



## Full wwPDB EM Validation Report ⓘ

Jul 15, 2024 – 12:44 am BST

PDB ID : 8C94  
EMDB ID : EMD-16501  
Title : Cryo-EM captures early ribosome assembly in action  
Authors : Lauer, S.; Nikolay, R.; Qin, B.  
Deposited on : 2023-01-21  
Resolution : 3.80 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

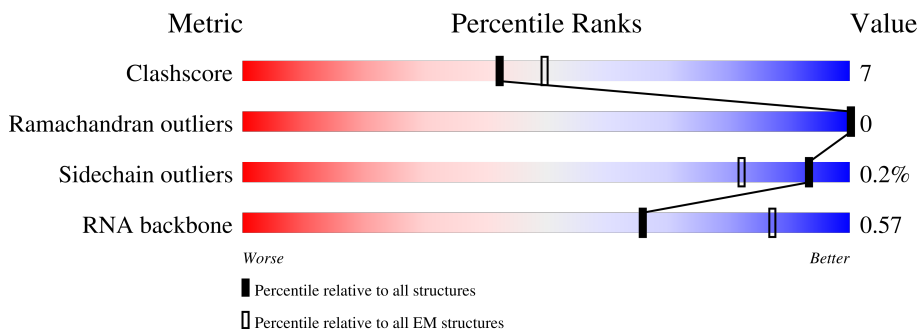
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.80 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	0	57	81% (Green), 14% (Yellow), 5% (Grey)
2	2	46	65% (Green), 20% (Yellow), 15% (Grey)
3	A	2904	5% (Red), 36% (Green), 18% (Yellow), 43% (Grey)
4	B	119	5% (Red), 70% (Green), 26% (Yellow), 1% (Grey)
5	D	209	69% (Green), 16% (Yellow), 15% (Grey)
6	E	201	80% (Green), 16% (Yellow), 4% (Grey)
7	F	179	75% (Green), 22% (Yellow), 3% (Grey)

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Mol	Chain	Length	Quality of chain
8	J	142	 75% 25%
9	K	123	 67% 85% 14%
10	L	144	 60% 18% 22%
11	N	127	 72% 22% 6%
12	O	117	 15% 74% 26%
13	P	115	 24% 92% 7%
14	Q	118	 6% 71% 28%
15	R	103	 6% 82% 18%
16	S	110	 9% 69% 22% 9%
17	U	104	 46% 81% 17%
18	V	94	 46% 77% 23%
19	W	85	 13% 68% 12% 20%
20	Y	63	 13% 71% 25%
21	Z	59	 5% 75% 24%

## 2 Entry composition

There are 21 unique types of molecules in this entry. The entry contains 54560 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 L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	0	54	429	260	91	77	1	0	0

- Molecule 2 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	2	39	315	188	78	48	1	0	0

- Molecule 3 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	A	1668	35860	15995	6653	11544	1668	0	0

- Molecule 4 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	B	119	2549	1135	466	829	119	0	0

- Molecule 5 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	D	178	1335	841	240	250	4	0	0

- Molecule 6 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	E	192	1481	934	263	279	5	0	0

- Molecule 7 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	F	177	1410	899	249	256	6	0	0

- Molecule 8 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	J	142	1129	714	212	199	4	0	0

- Molecule 9 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	K	122	938	587	180	165	6	0	0

- Molecule 10 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
10	L	113	808	500	157	151	0	0

- Molecule 11 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	N	120	960	593	196	166	5	0	0

- Molecule 12 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
12	O	116	892	552	178	162	0	0

- Molecule 13 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	P	114	917	574	179	163	1	0	0

- Molecule 14 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	Q	117	Total	C	N	O	0	0
			947	604	192	151		

- Molecule 15 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	R	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 16 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	S	100	Total	C	N	O	S	0	0
			781	486	149	144	2		

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

Mol	Chain	Residues	Atoms				AltConf	Trace
17	U	102	Total	C	N	O	0	0
			779	492	146	141		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
18	V	94	Total	C	N	O	S	0	0
			753	479	137	134	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
19	W	68	Total	C	N	O	S	0	0
			513	323	102	87	1		

- Molecule 20 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	Y	61	Total	C	N	O	S	0	0
			499	308	97	92	2		


- Molecule 21 is a protein called 50S ribosomal protein L30.

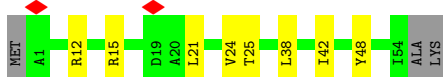
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	Z	58	449	281	87	79	2	0	0

### 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 L32

Chain 0: 

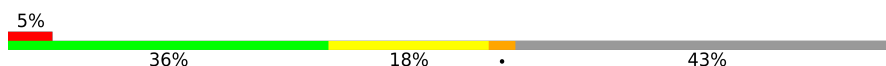


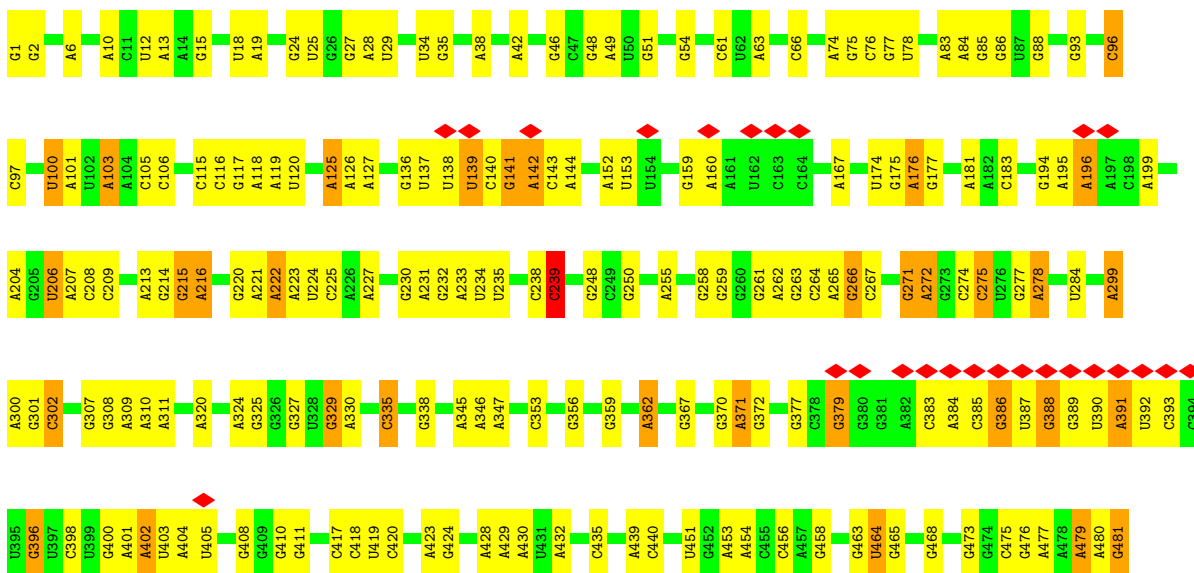
- Molecule 2: 50S ribosomal protein L34

Chain 2: 

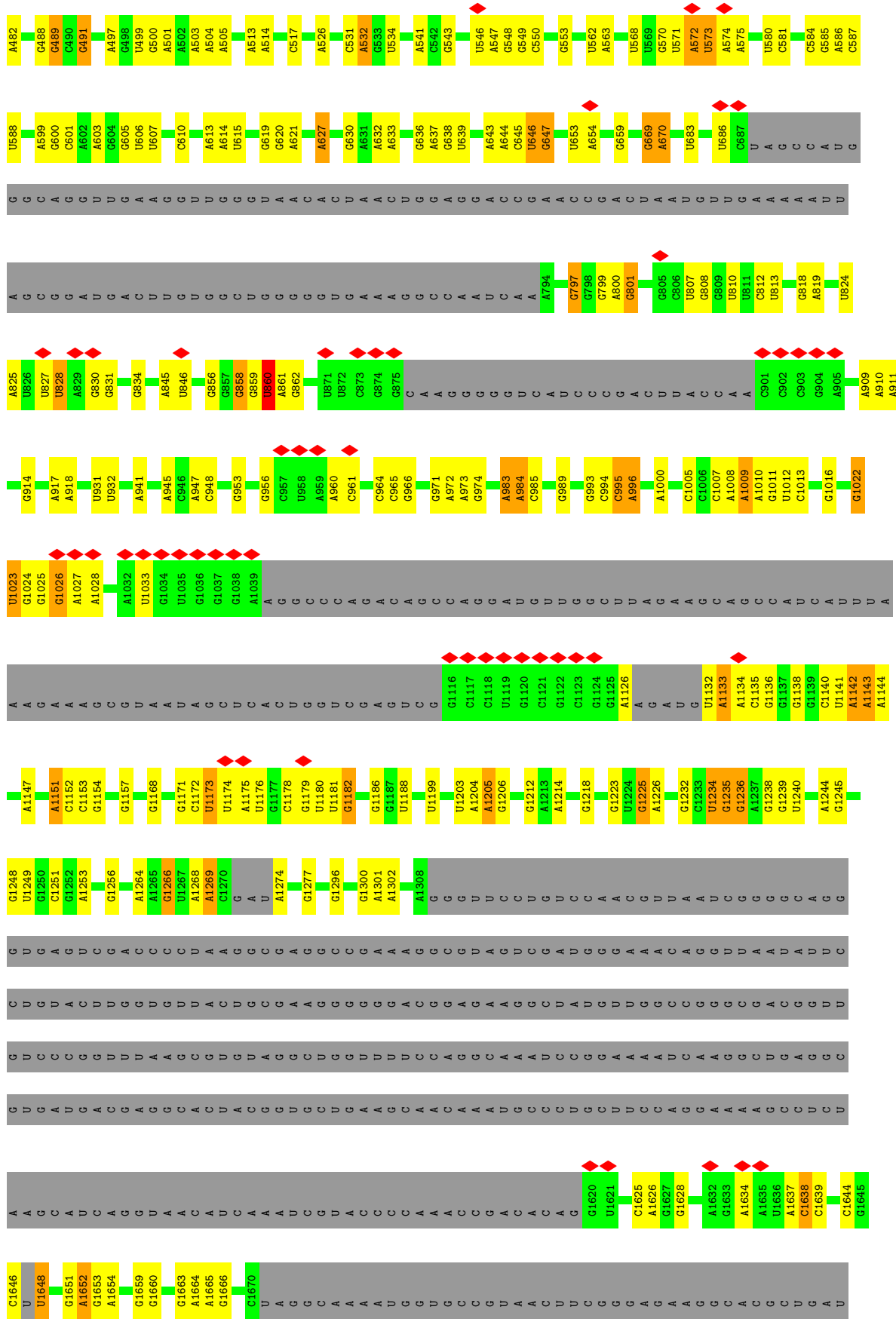


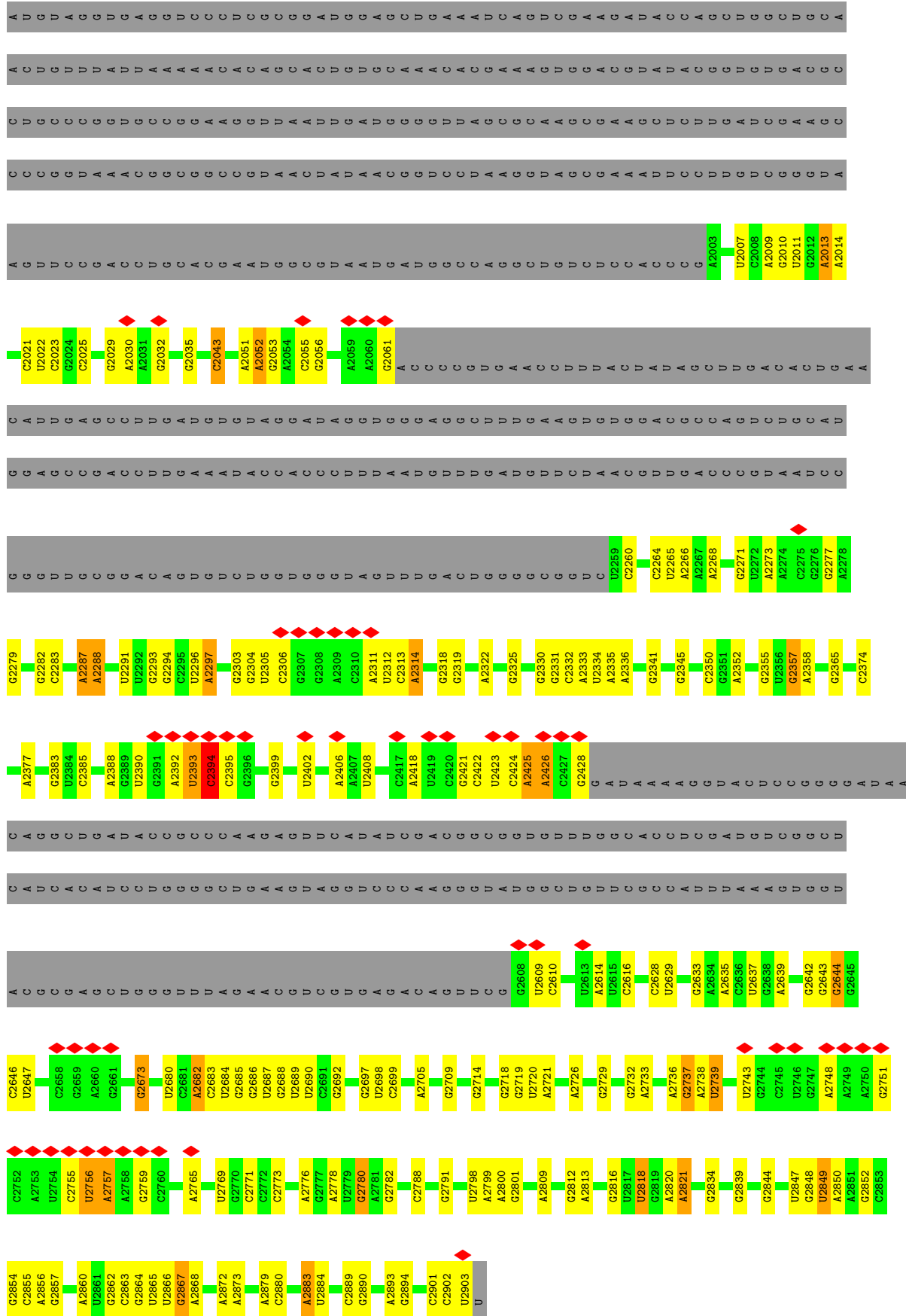
- Molecule 3: 23S rRNA

Chain A: 

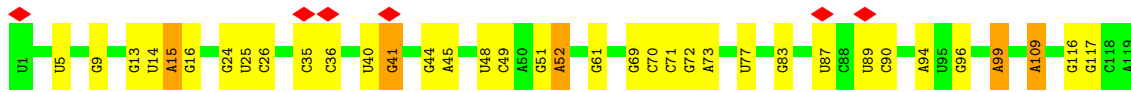




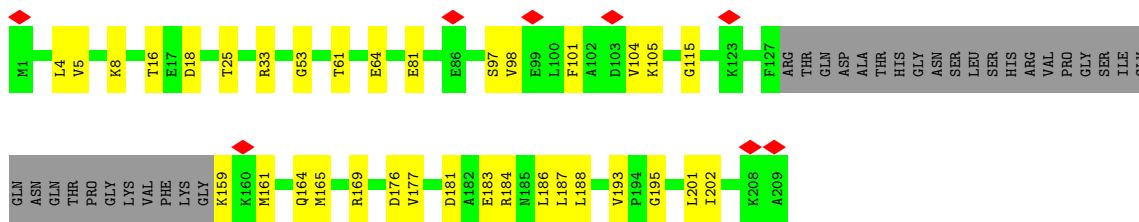




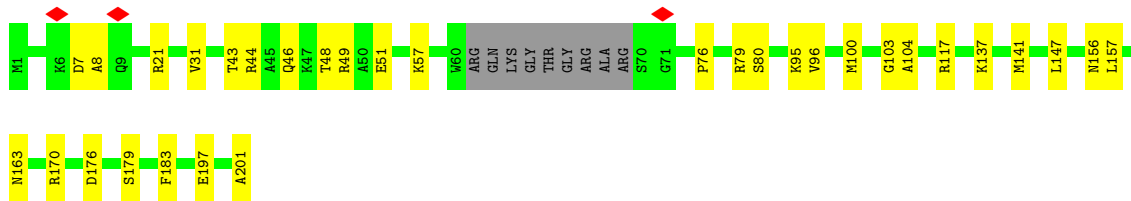
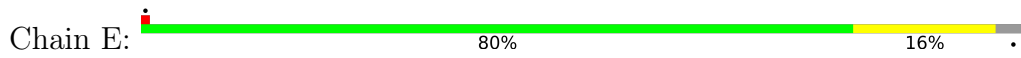
• Molecule 4: 5S rRNA



