



wwPDB EM Validation Summary Report ⓘ

Mar 5, 2026 – 09:25 PM UTC

PDB ID : 5LMS / pdb_00005lms
EMDB ID : EMD-4078
Title : Structure of bacterial 30S-IF1-IF3-mRNA-tRNA translation pre-initiation complex(state-2C)
Authors : Hussain, T.; Llacer, J.L.; Wimberly, B.T.; Ramakrishnan, V.
Deposited on : 2016-08-01
Resolution : 5.10 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:

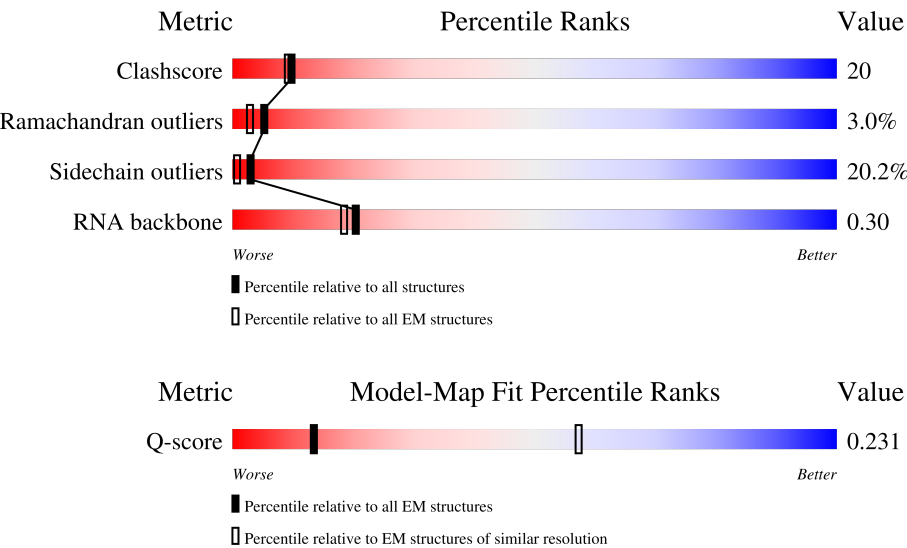
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
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 5.10 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.



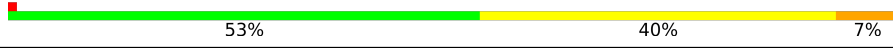
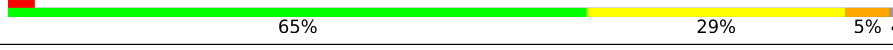
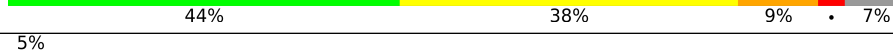
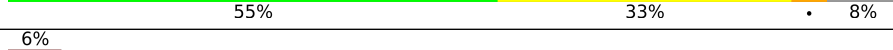
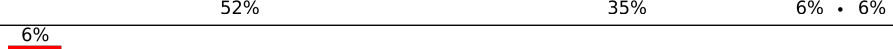
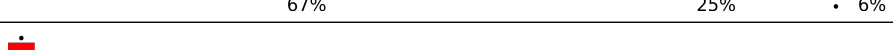
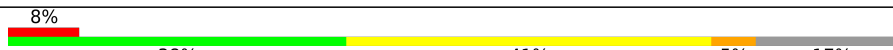
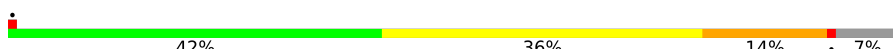
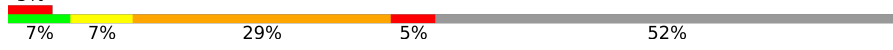
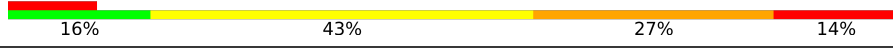
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	844 (4.60 - 5.60)

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	 22% 57% 18% ..
2	B	256	 21% 49% 33% 8% 9%
3	C	239	 52% 26% 8% 14%

Continued on next page...

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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	

2 Entry composition

There are 27 unique types of molecules in this entry. The entry contains 55648 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	119	Total	C	N	O	S	0	0
			885	549	168	165	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	118	Total	C	N	O	S	0	0
			937	579	193	163	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	80	Total	C	N	O	S	0	0
			647	414	119	112	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
			565	359	102	102	2		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
23	X	164	Total	C	N	O	S	0	0
			1336	841	245	241	9		

- Molecule 24 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	Y	20	Total	C	N	O	P	0	0
			439	196	89	134	20		

- Molecule 25 is a RNA chain called tRNAi.

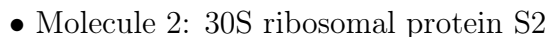
Mol	Chain	Residues	Atoms						AltConf	Trace
25	Z	77	Total	C	N	O	P	S	0	0
			1646	735	297	536	77	1		

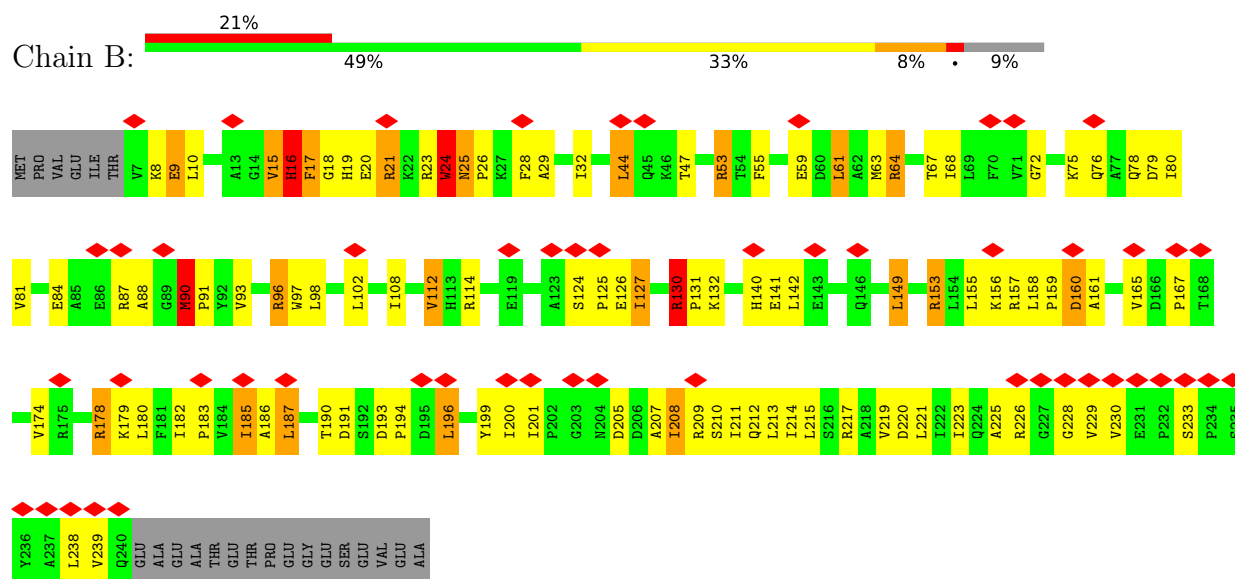
- Molecule 26 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

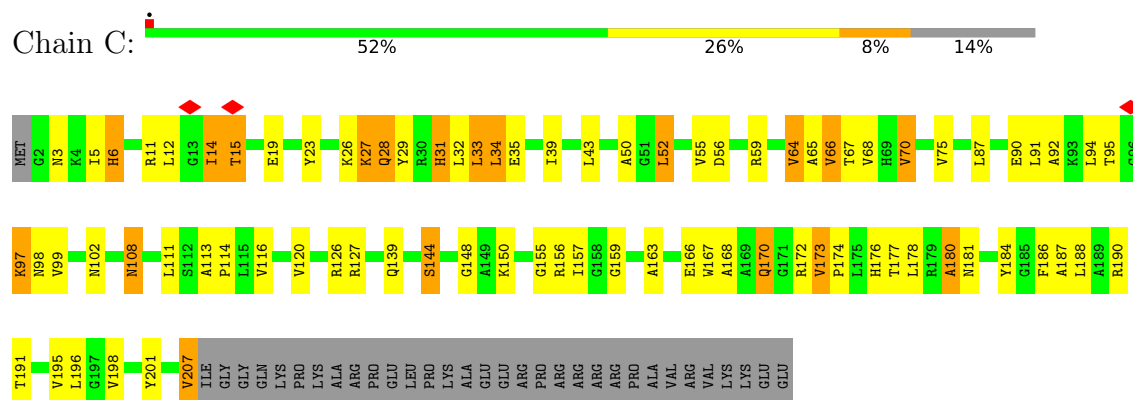
- Molecule 27 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
27	W	1	Total	Mg	0
			1	1	
27	Z	1	Total	Mg	0
			1	1	

