



Full wwPDB EM Validation Report ⓘ

Aug 26, 2025 – 05:04 PM JST

PDB ID : 7WL7 / pdb_00007wl7
EMDB ID : EMD-32576
Title : Mouse Pendrin in chloride and bicarbonate buffer in inward state
Authors : Liu, Q.Y.; Zhang, X.; Sun, L.; Chen, Z.G.
Deposited on : 2022-01-12
Resolution : 3.51 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.dev126
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.45.1

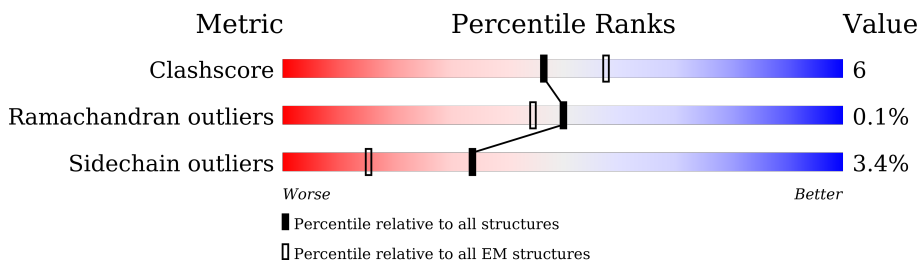
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.51 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	780	 68% 17% 15%
1	B	780	 71% 14% 15%

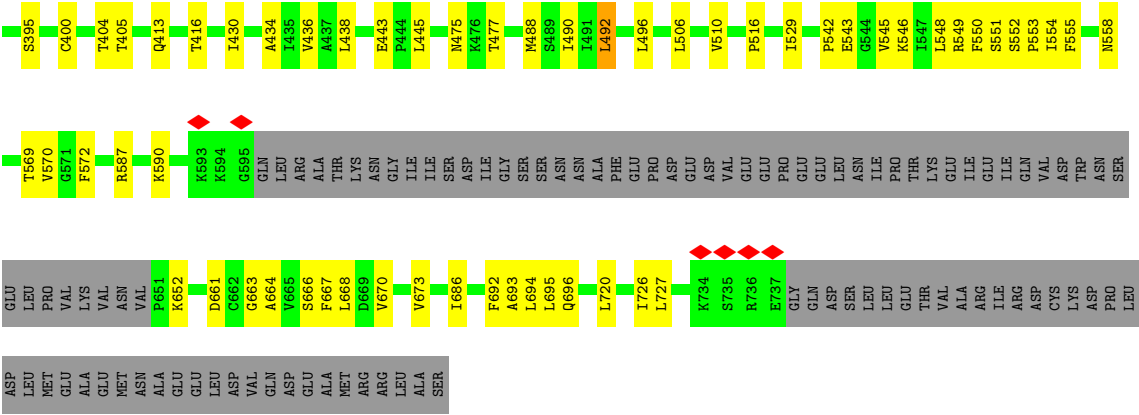
2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 10198 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 Pendrin.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	665	Total	C	N	O	S	0	0
			5099	3328	842	908	21		
1	B	665	Total	C	N	O	S	0	0
			5099	3328	842	908	21		



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	68679	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 ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.392	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.02	Depositor
Map size ($\text{\AA}$)	340.48, 340.48, 340.48	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.064, 1.064, 1.064	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	0.11	0/5200	0.30	0/7068
1	B	0.10	0/5200	0.31	0/7068
All	All	0.11	0/10400	0.31	0/14136

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	5099	0	5287	72	0
1	B	5099	0	5287	59	0
All	All	10198	0	10574	123	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.

