Full wwPDB EM Validation Report

Sep 16, 2026 – 09:58 AM EDT

PDB ID	:	8E3L / pdb_00008e3l
EMDB ID	:	EMD-27867
Title	:	E. coli 50S ribosome bound to D-linker solithromycin conjugate
Authors	:	Pellegrino, J.; Lee, D.J.; Fraser, J.S.; Seiple, I.B.
Deposited on	:	2022-08-17
Resolution	:	2.35 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

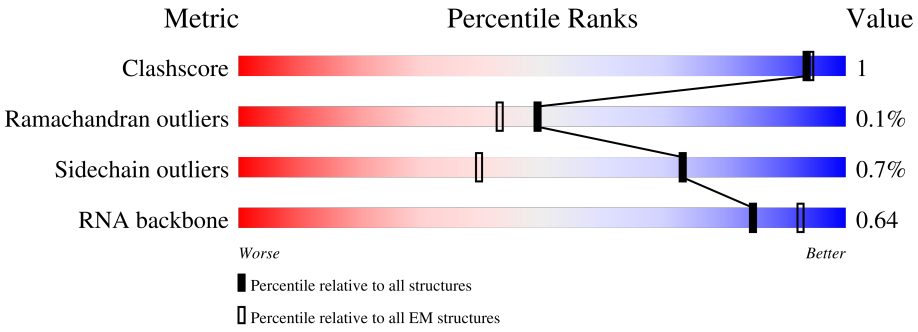
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data 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)	:	2.50

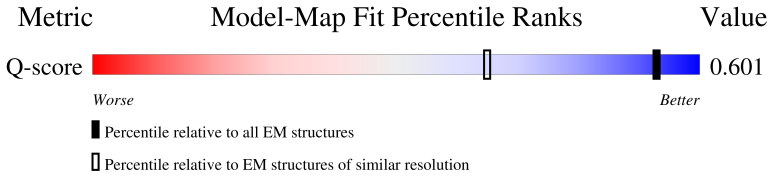
1 Overall quality at a glance

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

The reported resolution of this entry is 2.35 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.





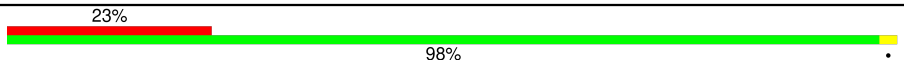
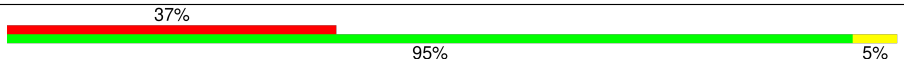
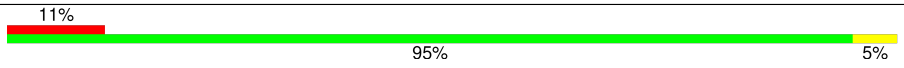
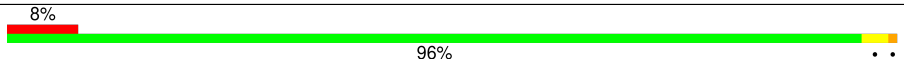
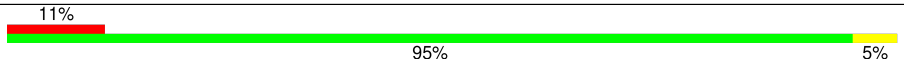
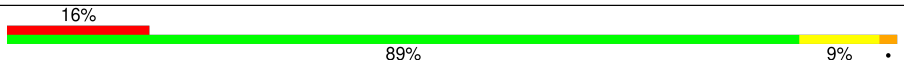
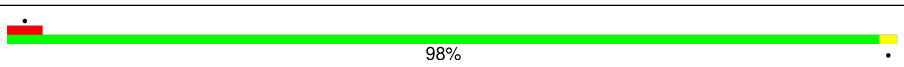
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	4607 (1.85 - 2.85)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	I	2904	15% 85% 13% •
2	J	118	54% 92% 8% •
3	K	271	6% 94% 5% •

Continued on next page...

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Mol	Chain	Length	Quality of chain
4	L	144	
5	M	201	
6	N	209	
7	O	142	
8	P	110	
9	Q	56	
10	R	46	

2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 116115 atoms, of which 42176 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 50S ribosomal RNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
1	I	2897	93497	27757	31291	11443	20109	2897	0	0

- Molecule 2 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
2	J	118	3810	1126	1281	464	821	118	0	0

- Molecule 3 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	K	271	4237	1288	2154	423	365	7	0	0

- Molecule 4 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
4	L	144	2182	654	1129	207	190	2	0	0

- Molecule 5 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
5	M	201	3170	974	1618	283	290	5	0	0

- Molecule 6 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
6	N	209	3182	979	1617	288	294	4	0	0

- Molecule 7 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	O	142	Total	C	H	N	O	S	0	0
			2291	714	1162	212	199	4		

- Molecule 8 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	P	110	Total	C	H	N	O	S	0	0
			1775	532	918	166	156	3		

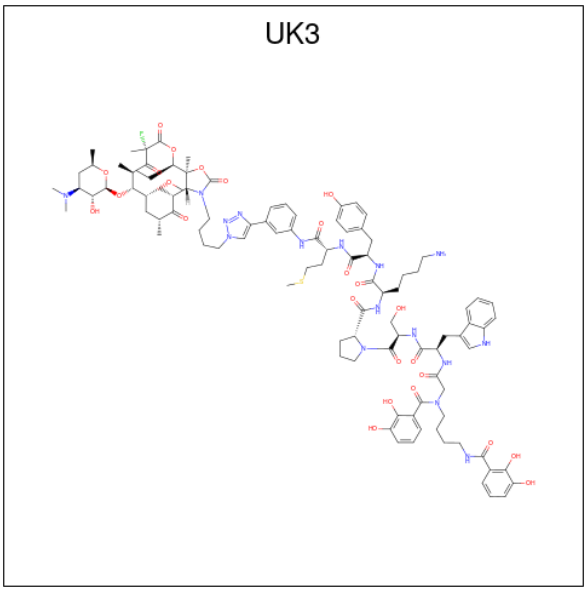
- Molecule 9 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	Q	56	Total	C	H	N	O	S	0	0
			898	269	454	94	80	1		

- Molecule 10 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	R	46	Total	C	H	N	O	S	0	0
			794	228	417	90	57	2		

- Molecule 11 is (2 {R})- {N}-[(2 {R})-6-azanyl-1-[[(2 {R})-1-[[(2 {R})-1-[[3-[1-[4-[(1 {S},2 {R},5 {S},7 {R},8 {R},9 {R},11 {R},13 {R},14 {R})-8-[(2 {S},3 {R},4 {S},6 {R})-4-(dimethylamino)-6-methyl-3-oxidanyl-oxan-2-yl]oxy-2-ethyl-5-fluoranyl-9-methoxy-1,5,7,11,13-pentamethyl-4,6,12,16-tetrakis(oxidanylidene)-3,17-dioxa-15-azabicyclo[12.3.0]heptadecan-15-yl]butyl]-1,2,3-triazol-4-yl]phenyl]amino]-4-methylsulfanyl-1-oxidanylidene-butan-2-yl]amino]-3-(4-hydroxyphenyl)-1-oxidanylidene-propan-2-yl]amino]-1-oxidanylidene-hexan-2-yl]-1-[(2 {R})-2-[[(2 {R})-2-[2-[[2,3-bis(oxidanyl)phenyl]carbonyl-[4-[[2,3-bis(oxidanyl)phenyl]carbonylamino]butyl]amino]ethanoylamino]-3-(1 {H}-indol-3-yl)propanoyl]amino]-3-oxidanyl-propanoyl]pyrrolidine-2-carboxamide (CCD ID: UK3) (formula: $C_{101}H_{135}FN_{16}O_{25}S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms							AltConf
			Total	C	F	H	N	O	S	
11	I	1	279	101	1	135	16	25	1	0

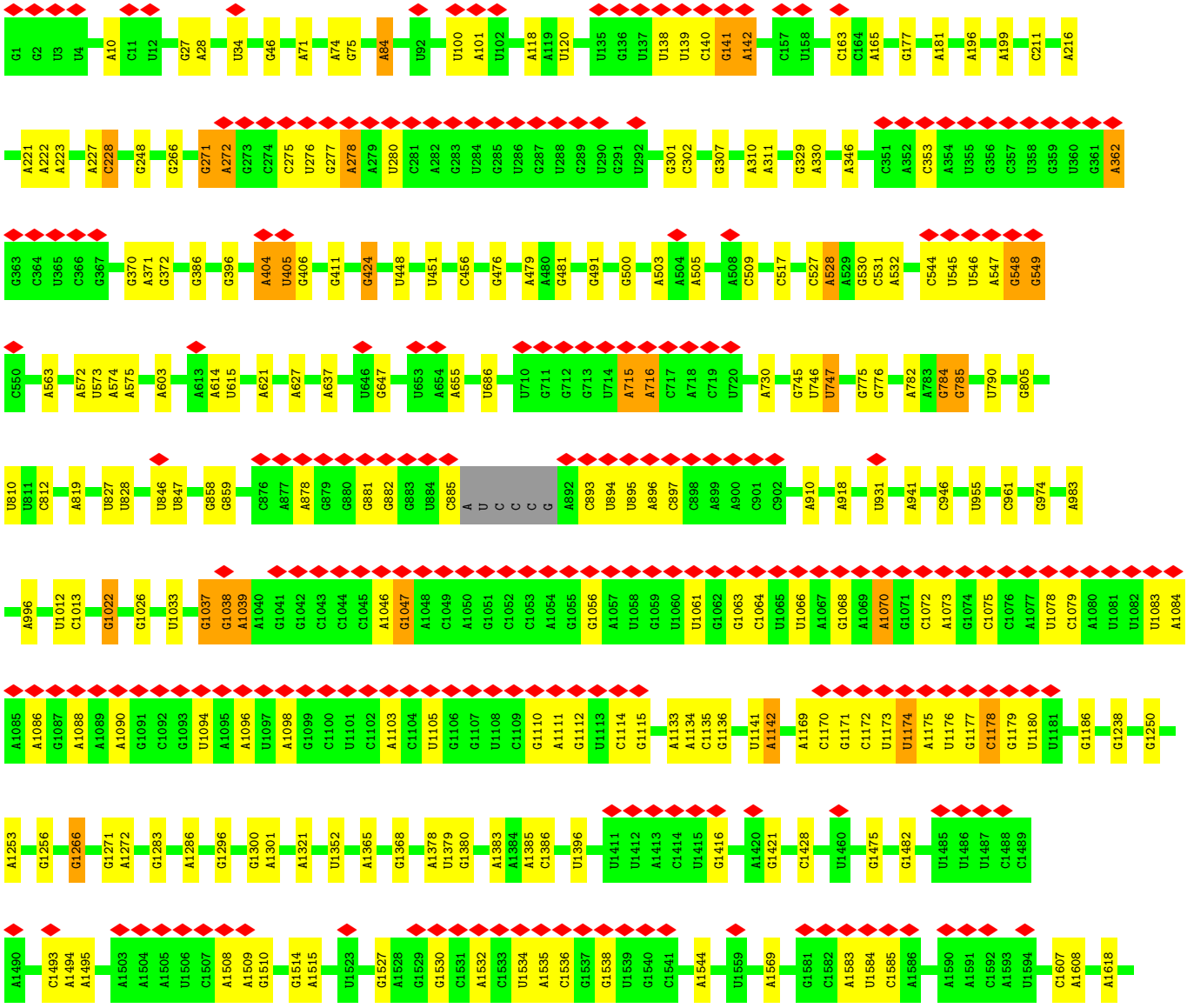
3 Residue-property plots (i)

