wwPDB EM Validation Summary Report (i)

Dec 18, 2022 – 02:57 pm GMT

PDB ID	:	7NAR
EMDB ID	:	EMD-12245
Title	:	Complete Bacterial 30S ribosomal subunit assembly complex state F (+RsgA)(Consensus Refinement)
Authors	:	Schedlbauer, A.; Iturrioz, I.; Ochoa-Lizarralde, B.; Diercks, T.; Kaminishi, T.; Capuni, R.; Astigarraga, E.; Gil-Carton, D.; Fucini, P.; Connell, S.
Deposited on	:	2021-01-25
Resolution	:	3.00 Å(reported)
Based on initial model	:	4YBB

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 (i) 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 (1)) were used in the production of this report:

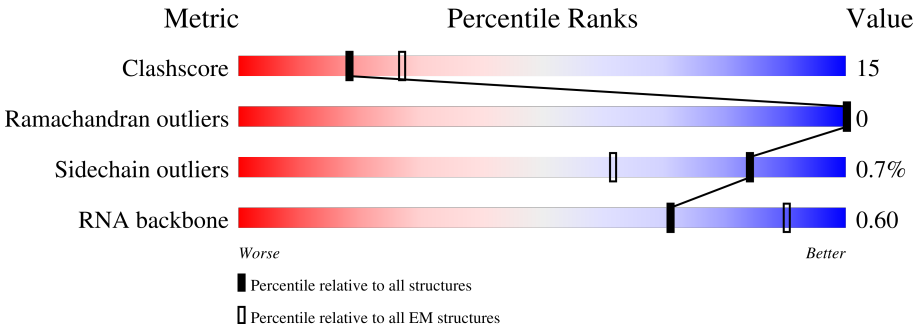
EMDB validation analysis	:	0.0.1.dev43
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

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 3.00 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 <=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	1542	47% 45% 7%
2	B	241	23% 76% 17% 7%
3	C	233	66% 25% 9%
4	D	206	70% 30%
5	E	167	59% 34% 7%
6	F	135	52% 27% 21%
7	G	179	19% 53% 27% 20%

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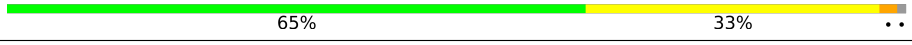
Mol	Chain	Length	Quality of chain
8	H	130	
9	I	130	
10	J	103	
11	K	129	
12	L	124	
13	M	118	
14	N	101	
15	O	89	
16	P	82	
17	Q	84	
18	R	75	
19	S	92	
20	T	87	
21	U	71	
22	W	350	

2 Entry composition (i)

There are 25 unique types of molecules in this entry. The entry contains 54452 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
			Total	C	N	O	P		
1	A	1534	32930	14694	6041	10661	1534	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	224	1753	1109	315	321	8	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	211	1653	1046	310	293	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	205	1643	1026	315	298	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	156	1152	717	217	212	6	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	106	862	545	156	154	7	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	144	Total	C	N	O	S	0	0
			1129	702	218	205	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	129	Total	C	N	O	S	0	0
			979	616	173	184	6		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	127	Total	C	N	O	S	0	0
			1022	634	206	179	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	99	Total	C	N	O	S	0	0
			795	498	152	144	1		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	117	Total	C	N	O	S	0	0
			877	540	174	160	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	123	Total	C	N	O	S	0	0
			957	591	196	165	5		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	114	Total	C	N	O	S	0	0
			883	546	178	156	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	100	Total	C	N	O	S	0	0
			805	499	164	139	3		

- 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
			714	439	144	130	1		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	82	Total	C	N	O	S	0	0
			649	406	128	114	1		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	80	Total	C	N	O	S	0	0
			648	411	121	113	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	65	Total	C	N	O	S	0	0
			535	339	100	95	1		

- 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
			658	421	125	110	2		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	86	Total	C	N	O	S	0	0
			670	414	138	115	3		

- Molecule 21 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	66	Total	C	N	O	S	0	0
			551	341	118	91	1		

- Molecule 22 is a protein called Small ribosomal subunit biogenesis GTPase RsgA.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	W	314	Total	C	N	O	S	0	0
			2456	1542	433	471	10		

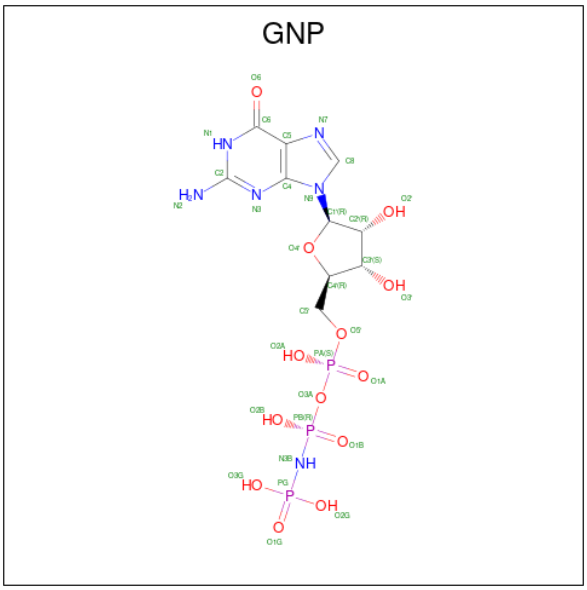
- Molecule 23 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
23	A	95	Total	Mg	0
			95	95	
23	W	2	Total	Mg	0
			2	2	

- Molecule 24 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
24	B	1	Total	Zn	0
			1	1	
24	W	1	Total	Zn	0
			1	1	

- Molecule 25 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).



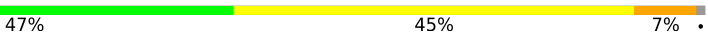
Mol	Chain	Residues	Atoms					AltConf
25	W	1	Total	C	N	O	P	0
			32	10	6	13	3	

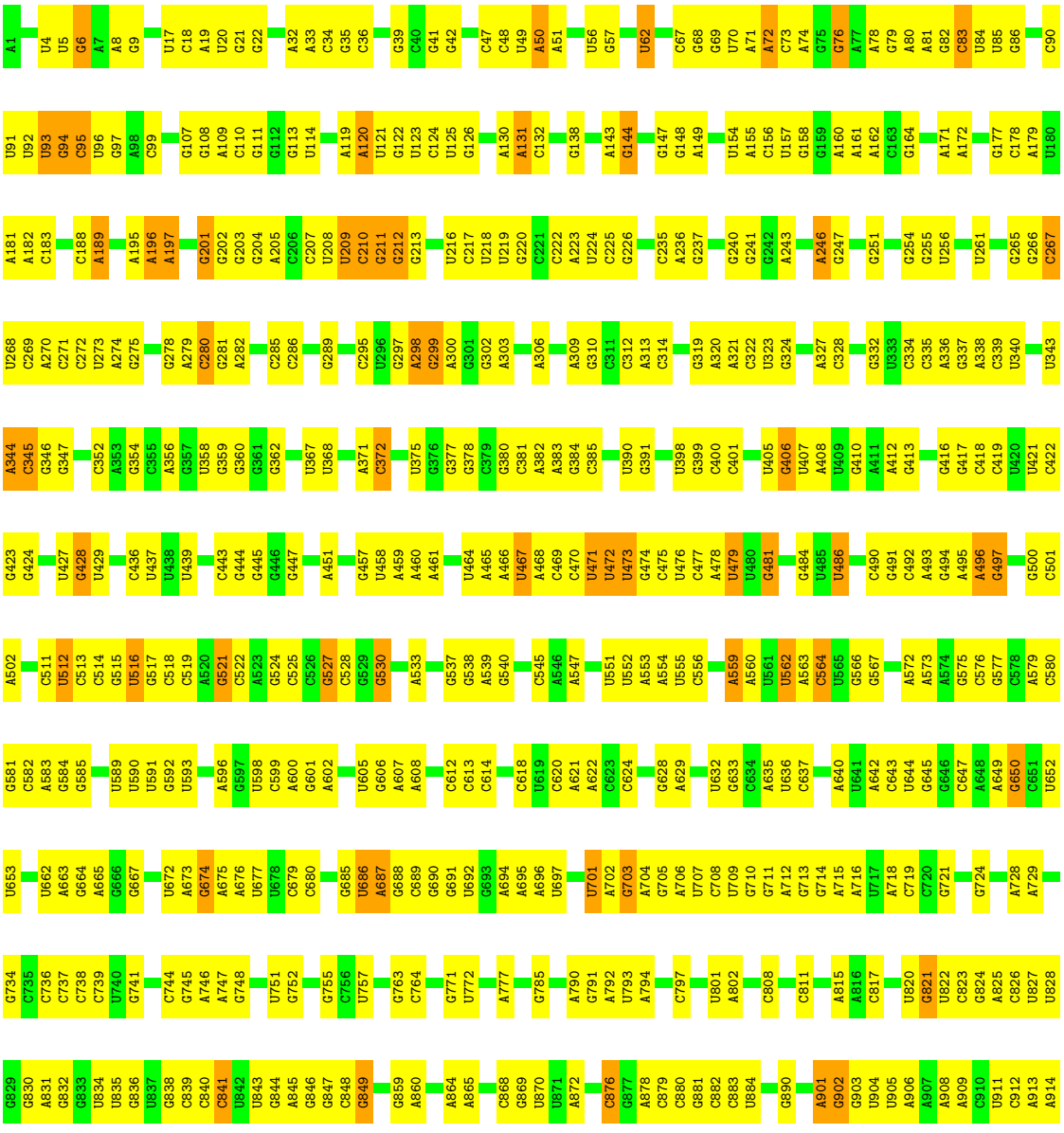
3 Residue-property plots (i)

