



Full wwPDB EM Validation Report ⓘ

Mar 25, 2026 – 05:57 AM UTC

PDB ID : 9H3U / pdb_00009h3u
EMDB ID : EMD-51838
Title : 50S subunit precursor C_H68
Authors : Lauer, S.; Nikolay, R.; Spahn, C.M.T.
Deposited on : 2024-10-17
Resolution : 3.47 Å(reported)
Based on initial model : 8RPY

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 ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

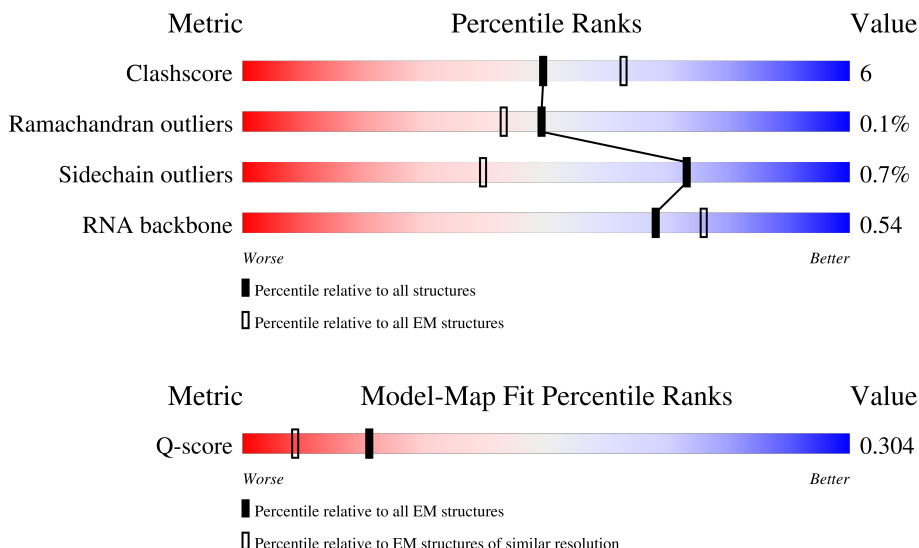
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.47 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.



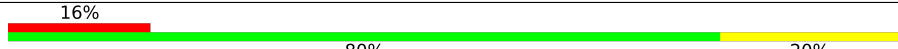
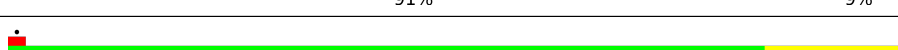
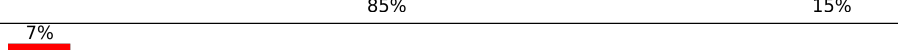
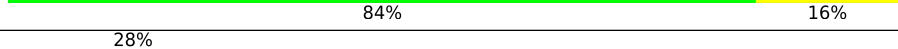
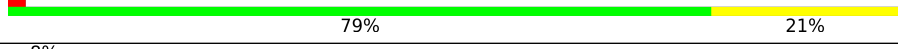
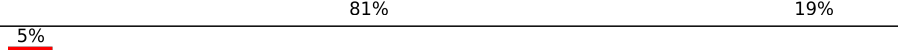
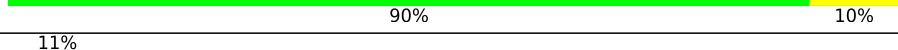
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	13733 (2.97 - 3.97)

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

Mol	Chain	Length	Quality of chain
1	0	56	
2	2	46	
3	A	2903	

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Mol	Chain	Length	Quality of chain
4	C	271	
5	D	209	
6	E	201	
7	H	149	
8	J	142	
9	K	122	
10	L	143	
11	N	120	
12	P	114	
13	Q	117	
14	R	103	
15	S	110	
16	T	93	
17	U	102	
18	X	77	
19	Y	63	
20	Z	58	

2 Entry composition [i](#)

There are 20 unique types of molecules in this entry. The entry contains 72305 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 Large ribosomal subunit protein bL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 2 is a protein called Large ribosomal subunit protein bL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	2	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	2539	Total	C	N	O	P	1	0
			54532	24326	10035	17631	2540		

- Molecule 4 is a protein called Large ribosomal subunit protein uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	260	Total	C	N	O	S	0	0
			2004	1242	405	350	7		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
5	D	209	Total	C	N	O	S	0	0
			1565	979	288	294	4		

- Molecule 6 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	E	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 7 is a protein called Large ribosomal subunit protein bL9.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	149	Total	C	N	O	S	0	0
			1111	699	197	214	1		

- Molecule 8 is a protein called Large ribosomal subunit protein uL13.

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

- Molecule 9 is a protein called Large ribosomal subunit protein uL14.

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

- Molecule 10 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	L	143	Total	C	N	O	S	0	0
			1045	649	206	189	1		

- Molecule 11 is a protein called Large ribosomal subunit protein bL17.

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

- Molecule 12 is a protein called Large ribosomal subunit protein bL19.

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

- Molecule 13 is a protein called Large ribosomal subunit protein bL20.

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

- Molecule 14 is a protein called Large ribosomal subunit protein bL21.

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

- Molecule 15 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	S	110	Total	C	N	O	S	1	0
			868	538	170	157	3		

- Molecule 16 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	T	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 17 is a protein called Large ribosomal subunit protein uL24.

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

- Molecule 18 is a protein called Large ribosomal subunit protein bL28.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	X	77	Total	C	N	O	S	0	0
			625	388	129	106	2		

- Molecule 19 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	Y	63	Total	C	N	O	S	0	0
			509	313	99	95	2		

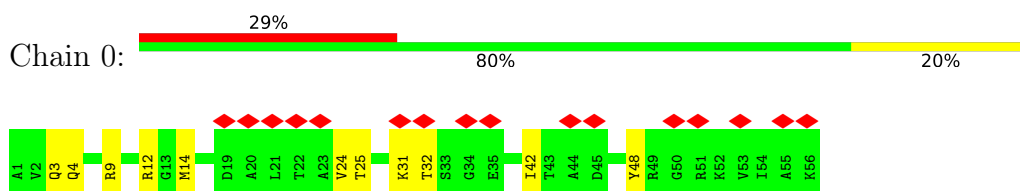
- Molecule 20 is a protein called Large ribosomal subunit protein uL30.

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

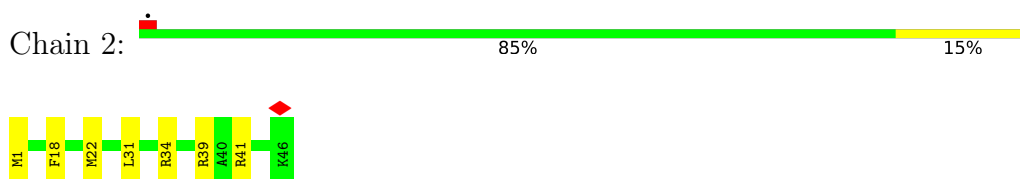
3 Residue-property plots

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.

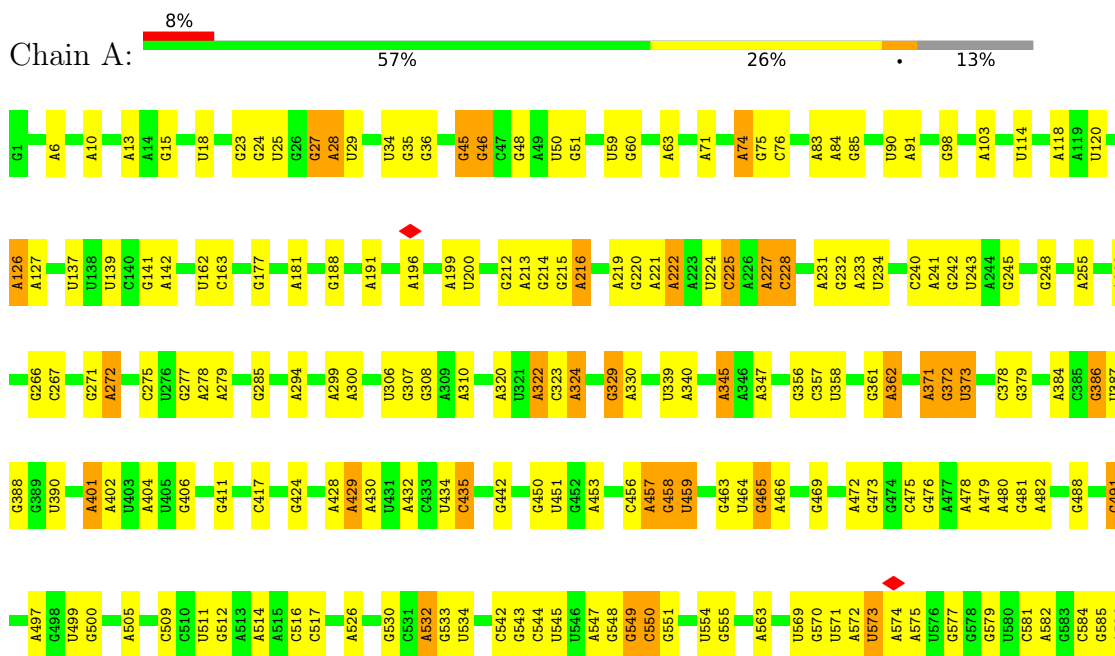
- Molecule 1: Large ribosomal subunit protein bL32

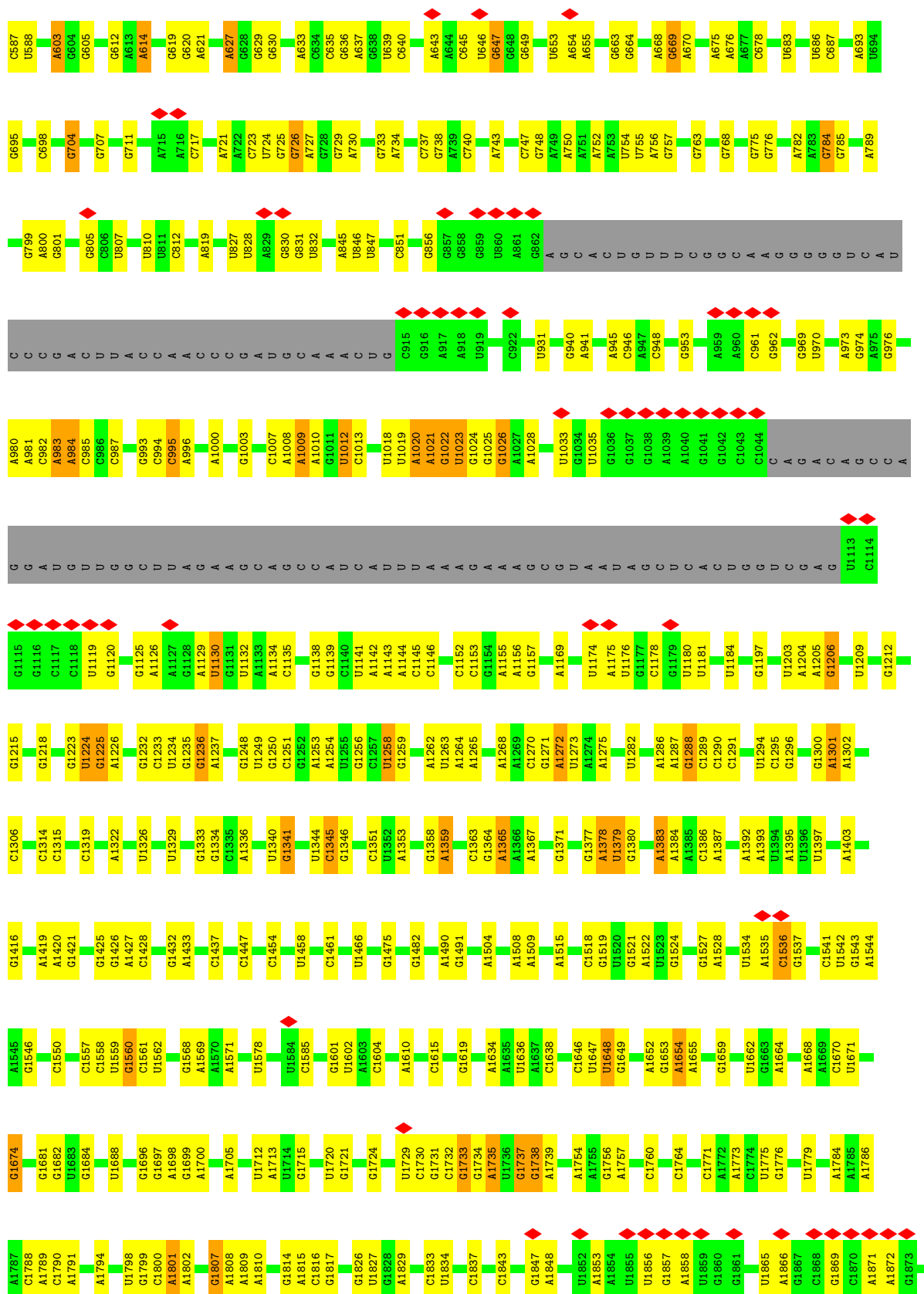


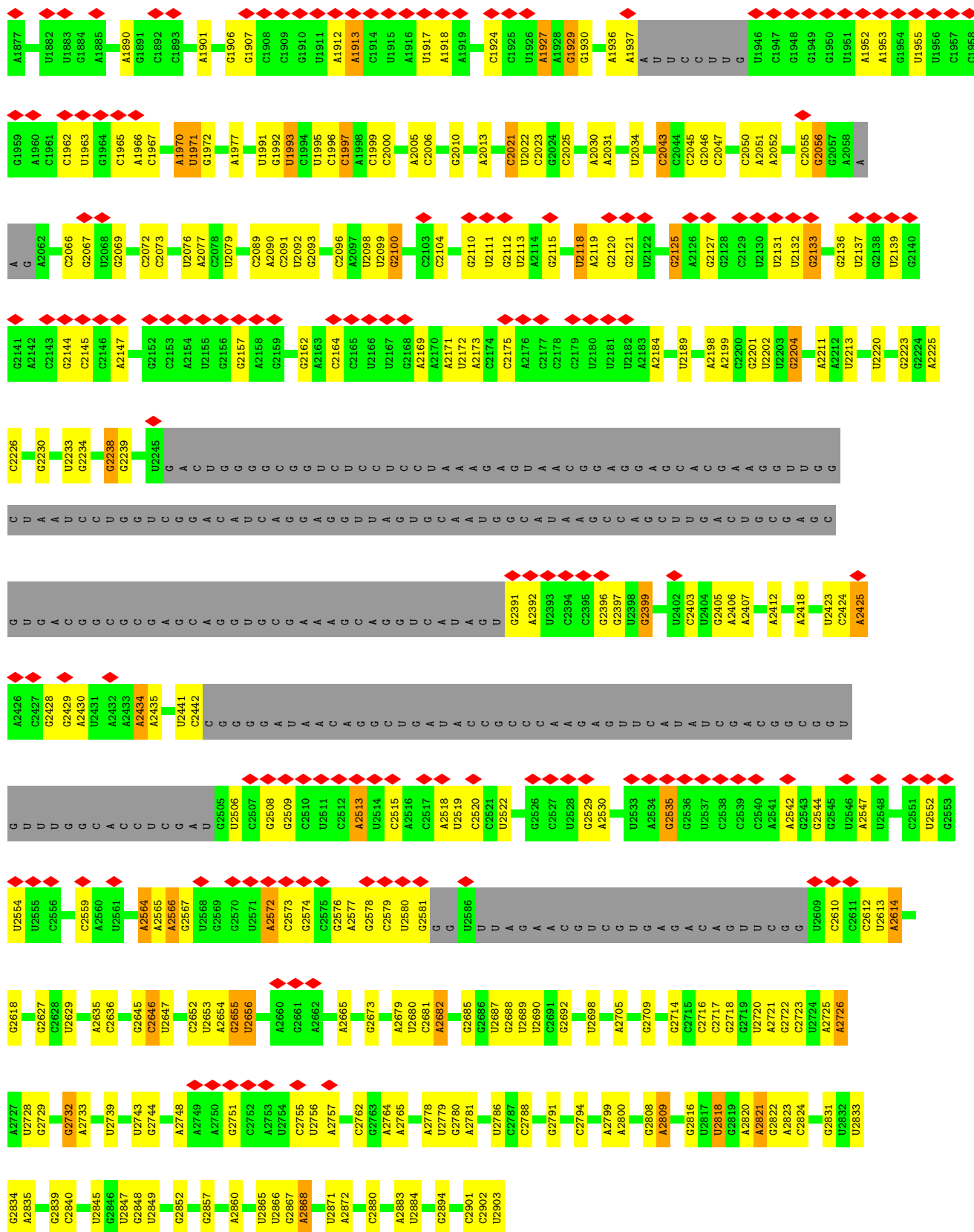
- Molecule 2: Large ribosomal subunit protein bL34