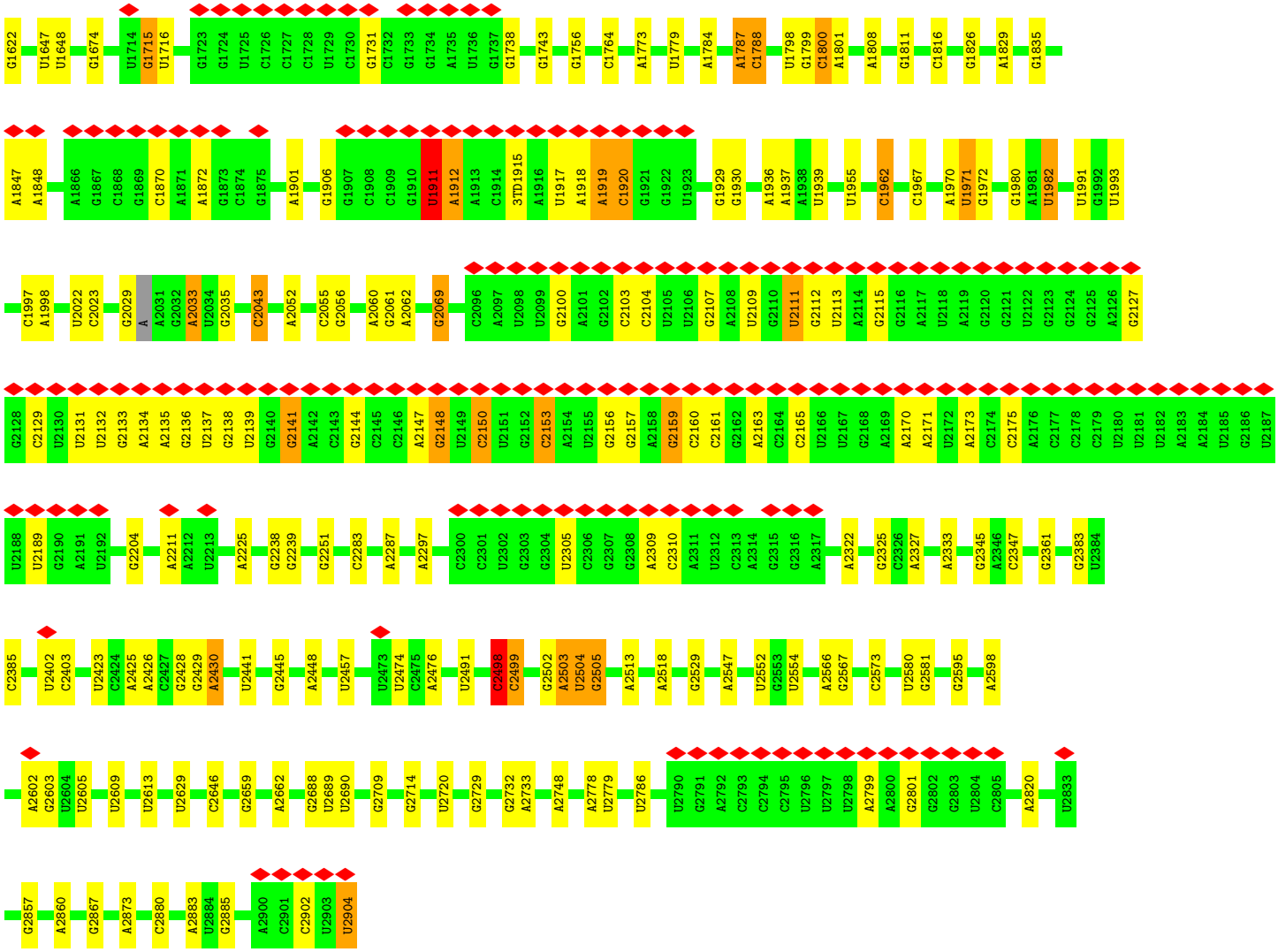
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

Chain I:

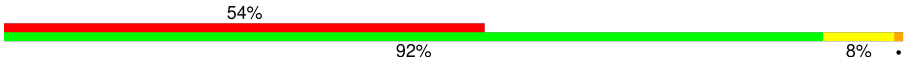






• Molecule 2: 5S ribosomal RNA

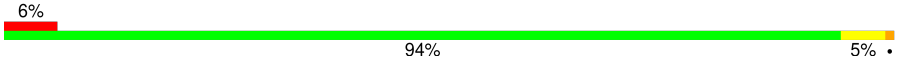
Chain J:

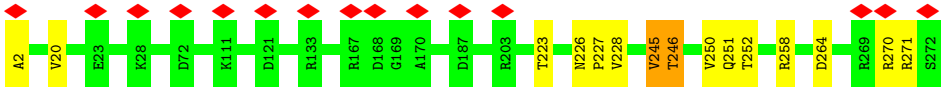




• Molecule 3: 50S ribosomal protein L2

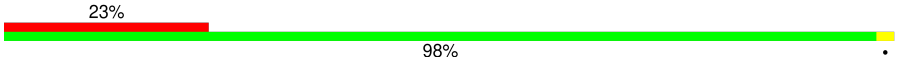
Chain K:

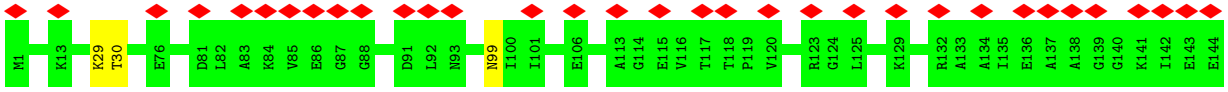




• Molecule 4: 50S ribosomal protein L15

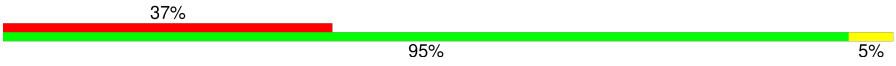
Chain L:

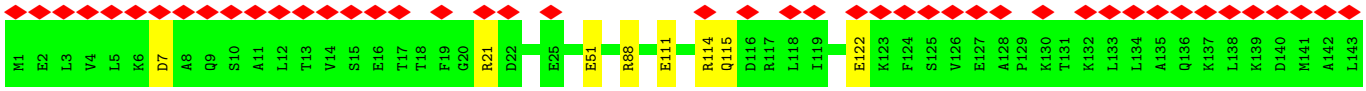


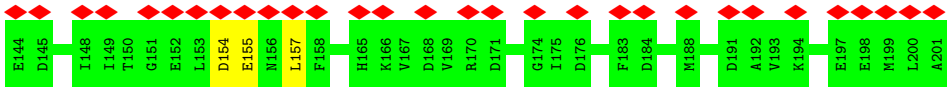


• Molecule 5: 50S ribosomal protein L4

Chain M:

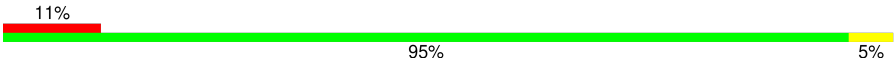


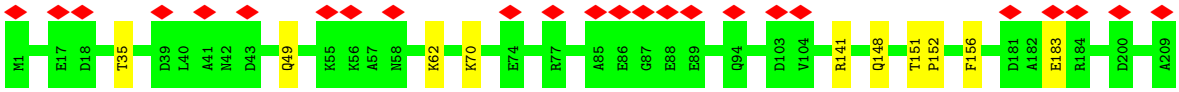




• Molecule 6: 50S ribosomal protein L3

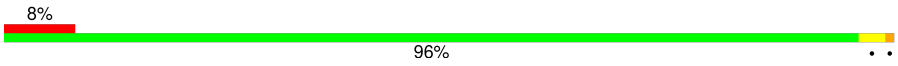
Chain N:

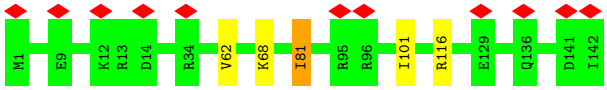




• Molecule 7: 50S ribosomal protein L13

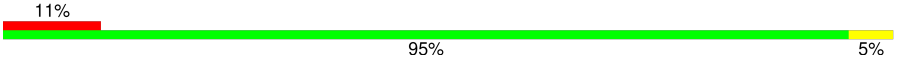
Chain O:

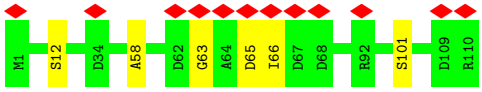




• Molecule 8: 50S ribosomal protein L22

Chain P:

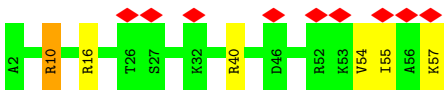




• Molecule 9: 50S ribosomal protein L32

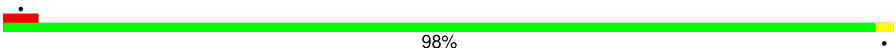
Chain Q:

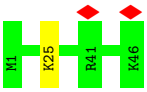




• Molecule 10: 50S ribosomal protein L34

Chain R:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	105104	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	69	Depositor
Minimum defocus (nm)	400	Depositor
Maximum defocus (nm)	1000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	23.226	Depositor
Minimum map value	-7.763	Depositor
Average map value	0.027	Depositor
Map value standard deviation	0.784	Depositor
Recommended contour level	4.1	Depositor
Map size (Å)	332.5, 332.5, 332.5	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.665, 0.665, 0.665	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: UK3, 2MA, 2MG, 1MG, OMG, 3TD, 5MC, G7M, 6MZ, OMC, 5MU, OMU, 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	I	0.10	0/69165	0.17	0/107896
2	J	0.06	0/2828	0.13	0/4410
3	K	0.14	0/2122	0.32	0/2852
4	L	0.12	0/1062	0.30	0/1413
5	M	0.11	0/1571	0.25	0/2113
6	N	0.12	0/1586	0.27	0/2134
7	O	0.11	0/1152	0.26	0/1551
8	P	0.12	0/864	0.24	0/1156
9	Q	0.13	0/450	0.33	0/599
10	R	0.15	0/380	0.37	0/498
All	All	0.10	0/81180	0.18	0/124622

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	K	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	K	246	THR	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	I	62206	31291	31305	98	0
2	J	2529	1281	1281	2	0
3	K	2083	2154	2154	10	0
4	L	1053	1129	1129	3	0
5	M	1552	1618	1618	6	0
6	N	1565	1617	1616	7	0
7	O	1129	1162	1162	5	0
8	P	857	918	922	3	0
9	Q	444	454	458	5	0
10	R	377	417	418	1	0
11	I	144	135	0	0	0
All	All	73939	42176	42063	123	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 1.

