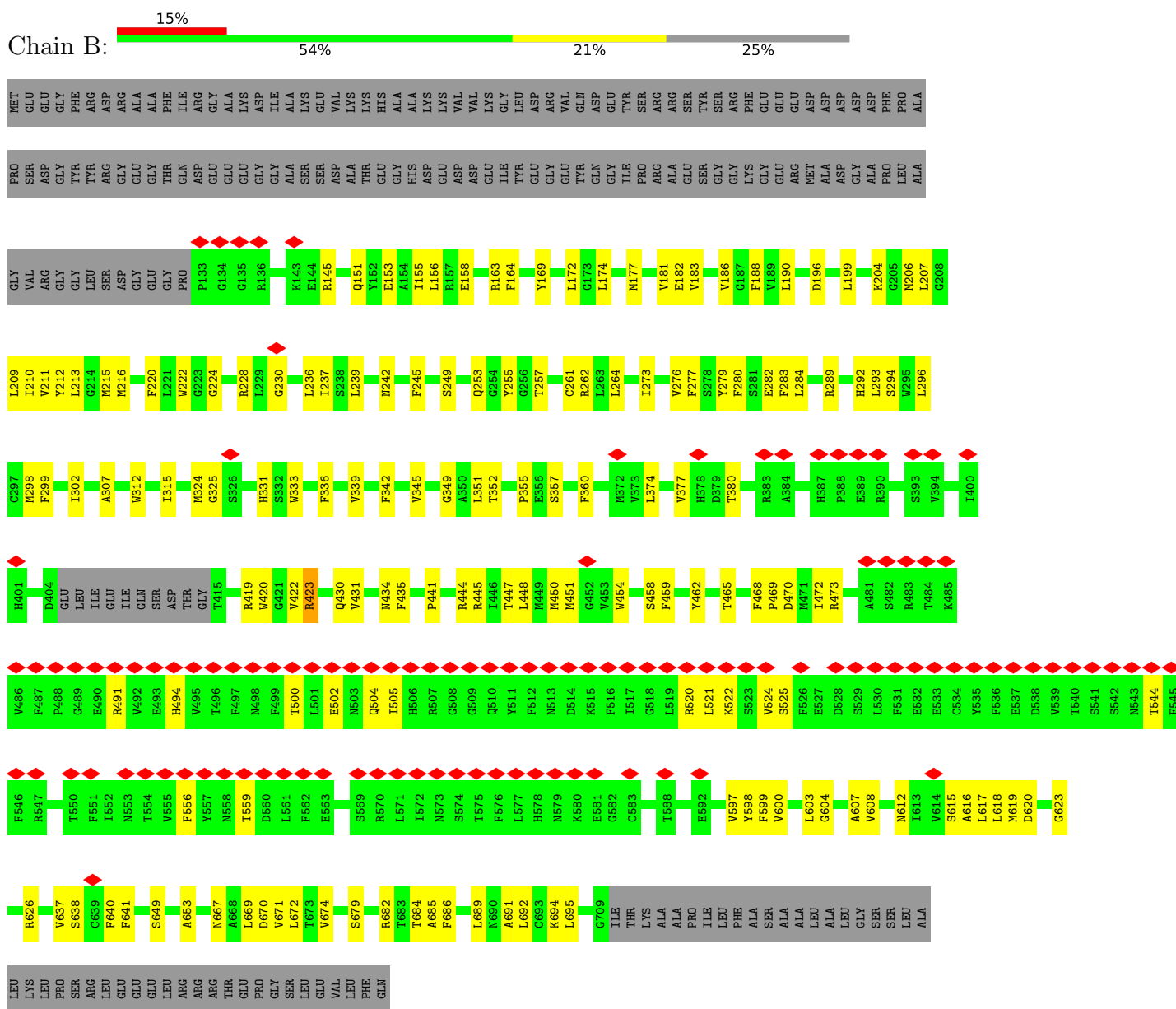
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Chain	Residue	Modelled	Actual	Comment	Reference
C	740	GLU	-	expression tag	UNP Q7L0J3
C	741	LEU	-	expression tag	UNP Q7L0J3
C	742	ARG	-	expression tag	UNP Q7L0J3
C	743	ARG	-	expression tag	UNP Q7L0J3
C	744	ARG	-	expression tag	UNP Q7L0J3
C	745	THR	-	expression tag	UNP Q7L0J3
C	746	GLU	-	expression tag	UNP Q7L0J3
C	747	PRO	-	expression tag	UNP Q7L0J3
C	748	GLY	-	expression tag	UNP Q7L0J3
C	749	SER	-	expression tag	UNP Q7L0J3
C	750	LEU	-	expression tag	UNP Q7L0J3
C	751	GLU	-	expression tag	UNP Q7L0J3
C	752	VAL	-	expression tag	UNP Q7L0J3
C	753	LEU	-	expression tag	UNP Q7L0J3
C	754	PHE	-	expression tag	UNP Q7L0J3
C	755	GLN	-	expression tag	UNP Q7L0J3

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Synaptic vesicle glycoprotein 2A



- Molecule 1: Synaptic vesicle glycoprotein 2A



MET
GLU
GLY
GLY
PHE
ARG
ASP
ARG
ALA
PHE
ALA
ILE
ARG
GLY
LYS
LYS
ASP
ILE
ALA
LYS
GLU

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

GLY
VAL
ARG
GLY
LEU
SER
ASP
GLY
GLY
GLY
PRO
P133
G134
G136
G140
K143
E144
L148
I155
E158
H161
Y169
L172
L176
M177
V181
E182
Y186
Y212
M216
W222
G223
A226
D227
R228
L229
G230
Q233
I237
I289

V276
E282
F283
K288
H292
L296
C297
M298
F299
I302
G303
A307
W320
S321
F322
Q323
K324
G326
Q329
F330
H331
R334
S357
K366
E369
M372
V377
H378
M381
M382
R383
A394
P388
E389
R390
V391
V394
I397
K396
T399
I400

D404
GLU
LEU
ILE
GLU
ILE
GLN
SER
ASP
THR
GLY
T415
S437
Y443
I446
G452
V453
W454
F455
T456
Y461
Y462
G463
L464
T465
Y466
W467
F468
I472
K485
V486
F487
P488
G489
E490
R491
V492
E493
H494
V495
T496
F497
M498
F499
T500
L501
E502
M503
Q504
T505
H506
R507
G508

