



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2026 – 05:46 AM UTC

PDB ID : 5LMQ / pdb_00005lmq
EMDB ID : EMD-4076
Title : Structure of bacterial 30S-IF1-IF3-mRNA-tRNA translation pre-initiation complex, open form (state-2A)
Authors : Hussain, T.; Llacer, J.L.; Wimberly, B.T.; Ramakrishnan, V.
Deposited on : 2016-08-01
Resolution : 4.20 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at
<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

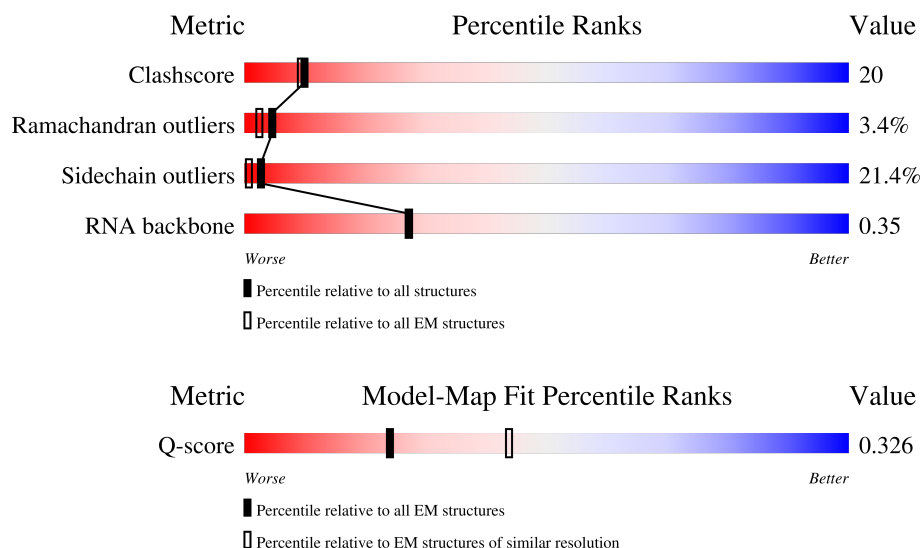
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.20 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.



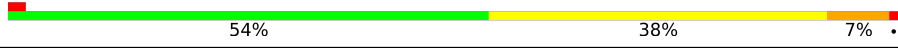
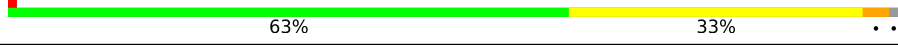
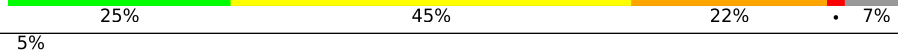
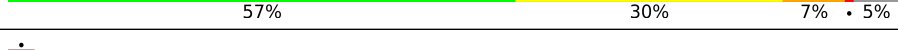
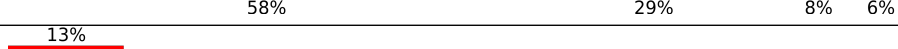
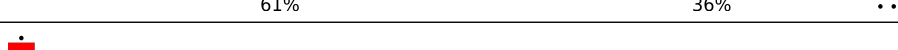
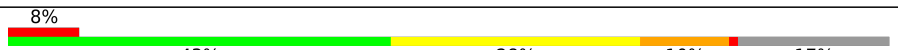
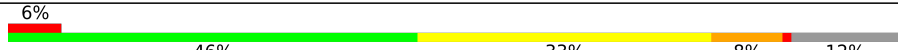
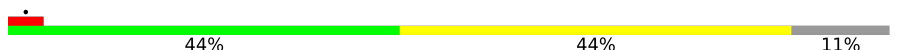
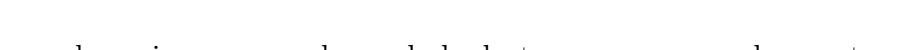
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	5410 (3.70 - 4.70)

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	1522	
2	B	256	
3	C	239	

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Mol	Chain	Length	Quality of chain
4	D	209	
5	E	162	
6	F	101	
7	G	156	
8	H	138	
9	I	128	
10	J	105	
11	K	129	
12	L	132	
13	M	126	
14	N	61	
15	O	89	
16	P	88	
17	Q	105	
18	R	88	
19	S	93	
20	T	106	
21	V	27	
22	W	72	
23	X	171	
24	Y	42	
25	Z	77	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
27	ZN	D	300	-	-	X	-

2 Entry composition

There are 27 unique types of molecules in this entry. The entry contains 55841 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 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1514	Total	C	N	O	P	0	0
			32522	14481	6019	10512	1510		

- Molecule 2 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	234	Total	C	N	O	S	0	0
			1900	1213	341	341	5		

- Molecule 3 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	206	Total	C	N	O	S	0	0
			1612	1016	314	281	1		

- Molecule 4 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	208	Total	C	N	O	S	0	0
			1703	1066	339	291	7		

- Molecule 5 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	150	Total	C	N	O	S	0	0
			1146	724	217	201	4		

- Molecule 6 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	101	Total	C	N	O	S	0	0
			843	531	155	154	3		

- Molecule 7 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	155	Total	C	N	O	S	0	0
			1257	781	252	218	6		

- Molecule 8 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	138	Total	C	N	O	S	0	0
			1116	705	215	193	3		

- Molecule 9 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	I	127	Total	C	N	O	0	0
			1010	639	197	174		

- Molecule 10 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	98	Total	C	N	O	S	0	0
			792	498	156	137	1		

- Molecule 11 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	122	Total	C	N	O	S	0	0
			906	563	172	168	3		

- Molecule 12 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	124	Total	C	N	O	S	0	0
			970	611	195	163	1		

- Molecule 13 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	125	Total	C	N	O	S	0	0
			997	617	207	171	2		

- Molecule 14 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	60	Total	C	N	O	S	0	0
			492	312	104	72	4		

- Molecule 15 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	88	Total	C	N	O	S	0	0
			734	459	147	126	2		

- Molecule 16 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	83	Total	C	N	O	S	0	0
			700	443	139	117	1		

- Molecule 17 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	99	Total	C	N	O	S	0	0
			823	528	151	142	2		

- Molecule 18 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	73	Total	C	N	O		0	0
			598	381	118	99			

- Molecule 19 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	82	Total	C	N	O	S	0	0
			655	419	120	114	2		

- Molecule 20 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	99	Total	C	N	O	S	0	0
			763	470	162	129	2		

- Molecule 21 is a protein called 30S ribosomal protein Thx.

Mol	Chain	Residues	Atoms				AltConf	Trace
21	V	24	Total	C	N	O	0	0
			208	128	50	30		

- Molecule 22 is a protein called Translation initiation factor IF-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	W	71	Total	C	N	O	S	0	0
			570	362	103	103	2		

- Molecule 23 is a protein called Translation initiation factor IF-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	X	168	Total	C	N	O	S	0	0
			1356	853	249	245	9		

- Molecule 24 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	Y	21	Total	C	N	O	P	0	0
			459	205	91	142	21		

- Molecule 25 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
25	Z	77	Total	C	N	O	P	S	0	0
			1643	735	297	534	76	1		

- Molecule 26 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
26	A	63	Total	Mg	0
			63	63	
26	W	1	Total	Mg	0
			1	1	

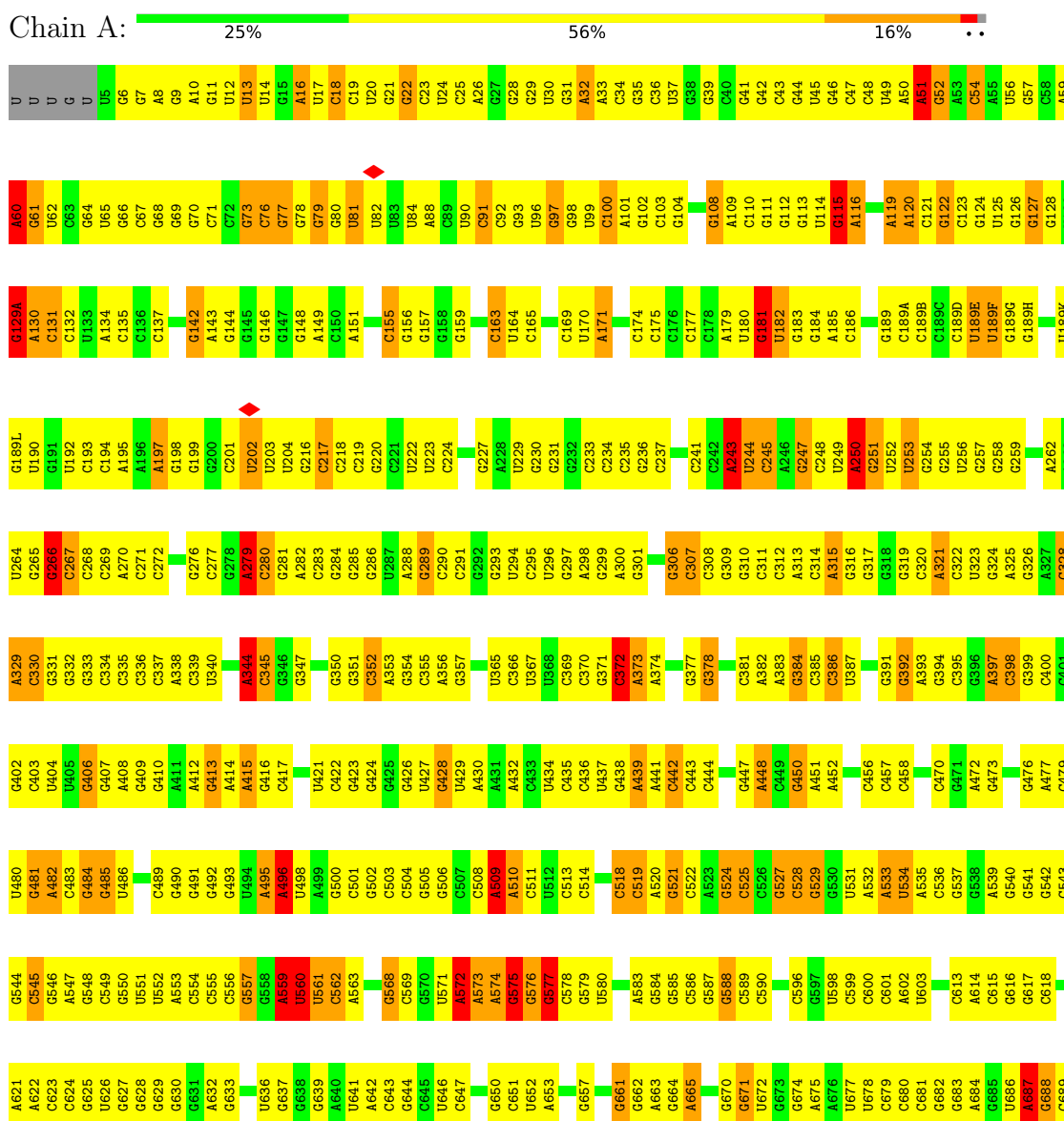
- Molecule 27 is ZINC ION (CCD ID: ZN) (formula: Zn).

