



Full wwPDB EM Validation Report ⓘ

Mar 24, 2026 – 07:44 AM UTC

PDB ID : 8C8Y / pdb_00008c8y
EMDB ID : EMD-16495
Title : Cryo-EM captures early ribosome assembly in action
Authors : Lauer, S.; Nikolay, R.; Qin, B.
Deposited on : 2023-01-21
Resolution : 3.03 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ 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:

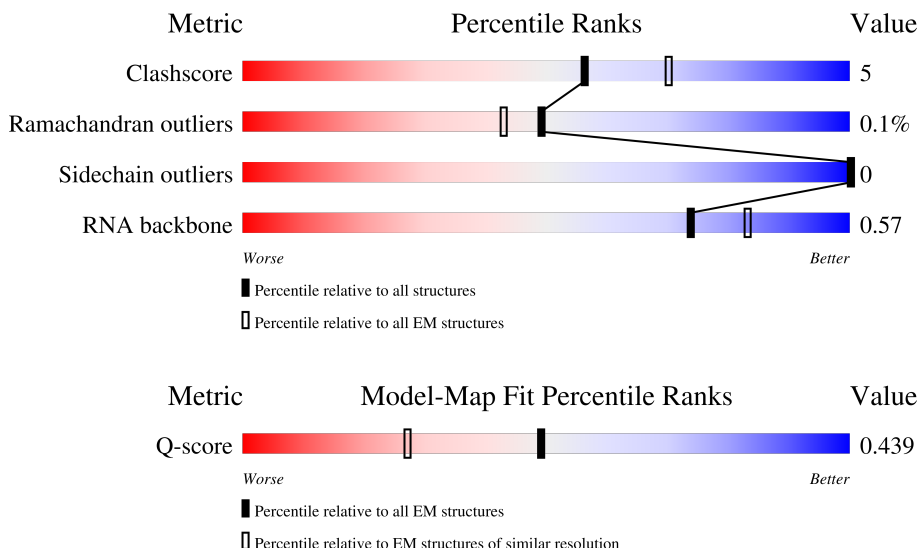
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & 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 3.03 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.



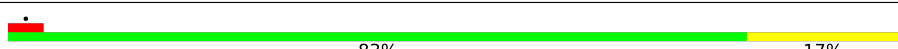
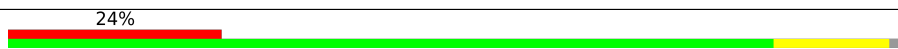
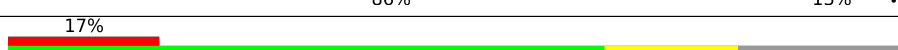
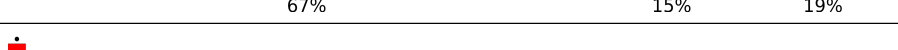
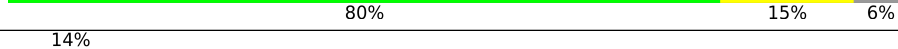
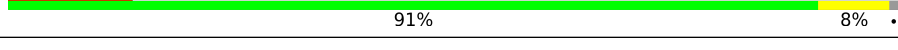
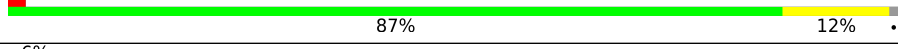
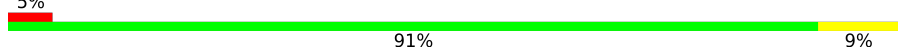
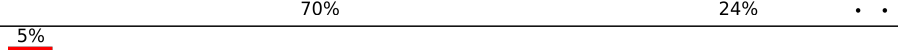
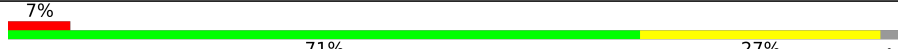
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	13929 (2.53 - 3.53)

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	V	94	94% 82% 18%
2	A	2904	14% 61% 23% 12%
3	C	273	76% 14% 10%

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Mol	Chain	Length	Quality of chain
4	D	209	
5	E	201	
6	J	142	
7	K	123	
8	L	144	
9	N	127	
10	P	115	
11	Q	118	
12	R	103	
13	S	110	
14	T	100	
15	U	104	
16	X	78	
17	Y	63	
18	0	57	
19	2	46	
20	O	117	
21	F	179	
22	B	119	
23	Z	59	
24	H	149	
25	W	76	

2 Entry composition

There are 25 unique types of molecules in this entry. The entry contains 77316 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 L25.

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

- Molecule 2 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	2548	Total	C	N	O	P	0	0
			54738	24415	10100	17675	2548		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	246	Total	C	N	O	S	0	0
			1894	1170	385	332	7		

- Molecule 4 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	184	Total	C	N	O	S	0	0
			1379	871	248	256	4		

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

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

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

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

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

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
8	L	117	Total	C	N	O		0	0
			844	527	161	156			

- Molecule 9 is a protein called 50S ribosomal protein L17.

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

- Molecule 10 is a protein called 50S ribosomal protein L19.

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

- Molecule 11 is a protein called 50S ribosomal protein L20.

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

- Molecule 12 is a protein called 50S ribosomal protein L21.

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

- Molecule 13 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	S	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 14 is a protein called 50S ribosomal protein L23.

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

- Molecule 15 is a protein called 50S ribosomal protein L24.

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

- Molecule 16 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	X	75	Total	C	N	O	S	0	0
			609	379	125	103	2		

- Molecule 17 is a protein called 50S ribosomal protein L29.

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

- Molecule 18 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	0	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 19 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	2	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 20 is a protein called 50S ribosomal protein L18.

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

- Molecule 21 is a protein called 50S ribosomal protein L5.

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

- Molecule 22 is a RNA chain called 5S rRNA.

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

- Molecule 23 is a protein called 50S ribosomal protein L30.

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

- Molecule 24 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	H	50	Total	C	N	O	S	0	0
			384	247	68	68	1		

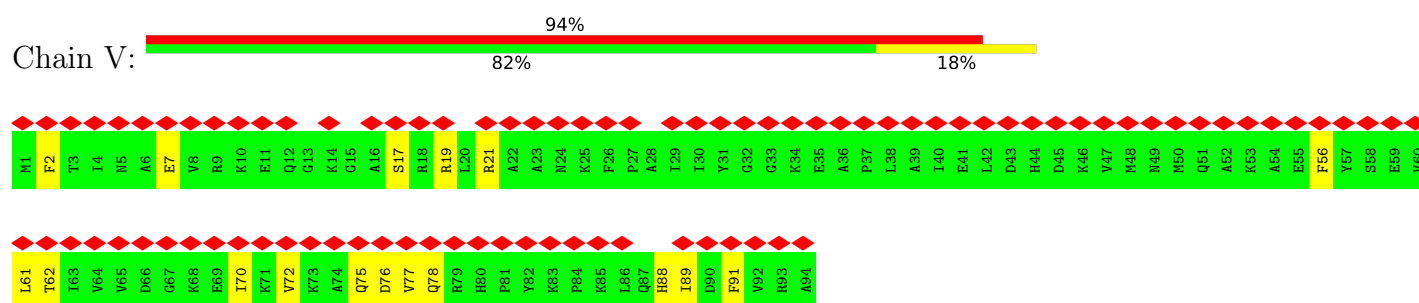
- Molecule 25 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	W	71	Total	C	N	O	S	0	0
			533	334	105	93	1		

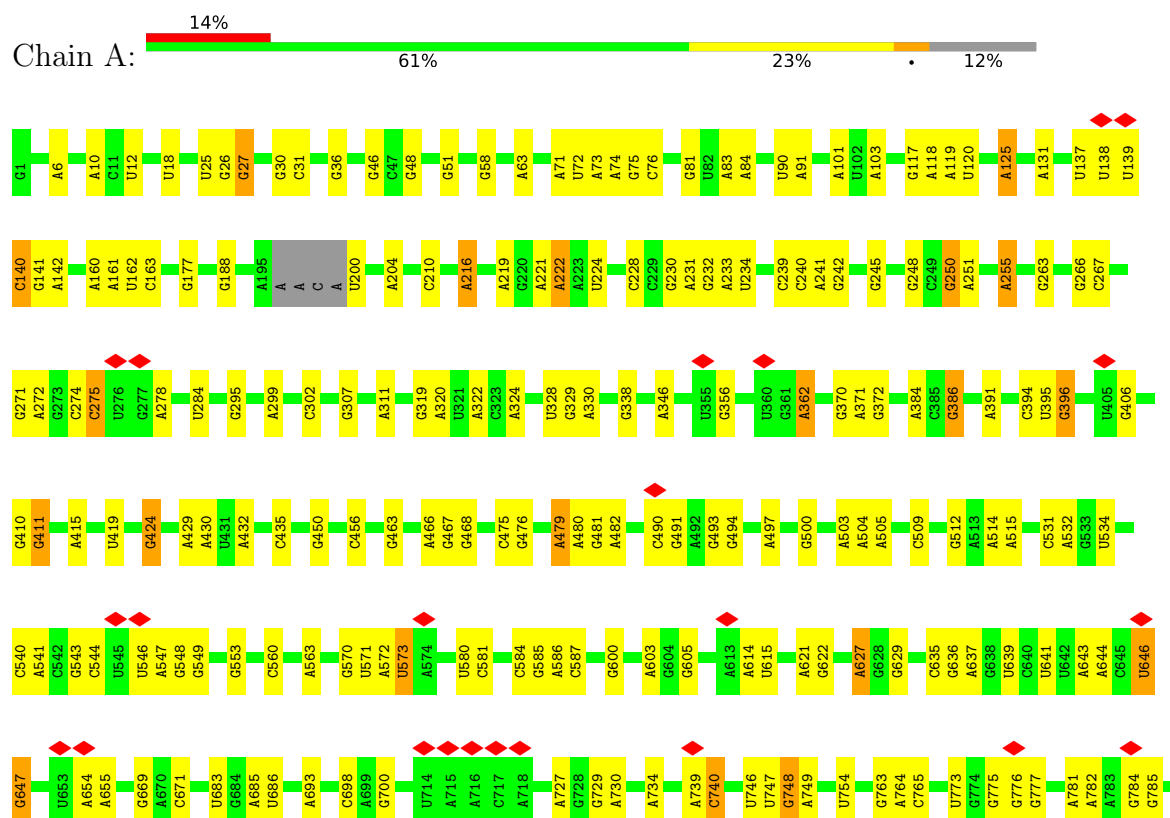
3 Residue-property plots

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.

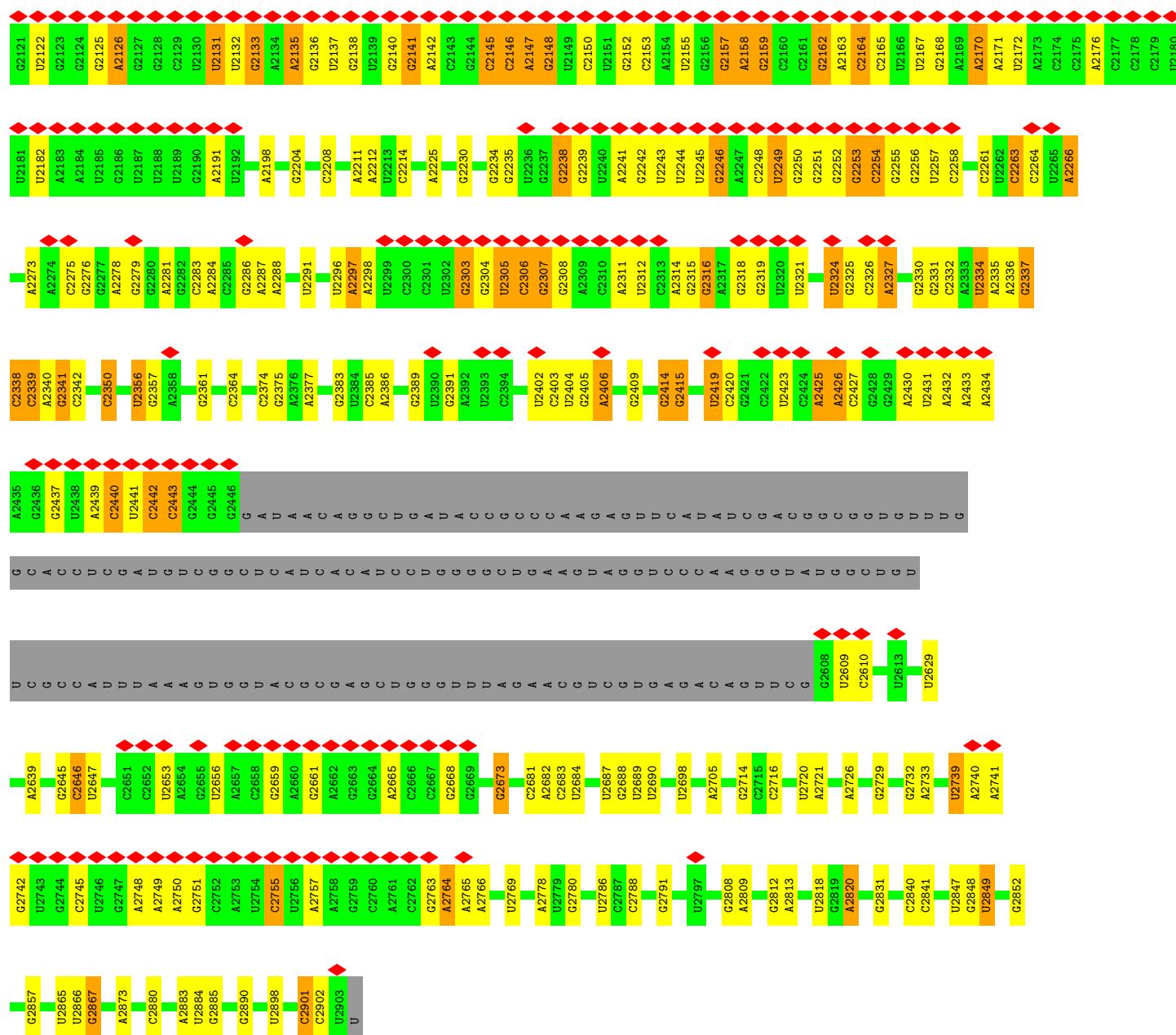
- Molecule 1: 50S ribosomal protein L25



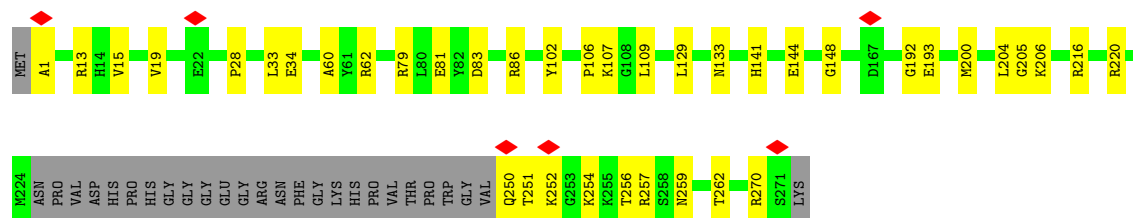
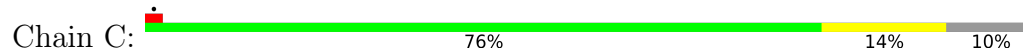
- Molecule 2: 23S rRNA



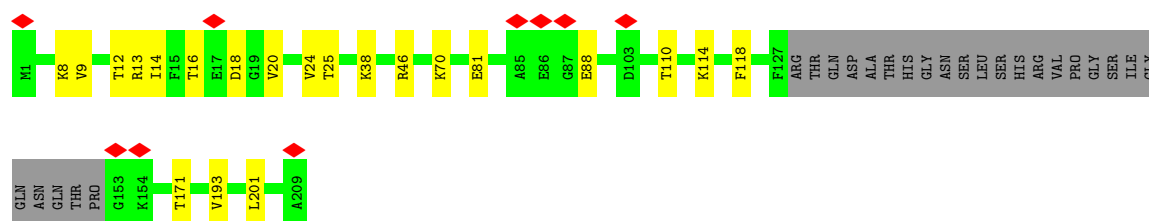
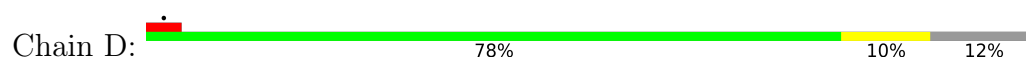




