



Full wwPDB EM Validation Report ⓘ

Nov 9, 2022 – 01:34 AM JST

PDB ID : 6ACZ
EMDB ID : EMD-9603
Title : The structure of CVA10 virus A-particle from its complex with Fab 2G8
Authors : Zhu, R.; Zheng, Q.B.; Xu, L.F.; Cui, Y.X.; Li, S.W.; Yan, X.D.; Zhou, Z.H.;
Cheng, T.
Deposited on : 2018-07-28
Resolution : 4.30 Å(reported)

This is a Full wwPDB EM Validation 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:

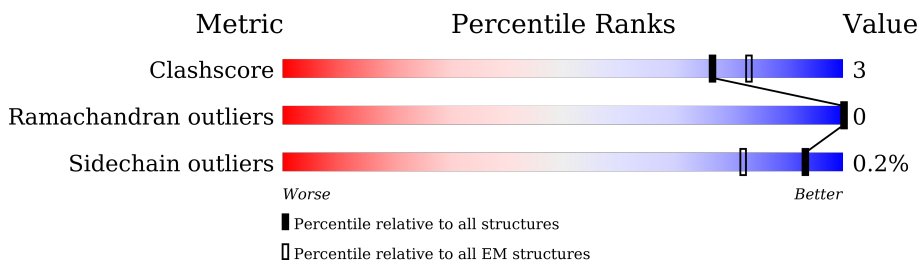
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

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 4.30 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	A	298	 70% 27%
2	B	255	 80% 16%
3	C	240	 80% 11% 8%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5094 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 VP1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	219	1753	1120	305	315	13	0	0

- Molecule 2 is a protein called VP2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	213	1666	1083	275	303	5	0	0

- Molecule 3 is a protein called VP3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	220	1675	1071	273	321	10	0	0

3 Residue-property plots [i](#)

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: VP1

Chain A:  70% 27%

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

GLU ASN MET ILE THR ARG G68 R72 R86 L95 G98 GLY THR ASP T102 Q151 V180 P185 P186 A187 P208 THR PHE GLY GLN HIS PRO GLU THR SER N218 T219 L223 N226 R235 L246 R266 F275 P276 M298


- Molecule 2: VP2

Chain B:  80% 16%

SER PRO SER VAL GLU ALA CYS GLY TYR ASP ARG VAL ALA GLN LEU THR VAL GLY ASN SER SER ILE THR THR GLN ALA ALA N30 D44 A49 VAL ASP R52 D57 L66 V65 L86 A121 G136 S137 ASN THR LYS PRO ASN GLY ALA P145 S169

S221 F222 L223 I233 I239 Q253 ALA VAL SER GLN

- Molecule 3: VP3

Chain C:  80% 11% 8%

GLY I2 N11 D18 T51 I52 V55 R56 N57 L64 T65 R66 L67 L68 I69 S72 S73 Q74 D87 R90 T97 G100 K128 S138 A139 Q140 P141 T146 D156 L159 M172 THR HIS PHE ARG THR ALA LYS THR THR GLY ASN TYR ASP

TYR TYR THR A189 Y211 T212 I213 T230 D231 A237 VAL LEU GLN

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, I	Depositor
Number of particles used	14425	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	25	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.144	Depositor
Minimum map value	-0.074	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.008	Depositor
Recommended contour level	0.0302	Depositor
Map size (\AA)	676.8, 676.8, 676.8	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.128, 1.128, 1.128	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	A	0.40	0/1801	0.54	0/2447
2	B	0.40	0/1721	0.56	0/2359
3	C	0.39	0/1717	0.60	0/2353
All	All	0.40	0/5239	0.57	0/7159

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	A	1753	0	1719	6	0
2	B	1666	0	1608	5	0
3	C	1675	0	1653	21	0
All	All	5094	0	4980	30	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.

All (30) 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:68:LEU:HD23	3:C:213:ILE:HG22	1.57	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:66:ARG:HH11	3:C:66:ARG:HG2	1.41	0.85
3:C:52:ILE:HG21	3:C:67:LEU:HD23	1.65	0.78
3:C:55:VAL:HG11	3:C:69:ILE:HD11	1.70	0.73
3:C:66:ARG:HG2	3:C:66:ARG:NH1	1.99	0.73
3:C:64:LEU:HD12	3:C:64:LEU:O	1.90	0.70
3:C:68:LEU:HD22	3:C:211:TYR:HB3	1.75	0.68
3:C:68:LEU:CD2	3:C:213:ILE:HG22	2.27	0.64
2:B:223:LEU:HD11	2:B:233:ILE:HD12	1.84	0.59
3:C:51:THR:OG1	3:C:97:THR:OG1	2.22	0.56
3:C:90:ARG:NH2	3:C:172:ASN:O	2.39	0.56
3:C:66:ARG:HH11	3:C:66:ARG:CG	2.14	0.55
1:A:266:ARG:NH1	2:B:169:SER:O	2.41	0.54
2:B:121:ALA:H	2:B:221:SER:HB3	1.72	0.52
1:A:180:VAL:HG21	1:A:187:ALA:HB2	1.93	0.51
2:B:66:LEU:HD13	2:B:239:ILE:HD13	1.93	0.50
3:C:97:THR:HG23	3:C:100:GLY:H	1.78	0.49
3:C:68:LEU:HD13	3:C:211:TYR:CG	2.48	0.48
3:C:72:SER:OG	3:C:74:GLN:OE1	2.30	0.48
2:B:85:VAL:HG23	2:B:86:LEU:HD12	1.96	0.48
1:A:151:GLN:OE1	1:A:235:ARG:NH2	2.47	0.48
3:C:128:LYS:HG2	3:C:156:ASP:HB3	1.99	0.45
3:C:141:PRO:HB3	3:C:146:THR:HG23	2.00	0.43
3:C:57:ASN:CG	3:C:57:ASN:O	2.58	0.42
1:A:185:PRO:HB3	3:C:11:ASN:HB3	2.00	0.42
1:A:95:LEU:HD12	1:A:246:LEU:HB2	2.01	0.42
3:C:87:ASP:N	3:C:87:ASP:OD1	2.52	0.41
1:A:275:PHE:HA	1:A:276:PRO:HD3	1.84	0.41
3:C:138:SER:OG	3:C:139:ALA:N	2.54	0.41
3:C:230:THR:OG1	3:C:231:ASP:N	2.54	0.41

