Full wwPDB EM Validation Report

Aug 25, 2025 – 11:14 AM EDT

PDB ID	:	9MN4 / pdb_00009mn4
EMDB ID	:	EMD-48412
Title	:	Structure of the human mitochondrial initially transcribing complex, IC3
Authors	:	Herbine, K.H.; Nayak, A.R.; Temiakov, D.
Deposited on	:	2024-12-20
Resolution	:	3.05 Å(reported)
Based on initial model	:	6ERP

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:

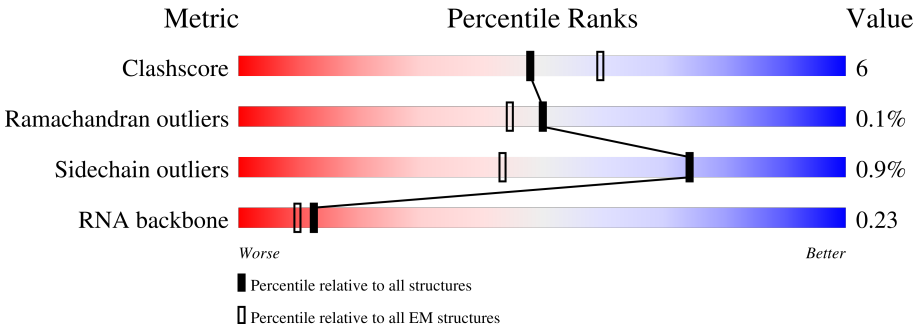
EMDB validation analysis	:	0.0.1.dev126
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (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 3.05 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
RNA backbone	6643	2191

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 <=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	246	50% 70% 9% 22%
2	B	396	• 66% 16% 18%
3	E	1230	• 73% 13% • 14%
4	N	60	20% 63% 20% 17%
5	R	3	100%
6	T	60	23% 55% 25% • 17%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 14835 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 Transcription factor A, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	192	Total	C	N	O	S	0	0
			1615	1019	291	300	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	49	SER	CYS	conflict	UNP Q00059

- Molecule 2 is a protein called Dimethyladenosine transferase 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	324	Total	C	N	O	S	0	0
			2632	1699	453	465	15		

- Molecule 3 is a protein called DNA-directed RNA polymerase, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	E	1062	Total	C	N	O	S	0	0
			8480	5391	1532	1503	54		

- Molecule 4 is a DNA chain called Non-Template Strand DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	N	50	Total	C	N	O	P	0	0
			1035	492	198	296	49		

- Molecule 5 is a RNA chain called RNA (RNA3mt).

Mol	Chain	Residues	Atoms					AltConf	Trace
5	R	3	Total	C	N	O	P	0	0
			68	30	15	20	3		

- Molecule 6 is a DNA chain called Template Strand DNA.

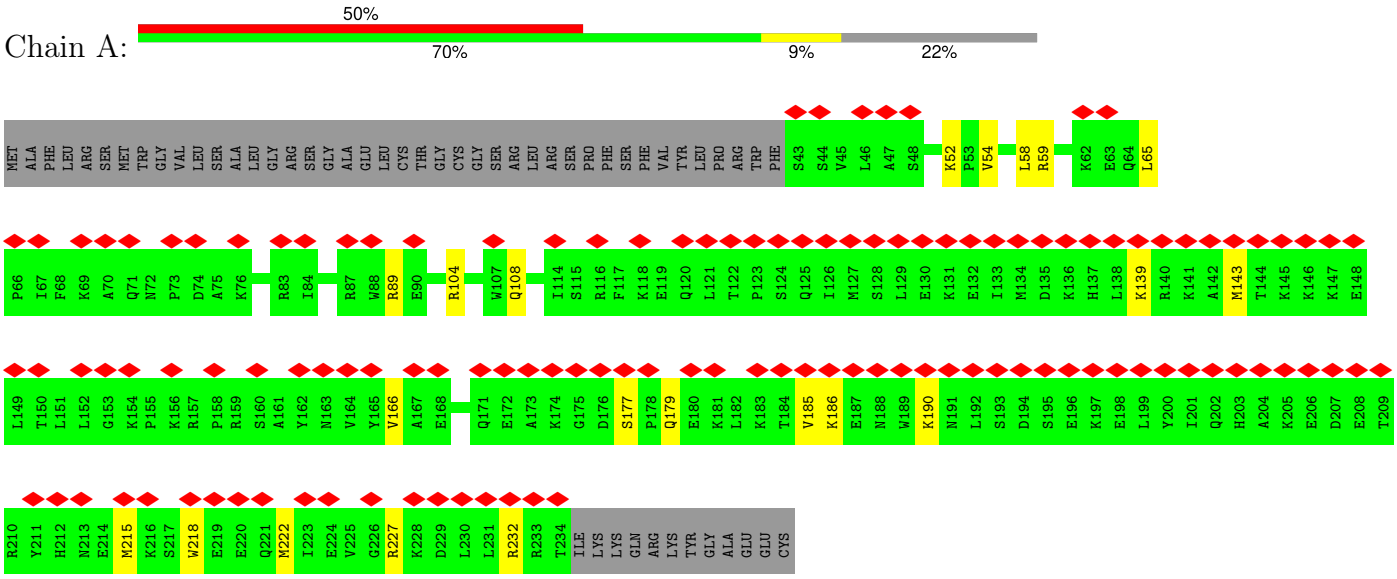
Mol	Chain	Residues	Atoms					AltConf	Trace
6	T	50	Total	C	N	O	P	0	0
			1005	481	179	296	49		

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.

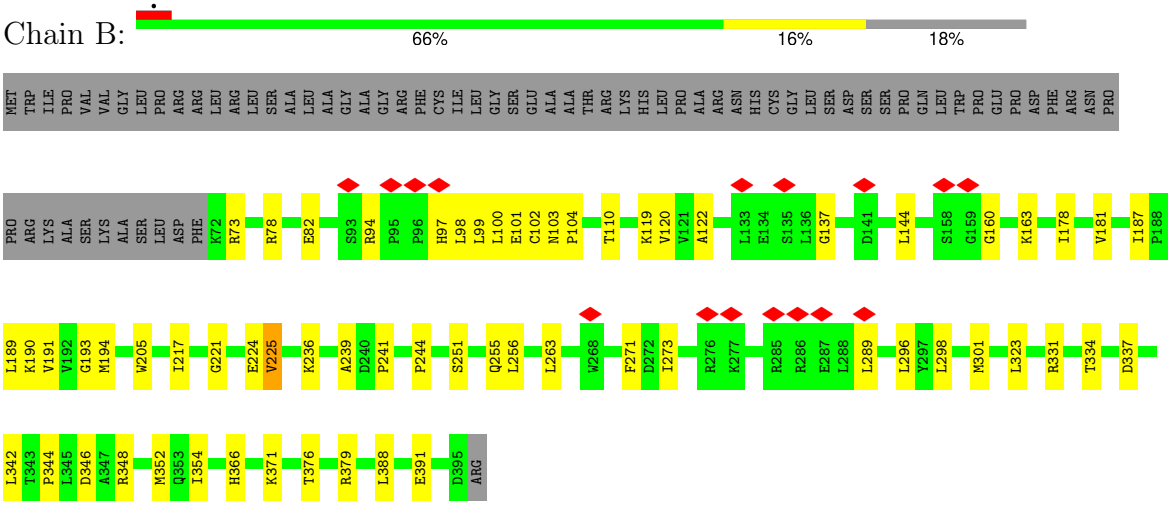
• Molecule 1: Transcription factor A, mitochondrial

Chain A:



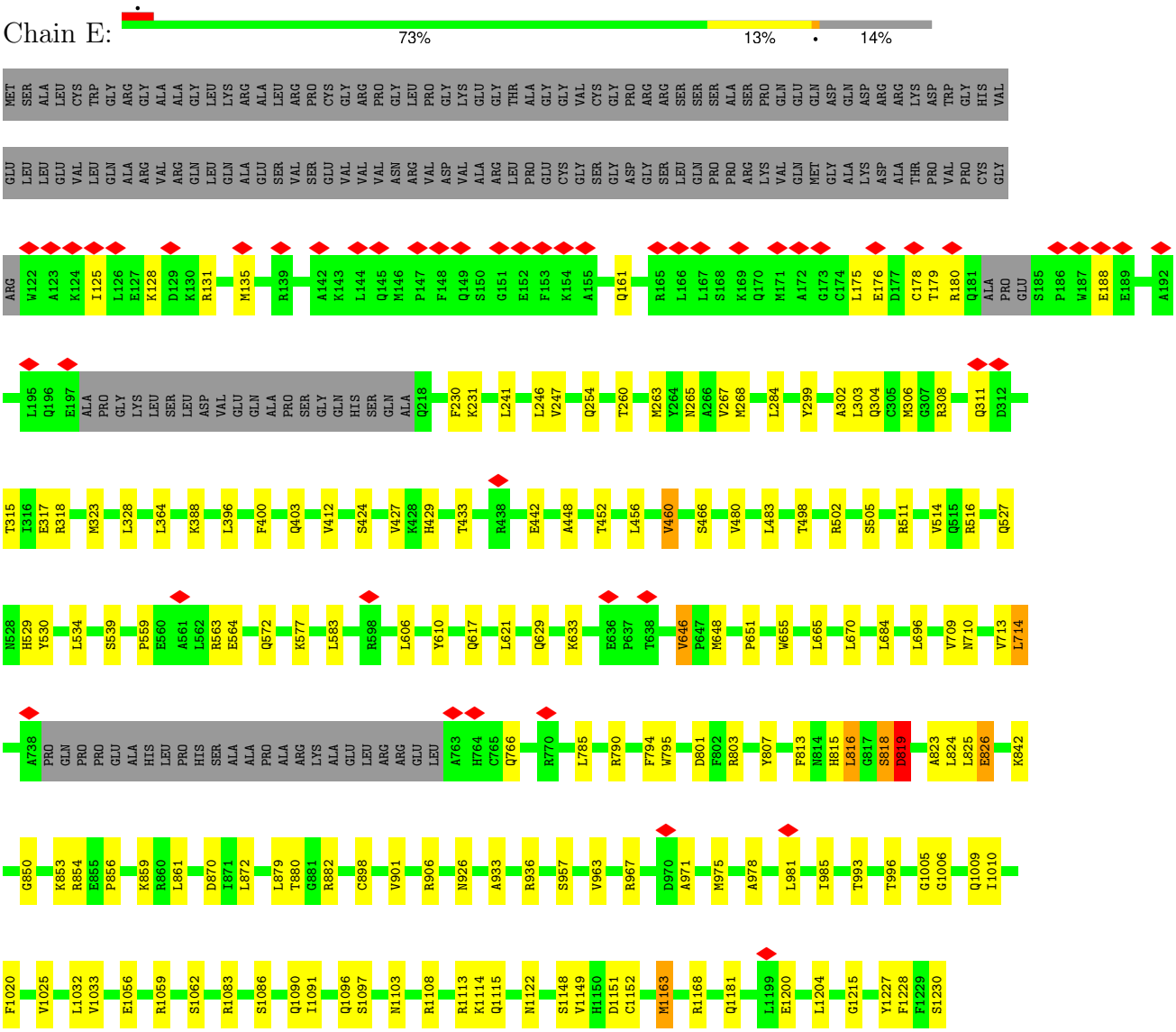
• Molecule 2: Dimethyladenosine transferase 2, mitochondrial

Chain B:



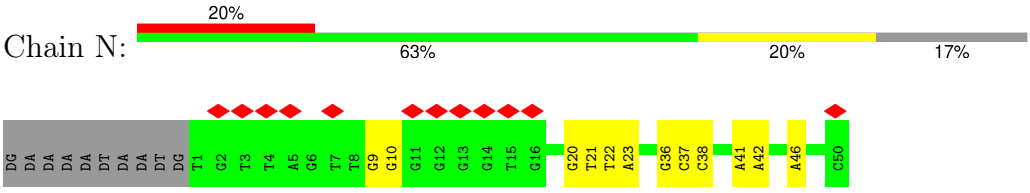
• Molecule 3: DNA-directed RNA polymerase, mitochondrial

Chain E:



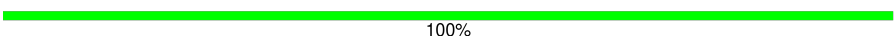
• Molecule 4: Non-Template Strand DNA

Chain N:



• Molecule 5: RNA (RNA3mt)

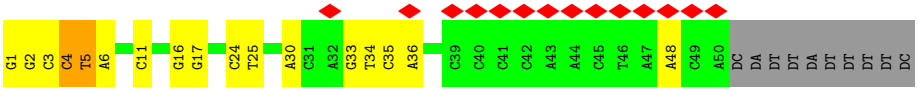
Chain R:



There are no outlier residues recorded for this chain.

• Molecule 6: Template Strand DNA

Chain T:


G1
G2
C3
C4
T5
A6
C11
G16
G17
C24
T25
A30
C31
A32
G33
T34
C35
A36
C39
C40
C41
C42
A43
A44
C45
T46
A47
A48
C49
A50
DC
DA
DT
DT
DA
DT
DT
DT
DT
DC

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	109470	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	47.69	Depositor
Minimum defocus (nm)	300	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	165000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	2.198	Depositor
Minimum map value	-0.025	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.025	Depositor
Recommended contour level	0.015	Depositor
Map size (Å)	288.384, 288.384, 288.384	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.751, 0.751, 0.751	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	0.12	0/1646	0.26	0/2202
2	B	0.21	0/2697	0.50	0/3646
3	E	0.22	0/8675	0.50	4/11752 (0.0%)
4	N	0.26	0/1164	0.47	0/1798
5	R	0.59	0/76	0.93	0/117
6	T	0.42	2/1124 (0.2%)	0.75	5/1728 (0.3%)
All	All	0.24	2/15382 (0.0%)	0.51	9/21243 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
3	E	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	T	3	DC	O3'-P	-8.01	1.49	1.61
6	T	5	DT	O3'-P	-5.01	1.53	1.61

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	T	3	DC	P-O3'-C3'	-12.92	100.82	120.20
6	T	4	DC	O3'-P-O5'	11.27	120.91	104.00
6	T	3	DC	C4'-C3'-O3'	-7.60	98.60	110.00
3	E	819	ASP	N-CA-C	-7.19	105.12	114.04
6	T	3	DC	OP1-P-O3'	-6.97	87.10	108.00
3	E	816	LEU	N-CA-C	-6.00	103.33	111.55
3	E	1113	ARG	N-CA-C	-5.71	106.35	113.55
3	E	1163	MET	CB-CG-SD	5.15	128.16	112.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	T	11	DC	O3'-P-O5'	-5.09	96.37	104.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	E	1148	SER	Peptide
3	E	178	CYS	Peptide

