



Full wwPDB EM Validation Report ⓘ

Jul 8, 2024 – 07:15 am BST

PDB ID : 7Z4H
EMDB ID : EMD-14497
Title : SpCas9 bound to 14-nucleotide complementary DNA substrate
Authors : Pacesa, M.; Jinek, M.
Deposited on : 2022-03-03
Resolution : 3.49 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.dev92
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

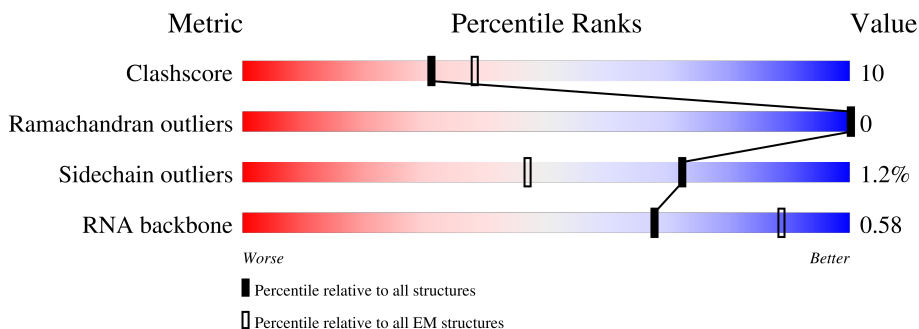
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.49 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	102	
2	C	34	
3	D	34	
4	B	1368	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 13900 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 RNA chain called sgRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	A	92	1970	883	363	633	91	0	0

- Molecule 2 is a DNA chain called Target strand of 14-nucleotide complementary DNA substrate.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	C	31	625	301	107	187	30	0	0

- Molecule 3 is a DNA chain called Non-target strand of 14-nucleotide complementary DNA substrate.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	D	19	389	187	71	113	18	0	0

- Molecule 4 is a protein called CRISPR-associated endonuclease Cas9/Csn1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	B	1334	10916	6956	1894	2043	23	0	0

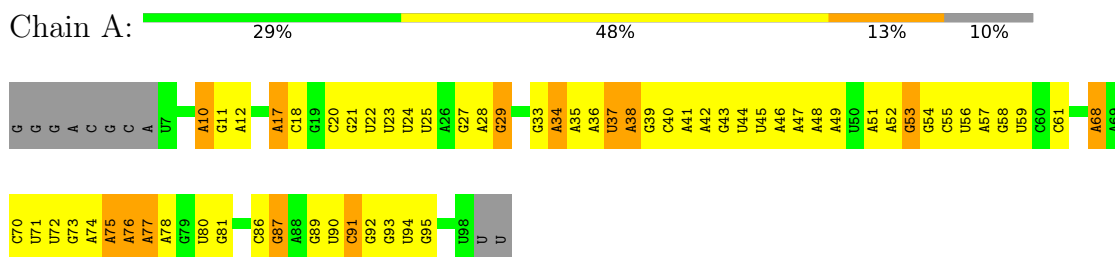
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	10	ALA	ASP	engineered mutation	UNP Q99ZW2
B	840	ALA	HIS	engineered mutation	UNP Q99ZW2

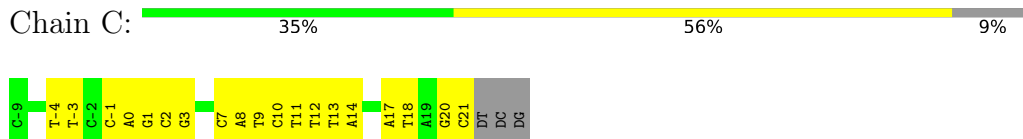
3 Residue-property plots

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.

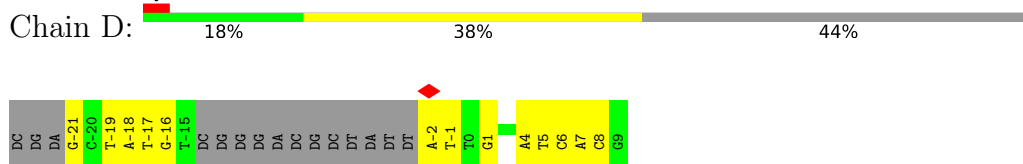
- Molecule 1: sgRNA



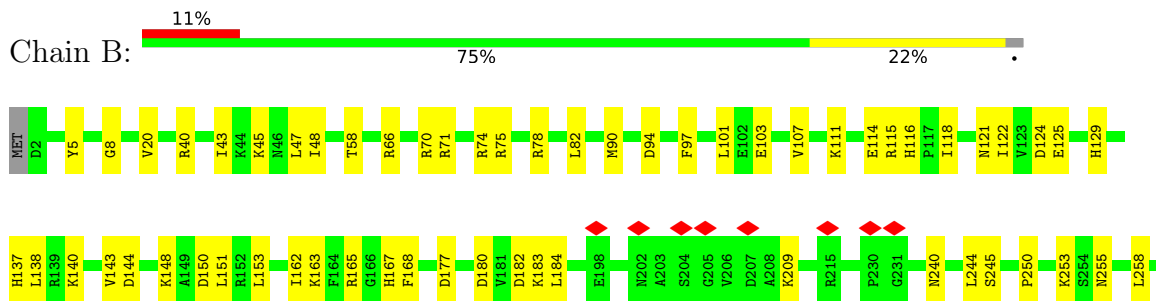
- Molecule 2: Target strand of 14-nucleotide complementary DNA substrate



- Molecule 3: Non-target strand of 14-nucleotide complementary DNA substrate



- Molecule 4: CRISPR-associated endonuclease Cas9/Csn1



D273	I448	Y594	A728	Y815	V875	R951	Y1036	S1202	I1331
N277	P449	H595	A731	L816	V876	V955	F1037	L1203	D1332
Y286	V452	I600	P731	Q817	K877	I956	F1038	F1204	R1333
L289	L455	I800	M751	N818	K878	T957	Y1039	E1205	L1343
S297	L455	K604	G752	G819	M879	L958	S1040	L1206	D1344
T313	A463	N609	R753	D821	K880	L962	N1041	E1207	A1345
K314	K468	E610	P756	M822	N881	V963	I1042	G1209	I1348
A315	I473	E611	I761	Y823	Y882	R967	K1047	R1210	H1349
I322	W476	E611	N767	V824	W883	K968	T1051	L1214	Q1350
E327	D483	E611	GLN	D825	L886	D969	L1052	A1215	S1351
L332	K484	E611	THR	Q826	L887	K974	A1053	E1219	E1357
K336	K489	E611	THR	E827	N888	N980	M1054	L1220	T1358
R340	Q489	E611	GLN	E828	A890	Y981	G1055	Q1221	R1359
E370	E493	E611	LYS	D829	K890	A984	E1056	N1224	L1362
K374	R494	E611	GLY	I830	L891	H985	R1058	E1225	L1365
K392	R494	E611	GLN	R831	I892	D986	K1059	F1235	G1366
Q402	R494	E611	LYS	R832	T893	N990	R1060	L1236	GLY
R408	D499	E611	N776	L833	Q894	A991	E1064	E1243	ASP
T404	L502	E611	R777	S834	R895	L997	V1074	LYS	
F405	K506	E611	R778	D835	K896	K1003	D1075	LEU	
P411	K507	E611	E779	Y836	F897	F1007	K1076	LYS	
I414	L508	E611	M781	D837	D898	E1008	D1079	GLY	
L419	K536	E611	K782	R838	N899	S1006	Q1091	S1248	
H420	P537	E611	R783	D839	T901	F1007	V1092	D1251	
E427	K645	E611	I784	A840	K902	F1009	F1105	K1255	
F429	V549	E611	G787	I841	A903	G1011	S1109	K1263	
Y430	F553	E611	I788	V842	E904	D1012	S1120	L1266	
F432	T555	E611	K789	P843	R905	Y1013	A1121	Q1272	
K434	N556	E611	E790	Q844	G906	VAL	R1122	V1280	
K439	R557	E611	L791	F846	G907	TYR	Y1131	K1289	
I440	F569	E611	G792	L847	L908	ASP	F1134	K1300	
E441	C574	E611	L796	K848	L911	V1018	Y1141	E1304	
K442	F575	E611	K797	D849	A914	R1019	F1159	Q1305	
I443	D576	E611	E798	S851	G915	M1020	S1159	A1306	
L444	S577	E611	N803	I852	K918	I1022	W1160	E1307	
T446	V578	E611	T804	N854	R919	A1023	K1161	N1308	
F446	L591	E611	Q805	K855	L921	LYS	L1164	I1309	
R447		E611	L806	V856	Q226	GLU	G1165	L1310	
		E611	Q807	L857	H930	SER	I1166	F1313	
		E611	N808	T858	V931	GLN	ALA	Y1326	
		E611	E809	N859	H931	ILE	THR	F1327	
		E611	K810	S860	G932	LYS	A1034		
		E611	L811	D861	L935	LYS	K1035		
		E611	Y812	K862	Y943	ALA			
		E611	L813	N863	N946	LYS			
		E611	L814	G865	D947	GLU			
		E611		K866	K948	GLN			
		E611		S867	L949	GLU			
		E611		D868	I950	ILE			
		E611		N869		LYS			
		E611		V870		THR			
		E611		P871		ASP			
		E611		S872					
		E611		E873					
		E611		E874					

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	75738	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 ($e^-/\text{\AA}^2$)	67.44	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.176	Depositor
Minimum map value	-0.052	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.034	Depositor
Map size (Å)	249.59999, 249.59999, 249.59999	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.65, 0.65, 0.65	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	0.30	0/2208	0.77	0/3441
2	C	0.52	0/698	0.95	0/1074
3	D	0.58	0/435	0.94	0/668
4	B	0.26	0/11107	0.45	0/14923
All	All	0.30	0/14448	0.58	0/20106

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	1970	0	991	56	0
2	C	625	0	353	21	0
3	D	389	0	218	13	0
4	B	10916	0	11085	194	0
All	All	13900	0	12647	257	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 10.