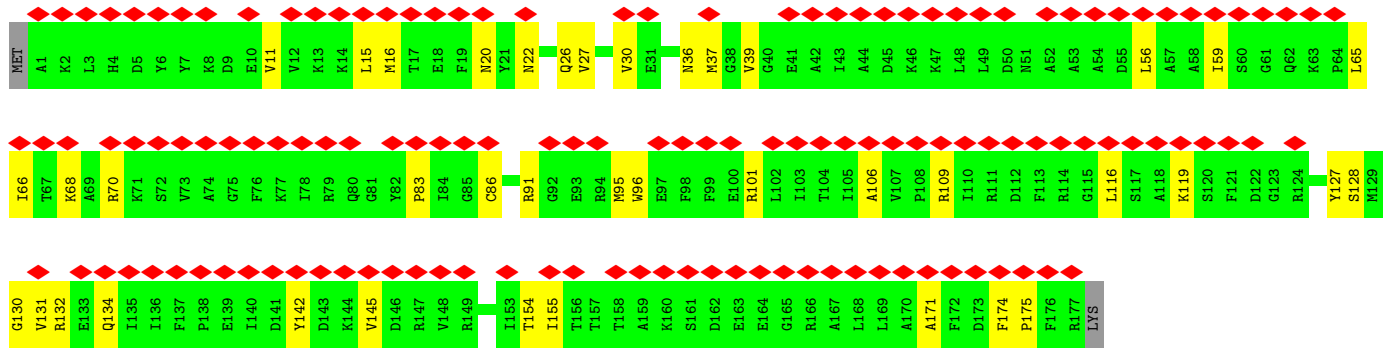
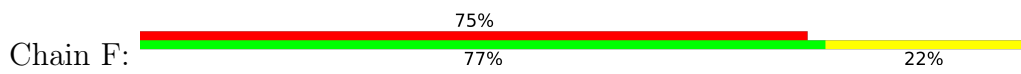
• Molecule 5: 50S ribosomal protein L3



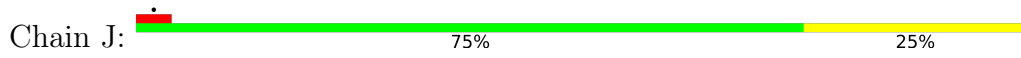
• Molecule 6: 50S ribosomal protein L4

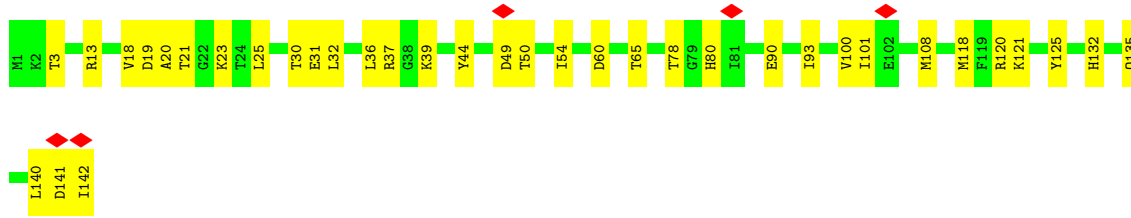


• Molecule 7: 50S ribosomal protein L5

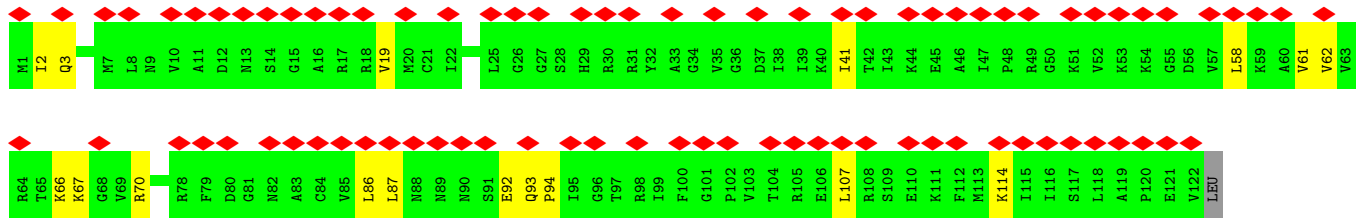
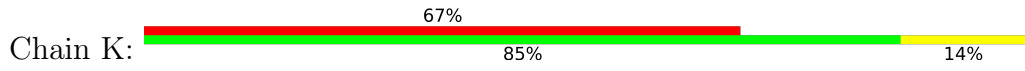


• Molecule 8: 50S ribosomal protein L13

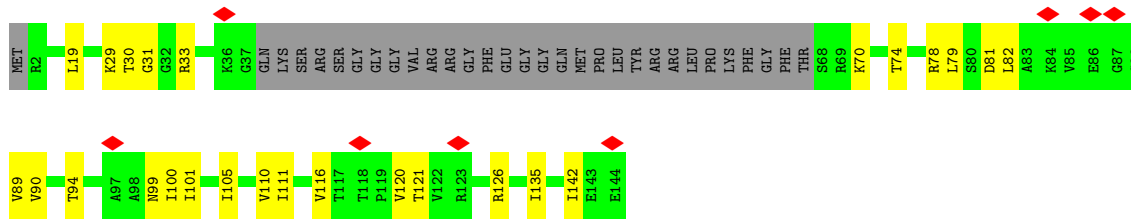




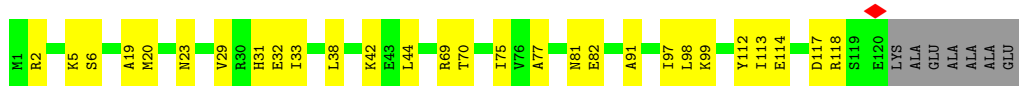
• Molecule 9: 50S ribosomal protein L14



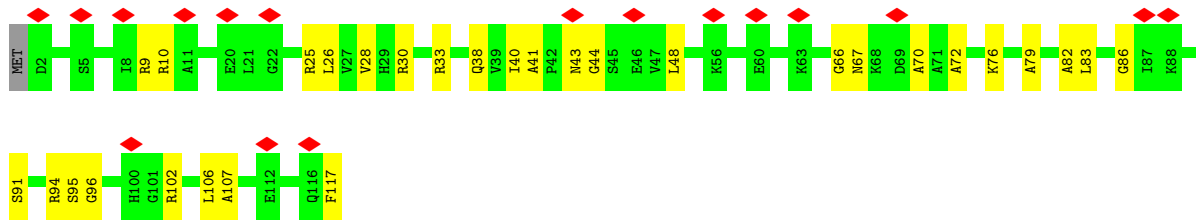
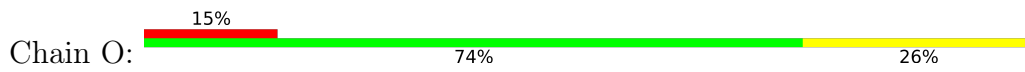
• Molecule 10: 50S ribosomal protein L15



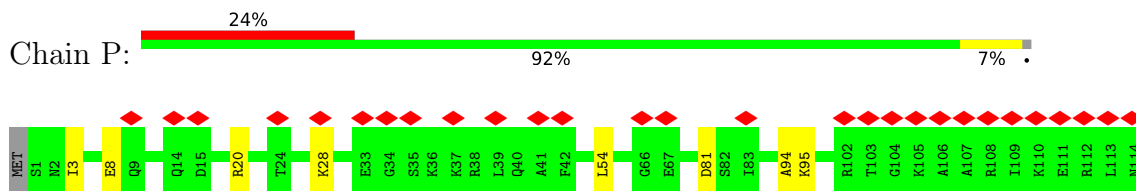
• Molecule 11: 50S ribosomal protein L17



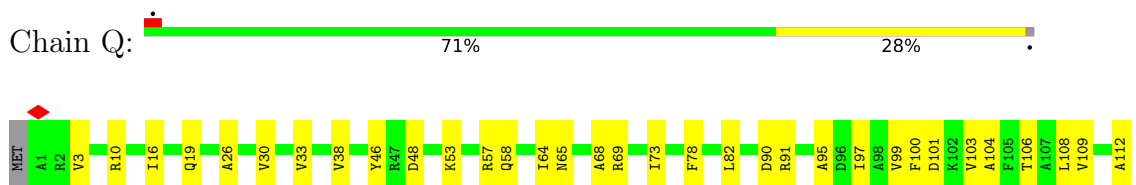
• Molecule 12: 50S ribosomal protein L18



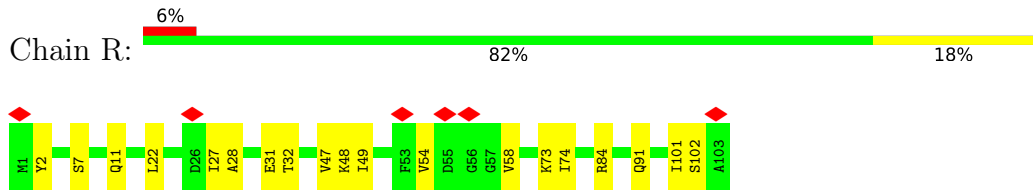
• Molecule 13: 50S ribosomal protein L19



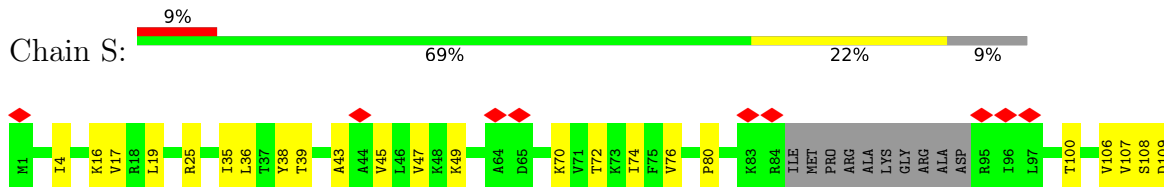
• Molecule 14: 50S ribosomal protein L20



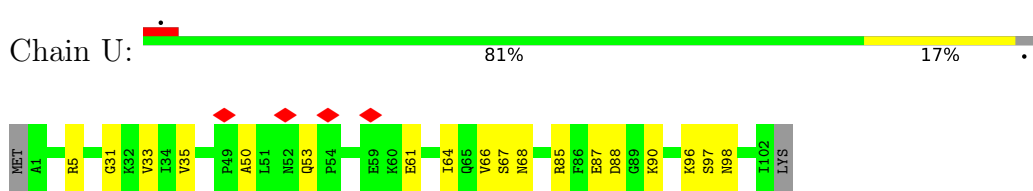
• Molecule 15: 50S ribosomal protein L21



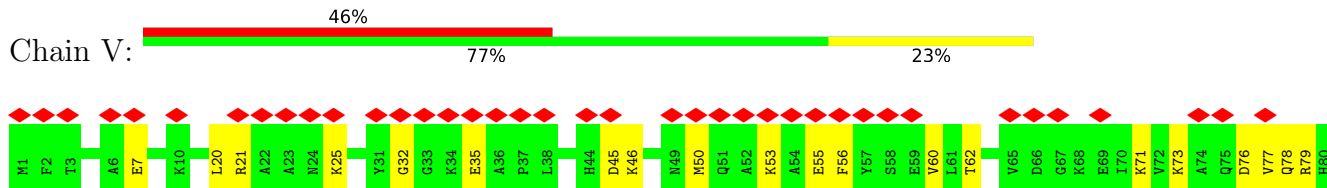
• Molecule 16: 50S ribosomal protein L22

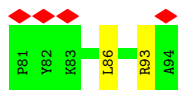


• Molecule 17: 50S ribosomal protein L24

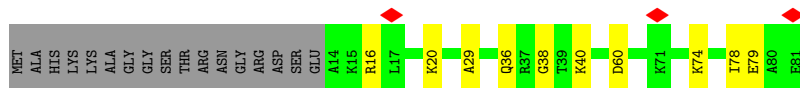


• Molecule 18: 50S ribosomal protein L25

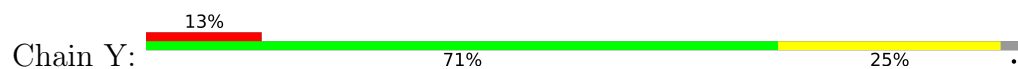




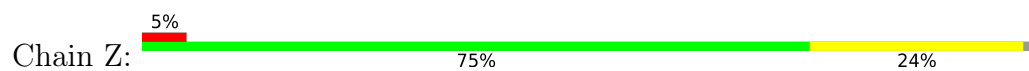
- Molecule 19: 50S ribosomal protein L27



- Molecule 20: 50S ribosomal protein L29



- Molecule 21: 50S ribosomal protein L30



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	3980	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	62	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	31000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.838	Depositor
Minimum map value	-0.837	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.084	Depositor
Recommended contour level	0.35	Depositor
Map size ( $\text{\AA}$ )	375.0, 375.0, 375.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.25, 1.25, 1.25	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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	0	0.23	0/435	0.56	0/581
2	2	0.23	0/316	0.67	0/413
3	A	0.19	0/40168	0.73	15/62651 (0.0%)
4	B	0.15	0/2850	0.70	0/4444
5	D	0.25	0/1350	0.52	0/1814
6	E	0.24	0/1499	0.48	0/2018
7	F	0.25	0/1434	0.51	0/1926
8	J	0.24	0/1152	0.49	0/1551
9	K	0.25	0/947	0.55	0/1268
10	L	0.24	0/810	0.56	0/1079
11	N	0.24	0/973	0.60	0/1301
12	O	0.24	0/902	0.54	0/1209
13	P	0.25	0/929	0.54	0/1242
14	Q	0.26	0/960	0.53	0/1278
15	R	0.25	0/829	0.53	0/1107
16	S	0.24	0/786	0.51	0/1051
17	U	0.25	0/787	0.52	0/1051
18	V	0.25	0/766	0.50	0/1025
19	W	0.25	0/520	0.51	0/687
20	Y	0.25	0/500	0.53	0/665
21	Z	0.24	0/453	0.54	0/605
All	All	0.20	0/59366	0.68	15/88966 (0.0%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1648	U	P-O3'-C3'	-10.60	106.98	119.70
3	A	2737	G	P-O3'-C3'	-9.69	108.07	119.70
3	A	2422	C	P-O3'-C3'	-8.54	109.45	119.70
3	A	2902	C	N3-C2-O2	-7.90	116.37	121.90
3	A	239	C	N3-C2-O2	-7.11	116.92	121.90
3	A	2393	U	P-O3'-C3'	-7.10	111.18	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	2736	A	P-O3'-C3'	-6.59	111.79	119.70
3	A	1269	A	P-O3'-C3'	-6.11	112.37	119.70
3	A	2421	G	P-O3'-C3'	-5.50	113.10	119.70
3	A	2771	C	N3-C2-O2	-5.38	118.13	121.90
3	A	860	U	C2-N1-C1'	5.26	124.01	117.70
3	A	2902	C	N1-C2-O2	5.18	122.01	118.90
3	A	2901	C	N1-C2-O2	5.16	121.99	118.90
3	A	2392	A	P-O3'-C3'	-5.06	113.63	119.70
3	A	2394	C	P-O3'-C3'	-5.00	113.69	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	0	429	0	443	6	0
2	2	315	0	349	6	0
3	A	35860	0	18041	359	0
4	B	2549	0	1291	27	0
5	D	1335	0	1390	24	0
6	E	1481	0	1540	21	0
7	F	1410	0	1447	32	0
8	J	1129	0	1162	27	0
9	K	938	0	1012	12	0
10	L	808	0	875	20	0
11	N	960	0	1000	18	0
12	O	892	0	923	22	0
13	P	917	0	965	8	0
14	Q	947	0	1022	31	0
15	R	816	0	839	20	0
16	S	781	0	838	21	0
17	U	779	0	834	15	0
18	V	753	0	780	18	0
19	W	513	0	537	9	0
20	Y	499	0	535	13	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
21	Z	449	0	491	12	0
All	All	54560	0	36314	622	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 7.