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	1615	0	1655	13	0
2	B	2632	0	2682	39	0
3	E	8480	0	8590	97	0
4	N	1035	0	564	11	0
5	R	68	0	34	0	0
6	T	1005	0	563	19	0
All	All	14835	0	14088	165	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 (165) 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:E:629:GLN:O	3:E:633:LYS:HB2	1.73	0.86
6:T:5:DT:H2"	6:T:6:DA:C8	2.19	0.78
1:A:222:MET:HB3	1:A:227:ARG:HB2	1.68	0.75
3:E:617:GLN:HG2	4:N:36:DG:H21	1.54	0.70
3:E:870:ASP:OD1	3:E:882:ARG:NH2	2.25	0.69
3:E:1096:GLN:HE21	6:T:16:DG:H5'	1.59	0.67
3:E:403:GLN:NE2	3:E:648:MET:SD	2.69	0.66
3:E:967:ARG:HE	3:E:981:LEU:HB3	1.63	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:516:ARG:HH22	3:E:564:GLU:H	1.46	0.61
3:E:161:GLN:HE21	3:E:247:VAL:HG13	1.65	0.60
2:B:160:GLY:O	2:B:163:LYS:NZ	2.34	0.60
3:E:856:PRO:HG2	3:E:859:LYS:HG3	1.83	0.60
3:E:303:LEU:HD11	3:E:323:MET:HE1	1.84	0.60
3:E:1083:ARG:HD3	3:E:1108:ARG:HG3	1.84	0.60
3:E:563:ARG:NH1	3:E:665:LEU:O	2.36	0.59
3:E:303:LEU:HD22	3:E:317:GLU:HG2	1.83	0.59
3:E:304:GLN:HE21	3:E:308:ARG:HH22	1.50	0.58
3:E:396:LEU:HD13	3:E:534:LEU:HD11	1.84	0.58
3:E:1149:VAL:HB	3:E:1152:CYS:HB3	1.86	0.58
3:E:872:LEU:HD22	3:E:906:ARG:HH21	1.68	0.58
6:T:5:DT:C2	6:T:6:DA:C2	2.93	0.57
3:E:516:ARG:HH12	3:E:564:GLU:HB2	1.70	0.57
3:E:879:LEU:HG	3:E:880:THR:HG23	1.85	0.57
2:B:137:GLY:HA3	2:B:144:LEU:HD23	1.87	0.56
3:E:818:SER:OG	3:E:819:ASP:N	2.34	0.56
3:E:1103:ASN:OD1	3:E:1108:ARG:NH2	2.38	0.56
3:E:606:LEU:HD22	3:E:621:LEU:HB3	1.89	0.55
3:E:1010:ILE:HD11	3:E:1033:VAL:HB	1.88	0.55
2:B:104:PRO:HG3	2:B:122:ALA:HB1	1.88	0.55
3:E:396:LEU:HB3	3:E:534:LEU:HD21	1.88	0.55
3:E:505:SER:OG	3:E:572:GLN:O	2.23	0.54
2:B:101:GLU:OE2	2:B:103:ASN:N	2.33	0.54
3:E:967:ARG:HH22	3:E:1032:LEU:HA	1.72	0.54
3:E:315:THR:HB	3:E:318:ARG:HB2	1.90	0.54
1:A:54:VAL:O	1:A:59:ARG:NH2	2.40	0.54
2:B:100:LEU:HD11	2:B:189:LEU:HD23	1.90	0.54
3:E:498:THR:HG22	3:E:502:ARG:HE	1.73	0.54
2:B:271:PHE:HE2	2:B:296:LEU:HD22	1.73	0.53
2:B:94:ARG:NH2	2:B:187:ILE:O	2.39	0.53
3:E:606:LEU:HD13	3:E:621:LEU:HD23	1.91	0.53
2:B:263:LEU:HB2	2:B:298:LEU:HD22	1.90	0.53
2:B:241:PRO:HD3	2:B:366:HIS:HA	1.91	0.53
4:N:20:DG:H3'	4:N:21:DT:H72	1.91	0.53
2:B:241:PRO:HG3	2:B:366:HIS:CD2	2.43	0.52
3:E:188:GLU:OE2	3:E:311:GLN:NE2	2.43	0.52
3:E:936:ARG:HB2	3:E:1215:GLY:H	1.75	0.52
1:A:232:ARG:NH1	6:T:48:DA:OP1	2.41	0.52
3:E:1062:SER:OG	3:E:1115:GLN:OE1	2.26	0.52
3:E:710:ASN:ND2	3:E:826:GLU:OE1	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:530:TYR:OH	3:E:651:PRO:O	2.26	0.52
6:T:5:DT:C4	6:T:6:DA:N1	2.78	0.51
3:E:610:TYR:OH	6:T:17:DG:OP1	2.28	0.51
3:E:971:ALA:HB1	3:E:978:ALA:HB2	1.93	0.51
2:B:391:GLU:OE2	3:E:766:GLN:NE2	2.44	0.51
3:E:709:VAL:HG11	3:E:790:ARG:HA	1.92	0.51
6:T:35:DC:H2"	6:T:36:DA:C8	2.46	0.50
1:A:177:SER:OG	1:A:179:GLN:OE1	2.29	0.50
2:B:323:LEU:HD12	2:B:342:LEU:HD13	1.93	0.50
3:E:388:LYS:HD3	3:E:539:SER:HA	1.94	0.50
3:E:1181:GLN:N	3:E:1181:GLN:OE1	2.44	0.50
1:A:104:ARG:O	1:A:108:GLN:NE2	2.44	0.50
3:E:1090:GLN:NE2	3:E:1097:SER:OG	2.44	0.50
3:E:933:ALA:O	3:E:936:ARG:NH1	2.44	0.49
1:A:89:ARG:NH1	4:N:21:DT:OP1	2.46	0.49
2:B:98:LEU:HD23	2:B:119:LYS:H	1.78	0.49
2:B:102:CYS:HB2	2:B:193:GLY:HA3	1.94	0.49
3:E:655:TRP:HB3	3:E:696:LEU:HD22	1.95	0.49
2:B:344:PRO:HD3	2:B:388:LEU:HD23	1.95	0.49
6:T:5:DT:N3	6:T:6:DA:C2	2.81	0.49
2:B:256:LEU:HG	2:B:371:LYS:HE2	1.95	0.48
3:E:1168:ARG:NH2	3:E:1228:PHE:O	2.46	0.48
1:A:186:LYS:HE2	1:A:190:LYS:HE3	1.95	0.48
3:E:577:LYS:NZ	3:E:1091:ILE:O	2.47	0.48
3:E:646:VAL:HG13	3:E:785:LEU:HD11	1.96	0.48
4:N:22:DT:H2"	4:N:23:DA:C8	2.48	0.48
3:E:1086:SER:HB2	3:E:1108:ARG:HD3	1.93	0.48
3:E:1200:GLU:HG2	3:E:1204:LEU:HD12	1.96	0.47
3:E:975:MET:SD	3:E:975:MET:N	2.87	0.47
2:B:239:ALA:O	2:B:255:GLN:NE2	2.43	0.47
6:T:5:DT:C5	6:T:6:DA:C6	3.03	0.47
1:A:166:VAL:HA	1:A:185:VAL:HG11	1.96	0.47
2:B:73:ARG:NH2	2:B:194:MET:SD	2.87	0.47
3:E:713:VAL:HG11	3:E:823:ALA:HB1	1.96	0.47
3:E:801:ASP:HB3	3:E:807:TYR:HE1	1.79	0.47
2:B:193:GLY:C	2:B:194:MET:HE2	2.40	0.47
2:B:97:HIS:HB3	2:B:189:LEU:HG	1.97	0.47
3:E:299:TYR:HB3	3:E:323:MET:HE2	1.97	0.47
3:E:854:ARG:HH12	3:E:957:SER:HB2	1.81	0.46
2:B:348:ARG:O	2:B:352:MET:HG3	2.14	0.46
2:B:163:LYS:HB3	4:N:41:DA:H62	1.78	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:714:LEU:HB3	3:E:824:LEU:HD22	1.98	0.46
2:B:273:ILE:HD13	2:B:289:LEU:HD12	1.97	0.46
2:B:190:LYS:NZ	2:B:224:GLU:OE1	2.39	0.46
3:E:260:THR:H	3:E:263:MET:HE3	1.81	0.46
3:E:713:VAL:HG11	3:E:823:ALA:O	2.16	0.45
1:A:218:TRP:CD1	1:A:222:MET:HE3	2.51	0.45
2:B:100:LEU:HB2	2:B:191:VAL:HG22	1.98	0.45
2:B:178:ILE:HG12	2:B:189:LEU:HD11	1.98	0.45
2:B:244:PRO:O	2:B:331:ARG:NH2	2.39	0.45
6:T:1:DG:H2"	6:T:2:DG:C8	2.51	0.45
2:B:354:ILE:HG22	2:B:376:THR:HG21	1.98	0.45
3:E:1006:GLY:O	3:E:1010:ILE:HG12	2.15	0.45
2:B:346:ASP:OD1	2:B:346:ASP:N	2.46	0.45
2:B:334:THR:HG23	2:B:337:ASP:H	1.82	0.45
4:N:9:DG:H2"	4:N:10:DG:H5"	1.99	0.45
3:E:265:ASN:HA	3:E:268:MET:HE3	1.99	0.44
3:E:442:GLU:HG2	3:E:480:VAL:HG11	1.98	0.44
3:E:516:ARG:NH2	3:E:564:GLU:H	2.15	0.44
6:T:5:DT:C6	6:T:6:DA:C6	3.06	0.44
3:E:246:LEU:HD22	3:E:267:VAL:HG11	1.98	0.44
3:E:850:GLY:O	3:E:853:LYS:NZ	2.45	0.44
3:E:898:CYS:HA	3:E:901:VAL:HG22	1.98	0.44
2:B:376:THR:HG22	2:B:379:ARG:HH12	1.83	0.44
3:E:412:VAL:HG21	3:E:646:VAL:HG21	1.99	0.44
3:E:302:ALA:O	3:E:306:MET:HG3	2.18	0.44
3:E:400:PHE:HE1	3:E:527:GLN:HG2	1.83	0.43
3:E:670:LEU:HD23	3:E:684:LEU:HD23	1.99	0.43
3:E:963:VAL:HG23	3:E:985:ILE:HD12	1.99	0.43
3:E:1020:PHE:HE2	3:E:1025:VAL:HG22	1.81	0.43
1:A:52:LYS:HB3	6:T:30:DA:H5"	2.00	0.43
2:B:98:LEU:HG	2:B:99:LEU:HD23	1.99	0.43
3:E:967:ARG:HH21	3:E:981:LEU:HG	1.83	0.43
1:A:139:LYS:O	1:A:143:MET:HG3	2.18	0.43
2:B:225:VAL:HG23	2:B:301:MET:HB2	2.00	0.43
3:E:230:PHE:CD2	3:E:263:MET:HG2	2.53	0.43
3:E:284:LEU:HD23	3:E:284:LEU:HA	1.83	0.43
3:E:1227:TYR:HA	3:E:1230:SER:HB2	2.00	0.43
2:B:110:THR:HA	2:B:120:VAL:HG21	2.00	0.43
3:E:424:SER:H	3:E:427:VAL:HB	1.84	0.42
3:E:803:ARG:NH1	3:E:1122:ASN:OD1	2.42	0.42
1:A:65:LEU:HD21	6:T:33:DG:H5'	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:205:TRP:NE1	4:N:38:DC:OP2	2.45	0.42
3:E:125:ILE:HA	3:E:128:LYS:HE2	2.02	0.42
3:E:231:LYS:HE3	3:E:231:LYS:HB3	1.87	0.42
3:E:429:HIS:O	3:E:433:THR:OG1	2.33	0.42
3:E:926:ASN:HD22	3:E:1151:ASP:HB3	1.84	0.42
3:E:176:GLU:O	3:E:180:ARG:HB2	2.20	0.41
3:E:241:LEU:HD23	3:E:460:VAL:HG11	2.02	0.41
3:E:254:GLN:NE2	6:T:25:DT:OP1	2.35	0.41
2:B:205:TRP:HE1	4:N:38:DC:P	2.42	0.41
3:E:323:MET:HG2	3:E:328:LEU:HB2	2.01	0.41
4:N:46:DA:N1	6:T:6:DA:H2	2.16	0.41
3:E:815:HIS:HB3	3:E:825:LEU:HD22	2.02	0.41
3:E:816:LEU:HG	3:E:1149:VAL:HG13	2.02	0.41
3:E:1005:GLY:O	3:E:1009:GLN:HG3	2.20	0.41
3:E:131:ARG:O	3:E:135:MET:HG3	2.20	0.41
3:E:794:PHE:C	3:E:795:TRP:HD1	2.29	0.41
3:E:511:ARG:HA	3:E:514:VAL:HG22	2.03	0.41
2:B:78:ARG:NH1	2:B:82:GLU:OE1	2.53	0.41
3:E:448:ALA:O	3:E:452:THR:OG1	2.30	0.41
1:A:58:LEU:HD12	6:T:30:DA:H2'	2.03	0.41
3:E:529:HIS:CE1	3:E:559:PRO:HD3	2.56	0.41
3:E:993:THR:HA	3:E:996:THR:HG22	2.03	0.41
3:E:1056:GLU:OE2	3:E:1059:ARG:NH1	2.54	0.41
4:N:41:DA:H2"	4:N:42:DA:C8	2.56	0.41
3:E:175:LEU:O	3:E:179:THR:OG1	2.17	0.40
3:E:483:LEU:HB3	3:E:583:LEU:HD12	2.03	0.40
3:E:842:LYS:HE3	3:E:861:LEU:HD11	2.03	0.40
2:B:181:VAL:HG23	2:B:221:GLY:HA3	2.03	0.40
3:E:456:LEU:HB3	3:E:466:SER:OG	2.21	0.40
4:N:37:DC:H4'	4:N:38:DC:H5'	2.02	0.40
6:T:4:DC:H6	6:T:4:DC:H2'	1.74	0.40
6:T:24:DC:H2"	6:T:25:DT:C5	2.57	0.40
6:T:33:DG:H2'	6:T:34:DT:H71	2.04	0.40
2:B:236:LYS:O	2:B:251:SER:OG	2.30	0.40

