



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2026 – 11:50 AM UTC

PDB ID : 9GUS / pdb_00009gus
EMDB ID : EMD-51618
Title : 30S mRNA delivery complex TEC resolved (30S only)
Authors : Rahil, H.; Weixlbaumer, A.; Webster, M.W.
Deposited on : 2024-09-20
Resolution : 3.50 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:

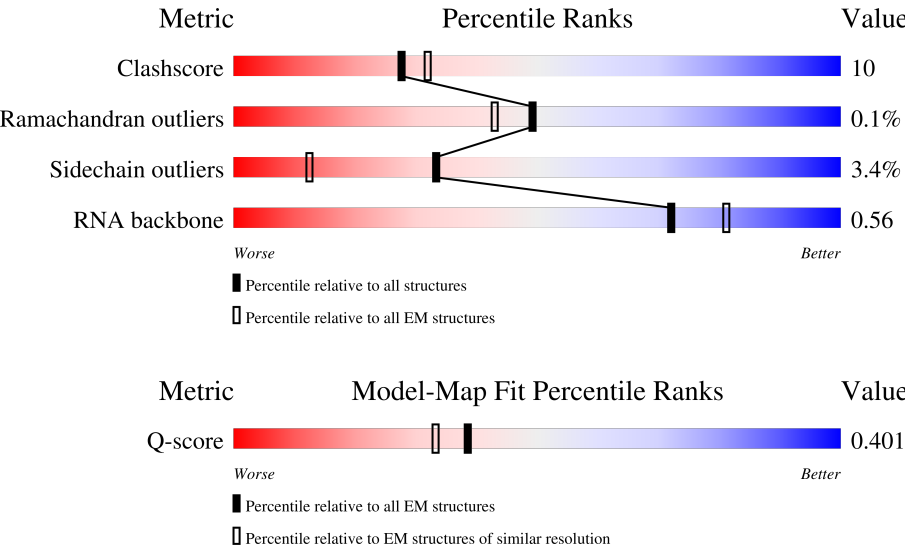
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
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 i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.50 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.



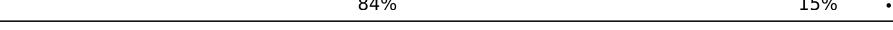
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	13950 (3.00 - 4.00)

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	1541	
2	B	557	
3	C	241	

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Mol	Chain	Length	Quality of chain
4	D	233	 76%15%9%
5	E	206	 83%17%
6	F	156	 81%18%.
7	G	131	 60%18%.21%
8	H	156	 78%20%..
9	I	130	 88%9%..
10	J	130	 71%27%..
11	K	103	 75%22%..
12	L	129	 64%27%9%
13	M	124	 76%21%..
14	N	118	 74%21%..
15	O	101	 86%13%.
16	P	89	 90%8%..
17	Q	82	 84%15%.
18	R	84	 76%19%5%
19	S	75	 65%24%11%
20	T	92	 70%20%.10%
21	U	87	 85%13%..
22	V	71	 69%28%..
23	W	77	 25%62%13%
24	X	53	 11%13%9%66%

2 Entry composition

There are 25 unique types of molecules in this entry. The entry contains 55373 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 ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1539	Total	C	N	O	P	0	0
			33023	14736	6046	10702	1539		

- Molecule 2 is a protein called 30S ribosomal protein S1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	174	Total	C	N	O	S	0	0
			1100	674	197	228	1		

- Molecule 3 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	226	Total	C	N	O	S	0	0
			1764	1116	316	324	8		

- Molecule 4 is a protein called Small ribosomal subunit protein uS3.

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

- Molecule 5 is a protein called Small ribosomal subunit protein uS4.

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

- Molecule 6 is a protein called 30S ribosomal protein S5.

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

- Molecule 7 is a protein called Small ribosomal subunit protein bS6.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	104	Total	C	N	O	S	0	0
			848	536	153	152	7		

- Molecule 8 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	153	Total	C	N	O	S	0	0
			1203	750	231	218	4		

- Molecule 9 is a protein called 30S ribosomal protein S8.

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

- Molecule 10 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	128	Total	C	N	O	S	0	0
			1031	639	207	182	3		

- Molecule 11 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	101	Total	C	N	O	S	0	0
			808	504	155	148	1		

- Molecule 12 is a protein called 30S ribosomal protein S11.

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

- Molecule 13 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	122	Total	C	N	O	S	0	0
			951	588	195	163	5		

- Molecule 14 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	115	Total	C	N	O	S	0	0
			891	552	179	157	3		

- Molecule 15 is a protein called 30S ribosomal protein S14.

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

- Molecule 16 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	88	Total	C	N	O	S	0	0
			714	439	144	130	1		

- Molecule 17 is a protein called 30S ribosomal protein S16.

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

- Molecule 18 is a protein called 30S ribosomal protein S17.

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

- Molecule 19 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	67	Total	C	N	O	S	0	0
			554	350	104	99	1		

- Molecule 20 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	83	Total	C	N	O	S	0	0
			663	424	126	111	2		

- Molecule 21 is a protein called 30S ribosomal protein S20.

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

- Molecule 22 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	V	70	Total	C	N	O	S	0	0
			590	366	125	98	1		

- Molecule 23 is a RNA chain called tRNA(fmet) P-site.

Mol	Chain	Residues	Atoms						AltConf	Trace
23	W	77	Total	C	N	O	P	S	0	0
			1645	734	297	536	77	1		

- Molecule 24 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	X	18	Total	C	N	O	P	0	0
			387	173	70	126	18		