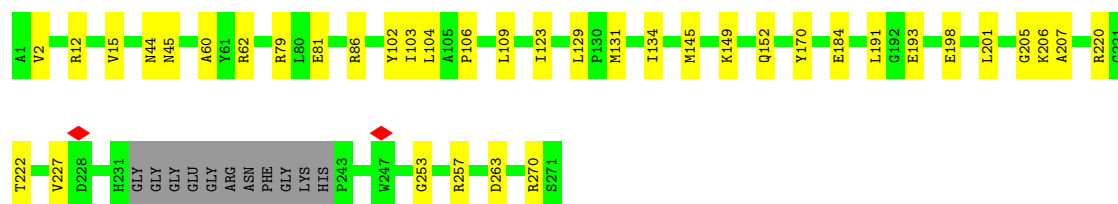
- Molecule 3: 23S ribosomal RNA





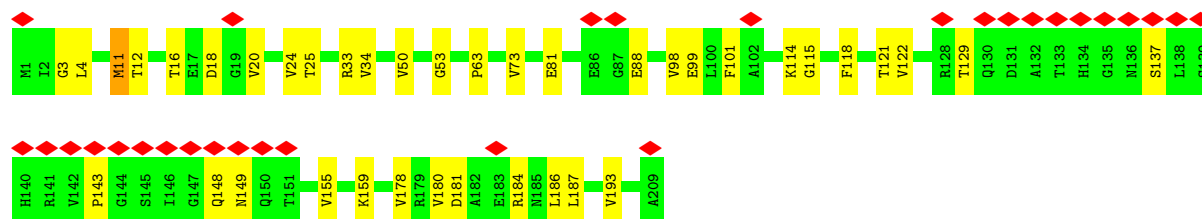


Chain C:  82% 14%



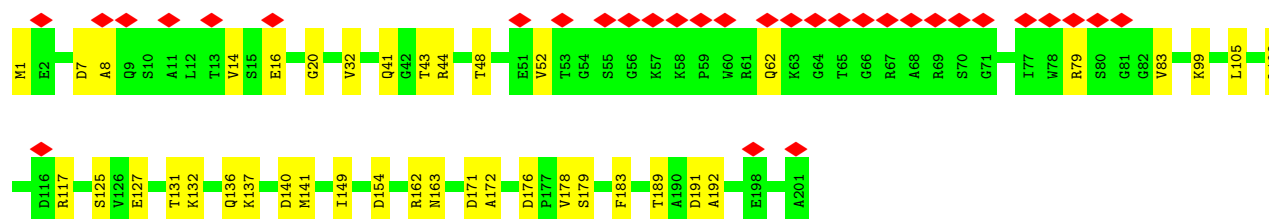
- Molecule 5: 50S ribosomal protein L3

Chain D:  14% 81% 18%

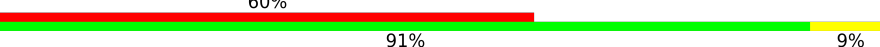


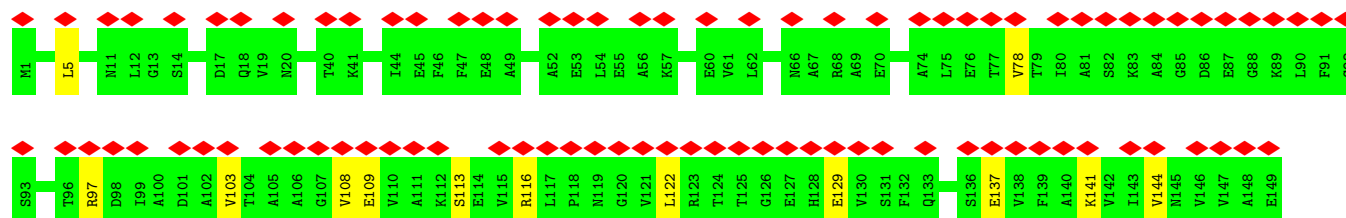
- Molecule 6: Large ribosomal subunit protein uL4

Chain E:  16% 80% 20%



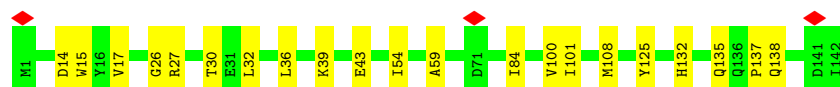
- Molecule 7: Large ribosomal subunit protein bL9

Chain H:  60% 91% 9%

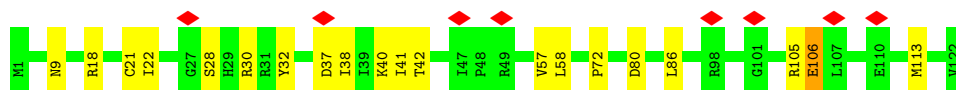
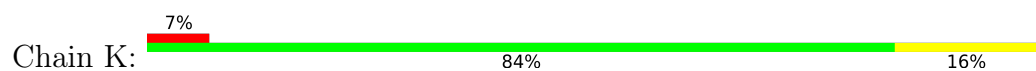


- Molecule 8: Large ribosomal subunit protein uL13

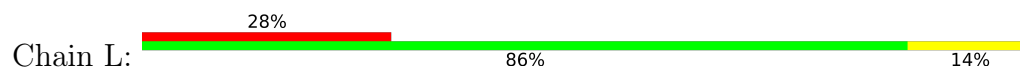
Chain J:  85% 15%



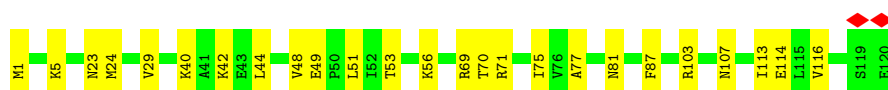
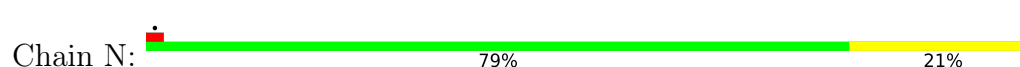
- Molecule 9: Large ribosomal subunit protein uL14



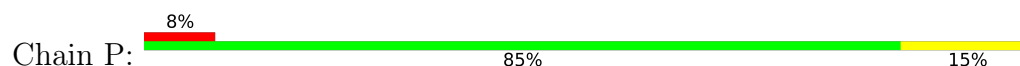
- Molecule 10: Large ribosomal subunit protein uL15



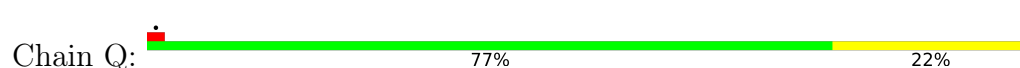
- Molecule 11: Large ribosomal subunit protein bL17



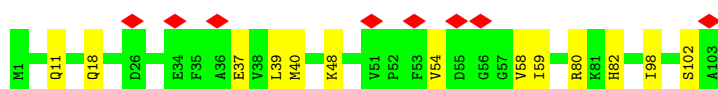
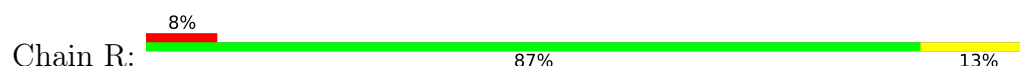
- Molecule 12: Large ribosomal subunit protein bL19



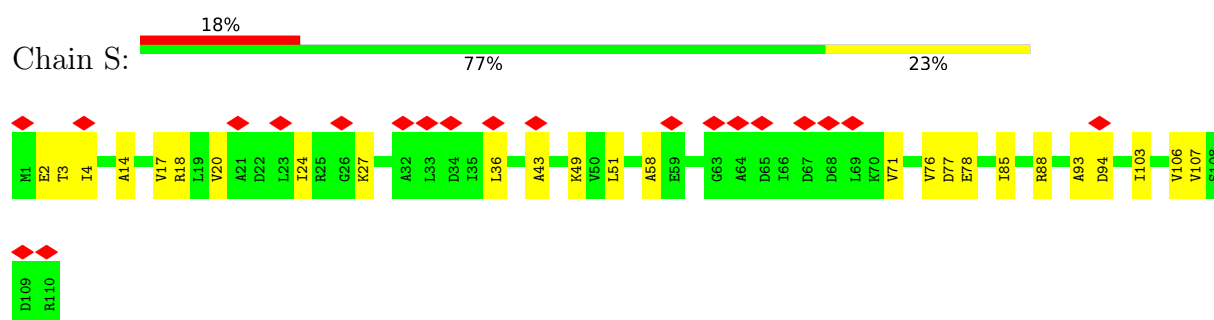
- Molecule 13: Large ribosomal subunit protein bL20



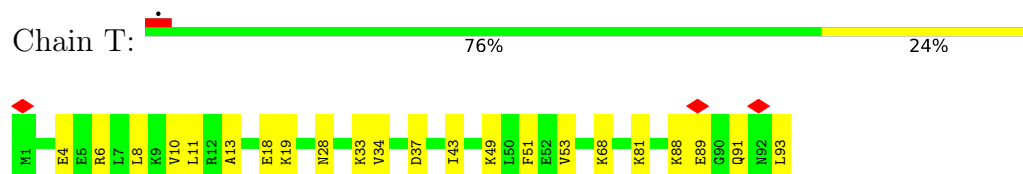
- Molecule 14: Large ribosomal subunit protein bL21



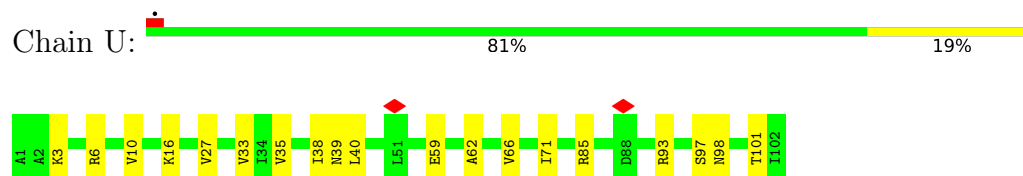
- Molecule 15: Large ribosomal subunit protein uL22



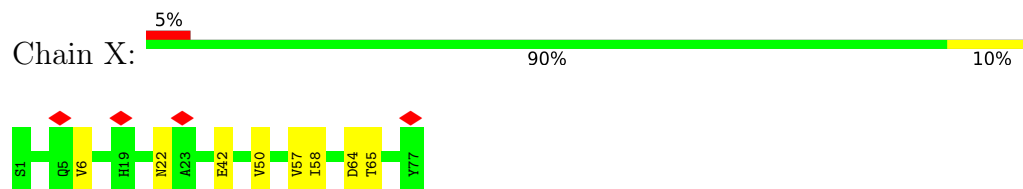
- Molecule 16: Large ribosomal subunit protein uL23



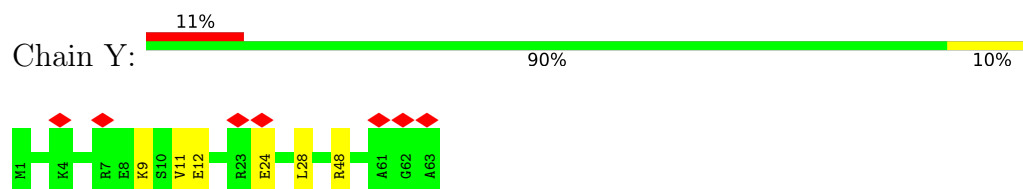
- Molecule 17: Large ribosomal subunit protein uL24



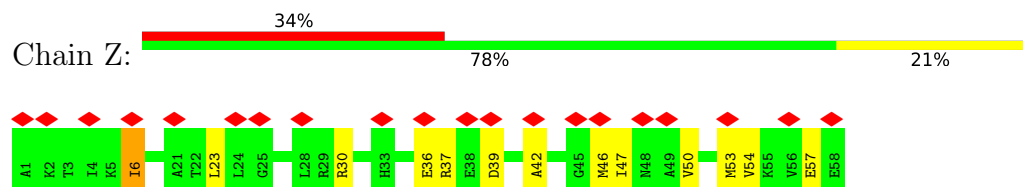
- Molecule 18: Large ribosomal subunit protein bL28



- Molecule 19: Large ribosomal subunit protein uL29



- Molecule 20: Large ribosomal subunit protein uL30



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	10420	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	45	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.958	Depositor
Minimum map value	-0.476	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.096	Depositor
Recommended contour level	0.382	Depositor
Map size (Å)	424.0, 424.0, 424.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.4133333, 1.4133333, 1.4133333	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	0.10	0/450	0.20	0/599
2	2	0.11	0/380	0.20	0/498
3	A	0.07	0/61069	0.20	2/95252 (0.0%)
4	C	0.09	0/2040	0.23	0/2744
5	D	0.09	0/1586	0.23	0/2134
6	E	0.09	0/1571	0.21	0/2113
7	H	0.08	0/1122	0.21	0/1515
8	J	0.09	0/1152	0.21	0/1551
9	K	0.10	0/947	0.24	0/1268
10	L	0.09	0/1054	0.29	0/1403
11	N	0.10	0/973	0.24	0/1301
12	P	0.09	0/929	0.21	0/1242
13	Q	0.10	0/960	0.20	0/1278
14	R	0.11	0/829	0.26	0/1107
15	S	0.10	0/875	0.25	0/1170
16	T	0.10	0/744	0.23	0/994
17	U	0.10	0/787	0.23	0/1051
18	X	0.10	0/635	0.20	0/848
19	Y	0.10	0/510	0.18	0/677
20	Z	0.11	0/453	0.22	0/605
All	All	0.07	0/79066	0.21	2/119350 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1913	A	OP1-P-O3'	-8.71	81.88	108.00
3	A	1913	A	OP2-P-O3'	-8.44	82.68	108.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	0	444	0	461	8	0
2	2	377	0	418	5	0
3	A	54532	0	27432	436	0
4	C	2004	0	2088	31	0
5	D	1565	0	1616	38	0
6	E	1552	0	1619	30	0
7	H	1111	0	1148	8	0
8	J	1129	0	1162	17	0
9	K	938	0	1012	16	0
10	L	1045	0	1117	16	0
11	N	960	0	1000	20	0
12	P	917	0	965	19	0
13	Q	947	0	1022	25	0
14	R	816	0	839	12	0
15	S	868	0	934	21	0
16	T	738	0	807	17	0
17	U	779	0	834	13	0
18	X	625	0	655	6	0
19	Y	509	0	543	4	0
20	Z	449	0	491	9	0
All	All	72305	0	46163	648	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 6.

