



Full wwPDB EM Validation Report ⓘ

Oct 7, 2026 – 04:25 PM EDT

PDB ID : 9ZTQ / pdb_00009ztq
EMDB ID : EMD-74769
Title : Nucleosome with an SSB at SHL +5.3 in complex with human PARP2, Class 5
Authors : Gregory-Lott, E.; Kim, T.H.; Jayathilake, C.; Virk, R.K.
Deposited on : 2025-12-23
Resolution : 2.63 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:

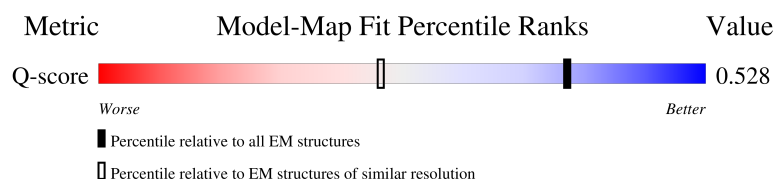
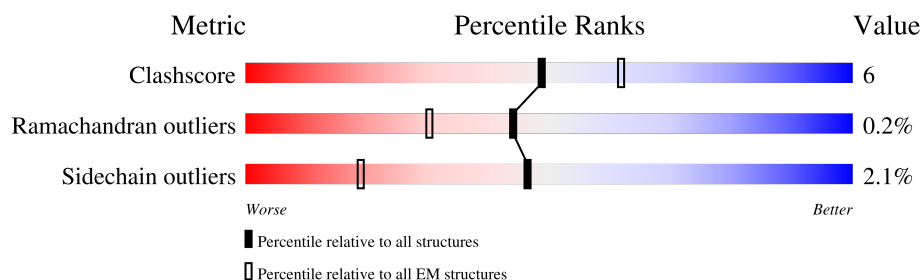
EMDB validation analysis : 0.0.1.dev133
MolProbity : 4-5-2 with Phenix2.2
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.51

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 2.63 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	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	8888 (2.13 - 3.13)

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	124	
1	B	124	
2	C	125	
2	D	125	

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Mol	Chain	Length	Quality of chain
3	E	136	
3	F	136	
4	G	104	
4	H	104	
5	I	274	
5	J	274	
6	K	130	
7	L	23	
8	M	153	
9	P	494	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 32430 atoms, of which 14931 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 Histone H2A.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	107	Total	C	H	N	O	S	0	0
			1701	518	880	160	142	1		
1	B	107	Total	C	H	N	O	S	0	0
			1701	518	880	160	142	1		

- Molecule 2 is a protein called Histone H2B.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	C	96	Total	C	H	N	O	S	0	0
			1562	480	800	139	141	2		
2	D	97	Total	C	H	N	O	S	0	0
			1583	486	812	141	142	2		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	0	GLY	-	expression tag	UNP P02283
C	2	ILE	-	insertion	UNP P02283
D	0	GLY	-	expression tag	UNP P02283
D	2	ILE	-	insertion	UNP P02283

- Molecule 3 is a protein called Histone H3.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	E	99	Total	C	H	N	O	S	0	0
			1673	514	857	158	142	2		
3	F	99	Total	C	H	N	O	S	0	0
			1673	514	857	158	142	2		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	111	SER	CYS	engineered mutation	UNP P02299

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Chain	Residue	Modelled	Actual	Comment	Reference
F	111	SER	CYS	engineered mutation	UNP P02299

- Molecule 4 is a protein called Histone H4.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	G	83	Total	C	H	N	O	S	0	0
			1373	418	711	129	114	1		
4	H	83	Total	C	H	N	O	S	0	0
			1372	418	710	129	114	1		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	2	ILE	-	insertion	UNP P84040
H	2	ILE	-	insertion	UNP P84040

- Molecule 5 is a protein called mAb PL2-6 antibody.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	I	230	Total	C	H	N	O	S	0	0
			3543	1132	1743	296	363	9		
5	J	230	Total	C	H	N	O	S	0	0
			3542	1132	1742	296	363	9		

- Molecule 6 is a DNA chain called DNA 130-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	K	130	Total	C	H	N	O	P	0	0
			4103	1255	1458	479	781	130		

- Molecule 7 is a DNA chain called DNA 23-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	L	23	Total	C	H	N	O	P	0	0
			734	226	262	83	140	23		

- Molecule 8 is a DNA chain called DNA 153-mer.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	M	153	Total	C	H	N	O	P	0	0
			4874	1494	1717	594	916	153		

- Molecule 9 is a protein called Poly [ADP-ribose] polymerase 2.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	P	184	Total	C	H	N	O	S	0	0
			2996	944	1502	264	274	12		

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: Histone H2A

Chain A:  82% 14%



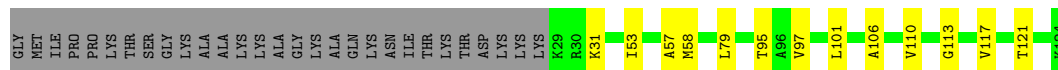
• Molecule 1: Histone H2A

Chain B:  81% 6% 14%



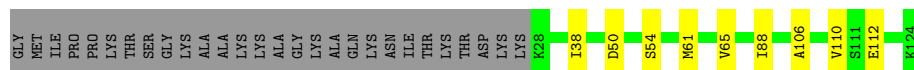
• Molecule 2: Histone H2B

Chain C:  66% 10% 23%



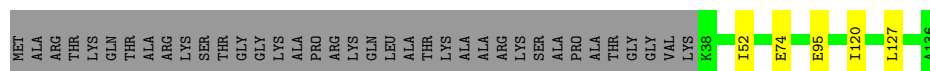
• Molecule 2: Histone H2B

Chain D:  70% 7% 22%



• Molecule 3: Histone H3

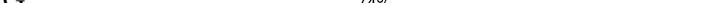
Chain E:  69% 27%

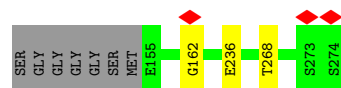
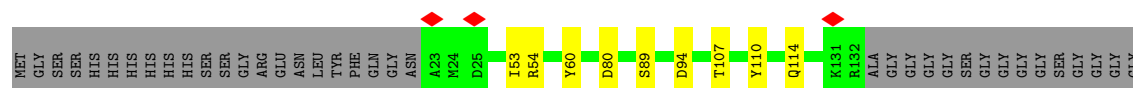
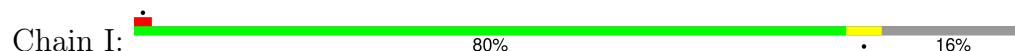
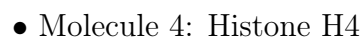


• Molecule 3: Histone H3

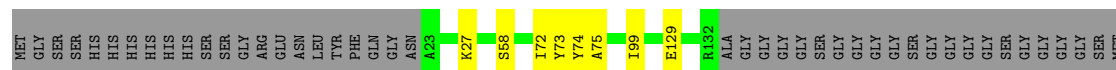
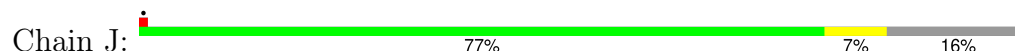
Chain F:  65% 8% 27%



- Chain G:  74% 6% 20%



- Molecule 5: mAb PL2-6 antibody



- Molecule 6: DNA 130-mer



- Molecule 7: DNA 23-mer

G1	T2	C3	A4	G5		A14	T15		T20	G21	A22	T23
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- Chain M:  79% 21%

A1	T2	C3	A4	T14	A15	T16	A17	T18	C19	A22	C23	G24	A25	A26	G27	A28	C35	A36	T53	T54	G55	T60	T61	G72	G73	C84	G85	T86	T90	T91	T92	A93	C126	G127	T153
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- Chain P: 23% 12% 63%

[illegible]

M203
L204
Q205
M206
D207
Y208
A209
T210
ASN
THR
GLN
ASP
GLU
GLU
GLU
THR
LYS
LYS
GLU
GLU
SER
LEU
LEU
LYS
SER
PRO
LEU
LYS
PRO
GLU
SER
GLN
LEU
ASP
LEU
LEU
ARG
VAL
GLN
GLU
LEU
ILE
LYS
LEU
ILE
CYS
ASN
VAL
GLN
ALA
MET
GLU
GLU
MET
MET
GLU
MET
M258
Y260
K265

P266	L267	G268	K269	L270	T271	L275	K276	S281	L282	L285	C288	L289	Q293	H294	G295	K296	A297	L298	M299	Y306	T307	R308	L309	P310	HIS	ASP	PHE	GLY	LEU	LEU	ARG	THR	PRO	PRO	L320	L321	L322	L327	S328	E329	K330	ILE	GLN	LEU	LEU	GLU	ALA	LEU	LEU	GLY	ASP	ILE	GLU	ILE
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ILE	LYS	LEU	VAL	LYS	THR	GLU	LEU	GLN	SER	PRO	GLU	HIS	ASN	ARG	GLN	CYS	ALA	LEU	ARG	LEU	LEU	ASP	GLU	LYS	VAL	ILE	SER	GLN	TYR	LEU	GLN	SER	THR	THR	THR	LEU	ASP
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LEU PHE GLU VAL GLU LYS ASP GLY GLU LYS GLU ALA PHE ARG ARG ASP MET LEU TRP HIS GLY SER ARG MET SER ASN VAL GLY ILE LEU SER HIS GLY LEU ARG ILE ALA PRO GLU ALA PRO ILE THR GLY TYR MET PHE GLY LYS ILE TYR PHE