All (622) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:51:G:O2'	4:B:52:A:O4'	1.79	1.00
3:A:1214:A:N6	3:A:1235:G:H21	1.60	0.99
3:A:1214:A:H62	3:A:1235:G:N2	1.61	0.99
3:A:388:G:C6	3:A:391:A:N7	2.34	0.96
3:A:2635:A:O2'	5:D:81:GLU:OE2	1.81	0.95
9:K:58:LEU:HD11	9:K:86:LEU:HD12	1.49	0.94
3:A:1652:A:O2'	3:A:1653:G:O4'	1.86	0.93
3:A:388:G:O6	3:A:391:A:N7	2.02	0.91
3:A:571:U:O2'	3:A:573:U:OP2	1.88	0.91
3:A:61:C:O2	3:A:93:G:N2	2.05	0.89
5:D:61:THR:OG1	5:D:64:GLU:OE1	1.92	0.88
3:A:588:U:O4	3:A:670:A:O2'	1.92	0.87
18:V:60:VAL:HG13	18:V:71:LYS:HD2	1.57	0.87
3:A:534:U:O2'	14:Q:48:ASP:OD2	1.93	0.86
3:A:2355:G:O2'	19:W:20:LYS:NZ	2.08	0.86
21:Z:6:ILE:HD13	21:Z:47:ILE:HD11	1.55	0.86
3:A:2053:G:N2	3:A:2616:C:O2	2.09	0.85
3:A:117:G:OP2	3:A:119:A:O2'	1.94	0.85
3:A:388:G:O6	3:A:391:A:C5	2.30	0.85
3:A:137:U:O2	3:A:142:A:N6	2.10	0.85
3:A:299:A:O2'	3:A:300:A:O4'	1.93	0.85
3:A:1154:G:OP2	14:Q:57:ARG:NH1	2.10	0.84
3:A:308:G:N2	3:A:501:A:N7	2.26	0.83
3:A:320:A:N3	6:E:163:ASN:ND2	2.26	0.83
3:A:2646:C:OP2	3:A:2732:G:O2'	1.98	0.82
3:A:2011:U:OP2	16:S:16:LYS:NZ	2.10	0.82
3:A:234:U:O4	3:A:263:G:N2	2.12	0.82
3:A:77:G:OP1	20:Y:52:ARG:NH1	2.13	0.82
3:A:126:A:O2'	3:A:127:A:O4'	1.97	0.82
3:A:834:G:O2'	3:A:2358:A:O2'	1.99	0.81
3:A:1007:C:OP2	3:A:1008:A:O2'	1.99	0.81
3:A:1024:G:OP2	3:A:1025:G:O2'	1.99	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1203:U:OP2	3:A:1204:A:O2'	1.99	0.81
3:A:2265:U:OP2	3:A:2266:A:O2'	1.99	0.81
3:A:948:C:HO2'	3:A:984:A:HO2'	1.19	0.80
17:U:50:ALA:O	17:U:53:GLN:NE2	2.15	0.80
3:A:1225:G:O2'	3:A:1226:A:O4'	1.99	0.80
3:A:2294:G:OP1	12:O:10:ARG:NH2	2.15	0.79
3:A:66:C:N3	3:A:88:G:N1	2.30	0.79
3:A:1628:G:N2	3:A:1639:C:N3	2.31	0.79
3:A:2685:G:O2'	3:A:2726:A:N1	2.14	0.79
3:A:224:U:OP2	3:A:408:G:N2	2.15	0.79
4:B:41:G:O6	7:F:68:LYS:NZ	2.16	0.79
3:A:858:G:O2'	3:A:2268:A:N3	2.15	0.79
3:A:324:A:OP2	3:A:1205:A:N6	2.16	0.78
3:A:66:C:O2	3:A:88:G:N2	2.16	0.78
3:A:2313:C:OP2	7:F:70:ARG:NH1	2.16	0.78
4:B:36:C:N4	4:B:49:C:O2	2.16	0.78
3:A:669:G:O2'	3:A:670:A:O4'	2.00	0.78
3:A:1214:A:H62	3:A:1235:G:H21	0.81	0.78
3:A:2633:G:O2'	5:D:64:GLU:OE2	2.00	0.78
3:A:573:U:O4	3:A:2029:G:O2'	2.00	0.78
5:D:159:LYS:NZ	5:D:161:MET:SD	2.56	0.77
3:A:918:A:O2'	4:B:96:G:N2	2.18	0.77
3:A:335:C:O2	17:U:67:SER:OG	2.03	0.77
3:A:76:C:O2'	20:Y:55:THR:HG21	1.84	0.76
3:A:2377:A:O2'	12:O:117:PHE:O	2.03	0.76
3:A:514:A:N3	3:A:581:C:O2'	2.18	0.76
3:A:1009:A:O2'	3:A:1010:A:O4'	2.02	0.76
8:J:49:ASP:OD1	8:J:121:LYS:NZ	2.18	0.76
3:A:1153:C:OP1	14:Q:91:ARG:NH2	2.19	0.76
3:A:2682:A:O2'	3:A:2683:C:O4'	2.04	0.76
10:L:19:LEU:HD12	10:L:31:GLY:HA3	1.68	0.75
3:A:1296:G:OP1	3:A:2709:G:O2'	2.03	0.75
4:B:49:C:OP1	12:O:102:ARG:NE	2.19	0.75
2:2:14:ARG:NH1	3:A:125:A:OP1	2.20	0.75
4:B:77:U:O2	4:B:99:A:N7	2.19	0.74
3:A:2743:U:OP2	3:A:2755:C:N4	2.20	0.74
17:U:85:ARG:NE	17:U:87:GLU:OE2	2.19	0.74
3:A:1664:A:O2'	9:K:67:LYS:NZ	2.19	0.74
3:A:1:G:O2'	3:A:2:G:O4'	2.03	0.74
3:A:1024:G:O2'	3:A:1144:A:O2'	2.04	0.74
3:A:271:G:OP1	3:A:367:G:N2	2.20	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:5:U:OP1	4:B:61:G:O2'	2.05	0.74
17:U:33:VAL:HG23	17:U:66:VAL:HG22	1.69	0.73
3:A:989:G:OP2	21:Z:11:SER:OG	2.01	0.73
3:A:953:G:O2'	3:A:2266:A:OP2	2.06	0.73
3:A:627:A:OP1	10:L:78:ARG:NH2	2.22	0.73
3:A:175:G:O2'	3:A:176:A:O5'	2.06	0.72
3:A:223:A:O2'	3:A:420:C:O2	2.05	0.72
16:S:80:PRO:O	16:S:100:THR:OG1	2.04	0.72
3:A:475:C:O2	3:A:479:A:N6	2.23	0.72
3:A:1168:G:O6	3:A:1182:G:C6	2.42	0.72
19:W:29:ALA:N	19:W:60:ASP:OD1	2.23	0.72
3:A:325:G:O6	3:A:338:G:N2	2.23	0.72
3:A:27:G:O2'	3:A:28:A:OP2	2.07	0.71
3:A:386:G:OP2	3:A:388:G:N2	2.24	0.71
3:A:2788:C:O2'	3:A:2809:A:N3	2.23	0.71
4:B:45:A:O4'	7:F:91:ARG:NH1	2.24	0.71
16:S:36:LEU:HD21	16:S:47:VAL:HG13	1.71	0.71
3:A:1651:G:C2	3:A:2007:U:C2	2.79	0.70
3:A:909:A:O2'	3:A:911:A:OP2	2.06	0.70
3:A:2751:G:N2	3:A:2751:G:OP1	2.25	0.70
3:A:78:U:OP2	20:Y:2:LYS:NZ	2.25	0.69
3:A:2303:G:OP1	7:F:119:LYS:NZ	2.24	0.69
3:A:1235:G:O2'	3:A:1236:G:N7	2.24	0.69
20:Y:52:ARG:O	20:Y:55:THR:OG1	2.11	0.69
3:A:261:G:O2'	3:A:610:C:O2'	2.10	0.69
3:A:35:G:O2'	3:A:454:A:O4'	2.10	0.69
3:A:1142:A:N7	3:A:1144:A:N6	2.41	0.69
3:A:213:A:O2'	3:A:214:G:O4'	2.11	0.69
3:A:620:G:N2	3:A:620:G:OP2	2.26	0.68
3:A:2352:A:N6	3:A:2365:G:O2'	2.27	0.68
7:F:130:GLY:O	7:F:132:ARG:NH1	2.27	0.68
18:V:77:VAL:HG22	18:V:79:ARG:NH1	2.09	0.67
3:A:813:U:OP1	15:R:84:ARG:NH2	2.26	0.67
3:A:1010:A:OP1	14:Q:65:ASN:ND2	2.27	0.67
3:A:570:G:O2'	3:A:983:A:N1	2.26	0.67
3:A:2849:U:O4	13:P:20:ARG:NH1	2.28	0.67
15:R:49:ILE:HG22	15:R:54:VAL:CG2	2.24	0.67
3:A:1665:A:O3'	9:K:66:LYS:NZ	2.27	0.66
3:A:176:A:O2'	3:A:177:G:O4'	2.13	0.66
3:A:271:G:O2'	3:A:272:A:O5'	2.06	0.66
18:V:45:ASP:OD1	18:V:46:LYS:N	2.27	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1168:G:O6	3:A:1181:U:O2	2.12	0.66
4:B:14:U:OP2	4:B:70:C:O2'	2.11	0.66
3:A:220:G:N2	3:A:428:A:N7	2.43	0.66
3:A:196:A:N6	3:A:831:G:O2'	2.28	0.66
3:A:2818:U:OP2	11:N:42:LYS:NZ	2.28	0.66
4:B:25:U:O2	4:B:117:G:O2'	2.08	0.66
3:A:1277:G:H4'	11:N:20:MET:HE1	1.77	0.66
12:O:10:ARG:NH1	12:O:96:GLY:O	2.28	0.66
3:A:194:G:O2'	3:A:195:A:O4'	2.10	0.65
3:A:301:G:O2'	3:A:302:C:OP2	2.12	0.65
5:D:186:LEU:HD21	13:P:3:ILE:HG21	1.78	0.65
3:A:284:U:O2	3:A:356:G:O6	2.14	0.65
3:A:858:G:OP1	19:W:74:LYS:NZ	2.30	0.65
14:Q:19:GLN:OE1	15:R:73:LYS:NZ	2.29	0.65
11:N:69:ARG:O	11:N:70:THR:OG1	2.14	0.65
1:O:12:ARG:NH2	3:A:517:C:OP1	2.29	0.65
3:A:2692:G:N3	3:A:2847:U:O2'	2.30	0.65
18:V:77:VAL:HG22	18:V:79:ARG:HH11	1.62	0.65
20:Y:59:GLU:N	20:Y:59:GLU:OE1	2.29	0.65
3:A:636:G:OP2	10:L:126:ARG:NH1	2.29	0.65
4:B:48:U:OP2	12:O:30:ARG:NH2	2.30	0.64
6:E:117:ARG:NH2	6:E:183:PHE:O	2.30	0.64
3:A:379:G:N1	3:A:396:G:O6	2.31	0.64
3:A:2357:G:OP1	19:W:16:ARG:NE	2.30	0.64
14:Q:30:VAL:HG13	14:Q:33:VAL:HG22	1.79	0.64
10:L:29:LYS:O	10:L:30:THR:OG1	2.11	0.64
3:A:2873:A:O4'	11:N:6:SER:OG	2.11	0.63
3:A:2816:G:N3	3:A:2883:A:O2'	2.26	0.63
3:A:2854:G:N1	3:A:2864:G:O6	2.31	0.63
3:A:500:G:N1	3:A:503:A:OP2	2.31	0.63
17:U:61:GLU:N	17:U:61:GLU:OE1	2.32	0.63
3:A:329:G:OP2	17:U:68:ASN:ND2	2.32	0.63
3:A:345:A:N3	3:A:347:A:N6	2.47	0.63
7:F:134:GLN:N	7:F:134:GLN:OE1	2.32	0.63
16:S:109:ASP:OD1	16:S:110:ARG:NH1	2.32	0.63
20:Y:51:ALA:O	20:Y:55:THR:HG23	1.99	0.62
3:A:174:U:N3	3:A:175:G:O6	2.32	0.62
3:A:262:A:N3	3:A:430:A:O2'	2.27	0.62
3:A:964:C:O2'	3:A:2273:A:N3	2.30	0.62
8:J:13:ARG:NH2	8:J:49:ASP:OD2	2.33	0.62
3:A:1651:G:N1	3:A:2007:U:N3	2.48	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:J:37:ARG:NH1	8:J:44:TYR:OH	2.33	0.62
3:A:1022:G:N7	3:A:1140:C:N4	2.48	0.61
6:E:156:ASN:OD1	6:E:157:LEU:N	2.33	0.61
4:B:26:C:O2'	4:B:116:G:O2'	2.17	0.61
14:Q:108:LEU:HD22	15:R:48:LYS:HZ1	1.65	0.61
3:A:669:G:H22	3:A:801:G:C1'	2.13	0.61
3:A:278:A:N6	3:A:362:A:N7	2.49	0.61
3:A:2312:U:O2	7:F:36:ASN:ND2	2.34	0.61
14:Q:73:ILE:HG21	14:Q:109:VAL:HG23	1.82	0.61
3:A:139:U:O2'	3:A:141:G:N2	2.34	0.60
3:A:571:U:O2'	3:A:572:A:O5'	2.19	0.60
18:V:78:GLN:O	18:V:79:ARG:NH1	2.34	0.60
3:A:2857:G:N2	3:A:2860:A:OP2	2.35	0.60
3:A:2335:A:OP2	12:O:9:ARG:NH2	2.34	0.60
3:A:917:A:O2'	3:A:918:A:O4'	2.17	0.60
3:A:2839:G:N2	11:N:91:ALA:O	2.35	0.60
14:Q:78:PHE:O	14:Q:82:LEU:HD23	2.01	0.60
16:S:17:VAL:CG2	16:S:76:VAL:HG11	2.32	0.60
3:A:1168:G:O6	3:A:1182:G:C5	2.55	0.60
20:Y:19:LEU:HD12	20:Y:20:ASN:N	2.17	0.60
3:A:308:G:O2'	3:A:309:A:O4'	2.14	0.59
3:A:372:G:O2'	3:A:400:G:O6	2.12	0.59
3:A:1173:U:O2	3:A:1176:U:N3	2.35	0.59
3:A:2821:A:OP2	5:D:115:GLY:N	2.34	0.59
3:A:1138:G:N2	8:J:108:MET:SD	2.71	0.59
16:S:17:VAL:HG23	16:S:76:VAL:HG11	1.85	0.59
3:A:115:C:HO2'	3:A:127:A:HO2'	1.51	0.59
3:A:482:A:O2'	3:A:497:A:N1	2.36	0.59
21:Z:47:ILE:O	21:Z:51:SER:N	2.35	0.59
21:Z:50:VAL:HG12	21:Z:50:VAL:O	2.02	0.59
3:A:1651:G:N1	3:A:2007:U:C2	2.71	0.59
3:A:66:C:N4	3:A:88:G:O6	2.36	0.59
3:A:2341:G:N2	3:A:2374:C:O3'	2.35	0.59
3:A:2296:U:O4	12:O:9:ARG:NH2	2.36	0.58
12:O:43:ASN:OD1	12:O:44:GLY:N	2.37	0.58
12:O:106:LEU:HD12	12:O:107:ALA:N	2.19	0.58
3:A:227:A:N6	3:A:410:G:O2'	2.35	0.58
3:A:428:A:O2'	3:A:429:A:O4'	2.11	0.58
12:O:41:ALA:HB2	12:O:48:LEU:HD11	1.84	0.58
3:A:2313:C:O4'	7:F:36:ASN:ND2	2.36	0.58
3:A:1625:C:N4	3:A:1626:A:N1	2.52	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:799:G:OP2	3:A:800:A:O2'	2.12	0.57
3:A:1248:G:OP1	6:E:44:ARG:NH1	2.38	0.57
5:D:33:ARG:NH2	5:D:53:GLY:O	2.35	0.57
3:A:2287:A:O2'	3:A:2288:A:OP2	2.20	0.57
11:N:19:ALA:O	11:N:23:ASN:ND2	2.37	0.57
3:A:1022:G:O2'	3:A:1023:U:OP2	2.18	0.57
9:K:58:LEU:CD1	9:K:86:LEU:HD12	2.28	0.57
3:A:476:G:N1	3:A:479:A:OP2	2.37	0.57
3:A:18:U:O4	3:A:19:A:N6	2.38	0.57
18:V:35:GLU:OE2	18:V:93:ARG:NH1	2.38	0.57
7:F:15:LEU:HD13	7:F:27:VAL:HG23	1.87	0.56
3:A:2865:U:OP2	3:A:2866:U:O2'	2.21	0.56
4:B:77:U:OP1	18:V:21:ARG:NH1	2.38	0.56
3:A:2394:C:H2'	3:A:2395:C:H6	1.71	0.56
3:A:2705:A:O2'	3:A:2852:G:OP1	2.21	0.56
7:F:59:ILE:O	7:F:101:ARG:NH2	2.39	0.56
10:L:70:LYS:NZ	10:L:74:THR:OG1	2.36	0.56
3:A:2332:C:O2'	3:A:2335:A:O2'	2.23	0.56
3:A:390:U:O2'	3:A:391:A:O5'	2.21	0.56
3:A:513:A:N3	14:Q:10:ARG:NH2	2.51	0.56
3:A:2780:G:OP2	8:J:120:ARG:NE	2.39	0.55
4:B:51:G:HO2'	4:B:52:A:C1'	2.13	0.55
3:A:48:G:H22	3:A:177:G:P	2.29	0.55
3:A:2297:A:C5	3:A:2318:G:N2	2.75	0.55
21:Z:4:ILE:HG22	21:Z:37:ARG:O	2.07	0.55
3:A:2282:G:N2	3:A:2390:U:O2	2.39	0.55
16:S:17:VAL:HG12	16:S:43:ALA:HB2	1.88	0.55
20:Y:58:ASN:OD1	20:Y:59:GLU:N	2.39	0.54
8:J:23:LYS:NZ	8:J:142:ILE:OXT	2.32	0.54
7:F:16:MET:O	7:F:20:ASN:N	2.34	0.54
3:A:911:A:N3	3:A:2277:G:N2	2.55	0.54
3:A:532:A:N1	3:A:2035:G:N2	2.55	0.54
3:A:2291:U:O2'	3:A:2374:C:O2	2.26	0.54
3:A:2297:A:N6	3:A:2319:G:O4'	2.41	0.54
8:J:19:ASP:OD1	8:J:21:THR:HG23	2.08	0.54
3:A:1168:G:C5	3:A:1182:G:C2	2.95	0.54
3:A:2293:G:OP1	12:O:94:ARG:NH2	2.41	0.54
3:A:2773:C:OP1	5:D:169:ARG:NH1	2.40	0.54
7:F:95:MET:SD	7:F:96:TRP:N	2.81	0.54
20:Y:45:GLN:O	20:Y:47:ARG:N	2.41	0.54
21:Z:6:ILE:CD1	21:Z:47:ILE:HD11	2.31	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:2798:U:O2	3:A:2799:A:N6	2.42	0.53
8:J:78:THR:HG23	8:J:80:HIS:H	1.73	0.53
16:S:35:ILE:O	16:S:39:THR:OG1	2.19	0.53
2:2:13:ASN:O	2:2:17:GLY:N	2.39	0.53
3:A:100:U:O2	3:A:101:A:N6	2.42	0.53
3:A:2330:G:H21	19:W:38:GLY:HA2	1.72	0.53
6:E:147:LEU:HD11	6:E:170:ARG:HD3	1.90	0.53
16:S:17:VAL:HG12	16:S:43:ALA:CB	2.39	0.53
17:U:96:LYS:O	17:U:97:SER:OG	2.22	0.53
3:A:1141:U:H4'	3:A:1142:A:O4'	2.09	0.53
3:A:1199:U:C1'	14:Q:3:VAL:HG12	2.38	0.53
14:Q:104:ALA:O	14:Q:108:LEU:HD23	2.08	0.53
16:S:45:VAL:HG22	16:S:49:LYS:HZ3	1.73	0.53
16:S:45:VAL:HG22	16:S:49:LYS:NZ	2.23	0.53
10:L:101:ILE:HB	10:L:105:ILE:HG21	1.91	0.53
6:E:176:ASP:OD1	6:E:179:SER:OG	2.18	0.53
18:V:20:LEU:O	18:V:25:LYS:N	2.40	0.53
3:A:214:G:H2'	3:A:215:G:O4'	2.09	0.53
11:N:38:LEU:HD21	11:N:99:LYS:HG2	1.91	0.52
18:V:32:GLY:O	18:V:93:ARG:NH1	2.43	0.52
14:Q:46:TYR:CD1	15:R:74:ILE:HD11	2.45	0.52
3:A:1653:G:OP1	11:N:2:ARG:NE	2.42	0.52
11:N:29:VAL:HG11	11:N:75:ILE:HG23	1.90	0.52
3:A:1028:A:OP2	3:A:1126:A:N6	2.42	0.52
3:A:2628:C:O2'	3:A:2782:G:OP1	2.19	0.52
4:B:5:U:P	4:B:61:G:HO2'	2.28	0.52
11:N:33:ILE:HD13	11:N:114:GLU:OE1	2.09	0.52
3:A:828:U:O2'	3:A:831:G:O6	2.28	0.52
3:A:1026:G:O2'	3:A:1027:A:O4'	2.16	0.52
3:A:451:U:C4	3:A:453:A:C8	2.98	0.52
3:A:996:A:O2'	14:Q:90:ASP:OD2	2.27	0.52
3:A:1652:A:HO2'	3:A:1653:G:C4'	2.14	0.52
4:B:15:A:OP2	4:B:69:G:N2	2.35	0.51
3:A:1009:A:OP2	8:J:39:LYS:NZ	2.37	0.51
6:E:31:VAL:HG21	6:E:104:ALA:CB	2.40	0.51
6:E:7:ASP:OD1	6:E:8:ALA:N	2.40	0.51
3:A:1651:G:C2	3:A:2007:U:O2	2.62	0.51
3:A:2847:U:OP1	13:P:95:LYS:NZ	2.39	0.51
6:E:46:GLN:N	6:E:46:GLN:OE1	2.43	0.51
12:O:26:LEU:HD12	12:O:38:GLN:O	2.10	0.51
3:A:177:G:OP2	3:A:177:G:N2	2.43	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:370:G:OP1	3:A:423:A:N6	2.42	0.51
3:A:1218:G:N1	3:A:1232:G:N7	2.58	0.51
3:A:2303:G:O6	3:A:2314:A:N6	2.44	0.51
11:N:33:ILE:HD11	11:N:112:TYR:HB3	1.93	0.51
3:A:600:G:N2	3:A:605:G:O3'	2.43	0.51
3:A:2393:U:H6	3:A:2393:U:O5'	1.93	0.51
17:U:33:VAL:HG23	17:U:66:VAL:CG2	2.40	0.51
10:L:90:VAL:HG23	10:L:120:VAL:HG11	1.93	0.51
10:L:79:LEU:HD21	10:L:110:VAL:HG12	1.93	0.51
10:L:116:VAL:O	10:L:116:VAL:HG13	2.11	0.51
3:A:1151:A:H2'	3:A:1152:C:O4'	2.11	0.51
3:A:1651:G:C6	3:A:1652:A:C2	2.99	0.51
14:Q:108:LEU:HD22	15:R:48:LYS:NZ	2.26	0.50
16:S:72:THR:OG1	16:S:106:VAL:O	2.24	0.50
18:V:7:GLU:N	18:V:7:GLU:OE1	2.45	0.50
4:B:83:G:O6	4:B:94:A:N6	2.44	0.50
3:A:1000:A:OP2	3:A:1154:G:N1	2.36	0.50
10:L:100:ILE:HG23	10:L:101:ILE:HG23	1.93	0.50
14:Q:103:VAL:O	14:Q:106:THR:OG1	2.26	0.50
15:R:27:ILE:HG21	15:R:31:GLU:OE2	2.10	0.50
3:A:2850:A:OP2	3:A:2866:U:N3	2.41	0.50
3:A:49:A:N1	3:A:177:G:N2	2.60	0.50
3:A:948:C:O2'	3:A:984:A:O2'	2.03	0.50
7:F:15:LEU:HD22	7:F:27:VAL:HG23	1.92	0.50
19:W:79:GLU:OE1	19:W:79:GLU:N	2.45	0.50
3:A:235:U:O4	3:A:263:G:N2	2.44	0.50
3:A:1651:G:C6	3:A:2007:U:N3	2.80	0.50
3:A:2680:U:O2	3:A:2682:A:N6	2.44	0.50
5:D:4:LEU:HD12	5:D:101:PHE:HE2	1.75	0.50
3:A:1142:A:O2'	3:A:1143:A:O5'	2.23	0.50
3:A:2643:G:H2'	3:A:2644:G:C1'	2.40	0.50
3:A:2698:U:H2'	3:A:2699:C:C6	2.46	0.50
5:D:8:LYS:CG	5:D:201:LEU:HD11	2.42	0.50
14:Q:30:VAL:HG13	14:Q:33:VAL:CG2	2.41	0.50
9:K:86:LEU:O	9:K:87:LEU:HD23	2.11	0.49
7:F:131:VAL:HG23	7:F:131:VAL:O	2.12	0.49
8:J:118:MET:HA	8:J:121:LYS:HZ3	1.76	0.49
3:A:175:G:C2'	3:A:176:A:O5'	2.60	0.49
3:A:584:C:N4	3:A:585:G:O6	2.45	0.49
6:E:197:GLU:O	6:E:201:ALA:N	2.44	0.49
12:O:25:ARG:NH2	12:O:40:ILE:HG21	2.28	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:R:11:GLN:N	15:R:11:GLN:OE1	2.45	0.49
9:K:87:LEU:HD23	9:K:94:PRO:HB3	1.95	0.49
3:A:1011:G:OP2	14:Q:69:ARG:NH2	2.44	0.49
3:A:327:G:N2	17:U:67:SER:OG	2.46	0.49
3:A:860:U:H2'	3:A:860:U:O2	2.13	0.49
4:B:9:G:OP1	12:O:25:ARG:NH2	2.45	0.49
3:A:38:A:N3	6:E:43:THR:HG21	2.28	0.49
4:B:41:G:C8	7:F:65:LEU:HD11	2.48	0.49
3:A:238:C:H2'	3:A:239:C:C1'	2.43	0.48
3:A:258:G:H2'	3:A:259:G:C8	2.47	0.48
3:A:2399:G:O6	3:A:2418:A:N6	2.47	0.48
17:U:31:GLY:O	17:U:66:VAL:HG23	2.13	0.48
21:Z:40:THR:HG23	21:Z:43:ILE:H	1.78	0.48
3:A:1663:G:HO2'	3:A:1664:A:H8	1.61	0.48
17:U:88:ASP:O	17:U:90:LYS:N	2.47	0.48