All (648) 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)
3:A:1287:A:N6	3:A:1649:G:O2'	1.97	0.98
3:A:23:G:N2	15:S:77:ASP:OD2	2.00	0.94
3:A:177:G:OP2	3:A:177:G:N2	2.06	0.88
3:A:948:C:O2	3:A:984:A:O2'	1.92	0.87
3:A:1826:G:O2'	3:A:1971:U:OP2	1.92	0.86
3:A:570:G:O4'	3:A:983:A:N6	2.09	0.85
3:A:2522:U:O2'	3:A:2647:U:OP1	1.94	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:275:C:O2	3:A:362:A:N6	2.09	0.85
3:A:1837:C:O2'	3:A:1927:A:N3	2.07	0.85
3:A:1447:C:O2'	3:A:1544:A:N3	2.09	0.85
3:A:1007:C:OP2	3:A:1008:A:O2'	1.95	0.85
3:A:514:A:N3	3:A:581:C:O2'	2.10	0.84
3:A:1724:G:O6	3:A:1737:G:N2	2.10	0.84
3:A:126:A:O2'	3:A:127:A:O4'	1.93	0.84
3:A:571:U:O2'	3:A:573:U:OP2	1.96	0.84
3:A:1351:C:O2'	3:A:1571:A:O2'	1.95	0.84
3:A:1636:U:O2'	3:A:1760:C:O2	1.95	0.83
3:A:1697:G:OP2	3:A:1698:A:O2'	1.97	0.82
3:A:1779:U:OP2	3:A:1784:A:N6	2.13	0.81
3:A:612:G:N2	3:A:614:A:O2'	2.13	0.81
3:A:2645:G:OP2	3:A:2645:G:N2	2.15	0.80
3:A:2816:G:N3	3:A:2883:A:O2'	2.15	0.80
3:A:1681:G:OP2	3:A:1757:A:N6	2.15	0.80
3:A:227:A:O2'	3:A:228:C:O5'	1.99	0.80
3:A:1834:U:O2'	3:A:1970:A:OP2	2.00	0.79
3:A:320:A:N3	6:E:163:ASN:ND2	2.30	0.79
3:A:1953:A:O2'	3:A:2559:C:O2	1.99	0.79
3:A:1351:C:HO2'	3:A:1571:A:HO2'	1.25	0.79
3:A:2865:U:OP2	3:A:2866:U:O2'	2.00	0.79
3:A:1798:U:O2'	3:A:1802:A:N3	2.16	0.79
3:A:754:U:O2'	3:A:1272:A:N1	2.15	0.78
13:Q:88:GLU:O	14:R:11:GLN:NE2	2.16	0.78
3:A:2857:G:N2	3:A:2860:A:OP2	2.15	0.78
15:S:71:VAL:HG12	15:S:107:VAL:HG12	1.63	0.78
3:A:1907:G:O6	3:A:1924:C:N4	2.16	0.78
3:A:743:A:O2'	3:A:1659:G:OP1	2.01	0.77
3:A:2077:A:N3	3:A:2434:A:O2'	2.16	0.77
3:A:1721:G:O2'	3:A:1739:A:N6	2.18	0.77
3:A:2115:G:N2	3:A:2118:U:OP2	2.18	0.77
6:E:176:ASP:OD1	6:E:179:SER:OG	2.02	0.77
3:A:526:A:O2'	3:A:2043:C:O2	2.01	0.76
3:A:1152:C:OP1	13:Q:83:LYS:NZ	2.17	0.76
3:A:1754:A:O2'	12:P:102:ARG:NH2	2.19	0.76
3:A:2705:A:O2'	3:A:2852:G:OP1	2.04	0.75
3:A:219:A:N3	3:A:234:U:O2'	2.19	0.75
3:A:2564:A:O2'	3:A:2565:A:O4'	2.02	0.75
3:A:200:U:O2	3:A:386:G:N2	2.19	0.75
3:A:1203:U:OP2	3:A:1204:A:O2'	2.01	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1248:G:OP1	6:E:44:ARG:NH1	2.20	0.75
3:A:569:U:OP1	3:A:945:A:O2'	2.03	0.74
3:A:2091:C:OP2	3:A:2092:U:O2'	2.04	0.74
3:A:2006:C:O2'	3:A:2823:A:N3	2.20	0.73
3:A:2223:G:OP1	4:C:170:TYR:OH	2.06	0.73
3:A:2530:A:OP2	3:A:2535:G:N2	2.21	0.73
10:L:55:MET:O	10:L:60:ARG:NH1	2.21	0.73
11:N:77:ALA:O	11:N:81:ASN:ND2	2.21	0.73
3:A:18:U:O2'	3:A:554:U:OP1	2.07	0.73
6:E:140:ASP:OD1	6:E:141:MET:N	2.21	0.73
3:A:76:C:OP1	19:Y:48:ARG:NH1	2.22	0.73
3:A:1843:C:O2'	4:C:253:GLY:O	2.05	0.73
3:A:605:G:OP1	6:E:99:LYS:NZ	2.22	0.72
3:A:2743:U:OP2	3:A:2755:C:N4	2.23	0.72
7:H:129:GLU:OE2	7:H:141:LYS:NZ	2.23	0.72
16:T:6:ARG:O	16:T:10:VAL:HG13	1.89	0.72
12:P:64:SER:OG	12:P:67:GLU:O	2.09	0.71
20:Z:6:ILE:HD12	20:Z:47:ILE:HD11	1.71	0.71
3:A:2576:G:O2'	3:A:2579:C:OP2	2.06	0.71
3:A:2635:A:O2'	5:D:81:GLU:OE2	2.06	0.71
3:A:2839:G:O2'	11:N:49:GLU:OE1	2.04	0.71
3:A:1550:C:OP1	3:A:1720:U:O2'	2.08	0.71
3:A:2692:G:N3	3:A:2847:U:O2'	2.24	0.71
3:A:84:A:N1	3:A:98:G:O2'	2.24	0.71
3:A:1315:C:O2'	3:A:1392:A:N3	2.24	0.71
3:A:1638:C:O2	3:A:2698:U:O2'	2.09	0.71
4:C:79:ARG:NH1	4:C:81:GLU:OE2	2.24	0.71
4:C:257:ARG:NH2	4:C:263:ASP:OD1	2.24	0.71
1:0:3:GLN:OE1	3:A:1263:U:O2'	2.08	0.70
3:A:577:G:O2'	3:A:1254:A:OP1	2.08	0.70
12:P:10:GLU:N	12:P:10:GLU:OE1	2.24	0.70
3:A:2047:C:O2'	3:A:2823:A:N1	2.23	0.70
3:A:810:U:O4	10:L:30:THR:HG22	1.92	0.70
3:A:987:C:O2'	3:A:1000:A:N3	2.25	0.70
1:0:9:ARG:NH2	3:A:516:C:OP1	2.24	0.69
3:A:548:G:O2'	3:A:549:G:O4'	2.10	0.69
3:A:2646:C:OP2	3:A:2732:G:O2'	2.10	0.69
3:A:2788:C:O2'	3:A:2809:A:N3	2.23	0.69
3:A:1218:G:N1	3:A:1232:G:N7	2.41	0.69
3:A:2144:G:O2'	3:A:2147:A:N1	2.25	0.68
3:A:345:A:N3	3:A:347:A:N6	2.41	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1536:C:O2'	3:A:1537:G:N2	2.26	0.68
11:N:1:MET:SD	11:N:1:MET:N	2.67	0.68
3:A:227:A:HO2'	3:A:228:C:P	2.16	0.68
7:H:113:SER:O	7:H:116:ARG:NH1	2.26	0.68
15:S:88:ARG:NH1	15:S:94:ASP:OD2	2.27	0.68
3:A:1021:A:H61	3:A:1142:A:H61	1.42	0.68
3:A:59:U:O2'	3:A:74:A:OP2	2.09	0.67
3:A:1026:G:OP2	3:A:1134:A:O2'	2.09	0.67
3:A:1688:U:O2'	3:A:1700:A:N7	2.26	0.67
13:Q:89:ILE:HG12	14:R:39:LEU:HD21	1.76	0.67
3:A:534:U:O2'	13:Q:48:ASP:OD2	2.09	0.67
3:A:1936:A:OP2	3:A:1962:C:N4	2.28	0.67
6:E:1:MET:N	6:E:14:VAL:O	2.27	0.67
16:T:91:GLN:N	16:T:91:GLN:OE1	2.27	0.67
20:Z:57:GLU:N	20:Z:57:GLU:OE1	2.27	0.67
4:C:198:GLU:N	4:C:198:GLU:OE1	2.28	0.67
3:A:1156:A:N7	13:Q:47:ARG:NH2	2.43	0.67
3:A:1294:U:O2	11:N:23:ASN:ND2	2.28	0.67
5:D:99:GLU:N	5:D:99:GLU:OE1	2.28	0.66
20:Z:46:MET:O	20:Z:50:VAL:HG22	1.94	0.66
3:A:191:A:O2'	3:A:678:C:O2	2.13	0.66
3:A:1668:A:N3	3:A:1670:C:N4	2.42	0.66
15:S:17:VAL:HG23	15:S:43:ALA:HB1	1.77	0.66
3:A:2125:G:N2	3:A:2171:A:OP1	2.29	0.66
3:A:271:G:O2'	3:A:272:A:OP2	2.11	0.66
3:A:1754:A:N6	3:A:2717:C:O4'	2.29	0.66
3:A:2566:A:N1	9:K:28:SER:OG	2.27	0.66
3:A:1018:U:O2'	3:A:1120:G:N2	2.28	0.65
14:R:18:GLN:O	14:R:98:ILE:HG22	1.95	0.65
20:Z:36:GLU:O	20:Z:37:ARG:NE	2.30	0.65
3:A:1853:A:N3	3:A:2233:U:O2'	2.28	0.65
3:A:2818:U:OP2	11:N:42:LYS:NZ	2.29	0.65
2:2:34:ARG:NH2	2:2:41:ARG:O	2.30	0.65
3:A:1288:G:OP2	3:A:1288:G:N2	2.27	0.65
3:A:2655:G:O2'	3:A:2656:U:O5'	2.14	0.65
7:H:137:GLU:N	7:H:137:GLU:OE1	2.29	0.65
8:J:17:VAL:HG23	8:J:137:PRO:HB2	1.79	0.65
9:K:42:THR:HG22	9:K:57:VAL:HG22	1.77	0.65
3:A:698:C:O2'	3:A:734:A:N6	2.23	0.65
3:A:2682:A:N1	3:A:2728:U:O2'	2.29	0.65
16:T:34:VAL:HG11	16:T:43:ILE:CD1	2.27	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:627:A:OP1	10:L:78:ARG:NH1	2.31	0.64
3:A:2656:U:N3	3:A:2665:A:C8	2.65	0.64
3:A:976:G:O2'	3:A:1155:A:O2'	2.15	0.64
3:A:1393:A:N6	16:T:18:GLU:OE2	2.27	0.64
3:A:1125:G:OP2	3:A:1126:A:O2'	2.13	0.64
16:T:4:GLU:N	16:T:4:GLU:OE1	2.30	0.64
3:A:2723:C:OP1	5:D:114:LYS:NZ	2.26	0.63
3:A:482:A:O2'	3:A:497:A:N1	2.31	0.63
3:A:1258:U:O4'	6:E:79:ARG:NH1	2.32	0.63
7:H:109:GLU:N	7:H:109:GLU:OE1	2.32	0.63
3:A:675:A:O2'	6:E:62:GLN:NE2	2.32	0.63
3:A:676:A:HO2'	3:A:2442:C:HO2'	1.47	0.63
6:E:125:SER:O	6:E:137:LYS:NZ	2.31	0.63
3:A:488:G:O3'	15:S:49:LYS:NZ	2.32	0.62
3:A:83:A:O2'	3:A:103:A:N6	2.33	0.62
3:A:1997:C:O5'	5:D:129:THR:OG1	2.18	0.62
3:A:2066:C:N4	3:A:2067:G:O6	2.33	0.62
5:D:16:THR:OG1	5:D:18:ASP:OD1	2.05	0.62
3:A:1019:U:OP1	3:A:1035:U:O2'	2.16	0.62
3:A:1869:G:N2	3:A:1872:A:OP2	2.33	0.62
3:A:2681:C:OP1	5:D:114:LYS:NZ	2.33	0.62
3:A:463:G:N2	3:A:466:A:OP2	2.26	0.62
3:A:1801:A:N6	3:A:2201:G:O2'	2.33	0.62
3:A:2572:A:OP2	5:D:149:ASN:ND2	2.32	0.62
4:C:134:ILE:HD12	4:C:191:LEU:HD21	1.82	0.62
3:A:571:U:OP1	14:R:80:ARG:NH2	2.31	0.61
3:A:629:G:N3	3:A:639:U:O2'	2.33	0.61
3:A:2580:U:O2'	3:A:2581:G:O4'	2.18	0.61
3:A:2581:G:N2	3:A:2581:G:OP2	2.33	0.61
6:E:127:GLU:N	6:E:127:GLU:OE1	2.33	0.61
3:A:188:G:O2'	3:A:1365:A:N6	2.32	0.61
4:C:129:LEU:HB2	4:C:134:ILE:HD11	1.82	0.61
12:P:54:LEU:HD23	12:P:54:LEU:O	2.00	0.61
20:Z:6:ILE:HD12	20:Z:47:ILE:CD1	2.30	0.61
11:N:114:GLU:N	11:N:114:GLU:OE1	2.34	0.61
3:A:2821:A:OP2	5:D:115:GLY:N	2.34	0.61
3:A:1021:A:N6	3:A:1142:A:H61	1.98	0.61
3:A:453:A:N3	3:A:457:A:O2'	2.34	0.60
3:A:2099:U:O2'	3:A:2100:G:O5'	2.15	0.60
3:A:2725:A:O2'	3:A:2726:A:O5'	2.16	0.60
8:J:125:TYR:OH	8:J:132:HIS:NE2	2.25	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:693:A:O2'	3:A:1353:A:N3	2.31	0.60
5:D:81:GLU:N	5:D:81:GLU:OE1	2.34	0.60
8:J:138:GLN:OE1	8:J:138:GLN:N	2.33	0.60
9:K:105:ARG:NH2	12:P:32:VAL:O	2.35	0.60
3:A:1536:C:HO2'	3:A:1537:G:N2	1.99	0.60
3:A:1028:A:OP2	3:A:1126:A:N6	2.34	0.60
3:A:27:G:O2'	3:A:28:A:OP2	2.15	0.60
3:A:1426:G:OP2	3:A:1427:A:O2'	2.05	0.60
3:A:1521:G:OP2	3:A:1522:A:O2'	2.18	0.60
3:A:1814:G:OP2	3:A:1815:A:O2'	2.18	0.60
3:A:2840:C:H5''	11:N:53:THR:HG21	1.84	0.60
5:D:4:LEU:HD13	5:D:101:PHE:CZ	2.36	0.60
3:A:1009:A:OP2	8:J:39:LYS:NZ	2.35	0.59
5:D:88:GLU:N	5:D:88:GLU:OE1	2.36	0.59
3:A:2627:G:O2'	3:A:2781:A:N1	2.31	0.59
16:T:34:VAL:HG11	16:T:43:ILE:HD12	1.83	0.59
3:A:807:U:OP2	10:L:41:ARG:NH2	2.35	0.59
3:A:2720:U:OP1	12:P:52:ARG:NH2	2.35	0.59
3:A:2513:A:O2'	5:D:159:LYS:NZ	2.36	0.59
3:A:1696:G:N2	3:A:1977:A:O2'	2.35	0.58
3:A:2840:C:C5'	11:N:53:THR:HG21	2.33	0.58
3:A:2079:U:O2'	18:X:22:ASN:OD1	2.21	0.58
3:A:1363:C:O2'	3:A:1809:A:N3	2.36	0.58
3:A:1712:U:OP2	3:A:1713:A:O2'	2.10	0.58
10:L:91:ASP:OD1	10:L:92:LEU:N	2.35	0.58
3:A:1798:U:OP2	4:C:270:ARG:NH2	2.36	0.58
3:A:1801:A:OP2	4:C:149:LYS:NZ	2.37	0.58
3:A:2656:U:C2	3:A:2665:A:N7	2.72	0.58
3:A:993:G:OP1	13:Q:49:ARG:NH1	2.37	0.57
7:H:78:VAL:HB	7:H:144:VAL:HG12	1.86	0.57
3:A:1995:U:OP2	3:A:1996:C:O2'	2.18	0.57
3:A:1223:G:N2	3:A:1226:A:OP2	2.32	0.57
3:A:36:G:N3	3:A:450:G:O2'	2.37	0.57
10:L:135:ILE:HD11	10:L:142:ILE:HD11	1.87	0.57
3:A:85:G:OP1	17:U:6:ARG:N	2.38	0.57
12:P:33:GLU:N	12:P:33:GLU:OE1	2.38	0.57
3:A:1654:A:O2'	5:D:118:PHE:O	2.22	0.57
3:A:1799:G:OP1	4:C:257:ARG:NH1	2.37	0.57
11:N:69:ARG:O	11:N:70:THR:OG1	2.17	0.57
3:A:1682:G:OP2	3:A:1699:G:N2	2.35	0.57
3:A:587:C:N3	10:L:33:ARG:NH2	2.52	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1341:G:OP1	3:A:1397:U:N3	2.37	0.57
1:0:4:GLN:OE1	3:A:2056:G:O2'	2.22	0.56
3:A:2090:A:N6	3:A:2230:G:O6	2.38	0.56
8:J:135:GLN:N	8:J:135:GLN:OE1	2.39	0.56
3:A:48:G:H22	3:A:177:G:P	2.29	0.56
8:J:125:TYR:HH	8:J:132:HIS:HE2	1.42	0.56
3:A:1771:C:O2'	3:A:1786:A:O4'	2.24	0.56
3:A:2073:C:C5'	4:C:227:VAL:HG12	2.36	0.56
3:A:2509:G:N1	3:A:2580:U:O4	2.39	0.56
15:S:2:GLU:OE1	15:S:2:GLU:N	2.39	0.56
3:A:612:G:N2	3:A:614:A:HO2'	2.02	0.55
2:2:39:ARG:NH1	3:A:469:G:O6	2.39	0.55
3:A:1326:U:HO2'	3:A:2010:G:HO2'	1.54	0.55
6:E:171:ASP:OD1	6:E:172:ALA:N	2.39	0.55
10:L:27:LEU:HD23	10:L:27:LEU:H	1.71	0.55
3:A:1857:G:HO2'	3:A:1858:A:H8	1.55	0.55
4:C:131:MET:SD	4:C:131:MET:N	2.78	0.55
3:A:1383:A:O2'	3:A:1384:A:O4'	2.12	0.54
3:A:388:G:O6	3:A:390:U:O2'	2.11	0.54
3:A:1527:G:N1	3:A:1544:A:OP2	2.37	0.54
3:A:1817:G:OP1	4:C:86:ARG:NH2	2.41	0.54
5:D:33:ARG:NH2	5:D:53:GLY:O	2.37	0.54
3:A:13:A:O2'	3:A:15:G:N7	2.41	0.54
3:A:1282:U:O4	3:A:1286:A:N7	2.41	0.54
5:D:121:THR:HG21	5:D:143:PRO:HB3	1.90	0.54
4:C:44:ASN:OD1	4:C:45:ASN:N	2.40	0.54
11:N:29:VAL:HG23	11:N:75:ILE:HD12	1.89	0.54
3:A:434:U:O2	3:A:435:C:N4	2.37	0.54
8:J:32:LEU:O	8:J:36:LEU:HD23	2.08	0.54
19:Y:24:GLU:HA	19:Y:28:LEU:HD23	1.89	0.54
3:A:994:C:OP2	13:Q:49:ARG:NH2	2.40	0.53
6:E:154:ASP:OD1	6:E:154:ASP:N	2.41	0.53
3:A:586:A:OP2	3:A:1251:C:N4	2.41	0.53
5:D:180:VAL:HG12	5:D:187:LEU:HD12	1.91	0.53
3:A:29:U:O2	3:A:1215:G:O2'	2.25	0.53
3:A:372:G:O2'	3:A:373:U:P	2.66	0.53
2:2:34:ARG:NH1	3:A:466:A:OP1	2.41	0.53
3:A:1929:G:OP2	3:A:1929:G:N2	2.42	0.53
3:A:90:U:OP2	3:A:91:A:O2'	2.08	0.53
5:D:33:ARG:HG3	5:D:73:VAL:HG13	1.91	0.53
15:S:4:ILE:HG22	15:S:106:VAL:HG22	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:572:A:OP2	14:R:80:ARG:NH1	2.37	0.53
3:A:1205:A:O2'	3:A:1206:G:OP1	2.26	0.53
17:U:35:VAL:HB	17:U:38:ILE:HD13	1.90	0.53
3:A:240:C:OP2	3:A:241:A:O2'	2.18	0.52
3:A:340:A:O2'	6:E:162:ARG:NH2	2.43	0.52
5:D:3:GLY:C	5:D:4:LEU:HD12	2.35	0.52
6:E:48:THR:O	6:E:52:VAL:HG23	2.10	0.52
3:A:569:U:O2'	3:A:983:A:N1	2.36	0.52
3:A:2423:U:HO2'	3:A:2425:A:HO2'	1.56	0.52
14:R:39:LEU:HD23	14:R:40:MET:HB2	1.92	0.52
3:A:324:A:N6	3:A:339:U:O4'	2.42	0.52
3:A:1999:C:O2	3:A:2687:U:O2'	2.23	0.52
8:J:14:ASP:OD1	8:J:15:TRP:N	2.38	0.52
3:A:630:G:N2	3:A:633:A:OP2	2.36	0.52
3:A:1340:U:OP1	16:T:19:LYS:NZ	2.41	0.52
3:A:1528:A:OP2	3:A:1543:G:N2	2.41	0.52
3:A:372:G:O2'	3:A:373:U:O5'	2.25	0.52
13:Q:48:ASP:OD1	13:Q:49:ARG:N	2.42	0.52
13:Q:104:ALA:O	13:Q:108:LEU:HD23	2.10	0.52
3:A:1270:C:N4	3:A:1648:U:O4	2.43	0.52
15:S:18:ARG:NH1	15:S:76:VAL:O	2.43	0.52
20:Z:50:VAL:O	20:Z:54:VAL:HG22	2.10	0.52
3:A:45:G:N7	3:A:215:G:O2'	2.43	0.51
3:A:784:G:C6	4:C:227:VAL:HG11	2.45	0.51
5:D:180:VAL:HG12	5:D:187:LEU:CD1	2.41	0.51
5:D:181:ASP:N	5:D:181:ASP:OD1	2.43	0.51
8:J:43:GLU:N	8:J:43:GLU:OE1	2.43	0.51
3:A:225:C:N3	3:A:231:A:N6	2.59	0.51
3:A:372:G:H3'	18:X:57:VAL:HG12	1.91	0.51
3:A:464:U:C2'	3:A:465:G:O5'	2.59	0.51
3:A:737:C:N4	3:A:738:G:O6	2.42	0.51
3:A:1604:C:O2'	3:A:1610:A:N1	2.39	0.51
16:T:28:ASN:ND2	16:T:88:LYS:O	2.40	0.51
3:A:262:A:N3	3:A:430:A:O2'	2.40	0.51
3:A:1020:A:H1'	3:A:1021:A:OP2	2.11	0.51
6:E:117:ARG:NH2	6:E:183:PHE:O	2.44	0.51
3:A:627:A:C5	10:L:111:ILE:HD11	2.46	0.51
3:A:549:G:O2'	3:A:550:C:P	2.69	0.51
3:A:1129:A:O2'	3:A:2515:C:O2	2.22	0.51
4:C:123:ILE:O	4:C:123:ILE:HG22	2.10	0.51
3:A:574:A:N6	3:A:2034:U:OP1	2.43	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1534:U:O2'	3:A:1537:G:O6	2.17	0.51
3:A:2656:U:O2	3:A:2665:A:N7	2.43	0.51
3:A:532:A:N7	3:A:2021:C:O2'	2.28	0.51
3:A:799:G:OP2	3:A:800:A:O2'	2.29	0.50
3:A:2120:G:N1	3:A:2121:G:O6	2.43	0.50
15:S:85:ILE:HD11	15:S:93:ALA:HB1	1.93	0.50
3:A:442:G:N2	6:E:43:THR:O	2.39	0.50
3:A:1378:A:O2'	3:A:1380:G:OP2	2.28	0.50
3:A:2519:U:O4'	3:A:2542:A:N6	2.44	0.50
3:A:2845:U:O3'	12:P:52:ARG:NH1	2.44	0.50
3:A:371:A:N6	3:A:402:A:OP2	2.43	0.50
3:A:723:C:C2	3:A:724:U:C5	2.99	0.50
3:A:2577:A:O4'	3:A:2612:C:N4	2.44	0.50
14:R:59:ILE:HG23	14:R:98:ILE:HD13	1.94	0.50
3:A:1364:G:N2	3:A:1367:A:OP2	2.36	0.50
3:A:2133:G:N2	3:A:2157:G:O6	2.45	0.50
3:A:2578:G:OP1	3:A:2614:A:N6	2.45	0.50
6:E:176:ASP:OD1	6:E:176:ASP:N	2.45	0.50
9:K:41:ILE:HD11	9:K:86:LEU:HD13	1.94	0.50
17:U:3:LYS:O	17:U:93:ARG:NH1	2.45	0.50
5:D:12:THR:HG21	12:P:4:ILE:HG23	1.94	0.50
9:K:113:MET:SD	9:K:113:MET:N	2.84	0.50
17:U:38:ILE:N	17:U:38:ILE:HD12	2.27	0.50
17:U:39:ASN:ND2	17:U:62:ALA:O	2.45	0.50
3:A:1287:A:N6	3:A:1649:G:HO2'	2.06	0.49
3:A:220:G:O2'	3:A:233:A:O2'	2.24	0.49
3:A:635:C:O2'	3:A:639:U:OP1	2.29	0.49
6:E:16:GLU:O	6:E:20:GLY:N	2.40	0.49
3:A:2202:U:O2'	3:A:2204:G:OP1	2.22	0.49
13:Q:75:TYR:OH	13:Q:91:ARG:NH1	2.45	0.49
4:C:184:GLU:OE1	4:C:184:GLU:N	2.41	0.49
11:N:49:GLU:O	11:N:53:THR:HG23	2.13	0.49
3:A:1155:A:O3'	13:Q:54:ARG:NH2	2.46	0.49
13:Q:82:LEU:HD12	13:Q:87:VAL:HB	1.95	0.49
6:E:32:VAL:HG23	6:E:178:VAL:HG22	1.95	0.49
3:A:458:G:O2'	3:A:459:U:P	2.71	0.49
10:L:90:VAL:N	10:L:121:THR:O	2.39	0.49
3:A:378:C:N4	3:A:379:G:O6	2.46	0.48
3:A:1912:A:OP2	3:A:1918:A:N6	2.41	0.48
3:A:548:G:O2'	3:A:549:G:O5'	2.17	0.48
3:A:619:G:OP2	3:A:620:G:N2	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:329:G:O6	17:U:16:LYS:N	2.46	0.48
