



## Full wwPDB EM Validation Report ⓘ

Nov 12, 2024 – 12:30 AM EST

PDB ID : 8E41  
EMDB ID : EMD-27876  
Title : E. coli 50S ribosome bound to tiamulin and VS1  
Authors : Pellegrino, J.; Lee, D.J.; Fraser, J.S.; Seiple, I.B.  
Deposited on : 2022-08-17  
Resolution : 2.13 Å (reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

---

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

EMDB validation analysis : 0.0.1.dev113  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

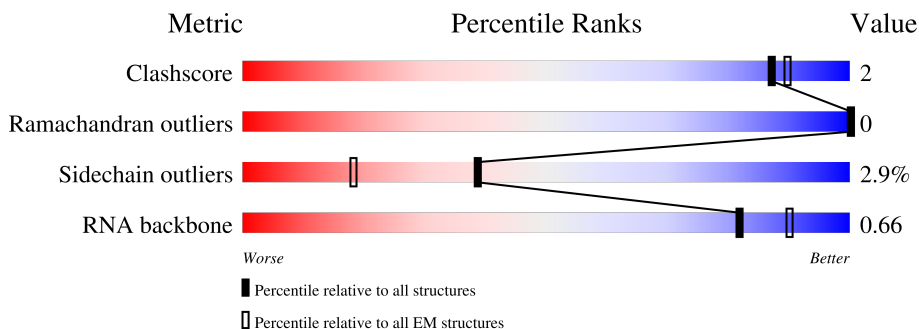
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.13 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



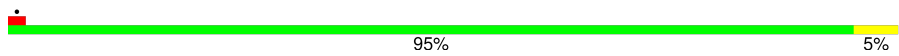
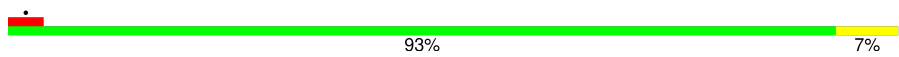
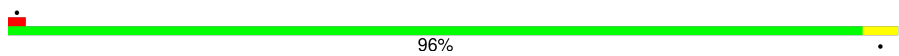

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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

Mol	Chain	Length	Quality of chain
1	I	2904	 7% 82% 16%
2	J	118	 90% 10%
3	K	271	 90% 9%
4	L	144	 90% 10%
5	M	201	 92% 6%
6	N	209	 92% 8%
7	O	142	 88% 11%

Continued on next page...

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
8	P	110	 95% 5%
9	Q	56	 93% 7%
10	R	46	 96%
11	B	7	 57% 43%

## 2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 116059 atoms, of which 42148 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a RNA chain called 50S ribosomal RNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
1	I	2898	93530	27767	31302	11448	20115	2898	0	0

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

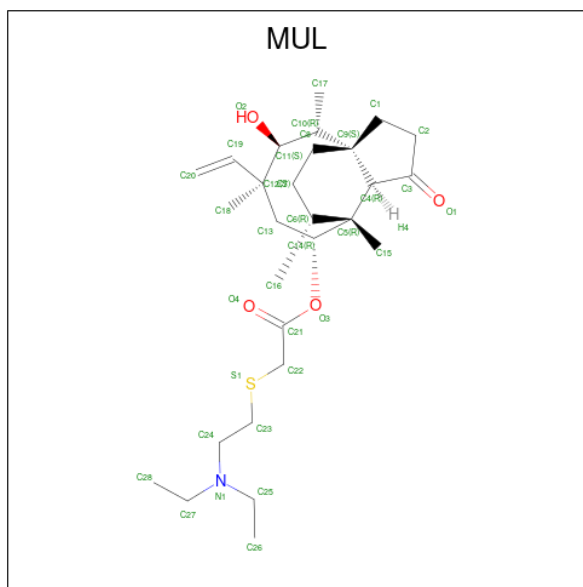
- Molecule 10 is a protein called 50S ribosomal protein L34.

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

- Molecule 11 is a protein called VIRGINIAMYCIN S1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
11	B	7	109	43	49	7	10	0	0

- Molecule 12 is TIAMULIN (three-letter code: MUL) (formula: C<sub>28</sub>H<sub>47</sub>NO<sub>4</sub>S) (labeled as "Ligand of Interest" by depositor).