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	213/298 (72%)	197 (92%)	16 (8%)	0	100	100
2	B	207/255 (81%)	188 (91%)	19 (9%)	0	100	100
3	C	216/240 (90%)	192 (89%)	24 (11%)	0	100	100
All	All	636/793 (80%)	577 (91%)	59 (9%)	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	A	192/254 (76%)	191 (100%)	1 (0%)	88	93
2	B	181/215 (84%)	181 (100%)	0	100	100
3	C	185/201 (92%)	185 (100%)	0	100	100
All	All	558/670 (83%)	557 (100%)	1 (0%)	93	96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	86	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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.

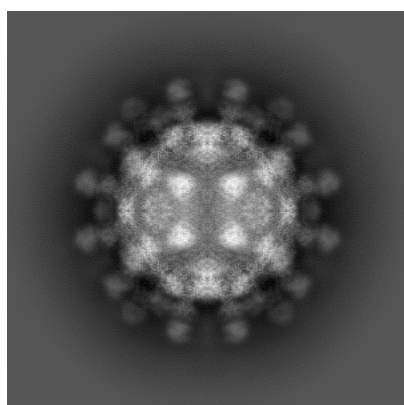
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-9603. These allow visual inspection of the internal detail of the map and identification of artifacts.

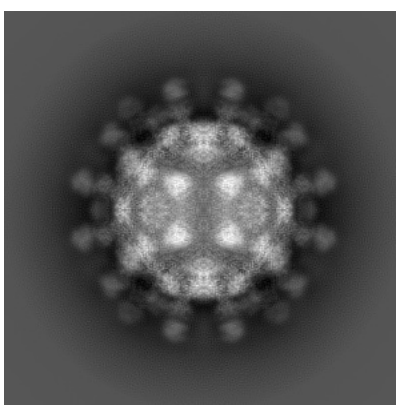
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

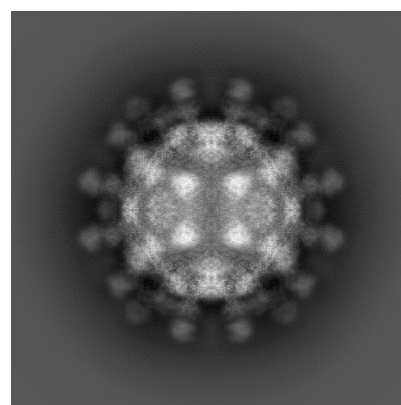
6.1.1 Primary map



X



Y

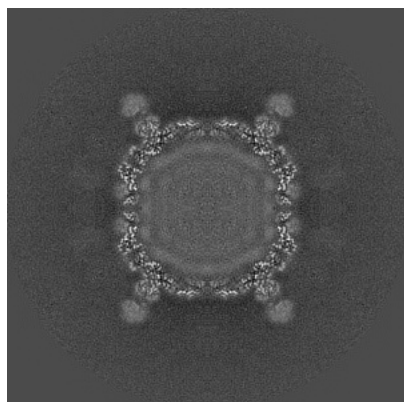


Z

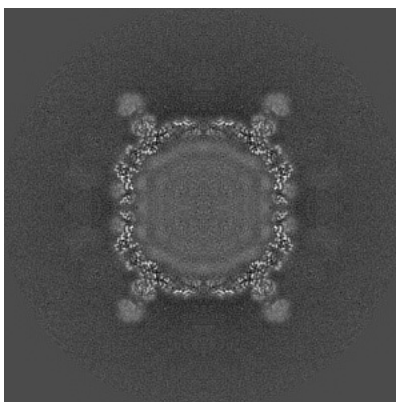
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