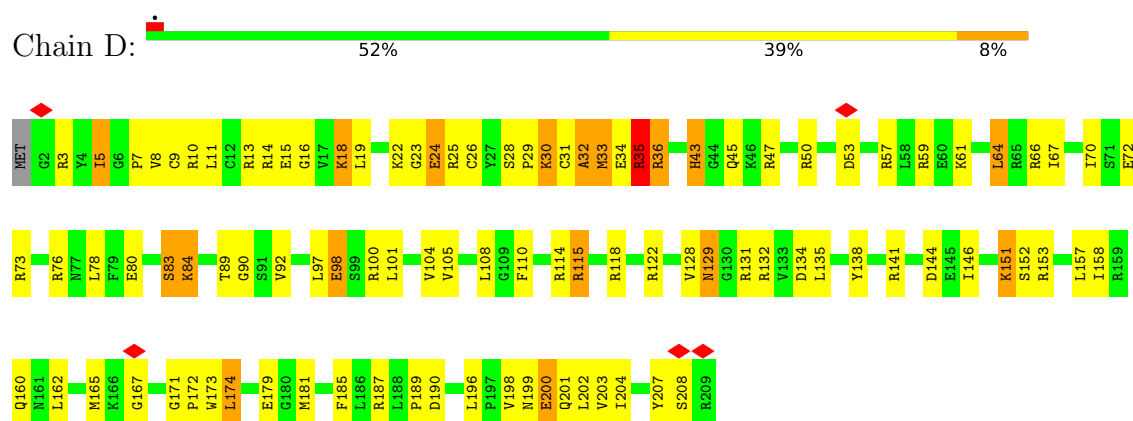




• Molecule 3: 30S ribosomal protein S3

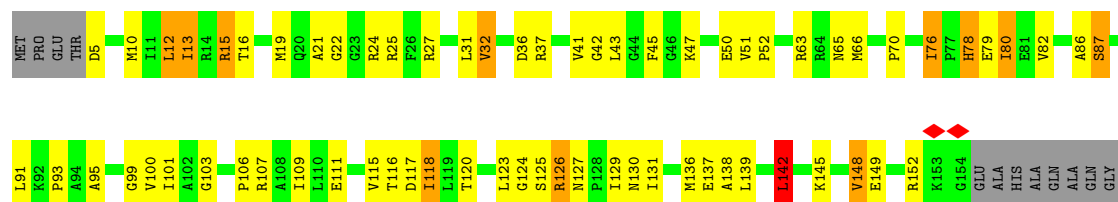


• Molecule 4: 30S ribosomal protein S4

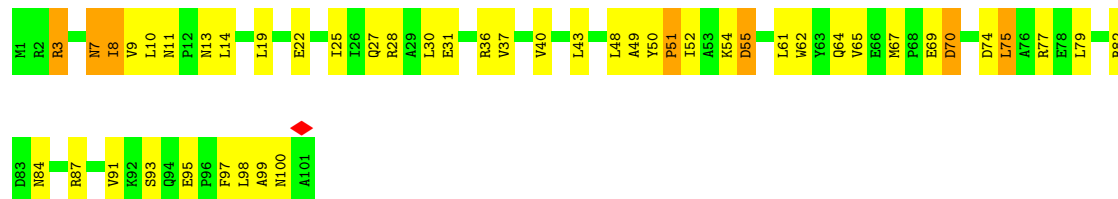


• Molecule 5: 30S ribosomal protein S5

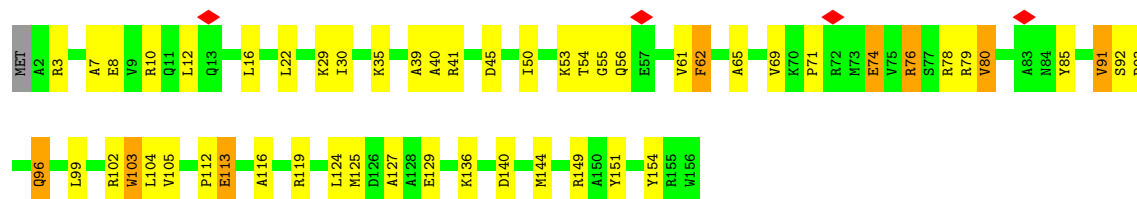




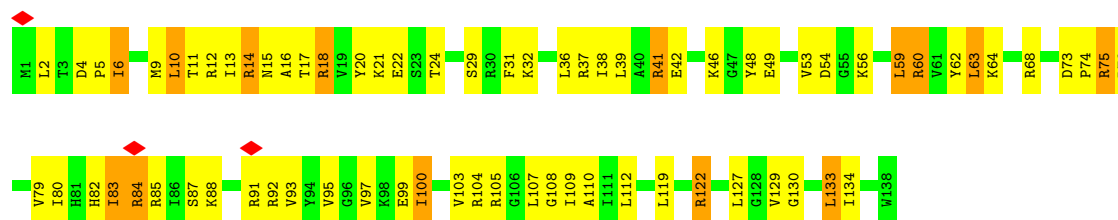
• Molecule 6: 30S ribosomal protein S6



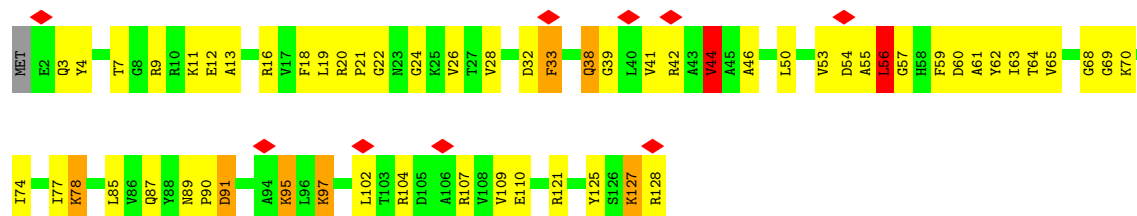
• Molecule 7: 30S ribosomal protein S7



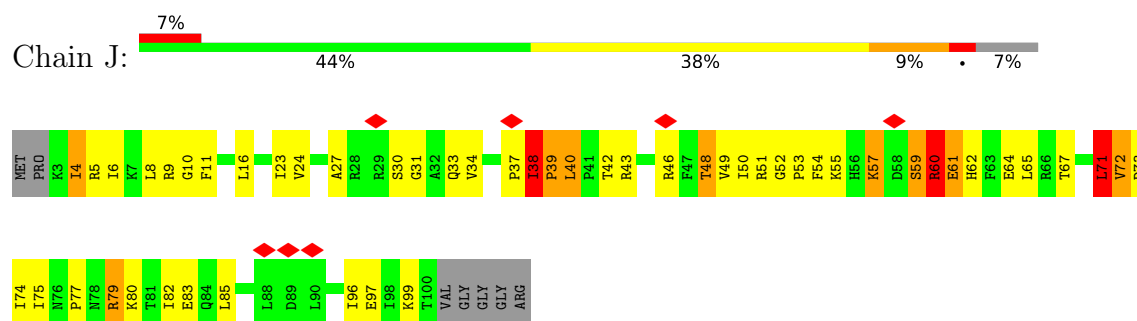
• Molecule 8: 30S ribosomal protein S8



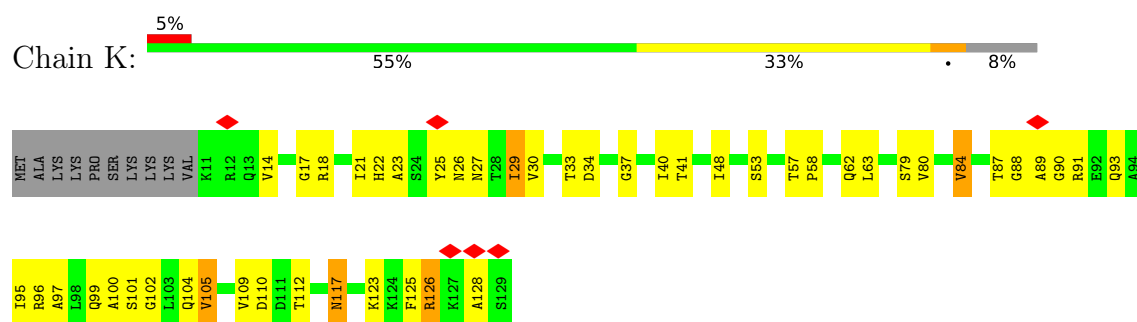
• Molecule 9: 30S ribosomal protein S9



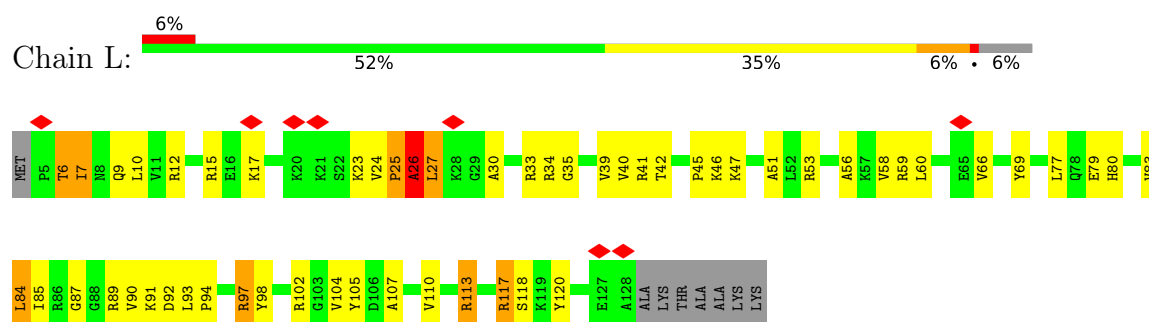
- Molecule 10: 30S ribosomal protein S10



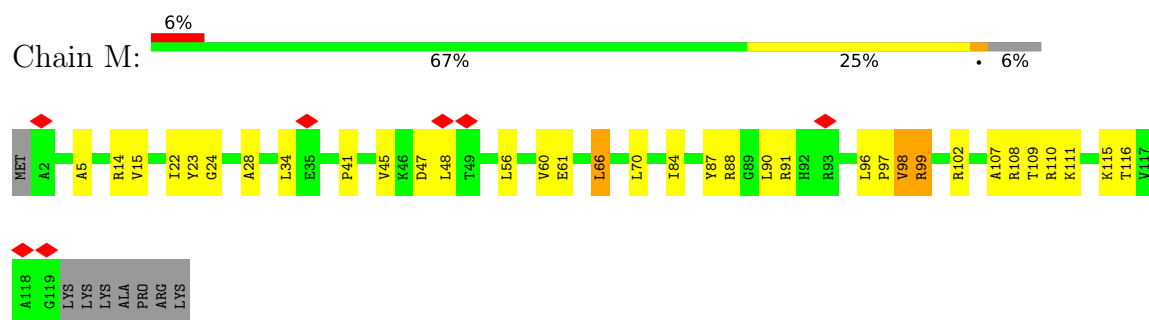
- Molecule 11: 30S ribosomal protein S11