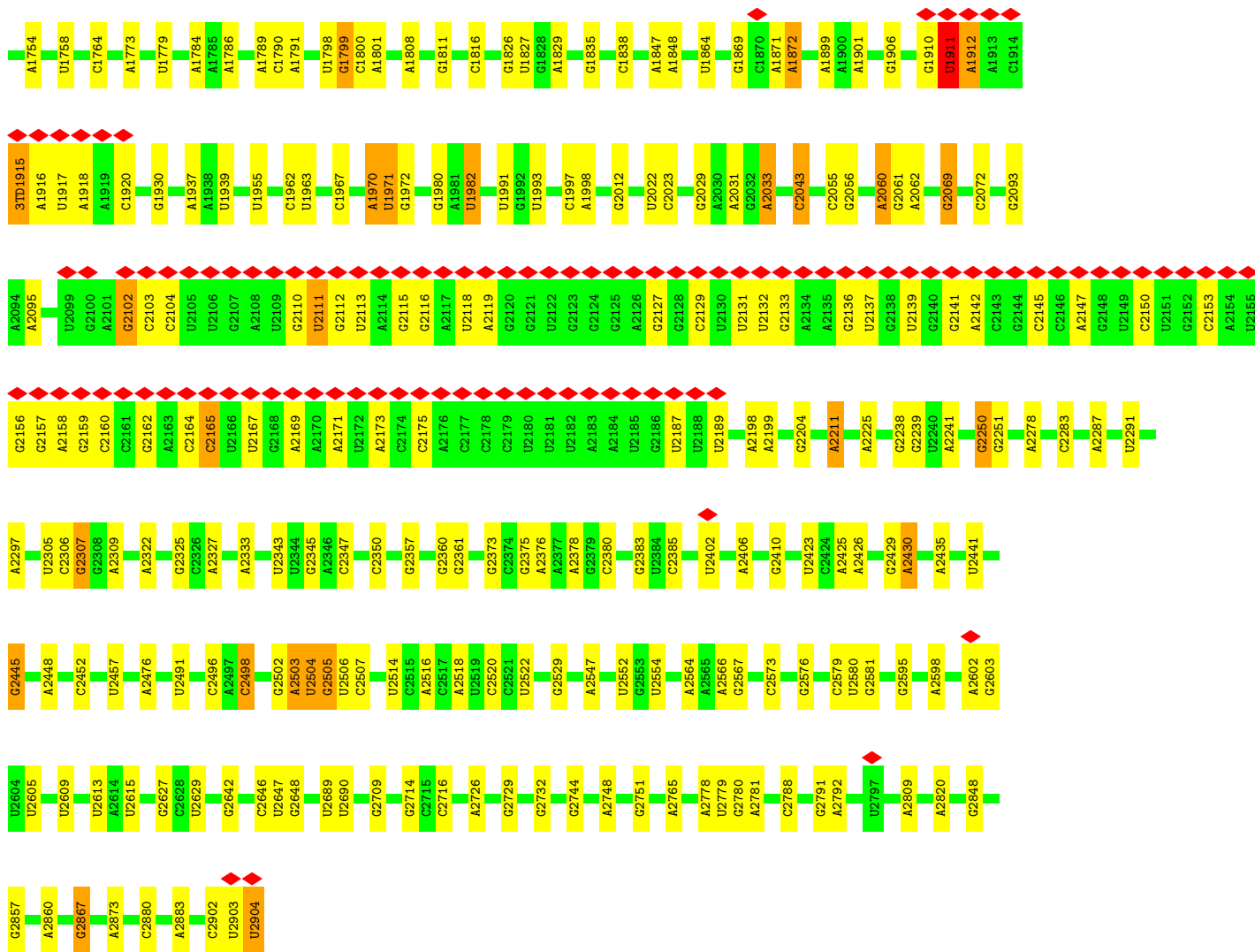
Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		S
12	I	1	81	28	47	1	4	1	0