Y511
F512
N513
D514
K515
G518
L519
R520
L521
K522
S523
V524
S525
F526
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S529
F536
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D538
V539
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S541
S542
M543
M548
M553
Y557
N558
T559
D560
L561
F562
E563
Y564
K565
F566
V567
M568
S569
R570
M573
L577
H578
N579
K580
E581
G582
G583
T588
G589

T590
G591
E592
A607
V608
L609
P610
I613
L618
I622
L625
G630
M634
V637
S638
F641
L642
S643
S649
A650
L654
F658
G659
D670
T673
V674
P678
K681
R682
T683
T684
N690
K694
L695
L699
F704
V708
G709

K712
P715
I716
A719
L723
L733
P734
SER
ARG
LEU
GLU
GLU
LEU
LEU
ARG
ARG
ARG
THR
GLU
GLU
PRO
GLY
SER
LEU
GLU
VAL
LEU
PHE
GLN

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	119837	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	2.524	Depositor
Minimum map value	-2.074	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.043	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	251.64, 251.64, 251.64	wwPDB
Map dimensions	270, 270, 270	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.932, 0.932, 0.932	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	B	0.26	0/4631	0.51	0/6263
1	C	0.27	0/4805	0.48	0/6501
All	All	0.26	0/9436	0.49	0/12764

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	B	4505	0	4404	109	0
1	C	4676	0	4601	82	0
All	All	9181	0	9005	185	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 10.

The worst 5 of 185 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:B:181:VAL:HG22	1:B:307:ALA:HB2	1.68	0.73
1:C:643:SER:HB2	1:C:716:ILE:HG21	1.72	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:692:LEU:HA	1:B:695:LEU:HD12	1.72	0.71
1:B:228:ARG:HH22	1:B:434:ASN:HB2	1.57	0.68
1:C:182:GLU:HG2	1:C:269:ILE:HG21	1.74	0.68

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	B	563/755 (75%)	547 (97%)	16 (3%)	0	100	100
1	C	588/755 (78%)	572 (97%)	16 (3%)	0	100	100
All	All	1151/1510 (76%)	1119 (97%)	32 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [\(i\)](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	477/622 (77%)	473 (99%)	4 (1%)	81	91
1	C	494/622 (79%)	493 (100%)	1 (0%)	93	98
All	All	971/1244 (78%)	966 (100%)	5 (0%)	89	94

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	145	ARG
1	B	204	LYS
1	B	423	ARG
1	B	491	ARG
1	C	570	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	612	ASN
1	C	381	ASN

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 monosaccharides 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.

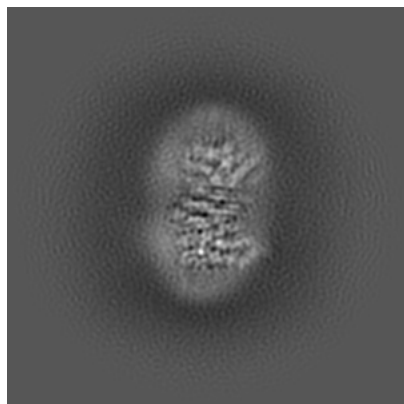
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-39206. These allow visual inspection of the internal detail of the map and identification of artifacts.

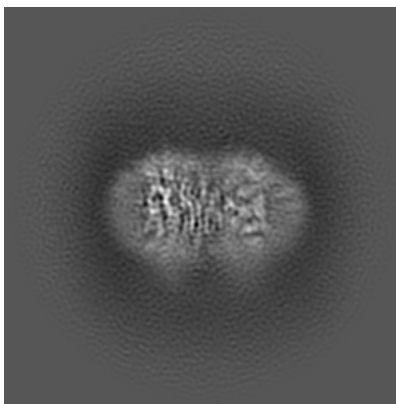
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

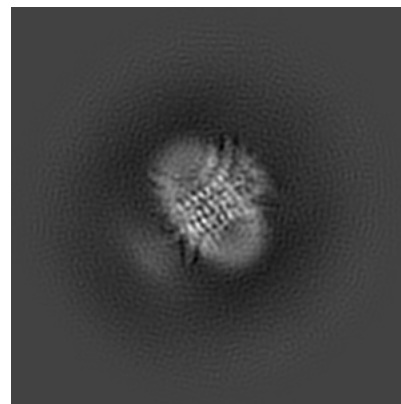
6.1.1 Primary map



X

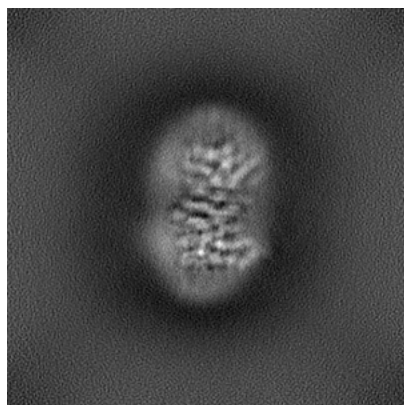


Y

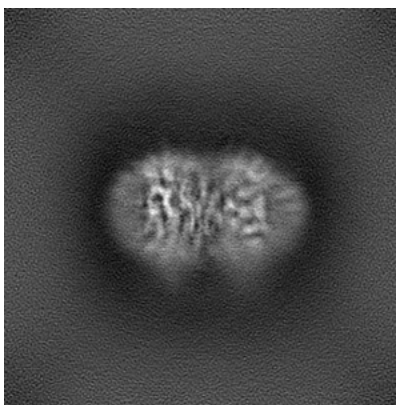


Z

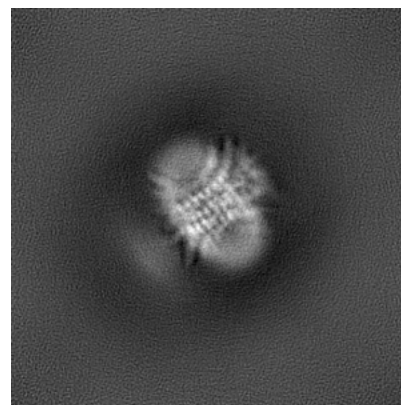
6.1.2 Raw map



X



Y

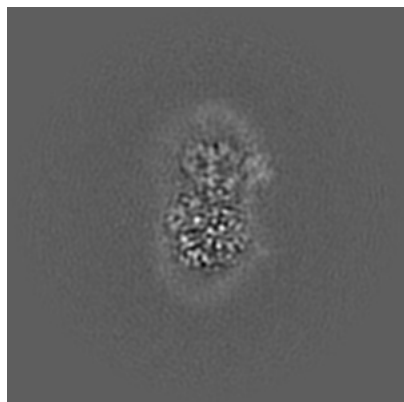


Z

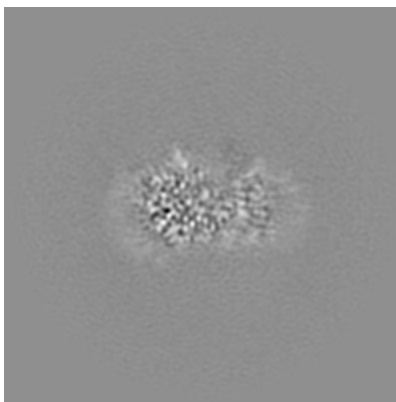
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

