



Full wwPDB EM Validation Report ⓘ

Mar 10, 2026 – 01:57 PM UTC

PDB ID : 7TI4 / pdb_00007ti4
EMDB ID : EMD-25909
Title : Adeno-associated Virus Go.1 at 2.9 Angstroms resolution, AAVGo.1 AAV-Go
Authors : Silveria, M.; Large, E.
Deposited on : 2022-01-12
Resolution : 2.93 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.dev132
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) : 2.49

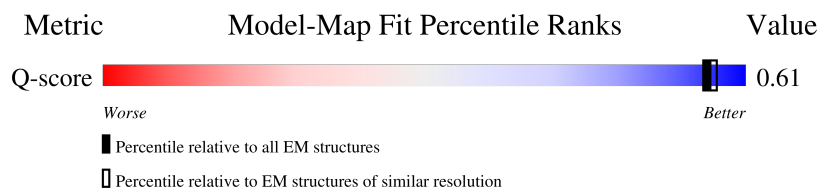
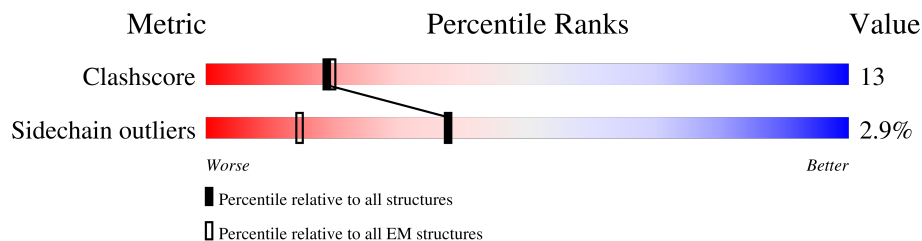
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.93 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	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	13037 (2.43 - 3.43)

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	726	

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 4125 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 Capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	518	4125	2604	710	795	16	0	0

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	140568	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY; CTF correction was performed per particle	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	32.9	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	2700	Depositor
Magnification	64000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	159.119	Depositor
Minimum map value	-85.147	Depositor
Average map value	0.000	Depositor
Map value standard deviation	10.000	Depositor
Recommended contour level	21	Depositor
Map size ($\text{\AA}$)	338.4781, 338.4781, 338.4781	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.66109, 0.66109, 0.66109	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	0.87	2/4251 (0.0%)	1.02	23/5806 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	339	TYR	CA-C	-5.56	1.47	1.53
1	A	638	MET	SD-CE	5.20	1.92	1.79

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	411	VAL	N-CA-C	-8.67	102.08	109.19
1	A	287	TRP	N-CA-C	-7.82	102.35	111.03
1	A	578	ALA	N-CA-C	-7.66	103.93	113.20
1	A	645	VAL	CA-C-N	7.52	127.53	119.78
1	A	645	VAL	C-N-CA	7.52	127.53	119.78
1	A	280	SER	N-CA-C	-7.50	103.70	114.12
1	A	357	PRO	N-CA-C	7.44	119.77	110.70
1	A	557	THR	N-CA-C	-7.29	103.55	114.64
1	A	607	GLY	CA-C-N	6.74	126.66	119.85
1	A	607	GLY	C-N-CA	6.74	126.66	119.85
1	A	558	GLN	CA-C-N	-6.53	113.08	119.87
1	A	558	GLN	C-N-CA	-6.53	113.08	119.87
1	A	345	VAL	N-CA-C	6.52	117.30	110.72
1	A	411	VAL	CA-C-N	-5.60	114.21	120.14
1	A	411	VAL	C-N-CA	-5.60	114.21	120.14
1	A	525	LEU	N-CA-C	5.56	118.10	111.71
1	A	414	HIS	N-CA-C	-5.52	102.31	110.48
1	A	271	GLY	N-CA-C	-5.41	102.84	111.18
1	A	486	VAL	N-CA-C	5.41	116.56	109.21
1	A	613	ILE	CB-CA-C	-5.30	106.01	110.94
1	A	260	ALA	N-CA-C	-5.29	106.78	113.18
1	A	574	ASN	N-CA-C	5.21	114.92	108.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	333	VAL	N-CA-C	5.16	115.34	108.27

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	4125	0	3870	103	0
All	All	4125	0	3870	103	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 13.