All (257) 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:D:-21:DG:H5''	4:B:1006:SER:HB2	1.55	0.88
3:D:-2:DA:H1'	3:D:-1:DT:H5'	1.66	0.78
4:B:240:ASN:ND2	4:B:255:ASN:OD1	2.19	0.75
1:A:44:U:O2'	4:B:402:GLN:OE1	2.04	0.74
4:B:137:HIS:HA	4:B:322:ILE:HD11	1.73	0.71
4:B:180:ASP:HB2	4:B:184:LEU:HG	1.72	0.71
4:B:20:VAL:HB	4:B:47:LEU:HB3	1.73	0.71
1:A:94:U:H2'	1:A:95:G:H8	1.57	0.69
4:B:8:GLY:HA3	4:B:991:ALA:HB2	1.74	0.68
4:B:951:ARG:HH12	4:B:1011:GLY:HA3	1.59	0.68
4:B:82:LEU:HD22	4:B:162:ILE:HD12	1.75	0.68
1:A:61:C:OP1	4:B:70:ARG:NH2	2.24	0.67
4:B:1206:LEU:HD23	4:B:1345:ALA:HB2	1.76	0.67
4:B:569:PHE:HB3	4:B:575:PHE:HB2	1.75	0.67
4:B:864:ARG:HH11	4:B:867:SER:HA	1.59	0.66
2:C:-1:DC:H2''	2:C:0:DA:C8	2.32	0.65
4:B:846:PHE:HA	4:B:1040:SER:HB3	1.78	0.65
4:B:671:ARG:HG2	4:B:678:THR:HG22	1.78	0.65
4:B:849:ASP:HB3	4:B:854:ASN:HD22	1.62	0.65
4:B:140:LYS:NZ	4:B:144:ASP:OD2	2.30	0.63
4:B:820:ARG:NH2	4:B:825:ASP:OD1	2.31	0.63
4:B:1164:LEU:HD21	4:B:1185:LYS:HD3	1.81	0.63
1:A:75:A:H2'	1:A:76:A:C8	2.35	0.62
4:B:1300:LYS:O	4:B:1305:GLN:NE2	2.32	0.62
4:B:1051:THR:HG22	4:B:1053:ALA:H	1.64	0.62
2:C:2:DC:H2'	2:C:3:DG:H8	1.64	0.62
4:B:820:ARG:HG2	4:B:827:GLU:HG2	1.82	0.62
4:B:244:LEU:HB2	4:B:250:PRO:HG3	1.82	0.62
1:A:91:C:H5''	4:B:1091:GLN:HG3	1.81	0.61
4:B:508:LEU:HD21	4:B:664:ARG:HB2	1.82	0.61
4:B:1064:GLU:HB2	4:B:1074:TRP:HB3	1.83	0.61
1:A:46:A:H2'	1:A:47:A:H8	1.66	0.61
4:B:1023:ALA:HA	4:B:1035:LYS:HD3	1.83	0.61
4:B:783:ARG:NH2	4:B:891:LEU:O	2.34	0.61
4:B:182:ASP:OD1	4:B:209:LYS:NZ	2.34	0.60
4:B:427:GLU:HB2	4:B:434:LYS:HB2	1.81	0.60
4:B:1215:ALA:HB2	4:B:1221:GLN:HG3	1.83	0.60
4:B:820:ARG:HA	4:B:827:GLU:HA	1.84	0.60
4:B:914:ALA:HB2	4:B:1022:ILE:HD11	1.83	0.59
4:B:419:LEU:HD13	4:B:444:LEU:HD12	1.84	0.59
4:B:530:VAL:HG22	4:B:537:PRO:HB3	1.84	0.59
1:A:37:U:H2'	1:A:38:A:C8	2.37	0.59