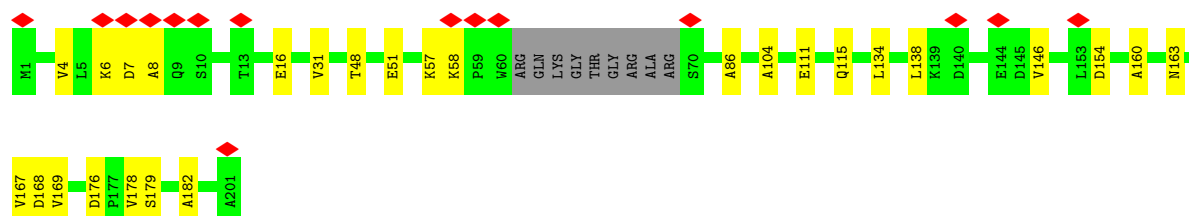
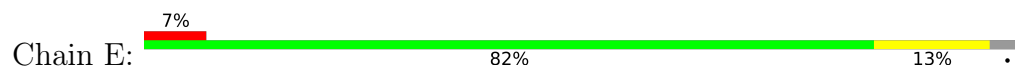
• Molecule 3: 50S ribosomal protein L2



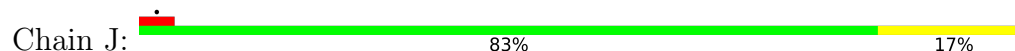
• Molecule 4: 50S ribosomal protein L3



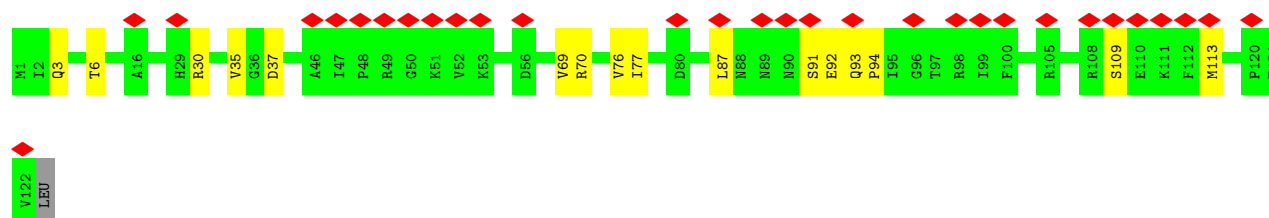
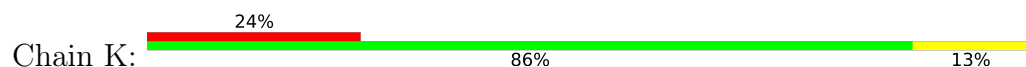
- Molecule 5: 50S ribosomal protein L4



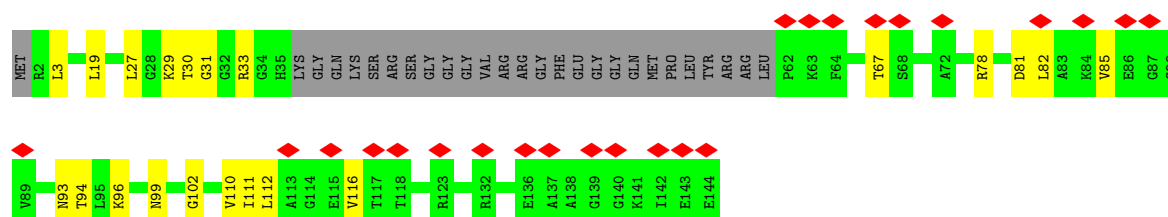
- Molecule 6: 50S ribosomal protein L13



- Molecule 7: 50S ribosomal protein L14



- Molecule 8: 50S ribosomal protein L15



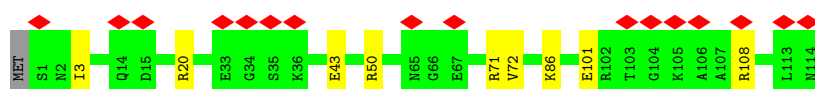
- Molecule 9: 50S ribosomal protein L17

Chain N: 



- Molecule 10: 50S ribosomal protein L19

Chain P: 



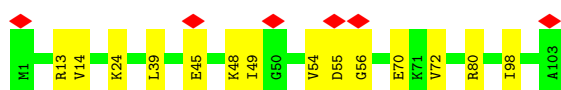
- Molecule 11: 50S ribosomal protein L20

Chain Q: 



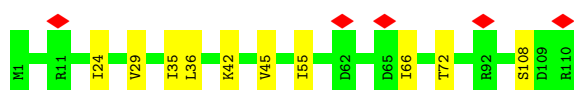
- Molecule 12: 50S ribosomal protein L21

Chain R: 



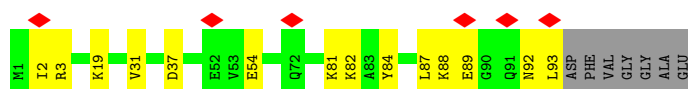
- Molecule 13: 50S ribosomal protein L22

Chain S: 



- Molecule 14: 50S ribosomal protein L23

Chain T: 

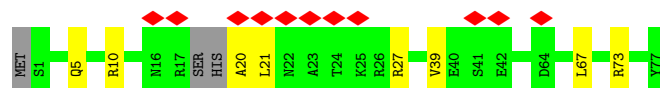
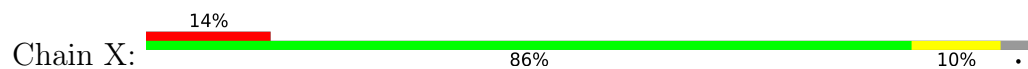


- Molecule 15: 50S ribosomal protein L24

Chain U: 



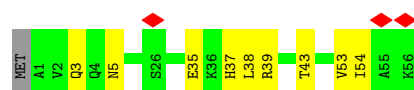
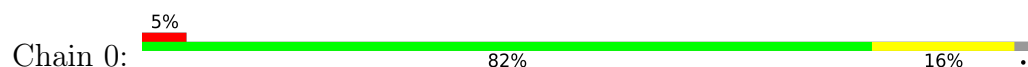
- Molecule 16: 50S ribosomal protein L28



- Molecule 17: 50S ribosomal protein L29



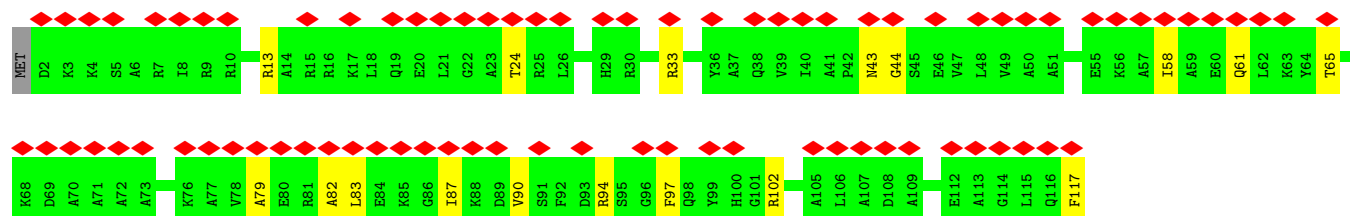
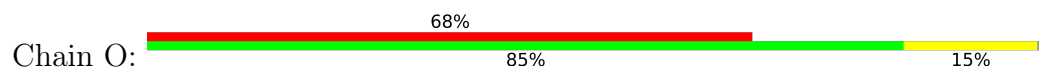
- Molecule 18: 50S ribosomal protein L32



- Molecule 19: 50S ribosomal protein L34

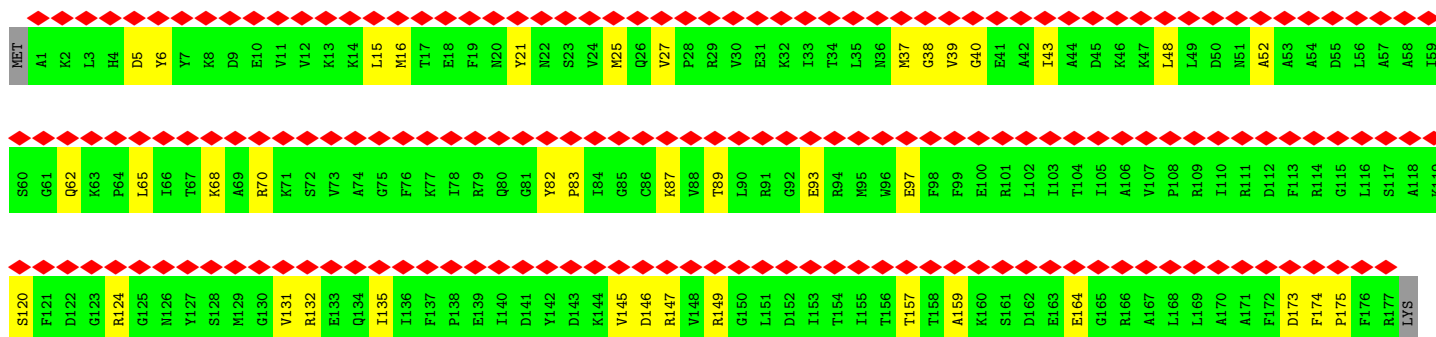


- Molecule 20: 50S ribosomal protein L18



- Molecule 21: 50S ribosomal protein L5





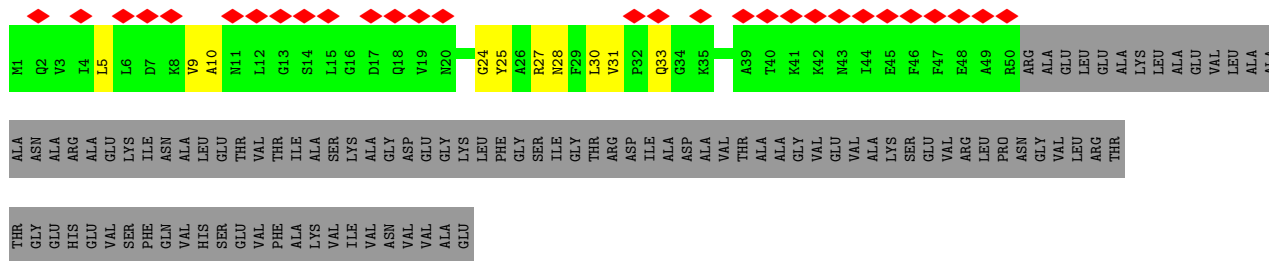
• Molecule 22: 5S rRNA



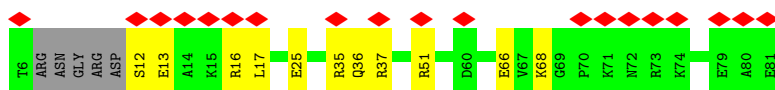
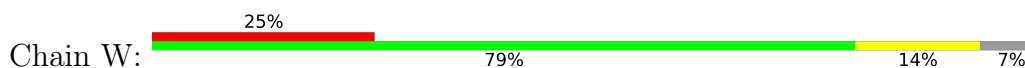
• Molecule 23: 50S ribosomal protein L30



• Molecule 24: 50S ribosomal protein L9



• Molecule 25: 50S ribosomal protein L27



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	40540	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	3.534	Depositor
Minimum map value	-1.736	Depositor
Average map value	0.008	Depositor
Map value standard deviation	0.148	Depositor
Recommended contour level	0.6	Depositor
Map size (Å)	375.0, 375.0, 375.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	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	V	0.10	0/766	0.22	0/1025
2	A	0.08	0/61309	0.20	0/95639
3	C	0.10	0/1922	0.24	0/2577
4	D	0.10	0/1395	0.22	0/1872
5	E	0.10	0/1499	0.22	0/2018
6	J	0.10	0/1152	0.21	0/1551
7	K	0.11	0/947	0.25	0/1268
8	L	0.11	0/849	0.31	0/1132
9	N	0.11	0/973	0.29	0/1301
10	P	0.11	0/929	0.23	0/1242
11	Q	0.12	0/960	0.23	0/1278
12	R	0.12	0/829	0.29	0/1107
13	S	0.12	0/864	0.27	0/1156
14	T	0.12	0/744	0.36	0/994
15	U	0.11	0/787	0.25	0/1051
16	X	0.10	0/617	0.23	0/822
17	Y	0.13	0/500	0.38	0/665
18	O	0.11	0/450	0.22	0/599
19	2	0.13	0/380	0.27	0/498
20	O	0.08	0/902	0.21	0/1209
21	F	0.17	0/1434	0.38	2/1926 (0.1%)
22	B	0.06	0/2850	0.18	0/4444
23	Z	0.12	0/453	0.24	0/605
24	H	0.13	0/389	0.35	0/523
25	W	0.08	0/539	0.24	0/711
All	All	0.09	0/84439	0.21	2/127213 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
21	F	83	PRO	N-CD-CG	-8.37	90.64	103.20
21	F	83	PRO	CA-N-CD	-6.55	102.83	112.00

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	V	753	0	780	13	0
2	A	54738	0	27526	347	0
3	C	1894	0	1988	29	0
4	D	1379	0	1440	15	0
5	E	1481	0	1540	19	0
6	J	1129	0	1162	16	0
7	K	938	0	1012	18	0
8	L	844	0	908	20	0
9	N	960	0	1000	14	0
10	P	917	0	965	10	0
11	Q	947	0	1022	16	0
12	R	816	0	839	14	0
13	S	857	0	922	6	0
14	T	738	0	807	9	0
15	U	779	0	834	10	0
16	X	609	0	642	7	0
17	Y	499	0	535	13	0
18	0	444	0	461	7	0
19	2	377	0	418	5	0
20	O	892	0	923	11	0
21	F	1410	0	1447	31	0
22	B	2549	0	1291	26	0
23	Z	449	0	491	12	0
24	H	384	0	405	7	0
25	W	533	0	549	10	0
All	All	77316	0	49907	588	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 5.