- Molecule 12: 30S ribosomal protein S12



- Molecule 13: 30S ribosomal protein S13

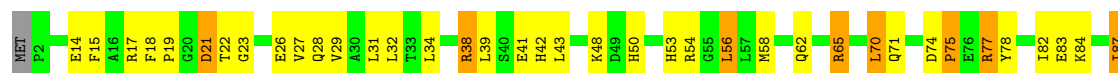


- Molecule 14: 30S ribosomal protein S14 type Z





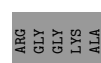
- Molecule 15: 30S ribosomal protein S15



- Molecule 16: 30S ribosomal protein S16



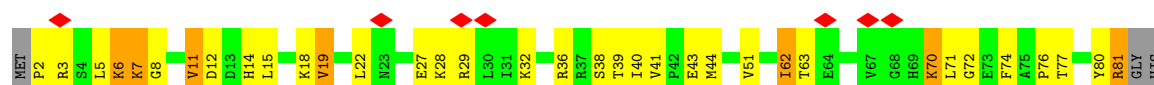
- Molecule 17: 30S ribosomal protein S17



- Molecule 18: 30S ribosomal protein S18



- Molecule 19: 30S ribosomal protein S19



GLY
LYS
GLU
ALA
LYS
LYS
LYS
LYS
LYS

- Molecule 20: 30S ribosomal protein S20

Chain T: 

MET
ALA
GLN
LYS
LYS
LYS
PRO
LYS
R8
N9
S11
L10
A12
L13
K14
R15
Q18
S19
L24
L20
R23
R25
A28
K29
I33
I41
Q42
L43
A44
Q45
A49
E50
E51
A52
L53
K54
I55
M56
R57
E60
S61
L62
K65
K68
G69
S70
T71
L72
H73
K74
N75
A76

A77
A78
R79
R80
K81
S82
R83
L84
M85
R86
K87
V88
R89
Q90
L91
L92
E93
A94
A95
G96
A97
I100
L104
S105
A106

- Molecule 21: 30S ribosomal protein Thx

Chain V: 

MET
G2
K3
G4
K12
I13
Y21
K25
LYS
LYS

- Molecule 22: Translation initiation factor IF-1

Chain W: 

MET
A1
K2
E3
K4
D5
T6
I7
R8
T9
E10
G11
V12
V13
T14
E15
A16
L17
P18
N19
A20
T21
F22
R23
V24
D27
S28
G29
P30
E31
I32
L33
S37
M40
R46
P49
G50
D51
R52
V53
V54
V55
E56
R64
G65
R66
I67
V68
V69
R70
K71

- Molecule 23: Translation initiation factor IF-3

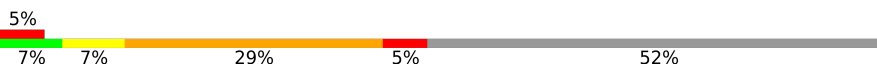
Chain X: 

MET
K3
E4
Y5
L6
T7
N8
E9
R10
I11
A12
A13
K14
K15
V16
V17
V18
V19
G20
P21
D22
G23
K24
Q25
L26
G27
I28
M29
D30
T31
R32
E33
A34
L35
R36
L37
A38
Q39
E40
M41
D42
L43
D44
L45
V46
L47
V48
G49
P50
N51
A52
D53
P54
P55
V56
A57
R58
I59
M60
D61

Y62
S63
K64
W65
R66
Y67
E68
Q69
Q70
M71
A72
E73
K74
E75
A76
R77
K78
LYS
ALA
LYS
ARG
T83
E84
V85
V86
K86
S87
I88
K89
F90
R91
V92
K93
I94
D95
E96
Y99
L103
I106
Q111
V116
K117
V118
T119
I120
M121
F122
R123
G124
R125
E126
V127
A128
E131

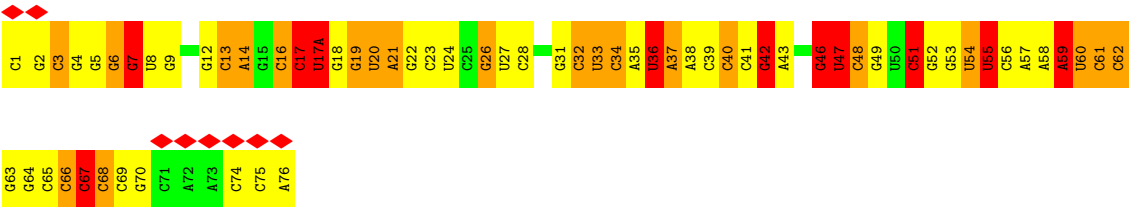
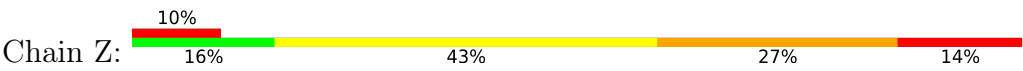
R135
I136
L137
V140
D143
V150
P154
E155
M156
L157
G158
R159
N162
M163
L164
P167
V168
K169
V170
SER
ALA

- Molecule 24: mRNA

Chain Y: 

G
C
U
C
U
U
U
U
U
A
C
A
A
A
U
U
U
U
U
C
A20
G21
G22
C23
A24
A25
G26
G27
A28
G29
G30
U31
A32
A33
A34
A35
A36
U37
G38
U39
C
A

- Molecule 25: tRNAi



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	7898	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	0.356	Depositor
Minimum map value	-0.108	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.020	Depositor
Recommended contour level	0.055	Depositor
Map size (Å)	348.4, 348.4, 348.4	wwPDB
Map dimensions	260, 260, 260	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	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: ZN, MG, G7M, 4SU, OMC, 5MU, PSU

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	0.45	0/36394	0.86	84/56779 (0.1%)
2	B	0.81	1/1935 (0.1%)	1.18	7/2609 (0.3%)
3	C	0.65	0/1636	1.23	13/2205 (0.6%)
4	D	0.65	0/1733	1.26	10/2318 (0.4%)
5	E	0.65	0/1162	1.37	8/1564 (0.5%)
6	F	0.64	0/856	1.14	5/1154 (0.4%)
7	G	0.70	0/1276	1.18	3/1709 (0.2%)
8	H	0.62	0/1136	1.16	3/1527 (0.2%)
9	I	0.69	0/1029	1.20	2/1379 (0.1%)
10	J	0.84	0/805	1.67	13/1082 (1.2%)
11	K	0.78	0/900	1.23	7/1213 (0.6%)
12	L	0.57	0/986	1.06	4/1320 (0.3%)
13	M	0.76	0/947	1.16	2/1270 (0.2%)
14	N	0.59	0/501	1.01	0/664
15	O	0.65	0/745	1.26	1/992 (0.1%)
16	P	0.57	0/716	1.00	1/963 (0.1%)
17	Q	0.56	0/836	1.08	2/1117 (0.2%)
18	R	0.76	0/604	1.17	1/801 (0.1%)
19	S	0.91	0/661	1.35	3/890 (0.3%)
20	T	0.67	0/765	1.35	5/1007 (0.5%)
21	V	0.79	0/212	0.97	0/277
22	W	0.98	0/575	1.46	6/778 (0.8%)
23	X	1.01	1/1354 (0.1%)	1.28	11/1813 (0.6%)
24	Y	0.61	0/493	0.94	2/766 (0.3%)
25	Z	0.66	2/1719 (0.1%)	1.00	12/2674 (0.4%)
All	All	0.57	4/59976 (0.0%)	1.00	205/88871 (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
3	C	1	0
14	N	0	1
19	S	1	0
23	X	0	1
All	All	2	2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	Z	42	G	O3'-P	10.61	1.77	1.61
2	B	233	SER	C-N	5.67	1.38	1.33
25	Z	46	G7M	O3'-P	5.62	1.61	1.56
23	X	54	PRO	CA-C	5.58	1.57	1.52

The worst 5 of 205 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	E	15	ARG	N-CA-C	-23.22	71.68	109.76
19	S	70	LYS	CB-CA-C	23.20	156.58	110.42
9	I	7	THR	CB-CA-C	-22.34	74.42	111.51
10	J	60	ARG	CB-CA-C	-17.92	74.76	110.42
22	W	23	ARG	N-CA-C	-16.90	82.89	109.76

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	C	14	ILE	CA
19	S	70	LYS	CA

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
14	N	13	THR	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.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	32522	0	16436	1209	0
2	B	1900	0	1951	45	0
3	C	1612	0	1677	68	0
4	D	1703	0	1766	59	0
5	E	1146	0	1207	37	0
6	F	843	0	857	25	0
7	G	1257	0	1296	30	0
8	H	1116	0	1177	45	0
9	I	1010	0	1037	35	0
10	J	792	0	835	34	0
11	K	885	0	904	18	0
12	L	970	0	1057	34	0
13	M	937	0	995	17	0
14	N	492	0	530	30	0
15	O	734	0	771	18	0
16	P	700	0	720	16	0
17	Q	823	0	891	21	0
18	R	598	0	670	28	0
19	S	647	0	673	28	0
20	T	763	0	861	32	0
21	V	208	0	221	1	0
22	W	565	0	588	10	0
23	X	1336	0	1389	56	0
24	Y	439	0	219	38	0
25	Z	1646	0	845	119	0
26	D	1	0	0	1	0
26	N	1	0	0	0	0
27	W	1	0	0	0	0
27	Z	1	0	0	0	0
All	All	55648	0	39573	1854	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 1854 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)
4:D:199:ASN:ND2	4:D:202:LEU:HG	1.25	1.43
3:C:29:TYR:CE1	3:C:33:LEU:HD12	1.67	1.30
1:A:1345:U:N3	1:A:1375:A:N6	1.80	1.28
1:A:72:C:C2'	1:A:73:G:H5'	1.65	1.23
23:X:5:TYR:OH	25:Z:20:U:C6	1.92	1.21

