



## wwPDB EM Validation Summary Report ⓘ

Nov 15, 2022 – 12:38 PM EST

PDB ID : 6W7N  
EMDB ID : EMD-21572  
Title : 30S-Inactive-low-Mg<sup>2+</sup> Class A  
Authors : Jahagirdar, D.; Jha, V.; Basu, B.; Gomez-Blanco, J.; Vargas, J.; Ortega, J.  
Deposited on : 2020-03-19  
Resolution : 3.40 Å (reported)  
Based on initial model : 4V4Q

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev43  
MolProbity : 4.02b-467  
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) : 2.31.2

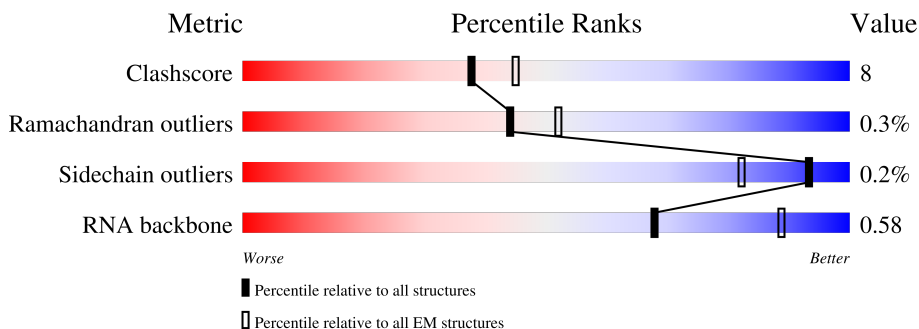
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 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.




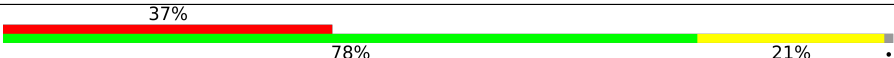
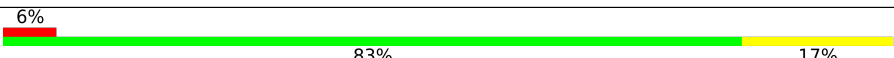
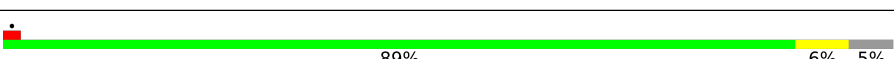

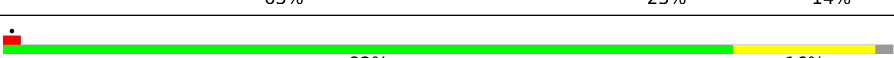
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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  $\geq 3$ , 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	1542	
2	C	233	
3	D	206	
4	E	167	
5	H	130	
6	I	130	
7	J	103	

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Mol	Chain	Length	Quality of chain
8	L	124	
9	M	118	
10	N	101	
11	O	89	
12	P	82	
13	Q	84	
14	S	92	
15	T	87	

## 2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 42287 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	1372	Total	C	N	O	P	0	0
			29443	13131	5408	9532	1372		

- Molecule 2 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	206	Total	C	N	O	S	0	0
			1622	1027	305	288	2		

- Molecule 3 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	205	Total	C	N	O	S	0	0
			1602	1000	310	289	3		

- Molecule 4 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	150	Total	C	N	O	S	0	0
			1073	665	204	198	6		

- Molecule 5 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	H	129	Total	C	N	O	S	0	0
			958	602	172	178	6		

- Molecule 6 is a protein called 30S ribosomal protein S9.

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

- Molecule 7 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	J	98	Total	C	N	O	S	0	0
			786	493	150	142	1		

- Molecule 8 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	L	121	Total	C	N	O	S	0	0
			903	555	186	160	2		

- Molecule 9 is a protein called 30S ribosomal protein S13.

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

- Molecule 10 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	N	96	Total	C	N	O	S	0	0
			774	483	160	128	3		

- Molecule 11 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	O	88	Total	C	N	O	S	0	0
			696	428	138	129	1		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	79	ARG	GLN	conflict	UNP A0A4S5B232

- Molecule 12 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms				AltConf	Trace
12	P	82	Total	C	N	O	0	0
			640	401	128	111		

- Molecule 13 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	Q	80	Total	C	N	O	S	0	0
			610	383	116	108	3		

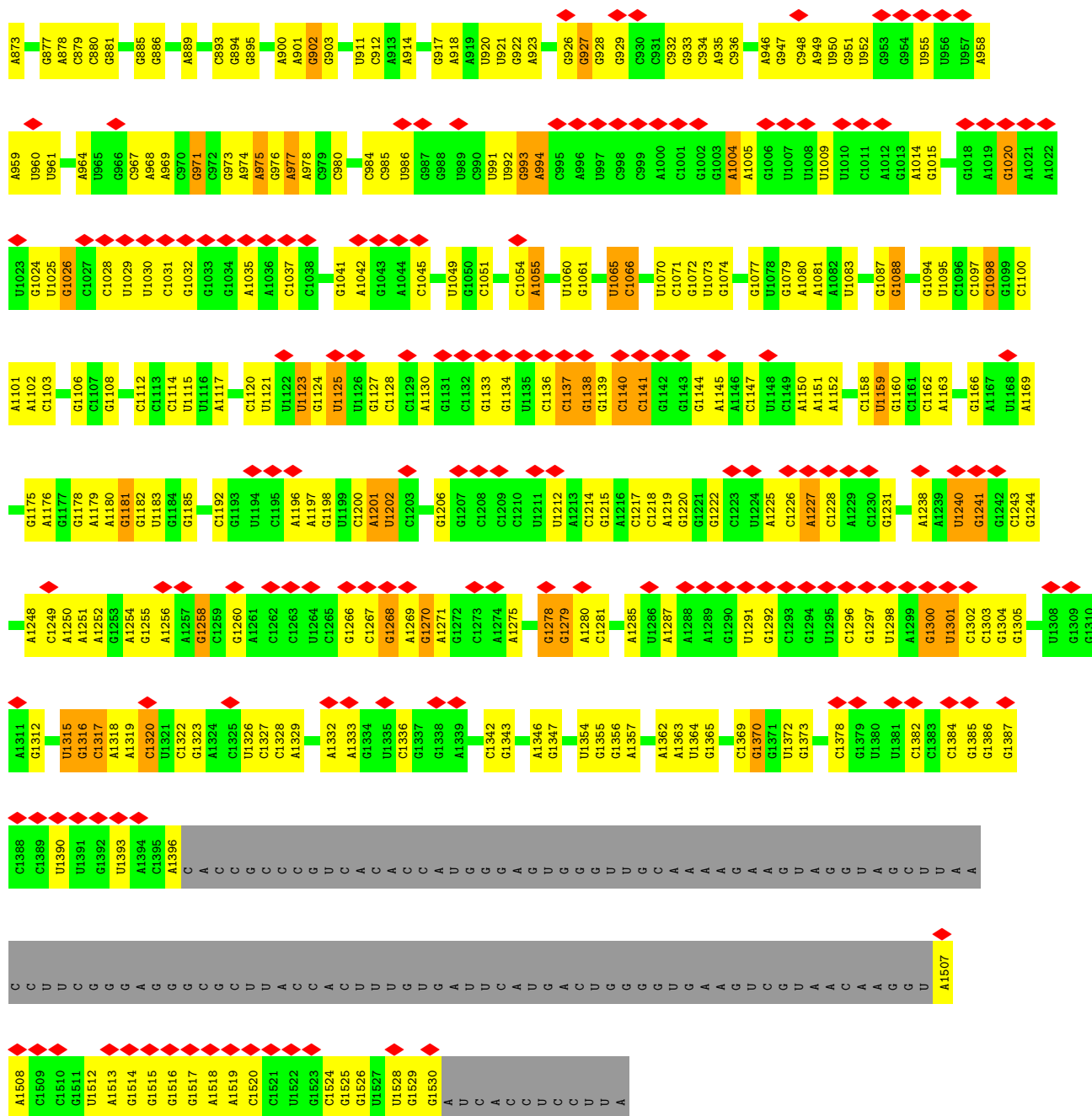
- Molecule 14 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	S	79	Total	C	N	O	S	0	0
			637	408	120	107	2		