All (123) 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:692:PHE:HB3	1:A:695:LEU:HD23	1.78	0.66
1:A:696:GLN:HE21	1:B:549:ARG:HH21	1.45	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:549:ARG:HH21	1:B:696:GLN:HE21	1.45	0.64
1:A:434:ALA:HA	1:A:438:LEU:HB3	1.80	0.63
1:A:555:PHE:HB3	1:A:667:PHE:HE1	1.65	0.61
1:B:692:PHE:HB3	1:B:695:LEU:HD23	1.81	0.61
1:B:103:MET:HB2	1:B:113:VAL:HG22	1.81	0.61
1:B:555:PHE:HB3	1:B:667:PHE:HE1	1.65	0.61
1:A:101:GLN:OE1	1:A:409:ARG:NH1	2.35	0.59
1:B:434:ALA:HA	1:B:438:LEU:HB3	1.85	0.59
1:A:155:MET:HB3	1:A:188:LEU:HD21	1.85	0.58
1:B:105:TYR:HD2	1:B:140:PRO:HB2	1.67	0.58
1:B:295:ARG:HG3	1:B:296:ILE:HG12	1.85	0.58
1:B:194:LEU:HD22	1:B:341:PRO:HG2	1.87	0.57
1:B:27:TYR:HB3	1:B:32:PHE:HB2	1.85	0.57
1:A:78:TYR:OH	1:A:87:ASP:OD2	2.21	0.57
1:A:94:THR:HG21	1:A:413:GLN:HB3	1.86	0.57
1:A:329:LYS:HA	1:A:443:GLU:HG2	1.87	0.56
1:A:395:SER:HB3	1:A:400:CYS:HB2	1.86	0.56
1:A:587:ARG:HD2	1:A:590:LYS:HD3	1.87	0.56
1:A:542:PRO:HB2	1:A:545:VAL:HB	1.88	0.56
1:A:118:TYR:OH	1:A:334:GLY:O	2.22	0.55
1:A:22:VAL:HG22	1:B:22:VAL:HG22	1.87	0.55
1:A:18:CYS:SG	1:A:19:SER:N	2.80	0.55
1:B:94:THR:HG21	1:B:413:GLN:HB3	1.88	0.55
1:B:102:GLY:HA2	1:B:140:PRO:HG2	1.88	0.54
1:B:475:ASN:OD1	1:B:477:THR:OG1	2.22	0.54
1:B:329:LYS:HA	1:B:443:GLU:HG2	1.89	0.54
1:A:27:TYR:HB3	1:A:32:PHE:HB2	1.88	0.53
1:A:105:TYR:HD2	1:A:140:PRO:HB2	1.72	0.53
1:A:237:LYS:HB2	1:A:260:ILE:HD11	1.91	0.53
1:A:295:ARG:HG3	1:A:296:ILE:HG12	1.90	0.53
1:B:542:PRO:HB2	1:B:545:VAL:HB	1.90	0.53
1:B:587:ARG:HD2	1:B:590:LYS:HD3	1.88	0.53
1:A:548:LEU:HD22	1:A:569:THR:HG21	1.89	0.53
1:A:475:ASN:OD1	1:A:477:THR:OG1	2.22	0.53
1:A:663:GLY:O	1:A:696:GLN:NE2	2.41	0.53
1:B:298:VAL:HG23	1:B:416:THR:HG22	1.91	0.53
1:A:348:ASP:OD1	1:A:348:ASP:N	2.38	0.53
1:B:663:GLY:O	1:B:696:GLN:NE2	2.42	0.53
1:B:18:CYS:SG	1:B:19:SER:N	2.75	0.52
1:A:283:MET:SD	1:A:459:LYS:NZ	2.72	0.52
1:A:516:PRO:HG3	1:A:552:SER:HB2	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:546:LYS:NZ	1:B:569:THR:O	2.40	0.51
1:A:194:LEU:HD22	1:A:341:PRO:HG2	1.92	0.51
1:B:661:ASP:HA	1:B:693:ALA:HB3	1.92	0.51
1:B:230:GLN:HG2	1:B:253:ILE:HD12	1.94	0.50
1:A:661:ASP:HA	1:A:693:ALA:HB3	1.93	0.50
1:B:652:LYS:HD3	1:B:686:ILE:HB	1.92	0.50
1:A:153:LEU:HD23	1:A:185:ARG:HH12	1.77	0.50
1:B:155:MET:HB3	1:B:188:LEU:HD21	1.94	0.50
1:B:516:PRO:HG3	1:B:552:SER:HB2	1.93	0.50
1:A:518:TRP:CG	1:A:565:CYS:HG	2.30	0.49
1:B:395:SER:HB3	1:B:400:CYS:HB2	1.94	0.49
1:A:212:VAL:HG21	1:A:361:TYR:HE2	1.78	0.49
1:B:148:VAL:HG13	1:B:192:LEU:HD23	1.95	0.49
1:A:488:MET:HG3	1:A:492:LEU:HD21	1.94	0.49
1:A:40:LEU:H	1:A:40:LEU:HD23	1.78	0.49
1:B:118:TYR:OH	1:B:334:GLY:O	2.30	0.49
1:A:506:LEU:HD22	1:B:510:VAL:HG11	1.95	0.48
1:A:248:ASN:OD1	1:A:249:GLY:N	2.46	0.48
1:A:554:ILE:HA	1:A:558:ASN:HD21	1.77	0.48
1:B:162:LEU:HD23	1:B:162:LEU:H	1.79	0.48
1:B:30:LEU:HD23	1:B:30:LEU:H	1.79	0.48
1:A:146:LEU:HD22	1:A:231:VAL:HG23	1.96	0.48
1:A:30:LEU:H	1:A:30:LEU:HD23	1.79	0.48
1:A:516:PRO:HG2	1:A:550:PHE:CZ	2.49	0.47
1:B:79:ARG:HB2	1:B:83:TRP:CD2	2.49	0.47
1:A:79:ARG:HB2	1:A:83:TRP:CD2	2.50	0.47
1:A:253:ILE:HG21	1:A:490:ILE:HG23	1.96	0.47
1:B:40:LEU:HD23	1:B:40:LEU:H	1.79	0.47
1:B:92:VAL:HG12	1:B:430:ILE:HD11	1.97	0.47
1:B:488:MET:HG3	1:B:492:LEU:HD21	1.95	0.47
1:B:248:ASN:OD1	1:B:249:GLY:N	2.47	0.47
1:A:103:MET:HE2	1:A:450:LEU:HD11	1.97	0.47
1:B:171:LEU:H	1:B:171:LEU:HD23	1.80	0.47
1:A:181:ARG:HE	1:A:185:ARG:HE	1.63	0.46
1:A:321:LYS:NZ	1:A:322:ASN:OD1	2.46	0.46
1:A:171:LEU:H	1:A:171:LEU:HD23	1.80	0.46
1:A:510:VAL:HG11	1:B:506:LEU:HD22	1.96	0.46
1:B:516:PRO:HG2	1:B:550:PHE:CZ	2.51	0.46
1:A:668:LEU:HA	1:A:668:LEU:HD22	1.81	0.46
1:A:529:ILE:HG12	1:B:720:LEU:HD13	1.98	0.46
1:A:92:VAL:HG12	1:A:430:ILE:HD11	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:212:VAL:HG21	1:B:361:TYR:HE2	1.80	0.45
1:B:553:PRO:HG3	1:B:666:SER:H	1.82	0.45
1:B:542:PRO:HG2	1:B:726:ILE:HD12	1.98	0.44
1:A:162:LEU:H	1:A:162:LEU:HD23	1.81	0.44
1:B:27:TYR:HA	1:B:31:ALA:HB3	1.99	0.44
1:B:167:ASN:O	1:B:167:ASN:ND2	2.50	0.44
1:A:372:ALA:O	1:A:376:ASP:N	2.50	0.44
1:A:167:ASN:O	1:A:167:ASN:ND2	2.50	0.44
1:A:27:TYR:HA	1:A:31:ALA:HB3	1.99	0.44
1:B:548:LEU:HD22	1:B:569:THR:HG21	2.00	0.44
1:B:570:VAL:HG23	1:B:572:PHE:H	1.83	0.44
1:A:454:VAL:O	1:A:458:LEU:HG	2.18	0.44
1:A:553:PRO:HA	1:A:665:VAL:HG12	2.00	0.44
1:A:289:ASN:HD21	1:A:299:PRO:HA	1.82	0.43
1:A:88:ILE:HD12	1:A:426:ILE:HG21	2.00	0.43
1:A:181:ARG:NE	1:A:185:ARG:HE	2.17	0.42
1:A:103:MET:HE1	1:A:442:LEU:HD13	2.02	0.42
1:A:196:VAL:HG13	1:A:357:ALA:HB2	1.99	0.42
1:B:321:LYS:NZ	1:B:322:ASN:OD1	2.47	0.42
1:A:542:PRO:HG2	1:A:726:ILE:HD12	2.01	0.42
1:B:311:THR:HG22	1:B:445:LEU:HB2	2.01	0.41
1:B:348:ASP:OD1	1:B:348:ASP:N	2.42	0.41
1:B:551:SER:HA	1:B:664:ALA:HB3	2.02	0.41
1:B:554:ILE:HA	1:B:558:ASN:HD21	1.85	0.41
1:A:302:ILE:HG23	1:A:303:GLU:OE1	2.20	0.41
1:A:566:ILE:HA	1:A:569:THR:HG22	2.02	0.41
1:B:670:VAL:O	1:B:673:VAL:HG12	2.21	0.41
1:A:151:VAL:HG11	1:A:352:ALA:HB1	2.03	0.41
1:A:581:ARG:HE	1:A:652:LYS:HE2	1.85	0.41
1:A:489:SER:HA	1:A:497:GLY:HA3	2.02	0.41
1:B:92:VAL:HA	1:B:430:ILE:HG13	2.02	0.41
1:A:85:LEU:HA	1:A:88:ILE:HG22	2.03	0.41
1:A:551:SER:HA	1:A:664:ALA:HB3	2.02	0.41
1:A:720:LEU:HD13	1:B:529:ILE:HG12	2.03	0.41
1:B:129:VAL:HG23	1:B:130:PHE:CD2	2.56	0.41
1:A:570:VAL:HG23	1:A:572:PHE:H	1.85	0.40
1:A:306:VAL:HA	1:A:309:ILE:HG22	2.04	0.40
1:A:664:ALA:HA	1:B:664:ALA:HA	2.03	0.40
1:B:226:ALA:HB1	1:B:490:ILE:HG13	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	661/780 (85%)	630 (95%)	30 (4%)	1 (0%)	44	75
1	B	661/780 (85%)	630 (95%)	31 (5%)	0	100	100
All	All	1322/1560 (85%)	1260 (95%)	61 (5%)	1 (0%)	50	79