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%)	178 (77%)	41 (18%)	13 (6%)	1	14
3	C	204/239 (85%)	173 (85%)	25 (12%)	6 (3%)	3	23
4	D	206/209 (99%)	174 (84%)	25 (12%)	7 (3%)	3	20
5	E	148/162 (91%)	130 (88%)	16 (11%)	2 (1%)	9	38
6	F	99/101 (98%)	91 (92%)	6 (6%)	2 (2%)	6	30
7	G	153/156 (98%)	133 (87%)	17 (11%)	3 (2%)	6	30
8	H	136/138 (99%)	117 (86%)	17 (12%)	2 (2%)	8	38
9	I	125/128 (98%)	101 (81%)	18 (14%)	6 (5%)	2	16
10	J	96/105 (91%)	77 (80%)	11 (12%)	8 (8%)	0	9
11	K	117/129 (91%)	97 (83%)	16 (14%)	4 (3%)	3	20
12	L	122/132 (92%)	95 (78%)	24 (20%)	3 (2%)	4	25
13	M	116/126 (92%)	94 (81%)	19 (16%)	3 (3%)	4	25
14	N	58/61 (95%)	44 (76%)	14 (24%)	0	100	100
15	O	86/89 (97%)	79 (92%)	6 (7%)	1 (1%)	10	42
16	P	81/88 (92%)	76 (94%)	5 (6%)	0	100	100
17	Q	97/105 (92%)	85 (88%)	11 (11%)	1 (1%)	12	47
18	R	71/88 (81%)	59 (83%)	9 (13%)	3 (4%)	2	17
19	S	78/93 (84%)	62 (80%)	15 (19%)	1 (1%)	9	40
20	T	97/106 (92%)	81 (84%)	10 (10%)	6 (6%)	1	13
21	V	22/27 (82%)	19 (86%)	3 (14%)	0	100	100
22	W	69/72 (96%)	58 (84%)	9 (13%)	2 (3%)	3	23
23	X	160/171 (94%)	135 (84%)	21 (13%)	4 (2%)	4	25
All	All	2573/2781 (92%)	2158 (84%)	338 (13%)	77 (3%)	5	22

5 of 77 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	21	ARG
2	B	24	TRP
8	H	105	ARG
10	J	39	PRO
10	J	40	LEU

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%)	148 (73%)	54 (27%)	0	3
3	C	160/188 (85%)	130 (81%)	30 (19%)	1	9
4	D	180/181 (99%)	141 (78%)	39 (22%)	1	6
5	E	115/123 (94%)	89 (77%)	26 (23%)	1	6
6	F	90/90 (100%)	71 (79%)	19 (21%)	1	7
7	G	126/127 (99%)	110 (87%)	16 (13%)	4	17
8	H	119/119 (100%)	89 (75%)	30 (25%)	0	4
9	I	98/99 (99%)	83 (85%)	15 (15%)	3	13
10	J	87/92 (95%)	73 (84%)	14 (16%)	2	12
11	K	90/99 (91%)	75 (83%)	15 (17%)	2	11
12	L	104/109 (95%)	82 (79%)	22 (21%)	1	7
13	M	94/101 (93%)	84 (89%)	10 (11%)	6	22
14	N	49/50 (98%)	39 (80%)	10 (20%)	1	8
15	O	79/80 (99%)	57 (72%)	22 (28%)	0	3
16	P	72/74 (97%)	56 (78%)	16 (22%)	1	6
17	Q	94/97 (97%)	78 (83%)	16 (17%)	2	11
18	R	64/77 (83%)	48 (75%)	16 (25%)	0	4
19	S	71/80 (89%)	55 (78%)	16 (22%)	1	6
20	T	76/82 (93%)	60 (79%)	16 (21%)	1	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
21	V	19/22 (86%)	16 (84%)	3 (16%)	2	12
22	W	61/63 (97%)	53 (87%)	8 (13%)	4	16
23	X	145/150 (97%)	115 (79%)	30 (21%)	1	7
All	All	2195/2323 (94%)	1752 (80%)	443 (20%)	3	8

5 of 443 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
10	J	16	LEU
13	M	102	ARG
23	X	143	ASP
20	T	74	LYS
10	J	74	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 56 such sidechains are listed below:

Mol	Chain	Res	Type
7	G	122	HIS
23	X	114	HIS
11	K	13	GLN
20	T	75	ASN
18	R	36	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1508/1522 (99%)	447 (29%)	113 (7%)
24	Y	19/42 (45%)	15 (78%)	3 (15%)
25	Z	75/77 (97%)	32 (42%)	9 (12%)
All	All	1602/1641 (97%)	494 (30%)	125 (7%)

5 of 494 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 125 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	812	C
1	A	1503	A
1	A	1001	A
1	A	1498	U
25	Z	17(A)	U

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

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	5MU	Z	54	25	19,22,23	1.54	3 (15%)	27,32,35	1.90	6 (22%)
25	OMC	Z	32	25	19,22,23	1.03	2 (10%)	25,31,34	1.48	4 (16%)
25	G7M	Z	46	25	23,26,27	2.58	5 (21%)	34,39,42	2.86	13 (38%)
25	4SU	Z	8	25	18,21,22	1.90	5 (27%)	25,30,33	2.54	9 (36%)
25	PSU	Z	55	25	18,21,22	1.47	3 (16%)	21,30,33	2.22	6 (28%)

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	5MU	Z	54	25	-	0/7/25/26	0/2/2/2
25	OMC	Z	32	25	-	1/9/27/28	0/2/2/2
25	G7M	Z	46	25	-	2/7/25/26	0/3/3/3
25	4SU	Z	8	25	-	1/7/25/26	0/2/2/2
25	PSU	Z	55	25	-	4/7/25/26	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	8.57	1.47	1.33
25	Z	8	4SU	C4-S4	-4.89	1.60	1.68
25	Z	55	PSU	C6-C5	4.69	1.40	1.35
25	Z	46	G7M	C8-N9	4.63	1.48	1.35
25	Z	46	G7M	C5-C4	4.43	1.49	1.38

The worst 5 of 38 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
25	Z	46	G7M	CN7-N7-C8	-7.56	113.34	124.79
25	Z	46	G7M	N9-C8-N7	-6.26	97.28	112.48
25	Z	46	G7M	C8-N7-C5	6.21	115.55	107.78
25	Z	55	PSU	N1-C2-N3	5.76	121.25	115.17
25	Z	8	4SU	C4-N3-C2	-5.55	122.00	127.31

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
25	Z	55	PSU	O4'-C4'-C5'-O5'
25	Z	55	PSU	C3'-C4'-C5'-O5'
25	Z	46	G7M	C3'-C4'-C5'-O5'
25	Z	46	G7M	O4'-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	54	5MU	2	0
25	Z	32	OMC	2	0
25	Z	46	G7M	4	0
25	Z	55	PSU	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 4 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
25	Z	3
24	Y	1

The worst 5 of 10 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	Z	55:PSU	O3'	56:C	P	5.82
1	A	841:U	O3'	848:C	P	5.50
1	A	93:G	O3'	96:U	P	4.90
1	A	84:U	O3'	88:A	P	4.32
1	A	1442(A):G	O3'	1442(B):A	P	3.51

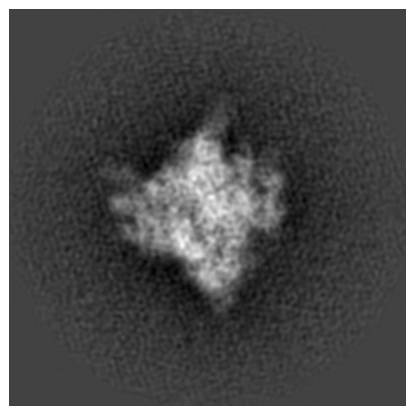
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-4078. These allow visual inspection of the internal detail of the map and identification of artifacts.

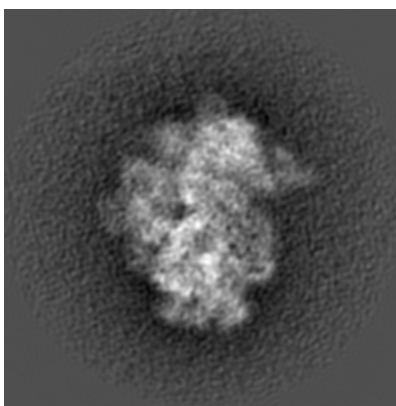
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

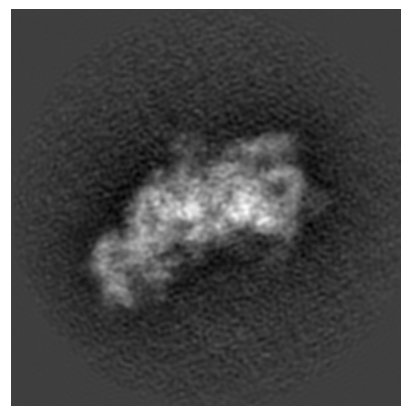
6.1.1 Primary map



X

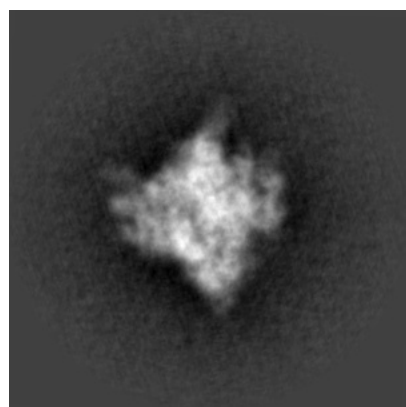


Y

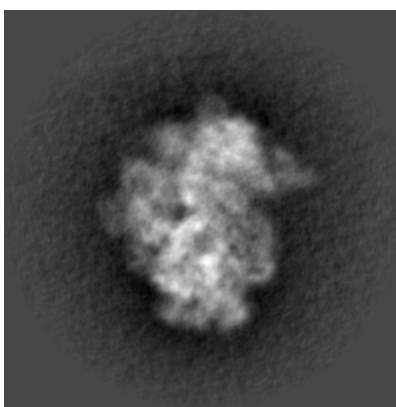


Z

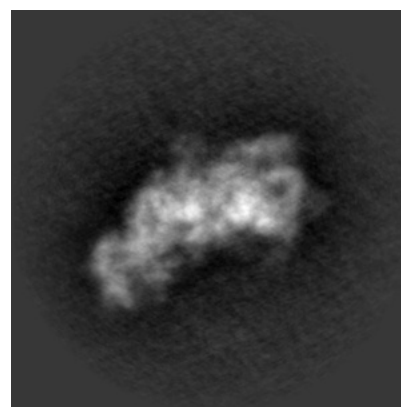
6.1.2 Raw map



X



Y

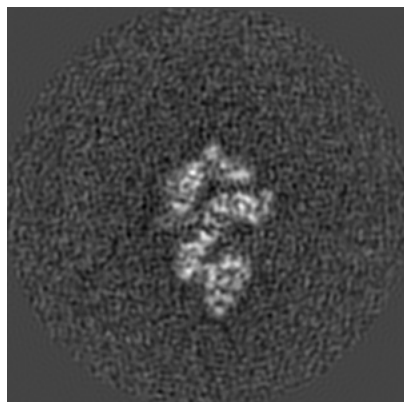


Z

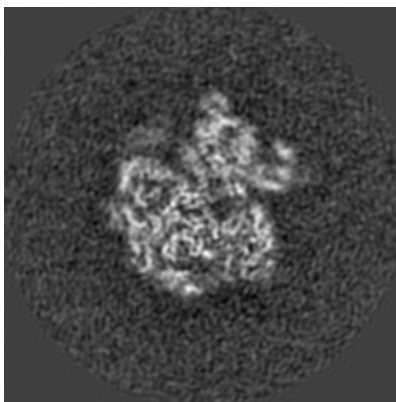
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