5:D:97:SER:OG	5:D:98:VAL:N	2.46	0.48
6:E:79:ARG:O	6:E:80:SER:OG	2.29	0.48
10:L:19:LEU:HD23	10:L:19:LEU:H	1.77	0.48
3:A:159:G:O2'	3:A:167:A:N6	2.38	0.48
3:A:526:A:O2'	3:A:2043:C:O2	2.29	0.48
3:A:621:A:OP2	10:L:99:ASN:ND2	2.47	0.48
3:A:630:G:N2	3:A:633:A:OP2	2.47	0.48
3:A:1016:G:O6	3:A:1147:A:N6	2.46	0.48
14:Q:46:TYR:CG	15:R:74:ILE:HD11	2.49	0.48
3:A:371:A:N6	3:A:402:A:OP2	2.46	0.48
7:F:30:VAL:HG21	7:F:155:ILE:HD11	1.96	0.48
7:F:37:MET:O	7:F:37:MET:SD	2.72	0.48
14:Q:68:ALA:HB1	14:Q:73:ILE:HG23	1.96	0.48
15:R:58:VAL:N	15:R:102:SER:OG	2.46	0.47
3:A:28:A:N3	14:Q:10:ARG:NH1	2.62	0.47
7:F:56:LEU:HD12	7:F:86:CYS:SG	2.53	0.47
3:A:27:G:HO2'	3:A:28:A:P	2.35	0.47
3:A:136:G:N1	3:A:144:A:C6	2.82	0.47
3:A:2304:G:O2'	7:F:132:ARG:NH2	2.44	0.47
20:Y:10:SER:O	20:Y:14:LEU:HD23	2.14	0.47
3:A:861:A:C6	3:A:917:A:N1	2.82	0.47
19:W:78:ILE:HG23	19:W:78:ILE:O	2.15	0.47
3:A:1223:G:N2	3:A:1226:A:OP2	2.43	0.47
3:A:1274:A:N1	3:A:1644:C:O2'	2.44	0.47
3:A:1638:C:C2	3:A:2697:G:N2	2.82	0.47
3:A:84:A:OP1	17:U:5:ARG:NH1	2.46	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:383:C:N4	3:A:386:G:OP2	2.48	0.47
3:A:463:G:H3'	3:A:464:U:C5'	2.45	0.47
5:D:16:THR:OG1	5:D:18:ASP:OD1	2.12	0.47
18:V:78:GLN:OE1	18:V:78:GLN:N	2.48	0.47
8:J:140:LEU:HD23	8:J:141:ASP:N	2.30	0.47
3:A:2053:G:N1	3:A:2616:C:N3	2.48	0.47
18:V:50:MET:O	18:V:56:PHE:CD2	2.67	0.47
4:B:15:A:N7	4:B:109:A:N6	2.63	0.47
11:N:2:ARG:NH1	11:N:5:LYS:O	2.48	0.47
15:R:49:ILE:HG22	15:R:54:VAL:HG21	1.97	0.47
3:A:669:G:H22	3:A:801:G:H1'	1.80	0.46
4:B:52:A:N7	12:O:33:ARG:NH2	2.62	0.46
7:F:66:ILE:HD11	7:F:83:PRO:HB2	1.97	0.46
3:A:2314:A:C4'	7:F:154:THR:HG21	2.45	0.46
7:F:22:ASN:OD1	7:F:26:GLN:NE2	2.46	0.46
16:S:25:ARG:NH1	16:S:74:ILE:O	2.49	0.46
3:A:475:C:C2	3:A:479:A:N6	2.82	0.46
3:A:993:G:H21	15:R:91:GLN:HE22	1.62	0.46
14:Q:64:ILE:HD11	14:Q:95:ALA:N	2.30	0.46
18:V:53:LYS:NZ	18:V:55:GLU:HB2	2.30	0.46
21:Z:36:GLU:O	21:Z:37:ARG:NH1	2.43	0.46
3:A:966:G:H4'	3:A:2271:G:H22	1.81	0.46
3:A:2686:G:H2'	3:A:2687:U:O4'	2.16	0.46
11:N:82:GLU:OE1	11:N:82:GLU:N	2.48	0.46
14:Q:97:ILE:O	14:Q:101:ASP:N	2.48	0.46
3:A:402:A:O2'	3:A:403:U:O4'	2.26	0.46
3:A:2738:A:H3'	3:A:2739:U:H5''	1.98	0.46
18:V:76:ASP:OD1	18:V:77:VAL:N	2.48	0.46
3:A:643:A:N7	3:A:644:A:N6	2.63	0.46
3:A:646:U:H3'	3:A:647:G:C5'	2.46	0.46
3:A:1142:A:O2'	3:A:1143:A:H2'	2.15	0.46
3:A:1268:A:C6	3:A:2013:A:N1	2.84	0.46
6:E:31:VAL:HG21	6:E:104:ALA:HB2	1.98	0.46
11:N:31:HIS:O	11:N:32:GLU:HG2	2.15	0.46
3:A:481:G:O2'	3:A:482:A:OP2	2.33	0.46
8:J:36:LEU:CD2	8:J:54:ILE:HD12	2.46	0.46
2:2:35:ARG:NH1	3:A:54:G:O2'	2.45	0.46
3:A:1648:U:H6	3:A:1648:U:O5'	1.98	0.46
3:A:2642:G:OP1	8:J:78:THR:HG21	2.15	0.46
11:N:44:LEU:HD22	11:N:113:ILE:HD13	1.98	0.46
2:2:43:THR:HG23	2:2:44:VAL:N	2.30	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:619:G:OP2	3:A:620:G:N1	2.49	0.46
14:Q:99:VAL:HG13	14:Q:100:PHE:CD1	2.51	0.46
14:Q:101:ASP:OD2	15:R:2:TYR:OH	2.31	0.46
3:A:6:A:N3	8:J:135:GLN:NE2	2.64	0.46
3:A:371:A:O2'	3:A:372:G:OP2	2.28	0.46
3:A:388:G:C5	3:A:391:A:N7	2.84	0.46
3:A:587:C:N3	10:L:33:ARG:NH2	2.63	0.46
3:A:2637:U:O4	3:A:2776:A:N7	2.49	0.46
14:Q:82:LEU:HD22	14:Q:112:ALA:HB2	1.98	0.46
3:A:2009:A:C2	3:A:2010:G:C5	3.04	0.45
3:A:2862:G:H2'	3:A:2863:C:O4'	2.16	0.45
7:F:11:VAL:HG13	7:F:171:ALA:HB1	1.98	0.45
8:J:31:GLU:HG2	8:J:142:ILE:HD12	1.98	0.45
11:N:97:ILE:C	11:N:98:LEU:HD22	2.37	0.45
3:A:97:C:O2	3:A:103:A:O2'	2.32	0.45
3:A:262:A:H2'	3:A:263:G:O4'	2.16	0.45
3:A:499:U:H2'	3:A:500:G:O4'	2.17	0.45
3:A:859:G:N2	3:A:917:A:OP2	2.42	0.45
5:D:181:ASP:OD2	5:D:184:ARG:NE	2.46	0.45
3:A:419:U:H2'	3:A:420:C:C6	2.52	0.45
3:A:810:U:O4	10:L:30:THR:HG22	2.16	0.45
3:A:824:U:O4	3:A:825:A:N6	2.49	0.45
3:A:1234:U:O2'	3:A:1235:G:OP1	2.25	0.45
3:A:2682:A:H2'	3:A:2683:C:C6	2.50	0.45
8:J:18:VAL:HG21	8:J:32:LEU:HD21	1.97	0.45
3:A:1133:A:H4'	3:A:1134:A:H5''	1.98	0.45
8:J:125:TYR:OH	8:J:132:HIS:NE2	2.48	0.45
10:L:135:ILE:HG12	10:L:142:ILE:HD11	1.99	0.45
3:A:175:G:HO2'	3:A:176:A:P	2.38	0.45
3:A:489:G:HO2'	3:A:491:G:H8	1.62	0.45
3:A:2425:A:OP2	3:A:2426:A:O2'	2.23	0.45
1:O:42:ILE:HG22	1:O:48:TYR:HB2	1.98	0.45
3:A:13:A:O2'	3:A:15:G:N7	2.49	0.45
3:A:307:G:N1	3:A:310:A:OP2	2.46	0.45
3:A:2291:U:O2	3:A:2374:C:O2'	2.34	0.45
5:D:164:GLN:OE1	5:D:165:MET:N	2.50	0.45
12:O:33:ARG:O	12:O:66:GLY:N	2.50	0.45
15:R:49:ILE:HG13	15:R:49:ILE:O	2.16	0.45
17:U:97:SER:O	17:U:98:ASN:CG	2.55	0.45
4:B:26:C:HO2'	4:B:116:G:HO2'	1.57	0.45
16:S:43:ALA:O	16:S:47:VAL:HG12	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1637:A:H2'	3:A:1638:C:C5	2.52	0.45
4:B:40:U:N3	4:B:44:G:OP2	2.47	0.45
3:A:1168:G:C6	3:A:1182:G:C2	3.04	0.45
15:R:7:SER:OG	15:R:22:LEU:HD22	2.17	0.45
15:R:49:ILE:HG22	15:R:54:VAL:HG23	1.99	0.45
18:V:62:THR:HG23	18:V:71:LYS:NZ	2.32	0.45
3:A:206:U:C2	3:A:207:A:C8	3.05	0.44
3:A:1024:G:P	3:A:1025:G:HO2'	2.34	0.44
3:A:2683:C:O2	9:K:70:ARG:NH2	2.50	0.44
3:A:2718:G:H2'	3:A:2719:G:O4'	2.17	0.44
3:A:83:A:C2'	3:A:103:A:H61	2.30	0.44
3:A:669:G:N2	3:A:801:G:O2'	2.50	0.44
3:A:2264:C:H2'	3:A:2265:U:O4'	2.17	0.44
3:A:2687:U:H2'	3:A:2688:G:O4'	2.18	0.44
5:D:187:LEU:HD23	5:D:188:LEU:N	2.32	0.44
13:P:28:LYS:O	13:P:81:ASP:N	2.43	0.44
18:V:60:VAL:HG23	18:V:73:LYS:HG2	2.00	0.44
21:Z:23:LEU:HD11	21:Z:53:MET:CE	2.48	0.44
3:A:152:A:H2'	3:A:153:U:C6	2.52	0.44
3:A:2331:G:OP1	19:W:40:LYS:NZ	2.51	0.44
16:S:45:VAL:O	16:S:49:LYS:NZ	2.44	0.44
3:A:2314:A:H4'	7:F:154:THR:HG21	2.00	0.44
9:K:19:VAL:HB	9:K:41:ILE:HD12	1.99	0.44
12:O:26:LEU:N	12:O:91:SER:O	2.51	0.44
2:2:9:VAL:HG13	2:2:10:LEU:HD22	2.00	0.44
3:A:1009:A:O5'	14:Q:58:GLN:NE2	2.51	0.44
3:A:2720:U:C2	3:A:2721:A:C8	3.06	0.44
6:E:137:LYS:O	6:E:141:MET:HE3	2.18	0.44
3:A:669:G:HO2'	3:A:670:A:C4'	2.24	0.44
3:A:947:A:C6	3:A:971:G:N1	2.86	0.44
3:A:972:A:OP2	3:A:973:A:O2'	2.24	0.44
5:D:5:VAL:HG22	5:D:202:ILE:HD12	2.00	0.44
3:A:222:A:H61	3:A:232:G:H1'	1.82	0.44
3:A:2306:C:N4	7:F:39:VAL:O	2.45	0.44
5:D:186:LEU:HD21	13:P:3:ILE:CG2	2.44	0.44
10:L:120:VAL:HG12	10:L:121:THR:N	2.33	0.44
12:O:79:ALA:O	12:O:83:LEU:HD23	2.18	0.44
21:Z:19:HIS:O	21:Z:23:LEU:HD13	2.18	0.44
3:A:48:G:N2	3:A:177:G:OP1	2.49	0.43
4:B:13:G:O2'	4:B:69:G:N2	2.50	0.43
3:A:1234:U:HO2'	3:A:1235:G:P	2.38	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:2737:G:H2'	3:A:2738:A:C8	2.52	0.43
5:D:8:LYS:NZ	5:D:195:GLY:O	2.34	0.43
6:E:96:VAL:HG23	6:E:100:MET:HE3	2.00	0.43
2:2:39:ARG:NH2	3:A:468:G:N7	2.59	0.43
3:A:48:G:N1	3:A:177:G:OP1	2.45	0.43
3:A:96:C:O2	3:A:96:C:H2'	2.19	0.43
20:Y:20:ASN:ND2	20:Y:24:GLU:OE1	2.52	0.43
3:A:994:C:OP2	14:Q:53:LYS:NZ	2.48	0.43
8:J:100:VAL:HG13	8:J:101:ILE:N	2.34	0.43
16:S:72:THR:HG21	16:S:108:SER:HB3	2.00	0.43
3:A:2867:G:N7	13:P:20:ARG:NE	2.66	0.43
11:N:117:ASP:OD1	11:N:118:ARG:N	2.47	0.43
15:R:27:ILE:HG22	15:R:28:ALA:N	2.33	0.43
18:V:79:ARG:HH12	18:V:86:LEU:HD12	1.84	0.43
1:0:15:ARG:NH1	3:A:1266:G:OP1	2.51	0.43
3:A:801:G:C1'	6:E:49:ARG:HH12	2.31	0.43
3:A:1142:A:HO2'	3:A:1143:A:P	2.41	0.43
3:A:28:A:H2'	3:A:29:U:O4'	2.18	0.43
6:E:96:VAL:HG23	6:E:100:MET:CE	2.48	0.43
17:U:98:ASN:C	17:U:98:ASN:OD1	2.57	0.43
3:A:995:C:O2	8:J:3:THR:OG1	2.28	0.43
3:A:956:G:O2'	3:A:960:A:N6	2.52	0.43
3:A:2688:G:N1	3:A:2720:U:OP2	2.46	0.43
5:D:5:VAL:HG22	5:D:202:ILE:CD1	2.49	0.43
6:E:48:THR:OG1	6:E:51:GLU:OE1	2.37	0.43
3:A:116:C:H2'	3:A:117:G:O4'	2.19	0.42
3:A:599:A:N6	3:A:659:G:O6	2.52	0.42
13:P:8:GLU:OE1	13:P:54:LEU:HD13	2.19	0.42
3:A:2260:C:O2'	3:A:2388:A:O2'	2.18	0.42
3:A:2647:U:O2	3:A:2673:G:O6	2.36	0.42
3:A:2848:G:OP2	13:P:94:ALA:N	2.44	0.42
5:D:183:GLU:OE1	5:D:183:GLU:N	2.47	0.42
14:Q:73:ILE:HG21	14:Q:109:VAL:CG2	2.49	0.42
1:0:21:LEU:HD12	16:S:19:LEU:HB3	2.00	0.42
3:A:143:C:H2'	3:A:144:A:C8	2.54	0.42
10:L:81:ASP:O	10:L:82:LEU:HG	2.18	0.42
14:Q:16:ILE:HD11	14:Q:38:VAL:HG11	2.01	0.42
19:W:36:GLN:OE1	19:W:40:LYS:N	2.47	0.42
3:A:1171:G:N1	3:A:1179:G:O6	2.52	0.42
3:A:2265:U:P	3:A:2266:A:HO2'	2.32	0.42
11:N:77:ALA:O	11:N:81:ASN:ND2	2.51	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
17:U:35:VAL:HG21	17:U:64:ILE:HD11	2.01	0.42
9:K:92:GLU:O	9:K:93:GLN:C	2.57	0.42
10:L:89:VAL:HG23	10:L:89:VAL:O	2.19	0.42
12:O:82:ALA:O	12:O:86:GLY:N	2.45	0.42
20:Y:50:VAL:HG13	20:Y:51:ALA:N	2.34	0.42
3:A:85:G:H2'	3:A:86:G:O4'	2.19	0.42
3:A:105:C:C2	3:A:106:C:C5	3.08	0.42
7:F:15:LEU:HD13	7:F:27:VAL:CG2	2.50	0.42
21:Z:47:ILE:O	21:Z:51:SER:OG	2.33	0.42
3:A:477:A:N6	3:A:501:A:OP1	2.53	0.42
3:A:1268:A:C2	3:A:1269:A:H1'	2.53	0.42
5:D:25:THR:HG21	5:D:193:VAL:HG22	2.02	0.42
16:S:70:LYS:O	16:S:107:VAL:HG13	2.19	0.42
4:B:73:A:N3	4:B:73:A:H2'	2.34	0.42
8:J:19:ASP:OD1	8:J:20:ALA:N	2.52	0.42
10:L:94:THR:HG22	10:L:94:THR:O	2.19	0.42
3:A:35:G:H1'	3:A:454:A:N3	2.34	0.42
3:A:2756:U:H4'	3:A:2757:A:OP1	2.20	0.42
7:F:128:SER:HB2	7:F:154:THR:HG23	2.02	0.42
9:K:107:LEU:N	9:K:107:LEU:HD12	2.33	0.42
3:A:258:G:H2'	3:A:259:G:O4'	2.19	0.42
3:A:797:G:P	6:E:57:LYS:NZ	2.93	0.42
6:E:49:ARG:HD2	6:E:76:PRO:HD3	2.02	0.41
3:A:216:A:C8	3:A:432:A:N6	2.89	0.41
3:A:1132:U:O2'	3:A:1133:A:H5'	2.20	0.41
3:A:2297:A:C6	3:A:2318:G:N2	2.88	0.41
3:A:2688:G:N2	3:A:2720:U:OP2	2.52	0.41
9:K:2:ILE:HG22	9:K:3:GLN:N	2.35	0.41
18:V:62:THR:HG23	18:V:71:LYS:HZ3	1.85	0.41
20:Y:20:ASN:O	20:Y:25:GLN:OE1	2.38	0.41
1:O:38:LEU:HD13	16:S:38:TYR:CD2	2.55	0.41
3:A:807:U:C2	3:A:808:G:C8	3.08	0.41
3:A:2847:U:H2'	3:A:2848:G:O4'	2.20	0.41
5:D:104:VAL:HG23	5:D:105:LYS:N	2.36	0.41
7:F:174:PHE:O	7:F:175:PRO:C	2.58	0.41
12:O:72:ALA:O	12:O:76:LYS:HG2	2.20	0.41
3:A:541:A:N6	3:A:553:G:O6	2.53	0.41
3:A:562:U:O2	3:A:572:A:N6	2.53	0.41
3:A:2800:A:H3'	3:A:2801:G:H5'	2.02	0.41
4:B:71:C:H2'	4:B:72:G:O4'	2.21	0.41
7:F:116:LEU:HD12	7:F:127:TYR:OH	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:K:61:VAL:HG22	9:K:62:VAL:N	2.36	0.41
3:A:208:C:C2	3:A:209:C:C5	3.09	0.41
3:A:636:G:C6	10:L:111:ILE:HD11	2.56	0.41
3:A:861:A:C6	3:A:862:G:C4	3.09	0.41
3:A:1204:A:O4'	3:A:1206:G:C8	2.73	0.41
7:F:142:TYR:O	7:F:145:VAL:HG22	2.20	0.41
8:J:90:GLU:O	8:J:93:ILE:HG22	2.20	0.41
3:A:1638:C:N3	3:A:2698:U:H1'	2.35	0.41
3:A:2756:U:O4	3:A:2759:G:O6	2.38	0.41
8:J:50:THR:O	8:J:50:THR:HG22	2.20	0.41
3:A:1651:G:N2	3:A:2007:U:C2	2.89	0.41
3:A:2812:G:N2	3:A:2889:C:C2	2.88	0.41
5:D:176:ASP:OD1	5:D:177:VAL:N	2.54	0.41
7:F:106:ALA:HA	7:F:109:ARG:HE	1.85	0.41
12:O:28:VAL:O	12:O:95:SER:OG	2.29	0.41
16:S:4:ILE:HD13	16:S:106:VAL:HG13	2.02	0.41
3:A:266:G:H2'	3:A:267:C:O4'	2.20	0.41
3:A:392:U:H2'	3:A:393:C:C6	2.56	0.41
3:A:417:C:C2	3:A:418:C:C5	3.09	0.41
3:A:439:A:H2'	3:A:440:C:O4'	2.21	0.41
3:A:580:U:H2'	3:A:581:C:H6	1.86	0.41
3:A:1141:U:OP2	8:J:65:THR:OG1	2.39	0.41
3:A:1239:G:H2'	3:A:1240:U:O4'	2.21	0.41
3:A:1268:A:N1	3:A:2013:A:N1	2.69	0.41
3:A:2737:G:H2'	3:A:2738:A:N9	2.36	0.41
3:A:2889:C:H2'	3:A:2890:G:O4'	2.21	0.41
8:J:60:ASP:HA	8:J:93:ILE:HD11	2.03	0.41
14:Q:26:ALA:O	14:Q:30:VAL:HG12	2.20	0.41
21:Z:57:GLU:N	21:Z:57:GLU:OE1	2.53	0.41
1:O:24:VAL:HG13	1:O:25:THR:N	2.35	0.41
3:A:271:G:C4	3:A:272:A:C8	3.09	0.41
3:A:274:C:H2'	3:A:275:C:C1'	2.51	0.41
6:E:21:ARG:NH2	6:E:103:GLY:O	2.54	0.41
8:J:25:LEU:O	8:J:25:LEU:HD23	2.21	0.41
16:S:47:VAL:O	16:S:47:VAL:HG22	2.21	0.41
3:A:601:C:O2'	3:A:605:G:OP1	2.39	0.40
3:A:638:G:H2'	3:A:639:U:O4'	2.21	0.40
3:A:1244:A:N6	3:A:1245:G:O6	2.54	0.40
3:A:2848:G:H1'	3:A:2868:A:H61	1.86	0.40
3:A:2854:G:H2'	3:A:2855:C:C6	2.55	0.40
3:A:2855:C:H2'	3:A:2856:A:H8	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:J:25:LEU:HD23	8:J:25:LEU:C	2.41	0.40
15:R:47:VAL:O	15:R:47:VAL:HG13	2.21	0.40
3:A:24:G:H2'	3:A:25:U:C6	2.56	0.40
3:A:225:C:N3	3:A:231:A:N6	2.69	0.40
3:A:818:G:N1	3:A:1188:U:OP2	2.44	0.40
3:A:2812:G:H2'	3:A:2813:A:O4'	2.21	0.40
4:B:77:U:C2	4:B:99:A:N7	2.87	0.40
12:O:67:ASN:H	12:O:70:ALA:HB3	1.87	0.40
3:A:965:C:N4	3:A:966:G:O6	2.54	0.40
5:D:5:VAL:HG13	5:D:202:ILE:HD13	2.03	0.40
7:F:30:VAL:CG2	7:F:155:ILE:HD11	2.51	0.40
15:R:32:THR:O	15:R:32:THR:HG23	2.21	0.40
3:A:1005:C:O2'	8:J:30:THR:HG21	2.21	0.40
3:A:2013:A:O2'	3:A:2014:A:C5'	2.70	0.40
3:A:2051:A:N3	3:A:2052:A:N6	2.69	0.40
15:R:101:ILE:N	15:R:101:ILE:HD12	2.36	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	
1	0	52/57 (91%)	50 (96%)	2 (4%)	0	100	100
2	2	37/46 (80%)	34 (92%)	3 (8%)	0	100	100
5	D	174/209 (83%)	168 (97%)	6 (3%)	0	100	100
6	E	188/201 (94%)	183 (97%)	5 (3%)	0	100	100
7	F	175/179 (98%)	165 (94%)	10 (6%)	0	100	100
8	J	140/142 (99%)	133 (95%)	7 (5%)	0	100	100
9	K	120/123 (98%)	110 (92%)	10 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	L	109/144 (76%)	97 (89%)	12 (11%)	0	100	100
11	N	118/127 (93%)	112 (95%)	6 (5%)	0	100	100
12	O	114/117 (97%)	107 (94%)	7 (6%)	0	100	100
13	P	112/115 (97%)	110 (98%)	2 (2%)	0	100	100
14	Q	115/118 (98%)	109 (95%)	6 (5%)	0	100	100
15	R	101/103 (98%)	95 (94%)	6 (6%)	0	100	100
16	S	96/110 (87%)	93 (97%)	3 (3%)	0	100	100
17	U	100/104 (96%)	88 (88%)	12 (12%)	0	100	100
18	V	92/94 (98%)	90 (98%)	2 (2%)	0	100	100
19	W	66/85 (78%)	66 (100%)	0	0	100	100
20	Y	59/63 (94%)	51 (86%)	8 (14%)	0	100	100
21	Z	56/59 (95%)	56 (100%)	0	0	100	100
All	All	2024/2196 (92%)	1917 (95%)	107 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 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	0	46/48 (96%)	46 (100%)	0	100	100
2	2	31/38 (82%)	31 (100%)	0	100	100
5	D	139/164 (85%)	139 (100%)	0	100	100
6	E	159/165 (96%)	158 (99%)	1 (1%)	86	92
7	F	148/150 (99%)	148 (100%)	0	100	100
8	J	116/116 (100%)	116 (100%)	0	100	100
9	K	103/104 (99%)	102 (99%)	1 (1%)	76	86
10	L	79/103 (77%)	79 (100%)	0	100	100
11	N	100/103 (97%)	100 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	O	86/87 (99%)	86 (100%)	0	100	100
13	P	99/100 (99%)	99 (100%)	0	100	100
14	Q	89/90 (99%)	89 (100%)	0	100	100
15	R	84/84 (100%)	84 (100%)	0	100	100
16	S	86/93 (92%)	86 (100%)	0	100	100
17	U	83/85 (98%)	83 (100%)	0	100	100
18	V	78/78 (100%)	78 (100%)	0	100	100
19	W	50/63 (79%)	50 (100%)	0	100	100
20	Y	55/55 (100%)	54 (98%)	1 (2%)	59	77
21	Z	48/49 (98%)	48 (100%)	0	100	100
All	All	1679/1775 (95%)	1676 (100%)	3 (0%)	93	97