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:545:LYS:NZ	4:B:683:LEU:O	2.36	0.58
3:D:6:DC:H2''	3:D:7:DA:C8	2.38	0.58
4:B:75:ARG:HA	4:B:78:ARG:HE	1.69	0.58
4:B:273:ASP:O	4:B:277:ASN:ND2	2.37	0.58
4:B:853:ASP:OD2	4:B:895:ARG:NH1	2.35	0.58
4:B:817:GLN:O	4:B:882:TYR:OH	2.23	0.57
3:D:-19:DT:H2'	3:D:-18:DA:C8	2.40	0.57
1:A:45:U:H2'	1:A:46:A:H8	1.70	0.57
1:A:37:U:H2'	1:A:38:A:H8	1.69	0.57
1:A:94:U:H2'	1:A:95:G:C8	2.39	0.57
4:B:853:ASP:OD1	4:B:893:THR:OG1	2.21	0.57
4:B:180:ASP:HB3	4:B:183:LYS:HB2	1.88	0.56
4:B:370:GLU:OE2	4:B:374:LYS:NZ	2.39	0.56
1:A:17:A:OP2	4:B:74:ARG:NH1	2.34	0.56
4:B:956:ILE:HG12	4:B:1009:VAL:HG22	1.87	0.56
4:B:1075:ASP:N	4:B:1079:ASP:OD2	2.30	0.56
1:A:46:A:H2'	1:A:47:A:C8	2.41	0.55
4:B:761:ILE:CD1	4:B:955:VAL:HG13	2.37	0.55
3:D:4:DA:H2'	3:D:5:DT:H71	1.89	0.55
4:B:788:ILE:HG12	4:B:796:LEU:HG	1.89	0.55
1:A:56:U:O2'	1:A:58:G:N2	2.40	0.55
3:D:-18:DA:H3'	3:D:-17:DT:H71	1.88	0.55
4:B:981:TYR:CE1	4:B:1092:VAL:HB	2.42	0.55
4:B:980:ASN:ND2	4:B:1225:GLU:OE2	2.40	0.55
3:D:-19:DT:H2'	3:D:-18:DA:H8	1.71	0.55
3:D:1:DG:N7	4:B:1333:ARG:NH2	2.55	0.55
2:C:-4:DT:H1'	2:C:-3:DT:H5'	1.88	0.54
4:B:286:TYR:O	4:B:289:LEU:HB3	2.08	0.54
2:C:7:DC:H2'	2:C:8:DA:H8	1.73	0.54
4:B:209:LYS:HZ2	4:B:209:LYS:HB2	1.73	0.53
4:B:468:LYS:HE3	4:B:483:ASP:HA	1.90	0.53
4:B:499:ASP:OD2	4:B:502:LEU:N	2.41	0.53
4:B:1349:HIS:HB2	4:B:1358:THR:HB	1.89	0.53
4:B:556:ASN:O	4:B:595:HIS:NE2	2.41	0.53
4:B:686:ASP:HB3	4:B:690:ASN:HA	1.91	0.53
1:A:54:G:H2'	1:A:55:C:C6	2.44	0.52
4:B:420:HIS:ND1	4:B:441:GLU:OE2	2.41	0.52
4:B:967:ARG:NH1	4:B:986:ASP:OD1	2.43	0.52
4:B:1021:MET:HG3	4:B:1036:TYR:HB2	1.91	0.52
4:B:1161:LYS:HE3	4:B:1343:LEU:HB3	1.91	0.52
2:C:20:DG:H4'	4:B:695:GLN:HE21	1.74	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:75:ARG:HB2	4:B:78:ARG:HH21	1.75	0.52
2:C:8:DA:H2'	2:C:9:DT:H6	1.75	0.51
2:C:8:DA:H2'	2:C:9:DT:C6	2.46	0.51
4:B:833:LEU:HD23	4:B:836:TYR:HD2	1.76	0.51
2:C:11:DT:H2''	4:B:728:ALA:HB1	1.92	0.51
1:A:40:C:OP1	4:B:340:ARG:NH1	2.37	0.51
4:B:926:GLN:O	4:B:930:HIS:ND1	2.30	0.51
1:A:18:C:H41	4:B:71:ARG:NH2	2.09	0.51
2:C:1:DG:OP2	4:B:1109:SER:N	2.44	0.51
4:B:1209:GLY:O	4:B:1224:ASN:ND2	2.43	0.51
4:B:493:GLU:HB3	4:B:506:LYS:NZ	2.26	0.50
4:B:958:LEU:HD11	4:B:962:LEU:HD23	1.93	0.50
1:A:47:A:H4'	4:B:101:LEU:HD22	1.93	0.50
4:B:665:LYS:HA	4:B:669:GLY:HA3	1.92	0.50
4:B:168:PHE:CD1	4:B:447:ARG:HD3	2.46	0.50
4:B:121:ASN:ND2	4:B:124:ASP:OD2	2.39	0.50
4:B:463:ALA:O	4:B:494:ARG:NH1	2.44	0.50
4:B:530:VAL:O	4:B:578:VAL:HA	2.11	0.50
1:A:21:G:H1'	2:C:1:DG:N2	2.26	0.50
1:A:43:G:N7	4:B:336:LYS:NZ	2.54	0.50
4:B:443:ILE:HD11	4:B:476:TRP:HZ2	1.76	0.50
4:B:1308:ASN:OD1	4:B:1327:PHE:N	2.43	0.50
1:A:47:A:O2'	4:B:101:LEU:O	2.28	0.49
4:B:870:VAL:HG23	4:B:908:LEU:HB2	1.94	0.49
4:B:411:PRO:HG2	4:B:414:ILE:HG12	1.93	0.49
4:B:554:LYS:HB3	4:B:604:LYS:HZ1	1.78	0.49
4:B:677:LYS:HB3	4:B:681:ASP:HB2	1.94	0.49
2:C:9:DT:H2'	2:C:10:DC:H6	1.77	0.49
3:D:7:DA:H2''	3:D:8:DC:H2'	1.94	0.49
1:A:22:U:H2'	1:A:23:U:H6	1.78	0.49
4:B:967:ARG:NH2	4:B:974:LYS:HB3	2.28	0.49
4:B:969:ASP:HB3	4:B:1047:LYS:NZ	2.27	0.49
1:A:92:G:OP1	4:B:40:ARG:NH1	2.45	0.49
1:A:53:G:H2'	1:A:54:G:H8	1.77	0.49
1:A:90:U:O2	4:B:981:TYR:OH	2.31	0.49
2:C:7:DC:H2'	2:C:8:DA:C8	2.48	0.49
4:B:1120:ILE:N	4:B:1134:PHE:O	2.38	0.49
2:C:17:DA:H3'	2:C:18:DT:H71	1.95	0.48
4:B:48:ILE:HG12	4:B:984:ALA:HB1	1.96	0.48
4:B:327:GLU:OE1	4:B:392:LYS:NZ	2.44	0.48
4:B:870:VAL:HG11	4:B:902:LYS:HB3	1.94	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:874:GLU:HG2	4:B:878:LYS:HE3	1.95	0.48
4:B:943:TYR:HA	4:B:949:LEU:HA	1.94	0.48
4:B:1310:ILE:HA	4:B:1313:PHE:HD2	1.78	0.48
4:B:439:LYS:HG2	4:B:476:TRP:CD1	2.49	0.48
4:B:1198:LEU:HD13	4:B:1204:PHE:HZ	1.79	0.48
1:A:45:U:H2'	1:A:46:A:C8	2.48	0.47
2:C:2:DC:H2'	2:C:3:DG:C8	2.46	0.47
2:C:9:DT:H2'	2:C:10:DC:C6	2.49	0.47
4:B:549:VAL:HA	4:B:553:PHE:HD2	1.79	0.47
1:A:11:G:H2'	1:A:12:A:H8	1.79	0.47
1:A:43:G:H3'	1:A:44:U:C6	2.50	0.47
1:A:61:C:P	4:B:70:ARG:HH21	2.36	0.47
4:B:1308:ASN:HB3	4:B:1326:TYR:CD1	2.50	0.47
1:A:73:G:O2'	1:A:75:A:N6	2.40	0.47
4:B:442:LYS:HA	4:B:445:THR:HG22	1.96	0.47
4:B:790:GLU:HG2	4:B:889:ALA:HA	1.96	0.47
4:B:915:GLY:O	4:B:919:ARG:HG2	2.14	0.47
4:B:107:VAL:HG13	4:B:1131:TYR:CE1	2.49	0.47
4:B:138:LEU:HD11	4:B:153:LEU:HB3	1.97	0.47
2:C:12:DT:H2'	2:C:13:DT:C6	2.51	0.46
1:A:86:C:H2'	1:A:87:G:O4'	2.16	0.46
4:B:125:GLU:OE2	4:B:129:HIS:NE2	2.45	0.46
4:B:1210:ARG:HA	4:B:1280:VAL:HG13	1.97	0.46
2:C:11:DT:H3'	2:C:12:DT:H71	1.96	0.46
4:B:591:LEU:HB3	4:B:594:TYR:HB3	1.98	0.46
1:A:91:C:H2'	1:A:92:G:H8	1.79	0.46
1:A:24:U:H2'	1:A:25:U:C6	2.50	0.46
1:A:34:A:H3'	1:A:35:A:H8	1.80	0.46
2:C:10:DC:H3'	2:C:11:DT:H71	1.98	0.46
2:C:13:DT:C2	2:C:14:DA:C8	3.04	0.46
4:B:103:GLU:O	4:B:111:LYS:NZ	2.48	0.46
4:B:137:HIS:CE1	4:B:322:ILE:HG12	2.51	0.46
4:B:58:THR:HA	4:B:731:PRO:HG2	1.98	0.46
4:B:921:LEU:HD13	4:B:921:LEU:HA	1.76	0.46
4:B:5:TYR:CE2	4:B:756:PRO:HB3	2.51	0.45
4:B:628:ASP:OD2	4:B:631:MET:HG2	2.16	0.45
1:A:22:U:H2'	1:A:23:U:C6	2.52	0.45
1:A:48:A:OP2	4:B:163:LYS:NZ	2.43	0.45
4:B:114:GLU:OE1	4:B:116:HIS:N	2.29	0.45
4:B:609:ASN:HD21	4:B:611:GLU:HB2	1.81	0.45
4:B:761:ILE:HD13	4:B:955:VAL:HG13	1.97	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:-17:DT:H2'	3:D:-16:DG:C8	2.52	0.45
4:B:1304:GLU:O	4:B:1308:ASN:ND2	2.33	0.45
4:B:148:LYS:HB2	4:B:429:PHE:CD1	2.52	0.45
4:B:956:ILE:HG23	4:B:1008:PHE:HD2	1.81	0.45
1:A:27:G:OP2	4:B:115:ARG:NH1	2.49	0.45
4:B:66:ARG:HG2	4:B:70:ARG:NH1	2.32	0.45
4:B:90:MET:O	4:B:94:ASP:N	2.46	0.45
4:B:1148:LYS:HG3	4:B:1159:SER:HA	1.99	0.45
4:B:1362:LEU:HA	4:B:1365:LEU:HD13	1.98	0.45
1:A:10:A:H2'	1:A:11:G:C8	2.51	0.45
4:B:43:ILE:HD13	4:B:45:LYS:HE2	1.98	0.45
4:B:332:LEU:HD11	4:B:336:LYS:HE3	1.99	0.44
4:B:677:LYS:NZ	4:B:685:SER:O	2.49	0.44
4:B:1357:GLU:OE1	4:B:1359:ARG:NH1	2.49	0.44
4:B:253:LYS:HG3	4:B:258:LEU:O	2.17	0.44
4:B:557:ARG:HA	4:B:595:HIS:CD2	2.52	0.44
4:B:526:LYS:HA	4:B:526:LYS:HD3	1.77	0.44
4:B:783:ARG:NH1	4:B:812:TYR:OH	2.49	0.44
4:B:932:ALA:HA	4:B:955:VAL:HG11	2.00	0.44
4:B:455:LEU:HB3	4:B:473:ILE:HD12	2.00	0.44
1:A:20:C:C2	1:A:21:G:C8	3.05	0.44
1:A:77:A:H2'	1:A:78:A:H8	1.82	0.44
4:B:918:LYS:NZ	4:B:1007:GLU:OE2	2.49	0.44
4:B:870:VAL:HG21	4:B:902:LYS:HD3	2.00	0.43
3:D:1:DG:OP2	4:B:1221:GLN:NE2	2.48	0.43
4:B:828:LEU:HB3	4:B:836:TYR:CE2	2.53	0.43
4:B:963:VAL:HG21	4:B:990:ASN:OD1	2.19	0.43
1:A:53:G:H2'	1:A:54:G:C8	2.54	0.43
3:D:1:DG:H2'	4:B:1219:GLU:OE1	2.19	0.43
4:B:832:ARG:NH1	4:B:835:ASP:OD2	2.52	0.43
1:A:80:U:OP2	4:B:753:ARG:NH2	2.52	0.43
1:A:93:G:H2'	1:A:94:U:C6	2.54	0.43
4:B:1236:LEU:HB3	4:B:1310:ILE:HD11	2.00	0.43
1:A:72:U:H2'	1:A:73:G:O4'	2.19	0.43
4:B:182:ASP:OD1	4:B:209:LYS:HB2	2.19	0.43
4:B:886:LEU:HD22	4:B:891:LEU:HD12	1.99	0.43
4:B:997:LEU:HD11	4:B:1042:ILE:HG13	2.00	0.43
4:B:1348:ILE:HG12	4:B:1359:ARG:HG2	2.00	0.43
1:A:68:A:C8	4:B:1351:SER:HA	2.54	0.43
1:A:29:G:C6	1:A:41:A:C6	3.07	0.43
4:B:449:PRO:HB2	4:B:452:VAL:HG23	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:245:SER:HA	4:B:297:SER:HB2	2.01	0.43
4:B:1058:ARG:HG2	4:B:1059:LYS:H	1.83	0.43
4:B:177:ASP:N	4:B:177:ASP:OD1	2.52	0.42
2:C:12:DT:H2'	2:C:13:DT:H6	1.85	0.42
3:D:-2:DA:H2'	3:D:-1:DT:H72	2.01	0.42
4:B:1251:ASP:HB3	4:B:1255:LYS:NZ	2.34	0.42
1:A:77:A:H2'	1:A:78:A:C8	2.54	0.42
4:B:569:PHE:O	4:B:574:CYS:N	2.52	0.42
4:B:1263:LYS:O	4:B:1266:LEU:HB2	2.19	0.42
4:B:1207:GLU:OE2	4:B:1210:ARG:NH2	2.44	0.42
4:B:1235:PHE:CD1	4:B:1262:HIS:HB2	2.54	0.42
4:B:97:PHE:HE1	4:B:118:ILE:HA	1.85	0.42
4:B:143:VAL:HG11	4:B:315:ALA:HB2	2.01	0.42
4:B:963:VAL:O	4:B:967:ARG:HG3	2.19	0.42
4:B:1199:PRO:O	4:B:1202:SER:OG	2.28	0.42
4:B:144:ASP:OD1	4:B:313:THR:OG1	2.34	0.42
4:B:484:LYS:HB3	4:B:484:LYS:HE3	1.86	0.42
4:B:1333:ARG:H	4:B:1333:ARG:HG2	1.69	0.42
4:B:439:LYS:HG2	4:B:476:TRP:NE1	2.34	0.42
4:B:493:GLU:HB3	4:B:506:LYS:HZ3	1.85	0.42
4:B:1289:LYS:HE3	4:B:1331:ILE:HD12	2.01	0.42
1:A:38:A:H2'	1:A:39:G:C8	2.55	0.41
1:A:49:A:N3	4:B:1122:ARG:NH2	2.67	0.41
1:A:93:G:H2'	1:A:94:U:H6	1.85	0.41
4:B:935:LEU:HD23	4:B:935:LEU:HA	1.76	0.41
1:A:11:G:H2'	1:A:12:A:C8	2.55	0.41
2:C:20:DG:H3'	2:C:21:DC:C5	2.56	0.41
4:B:845:SER:O	4:B:1041:ASN:N	2.54	0.41
1:A:18:C:OP1	4:B:165:ARG:NE	2.45	0.41
1:A:22:U:C2	1:A:23:U:C5	3.09	0.41
1:A:33:G:N2	1:A:36:A:OP2	2.42	0.41
4:B:430:TYR:HB3	4:B:432:PHE:CE1	2.55	0.41
4:B:489:GLN:HG3	4:B:625:LEU:HD13	2.03	0.41
4:B:1022:ILE:HD12	4:B:1022:ILE:H	1.85	0.41
4:B:404:THR:HG22	4:B:405:PHE:H	1.85	0.41
4:B:600:ILE:HG23	4:B:650:GLN:HE21	1.85	0.41
4:B:873:GLU:HG2	4:B:903:ALA:HB1	2.03	0.41
4:B:911:LEU:HB2	4:B:1019:ARG:HH21	1.86	0.41
4:B:5:TYR:CZ	4:B:751:MET:HG3	2.56	0.41
4:B:150:ASP:OD1	4:B:151:LEU:N	2.54	0.41
4:B:654:ARG:HD3	4:B:656:TYR:CE2	2.56	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:1052:LEU:HB2	4:B:1056:GLU:HB2	2.02	0.41
1:A:70:C:C2	1:A:71:U:C5	3.09	0.40
4:B:1060:ARG:HB2	4:B:1076:LYS:HZ1	1.86	0.40
4:B:107:VAL:HG22	4:B:1131:TYR:OH	2.22	0.40
4:B:806:LEU:HD23	4:B:806:LEU:HA	1.93	0.40
4:B:1204:PHE:HE1	4:B:1214:LEU:HB2	1.87	0.40
1:A:41:A:H2'	1:A:42:A:C8	2.56	0.40
4:B:1306:ALA:O	4:B:1310:ILE:HG12	2.21	0.40
1:A:52:A:C8	4:B:1105:PHE:HE2	2.39	0.40
4:B:1141:TYR:O	4:B:1166:ILE:HB	2.21	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
4	B	1322/1368 (97%)	1295 (98%)	27 (2%)	0	100 100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
4	B	1198/1225 (98%)	1184 (99%)	14 (1%)	71 87