16:T:13:ALA:O	16:T:33:LYS:N	2.42	0.48
3:A:308:G:O2'	3:A:329:G:N2	2.46	0.48
3:A:320:A:H2'	6:E:131:THR:HG21	1.95	0.48
4:C:2:VAL:HG21	4:C:201:LEU:HG	1.94	0.48
9:K:21:CYS:HA	9:K:41:ILE:HG22	1.93	0.48
11:N:116:VAL:HG23	11:N:116:VAL:O	2.13	0.48
16:T:51:PHE:O	16:T:53:VAL:HG13	2.13	0.48
3:A:1215:G:O6	3:A:1235:G:C2	2.66	0.48
14:R:39:LEU:HD23	14:R:40:MET:CB	2.44	0.48
3:A:517:C:O2'	15:S:18:ARG:NH2	2.47	0.48
3:A:1209:U:O2'	3:A:1237:A:N1	2.41	0.48
6:E:191:ASP:OD1	6:E:192:ALA:N	2.46	0.48
3:A:212:G:H2'	3:A:213:A:C8	2.49	0.48
3:A:1130:U:N3	3:A:2025:C:OP1	2.44	0.48
15:S:14:ALA:HA	15:S:17:VAL:HG12	1.95	0.48
3:A:1022:G:H4'	3:A:1023:U:O5'	2.13	0.48
3:A:224:U:O4	3:A:232:G:N2	2.47	0.48
3:A:1670:C:O2	3:A:1993:U:O2'	2.12	0.48
3:A:2580:U:OP1	5:D:137:SER:OG	2.32	0.48
5:D:34:VAL:HA	5:D:50:VAL:HG12	1.96	0.48
3:A:322:A:OP1	6:E:162:ARG:NE	2.47	0.47
3:A:1275:A:N1	3:A:1295:C:O2'	2.38	0.47
3:A:1466:U:O3'	3:A:1546:G:O2'	2.32	0.47
3:A:372:G:HO2'	3:A:373:U:P	2.36	0.47
3:A:994:C:OP1	13:Q:52:ARG:NH2	2.47	0.47
3:A:1020:A:H4'	3:A:1021:A:O5'	2.14	0.47
17:U:98:ASN:O	17:U:98:ASN:CG	2.57	0.47
11:N:44:LEU:HD21	11:N:48:VAL:HG11	1.95	0.47
3:A:1233:C:C2	3:A:1234:U:C5	3.02	0.47
3:A:2618:G:H21	5:D:155:VAL:HG21	1.80	0.47
12:P:56:SER:HG	12:P:75:THR:HG1	1.49	0.47
17:U:33:VAL:HG13	17:U:66:VAL:HG12	1.97	0.47
3:A:664:G:O2'	3:A:940:G:OP1	2.28	0.47
3:A:1138:G:N2	8:J:108:MET:SD	2.78	0.47
3:A:1568:G:OP2	4:C:62:ARG:NH2	2.48	0.47
3:A:1655:A:N6	3:A:2005:A:O2'	2.47	0.47
6:E:189:THR:OG1	6:E:191:ASP:OD1	2.20	0.47
5:D:34:VAL:HG22	5:D:50:VAL:HG12	1.96	0.47
6:E:7:ASP:OD1	6:E:8:ALA:N	2.45	0.47
3:A:548:G:C2'	3:A:549:G:O4'	2.63	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1024:G:OP2	3:A:1025:G:O2'	2.20	0.47
3:A:1790:C:H2'	3:A:1791:A:C8	2.50	0.47
3:A:1289:C:C2	3:A:1290:C:C5	3.03	0.47
3:A:1965:C:OP1	3:A:1966:A:O2'	2.33	0.46
18:X:64:ASP:OD1	18:X:65:THR:N	2.48	0.46
3:A:442:G:O4'	6:E:41:GLN:NE2	2.47	0.46
3:A:729:G:O2'	3:A:763:G:H4'	2.15	0.46
6:E:41:GLN:NE2	6:E:43:THR:OG1	2.46	0.46
11:N:103:ARG:O	11:N:107:ASN:N	2.48	0.46
12:P:47:ILE:HG22	12:P:99:LEU:HD12	1.96	0.46
3:A:299:A:O2'	3:A:300:A:O4'	2.30	0.46
3:A:488:G:H22	3:A:491:G:H5''	1.80	0.46
9:K:22:ILE:HD13	9:K:42:THR:HG23	1.98	0.46
9:K:37:ASP:OD1	9:K:38:ILE:N	2.49	0.46
3:A:1141:U:O2	3:A:1142:A:N6	2.49	0.46
3:A:1264:A:OP2	3:A:1265:A:O2'	2.16	0.46
3:A:1662:U:O2'	3:A:2687:U:OP1	2.31	0.46
3:A:1827:U:OP1	3:A:1971:U:O2'	2.30	0.46
3:A:45:G:H5''	3:A:46:G:H5'	1.98	0.46
3:A:222:A:H61	3:A:232:G:H1'	1.80	0.46
3:A:549:G:HO2'	3:A:550:C:P	2.39	0.46
3:A:851:C:O2'	20:Z:42:ALA:O	2.33	0.46
3:A:1326:U:O2'	3:A:2010:G:O2'	2.27	0.46
3:A:2580:U:H2'	3:A:2581:G:C4	2.51	0.46
20:Z:23:LEU:HG	20:Z:53:MET:HE1	1.97	0.46
3:A:475:C:O2	3:A:479:A:N6	2.49	0.46
3:A:1024:G:H1'	3:A:1144:A:O2'	2.16	0.46
3:A:1235:G:O3'	3:A:1236:G:O4'	2.34	0.46
3:A:1258:U:O4'	6:E:79:ARG:CZ	2.64	0.46
5:D:98:VAL:HG22	5:D:98:VAL:O	2.15	0.46
15:S:76:VAL:HG22	15:S:103:ILE:HG23	1.97	0.46
3:A:995:C:O2'	13:Q:92:LYS:NZ	2.46	0.46
5:D:24:VAL:CG1	5:D:178:VAL:HG21	2.46	0.46
8:J:32:LEU:HD22	8:J:54:ILE:HG21	1.97	0.46
13:Q:82:LEU:HD11	13:Q:108:LEU:HD12	1.96	0.46
3:A:639:U:C2	3:A:640:C:C5	3.04	0.46
3:A:729:G:O4'	4:C:206:LYS:NZ	2.46	0.46
3:A:1287:A:O2'	3:A:1288:G:O5'	2.33	0.46
3:A:1353:A:OP2	3:A:1377:G:N1	2.42	0.46
3:A:2073:C:H5''	4:C:227:VAL:HG12	1.98	0.46
3:A:2653:U:OP2	3:A:2654:A:O2'	2.19	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
17:U:27:VAL:HG12	17:U:33:VAL:HG12	1.98	0.46
3:A:458:G:O2'	3:A:459:U:O5'	2.34	0.45
3:A:1142:A:C4	3:A:1144:A:N7	2.84	0.45
3:A:1145:C:C2	3:A:1146:C:C5	3.03	0.45
3:A:1359:A:OP2	3:A:1371:G:N1	2.48	0.45
5:D:4:LEU:HD13	5:D:101:PHE:CE2	2.51	0.45
15:S:20:VAL:HG21	15:S:43:ALA:HB3	1.97	0.45
15:S:71:VAL:HG12	15:S:107:VAL:CG1	2.40	0.45
1:O:31:LYS:HG3	1:O:32:THR:HG23	1.97	0.45
3:A:48:G:N2	3:A:177:G:OP2	2.49	0.45
5:D:186:LEU:CD2	12:P:7:LEU:HD21	2.47	0.45
3:A:549:G:O2'	3:A:550:C:OP1	2.33	0.45
3:A:1296:G:OP1	3:A:2709:G:O2'	2.17	0.45
3:A:1737:G:O3'	3:A:1738:G:O4'	2.35	0.45
3:A:1290:C:C2	3:A:1291:C:C5	3.05	0.45
3:A:1322:A:N1	3:A:1333:G:O2'	2.40	0.45
4:C:106:PRO:HD2	4:C:109:LEU:HD22	1.98	0.45
5:D:122:VAL:HG11	5:D:129:THR:HG22	1.99	0.45
16:T:4:GLU:O	16:T:8:LEU:HD23	2.16	0.45
18:X:6:VAL:HG21	18:X:58:ILE:HD11	1.98	0.45
9:K:30:ARG:NH2	9:K:32:TYR:O	2.50	0.45
3:A:2720:U:C2	3:A:2721:A:C8	3.05	0.45
3:A:1007:C:P	3:A:1008:A:HO2'	2.29	0.45
3:A:1153:C:OP1	13:Q:91:ARG:NH1	2.41	0.45
3:A:2751:G:OP1	3:A:2751:G:N2	2.43	0.45
8:J:26:GLY:O	8:J:30:THR:HG23	2.16	0.45
3:A:1432:G:H2'	3:A:1433:A:C8	2.52	0.45
3:A:1601:G:H2'	3:A:1602:U:O4'	2.16	0.45
3:A:1697:G:P	3:A:1698:A:HO2'	2.30	0.45
3:A:582:A:N6	3:A:1259:G:O6	2.50	0.44
3:A:1022:G:H1'	3:A:1023:U:OP2	2.17	0.44
3:A:1733:G:C2	3:A:1734:G:N7	2.85	0.44
12:P:3:ILE:HD12	12:P:3:ILE:H	1.81	0.44
3:A:1378:A:C4'	3:A:1379:U:OP1	2.66	0.44
3:A:2645:G:H3'	3:A:2646:C:H5'	1.99	0.44
5:D:16:THR:OG1	5:D:20:VAL:HG22	2.17	0.44
3:A:1141:U:H4'	3:A:1142:A:O4'	2.17	0.44
3:A:1671:U:N3	3:A:1674:G:OP2	2.45	0.44
3:A:458:G:HO2'	3:A:459:U:P	2.40	0.44
3:A:548:G:HO2'	3:A:549:G:P	2.36	0.44
3:A:1268:A:H1'	3:A:2013:A:H61	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1344:U:H3'	3:A:1345:C:H5'	1.98	0.44
3:A:1557:C:OP2	3:A:1558:C:O2'	2.30	0.44
3:A:2220:U:O2'	7:H:97:ARG:NH2	2.50	0.44
3:A:2652:C:H2'	3:A:2653:U:O4'	2.18	0.44
3:A:2655:G:O2'	3:A:2656:U:P	2.75	0.44
5:D:11:MET:SD	5:D:11:MET:N	2.90	0.44
11:N:44:LEU:HD22	11:N:113:ILE:HD13	2.00	0.44
3:A:306:U:H2'	3:A:307:G:O4'	2.17	0.44
3:A:1319:C:N4	3:A:1334:G:O6	2.50	0.44
3:A:2679:A:N6	3:A:2729:G:O6	2.51	0.44
3:A:1754:A:N1	3:A:2716:C:O2'	2.49	0.44
7:H:103:VAL:HG12	7:H:108:VAL:O	2.18	0.44
9:K:58:LEU:N	9:K:58:LEU:HD23	2.32	0.44
16:T:37:ASP:O	16:T:81:LYS:NZ	2.49	0.44
1:O:42:ILE:HG22	1:O:48:TYR:HB2	2.00	0.44
3:A:981:A:OP2	3:A:982:C:N4	2.48	0.44
3:A:1790:C:O2'	4:C:207:ALA:HB2	2.17	0.44
11:N:70:THR:O	11:N:71:ARG:C	2.61	0.44
17:U:10:VAL:HG12	17:U:71:ILE:HD13	1.99	0.44
17:U:85:ARG:NH2	17:U:101:THR:OG1	2.49	0.44
3:A:1754:A:HO2'	12:P:102:ARG:NH2	2.15	0.44
3:A:1788:C:C2	3:A:1789:A:C8	3.06	0.44
3:A:2092:U:OP1	3:A:2199:A:O2'	2.34	0.44
3:A:2552:U:H3'	3:A:2552:U:O2	2.18	0.44
13:Q:49:ARG:CZ	13:Q:49:ARG:HB3	2.48	0.44
3:A:725:G:O3'	3:A:726:G:O4'	2.35	0.43
5:D:24:VAL:HG12	5:D:178:VAL:HG21	1.99	0.43
10:L:77:ILE:N	10:L:77:ILE:HD12	2.33	0.43
3:A:584:C:N4	3:A:585:G:O6	2.50	0.43
3:A:1012:U:O2	8:J:27:ARG:NH1	2.50	0.43
3:A:1542:U:H2'	3:A:1543:G:O4'	2.18	0.43
13:Q:60:TRP:O	13:Q:64:ILE:HG12	2.18	0.43
15:S:51:LEU:O	15:S:51:LEU:HD23	2.18	0.43
17:U:97:SER:O	17:U:98:ASN:OD1	2.35	0.43
3:A:582:A:OP1	13:Q:13:HIS:ND1	2.48	0.43
3:A:729:G:C2	3:A:1775:U:H1'	2.54	0.43
3:A:993:G:H3'	13:Q:49:ARG:HH21	1.83	0.43
3:A:1224:U:H4'	3:A:1225:G:OP1	2.17	0.43
3:A:2822:G:O2'	3:A:2824:C:OP2	2.32	0.43
4:C:103:ILE:HG22	4:C:104:LEU:N	2.34	0.43
8:J:59:ALA:HB1	8:J:101:ILE:HD13	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
15:S:3:THR:HG21	15:S:58:ALA:CA	2.48	0.43
3:A:603:A:N6	3:A:655:A:O4'	2.50	0.43
3:A:645:C:H2'	3:A:647:G:C8	2.53	0.43
3:A:2089:C:N4	3:A:2090:A:H62	2.16	0.43
3:A:2834:G:O2'	3:A:2835:A:O5'	2.35	0.43
7:H:5:LEU:HD12	7:H:5:LEU:N	2.34	0.43
8:J:100:VAL:HG23	8:J:101:ILE:N	2.33	0.43
19:Y:11:VAL:HG23	19:Y:12:GLU:N	2.34	0.43
3:A:499:U:H2'	3:A:500:G:O4'	2.17	0.43
3:A:1433:A:H61	3:A:1560:G:H1	1.67	0.43
3:A:2076:U:OP2	3:A:2238:G:N2	2.44	0.43
3:A:2647:U:O2	3:A:2673:G:O6	2.35	0.43
3:A:2405:G:O2'	3:A:2412:A:N6	2.50	0.43
14:R:37:GLU:OE1	14:R:37:GLU:N	2.48	0.43
10:L:95:LEU:HD23	10:L:101:ILE:HD13	2.01	0.43
3:A:542:C:N4	3:A:543:G:O6	2.52	0.43
3:A:704:G:O2'	3:A:727:A:N6	2.46	0.43
3:A:1225:G:O2'	3:A:1226:A:O4'	2.35	0.43
3:A:1794:A:N6	3:A:1826:G:O6	2.52	0.43
3:A:2848:G:O2'	3:A:2868:A:N6	2.50	0.43
15:S:27:LYS:O	15:S:71:VAL:HG22	2.19	0.43
3:A:554:U:H2'	3:A:555:G:O4'	2.19	0.42
3:A:579:G:C6	3:A:1262:A:N6	2.87	0.42
3:A:636:G:C2	10:L:111:ILE:HD12	2.54	0.42
3:A:754:U:C2	3:A:755:U:C5	3.07	0.42
3:A:831:G:H2'	3:A:832:U:O4'	2.19	0.42
3:A:1003:G:O2'	3:A:1010:A:N1	2.47	0.42
3:A:2399:G:C6	3:A:2418:A:C6	3.06	0.42
6:E:149:ILE:HG23	6:E:149:ILE:O	2.19	0.42
13:Q:108:LEU:HD22	14:R:48:LYS:NZ	2.34	0.42
14:R:58:VAL:N	14:R:102:SER:OG	2.49	0.42
3:A:279:A:N6	3:A:361:G:O2'	2.51	0.42
3:A:2000:C:OP1	11:N:5:LYS:NZ	2.51	0.42
1:O:12:ARG:NH2	3:A:517:C:OP1	2.52	0.42
3:A:213:A:H2'	3:A:214:G:C8	2.54	0.42
4:C:220:ARG:NH1	4:C:222:THR:OG1	2.53	0.42
13:Q:78:PHE:O	13:Q:82:LEU:HD23	2.19	0.42
3:A:24:G:C2	3:A:25:U:C5	3.07	0.42
3:A:245:G:O2'	3:A:384:A:N1	2.47	0.42
3:A:1664:A:H61	3:A:1996:C:N4	2.17	0.42
3:A:1890:A:N1	3:A:2234:G:O2'	2.46	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:K:58:LEU:HD11	9:K:86:LEU:HD12	2.01	0.42
9:K:80:ASP:OD2	12:P:61:ARG:NH2	2.52	0.42
10:L:5:THR:HG22	10:L:5:THR:O	2.18	0.42
3:A:357:C:C2	3:A:358:U:C5	3.06	0.42
3:A:511:U:O4	3:A:512:G:N1	2.52	0.42
4:C:15:VAL:HG22	4:C:205:GLY:HA3	2.00	0.42
11:N:56:LYS:NZ	11:N:87:PHE:O	2.53	0.42
3:A:428:A:C2'	3:A:429:A:O5'	2.68	0.42
3:A:640:C:N4	3:A:649:G:O6	2.53	0.42
3:A:704:G:H22	3:A:726:G:H1'	1.85	0.42
3:A:729:G:P	4:C:12:ARG:HG2	2.60	0.42
3:A:1734:G:C2	3:A:1735:A:N7	2.88	0.42
3:A:2564:A:C2	3:A:2647:U:H4'	2.55	0.42
9:K:9:ASN:OD1	9:K:18:ARG:NH1	2.43	0.42
3:A:570:G:C1'	3:A:983:A:N6	2.82	0.42
3:A:1282:U:H3	3:A:1286:A:H62	1.68	0.42
3:A:1738:G:HO2'	3:A:1739:A:C5'	2.32	0.42
3:A:2544:G:H4'	3:A:2645:G:P	2.60	0.42
5:D:25:THR:HG21	5:D:193:VAL:HG22	2.01	0.42
16:T:89:GLU:OE1	16:T:89:GLU:N	2.45	0.42
3:A:733:G:N2	3:A:734:A:N7	2.68	0.42
1:0:24:VAL:HG23	1:0:25:THR:N	2.35	0.42
3:A:756:A:H2'	3:A:757:G:O4'	2.19	0.42
3:A:2687:U:H2'	3:A:2688:G:O4'	2.20	0.42
12:P:12:MET:HE2	12:P:54:LEU:N	2.35	0.42
15:S:76:VAL:HG12	15:S:77:ASP:N	2.34	0.42
3:A:550:C:H2'	3:A:551:G:H8	1.84	0.42
3:A:1184:U:OP2	20:Z:30:ARG:NH2	2.53	0.41
3:A:1197:G:N2	3:A:1249:U:O2'	2.53	0.41
3:A:1518:C:N4	3:A:1519:G:O6	2.53	0.41
3:A:1847:G:O2'	3:A:1848:A:O5'	2.37	0.41
3:A:2786:U:O2'	5:D:63:PRO:O	2.38	0.41
5:D:181:ASP:OD2	5:D:184:ARG:NH2	2.53	0.41
13:Q:85:ALA:O	13:Q:86:SER:OG	2.27	0.41
15:S:77:ASP:OD1	15:S:78:GLU:N	2.52	0.41
16:T:8:LEU:HD22	16:T:49:LYS:NZ	2.35	0.41
3:A:457:A:N7	3:A:472:A:N6	2.67	0.41
3:A:1301:A:H2'	3:A:1301:A:N3	2.35	0.41
3:A:1684:G:C6	3:A:1705:A:N6	2.87	0.41
3:A:2831:G:N2	3:A:2884:U:OP2	2.53	0.41
4:C:60:ALA:O	4:C:62:ARG:NH1	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
18:X:42:GLU:OE1	18:X:42:GLU:N	2.52	0.41
3:A:711:G:C6	3:A:721:A:C6	3.09	0.41
3:A:1386:C:H2'	3:A:1387:A:H8	1.84	0.41
3:A:1561:C:C2	3:A:1562:U:C5	3.08	0.41
4:C:102:TYR:O	4:C:103:ILE:HD13	2.21	0.41
12:P:67:GLU:N	12:P:67:GLU:OE1	2.53	0.41
9:K:106:GLU:OE1	9:K:106:GLU:N	2.53	0.41
2:2:18:PHE:CE1	2:2:31:LEU:HD13	2.56	0.41
3:A:371:A:H61	3:A:401:A:H3'	1.84	0.41
3:A:750:A:OP1	3:A:1615:C:N4	2.50	0.41
3:A:1346:G:N1	3:A:1601:G:C6	2.88	0.41
3:A:1807:G:N2	3:A:1810:A:OP2	2.37	0.41
10:L:30:THR:O	10:L:33:ARG:NE	2.53	0.41
3:A:1023:U:OP2	3:A:1024:G:N7	2.53	0.41
3:A:1856:U:H2'	3:A:1857:G:O4'	2.21	0.41
3:A:2679:A:H2'	3:A:2680:U:C6	2.55	0.41
3:A:2840:C:H5'	11:N:53:THR:HG21	2.01	0.41
11:N:24:MET:HE1	11:N:40:LYS:HB3	2.02	0.41
3:A:6:A:N3	8:J:135:GLN:NE2	2.69	0.41
3:A:1287:A:C2'	3:A:1288:G:O5'	2.69	0.41
3:A:1541:C:H2'	3:A:1542:U:O4'	2.21	0.41
3:A:2508:G:O6	3:A:2581:G:N7	2.54	0.41
3:A:2756:U:H4'	3:A:2757:A:OP1	2.19	0.41
16:T:10:VAL:HG23	16:T:11:LEU:N	2.36	0.41
3:A:707:G:O6	3:A:725:G:C2	2.74	0.41
3:A:1262:A:C6	3:A:1263:U:C4	3.09	0.41
3:A:2574:G:O2'	5:D:148:GLN:O	2.31	0.41
12:P:3:ILE:O	12:P:7:LEU:HG	2.20	0.41
1:0:14:MET:SD	3:A:2045:C:O3'	2.78	0.41
2:2:1:MET:N	3:A:1619:G:O2'	2.53	0.41
3:A:216:A:C8	3:A:432:A:N6	2.89	0.41
3:A:768:G:N2	3:A:1379:U:O2'	2.50	0.41
3:A:969:G:H2'	3:A:970:U:C6	2.56	0.41
3:A:1558:C:O4'	3:A:1560:G:C8	2.74	0.41
3:A:1652:A:H2'	3:A:1653:G:O4'	2.21	0.41
3:A:2506[A]:U:OP2	3:A:2576:G:N1	2.41	0.41
3:A:2725:A:H2'	3:A:2726:A:H2'	2.02	0.41
6:E:105:LEU:O	6:E:109:LEU:HD23	2.21	0.41
15:S:24:ILE:HD13	15:S:36:LEU:HD11	2.02	0.41
17:U:40:LEU:HD12	17:U:59:GLU:HG3	2.02	0.41
19:Y:9:LYS:N	19:Y:12:GLU:OE2	2.48	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:549:G:C2'	3:A:550:C:O5'	2.68	0.41
3:A:1952:A:C8	9:K:42:THR:HG21	2.56	0.41
4:C:145:MET:HE1	4:C:152:GLN:HB2	2.03	0.41
13:Q:65:ASN:OD1	13:Q:69:ARG:NE	2.54	0.41
16:T:93:LEU:HD12	16:T:93:LEU:C	2.46	0.41
3:A:664:G:OP2	10:L:17:LYS:NZ	2.54	0.40
3:A:1025:G:N2	3:A:1139:G:O6	2.52	0.40
3:A:1720:U:H2'	3:A:1721:G:O4'	2.20	0.40
5:D:20:VAL:HG12	9:K:72:PRO:HB2	2.02	0.40
18:X:6:VAL:HG23	18:X:50:VAL:HG12	2.03	0.40
3:A:1336:A:OP2	16:T:68:LYS:NZ	2.38	0.40
3:A:2098:U:O2	3:A:2098:U:H2'	2.21	0.40
13:Q:67:ALA:HB1	13:Q:105:PHE:CE2	2.57	0.40
3:A:669:G:C2	3:A:801:G:C6	3.09	0.40
3:A:2050:C:H2'	3:A:2051:A:O4'	2.21	0.40
6:E:132:LYS:NZ	6:E:136:GLN:OE1	2.54	0.40
12:P:3:ILE:HD12	12:P:3:ILE:N	2.36	0.40
14:R:98:ILE:HG23	14:R:98:ILE:O	2.21	0.40
15:S:17:VAL:HG13	15:S:76:VAL:HG21	2.03	0.40
3:A:476:G:C4	3:A:478:A:OP2	2.74	0.40
3:A:1264:A:O5'	3:A:1265:A:H2'	2.21	0.40
4:C:193:GLU:OE1	4:C:193:GLU:N	2.54	0.40
3:A:285:G:C6	3:A:356:G:C5	3.09	0.40
3:A:1288:G:OP1	3:A:1289:C:N4	2.49	0.40
3:A:1425:G:H2'	3:A:1426:G:O4'	2.22	0.40
8:J:84:ILE:O	8:J:84:ILE:HG23	2.21	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	54/56 (96%)	52 (96%)	2 (4%)	0	100	100
2	2	44/46 (96%)	44 (100%)	0	0	100	100
4	C	256/271 (94%)	247 (96%)	9 (4%)	0	100	100
5	D	207/209 (99%)	194 (94%)	13 (6%)	0	100	100
6	E	199/201 (99%)	192 (96%)	6 (3%)	1 (0%)	24	58
7	H	147/149 (99%)	138 (94%)	9 (6%)	0	100	100
8	J	140/142 (99%)	139 (99%)	1 (1%)	0	100	100
9	K	120/122 (98%)	117 (98%)	3 (2%)	0	100	100
10	L	141/143 (99%)	128 (91%)	13 (9%)	0	100	100
11	N	118/120 (98%)	110 (93%)	8 (7%)	0	100	100
12	P	112/114 (98%)	111 (99%)	1 (1%)	0	100	100
13	Q	115/117 (98%)	111 (96%)	4 (4%)	0	100	100
14	R	101/103 (98%)	96 (95%)	4 (4%)	1 (1%)	12	44
15	S	109/110 (99%)	104 (95%)	5 (5%)	0	100	100
16	T	91/93 (98%)	87 (96%)	4 (4%)	0	100	100
17	U	100/102 (98%)	89 (89%)	11 (11%)	0	100	100
18	X	75/77 (97%)	75 (100%)	0	0	100	100
19	Y	61/63 (97%)	57 (93%)	4 (7%)	0	100	100
20	Z	56/58 (97%)	55 (98%)	1 (2%)	0	100	100
All	All	2246/2296 (98%)	2146 (96%)	98 (4%)	2 (0%)	49	79