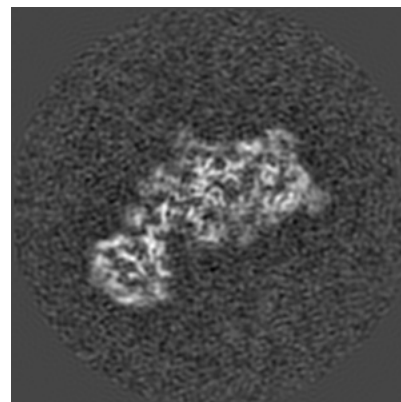
6.2.1 Primary map



X Index: 130

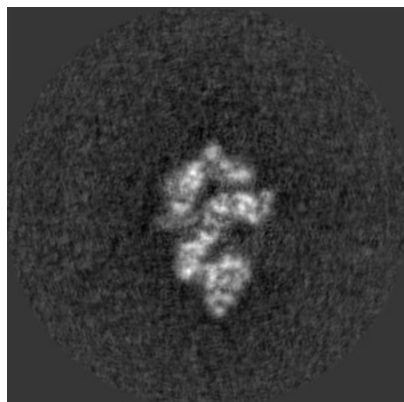


Y Index: 130

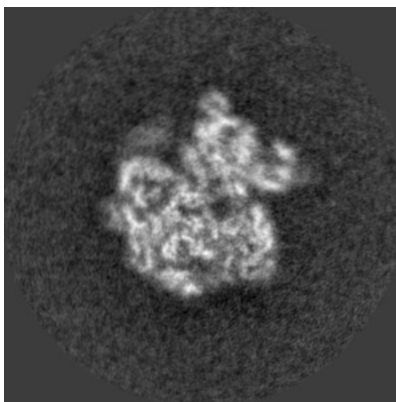


Z Index: 130

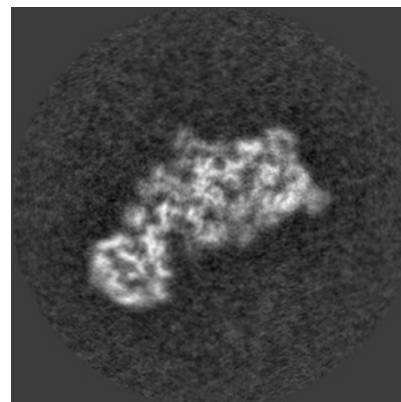
6.2.2 Raw map



X Index: 130



Y Index: 130

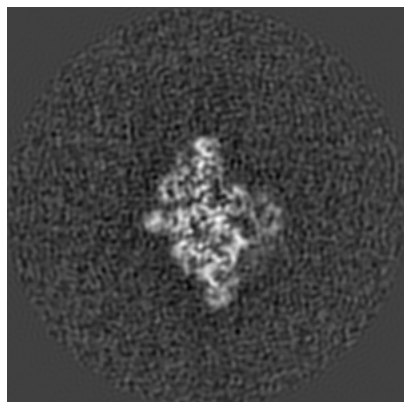


Z Index: 130

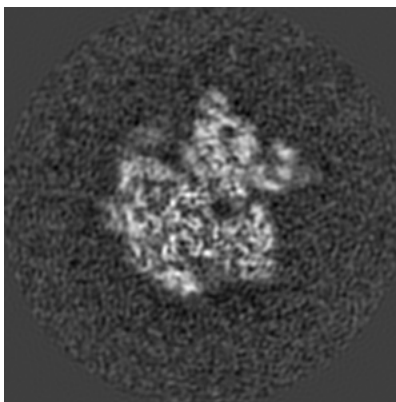
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

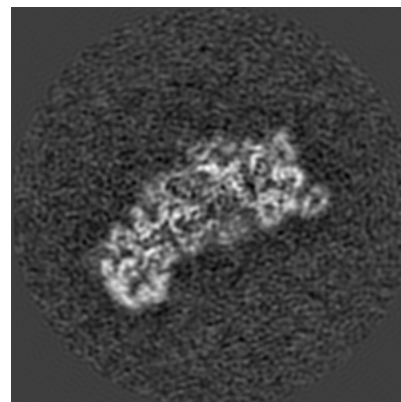
6.3.1 Primary map



X Index: 118

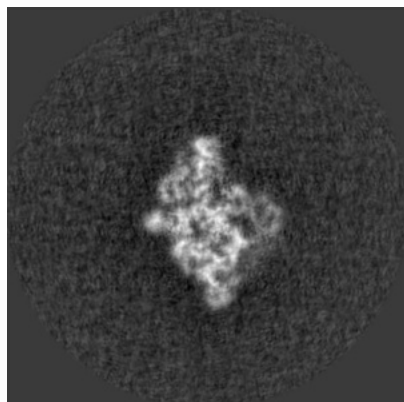


Y Index: 131

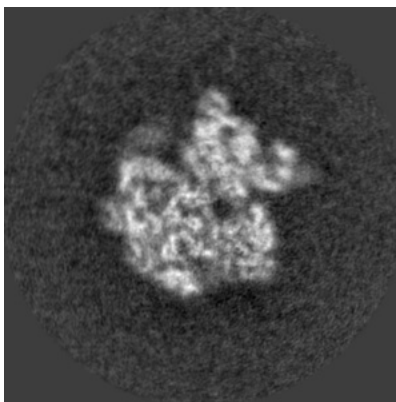


Z Index: 135

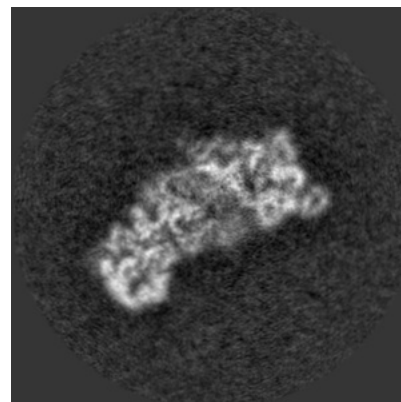
6.3.2 Raw map



X Index: 118



Y Index: 131

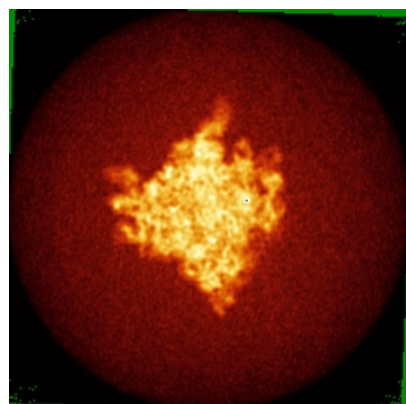


Z Index: 135

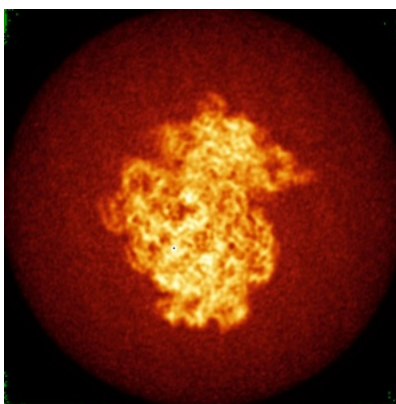
The images above show the largest variance slices of the map in three orthogonal directions.