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	670	VAL

5.3.2 Protein sidechains

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	561/668 (84%)	541 (96%)	20 (4%)	30	58
1	B	561/668 (84%)	543 (97%)	18 (3%)	34	61
All	All	1122/1336 (84%)	1084 (97%)	38 (3%)	34	60

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	LEU
1	A	59	LYS
1	A	89	ILE
1	A	163	VAL
1	A	182	ASP

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Mol	Chain	Res	Type
1	A	208	ILE
1	A	298	VAL
1	A	303	GLU
1	A	348	ASP
1	A	404	THR
1	A	405	THR
1	A	492	LEU
1	A	496	LEU
1	A	543	GLU
1	A	559	VAL
1	A	668	LEU
1	A	673	VAL
1	A	676	LEU
1	A	694	LEU
1	A	727	LEU
1	B	46	LEU
1	B	59	LYS
1	B	89	ILE
1	B	113	VAL
1	B	114	GLN
1	B	163	VAL
1	B	208	ILE
1	B	298	VAL
1	B	385	PHE
1	B	404	THR
1	B	405	THR
1	B	436	VAL
1	B	492	LEU
1	B	496	LEU
1	B	543	GLU
1	B	668	LEU
1	B	694	LEU
1	B	727	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	235	GLN
1	A	241	ASN
1	A	289	ASN
1	A	382	ASN
1	A	413	GLN

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Mol	Chain	Res	Type
1	A	421	GLN
1	A	712	ASN
1	A	730	GLN
1	A	731	ASN
1	B	33	GLN
1	B	289	ASN
1	B	413	GLN
1	B	421	GLN
1	B	730	GLN
1	B	731	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.