ALA	ASP	MET	SER	SER	LYS	SER	ALA	ALA	ASN	TYR	CYS	PHE	ALA	SER	ARG	LEU	LEU	LEU	LEU	ASN	LYS	GLY	THR	GLY	GLU	VAL	LEU	ALA	LEU	GLY	GLN	CYS	ASN	GLU	GLU	LEU	LEU	GLU	GLU	ALA	ALA	ASN	PRO	PRO	LYS	ALA	GLY	GLY	LYS	THR	SER	HIS	LYS	GLY	LEU	LEU	GLN	LEU	LEU	GLY	GLY	LEU	LEU	ALA	PRO
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SER	SER	ALA	HIS	PHE	VAL	THR	LEU	ASN	GLY	SER	THR	VAL	PRO	PRO	LEU	GLY	ALA	SER	ASP	THR	GLY	ILE	LEU	ASN	PRO	ASP	GLY	TYR	THR	LEU	ASN	TYR	GLU	TYR	ILE	VAL	VAL	TYR	ASN	ASN	PRO	ASN	GLN	VAL	ARG	MET	ARG	TYR	LEU	LYS	VAL	GLN	PHE	ASN	PHE	LEU	GLN	LEU	TRP
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4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	75253	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 ($e^-/\text{\AA}^2$)	48	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.553	Depositor
Minimum map value	-0.295	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.0452	Depositor
Map size (Å)	331.2, 331.2, 331.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.828, 0.828, 0.828	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	0.15	0/831	0.33	0/1119
1	B	0.16	0/831	0.35	0/1119
2	C	0.14	0/773	0.29	0/1035
2	D	0.16	0/782	0.33	0/1046
3	E	0.14	0/828	0.31	0/1109
3	F	0.16	0/828	0.35	0/1109
4	G	0.14	0/669	0.32	0/894
4	H	0.18	0/669	0.39	0/894
5	I	0.12	0/1842	0.31	0/2493
5	J	0.14	0/1842	0.35	0/2493
6	K	0.75	0/2962	0.90	0/4564
7	L	0.72	0/528	0.92	0/811
8	M	0.72	0/3546	0.87	0/5476
9	P	0.19	0/1520	0.51	0/2035
All	All	0.47	0/18451	0.63	0/26197