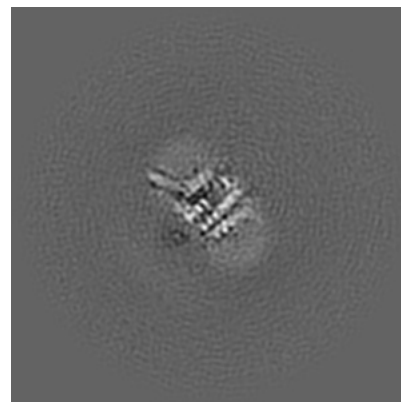
6.2.1 Primary map



X Index: 135

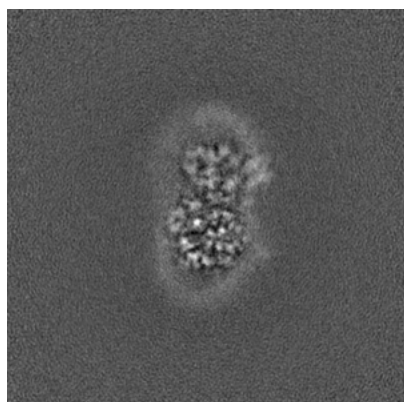


Y Index: 135

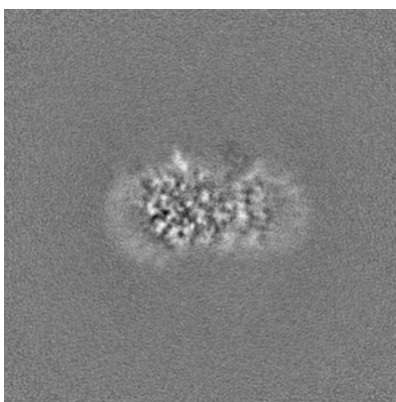


Z Index: 135

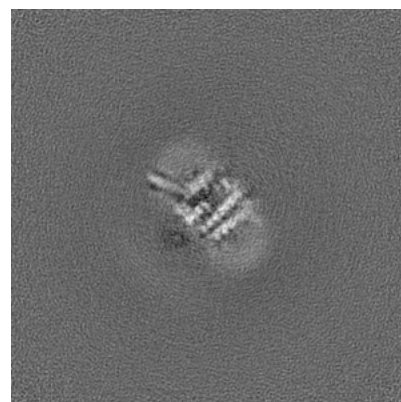
6.2.2 Raw map



X Index: 135



Y Index: 135

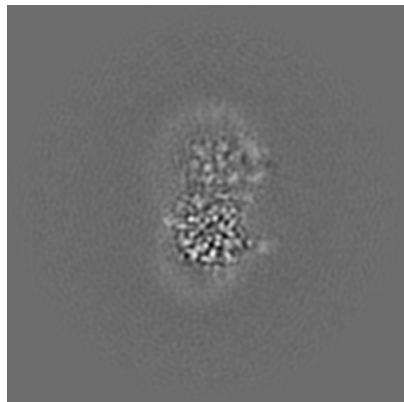


Z Index: 135

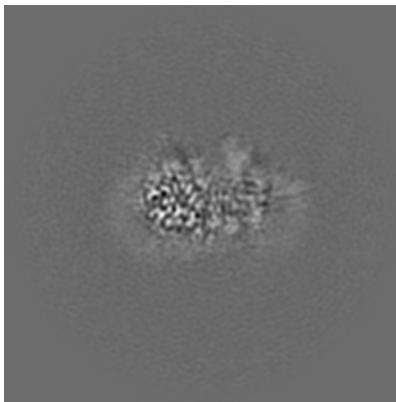
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