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
14	R	54	VAL
6	E	83	VAL

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	0	47/47 (100%)	47 (100%)	0	100	100
2	2	38/38 (100%)	37 (97%)	1 (3%)	40	63
4	C	210/216 (97%)	210 (100%)	0	100	100
5	D	164/164 (100%)	163 (99%)	1 (1%)	78	79
6	E	165/165 (100%)	165 (100%)	0	100	100
7	H	114/114 (100%)	113 (99%)	1 (1%)	70	75
8	J	116/116 (100%)	116 (100%)	0	100	100
9	K	103/103 (100%)	101 (98%)	2 (2%)	50	67
10	L	102/102 (100%)	101 (99%)	1 (1%)	68	75
11	N	100/100 (100%)	99 (99%)	1 (1%)	68	75
12	P	99/99 (100%)	99 (100%)	0	100	100
13	Q	89/89 (100%)	86 (97%)	3 (3%)	32	58
14	R	84/84 (100%)	83 (99%)	1 (1%)	63	73
15	S	94/93 (101%)	94 (100%)	0	100	100
16	T	80/80 (100%)	80 (100%)	0	100	100
17	U	83/83 (100%)	83 (100%)	0	100	100
18	X	67/67 (100%)	67 (100%)	0	100	100
19	Y	55/55 (100%)	55 (100%)	0	100	100
20	Z	48/48 (100%)	46 (96%)	2 (4%)	26	52
All	All	1858/1863 (100%)	1845 (99%)	13 (1%)	73	77

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	2	22	MET
5	D	11	MET
7	H	122	LEU
9	K	40	LYS
9	K	106	GLU
10	L	127	VAL
11	N	51	LEU
13	Q	19	GLN
13	Q	71	ASN
13	Q	83	LYS
14	R	82	HIS
20	Z	6	ILE