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	821	880	879	4	0
1	B	821	880	879	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	762	800	798	8	0
2	D	771	812	811	12	0
3	E	816	857	856	3	0
3	F	816	857	856	8	0
4	G	662	711	709	3	0
4	H	662	710	709	7	0
5	I	1800	1743	1740	5	0
5	J	1800	1742	1740	16	0
6	K	2645	1458	1458	30	0
7	L	472	262	262	4	0
8	M	3157	1717	1717	25	0
9	P	1494	1502	1498	68	0
All	All	17499	14931	14912	187	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 (187) 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:73:ASN:O	1:A:73:ASN:ND2	2.13	0.82
9:P:117:VAL:C	9:P:118:MET:HE3	2.10	0.76
9:P:118:MET:HE3	9:P:118:MET:N	2.08	0.68
9:P:270:LEU:HD12	9:P:275:ILE:HB	1.74	0.68
9:P:282:LEU:HD12	9:P:282:LEU:O	1.95	0.67
9:P:321:ILE:HG23	9:P:327:LEU:HA	1.78	0.66
9:P:320:LEU:C	9:P:321:ILE:HD13	2.23	0.64
1:B:76:THR:HG22	1:B:76:THR:O	1.98	0.63
9:P:282:LEU:HD13	9:P:328:SER:OG	2.00	0.62
5:J:202:ILE:HG21	5:J:235:MET:HE1	1.82	0.61
9:P:94:VAL:HG22	9:P:94:VAL:O	2.01	0.61
5:J:58:SER:HB3	5:J:260:THR:HG21	1.82	0.60
9:P:125:GLN:HG3	9:P:299:MET:HE1	1.84	0.60
8:M:53:DT:H2'	8:M:54:DT:H71	1.82	0.60
2:C:53:ILE:HG21	2:C:58:MET:HE2	1.83	0.60
9:P:114:VAL:HG22	9:P:208:TYR:HB3	1.84	0.60
4:G:72:VAL:O	4:G:76:GLU:HG3	2.02	0.60
2:D:38:ILE:H	2:D:38:ILE:HD12	1.67	0.59
9:P:258:MET:N	9:P:258:MET:HE2	2.18	0.59
9:P:271:THR:O	9:P:275:ILE:HG22	2.02	0.58
5:J:184:THR:HG23	5:J:208:TYR:HA	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:P:320:LEU:O	9:P:321:ILE:HD13	2.04	0.58
2:D:38:ILE:HD11	6:K:126:DT:P	2.43	0.57
3:F:47:VAL:O	3:F:51:GLU:HG3	2.03	0.57
9:P:121:GLN:HA	9:P:307:THR:HG23	1.86	0.56
9:P:298:LEU:HD12	9:P:299:MET:N	2.20	0.56
9:P:124:LEU:HD21	9:P:320:LEU:HD11	1.87	0.56
1:A:73:ASN:HD22	1:A:73:ASN:C	2.06	0.56
2:C:117:VAL:O	2:C:121:THR:HG23	2.06	0.56
3:F:62:LEU:HD12	4:H:39:LEU:HD23	1.89	0.55
2:C:97:VAL:HG13	2:C:101:LEU:HD12	1.89	0.54
5:J:159:GLN:N	5:J:159:GLN:OE1	2.40	0.54
1:A:30:ILE:HD13	1:A:52:ALA:HB2	1.88	0.54
1:B:40:ALA:CB	2:D:88:ILE:HD13	2.37	0.54
2:C:113:GLY:O	2:C:117:VAL:HG23	2.08	0.54
9:P:270:LEU:HD13	9:P:271:THR:N	2.22	0.54
9:P:275:ILE:HG23	9:P:276:LYS:CD	2.38	0.54
9:P:124:LEU:HD22	9:P:299:MET:CE	2.38	0.53
9:P:321:ILE:HD12	9:P:327:LEU:HA	1.90	0.53
1:B:40:ALA:HB2	2:D:88:ILE:HD13	1.89	0.53
6:K:107:DT:H2'	6:K:108:DT:H71	1.91	0.51
6:K:106:DA:H2'	6:K:107:DT:H71	1.93	0.51
9:P:294:HIS:HA	9:P:298:LEU:HD21	1.93	0.51
5:J:160:GLN:NE2	5:J:268:THR:HG22	2.26	0.51
9:P:122:THR:CG2	9:P:306:TYR:CD2	2.94	0.51
8:M:60:DT:H4'	8:M:61:DT:OP1	2.12	0.50
5:J:99:ILE:N	5:J:99:ILE:HD12	2.27	0.50
9:P:154:VAL:HG22	9:P:267:LEU:HD13	1.93	0.50
2:D:38:ILE:HD11	6:K:126:DT:OP2	2.12	0.50
9:P:202:ASP:CB	9:P:307:THR:HG22	2.42	0.50
5:I:162:GLY:O	5:I:268:THR:HG23	2.11	0.50
6:K:20:DC:H2''	6:K:21:DC:C6	2.48	0.49
9:P:129:ASN:O	9:P:129:ASN:OD1	2.30	0.49
8:M:90:DT:H4'	8:M:91:DT:OP1	2.11	0.49
7:L:4:DA:H1'	7:L:5:DG:N7	2.27	0.49
6:K:106:DA:H4'	6:K:107:DT:OP1	2.13	0.49
9:P:98:CYS:O	9:P:99:THR:C	2.54	0.49
9:P:114:VAL:HG22	9:P:208:TYR:CG	2.47	0.49
9:P:206:MET:HB3	9:P:208:TYR:CE1	2.48	0.49
1:B:77:ARG:NH2	2:D:54:SER:HA	2.28	0.49
4:H:24:LEU:HD22	4:H:27:ASN:OD1	2.12	0.49
3:F:98:GLU:HG2	4:H:39:LEU:HD21	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:K:55:DA:H2'	6:K:56:DC:C6	2.48	0.48
9:P:124:LEU:HD22	9:P:299:MET:HE2	1.95	0.48
5:I:107:THR:HG23	5:I:107:THR:O	2.14	0.48
1:B:76:THR:O	1:B:76:THR:CG2	2.62	0.48
6:K:112:DC:H2''	6:K:113:DC:C5	2.48	0.48
9:P:136:LEU:HD23	9:P:137:LEU:N	2.29	0.48
9:P:265:ALA:HB1	9:P:268:GLY:O	2.13	0.48
6:K:73:DC:H2''	6:K:74:DG:C8	2.48	0.47
5:I:80:ASP:OD1	5:I:80:ASP:C	2.57	0.47
8:M:16:DT:H2''	8:M:17:DA:C8	2.49	0.47
5:J:72:ILE:HG22	5:J:74:TYR:O	2.13	0.47
5:J:129:GLU:HA	5:J:129:GLU:OE1	2.14	0.47
6:K:3:DC:H2''	6:K:4:DC:C6	2.49	0.47
8:M:3:DC:H2''	8:M:4:DA:C8	2.50	0.47
9:P:154:VAL:HG23	9:P:267:LEU:HD22	1.97	0.46
8:M:23:DC:C2'	8:M:24:DG:C8	2.98	0.46
9:P:114:VAL:HG22	9:P:208:TYR:CB	2.45	0.46
9:P:275:ILE:HG23	9:P:276:LYS:HD3	1.96	0.46
9:P:105:ALA:HA	9:P:140:ASP:H	1.81	0.46
4:H:54:GLU:OE1	4:H:54:GLU:N	2.48	0.46
9:P:118:MET:HE2	9:P:133:LEU:CD1	2.46	0.46
2:D:50:ASP:OD1	2:D:50:ASP:C	2.58	0.46
5:J:58:SER:CB	5:J:260:THR:HG21	2.44	0.46
9:P:121:GLN:OE1	9:P:201:TYR:CD1	2.69	0.46
6:K:114:DC:C2'	6:K:115:DT:H72	2.46	0.46
8:M:84:DC:H2''	8:M:85:DG:C8	2.51	0.46
5:J:73:TYR:CD2	5:J:73:TYR:C	2.94	0.46
9:P:259:LYS:HD3	9:P:260:TYR:HD2	1.81	0.46
6:K:92:DT:H2''	6:K:93:DA:C8	2.50	0.46
9:P:101:LYS:C	9:P:105:ALA:HB3	2.41	0.46
4:H:51:LEU:N	4:H:51:LEU:HD12	2.31	0.45
6:K:93:DA:H1'	6:K:94:DA:C8	2.51	0.45
1:B:77:ARG:NH2	8:M:22:DA:H3'	2.31	0.45
8:M:53:DT:C2'	8:M:54:DT:H71	2.45	0.45
9:P:136:LEU:HD23	9:P:136:LEU:C	2.41	0.45
3:F:91:MET:O	3:F:95:GLU:HG2	2.16	0.45
9:P:204:LEU:HD21	9:P:270:LEU:HD21	1.98	0.45
8:M:60:DT:H2''	8:M:61:DT:O5'	2.17	0.45
5:J:27:LYS:HD2	5:J:27:LYS:C	2.42	0.45
6:K:79:DG:H2'	6:K:80:DT:H72	1.98	0.45
8:M:85:DG:H2'	8:M:86:DT:H71	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:P:122:THR:HG21	9:P:306:TYR:CD2	2.52	0.44
2:D:106:ALA:O	2:D:110:VAL:HG23	2.16	0.44
9:P:197:VAL:HG13	9:P:198:PRO:HD2	1.99	0.44
5:I:53:ILE:C	5:I:54:ARG:HG2	2.42	0.44
5:J:268:THR:O	5:J:268:THR:HG23	2.17	0.44
6:K:57:DC:C2'	6:K:58:DG:C8	3.01	0.44
6:K:111:DT:H2''	6:K:112:DC:C6	2.52	0.44
2:C:79:LEU:HD21	2:C:95:THR:HG21	2.00	0.44
2:D:38:ILE:HD11	6:K:126:DT:OP1	2.17	0.44
9:P:288:CYS:HB2	9:P:298:LEU:HD22	2.00	0.44
2:C:106:ALA:O	2:C:110:VAL:HG23	2.18	0.43
7:L:1:DG:H2'	7:L:2:DT:C6	2.51	0.43
3:E:127:LEU:HD22	3:F:114:HIS:CG	2.53	0.43
4:H:85:ALA:O	4:H:89:VAL:HG23	2.18	0.43
6:K:125:DG:H2''	6:K:126:DT:H71	2.01	0.43
8:M:15:DA:H2'	8:M:16:DT:H71	2.00	0.43
8:M:54:DT:C2	8:M:55:DG:C8	3.06	0.43
9:P:329:GLU:O	9:P:330:LYS:HG3	2.18	0.43
3:F:51:GLU:HA	3:F:54:ARG:HG2	2.00	0.43
9:P:125:GLN:H	9:P:125:GLN:CD	2.26	0.43
9:P:126:PHE:CD2	9:P:126:PHE:N	2.87	0.43
8:M:14:DT:C2	8:M:15:DA:N7	2.86	0.43
9:P:258:MET:HE2	9:P:258:MET:CA	2.49	0.43
6:K:40:DG:H2''	6:K:41:DT:C6	2.54	0.43
9:P:204:LEU:HD21	9:P:308:ARG:O	2.18	0.42
5:J:74:TYR:O	5:J:75:ALA:C	2.61	0.42
8:M:18:DT:H2''	8:M:19:DC:C5	2.54	0.42
9:P:101:LYS:O	9:P:105:ALA:HB3	2.19	0.42
9:P:126:PHE:O	9:P:127:ASN:OD1	2.38	0.42
3:F:49:LEU:HD11	4:H:46:LYS:HE3	2.00	0.42
8:M:126:DC:H2''	8:M:127:DG:C8	2.54	0.42
9:P:105:ALA:HB2	9:P:139:ASP:OD1	2.19	0.42
9:P:149:MET:O	9:P:160:HIS:HB3	2.19	0.42
6:K:40:DG:H2''	6:K:41:DT:H71	2.02	0.42
5:J:155:GLU:C	5:J:155:GLU:OE2	2.62	0.42
6:K:106:DA:H2''	6:K:107:DT:O5'	2.19	0.42
9:P:293:GLN:OE1	9:P:294:HIS:N	2.52	0.42
6:K:42:DA:H2''	6:K:43:DG:C8	2.55	0.42
6:K:45:DC:H2''	6:K:46:DA:C8	2.54	0.42
9:P:285:ILE:HG22	9:P:298:LEU:HB2	2.01	0.42
5:J:204:TYR:C	5:J:204:TYR:CD1	2.98	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:53:ILE:HD13	2:C:58:MET:HE2	2.02	0.41
8:M:27:DG:H2''	8:M:28:DA:C8	2.55	0.41
2:D:61:MET:O	2:D:65:VAL:HG23	2.21	0.41
6:K:81:DC:H2''	6:K:82:DC:C5	2.55	0.41
1:B:77:ARG:CZ	2:D:54:SER:HA	2.50	0.41
9:P:282:LEU:O	9:P:285:ILE:HG12	2.20	0.41
6:K:57:DC:H2'	6:K:58:DG:C8	2.56	0.41
9:P:136:LEU:HA	9:P:147:VAL:HA	2.02	0.41
9:P:131:TYR:CD1	9:P:131:TYR:C	2.98	0.41
3:E:120:ILE:O	3:E:120:ILE:HG13	2.20	0.41
8:M:85:DG:C2'	8:M:86:DT:H71	2.51	0.41
4:G:48:ILE:HG22	4:G:49:SER:O	2.21	0.41
9:P:184:THR:OG1	9:P:201:TYR:HB2	2.20	0.41
3:F:123:LYS:HA	3:F:126:GLN:HG3	2.03	0.41
8:M:35:DC:H2'	8:M:36:DA:C8	2.55	0.41
3:E:52:ILE:HD11	4:G:46:LYS:HA	2.03	0.41
5:J:164:GLU:OE1	5:J:164:GLU:HA	2.20	0.41
6:K:123:DA:H4'	6:K:124:DG:OP1	2.21	0.41
7:L:20:DT:H2''	7:L:21:DG:C8	2.55	0.41
8:M:72:DG:H2''	8:M:73:DG:C8	2.56	0.41
8:M:91:DT:H4'	8:M:92:DT:OP1	2.20	0.41
9:P:259:LYS:HG2	9:P:267:LEU:C	2.46	0.41
9:P:327:LEU:C	9:P:327:LEU:HD12	2.46	0.41
1:B:57:TYR:HB2	2:D:112:GLU:HG3	2.03	0.41
6:K:41:DT:O3'	6:K:42:DA:C8	2.74	0.41
8:M:92:DT:H2''	8:M:93:DA:C8	2.56	0.41
2:C:53:ILE:HG12	2:C:57:ALA:HB3	2.02	0.40
7:L:14:DA:C8	7:L:15:DT:H72	2.56	0.40
9:P:144:ASN:OD1	9:P:144:ASN:N	2.54	0.40
9:P:163:VAL:HG13	9:P:164:ALA:N	2.36	0.40
6:K:30:DT:H2''	6:K:31:DC:C5	2.56	0.40
6:K:59:DC:C2'	6:K:60:DT:H72	2.51	0.40
8:M:35:DC:H2'	8:M:36:DA:H8	1.87	0.40
9:P:136:LEU:HB2	9:P:147:VAL:HG22	2.03	0.40
9:P:180:PHE:CD1	9:P:203:MET:HG3	2.56	0.40
9:P:203:MET:O	9:P:204:LEU:HD12	2.22	0.40
5:I:60:TYR:O	5:I:110:TYR:HA	2.21	0.40
8:M:24:DG:C2'	8:M:25:DG:C8	3.04	0.40
8:M:126:DC:C2'	8:M:127:DG:C8	3.04	0.40
6:K:79:DG:C2'	6:K:80:DT:H72	2.51	0.40
9:P:131:TYR:CD1	9:P:132:TYR:N	2.89	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:LYS:HE2	1:A:118:LYS:HB3	1.92	0.40
9:P:133:LEU:C	9:P:133:LEU:HD23	2.46	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	105/124 (85%)	103 (98%)	2 (2%)	0	100	100
1	B	105/124 (85%)	102 (97%)	3 (3%)	0	100	100
2	C	94/125 (75%)	93 (99%)	1 (1%)	0	100	100
2	D	95/125 (76%)	93 (98%)	2 (2%)	0	100	100
3	E	97/136 (71%)	96 (99%)	1 (1%)	0	100	100
3	F	97/136 (71%)	95 (98%)	2 (2%)	0	100	100
4	G	81/104 (78%)	81 (100%)	0	0	100	100
4	H	81/104 (78%)	78 (96%)	3 (4%)	0	100	100
5	I	226/274 (82%)	218 (96%)	8 (4%)	0	100	100
5	J	226/274 (82%)	223 (99%)	3 (1%)	0	100	100
9	P	178/494 (36%)	147 (83%)	28 (16%)	3 (2%)	7	9
All	All	1385/2020 (69%)	1329 (96%)	53 (4%)	3 (0%)	44	58