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	190/246 (77%)	190 (100%)	0	0	100	100
2	B	322/396 (81%)	296 (92%)	26 (8%)	0	100	100
3	E	1054/1230 (86%)	1016 (96%)	37 (4%)	1 (0%)	48	77
All	All	1566/1872 (84%)	1502 (96%)	63 (4%)	1 (0%)	50	77

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	E	818	SER

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	178/222 (80%)	177 (99%)	1 (1%)	84	90
2	B	290/349 (83%)	288 (99%)	2 (1%)	81	89
3	E	924/1057 (87%)	915 (99%)	9 (1%)	73	85
All	All	1392/1628 (86%)	1380 (99%)	12 (1%)	74	86

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	215	MET
2	B	217	ILE

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Continued from previous page...

Mol	Chain	Res	Type
2	B	225	VAL
3	E	364	LEU
3	E	460	VAL
3	E	646	VAL
3	E	714	LEU
3	E	813	PHE
3	E	819	ASP
3	E	826	GLU
3	E	1114	LYS
3	E	1163	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	108	GLN
1	A	203	HIS
1	A	212	HIS
2	B	294	GLN
2	B	366	HIS
3	E	161	GLN
3	E	196	GLN
3	E	222	GLN
3	E	249	HIS
3	E	304	GLN
3	E	311	GLN
3	E	512	HIS
3	E	528	ASN
3	E	680	HIS
3	E	764	HIS
3	E	788	HIS
3	E	921	GLN
3	E	926	ASN
3	E	930	HIS
3	E	972	GLN
3	E	1035	GLN
3	E	1080	GLN
3	E	1090	GLN
3	E	1164	ASN
3	E	1170	GLN
3	E	1209	GLN
3	E	1221	GLN

5.3.3 RNA

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
5	R	2/3 (66%)	0	0

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

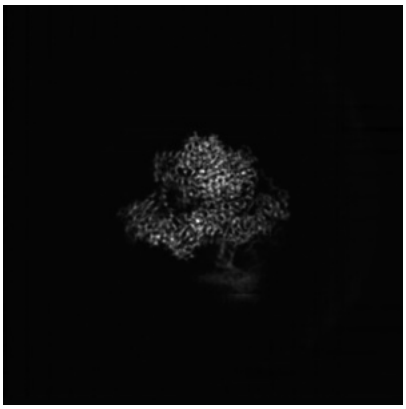
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-48412. These allow visual inspection of the internal detail of the map and identification of artifacts.

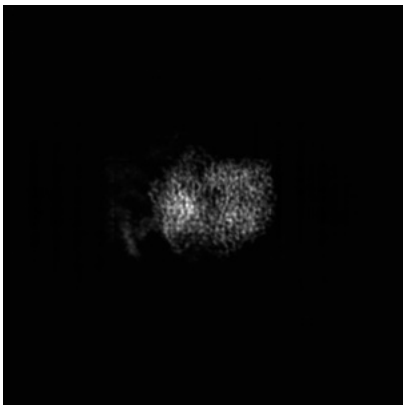
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