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

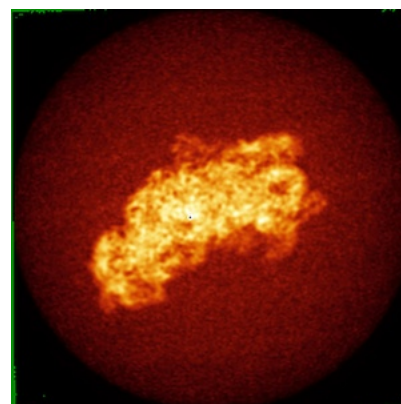
6.4.1 Primary map



X

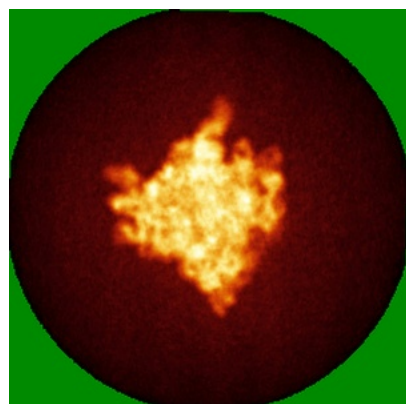


Y

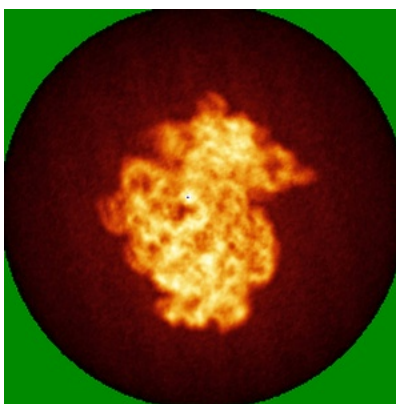


Z

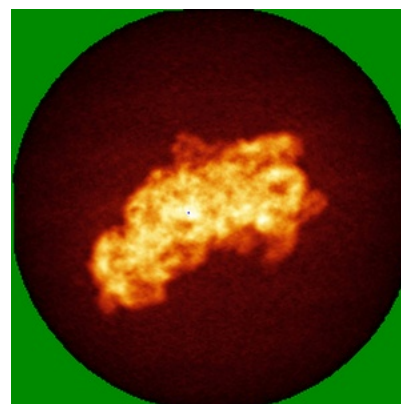
6.4.2 Raw map



X



Y

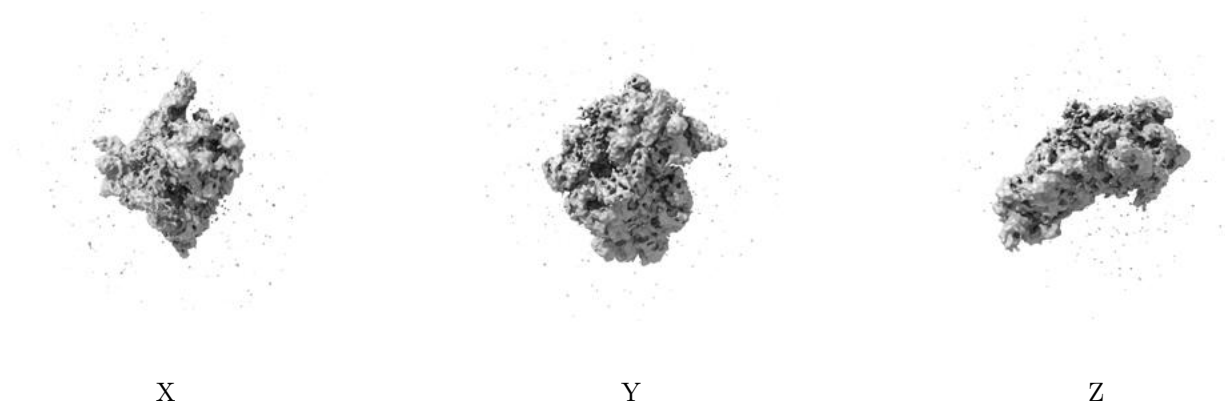


Z

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.

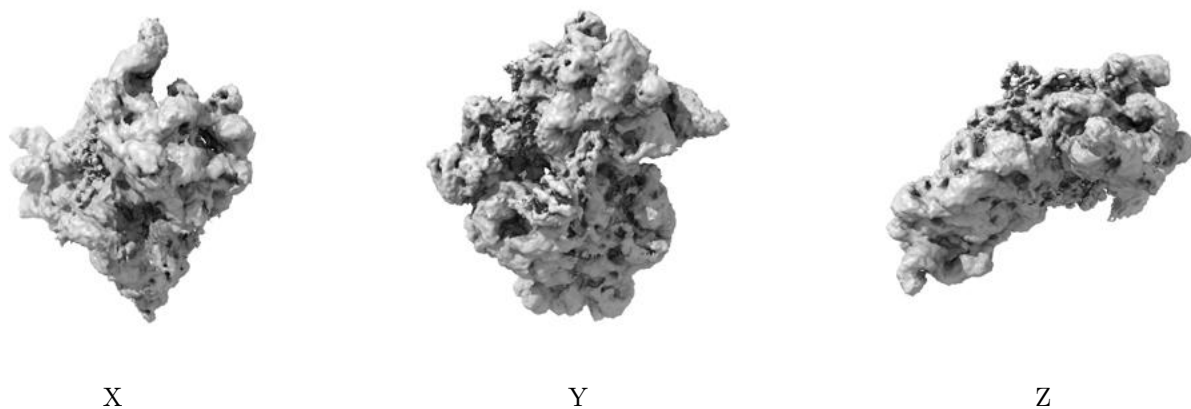
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.055. 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.

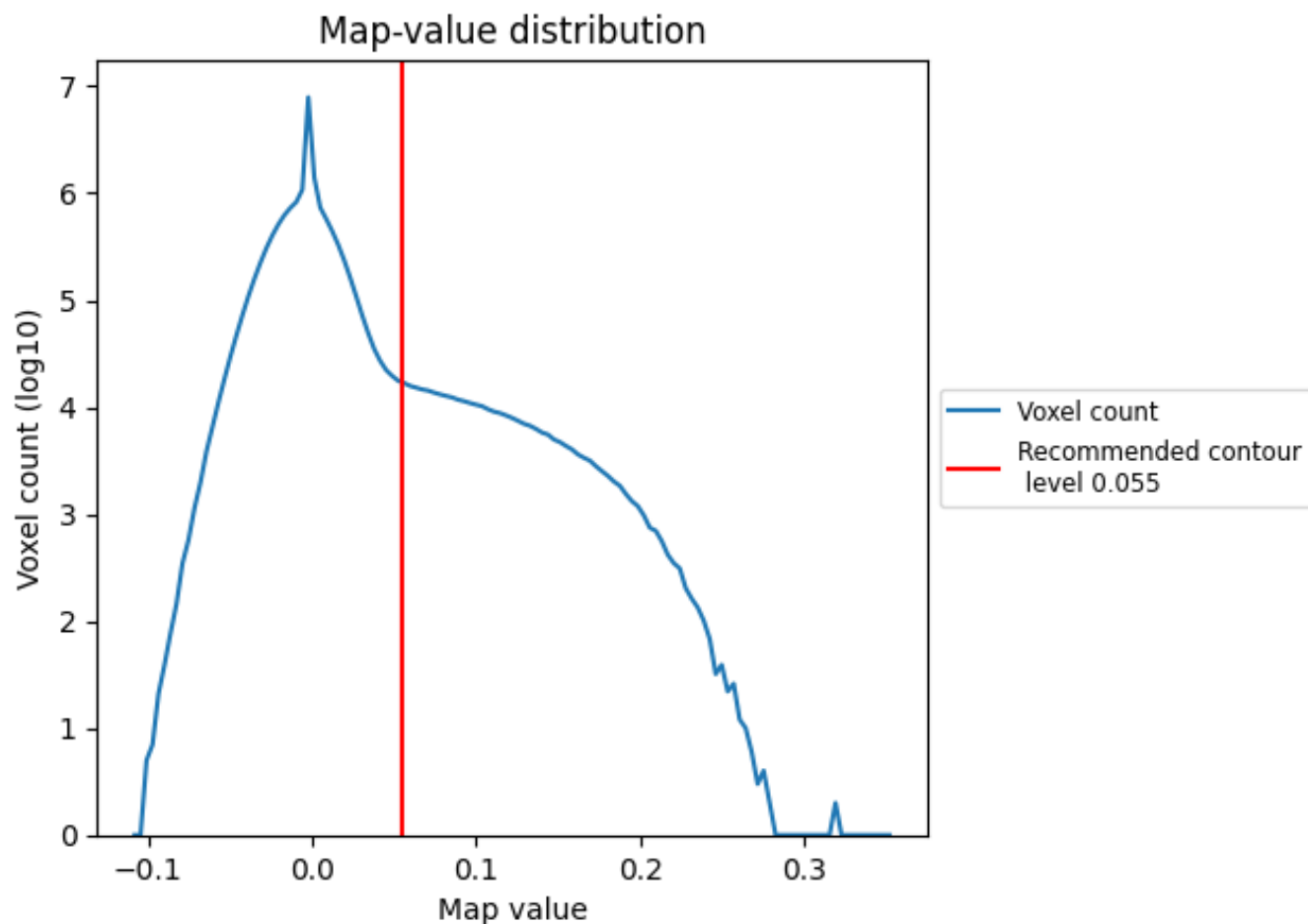
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

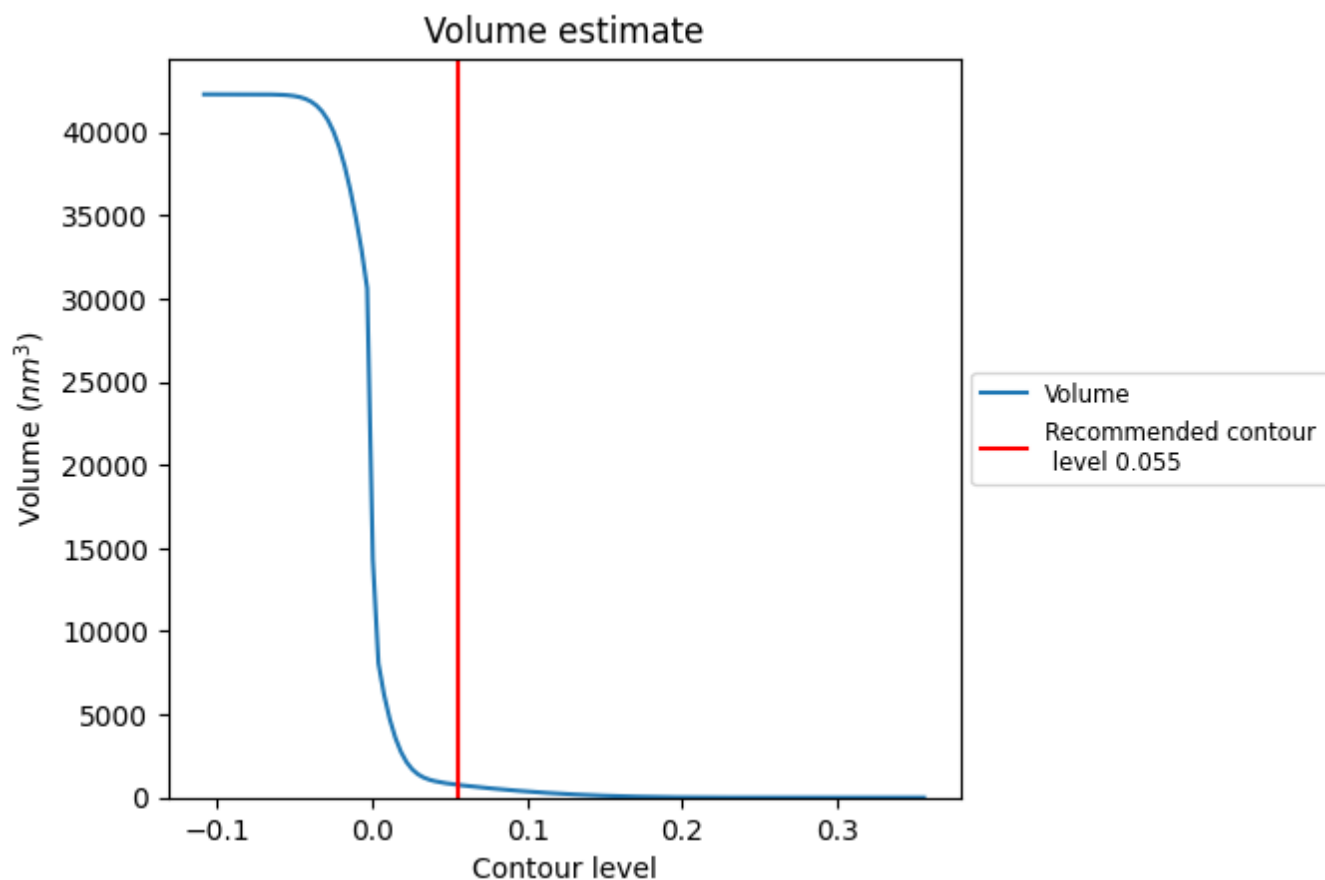
This section contains the results of statistical analysis of the map.