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
9	P	99	THR
9	P	209	ALA
9	P	100	ALA

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	83/94 (88%)	82 (99%)	1 (1%)	63	78
1	B	83/94 (88%)	80 (96%)	3 (4%)	31	50
2	C	83/105 (79%)	82 (99%)	1 (1%)	63	78
2	D	84/105 (80%)	84 (100%)	0	100	100
3	E	86/111 (78%)	84 (98%)	2 (2%)	44	65
3	F	86/111 (78%)	86 (100%)	0	100	100
4	G	68/80 (85%)	67 (98%)	1 (2%)	57	74
4	H	68/80 (85%)	66 (97%)	2 (3%)	37	57
5	I	202/226 (89%)	198 (98%)	4 (2%)	48	68
5	J	202/226 (89%)	202 (100%)	0	100	100
9	P	160/433 (37%)	149 (93%)	11 (7%)	14	23
All	All	1205/1665 (72%)	1180 (98%)	25 (2%)	46	67

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	ASN
1	B	41	GLU
1	B	95	LYS
1	B	101	THR
2	C	31	LYS
3	E	74	GLU
3	E	95	GLU
4	G	55	GLU
4	H	55	GLU
4	H	61	LYS
5	I	89	SER
5	I	94	ASP
5	I	114	GLN
5	I	236	GLU
9	P	104	LYS

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Mol	Chain	Res	Type
9	P	131	TYR
9	P	140	ASP
9	P	160	HIS
9	P	163	VAL
9	P	180	PHE
9	P	281	SER
9	P	282	LEU
9	P	285	ILE
9	P	296	ARG
9	P	299	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	112	GLN
1	B	68	ASN
3	E	86	GLN
3	F	86	GLN
4	G	29	GLN
5	I	115	HIS
5	I	157	GLN
5	J	93	GLN
9	P	121	GLN
9	P	261	ASN
9	P	280	GLN
9	P	303	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.

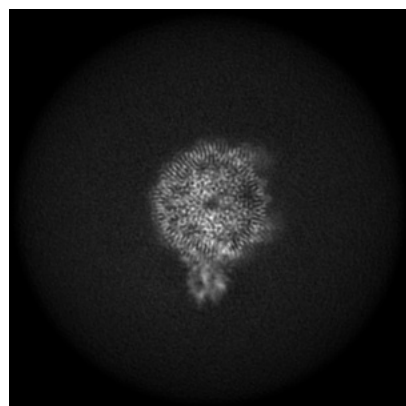
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-74769. These allow visual inspection of the internal detail of the map and identification of artifacts.

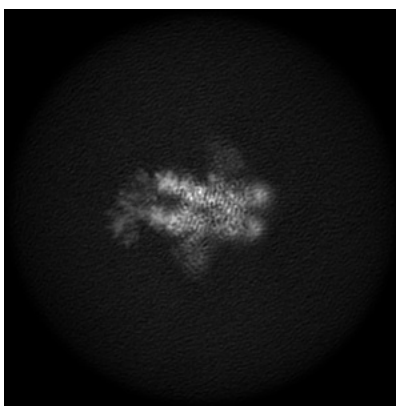
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

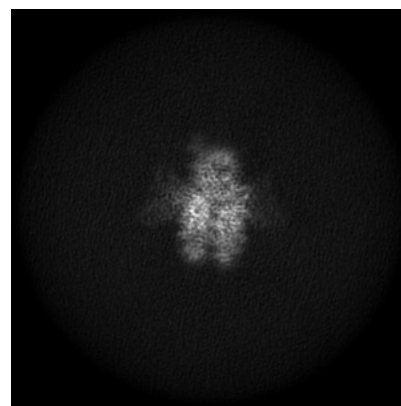
6.1.1 Primary map



X

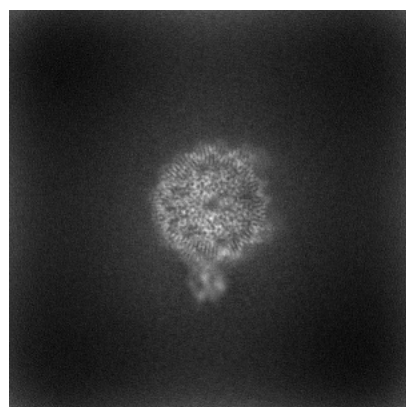


Y

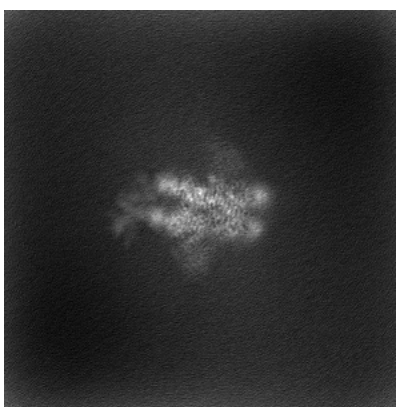


Z

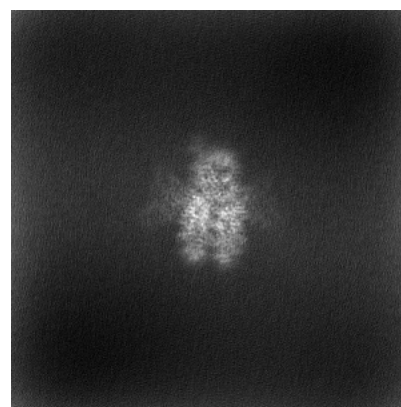
6.1.2 Raw map



X



Y

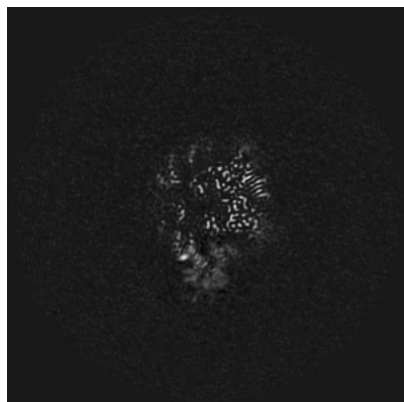


Z

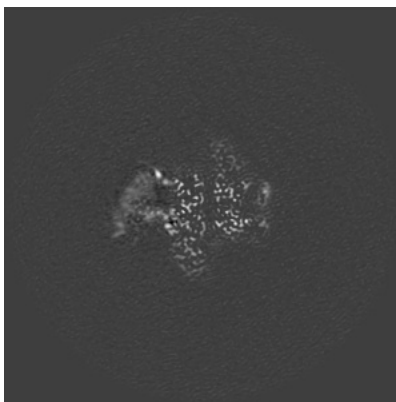
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