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	B	122	ILE
4	B	167	HIS
4	B	653	ARG
4	B	654	ARG
4	B	655	ARG
4	B	656	TYR
4	B	703	THR
4	B	943	TYR
4	B	1003	LYS
4	B	1037	PHE
4	B	1041	ASN
4	B	1263	LYS
4	B	1272	GLN
4	B	1333	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
4	B	739	GLN
4	B	1241	HIS
4	B	1262	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	91/102 (89%)	20 (21%)	0

All (20) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	10	A
1	A	17	A
1	A	28	A
1	A	29	G
1	A	34	A
1	A	37	U
1	A	38	A
1	A	51	A
1	A	53	G

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	57	A
1	A	59	U
1	A	68	A
1	A	74	A
1	A	75	A
1	A	76	A
1	A	77	A
1	A	81	G
1	A	87	G
1	A	89	G
1	A	91	C

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

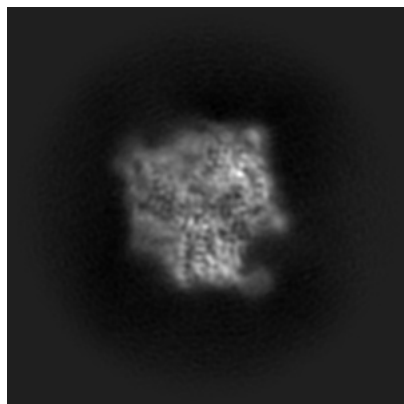
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14497. These allow visual inspection of the internal detail of the map and identification of artifacts.

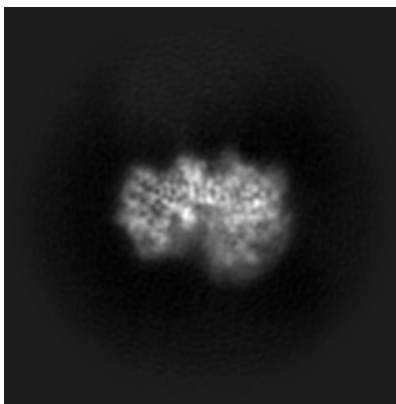
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

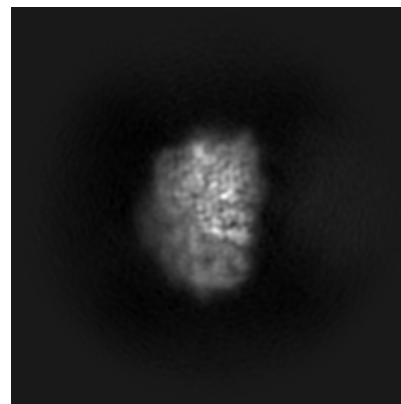
6.1.1 Primary map



X

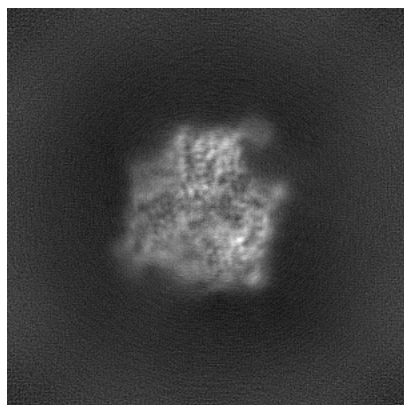


Y

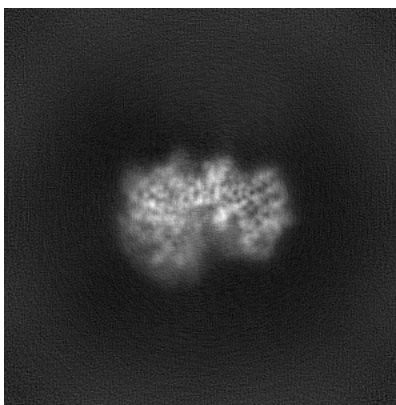


Z

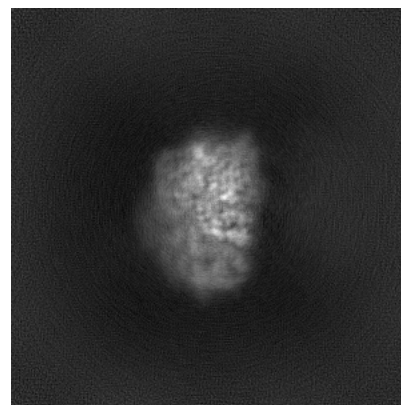
6.1.2 Raw map



X



Y

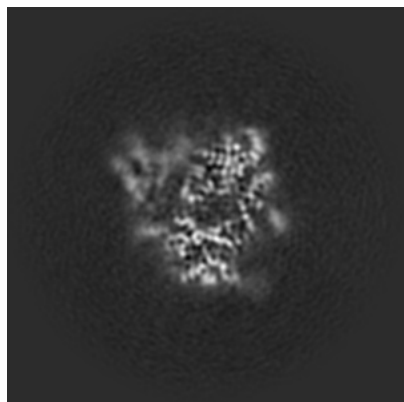


Z

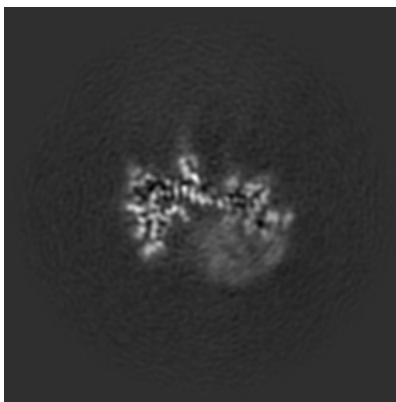
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