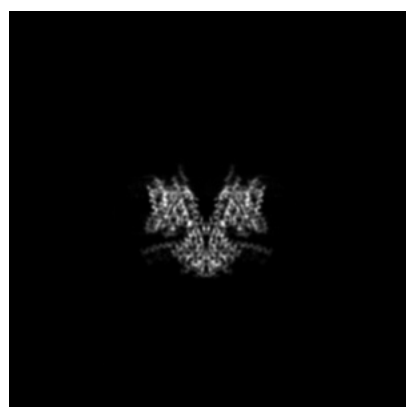
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-32576. These allow visual inspection of the internal detail of the map and identification of artifacts.

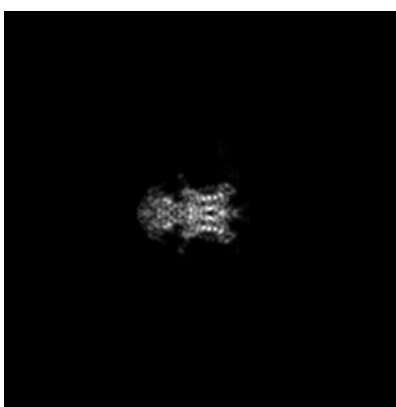
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

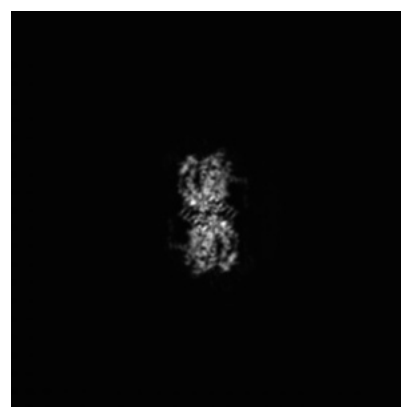
6.1.1 Primary map



X



Y

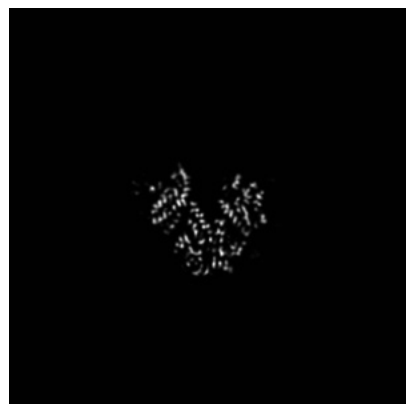


Z

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

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 160



Y Index: 160

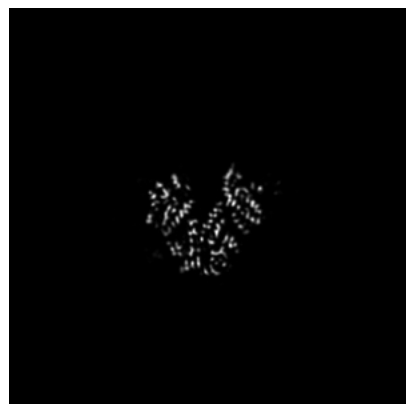


Z Index: 160

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: 155



Y Index: 142

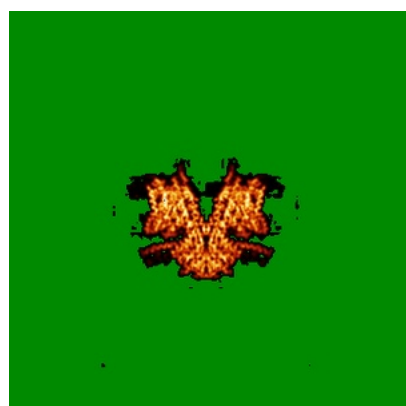


Z Index: 174

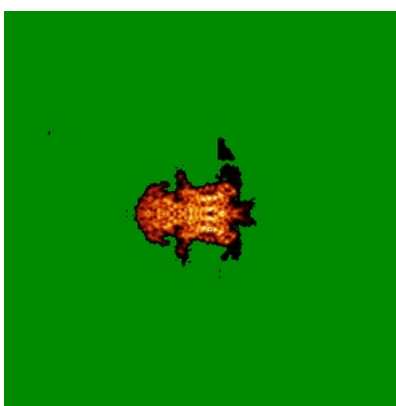
The images above show the largest variance slices of the map in three orthogonal directions.