All (123) 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:I:1919:A:O2'	1:I:1920:C:OP1	1.92	0.87
1:I:1911:PSU:O2'	1:I:1912:A:OP1	1.96	0.84
1:I:1998:A:OP2	6:N:141:ARG:NH2	2.11	0.84
1:I:1072:C:OP1	1:I:1075:C:N4	2.11	0.82
1:I:1779:U:OP2	1:I:1784:A:N6	2.12	0.82
3:K:2:ALA:N	3:K:20:VAL:O	2.13	0.82
1:I:1799:G:OP2	3:K:270:ARG:NH1	2.12	0.82
1:I:1787:A:O2'	1:I:1788:C:OP1	2.00	0.80
1:I:1980:G:O2'	1:I:1982:U:OP2	2.00	0.79
5:M:21:ARG:O	5:M:114:ARG:NH2	2.16	0.79
1:I:2138:G:O6	1:I:2150:C:N4	2.20	0.75
1:I:1826:G:O2'	1:I:1971:U:OP2	2.07	0.73
1:I:1038:G:O2'	1:I:1039:A:OP1	2.05	0.73
6:N:156:PHE:HB3	7:O:81:ILE:HD11	1.71	0.71
1:I:2786:U:OP1	6:N:70:LYS:NZ	2.24	0.71
3:K:251:GLN:O	3:K:252:THR:OG1	2.08	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:2141:G:O6	1:I:2144:G:N2	2.23	0.71
1:I:2111:U:O2	1:I:2115:G:N2	2.24	0.70
1:I:621:A:OP2	4:L:99:ASN:ND2	2.25	0.69
1:I:1064:C:N4	1:I:1070:A:OP2	2.25	0.69
2:J:24:G:O2'	2:J:56:G:N7	2.24	0.69
1:I:1607:C:N4	1:I:1622:G:OP2	2.26	0.68
1:I:1715:G:O2'	1:I:1743:G:O6	2.09	0.68
3:K:226:ASN:O	3:K:228:VAL:N	2.28	0.67
1:I:528:A:OP2	7:O:116:ARG:NH2	2.28	0.67
1:I:1066:U:O2'	1:I:1068:G:N7	2.23	0.66
3:K:246:THR:HG23	3:K:252:THR:CG2	2.25	0.65
1:I:715:A:O2'	1:I:716:A:OP1	2.14	0.65
1:I:500:G:N1	1:I:503:A:OP2	2.32	0.63
1:I:1047:G:HO2'	1:I:1110:G:H1	1.48	0.61
1:I:1083:U:N3	1:I:1086:A:OP2	2.34	0.60
1:I:1266:G:OP1	9:Q:16:ARG:NE	2.32	0.59
1:I:1475:G:O2'	1:I:1514:G:O6	2.20	0.59
1:I:307:G:N1	1:I:310:A:OP2	2.36	0.58
1:I:1936:A:OP2	1:I:1962:5MC:N4	2.37	0.58
1:I:211:C:OP1	10:R:25:LYS:NZ	2.36	0.58
1:I:370:G:O2'	1:I:424:G:OP1	2.22	0.58
8:P:12:SER:O	8:P:101:SER:OG	2.18	0.57
1:I:2503:2MA:O2'	1:I:2505:G:OP2	2.22	0.57
6:N:183:GLU:N	6:N:183:GLU:OE1	2.37	0.56
1:I:548:G:O2'	1:I:549:G:N7	2.37	0.56
1:I:1174:U:OP1	1:I:1177:G:N2	2.39	0.56
1:I:1800:C:OP1	3:K:258:ARG:NH1	2.38	0.56
1:I:1799:G:OP1	3:K:258:ARG:NE	2.37	0.56
1:I:227:A:O2'	1:I:228:C:OP2	2.18	0.55
1:I:1527:G:N1	1:I:1544:A:OP2	2.38	0.55
1:I:2646:C:OP2	1:I:2732:G:O2'	2.22	0.55
3:K:258:ARG:NH2	3:K:264:ASP:OD1	2.40	0.55
1:I:276:U:O2'	1:I:278:A:N7	2.41	0.54
1:I:2857:G:N2	1:I:2860:A:OP2	2.36	0.53
1:I:271:G:O2'	1:I:272:A:O5'	2.26	0.53
1:I:141:G:O2'	1:I:142:A:OP2	2.24	0.53
1:I:301:G:O2'	1:I:302:C:OP2	2.22	0.52
1:I:2659:G:N2	1:I:2662:A:OP2	2.41	0.52
1:I:1037:G:O6	1:I:1038:G:N2	2.42	0.52
9:Q:55:ILE:O	9:Q:55:ILE:HD12	2.10	0.52
1:I:1385:A:O2'	1:I:1396:U:O2	2.27	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:1178:C:N4	1:I:1179:G:O6	2.44	0.50
1:I:2430:A:H2'	1:I:2430:A:N3	2.26	0.50
5:M:154:ASP:OD1	5:M:155:GLU:N	2.44	0.49
1:I:1026:G:OP2	1:I:1134:A:O2'	2.28	0.49
1:I:2134:A:N3	1:I:2159:G:N2	2.61	0.49
1:I:2052:A:O2'	6:N:148:GLN:O	2.20	0.49
1:I:27:G:O2'	1:I:28:A:OP2	2.27	0.48
1:I:278:A:N6	1:I:362:A:N7	2.61	0.48
1:I:1911:PSU:O3'	1:I:1918:A:N6	2.40	0.47
5:M:51:GLU:OE2	5:M:88:ARG:NH1	2.46	0.47
1:I:1061:U:O2'	1:I:1063:G:OP2	2.25	0.46
6:N:35:THR:OG1	6:N:49:GLN:OE1	2.31	0.46
1:I:2595:G:N2	1:I:2598:A:OP2	2.41	0.46
1:I:1421:G:N2	1:I:1495:A:N1	2.62	0.46
1:I:1084:A:N3	1:I:1105:U:O2'	2.45	0.46
7:O:81:ILE:H	7:O:81:ILE:HD12	1.80	0.46
1:I:1787:A:O2'	1:I:1788:C:P	2.74	0.46
7:O:62:VAL:HG11	7:O:101:ILE:HD11	1.98	0.46
1:I:1073:A:O3'	1:I:2474:U:O2'	2.33	0.46
1:I:1283:G:N1	1:I:1286:A:OP2	2.49	0.45
4:L:29:LYS:O	4:L:30:THR:OG1	2.29	0.45
1:I:1919:A:O2'	1:I:1920:C:P	2.74	0.45
1:I:2902:C:OP2	1:I:2904:U:O3'	2.29	0.45
1:I:881:G:N2	1:I:882:G:O6	2.50	0.44
1:I:1038:G:O2'	1:I:1039:A:P	2.75	0.44
1:I:2581:G:OP2	1:I:2581:G:N2	2.47	0.44
1:I:1919:A:HO2'	1:I:1920:C:P	2.36	0.44
1:I:517:C:OP2	9:Q:10:ARG:NH2	2.50	0.44
5:M:7:ASP:OD1	5:M:7:ASP:N	2.51	0.44
1:I:918:A:N3	2:J:80:U:O2'	2.49	0.44
1:I:476:G:N1	1:I:479:A:OP2	2.45	0.44
1:I:810:U:O4	4:L:30:THR:HG22	2.18	0.44
1:I:2033:A:O2'	1:I:2035:G:OP2	2.36	0.43
1:I:784:G:H5'	1:I:785:G:OP1	2.17	0.43
1:I:1378:A:O2'	1:I:1380:G:OP2	2.36	0.43
1:I:84:A:H62	1:I:101:A:H2	1.67	0.43
1:I:2141:G:N2	1:I:2148:G:N3	2.67	0.43
1:I:2688:G:N1	1:I:2720:U:OP2	2.38	0.43
1:I:1171:G:H1'	1:I:1179:G:H22	1.84	0.43
1:I:528:A:C2	1:I:2043:C:H4'	2.54	0.42
1:I:2799:A:O2'	1:I:2801:G:OP2	2.31	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:1022:G:O6	7:O:68:LYS:NZ	2.31	0.42
9:Q:54:VAL:O	9:Q:55:ILE:C	2.62	0.42
3:K:245:VAL:HA	3:K:250:VAL:O	2.19	0.42
1:I:2029:G:N1	1:I:2033:A:OP2	2.40	0.42
1:I:1086:A:O2'	1:I:1103:A:N6	2.50	0.42
1:I:2135:A:OP1	1:I:2153:C:N4	2.48	0.42
8:P:58:ALA:O	8:P:63:GLY:N	2.53	0.42
1:I:1094:U:O4'	1:I:1098:A:N6	2.53	0.42
1:I:2498:OMC:H2'	1:I:2499:C:H5'	2.01	0.42
1:I:1114:C:N4	1:I:1115:G:O6	2.53	0.42
1:I:895:U:O2'	1:I:897:C:N4	2.53	0.41
1:I:1296:G:OP1	1:I:2709:G:O2'	2.35	0.41
1:I:1798:U:OP2	3:K:271:ARG:NH2	2.51	0.41
1:I:2885:G:N7	9:Q:40:ARG:NH2	2.64	0.41
1:I:177:G:OP2	1:I:177:G:N2	2.37	0.41
1:I:1141:U:H4'	1:I:1142:A:O4'	2.20	0.41
1:I:1715:G:O2'	1:I:1716:U:OP2	2.38	0.41
5:M:111:GLU:OE2	5:M:115:GLN:NE2	2.54	0.41
1:I:100:U:O2	1:I:101:A:N6	2.54	0.41
1:I:404:A:C4'	1:I:405:U:OP2	2.70	0.40
6:N:151:THR:HB	6:N:152:PRO:CD	2.50	0.40
1:I:141:G:O2'	1:I:142:A:P	2.79	0.40
1:I:1911:PSU:HO2'	1:I:1912:A:P	2.32	0.40
8:P:65:ASP:OD1	8:P:66:ILE:N	2.54	0.40
5:M:122:GLU:OE1	5:M:122:GLU:N	2.41	0.40

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	
3	K	269/271 (99%)	241 (90%)	27 (10%)	1 (0%)	30	34

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	L	142/144 (99%)	134 (94%)	8 (6%)	0	100	100
5	M	199/201 (99%)	193 (97%)	6 (3%)	0	100	100
6	N	207/209 (99%)	197 (95%)	10 (5%)	0	100	100
7	O	140/142 (99%)	138 (99%)	2 (1%)	0	100	100
8	P	108/110 (98%)	106 (98%)	2 (2%)	0	100	100
9	Q	54/56 (96%)	50 (93%)	4 (7%)	0	100	100
10	R	44/46 (96%)	43 (98%)	1 (2%)	0	100	100
All	All	1163/1179 (99%)	1102 (95%)	60 (5%)	1 (0%)	49	59

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	K	227	PRO

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	
3	K	216/216 (100%)	214 (99%)	2 (1%)	70	82
4	L	103/103 (100%)	103 (100%)	0	100	100
5	M	165/165 (100%)	164 (99%)	1 (1%)	78	87
6	N	164/164 (100%)	163 (99%)	1 (1%)	78	87
7	O	116/116 (100%)	115 (99%)	1 (1%)	70	82
8	P	93/93 (100%)	93 (100%)	0	100	100
9	Q	47/47 (100%)	45 (96%)	2 (4%)	26	34
10	R	38/38 (100%)	38 (100%)	0	100	100
All	All	942/942 (100%)	935 (99%)	7 (1%)	73	86

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	K	223	THR
3	K	245	VAL
5	M	157	LEU
6	N	62	LYS
7	O	81	ILE
9	Q	10	ARG
9	Q	57	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
3	K	200	HIS
4	L	99	ASN
5	M	90	GLN
7	O	128	ASN
7	O	138	GLN
10	R	29	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	I	2894/2904 (99%)	318 (10%)	9 (0%)
2	J	117/118 (99%)	8 (6%)	1 (0%)
All	All	3011/3022 (99%)	326 (10%)	10 (0%)

All (326) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	I	10	A
1	I	34	U
1	I	46	G
1	I	71	A
1	I	74	A
1	I	75	G
1	I	84	A
1	I	118	A
1	I	120	U
1	I	138	U
1	I	139	U
1	I	140	C
1	I	141	G

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Mol	Chain	Res	Type
1	I	142	A
1	I	163	C
1	I	165	A
1	I	181	A
1	I	196	A
1	I	199	A
1	I	216	A
1	I	221	A
1	I	222	A
1	I	223	A
1	I	228	C
1	I	248	G
1	I	266	G
1	I	272	A
1	I	275	C
1	I	277	G
1	I	278	A
1	I	280	U
1	I	311	A
1	I	329	G
1	I	330	A
1	I	346	A
1	I	353	C
1	I	362	A
1	I	371	A
1	I	372	G
1	I	386	G
1	I	396	G
1	I	405	U
1	I	406	G
1	I	411	G
1	I	424	G
1	I	448	U
1	I	451	U
1	I	456	C
1	I	481	G
1	I	491	G
1	I	505	A
1	I	509	C
1	I	527	C
1	I	528	A
1	I	530	G

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Mol	Chain	Res	Type
1	I	531	C
1	I	532	A
1	I	544	C
1	I	545	U
1	I	546	U
1	I	547	A
1	I	548	G
1	I	549	G
1	I	563	A
1	I	572	A
1	I	573	U
1	I	574	A
1	I	575	A
1	I	603	A
1	I	614	A
1	I	615	U
1	I	627	A
1	I	637	A
1	I	647	G
1	I	655	A
1	I	686	U
1	I	715	A
1	I	716	A
1	I	730	A
1	I	747	5MU
1	I	775	G
1	I	776	G
1	I	782	A
1	I	784	G
1	I	785	G
1	I	790	U
1	I	805	G
1	I	812	C
1	I	819	A
1	I	827	U
1	I	828	U
1	I	846	U
1	I	847	U
1	I	858	G
1	I	859	G
1	I	878	A
1	I	885	C

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Mol	Chain	Res	Type
1	I	893	C
1	I	894	U
1	I	896	A
1	I	910	A
1	I	931	U
1	I	941	A
1	I	946	C
1	I	961	C
1	I	974	G
1	I	983	A
1	I	996	A
1	I	1012	U
1	I	1013	C
1	I	1022	G
1	I	1033	U
1	I	1037	G
1	I	1039	A
1	I	1046	A
1	I	1047	G
1	I	1056	G
1	I	1070	A
1	I	1078	U
1	I	1079	C
1	I	1088	A
1	I	1090	A
1	I	1096	A
1	I	1111	A
1	I	1112	G
1	I	1133	A
1	I	1135	C
1	I	1136	G
1	I	1142	A
1	I	1169	A
1	I	1170	C
1	I	1172	C
1	I	1173	U
1	I	1174	U
1	I	1175	A
1	I	1176	U
1	I	1178	C
1	I	1180	U
1	I	1186	G

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Mol	Chain	Res	Type
1	I	1238	G
1	I	1250	G
1	I	1253	A
1	I	1256	G
1	I	1266	G
1	I	1271	G
1	I	1272	A
1	I	1300	G
1	I	1301	A
1	I	1321	A
1	I	1352	U
1	I	1365	A
1	I	1368	G
1	I	1379	U
1	I	1383	A
1	I	1386	C
1	I	1416	G
1	I	1428	C
1	I	1482	G
1	I	1493	C
1	I	1494	A
1	I	1508	A
1	I	1509	A
1	I	1510	G
1	I	1515	A
1	I	1530	G
1	I	1532	A
1	I	1534	U
1	I	1535	A
1	I	1536	C
1	I	1538	G
1	I	1569	A
1	I	1583	A
1	I	1584	U
1	I	1585	C
1	I	1608	A
1	I	1647	U
1	I	1648	U
1	I	1674	G
1	I	1715	G
1	I	1731	G
1	I	1738	G

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Mol	Chain	Res	Type
1	I	1756	G
1	I	1764	C
1	I	1773	A
1	I	1788	C
1	I	1800	C
1	I	1801	A
1	I	1808	A
1	I	1811	G
1	I	1816	C
1	I	1829	A
1	I	1847	A
1	I	1848	A
1	I	1870	C
1	I	1872	A
1	I	1901	A
1	I	1906	G
1	I	1912	A
1	I	1920	C
1	I	1929	G
1	I	1930	G
1	I	1937	A
1	I	1955	U
1	I	1967	C
1	I	1970	A
1	I	1971	U
1	I	1972	G
1	I	1982	U
1	I	1991	U
1	I	1993	U
1	I	1997	C
1	I	2022	U
1	I	2023	C
1	I	2033	A
1	I	2043	C
1	I	2055	C
1	I	2056	G
1	I	2060	A
1	I	2061	G
1	I	2062	A
1	I	2069	G7M
1	I	2100	G
1	I	2103	C

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Mol	Chain	Res	Type
1	I	2104	C
1	I	2107	G
1	I	2109	U
1	I	2111	U
1	I	2112	G
1	I	2113	U
1	I	2127	G
1	I	2129	C
1	I	2131	U
1	I	2132	U
1	I	2133	G
1	I	2136	G
1	I	2137	U
1	I	2139	U
1	I	2141	G
1	I	2147	A
1	I	2148	G
1	I	2150	C
1	I	2153	C
1	I	2156	G
1	I	2157	G
1	I	2159	G
1	I	2160	C
1	I	2161	C
1	I	2163	A
1	I	2165	C
1	I	2170	A
1	I	2171	A
1	I	2173	A
1	I	2175	C
1	I	2189	U
1	I	2204	G
1	I	2211	A
1	I	2225	A
1	I	2238	G
1	I	2239	G
1	I	2283	C
1	I	2287	A
1	I	2297	A
1	I	2305	U
1	I	2309	A
1	I	2310	C