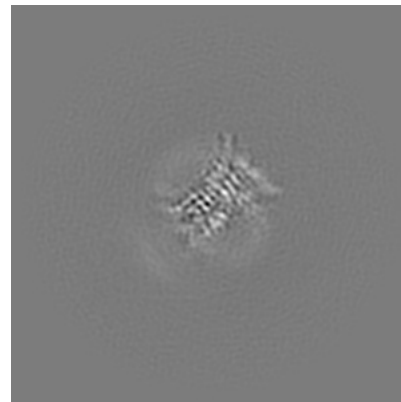
6.3.1 Primary map



X Index: 137

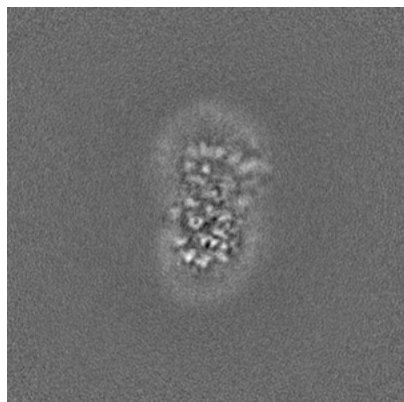


Y Index: 141

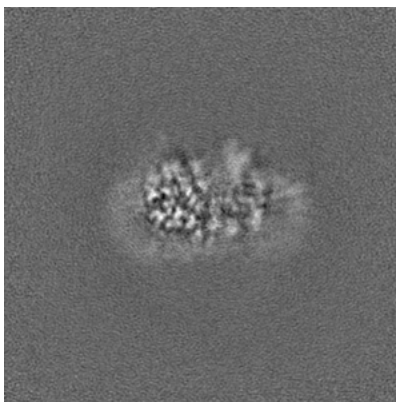


Z Index: 110

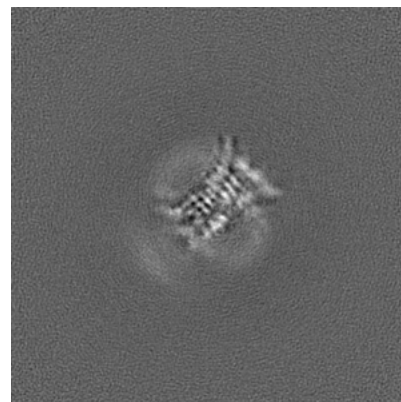
6.3.2 Raw map



X Index: 132



Y Index: 141

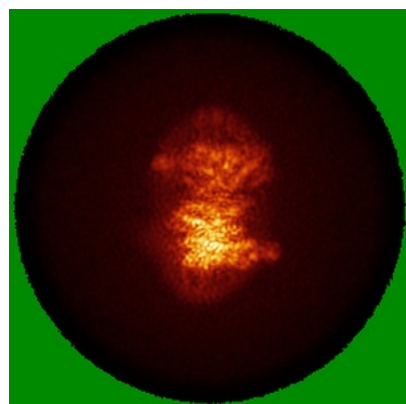


Z Index: 110

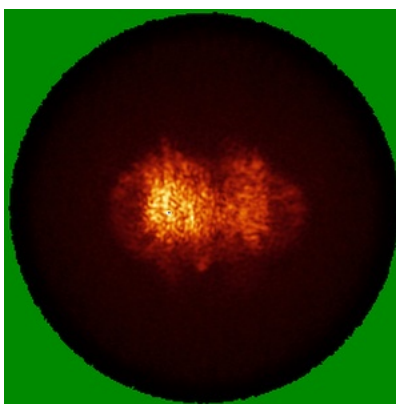
The images above show the largest variance slices of the map in three orthogonal directions.

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

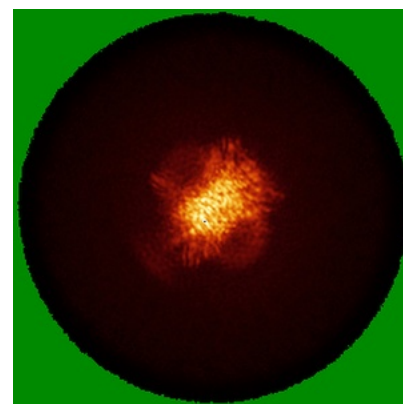
6.4.1 Primary map



X

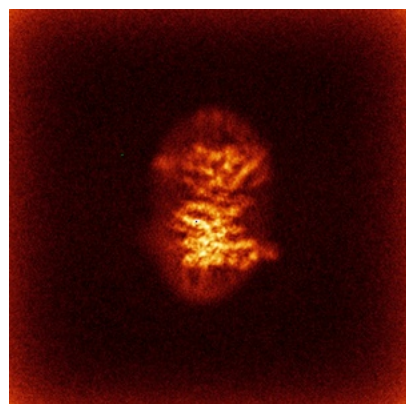


Y

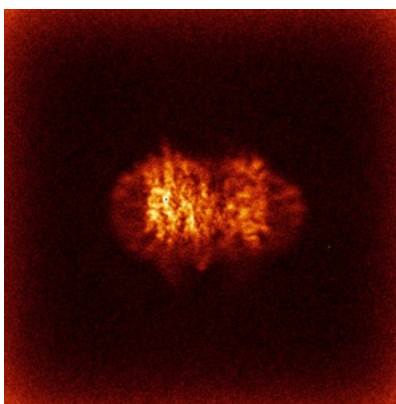


Z

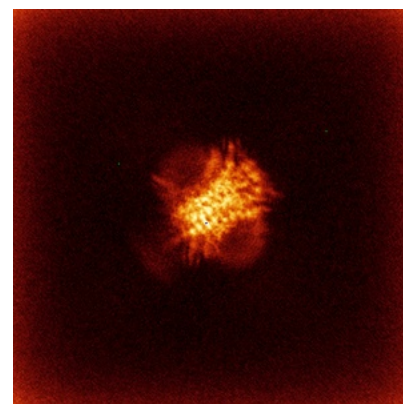
6.4.2 Raw map



X



Y

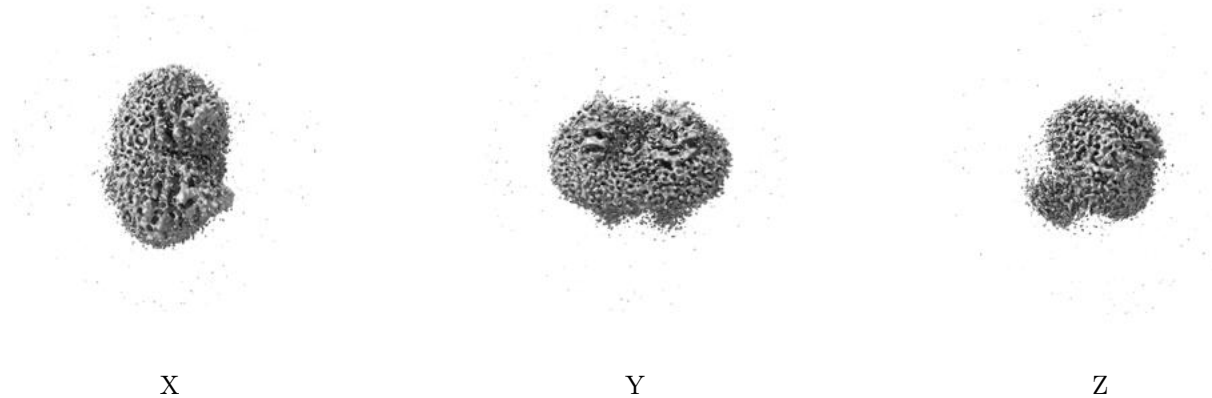


Z

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.

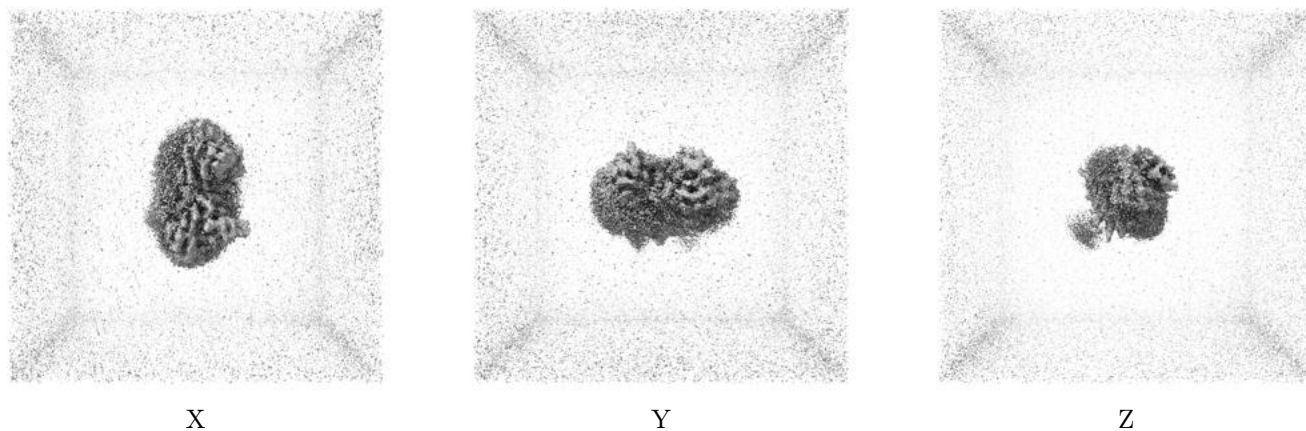
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.1. 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.