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Mol	Chain	Res	Type
20	Z	39	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
2	2	26	ASN
4	C	52	HIS
4	C	133	ASN
4	C	152	GLN
5	D	134	HIS
5	D	167	ASN
5	D	173	GLN
6	E	29	HIS
6	E	41	GLN
6	E	62	GLN
7	H	18	GLN
8	J	128	ASN
11	N	81	ASN
15	S	9	HIS
17	U	39	ASN
18	X	5	GLN
19	Y	15	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	A	2530/2903 (87%)	380 (15%)	14 (0%)

All (380) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	A	10	A
3	A	27	G
3	A	28	A
3	A	34	U
3	A	35	G
3	A	45	G
3	A	46	G
3	A	50	U
3	A	51	G

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Mol	Chain	Res	Type
3	A	60	G
3	A	63	A
3	A	71	A
3	A	74	A
3	A	75	G
3	A	114	U
3	A	118	A
3	A	120	U
3	A	126	A
3	A	137	U
3	A	139	U
3	A	141	G
3	A	142	A
3	A	162	U
3	A	163	C
3	A	181	A
3	A	196	A
3	A	199	A
3	A	216	A
3	A	221	A
3	A	222	A
3	A	225	C
3	A	228	C
3	A	243	U
3	A	248	G
3	A	255	A
3	A	266	G
3	A	267	C
3	A	272	A
3	A	277	G
3	A	278	A
3	A	294	A
3	A	310	A
3	A	322	A
3	A	323	C
3	A	324	A
3	A	329	G
3	A	330	A
3	A	345	A
3	A	362	A
3	A	371	A
3	A	372	G

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Mol	Chain	Res	Type
3	A	373	U
3	A	386	G
3	A	387	U
3	A	401	A
3	A	404	A
3	A	406	G
3	A	411	G
3	A	417	C
3	A	424	G
3	A	429	A
3	A	435	C
3	A	451	U
3	A	456	C
3	A	457	A
3	A	458	G
3	A	459	U
3	A	465	G
3	A	473	G
3	A	480	A
3	A	481	G
3	A	491	G
3	A	505	A
3	A	509	C
3	A	530	G
3	A	532	A
3	A	533	G
3	A	544	C
3	A	545	U
3	A	547	A
3	A	550	C
3	A	563	A
3	A	573	U
3	A	575	A
3	A	588	U
3	A	603	A
3	A	614	A
3	A	621	A
3	A	627	A
3	A	637	A
3	A	643	A
3	A	646	U
3	A	647	G

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Mol	Chain	Res	Type
3	A	653	U
3	A	654	A
3	A	663	G
3	A	668	A
3	A	669	G
3	A	670	A
3	A	683	U
3	A	686	U
3	A	687	C
3	A	695	G
3	A	704	G
3	A	717	C
3	A	726	G
3	A	730	A
3	A	740	C
3	A	747	C
3	A	748	G
3	A	752	A
3	A	775	G
3	A	776	G
3	A	782	A
3	A	784	G
3	A	785	G
3	A	789	A
3	A	805	G
3	A	812	C
3	A	819	A
3	A	827	U
3	A	828	U
3	A	830	G
3	A	845	A
3	A	846	U
3	A	847	U
3	A	856	G
3	A	931	U
3	A	941	A
3	A	946	C
3	A	953	G
3	A	961	C
3	A	962	G
3	A	973	A
3	A	974	G

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Mol	Chain	Res	Type
3	A	980	A
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	1021	A
3	A	1023	U
3	A	1026	G
3	A	1033	U
3	A	1119	U
3	A	1130	U
3	A	1132	U
3	A	1135	C
3	A	1143	A
3	A	1157	G
3	A	1169	A
3	A	1174	U
3	A	1175	A
3	A	1176	U
3	A	1178	C
3	A	1180	U
3	A	1181	U
3	A	1206	G
3	A	1212	G
3	A	1225	G
3	A	1236	G
3	A	1250	G
3	A	1253	A
3	A	1256	G
3	A	1258	U
3	A	1271	G
3	A	1272	A
3	A	1273	U
3	A	1288	G
3	A	1300	G
3	A	1301	A
3	A	1302	A
3	A	1306	C

Continued on next page...

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Mol	Chain	Res	Type
3	A	1314	C
3	A	1329	U
3	A	1341	G
3	A	1345	C
3	A	1359	A
3	A	1365	A
3	A	1378	A
3	A	1379	U
3	A	1383	A
3	A	1395	A
3	A	1403	A
3	A	1416	G
3	A	1419	A
3	A	1420	A
3	A	1421	G
3	A	1428	C
3	A	1437	C
3	A	1454	C
3	A	1458	U
3	A	1461	C
3	A	1475	G
3	A	1482	G
3	A	1490	A
3	A	1491	G
3	A	1504	A
3	A	1508	A
3	A	1509	A
3	A	1515	A
3	A	1524	G
3	A	1535	A
3	A	1536	C
3	A	1559	U
3	A	1560	G
3	A	1569	A
3	A	1578	U
3	A	1585	C
3	A	1634	A
3	A	1646	C
3	A	1647	U
3	A	1648	U
3	A	1654	A
3	A	1674	G

Continued on next page...

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Mol	Chain	Res	Type
3	A	1715	G
3	A	1729	U
3	A	1730	C
3	A	1731	G
3	A	1732	C
3	A	1733	G
3	A	1735	A
3	A	1737	G
3	A	1738	G
3	A	1756	G
3	A	1764	C
3	A	1773	A
3	A	1776	G
3	A	1800	C
3	A	1801	A
3	A	1807	G
3	A	1808	A
3	A	1816	C
3	A	1829	A
3	A	1833	C
3	A	1865	U
3	A	1866	A
3	A	1871	A
3	A	1901	A
3	A	1906	G
3	A	1913	A
3	A	1917	U
3	A	1927	A
3	A	1929	G
3	A	1930	G
3	A	1937	A
3	A	1955	U
3	A	1963	U
3	A	1967	C
3	A	1970	A
3	A	1971	U
3	A	1972	G
3	A	1991	U
3	A	1992	G
3	A	1993	U
3	A	1997	C
3	A	2021	C

Continued on next page...

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Mol	Chain	Res	Type
3	A	2022	U
3	A	2023	C
3	A	2030	A
3	A	2031	A
3	A	2043	C
3	A	2046	G
3	A	2052	A
3	A	2055	C
3	A	2056	G
3	A	2069	G
3	A	2072	C
3	A	2093	G
3	A	2096	C
3	A	2100	G
3	A	2104	C
3	A	2110	G
3	A	2111	U
3	A	2112	G
3	A	2113	U
3	A	2118	U
3	A	2119	A
3	A	2125	G
3	A	2127	G
3	A	2131	U
3	A	2132	U
3	A	2133	G
3	A	2136	G
3	A	2137	U
3	A	2139	U
3	A	2145	C
3	A	2162	G
3	A	2164	C
3	A	2169	A
3	A	2172	U
3	A	2173	A
3	A	2175	C
3	A	2184	A
3	A	2189	U
3	A	2198	A
3	A	2204	G
3	A	2211	A
3	A	2213	U

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
3	A	2225	A
3	A	2226	C
3	A	2238	G
3	A	2239	G
3	A	2392	A
3	A	2396	G
3	A	2397	G
3	A	2399	G
3	A	2403	C
3	A	2406	A
3	A	2407	A
3	A	2424	C
3	A	2425	A
3	A	2428	G
3	A	2429	G
3	A	2430	A
3	A	2434	A
3	A	2435	A
3	A	2441	U
3	A	2513	A
3	A	2518	A
3	A	2520	C
3	A	2529	G
3	A	2535	G
3	A	2547	A
3	A	2554	U
3	A	2564	A
3	A	2566	A
3	A	2567	G
3	A	2572	A
3	A	2573	C
3	A	2610	C
3	A	2613	U
3	A	2614	A
3	A	2629	U
3	A	2636	C
3	A	2646	C
3	A	2655	G
3	A	2656	U
3	A	2682	A
3	A	2685	G
3	A	2689	U

Continued on next page...

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Mol	Chain	Res	Type
3	A	2690	U
3	A	2714	G
3	A	2718	G
3	A	2722	G
3	A	2726	A
3	A	2732	G
3	A	2733	A
3	A	2739	U
3	A	2744	G
3	A	2748	A
3	A	2762	C
3	A	2764	A
3	A	2765	A
3	A	2778	A
3	A	2779	U
3	A	2780	G
3	A	2791	G
3	A	2794	C
3	A	2799	A
3	A	2800	A
3	A	2809	A
3	A	2818	U
3	A	2820	A
3	A	2821	A
3	A	2833	U
3	A	2849	U
3	A	2867	G
3	A	2868	A
3	A	2871	U
3	A	2872	A
3	A	2880	C
3	A	2894	G
3	A	2901	C
3	A	2902	C
3	A	2903	U

All (14) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	A	227	A
3	A	242	G
3	A	372	G

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Continued from previous page...

Mol	Chain	Res	Type
3	A	458	G
3	A	549	G
3	A	784	G
3	A	1020	A
3	A	1022	G
3	A	1224	U
3	A	1358	G
3	A	1378	A
3	A	2391	G
3	A	2655	G
3	A	2808	G

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 oligosaccharides 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.

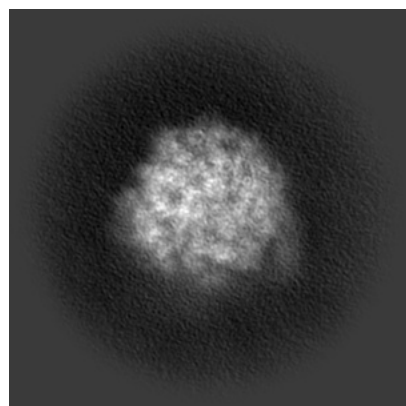
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-51838. These allow visual inspection of the internal detail of the map and identification of artifacts.

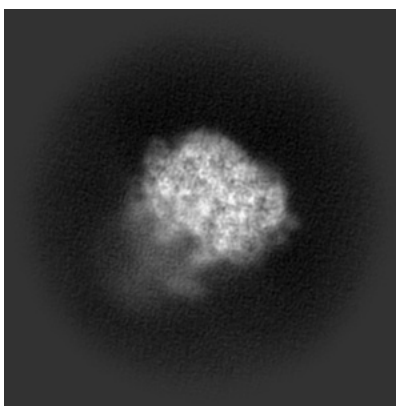
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

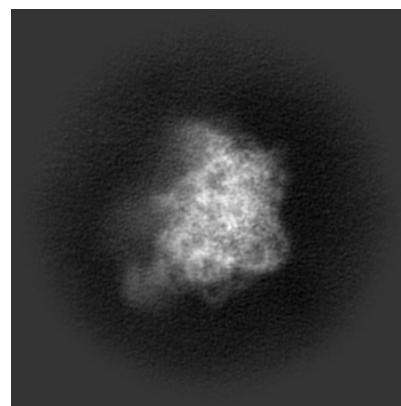
6.1.1 Primary map



X

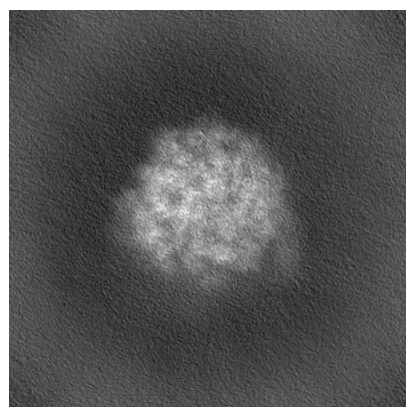


Y

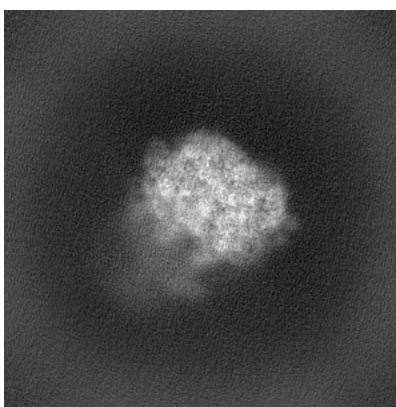


Z

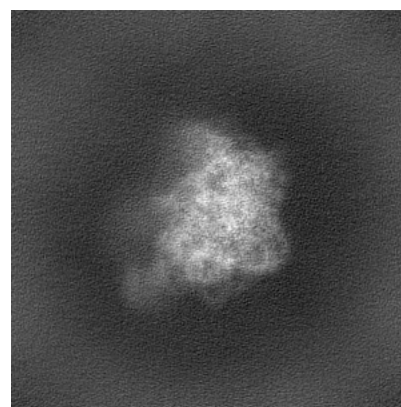
6.1.2 Raw map



X



Y

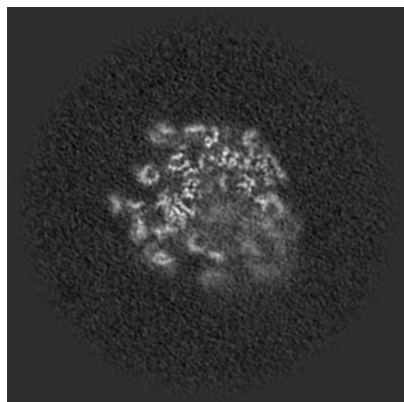


Z

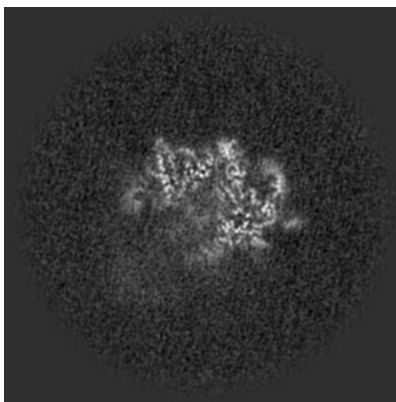
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

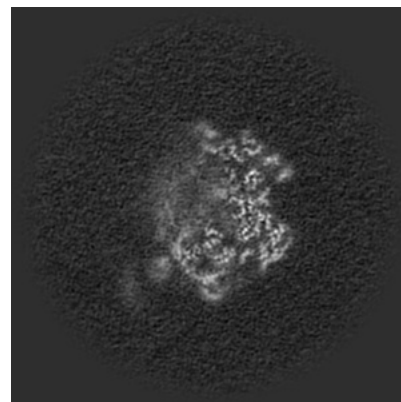
6.2.1 Primary map



X Index: 150

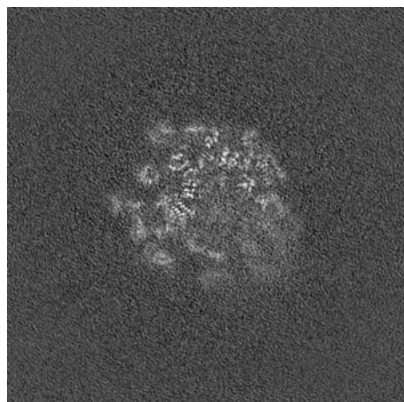


Y Index: 150

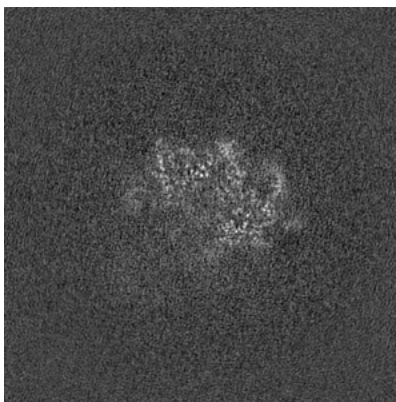


Z Index: 150

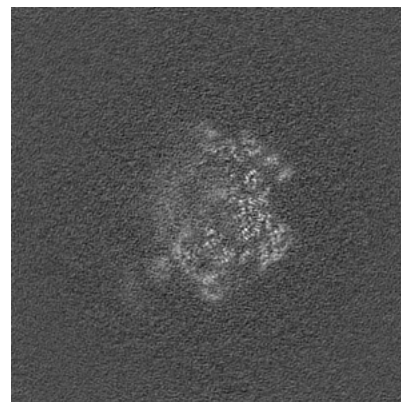
6.2.2 Raw map



X Index: 150



Y Index: 150

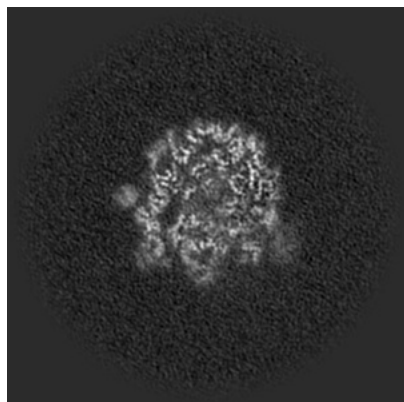


Z Index: 150

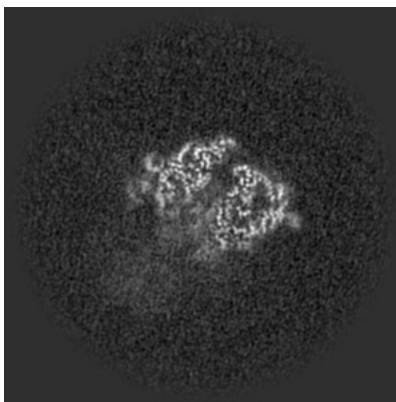
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