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.

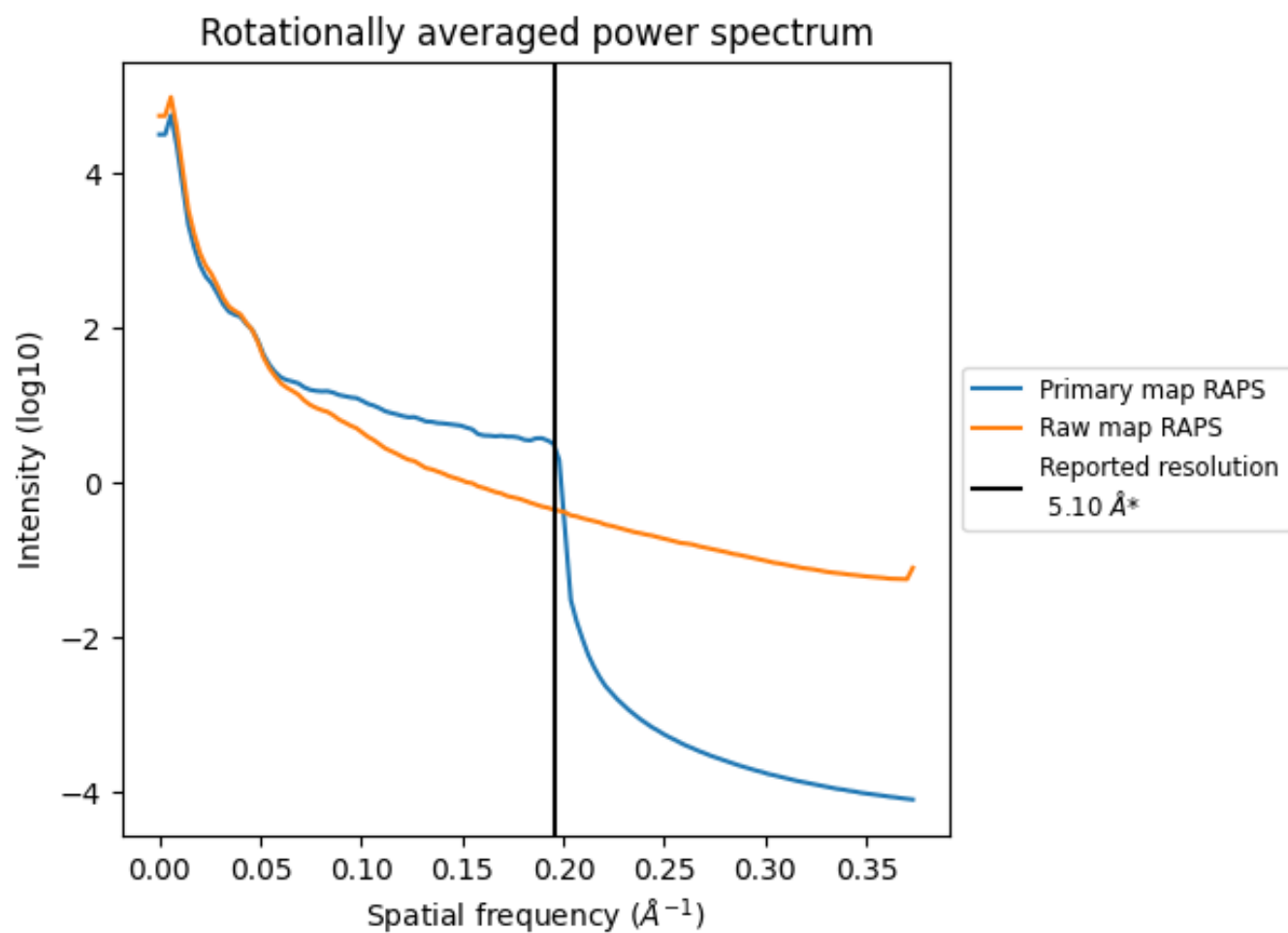
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 769 nm³; this corresponds to an approximate mass of 694 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](#)