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	E	95	LYS
9	K	114	LYS
20	Y	7	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
7	F	36	ASN
12	O	100	HIS
17	U	53	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	A	1657/2904 (57%)	267 (16%)	7 (0%)
4	B	118/119 (99%)	11 (9%)	0
All	All	1775/3023 (58%)	278 (15%)	7 (0%)

All (278) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	A	10	A
3	A	12	U
3	A	34	U
3	A	42	A
3	A	46	G
3	A	51	G
3	A	63	A
3	A	74	A
3	A	75	G
3	A	96	C
3	A	100	U
3	A	103	A
3	A	118	A
3	A	120	U
3	A	125	A
3	A	138	U
3	A	139	U
3	A	140	C
3	A	141	G
3	A	142	A
3	A	160	A
3	A	176	A
3	A	181	A
3	A	183	C
3	A	196	A
3	A	199	A
3	A	204	A
3	A	206	U
3	A	215	G
3	A	216	A
3	A	221	A
3	A	222	A
3	A	230	G
3	A	233	A
3	A	239	C
3	A	248	G
3	A	250	G
3	A	255	A
3	A	264	C
3	A	266	G
3	A	271	G
3	A	272	A
3	A	275	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	277	G
3	A	278	A
3	A	299	A
3	A	302	C
3	A	311	A
3	A	329	G
3	A	330	A
3	A	335	C
3	A	346	A
3	A	353	C
3	A	359	G
3	A	362	A
3	A	371	A
3	A	377	G
3	A	379	G
3	A	384	A
3	A	385	C
3	A	386	G
3	A	387	U
3	A	388	G
3	A	389	G
3	A	391	A
3	A	396	G
3	A	398	C
3	A	401	A
3	A	402	A
3	A	404	A
3	A	405	U
3	A	411	G
3	A	424	G
3	A	435	C
3	A	456	C
3	A	458	G
3	A	464	U
3	A	465	G
3	A	473	G
3	A	479	A
3	A	480	A
3	A	481	G
3	A	488	G
3	A	489	G
3	A	491	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	504	A
3	A	505	A
3	A	531	C
3	A	532	A
3	A	543	G
3	A	546	U
3	A	547	A
3	A	548	G
3	A	549	G
3	A	550	C
3	A	563	A
3	A	568	U
3	A	572	A
3	A	573	U
3	A	574	A
3	A	575	A
3	A	586	A
3	A	603	A
3	A	606	U
3	A	607	U
3	A	613	A
3	A	614	A
3	A	615	U
3	A	627	A
3	A	632	A
3	A	637	A
3	A	645	C
3	A	646	U
3	A	647	G
3	A	653	U
3	A	654	A
3	A	669	G
3	A	670	A
3	A	683	U
3	A	686	U
3	A	797	G
3	A	801	G
3	A	812	C
3	A	819	A
3	A	827	U
3	A	828	U
3	A	830	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	845	A
3	A	846	U
3	A	856	G
3	A	858	G
3	A	860	U
3	A	910	A
3	A	914	G
3	A	931	U
3	A	932	U
3	A	941	A
3	A	945	A
3	A	961	C
3	A	974	G
3	A	983	A
3	A	984	A
3	A	985	C
3	A	995	C
3	A	996	A
3	A	1009	A
3	A	1012	U
3	A	1013	C
3	A	1022	G
3	A	1023	U
3	A	1026	G
3	A	1033	U
3	A	1133	A
3	A	1135	C
3	A	1136	G
3	A	1142	A
3	A	1143	A
3	A	1151	A
3	A	1157	G
3	A	1172	C
3	A	1173	U
3	A	1174	U
3	A	1175	A
3	A	1178	C
3	A	1180	U
3	A	1182	G
3	A	1186	G
3	A	1205	A
3	A	1212	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	1225	G
3	A	1235	G
3	A	1236	G
3	A	1238	G
3	A	1249	U
3	A	1251	C
3	A	1253	A
3	A	1256	G
3	A	1264	A
3	A	1266	G
3	A	1300	G
3	A	1301	A
3	A	1302	A
3	A	1634	A
3	A	1638	C
3	A	1646	C
3	A	1652	A
3	A	1654	A
3	A	1659	G
3	A	1660	G
3	A	1666	G
3	A	2013	A
3	A	2021	C
3	A	2022	U
3	A	2023	C
3	A	2025	C
3	A	2030	A
3	A	2032	G
3	A	2043	C
3	A	2052	A
3	A	2055	C
3	A	2056	G
3	A	2061	G
3	A	2279	G
3	A	2283	C
3	A	2287	A
3	A	2288	A
3	A	2297	A
3	A	2305	U
3	A	2311	A
3	A	2314	A
3	A	2322	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	2325	G
3	A	2333	A
3	A	2334	U
3	A	2336	A
3	A	2345	G
3	A	2350	C
3	A	2357	G
3	A	2383	G
3	A	2385	C
3	A	2394	C
3	A	2402	U
3	A	2406	A
3	A	2408	U
3	A	2423	U
3	A	2424	C
3	A	2425	A
3	A	2426	A
3	A	2428	G
3	A	2609	U
3	A	2610	C
3	A	2614	A
3	A	2629	U
3	A	2639	A
3	A	2644	G
3	A	2673	G
3	A	2682	A
3	A	2684	U
3	A	2689	U
3	A	2690	U
3	A	2714	G
3	A	2729	G
3	A	2733	A
3	A	2739	U
3	A	2748	A
3	A	2756	U
3	A	2757	A
3	A	2765	A
3	A	2769	U
3	A	2778	A
3	A	2780	G
3	A	2791	G
3	A	2818	U