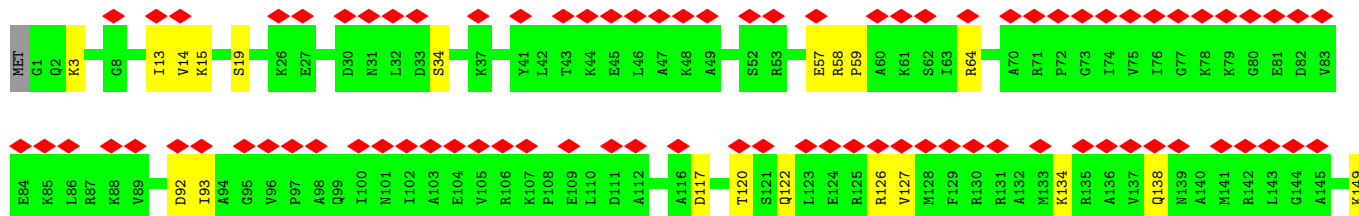
- Molecule 15 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	T	85	Total	C	N	O	S	0	0
			638	389	134	112	3		

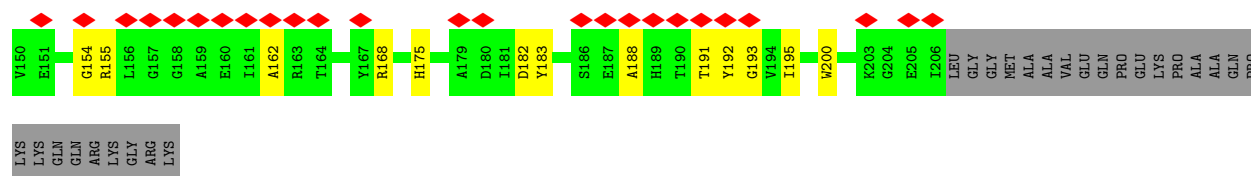




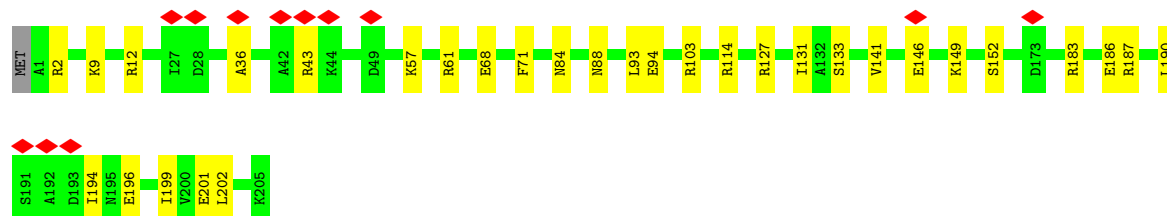
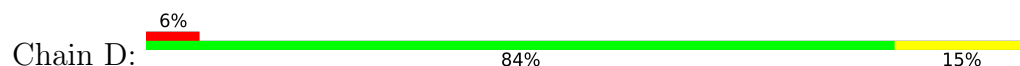
• Molecule 2: 30S ribosomal protein S3



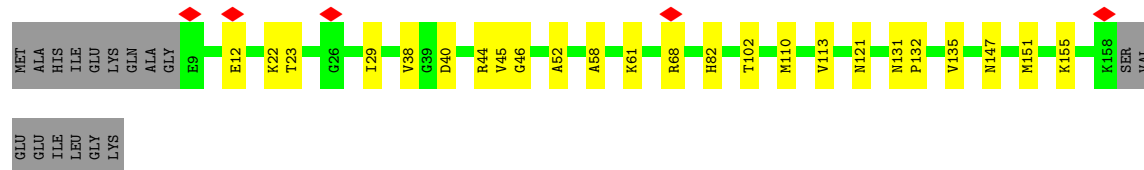
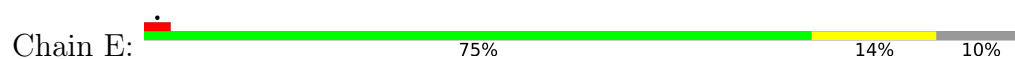




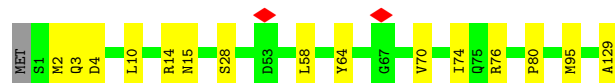
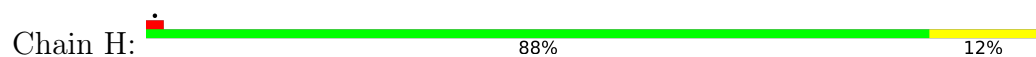
• Molecule 3: 30S ribosomal protein S4



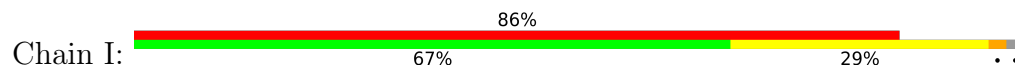
• Molecule 4: 30S ribosomal protein S5



• Molecule 5: 30S ribosomal protein S8

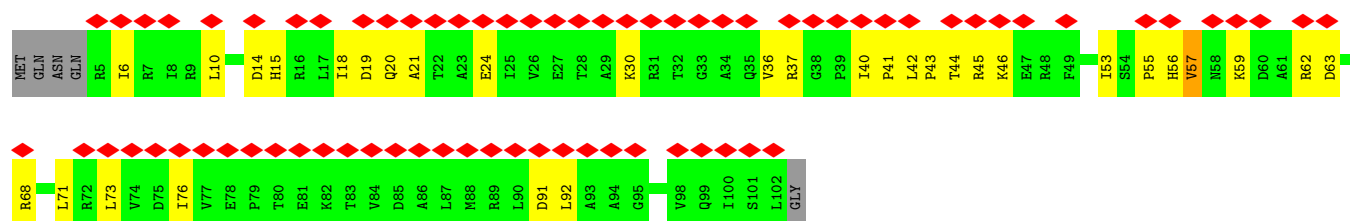


• Molecule 6: 30S ribosomal protein S9



• Molecule 7: 30S ribosomal protein S10

Chain J: 