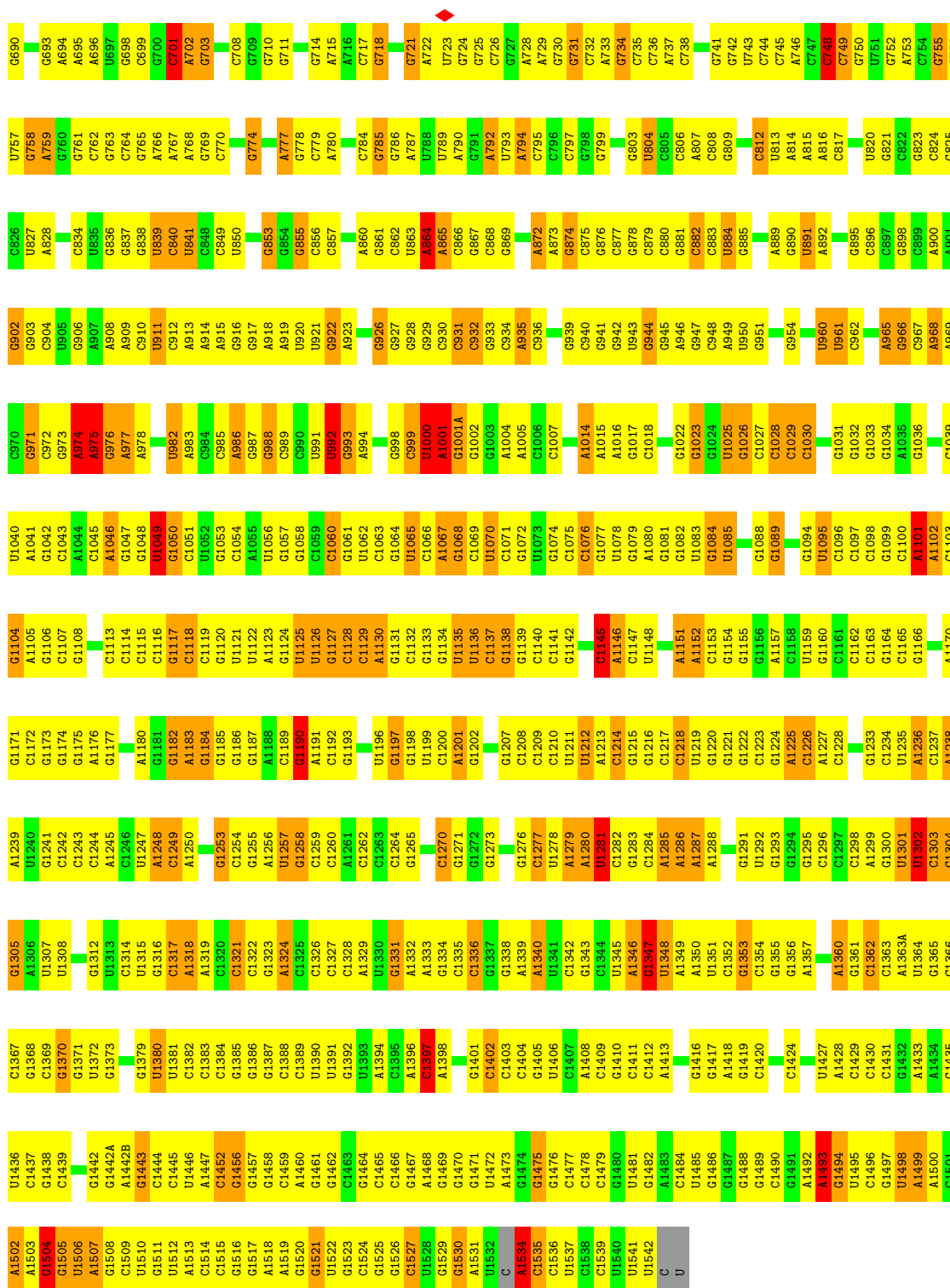
Mol	Chain	Residues	Atoms		AltConf
27	D	1	Total	Zn	0
			1	1	
27	N	1	Total	Zn	0
			1	1	

3 Residue-property plots

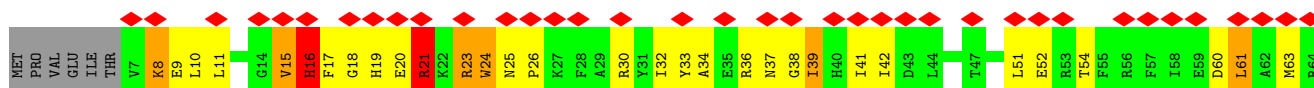
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