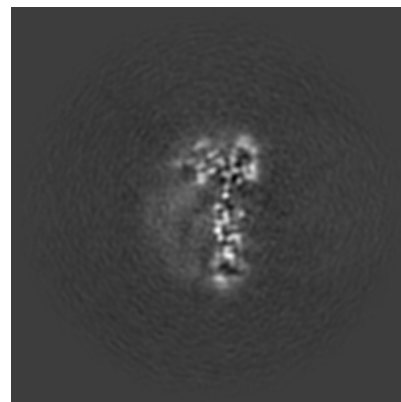
6.2.1 Primary map



X Index: 192

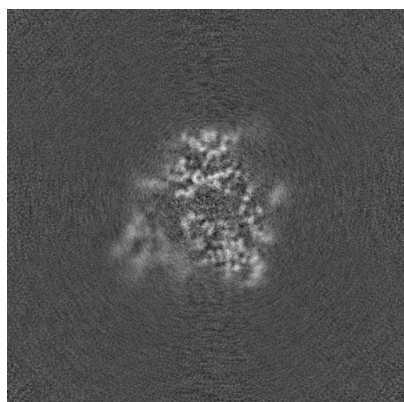


Y Index: 192

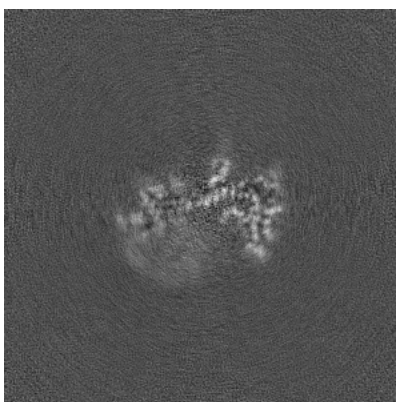


Z Index: 192

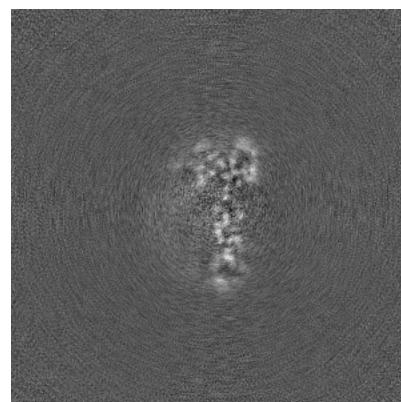
6.2.2 Raw map



X Index: 192



Y Index: 192

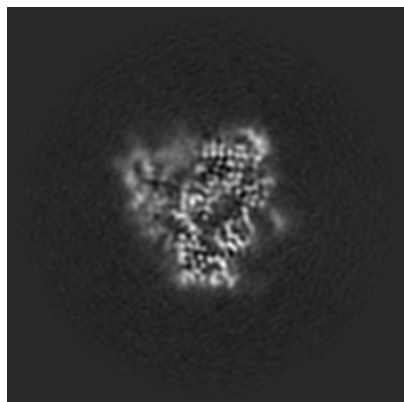


Z Index: 192

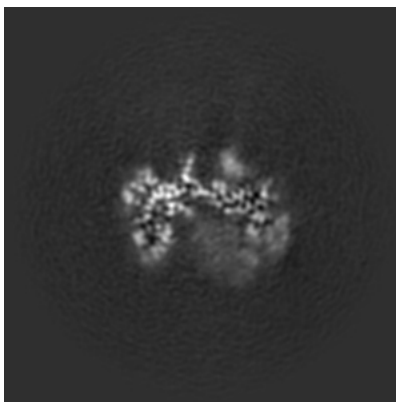
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

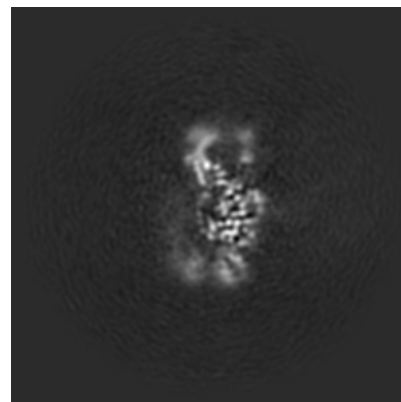
6.3.1 Primary map



X Index: 196

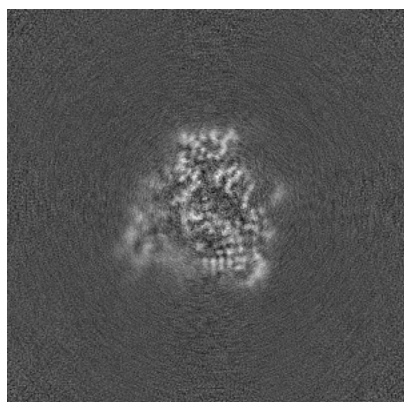


Y Index: 202

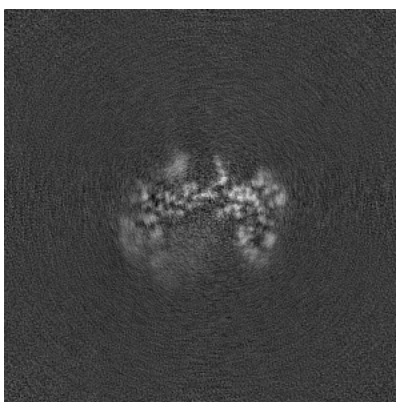


Z Index: 179

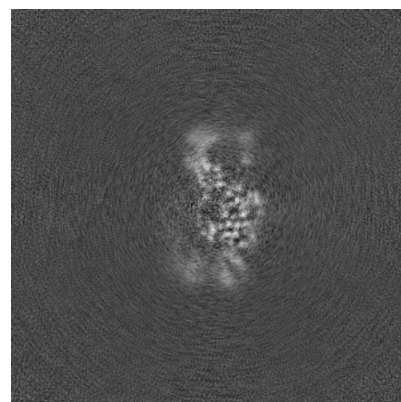
6.3.2 Raw map



X Index: 195



Y Index: 202

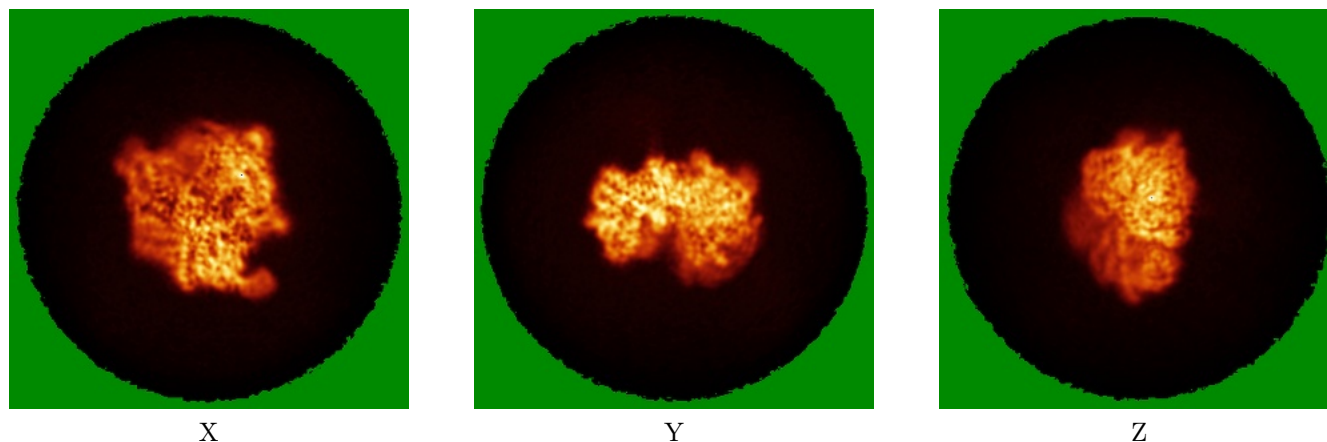


Z Index: 206

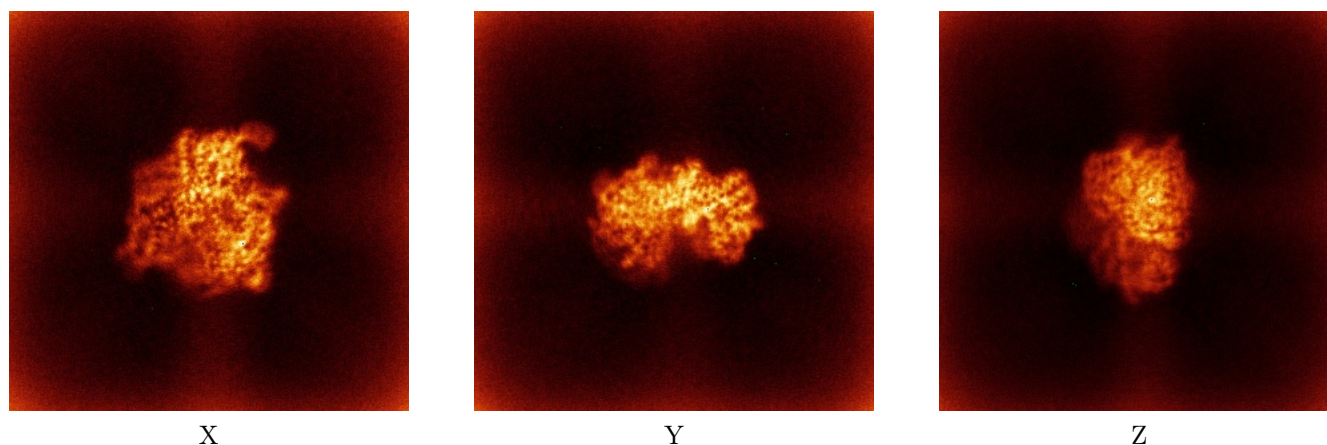
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