All (103) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:416:SER:HB3	1:A:719:THR:HG22	1.57	0.86
1:A:475:TRP:CH2	1:A:488:VAL:HG21	2.15	0.82
1:A:556:GLU:HG3	1:A:720:ARG:HB3	1.67	0.77
1:A:416:SER:CB	1:A:719:THR:HG22	2.22	0.70
1:A:302:LEU:HD13	1:A:673:MET:HG2	1.77	0.66
1:A:302:LEU:HD12	1:A:303:ARG:H	1.61	0.65
1:A:557:THR:HG22	1:A:599:MET:HE3	1.80	0.63
1:A:228:ARG:HH12	1:A:300:ARG:NH1	1.97	0.63
1:A:416:SER:HB3	1:A:719:THR:CG2	2.28	0.62
1:A:314:VAL:HB	1:A:662:THR:HG23	1.81	0.62
1:A:688:GLU:OE1	1:A:722:LEU:HD22	1.99	0.62
1:A:680:GLU:O	1:A:680:GLU:HG3	2.00	0.62
1:A:247:TYR:CE2	1:A:268:THR:HG22	2.36	0.61
1:A:516:THR:HG22	1:A:522:ARG:O	2.00	0.61
1:A:558:GLN:HG2	1:A:559:PRO:HD3	1.82	0.61
1:A:681:ASN:H	1:A:681:ASN:HD22	1.48	0.60
1:A:681:ASN:HD22	1:A:681:ASN:N	1.99	0.60
1:A:437:ARG:HG2	1:A:437:ARG:HH11	1.68	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:697:ASP:N	1:A:698:PRO:HD3	2.18	0.58
1:A:555:SER:C	1:A:557:THR:H	2.11	0.58
1:A:606:GLN:OE1	1:A:716:ALA:HA	2.03	0.58
1:A:315:THR:HG22	1:A:317:GLN:H	1.71	0.56
1:A:480:GLY:O	1:A:481:SER:C	2.50	0.55
1:A:478:SER:O	1:A:479:SER:C	2.48	0.55
1:A:249:GLU:HB2	1:A:266:TYR:CE1	2.42	0.55
1:A:416:SER:CB	1:A:719:THR:CG2	2.84	0.55
1:A:475:TRP:HH2	1:A:488:VAL:HG21	1.68	0.55
1:A:632:LYS:HE3	1:A:633:HIS:CE1	2.43	0.54
1:A:215:SER:HB2	1:A:307:PHE:HB2	1.89	0.54
1:A:330:THR:HG22	1:A:397:ARG:HG3	1.89	0.54
1:A:672:GLU:HG2	1:A:672:GLU:O	2.08	0.54
1:A:490:ASN:O	1:A:491:PHE:C	2.50	0.54
1:A:714:THR:HG22	1:A:714:THR:O	2.07	0.53
1:A:272:TYR:HB3	1:A:639:LEU:HD13	1.90	0.53
1:A:719:THR:HG22	1:A:719:THR:O	2.07	0.53
1:A:243:ASN:O	1:A:244:ASN:C	2.51	0.52
1:A:497:MET:HG3	1:A:506:VAL:HG11	1.91	0.51
1:A:556:GLU:HG3	1:A:720:ARG:CB	2.39	0.51
1:A:558:GLN:N	1:A:559:PRO:CD	2.73	0.51
1:A:315:THR:O	1:A:321:THR:HA	2.11	0.51
1:A:268:THR:HB	1:A:269:PRO:HD2	1.93	0.51
1:A:228:ARG:HD2	1:A:674:GLU:OE1	2.11	0.51
1:A:247:TYR:CD2	1:A:268:THR:HG22	2.46	0.51
1:A:648:ASN:ND2	1:A:648:ASN:C	2.67	0.51
1:A:331:VAL:CG1	1:A:396:LEU:HB2	2.41	0.50
1:A:304:VAL:HG12	1:A:305:LYS:N	2.26	0.50
1:A:473:GLN:HG3	1:A:474:GLY:N	2.25	0.50
1:A:228:ARG:NH1	1:A:300:ARG:HG3	2.25	0.50
1:A:279:HIS:C	1:A:279:HIS:CD2	2.89	0.50
1:A:224:TRP:O	1:A:225:MET:HE2	2.12	0.50
1:A:592:VAL:HG21	1:A:620:PHE:HE2	1.76	0.50
1:A:648:ASN:C	1:A:648:ASN:HD22	2.19	0.50
1:A:602:ASP:OD1	1:A:719:THR:HB	2.12	0.49
1:A:255:VAL:O	1:A:256:ASP:HB2	2.11	0.49
1:A:547:ASP:OD1	1:A:547:ASP:N	2.45	0.49
1:A:592:VAL:HG21	1:A:620:PHE:CE2	2.47	0.49
1:A:302:LEU:HD11	1:A:671:VAL:HG23	1.95	0.48
1:A:331:VAL:HG12	1:A:396:LEU:HB2	1.96	0.48
1:A:558:GLN:CG	1:A:559:PRO:HD3	2.44	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:249:GLU:HB2	1:A:266:TYR:HE1	1.77	0.48
1:A:291:ILE:HD12	1:A:721:TYR:CE2	2.49	0.48
1:A:439:VAL:HG11	1:A:450:GLN:HB3	1.94	0.48
1:A:302:LEU:HD12	1:A:303:ARG:N	2.29	0.48
1:A:416:SER:OG	1:A:719:THR:HG21	2.14	0.48
1:A:317:GLN:O	1:A:318:ASP:HB2	2.15	0.47
1:A:352:CYS:O	1:A:353:LEU:C	2.57	0.47
1:A:477:THR:O	1:A:478:SER:C	2.56	0.46
1:A:416:SER:OG	1:A:719:THR:CG2	2.63	0.46
1:A:252:SER:HB3	1:A:263:TYR:CD1	2.51	0.46
1:A:589:LEU:N	1:A:589:LEU:HD23	2.31	0.46
1:A:273:PHE:CE1	1:A:363:LEU:HD21	2.52	0.45
1:A:234:THR:O	1:A:235:ARG:HG2	2.17	0.45
1:A:418:ALA:O	1:A:723:THR:HA	2.17	0.45
1:A:532:ASN:ND2	1:A:534:GLN:O	2.50	0.45
1:A:278:PHE:C	1:A:280:SER:H	2.26	0.44
1:A:403:GLU:HG3	1:A:404:PHE:N	2.34	0.43
1:A:421:GLN:HB2	1:A:726:LEU:HB2	2.00	0.43
1:A:672:GLU:O	1:A:672:GLU:CG	2.67	0.43
1:A:424:PHE:CZ	1:A:466:PRO:HD3	2.53	0.43
1:A:233:SER:HB3	1:A:235:ARG:HH22	1.84	0.43
1:A:252:SER:HB3	1:A:263:TYR:CE1	2.54	0.43
1:A:401:ASN:OD1	1:A:401:ASN:C	2.62	0.42
1:A:239:LEU:HB3	1:A:665:SER:OG	2.19	0.42
1:A:411:VAL:CG2	1:A:412:PRO:HD2	2.49	0.42
1:A:476:ASN:O	1:A:484:ASN:ND2	2.47	0.42
1:A:673:MET:HE2	1:A:673:MET:HB3	1.95	0.42
1:A:725:PRO:O	1:A:726:LEU:C	2.61	0.42
1:A:548:ASN:OD1	1:A:548:ASN:C	2.62	0.42
1:A:228:ARG:HH12	1:A:300:ARG:HH11	1.64	0.42
1:A:436:TYR:CD1	1:A:436:TYR:N	2.87	0.42
1:A:506:VAL:O	1:A:507:ASN:C	2.61	0.42
1:A:437:ARG:HG2	1:A:437:ARG:NH1	2.32	0.42
1:A:485:ARG:HG2	1:A:488:VAL:CG1	2.50	0.42
1:A:681:ASN:N	1:A:681:ASN:ND2	2.68	0.41
1:A:439:VAL:HG11	1:A:450:GLN:CB	2.51	0.41
1:A:474:GLY:HA2	1:A:523:TYR:O	2.20	0.41
1:A:245:HIS:ND1	1:A:644:PRO:HB3	2.36	0.41
1:A:295:TRP:CH2	1:A:724:ARG:HD3	2.56	0.41
1:A:345:VAL:CG2	1:A:637:MET:HG2	2.51	0.41
1:A:477:THR:HG23	1:A:523:TYR:HD2	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:334:PHE:HB3	1:A:393:SER:HA	2.04	0.40
1:A:456:ARG:O	1:A:460:THR:HG23	2.20	0.40
1:A:236:THR:OG1	1:A:668:GLN:NE2	2.51	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