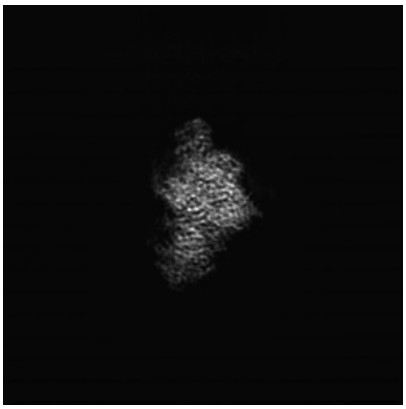
6.1.1 Primary map



X

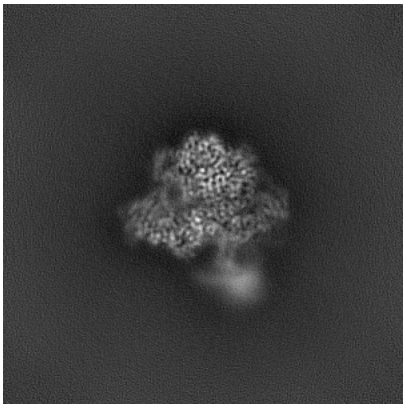


Y

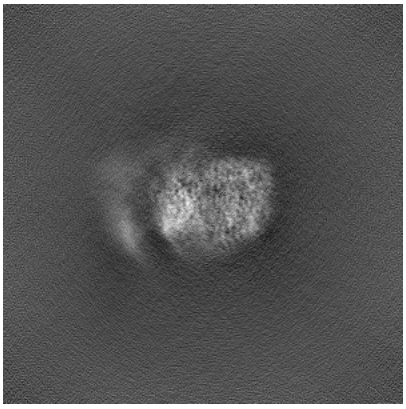


Z

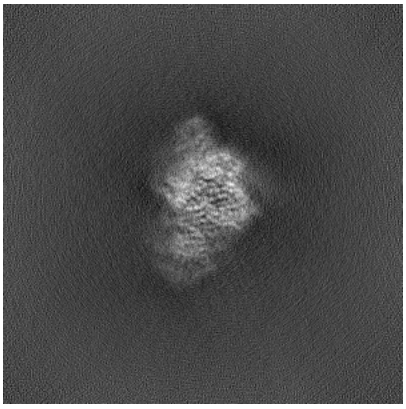
6.1.2 Raw map



X



Y

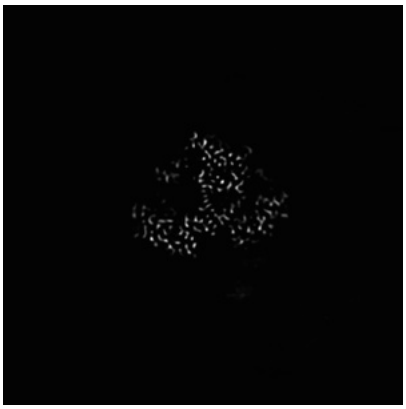


Z

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

6.2 Central slices (i)

6.2.1 Primary map

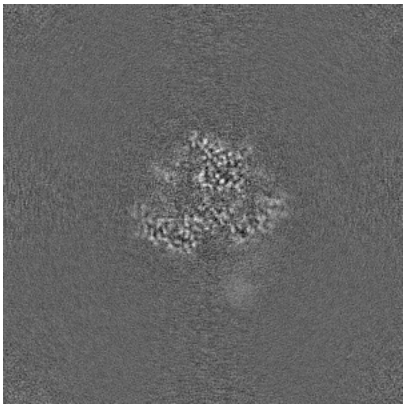


X Index: 192

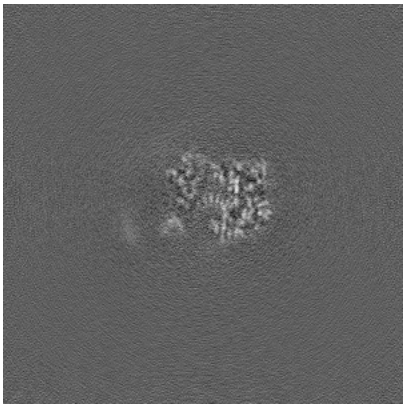
Y Index: 192

Z Index: 192

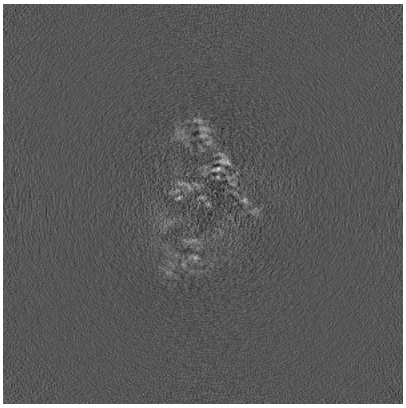
6.2.2 Raw map



X Index: 192



Y Index: 192



Z Index: 192

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

6.3 Largest variance slices (i)

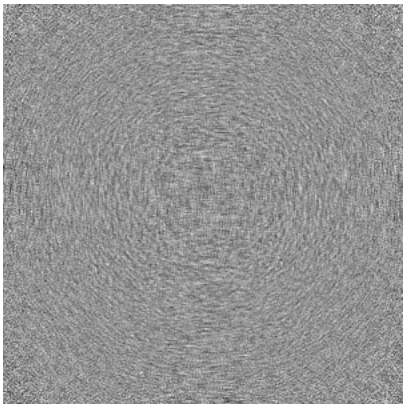
6.3.1 Primary map

X Index: 190

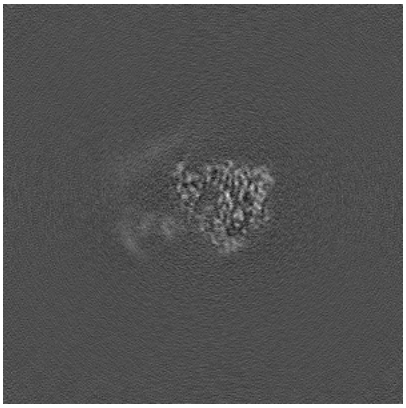
Y Index: 188

Z Index: 171

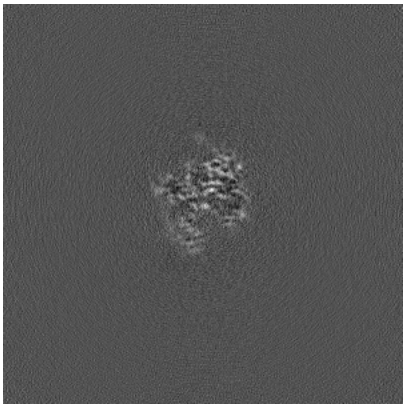
6.3.2 Raw map



X Index: 0



Y Index: 205

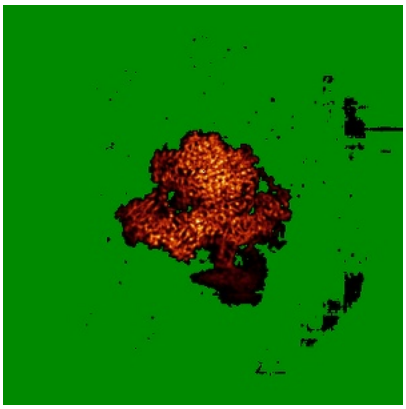


Z Index: 215

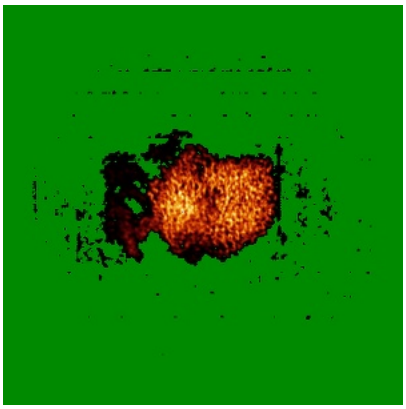
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

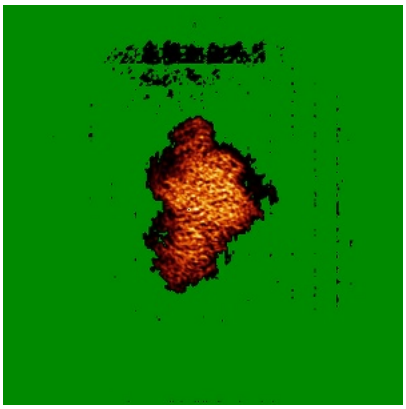
6.4.1 Primary map



X

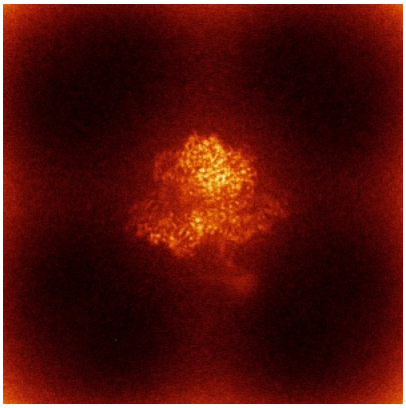


Y

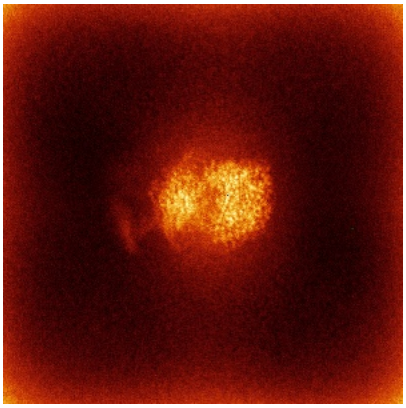


Z

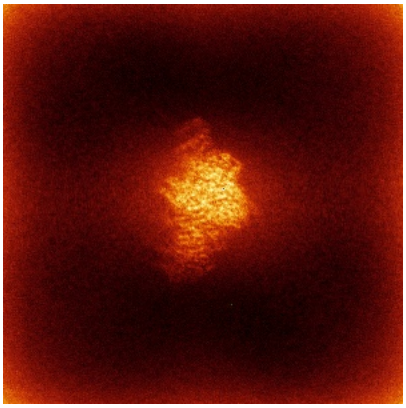
6.4.2 Raw map



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.