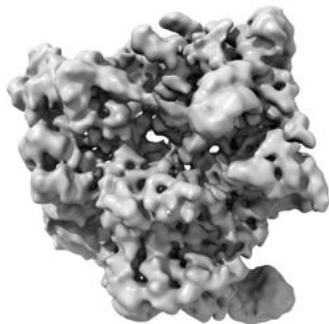
6.4.2 Raw map



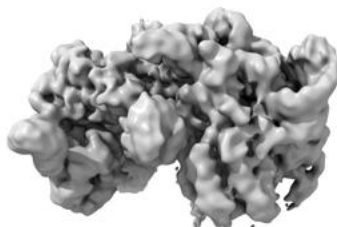
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

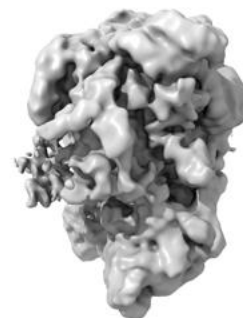
6.5.1 Primary map



X



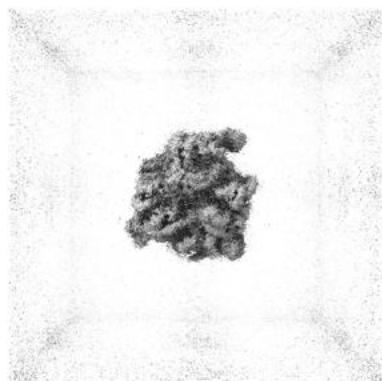
Y



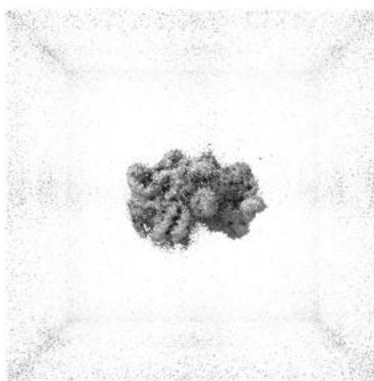
Z

The images above show the 3D surface view of the map at the recommended contour level 0.034. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

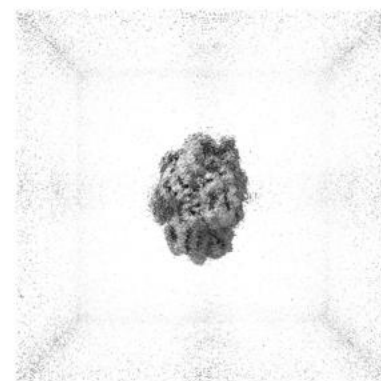
6.5.2 Raw map



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.

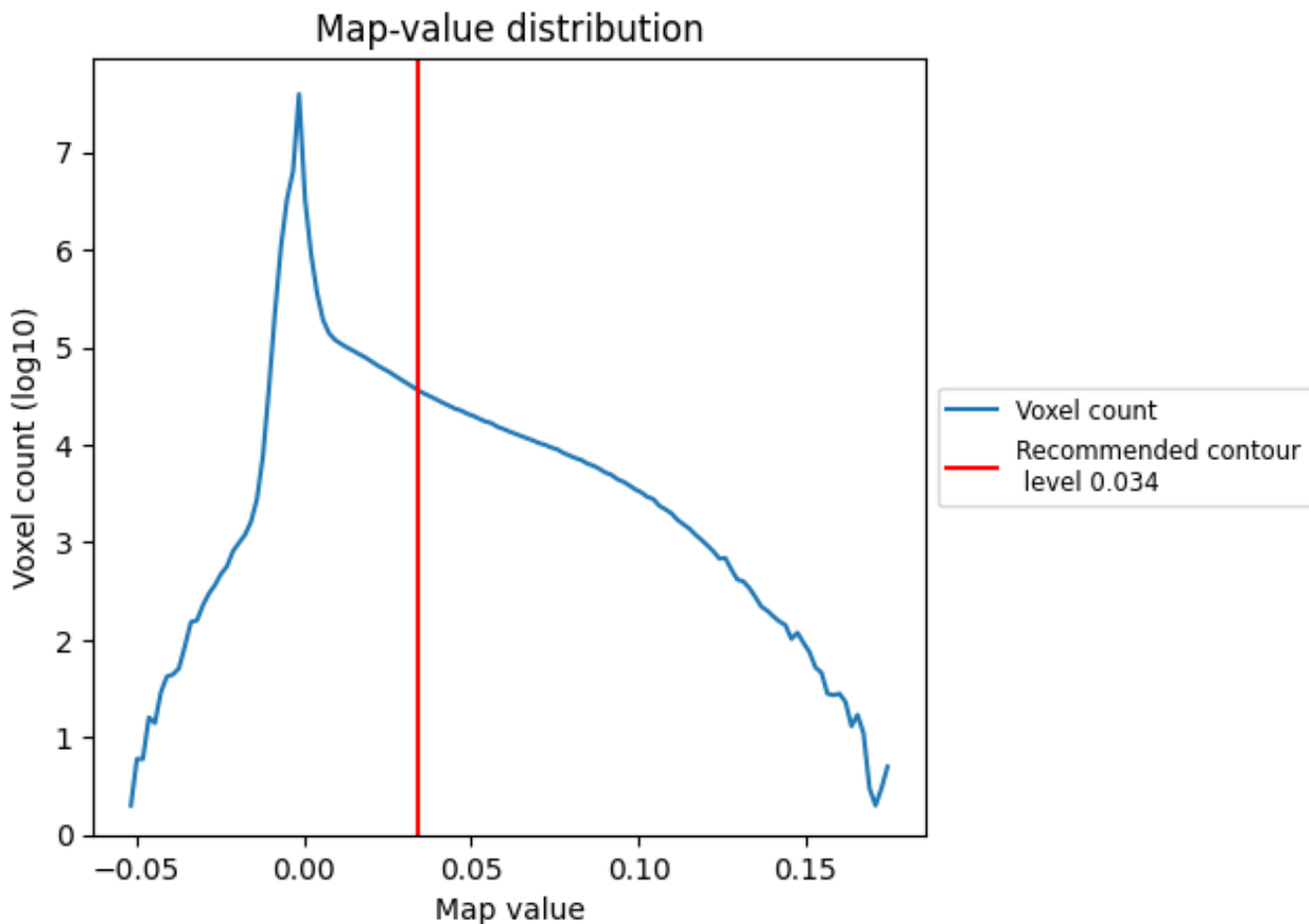
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

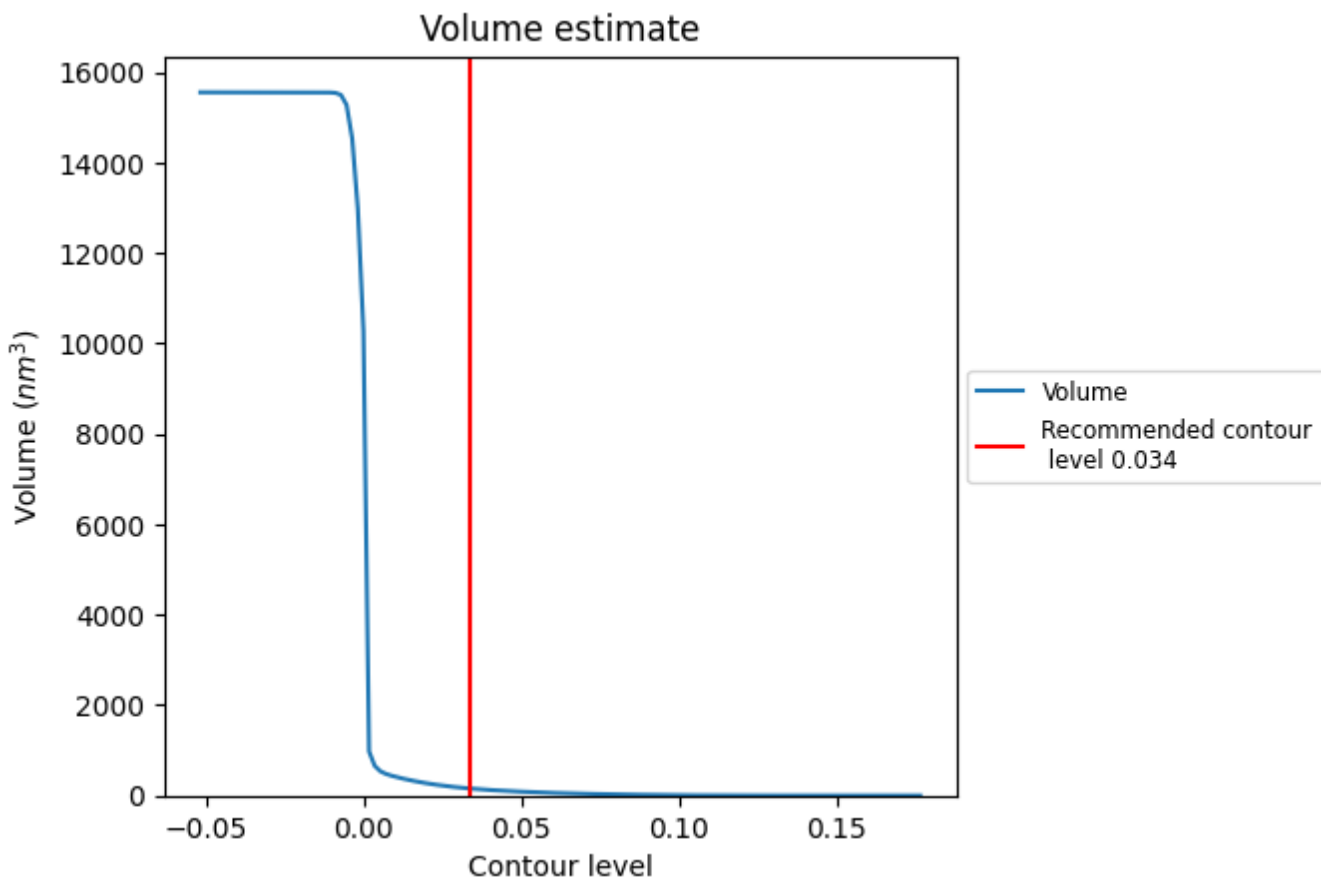
This section contains the results of statistical analysis of the map.