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
3	A	2820	A
3	A	2821	A
3	A	2834	G
3	A	2844	G
3	A	2849	U
3	A	2867	G
3	A	2872	A
3	A	2879	A
3	A	2880	C
3	A	2883	A
3	A	2884	U
3	A	2893	A
3	A	2894	G
3	A	2903	U
4	B	15	A
4	B	16	G
4	B	24	G
4	B	35	C
4	B	41	G
4	B	52	A
4	B	87	U
4	B	89	U
4	B	90	C
4	B	99	A
4	B	109	A

All (7) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	A	265	A
3	A	271	G
3	A	479	A
3	A	1142	A
3	A	1234	U
3	A	1235	G
3	A	2425	A

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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.

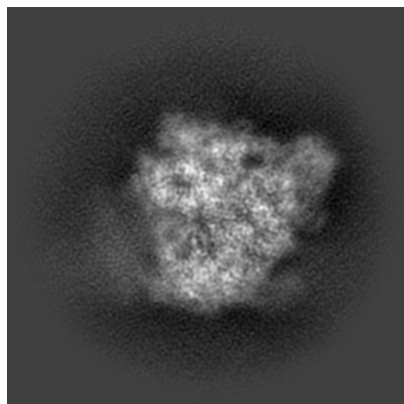
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16501. These allow visual inspection of the internal detail of the map and identification of artifacts.

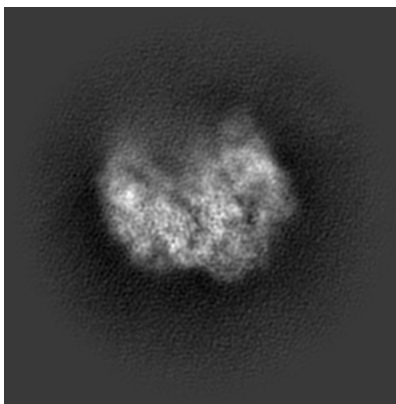
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

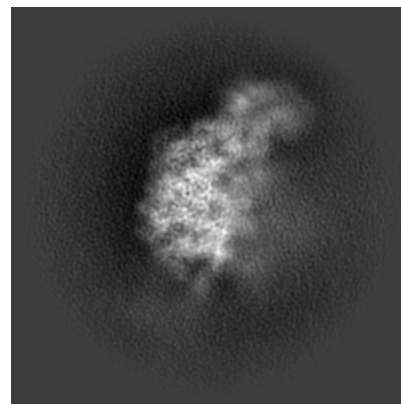
#### 6.1.1 Primary map



X

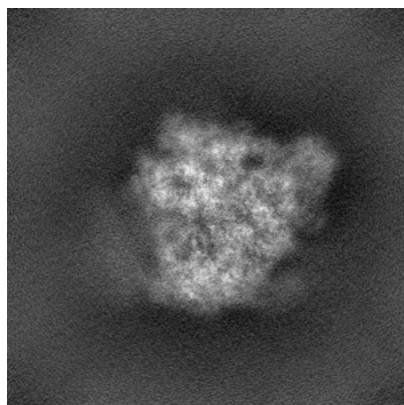


Y

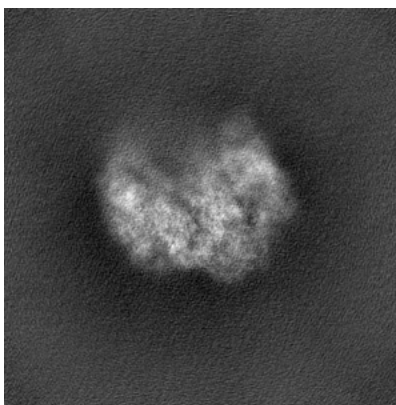


Z

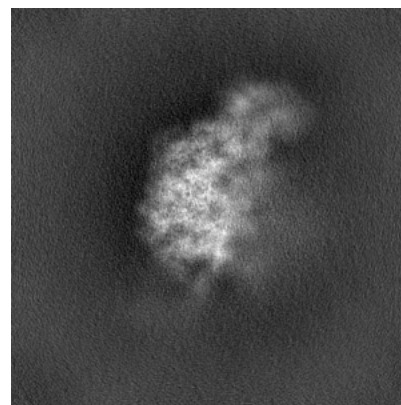
#### 6.1.2 Raw map



X



Y

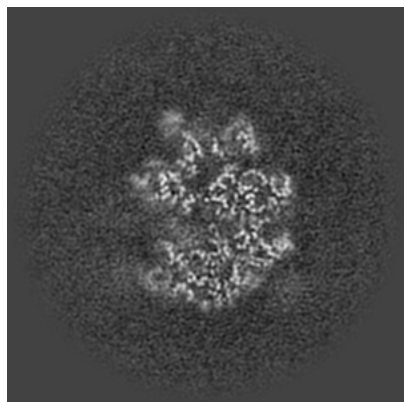


Z

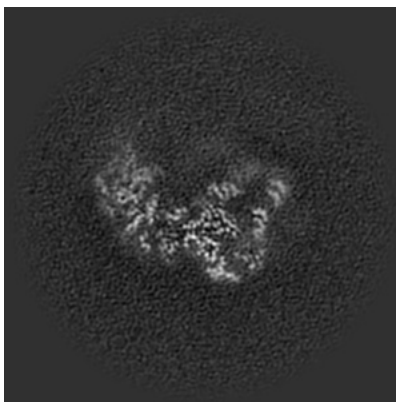
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

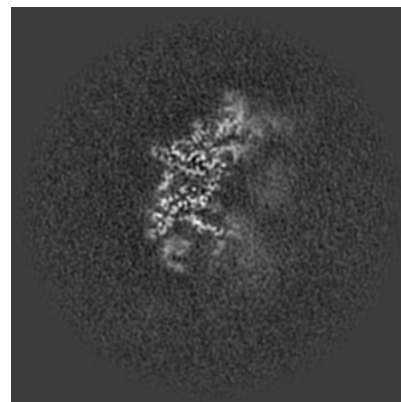
### 6.2.1 Primary map



X Index: 150

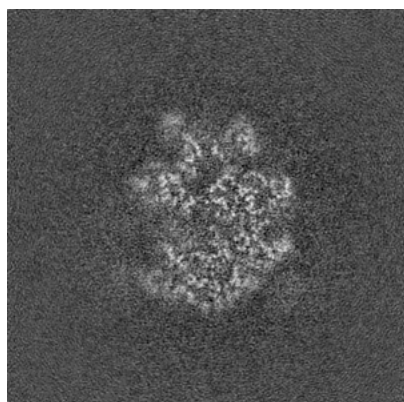


Y Index: 150

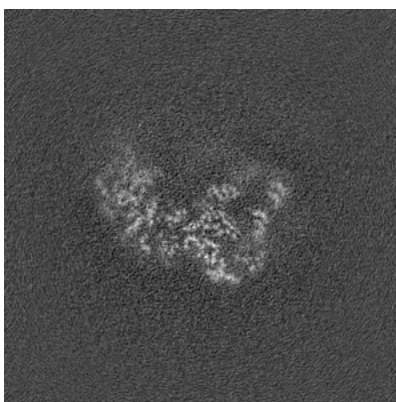


Z Index: 150

### 6.2.2 Raw map



X Index: 150



Y Index: 150

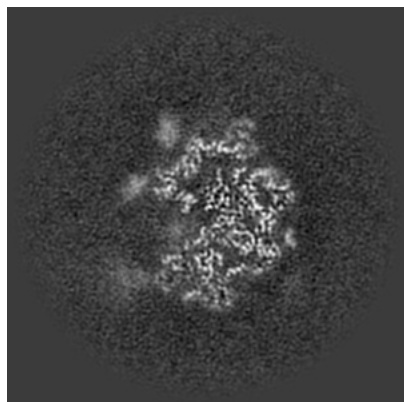


Z Index: 150

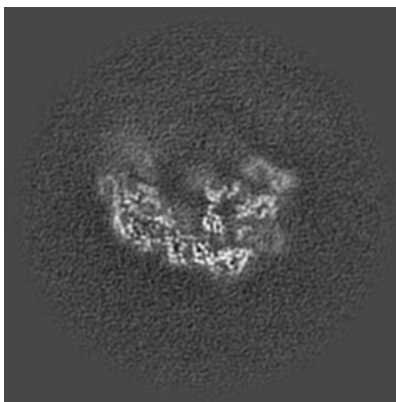
The images above show central slices of the map in three orthogonal directions.