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	453/615 (74%)	440 (97%)	13 (3%)	37	62

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	229	VAL
1	A	409	GLU
1	A	456	ARG
1	A	469	MET
1	A	485	ARG
1	A	547	ASP
1	A	576	GLN
1	A	606	GLN
1	A	671	VAL
1	A	672	GLU
1	A	681	ASN
1	A	720	ARG
1	A	724	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	279	HIS
1	A	414	HIS
1	A	422	ASN
1	A	448	GLN
1	A	498	ASN
1	A	566	ASN
1	A	633	HIS
1	A	642	ASN
1	A	648	ASN
1	A	668	GLN
1	A	681	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 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.

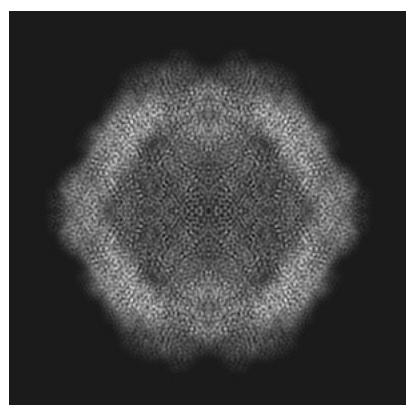
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-25909. These allow visual inspection of the internal detail of the map and identification of artifacts.

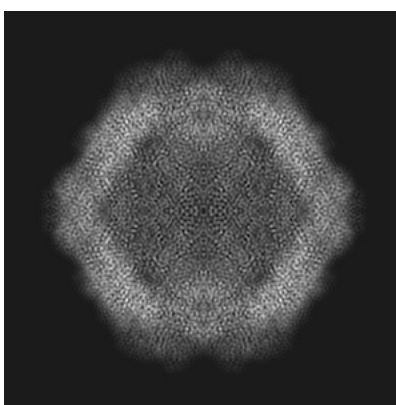
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

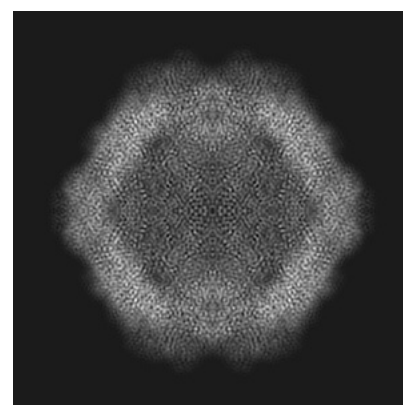
6.1.1 Primary map



X



Y

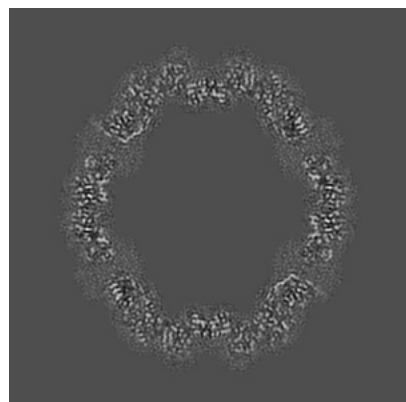


Z

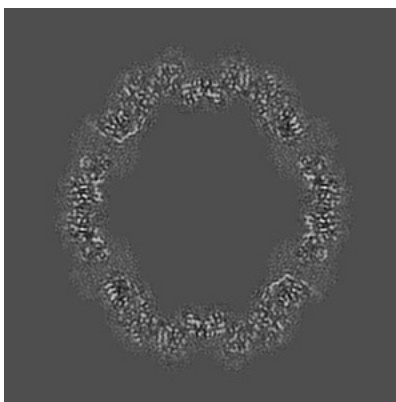
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