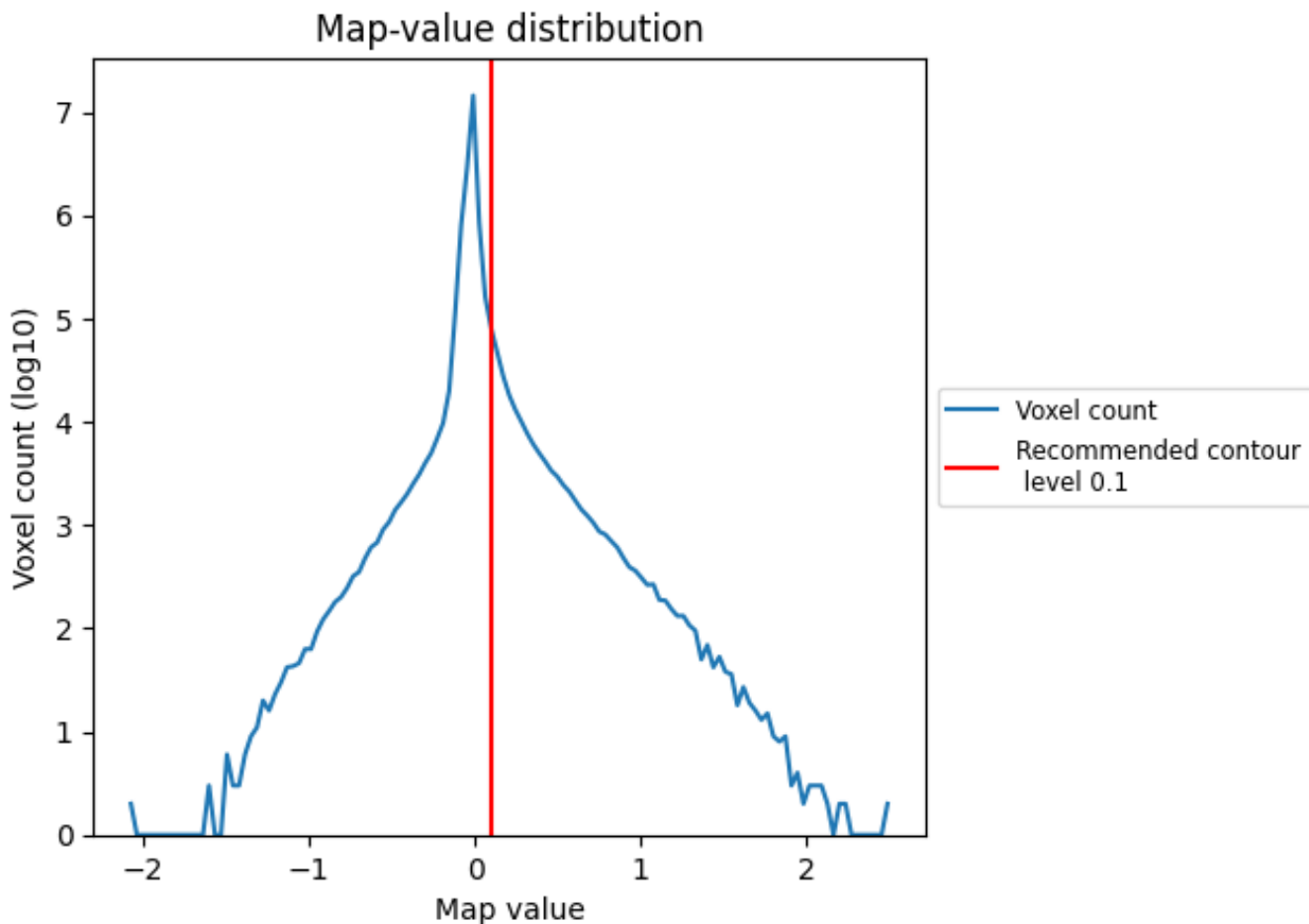
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

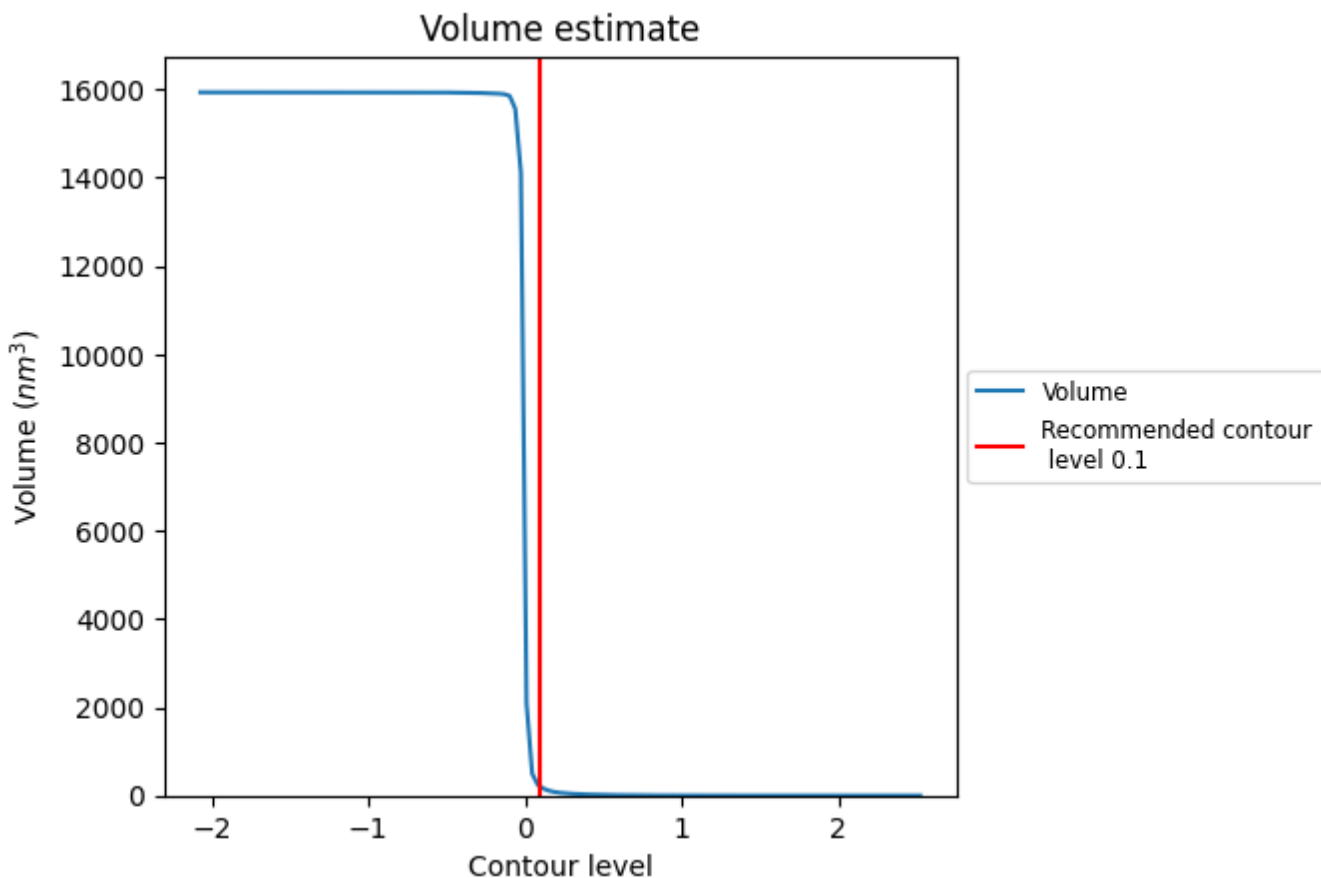
This section contains the results of statistical analysis of the map.