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Mol	Chain	Res	Type
1	I	2322	A
1	I	2325	G
1	I	2327	A
1	I	2333	A
1	I	2345	G
1	I	2347	C
1	I	2361	G
1	I	2383	G
1	I	2385	C
1	I	2402	U
1	I	2403	C
1	I	2423	U
1	I	2425	A
1	I	2426	A
1	I	2428	G
1	I	2429	G
1	I	2430	A
1	I	2441	U
1	I	2448	A
1	I	2476	A
1	I	2491	U
1	I	2498	OMC
1	I	2499	C
1	I	2502	G
1	I	2504	PSU
1	I	2505	G
1	I	2513	A
1	I	2518	A
1	I	2529	G
1	I	2547	A
1	I	2554	U
1	I	2566	A
1	I	2567	G
1	I	2573	C
1	I	2602	A
1	I	2603	G
1	I	2609	U
1	I	2613	U
1	I	2629	U
1	I	2689	U
1	I	2690	U
1	I	2714	G

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Mol	Chain	Res	Type
1	I	2729	G
1	I	2733	A
1	I	2748	A
1	I	2778	A
1	I	2779	U
1	I	2820	A
1	I	2867	G
1	I	2873	A
1	I	2880	C
1	I	2883	A
1	I	2904	U
2	J	15	A
2	J	35	C
2	J	36	C
2	J	56	G
2	J	89	U
2	J	90	C
2	J	99	A
2	J	109	A

All (10) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	I	271	G
1	I	404	A
1	I	715	A
1	I	784	G
1	I	1038	G
1	I	1787	A
1	I	1911	PSU
1	I	1919	A
1	I	2425	A
2	J	35	C

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

21 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond

length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	2MG	I	1835	1	23,26,27	0.77	0	33,38,41	2.14	8 (24%)
1	6MZ	I	1618	1	22,25,26	1.07	1 (4%)	29,36,39	2.16	9 (31%)
1	3TD	I	1915	1	19,22,23	1.06	2 (10%)	23,32,35	1.84	3 (13%)
1	PSU	I	955	1	18,21,22	0.92	1 (5%)	21,30,33	1.97	4 (19%)
1	OMG	I	2251	1	23,26,27	0.73	0	32,38,41	1.94	8 (25%)
1	2MA	I	2503	1	22,25,26	1.34	3 (13%)	32,37,40	1.99	7 (21%)
1	PSU	I	1917	1	18,21,22	0.84	0	21,30,33	1.97	4 (19%)
1	PSU	I	746	1	18,21,22	0.95	1 (5%)	21,30,33	1.96	5 (23%)
1	PSU	I	2605	1	18,21,22	0.91	1 (5%)	21,30,33	1.94	4 (19%)
1	5MC	I	1962	1	19,22,23	1.23	2 (10%)	26,32,35	1.12	3 (11%)
1	PSU	I	2580	1	18,21,22	0.96	1 (5%)	21,30,33	1.96	5 (23%)
1	PSU	I	1911	1	18,21,22	0.82	0	21,30,33	1.96	4 (19%)
1	PSU	I	2457	1	18,21,22	0.93	1 (5%)	21,30,33	1.95	4 (19%)
1	1MG	I	745	1	23,26,27	0.93	1 (4%)	33,39,42	1.71	6 (18%)
1	5MU	I	1939	1	19,22,23	1.04	3 (15%)	27,32,35	2.06	6 (22%)
1	OMC	I	2498	1	19,22,23	0.87	1 (5%)	25,31,34	1.02	2 (8%)
1	G7M	I	2069	1	23,26,27	0.51	0	34,39,42	0.94	3 (8%)
1	PSU	I	2504	1	18,21,22	0.93	1 (5%)	21,30,33	1.94	4 (19%)
1	OMU	I	2552	1	19,22,23	0.95	2 (10%)	25,31,34	1.91	6 (24%)
1	5MU	I	747	1	19,22,23	1.01	2 (10%)	27,32,35	2.09	6 (22%)
1	2MG	I	2445	1	23,26,27	0.79	1 (4%)	33,38,41	2.11	6 (18%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	2MG	I	1835	1	-	0/9/27/28	0/3/3/3
1	6MZ	I	1618	1	-	0/9/27/28	0/3/3/3
1	3TD	I	1915	1	-	2/7/25/26	0/2/2/2
1	PSU	I	955	1	-	0/7/25/26	0/2/2/2
1	OMG	I	2251	1	-	0/9/27/28	0/3/3/3
1	2MA	I	2503	1	-	2/7/25/26	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	PSU	I	1917	1	-	0/7/25/26	0/2/2/2
1	PSU	I	746	1	-	2/7/25/26	0/2/2/2
1	PSU	I	2605	1	-	0/7/25/26	0/2/2/2
1	5MC	I	1962	1	-	0/7/25/26	0/2/2/2
1	PSU	I	2580	1	-	1/7/25/26	0/2/2/2
1	PSU	I	1911	1	-	1/7/25/26	0/2/2/2
1	PSU	I	2457	1	-	0/7/25/26	0/2/2/2
1	1MG	I	745	1	-	0/7/25/26	0/3/3/3
1	5MU	I	1939	1	-	0/7/25/26	0/2/2/2
1	OMC	I	2498	1	-	2/9/27/28	0/2/2/2
1	G7M	I	2069	1	-	1/7/25/26	0/3/3/3
1	PSU	I	2504	1	-	2/7/25/26	0/2/2/2
1	OMU	I	2552	1	-	1/9/27/28	0/2/2/2
1	5MU	I	747	1	-	2/7/25/26	0/2/2/2
1	2MG	I	2445	1	-	1/9/27/28	0/3/3/3

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	1962	5MC	C5-C4	-3.95	1.41	1.44
1	I	2503	2MA	C6-N1	3.86	1.40	1.35
1	I	1618	6MZ	C6-N6	3.69	1.38	1.34
1	I	2503	2MA	C5-N7	-2.97	1.33	1.39
1	I	2498	OMC	C2-N1	-2.51	1.34	1.40
1	I	1915	3TD	C4-N3	-2.47	1.35	1.40
1	I	1962	5MC	C2-N1	-2.44	1.35	1.40
1	I	745	1MG	C6-N1	-2.44	1.35	1.40
1	I	747	5MU	C2-N1	-2.41	1.34	1.38
1	I	1915	3TD	C4-C5	-2.40	1.42	1.47
1	I	2503	2MA	C5-C6	2.39	1.47	1.41
1	I	2552	OMU	C2-N1	-2.37	1.34	1.38
1	I	1939	5MU	C2-N1	-2.35	1.34	1.38
1	I	1939	5MU	C4-N3	-2.13	1.34	1.38
1	I	2445	2MG	C6-N1	-2.09	1.34	1.38
1	I	2504	PSU	C4-N3	-2.06	1.35	1.38
1	I	2605	PSU	C4-N3	-2.03	1.35	1.38
1	I	1939	5MU	C4-C5	-2.03	1.41	1.44
1	I	2457	PSU	C4-N3	-2.02	1.35	1.38
1	I	2580	PSU	C4-N3	-2.01	1.35	1.38
1	I	747	5MU	C4-N3	-2.01	1.35	1.38
1	I	955	PSU	C4-N3	-2.01	1.35	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	2552	OMU	C4-N3	-2.01	1.35	1.38
1	I	746	PSU	C4-N3	-2.00	1.35	1.38

All (107) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	I	1835	2MG	C2-N3-C4	7.16	120.95	112.00
1	I	2445	2MG	C2-N3-C4	7.13	120.92	112.00
1	I	1915	3TD	N1-C2-N3	6.55	120.89	116.13
1	I	2503	2MA	C5-C4-N3	-5.97	120.89	127.18
1	I	2445	2MG	C5-C4-N3	-5.62	119.44	128.39
1	I	2251	OMG	C5-C4-N3	-5.57	119.53	128.39
1	I	1911	PSU	N1-C2-N3	5.53	121.00	115.17
1	I	1835	2MG	C5-C4-N3	-5.51	119.61	128.39
1	I	1917	PSU	N1-C2-N3	5.51	120.98	115.17
1	I	1618	6MZ	C5-C4-N3	-5.51	119.14	126.72
1	I	955	PSU	N1-C2-N3	5.49	120.96	115.17
1	I	746	PSU	N1-C2-N3	5.42	120.88	115.17
1	I	2580	PSU	N1-C2-N3	5.40	120.87	115.17
1	I	2504	PSU	N1-C2-N3	5.39	120.85	115.17
1	I	2457	PSU	N1-C2-N3	5.39	120.85	115.17
1	I	2605	PSU	N1-C2-N3	5.35	120.81	115.17
1	I	745	1MG	C5-C4-N3	-5.34	119.89	128.39
1	I	747	5MU	C4-N3-C2	-5.29	120.40	127.34
1	I	1939	5MU	C4-N3-C2	-5.24	120.47	127.34
1	I	2552	OMU	C4-N3-C2	-5.09	120.29	126.61
1	I	2251	OMG	C2-N3-C4	5.07	121.03	112.30
1	I	747	5MU	N3-C2-N1	4.73	121.05	114.89
1	I	2503	2MA	N3-C4-N9	4.70	132.95	126.99
1	I	2552	OMU	N3-C2-N1	4.69	121.00	114.89
1	I	1939	5MU	N3-C2-N1	4.64	120.94	114.89
1	I	1618	6MZ	N3-C4-N9	4.59	134.97	127.17
1	I	1917	PSU	C4-N3-C2	-4.54	120.12	126.37
1	I	747	5MU	C5-C4-N3	4.48	119.22	115.32
1	I	1911	PSU	C4-N3-C2	-4.47	120.22	126.37
1	I	955	PSU	C4-N3-C2	-4.42	120.28	126.37
1	I	1939	5MU	C5-C4-N3	4.42	119.17	115.32
1	I	2504	PSU	C4-N3-C2	-4.42	120.29	126.37
1	I	2457	PSU	C4-N3-C2	-4.41	120.30	126.37
1	I	746	PSU	C4-N3-C2	-4.39	120.32	126.37
1	I	2605	PSU	C4-N3-C2	-4.39	120.32	126.37
1	I	2580	PSU	C4-N3-C2	-4.38	120.34	126.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	I	2445	2MG	N9-C4-N3	4.33	134.60	125.95
1	I	2503	2MA	N6-C6-N1	4.27	122.79	117.03
1	I	2251	OMG	N9-C4-N3	4.24	134.43	125.95
1	I	747	5MU	O4-C4-C5	-4.20	120.11	124.92
1	I	1835	2MG	N9-C4-N3	4.18	134.31	125.95
1	I	1915	3TD	C4-N3-C2	-4.03	120.35	124.61
1	I	745	1MG	C2-N3-C4	4.02	121.01	111.98
1	I	1939	5MU	O4-C4-C5	-3.99	120.35	124.92
1	I	745	1MG	N9-C4-N3	3.97	133.90	125.95
1	I	1618	6MZ	N1-C2-N3	-3.96	122.59	128.58
1	I	1618	6MZ	C5-N7-C8	3.78	109.38	103.45
1	I	2503	2MA	C5-N7-C8	3.57	109.06	103.45
1	I	1618	6MZ	C2-N3-C4	3.56	120.52	111.83
1	I	1835	2MG	C2-N1-C6	-3.52	120.29	124.55
1	I	2445	2MG	C2-N1-C6	-3.46	120.36	124.55
1	I	1939	5MU	C5-C6-N1	-3.38	119.64	123.31
1	I	1962	5MC	C5-C6-N1	-3.37	119.65	123.31
1	I	2580	PSU	O2-C2-N1	-3.32	119.37	122.79
1	I	2457	PSU	O2-C2-N1	-3.28	119.41	122.79
1	I	955	PSU	O2-C2-N1	-3.25	119.44	122.79
1	I	1911	PSU	O2-C2-N1	-3.22	119.47	122.79
1	I	747	5MU	C5-C6-N1	-3.20	119.83	123.31
1	I	2552	OMU	C5-C4-N3	3.19	119.27	114.80
1	I	2504	PSU	O2-C2-N1	-3.18	119.51	122.79
1	I	2069	G7M	C8-N7-C5	-3.17	103.82	107.78
1	I	2552	OMU	CM2-O2'-C2'	-3.16	106.36	114.47
1	I	1618	6MZ	C9-N6-C6	-3.15	119.92	122.85
1	I	746	PSU	O2-C2-N1	-3.14	119.55	122.79
1	I	2498	OMC	CM2-O2'-C2'	-3.03	106.71	114.47
1	I	2605	PSU	O2-C2-N1	-3.02	119.68	122.79
1	I	1917	PSU	O2-C2-N1	-3.01	119.69	122.79
1	I	2503	2MA	C5-C6-N1	-2.97	114.28	118.90
1	I	1618	6MZ	C4-C5-N7	-2.94	107.22	110.58
1	I	2503	2MA	N9-C8-N7	-2.88	109.85	113.94
1	I	2552	OMU	O4-C4-C5	-2.80	120.33	125.16
1	I	2251	OMG	C8-N7-C5	2.76	109.17	104.26
1	I	1618	6MZ	N9-C8-N7	-2.74	110.05	113.94
1	I	1835	2MG	C8-N7-C5	2.74	109.14	104.26
1	I	745	1MG	C8-N7-C5	2.72	109.11	104.26
1	I	2445	2MG	C8-N7-C5	2.70	109.07	104.26
1	I	2251	OMG	C2-N1-C6	-2.65	120.30	125.11
1	I	2251	OMG	CM2-O2'-C2'	-2.60	107.80	114.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	I	2552	OMU	O2-C2-N1	-2.59	119.42	122.80
1	I	2503	2MA	C4-C5-N7	-2.59	107.63	110.58
1	I	747	5MU	O2-C2-N1	-2.52	119.51	122.80
1	I	1911	PSU	C6-N1-C2	-2.28	120.58	122.69
1	I	955	PSU	C6-N1-C2	-2.25	120.60	122.69
1	I	1915	3TD	C1'-C5-C4	2.20	120.95	117.61
1	I	1917	PSU	C6-N1-C2	-2.18	120.66	122.69
1	I	2580	PSU	C6-N1-C2	-2.18	120.67	122.69
1	I	746	PSU	C6-N1-C2	-2.17	120.67	122.69
1	I	2504	PSU	C6-N1-C2	-2.16	120.69	122.69
1	I	2457	PSU	C6-N1-C2	-2.16	120.69	122.69
1	I	2605	PSU	C6-N1-C2	-2.15	120.70	122.69
1	I	1939	5MU	O2-C2-N1	-2.15	120.00	122.80
1	I	745	1MG	C4-C5-N7	-2.12	107.30	110.67
1	I	1962	5MC	O2-C2-N3	-2.12	118.98	122.33
1	I	745	1MG	C6-C5-N7	2.12	134.06	129.36
1	I	1835	2MG	O6-C6-C5	-2.11	120.97	126.53
1	I	2069	G7M	C6-C5-N7	-2.10	129.54	132.17
1	I	1835	2MG	N1-C2-N2	2.09	118.69	116.56
1	I	2069	G7M	CN7-N7-C8	2.08	127.95	124.79
1	I	1618	6MZ	C6-C5-N7	2.08	134.70	132.43
1	I	1835	2MG	C4-C5-N7	-2.07	107.38	110.67
1	I	2445	2MG	O6-C6-C5	-2.06	121.09	126.53
1	I	2251	OMG	C4-C5-N7	-2.06	107.41	110.67
1	I	2580	PSU	O4'-C1'-C2'	2.06	108.00	105.15
1	I	746	PSU	O4'-C1'-C2'	2.05	107.99	105.15
1	I	2498	OMC	O2-C2-N3	-2.04	119.12	122.33
1	I	2251	OMG	O6-C6-C5	-2.03	121.16	126.53
1	I	1962	5MC	C5-C4-N3	-2.03	119.67	121.75