All (588) 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)
2:A:2338:C:O2'	2:A:2339:C:OP1	1.80	0.97
2:A:1927:A:O2'	2:A:1928:A:O5'	1.85	0.93
2:A:2330:G:O2'	2:A:2331:G:O4'	1.88	0.91
2:A:2125:G:O2'	2:A:2126:A:N7	2.04	0.89
2:A:1125:G:OP2	2:A:1126:A:O2'	1.90	0.89
9:N:37:THR:HG22	9:N:39:PRO:HD2	1.54	0.89
2:A:411:G:OP2	2:A:2406:A:O2'	1.91	0.89
2:A:2115:G:O2'	2:A:2116:G:OP1	1.89	0.89
2:A:2442:C:O2'	2:A:2443:C:O4'	1.91	0.88
22:B:51:G:O2'	22:B:52:A:O4'	1.89	0.88
2:A:1417:C:O2'	2:A:1587:G:O2'	1.91	0.88
2:A:2296:U:O2	2:A:2335:A:N7	2.08	0.86
2:A:1837:C:O2'	2:A:1927:A:N3	2.09	0.85
2:A:570:G:O4'	2:A:983:A:N6	2.10	0.85
2:A:2645:G:OP2	2:A:2645:G:N2	2.10	0.85
24:H:24:GLY:O	24:H:27:ARG:O	1.95	0.84
2:A:1779:U:OP2	2:A:1784:A:N6	2.11	0.84
22:B:77:U:O2	22:B:99:A:N7	2.10	0.83
7:K:30:ARG:NH2	7:K:37:ASP:OD2	2.12	0.82
2:A:754:U:O2'	2:A:1272:A:N1	2.12	0.81
2:A:2253:G:O2'	2:A:2254:C:OP2	1.97	0.81
2:A:948:C:O2'	2:A:984:A:O2'	1.97	0.81
2:A:2316:G:O2'	21:F:124:ARG:NH1	2.14	0.80
2:A:177:G:OP2	2:A:177:G:N2	2.11	0.80
2:A:534:U:O2'	11:Q:48:ASP:OD2	1.98	0.80
2:A:2116:G:O2'	2:A:2135:A:O2'	1.99	0.80
2:A:1826:G:O2'	2:A:1971:U:OP2	1.98	0.80
3:C:106:PRO:HD2	3:C:109:LEU:HD22	1.65	0.79
2:A:781:A:OP1	3:C:216:ARG:NH2	2.16	0.78
2:A:1417:C:HO2'	2:A:1587:G:HO2'	1.29	0.78
2:A:2324:U:O4	2:A:2332:C:N3	2.16	0.78
2:A:200:U:O2	2:A:386:G:N2	2.16	0.78
2:A:2647:U:O2	2:A:2673:G:O6	2.02	0.78
17:Y:45:GLN:O	17:Y:47:ARG:N	2.17	0.77
2:A:641:U:O2	2:A:647:G:O6	2.03	0.77
2:A:2659:G:O2'	2:A:2661:G:N7	2.18	0.77
2:A:1724:G:O6	2:A:1737:G:N2	2.18	0.76
2:A:2414:G:O2'	2:A:2415:G:OP1	2.03	0.76
2:A:2080:A:OP1	16:X:20:ALA:N	2.19	0.76
2:A:2739:U:O2	2:A:2764:A:N7	2.19	0.76
2:A:324:A:OP2	2:A:1205:A:N6	2.18	0.76
2:A:1814:G:OP2	2:A:1815:A:O2'	2.03	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2442:C:O2'	2:A:2443:C:O5'	2.04	0.75
2:A:1447:C:O2'	2:A:1544:A:N3	2.20	0.75
2:A:1294:U:O2	9:N:23:ASN:ND2	2.20	0.75
2:A:2291:U:O2'	2:A:2374:C:O2	2.05	0.75
2:A:1693:U:O2'	3:C:13:ARG:NH2	2.20	0.74
21:F:21:TYR:OH	21:F:164:GLU:OE2	2.05	0.74
8:L:93:ASN:O	8:L:94:THR:OG1	2.06	0.74
2:A:2115:G:OP2	2:A:2147:A:O2'	2.04	0.74
2:A:2646:C:OP2	2:A:2732:G:O2'	2.05	0.74
5:E:176:ASP:OD1	5:E:179:SER:OG	2.02	0.73
3:C:79:ARG:NH1	3:C:81:GLU:OE2	2.22	0.73
22:B:14:U:OP2	22:B:70:C:O2'	2.06	0.73
2:A:2684:U:O4'	7:K:70:ARG:NH1	2.22	0.72
2:A:1026:G:N2	2:A:1128:G:OP2	2.22	0.72
2:A:1341:G:OP2	2:A:1394:U:O2'	2.07	0.72
2:A:2326:C:O2'	2:A:2327:A:OP1	2.05	0.72
2:A:2898:U:O2'	6:J:134:ALA:O	2.06	0.72
2:A:320:A:N3	5:E:163:ASN:ND2	2.38	0.72
2:A:2298:A:OP1	21:F:70:ARG:NH2	2.23	0.72
2:A:160:A:N3	2:A:2208:C:O2'	2.23	0.72
2:A:125:A:OP2	19:2:19:ARG:NH1	2.23	0.72
2:A:1992:G:N2	2:A:1996:C:O2'	2.23	0.72
2:A:2748:A:O2'	2:A:2749:A:O4'	2.04	0.71
1:V:78:GLN:OE1	22:B:76:G:O2'	2.09	0.71
2:A:31:C:O2'	2:A:1238:G:OP1	2.08	0.71
2:A:1203:U:OP2	2:A:1204:A:O2'	2.07	0.71
2:A:1928:A:O2'	2:A:1929:G:O4'	2.04	0.71
2:A:2337:G:O2'	2:A:2338:C:O5'	2.08	0.71
2:A:1022:G:N2	2:A:1023:U:O4	2.23	0.70
4:D:16:THR:OG1	4:D:18:ASP:OD1	2.09	0.70
2:A:629:G:N3	2:A:639:U:O2'	2.25	0.70
2:A:1288:G:OP2	2:A:1288:G:N2	2.25	0.70
2:A:482:A:O2'	2:A:497:A:N1	2.23	0.70
2:A:2377:A:O2'	20:O:117:PHE:O	2.09	0.70
2:A:1528:A:OP2	2:A:1543:G:N2	2.24	0.70
2:A:219:A:N3	2:A:234:U:O2'	2.25	0.69
3:C:141:HIS:ND1	3:C:192:GLY:O	2.26	0.69
23:Z:3:THR:OG1	23:Z:36:GLU:OE2	2.04	0.69
2:A:1173:U:O2'	2:A:1176:U:O2	2.09	0.69
5:E:57:LYS:NZ	5:E:58:LYS:O	2.25	0.69
20:O:102:ARG:NE	22:B:49:C:OP1	2.26	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:635:C:O2'	2:A:639:U:OP1	2.10	0.68
2:A:951:C:N4	2:A:952:G:O6	2.27	0.68
2:A:2131:U:O2'	2:A:2133:G:N2	2.27	0.68
9:N:69:ARG:O	9:N:70:THR:OG1	2.12	0.68
21:F:62:GLN:NE2	21:F:89:THR:O	2.27	0.68
2:A:693:A:O2'	2:A:1353:A:N3	2.27	0.67
2:A:2865:U:OP2	2:A:2866:U:O2'	2.08	0.67
2:A:621:A:OP2	8:L:99:ASN:ND2	2.28	0.67
21:F:15:LEU:HD22	21:F:27:VAL:HG22	1.76	0.67
2:A:370:G:O2'	2:A:424:G:OP1	2.13	0.67
2:A:788:A:OP1	2:A:791:C:N4	2.27	0.67
2:A:2108:A:O2'	2:A:2182:U:N3	2.27	0.67
9:N:114:GLU:N	9:N:114:GLU:OE1	2.28	0.67
2:A:284:U:O2	2:A:356:G:O6	2.13	0.67
21:F:25:MET:HE2	22:B:54:G:H21	1.59	0.66
2:A:1653:G:O6	9:N:11:ASN:ND2	2.29	0.66
2:A:1681:G:OP2	2:A:1757:A:N6	2.27	0.66
1:V:21:ARG:NH1	22:B:77:U:OP1	2.28	0.66
2:A:1154:G:OP2	11:Q:57:ARG:NH1	2.29	0.66
2:A:2335:A:OP1	20:O:13:ARG:NH2	2.28	0.66
2:A:1795:C:O2	3:C:252:LYS:NZ	2.27	0.66
2:A:2705:A:O2'	2:A:2852:G:OP1	2.11	0.66
16:X:5:GLN:O	16:X:73:ARG:NH2	2.28	0.66
2:A:2066:C:N4	2:A:2067:G:O6	2.29	0.66
2:A:475:C:O2	2:A:479:A:N6	2.28	0.66
2:A:1495:A:N3	2:A:1578:U:O2'	2.27	0.66
23:Z:57:GLU:N	23:Z:57:GLU:OE1	2.29	0.65
10:P:43:GLU:OE1	10:P:86:LYS:NZ	2.29	0.65
2:A:81:G:O2'	2:A:295:G:O2'	2.14	0.65
2:A:1832:C:H41	2:A:1833:C:N4	1.93	0.65
20:O:24:THR:OG1	20:O:90:VAL:HG12	1.95	0.65
2:A:1363:C:O2'	2:A:1809:A:N3	2.26	0.65
2:A:514:A:N3	2:A:581:C:O2'	2.24	0.65
2:A:746:U:O4'	2:A:748:G:N2	2.29	0.65
2:A:1712:U:OP2	2:A:1713:A:O2'	2.13	0.65
2:A:700:G:O2'	2:A:1632:A:N3	2.28	0.65
8:L:110:VAL:HG12	8:L:110:VAL:O	1.96	0.65
2:A:76:C:O2'	17:Y:55:THR:HG21	1.97	0.65
2:A:395:U:O2'	2:A:396:G:N7	2.30	0.65
2:A:1995:U:O2	7:K:3:GLN:NE2	2.28	0.64
8:L:29:LYS:O	8:L:30:THR:OG1	2.11	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2291:U:O2	2:A:2374:C:O2'	2.13	0.64
11:Q:49:ARG:O	11:Q:53:LYS:NZ	2.29	0.64
2:A:1638:C:O2	2:A:2698:U:O2'	2.14	0.64
2:A:1928:A:O2'	2:A:1929:G:O5'	2.16	0.64
2:A:1132:U:OP2	2:A:1133:A:O2'	2.14	0.64
2:A:2158:A:O2'	2:A:2159:G:OP2	2.14	0.64
2:A:1011:G:OP1	11:Q:74:SER:OG	2.15	0.63
25:W:16:ARG:O	25:W:35:ARG:NH2	2.32	0.63
2:A:1163:G:OP1	12:R:24:LYS:NZ	2.31	0.63
2:A:2110:G:O2'	2:A:2111:U:OP1	2.13	0.63
2:A:1662:U:O2'	2:A:2687:U:OP1	2.17	0.63
13:S:24:ILE:HG22	13:S:35:ILE:HD11	1.80	0.63
22:B:31:C:O2'	22:B:32:U:O5'	2.16	0.63
2:A:571:U:OP1	12:R:80:ARG:NH2	2.31	0.62
2:A:463:G:N2	2:A:466:A:OP2	2.24	0.62
2:A:2284:A:O2'	2:A:2288:A:N6	2.32	0.62
2:A:1521:G:OP2	2:A:1522:A:O2'	2.10	0.62
2:A:263:G:O2'	2:A:429:A:N3	2.29	0.62
2:A:2126:A:N7	2:A:2162:G:N2	2.47	0.62
15:U:3:LYS:O	15:U:93:ARG:NH1	2.32	0.62
21:F:37:MET:HE1	21:F:52:ALA:HB1	1.81	0.62
2:A:698:C:O2'	2:A:734:A:N6	2.33	0.62
24:H:5:LEU:HD13	24:H:9:VAL:HG11	1.82	0.61
2:A:1288:G:OP1	2:A:1289:C:N4	2.32	0.61
3:C:28:PRO:HG2	3:C:33:LEU:HD11	1.82	0.61
2:A:850:U:OP1	23:Z:18:LYS:NZ	2.34	0.61
2:A:981:A:OP2	2:A:982:C:N4	2.33	0.61
2:A:2266:A:N6	2:A:2273:A:OP2	2.34	0.61
2:A:1927:A:HO2'	2:A:1928:A:C5'	2.09	0.60
14:T:54:GLU:N	14:T:89:GLU:OE2	2.34	0.60
3:C:144:GLU:OE2	3:C:148:GLY:N	2.34	0.60
2:A:1654:A:O2'	4:D:118:PHE:O	2.19	0.60
2:A:240:C:OP2	2:A:241:A:O2'	2.14	0.60
7:K:87:LEU:HD11	7:K:92:GLU:HB3	1.83	0.60
20:O:33:ARG:O	20:O:65:THR:OG1	2.12	0.60
2:A:643:A:N7	2:A:644:A:N6	2.50	0.60
2:A:828:U:O2'	2:A:831:G:O6	2.18	0.60
2:A:2820:A:OP1	9:N:2:ARG:NH1	2.34	0.60
23:Z:12:ALA:O	23:Z:20:LYS:NZ	2.32	0.60
2:A:161:A:OP2	2:A:162:U:O2'	2.17	0.59
1:V:2:PHE:O	1:V:62:THR:OG1	2.20	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:R:45:GLU:N	12:R:45:GLU:OE1	2.34	0.59
2:A:1303:G:O6	2:A:1304:A:N6	2.36	0.59
24:H:24:GLY:O	24:H:27:ARG:C	2.45	0.59
2:A:2118:U:OP1	2:A:2148:G:O2'	2.20	0.59
17:Y:38:GLN:OE1	17:Y:38:GLN:N	2.35	0.59
2:A:84:A:OP1	15:U:5:ARG:NH2	2.35	0.58
17:Y:52:ARG:O	17:Y:55:THR:HG22	2.03	0.58
11:Q:96:ASP:OD2	12:R:13:ARG:NH2	2.36	0.58
22:B:70:C:N3	22:B:107:G:N2	2.52	0.58
23:Z:6:ILE:HD12	23:Z:56:VAL:HG22	1.86	0.58
2:A:584:C:N4	2:A:585:G:O6	2.37	0.58
2:A:2849:U:O4	10:P:20:ARG:NH1	2.36	0.58
3:C:250:GLN:OE1	3:C:254:LYS:NZ	2.37	0.58
2:A:2831:G:N2	2:A:2884:U:OP2	2.37	0.58
20:O:58:ILE:O	20:O:61:GLN:NE2	2.37	0.58
4:D:12:THR:HG22	4:D:13:ARG:H	1.69	0.58
6:J:45:THR:HB	6:J:48:VAL:HG22	1.86	0.58
2:A:48:G:N2	2:A:177:G:OP2	2.37	0.57
2:A:2848:G:O2'	2:A:2867:G:N2	2.37	0.57
23:Z:6:ILE:CD1	23:Z:56:VAL:HG22	2.34	0.57
2:A:2414:G:HO2'	2:A:2415:G:P	2.27	0.57
2:A:1799:G:OP1	3:C:257:ARG:NE	2.36	0.57
2:A:1032:A:N1	2:A:1122:G:O6	2.38	0.57
2:A:1358:G:O2'	2:A:1373:A:N6	2.37	0.57
2:A:2297:A:OP2	2:A:2319:G:N2	2.35	0.57
17:Y:24:GLU:O	17:Y:28:LEU:HD23	2.04	0.57
21:F:135:ILE:HD11	21:F:145:VAL:HG11	1.85	0.57
2:A:1416:G:O2'	2:A:1417:C:OP2	2.17	0.57
2:A:2741:A:N6	2:A:2763:G:O2'	2.32	0.57
20:O:94:ARG:NH1	20:O:97:PHE:O	2.38	0.57
7:K:76:VAL:HG22	10:P:72:VAL:HG22	1.87	0.57
21:F:25:MET:CE	22:B:54:G:H21	2.17	0.57
2:A:980:A:O2'	2:A:981:A:O4'	2.18	0.56
2:A:48:G:H22	2:A:177:G:P	2.28	0.56
2:A:245:G:O2'	2:A:384:A:N1	2.34	0.56
2:A:2020:A:N7	18:O:5:ASN:ND2	2.53	0.56
2:A:1139:G:O2'	2:A:1143:A:N1	2.37	0.56
4:D:9:VAL:HG11	10:P:3:ILE:HD11	1.87	0.56
20:O:43:ASN:OD1	20:O:44:GLY:N	2.37	0.56
9:N:59:SER:OG	9:N:62:ASN:OD1	2.24	0.56
2:A:1016:G:O6	2:A:1147:A:N6	2.38	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2788:C:O2'	2:A:2809:A:N3	2.34	0.56
14:T:2:ILE:HA	14:T:3:ARG:C	2.31	0.56
2:A:299:A:N3	2:A:319:G:O2'	2.28	0.56
2:A:851:C:O2'	23:Z:42:ALA:O	2.24	0.55
2:A:2386:A:N3	25:W:37:ARG:NH2	2.53	0.55
8:L:19:LEU:HD23	8:L:19:LEU:H	1.70	0.55
2:A:274:C:H2'	2:A:275:C:C1'	2.37	0.55
2:A:500:G:N1	2:A:503:A:OP2	2.35	0.55
2:A:1365:A:OP1	16:X:27:ARG:NH2	2.39	0.55
2:A:627:A:OP1	8:L:78:ARG:NH2	2.34	0.55
2:A:685:A:O2'	2:A:773:U:O4	2.12	0.55
2:A:641:U:C2	2:A:647:G:O6	2.60	0.55
2:A:647:G:N2	2:A:2350:C:O3'	2.40	0.55
1:V:61:LEU:HD22	1:V:91:PHE:CE2	2.43	0.54
2:A:2115:G:HO2'	2:A:2116:G:P	2.24	0.54
2:A:1275:A:N1	2:A:1295:C:O2'	2.37	0.54
15:U:53:GLN:OE1	15:U:55:GLY:N	2.39	0.54
21:F:93:GLU:O	21:F:97:GLU:OE1	2.25	0.54
2:A:989:G:OP2	23:Z:11:SER:OG	2.08	0.54
2:A:1264:A:OP2	2:A:1265:A:O2'	2.21	0.54
2:A:2263:C:N4	2:A:2278:A:N1	2.56	0.54
21:F:97:GLU:OE1	21:F:97:GLU:N	2.40	0.54
2:A:1307:A:N6	2:A:1606:C:O2'	2.40	0.54
2:A:2303:G:O3'	21:F:120:SER:OG	2.24	0.54
2:A:278:A:N6	2:A:362:A:N7	2.56	0.54
2:A:210:C:OP1	19:2:29:GLN:NE2	2.40	0.54
2:A:573:U:O4	2:A:2029:G:O2'	2.19	0.54
8:L:85:VAL:HG12	8:L:85:VAL:O	2.08	0.53
4:D:8:LYS:HB2	4:D:201:LEU:HD11	1.90	0.53
6:J:59:ALA:HB1	6:J:101:ILE:HD13	1.91	0.53
2:A:1365:A:O2'	16:X:10:ARG:NH1	2.41	0.53
3:C:1:ALA:N	3:C:19:VAL:O	2.36	0.53
6:J:77:HIS:ND1	6:J:83:GLY:O	2.41	0.53
2:A:58:G:O2'	2:A:73:A:N1	2.39	0.53
2:A:1798:U:OP2	3:C:270:ARG:NH1	2.42	0.53
2:A:1009:A:N3	2:A:1153:C:O2'	2.39	0.53
6:J:43:GLU:N	6:J:43:GLU:OE1	2.41	0.53
2:A:1445:G:O6	2:A:1466:U:O2	2.27	0.52
21:F:65:LEU:HD22	22:B:42:C:C6	2.44	0.52
2:A:1636:U:O2'	2:A:1760:C:O2	2.19	0.52
2:A:2338:C:O2'	2:A:2339:C:P	2.68	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:972:A:OP2	2:A:973:A:O2'	2.20	0.52
2:A:1223:G:N2	2:A:1226:A:OP2	2.39	0.52
2:A:1227:G:OP2	11:Q:15:LYS:NZ	2.41	0.52
17:Y:58:ASN:OD1	17:Y:59:GLU:N	2.43	0.52
6:J:7:LYS:O	6:J:11:VAL:HG23	2.10	0.52
2:A:571:U:O2'	2:A:573:U:OP2	2.28	0.52
2:A:987:C:O2'	2:A:1000:A:N3	2.33	0.52
2:A:995:C:O2	6:J:3:THR:OG1	2.26	0.52
6:J:17:VAL:HG23	6:J:137:PRO:HB2	1.91	0.52
25:W:36:GLN:N	25:W:36:GLN:OE1	2.43	0.52
6:J:48:VAL:HG23	6:J:50:THR:HG23	1.91	0.51
2:A:2146:C:O2'	2:A:2148:G:N7	2.42	0.51
4:D:16:THR:OG1	4:D:20:VAL:HG12	2.11	0.51
13:S:24:ILE:HD13	13:S:36:LEU:HD11	1.92	0.51
14:T:87:LEU:O	14:T:88:LYS:HG3	2.10	0.51
20:O:87:ILE:HD12	20:O:90:VAL:HG13	1.92	0.51
2:A:600:G:N2	2:A:605:G:O3'	2.44	0.51
5:E:111:GLU:OE2	5:E:115:GLN:NE2	2.43	0.51
2:A:560:C:O2	11:Q:47:ARG:NH2	2.43	0.51
2:A:739:A:N3	2:A:740:C:N4	2.57	0.51
7:K:113:MET:HA	7:K:113:MET:HE2	1.93	0.51
12:R:49:ILE:HG22	12:R:54:VAL:HG23	1.91	0.51
20:O:79:ALA:O	20:O:83:LEU:HD23	2.11	0.51
2:A:391:A:O2'	2:A:410:G:OP1	2.28	0.51
2:A:2683:C:OP1	10:P:50:ARG:NH2	2.40	0.51
6:J:73:VAL:HG13	6:J:75:TYR:CE1	2.46	0.51
2:A:1791:A:N1	2:A:1829:A:H4'	2.26	0.51
12:R:49:ILE:CG2	12:R:54:VAL:HG23	2.41	0.51
2:A:2391:G:N1	2:A:2425:A:OP1	2.43	0.51
2:A:646:U:H3'	2:A:647:G:H4'	1.93	0.50
2:A:2016:U:O2	18:O:3:GLN:NE2	2.44	0.50
25:W:16:ARG:C	25:W:17:LEU:HD22	2.36	0.50
2:A:2898:U:O3'	6:J:136:GLN:NE2	2.44	0.50
2:A:27:G:O2'	2:A:512:G:N2	2.41	0.50
7:K:92:GLU:O	7:K:93:GLN:C	2.53	0.50
2:A:1027:A:N6	2:A:1126:A:O3'	2.45	0.50
2:A:1394:U:O2	14:T:19:LYS:NZ	2.39	0.50
3:C:15:VAL:HG22	3:C:205:GLY:HA3	1.94	0.50
5:E:168:ASP:OD1	5:E:169:VAL:N	2.45	0.50
2:A:1715:G:O2'	2:A:1716:U:OP2	2.29	0.50
2:A:2157:G:O2'	2:A:2158:A:O4'	2.30	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
22:B:40:U:N3	22:B:44:G:OP2	2.42	0.50
25:W:25:GLU:N	25:W:25:GLU:OE1	2.45	0.50
2:A:324:A:N6	2:A:338:G:O2'	2.44	0.50
10:P:108:ARG:HA	10:P:108:ARG:NE	2.27	0.50
3:C:200:MET:SD	3:C:200:MET:N	2.84	0.49
2:A:1833:C:H2'	2:A:1834:U:C6	2.47	0.49
15:U:51:LEU:O	15:U:51:LEU:HD23	2.13	0.49
2:A:188:G:O2'	2:A:1365:A:N6	2.45	0.49
2:A:2786:U:OP1	4:D:70:LYS:NZ	2.34	0.49
12:R:14:VAL:HG21	12:R:98:ILE:CD1	2.41	0.49
14:T:31:VAL:HG22	14:T:84:TYR:CD2	2.47	0.49
21:F:157:THR:HG22	21:F:159:ALA:H	1.78	0.49
2:A:242:G:N2	2:A:255:A:OP2	2.43	0.49
2:A:299:A:N1	2:A:322:A:O2'	2.32	0.49
2:A:627:A:N6	8:L:112:LEU:O	2.46	0.49
2:A:727:A:OP2	2:A:1431:A:O2'	2.30	0.49
5:E:182:ALA:HB2	8:L:3:LEU:HD11	1.93	0.49
7:K:70:ARG:HG2	7:K:76:VAL:HG12	1.95	0.49
2:A:2162:G:O2'	2:A:2164:C:O4'	2.30	0.49
8:L:19:LEU:HB3	8:L:27:LEU:HD12	1.94	0.49
2:A:1737:G:O3'	2:A:1738:G:O4'	2.31	0.49
2:A:1654:A:N1	2:A:2048:G:O2'	2.46	0.48
2:A:2740:A:N6	2:A:2764:A:O4'	2.46	0.48
5:E:138:LEU:HD11	5:E:146:VAL:HG11	1.95	0.48
15:U:98:ASN:C	15:U:98:ASN:OD1	2.56	0.48
21:F:146:ASP:OD1	21:F:147:ARG:N	2.46	0.48
2:A:72:U:OP2	17:Y:54:LYS:NZ	2.46	0.48
2:A:1328:A:HO2'	2:A:1329:U:P	2.36	0.48
2:A:2145:C:O2'	2:A:2147:A:N1	2.22	0.48
3:C:107:LYS:N	3:C:193:GLU:O	2.43	0.48
2:A:1696:G:N2	2:A:1977:A:O2'	2.45	0.48
2:A:1779:U:O2	2:A:1783:A:N6	2.46	0.48
7:K:35:VAL:HG22	7:K:69:VAL:HG12	1.95	0.48
2:A:1838:C:N4	2:A:1899:A:OP2	2.39	0.48
22:B:31:C:O2'	22:B:32:U:O4'	2.31	0.48
2:A:467:G:OP2	19:2:34:ARG:NH1	2.46	0.48
2:A:541:A:N6	2:A:553:G:O6	2.47	0.48
2:A:2077:A:H1'	2:A:2078:C:OP2	2.13	0.48
5:E:134:LEU:HD22	5:E:160:ALA:O	2.12	0.48
15:U:88:ASP:O	15:U:90:LYS:N	2.47	0.48
21:F:68:LYS:NZ	22:B:41:G:O6	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
22:B:77:U:C2	22:B:99:A:N7	2.81	0.48
9:N:10:LEU:O	9:N:11:ASN:C	2.57	0.48
2:A:570:G:C1'	2:A:983:A:H62	2.27	0.48
2:A:2281:A:O2'	2:A:2389:G:N3	2.47	0.48
2:A:1791:A:C2	2:A:1829:A:H4'	2.49	0.47
17:Y:24:GLU:HB3	17:Y:46:VAL:HG11	1.96	0.47
1:V:19:ARG:NH1	22:B:94:A:OP1	2.46	0.47
2:A:2090:A:N6	2:A:2230:G:O6	2.47	0.47
4:D:12:THR:HG22	4:D:13:ARG:N	2.28	0.47
21:F:16:MET:HE1	21:F:21:TYR:HB2	1.96	0.47
2:A:2364:C:OP1	25:W:51:ARG:NH1	2.47	0.47
9:N:11:ASN:O	9:N:12:ARG:HG3	2.13	0.47
21:F:5:ASP:OD1	21:F:6:TYR:N	2.45	0.47
2:A:1666:G:H4'	7:K:6:THR:HG23	1.96	0.47
2:A:2092:U:OP2	24:H:28:ASN:ND2	2.47	0.47
2:A:1351:C:O2'	2:A:1571:A:O2'	2.31	0.47
7:K:35:VAL:HG22	7:K:69:VAL:CG1	2.44	0.47
2:A:30:G:O2'	2:A:1214:A:N3	2.36	0.47
2:A:231:A:H2'	2:A:232:G:O4'	2.14	0.47
2:A:918:A:N3	22:B:80:U:O2'	2.46	0.47
2:A:1153:C:OP1	11:Q:91:ARG:NH2	2.45	0.47
3:C:259:ASN:HD22	3:C:262:THR:HG22	1.79	0.47
4:D:110:THR:HG22	4:D:171:THR:OG1	2.15	0.47
5:E:16:GLU:HA	5:E:16:GLU:OE1	2.13	0.47
3:C:60:ALA:O	3:C:62:ARG:NH1	2.44	0.47
13:S:72:THR:HG21	13:S:108:SER:HB3	1.96	0.46
18:O:53:VAL:HG12	18:O:54:ILE:H	1.80	0.46
4:D:46:ARG:NH2	4:D:88:GLU:O	2.48	0.46
8:L:67:THR:O	8:L:67:THR:HG23	2.15	0.46
24:H:9:VAL:HG22	24:H:10:ALA:H	1.81	0.46
2:A:2249:U:OP1	2:A:2253:G:N2	2.41	0.46
2:A:2414:G:O2'	2:A:2415:G:P	2.71	0.46
4:D:38:LYS:NZ	4:D:81:GLU:OE2	2.33	0.46
5:E:48:THR:OG1	5:E:51:GLU:OE1	2.28	0.46
2:A:216:A:C8	2:A:432:A:N6	2.84	0.46
2:A:1827:U:OP2	3:C:220:ARG:HD2	2.16	0.46
2:A:1930:G:O2'	2:A:1968:G:O6	2.30	0.46
21:F:174:PHE:O	21:F:175:PRO:C	2.59	0.46
11:Q:108:LEU:HA	12:R:48:LYS:NZ	2.30	0.46
23:Z:11:SER:HB2	23:Z:31:ILE:HD11	1.98	0.46
11:Q:108:LEU:HA	12:R:48:LYS:HZ1	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1383:A:O2'	2:A:1384:A:O4'	2.20	0.46
2:A:2338:C:HO2'	2:A:2339:C:P	2.32	0.46
5:E:146:VAL:HG12	5:E:167:VAL:HG22	1.98	0.46
18:O:53:VAL:HG12	18:O:54:ILE:N	2.30	0.46
24:H:31:VAL:O	24:H:33:GLN:N	2.44	0.46
2:A:1328:A:O2'	2:A:1329:U:O5'	2.32	0.46
2:A:1528:A:N6	2:A:1543:G:O2'	2.49	0.46
2:A:468:G:N7	19:2:39:ARG:NH2	2.57	0.45
2:A:998:C:OP2	11:Q:57:ARG:NH2	2.49	0.45
18:O:37:HIS:ND1	18:O:38:LEU:O	2.47	0.45
1:V:76:ASP:OD1	1:V:77:VAL:N	2.49	0.45
2:A:729:G:O2'	2:A:763:G:H4'	2.16	0.45
2:A:2656:U:N3	2:A:2665:A:C8	2.83	0.45
2:A:2741:A:H61	2:A:2763:G:C2'	2.28	0.45
17:Y:10:SER:O	17:Y:14:LEU:HD23	2.15	0.45
2:A:587:C:O2	8:L:33:ARG:NH2	2.50	0.45
9:N:77:ALA:O	9:N:81:ASN:ND2	2.49	0.45
2:A:2340:A:O2'	2:A:2341:G:OP1	2.27	0.45
8:L:116:VAL:O	8:L:116:VAL:HG13	2.17	0.45
10:P:101:GLU:OE1	10:P:101:GLU:HA	2.17	0.45
2:A:1789:A:OP2	3:C:220:ARG:NH1	2.49	0.45
7:K:87:LEU:HD11	7:K:92:GLU:CB	2.45	0.45
1:V:70:ILE:HG22	1:V:72:VAL:HG13	1.99	0.45
2:A:573:U:N3	2:A:2031:A:OP1	2.50	0.45
2:A:2437:G:N2	2:A:2440:C:H42	2.15	0.45
2:A:2885:G:OP2	18:O:39:ARG:NH2	2.50	0.45
2:A:36:G:N3	2:A:450:G:O2'	2.49	0.45
2:A:2296:U:O2	2:A:2335:A:C5	2.69	0.45
2:A:1721:G:O2'	2:A:1739:A:N6	2.50	0.45
7:K:109:SER:O	7:K:113:MET:HE3	2.17	0.45
1:V:88:HIS:NE2	22:B:75:G:O2'	2.50	0.45
21:F:15:LEU:HD23	21:F:21:TYR:HE2	1.82	0.45
21:F:43:ILE:O	21:F:82:TYR:OH	2.31	0.45
2:A:1204:A:O4'	2:A:1206:G:C8	2.71	0.44
2:A:1360:G:C8	2:A:1361:G:C8	3.05	0.44
21:F:65:LEU:HD23	21:F:65:LEU:H	1.82	0.44
24:H:25:TYR:CE2	24:H:30:LEU:HD11	2.52	0.44
7:K:93:GLN:O	7:K:94:PRO:C	2.60	0.44
25:W:66:GLU:OE1	25:W:68:LYS:NZ	2.45	0.44
2:A:239:C:HO2'	2:A:622:G:HO2'	1.59	0.44
3:C:129:LEU:HD12	3:C:133:ASN:OD1	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1730:C:O2'	2:A:1731:G:N3	2.39	0.44
11:Q:45:ALA:O	11:Q:49:ARG:HD3	2.18	0.44
2:A:1969:A:H2'	2:A:1972:G:H21	1.82	0.44
2:A:2076:U:OP2	2:A:2238:G:N2	2.46	0.44
2:A:2687:U:H2'	2:A:2688:G:O4'	2.17	0.44
17:Y:14:LEU:O	17:Y:18:LEU:HD23	2.17	0.44
21:F:65:LEU:HD13	22:B:42:C:C5	2.52	0.44
2:A:6:A:N3	6:J:135:GLN:NE2	2.64	0.44
2:A:18:U:OP1	11:Q:25:GLY:N	2.51	0.44
2:A:394:C:H2'	2:A:395:U:O4'	2.17	0.44
2:A:476:G:N1	2:A:479:A:OP2	2.44	0.44
2:A:2340:A:C6	2:A:2341:G:N7	2.85	0.44
8:L:81:ASP:O	8:L:82:LEU:HG	2.18	0.44
12:R:48:LYS:HG2	12:R:49:ILE:N	2.33	0.44
15:U:61:GLU:OE1	15:U:61:GLU:N	2.47	0.44
2:A:90:U:OP2	2:A:91:A:O2'	2.31	0.44
2:A:540:C:N4	2:A:541:A:H62	2.16	0.44
2:A:2291:U:O4	2:A:2341:G:O6	2.35	0.44
25:W:16:ARG:O	25:W:17:LEU:HD22	2.18	0.44
1:V:75:GLN:NE2	22:B:103:U:O2'	2.51	0.44
2:A:1401:G:H2'	2:A:1402:U:O4'	2.18	0.44
2:A:1668:A:N3	2:A:1670:C:N4	2.66	0.44
2:A:1969:A:O2'	2:A:1972:G:N3	2.50	0.44
3:C:81:GLU:OE1	3:C:102:TYR:OH	2.31	0.44
5:E:4:VAL:HG22	5:E:6:LYS:H	1.82	0.44
18:O:35:GLU:OE2	18:O:43:THR:OG1	2.34	0.44
2:A:84:A:H62	2:A:101:A:H2	1.65	0.43
2:A:415:A:N6	2:A:2409:G:O6	2.51	0.43
2:A:1797:G:O2'	3:C:256:THR:OG1	2.35	0.43
12:R:55:ASP:OD1	12:R:56:GLY:N	2.50	0.43
16:X:21:LEU:HG	16:X:21:LEU:O	2.18	0.43
1:V:7:GLU:N	1:V:7:GLU:OE1	2.51	0.43
2:A:117:G:OP2	2:A:119:A:O2'	2.26	0.43
2:A:1340:U:OP2	14:T:82:LYS:NZ	2.51	0.43
14:T:37:ASP:OD1	14:T:37:ASP:N	2.51	0.43
15:U:48:VAL:HG12	15:U:53:GLN:HE21	1.82	0.43
2:A:1726:C:N3	2:A:1735:A:N6	2.67	0.43
2:A:2305:U:O4	21:F:38:GLY:N	2.49	0.43
13:S:29:VAL:HG13	13:S:55:ILE:HD11	2.01	0.43
17:Y:46:VAL:HG23	17:Y:49:ASP:HB2	2.01	0.43
23:Z:47:ILE:HG21	23:Z:56:VAL:HG21	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:826:U:N3	2:A:828:U:O2'	2.52	0.43
2:A:1715:G:O2'	2:A:1743:G:O6	2.33	0.43
4:D:14:ILE:HD12	4:D:24:VAL:HG11	2.00	0.43
2:A:83:A:O2'	2:A:103:A:N6	2.52	0.43
5:E:31:VAL:HG21	5:E:104:ALA:CB	2.49	0.43
6:J:101:ILE:HD12	6:J:101:ILE:H	1.82	0.43
16:X:39:VAL:HG21	16:X:67:LEU:HD11	2.00	0.43
25:W:12:SER:OG	25:W:13:GLU:N	2.52	0.43
2:A:1800:C:P	3:C:262:THR:HG21	2.59	0.43
2:A:1807:G:N2	2:A:1810:A:OP2	2.37	0.43
2:A:2314:A:OP1	21:F:87:LYS:NZ	2.46	0.43
2:A:2338:C:H1'	2:A:2339:C:OP2	2.18	0.43
8:L:19:LEU:HB2	8:L:31:GLY:HA3	2.00	0.43
1:V:56:PHE:CE1	1:V:61:LEU:HD21	2.54	0.43
2:A:1788:C:OP1	3:C:220:ARG:NH2	2.51	0.43
14:T:92:ASN:OD1	14:T:93:LEU:N	2.51	0.43
15:U:6:ARG:O	15:U:7:ASP:C	2.62	0.43
21:F:39:VAL:HG13	21:F:40:GLY:N	2.33	0.43
2:A:222:A:H61	2:A:232:G:H1'	1.83	0.43
2:A:493:G:H2'	2:A:494:G:O4'	2.18	0.43
2:A:1820:U:C2	3:C:200:MET:SD	3.11	0.43
2:A:2656:U:C2	2:A:2665:A:N7	2.87	0.43
2:A:1365:A:HO2'	16:X:10:ARG:HH12	1.66	0.43
2:A:1378:A:C4'	2:A:1379:U:OP1	2.67	0.43
2:A:1927:A:C2'	2:A:1928:A:O5'	2.65	0.43
9:N:70:THR:O	9:N:71:ARG:C	2.61	0.43
21:F:48:LEU:HD11	21:F:147:ARG:HD3	2.01	0.43
4:D:9:VAL:HG21	10:P:3:ILE:HD11	2.00	0.42
7:K:113:MET:HE2	7:K:113:MET:CA	2.49	0.42
1:V:17:SER:O	1:V:21:ARG:HD3	2.19	0.42
2:A:1437:C:HO2'	2:A:1516:G:HO2'	1.63	0.42
2:A:2681:C:OP1	4:D:114:LYS:NZ	2.44	0.42
2:A:2742:G:OP2	2:A:2755:C:N4	2.52	0.42
3:C:34:GLU:N	3:C:34:GLU:OE1	2.52	0.42
5:E:48:THR:HG22	5:E:86:ALA:HB3	2.00	0.42
8:L:27:LEU:O	8:L:27:LEU:HG	2.18	0.42
2:A:1550:C:OP1	2:A:1720:U:O2'	2.09	0.42
22:B:83:G:O6	22:B:94:A:N6	2.52	0.42
23:Z:28:LEU:HD21	23:Z:35:VAL:HG22	2.02	0.42
2:A:2901:C:N4	2:A:2902:C:N4	2.67	0.42
21:F:131:VAL:HG12	21:F:132:ARG:N	2.34	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
22:B:15:A:N7	22:B:109:A:N6	2.67	0.42
1:V:77:VAL:HG23	1:V:89:ILE:HG22	2.01	0.42
2:A:137:U:H2'	2:A:140:C:N3	2.34	0.42
2:A:1118:C:C2	2:A:1119:U:C5	3.08	0.42
20:O:82:ALA:HB1	20:O:87:ILE:HD13	2.01	0.42
2:A:1357:C:H2'	2:A:1358:G:O4'	2.20	0.42
5:E:178:VAL:HG13	5:E:179:SER:N	2.35	0.42
2:A:1007:C:OP2	2:A:1008:A:O2'	2.30	0.42
2:A:1287:A:O2'	2:A:1288:G:H5'	2.20	0.42
2:A:1790:C:O3'	2:A:1791:A:H8	2.02	0.42
2:A:1928:A:H2'	2:A:1929:G:N3	2.34	0.42
2:A:2340:A:C2'	2:A:2341:G:OP1	2.68	0.42
5:E:31:VAL:HG21	5:E:104:ALA:HB2	2.01	0.42
13:S:42:LYS:O	13:S:45:VAL:HG12	2.20	0.42
17:Y:56:LEU:O	17:Y:57:LEU:HB3	2.19	0.42
2:A:2079:U:O4	2:A:2080:A:N6	2.52	0.42
2:A:2437:G:H21	2:A:2440:C:H42	1.67	0.42
10:P:72:VAL:O	10:P:72:VAL:HG23	2.20	0.42
11:Q:89:ILE:HG12	12:R:39:LEU:HD23	2.00	0.42
2:A:1116:G:C2	2:A:1117:C:C6	3.08	0.42
2:A:1386:C:H2'	2:A:1387:A:H8	1.84	0.42
2:A:1466:U:O3'	2:A:1546:G:O2'	2.38	0.42
2:A:2356:U:O2'	25:W:16:ARG:NH1	2.53	0.42
2:A:2847:U:H2'	2:A:2848:G:O4'	2.20	0.42
2:A:2291:U:N3	2:A:2341:G:N1	2.67	0.41
3:C:251:THR:HG23	3:C:252:LYS:HG2	2.02	0.41
5:E:48:THR:CG2	5:E:86:ALA:HB3	2.51	0.41
15:U:5:ARG:O	15:U:24:VAL:HG21	2.20	0.41
2:A:2167:U:N3	2:A:2170:A:OP2	2.48	0.41
2:A:2653:U:O2	2:A:2668:G:C6	2.73	0.41
12:R:70:GLU:OE1	12:R:70:GLU:N	2.48	0.41
2:A:1754:A:N1	2:A:2716:C:O2'	2.47	0.41
2:A:2092:U:H4'	2:A:2093:G:O5'	2.20	0.41
13:S:55:ILE:HG21	13:S:66:ILE:HD11	2.02	0.41
21:F:52:ALA:HB2	21:F:149:ARG:NH2	2.34	0.41
2:A:748:G:O2'	2:A:749:A:O5'	2.39	0.41
4:D:25:THR:HG21	4:D:193:VAL:HG22	2.02	0.41
19:2:41:ARG:NE	19:2:41:ARG:HA	2.35	0.41
8:L:96:LYS:NZ	8:L:102:GLY:O	2.43	0.41
2:A:250:G:H2'	2:A:251:A:C8	2.55	0.41
2:A:629:G:H1'	2:A:639:U:O2'	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2419:U:H2'	2:A:2420:C:H5	1.85	0.41
5:E:7:ASP:OD1	5:E:8:ALA:N	2.47	0.41
22:B:40:U:O4'	22:B:45:A:N6	2.54	0.41
2:A:2831:G:O2'	2:A:2884:U:OP1	2.36	0.41
2:A:1344:U:H3'	2:A:1345:C:H5'	2.01	0.41
2:A:1933:G:O2'	2:A:1973:G:N2	2.51	0.41
11:Q:49:ARG:NH2	12:R:72:VAL:HG22	2.35	0.41
22:B:24:G:N2	22:B:27:C:N3	2.67	0.41
23:Z:23:LEU:HD21	23:Z:53:MET:HE3	2.02	0.41
2:A:1000:A:OP2	2:A:1154:G:N1	2.36	0.41
2:A:1115:G:C2	2:A:1116:G:C8	3.09	0.41
2:A:1132:U:O2'	2:A:1133:A:N3	2.50	0.41
2:A:2065:C:H2'	2:A:2066:C:C6	2.56	0.41
2:A:2812:G:H2'	2:A:2813:A:O4'	2.21	0.41
3:C:83:ASP:OD2	3:C:86:ARG:NE	2.52	0.41
7:K:77:ILE:HD11	10:P:71:ARG:HD2	2.03	0.41
7:K:91:SER:O	7:K:92:GLU:C	2.64	0.41
8:L:82:LEU:HD12	8:L:82:LEU:O	2.21	0.41
8:L:112:LEU:HD23	8:L:112:LEU:C	2.46	0.41
9:N:48:VAL:HG13	9:N:49:GLU:N	2.35	0.41
14:T:37:ASP:O	14:T:81:LYS:NZ	2.54	0.41
17:Y:24:GLU:CB	17:Y:46:VAL:HG11	2.51	0.41
22:B:33:G:H2'	22:B:34:A:O4'	2.21	0.41
2:A:2246:G:N2	2:A:2426:A:O2'	2.54	0.41
3:C:204:LEU:O	3:C:206:LYS:N	2.50	0.41
21:F:173:ASP:O	21:F:174:PHE:C	2.63	0.41
22:B:40:U:O2'	22:B:43:C:OP2	2.33	0.41
6:J:88:THR:HG23	6:J:91:GLU:H	1.85	0.40
2:A:25:U:H3	2:A:515:A:N6	2.20	0.40
2:A:580:U:O3'	11:Q:30:VAL:HG13	2.21	0.40
2:A:867:C:N4	2:A:868:U:O4	2.55	0.40
2:A:1298:C:H2'	2:A:1299:G:O4'	2.21	0.40
2:A:1604:C:O2'	2:A:1610:A:N1	2.46	0.40
2:A:2306:C:H2'	2:A:2307:G:C8	2.56	0.40
2:A:636:G:C4	8:L:111:ILE:HD12	2.57	0.40
2:A:1670:C:O2	2:A:1993:U:O2'	2.35	0.40
2:A:2306:C:N4	21:F:38:GLY:O	2.48	0.40
2:A:2404:U:H2'	2:A:2405:G:O4'	2.21	0.40
2:A:2720:U:C2	2:A:2721:A:C8	3.09	0.40
5:E:154:ASP:OD1	5:E:154:ASP:N	2.47	0.40
9:N:66:ALA:O	9:N:69:ARG:O	2.39	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:570:G:H1'	2:A:983:A:H62	1.86	0.40
2:A:1574:C:C2	2:A:1575:C:C5	3.10	0.40
2:A:2234:G:H2'	2:A:2235:G:C8	2.56	0.40
2:A:2808:G:O2'	2:A:2890:G:O6	2.35	0.40
2:A:2840:C:C2	2:A:2841:C:C5	3.09	0.40
9:N:2:ARG:NH1	9:N:5:LYS:O	2.55	0.40
2:A:224:U:O4	2:A:419:U:O2'	2.39	0.40
2:A:1570:A:H2'	2:A:1571:A:C8	2.56	0.40
2:A:2140:G:N1	2:A:2141:G:N7	2.70	0.40
2:A:2334:U:H5''	2:A:2335:A:OP2	2.22	0.40
2:A:2683:C:O2	7:K:70:ARG:NH2	2.55	0.40
6:J:81:ILE:HG23	6:J:82:GLY:N	2.37	0.40
6:J:105:VAL:HG11	6:J:122:LEU:HD22	2.03	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	V	92/94 (98%)	91 (99%)	1 (1%)	0	100	100
3	C	242/273 (89%)	232 (96%)	10 (4%)	0	100	100
4	D	180/209 (86%)	172 (96%)	8 (4%)	0	100	100
5	E	188/201 (94%)	178 (95%)	10 (5%)	0	100	100
6	J	140/142 (99%)	136 (97%)	4 (3%)	0	100	100
7	K	120/123 (98%)	114 (95%)	6 (5%)	0	100	100
8	L	113/144 (78%)	95 (84%)	18 (16%)	0	100	100
9	N	118/127 (93%)	107 (91%)	11 (9%)	0	100	100
10	P	112/115 (97%)	110 (98%)	2 (2%)	0	100	100
11	Q	115/118 (98%)	111 (96%)	4 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
12	R	101/103 (98%)	96 (95%)	5 (5%)	0	100	100
13	S	108/110 (98%)	102 (94%)	6 (6%)	0	100	100
14	T	91/100 (91%)	82 (90%)	9 (10%)	0	100	100
15	U	100/104 (96%)	84 (84%)	16 (16%)	0	100	100
16	X	71/78 (91%)	69 (97%)	2 (3%)	0	100	100
17	Y	59/63 (94%)	49 (83%)	8 (14%)	2 (3%)	3	14
18	O	54/57 (95%)	50 (93%)	4 (7%)	0	100	100
19	2	44/46 (96%)	39 (89%)	5 (11%)	0	100	100
20	O	114/117 (97%)	110 (96%)	4 (4%)	0	100	100
21	F	175/179 (98%)	166 (95%)	9 (5%)	0	100	100
23	Z	56/59 (95%)	55 (98%)	1 (2%)	0	100	100
24	H	48/149 (32%)	37 (77%)	11 (23%)	0	100	100
25	W	68/76 (90%)	66 (97%)	2 (3%)	0	100	100
All	All	2509/2787 (90%)	2351 (94%)	156 (6%)	2 (0%)	49	78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
17	Y	46	VAL
17	Y	45	GLN