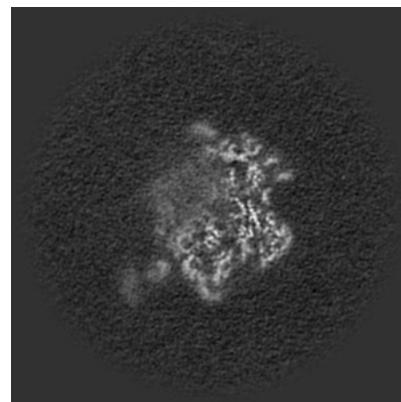
6.3.1 Primary map



X Index: 162

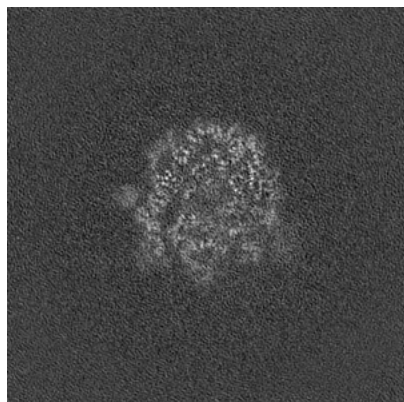


Y Index: 143

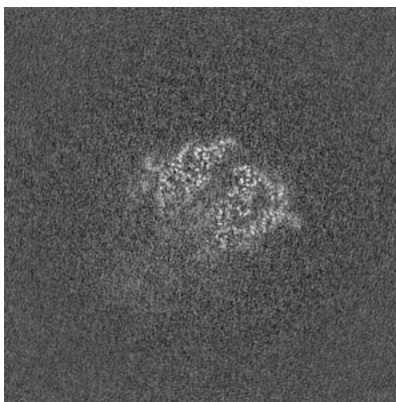


Z Index: 148

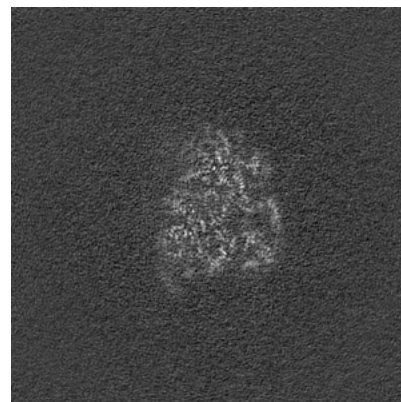
6.3.2 Raw map



X Index: 162



Y Index: 143

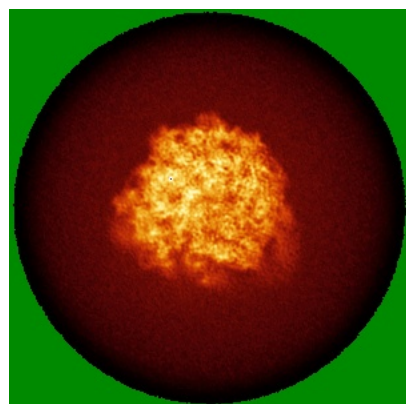


Z Index: 169

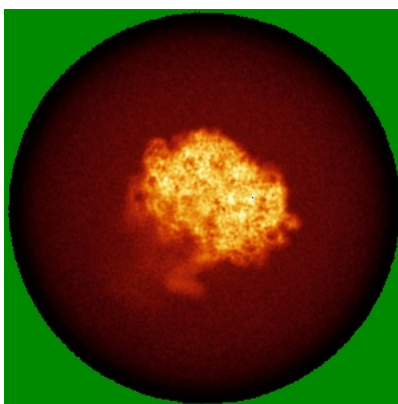
The images above show the largest variance slices of the map in three orthogonal directions.

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

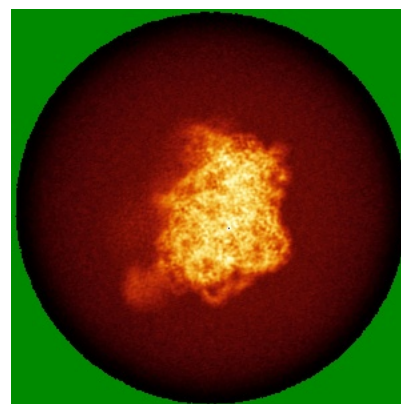
6.4.1 Primary map



X

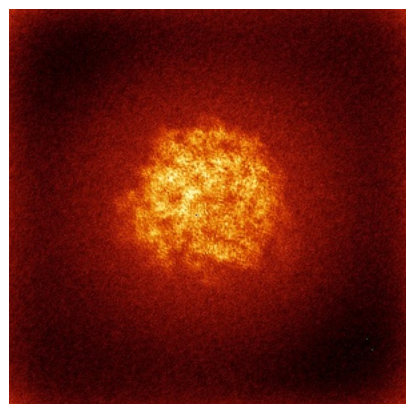


Y

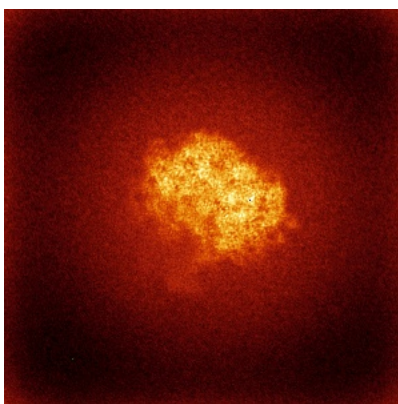


Z

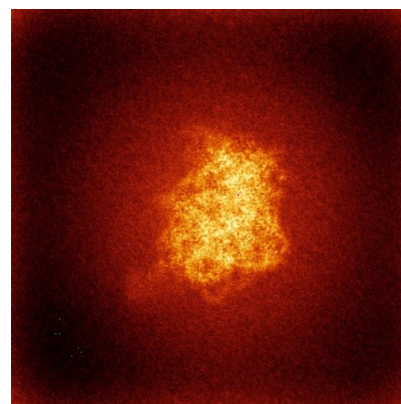
6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

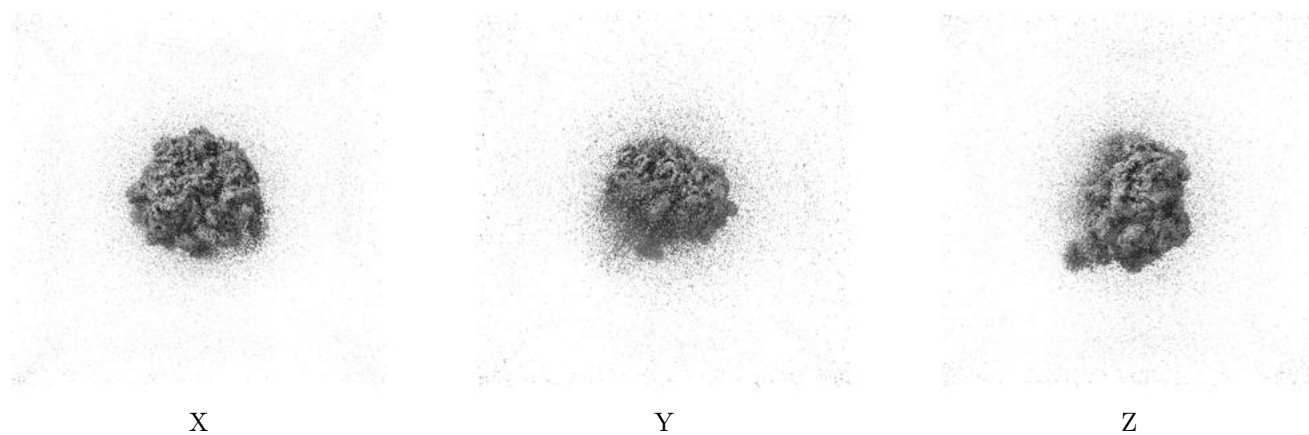
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.382. 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.

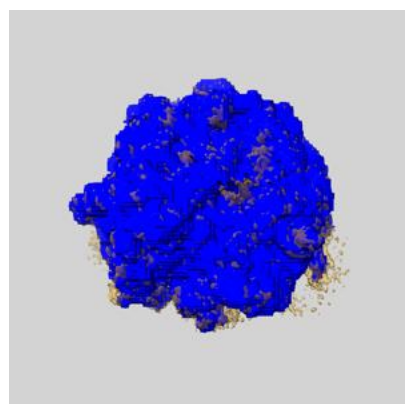
6.6 Mask visualisation [i](#)

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

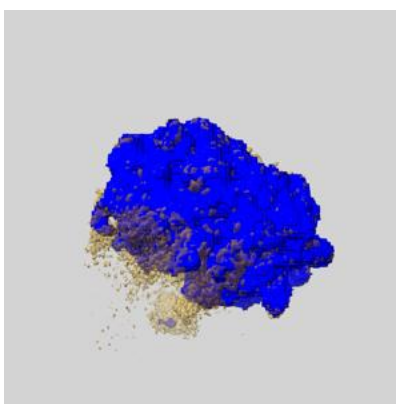
A mask typically either:

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

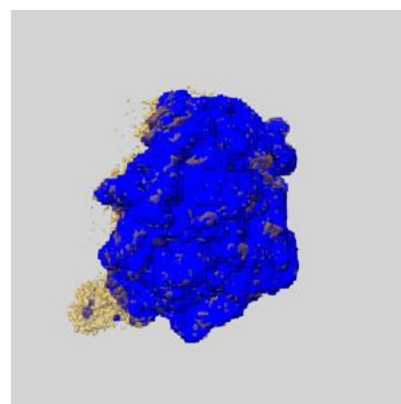
6.6.1 emd_51838_msk_1.map [i](#)



X



Y

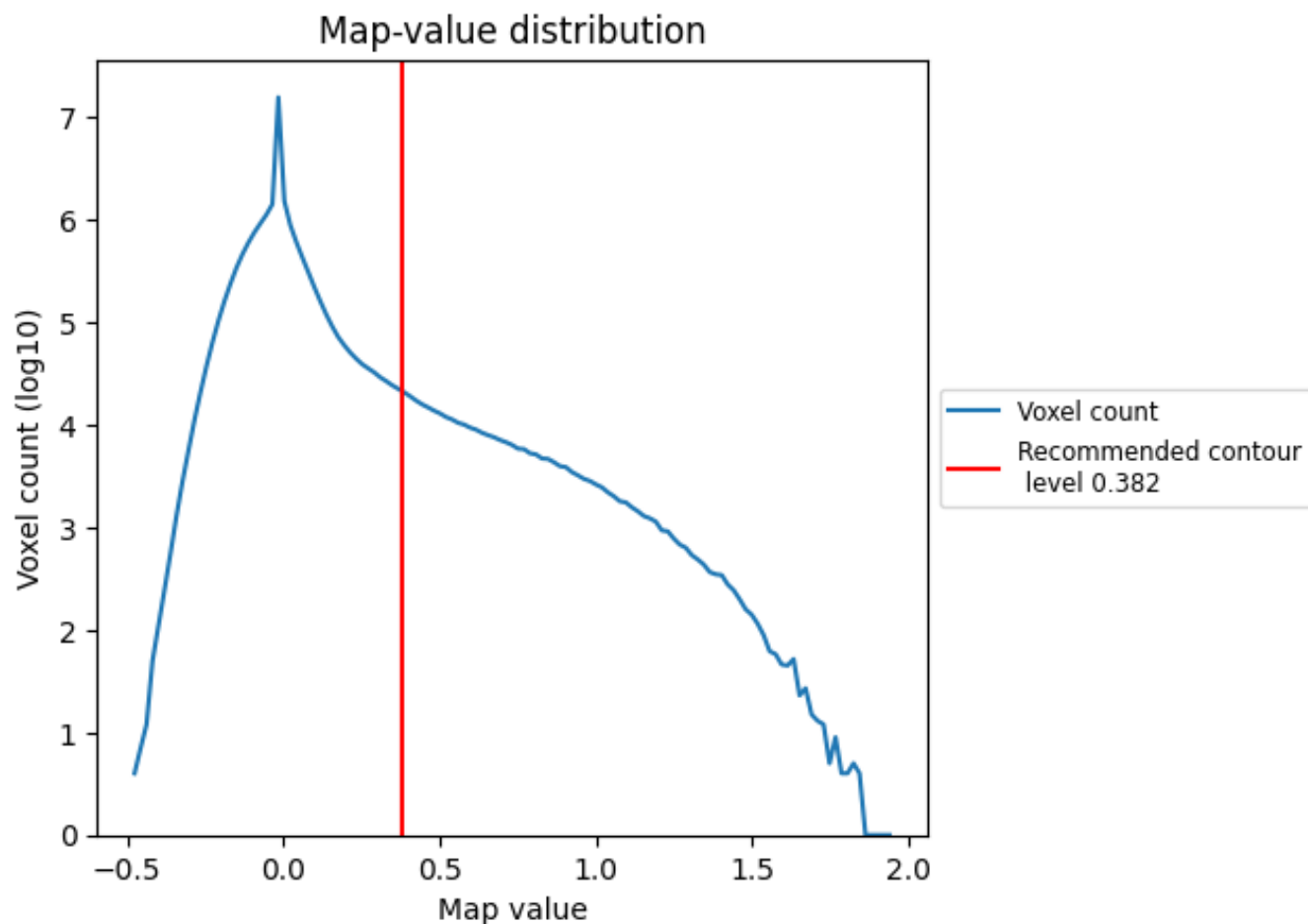


Z

7 Map analysis [i](#)

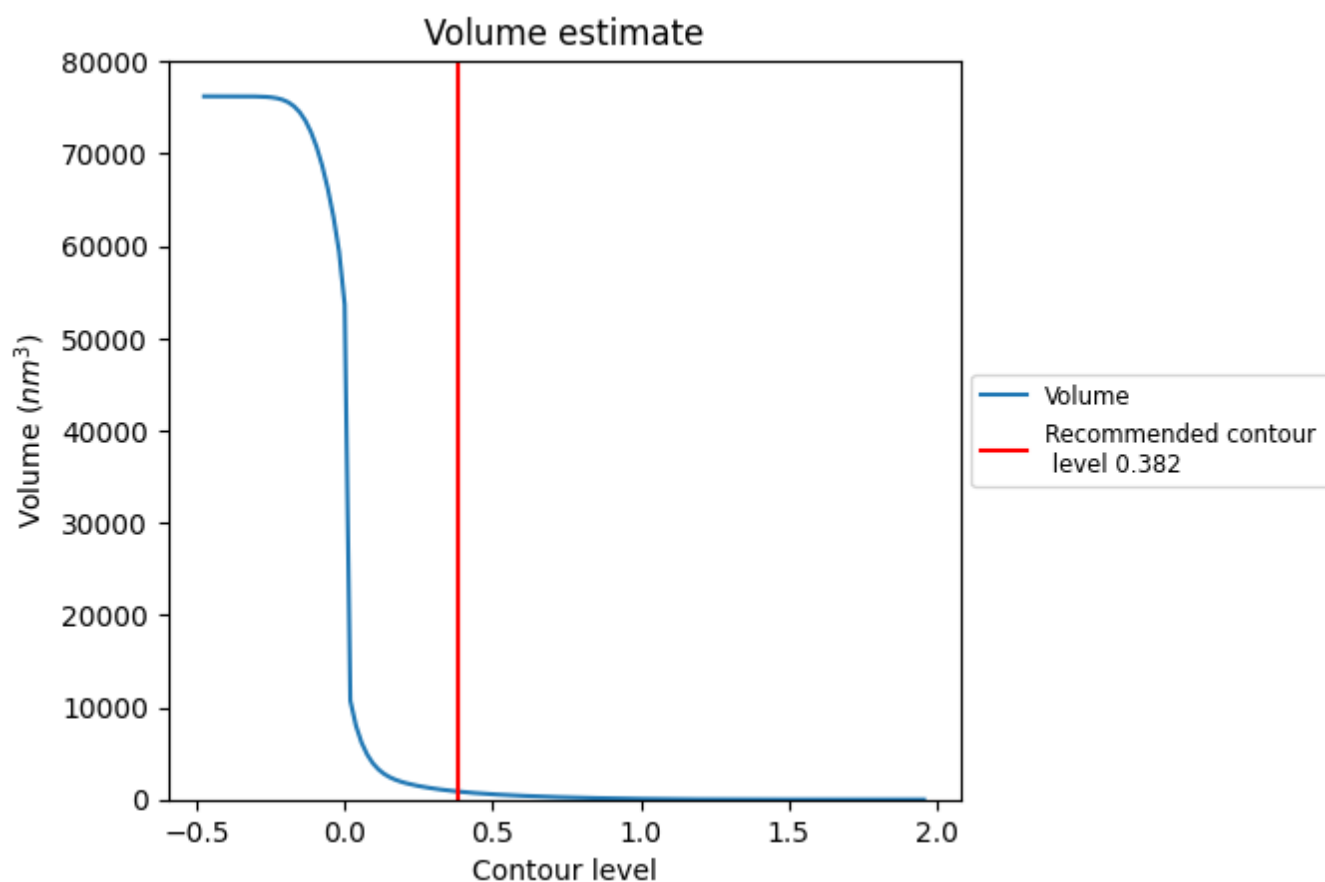
This section contains the results of statistical analysis of the map.

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.