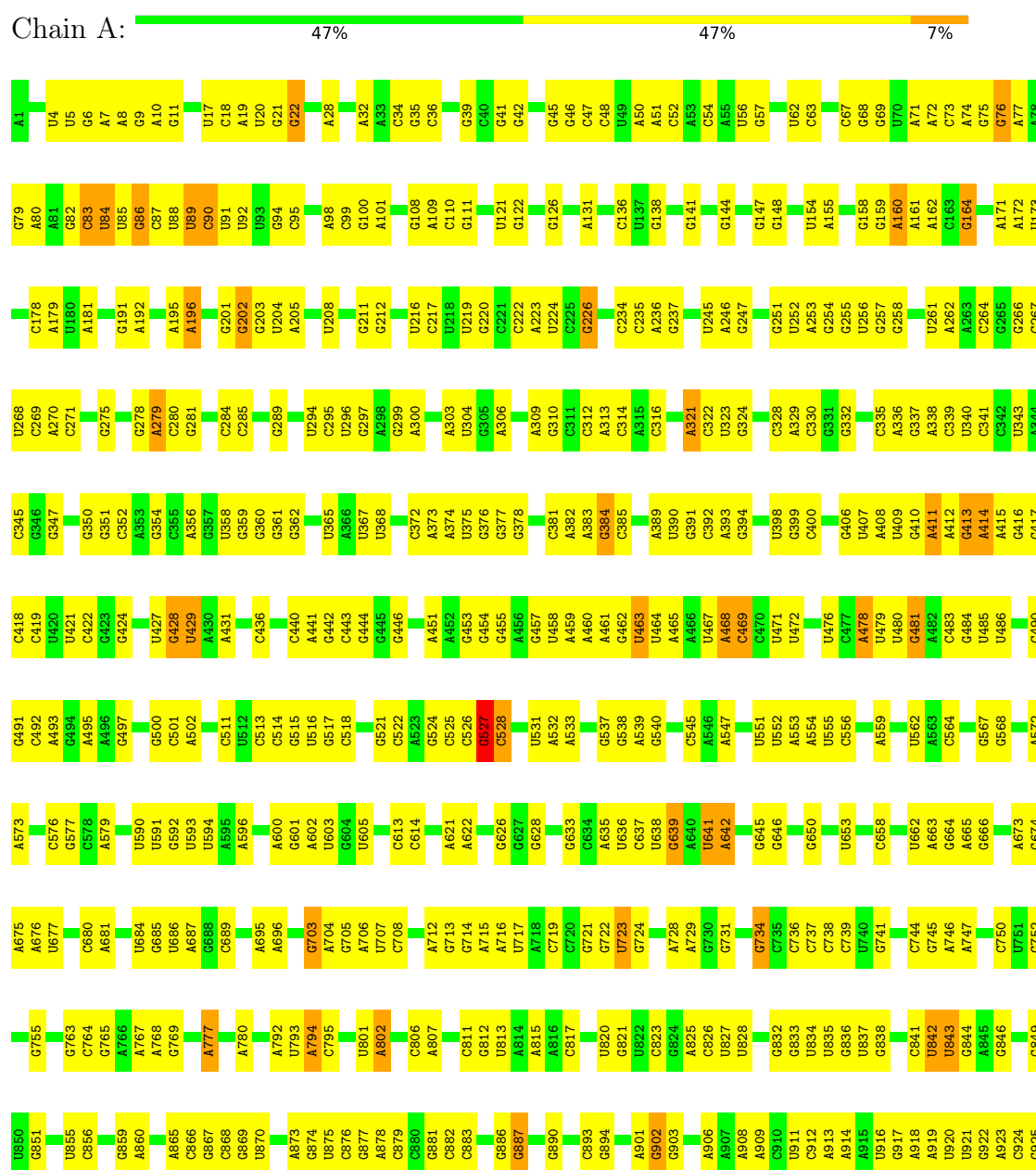
- Molecule 25 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
25	A	124	Total	Mg	0
			124	124	
25	M	1	Total	Mg	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 ribosomal RNA



ALA
LYS
ASP
GLU
GLY
ASP
GLU
LYS
ASP
ALA
ILE
ALA
THR
VAL
ASN
LYS
GLN
GLU
ASP
ALA
ALA
ASN
PHE
SER
ASN
ALA
MET
ALA
GLU
ALA
PHE
LYS
ALA
LYS
GLY
GLU

• Molecule 3: 30S ribosomal protein S2

Chain C:  77% 15% 6%

MET A2 T3 V4 S5 M6 R7 K11 F16 G17 T20 I31 N36 H39 I60 L68 L117 Q120 G124 T125 F126 D127 K128 L129 T130 K131 K132 E133 A134 L135 L157 A160 L161 D167 L179 I186 V187 D188 S191 D192 P193 D194 G195
V196 V199 D204 L212 Y213 Q227 ASP LEU ALA SER GLN ALA GLU GLU SER PHE VAL GLU ALA GLU

• Molecule 4: Small ribosomal subunit protein uS3

Chain D:  76% 15% 9%

MET G2 H6 R11 V15 W22 N25 T26 Y42 E46 L47 A50 R59 R72 P73 V76 I77 K80 V84 L87 R88 K89 V90 V106 L111 K114 I120 F130 M134 L144 G145 A146 V151 F152 V153 E170
M185 V200 K204 A212 VAL GLN GLN PRO GLU LYS PRO ALA ALA GLN PRO LYS LYS LYS GLN ARG GLY ARG LYS

• Molecule 5: Small ribosomal subunit protein uS4

Chain E:  83% 17%

MET A2 K8 L9 K10 L19 F20 L21 V25 R26 A27 T30 K31 C32 K33 L55 R56 Q59 R63 I64 Y65 E69 E95 N100 R104 R111 V129 P139 M170 L171 D174 K177 F182 P186 E187 R188 S189 D190 L191 S192 A193
D194 E202 K206

• Molecule 6: 30S ribosomal protein S5

Chain F:  81% 18%

E10 V38 K52 P57 K62 I72 T80 L81 V88 H89 T90 R93 V94 F95 M96 A99 I105 A110 M111 R112 A113 V114 V120 V123 L124 P133 I134 N135 V136 V137 R138 M147 P150 V153 L165

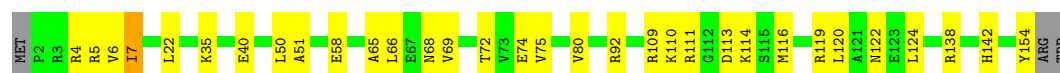
• Molecule 7: Small ribosomal subunit protein bS6

Chain G:  60% 18% 21%

K1 R2 H3 Y4 F8 H11 P12 I22 I29 R38 L39 E40 D41 W42 Q46 L47 I51 K56 A57 H58 N63 V64 I71 V84 I85 R86 R87 R88 R91 V96 V103 K104 ALA LYS ASP ASP GLU ARG ARG ARG ARG ASP ASP PHE ALA ASN
GLU THR ALA ASP ASP ALA ASP ALA GLY ASP SER GLU GLU

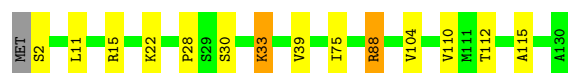
• Molecule 8: 30S ribosomal protein S7

Chain H:  78% 20% ..



- Molecule 9: 30S ribosomal protein S8

Chain I:  88% 9% ..



- Molecule 10: 30S ribosomal protein S9

Chain J:  71% 27% ..



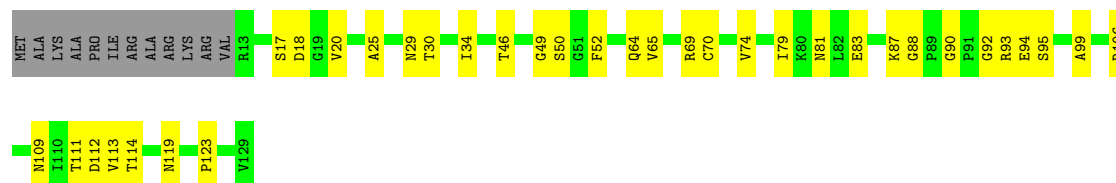
- Molecule 11: 30S ribosomal protein S10

Chain K:  75% 22% ..



- Molecule 12: 30S ribosomal protein S11

Chain L:  64% 27% 9%



- Molecule 13: 30S ribosomal protein S12

Chain M:  76% 21% ..



- Molecule 14: 30S ribosomal protein S13

Chain N:  74% 21% ..



- Molecule 15: 30S ribosomal protein S14

Chain O: 86% 13% .



- Molecule 16: Small ribosomal subunit protein uS15

Chain P: 90% 8% ..



- Molecule 17: 30S ribosomal protein S16

Chain Q: 84% 15% .