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

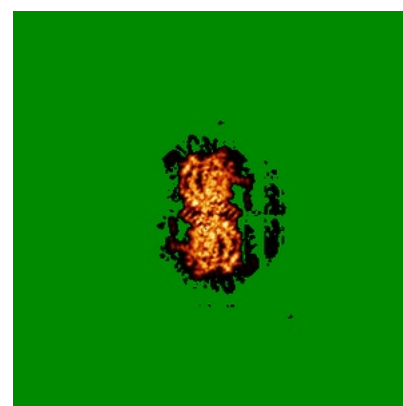
6.4.1 Primary map



X



Y

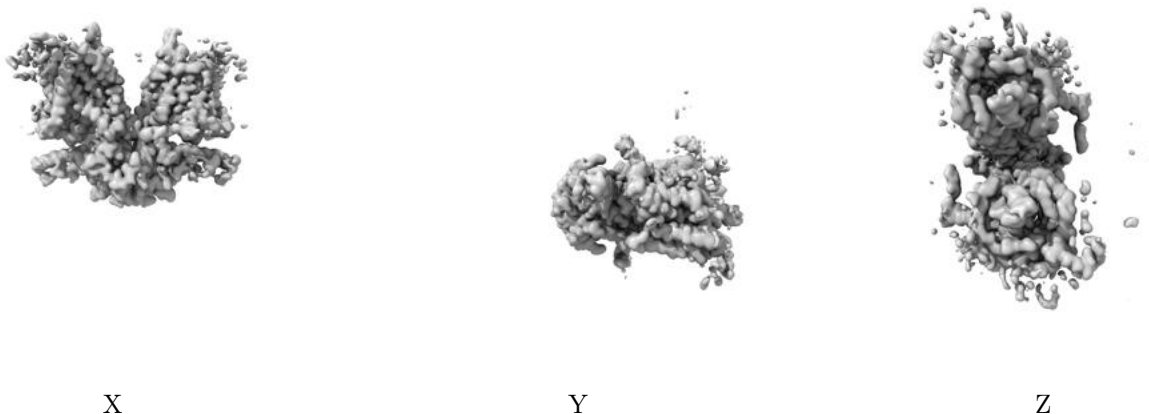


Z

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

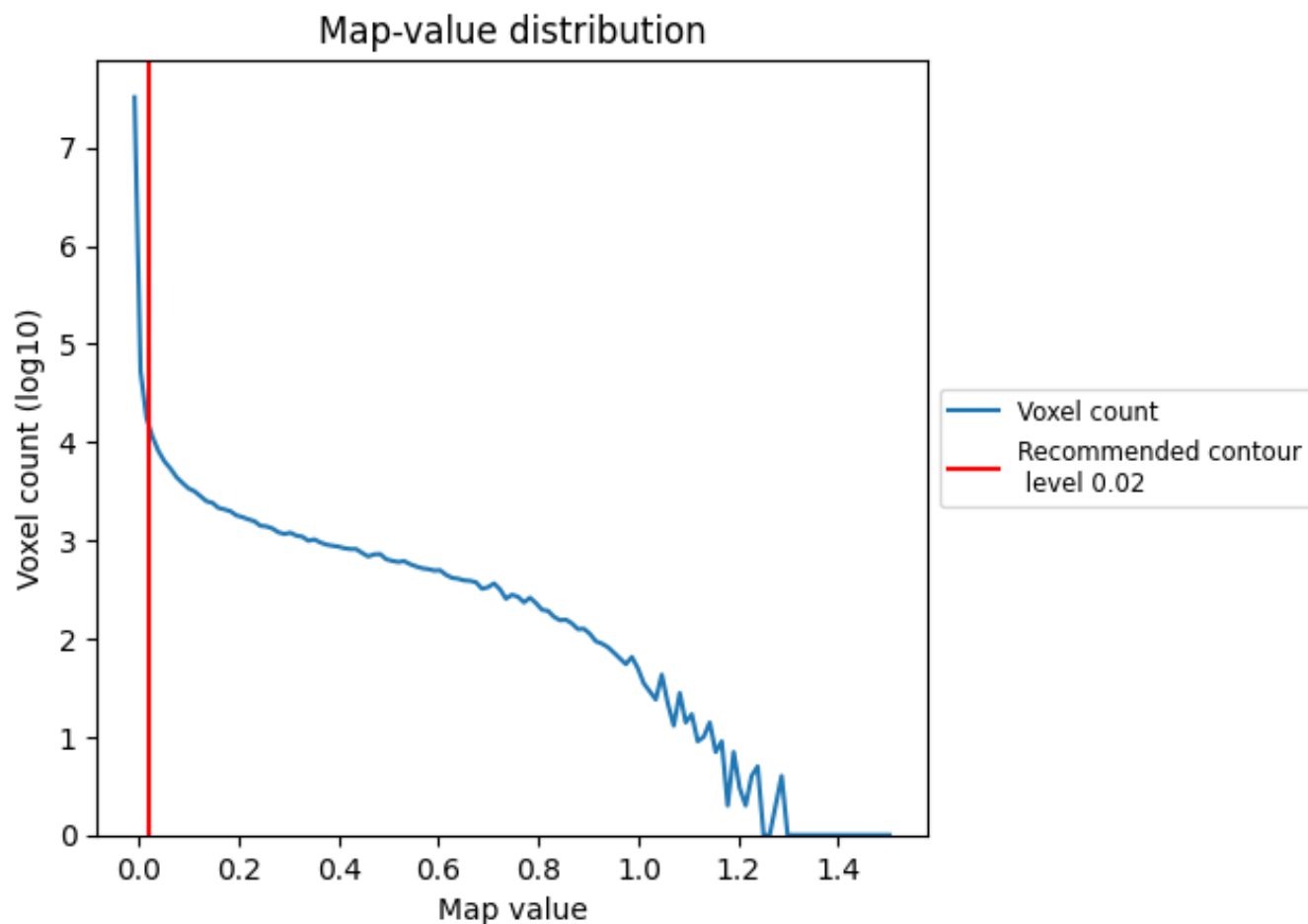
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