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	V	78/78 (100%)	78 (100%)	0	100	100
3	C	197/218 (90%)	197 (100%)	0	100	100
4	D	143/164 (87%)	143 (100%)	0	100	100
5	E	159/165 (96%)	159 (100%)	0	100	100
6	J	116/116 (100%)	116 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
7	K	103/104 (99%)	103 (100%)	0	100	100
8	L	83/103 (81%)	83 (100%)	0	100	100
9	N	100/103 (97%)	100 (100%)	0	100	100
10	P	99/100 (99%)	99 (100%)	0	100	100
11	Q	89/90 (99%)	89 (100%)	0	100	100
12	R	84/84 (100%)	84 (100%)	0	100	100
13	S	93/93 (100%)	93 (100%)	0	100	100
14	T	80/84 (95%)	80 (100%)	0	100	100
15	U	83/85 (98%)	83 (100%)	0	100	100
16	X	65/68 (96%)	65 (100%)	0	100	100
17	Y	55/55 (100%)	55 (100%)	0	100	100
18	0	47/48 (98%)	47 (100%)	0	100	100
19	2	38/38 (100%)	38 (100%)	0	100	100
20	O	86/87 (99%)	86 (100%)	0	100	100
21	F	148/150 (99%)	148 (100%)	0	100	100
23	Z	48/49 (98%)	48 (100%)	0	100	100
24	H	40/114 (35%)	40 (100%)	0	100	100
25	W	52/58 (90%)	52 (100%)	0	100	100
All	All	2086/2254 (92%)	2086 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	V	75	GLN
3	C	152	GLN
4	D	36	GLN
4	D	94	GLN
5	E	46	GLN
6	J	80	HIS
9	N	11	ASN
9	N	18	GLN
11	Q	19	GLN
12	R	12	HIS