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.

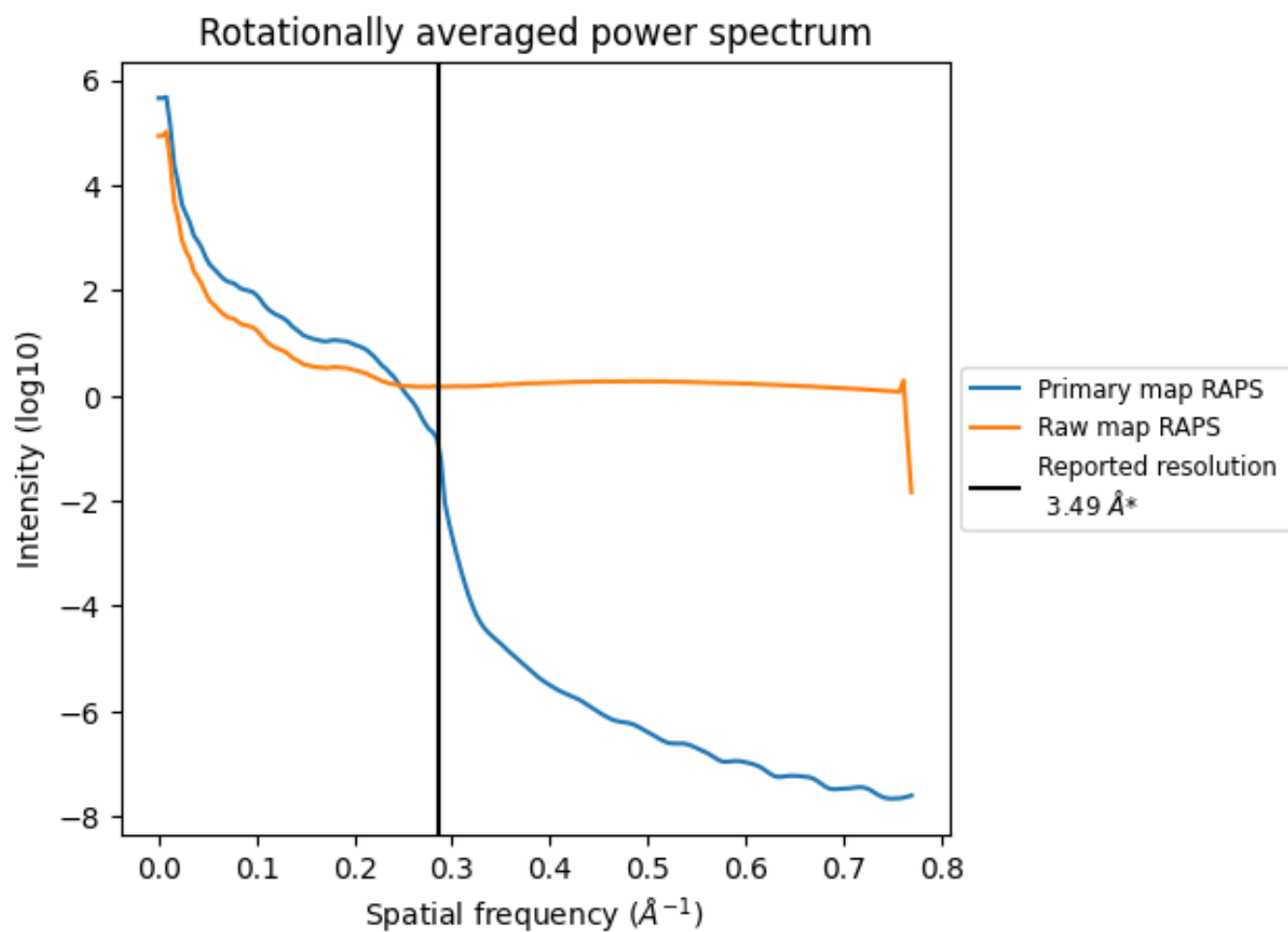
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 154 nm³; this corresponds to an approximate mass of 139 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 [\(i\)](#)

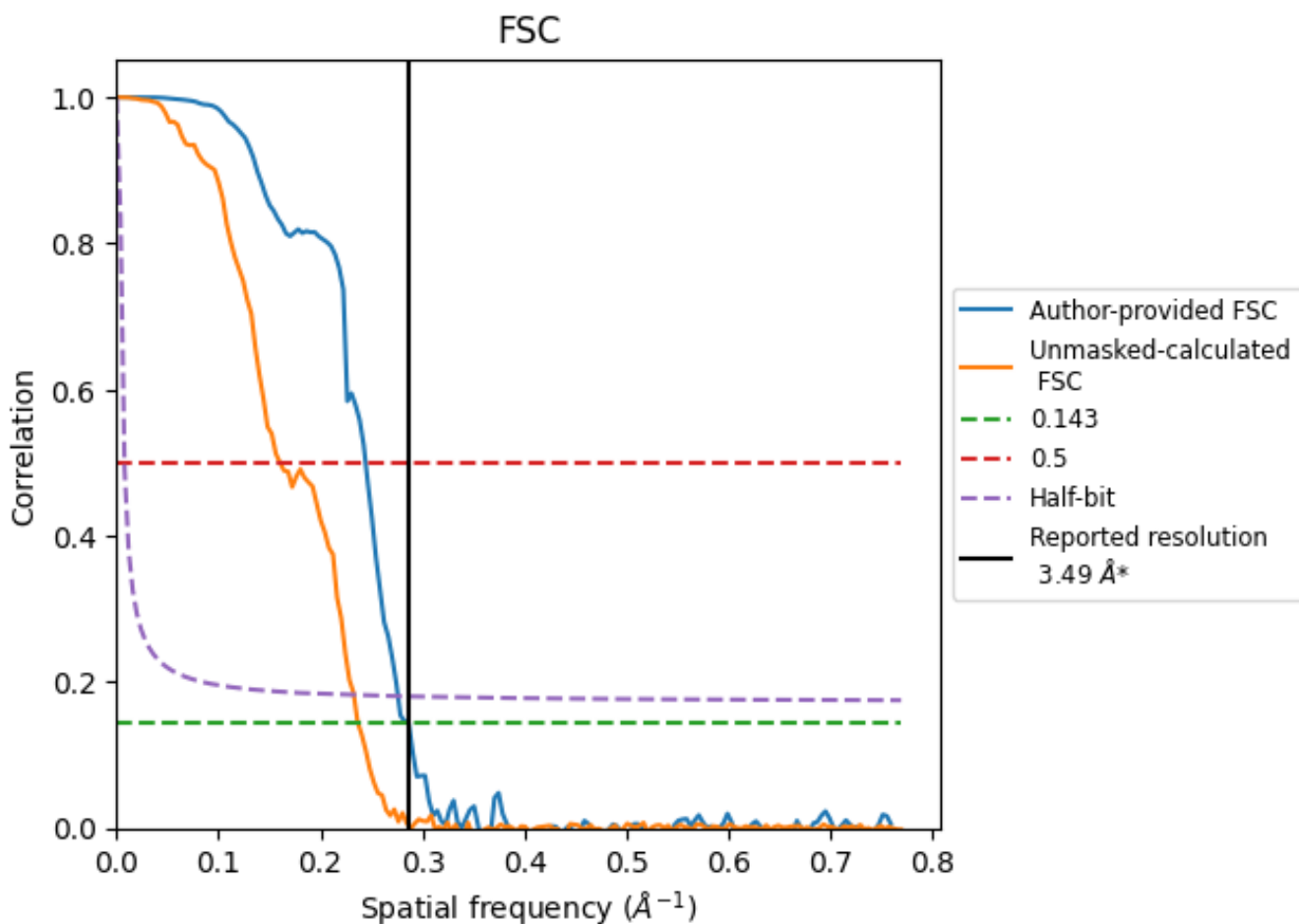


*Reported resolution corresponds to spatial frequency of 0.287 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.287 \AA^{-1}