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.

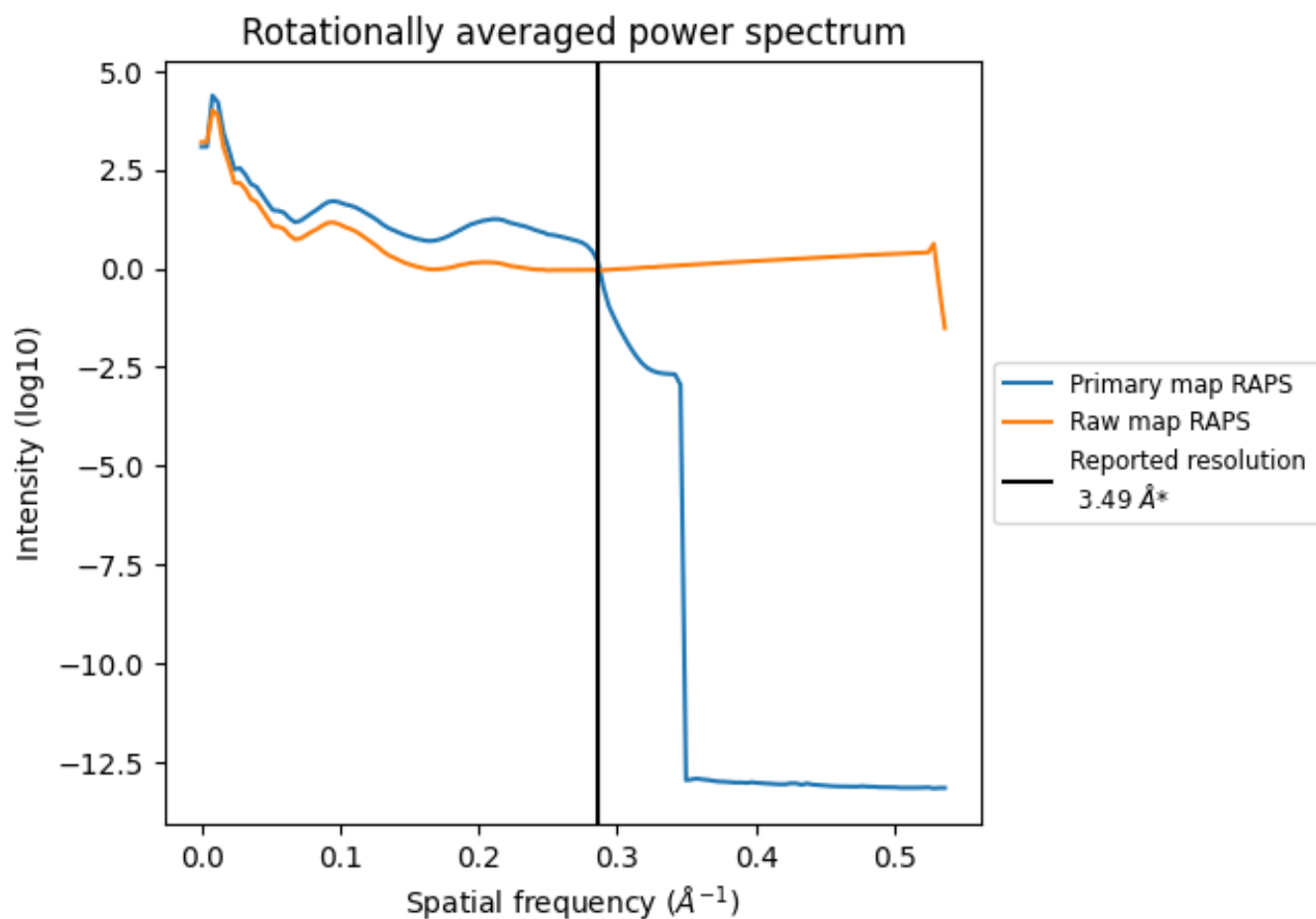
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 198 nm³; this corresponds to an approximate mass of 179 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum [i](#)