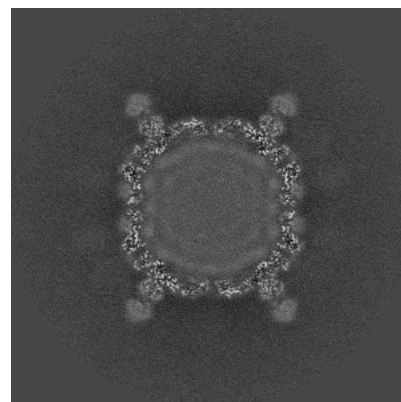
6.2.1 Primary map



X Index: 300



Y Index: 300

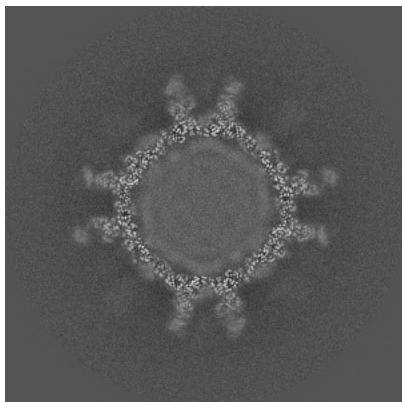


Z Index: 300

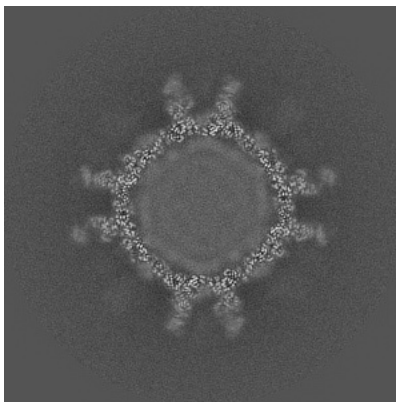
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

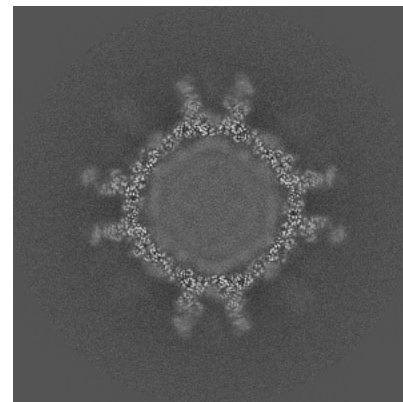
6.3.1 Primary map



X Index: 328



Y Index: 328

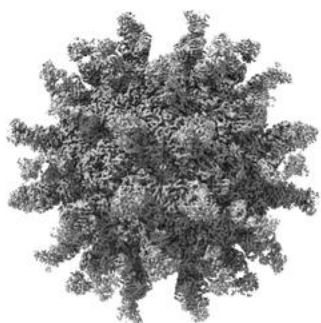


Z Index: 271

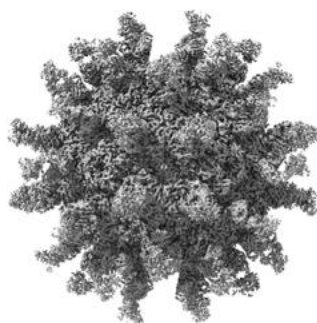
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

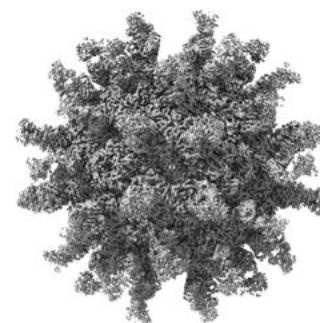
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0302. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