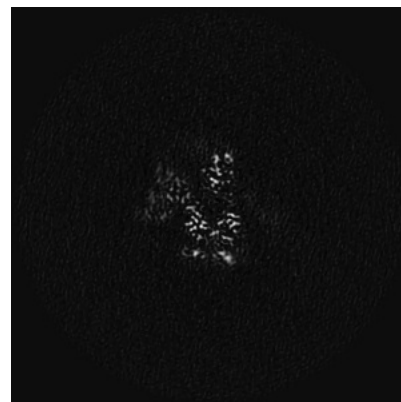
6.2.1 Primary map



X Index: 200

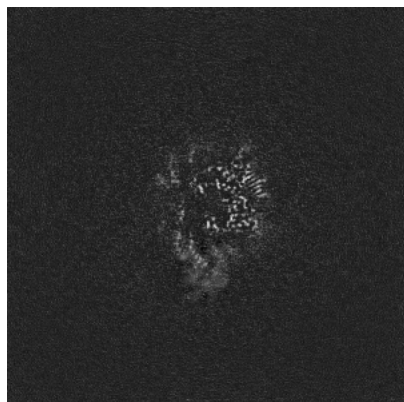


Y Index: 200

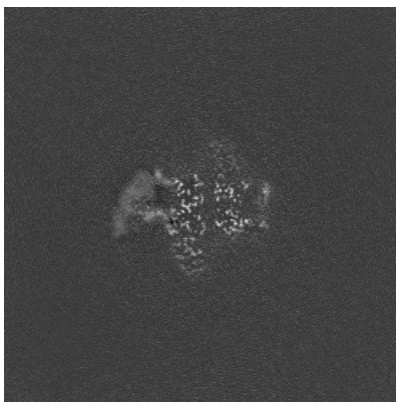


Z Index: 200

6.2.2 Raw map



X Index: 200



Y Index: 200

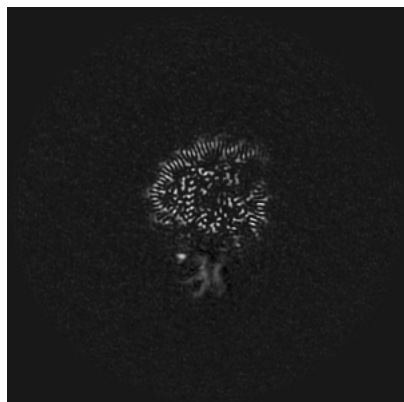


Z Index: 200

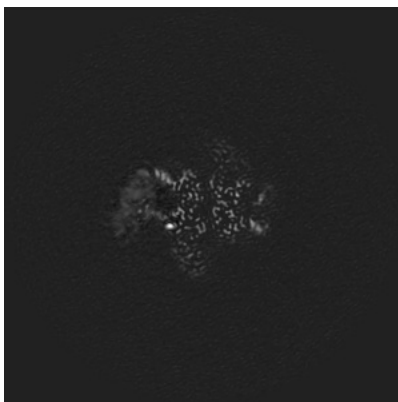
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

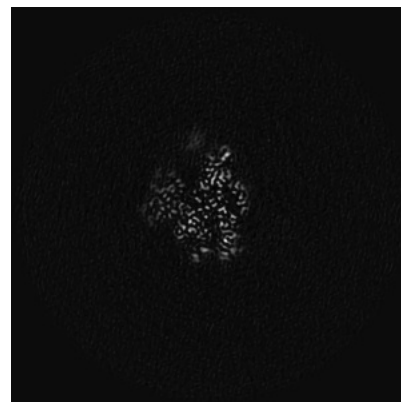
6.3.1 Primary map



X Index: 211

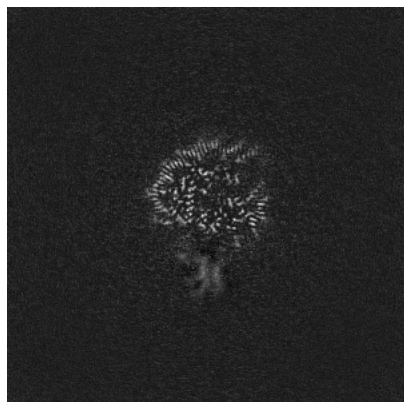


Y Index: 198

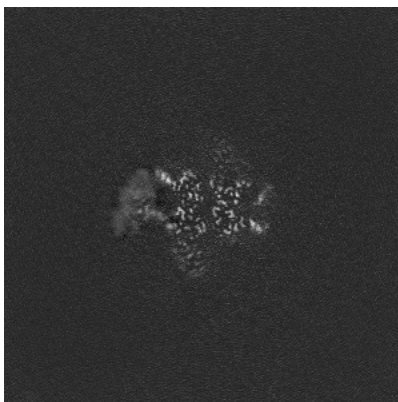


Z Index: 186

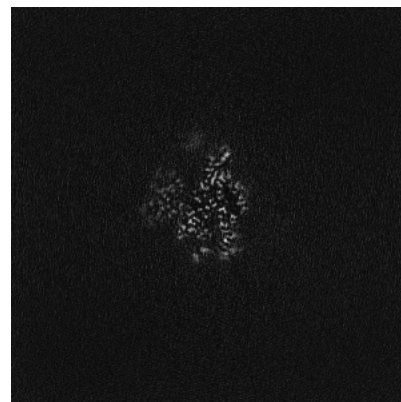
6.3.2 Raw map



X Index: 211



Y Index: 198

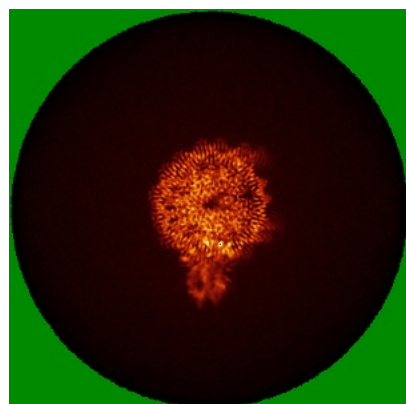


Z Index: 186

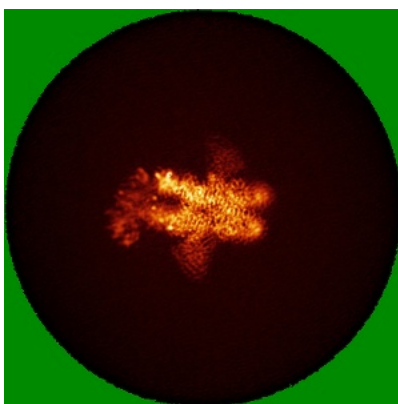
The images above show the largest variance slices of the map in three orthogonal directions.