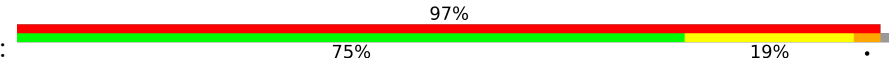


- Molecule 8: 30S ribosomal protein S12

Chain L: 




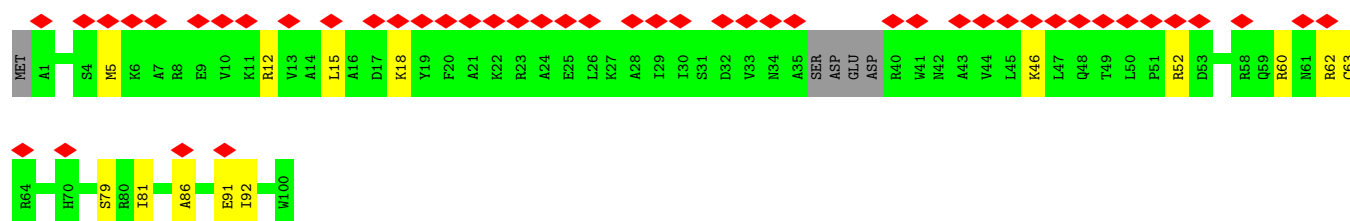
- Molecule 9: 30S ribosomal protein S13

Chain M: 




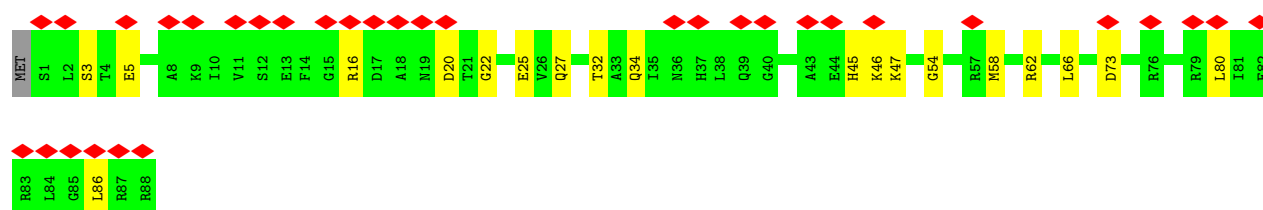
- Molecule 10: 30S ribosomal protein S14

Chain N: 

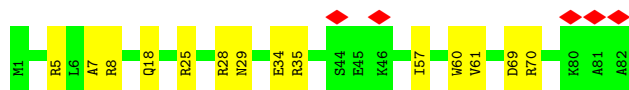
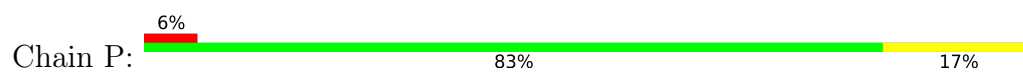


- Molecule 11: 30S ribosomal protein S15

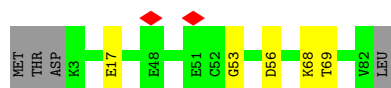
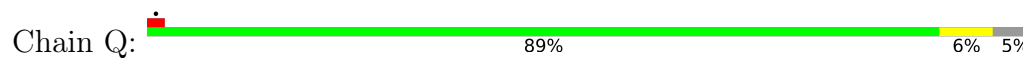
Chain O: 



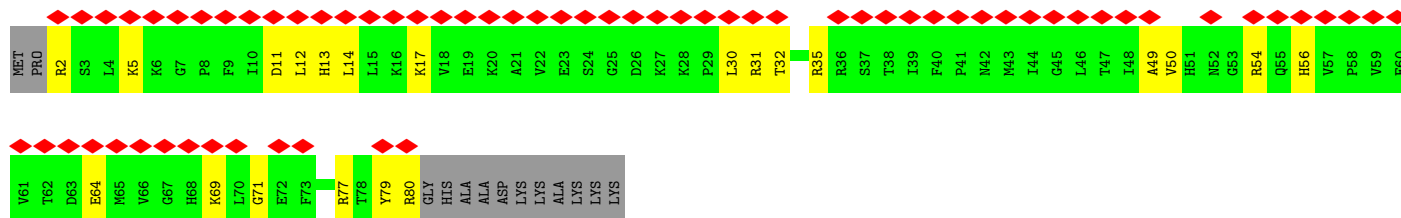
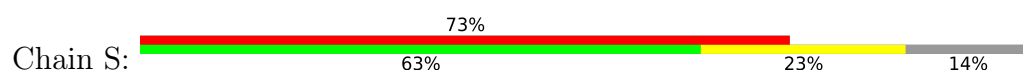
- Molecule 12: 30S ribosomal protein S16



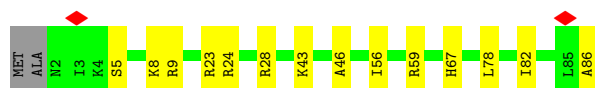
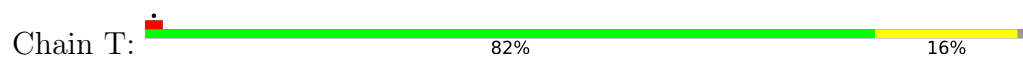
- Molecule 13: 30S ribosomal protein S17



- Molecule 14: 30S ribosomal protein S19



- Molecule 15: 30S ribosomal protein S20



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	421738	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 ( $e^-/\text{\AA}^2$ )	52	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	36.617	Depositor
Minimum map value	-19.302	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.992	Depositor
Recommended contour level	4.43	Depositor
Map size (Å)	326.192, 326.192, 326.192	wwPDB
Map dimensions	304, 304, 304	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.073, 1.073, 1.073	Depositor

## 5 Model quality

### 5.1 Standard geometry

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	0.20	0/32966	0.75	3/51421 (0.0%)
2	C	0.23	0/1649	0.43	0/2223
3	D	0.24	0/1624	0.42	0/2177
4	E	0.25	0/1086	0.44	0/1465
5	H	0.24	0/967	0.43	0/1299
6	I	0.23	0/1034	0.45	0/1375
7	J	0.23	0/796	0.47	0/1077
8	L	0.24	0/917	0.49	0/1239
9	M	0.22	0/892	0.44	0/1193
10	N	0.23	0/785	0.40	0/1043
11	O	0.23	0/704	0.42	0/944
12	P	0.25	0/650	0.47	0/873
13	Q	0.24	0/619	0.44	0/834
14	S	0.23	0/652	0.41	0/877
15	T	0.23	0/644	0.39	0/856
All	All	0.21	0/45985	0.68	3/68896 (0.0%)