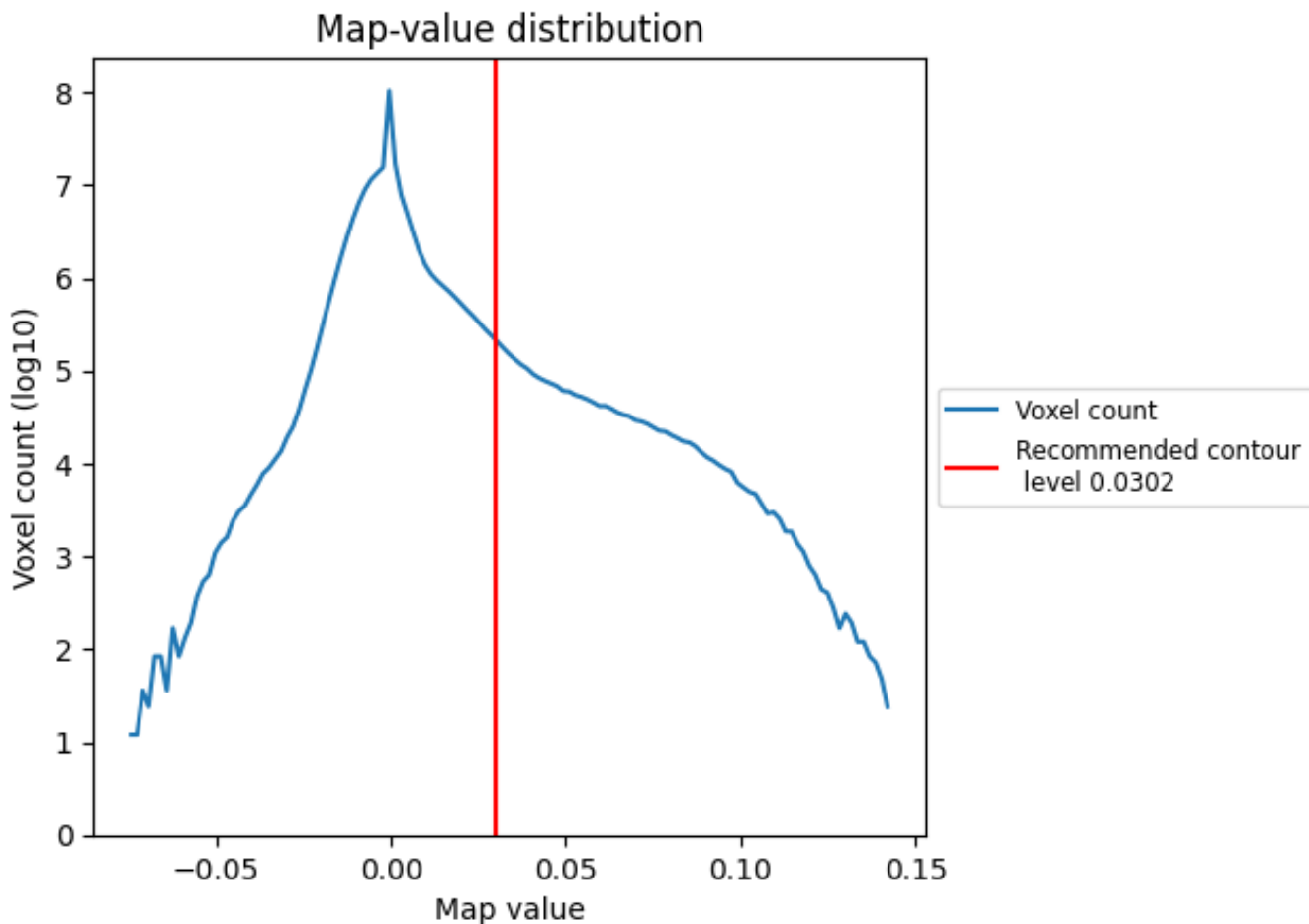
6.5 Mask visualisation

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

7 Map analysis [i](#)

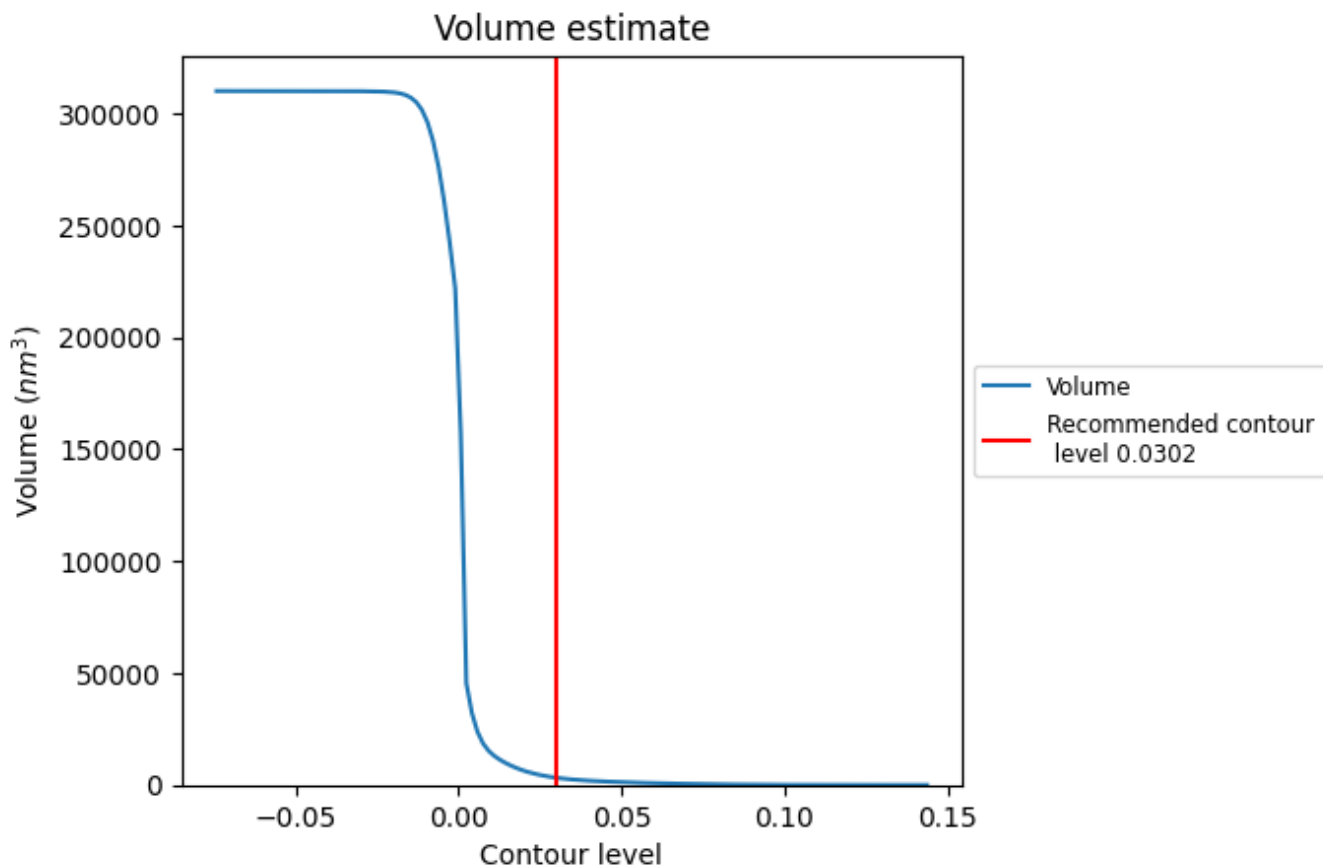
This section contains the results of statistical analysis of the map.