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

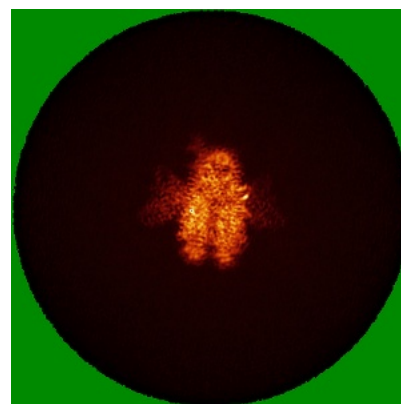
6.4.1 Primary map



X

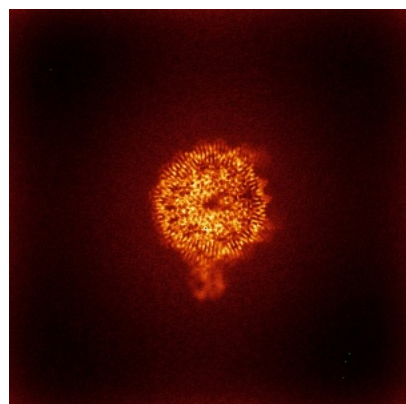


Y

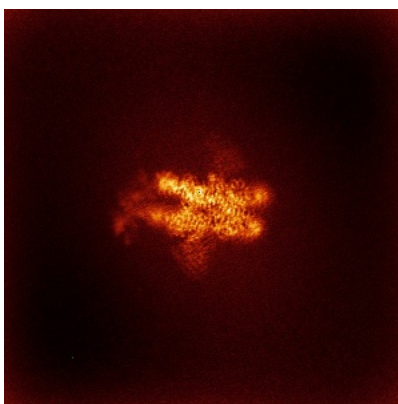


Z

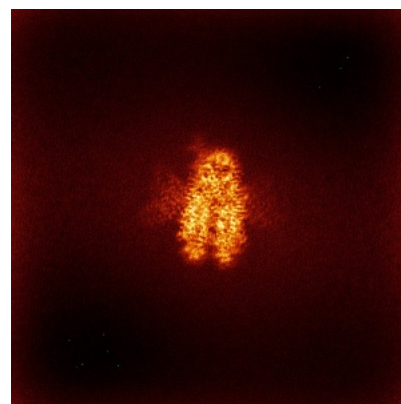
6.4.2 Raw map



X



Y

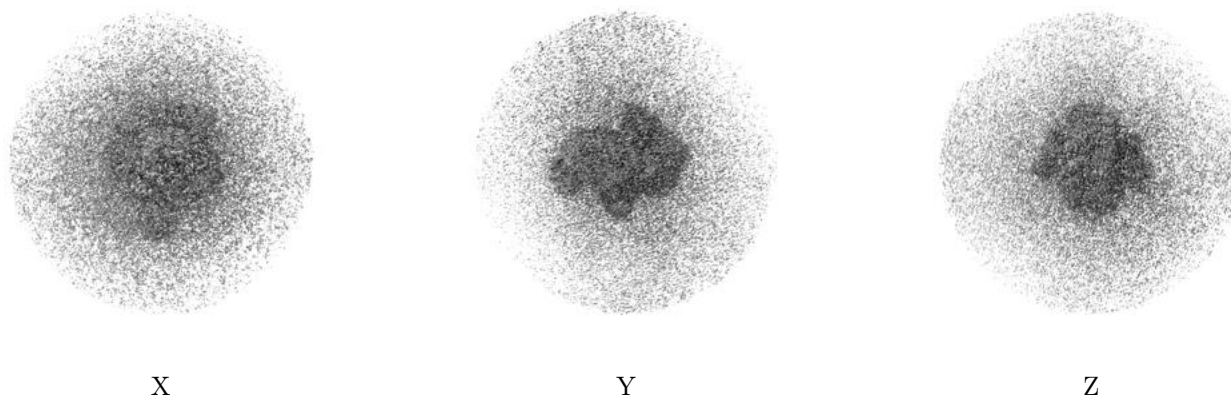


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

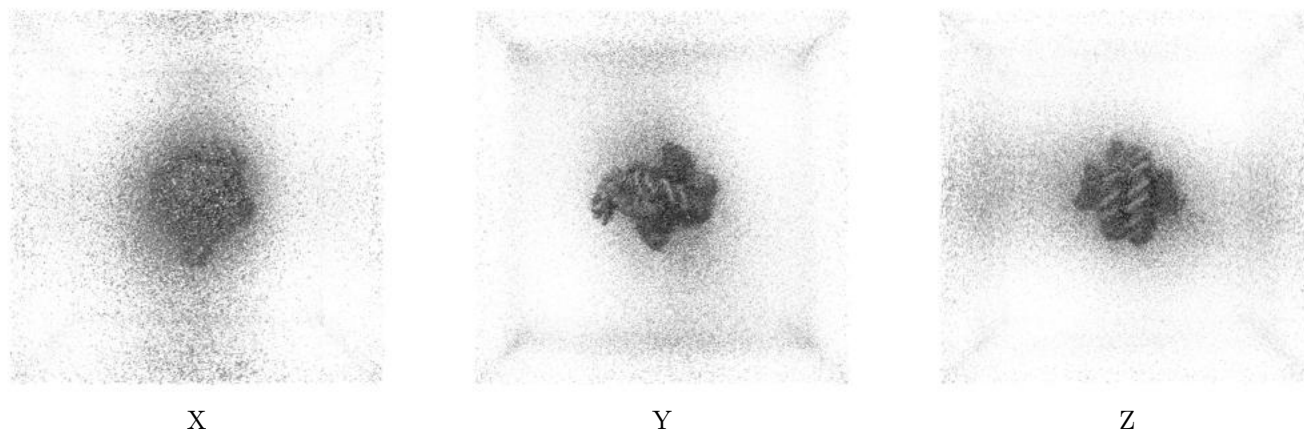
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0452. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

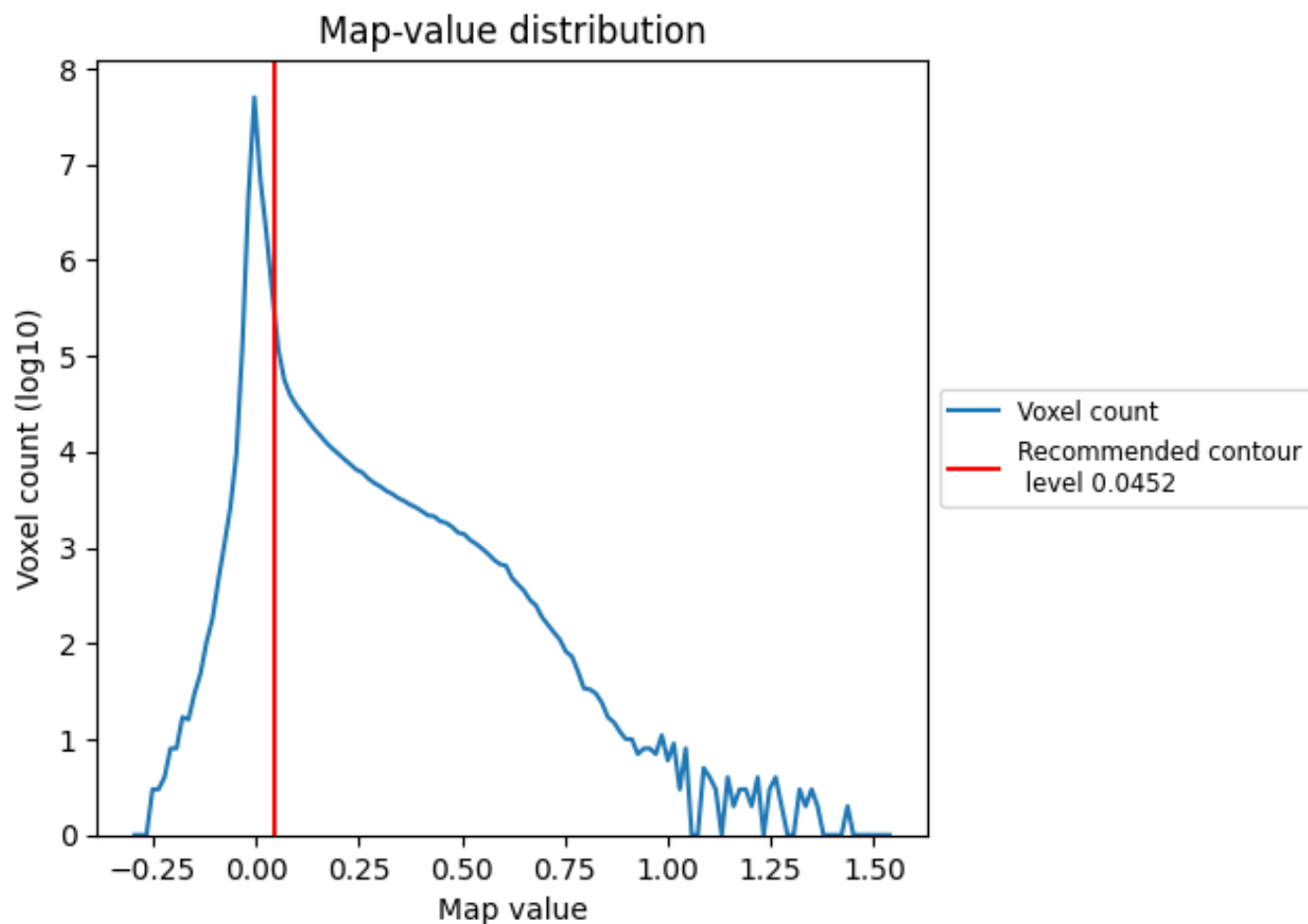
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

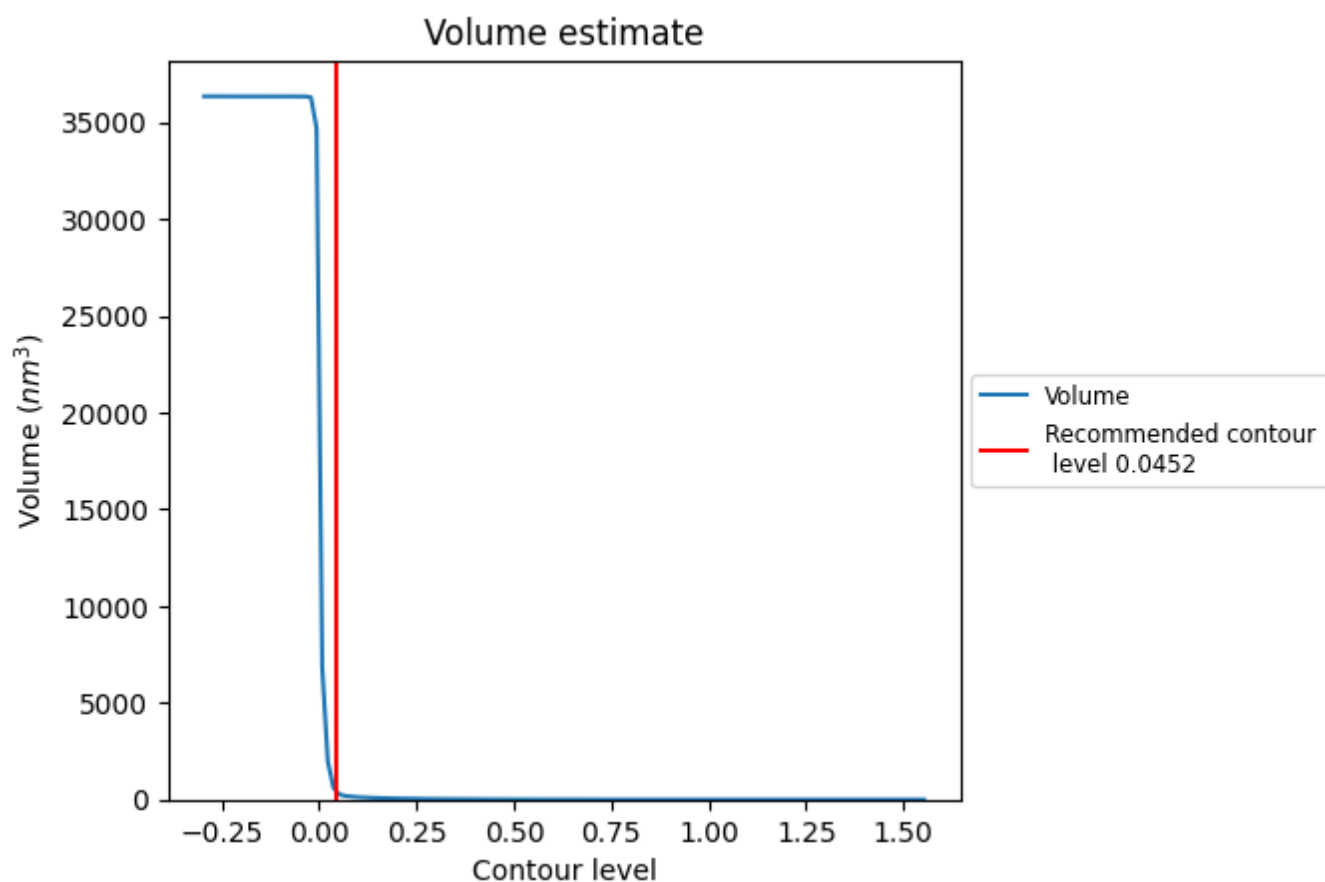
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