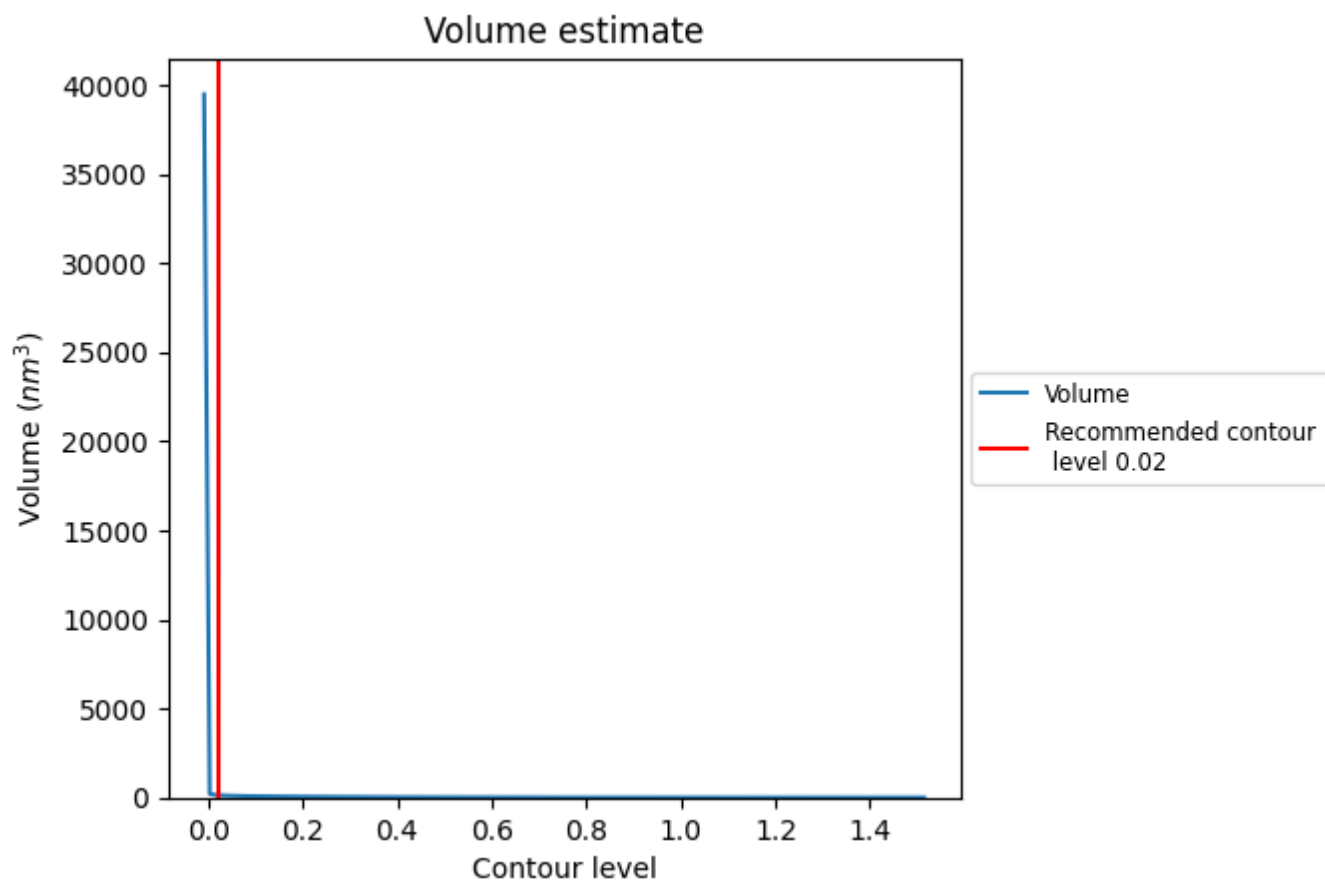
This section contains the results of statistical analysis of the map.

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.

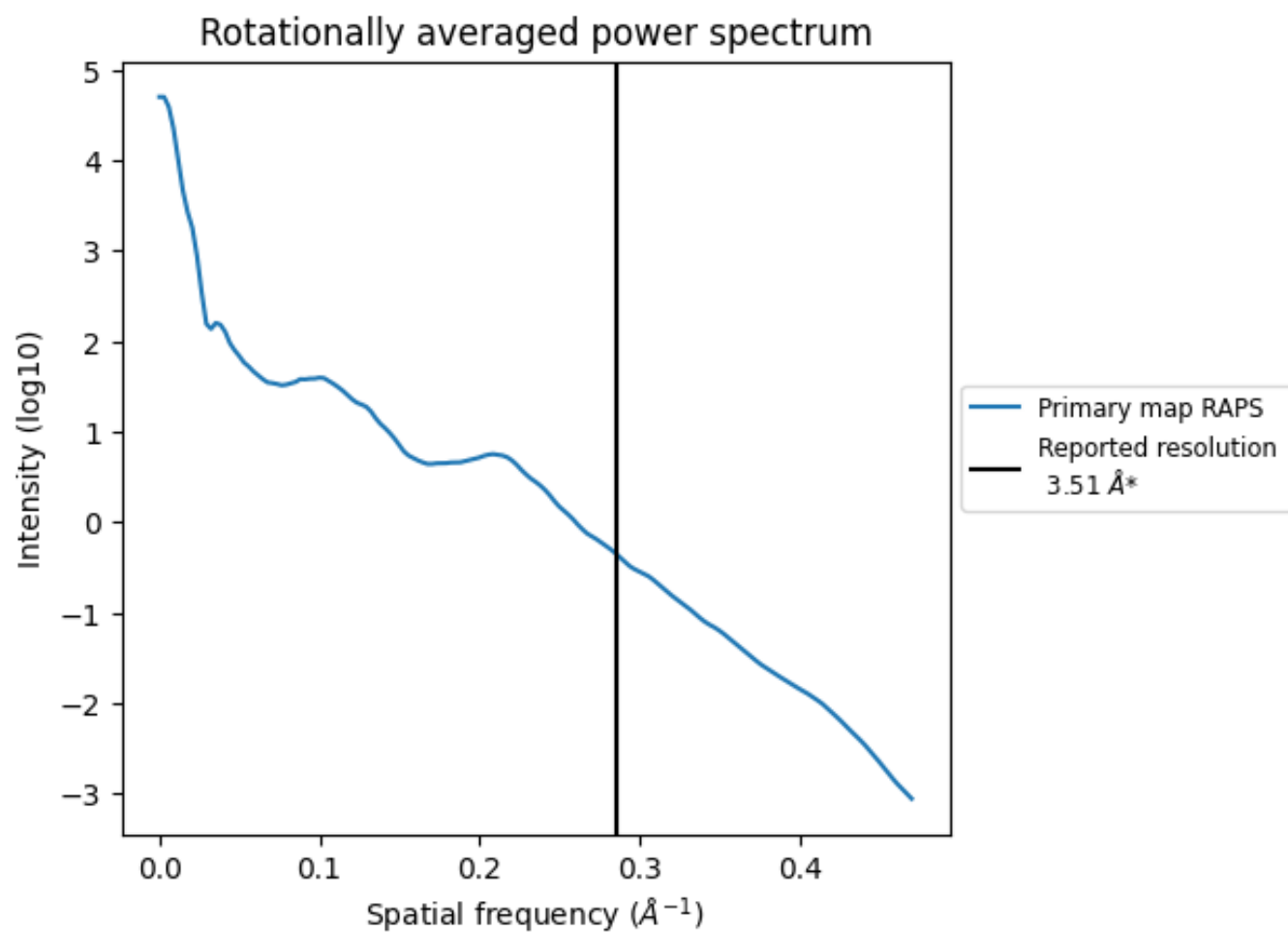
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 135 nm³; this corresponds to an approximate mass of 122 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 0.285 Å⁻¹