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

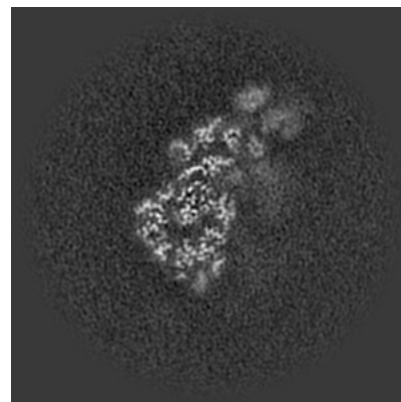
### 6.3.1 Primary map



X Index: 144

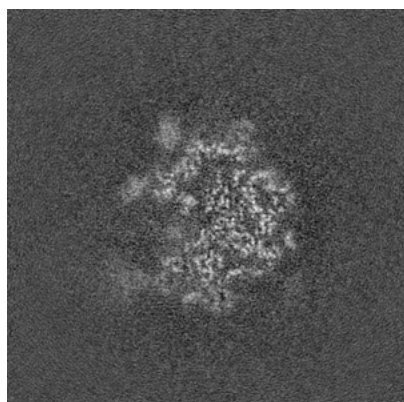


Y Index: 139

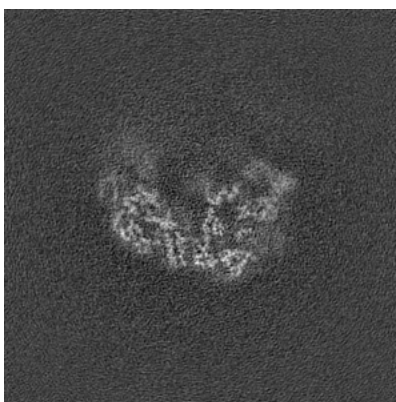


Z Index: 163

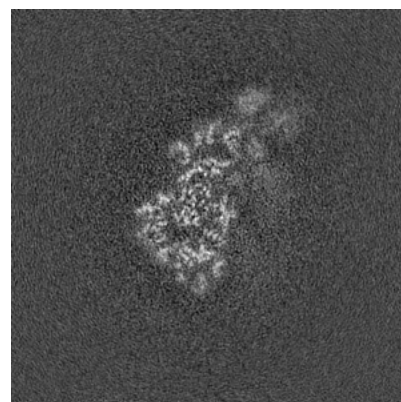
### 6.3.2 Raw map



X Index: 144



Y Index: 140



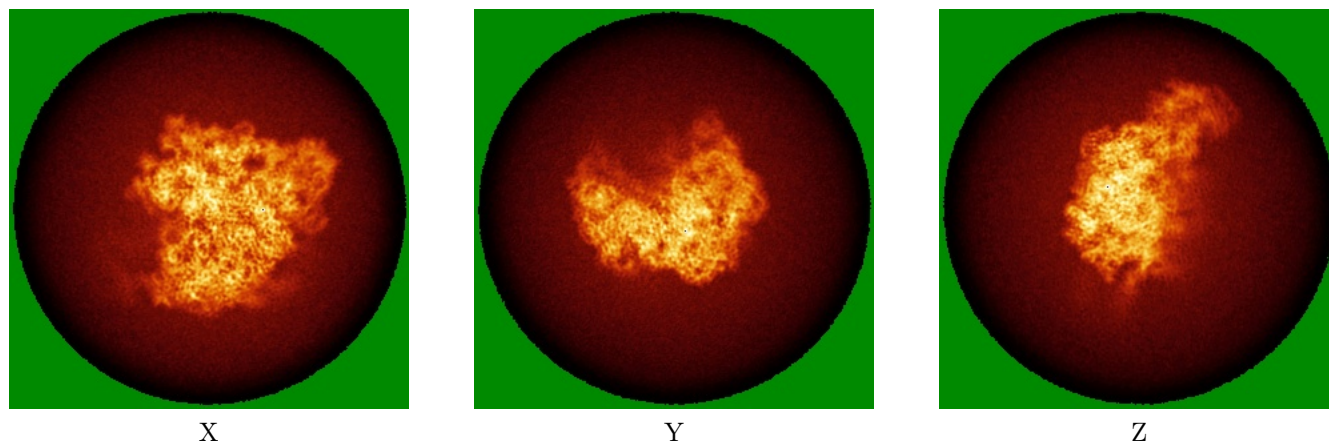
Z Index: 162

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

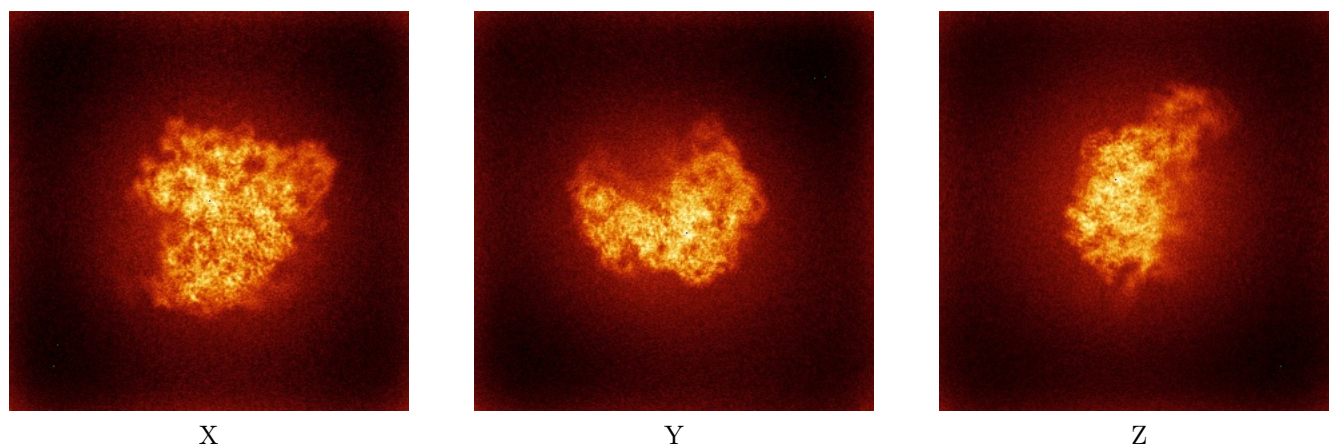


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

### 6.4.1 Primary map



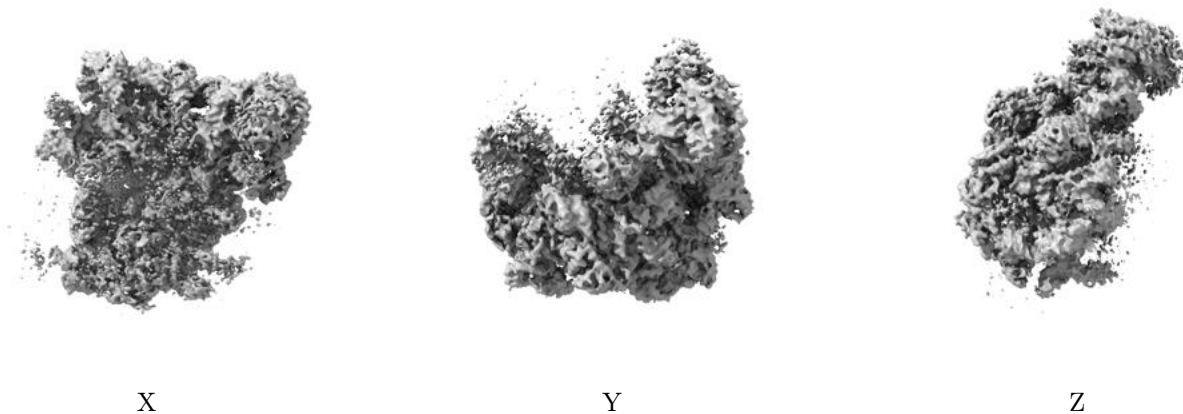
### 6.4.2 Raw map



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.

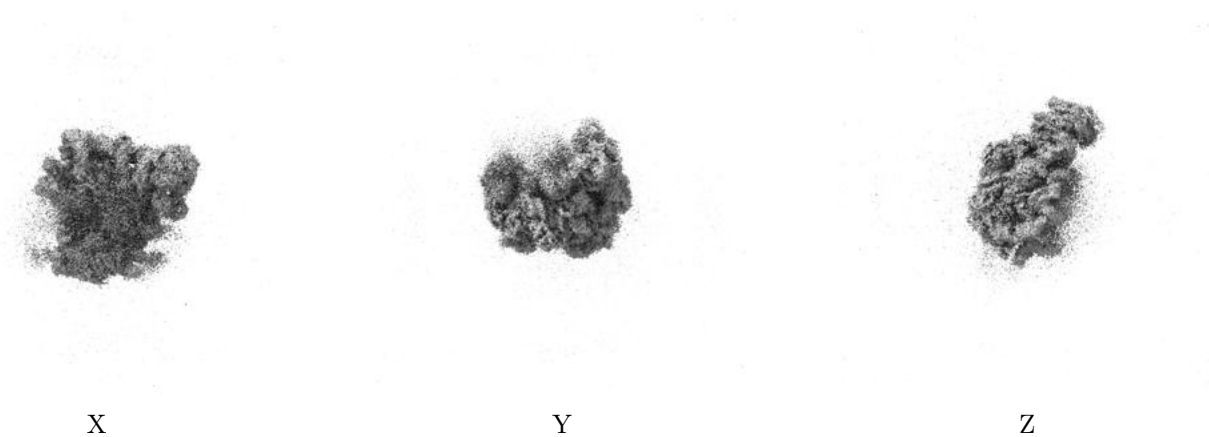
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.35. 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.



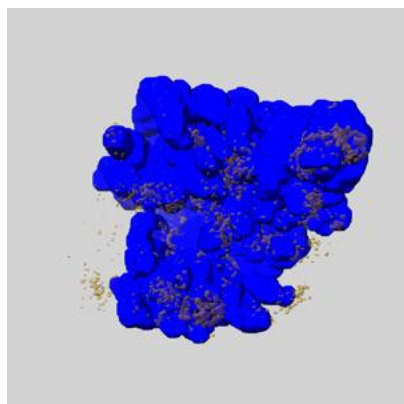
## 6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

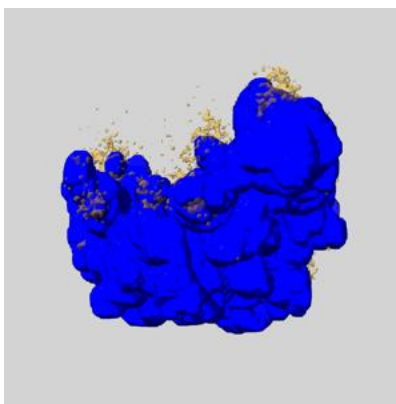
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

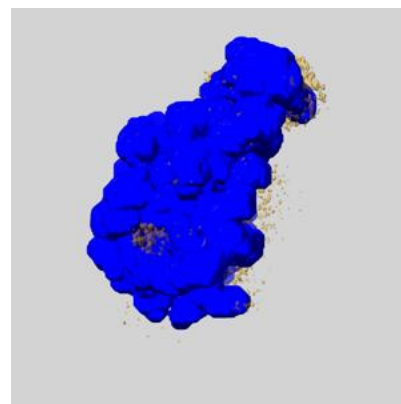
### 6.6.1 emd\_16501\_msk\_1.map [i](#)



X



Y

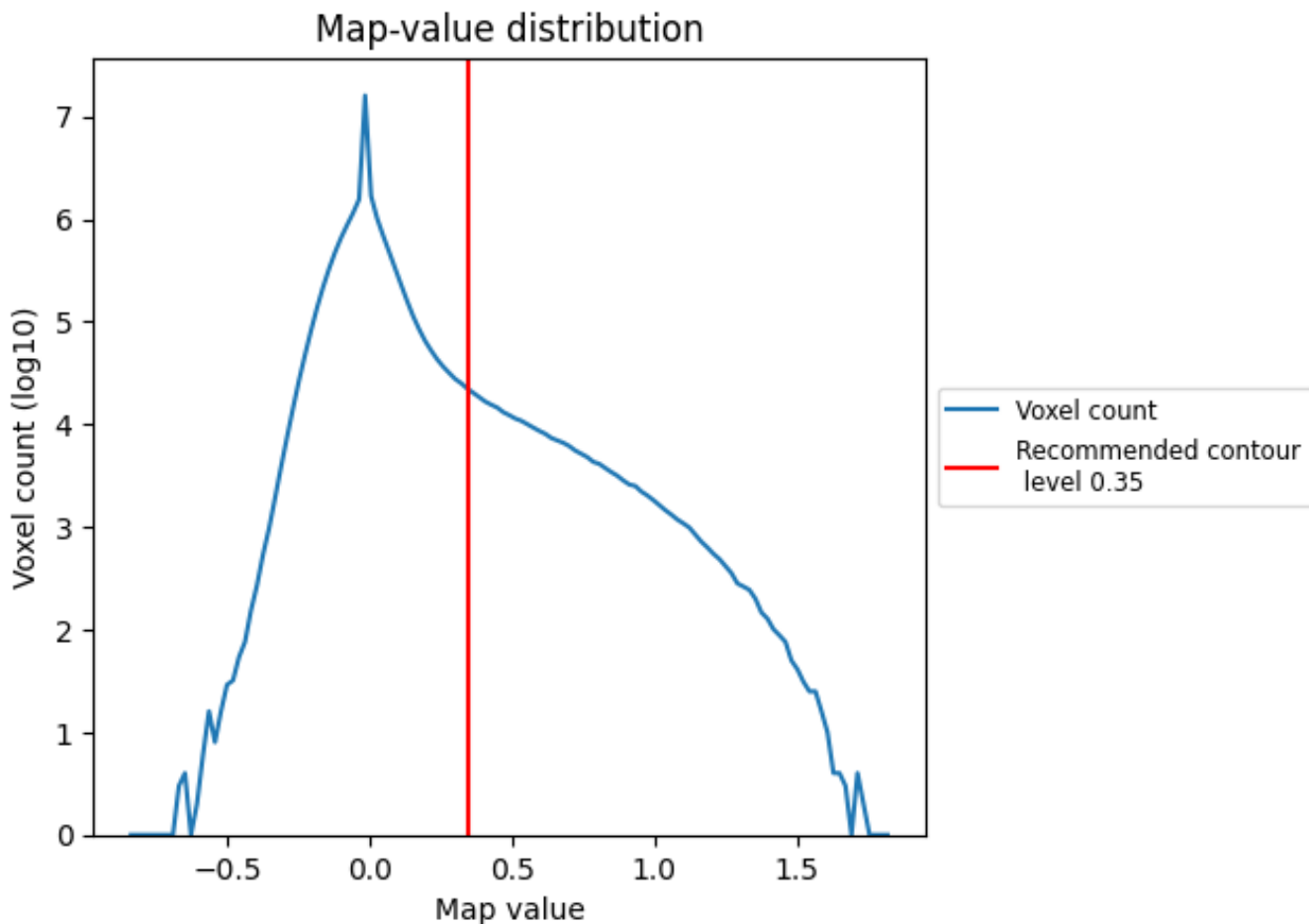


Z

## 7 Map analysis [i](#)

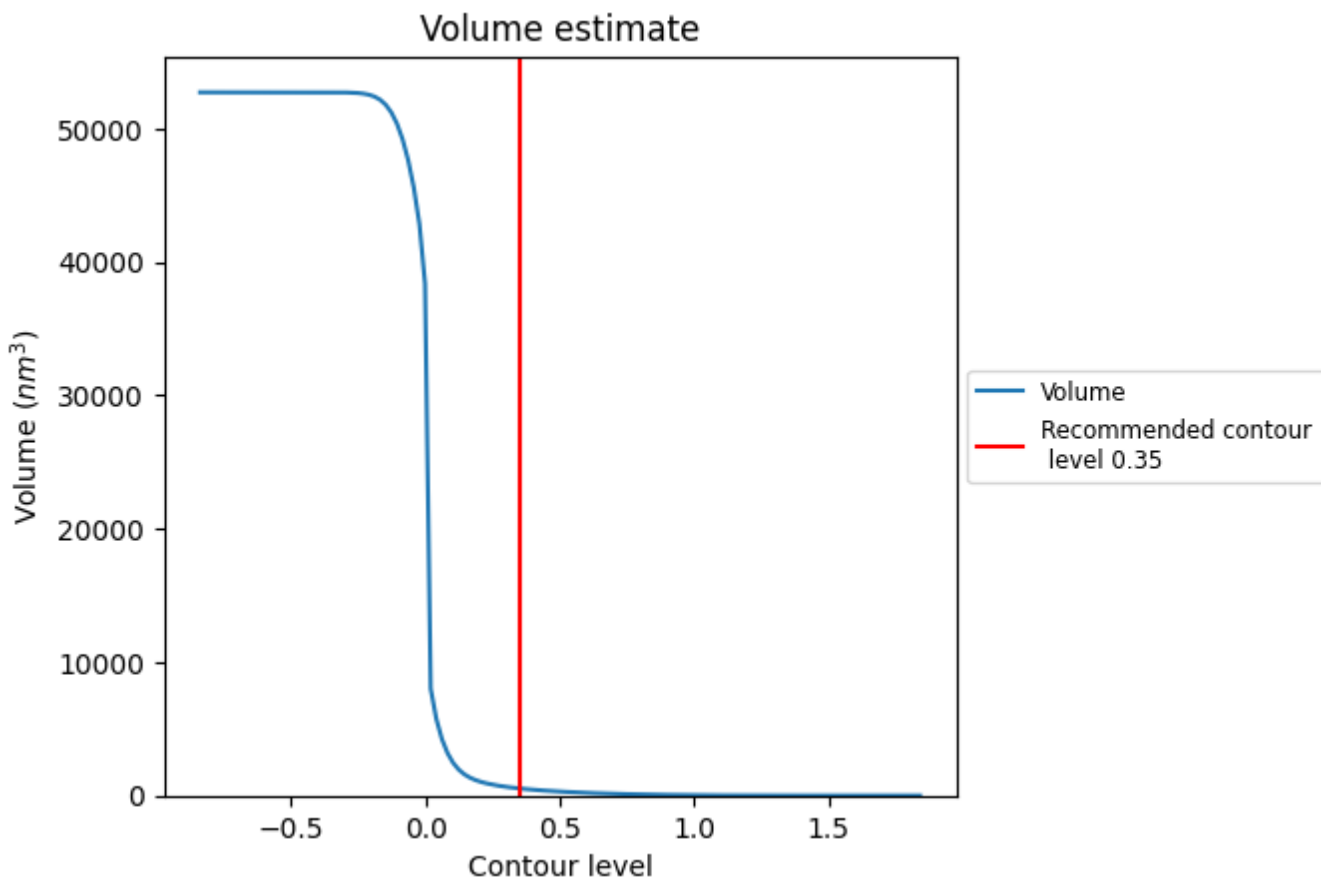
This section contains the results of statistical analysis of the map.