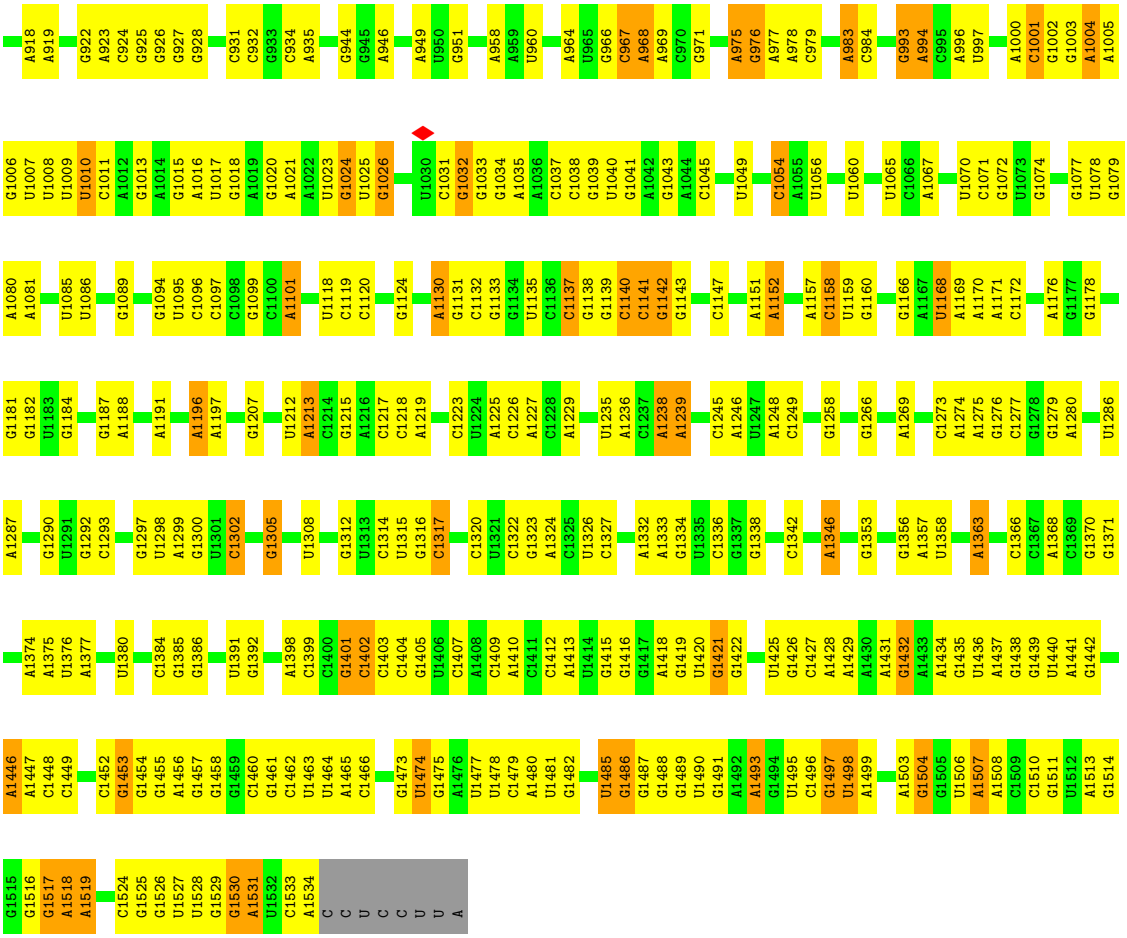
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: 16S rRNA

Chain A:

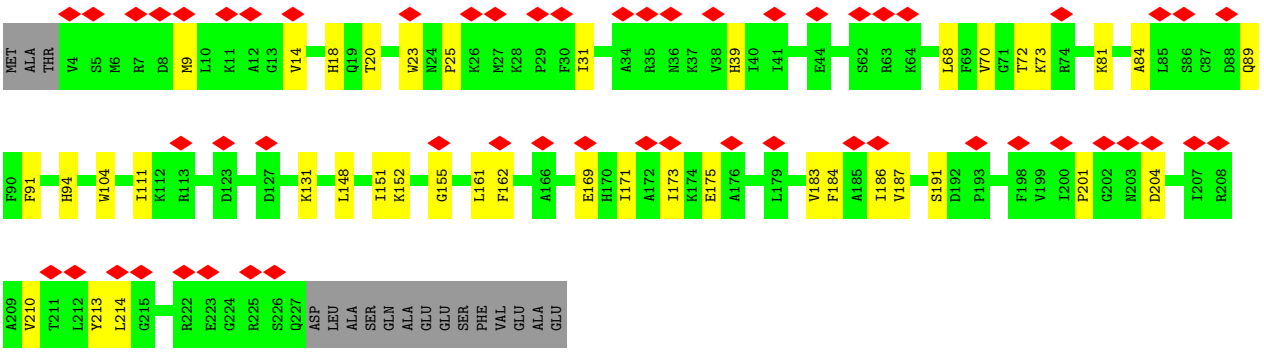






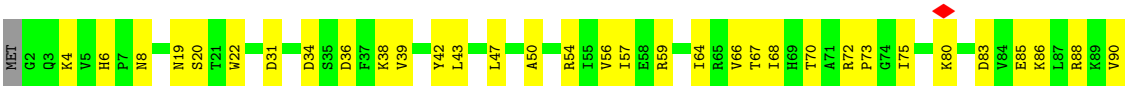
• Molecule 2: 30S ribosomal protein S2

Chain B:



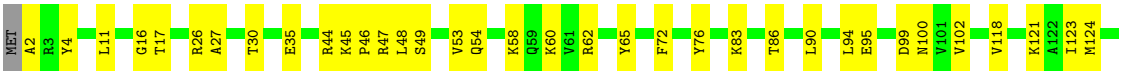
• Molecule 3: 30S ribosomal protein S3

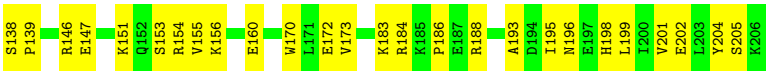
Chain C:



• Molecule 4: 30S ribosomal protein S4

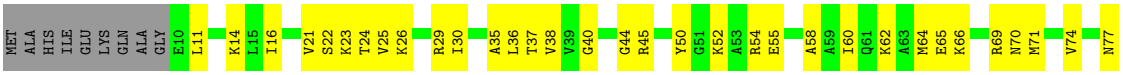
Chain D:

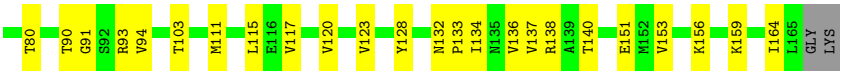




• Molecule 5: 30S ribosomal protein S5

Chain E:



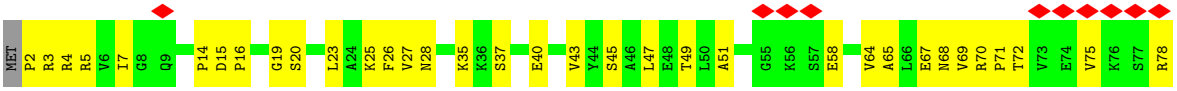


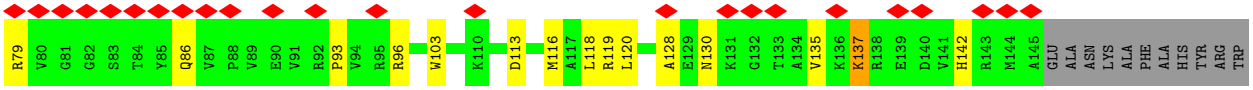
• Molecule 6: 30S ribosomal protein S6

Chain F:

• Molecule 7: 30S ribosomal protein S7

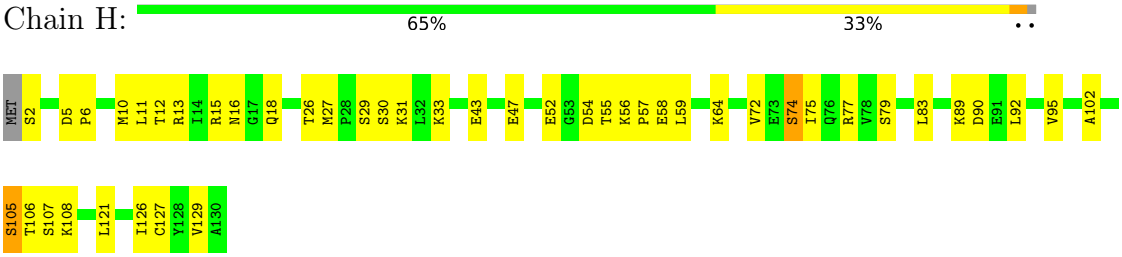
Chain G:





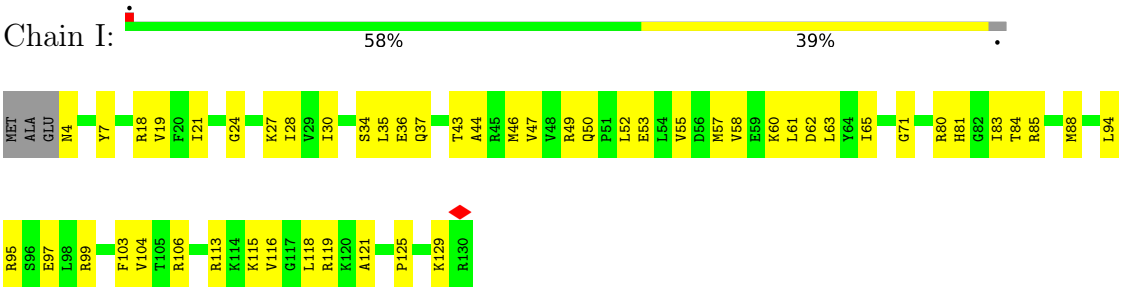
• Molecule 8: 30S ribosomal protein S8

Chain H:



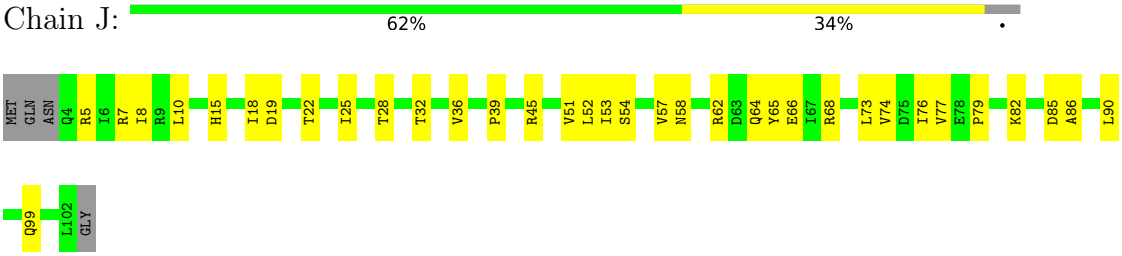
• Molecule 9: 30S ribosomal protein S9

Chain I:



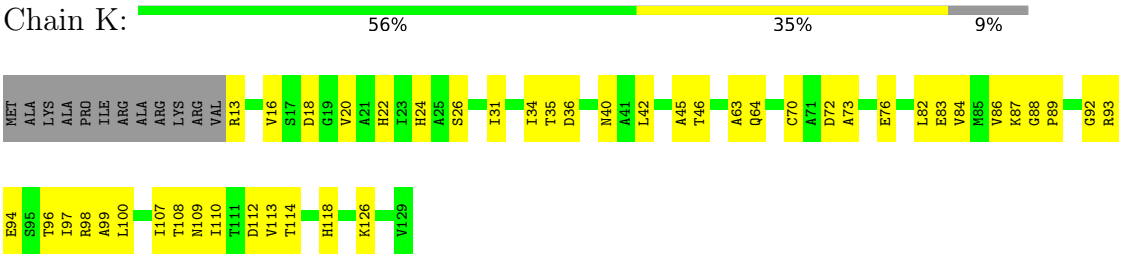
• Molecule 10: 30S ribosomal protein S10

Chain J:



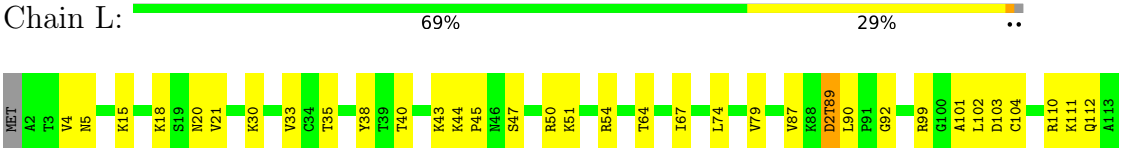
• Molecule 11: 30S ribosomal protein S11

Chain K:



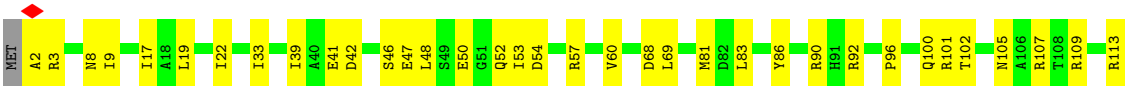
• Molecule 12: 30S ribosomal protein S12

Chain L:



• Molecule 13: 30S ribosomal protein S13

Chain M:

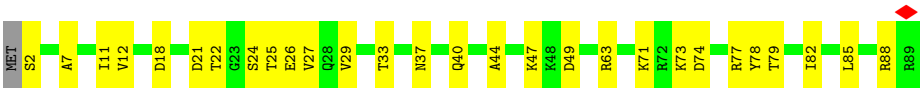


• Molecule 14: 30S ribosomal protein S14

Chain N:

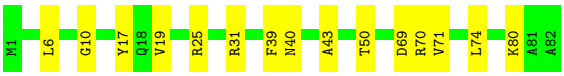
• Molecule 15: 30S ribosomal protein S15

Chain O:



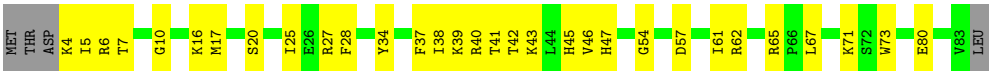
• Molecule 16: 30S ribosomal protein S16

Chain P:



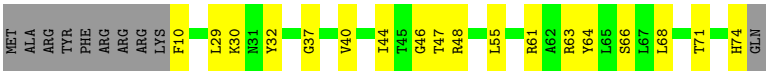
• Molecule 17: 30S ribosomal protein S17

Chain Q:



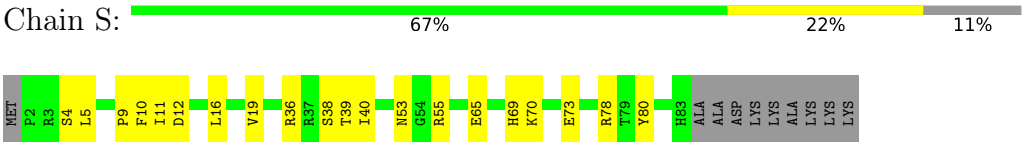
• Molecule 18: 30S ribosomal protein S18

Chain R:



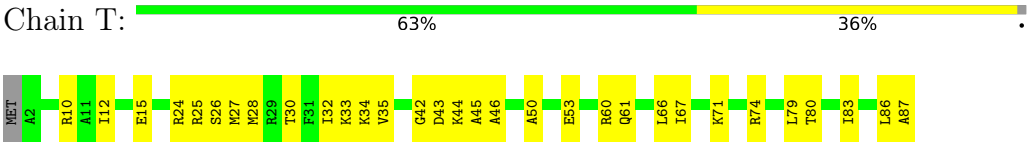
• Molecule 19: 30S ribosomal protein S19

Chain S:



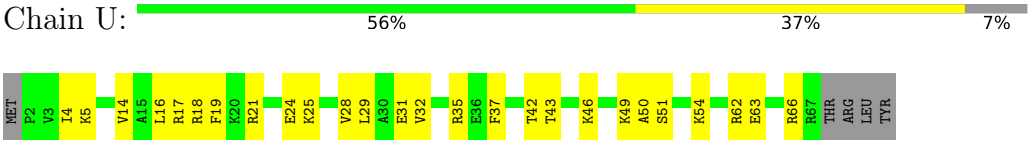
• Molecule 20: 30S ribosomal protein S20

Chain T:



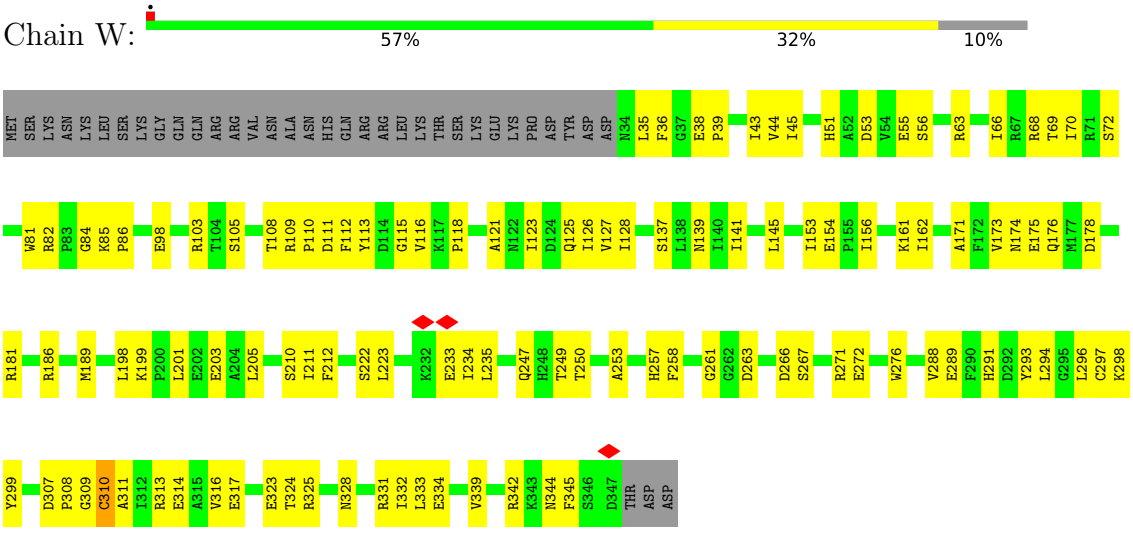
• Molecule 21: 30S ribosomal protein S21

Chain U:



• Molecule 22: Small ribosomal subunit biogenesis GTPase RsgA

Chain W:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	21537	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 ($e^-/Å^2$)	46.1	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.119	Depositor
Minimum map value	-0.034	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.016	Depositor
Map size (Å)	416.64, 416.64, 416.64	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.085, 1.085, 1.085	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: G7M, UR3, 2MG, MA6, PSU, 4OC, MG, 5MC, GNP, D2T, 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	0.66	0/36593	0.77	2/57081 (0.0%)
2	B	0.42	0/1784	0.53	0/2403
3	C	0.43	0/1680	0.51	0/2263
4	D	0.40	0/1665	0.47	0/2227
5	E	0.40	0/1165	0.51	0/1568
6	F	0.49	0/881	0.58	0/1189
7	G	0.43	0/1142	0.59	0/1531
8	H	0.47	0/989	0.54	0/1326
9	I	0.46	0/1034	0.54	0/1375
10	J	0.44	0/805	0.55	0/1089
11	K	0.47	0/893	0.56	0/1205
12	L	0.47	0/960	0.54	0/1286
13	M	0.43	0/892	0.56	0/1193
14	N	0.38	0/817	0.42	0/1088
15	O	0.36	0/722	0.45	0/964
16	P	0.49	0/659	0.54	0/884
17	Q	0.48	0/657	0.53	0/881
18	R	0.44	0/544	0.51	0/731
19	S	0.44	0/675	0.53	0/908
20	T	0.34	0/676	0.45	0/895
21	U	0.34	0/558	0.46	0/739
22	W	0.46	0/2501	0.53	0/3387
All	All	0.58	0/58292	0.70	2/86213 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1158	C	N1-C2-O2	5.39	122.14	118.90
1	A	1158	C	C2-N1-C1'	5.30	124.64	118.80

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	32930	0	16591	664	0
2	B	1753	0	1780	29	0
3	C	1653	0	1727	42	0
4	D	1643	0	1707	61	0
5	E	1152	0	1196	59	0
6	F	862	0	864	43	0
7	G	1129	0	1189	42	0
8	H	979	0	1031	56	0
9	I	1022	0	1070	40	0
10	J	795	0	836	26	0
11	K	877	0	887	39	0
12	L	957	0	1017	40	0
13	M	883	0	941	29	0
14	N	805	0	844	27	0
15	O	714	0	734	20	0
16	P	649	0	666	16	0
17	Q	648	0	691	31	0
18	R	535	0	552	16	0
19	S	658	0	683	16	0
20	T	670	0	719	29	0
21	U	551	0	589	28	0
22	W	2456	0	2422	108	0
23	A	95	0	0	0	0
23	W	2	0	0	0	0
24	B	1	0	0	0	0
24	W	1	0	0	0	0
25	W	32	0	13	2	0
All	All	54452	0	38749	1307	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 15.

