



## wwPDB EM Validation Summary Report ⓘ

Apr 12, 2023 – 02:49 PM EDT

PDB ID : 8CVM  
EMDB ID : EMD-27009  
Title : Cutibacterium acnes 50S ribosomal subunit with P-site tRNA and Sarecycline bound in the local refined map  
Authors : Lomakin, I.B.; Devarkar, S.C.; Bunick, C.G.  
Deposited on : 2022-05-18  
Resolution : 2.66 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](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>.

---

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

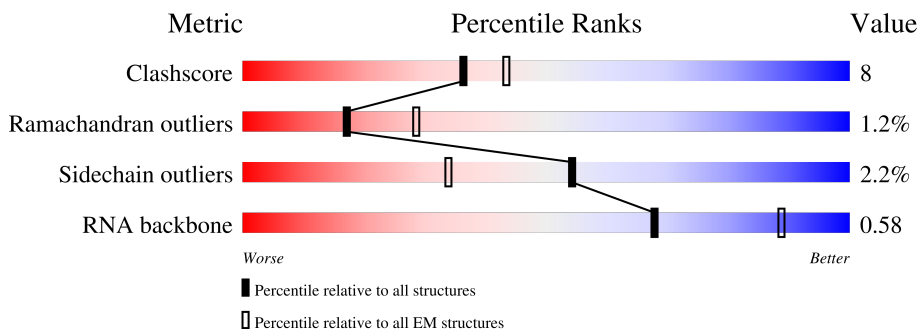
EMDB validation analysis : 0.0.1.dev50  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.32.2

# 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 2.66 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	c	278	98%
2	d	223	95%
3	e	301	67% (30% not modelled)
4	f	210	12% (86% green, 7% yellow)
5	g	180	5% (93% green, 6% yellow)
6	i	147	99%
7	j	122	98%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
8	k	146	97% ..
9	l	139	97% ..
10	m	187	63% . 36%
11	n	127	98% ..
12	o	117	13% 97% .
13	p	123	96% ..
14	q	102	100%
15	r	153	84% .. 14%
16	s	102	92% . 7%
17	t	122	87% . 12%
18	u	205	21% 85% . 13%
19	v	89	88% 12%
20	w	61	97% ..
21	x	77	88% . 10%
22	y	60	97% .
23	z	63	94% 5% .
24	0	56	61% 27% . 11%
25	1	44	91% 9%
26	2	68	85% 13% .
27	4	69	38% 41% 36% 17% ..
28	a	3086	76% 16% . 6%
29	b	120	91% 9%
30	V	24	88% 8% .
31	C	77	19% 68% 29% ..
32	3	37	51% 73% 27%

## 2 Entry composition [i](#)

There are 36 unique types of molecules in this entry. The entry contains 93049 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 protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	c	274	2091	1289	425	372	5	0	0

- Molecule 2 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	d	214	1586	984	304	291	7	0	0

- Molecule 3 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	e	210	1577	979	301	295	2	0	0

- Molecule 4 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	f	203	1623	1025	299	290	9	0	0

- Molecule 5 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	g	177	1376	867	250	258	1	0	0

- Molecule 6 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	i	146	1139	718	213	205	3	0	0

- Molecule 7 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	j	122	946	596	177	169	4	0	0

- Molecule 8 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	k	144	1072	675	196	199	2	0	0

- Molecule 9 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	l	136	1082	685	210	181	6	0	0

- Molecule 10 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	m	120	936	583	188	163	2	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
m	102	ILE	ASN	conflict	UNP A0A085AZY3

- Molecule 11 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	n	126	952	583	190	176	3	0	0

- Molecule 12 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	o	114	896	559	174	162	1	0	0

- Molecule 13 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	p	119	Total	C	N	O	S	0	0
			958	589	196	171	2		

- Molecule 14 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	q	102	Total	C	N	O	S	0	0
			778	487	140	150	1		

- Molecule 15 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	r	132	Total	C	N	O	S	0	0
			1017	624	204	182	7		

- Molecule 16 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	s	95	Total	C	N	O	S	0	0
			751	474	138	138	1		

- Molecule 17 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	t	107	Total	C	N	O	S	0	0
			833	516	163	153	1		

- Molecule 18 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	u	179	Total	C	N	O	S	0	0
			1376	865	240	268	3		

- Molecule 19 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms				AltConf	Trace
19	v	78	Total	C	N	O	0	0
			591	355	127	109		

- Molecule 20 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	w	60	Total	C	N	O	S	0	0
			474	290	102	77	5		

- Molecule 21 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	x	69	Total	C	N	O	S	0	0
			564	348	108	108			

- Molecule 22 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	y	58	Total	C	N	O	S	0	0
			467	290	91	83	3		

- Molecule 23 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	z	62	Total	C	N	O	S	0	0
			477	287	102	83	5		

- Molecule 24 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	0	50	Total	C	N	O	S	0	0
			423	253	91	73	6		

- Molecule 25 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	1	44	Total	C	N	O	S	0	0
			362	213	91	56	2		

- Molecule 26 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	2	67	Total	C	N	O	S	0	0
			513	315	110	87	1		

- Molecule 27 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	4	66	Total	C	N	O	S	0	0
			512	313	97	97	5		

- Molecule 28 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	a	2903	Total	C	N	O	P	6	0
			62531	27850	11406	20366	2909		

- Molecule 29 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	b	120	Total	C	N	O	P	0	0
			2567	1145	466	836	120		

- Molecule 30 is a protein called 50S ribosomal protein bL37.

Mol	Chain	Residues	Atoms				AltConf	Trace
30	V	23	Total	C	N	O	0	0
			183	106	50	27		

- Molecule 31 is a RNA chain called Initiator fMet RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
31	C	76	Total	C	N	O	P	S	0	0
			1625	725	294	529	76	1		

- Molecule 32 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	3	37	Total	C	N	O	S	0	0
			302	184	66	47	5		

- Molecule 33 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
33	c	3	Total	Mg	0
			3	3	
33	d	1	Total	Mg	0
			1	1	
33	k	2	Total	Mg	0
			2	2	

*Continued on next page...*



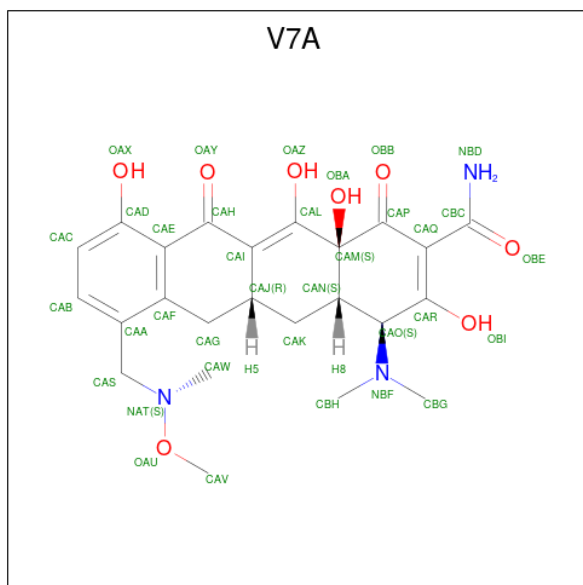
Continued from previous page...

Mol	Chain	Residues	Atoms		AltConf
33	1	1	Total	Mg	0
			1	1	
33	a	294	Total	Mg	0
			294	294	
33	b	2	Total	Mg	0
			2	2	
33	C	2	Total	Mg	0
			2	2	

- Molecule 34 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
34	w	1	Total	Zn	0
			1	1	
34	z	1	Total	Zn	0
			1	1	
34	0	1	Total	Zn	0
			1	1	
34	4	1	Total	Zn	0
			1	1	

- Molecule 35 is Sarecycline (three-letter code: V7A) (formula: C<sub>24</sub>H<sub>29</sub>N<sub>3</sub>O<sub>8</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
35	a	1	Total	C	N	O	0
			35	24	3	8	

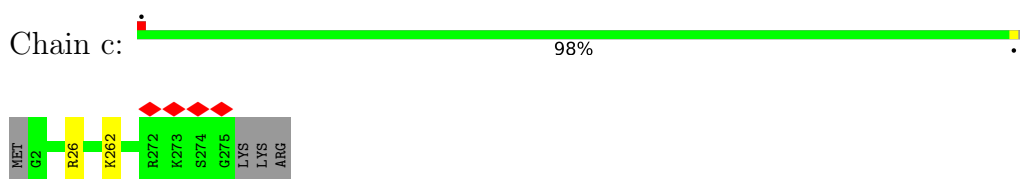
- Molecule 36 is water.

Mol	Chain	Residues	Atoms	AltConf
36	d	1	Total O 1 1	0
36	s	1	Total O 1 1	0
36	a	120	Total O 120 120	0
36	b	3	Total O 3 3	0

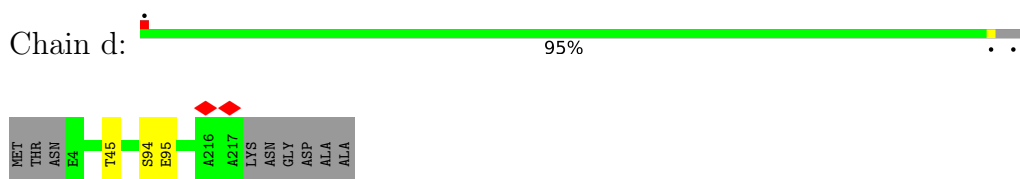
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