- Molecule 18: 30S ribosomal protein S17

Chain R: 76% 19% 5%



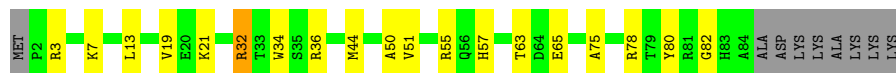
- Molecule 19: 30S ribosomal protein S18

Chain S: 65% 24% 11%



- Molecule 20: 30S ribosomal protein S19

Chain T: 70% 20% . 10%



- Molecule 21: 30S ribosomal protein S20

Chain U: 85% 13% ..



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	7285	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 ($e^-/\text{\AA}^2$)	49.95	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	4.336	Depositor
Minimum map value	-1.468	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.141	Depositor
Recommended contour level	0.159	Depositor
Map size (Å)	503.99997, 503.99997, 503.99997	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.84, 0.84, 0.84	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: D2T, 4OC, 4SU, PSU, 2MG, MA6, MG, OMC, G7M, UR3, H2U, 5MU, 5MC

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	0.22	1/36692 (0.0%)	0.32	0/57230
2	B	0.18	0/1105	0.37	0/1505
3	C	0.25	1/1795 (0.1%)	0.38	0/2418
4	D	0.23	0/1680	0.38	0/2263
5	E	0.18	0/1665	0.33	0/2227
6	F	0.21	0/1165	0.37	0/1568
7	G	0.22	0/867	0.45	0/1171
8	H	0.19	0/1219	0.37	0/1635
9	I	0.17	0/989	0.29	0/1326
10	J	0.24	0/1043	0.42	0/1387
11	K	0.22	0/818	0.42	0/1105
12	L	0.17	0/893	0.36	0/1205
13	M	0.19	0/954	0.34	0/1279
14	N	0.18	0/900	0.35	0/1204
15	O	0.22	0/817	0.31	0/1088
16	P	0.18	0/722	0.31	0/964
17	Q	0.19	0/659	0.32	0/884
18	R	0.17	0/657	0.34	0/881
19	S	0.19	0/563	0.30	0/754
20	T	0.22	0/680	0.34	0/915
21	U	0.20	0/676	0.27	0/895
22	V	0.17	0/598	0.34	0/792
23	W	0.19	0/1725	0.31	0/2687
24	X	0.20	0/433	0.38	0/673
All	All	0.21	2/59315 (0.0%)	0.33	0/88056

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	17	GLY	N-CA	5.20	1.49	1.44
1	A	527	G7M	O3'-P	5.05	1.61	1.56

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	33023	0	16643	579	0
2	B	1100	0	880	27	0
3	C	1764	0	1788	24	0
4	D	1653	0	1727	19	0
5	E	1643	0	1707	26	0
6	F	1152	0	1194	16	0
7	G	848	0	846	12	0
8	H	1203	0	1254	22	0
9	I	979	0	1031	8	0
10	J	1031	0	1076	20	0
11	K	808	0	845	12	0
12	L	877	0	887	26	0
13	M	951	0	1012	19	0
14	N	891	0	952	16	0
15	O	805	0	844	11	0
16	P	714	0	734	8	0
17	Q	649	0	666	9	0
18	R	648	0	691	12	0
19	S	554	0	573	12	0
20	T	663	0	688	15	0
21	U	670	0	719	10	0
22	V	590	0	629	12	0
23	W	1645	0	841	51	0
24	X	387	0	193	10	0
25	A	124	0	0	0	0
25	M	1	0	0	0	0
All	All	55373	0	38420	895	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.

The worst 5 of 895 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:1425:U:H3	1:A:1475:G:H1	1.02	0.99
23:W:51:U:H3	23:W:65:G:H1	0.93	0.93
1:A:664:G:H22	1:A:741:G:H1	1.21	0.87
1:A:1422:G:H1	1:A:1478:U:H3	1.21	0.87
1:A:713:G:H2'	1:A:714:G:C8	2.13	0.82

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	172/557 (31%)	162 (94%)	10 (6%)	0	100	100
3	C	224/241 (93%)	211 (94%)	13 (6%)	0	100	100
4	D	209/233 (90%)	202 (97%)	6 (3%)	1 (0%)	24	57
5	E	203/206 (98%)	202 (100%)	1 (0%)	0	100	100
6	F	154/156 (99%)	146 (95%)	8 (5%)	0	100	100
7	G	102/131 (78%)	95 (93%)	7 (7%)	0	100	100
8	H	151/156 (97%)	146 (97%)	5 (3%)	0	100	100
9	I	127/130 (98%)	125 (98%)	2 (2%)	0	100	100
10	J	126/130 (97%)	120 (95%)	6 (5%)	0	100	100
11	K	99/103 (96%)	97 (98%)	2 (2%)	0	100	100
12	L	115/129 (89%)	107 (93%)	8 (7%)	0	100	100
13	M	119/124 (96%)	113 (95%)	5 (4%)	1 (1%)	16	49
14	N	113/118 (96%)	111 (98%)	2 (2%)	0	100	100
15	O	98/101 (97%)	97 (99%)	1 (1%)	0	100	100
16	P	86/89 (97%)	85 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
17	Q	80/82 (98%)	78 (98%)	2 (2%)	0	100	100
18	R	78/84 (93%)	72 (92%)	6 (8%)	0	100	100
19	S	65/75 (87%)	62 (95%)	3 (5%)	0	100	100
20	T	81/92 (88%)	81 (100%)	0	0	100	100
21	U	84/87 (97%)	84 (100%)	0	0	100	100
22	V	68/71 (96%)	67 (98%)	1 (2%)	0	100	100
All	All	2554/3095 (82%)	2463 (96%)	89 (4%)	2 (0%)	49	79

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	D	80	LYS
13	M	88	LYS

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	75/461 (16%)	64 (85%)	11 (15%)	3	17
3	C	187/199 (94%)	182 (97%)	5 (3%)	39	62
4	D	172/190 (90%)	168 (98%)	4 (2%)	44	64
5	E	172/173 (99%)	170 (99%)	2 (1%)	63	73
6	F	119/119 (100%)	115 (97%)	4 (3%)	32	57
7	G	91/112 (81%)	86 (94%)	5 (6%)	19	46
8	H	126/129 (98%)	121 (96%)	5 (4%)	28	54
9	I	104/105 (99%)	100 (96%)	4 (4%)	29	55
10	J	106/107 (99%)	99 (93%)	7 (7%)	15	41
11	K	88/90 (98%)	85 (97%)	3 (3%)	32	57
12	L	90/99 (91%)	90 (100%)	0	100	100
13	M	102/103 (99%)	100 (98%)	2 (2%)	48	67

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
14	N	93/96 (97%)	88 (95%)	5 (5%)	20	46
15	O	83/84 (99%)	83 (100%)	0	100	100
16	P	76/77 (99%)	74 (97%)	2 (3%)	40	62
17	Q	65/65 (100%)	64 (98%)	1 (2%)	57	71
18	R	74/78 (95%)	72 (97%)	2 (3%)	39	62
19	S	58/65 (89%)	58 (100%)	0	100	100
20	T	72/79 (91%)	69 (96%)	3 (4%)	26	52
21	U	65/66 (98%)	64 (98%)	1 (2%)	57	71
22	V	60/61 (98%)	56 (93%)	4 (7%)	15	41
All	All	2078/2558 (81%)	2008 (97%)	70 (3%)	33	57

5 of 70 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
16	P	18	ASP
17	Q	42	ILE
21	U	67	ILE
6	F	105	ILE
6	F	94	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 32 such sidechains are listed below:

Mol	Chain	Res	Type
21	U	3	ASN
21	U	13	GLN
5	E	136	GLN
5	E	116	GLN
21	U	52	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1537/1541 (99%)	266 (17%)	5 (0%)
23	W	76/77 (98%)	17 (22%)	1 (1%)
24	X	17/53 (32%)	6 (35%)	1 (5%)
All	All	1630/1671 (97%)	289 (17%)	7 (0%)

5 of 289 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	4	U
1	A	5	U
1	A	9	G
1	A	22	G
1	A	32	A

5 of 7 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1166	G
1	A	1214	C
24	X	11	U
23	W	48	U
1	A	843	U

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

17 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	2MG	A	966	1	23,26,27	2.94	8 (34%)	33,38,41	3.07	10 (30%)
1	2MG	A	1516	1	23,26,27	2.88	9 (39%)	33,38,41	2.99	12 (36%)
1	MA6	A	1519	1	23,26,27	1.50	5 (21%)	33,38,41	3.80	12 (36%)
1	4OC	A	1402	1	20,23,24	3.53	9 (45%)	25,32,35	0.87	0
1	UR3	A	1498	1	19,22,23	2.79	7 (36%)	26,32,35	1.58	2 (7%)
23	H2U	W	21	23	18,21,22	3.08	5 (27%)	19,30,33	1.40	3 (15%)
23	OMC	W	33	23	19,22,23	3.08	8 (42%)	25,31,34	0.79	0
1	5MC	A	967	1	19,22,23	4.31	8 (42%)	26,32,35	1.00	2 (7%)
1	5MC	A	1407	1	19,22,23	4.36	8 (42%)	26,32,35	0.95	1 (3%)
23	PSU	W	56	23	18,21,22	1.11	1 (5%)	21,30,33	1.87	5 (23%)
1	G7M	A	527	1	23,26,27	2.72	9 (39%)	34,39,42	2.76	11 (32%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
23	4SU	W	8	23	18,21,22	4.37	8 (44%)	25,30,33	2.28	4 (16%)
13	D2T	M	89	13	8,9,10	1.76	1 (12%)	6,11,13	2.38	2 (33%)
1	2MG	A	1207	1	23,26,27	2.88	9 (39%)	33,38,41	2.90	13 (39%)
23	5MU	W	55	23	19,22,23	1.40	6 (31%)	27,32,35	2.03	6 (22%)
1	PSU	A	516	1	18,21,22	1.08	2 (11%)	21,30,33	1.98	5 (23%)
1	MA6	A	1518	1	23,26,27	1.51	4 (17%)	33,38,41	3.42	11 (33%)

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	2MG	A	966	1	-	2/9/27/28	0/3/3/3
1	2MG	A	1516	1	-	1/9/27/28	0/3/3/3
1	MA6	A	1519	1	-	7/11/29/30	0/3/3/3
1	4OC	A	1402	1	-	0/9/29/30	0/2/2/2
1	UR3	A	1498	1	-	0/7/25/26	0/2/2/2
23	H2U	W	21	23	-	4/7/38/39	0/2/2/2
23	OMC	W	33	23	-	1/9/27/28	0/2/2/2
1	5MC	A	967	1	-	1/7/25/26	0/2/2/2
1	5MC	A	1407	1	-	0/7/25/26	0/2/2/2
23	PSU	W	56	23	-	0/7/25/26	0/2/2/2
1	G7M	A	527	1	-	3/7/25/26	0/3/3/3
23	4SU	W	8	23	-	0/7/25/26	0/2/2/2
13	D2T	M	89	13	-	1/7/12/14	-
1	2MG	A	1207	1	-	1/9/27/28	0/3/3/3
23	5MU	W	55	23	-	0/7/25/26	0/2/2/2
1	PSU	A	516	1	-	0/7/25/26	0/2/2/2
1	MA6	A	1518	1	-	3/11/29/30	0/3/3/3

The worst 5 of 107 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1407	5MC	C6-C5	10.20	1.51	1.34
1	A	967	5MC	C6-C5	10.11	1.51	1.34
23	W	8	4SU	C4-N3	9.92	1.47	1.37
23	W	21	H2U	C2-N1	9.21	1.48	1.35
1	A	966	2MG	C2-N3	8.74	1.48	1.32

The worst 5 of 99 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1519	MA6	N1-C6-N6	-14.64	99.02	116.86
1	A	1518	MA6	N1-C6-N6	-13.00	101.02	116.86
1	A	1519	MA6	C5-C6-N6	9.85	140.92	125.33
1	A	966	2MG	C1'-N9-C8	-9.75	99.03	126.73
1	A	966	2MG	C1'-N9-C4	9.06	153.24	126.49

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1518	MA6	C5-C6-N6-C10
1	A	1519	MA6	O4'-C4'-C5'-O5'
1	A	1519	MA6	C5-C6-N6-C10
1	A	1519	MA6	N1-C6-N6-C10
23	W	21	H2U	O4'-C1'-N1-C6

There are no ring outliers.

10 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	966	2MG	1	0
1	A	1516	2MG	1	0
1	A	1519	MA6	3	0
1	A	1402	4OC	1	0
23	W	33	OMC	2	0
1	A	1407	5MC	1	0
1	A	527	G7M	1	0
13	M	89	D2T	1	0
1	A	1207	2MG	2	0
1	A	1518	MA6	4	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 125 ligands modelled in this entry, 125 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](#)

There are no chain breaks in this entry.

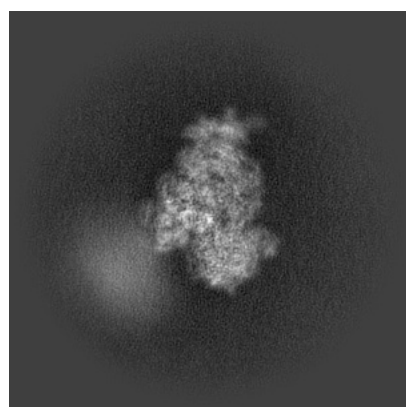
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-51618. These allow visual inspection of the internal detail of the map and identification of artifacts.

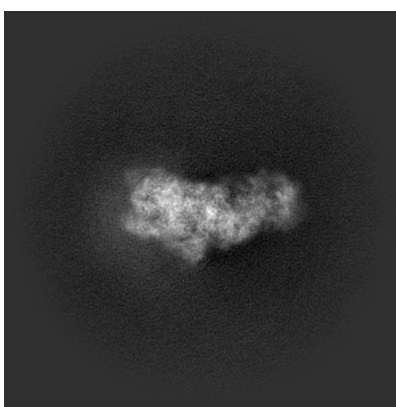
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