The worst 5 of 1307 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:OP1	5:E:52:LYS:HD2	1.29	1.24
1:A:1338:G:C2	22:W:299:TYR:CD1	2.29	1.09
1:A:1080:A:OP1	5:E:52:LYS:CD	2.08	1.02
6:F:63:ASN:ND2	6:F:96:VAL:HG23	1.77	0.99
8:H:47:GLU:HG3	8:H:64:LYS:CG	1.93	0.98

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	222/241 (92%)	216 (97%)	6 (3%)	0	100	100
3	C	209/233 (90%)	205 (98%)	4 (2%)	0	100	100
4	D	203/206 (98%)	197 (97%)	6 (3%)	0	100	100
5	E	154/167 (92%)	153 (99%)	1 (1%)	0	100	100
6	F	104/135 (77%)	98 (94%)	6 (6%)	0	100	100
7	G	142/179 (79%)	137 (96%)	5 (4%)	0	100	100
8	H	127/130 (98%)	124 (98%)	3 (2%)	0	100	100
9	I	125/130 (96%)	122 (98%)	3 (2%)	0	100	100
10	J	97/103 (94%)	94 (97%)	3 (3%)	0	100	100
11	K	115/129 (89%)	111 (96%)	4 (4%)	0	100	100
12	L	120/124 (97%)	110 (92%)	10 (8%)	0	100	100
13	M	112/118 (95%)	108 (96%)	4 (4%)	0	100	100
14	N	98/101 (97%)	94 (96%)	4 (4%)	0	100	100
15	O	86/89 (97%)	85 (99%)	1 (1%)	0	100	100
16	P	80/82 (98%)	79 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
17	Q	78/84 (93%)	72 (92%)	6 (8%)	0	100	100
18	R	63/75 (84%)	62 (98%)	1 (2%)	0	100	100
19	S	80/92 (87%)	78 (98%)	2 (2%)	0	100	100
20	T	84/87 (97%)	84 (100%)	0	0	100	100
21	U	64/71 (90%)	64 (100%)	0	0	100	100
22	W	312/350 (89%)	294 (94%)	18 (6%)	0	100	100
All	All	2675/2926 (91%)	2587 (97%)	88 (3%)	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	
2	B	186/199 (94%)	186 (100%)	0	100	100
3	C	172/190 (90%)	171 (99%)	1 (1%)	86	95
4	D	172/173 (99%)	171 (99%)	1 (1%)	86	95
5	E	119/126 (94%)	117 (98%)	2 (2%)	60	85
6	F	92/116 (79%)	92 (100%)	0	100	100
7	G	120/147 (82%)	118 (98%)	2 (2%)	60	85
8	H	104/105 (99%)	101 (97%)	3 (3%)	42	76
9	I	105/107 (98%)	105 (100%)	0	100	100
10	J	87/90 (97%)	86 (99%)	1 (1%)	73	90
11	K	90/99 (91%)	89 (99%)	1 (1%)	73	90
12	L	102/103 (99%)	102 (100%)	0	100	100
13	M	92/96 (96%)	92 (100%)	0	100	100
14	N	83/84 (99%)	83 (100%)	0	100	100
15	O	76/77 (99%)	74 (97%)	2 (3%)	46	78
16	P	65/65 (100%)	65 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
17	Q	74/78 (95%)	74 (100%)	0	100 100
18	R	56/65 (86%)	56 (100%)	0	100 100
19	S	72/79 (91%)	72 (100%)	0	100 100
20	T	65/66 (98%)	65 (100%)	0	100 100
21	U	56/61 (92%)	56 (100%)	0	100 100
22	W	268/302 (89%)	265 (99%)	3 (1%)	73 90
All	All	2256/2428 (93%)	2240 (99%)	16 (1%)	84 94

5 of 16 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
22	W	310	CYS
22	W	235	LEU
8	H	105	SER
15	O	24	SER
8	H	89	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
18	R	31	ASN
22	W	338	GLN
22	W	237	ASN
9	I	4	ASN
14	N	60	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1530/1542 (99%)	236 (15%)	7 (0%)

5 of 236 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	4	U
1	A	5	U
1	A	6	G
1	A	9	G

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Mol	Chain	Res	Type
1	A	22	G

5 of 7 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	428	G
1	A	471	U
1	A	1031	C
1	A	1024	G
1	A	298	A

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

12 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	$\#\|Z\| > 2$
1	G7M	A	527	1	20,26,27	0.95	1 (5%)	17,39,42	1.64	5 (29%)
1	MA6	A	1518	1	19,26,27	0.92	1 (5%)	18,38,41	1.71	5 (27%)
1	PSU	A	516	23,1	18,21,22	1.37	4 (22%)	22,30,33	1.85	4 (18%)
1	UR3	A	1498	23,1	19,22,23	1.04	1 (5%)	26,32,35	1.53	2 (7%)
1	5MC	A	967	1	18,22,23	0.96	2 (11%)	26,32,35	1.25	4 (15%)
1	4OC	A	1402	1	20,23,24	0.79	0	26,32,35	0.94	1 (3%)
1	5MC	A	1407	1	18,22,23	0.95	2 (11%)	26,32,35	1.22	3 (11%)
1	2MG	A	1516	1	18,26,27	0.94	1 (5%)	16,38,41	1.15	2 (12%)
1	2MG	A	966	1	18,26,27	0.95	1 (5%)	16,38,41	1.20	3 (18%)
12	D2T	L	89	12	7,9,10	1.04	1 (14%)	6,11,13	1.82	3 (50%)
1	2MG	A	1207	1	18,26,27	0.96	1 (5%)	16,38,41	1.20	3 (18%)
1	MA6	A	1519	1	19,26,27	0.94	1 (5%)	18,38,41	1.70	5 (27%)

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
1	G7M	A	527	1	-	2/3/25/26	0/3/3/3
1	MA6	A	1518	1	-	3/7/29/30	0/3/3/3
1	PSU	A	516	23,1	-	0/7/25/26	0/2/2/2
1	UR3	A	1498	23,1	-	1/7/25/26	0/2/2/2
1	5MC	A	967	1	-	0/7/25/26	0/2/2/2
1	4OC	A	1402	1	-	0/9/29/30	0/2/2/2
1	5MC	A	1407	1	-	0/7/25/26	0/2/2/2
1	2MG	A	1516	1	-	0/5/27/28	0/3/3/3
1	2MG	A	966	1	-	0/5/27/28	0/3/3/3
12	D2T	L	89	12	-	2/7/12/14	-
1	2MG	A	1207	1	-	0/5/27/28	0/3/3/3
1	MA6	A	1519	1	-	2/7/29/30	0/3/3/3

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	527	G7M	C8-N9	2.87	1.38	1.33
1	A	1207	2MG	C6-N1	-2.83	1.33	1.37
1	A	1516	2MG	C6-N1	-2.79	1.33	1.37
1	A	516	PSU	C4-N3	-2.74	1.33	1.38
1	A	966	2MG	C6-N1	-2.73	1.33	1.37

The worst 5 of 40 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	516	PSU	N1-C2-N3	5.68	121.56	115.13
1	A	1498	UR3	C4-N3-C2	-5.54	119.35	124.56
1	A	1407	5MC	C5-C6-N1	-3.98	119.24	123.34
1	A	516	PSU	C4-N3-C2	-3.72	120.98	126.34
1	A	527	G7M	C3'-C2'-C1'	-3.47	95.75	100.98

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	527	G7M	C3'-C4'-C5'-O5'
1	A	1518	MA6	O4'-C4'-C5'-O5'
1	A	1518	MA6	C3'-C4'-C5'-O5'
1	A	527	G7M	O4'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
1	A	1519	MA6	C5-C6-N6-C10

There are no ring outliers.

6 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	1518	MA6	5	0
1	A	516	PSU	1	0
1	A	967	5MC	1	0
1	A	1402	4OC	2	0
12	L	89	D2T	1	0
1	A	1519	MA6	2	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 100 ligands modelled in this entry, 99 are monoatomic - leaving 1 for Mogul analysis.

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	GNP	W	402	23	29,34,34	1.36	6 (20%)	33,54,54	2.29	6 (18%)

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	GNP	W	402	23	-	5/14/38/38	0/3/3/3

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	W	402	GNP	C6-N1	3.98	1.40	1.33
25	W	402	GNP	PB-O1B	2.56	1.50	1.46
25	W	402	GNP	PB-O2B	-2.39	1.50	1.56
25	W	402	GNP	PG-O2G	-2.19	1.50	1.56
25	W	402	GNP	PG-O3G	-2.14	1.51	1.56

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
25	W	402	GNP	C5-C6-N1	-8.94	111.20	123.43
25	W	402	GNP	C2-N1-C6	5.93	125.35	115.93
25	W	402	GNP	O2B-PB-O1B	3.73	117.74	109.92
25	W	402	GNP	O2G-PG-O1G	-3.28	105.20	113.45
25	W	402	GNP	C2-N3-C4	-2.92	112.03	115.36

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
25	W	402	GNP	PB-N3B-PG-O1G
25	W	402	GNP	PG-N3B-PB-O1B
25	W	402	GNP	PA-O3A-PB-O1B
25	W	402	GNP	PA-O3A-PB-O2B
25	W	402	GNP	O4'-C4'-C5'-O5'