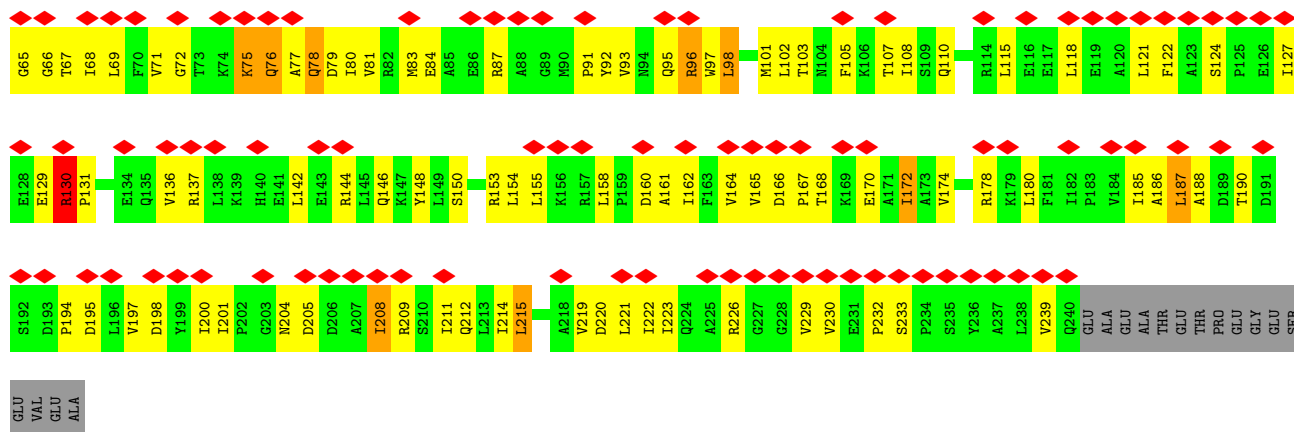
• Molecule 1: 16S rRNA



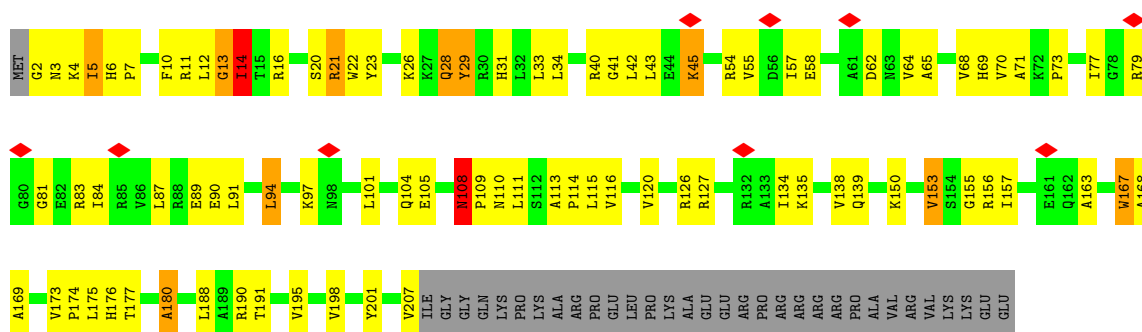


• Molecule 2: 30S ribosomal protein S2

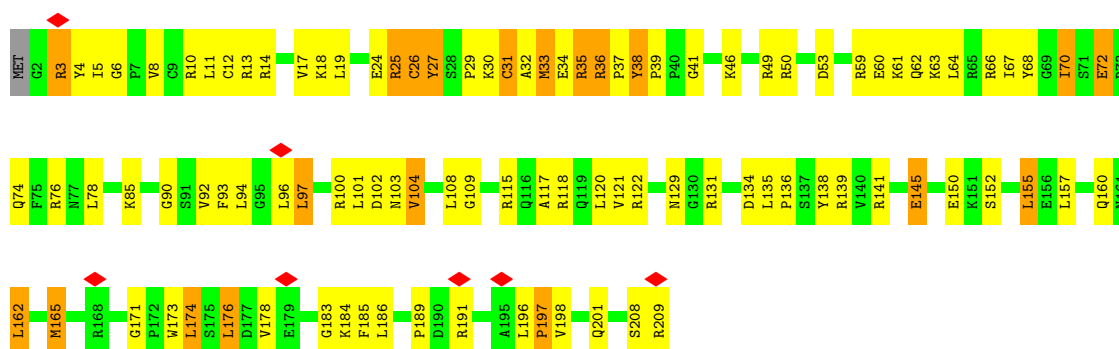




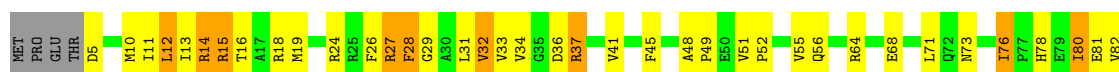
• Molecule 3: 30S ribosomal protein S3

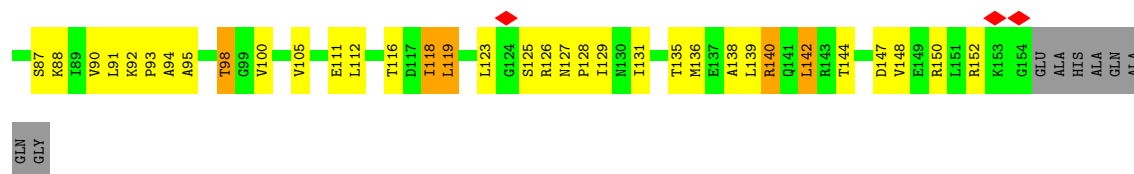


• Molecule 4: 30S ribosomal protein S4



• Molecule 5: 30S ribosomal protein S5





• Molecule 6: 30S ribosomal protein S6



• Molecule 7: 30S ribosomal protein S7



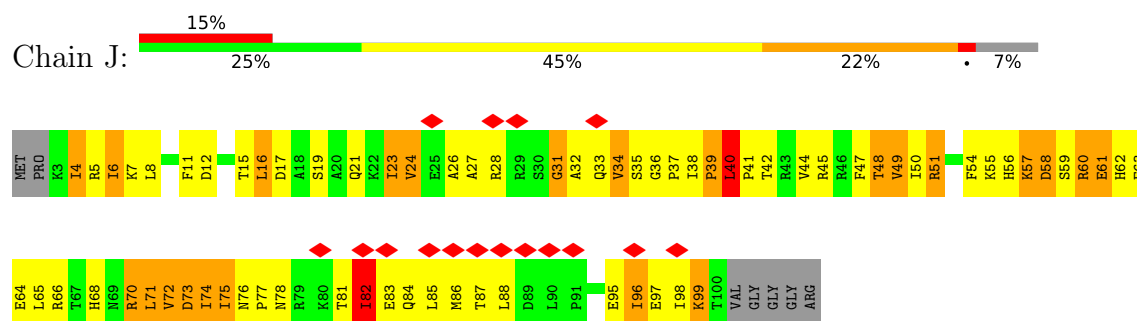
• Molecule 8: 30S ribosomal protein S8



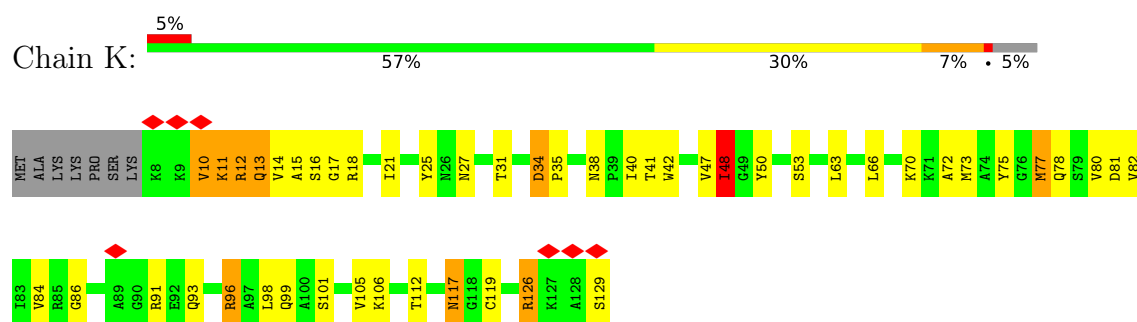
• Molecule 9: 30S ribosomal protein S9



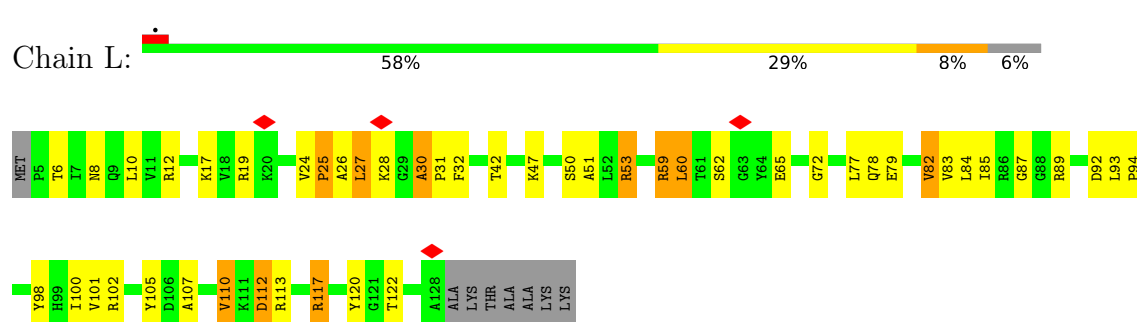
- Molecule 10: 30S ribosomal protein S10



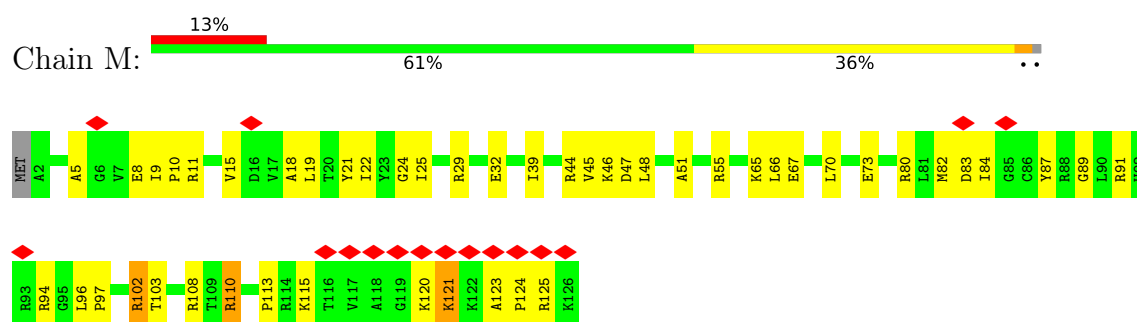
- Molecule 11: 30S ribosomal protein S11



- Molecule 12: 30S ribosomal protein S12

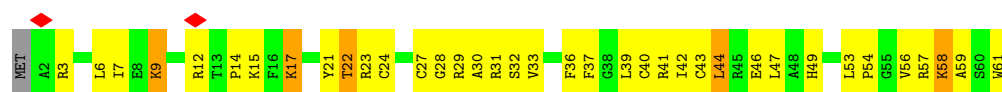


- Molecule 13: 30S ribosomal protein S13

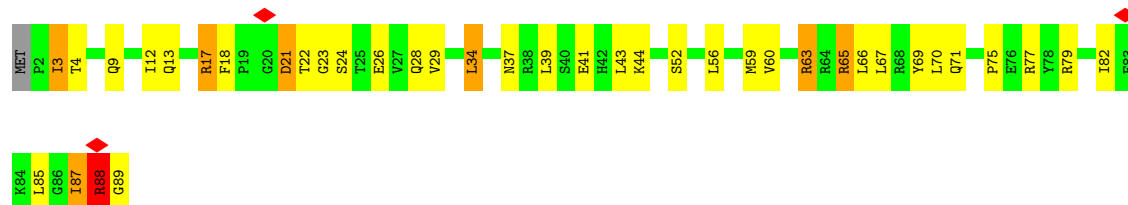


- Molecule 14: 30S ribosomal protein S14 type Z

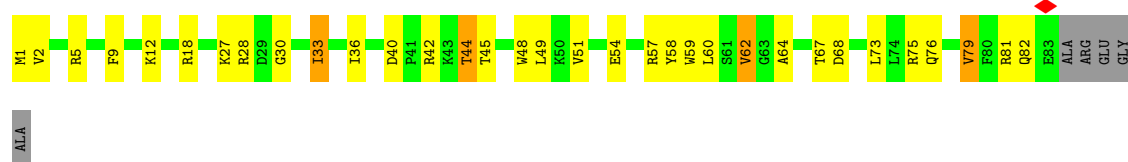




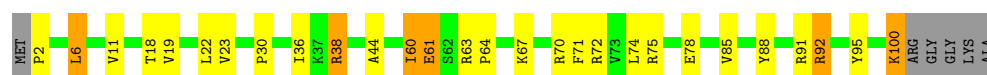
- Molecule 15: 30S ribosomal protein S15



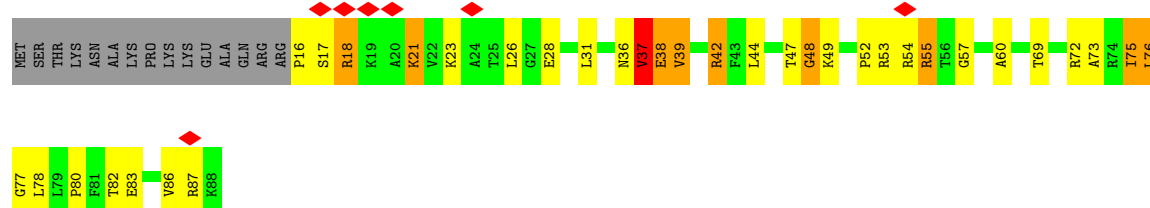
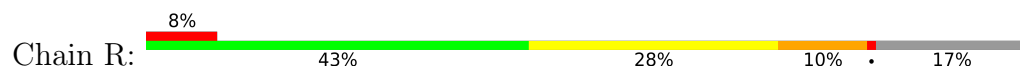
- Molecule 16: 30S ribosomal protein S16



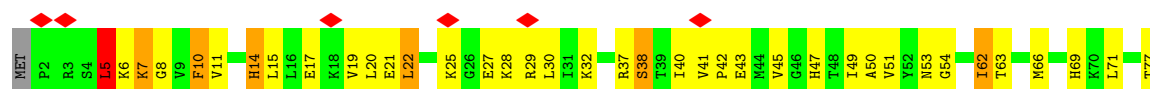
- Molecule 17: 30S ribosomal protein S17

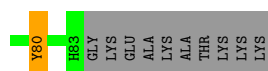


- Molecule 18: 30S ribosomal protein S18

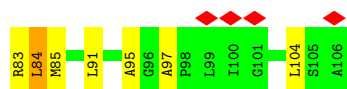


- Molecule 19: 30S ribosomal protein S19

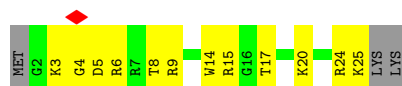




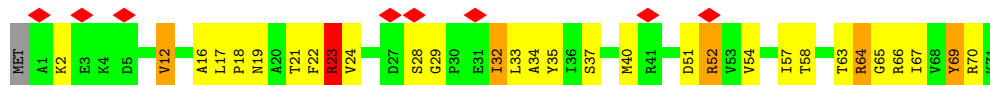
- Molecule 20: 30S ribosomal protein S20



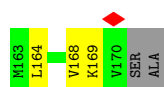
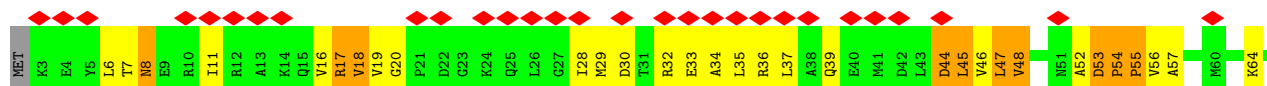
- Molecule 21: 30S ribosomal protein Thx