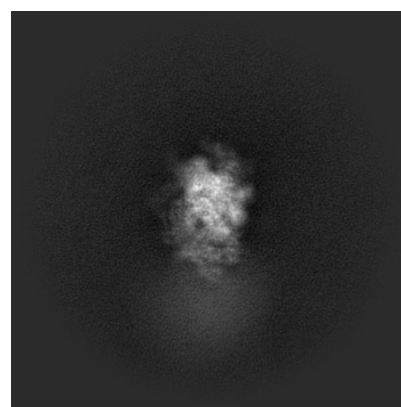
6.1.1 Primary map



X



Y

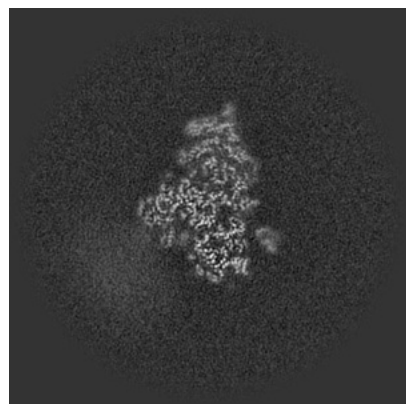


Z

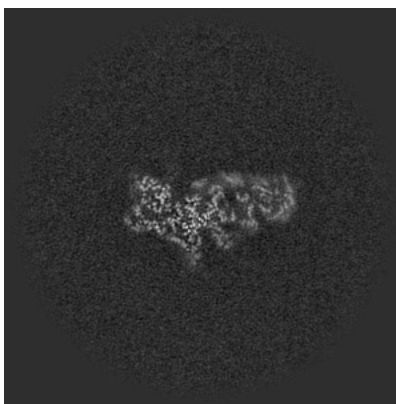
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

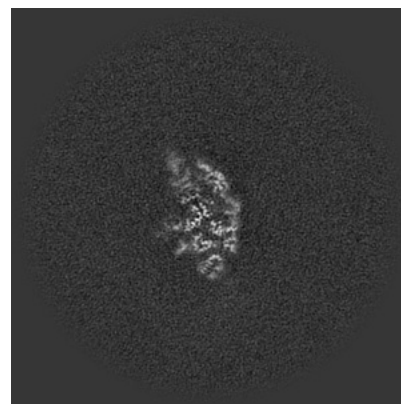
6.2.1 Primary map



X Index: 300



Y Index: 300

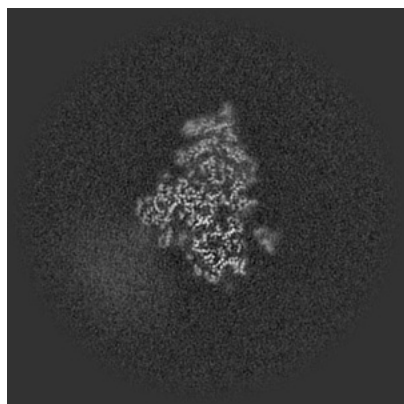


Z Index: 300

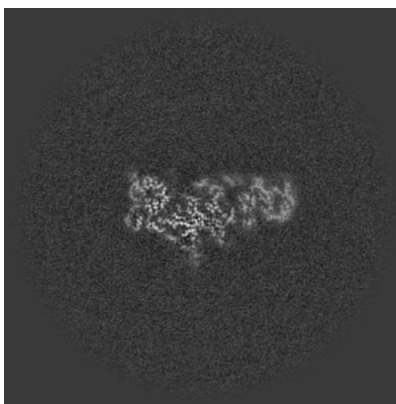
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

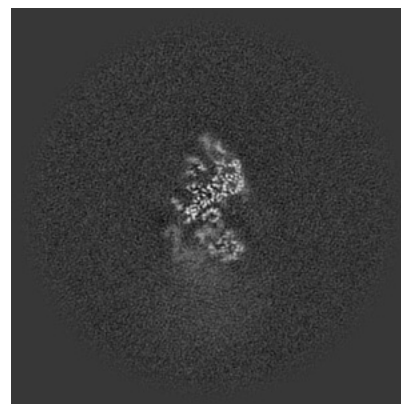
6.3.1 Primary map



X Index: 299



Y Index: 303

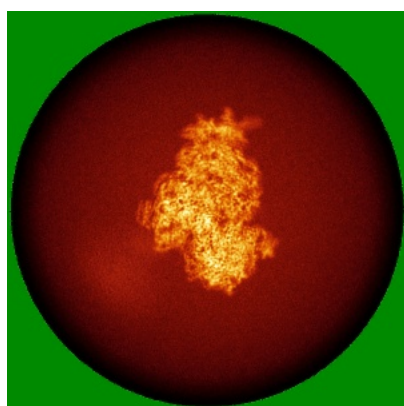


Z Index: 256

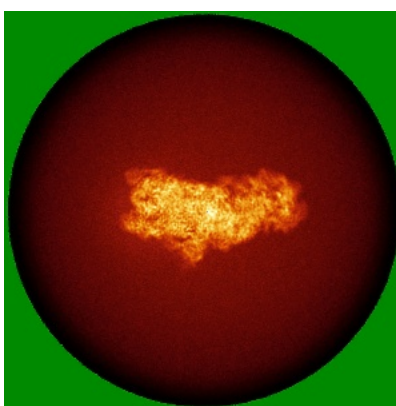
The images above show the largest variance slices of the map in three orthogonal directions.

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

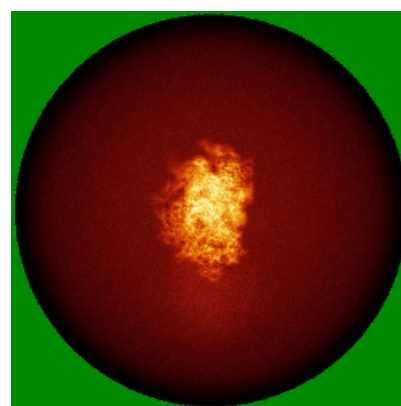
6.4.1 Primary map



X



Y

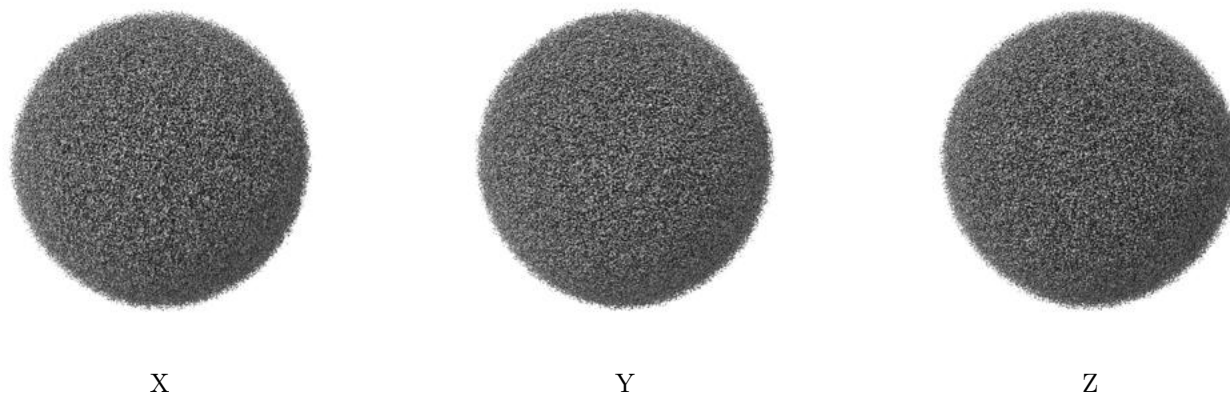


Z

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 0.159. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