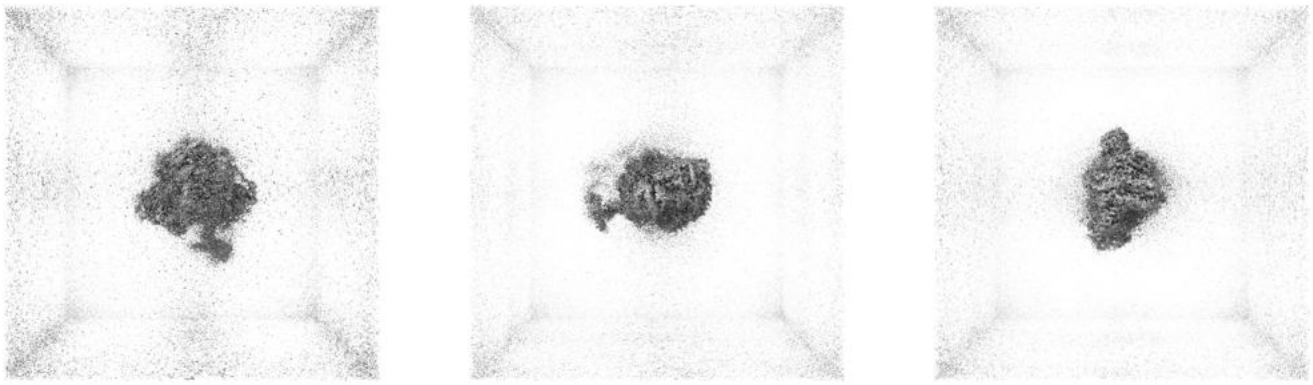
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.015. 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



X Y Z

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.

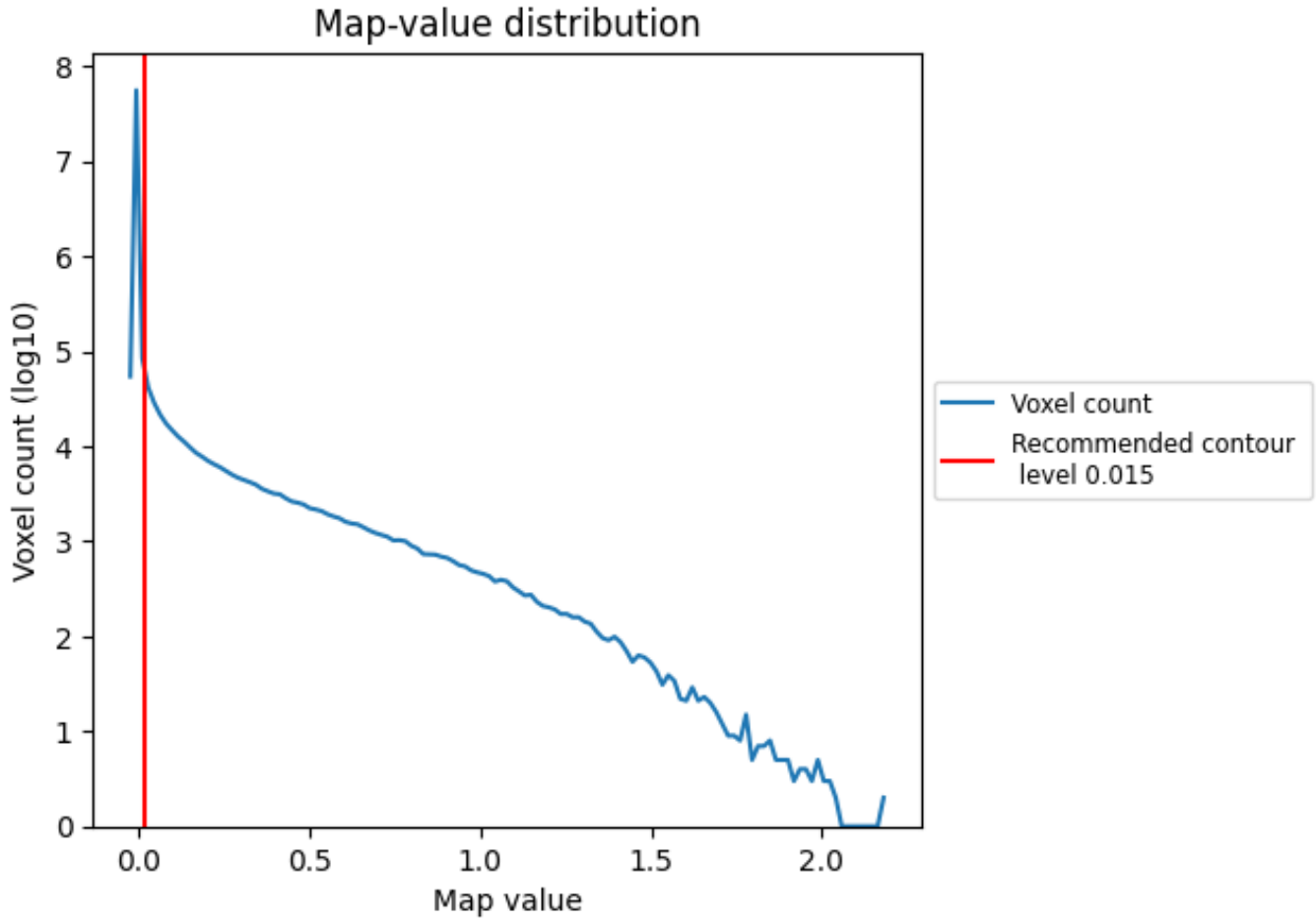
6.6 Mask visualisation (i)

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

7 Map analysis

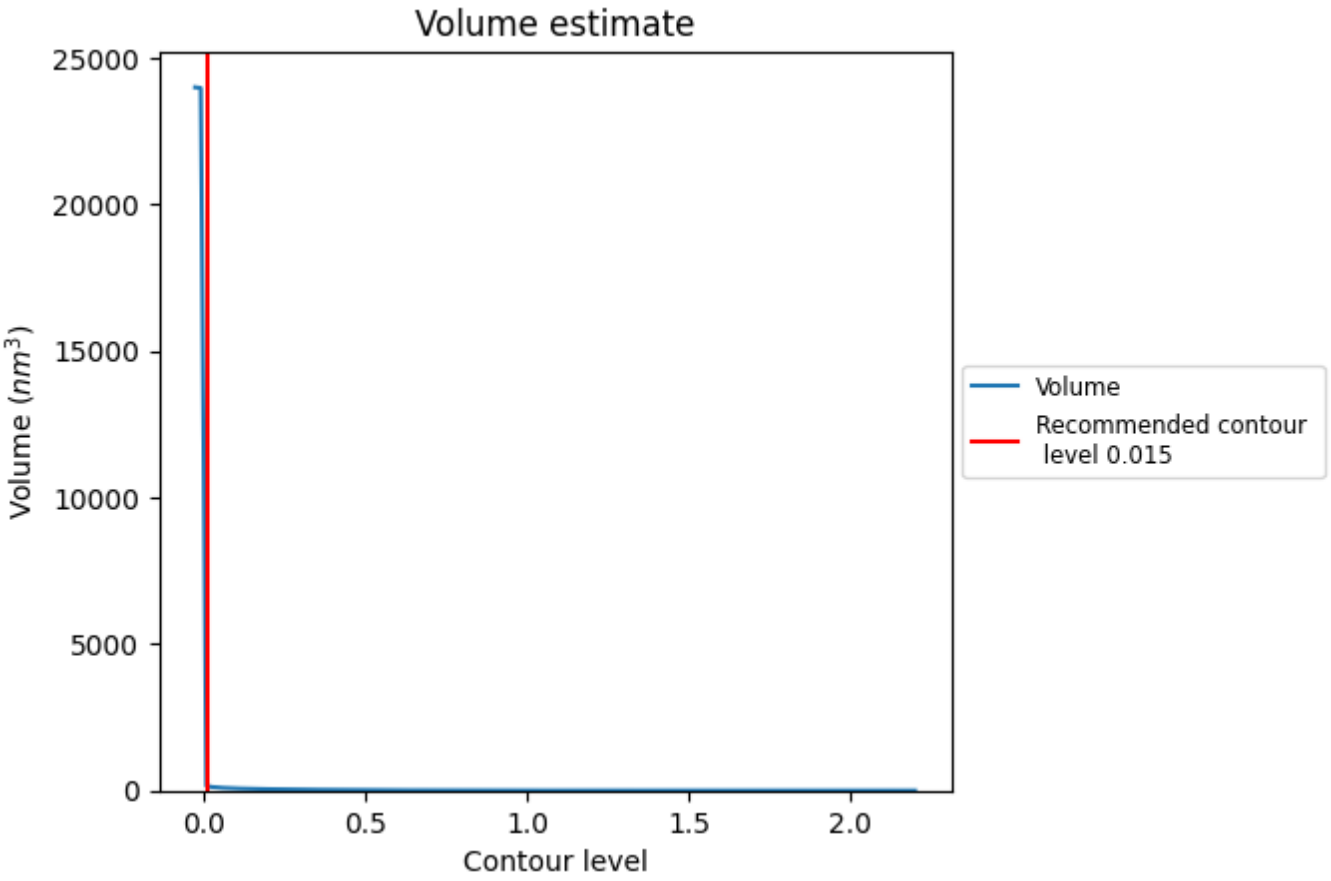
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