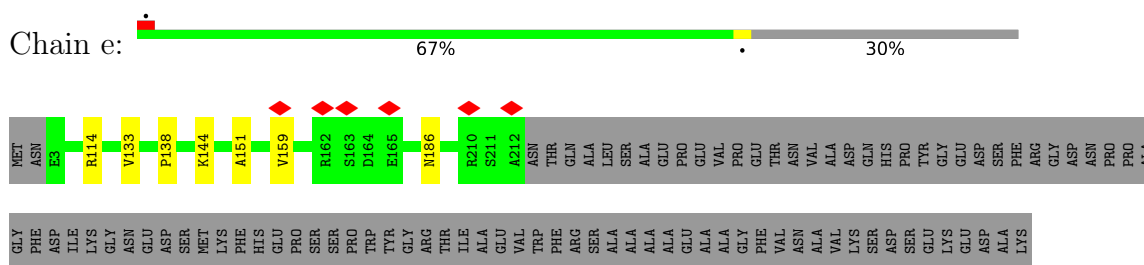
- Molecule 1: 50S ribosomal protein L2



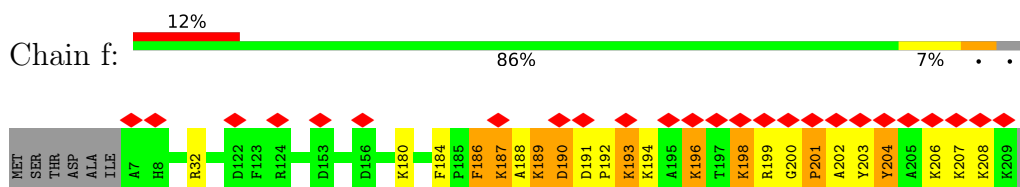
- Molecule 2: 50S ribosomal protein L3



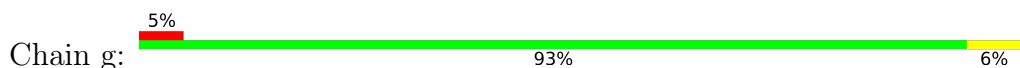
- Molecule 3: 50S ribosomal protein L4

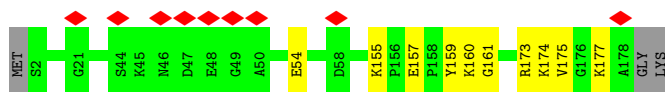


- Molecule 4: 50S ribosomal protein L5



- Molecule 5: 50S ribosomal protein L6





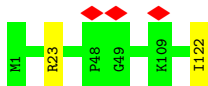
- Molecule 6: 50S ribosomal protein L13

Chain i: 99%



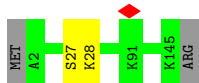
- Molecule 7: 50S ribosomal protein L14

Chain j: 98%



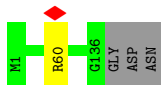
- Molecule 8: 50S ribosomal protein L15

Chain k: 97%



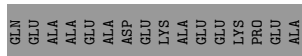
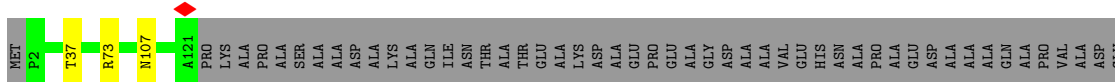
- Molecule 9: 50S ribosomal protein L16

Chain l: 97%



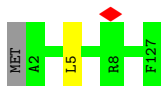
- Molecule 10: 50S ribosomal protein L17

Chain m: 63%

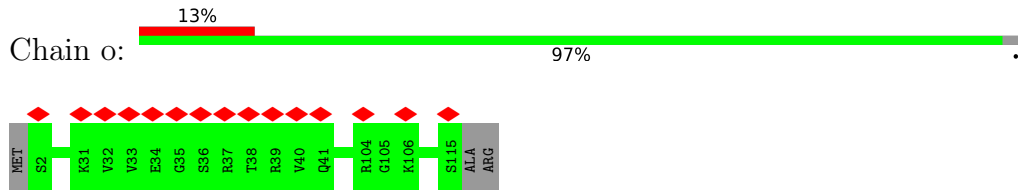


- Molecule 11: 50S ribosomal protein L18

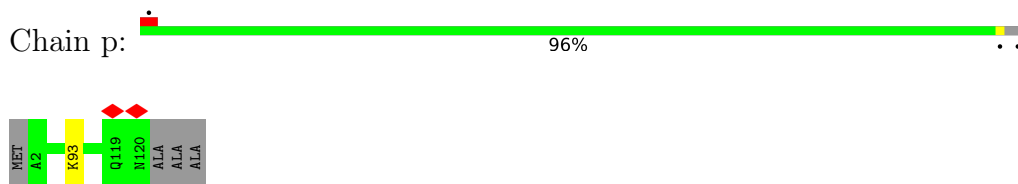
Chain n: 98%



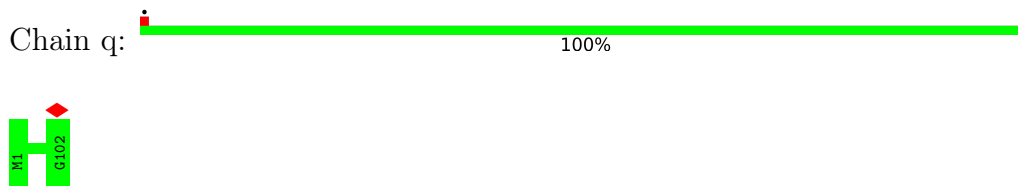
- Molecule 12: 50S ribosomal protein L19



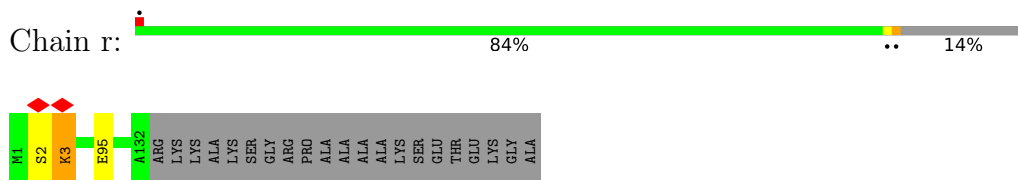
- Molecule 13: 50S ribosomal protein L20



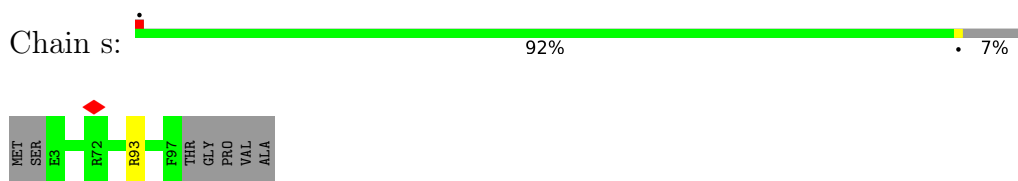
- Molecule 14: 50S ribosomal protein L21



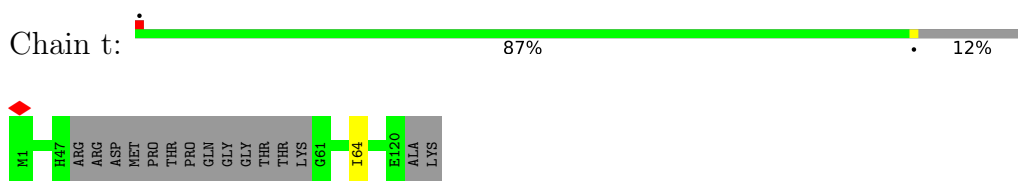
- Molecule 15: 50S ribosomal protein L22



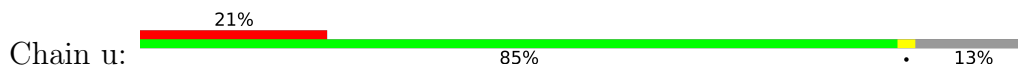
- Molecule 16: 50S ribosomal protein L23

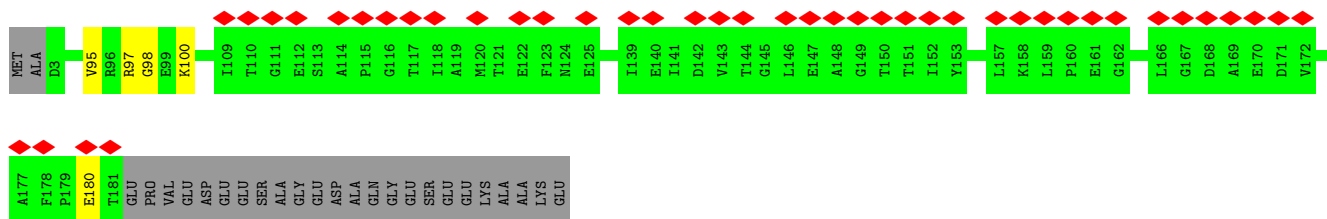


- Molecule 17: 50S ribosomal protein L24

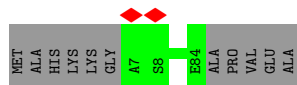
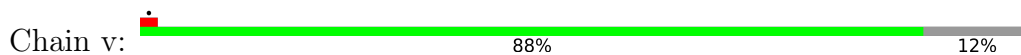


- Molecule 18: 50S ribosomal protein L25





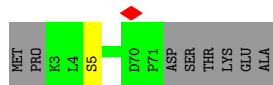
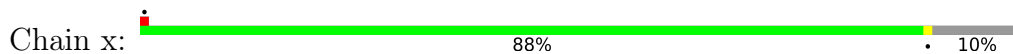
• Molecule 19: 50S ribosomal protein L27



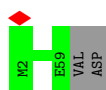
• Molecule 20: 50S ribosomal protein L28



• Molecule 21: 50S ribosomal protein L29



• Molecule 22: 50S ribosomal protein L30

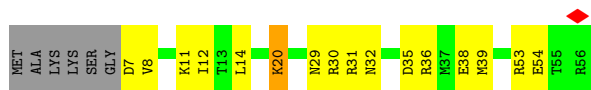


• Molecule 23: 50S ribosomal protein L32



• Molecule 24: 50S ribosomal protein L33

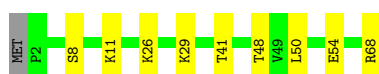
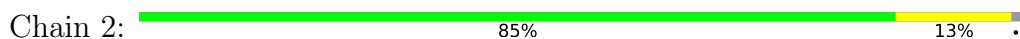




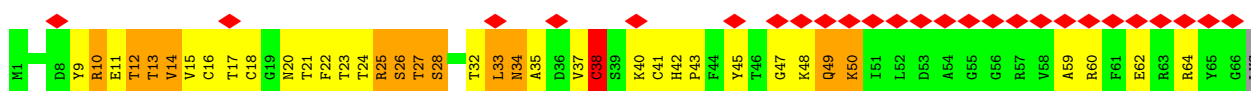
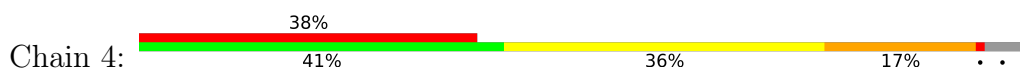
• Molecule 25: 50S ribosomal protein L34



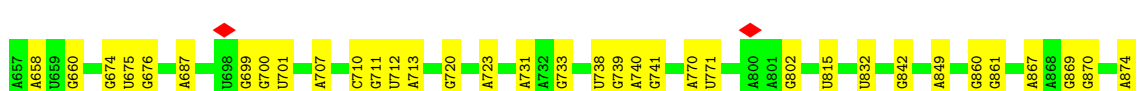
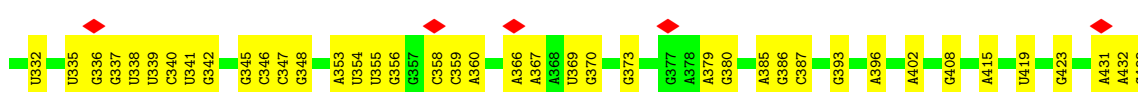
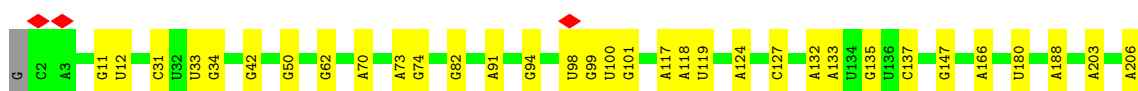
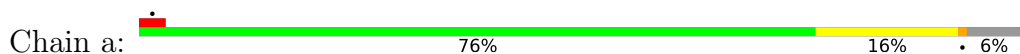
• Molecule 26: 50S ribosomal protein L35