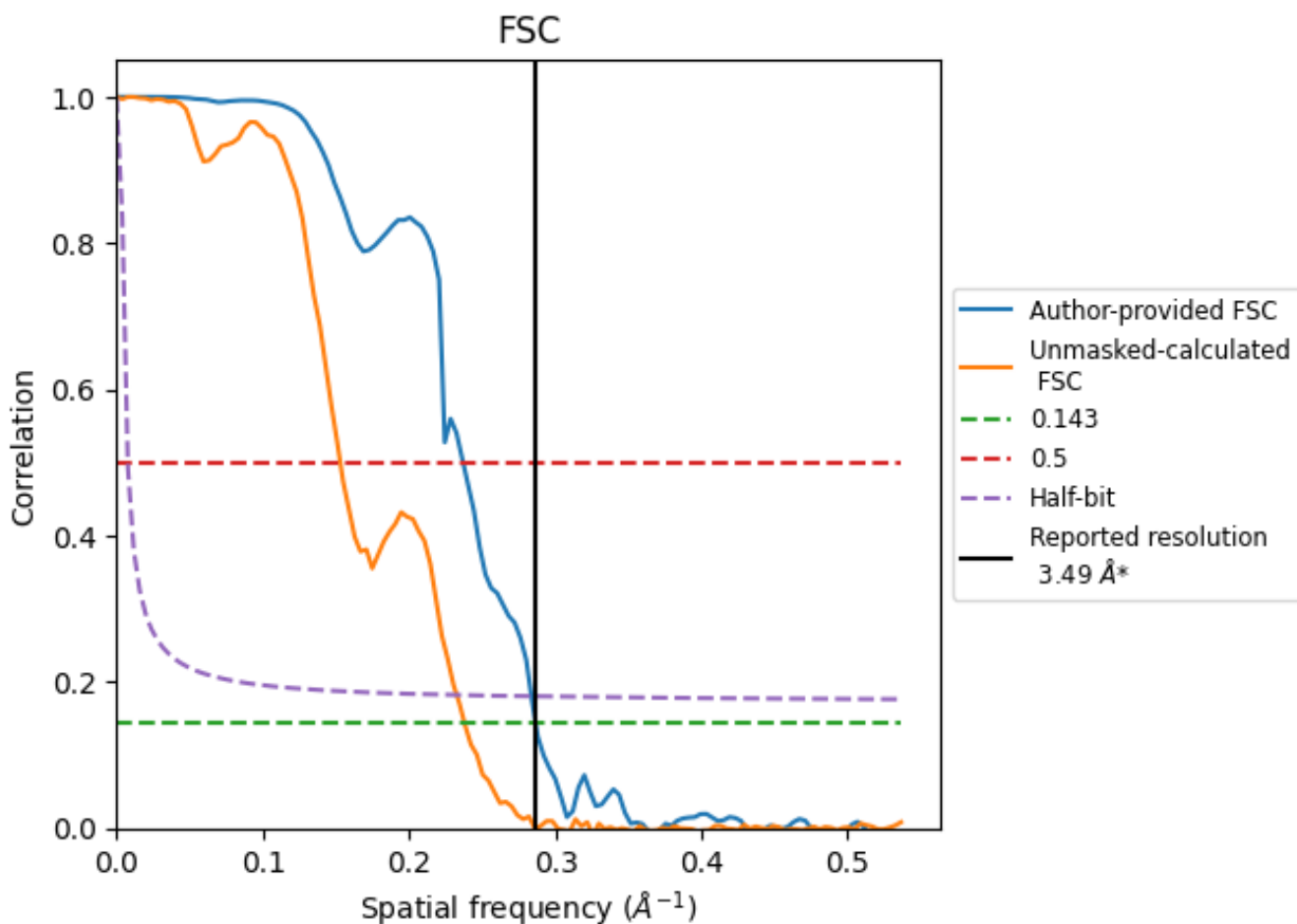


*Reported resolution corresponds to spatial frequency of 0.287 Å⁻¹

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 0.287 \AA^{-1}

8.2 Resolution estimates [i](#)

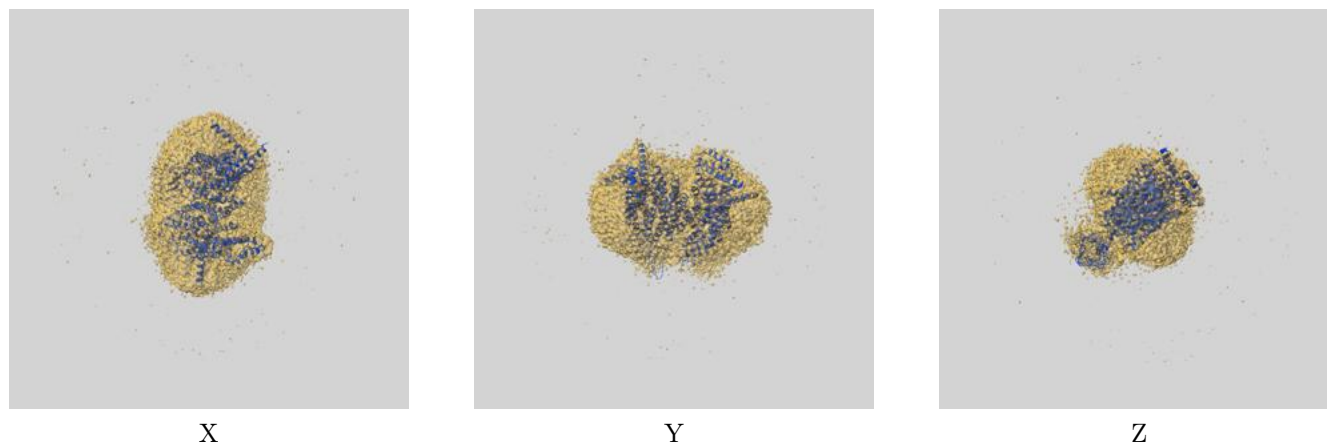
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.49	-	-
Author-provided FSC curve	3.49	4.22	3.52
Unmasked-calculated*	4.20	6.54	4.30

*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 4.20 differs from the reported value 3.49 by more than 10 %

9 Map-model fit [i](#)

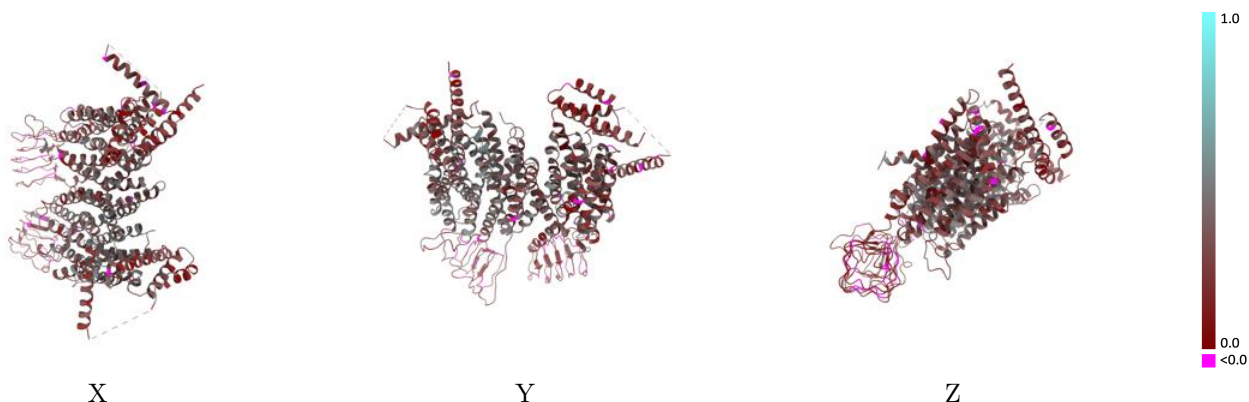
This section contains information regarding the fit between EMDB map EMD-39206 and PDB model 8YF0. Per-residue inclusion information can be found in section [3](#) on page [5](#).