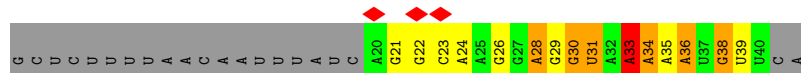
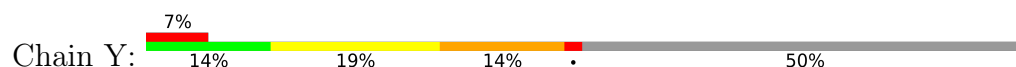
- Molecule 22: Translation initiation factor IF-1



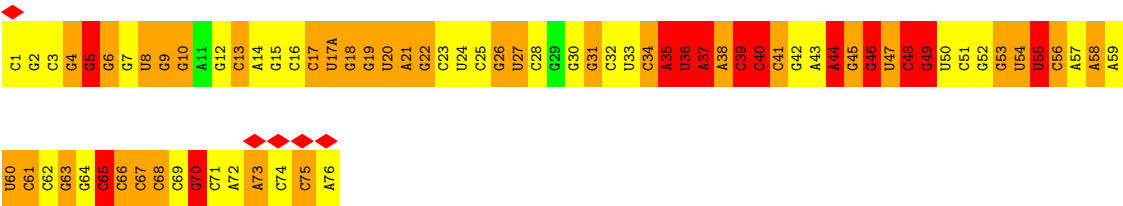
- Molecule 23: Translation initiation factor IF-3



- Molecule 24: mRNA



• Molecule 25: tRNA



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	31888	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	30	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	104478	Depositor
Image detector	OTHER	Depositor
Maximum map value	0.532	Depositor
Minimum map value	-0.139	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.023	Depositor
Recommended contour level	0.075	Depositor
Map size ($\text{\AA}$)	348.4, 348.4, 348.4	wwPDB
Map dimensions	260, 260, 260	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.34, 1.34, 1.34	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 4SU, MG, PSU, OMC, G7M, 5MU, ZN

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	0.46	2/36394 (0.0%)	0.85	93/56779 (0.2%)
2	B	0.77	0/1935	1.21	7/2609 (0.3%)
3	C	0.62	0/1636	1.19	7/2205 (0.3%)
4	D	0.58	0/1733	1.19	9/2318 (0.4%)
5	E	0.59	0/1162	1.18	6/1564 (0.4%)
6	F	0.57	0/856	1.14	6/1154 (0.5%)
7	G	0.57	0/1276	1.14	1/1709 (0.1%)
8	H	0.55	0/1136	1.08	3/1527 (0.2%)
9	I	0.60	0/1029	1.10	1/1379 (0.1%)
10	J	0.73	0/805	1.13	6/1082 (0.6%)
11	K	0.64	0/921	1.17	4/1241 (0.3%)
12	L	0.57	0/986	1.05	3/1320 (0.2%)
13	M	0.70	0/1008	1.23	3/1347 (0.2%)
14	N	0.55	0/501	1.03	0/664
15	O	0.62	0/745	1.25	1/992 (0.1%)
16	P	0.52	0/716	1.00	1/963 (0.1%)
17	Q	0.53	0/836	1.03	0/1117
18	R	0.64	0/604	1.13	1/801 (0.1%)
19	S	0.75	0/670	1.16	2/903 (0.2%)
20	T	0.65	0/765	1.32	1/1007 (0.1%)
21	V	0.54	0/212	1.01	1/277 (0.4%)
22	W	0.71	0/580	1.40	7/782 (0.9%)
23	X	0.76	0/1375	1.25	7/1844 (0.4%)
24	Y	0.60	0/516	0.99	2/804 (0.2%)
25	Z	0.65	2/1718 (0.1%)	1.07	17/2678 (0.6%)
All	All	0.54	4/60115 (0.0%)	0.97	189/89066 (0.2%)

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
2	B	0	2
8	H	0	1
12	L	0	1
23	X	0	2
All	All	0	6

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	Z	8	4SU	O3'-P	8.43	1.64	1.56
25	Z	46	G7M	O3'-P	7.77	1.64	1.56
1	A	1001	A	O3'-P	-6.75	1.53	1.61
1	A	999	C	O3'-P	-5.59	1.52	1.61

The worst 5 of 189 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
22	W	23	ARG	N-CA-C	-15.49	83.74	109.46
1	A	575	G	C2'-C3'-O3'	11.71	127.07	109.50
3	C	14	ILE	N-CA-C	11.49	121.45	110.42
1	A	1301	U	C2'-C3'-O3'	10.68	125.52	109.50
22	W	23	ARG	CB-CA-C	-10.23	93.02	109.80

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	11	LEU	Peptide
2	B	130	ARG	Peptide
8	H	2	LEU	Peptide
12	L	112	ASP	Peptide
23	X	53	ASP	Peptide

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	32522	0	16435	1114	0
2	B	1900	0	1951	58	0
3	C	1612	0	1677	82	0
4	D	1703	0	1765	80	0
5	E	1146	0	1207	75	0
6	F	843	0	857	19	0
7	G	1257	0	1296	27	0
8	H	1116	0	1177	17	0
9	I	1010	0	1037	49	0
10	J	792	0	835	87	0
11	K	906	0	928	22	0
12	L	970	0	1057	22	0
13	M	997	0	1072	28	0
14	N	492	0	530	46	0
15	O	734	0	771	20	0
16	P	700	0	720	19	0
17	Q	823	0	891	20	0
18	R	598	0	670	25	0
19	S	655	0	672	18	0
20	T	763	0	861	22	0
21	V	208	0	221	7	0
22	W	570	0	599	24	0
23	X	1356	0	1401	33	0
24	Y	459	0	228	15	0
25	Z	1643	0	844	129	0
26	A	63	0	0	0	0
26	W	1	0	0	0	0
27	D	1	0	0	4	0
27	N	1	0	0	0	0
All	All	55841	0	39702	1853	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 20.

The worst 5 of 1853 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:1080:A:H4'	5:E:16:THR:CG2	1.32	1.59
1:A:1080:A:C5'	5:E:16:THR:HG21	1.42	1.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:247:G:OP2	17:Q:100:LYS:CG	1.64	1.44
10:J:61:GLU:CD	14:N:58:LYS:HD3	1.39	1.44
1:A:1080:A:C4'	5:E:16:THR:CG2	2.00	1.40

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	
2	B	232/256 (91%)	187 (81%)	33 (14%)	12 (5%)	1	16
3	C	204/239 (85%)	176 (86%)	20 (10%)	8 (4%)	2	19
4	D	206/209 (99%)	185 (90%)	14 (7%)	7 (3%)	3	21
5	E	148/162 (91%)	134 (90%)	12 (8%)	2 (1%)	9	39
6	F	99/101 (98%)	90 (91%)	7 (7%)	2 (2%)	6	32
7	G	153/156 (98%)	134 (88%)	15 (10%)	4 (3%)	4	26
8	H	136/138 (99%)	122 (90%)	11 (8%)	3 (2%)	5	29
9	I	125/128 (98%)	106 (85%)	16 (13%)	3 (2%)	4	28
10	J	96/105 (91%)	74 (77%)	14 (15%)	8 (8%)	0	9
11	K	120/129 (93%)	100 (83%)	14 (12%)	6 (5%)	1	16
12	L	122/132 (92%)	99 (81%)	19 (16%)	4 (3%)	3	21
13	M	123/126 (98%)	105 (85%)	15 (12%)	3 (2%)	4	28
14	N	58/61 (95%)	49 (84%)	6 (10%)	3 (5%)	1	16
15	O	86/89 (97%)	79 (92%)	6 (7%)	1 (1%)	10	42
16	P	81/88 (92%)	73 (90%)	8 (10%)	0	100	100
17	Q	97/105 (92%)	87 (90%)	9 (9%)	1 (1%)	12	47
18	R	71/88 (81%)	64 (90%)	4 (6%)	3 (4%)	2	18

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	S	80/93 (86%)	59 (74%)	17 (21%)	4 (5%)	1	16
20	T	97/106 (92%)	84 (87%)	8 (8%)	5 (5%)	1	16
21	V	22/27 (82%)	19 (86%)	3 (14%)	0	100	100
22	W	69/72 (96%)	61 (88%)	6 (9%)	2 (3%)	3	24
23	X	166/171 (97%)	143 (86%)	15 (9%)	8 (5%)	2	17
All	All	2591/2781 (93%)	2230 (86%)	272 (10%)	89 (3%)	4	21

5 of 89 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	21	ARG
2	B	24	TRP
4	D	37	PRO
9	I	56	LEU
13	M	113	PRO

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	
2	B	202/220 (92%)	151 (75%)	51 (25%)	0	4
3	C	160/188 (85%)	137 (86%)	23 (14%)	3	15
4	D	180/181 (99%)	139 (77%)	41 (23%)	1	6
5	E	115/123 (94%)	81 (70%)	34 (30%)	0	2
6	F	90/90 (100%)	67 (74%)	23 (26%)	0	4
7	G	126/127 (99%)	108 (86%)	18 (14%)	3	16
8	H	119/119 (100%)	82 (69%)	37 (31%)	0	2
9	I	98/99 (99%)	81 (83%)	17 (17%)	2	12
10	J	87/92 (95%)	62 (71%)	25 (29%)	0	2
11	K	92/99 (93%)	72 (78%)	20 (22%)	1	6
12	L	104/109 (95%)	82 (79%)	22 (21%)	1	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
13	M	100/101 (99%)	86 (86%)	14 (14%)	3	16
14	N	49/50 (98%)	39 (80%)	10 (20%)	1	8
15	O	79/80 (99%)	58 (73%)	21 (27%)	0	3
16	P	72/74 (97%)	57 (79%)	15 (21%)	1	7
17	Q	94/97 (97%)	83 (88%)	11 (12%)	5	20
18	R	64/77 (83%)	50 (78%)	14 (22%)	1	6
19	S	71/80 (89%)	55 (78%)	16 (22%)	1	6
20	T	76/82 (93%)	56 (74%)	20 (26%)	0	3
21	V	19/22 (86%)	15 (79%)	4 (21%)	1	7
22	W	62/63 (98%)	50 (81%)	12 (19%)	1	9
23	X	145/150 (97%)	121 (83%)	24 (17%)	2	12
All	All	2204/2323 (95%)	1732 (79%)	472 (21%)	3	6

5 of 472 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
9	I	48	GLU
22	W	54	VAL
11	K	106	LYS
22	W	21	THR
19	S	17	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 37 such sidechains are listed below:

Mol	Chain	Res	Type
15	O	50	HIS
23	X	70	GLN
19	S	14	HIS
19	S	69	HIS
5	E	73	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1507/1522 (99%)	404 (26%)	107 (7%)
24	Y	20/42 (47%)	8 (40%)	2 (10%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
25	Z	76/77 (98%)	52 (68%)	9 (11%)
All	All	1603/1641 (97%)	464 (28%)	118 (7%)

5 of 464 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	6	G
1	A	7	G
1	A	8	A
1	A	9	G
1	A	13	U

5 of 118 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	965	A
25	Z	35	A
1	A	1139	G
25	Z	26	G
1	A	1447	A

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

5 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
25	G7M	Z	46	25	23,26,27	2.49	6 (26%)	34,39,42	3.01	12 (35%)
25	OMC	Z	32	25	19,22,23	0.96	2 (10%)	25,31,34	1.26	3 (12%)
25	PSU	Z	55	25	18,21,22	1.50	2 (11%)	21,30,33	2.16	5 (23%)
25	4SU	Z	8	25	18,21,22	1.77	4 (22%)	25,30,33	2.30	8 (32%)
25	5MU	Z	54	25	19,22,23	1.60	4 (21%)	27,32,35	1.80	8 (29%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
25	G7M	Z	46	25	-	2/7/25/26	0/3/3/3
25	OMC	Z	32	25	-	0/9/27/28	0/2/2/2
25	PSU	Z	55	25	-	3/7/25/26	0/2/2/2
25	4SU	Z	8	25	-	0/7/25/26	0/2/2/2
25	5MU	Z	54	25	-	0/7/25/26	0/2/2/2

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	Z	46	G7M	C8-N7	7.52	1.45	1.33
25	Z	55	PSU	C6-C5	5.04	1.40	1.35
25	Z	46	G7M	C8-N9	4.71	1.48	1.35
25	Z	46	G7M	C5-C4	4.56	1.49	1.38
25	Z	8	4SU	C4-S4	-4.55	1.60	1.68

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
25	Z	46	G7M	CN7-N7-C8	-8.28	112.25	124.79
25	Z	46	G7M	N9-C8-N7	-6.13	97.61	112.48
25	Z	46	G7M	N9-C4-N3	6.04	138.03	125.95
25	Z	46	G7M	C8-N7-C5	6.02	115.31	107.78
25	Z	55	PSU	N1-C2-N3	5.87	121.36	115.17

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
25	Z	46	G7M	O4'-C4'-C5'-O5'
25	Z	46	G7M	C3'-C4'-C5'-O5'
25	Z	55	PSU	O4'-C4'-C5'-O5'
25	Z	55	PSU	C3'-C4'-C5'-O5'
25	Z	55	PSU	O4'-C1'-C5-C4

There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
25	Z	46	G7M	4	0
25	Z	55	PSU	1	0
25	Z	8	4SU	1	0
25	Z	54	5MU	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 66 ligands modelled in this entry, 66 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	6

The worst 5 of 6 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	84:U	O3'	88:A	P	4.82
1	A	93:G	O3'	96:U	P	4.82
1	A	841:U	O3'	848:C	P	4.25
1	A	204:U	O3'	216:G	P	3.81
1	A	1442(A):G	O3'	1442(B):A	P	3.32

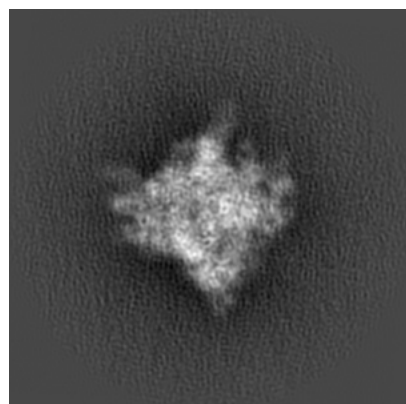
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-4076. These allow visual inspection of the internal detail of the map and identification of artifacts.

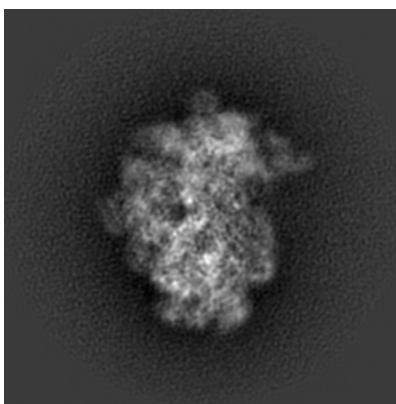
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

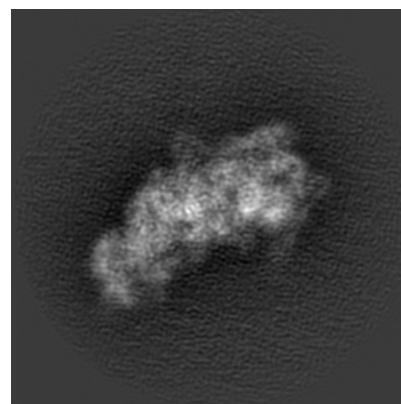
6.1.1 Primary map



X

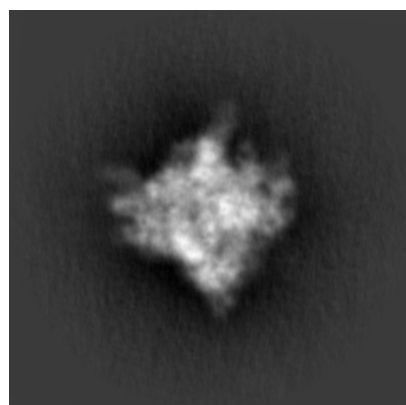


Y

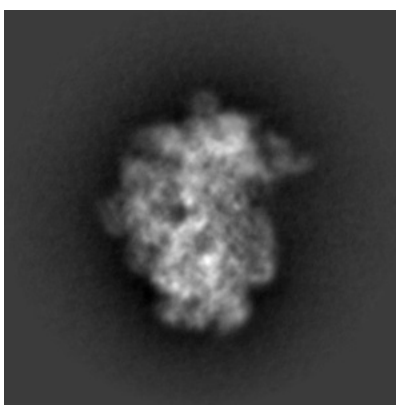


Z

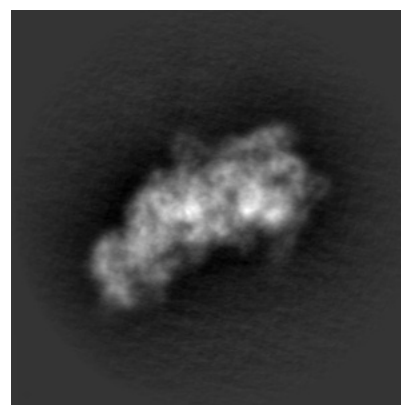
6.1.2 Raw map



X



Y

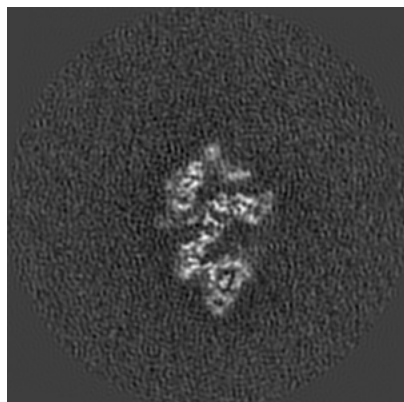


Z

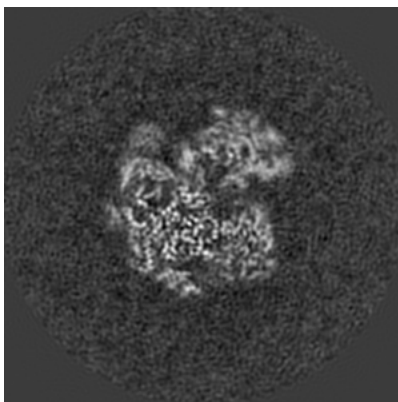
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

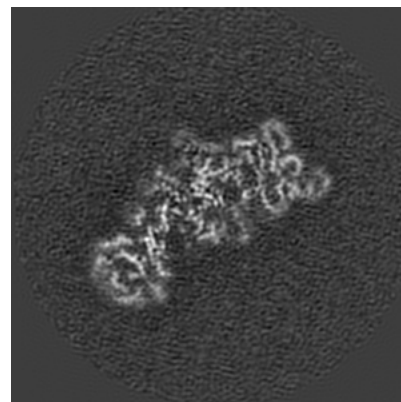
6.2.1 Primary map



X Index: 130

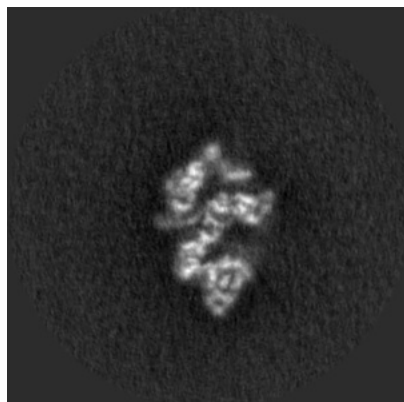


Y Index: 130

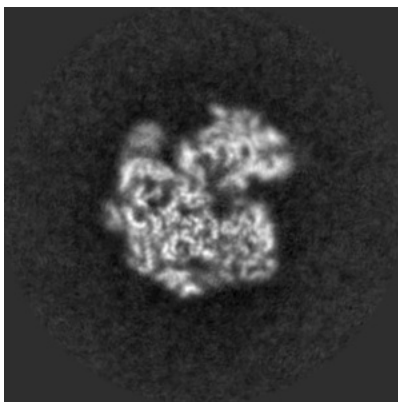


Z Index: 130

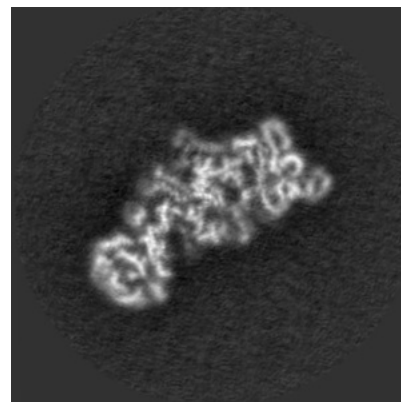
6.2.2 Raw map



X Index: 130



Y Index: 130

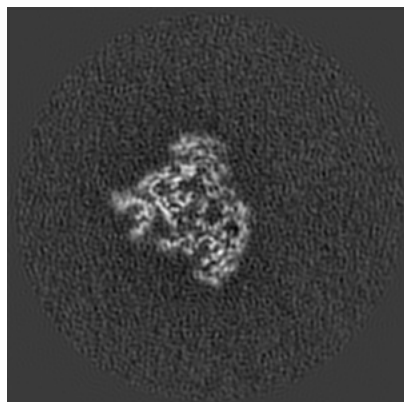


Z Index: 130

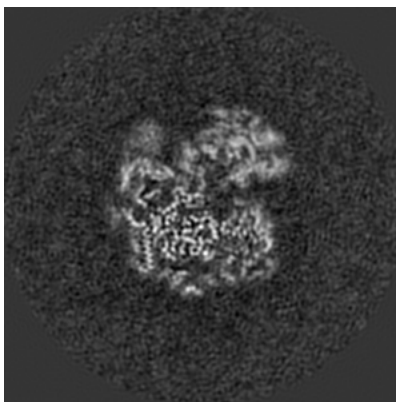
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