### 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.

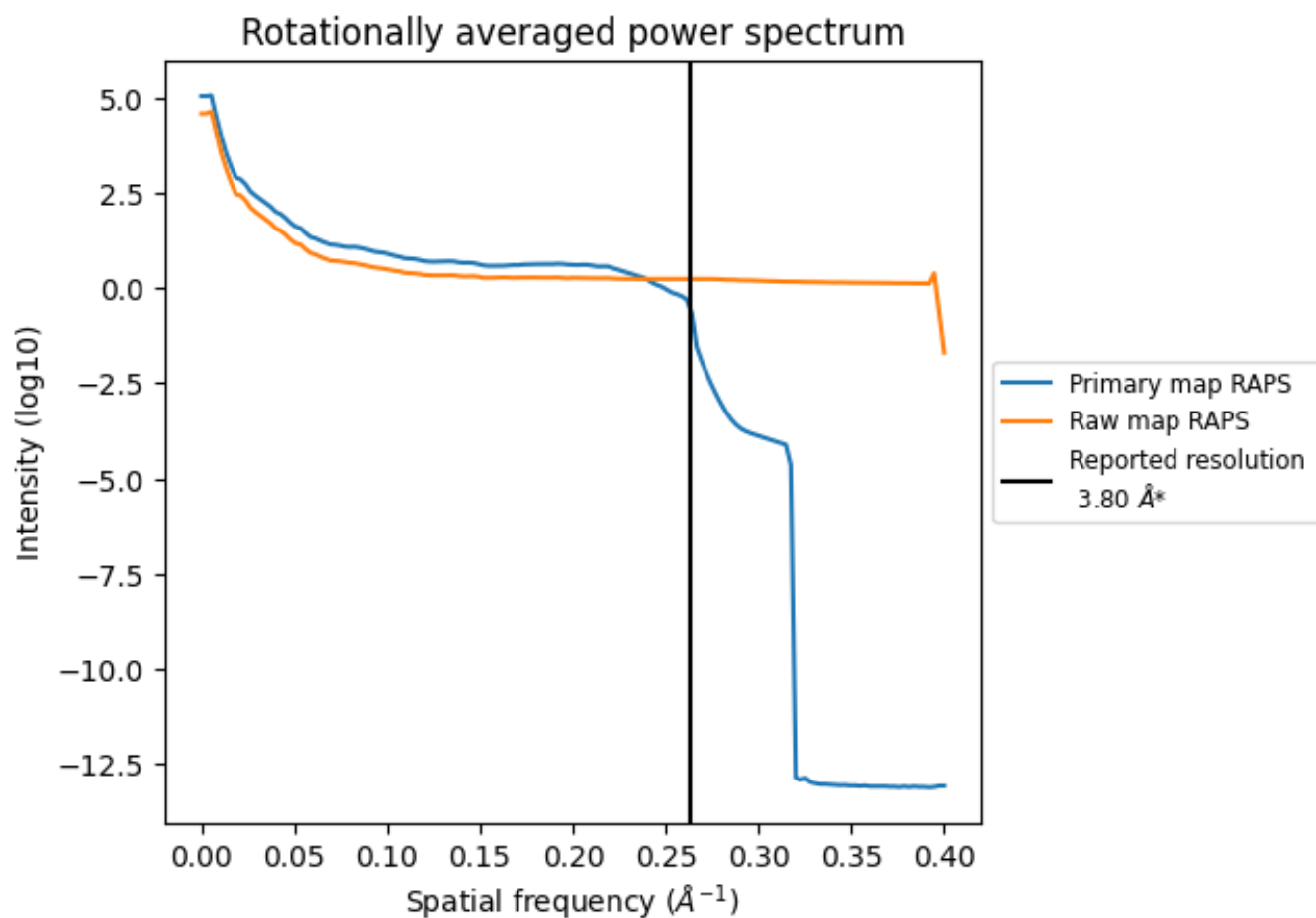
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 534 nm<sup>3</sup>; this corresponds to an approximate mass of 482 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

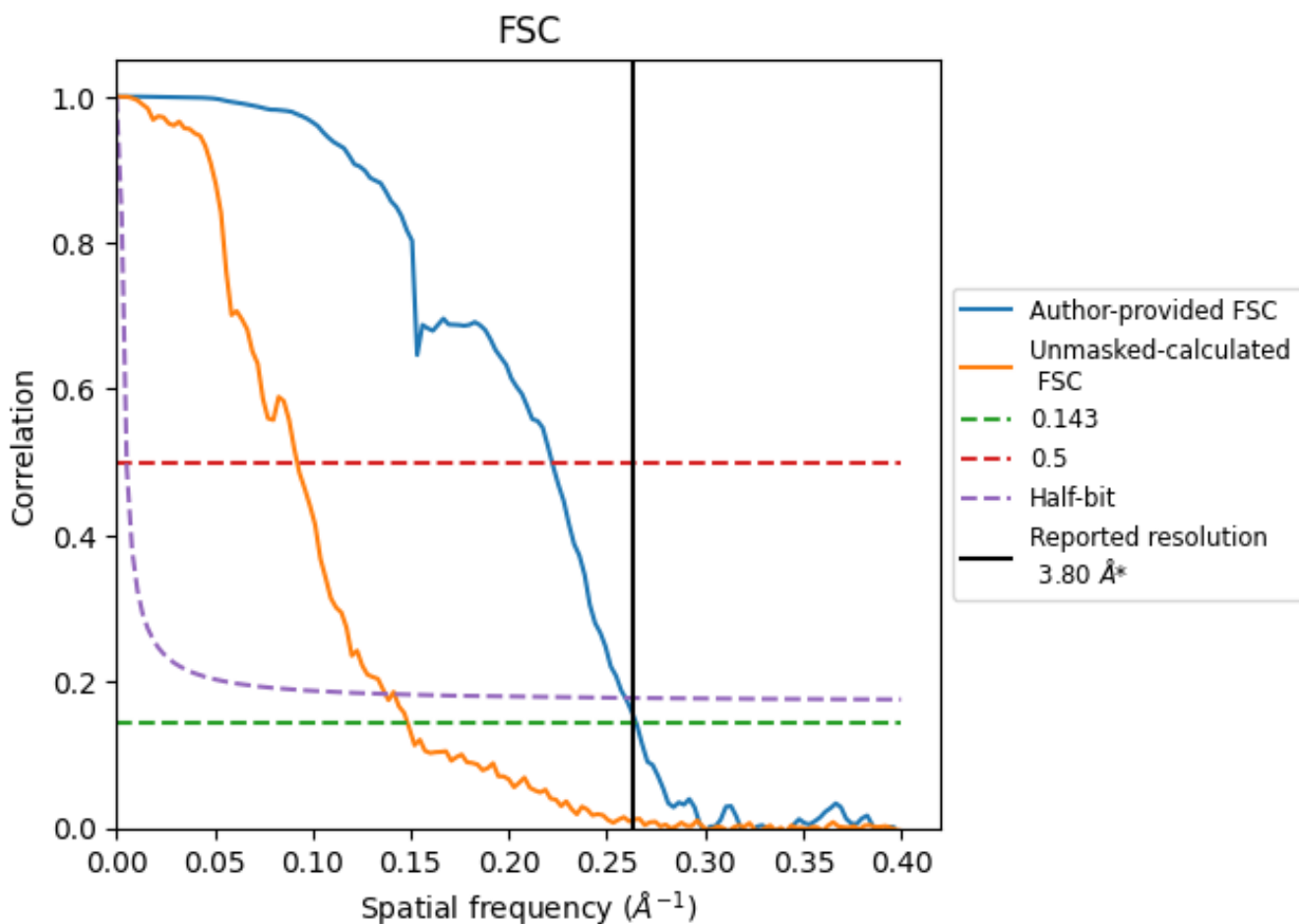


\*Reported resolution corresponds to spatial frequency of  $0.263 \text{ \AA}^{-1}$

## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.263 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

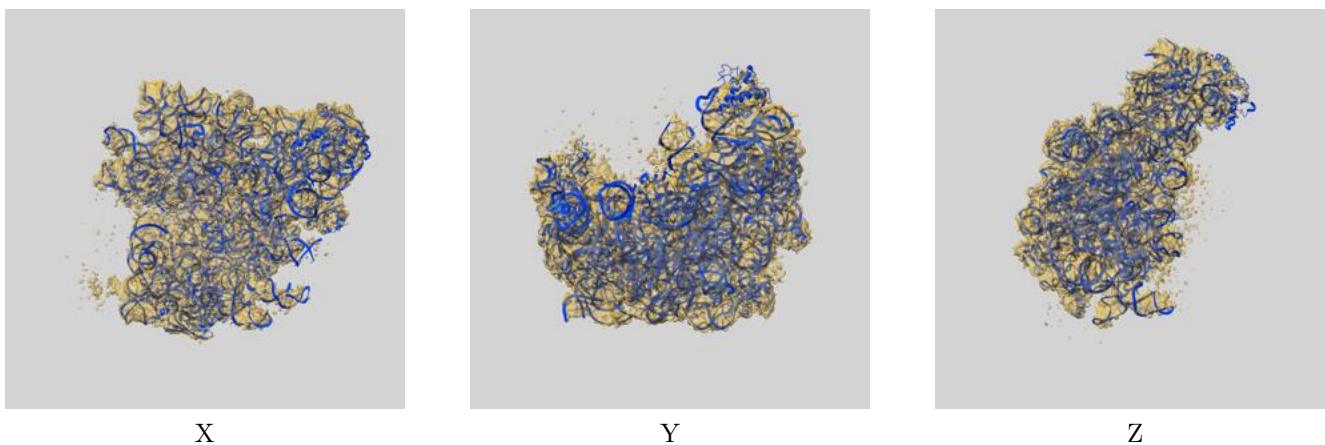
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.80	-	-
Author-provided FSC curve	3.77	4.50	3.85
Unmasked-calculated*	6.74	10.86	7.29

\*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 6.74 differs from the reported value 3.8 by more than 10 %

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

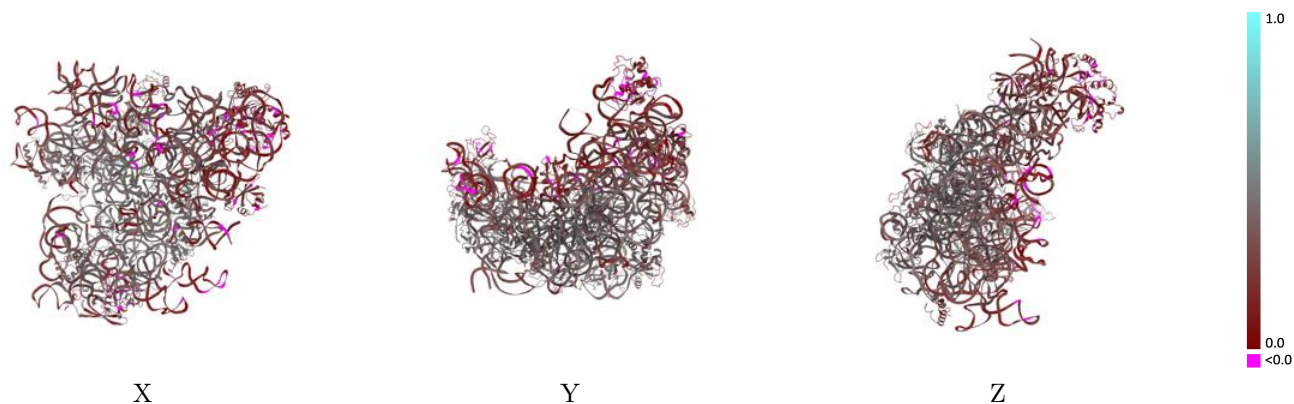
This section contains information regarding the fit between EMDB map EMD-16501 and PDB model 8C94. Per-residue inclusion information can be found in section 3 on page 8.

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



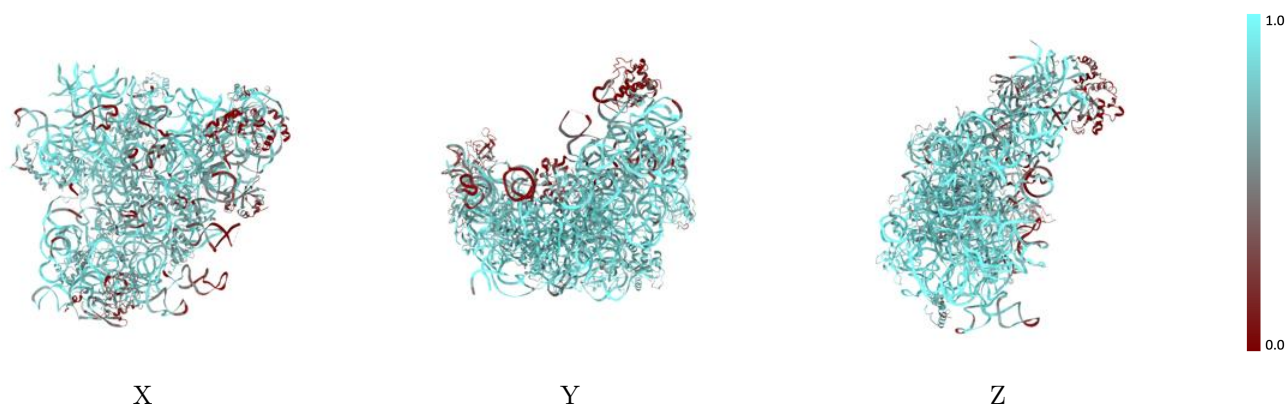
The images above show the 3D surface view of the map at the recommended contour level 0.35 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

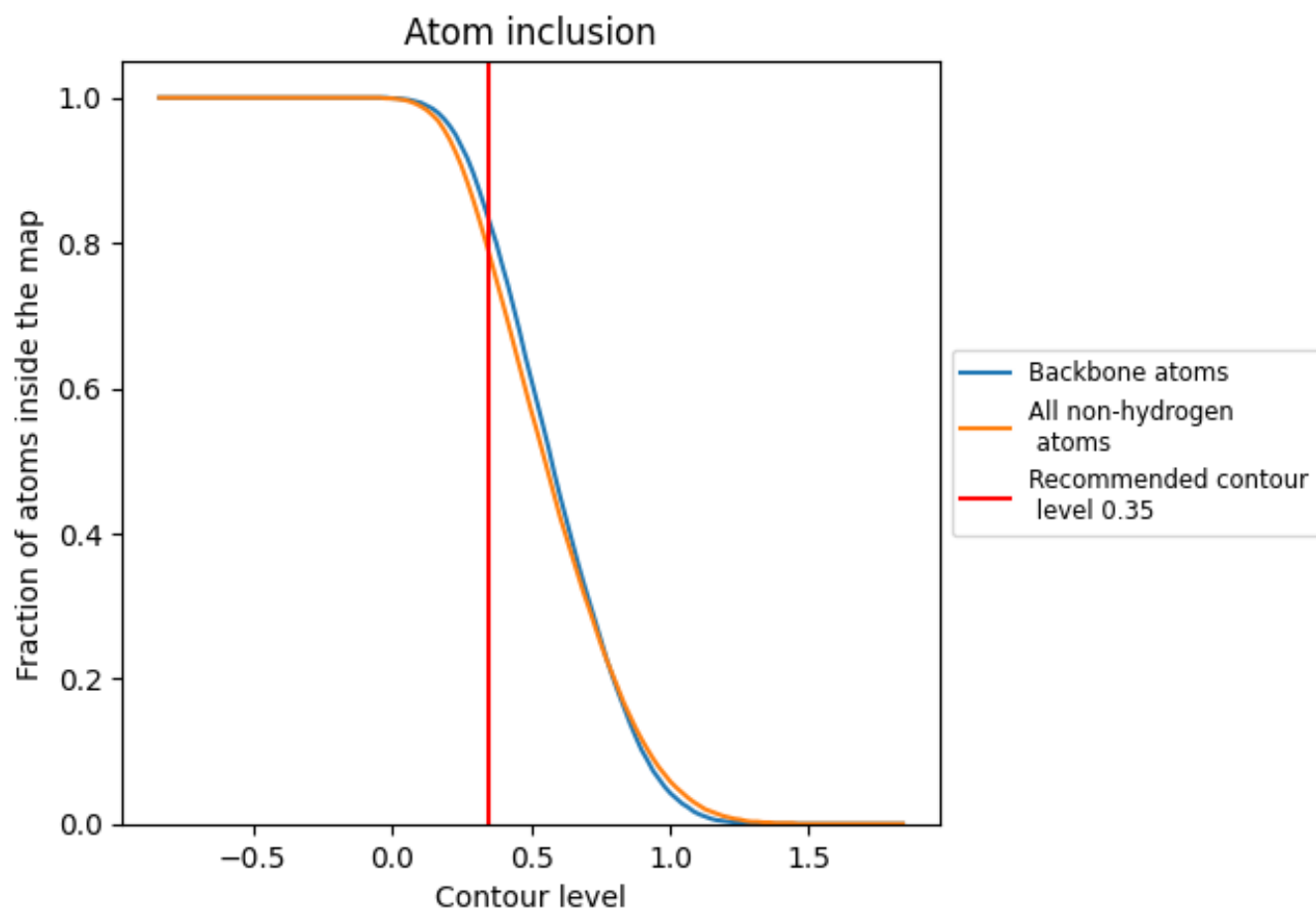
## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



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 (0.35).















































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 83% of all backbone atoms, 78% 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 (0.35) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7850	 0.3210
0	 0.8230	 0.4220
2	 0.7690	 0.3860
A	 0.8350	 0.3190
B	 0.8080	 0.2360
D	 0.7710	 0.4150
E	 0.7940	 0.4000
F	 0.2250	 0.1330
J	 0.7890	 0.4140
K	 0.3150	 0.2060
L	 0.7280	 0.3690
N	 0.7870	 0.3770
O	 0.6630	 0.2450
P	 0.5610	 0.3000
Q	 0.8350	 0.4150
R	 0.7820	 0.4180
S	 0.7160	 0.4080
U	 0.8240	 0.3990
V	 0.4550	 0.2070
W	 0.7110	 0.3950
Y	 0.6630	 0.2720
Z	 0.7850	 0.4160