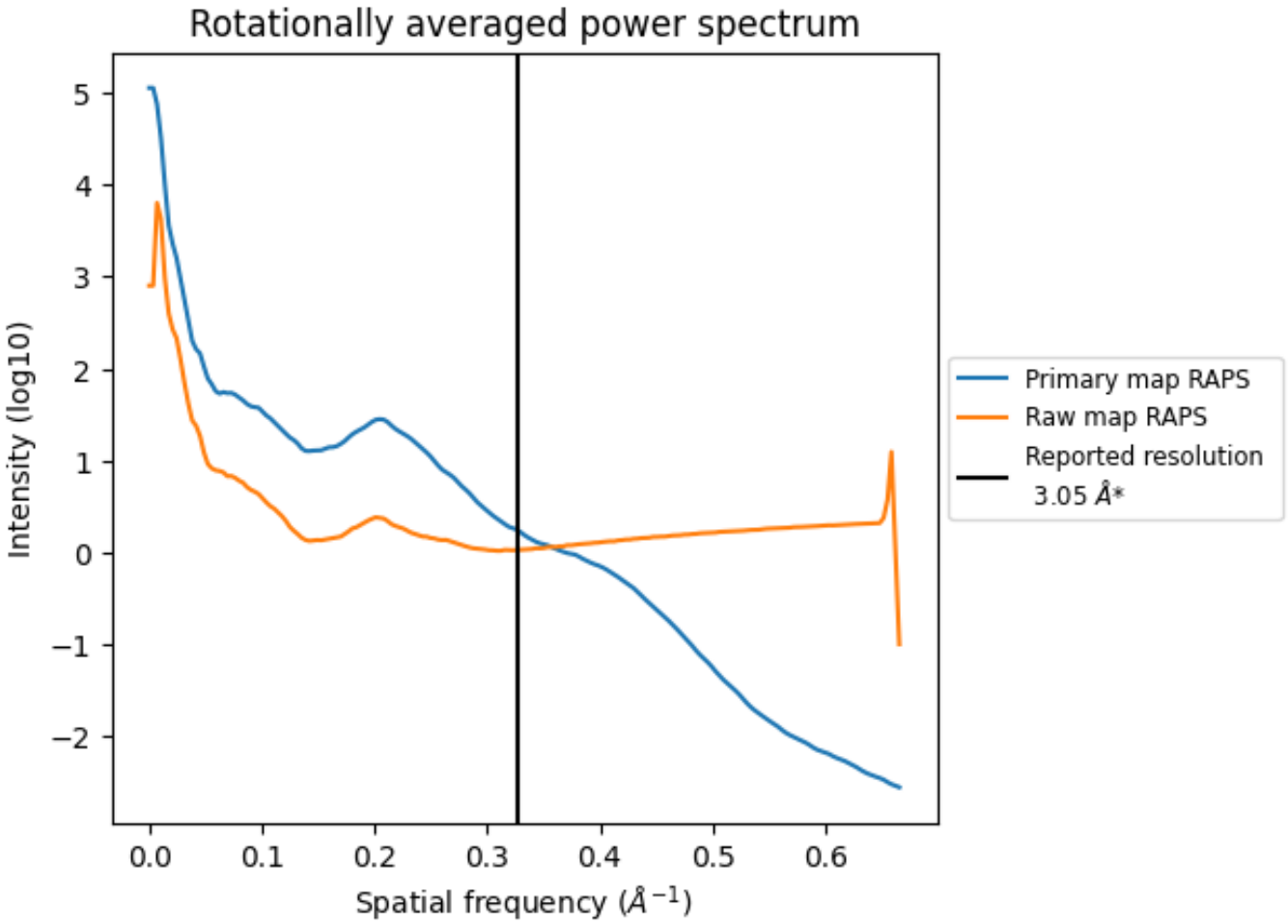
7.2 Volume estimate



The volume at the recommended contour level is 147 nm^3; this corresponds to an approximate mass of 133 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)

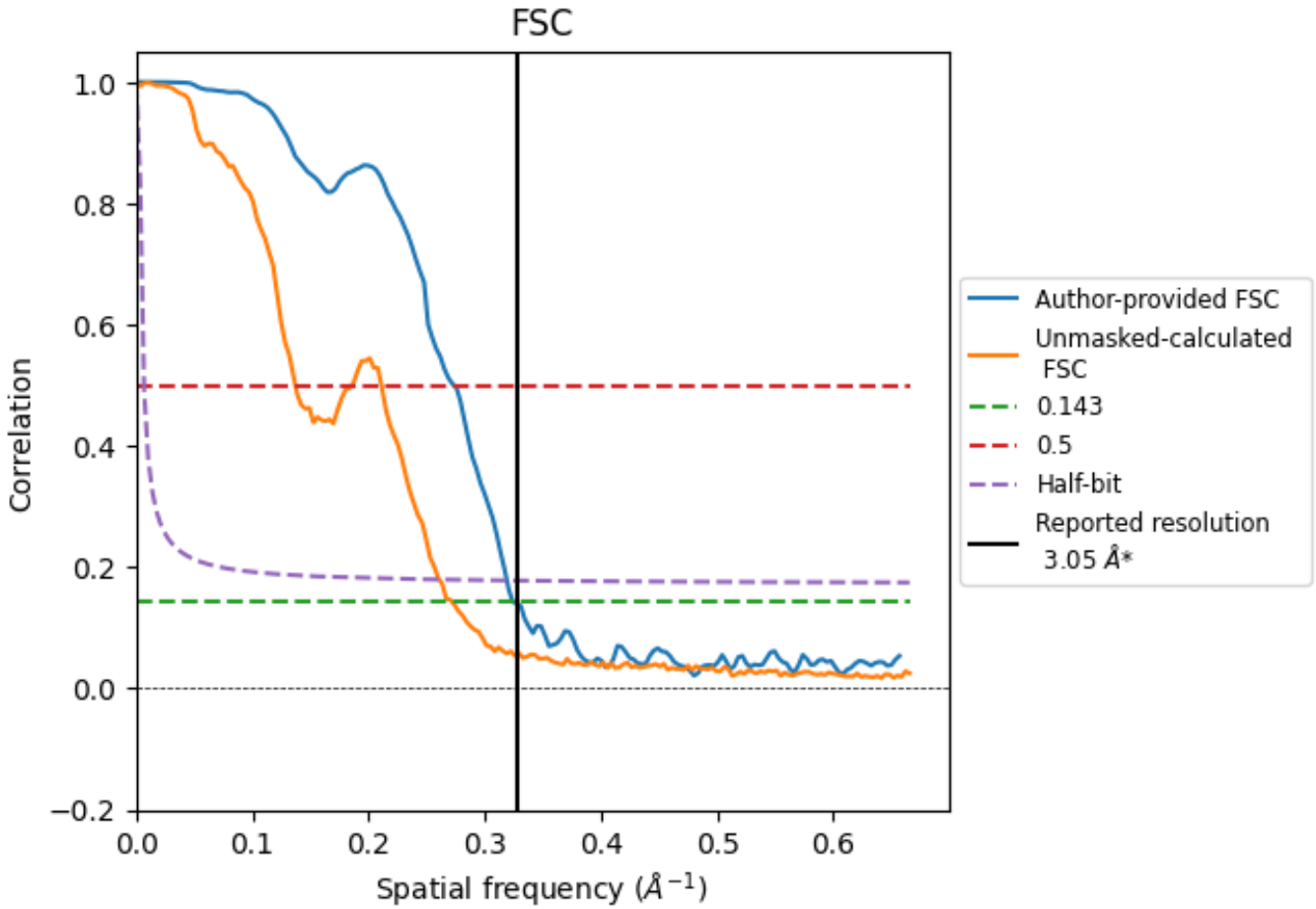


*Reported resolution corresponds to spatial frequency of 0.328 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.328 $Å^{-1}$

8.2 Resolution estimates (i)

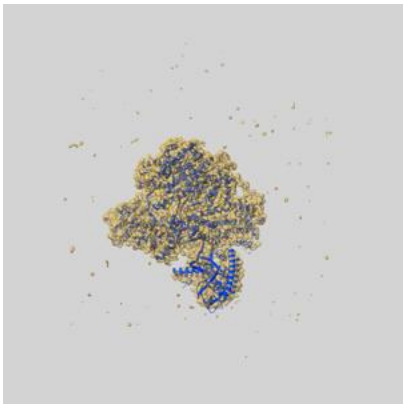
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.05	-	-
Author-provided FSC curve	3.08	3.66	3.13
Unmasked-calculated*	3.68	7.29	3.83

*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 3.68 differs from the reported value 3.05 by more than 10 %

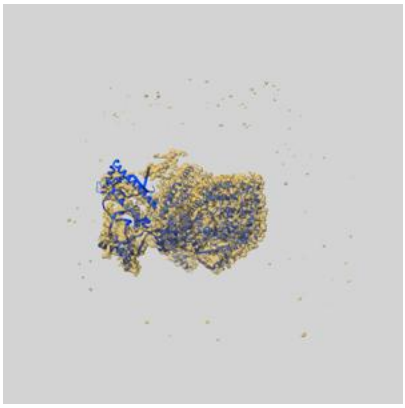
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-48412 and PDB model 9MN4. Per-residue inclusion information can be found in section 3 on page 5.