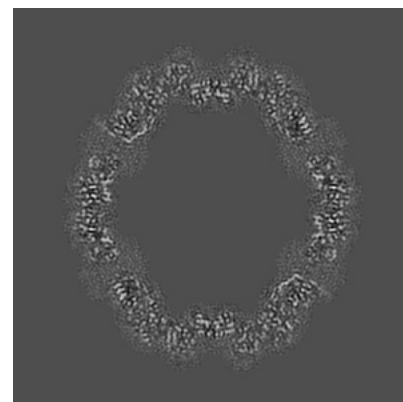
6.2.1 Primary map



X Index: 256



Y Index: 256

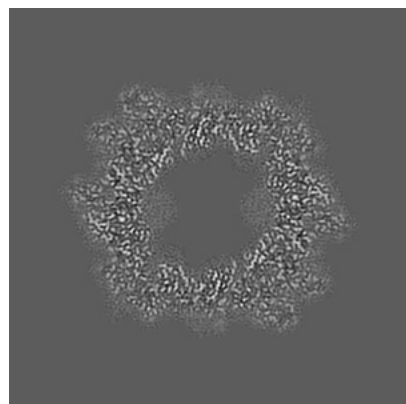


Z Index: 256

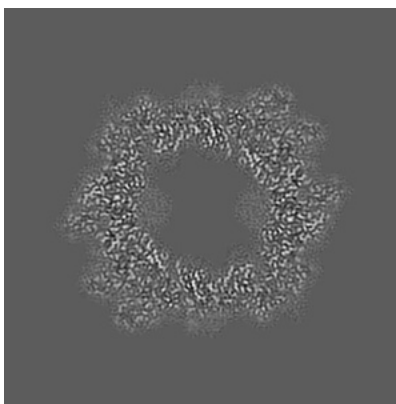
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

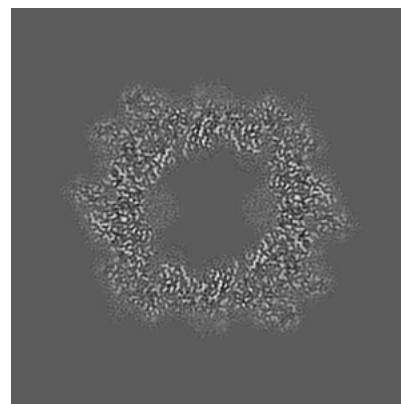
6.3.1 Primary map



X Index: 358



Y Index: 152

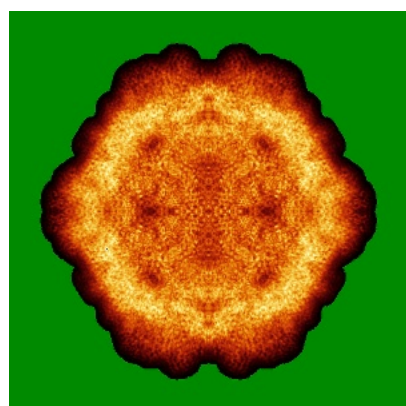


Z Index: 358

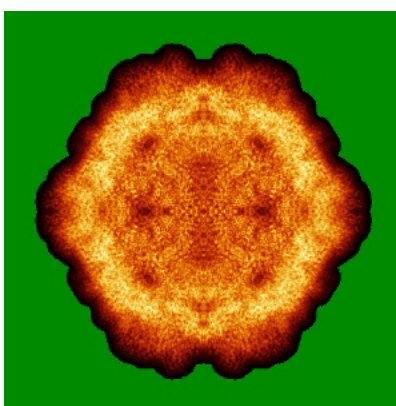
The images above show the largest variance slices of the map in three orthogonal directions.

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

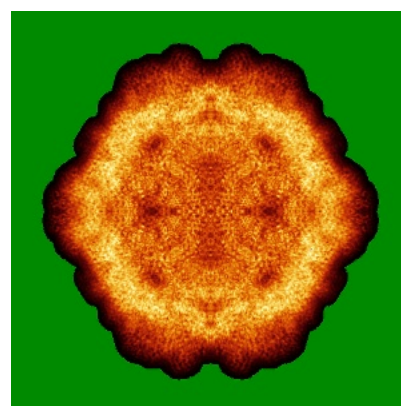
6.4.1 Primary map



X



Y

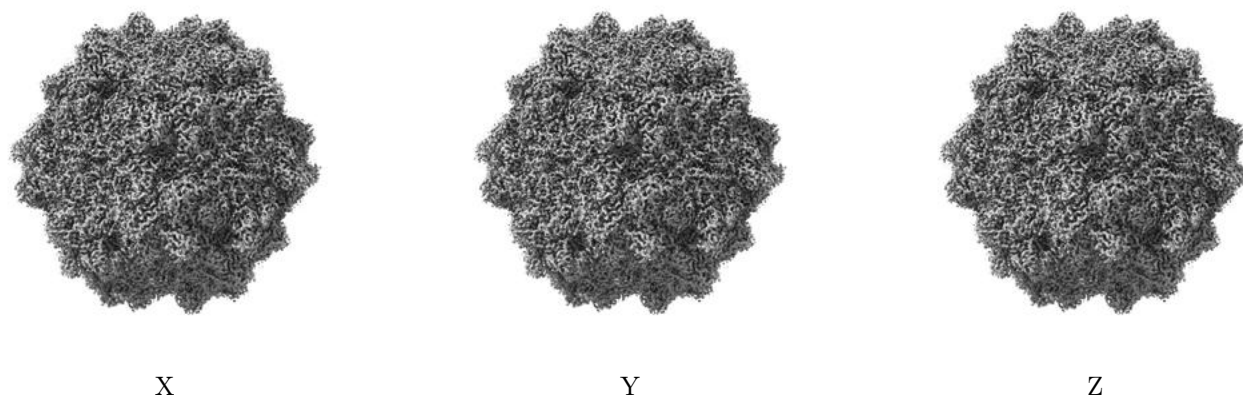


Z

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 21.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