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
7	J	0	1
9	M	0	1
All	All	0	2

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1141	C	N3-C2-O2	-8.53	115.93	121.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	504	C	C2-N3-C4	-5.99	116.91	119.90
1	A	960	U	C2-N1-C1'	5.30	124.06	117.70

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	J	57	VAL	Peptide
9	M	63	VAL	Peptide

## 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	29443	0	14822	391	0
2	C	1622	0	1694	22	0
3	D	1602	0	1628	22	0
4	E	1073	0	1070	22	0
5	H	958	0	1006	10	0
6	I	1022	0	1070	30	0
7	J	786	0	828	27	0
8	L	903	0	900	21	0
9	M	883	0	944	18	0
10	N	774	0	827	11	0
11	O	696	0	698	10	0
12	P	640	0	650	10	0
13	Q	610	0	602	3	0
14	S	637	0	665	15	0
15	T	638	0	643	10	0
All	All	42287	0	28047	550	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 8.

The worst 5 of 550 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:17:U:O2	1:A:1079:G:N2	1.91	1.03
1:A:1055:A:N6	1:A:1200:C:H42	1.58	1.00
1:A:1055:A:H62	1:A:1200:C:H42	1.07	1.00
1:A:1026:G:H1	1:A:1035:A:N6	1.61	0.98
1:A:1304:G:N2	1:A:1333:A:H62	1.66	0.92

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	C	204/233 (88%)	194 (95%)	10 (5%)	0	100	100
3	D	203/206 (98%)	183 (90%)	20 (10%)	0	100	100
4	E	148/167 (89%)	134 (90%)	14 (10%)	0	100	100
5	H	127/130 (98%)	122 (96%)	5 (4%)	0	100	100
6	I	125/130 (96%)	111 (89%)	13 (10%)	1 (1%)	19	51
7	J	96/103 (93%)	81 (84%)	14 (15%)	1 (1%)	15	46
8	L	119/124 (96%)	109 (92%)	10 (8%)	0	100	100
9	M	112/118 (95%)	104 (93%)	6 (5%)	2 (2%)	8	32
10	N	92/101 (91%)	85 (92%)	7 (8%)	0	100	100
11	O	86/89 (97%)	79 (92%)	6 (7%)	1 (1%)	13	41
12	P	80/82 (98%)	66 (82%)	14 (18%)	0	100	100
13	Q	78/84 (93%)	74 (95%)	4 (5%)	0	100	100
14	S	77/92 (84%)	72 (94%)	5 (6%)	0	100	100
15	T	83/87 (95%)	78 (94%)	5 (6%)	0	100	100
All	All	1630/1746 (93%)	1492 (92%)	133 (8%)	5 (0%)	44	72

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
7	J	57	VAL
9	M	65	GLU
6	I	56	MET
11	O	46	LYS
9	M	66	GLY

### 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	C	169/190 (89%)	168 (99%)	1 (1%)	86	94
3	D	160/173 (92%)	160 (100%)	0	100	100
4	E	103/126 (82%)	103 (100%)	0	100	100
5	H	99/105 (94%)	99 (100%)	0	100	100
6	I	105/107 (98%)	104 (99%)	1 (1%)	76	88
7	J	86/90 (96%)	86 (100%)	0	100	100
8	L	89/104 (86%)	89 (100%)	0	100	100
9	M	92/96 (96%)	92 (100%)	0	100	100
10	N	79/84 (94%)	79 (100%)	0	100	100
11	O	72/77 (94%)	72 (100%)	0	100	100
12	P	62/65 (95%)	62 (100%)	0	100	100
13	Q	63/78 (81%)	63 (100%)	0	100	100
14	S	70/79 (89%)	70 (100%)	0	100	100
15	T	57/66 (86%)	57 (100%)	0	100	100
All	All	1306/1440 (91%)	1304 (100%)	2 (0%)	93	98

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	126	ARG
6	I	44	ARG



Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
6	I	80	HIS
11	O	34	GLN
14	S	68	HIS
14	S	42	ASN
10	N	3	GLN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1368/1542 (88%)	230 (16%)	8 (0%)

5 of 230 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	3	A
1	A	4	U
1	A	5	U
1	A	6	G
1	A	7	A

5 of 8 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1528	U
1	A	1300	G
1	A	1101	A
1	A	1065	U
1	A	1201	A

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

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

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

There are no ligands in this entry.

## 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.

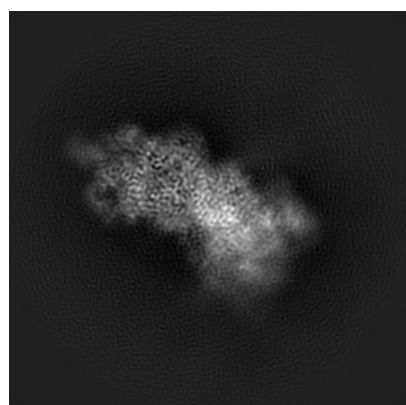
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21572. These allow visual inspection of the internal detail of the map and identification of artifacts.

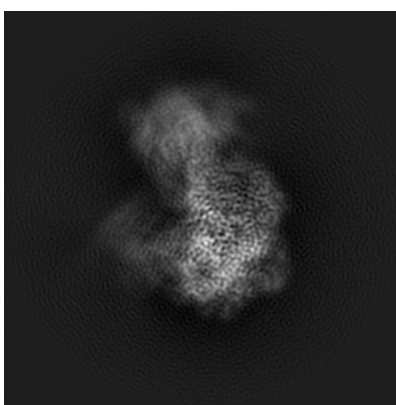
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

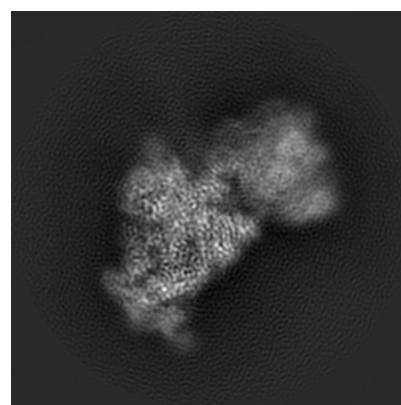
#### 6.1.1 Primary map



X



Y

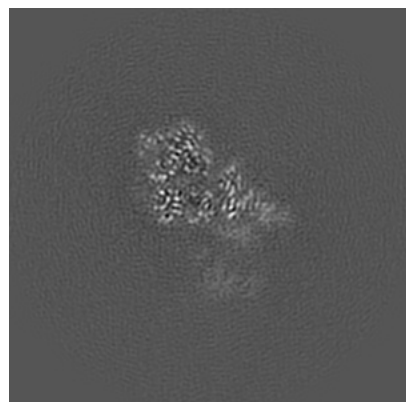


Z

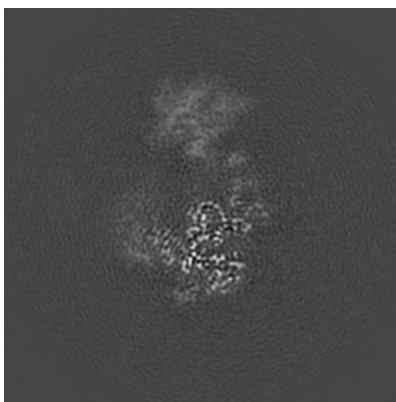
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