8.2 Resolution estimates [i](#)

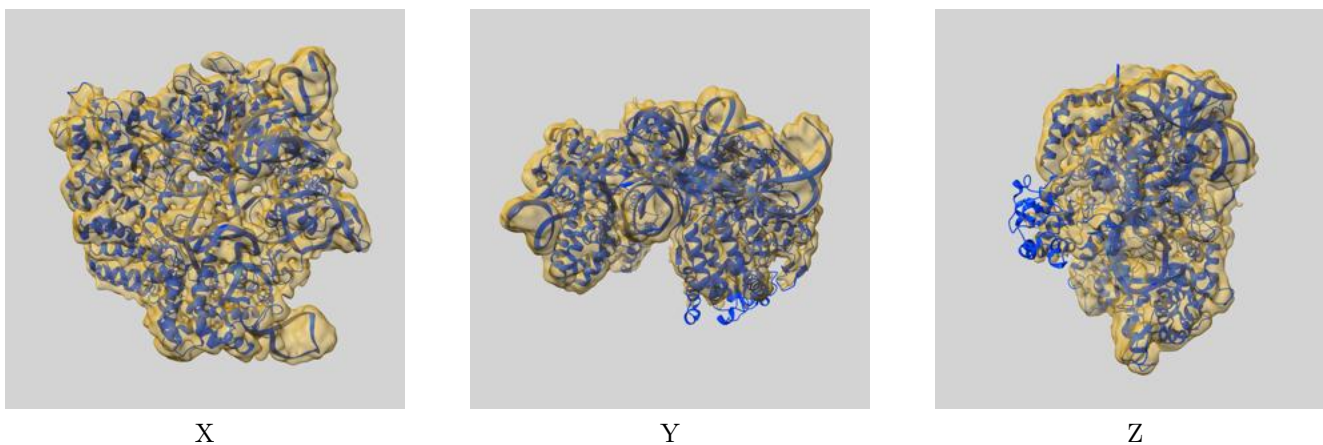
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.49	-	-
Author-provided FSC curve	3.49	4.09	3.62
Unmasked-calculated*	4.22	6.24	4.30

*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 4.22 differs from the reported value 3.49 by more than 10 %

9 Map-model fit [i](#)

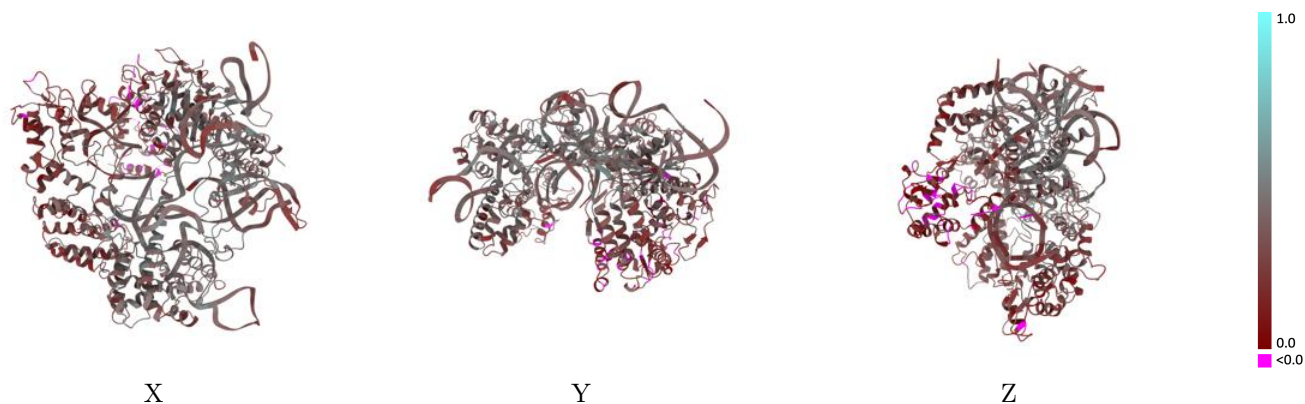
This section contains information regarding the fit between EMDB map EMD-14497 and PDB model 7Z4H. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



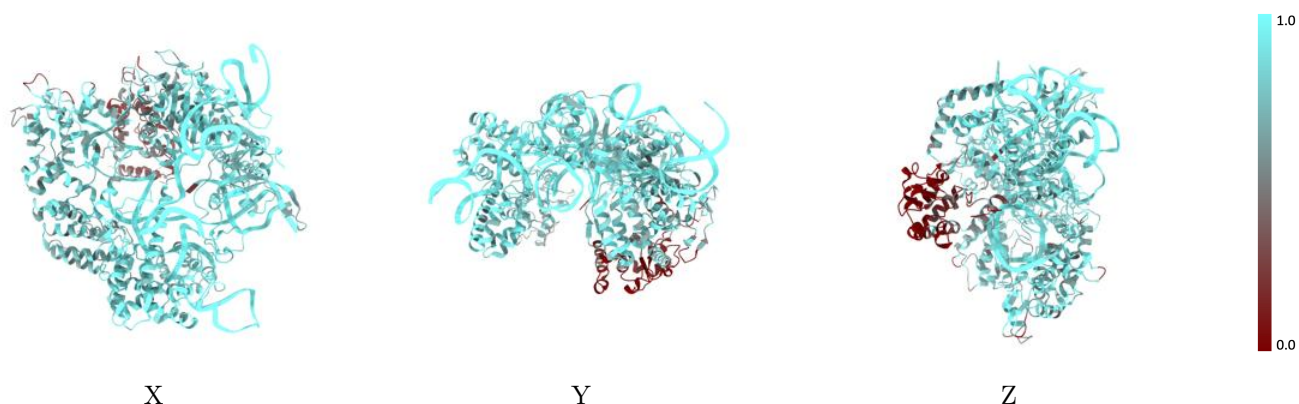
The images above show the 3D surface view of the map at the recommended contour level 0.034 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



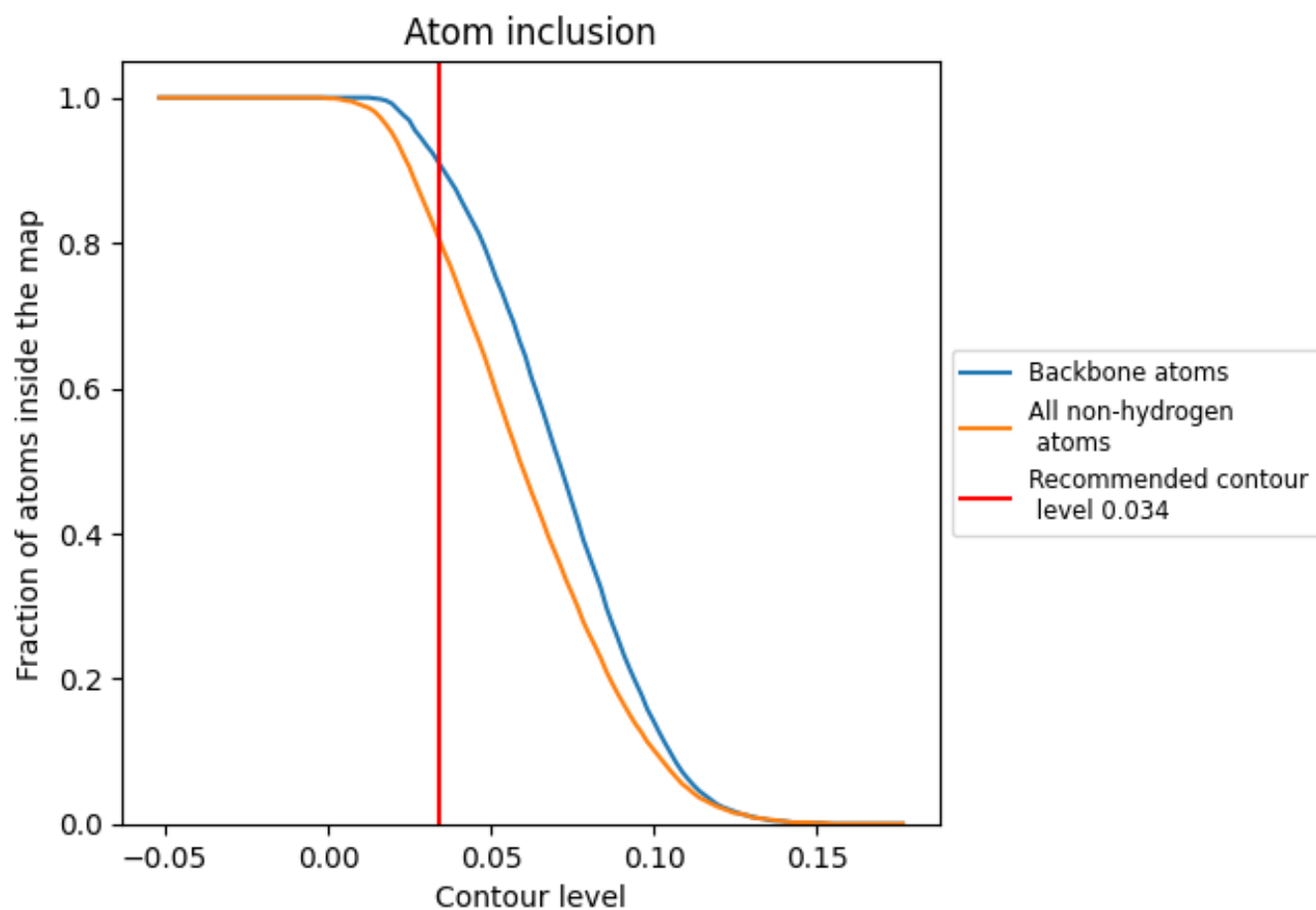
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.034).



9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 81% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.034) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8060	 0.3220
A	 0.9930	 0.3860
B	 0.7590	 0.3100
C	 0.9730	 0.3580
D	 0.8870	 0.2890