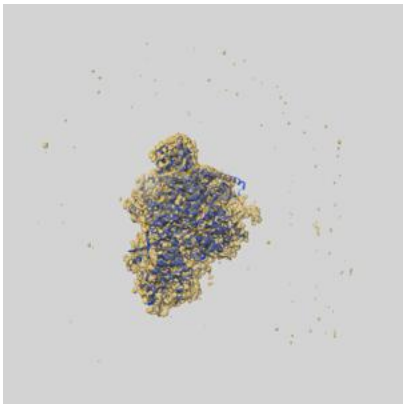
9.1 Map-model overlay



X



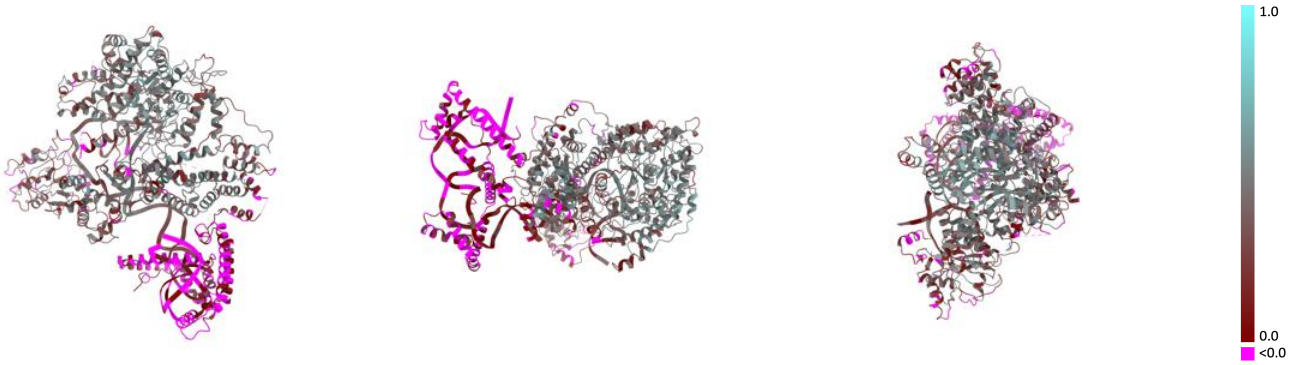
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.015 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.

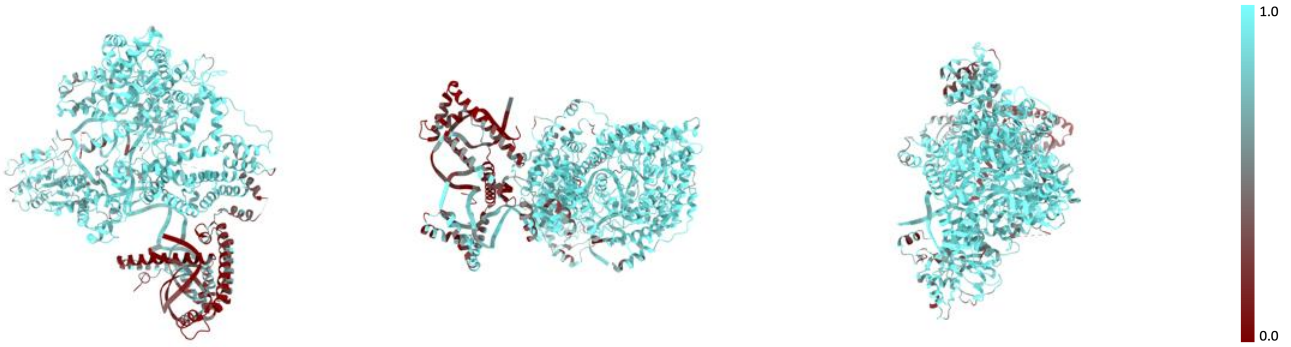
9.2 Q-score mapped to coordinate model (i)



X Y Z

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.

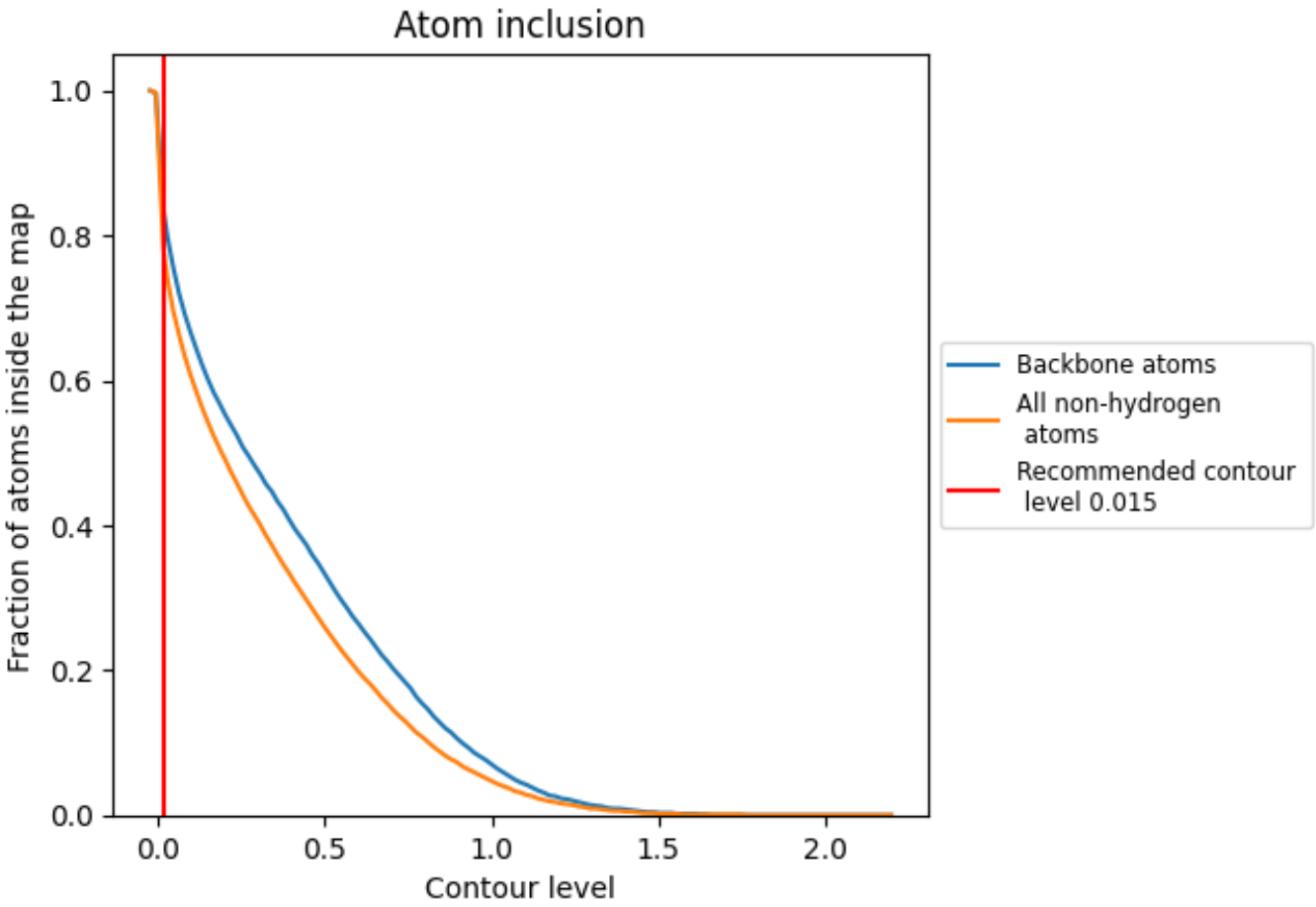
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.015).

9.4 Atom inclusion (i)



At the recommended contour level, 84% of all backbone atoms, 78% 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 (0.015) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7820	0.3130
A	0.3320	-0.0130
B	0.8410	0.3180
E	0.8800	0.4040
N	0.6470	0.1610
R	0.9120	0.5140
T	0.6550	0.1980