9.1 Map-model overlay [i](#)



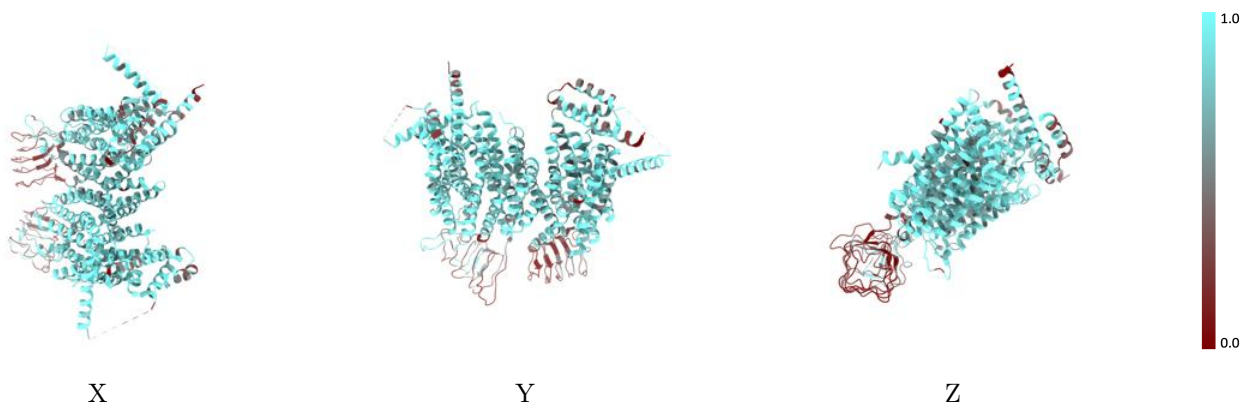
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



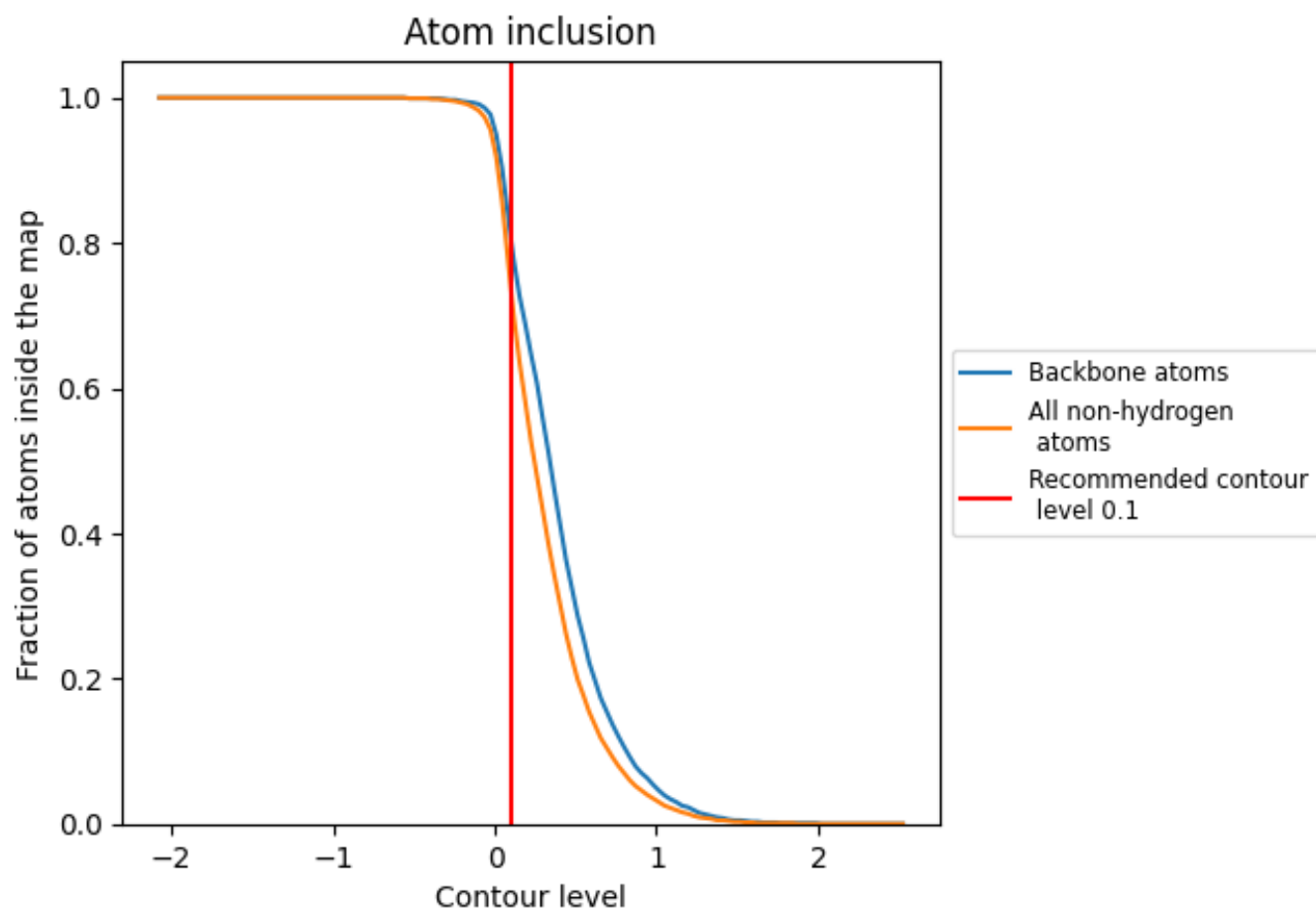
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.1).







9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 74% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7350	 0.2900
B	 0.6900	 0.2580
C	 0.7780	 0.3200