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.

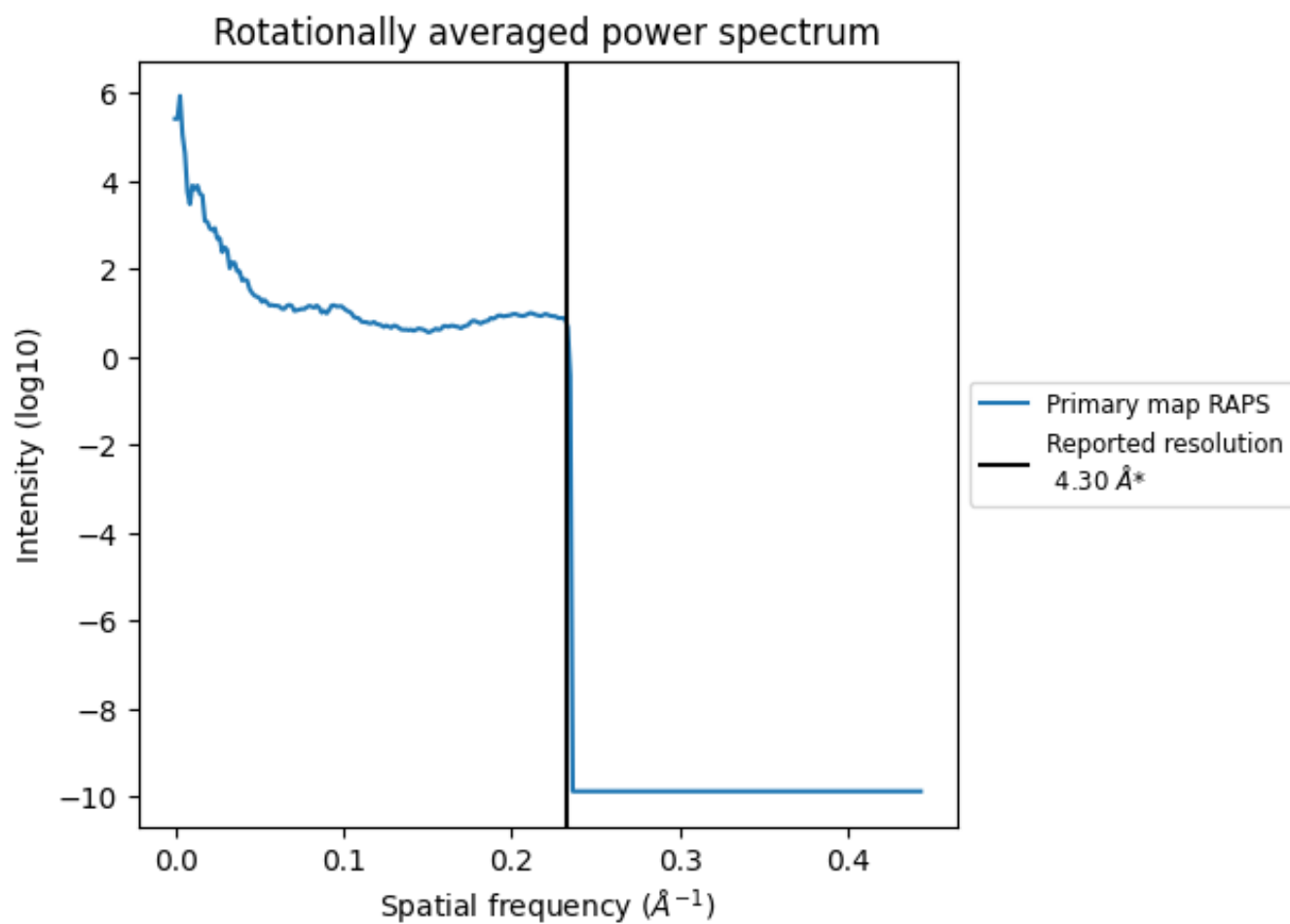
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 3172 nm^3 ; this corresponds to an approximate mass of 2866 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 [\(i\)](#)