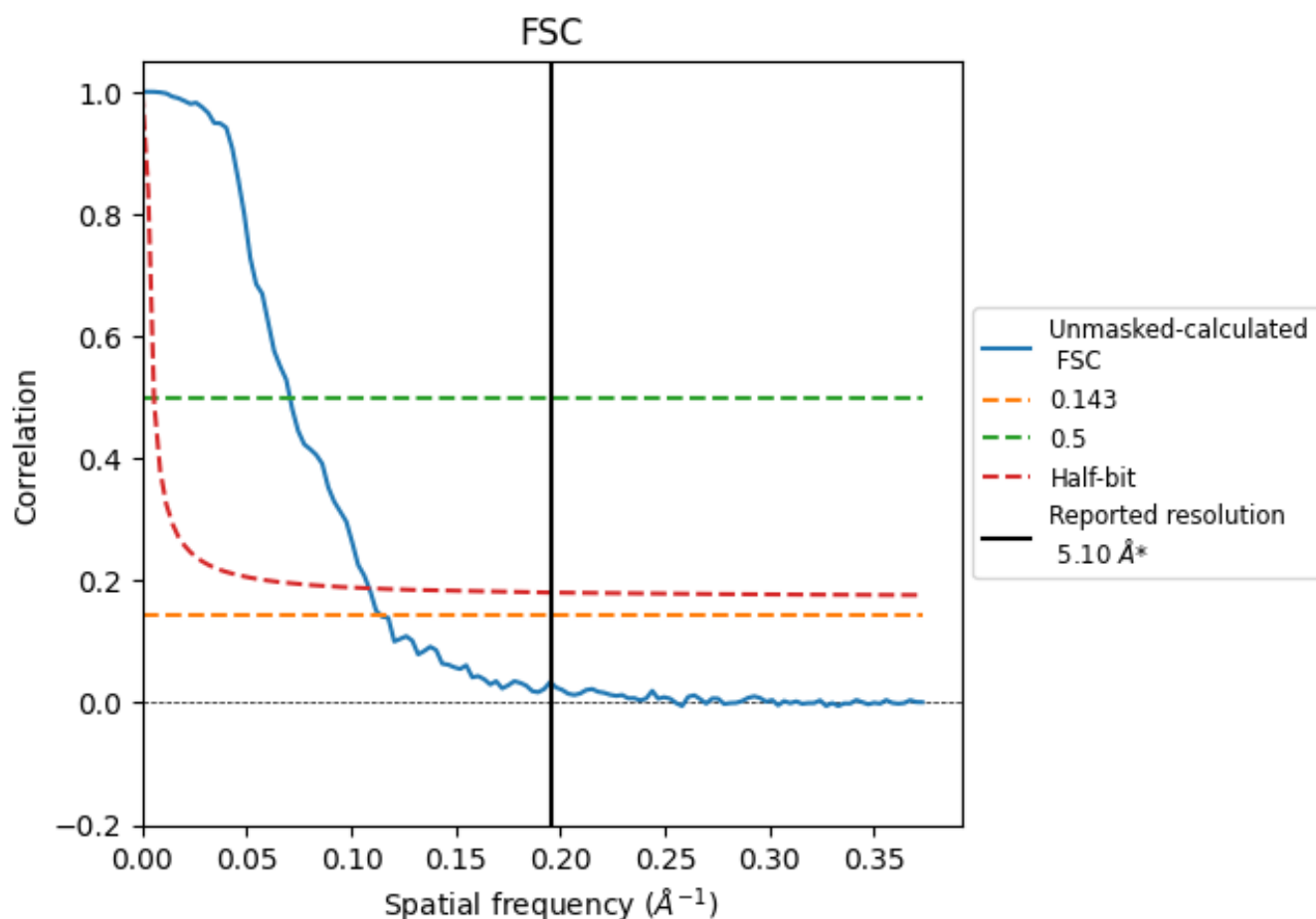


*Reported resolution corresponds to spatial frequency of 0.196 $\text{\AA}^{-1}$

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.196 Å⁻¹

8.2 Resolution estimates [i](#)

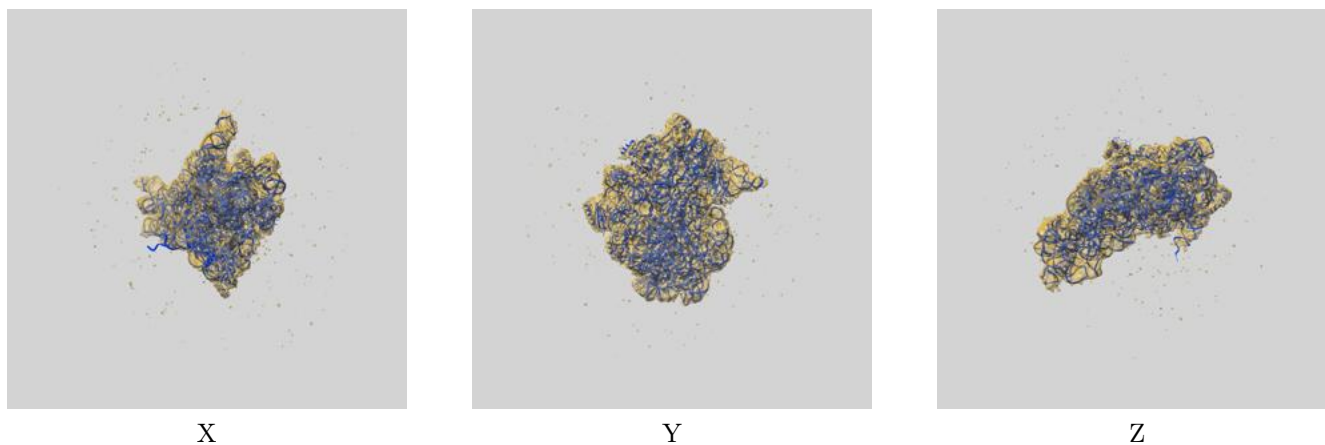
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	5.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	8.76	14.16	9.21

*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 8.76 differs from the reported value 5.1 by more than 10 %

9 Map-model fit [i](#)

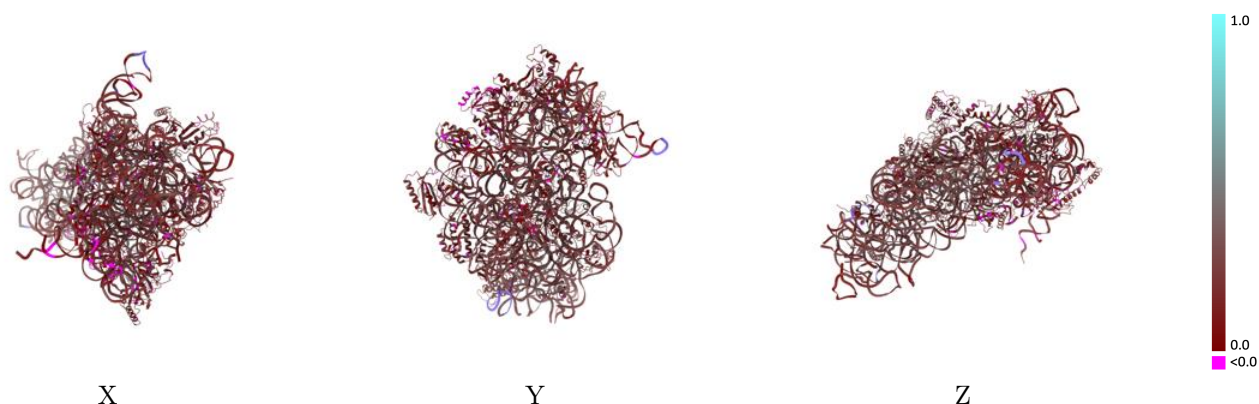
This section contains information regarding the fit between EMDB map EMD-4078 and PDB model 5LMS. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



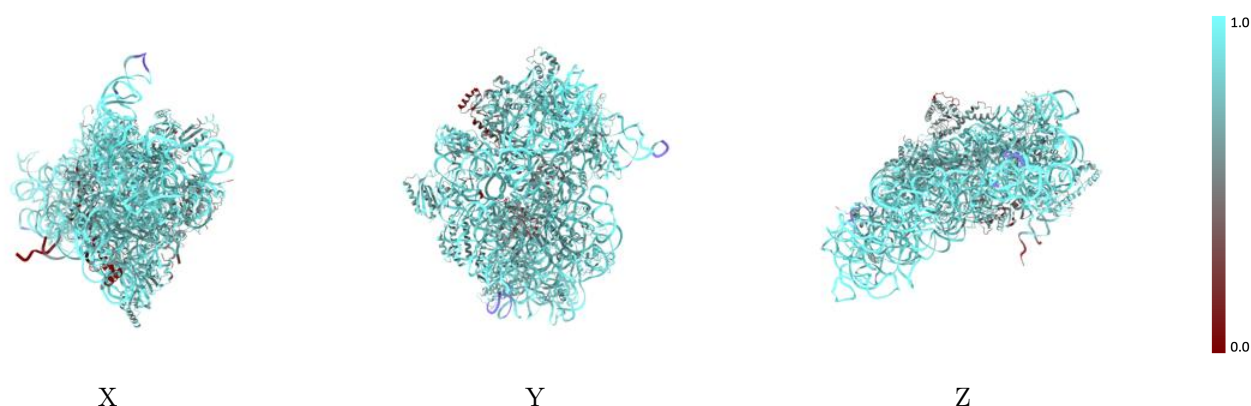
The images above show the 3D surface view of the map at the recommended contour level 0.055 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



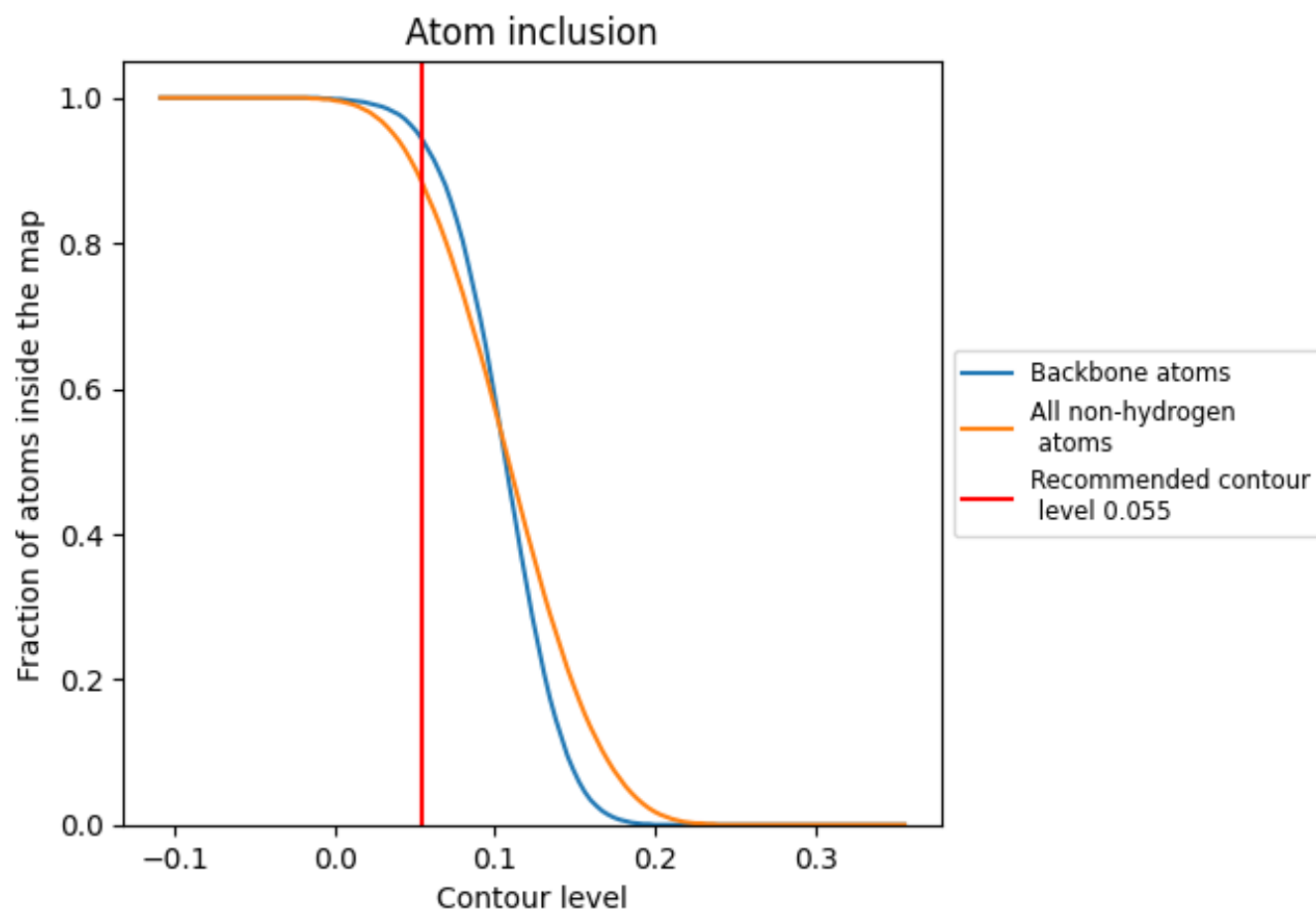
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.055).

9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 88% 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 (0.055) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8820	 0.2310
A	 0.9740	 0.2580
B	 0.5590	 0.1810
C	 0.7890	 0.2180
D	 0.8120	 0.2200
E	 0.7910	 0.2270
F	 0.7830	 0.2050
G	 0.7730	 0.2040
H	 0.8150	 0.2210
I	 0.7690	 0.1810
J	 0.7500	 0.2040
K	 0.8120	 0.1960
L	 0.7600	 0.2420
M	 0.8230	 0.1690
N	 0.8120	 0.2260
O	 0.7920	 0.2040
P	 0.7950	 0.2220
Q	 0.7980	 0.2210
R	 0.7580	 0.1790
S	 0.8260	 0.1670
T	 0.8130	 0.2010
V	 0.8220	 0.1600
W	 0.6300	 0.1670
X	 0.4700	 0.1210
Y	 0.8060	 0.1940
Z	 0.7500	 0.1210