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Mol	Chain	Res	Type
14	T	48	GLN
14	T	59	ASN
15	U	73	ASN
16	X	15	ASN
16	X	22	ASN
20	O	29	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	A	2540/2904 (87%)	416 (16%)	14 (0%)
22	B	118/119 (99%)	11 (9%)	1 (0%)
All	All	2658/3023 (87%)	427 (16%)	15 (0%)

All (427) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	A	10	A
2	A	12	U
2	A	26	G
2	A	27	G
2	A	46	G
2	A	51	G
2	A	63	A
2	A	71	A
2	A	74	A
2	A	75	G
2	A	118	A
2	A	120	U
2	A	125	A
2	A	131	A
2	A	138	U
2	A	139	U
2	A	140	C
2	A	141	G
2	A	142	A
2	A	163	C
2	A	204	A
2	A	216	A
2	A	221	A
2	A	222	A

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Mol	Chain	Res	Type
2	A	228	C
2	A	230	G
2	A	233	A
2	A	248	G
2	A	250	G
2	A	255	A
2	A	266	G
2	A	267	C
2	A	272	A
2	A	275	C
2	A	302	C
2	A	307	G
2	A	311	A
2	A	329	G
2	A	330	A
2	A	346	A
2	A	362	A
2	A	371	A
2	A	372	G
2	A	386	G
2	A	396	G
2	A	406	G
2	A	411	G
2	A	424	G
2	A	430	A
2	A	435	C
2	A	456	C
2	A	480	A
2	A	481	G
2	A	490	C
2	A	491	G
2	A	504	A
2	A	505	A
2	A	509	C
2	A	531	C
2	A	532	A
2	A	543	G
2	A	544	C
2	A	546	U
2	A	547	A
2	A	548	G
2	A	549	G

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Mol	Chain	Res	Type
2	A	563	A
2	A	572	A
2	A	573	U
2	A	586	A
2	A	603	A
2	A	614	A
2	A	615	U
2	A	627	A
2	A	637	A
2	A	646	U
2	A	647	G
2	A	654	A
2	A	655	A
2	A	669	G
2	A	671	C
2	A	683	U
2	A	686	U
2	A	730	A
2	A	740	C
2	A	747	U
2	A	748	G
2	A	764	A
2	A	765	C
2	A	775	G
2	A	776	G
2	A	777	G
2	A	782	A
2	A	784	G
2	A	785	G
2	A	789	A
2	A	792	A
2	A	812	C
2	A	819	A
2	A	827	U
2	A	828	U
2	A	830	G
2	A	845	A
2	A	846	U
2	A	856	G
2	A	858	G
2	A	859	G
2	A	863	A