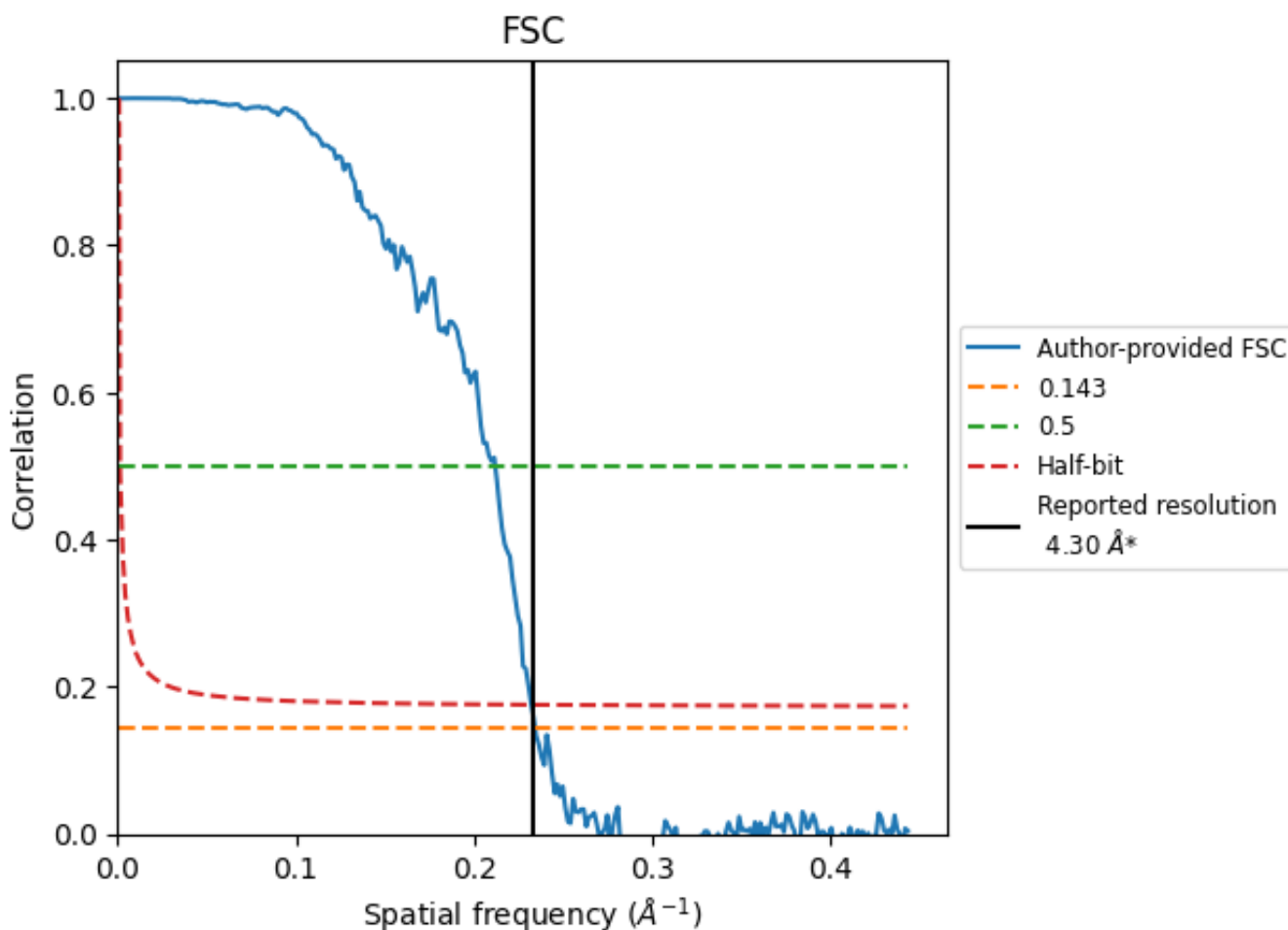


*Reported resolution corresponds to spatial frequency of 0.233 Å⁻¹

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 0.233 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.30	-	-
Author-provided FSC curve	4.27	4.72	4.31
Unmasked-calculated*	-	-	-

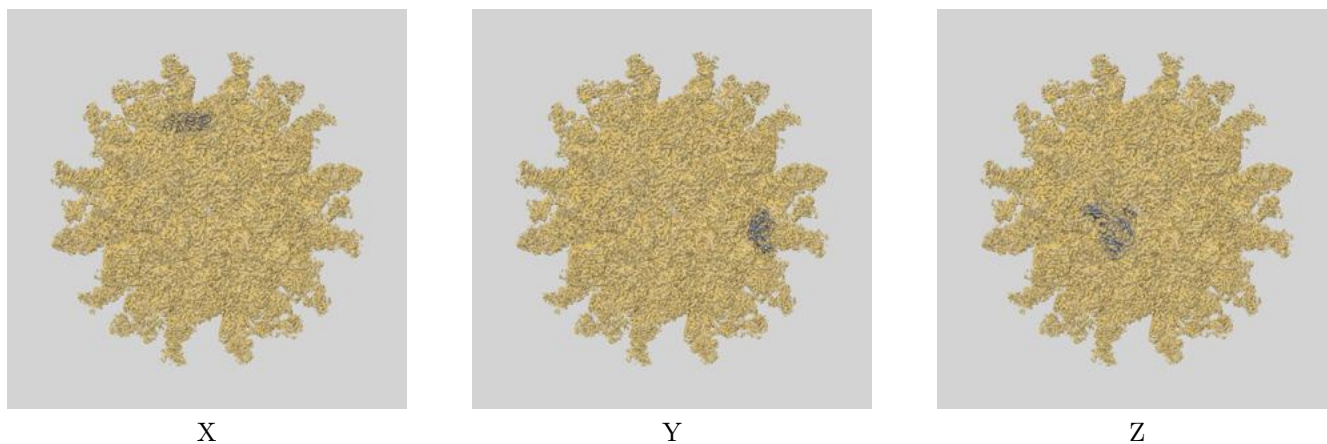
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