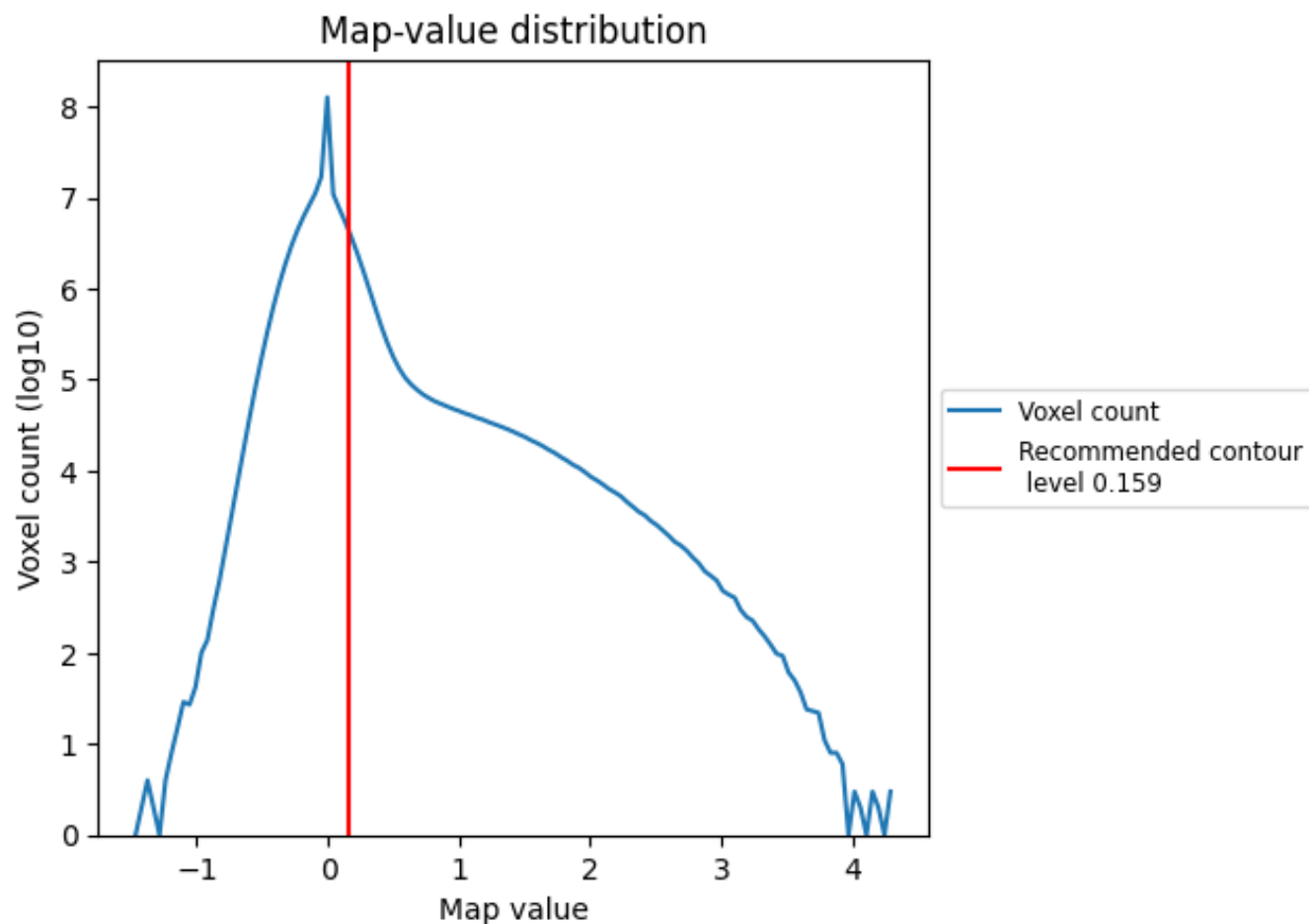
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

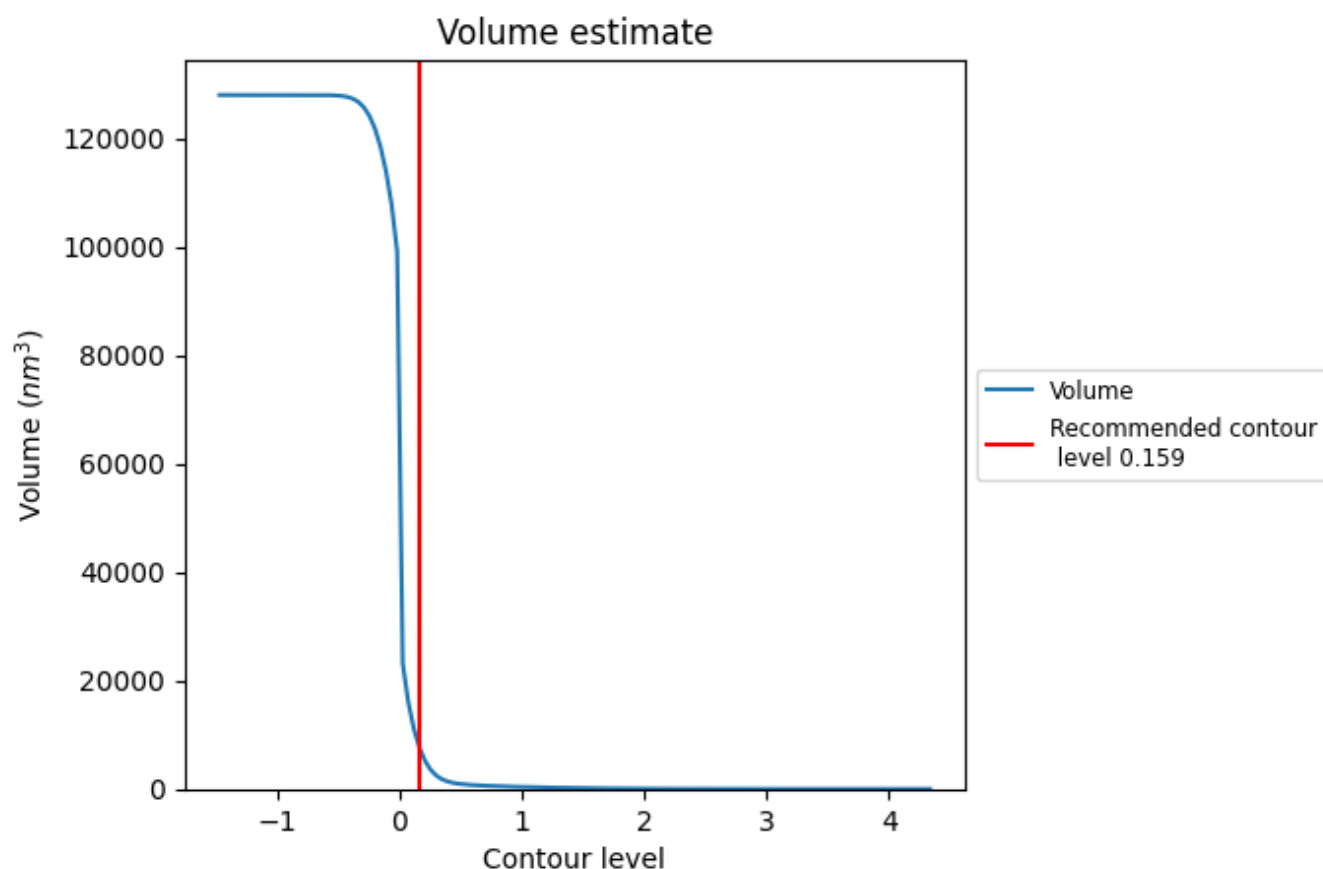
This section contains the results of statistical analysis of the map.