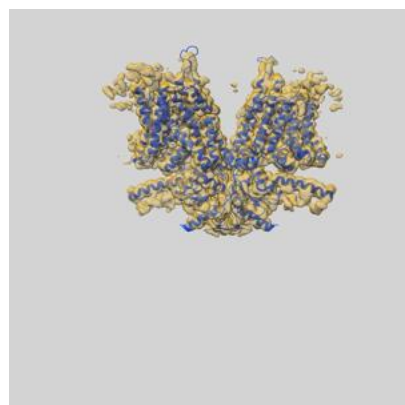
8 Fourier-Shell correlation

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

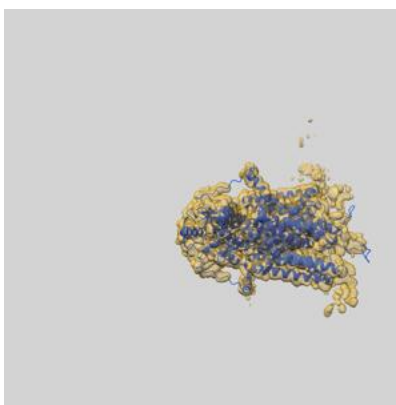
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-32576 and PDB model 7WL7. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

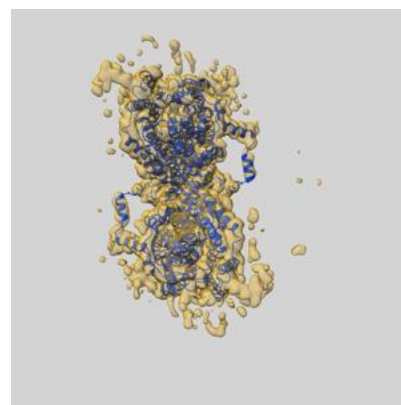
9.1 Map-model overlay [i](#)