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Mol	Chain	Res	Type
2	A	864	G
2	A	865	C
2	A	866	A
2	A	911	A
2	A	912	C
2	A	914	G
2	A	931	U
2	A	932	U
2	A	945	A
2	A	959	A
2	A	961	C
2	A	974	G
2	A	980	A
2	A	983	A
2	A	984	A
2	A	995	C
2	A	996	A
2	A	1009	A
2	A	1012	U
2	A	1013	C
2	A	1026	G
2	A	1033	U
2	A	1041	G
2	A	1043	C
2	A	1115	G
2	A	1124	G
2	A	1133	A
2	A	1134	A
2	A	1135	C
2	A	1136	G
2	A	1142	A
2	A	1171	G
2	A	1172	C
2	A	1174	U
2	A	1175	A
2	A	1180	U
2	A	1186	G
2	A	1205	A
2	A	1212	G
2	A	1236	G
2	A	1238	G
2	A	1249	U

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Mol	Chain	Res	Type
2	A	1253	A
2	A	1256	G
2	A	1266	G
2	A	1271	G
2	A	1272	A
2	A	1300	G
2	A	1301	A
2	A	1302	A
2	A	1314	C
2	A	1329	U
2	A	1345	C
2	A	1365	A
2	A	1378	A
2	A	1379	U
2	A	1395	A
2	A	1403	A
2	A	1416	G
2	A	1417	C
2	A	1428	C
2	A	1451	C
2	A	1452	G
2	A	1482	G
2	A	1493	C
2	A	1504	A
2	A	1509	A
2	A	1510	G
2	A	1515	A
2	A	1535	A
2	A	1555	G
2	A	1556	C
2	A	1566	A
2	A	1569	A
2	A	1578	U
2	A	1584	U
2	A	1585	C
2	A	1608	A
2	A	1634	A
2	A	1646	C
2	A	1647	U
2	A	1648	U
2	A	1654	A
2	A	1674	G

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Mol	Chain	Res	Type
2	A	1715	G
2	A	1729	U
2	A	1730	C
2	A	1732	C
2	A	1738	G
2	A	1764	C
2	A	1773	A
2	A	1781	U
2	A	1787	A
2	A	1800	C
2	A	1801	A
2	A	1808	A
2	A	1816	C
2	A	1829	A
2	A	1833	C
2	A	1835	G
2	A	1836	C
2	A	1839	G
2	A	1840	G
2	A	1899	A
2	A	1900	A
2	A	1903	G
2	A	1906	G
2	A	1925	C
2	A	1928	A
2	A	1929	G
2	A	1930	G
2	A	1931	U
2	A	1970	A
2	A	1971	U
2	A	1972	G
2	A	1973	G
2	A	1991	U
2	A	1992	G
2	A	1993	U
2	A	1997	C
2	A	2021	C
2	A	2022	U
2	A	2023	C
2	A	2025	C
2	A	2030	A
2	A	2031	A

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Mol	Chain	Res	Type
2	A	2033	A
2	A	2043	C
2	A	2051	A
2	A	2055	C
2	A	2062	A
2	A	2068	U
2	A	2071	A
2	A	2072	C
2	A	2073	C
2	A	2076	U
2	A	2077	A
2	A	2078	C
2	A	2093	G
2	A	2095	A
2	A	2096	C
2	A	2097	A
2	A	2099	U
2	A	2101	A
2	A	2102	G
2	A	2104	C
2	A	2107	G
2	A	2109	U
2	A	2111	U
2	A	2112	G
2	A	2113	U
2	A	2114	A
2	A	2116	G
2	A	2117	A
2	A	2118	U
2	A	2119	A
2	A	2120	G
2	A	2122	U
2	A	2126	A
2	A	2131	U
2	A	2132	U
2	A	2133	G
2	A	2135	A
2	A	2136	G
2	A	2137	U
2	A	2138	G
2	A	2141	G
2	A	2142	A

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Mol	Chain	Res	Type
2	A	2145	C
2	A	2146	C
2	A	2147	A
2	A	2148	G
2	A	2150	C
2	A	2152	G
2	A	2153	C
2	A	2155	U
2	A	2157	G
2	A	2158	A
2	A	2159	G
2	A	2162	G
2	A	2163	A
2	A	2164	C
2	A	2165	C
2	A	2168	G
2	A	2170	A
2	A	2171	A
2	A	2172	U
2	A	2176	A
2	A	2191	A
2	A	2198	A
2	A	2204	G
2	A	2211	A
2	A	2212	A
2	A	2214	C
2	A	2225	A
2	A	2238	G
2	A	2239	G
2	A	2241	A
2	A	2242	G
2	A	2243	U
2	A	2244	U
2	A	2245	U
2	A	2246	G
2	A	2248	C
2	A	2249	U
2	A	2250	G
2	A	2251	G
2	A	2252	G
2	A	2253	G
2	A	2254	C

Continued on next page...

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Mol	Chain	Res	Type
2	A	2255	G
2	A	2256	G
2	A	2257	U
2	A	2258	C
2	A	2261	C
2	A	2263	C
2	A	2264	C
2	A	2266	A
2	A	2275	C
2	A	2276	G
2	A	2279	G
2	A	2283	C
2	A	2286	G
2	A	2287	A
2	A	2297	A
2	A	2303	G
2	A	2304	G
2	A	2305	U
2	A	2306	C
2	A	2307	G
2	A	2308	G
2	A	2311	A
2	A	2312	U
2	A	2315	G
2	A	2316	G
2	A	2318	G
2	A	2321	U
2	A	2324	U
2	A	2325	G
2	A	2327	A
2	A	2334	U
2	A	2336	A
2	A	2337	G
2	A	2338	C
2	A	2339	C
2	A	2341	G
2	A	2342	C
2	A	2350	C
2	A	2356	U
2	A	2357	G
2	A	2361	G
2	A	2375	G

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	A	2383	G
2	A	2385	C
2	A	2402	U
2	A	2403	C
2	A	2406	A
2	A	2415	G
2	A	2419	U
2	A	2423	U
2	A	2425	A
2	A	2426	A
2	A	2427	C
2	A	2430	A
2	A	2431	U
2	A	2432	A
2	A	2433	A
2	A	2434	A
2	A	2439	A
2	A	2440	C
2	A	2441	U
2	A	2442	C
2	A	2443	C
2	A	2609	U
2	A	2610	C
2	A	2629	U
2	A	2639	A
2	A	2646	C
2	A	2673	G
2	A	2682	A
2	A	2689	U
2	A	2690	U
2	A	2714	G
2	A	2726	A
2	A	2729	G
2	A	2733	A
2	A	2739	U
2	A	2745	C
2	A	2750	A
2	A	2751	G
2	A	2755	C
2	A	2757	A
2	A	2764	A
2	A	2765	A

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Mol	Chain	Res	Type
2	A	2766	A
2	A	2769	U
2	A	2778	A
2	A	2780	G
2	A	2791	G
2	A	2818	U
2	A	2820	A
2	A	2849	U
2	A	2857	G
2	A	2867	G
2	A	2873	A
2	A	2880	C
2	A	2883	A
2	A	2901	C
22	B	13	G
22	B	15	A
22	B	31	C
22	B	32	U
22	B	35	C
22	B	41	G
22	B	53	A
22	B	89	U
22	B	90	C
22	B	99	A
22	B	109	A

All (15) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	A	271	G
2	A	328	U
2	A	479	A
2	A	1328	A
2	A	1378	A
2	A	1927	A
2	A	1928	A
2	A	2077	A
2	A	2092	U
2	A	2115	G
2	A	2136	G
2	A	2253	G
2	A	2338	C

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Mol	Chain	Res	Type
2	A	2414	G
22	B	31	C

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.

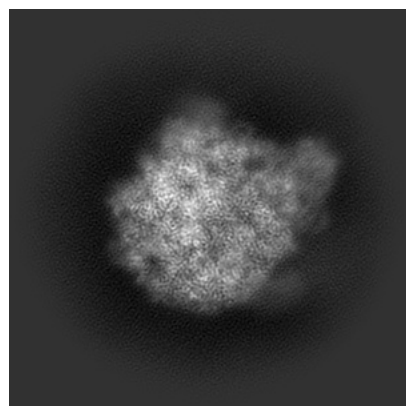
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16495. These allow visual inspection of the internal detail of the map and identification of artifacts.

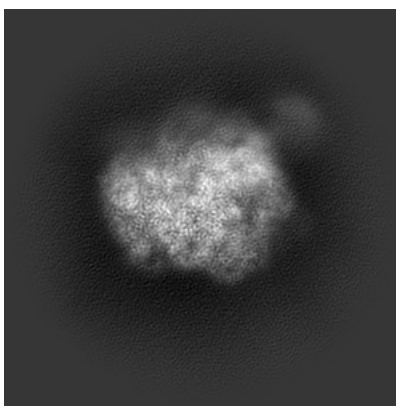
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

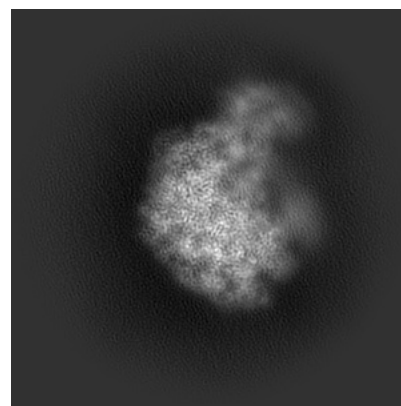
6.1.1 Primary map



X

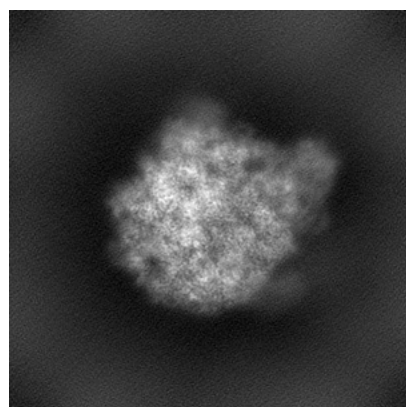


Y

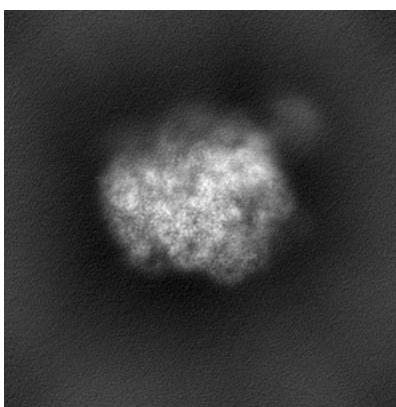


Z

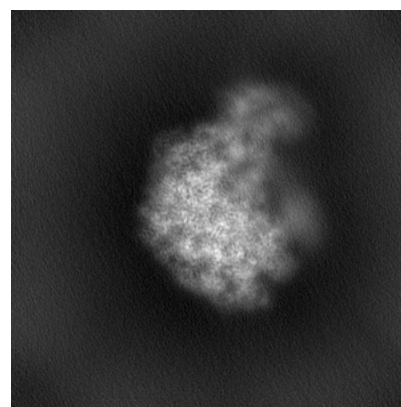
6.1.2 Raw map



X



Y

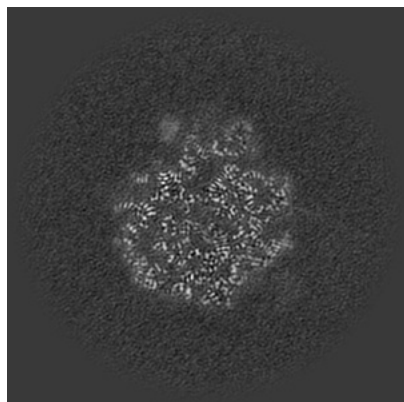


Z

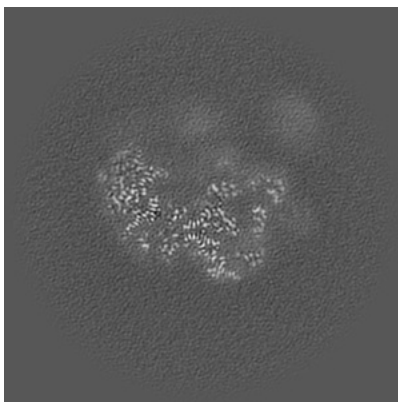
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

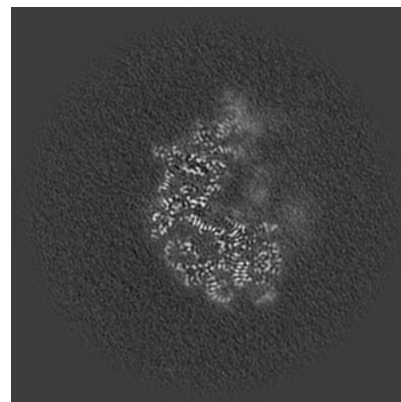
6.2.1 Primary map



X Index: 150

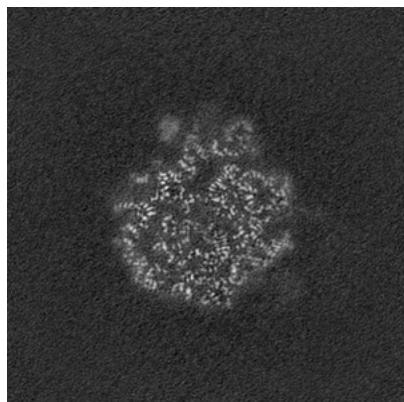


Y Index: 150

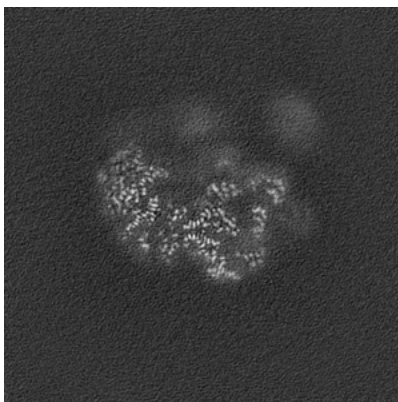


Z Index: 150

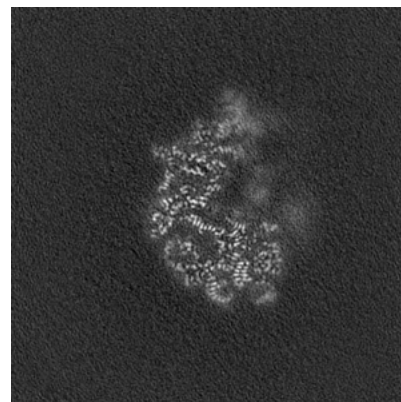
6.2.2 Raw map



X Index: 150



Y Index: 150

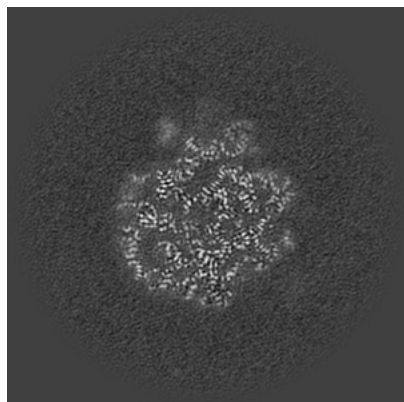


Z Index: 150

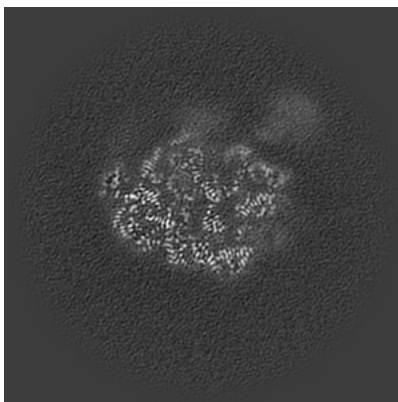
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

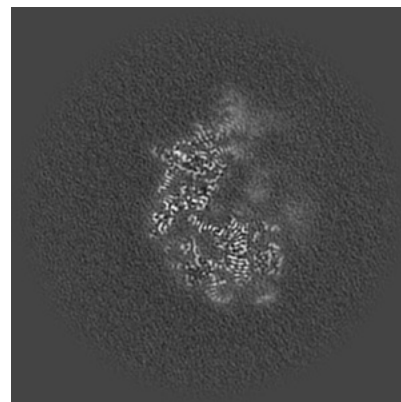
6.3.1 Primary map



X Index: 148

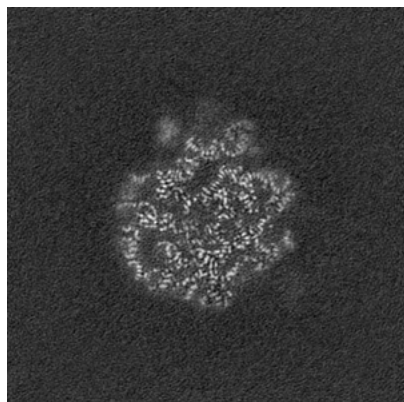


Y Index: 139

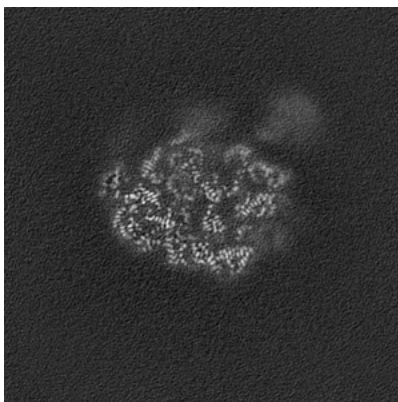


Z Index: 149

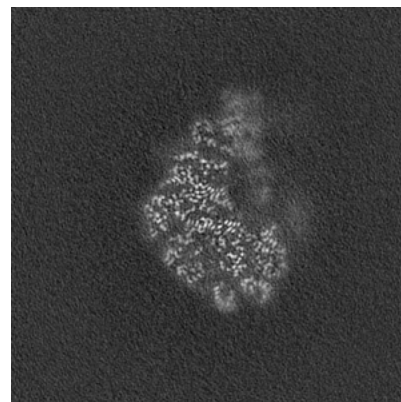
6.3.2 Raw map



X Index: 148



Y Index: 139

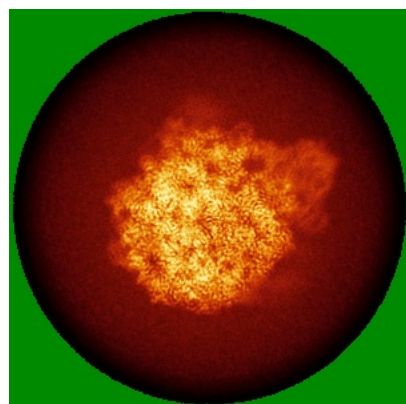


Z Index: 154

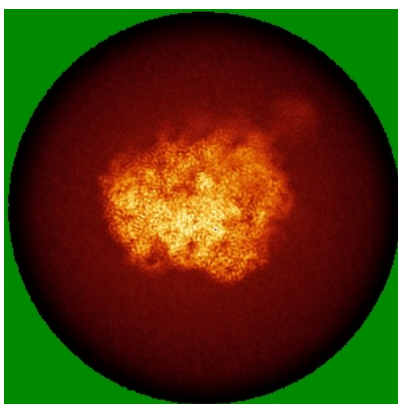
The images above show the largest variance slices of the map in three orthogonal directions.