• Molecule 27: 50S ribosomal protein L31



• Molecule 28: 23S ribosomal RNA

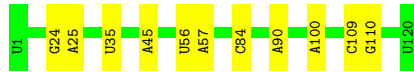




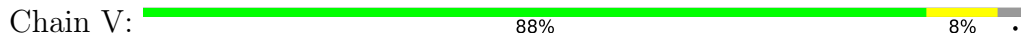




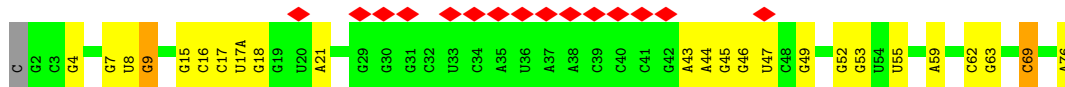
• Molecule 29: 5S ribosomal RNA



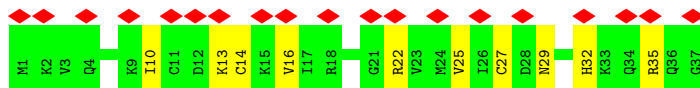
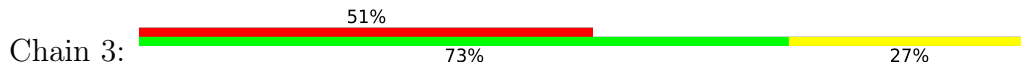
• Molecule 30: 50S ribosomal protein bL37



• Molecule 31: Initiator fMet RNA



• Molecule 32: 50S ribosomal protein L36



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	70853	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 ( $e^-/\text{\AA}^2$ )	30.56	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.651	Depositor
Minimum map value	-0.589	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.065	Depositor
Recommended contour level	0.16	Depositor
Map size ( $\text{\AA}$ )	363.12, 363.12, 363.12	wwPDB
Map dimensions	340, 340, 340	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.068, 1.068, 1.068	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: OMG, 4SU, OMU, OMC, V7A, H2U, PSU, 5MU, 2MA, 2MG, MG, ZN, 5MC, 3TD

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	c	0.33	0/2132	0.59	0/2871
2	d	0.35	0/1611	0.58	0/2172
3	e	0.35	0/1600	0.62	0/2165
4	f	0.35	0/1652	0.62	0/2210
5	g	0.32	0/1398	0.56	0/1884
6	i	0.34	0/1164	0.50	0/1574
7	j	0.33	0/957	0.59	0/1282
8	k	0.36	0/1090	0.58	0/1465
9	l	0.32	0/1108	0.56	0/1488
10	m	0.32	0/949	0.58	0/1277
11	n	0.27	0/959	0.59	0/1281
12	o	0.30	0/909	0.57	0/1216
13	p	0.31	0/969	0.53	0/1292
14	q	0.32	0/785	0.57	0/1050
15	r	0.34	0/1028	0.60	0/1379
16	s	0.31	0/759	0.57	0/1022
17	t	0.29	0/840	0.58	0/1123
18	u	0.29	0/1396	0.56	0/1896
19	v	0.33	0/598	0.61	0/800
20	w	0.31	0/483	0.58	0/648
21	x	0.29	0/567	0.57	0/759
22	y	0.29	0/471	0.58	0/627
23	z	0.33	0/487	0.53	0/654
24	0	0.34	0/429	0.63	0/569
25	1	0.29	0/365	0.67	0/478
26	2	0.30	0/519	0.58	0/682
27	4	0.52	0/521	0.73	1/700 (0.1%)
28	a	0.50	1/69579 (0.0%)	0.78	97/108567 (0.1%)
29	b	0.40	0/2871	0.68	0/4475
30	V	0.28	0/184	0.66	0/236
31	C	0.20	0/1725	0.67	0/2689
32	3	0.25	0/305	0.56	0/401

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
All	All	0.46	1/100410 (0.0%)	0.74	98/150932 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
28	a	445	U	C1'-N1	5.70	1.57	1.48

The worst 5 of 98 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
28	a	127	C	C5-C6-N1	15.97	128.99	121.00
28	a	127	C	C4-C5-C6	13.26	124.03	117.40
28	a	1349	U	P-O3'-C3'	-11.91	105.41	119.70
28	a	315	G	P-O3'-C3'	-11.90	105.42	119.70
28	a	2661	G	P-O3'-C3'	-11.46	105.95	119.70

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [\(i\)](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	c	2091	0	2150	0	0
2	d	1586	0	1634	0	0
3	e	1577	0	1619	0	0
4	f	1623	0	1665	0	0
5	g	1376	0	1421	0	0
6	i	1139	0	1163	0	0
7	j	946	0	1011	0	0
8	k	1072	0	1106	0	0
9	l	1082	0	1117	0	0
10	m	936	0	997	0	0
11	n	952	0	995	0	0
12	o	896	0	928	0	0
13	p	958	0	986	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
14	q	778	0	824	0	0
15	r	1017	0	1070	0	0
16	s	751	0	803	0	0
17	t	833	0	883	0	0
18	u	1376	0	1397	0	0
19	v	591	0	581	0	0
20	w	474	0	487	0	0
21	x	564	0	582	0	0
22	y	467	0	504	0	0
23	z	477	0	479	0	0
24	0	423	0	429	14	0
25	1	362	0	387	2	0
26	2	513	0	565	4	0
27	4	512	0	497	39	0
28	a	62531	0	31359	0	0
29	b	2567	0	1297	0	0
30	V	183	0	202	1	0
31	C	1625	0	829	10	0
32	3	302	0	333	5	0
33	1	1	0	0	0	0
33	C	2	0	0	0	0
33	a	294	0	0	0	0
33	b	2	0	0	0	0
33	c	3	0	0	0	0
33	d	1	0	0	0	0
33	k	2	0	0	0	0
34	0	1	0	0	0	0
34	4	1	0	0	0	0
34	w	1	0	0	0	0
34	z	1	0	0	0	0
35	a	35	0	0	0	0
36	a	120	0	0	0	0
36	b	3	0	0	0	0
36	d	1	0	0	0	0
36	s	1	0	0	0	0
All	All	93049	0	60300	75	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 75 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)
27:4:38:CYS:SG	27:4:41:CYS:HB2	1.83	1.10
27:4:16:CYS:HA	27:4:35:ALA:HB3	1.51	0.92
24:0:8:VAL:HA	24:0:30:ARG:HH21	1.35	0.88
27:4:49:GLN:O	27:4:50:LYS:HB2	1.72	0.87
27:4:11:GLU:HA	27:4:25:ARG:HA	1.69	0.74

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	
1	c	272/278 (98%)	254 (93%)	16 (6%)	2 (1%)	22	33
2	d	212/223 (95%)	198 (93%)	13 (6%)	1 (0%)	29	43
3	e	208/301 (69%)	185 (89%)	18 (9%)	5 (2%)	6	7
4	f	201/210 (96%)	168 (84%)	19 (10%)	14 (7%)	1	0
5	g	175/180 (97%)	162 (93%)	12 (7%)	1 (1%)	25	37
6	i	144/147 (98%)	139 (96%)	5 (4%)	0	100	100
7	j	120/122 (98%)	112 (93%)	8 (7%)	0	100	100
8	k	142/146 (97%)	120 (84%)	22 (16%)	0	100	100
9	l	134/139 (96%)	132 (98%)	2 (2%)	0	100	100
10	m	118/187 (63%)	112 (95%)	5 (4%)	1 (1%)	19	29
11	n	124/127 (98%)	120 (97%)	3 (2%)	1 (1%)	19	29
12	o	112/117 (96%)	110 (98%)	2 (2%)	0	100	100
13	p	117/123 (95%)	109 (93%)	7 (6%)	1 (1%)	17	26
14	q	100/102 (98%)	98 (98%)	2 (2%)	0	100	100
15	r	130/153 (85%)	123 (95%)	6 (5%)	1 (1%)	19	29
16	s	93/102 (91%)	87 (94%)	5 (5%)	1 (1%)	14	21

*Continued on next page...*

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
17	t	103/122 (84%)	99 (96%)	3 (3%)	1 (1%)	15	23
18	u	177/205 (86%)	168 (95%)	7 (4%)	2 (1%)	14	21
19	v	76/89 (85%)	73 (96%)	3 (4%)	0	100	100
20	w	58/61 (95%)	54 (93%)	3 (5%)	1 (2%)	9	13
21	x	67/77 (87%)	62 (92%)	4 (6%)	1 (2%)	10	15
22	y	56/60 (93%)	54 (96%)	2 (4%)	0	100	100
23	z	60/63 (95%)	55 (92%)	3 (5%)	2 (3%)	4	4
24	0	48/56 (86%)	42 (88%)	6 (12%)	0	100	100
25	1	42/44 (96%)	42 (100%)	0	0	100	100
26	2	65/68 (96%)	65 (100%)	0	0	100	100
27	4	64/69 (93%)	50 (78%)	11 (17%)	3 (5%)	2	2
30	V	21/24 (88%)	20 (95%)	1 (5%)	0	100	100
32	3	35/37 (95%)	35 (100%)	0	0	100	100
All	All	3274/3632 (90%)	3048 (93%)	188 (6%)	38 (1%)	17	19

5 of 38 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	c	26	ARG
3	e	151	ALA
3	e	159	VAL
3	e	186	ASN
4	f	188	ALA

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	c	216/220 (98%)	216 (100%)	0	100	100
2	d	166/172 (96%)	164 (99%)	2 (1%)	71	84
3	e	165/237 (70%)	163 (99%)	2 (1%)	71	84

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	f	169/175 (97%)	151 (89%)	18 (11%)	6	9
5	g	150/152 (99%)	141 (94%)	9 (6%)	19	30
6	i	118/120 (98%)	118 (100%)	0	100	100
7	j	101/101 (100%)	99 (98%)	2 (2%)	55	73
8	k	111/113 (98%)	109 (98%)	2 (2%)	59	75
9	l	108/110 (98%)	107 (99%)	1 (1%)	78	87
10	m	100/142 (70%)	98 (98%)	2 (2%)	55	73
11	n	95/96 (99%)	95 (100%)	0	100	100
12	o	97/99 (98%)	97 (100%)	0	100	100
13	p	98/99 (99%)	98 (100%)	0	100	100
14	q	84/84 (100%)	84 (100%)	0	100	100
15	r	105/118 (89%)	102 (97%)	3 (3%)	42	60
16	s	84/89 (94%)	84 (100%)	0	100	100
17	t	91/103 (88%)	91 (100%)	0	100	100
18	u	149/168 (89%)	146 (98%)	3 (2%)	55	73
19	v	60/67 (90%)	60 (100%)	0	100	100
20	w	52/53 (98%)	52 (100%)	0	100	100
21	x	61/68 (90%)	61 (100%)	0	100	100
22	y	53/55 (96%)	53 (100%)	0	100	100
23	z	51/52 (98%)	50 (98%)	1 (2%)	55	73
24	0	47/51 (92%)	46 (98%)	1 (2%)	53	72
25	1	36/36 (100%)	36 (100%)	0	100	100
26	2	54/55 (98%)	53 (98%)	1 (2%)	57	74
27	4	56/59 (95%)	44 (79%)	12 (21%)	1	1
30	V	16/17 (94%)	16 (100%)	0	100	100
32	3	35/35 (100%)	34 (97%)	1 (3%)	42	60
All	All	2728/2946 (93%)	2668 (98%)	60 (2%)	54	70

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	g	174	LYS
27	4	28	SER

Continued on next page...