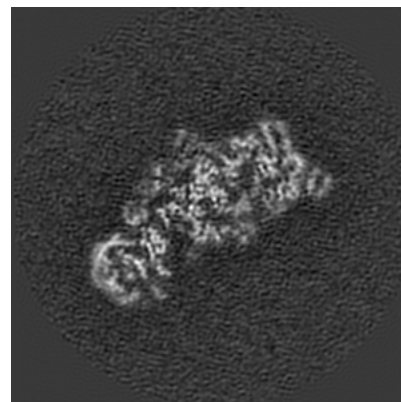
6.3.1 Primary map



X Index: 95

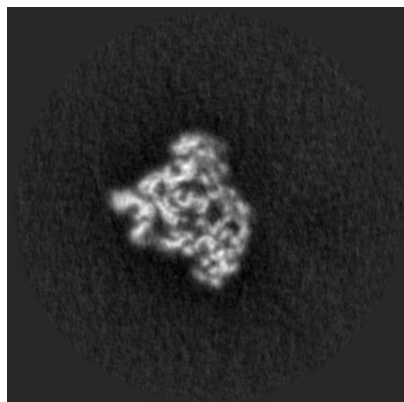


Y Index: 129

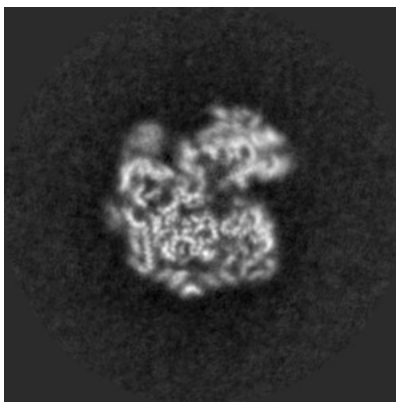


Z Index: 128

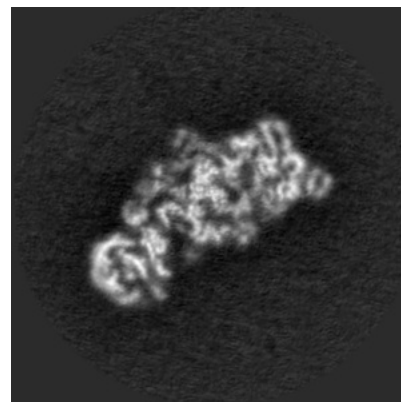
6.3.2 Raw map



X Index: 96



Y Index: 129

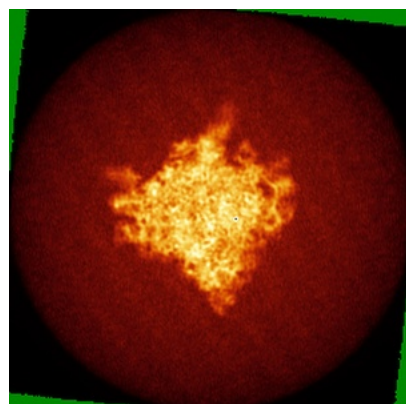


Z Index: 128

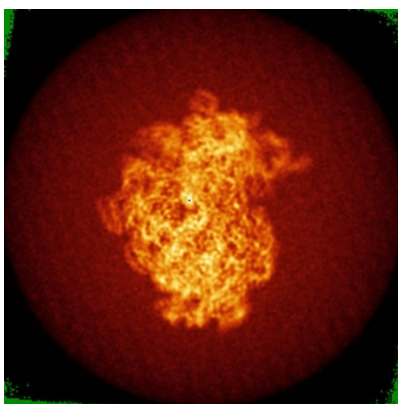
The images above show the largest variance slices of the map in three orthogonal directions.

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

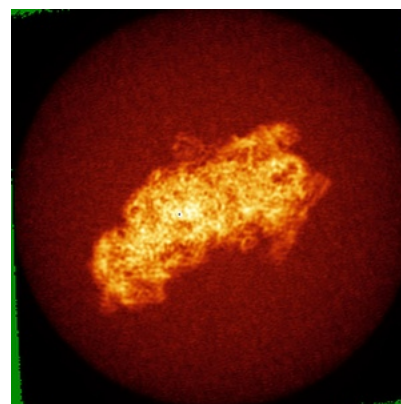
6.4.1 Primary map



X

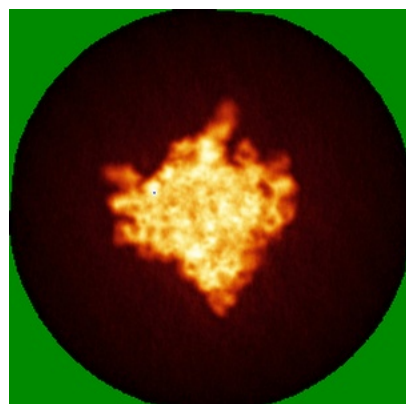


Y



Z

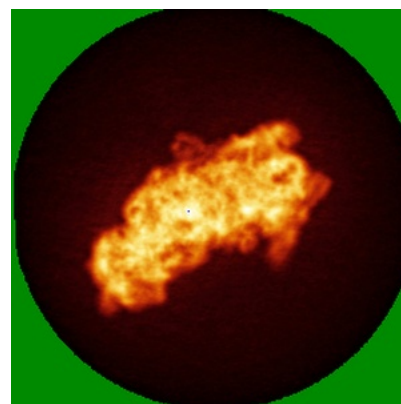
6.4.2 Raw map



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.

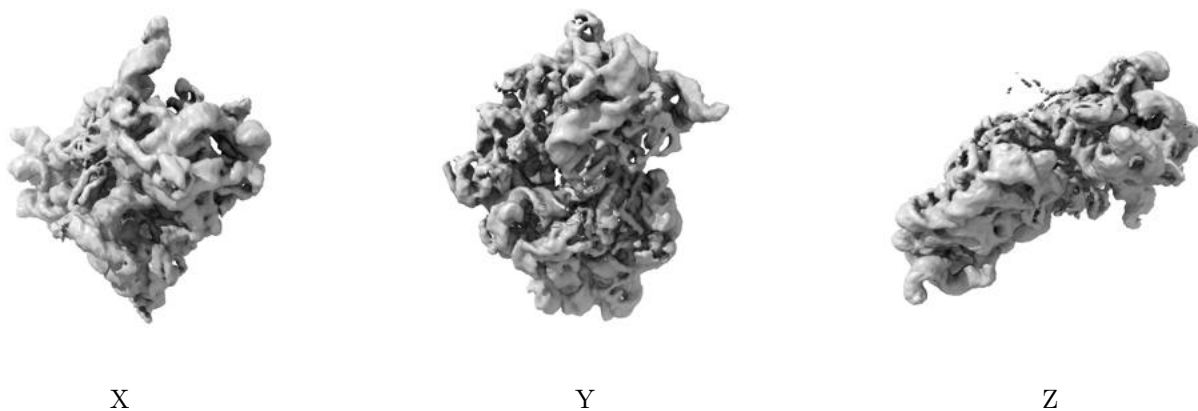
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.075. 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.

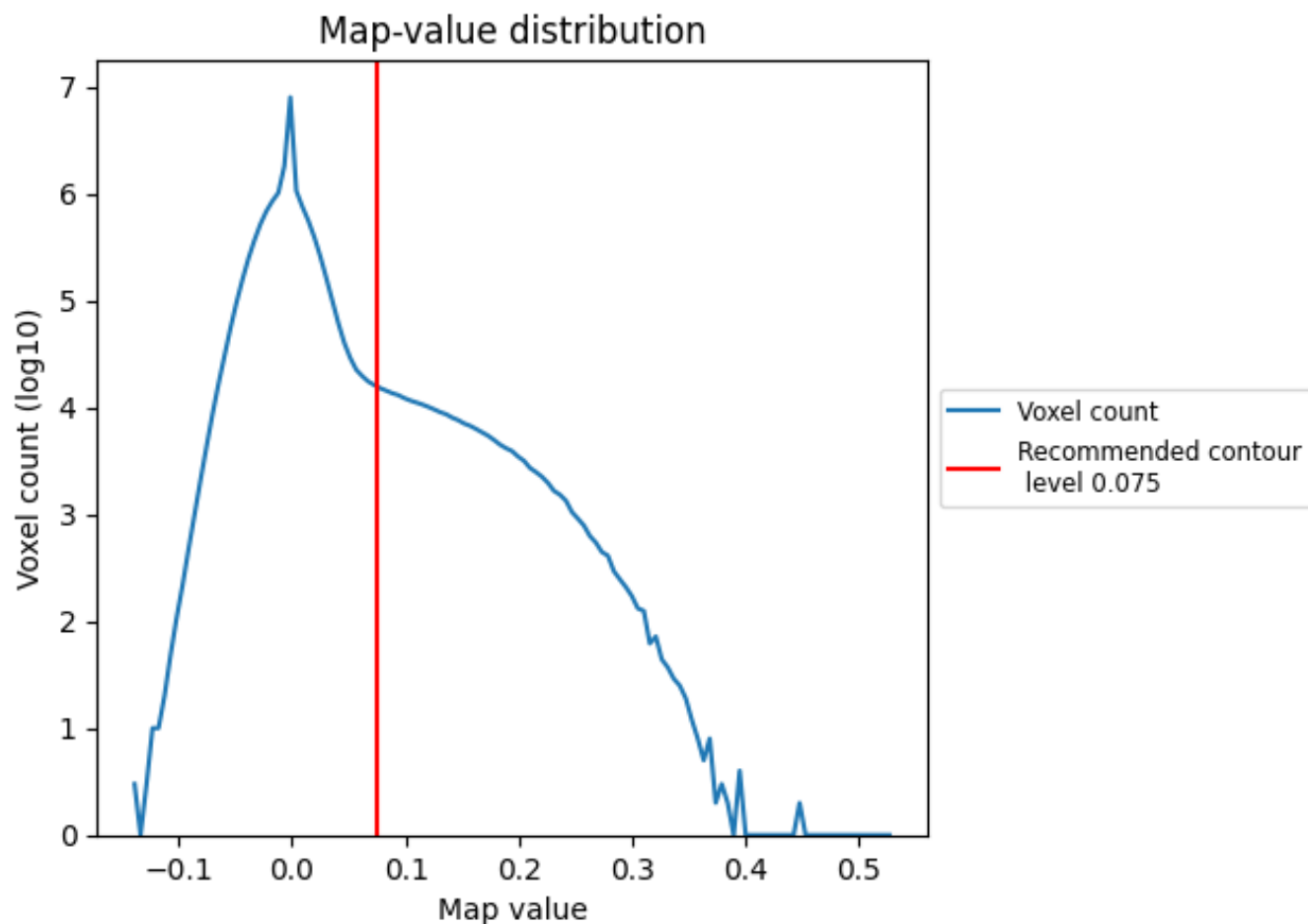
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