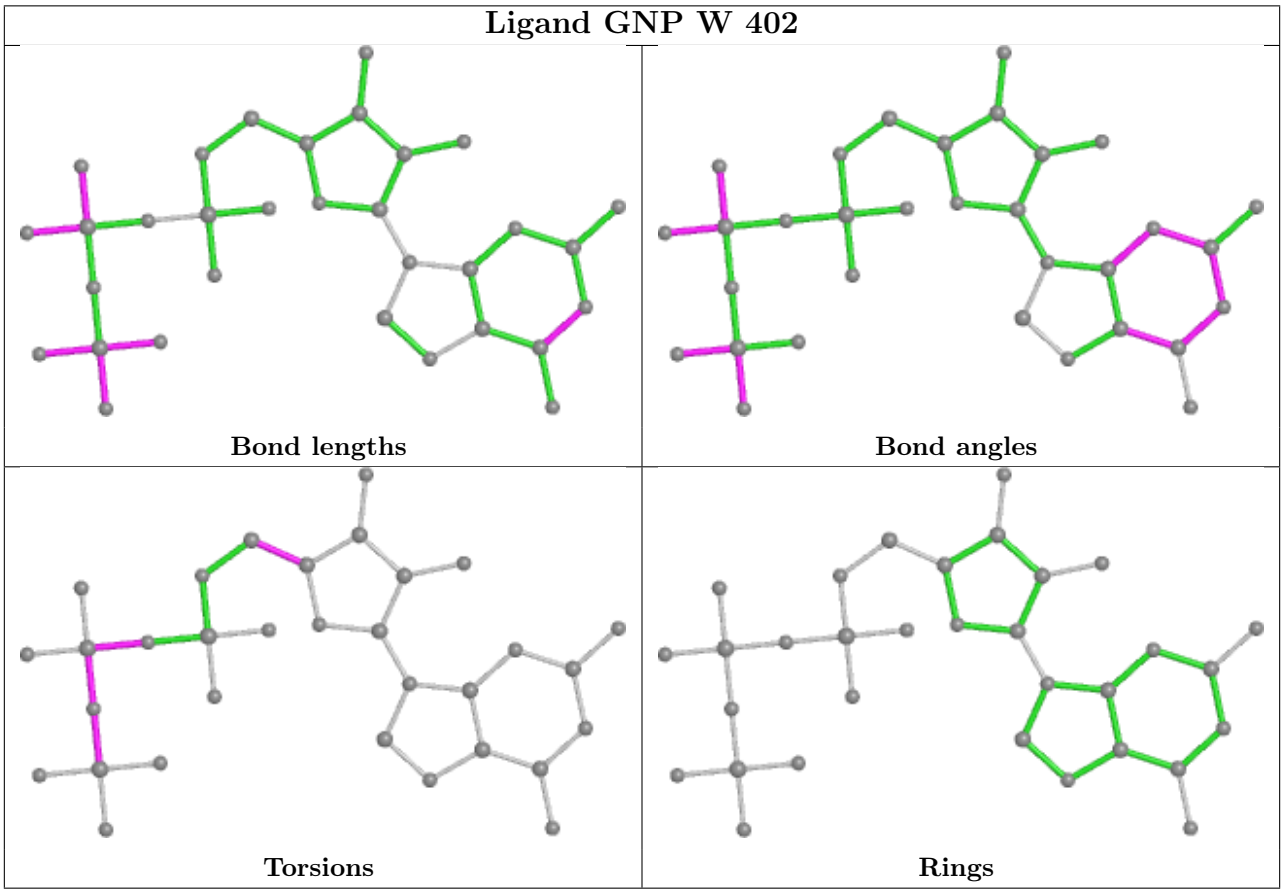
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
25	W	402	GNP	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

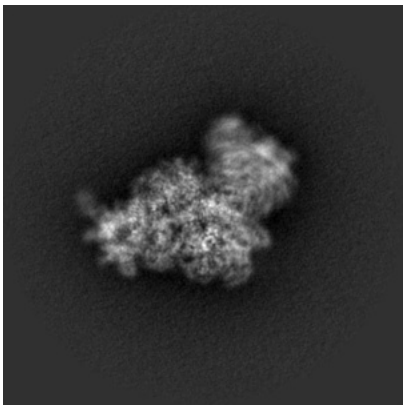
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-12245. These allow visual inspection of the internal detail of the map and identification of artifacts.

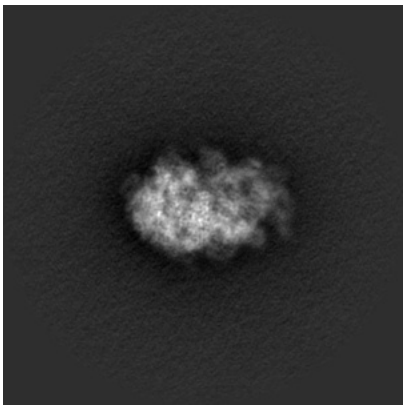
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

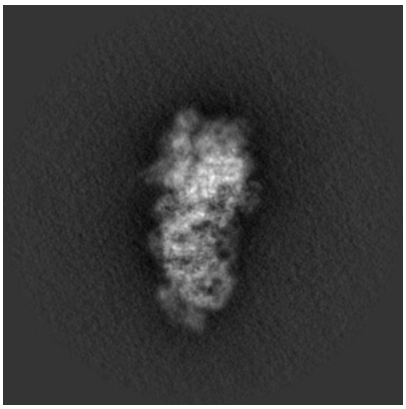
6.1.1 Primary map



X

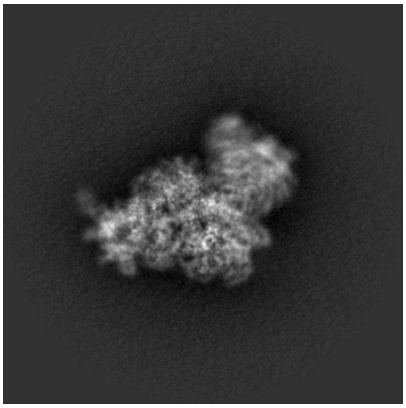


Y

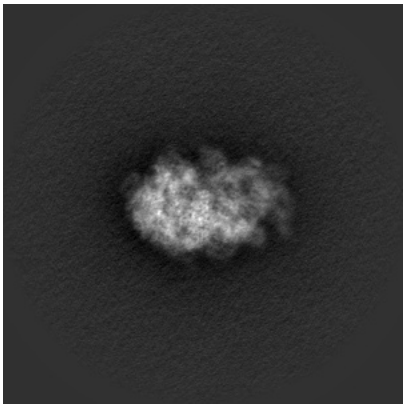


Z

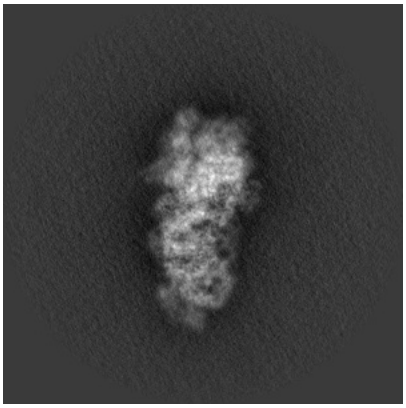
6.1.2 Raw map



X



Y

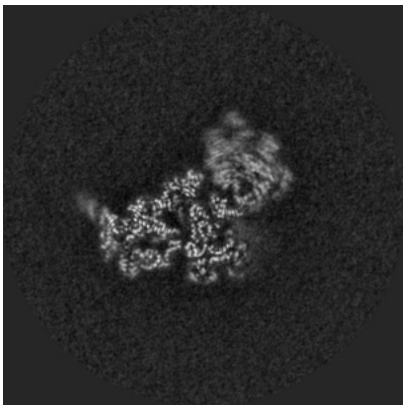


Z

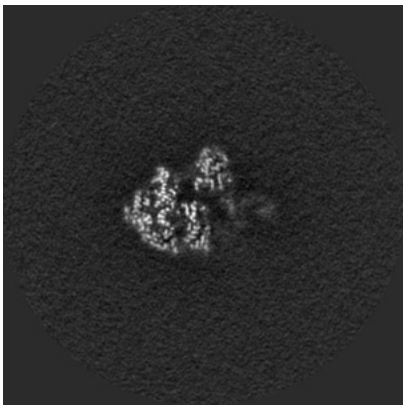
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

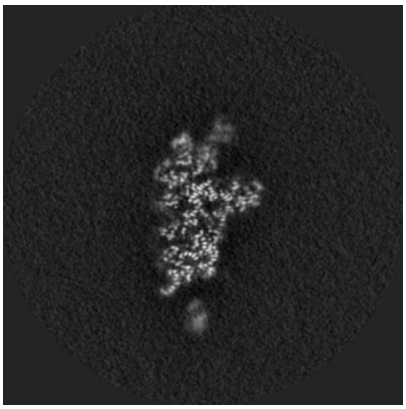
6.2.1 Primary map



X Index: 192

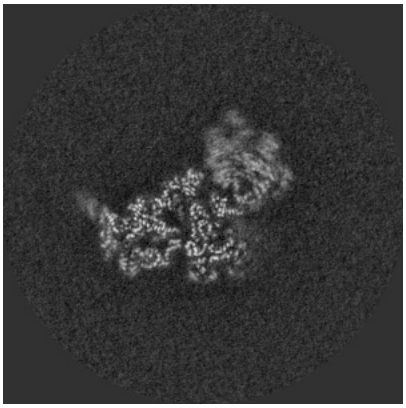


Y Index: 192

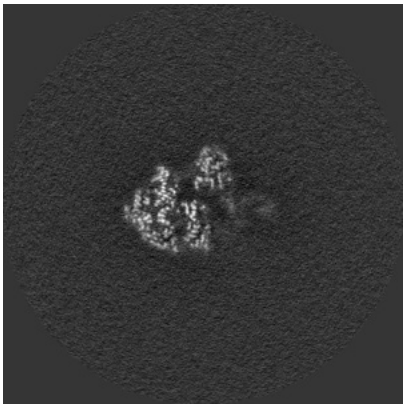


Z Index: 192

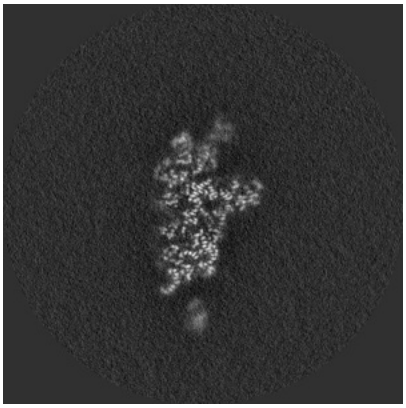
6.2.2 Raw map



X Index: 192



Y Index: 192

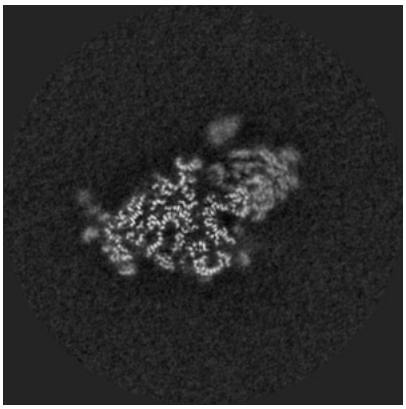


Z Index: 192

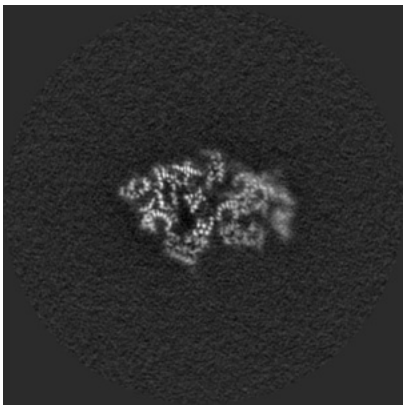
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