*Continued from previous page...*

Mol	Chain	Res	Type
9	1	60	ARG
27	4	27	THR
32	3	13	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
15	r	56	GLN
18	u	58	ASN
24	0	32	ASN
24	0	29	ASN
8	k	75	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
28	a	2885/3086 (93%)	484 (16%)	0
29	b	118/120 (98%)	11 (9%)	0
31	C	75/77 (97%)	10 (13%)	1 (1%)
All	All	3078/3283 (93%)	505 (16%)	1 (0%)

5 of 505 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
28	a	11	G
28	a	12	U
28	a	31	C
28	a	33	U
28	a	34	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
31	C	17(A)	U

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

22 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
28	H2U	a	2631	28	18,21,22	0.50	0	21,30,33	1.06	1 (4%)
28	PSU	a	2094	28	18,21,22	1.08	1 (5%)	22,30,33	1.79	5 (22%)
28	OMG	a	2433	31,28	18,26,27	1.23	2 (11%)	19,38,41	0.85	1 (5%)
28	2MG	a	2627	28	18,26,27	1.21	3 (16%)	16,38,41	0.88	1 (6%)
28	OMU	a	2734	28	19,22,23	2.87	7 (36%)	26,31,34	1.73	5 (19%)
31	5MC	C	32	31	18,22,23	0.53	0	26,32,35	0.59	0
31	5MU	C	54	31	19,22,23	0.42	0	28,32,35	0.62	0
28	OMC	a	2680	33,28	19,22,23	0.64	0	26,31,34	0.73	0
28	5MC	a	2145	28	18,22,23	0.60	0	26,32,35	0.68	0
31	PSU	C	55	31	18,21,22	1.10	1 (5%)	22,30,33	1.78	4 (18%)
28	PSU	a	2100	28	18,21,22	1.09	1 (5%)	22,30,33	1.74	4 (18%)
28	PSU	a	2639	28	18,21,22	1.05	1 (5%)	22,30,33	1.87	5 (22%)
28	PSU	a	1038	28	18,21,22	1.00	1 (5%)	22,30,33	1.87	3 (13%)
28	2MA	a	2685	33,28	17,25,26	2.28	4 (23%)	17,37,40	1.34	2 (11%)
28	5MU	a	2122	28	19,22,23	0.50	0	28,32,35	0.48	0
28	3TD	a	2098	28	18,22,23	4.18	6 (33%)	22,32,35	1.69	3 (13%)
28	2MG	a	2018	28	18,26,27	1.16	2 (11%)	16,38,41	0.90	1 (6%)
28	PSU	a	2786	28	18,21,22	1.06	1 (5%)	22,30,33	1.84	5 (22%)
31	4SU	C	8	31	18,21,22	3.67	7 (38%)	26,30,33	2.23	5 (19%)
28	PSU	a	2787	28	18,21,22	1.03	1 (5%)	22,30,33	1.78	3 (13%)
28	PSU	a	2762	28	18,21,22	1.07	1 (5%)	22,30,33	1.82	5 (22%)
28	PSU	a	2686	28	18,21,22	1.05	1 (5%)	22,30,33	1.79	4 (18%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
28	H2U	a	2631	28	-	0/7/38/39	0/2/2/2
28	PSU	a	2094	28	-	0/7/25/26	0/2/2/2
28	OMG	a	2433	31,28	-	1/5/27/28	0/3/3/3

*Continued on next page...*

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
28	2MG	a	2627	28	-	1/5/27/28	0/3/3/3
28	OMU	a	2734	28	-	0/9/27/28	0/2/2/2
31	5MC	C	32	31	-	0/7/25/26	0/2/2/2
31	5MU	C	54	31	-	0/7/25/26	0/2/2/2
28	OMC	a	2680	33,28	-	0/9/27/28	0/2/2/2
28	5MC	a	2145	28	-	0/7/25/26	0/2/2/2
31	PSU	C	55	31	-	0/7/25/26	0/2/2/2
28	PSU	a	2100	28	-	0/7/25/26	0/2/2/2
28	PSU	a	2639	28	-	0/7/25/26	0/2/2/2
28	PSU	a	1038	28	-	0/7/25/26	0/2/2/2
28	2MA	a	2685	33,28	-	2/3/25/26	0/3/3/3
28	5MU	a	2122	28	-	0/7/25/26	0/2/2/2
28	3TD	a	2098	28	-	2/7/25/26	0/2/2/2
28	2MG	a	2018	28	-	0/5/27/28	0/3/3/3
28	PSU	a	2786	28	-	0/7/25/26	0/2/2/2
31	4SU	C	8	31	-	0/7/25/26	0/2/2/2
28	PSU	a	2787	28	-	0/7/25/26	0/2/2/2
28	PSU	a	2762	28	-	0/7/25/26	0/2/2/2
28	PSU	a	2686	28	-	0/7/25/26	0/2/2/2

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
28	a	2098	3TD	C6-C5	12.45	1.49	1.35
28	a	2098	3TD	C2-N1	8.99	1.48	1.37
31	C	8	4SU	C2-N3	7.22	1.50	1.38
31	C	8	4SU	C2-N1	7.06	1.49	1.38
28	a	2685	2MA	C2-N3	6.90	1.45	1.31

The worst 5 of 57 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
31	C	8	4SU	C4-N3-C2	-7.83	119.73	127.34
31	C	8	4SU	C5-C4-N3	5.47	119.76	114.69
28	a	2734	OMU	C4-N3-C2	-5.45	119.40	126.58
28	a	2098	3TD	N1-C2-N3	5.27	120.30	116.14
28	a	1038	PSU	C4-N3-C2	-5.24	118.78	126.34

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
28	a	2098	3TD	C3'-C4'-C5'-O5'
28	a	2098	3TD	O4'-C4'-C5'-O5'
28	a	2433	OMG	C1'-C2'-O2'-CM2
28	a	2685	2MA	O4'-C4'-C5'-O5'
28	a	2685	2MA	C3'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 310 ligands modelled in this entry, 309 are monoatomic - leaving 1 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
35	V7A	a	3101	-	36,38,38	1.11	2 (5%)	40,60,60	0.85	2 (5%)

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
35	V7A	a	3101	-	-	8/13/72/72	0/4/4/4

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
35	a	3101	V7A	CBC-NBD	5.42	1.47	1.33

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
35	a	3101	V7A	OAY-CAH	2.21	1.27	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
35	a	3101	V7A	CAM-CAP-CAQ	2.46	119.65	115.75
35	a	3101	V7A	CAP-CAM-CAL	2.09	112.33	109.88

There are no chirality outliers.

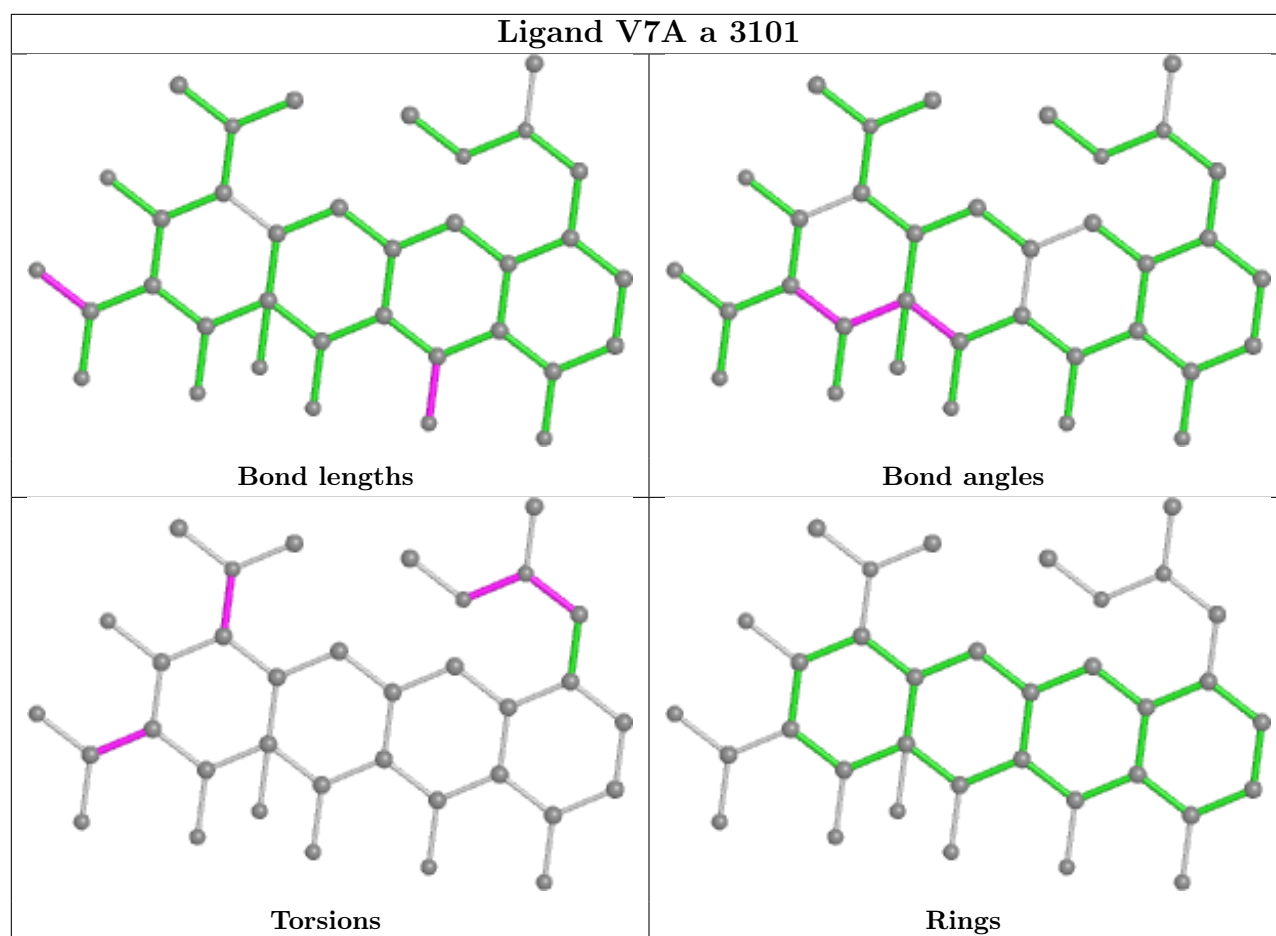
5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
35	a	3101	V7A	CAN-CAO-NBF-CBH
35	a	3101	V7A	CAP-CAQ-CBC-OBE
35	a	3101	V7A	CAR-CAQ-CBC-NBD
35	a	3101	V7A	CAR-CAQ-CBC-OBE
35	a	3101	V7A	CAA-CAS-NAT-CAW

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

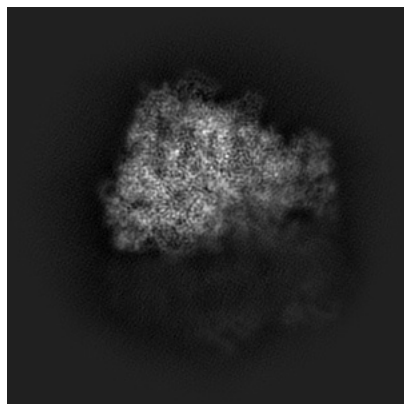
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-27009. These allow visual inspection of the internal detail of the map and identification of artifacts.