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

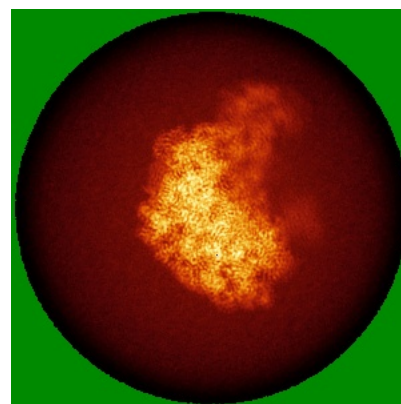
6.4.1 Primary map



X

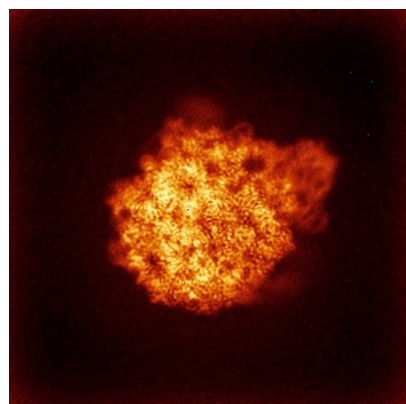


Y

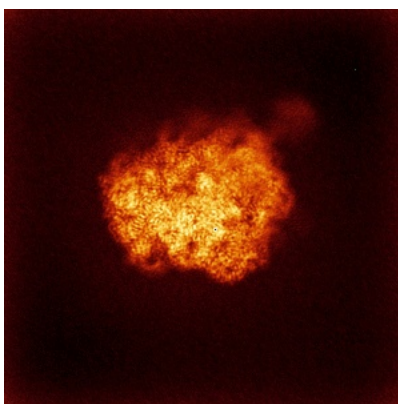


Z

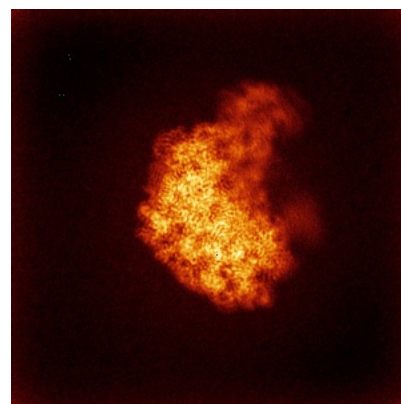
6.4.2 Raw map



X



Y

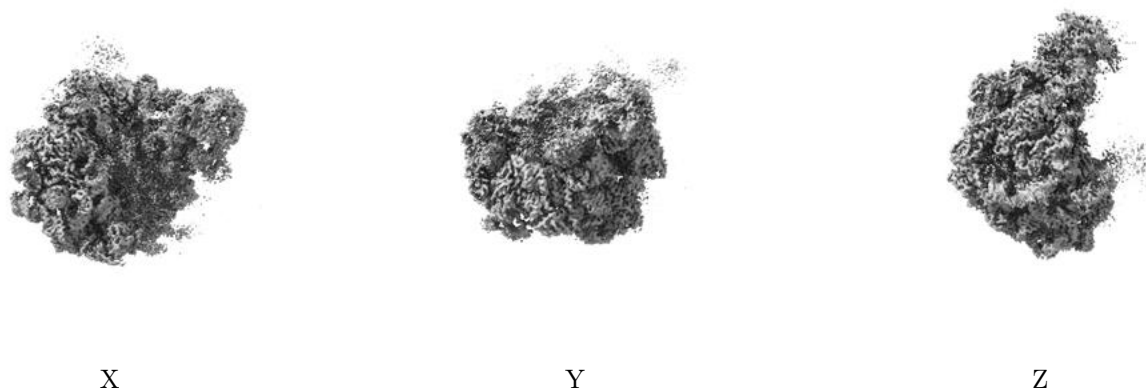


Z

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 0.6. 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.

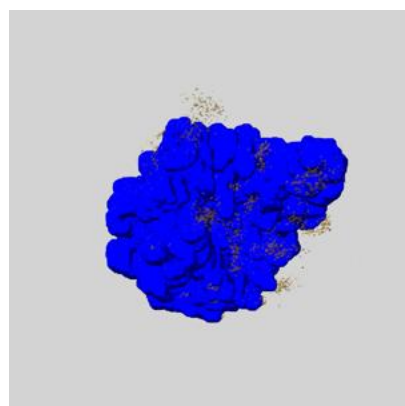
6.6 Mask visualisation [i](#)

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

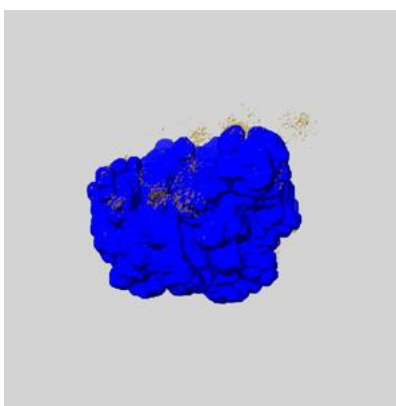
A mask typically either:

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

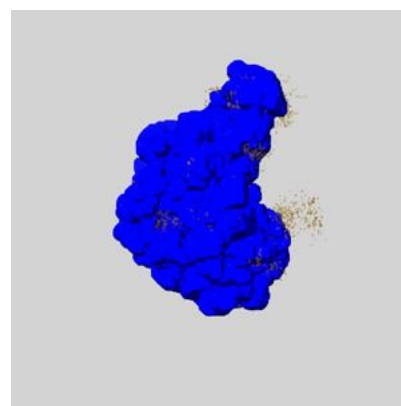
6.6.1 emd_16495_msk_1.map [i](#)



X



Y

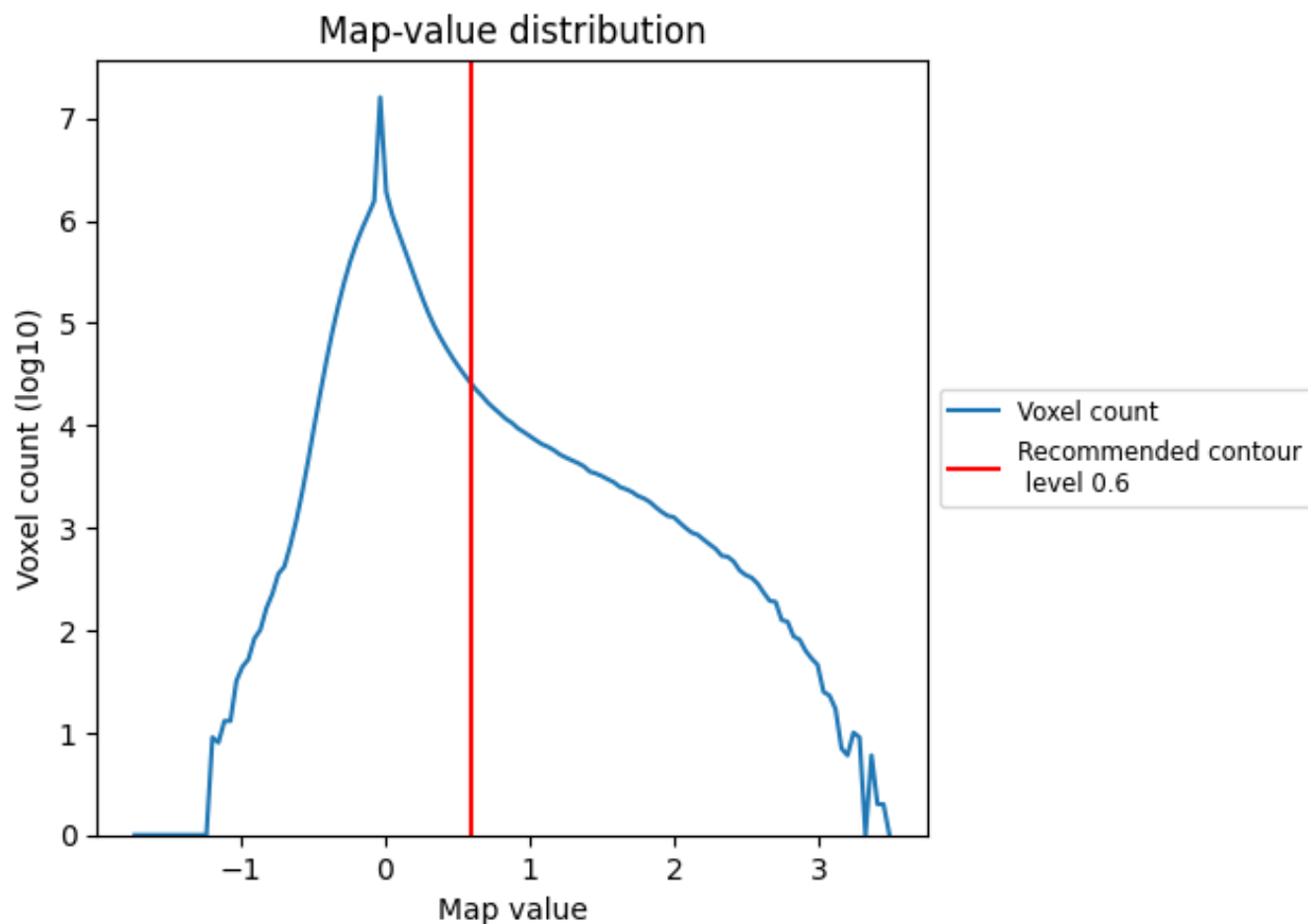


Z

7 Map analysis [i](#)

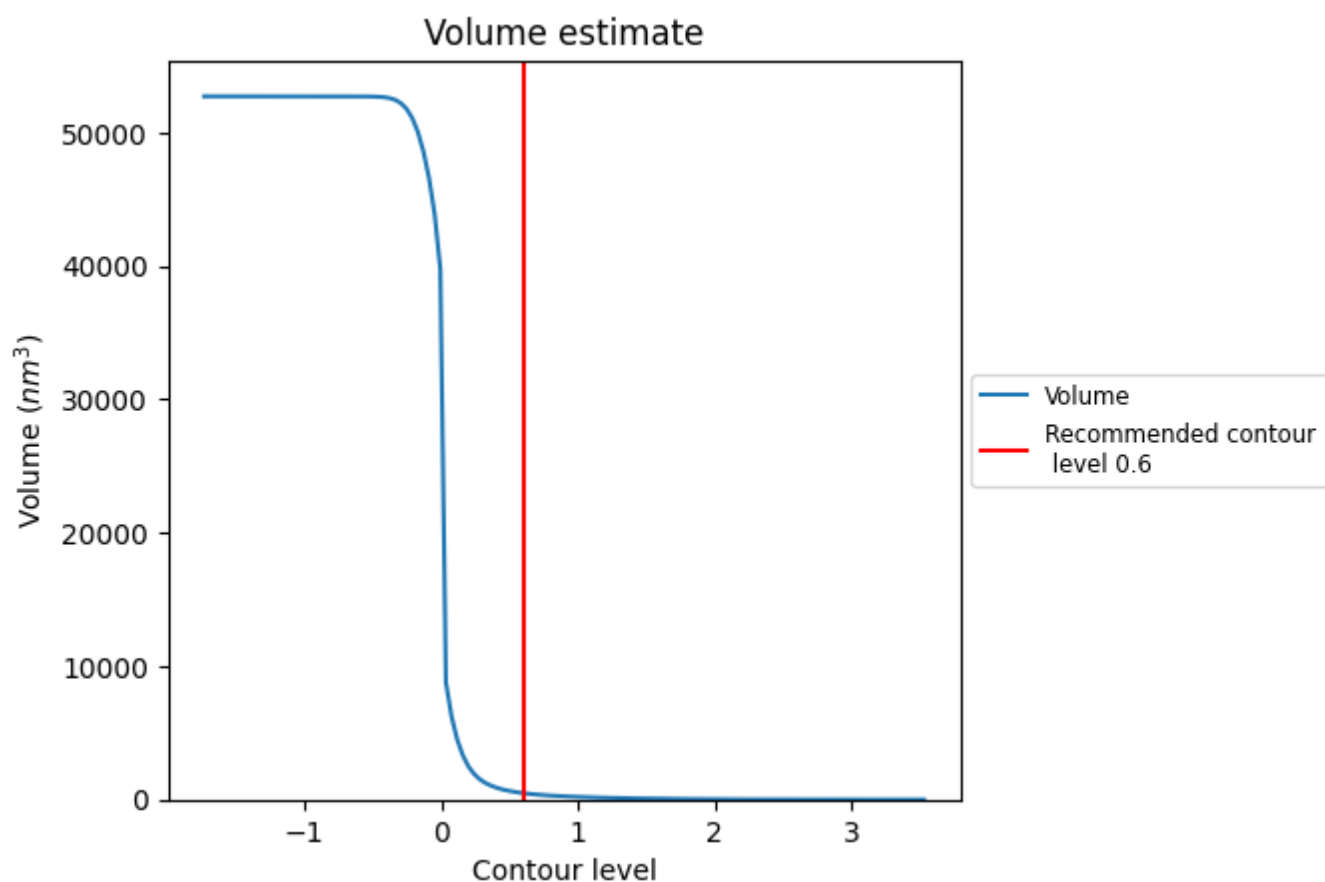
This section contains the results of statistical analysis of the map.

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.