6.3.1 Primary map



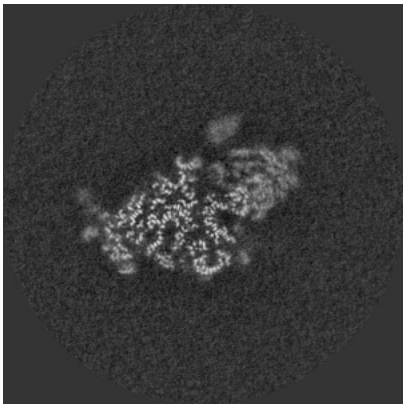
X Index: 176



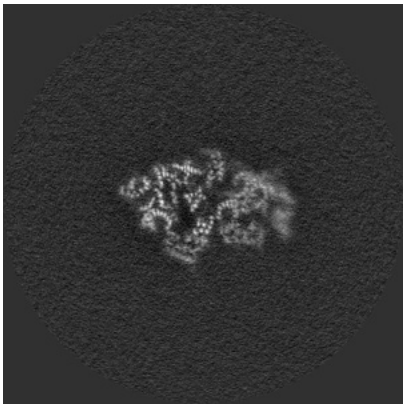
Y Index: 215

Z Index: 149

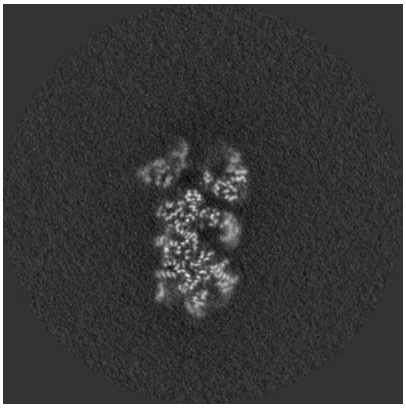
6.3.2 Raw map



X Index: 176



Y Index: 215



Z Index: 178

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

6.4 Orthogonal surface views (i)

6.4.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.016. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

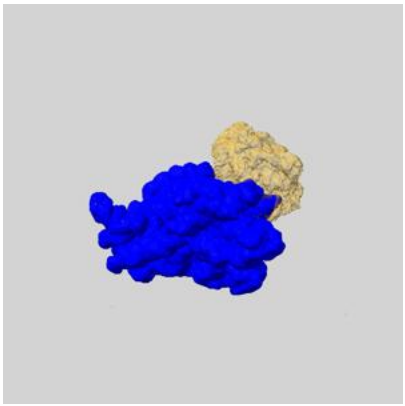
6.5 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

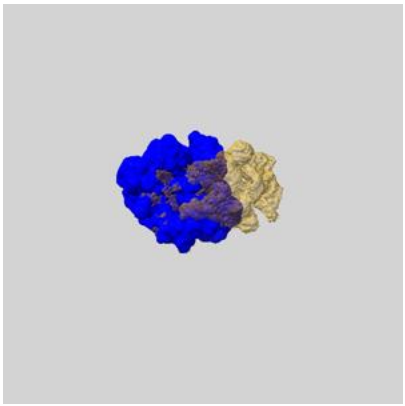
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

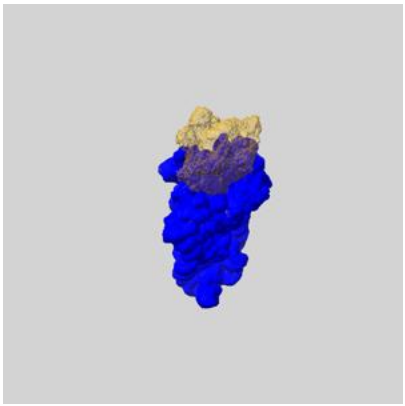
6.5.1 emd_12245_msk_1.map (i)



X

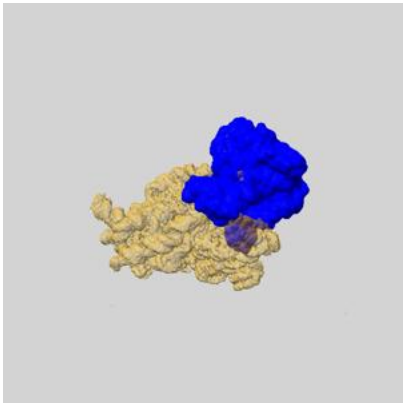


Y

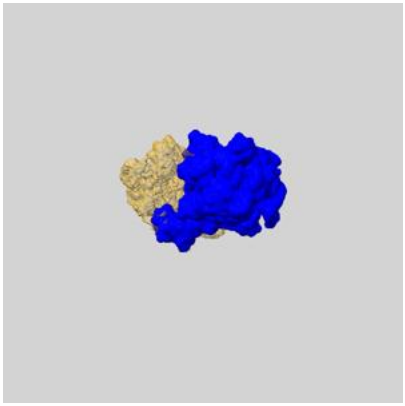


Z

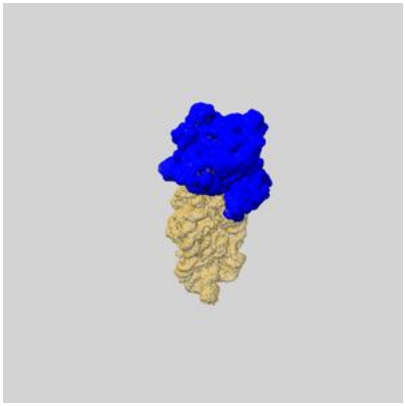
6.5.2 emd_12245_msk_2.map (i)