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.

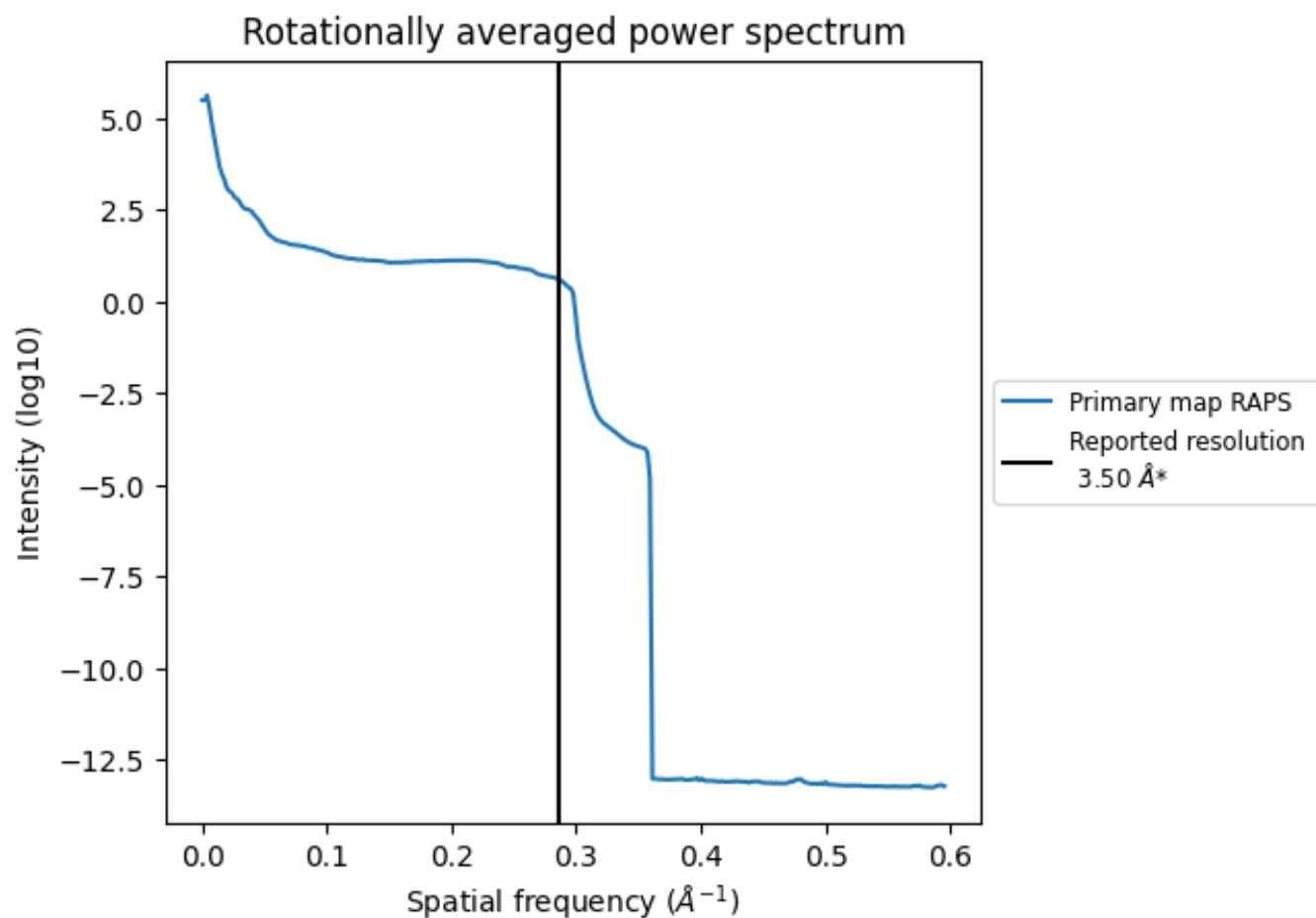
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 8075 nm³; this corresponds to an approximate mass of 7295 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ



*Reported resolution corresponds to spatial frequency of 0.286 Å⁻¹

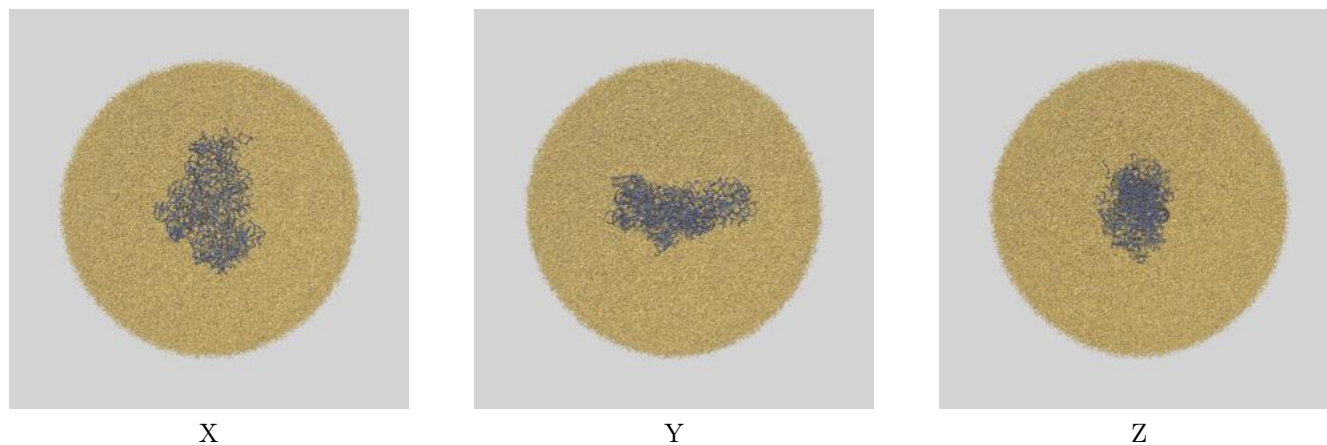
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

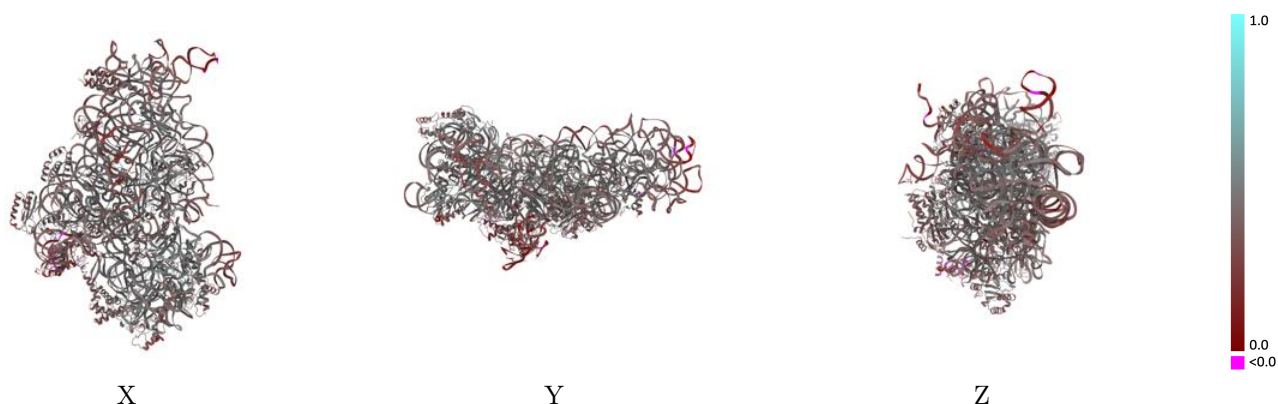
This section contains information regarding the fit between EMDB map EMD-51618 and PDB model 9GUS. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