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	I	747	5MU	C3'-C4'-C5'-O5'
1	I	747	5MU	O4'-C4'-C5'-O5'
1	I	1911	PSU	C2'-C1'-C5-C4
1	I	1915	3TD	O4'-C1'-C5-C4
1	I	1915	3TD	O4'-C1'-C5-C6
1	I	2504	PSU	O4'-C4'-C5'-O5'
1	I	2498	OMC	C3'-C4'-C5'-O5'
1	I	2498	OMC	O4'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
1	I	2503	2MA	O4'-C4'-C5'-O5'
1	I	2503	2MA	C3'-C4'-C5'-O5'
1	I	2504	PSU	C3'-C4'-C5'-O5'
1	I	2069	G7M	O4'-C4'-C5'-O5'
1	I	2445	2MG	C3'-C4'-C5'-O5'
1	I	746	PSU	O4'-C1'-C5-C4
1	I	746	PSU	O4'-C1'-C5-C6
1	I	2552	OMU	C3'-C2'-O2'-CM2
1	I	2580	PSU	O4'-C4'-C5'-O5'

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	I	2503	2MA	1	0
1	I	1962	5MC	1	0
1	I	1911	PSU	3	0
1	I	2498	OMC	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is 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	$\#\|Z\| > 2$
11	UK3	I	3001	-	150,154,154	0.97	5 (3%)	200,219,219	1.39	28 (14%)

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
11	UK3	I	3001	-	-	26/166/213/213	0/10/11/11

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	I	3001	UK3	N16-N2	4.33	1.39	1.32
11	I	3001	UK3	O24-C65	-3.40	1.42	1.47
11	I	3001	UK3	C72-N14	2.51	1.39	1.35
11	I	3001	UK3	C6-N16	-2.14	1.32	1.36
11	I	3001	UK3	C26-N12	2.03	1.48	1.45

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	I	3001	UK3	C33-N13-C37	5.30	134.10	122.11
11	I	3001	UK3	O24-C72-N14	-4.77	106.06	109.86
11	I	3001	UK3	O17-C37-N13	-4.51	113.80	122.59
11	I	3001	UK3	C65-O24-C72	4.50	113.16	109.23
11	I	3001	UK3	C10-C9-N8	-3.95	104.23	107.52
11	I	3001	UK3	C39-C37-N13	3.71	124.53	117.32
11	I	3001	UK3	C12-C79-C66	3.71	120.12	110.03
11	I	3001	UK3	C69-O25-C77	3.14	121.97	117.38
11	I	3001	UK3	C9-N8-C5	3.07	111.81	109.08
11	I	3001	UK3	C79-N5-C45	3.02	128.13	121.65
11	I	3001	UK3	C79-C66-N9	2.82	124.24	118.71
11	I	3001	UK3	C95-C96-N15	2.82	119.08	110.94
11	I	3001	UK3	C59-C18-C6	2.81	124.02	120.87
11	I	3001	UK3	C66-C79-N5	2.78	116.17	108.97
11	I	3001	UK3	C56-C78-C4	2.74	118.64	113.44
11	I	3001	UK3	C97-C98-C96	2.69	115.04	110.46
11	I	3001	UK3	O23-C66-C79	-2.57	114.90	119.61
11	I	3001	UK3	C8-N9-C66	2.56	130.46	121.45
11	I	3001	UK3	C50-C39-C41	-2.55	116.29	118.76
11	I	3001	UK3	C98-C96-N15	-2.40	108.85	115.59
11	I	3001	UK3	O25-C77-C82	2.38	113.92	110.87
11	I	3001	UK3	C29-C34-C23	2.28	116.14	110.30
11	I	3001	UK3	C90-N4-C23	2.20	126.37	121.65
11	I	3001	UK3	O2-C72-N14	2.18	130.97	128.08
11	I	3001	UK3	O24-C65-C68	-2.11	101.12	103.28
11	I	3001	UK3	C30-C18-C6	-2.08	116.90	120.43

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	I	3001	UK3	C47-C90-C54	2.06	115.14	110.11
11	I	3001	UK3	C18-C6-C1	-2.05	126.51	129.65

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
11	I	3001	UK3	O17-C37-N13-C33
11	I	3001	UK3	N9-C66-C79-C12
11	I	3001	UK3	O23-C66-C79-C12
11	I	3001	UK3	C39-C37-N13-C33
11	I	3001	UK3	N4-C23-C34-C29
11	I	3001	UK3	O15-C23-C34-C29
11	I	3001	UK3	C95-C96-N15-C100
11	I	3001	UK3	C5-C4-C78-C56
11	I	3001	UK3	O18-C54-C90-N4
11	I	3001	UK3	N3-C54-C90-N4
11	I	3001	UK3	C31-C33-N13-C37
11	I	3001	UK3	C10-C4-C78-C56
11	I	3001	UK3	C92-C88-C91-C87
11	I	3001	UK3	C28-C27-N12-C52
11	I	3001	UK3	O4-C7-C8-N9
11	I	3001	UK3	C28-C31-C33-N13
11	I	3001	UK3	N12-C52-C55-C58
11	I	3001	UK3	O5-C77-C82-C85
11	I	3001	UK3	O4-C7-C8-C15
11	I	3001	UK3	C34-C29-C32-C43
11	I	3001	UK3	O20-C52-C55-C58
11	I	3001	UK3	C21-C22-C25-N11
11	I	3001	UK3	C34-C29-C32-C35
11	I	3001	UK3	N7-C7-C8-N9
11	I	3001	UK3	C86-C88-C91-C87
11	I	3001	UK3	C28-C27-N12-C26

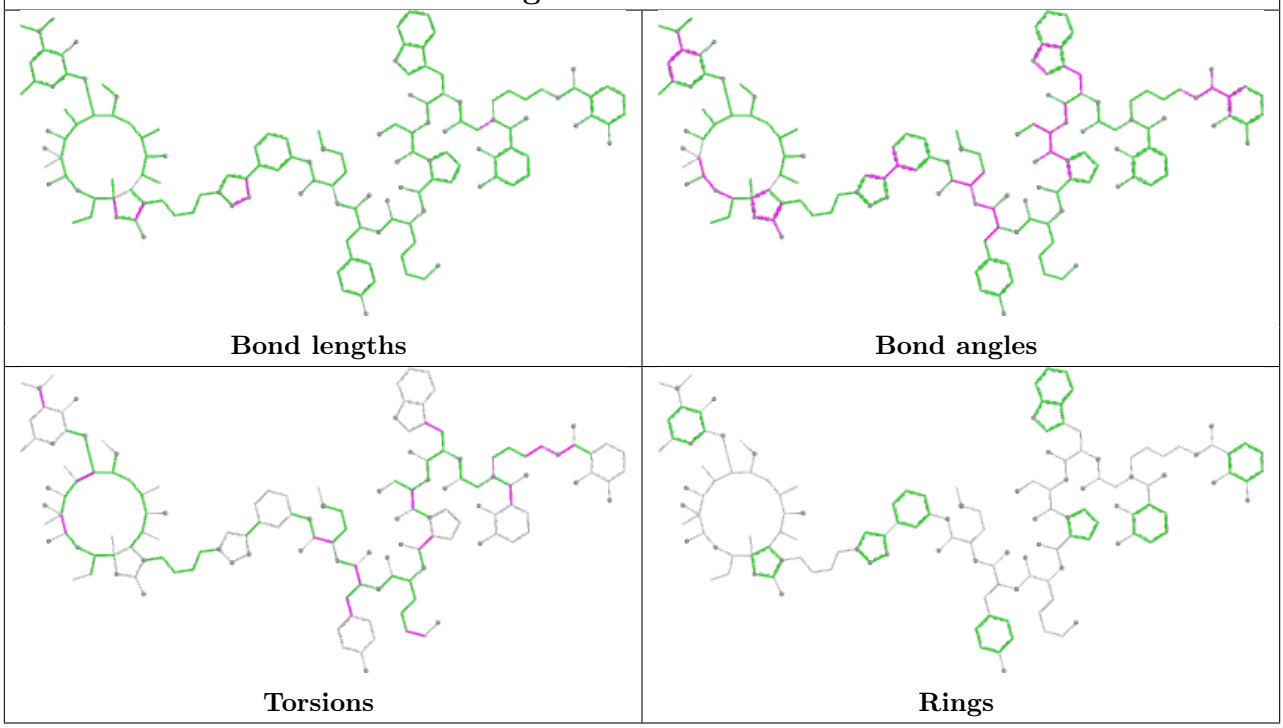
There are no ring outliers.

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand UK3 I 3001



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.

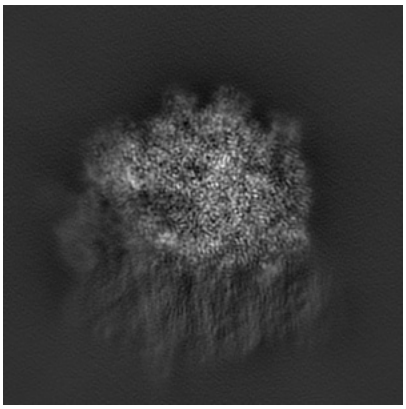
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-27867. These allow visual inspection of the internal detail of the map and identification of artifacts.