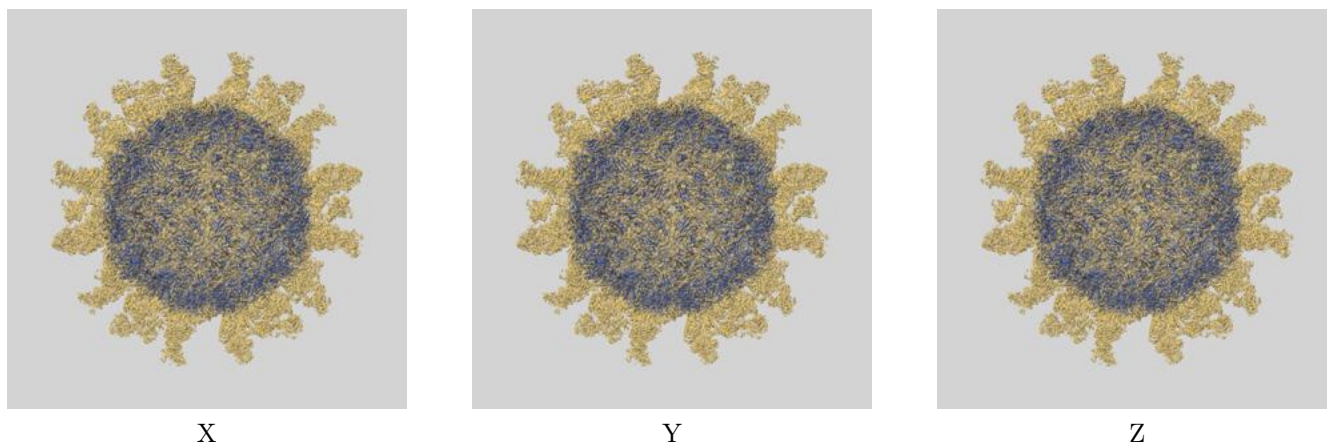
This section contains information regarding the fit between EMDB map EMD-9603 and PDB model 6ACZ. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlays

9.1.1 Map-model overlay [i](#)

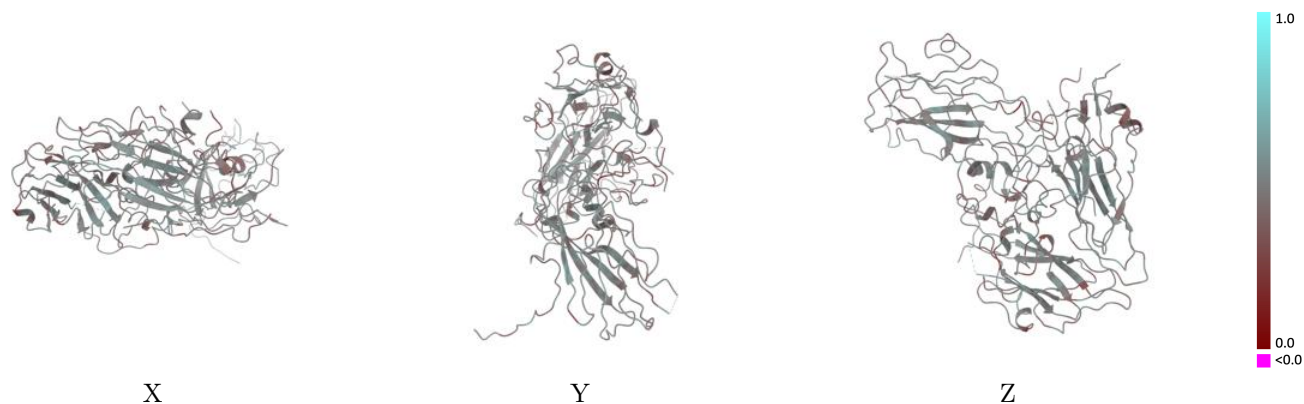


9.1.2 Map-model assembly overlay [i](#)



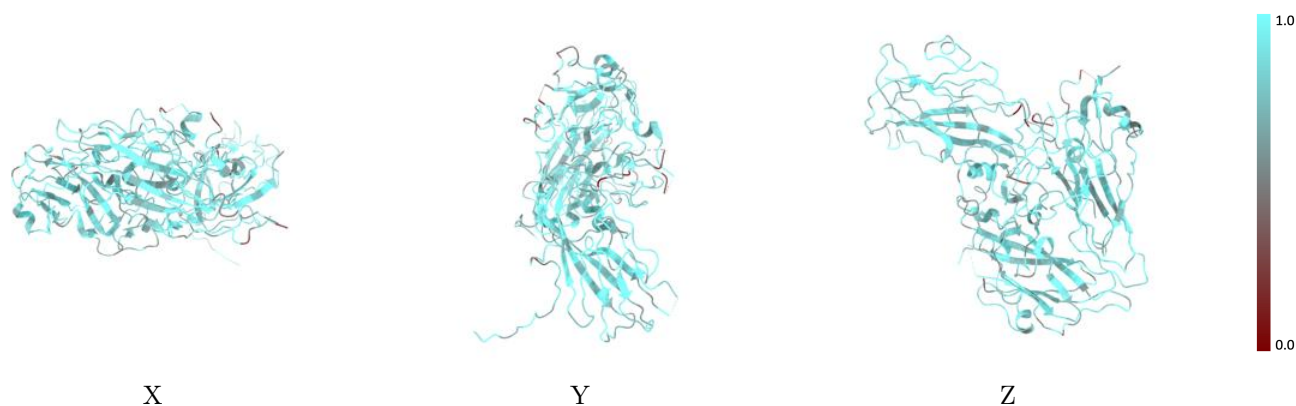
The images above show the 3D surface view of the map at the recommended contour level 0.0302 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



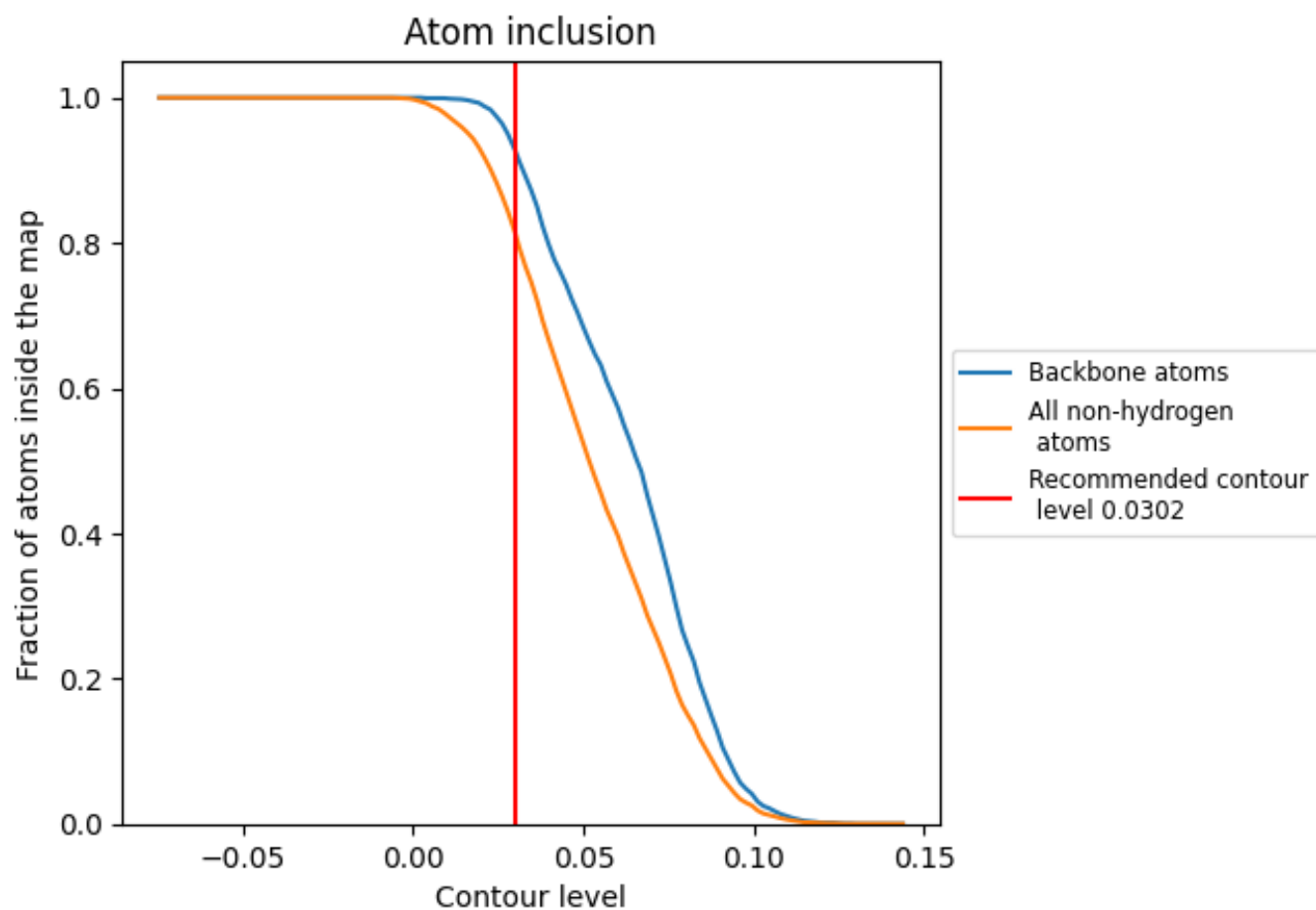
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0302).









9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 81% 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 (0.0302) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8109	 0.4660
A	 0.8096	 0.4630
B	 0.8132	 0.4730
C	 0.8099	 0.4620