X



Y

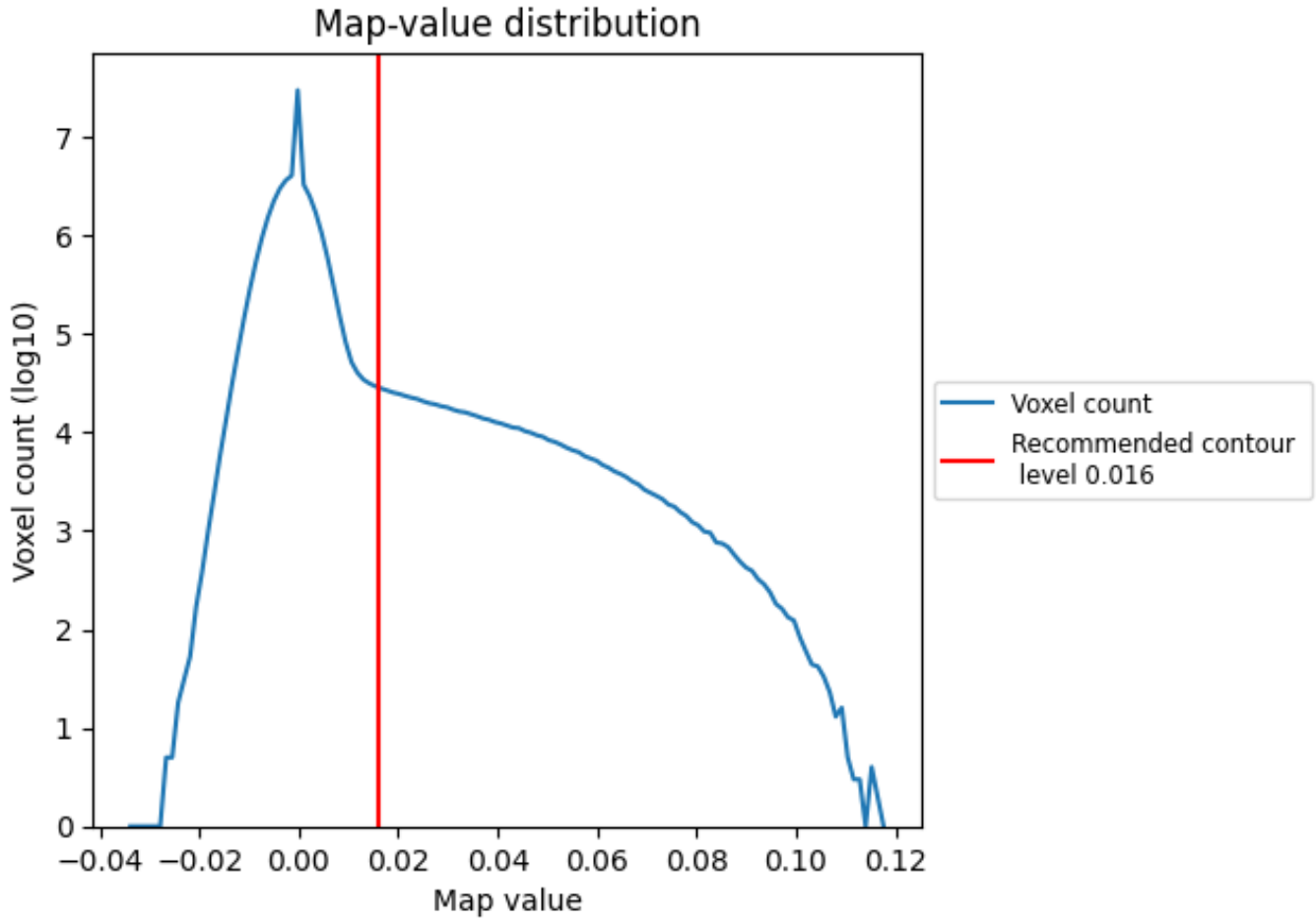


Z

7 Map analysis

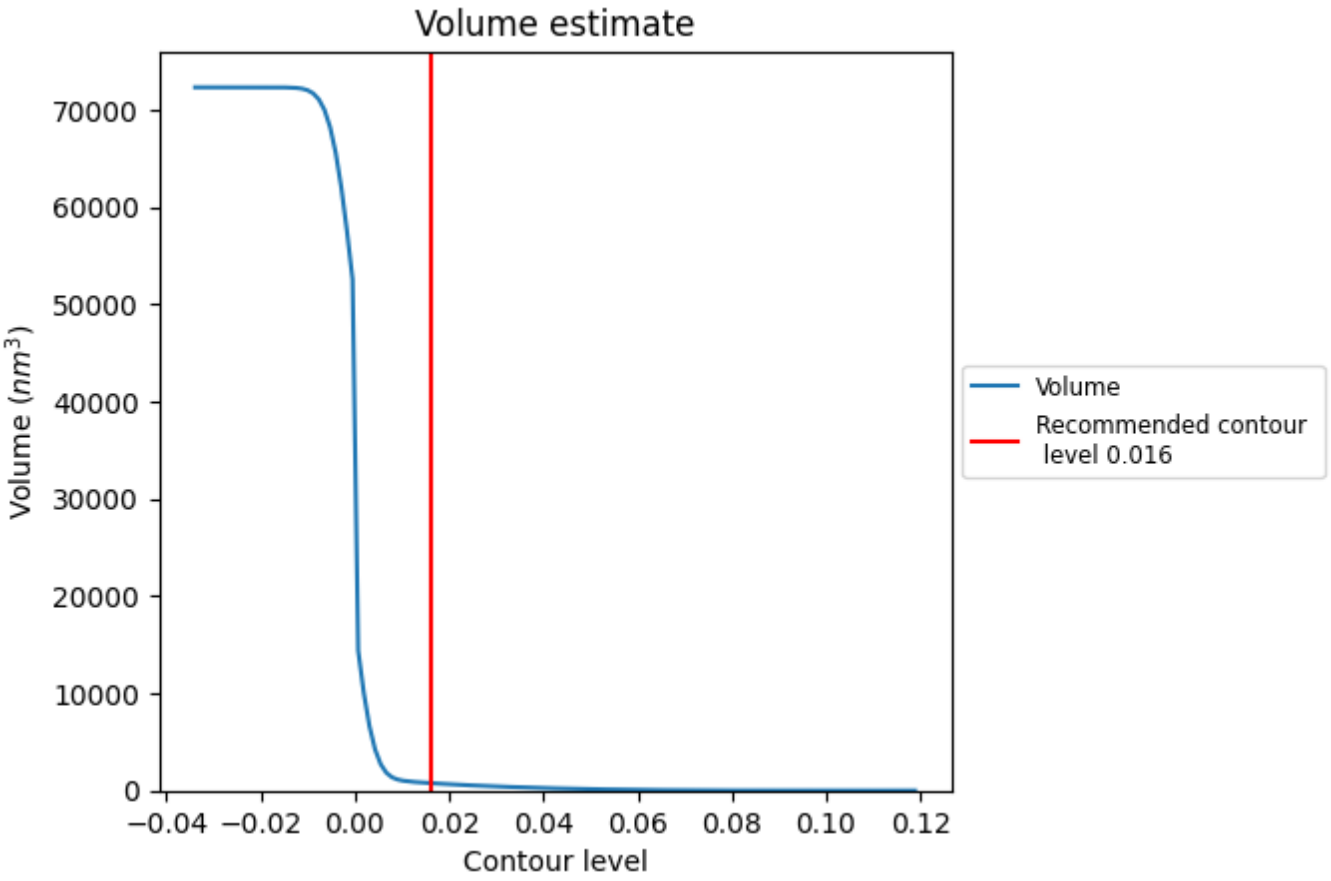
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

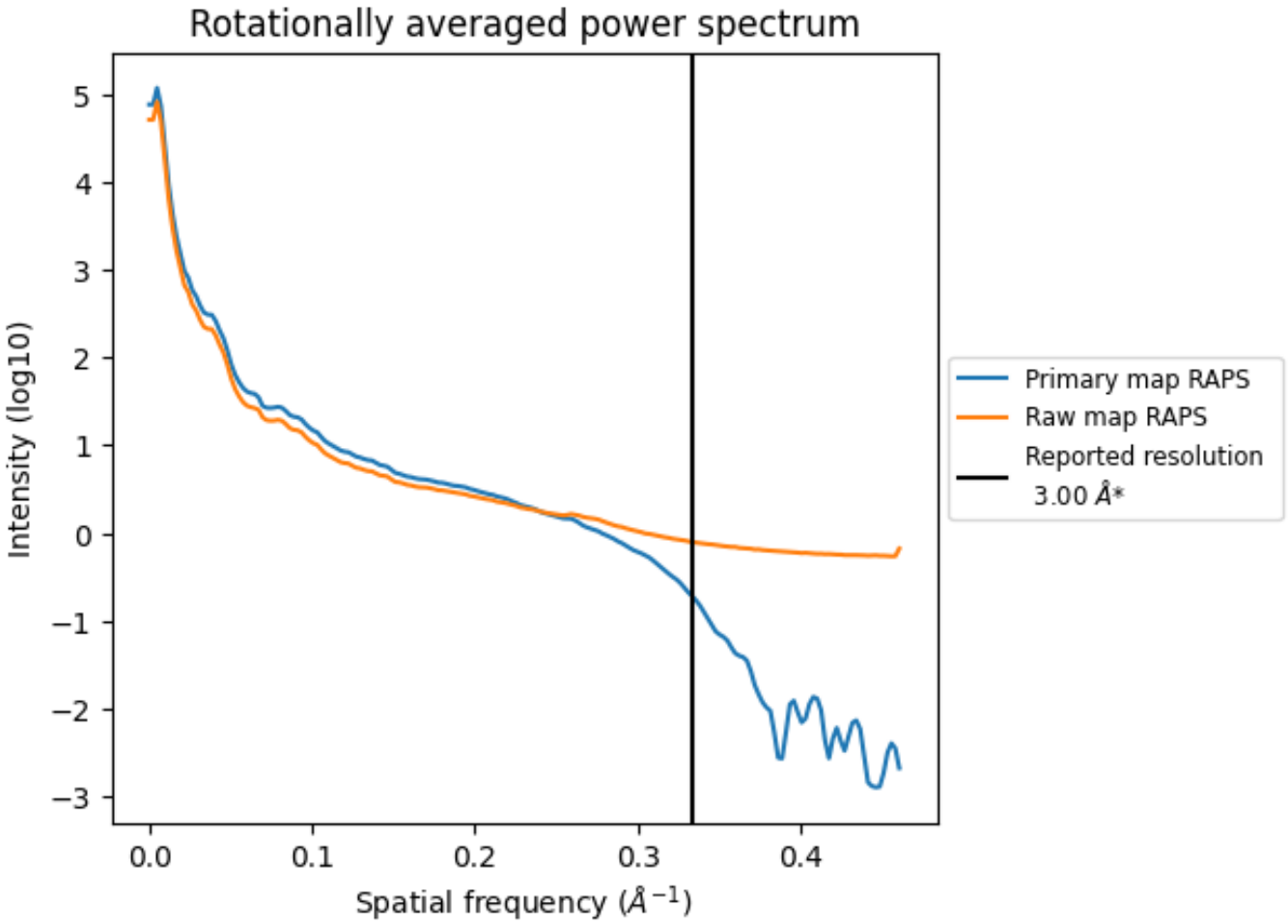
7.2 Volume estimate (i)



The volume at the recommended contour level is 766 nm^3; this corresponds to an approximate mass of 692 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)

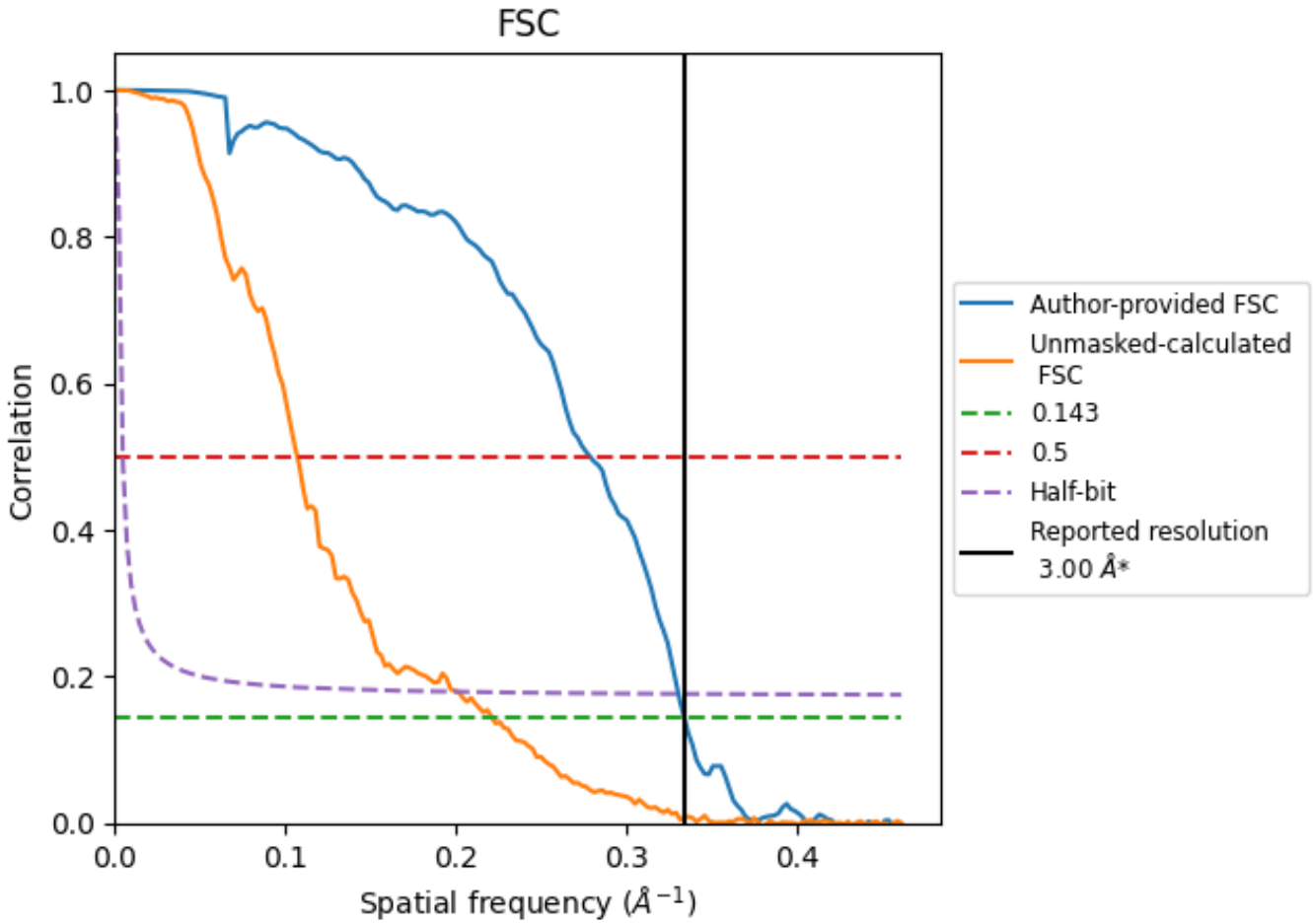


*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8 Fourier-Shell correlation