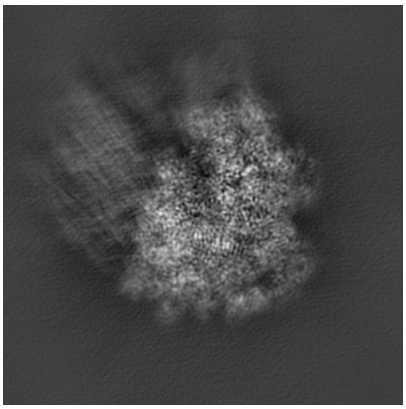
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

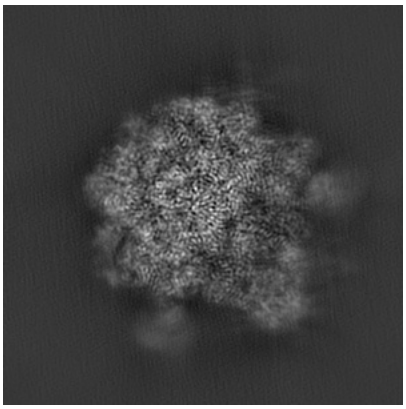
6.1.1 Primary map



X

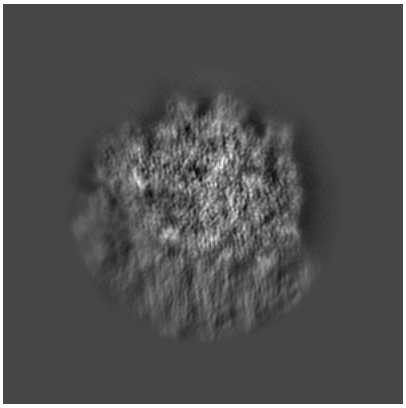


Y

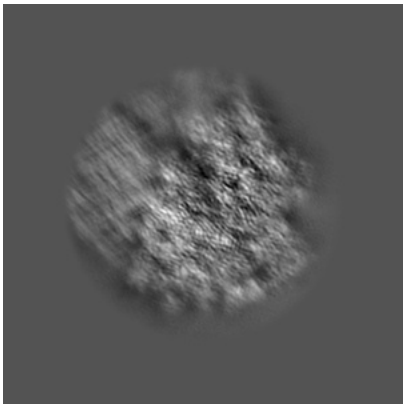


Z

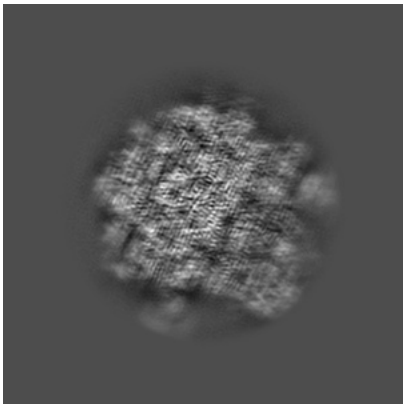
6.1.2 Raw map



X



Y

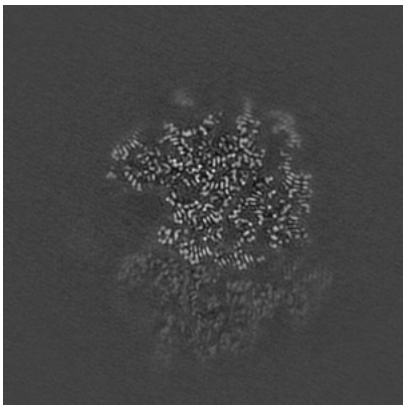


Z

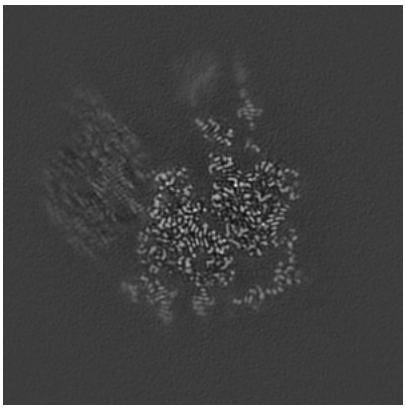
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

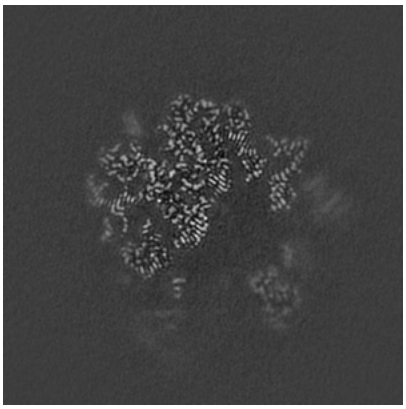
6.2.1 Primary map



X Index: 250

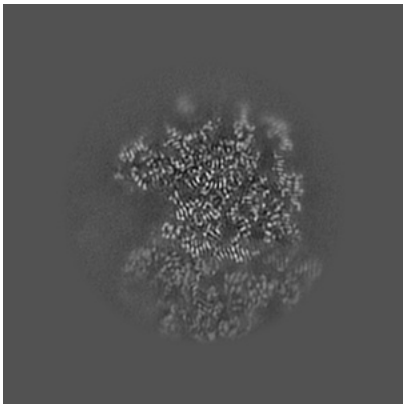


Y Index: 250

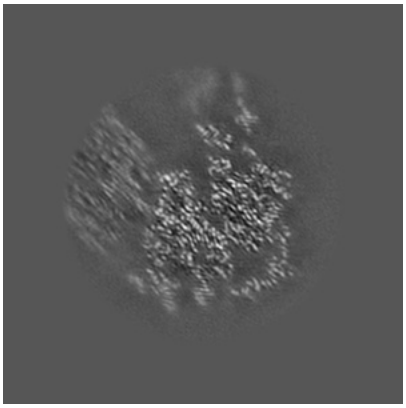


Z Index: 250

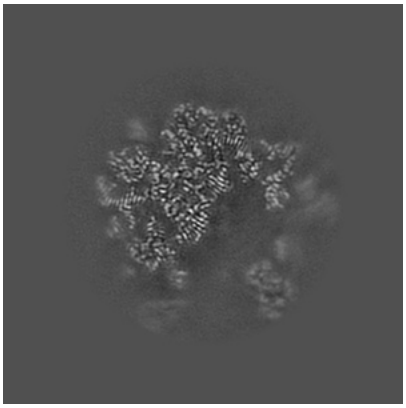
6.2.2 Raw map



X Index: 273



Y Index: 273

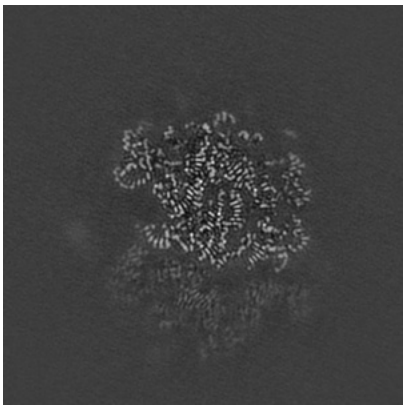


Z Index: 273

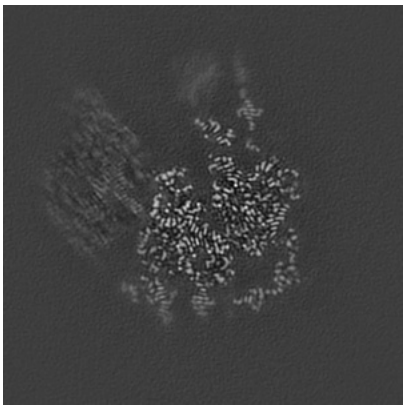
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

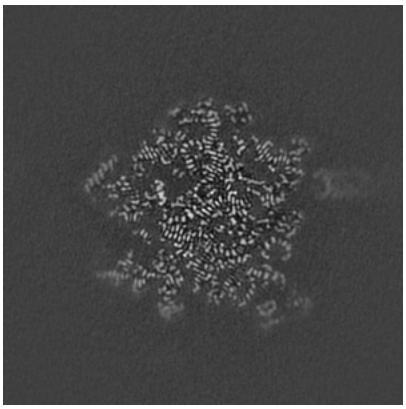
6.3.1 Primary map



X Index: 239

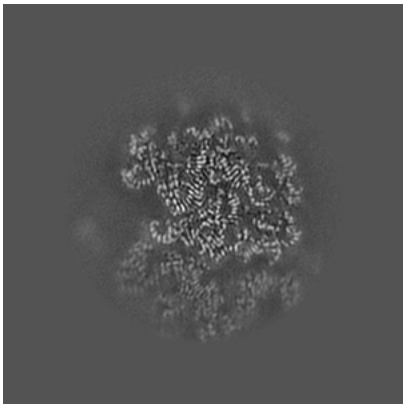


Y Index: 251

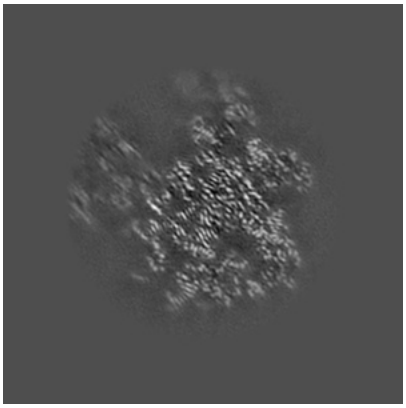


Z Index: 280

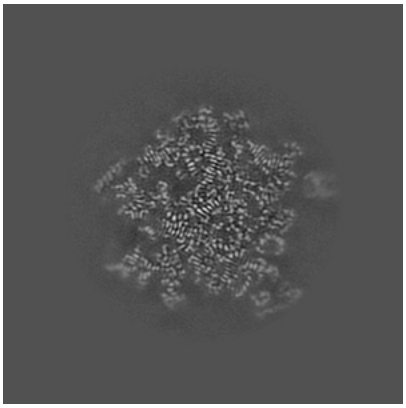
6.3.2 Raw map



X Index: 263



Y Index: 311

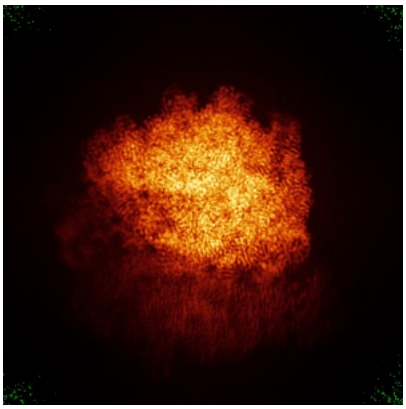


Z Index: 303

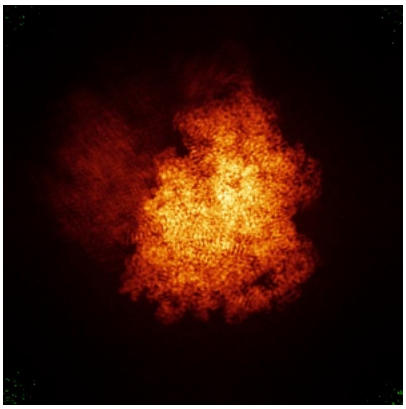
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

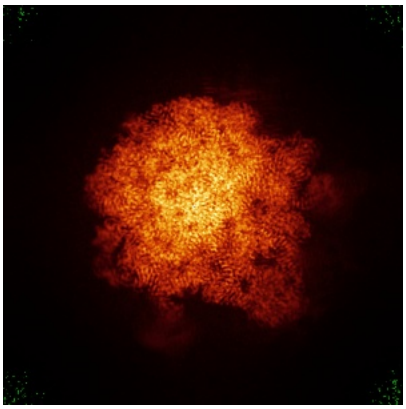
6.4.1 Primary map



X

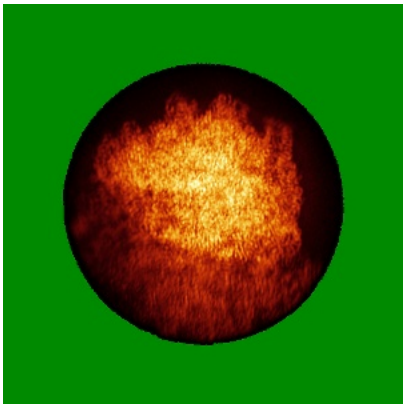


Y

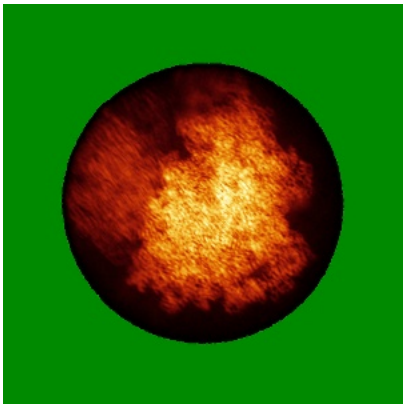


Z

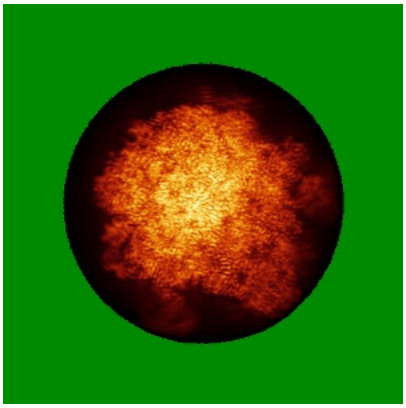
6.4.2 Raw map



X



Y

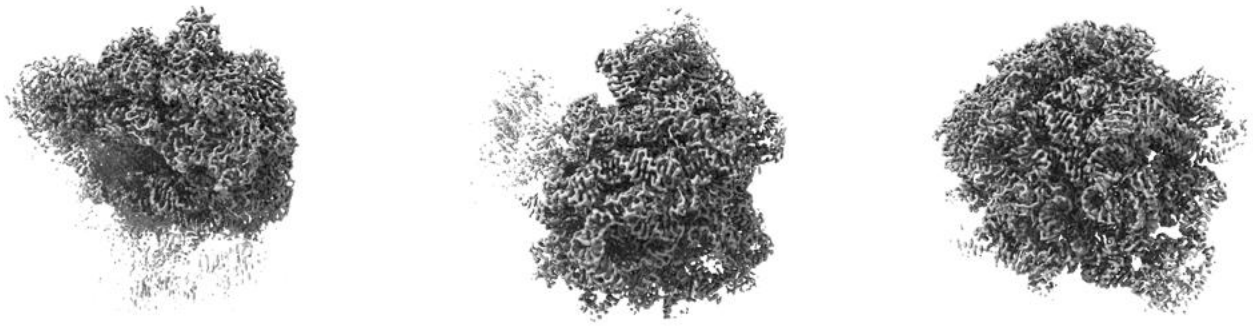


Z

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)