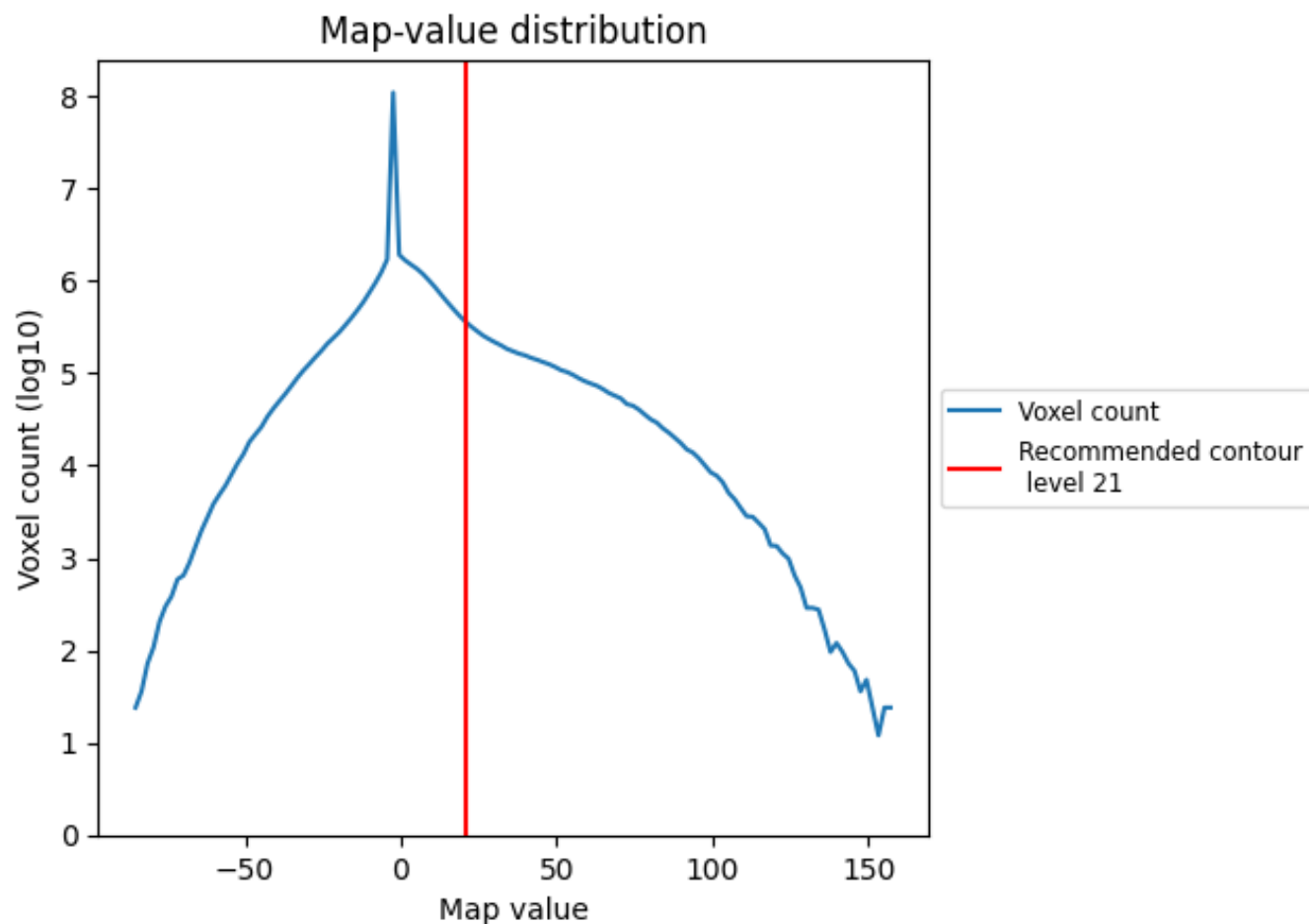
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

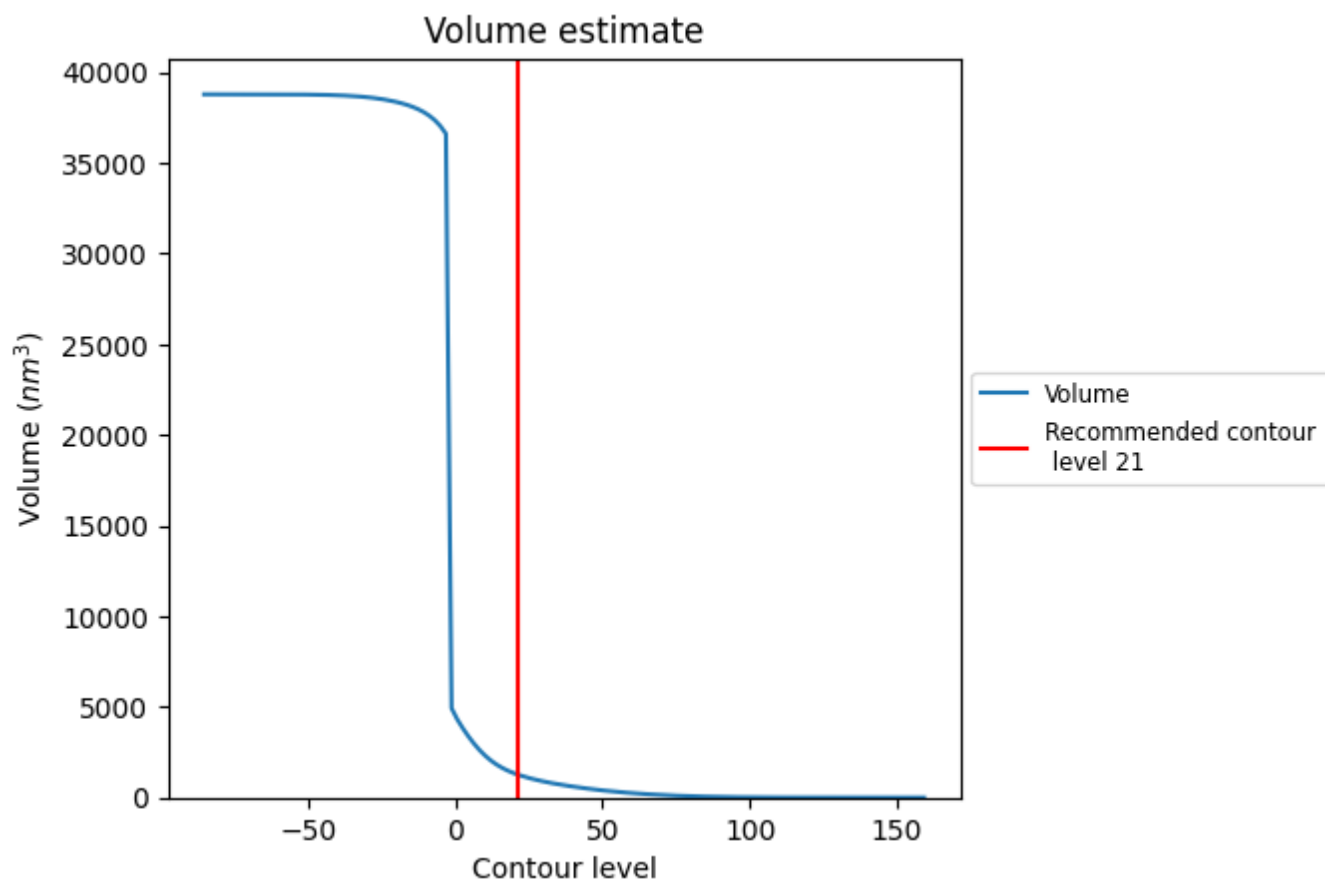
This section contains the results of statistical analysis of the map.