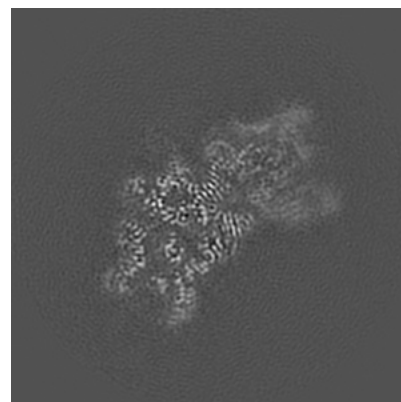
#### 6.2.1 Primary map



X Index: 152



Y Index: 152

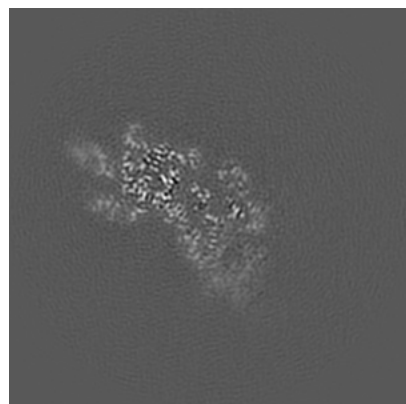


Z Index: 152

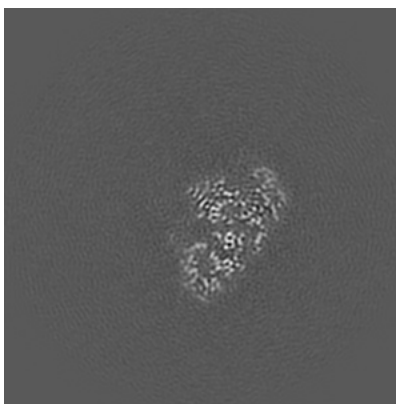
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