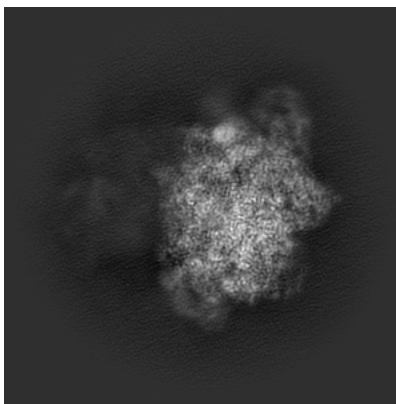
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

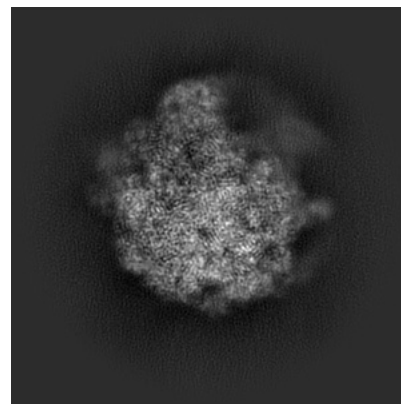
#### 6.1.1 Primary map



X

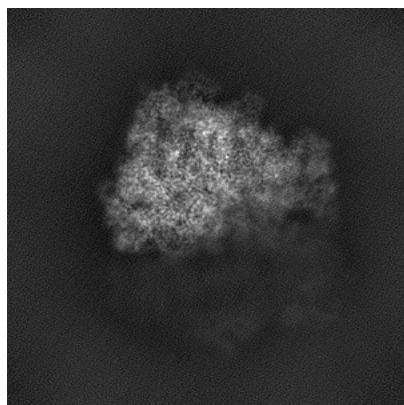


Y

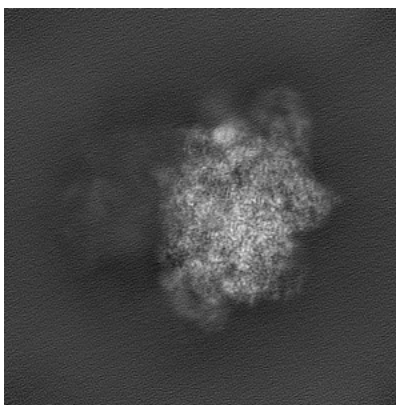


Z

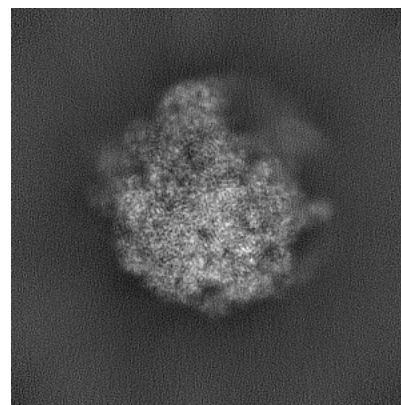
#### 6.1.2 Raw map



X



Y



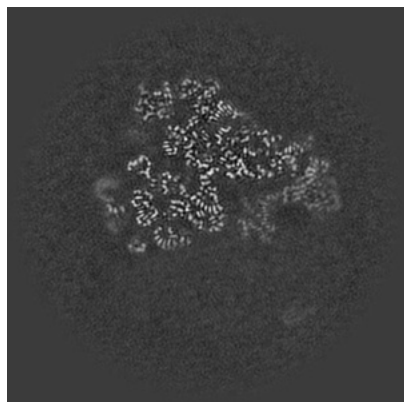
Z

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

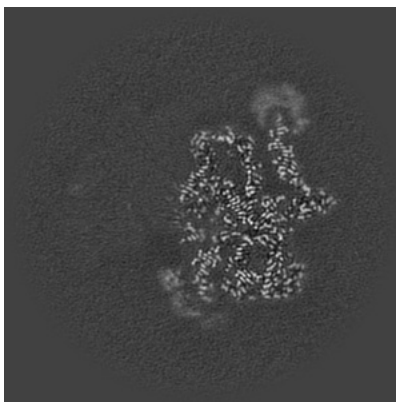


## 6.2 Central slices [i](#)

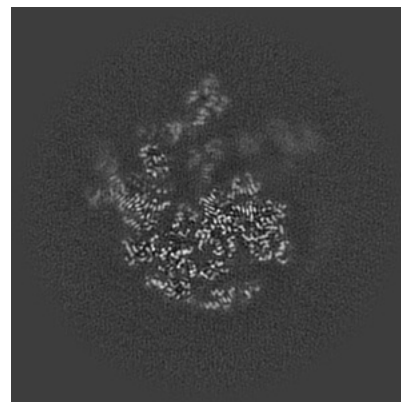
### 6.2.1 Primary map



X Index: 170

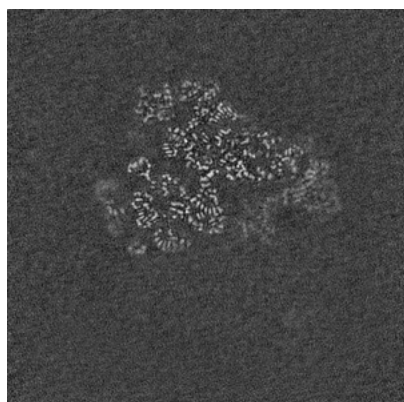


Y Index: 170

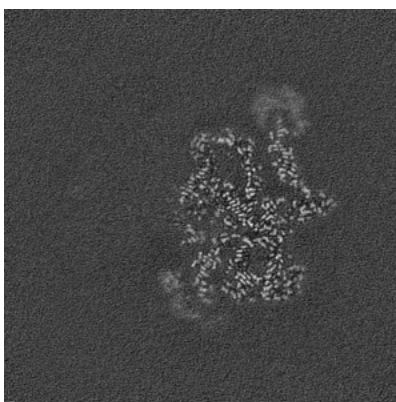


Z Index: 170

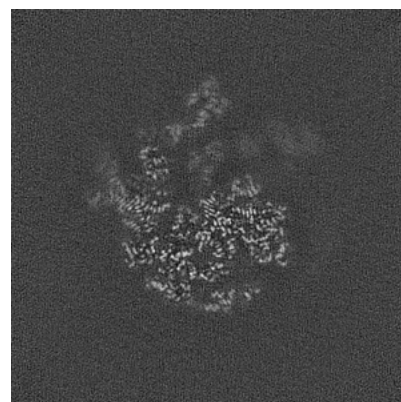
### 6.2.2 Raw map



X Index: 170



Y Index: 170



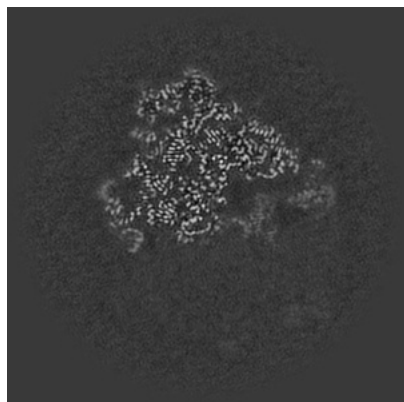
Z Index: 170

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

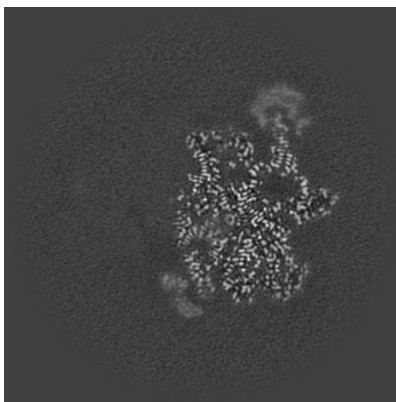


## 6.3 Largest variance slices [i](#)

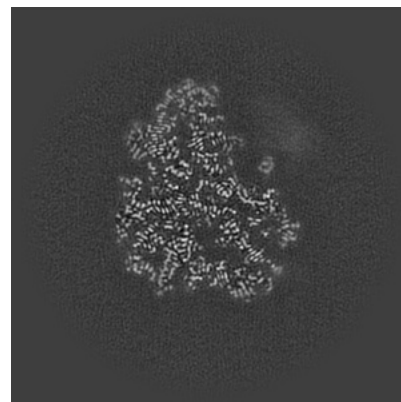
### 6.3.1 Primary map



X Index: 176

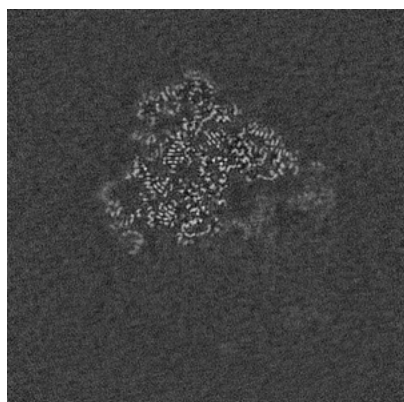


Y Index: 166

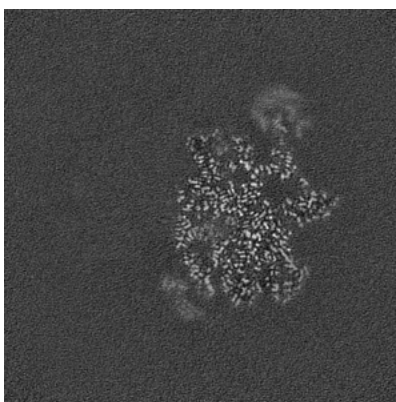


Z Index: 203

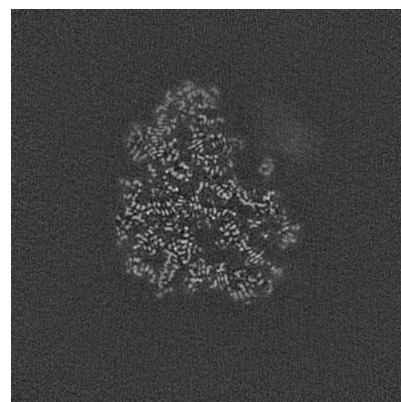
### 6.3.2 Raw map



X Index: 176



Y Index: 165

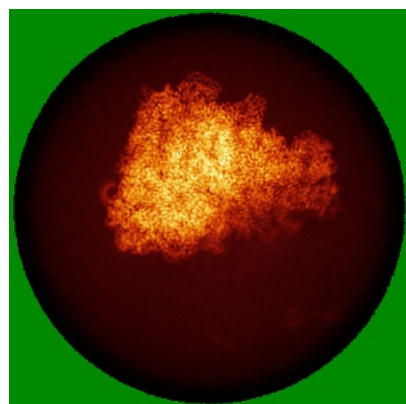


Z Index: 203

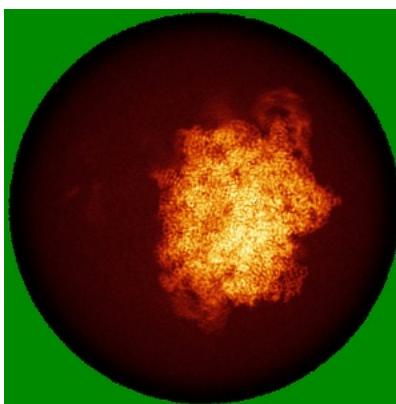
The images above show the largest variance slices of the map in three orthogonal directions.