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.

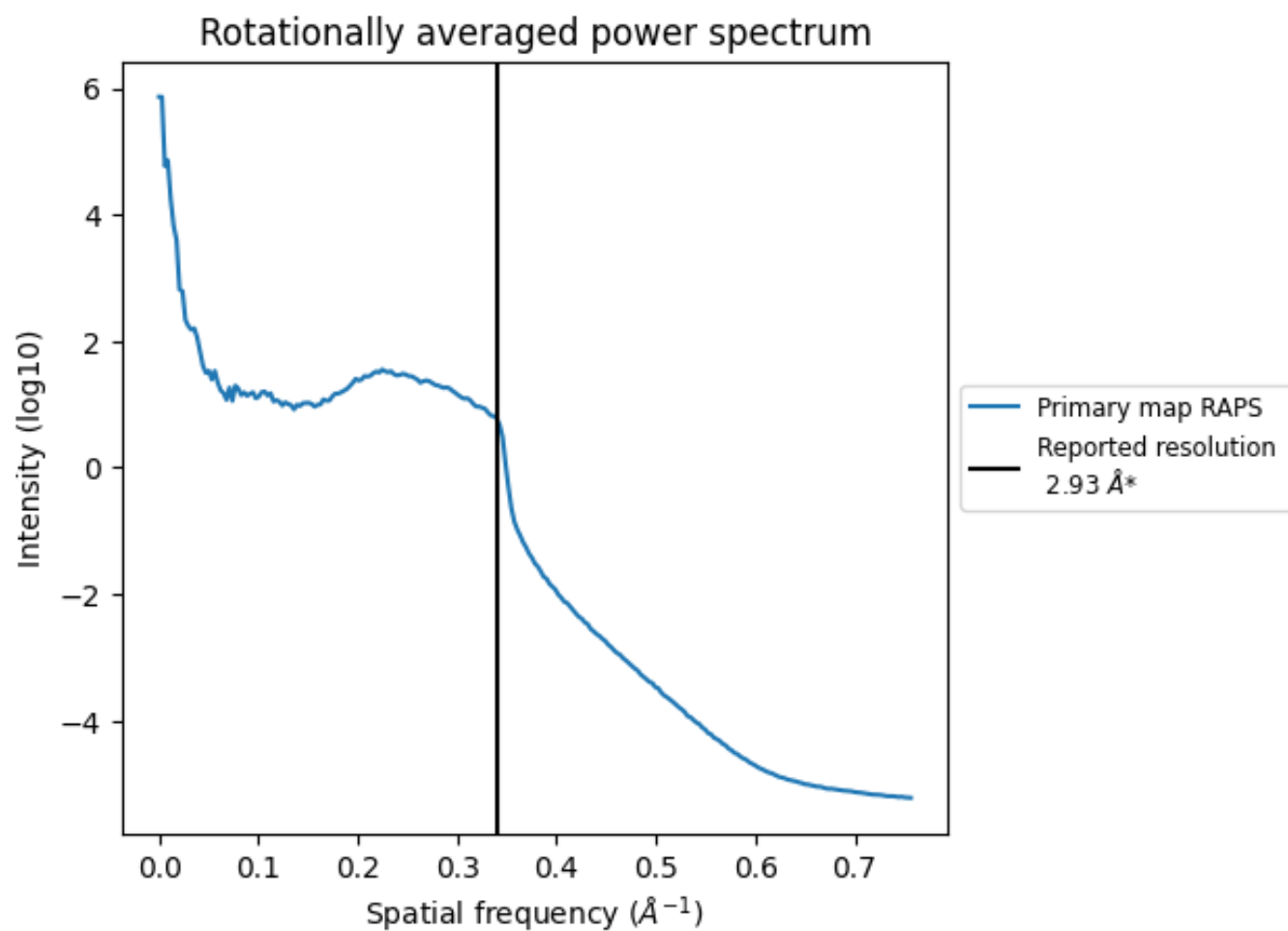
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1284 nm³; this corresponds to an approximate mass of 1160 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 0.341 $\text{\AA}^{-1}$