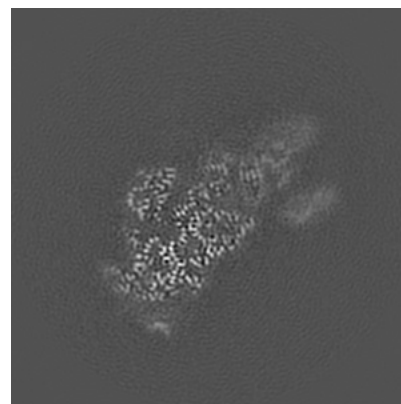
### 6.3.1 Primary map



X Index: 124



Y Index: 127

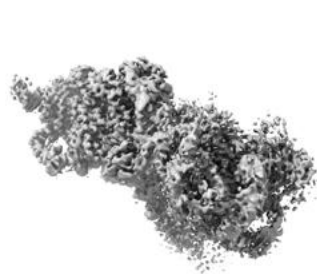


Z Index: 163

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

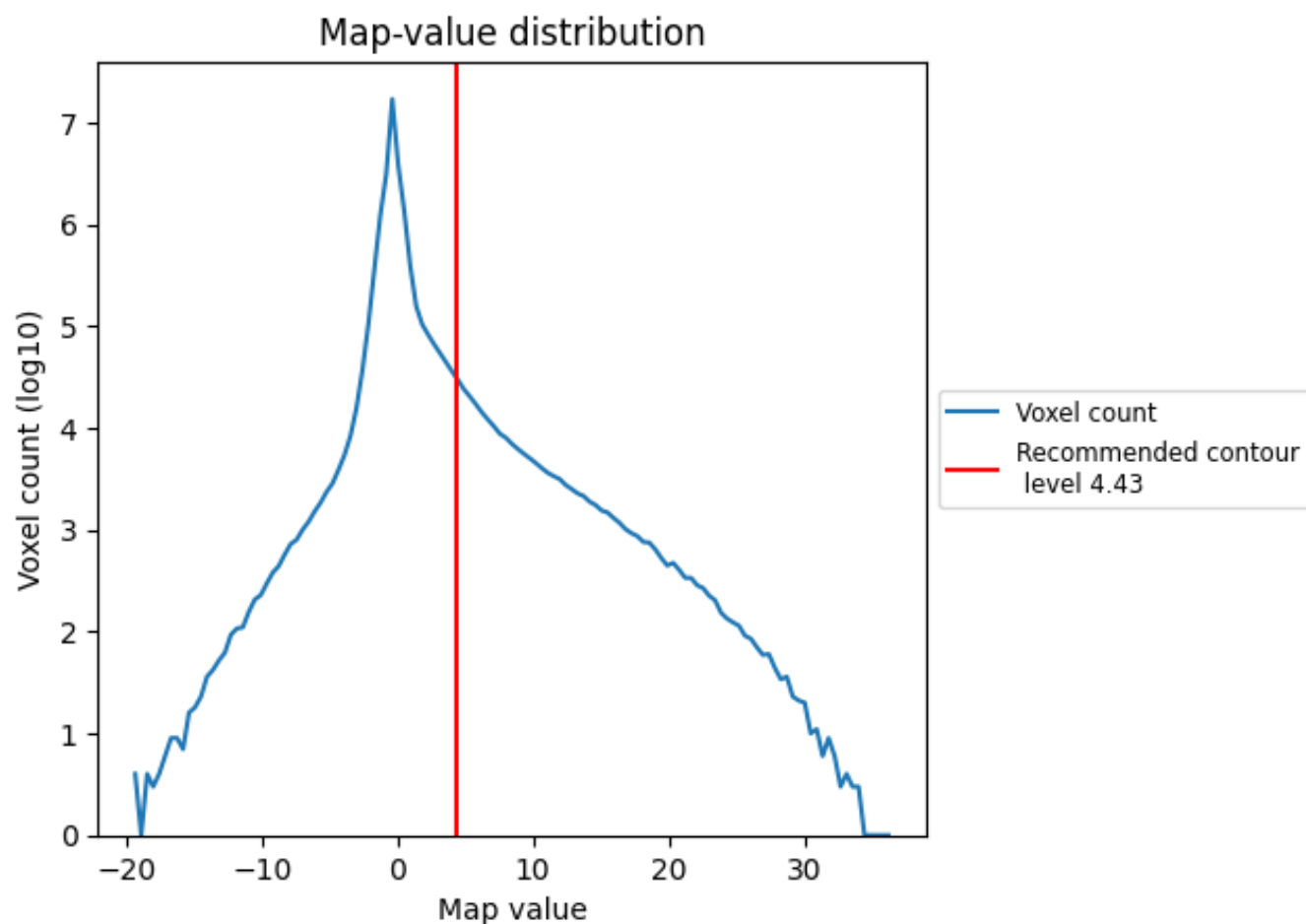
## 6.5 Mask visualisation

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

## 7 Map analysis [i](#)

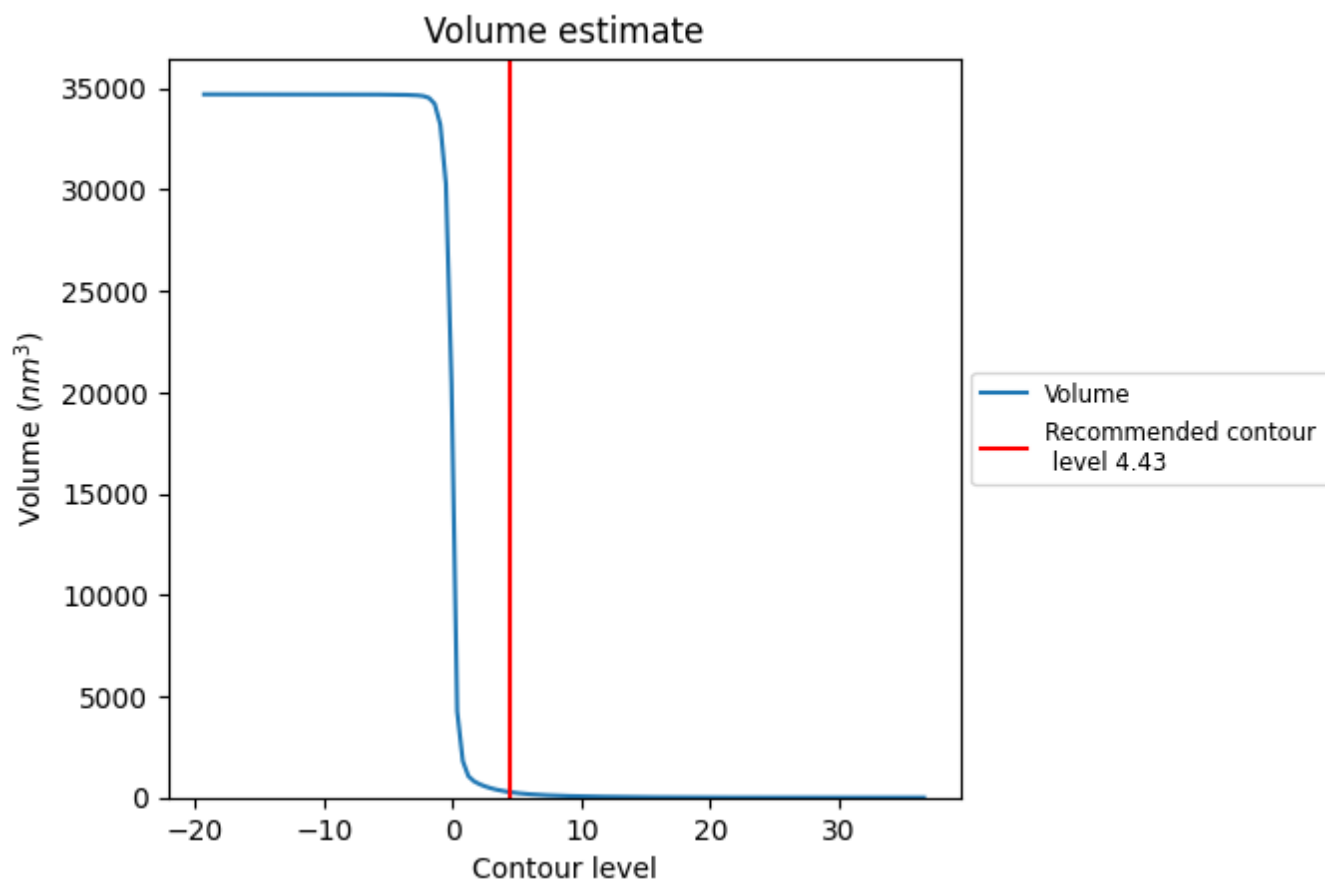
This section contains the results of statistical analysis of the map.

### 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.

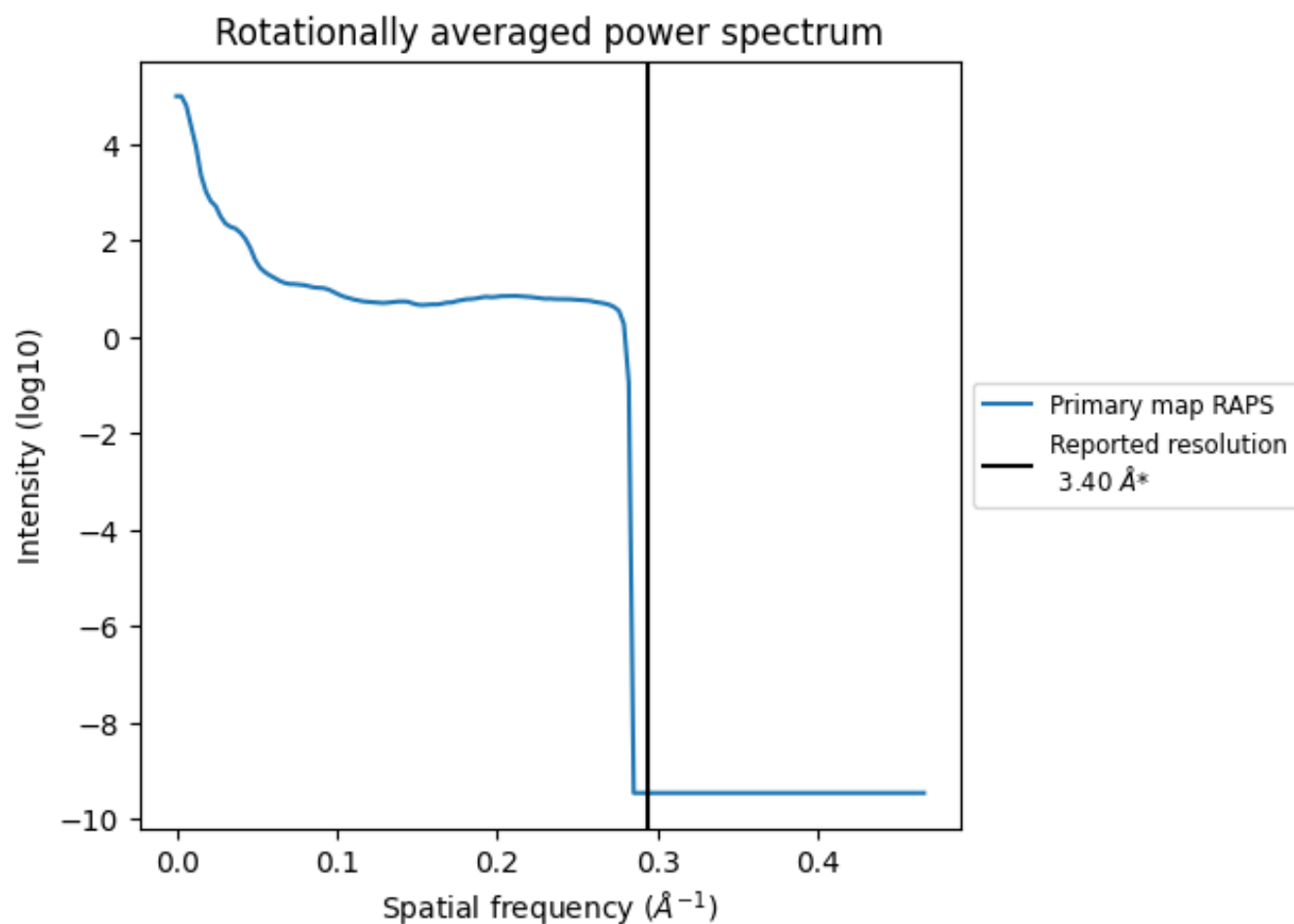
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 270 nm<sup>3</sup>; this corresponds to an approximate mass of 244 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 ⓘ