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

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8.2 Resolution estimates (i)

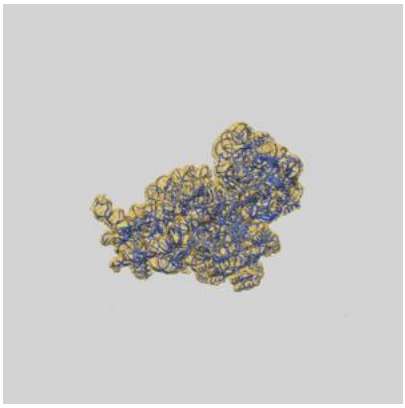
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	3.00	3.59	3.03
Unmasked-calculated*	4.52	9.35	4.98

*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 4.52 differs from the reported value 3.0 by more than 10 %

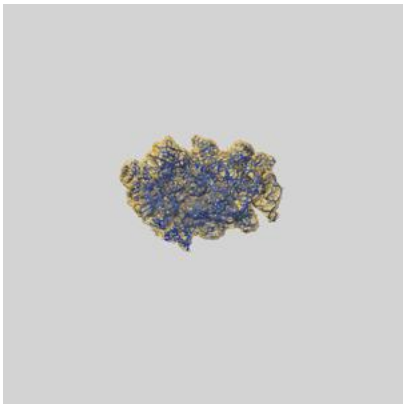
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-12245 and PDB model 7NAR. Per-residue inclusion information can be found in section 3 on page 9.

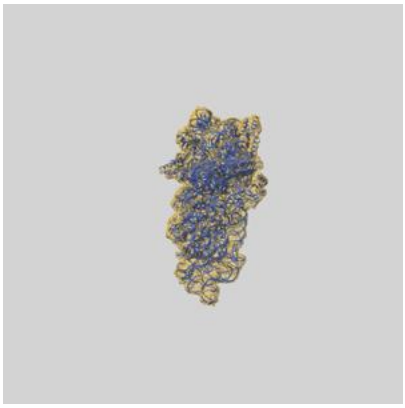
9.1 Map-model overlay



X



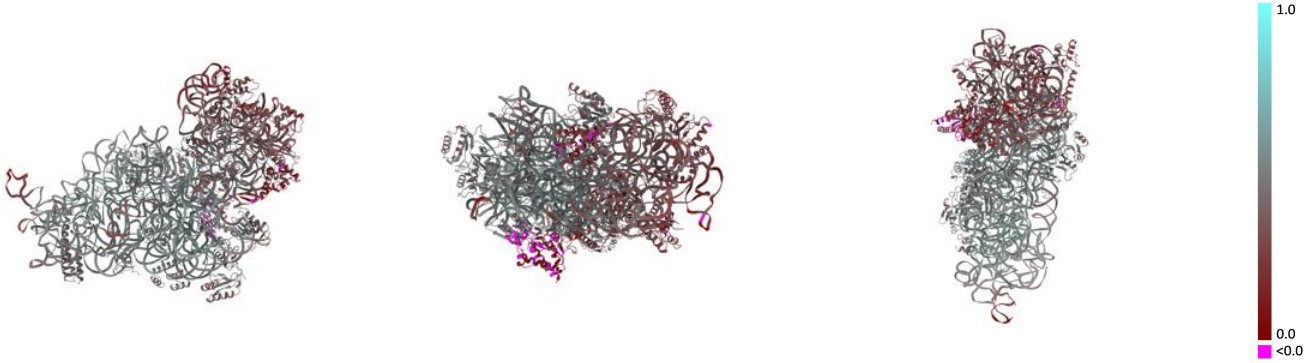
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.016 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

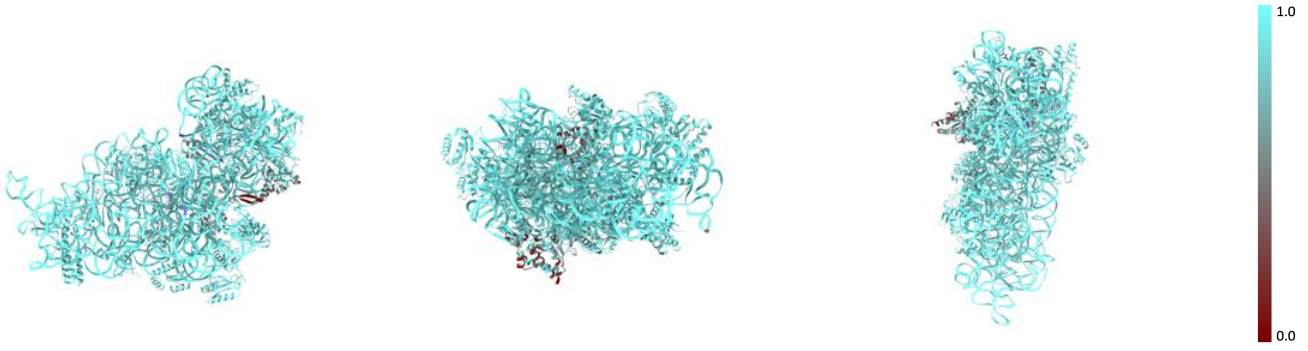
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

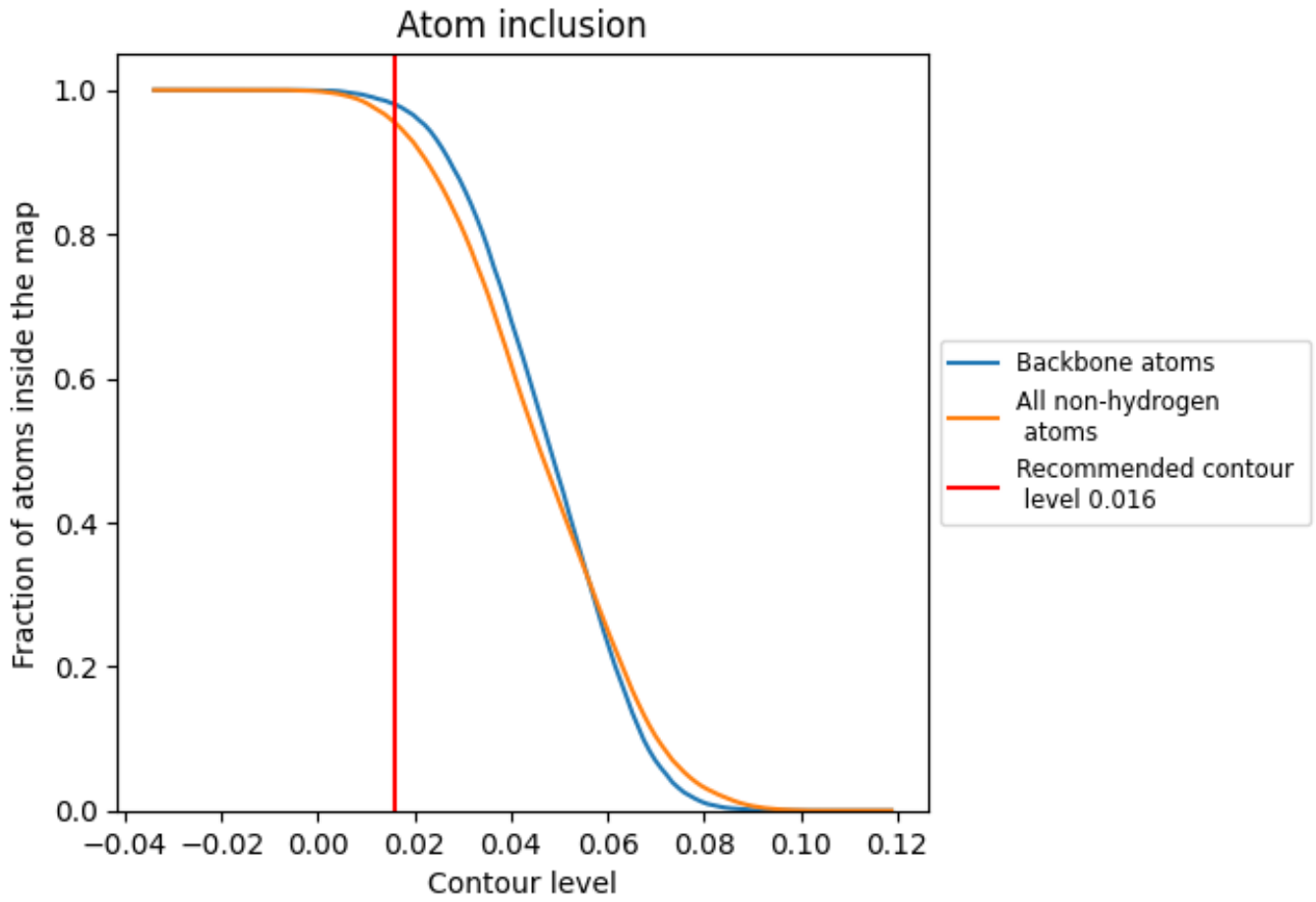
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.016).

9.4 Atom inclusion (i)



At the recommended contour level, 98% of all backbone atoms, 95% 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 (0.016) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9545	0.4350
A	0.9962	0.4690
B	0.6297	0.0970
C	0.8805	0.3250
D	0.9553	0.4840
E	0.9442	0.4990
F	0.9310	0.4240
G	0.6255	0.2090
H	0.9375	0.4990
I	0.9142	0.3230
J	0.9117	0.3000
K	0.9519	0.4320
L	0.9415	0.5130
M	0.9201	0.2910
N	0.9147	0.3260
O	0.9536	0.4680
P	0.9537	0.5010
Q	0.9652	0.4980
R	0.9533	0.4510
S	0.9330	0.3110
T	0.9725	0.4720
U	0.8511	0.4170
W	0.9156	0.4560