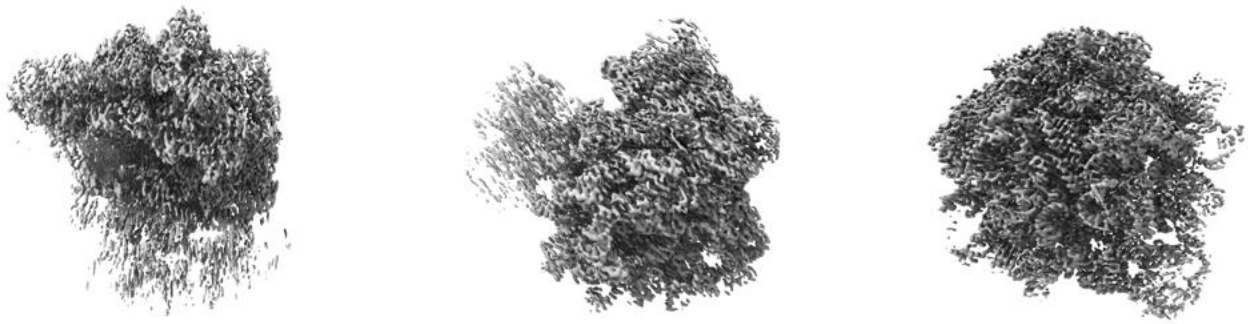
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 4.1. 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



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

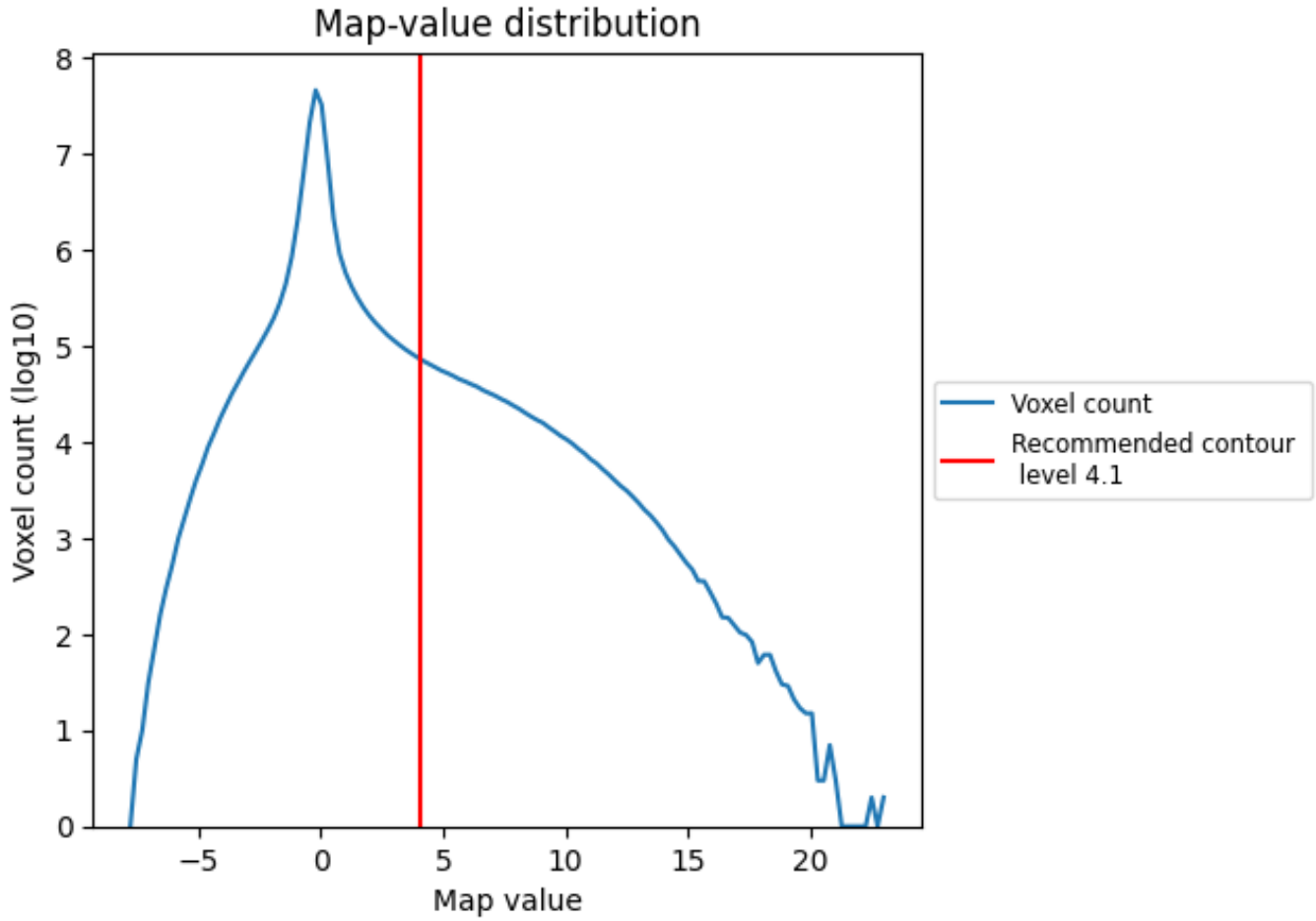
6.6 Mask visualisation (i)

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

7 Map analysis

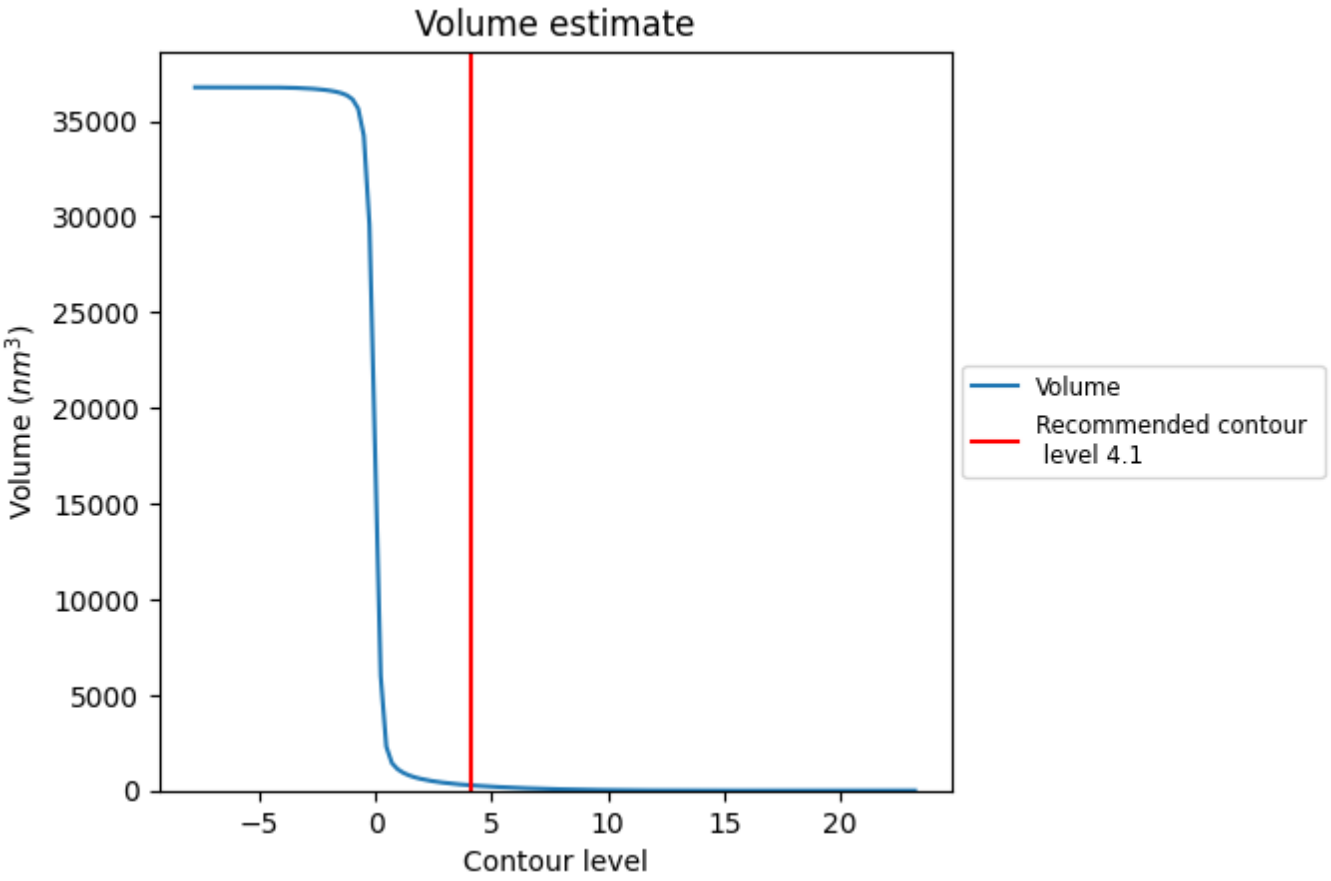
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

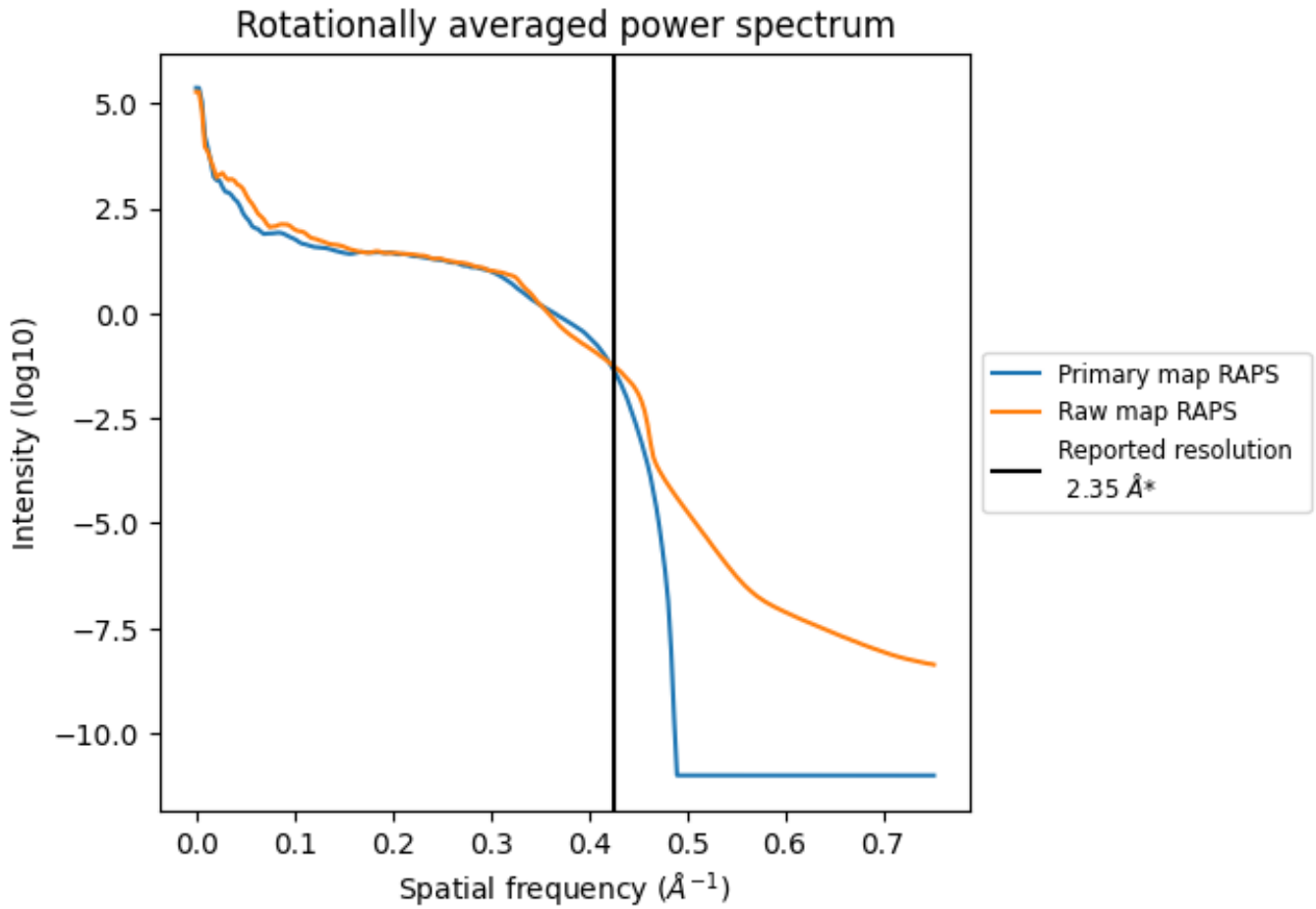
7.2 Volume estimate



The volume at the recommended contour level is 276 nm^3; this corresponds to an approximate mass of 249 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)