8 Fourier-Shell correlation

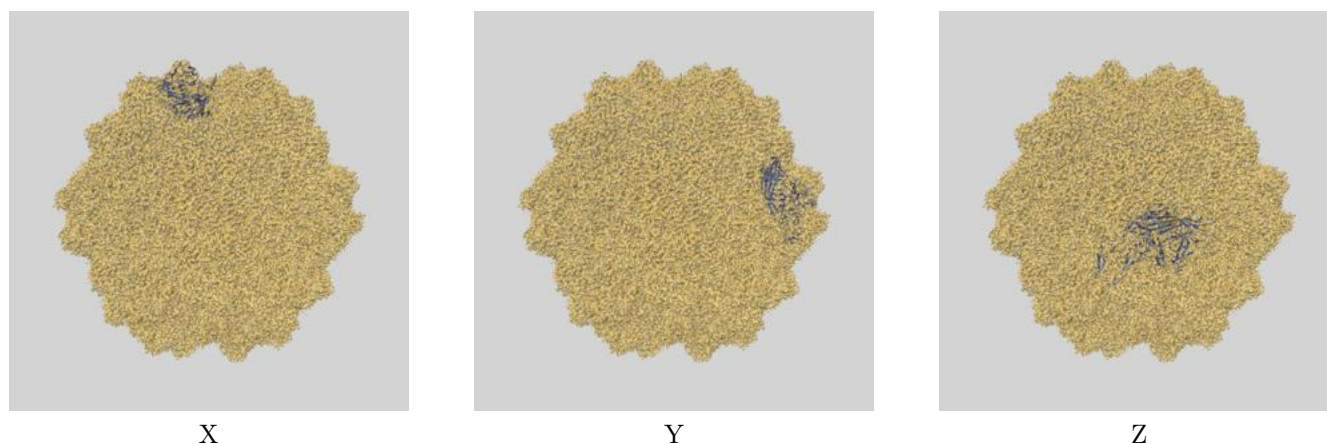
This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

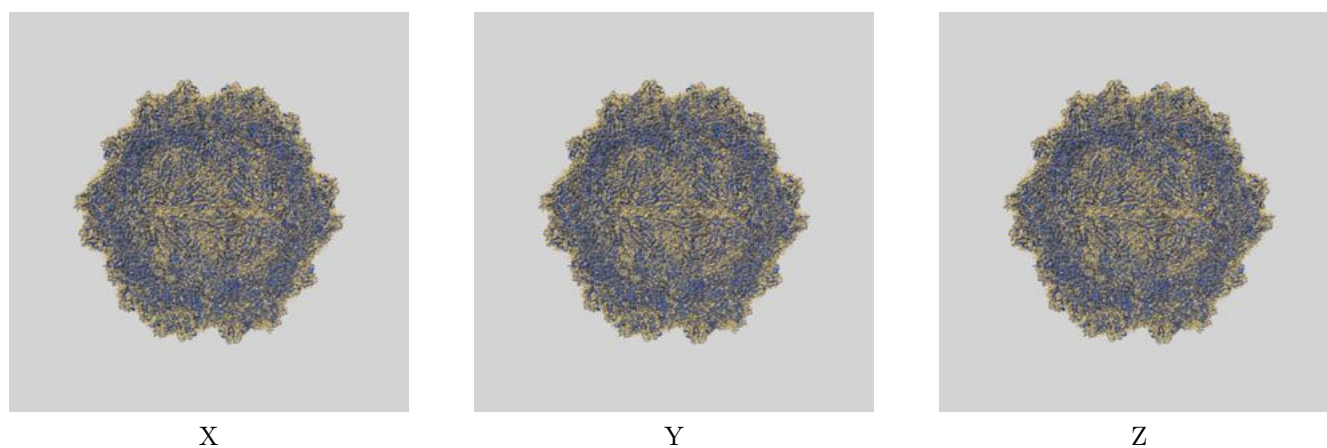
This section contains information regarding the fit between EMDB map EMD-25909 and PDB model 7TI4. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlays

9.1.1 Map-model overlay [i](#)

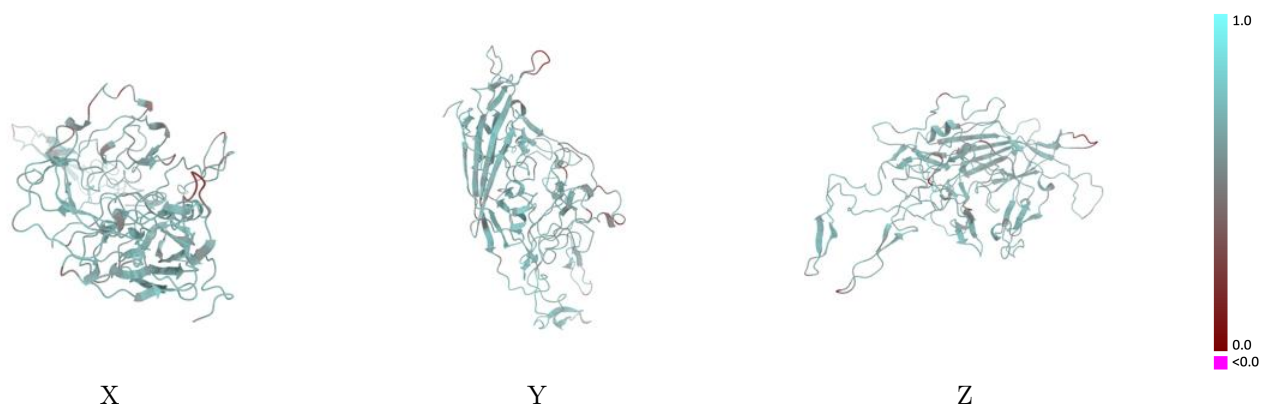


9.1.2 Map-model assembly overlay [i](#)



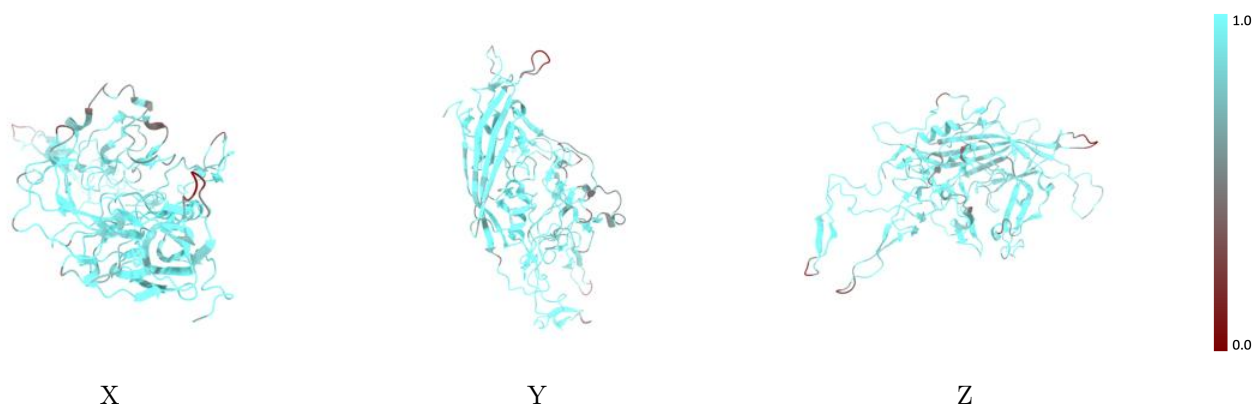
The images above show the 3D surface view of the map at the recommended contour level 21.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



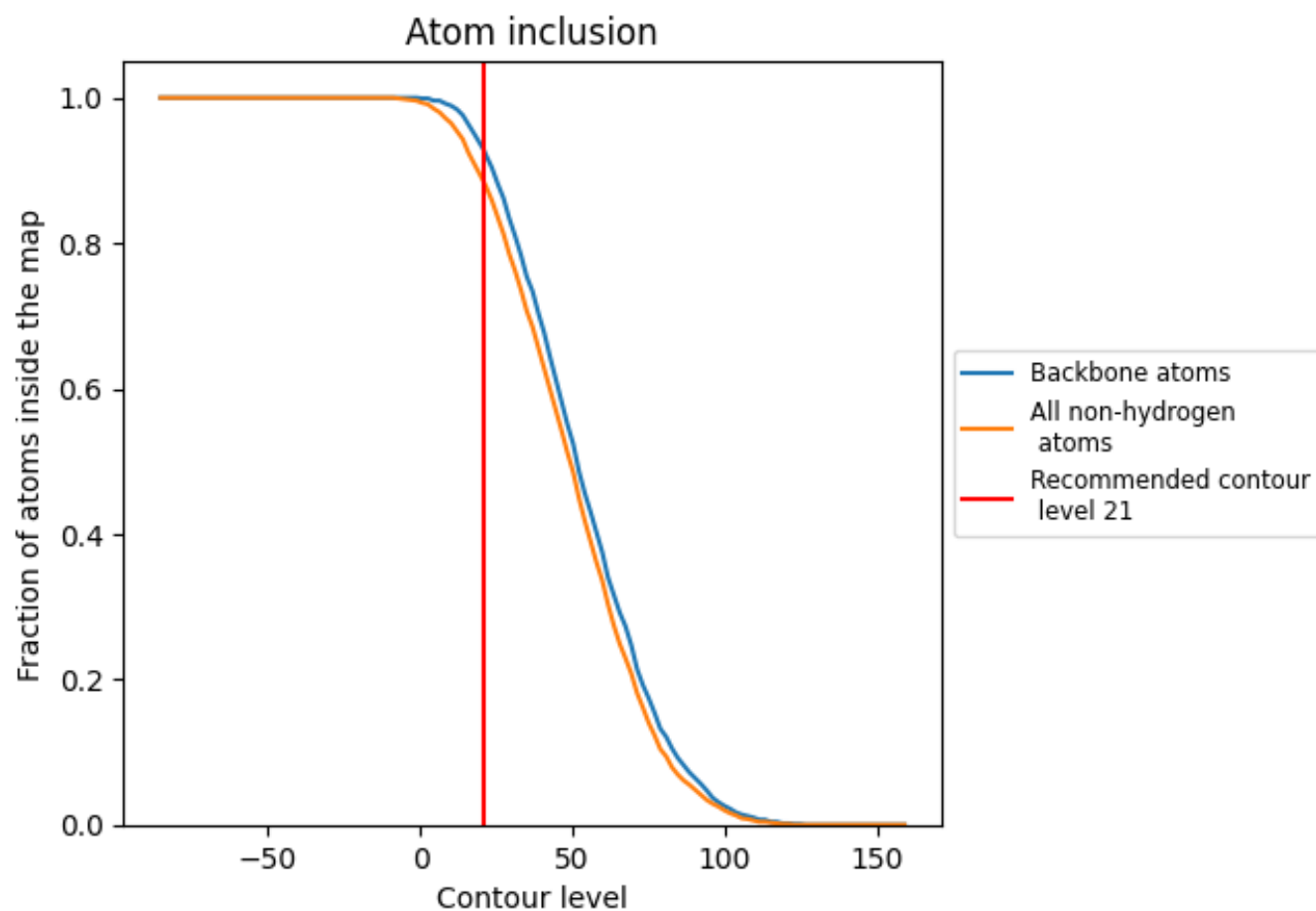
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (21).

9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 88% 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 (21) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8840	0.6100
A	0.8840	0.6100