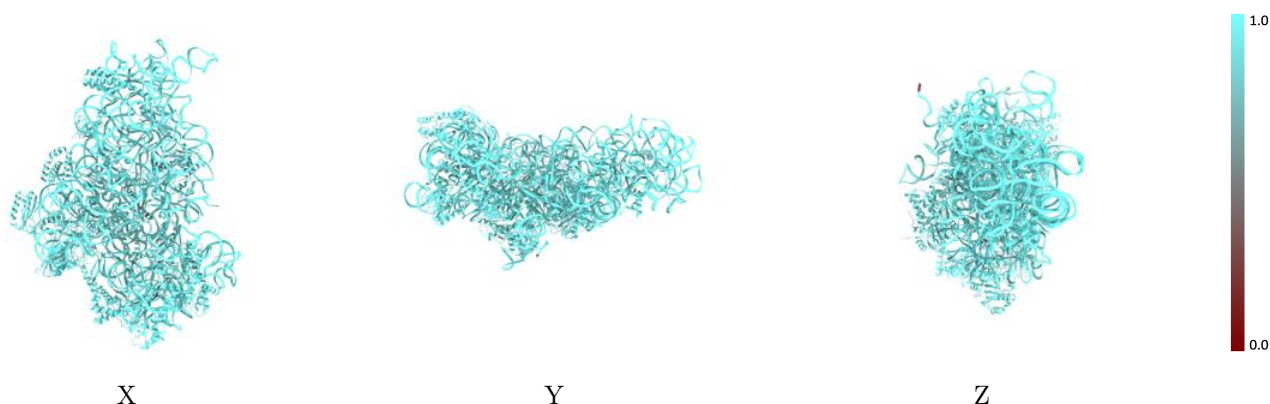
The images above show the 3D surface view of the map at the recommended contour level 0.159 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



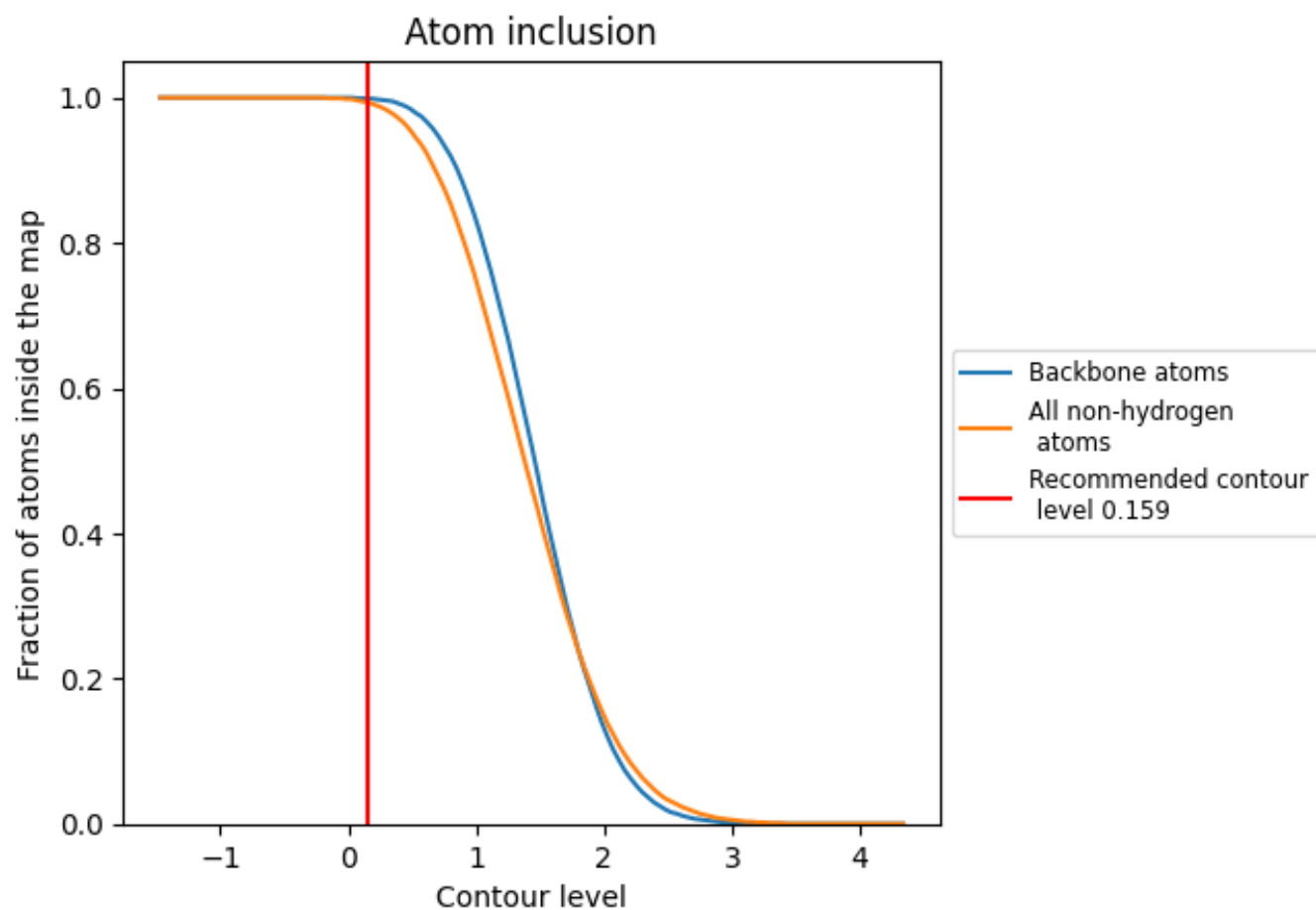
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.159).

9.4 Atom inclusion [i](#)



At the recommended contour level, 100% of all backbone atoms, 99% 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 (0.159) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9930	 0.4010
A	 1.0000	 0.4180
B	 0.9910	 0.2370
C	 0.9700	 0.3570
D	 0.9810	 0.4440
E	 0.9820	 0.3900
F	 0.9740	 0.4310
G	 0.9880	 0.3690
H	 0.9740	 0.3740
I	 0.9820	 0.4180
J	 0.9910	 0.4390
K	 0.9830	 0.4150
L	 0.9790	 0.3320
M	 0.9940	 0.4400
N	 0.9950	 0.3980
O	 0.9920	 0.4500
P	 0.9900	 0.3840
Q	 0.9890	 0.4350
R	 0.9920	 0.3850
S	 0.9790	 0.3810
T	 0.9920	 0.4480
U	 0.9910	 0.3810
V	 0.9660	 0.3260
W	 0.9820	 0.2320
X	 0.9790	 0.1360