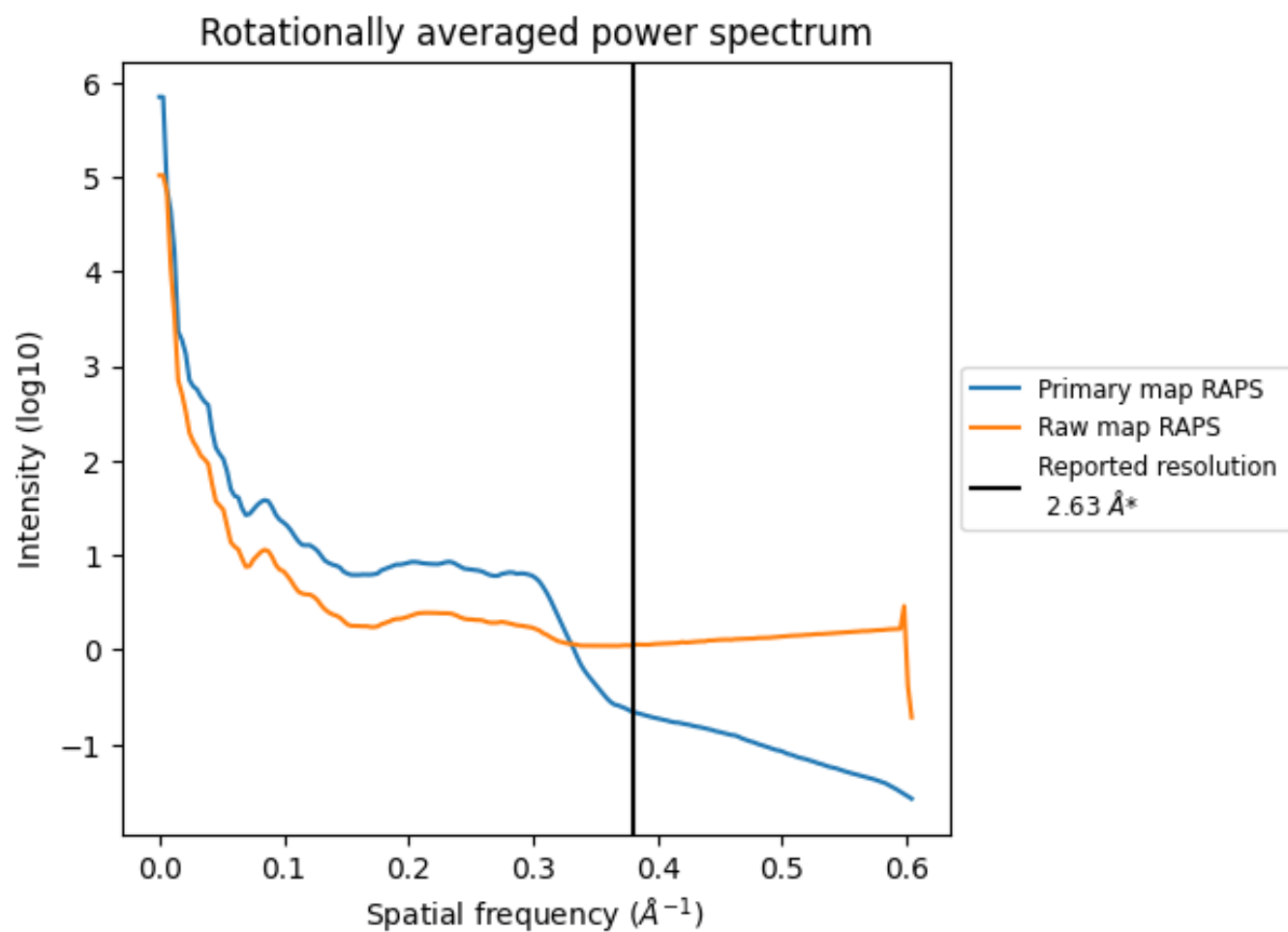
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 419 nm³; this corresponds to an approximate mass of 378 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 ⓘ

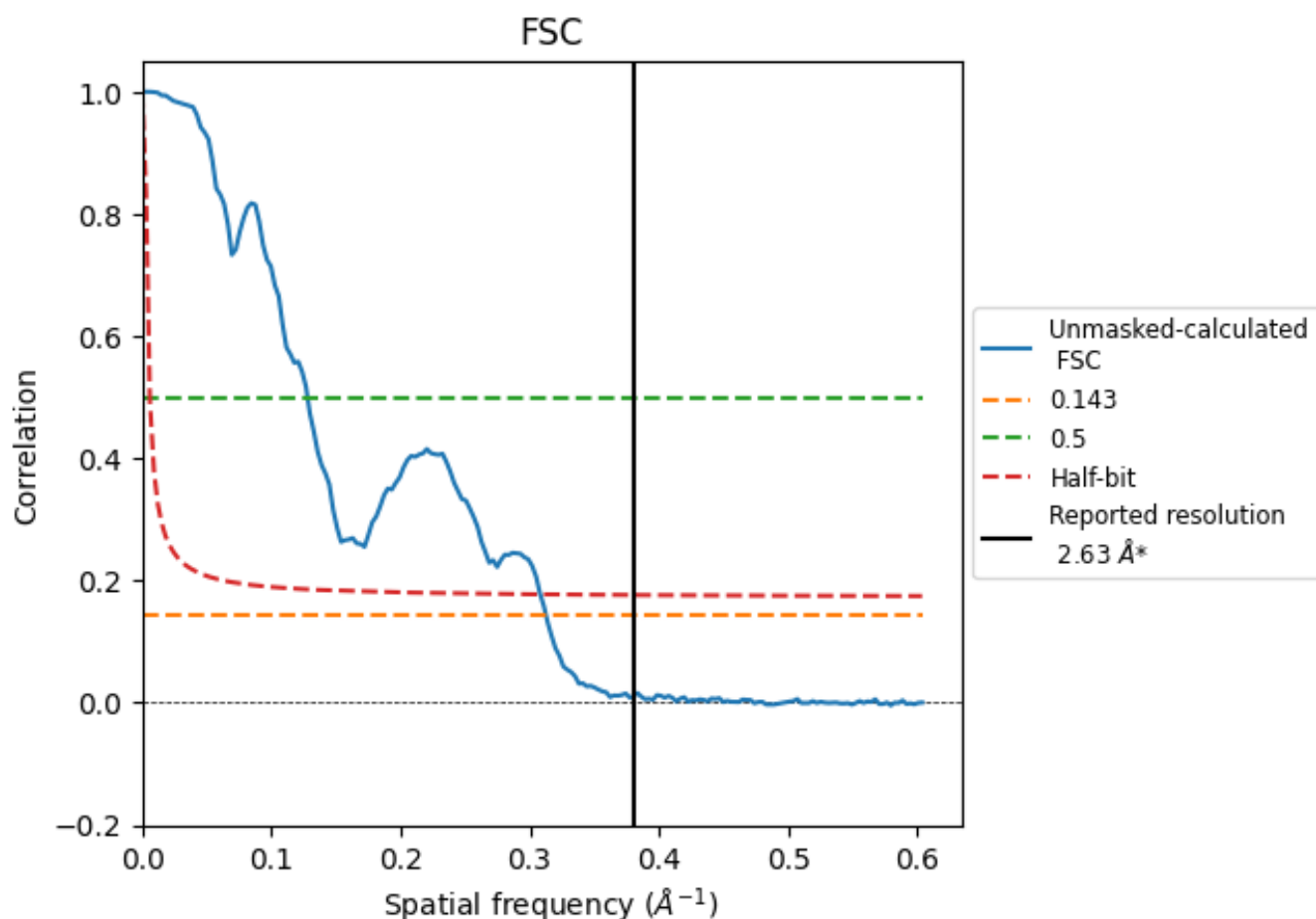


*Reported resolution corresponds to spatial frequency of $0.380 \text{ \AA}^{-1}$

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 0.380 Å⁻¹

8.2 Resolution estimates [i](#)

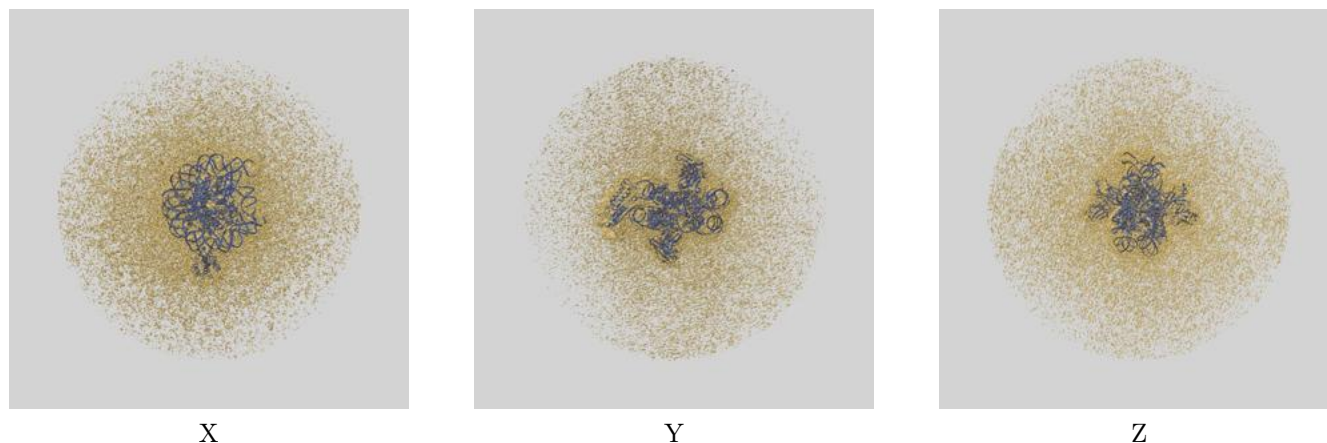
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.63	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.20	7.81	3.24