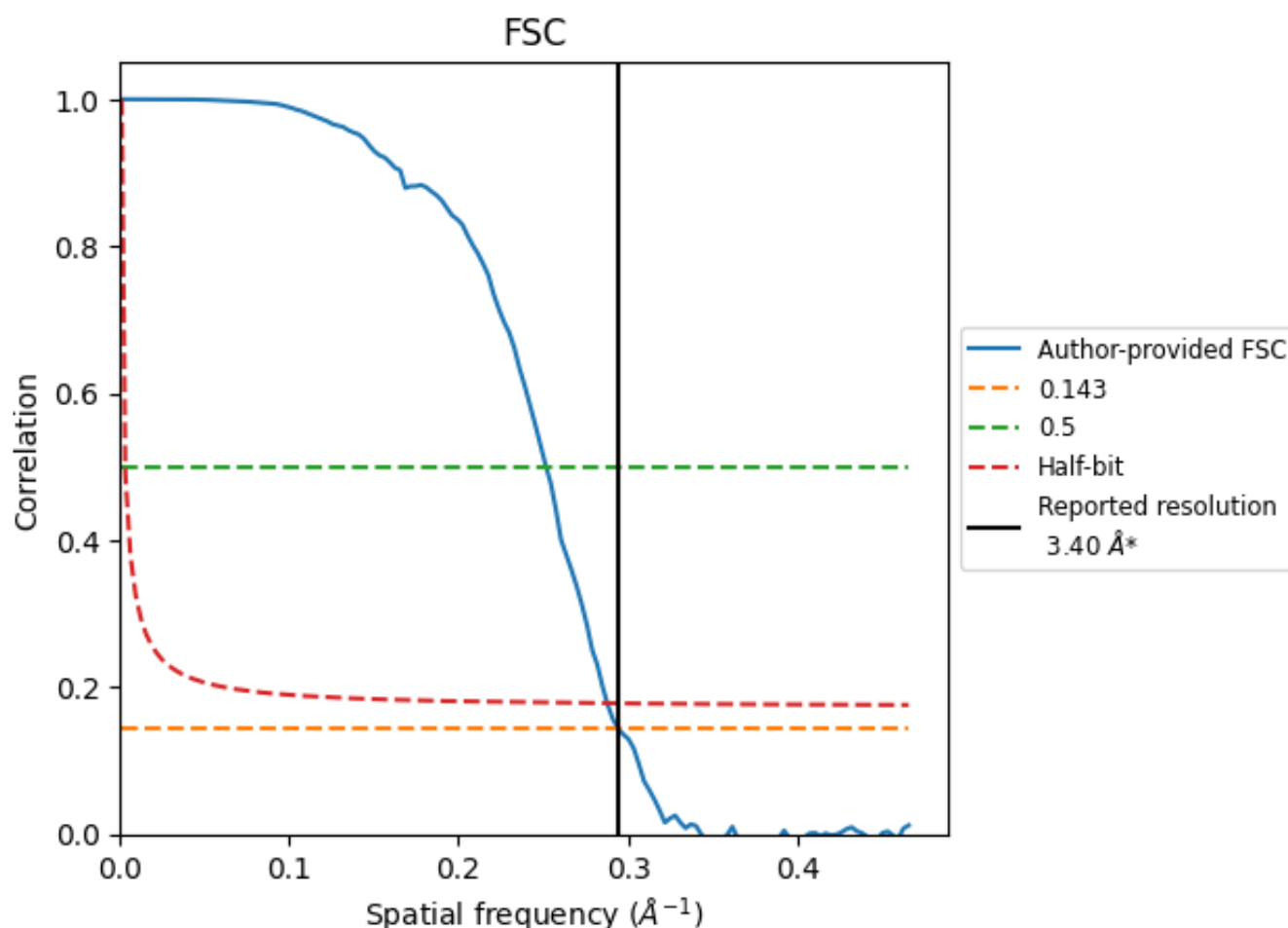
\*Reported resolution corresponds to spatial frequency of 0.294 Å<sup>-1</sup>



## 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 0.294  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

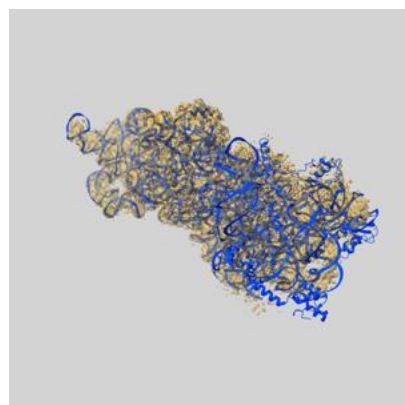
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.40	3.97	3.47
Unmasked-calculated*	-	-	-

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

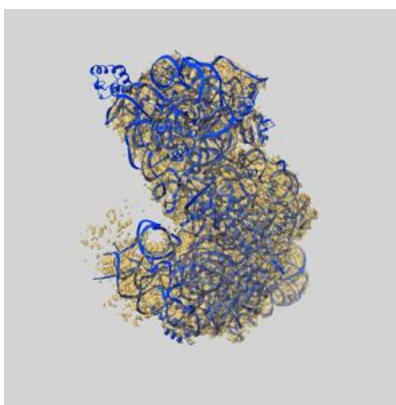
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-21572 and PDB model 6W7N. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

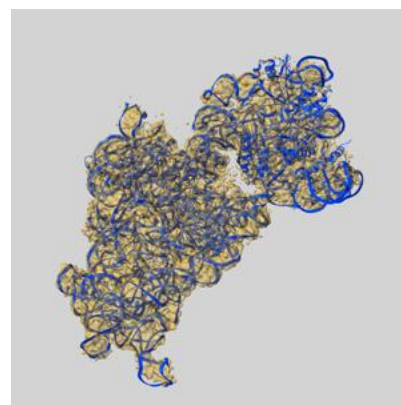
### 9.1 Map-model overlay [i](#)