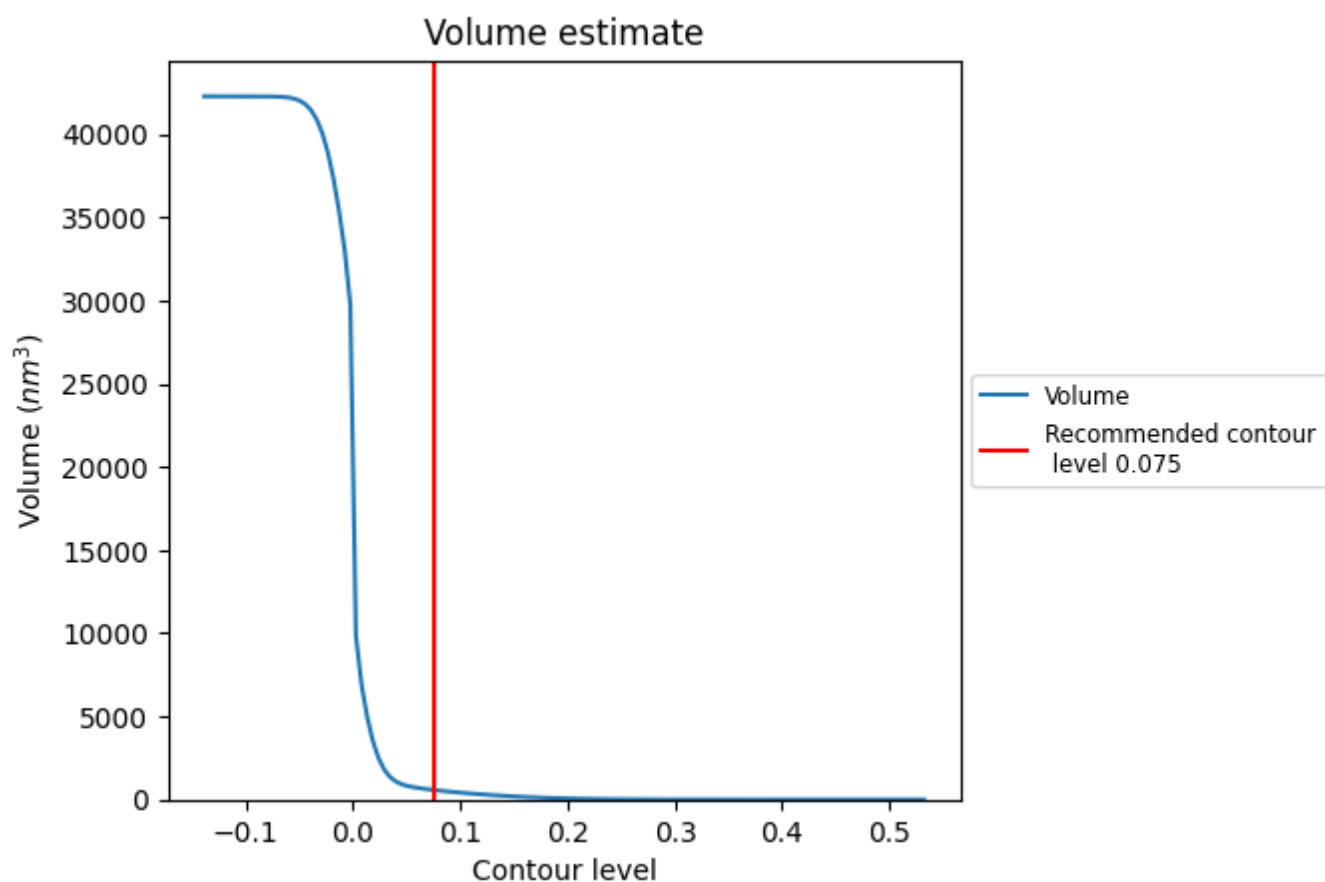
This section contains the results of statistical analysis of the map.

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.

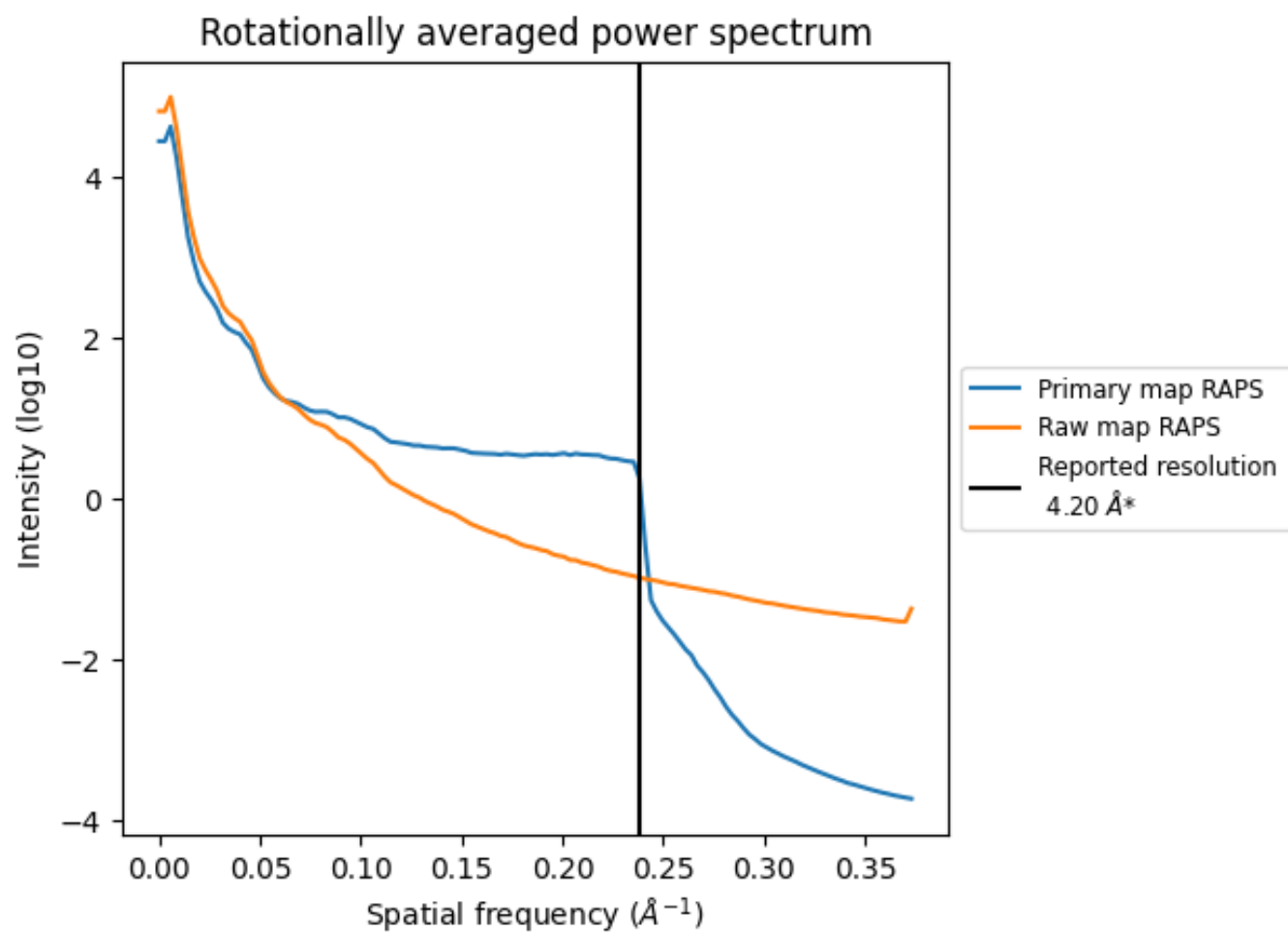
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 575 nm³; this corresponds to an approximate mass of 519 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](#)