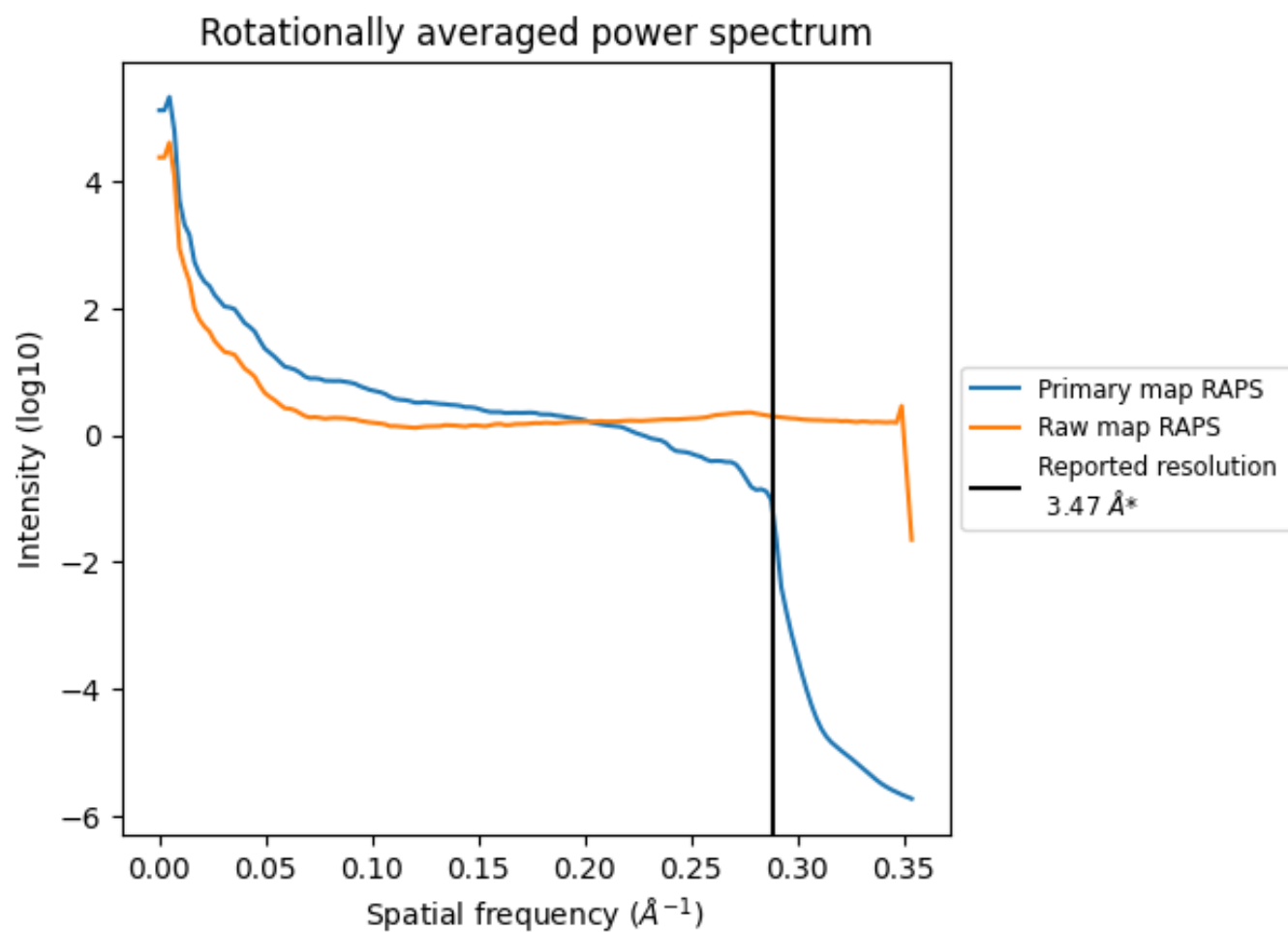
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 873 nm³; this corresponds to an approximate mass of 789 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

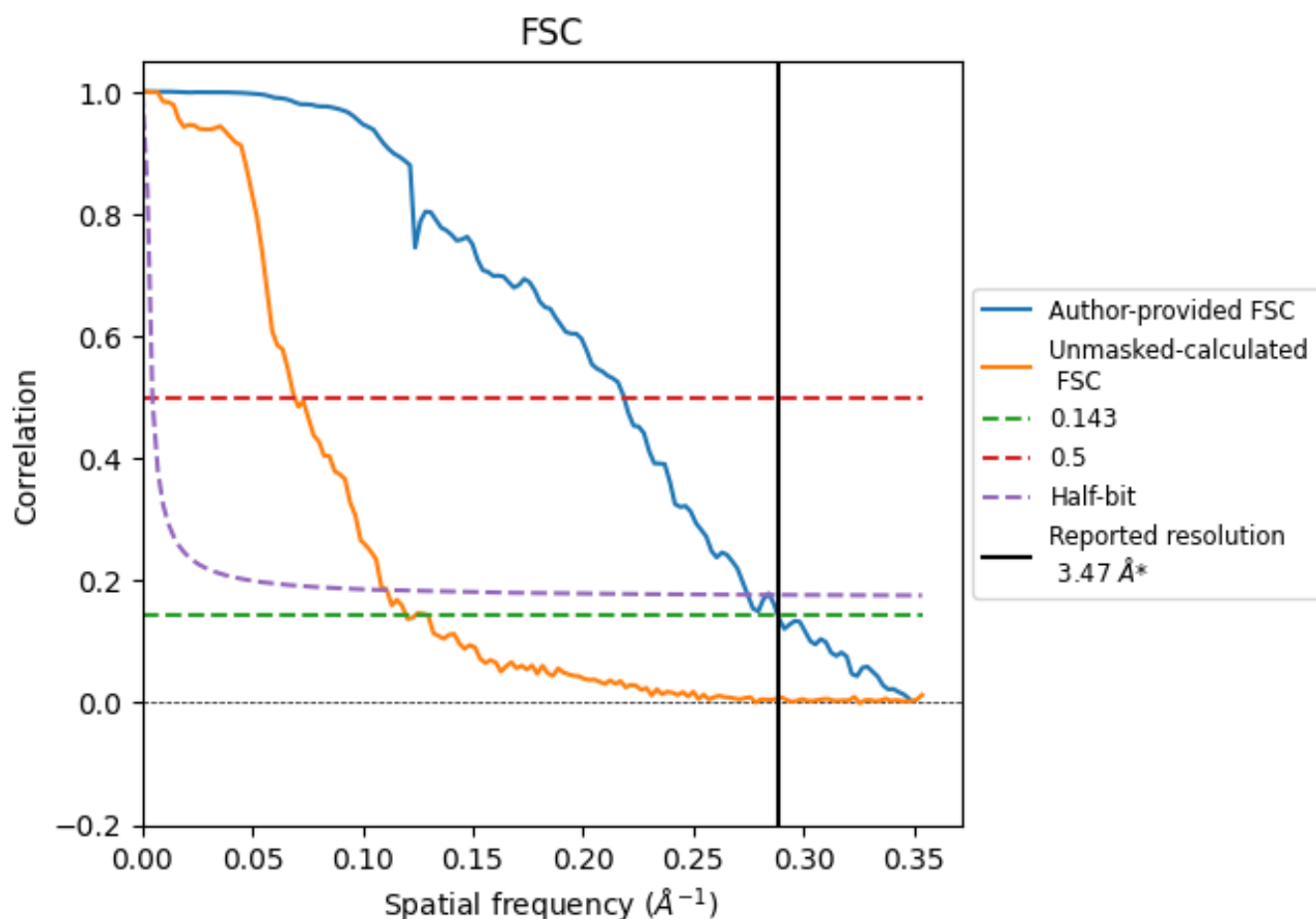


*Reported resolution corresponds to spatial frequency of 0.288 Å⁻¹

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 0.288 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

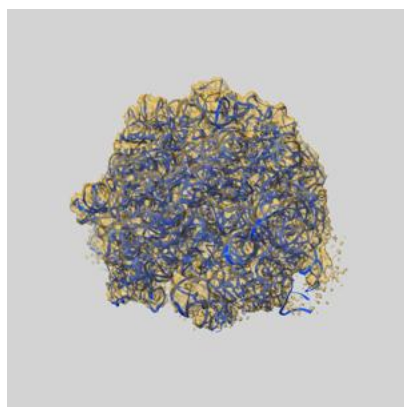
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.47	-	-
Author-provided FSC curve	3.47	4.58	3.64
Unmasked-calculated*	8.36	14.47	9.01

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 8.36 differs from the reported value 3.47 by more than 10 %

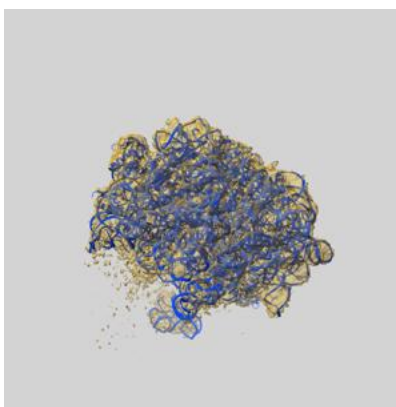
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-51838 and PDB model 9H3U. Per-residue inclusion information can be found in section [3](#) on page [7](#).

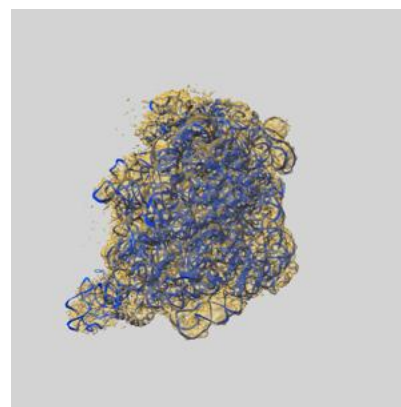
9.1 Map-model overlay [i](#)



X



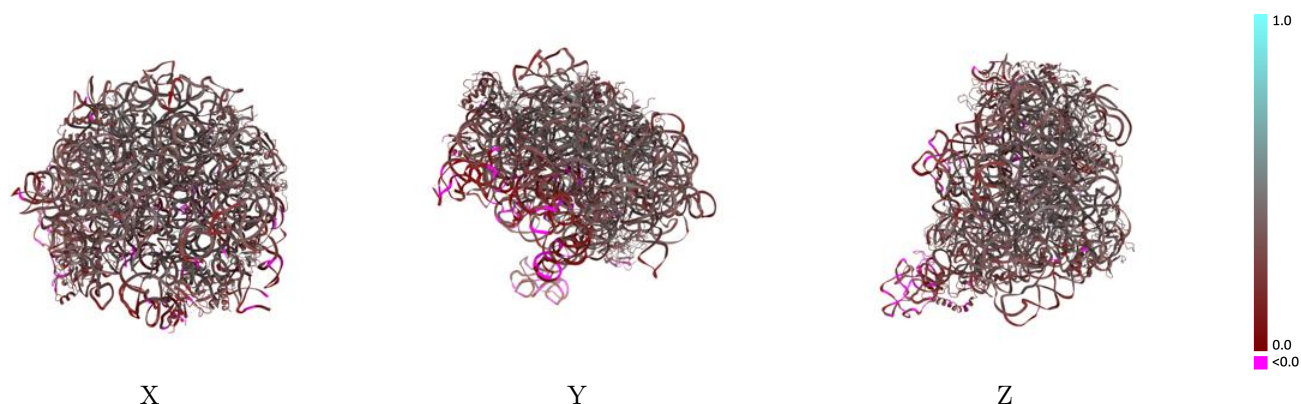
Y



Z

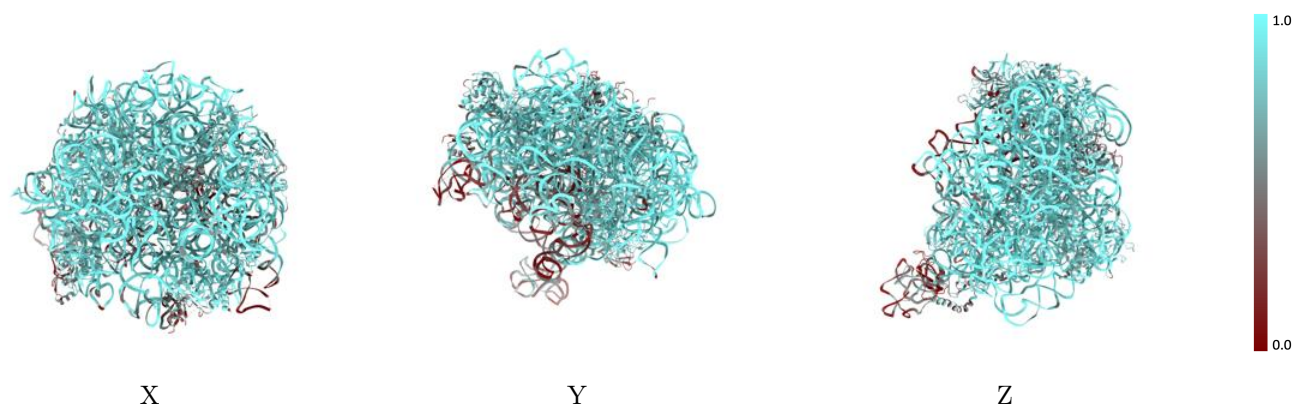
The images above show the 3D surface view of the map at the recommended contour level 0.382 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



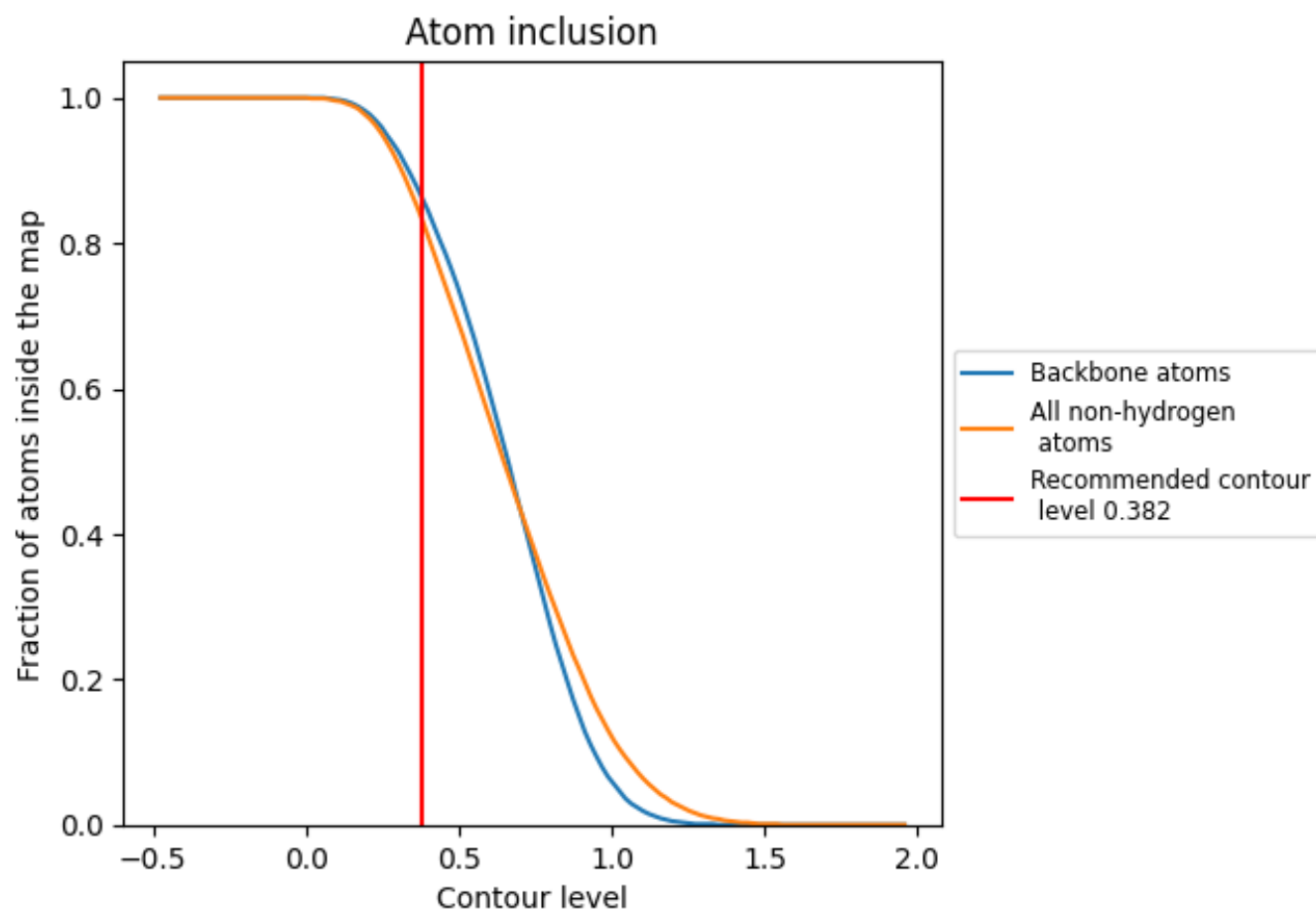
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.382).

9.4 Atom inclusion [i](#)



At the recommended contour level, 86% of all backbone atoms, 83% 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 (0.382) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8300	 0.3040
0	 0.6120	 0.3200
2	 0.8590	 0.3840
A	 0.8620	 0.3020
C	 0.8540	 0.3650
D	 0.7240	 0.3280
E	 0.6860	 0.2740
H	 0.3810	 0.1840
J	 0.8210	 0.3450
K	 0.7190	 0.3180
L	 0.5630	 0.2040
N	 0.8500	 0.3720
P	 0.7650	 0.3310
Q	 0.8620	 0.3540
R	 0.7890	 0.3030
S	 0.5920	 0.3310
T	 0.8090	 0.3630
U	 0.8110	 0.3260
X	 0.7850	 0.3280
Y	 0.7610	 0.2870
Z	 0.5080	 0.2130