X



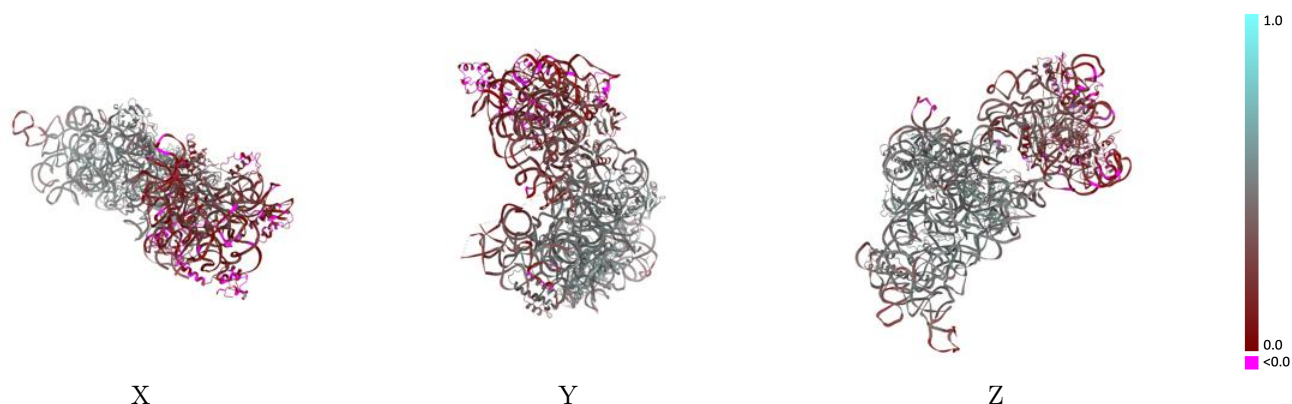
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.43 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](#)



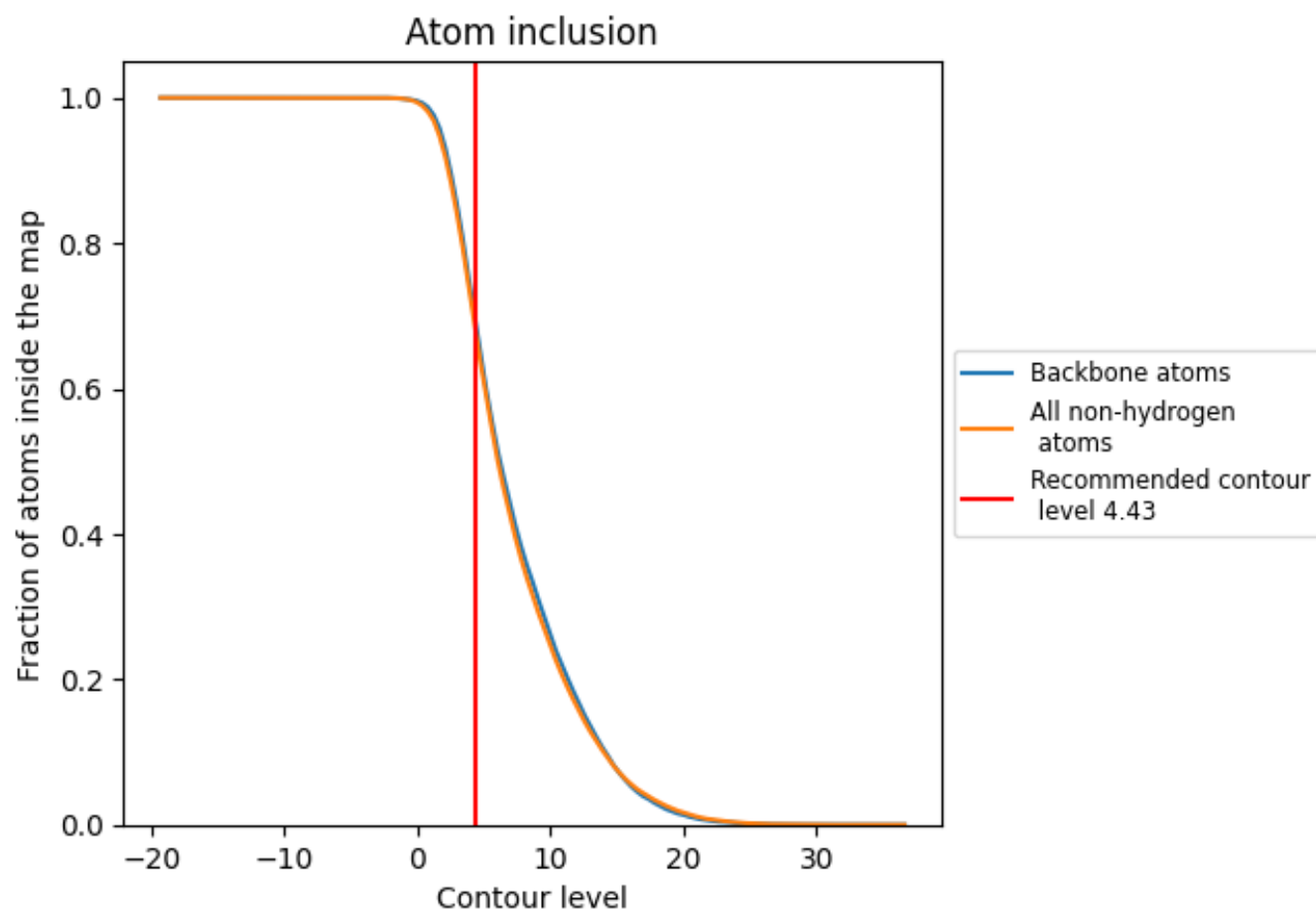
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.43).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 69% of all backbone atoms, 67% 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 (4.43) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.6731	<div></div> 0.3620
A	<div></div> 0.7309	<div></div> 0.3640
C	<div></div> 0.3991	<div></div> 0.2840
D	<div></div> 0.7679	<div></div> 0.4900
E	<div></div> 0.7882	<div></div> 0.4990
H	<div></div> 0.8094	<div></div> 0.5190
I	<div></div> 0.1450	<div></div> 0.1700
J	<div></div> 0.2733	<div></div> 0.1840
L	<div></div> 0.8496	<div></div> 0.5050
M	<div></div> 0.0306	<div></div> 0.0410
N	<div></div> 0.3782	<div></div> 0.2430
O	<div></div> 0.4659	<div></div> 0.4380
P	<div></div> 0.8155	<div></div> 0.5070
Q	<div></div> 0.8070	<div></div> 0.5070
S	<div></div> 0.1385	<div></div> 0.1100
T	<div></div> 0.7881	<div></div> 0.4780

1.0

0.0

<0.0