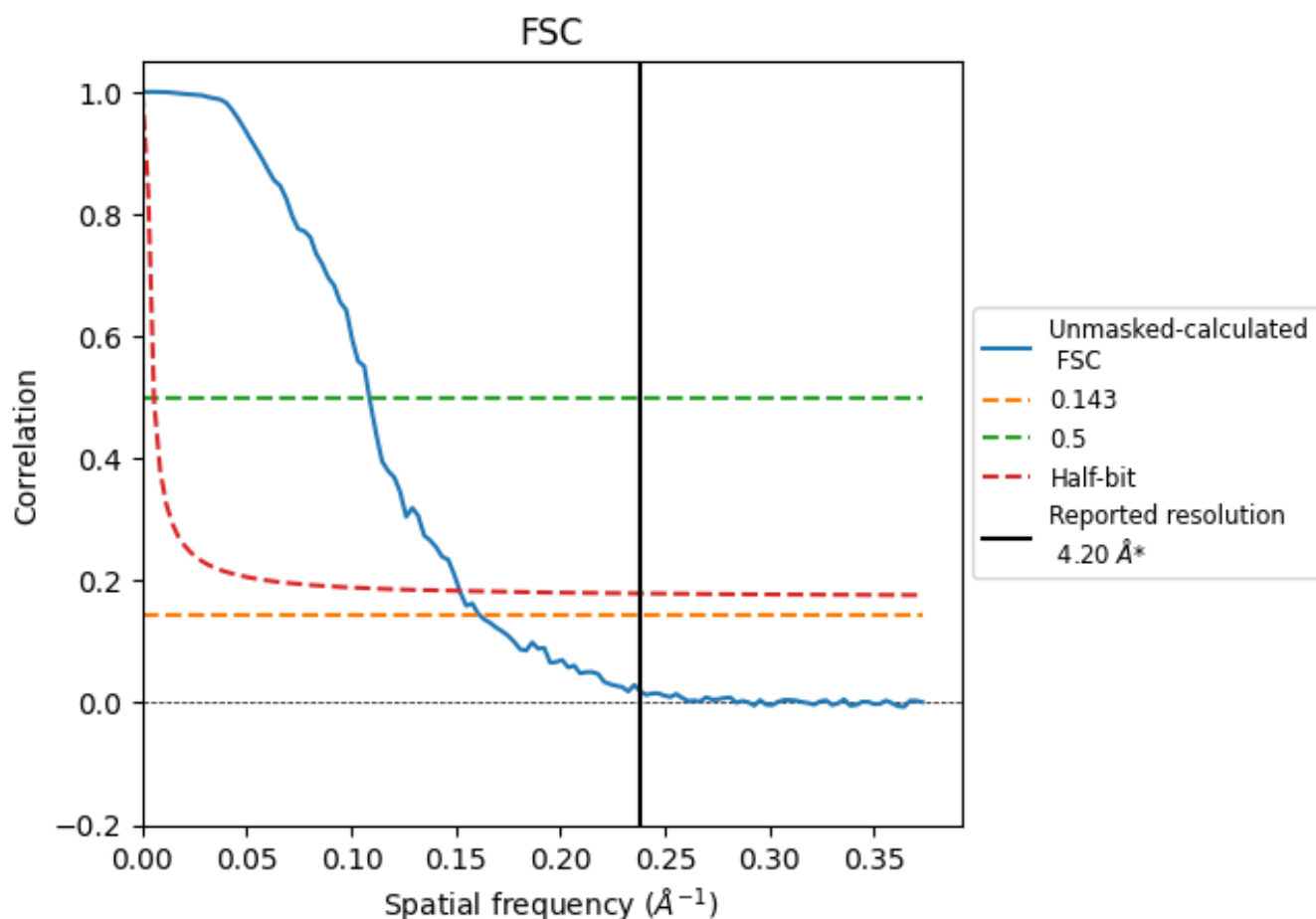


*Reported resolution corresponds to spatial frequency of 0.238 Å⁻¹

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 0.238 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.19	9.21	6.58

*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 6.19 differs from the reported value 4.2 by more than 10 %

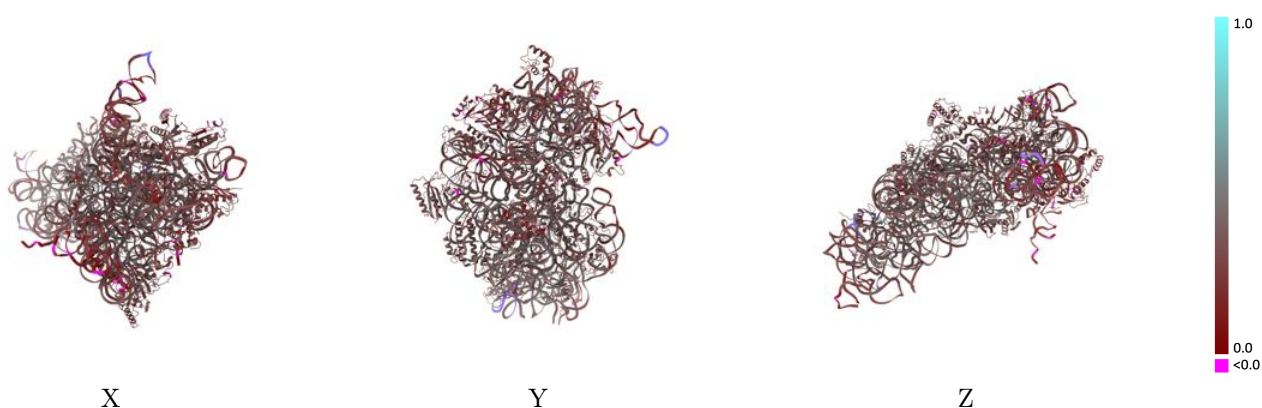
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-4076 and PDB model 5LMQ. Per-residue inclusion information can be found in section [3](#) on page [9](#).

9.1 Map-model overlay [i](#)

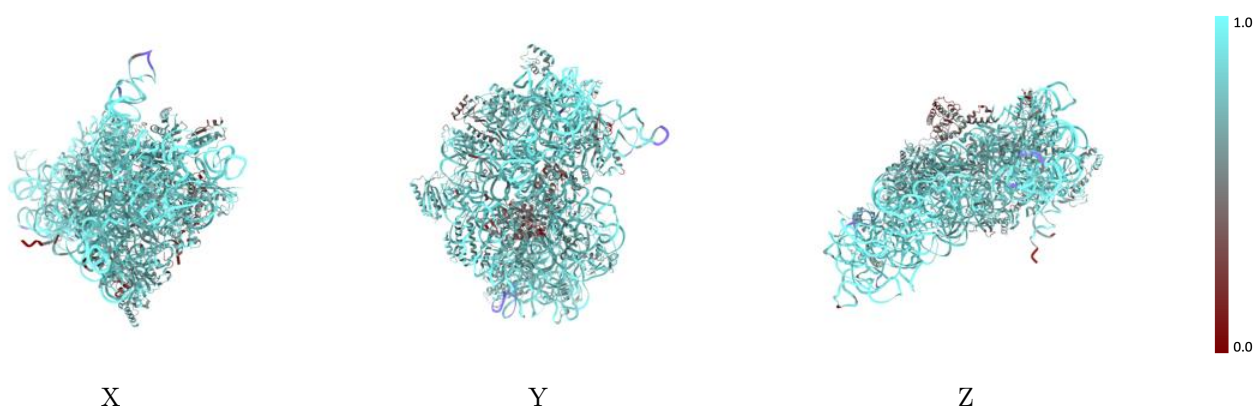
This section was not generated.

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



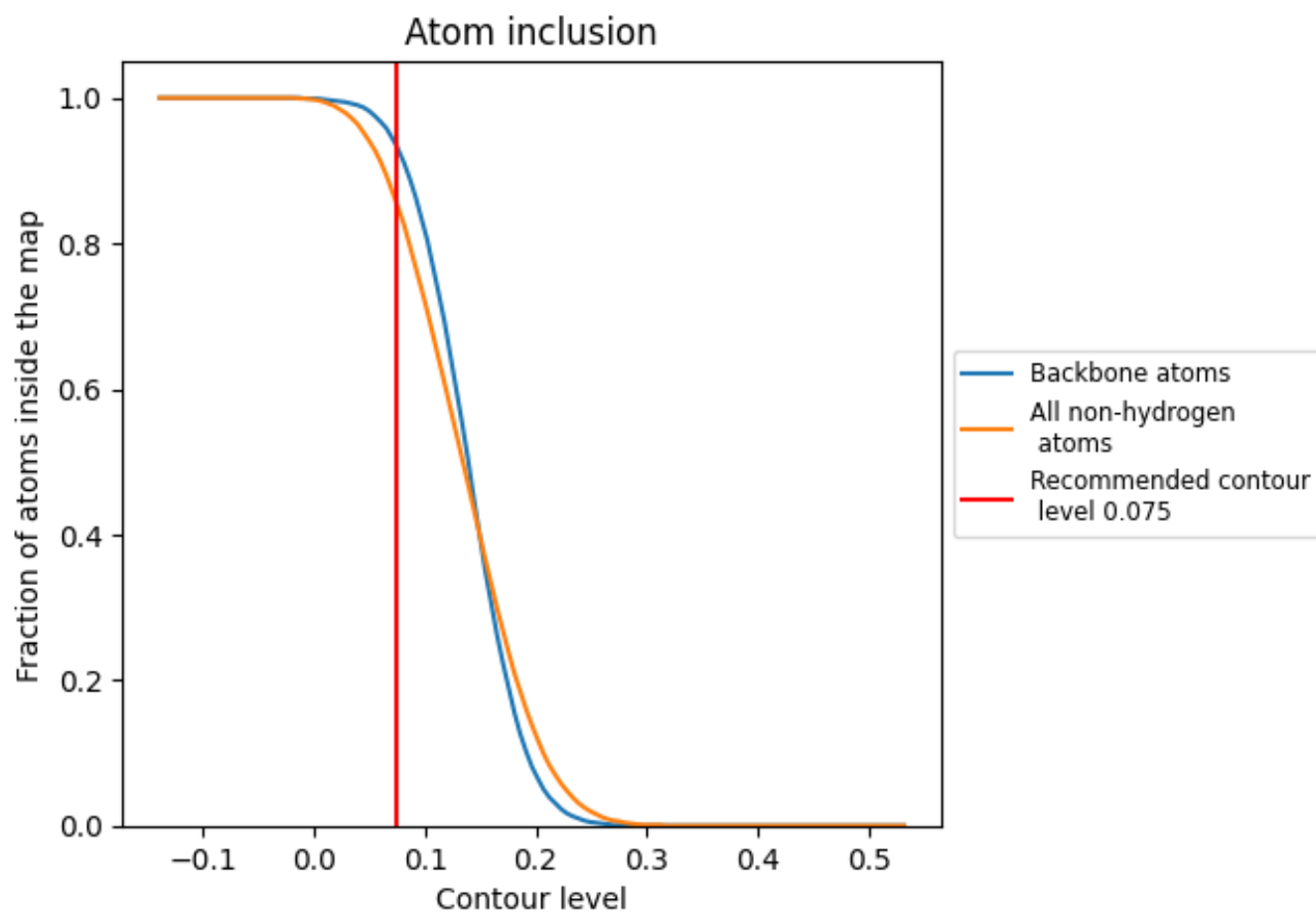
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.075).

9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 85% 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 (0.075) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8540	 0.3260
A	 0.9530	 0.3410
B	 0.3710	 0.2650
C	 0.7410	 0.3250
D	 0.7370	 0.3160
E	 0.7520	 0.3670
F	 0.7560	 0.3170
G	 0.7540	 0.3120
H	 0.7710	 0.3670
I	 0.7690	 0.2990
J	 0.6510	 0.2930
K	 0.7780	 0.3420
L	 0.7510	 0.3830
M	 0.6790	 0.2580
N	 0.7480	 0.3250
O	 0.7800	 0.3380
P	 0.8110	 0.3620
Q	 0.7920	 0.3710
R	 0.7410	 0.3060
S	 0.7440	 0.2670
T	 0.7290	 0.2910
V	 0.7490	 0.2940
W	 0.6460	 0.3220
X	 0.6190	 0.2500
Y	 0.6750	 0.2070
Z	 0.8160	 0.1910