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

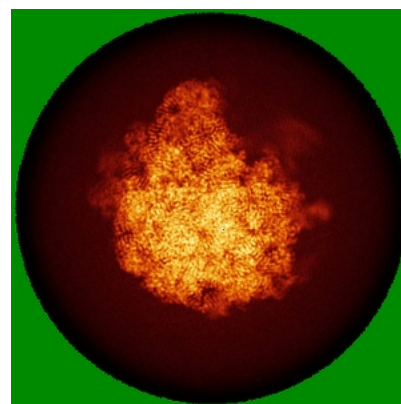
### 6.4.1 Primary map



X

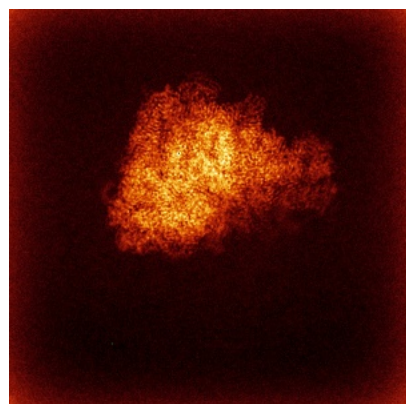


Y

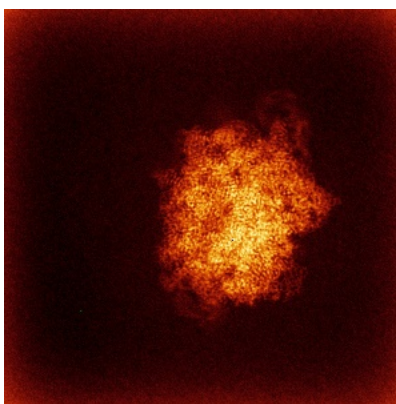


Z

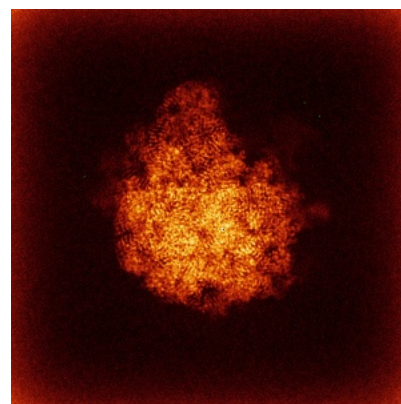
### 6.4.2 Raw map



X



Y

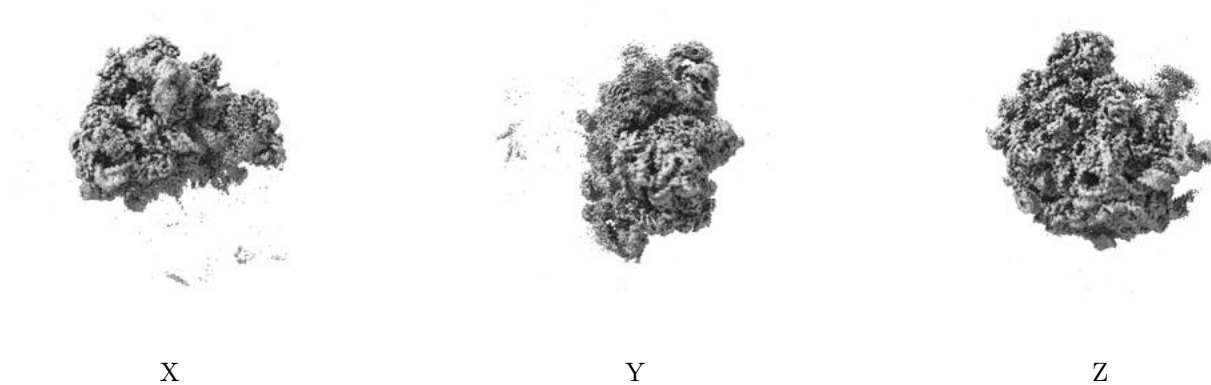


Z

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.

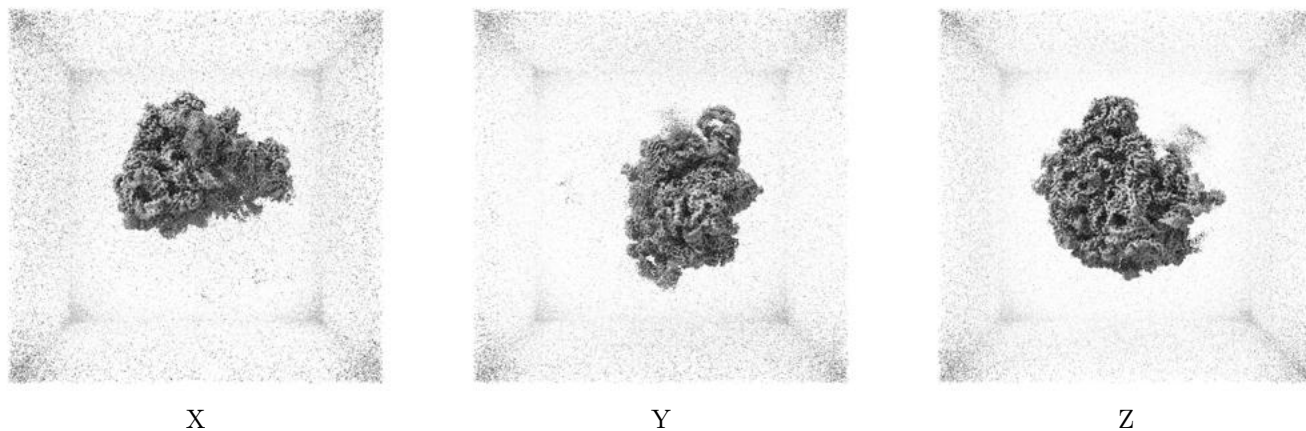
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.16. 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.

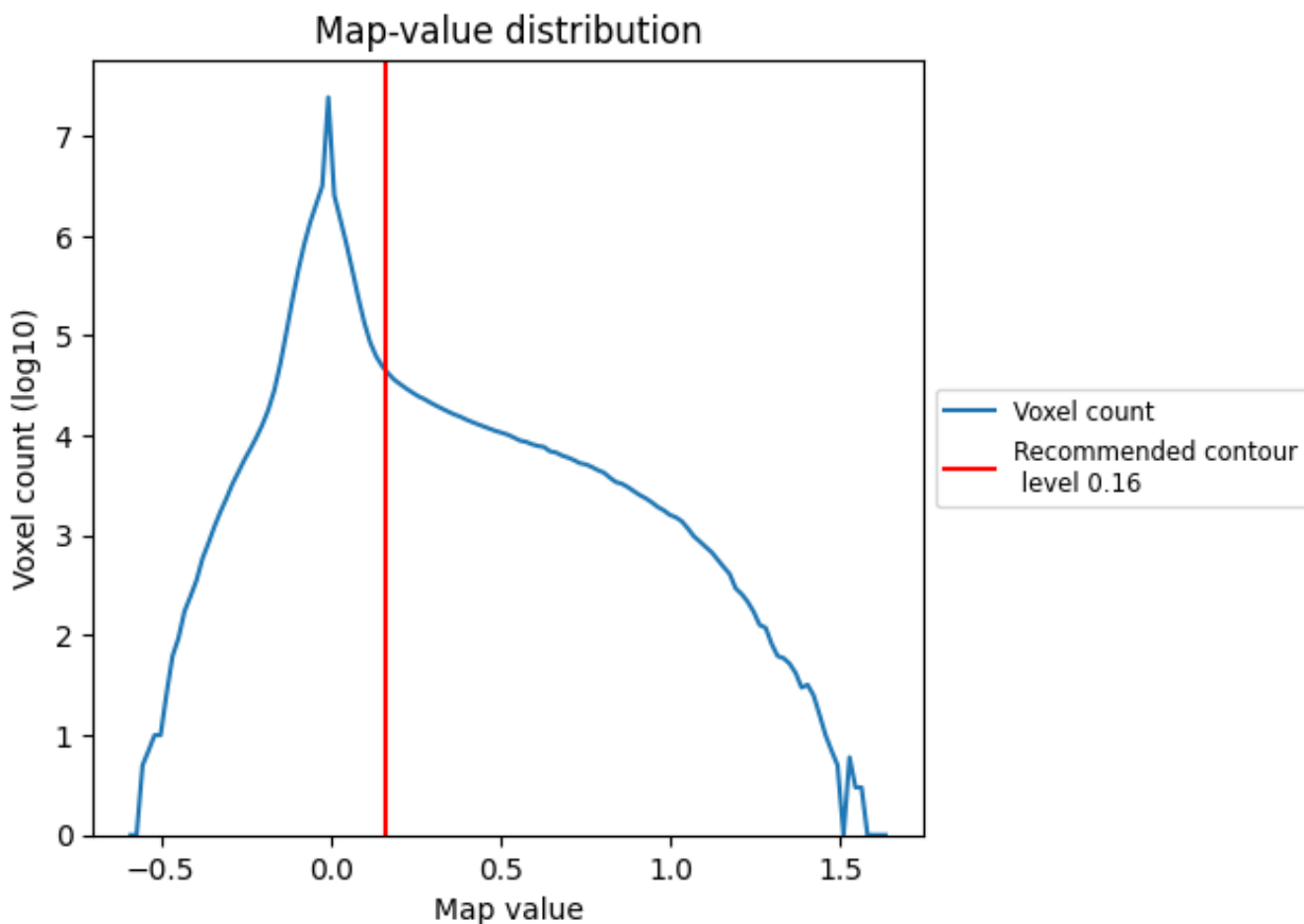
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