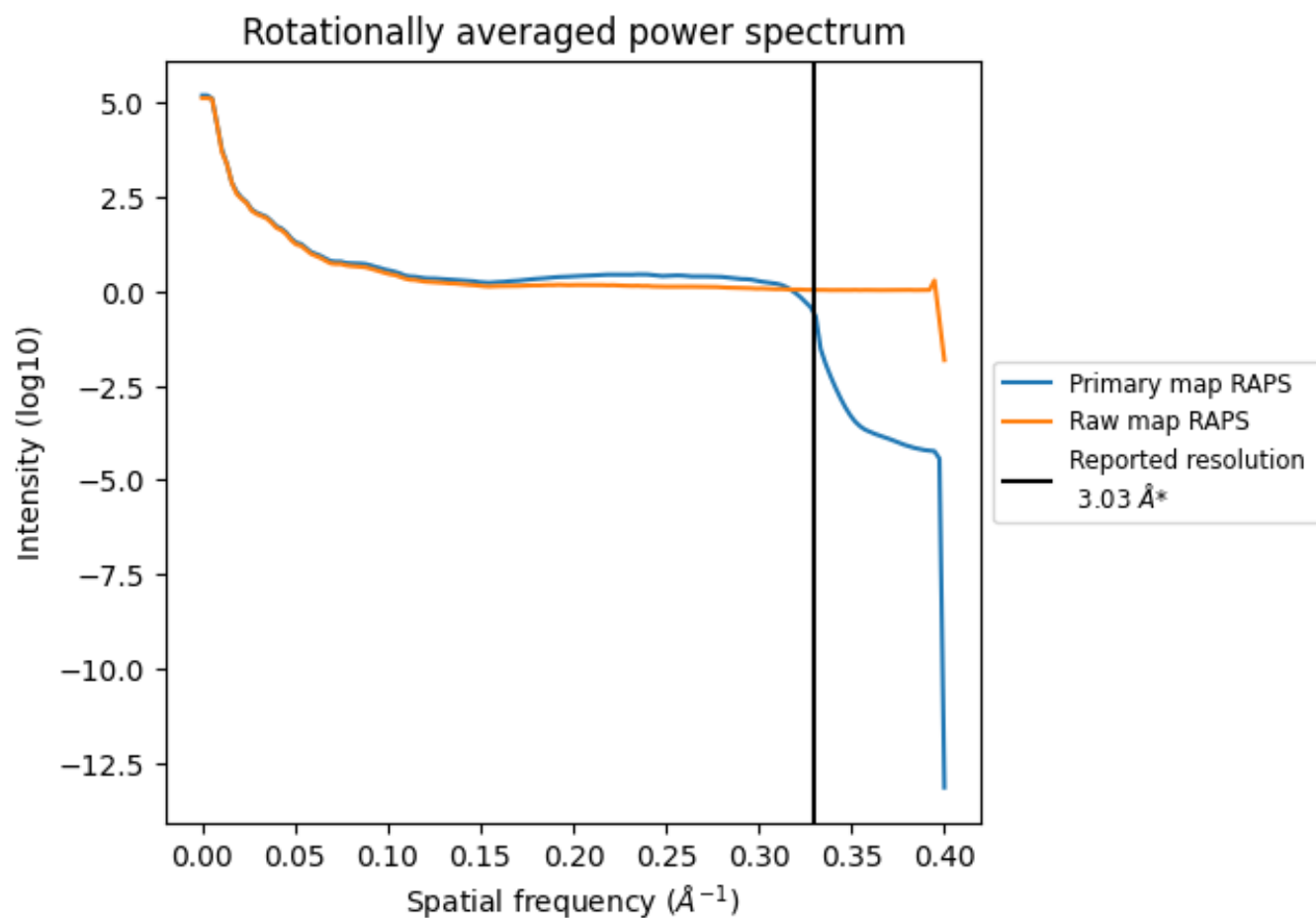
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 480 nm³; this corresponds to an approximate mass of 434 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 ⓘ

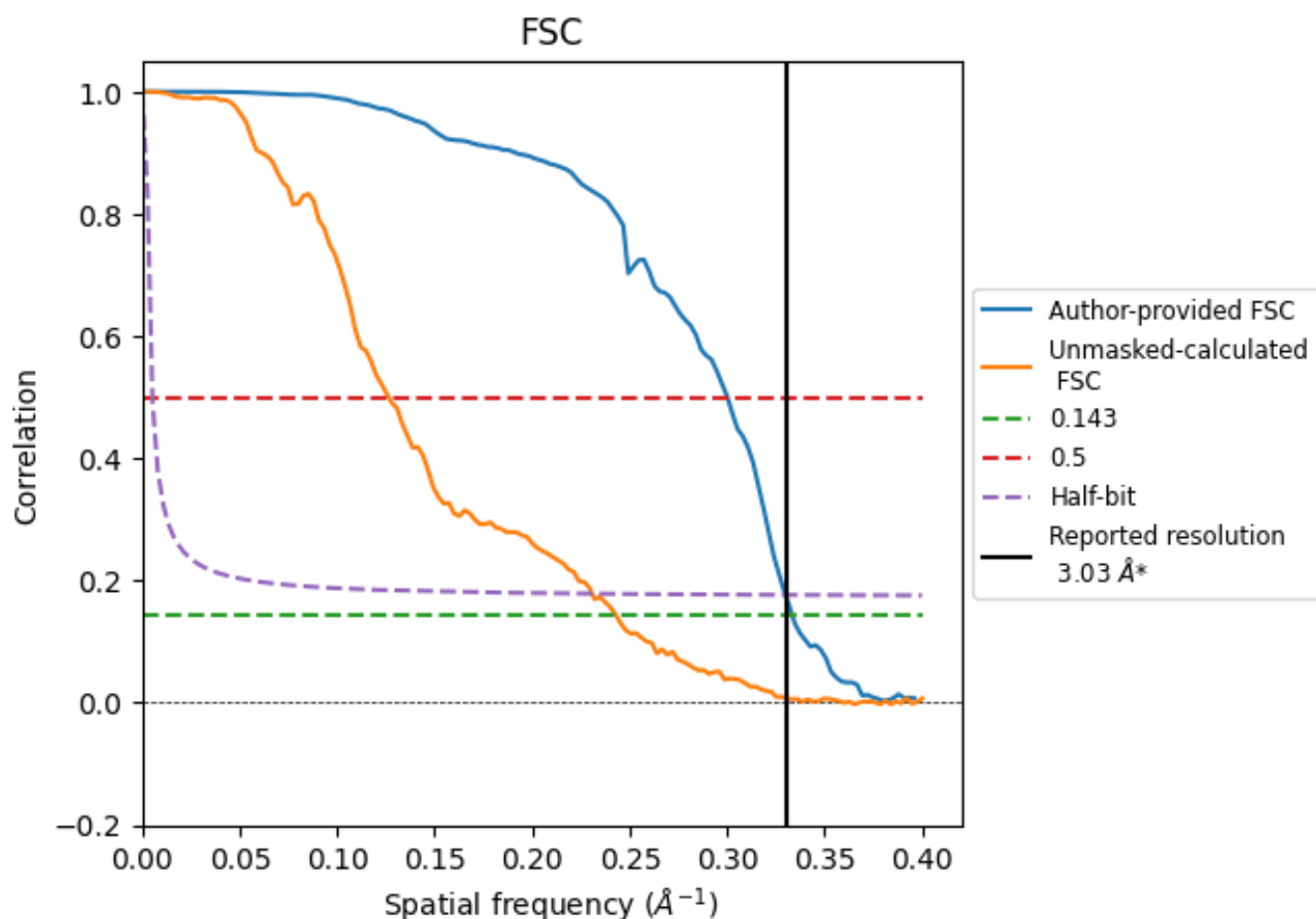


*Reported resolution corresponds to spatial frequency of 0.330 Å⁻¹

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 0.330 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

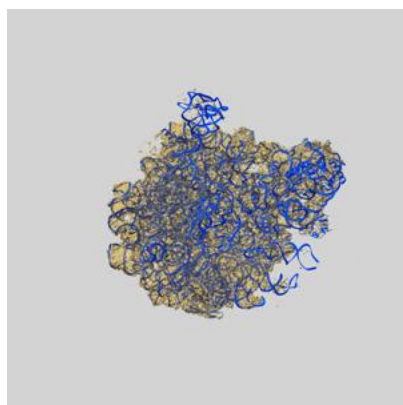
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.03	-	-
Author-provided FSC curve	3.00	3.33	3.03
Unmasked-calculated*	4.12	7.91	4.33

*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 4.12 differs from the reported value 3.03 by more than 10 %

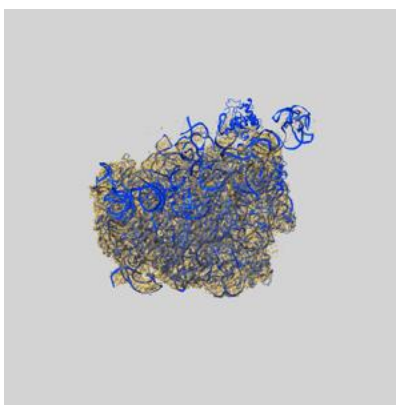
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-16495 and PDB model 8C8Y. Per-residue inclusion information can be found in section [3](#) on page [8](#).

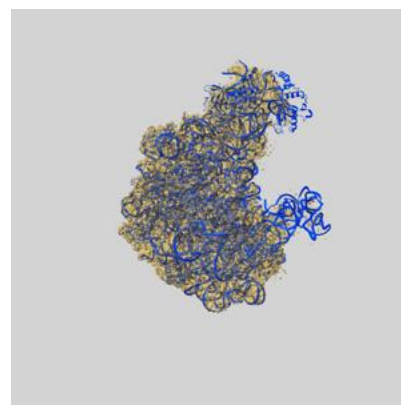
9.1 Map-model overlay [i](#)



X



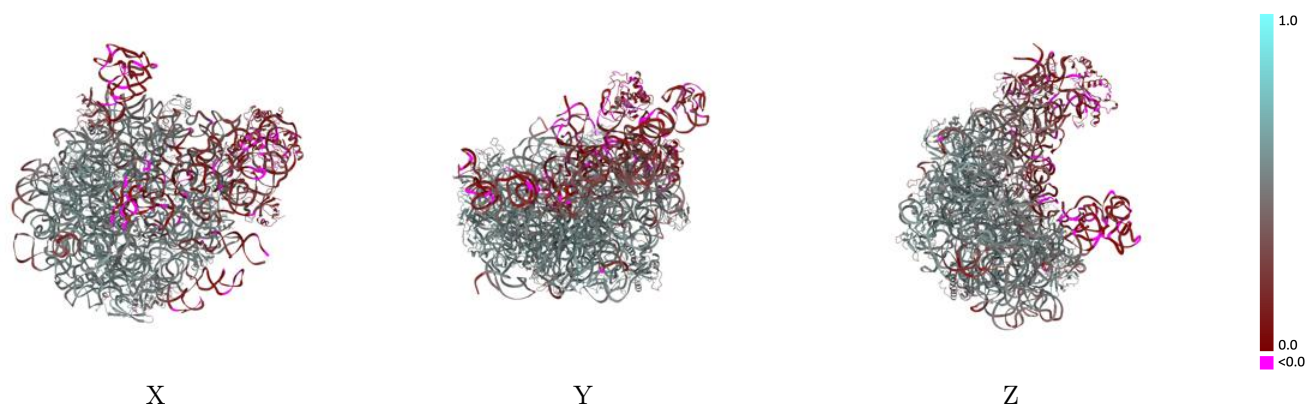
Y



Z

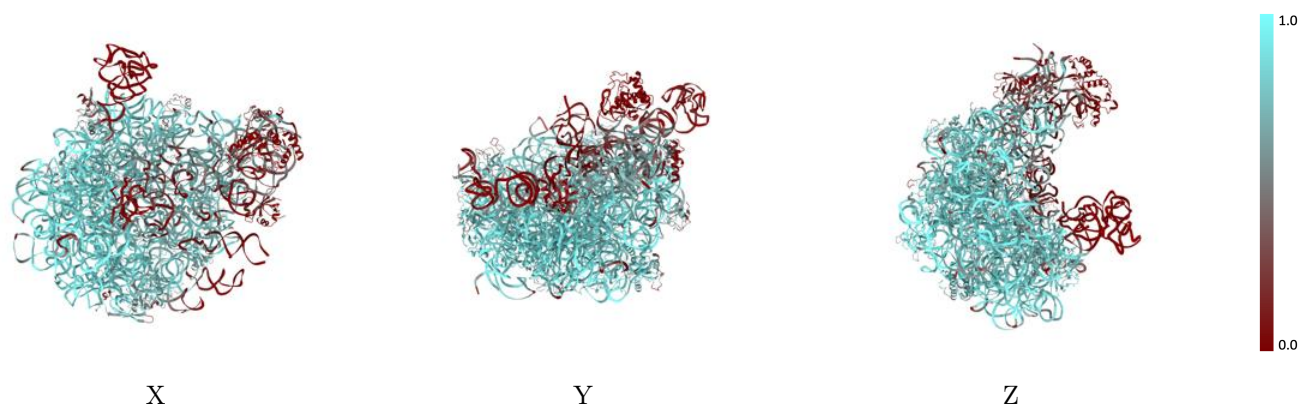
The images above show the 3D surface view of the map at the recommended contour level 0.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



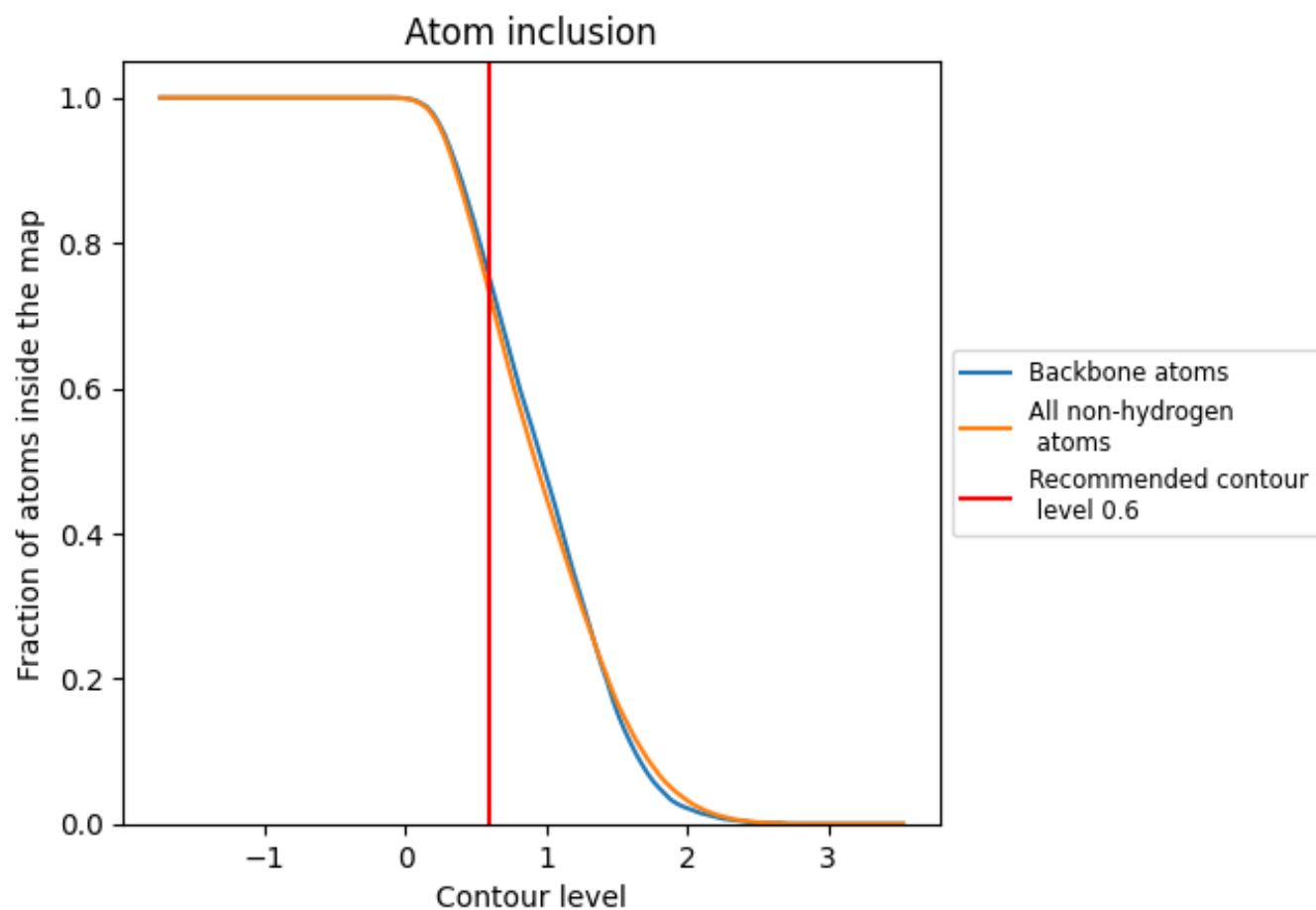
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.6).

9.4 Atom inclusion [i](#)



At the recommended contour level, 75% of all backbone atoms, 73% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7300	 0.4390
0	 0.8080	 0.5430
2	 0.8140	 0.5510
A	 0.7660	 0.4410
B	 0.5060	 0.2300
C	 0.8010	 0.5320
D	 0.8080	 0.5480
E	 0.7530	 0.5120
F	 0.0100	 0.1160
H	 0.3800	 0.2880
J	 0.8300	 0.5420
K	 0.5780	 0.4540
L	 0.6290	 0.4630
N	 0.8680	 0.5480
O	 0.2930	 0.2150
P	 0.7140	 0.5160
Q	 0.8610	 0.5470
R	 0.7880	 0.5220
S	 0.7980	 0.5350
T	 0.7740	 0.5070
U	 0.7810	 0.4970
V	 0.1180	 0.2040
W	 0.5160	 0.4180
X	 0.6700	 0.4970
Y	 0.7430	 0.4760
Z	 0.7710	 0.5230