*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 3.20 differs from the reported value 2.63 by more than 10 %

9 Map-model fit [i](#)

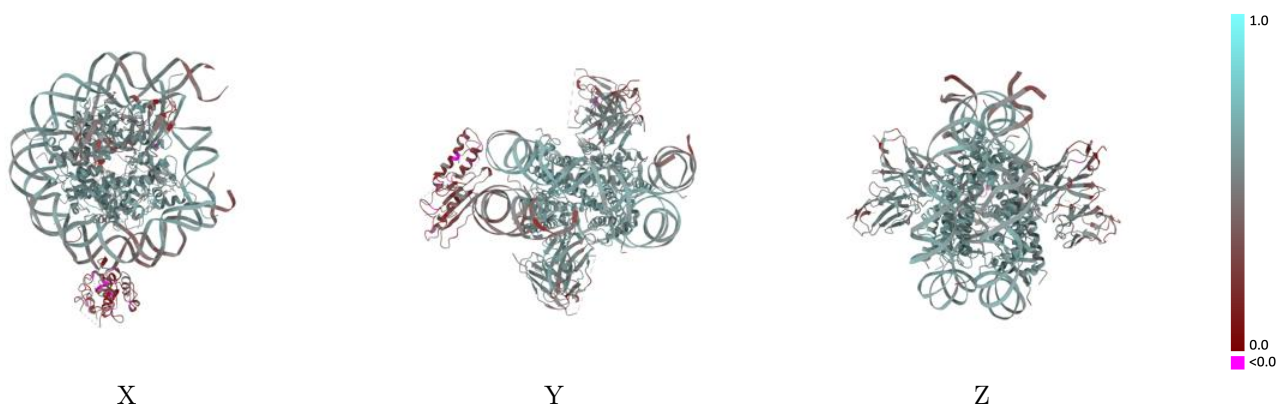
This section contains information regarding the fit between EMDB map EMD-74769 and PDB model 9ZTQ. Per-residue inclusion information can be found in section [3](#) on page [7](#).

9.1 Map-model overlay [i](#)



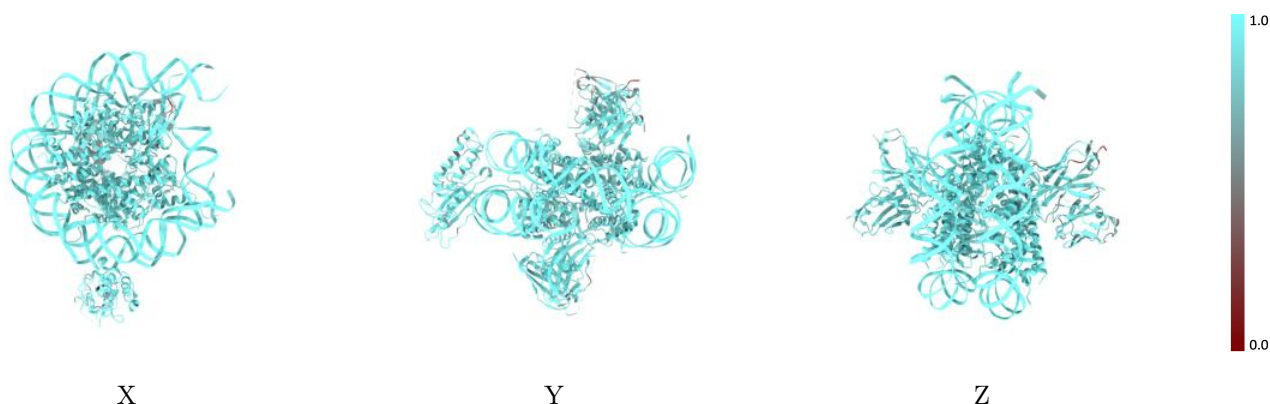
The images above show the 3D surface view of the map at the recommended contour level 0.0452 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



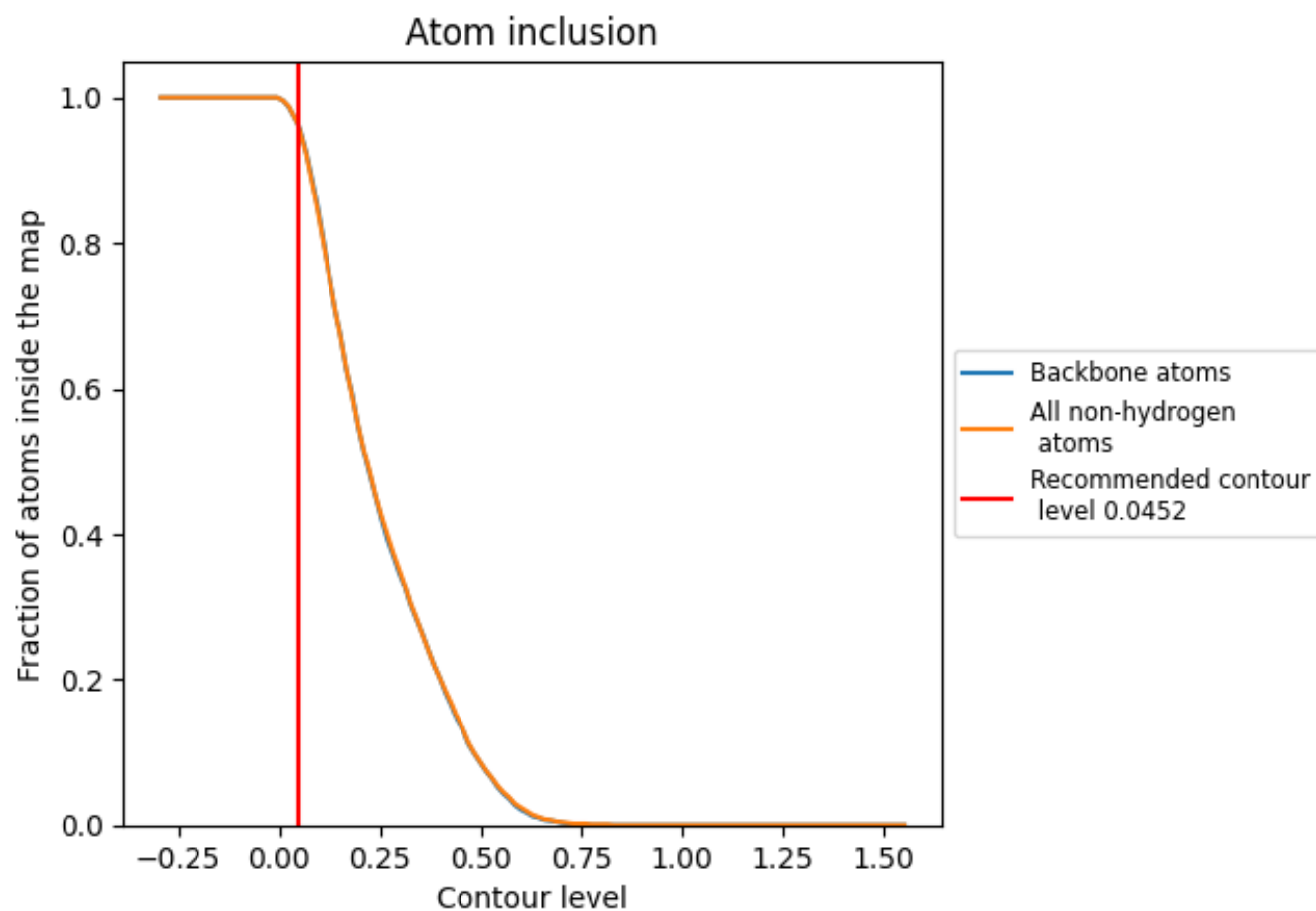
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0452).

9.4 Atom inclusion [i](#)



At the recommended contour level, 96% of all backbone atoms, 96% 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 (0.0452) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9640	 0.5280
A	 0.9880	 0.6070
B	 0.9860	 0.6170
C	 0.9890	 0.5910
D	 0.9920	 0.5840
E	 0.9900	 0.6230
F	 0.9870	 0.6110
G	 0.9810	 0.6130
H	 0.9870	 0.6130
I	 0.8440	 0.4570
J	 0.9400	 0.5220
K	 0.9940	 0.5570
L	 0.9770	 0.4180
M	 0.9900	 0.5400
P	 0.9320	 0.2540