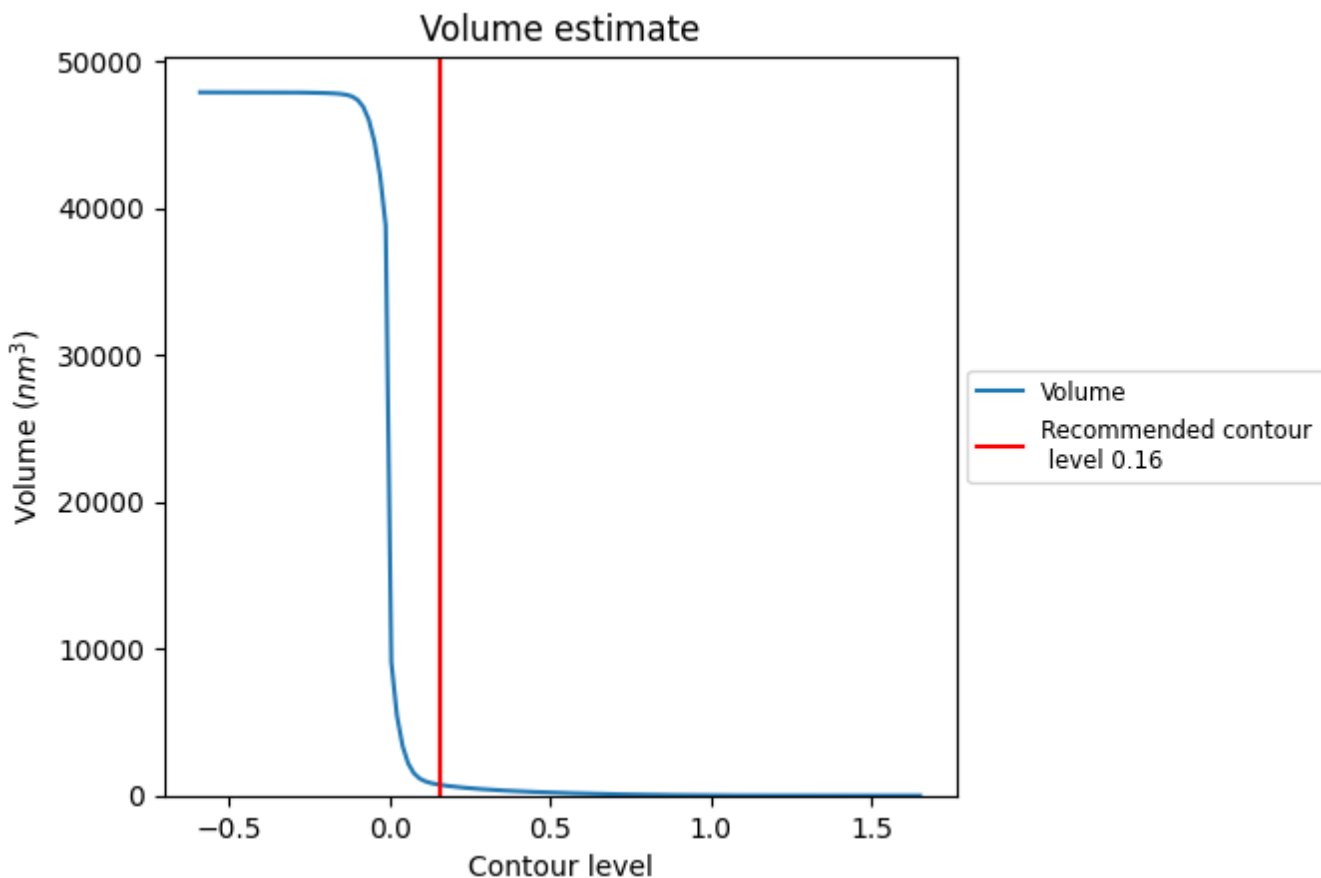
This section contains the results of statistical analysis of the map.

### 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.

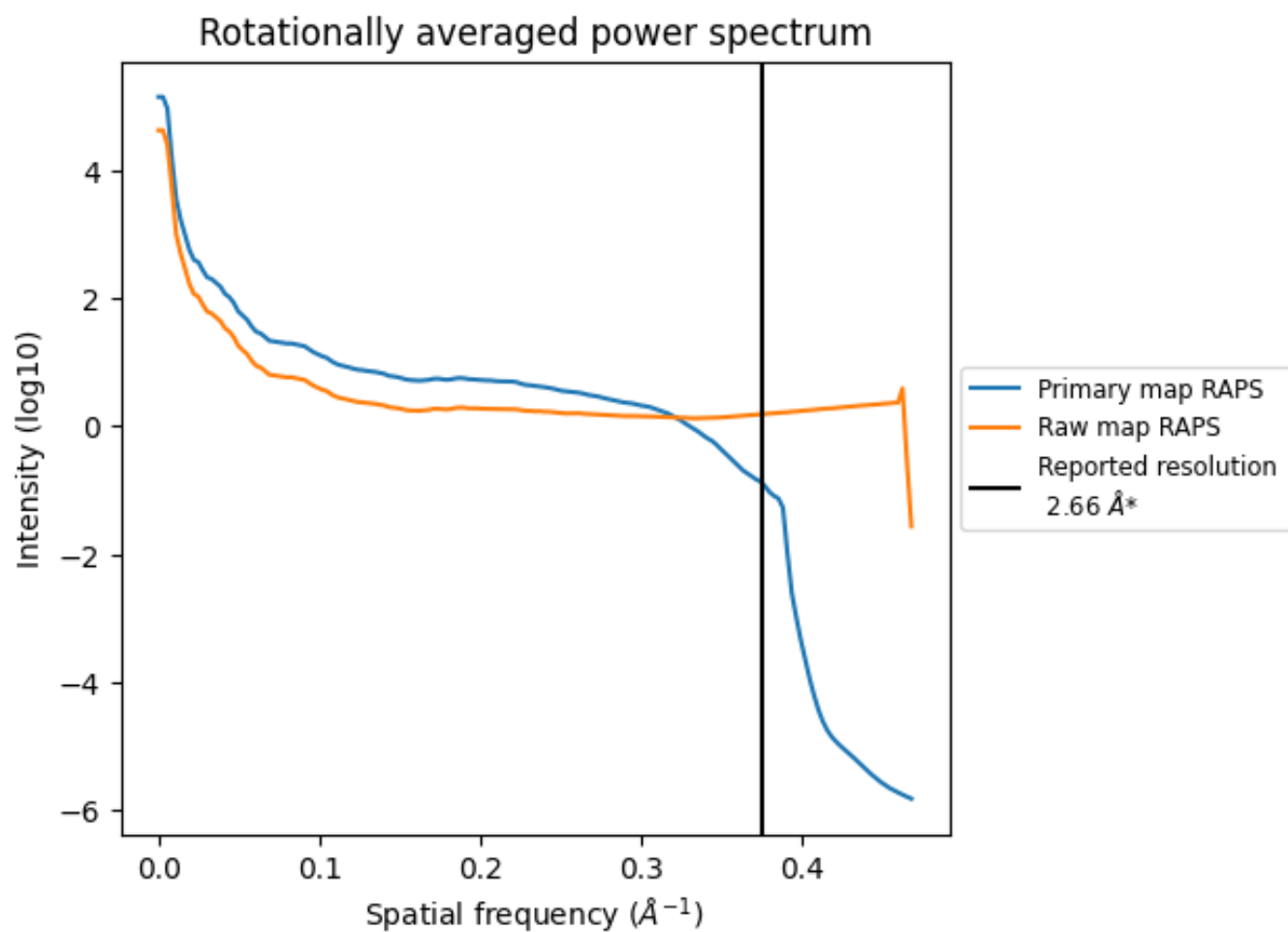
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 722 nm<sup>3</sup>; this corresponds to an approximate mass of 652 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



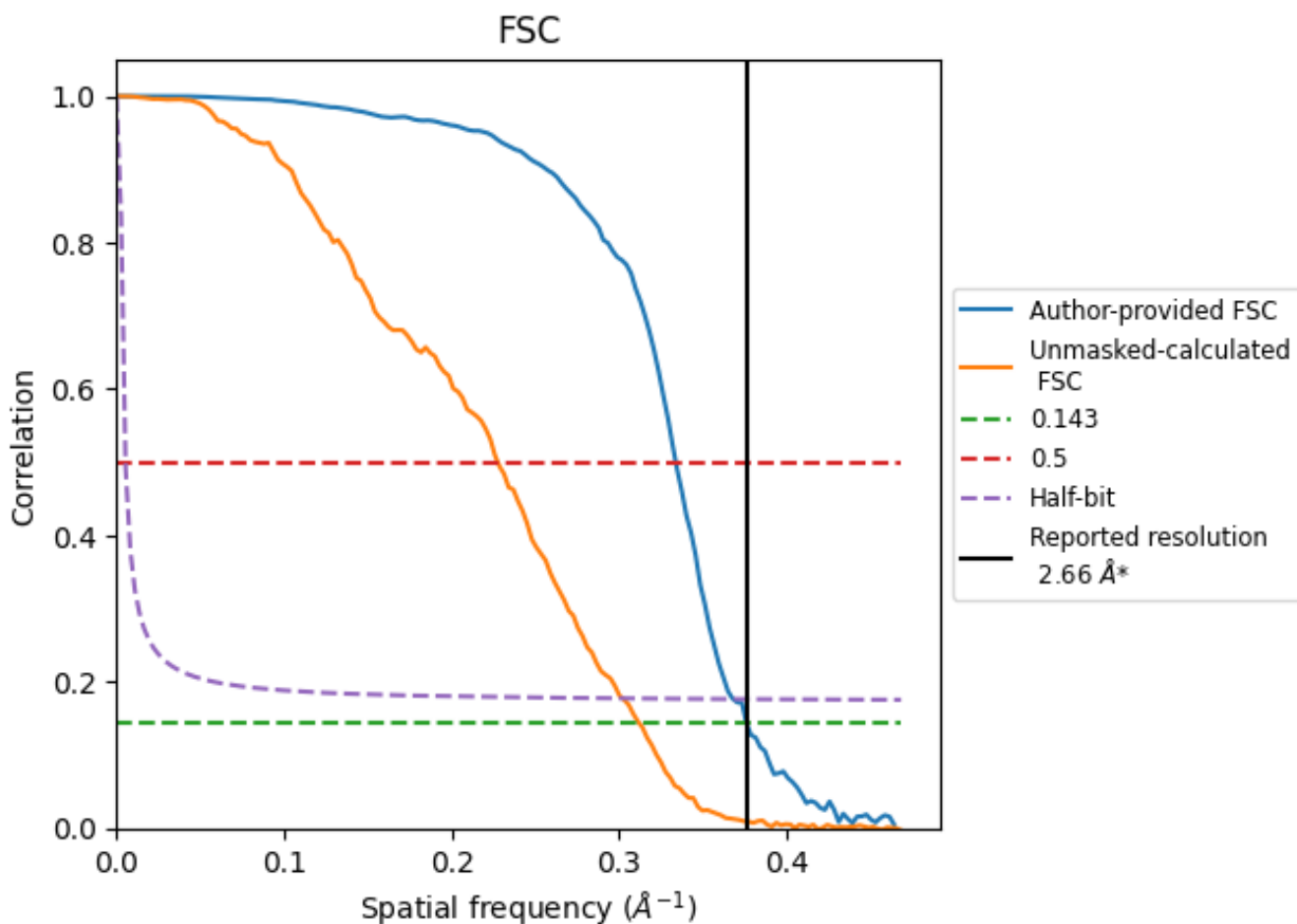
\*Reported resolution corresponds to spatial frequency of 0.376 Å<sup>-1</sup>