X



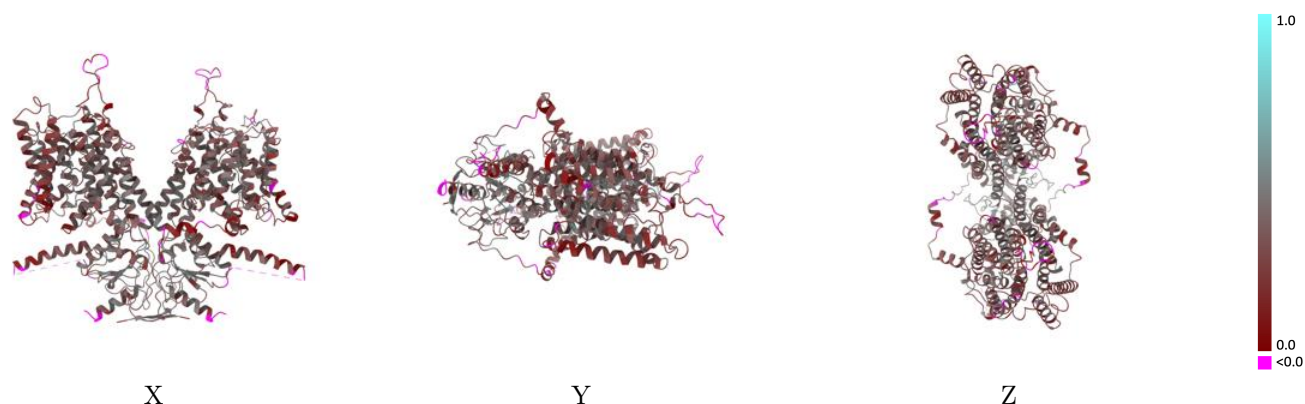
Y



Z

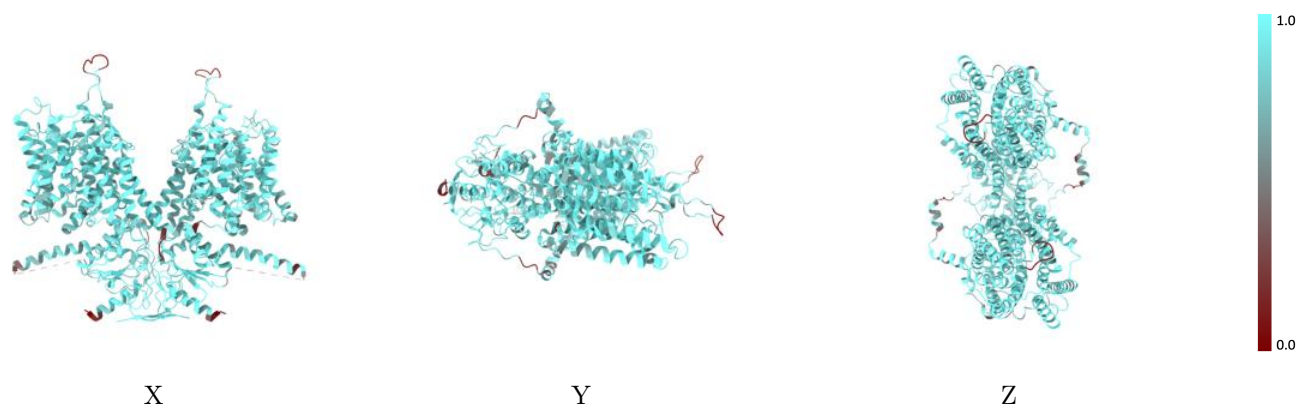
The images above show the 3D surface view of the map at the recommended contour level 0.02 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



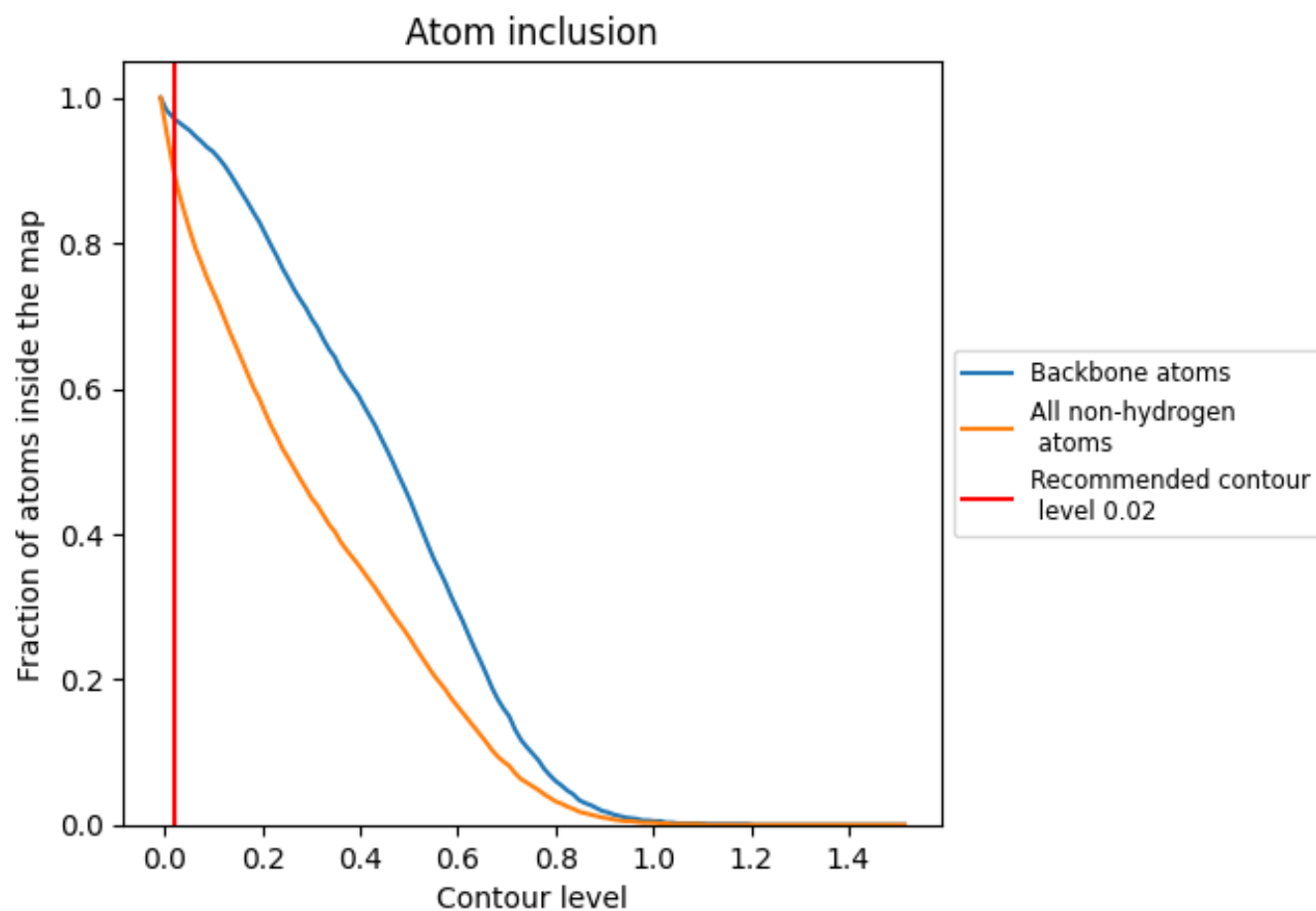
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.02).

9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 89% 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 (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8940	0.3200
A	0.8950	0.3190
B	0.8920	0.3200