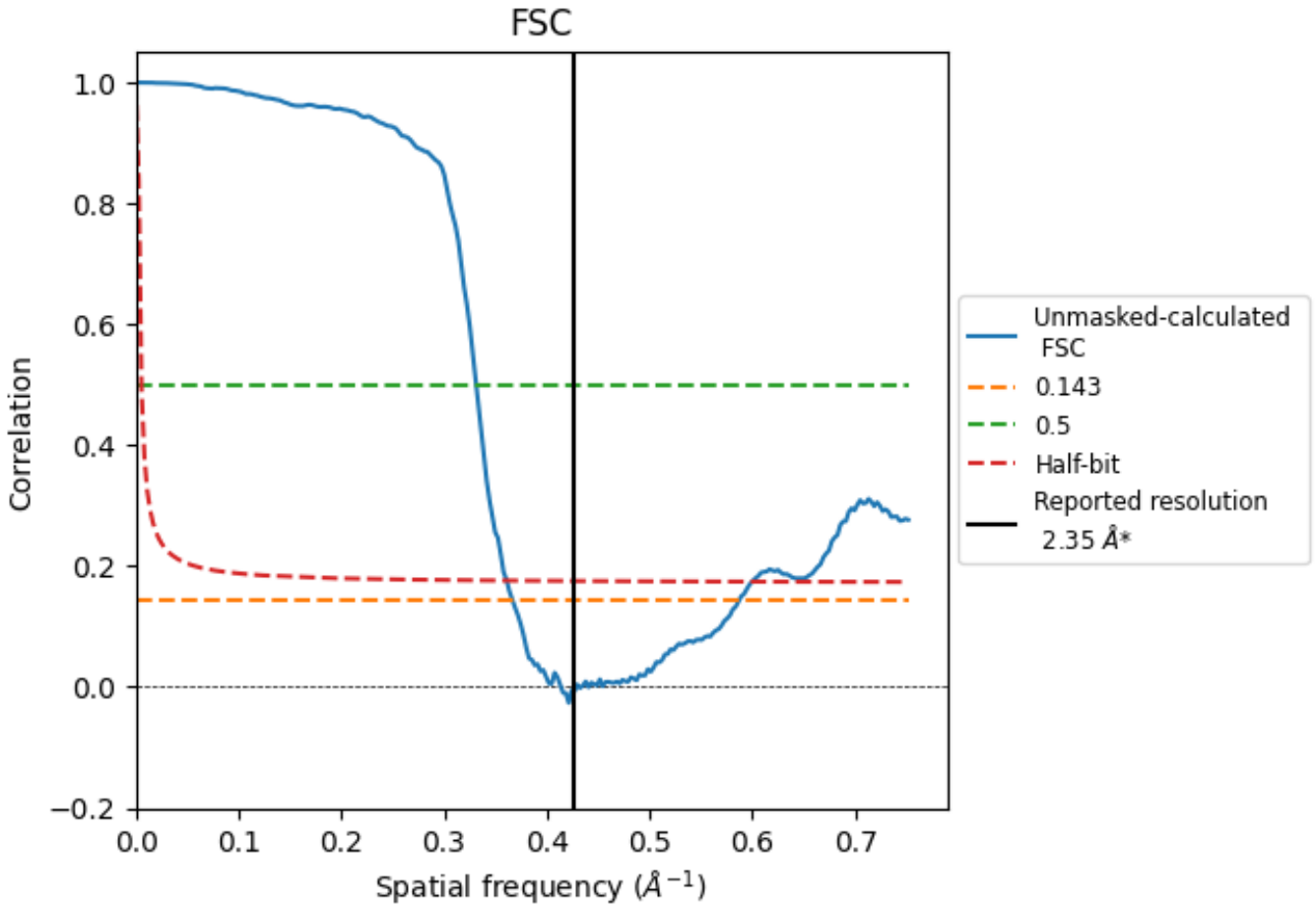


*Reported resolution corresponds to spatial frequency of 0.426 $Å^{-1}$

8 Fourier-Shell correlation

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

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.426 Å^{-1}

8.2 Resolution estimates (i)

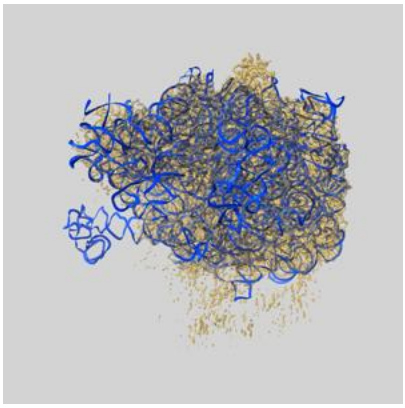
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.35	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.73	3.02	2.77

*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 2.73 differs from the reported value 2.35 by more than 10 %

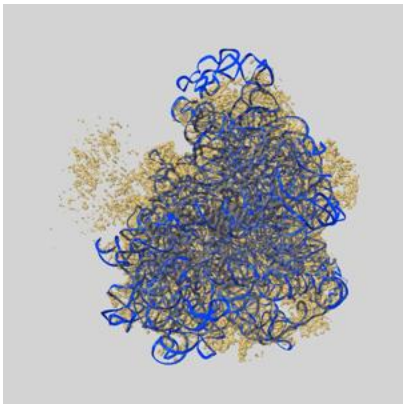
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-27867 and PDB model 8E3L. Per-residue inclusion information can be found in section 3 on page 7.

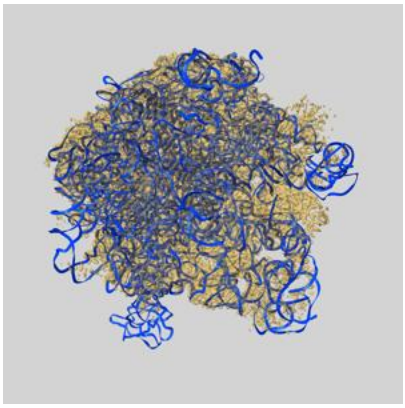
9.1 Map-model overlay



X



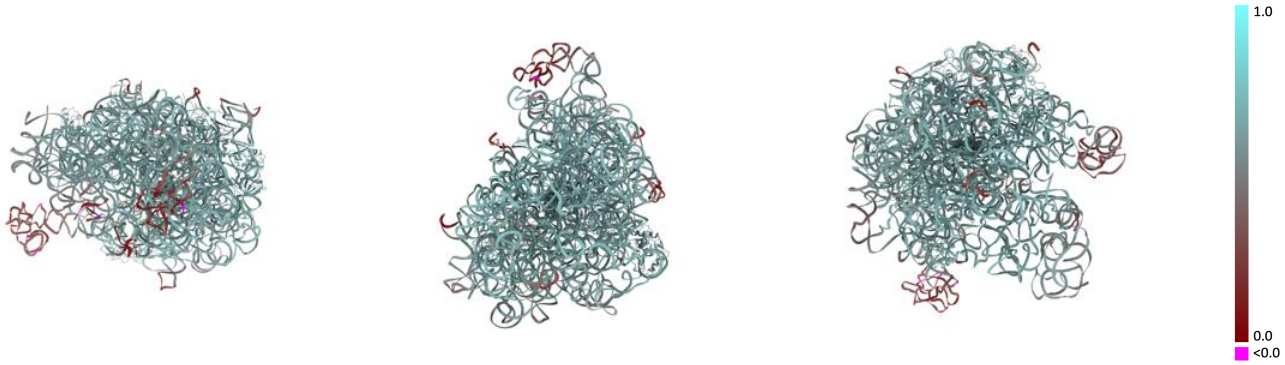
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

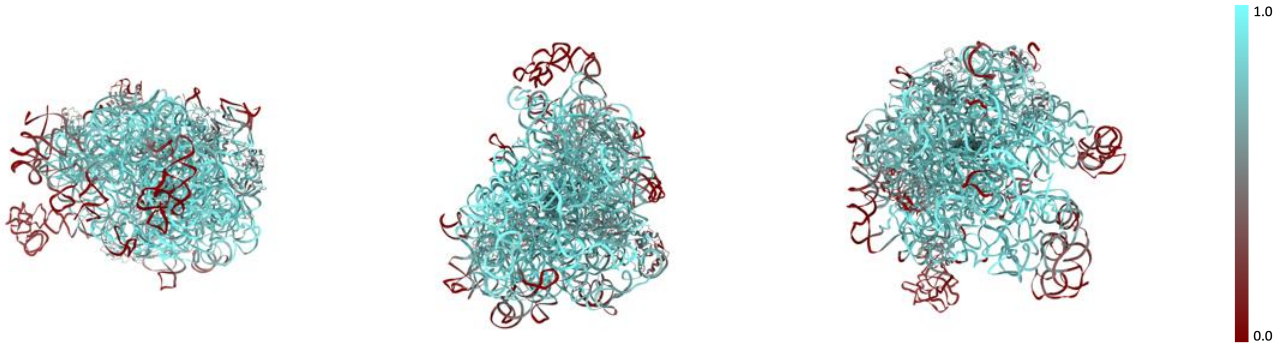
9.2 Q-score mapped to coordinate model (i)



X Y Z

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

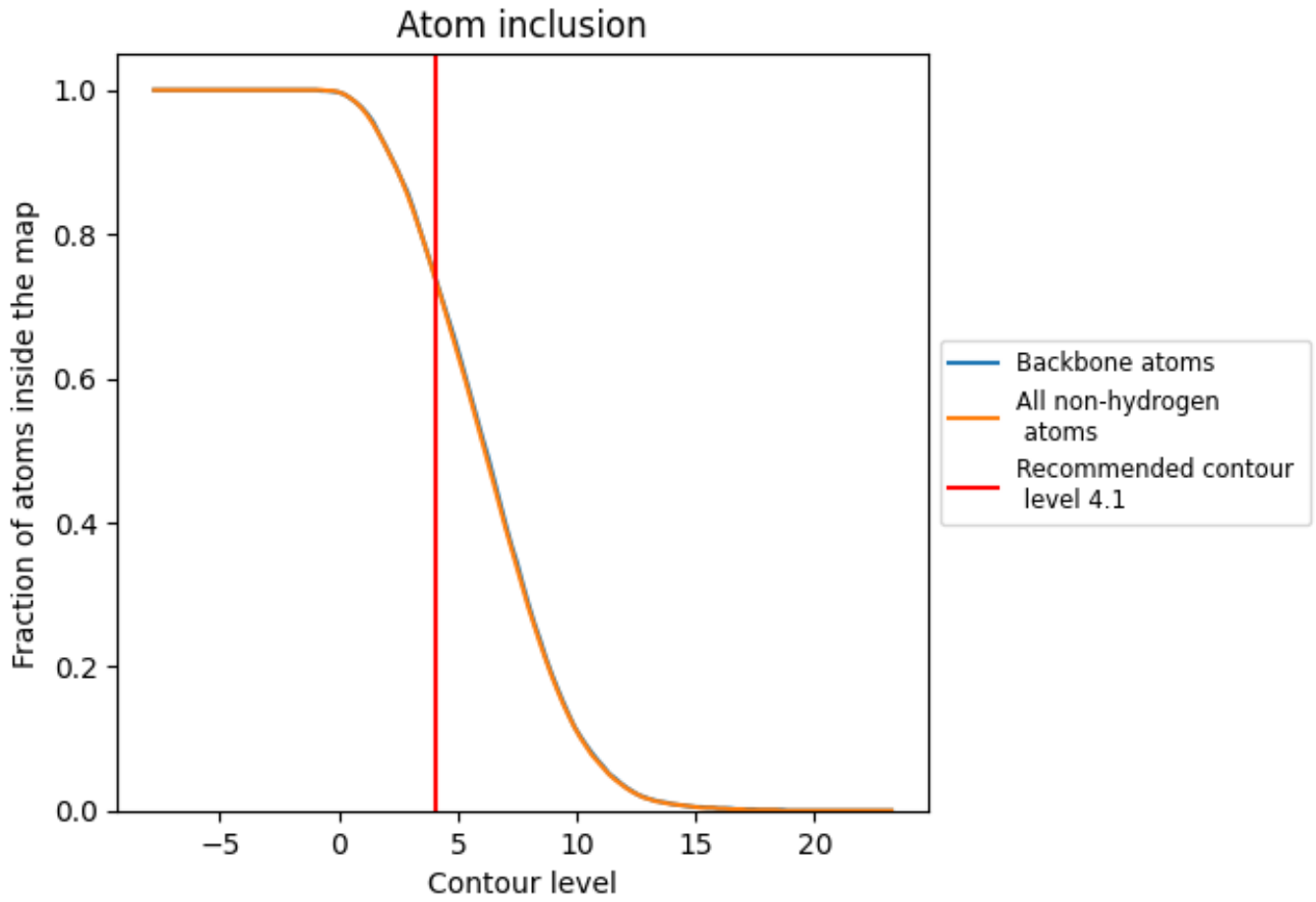
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (4.1).

9.4 Atom inclusion (i)



At the recommended contour level, 74% of all backbone atoms, 73% 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 (4.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7330	0.6010
I	0.7610	0.5990
J	0.4420	0.5620
K	0.7240	0.6290
L	0.6030	0.6180
M	0.5180	0.6130
N	0.6520	0.6340
O	0.6520	0.6330
P	0.6340	0.6330
Q	0.6470	0.6100
R	0.7830	0.6610