## 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 0.376 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.66	-	-
Author-provided FSC curve	2.66	3.00	2.72
Unmasked-calculated*	3.21	4.40	3.31

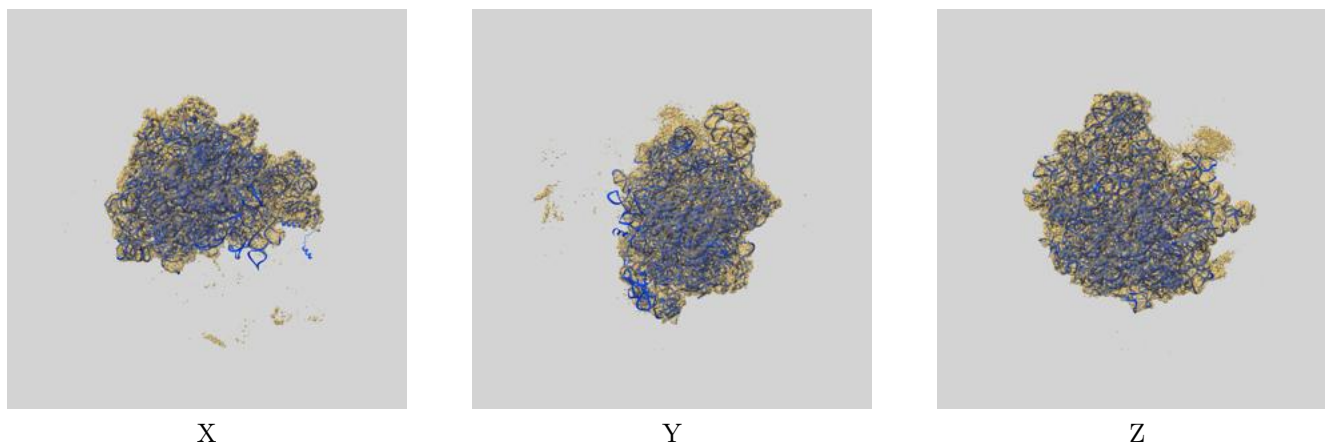
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.21 differs from the reported value 2.66 by more than 10 %



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

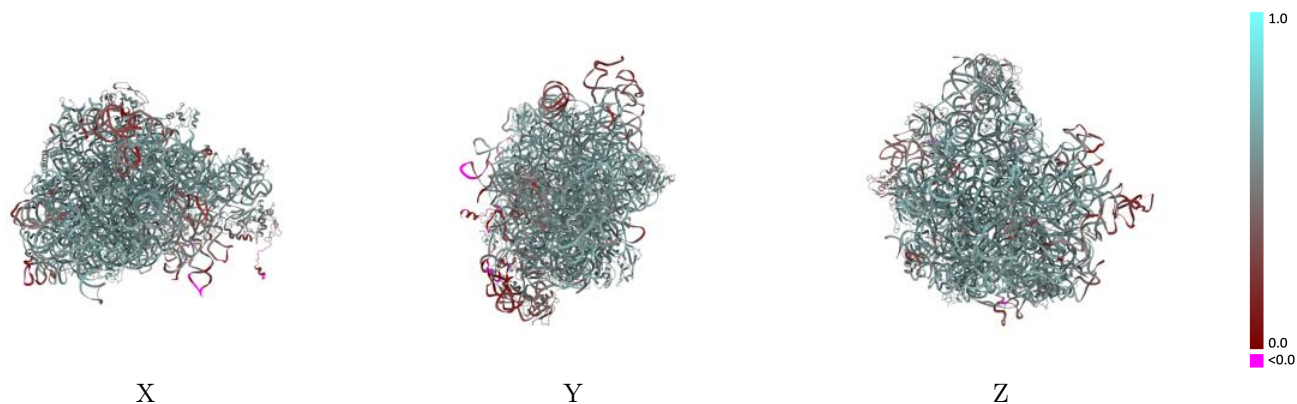
This section contains information regarding the fit between EMDB map EMD-27009 and PDB model 8CVM. Per-residue inclusion information can be found in section [3](#) on page [11](#).

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



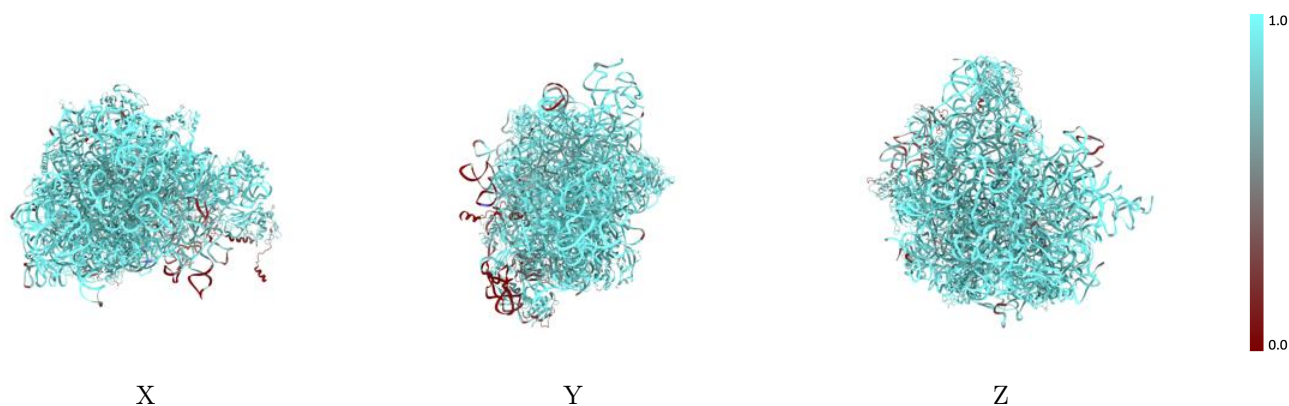
The images above show the 3D surface view of the map at the recommended contour level 0.16 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



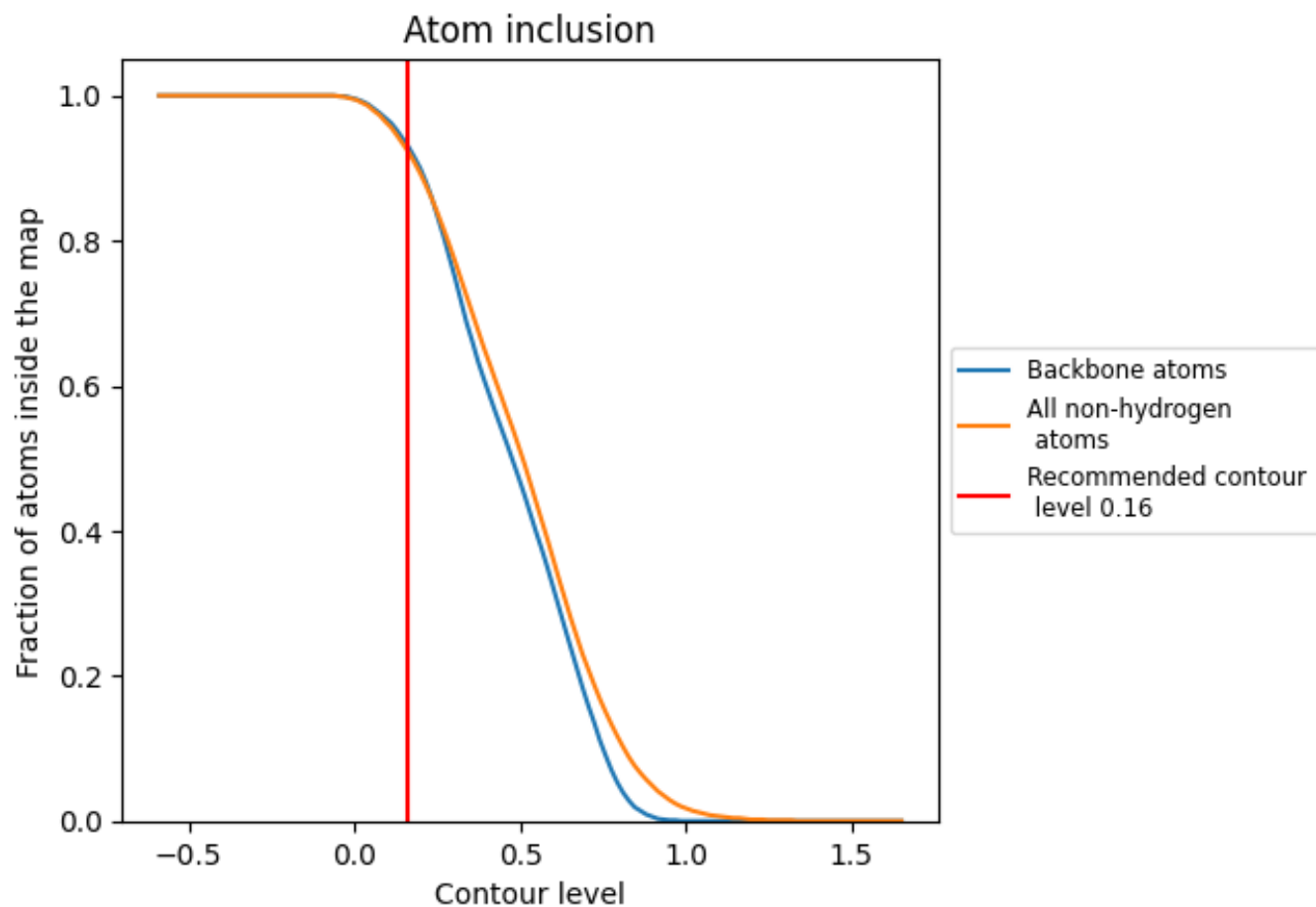
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.16).



































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 92% 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 (0.16) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9240	 0.5650
0	 0.8910	 0.5770
1	 0.9670	 0.6300
2	 0.9640	 0.6170
3	 0.4250	 0.5010
4	 0.4580	 0.3200
C	 0.6210	 0.4180
V	 0.9590	 0.6280
a	 0.9460	 0.5700
b	 0.9950	 0.5750
c	 0.9520	 0.6070
d	 0.9540	 0.5990
e	 0.9210	 0.5550
f	 0.7690	 0.4600
g	 0.7380	 0.4160
i	 0.9640	 0.6110
j	 0.8690	 0.5740
k	 0.9390	 0.5800
l	 0.9550	 0.6050
m	 0.9490	 0.5980
n	 0.9190	 0.5450
o	 0.8000	 0.5590
p	 0.9610	 0.6110
q	 0.9170	 0.5840
r	 0.9410	 0.5960
s	 0.9300	 0.5820
t	 0.9380	 0.5690
u	 0.6720	 0.4910
v	 0.9560	 0.6090
w	 0.9780	 0.6210
x	 0.9140	 0.5560
y	 0.9600	 0.5950
z	 0.9480	 0.6040