### 3 Residue-property plots

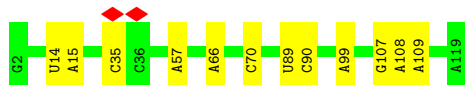
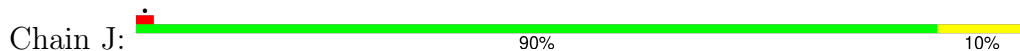
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

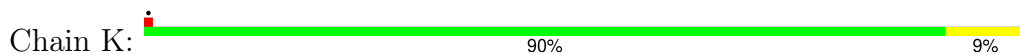




• Molecule 2: 5S ribosomal RNA



• Molecule 3: 50S ribosomal protein L2



• Molecule 4: 50S ribosomal protein L15



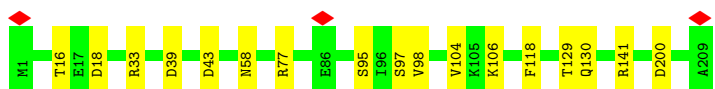




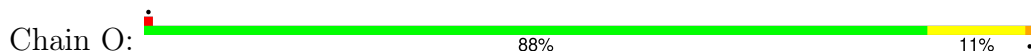
- Molecule 5: 50S ribosomal protein L4



- Molecule 6: 50S ribosomal protein L3



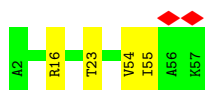
- Molecule 7: 50S ribosomal protein L13



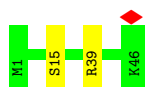
- Molecule 8: 50S ribosomal protein L22



- Molecule 9: 50S ribosomal protein L32



- Molecule 10: 50S ribosomal protein L34



- Molecule 11: VIRGINIAMYCIN S1



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	192760	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	23.45	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1300	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	36.084	Depositor
Minimum map value	-11.057	Depositor
Average map value	-0.022	Depositor
Map value standard deviation	0.881	Depositor
Recommended contour level	3.8	Depositor
Map size (Å)	413.05, 413.05, 413.05	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8261, 0.8261, 0.8261	Depositor

## 5 Model quality [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: 004, 3TD, OMC, DBB, 2MG, 6MZ, G7M, MHW, MUL, 5MC, OMU, PSU, MHV, 5MU, 2MA, 1MG, MEA, OMG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	I	0.22	0/69191	0.66	0/107939
2	J	0.17	0/2828	0.65	0/4410
3	K	0.25	0/2122	0.56	0/2852
4	L	0.25	0/1062	0.57	0/1413
5	M	0.24	0/1571	0.50	0/2113
6	N	0.25	0/1586	0.51	0/2134
7	O	0.25	0/1152	0.50	0/1551
8	P	0.24	0/864	0.53	0/1156
9	Q	0.23	0/450	0.57	0/599
10	R	0.24	0/380	0.65	0/498
11	B	0.63	0/13	0.82	0/15
All	All	0.22	0/81219	0.65	0/124680

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	I	62228	31302	31315	144	0
2	J	2529	1281	1281	3	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	K	2083	2154	2154	17	0
4	L	1053	1129	1129	10	0
5	M	1552	1618	1619	9	0
6	N	1565	1617	1616	8	0
7	O	1129	1162	1162	12	0
8	P	857	918	922	4	0
9	Q	444	454	458	3	0
10	R	377	417	418	1	0
11	B	60	49	47	0	0
12	I	34	47	47	1	0
All	All	73911	42148	42168	195	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 2.

All (195) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:2902:C:OP2	1:I:2904:U:O3'	1.98	0.80
1:I:1826:G:O2'	1:I:1971:U:OP2	2.01	0.79
1:I:1420:A:O2'	1:I:2211:A:N7	2.15	0.79
1:I:1779:U:OP2	1:I:1784:A:N6	2.15	0.79
1:I:1069:A:N6	1:I:1096:A:OP1	2.16	0.78
1:I:1390:U:O2	1:I:1395:A:N6	2.17	0.76
5:M:21:ARG:O	5:M:114:ARG:NH2	2.19	0.76
1:I:1656:C:OP1	6:N:141:ARG:NH1	2.20	0.75
1:I:1715:G:O2'	1:I:1743:G:O6	2.03	0.75
1:I:1061:U:O2'	1:I:1063:G:OP2	2.04	0.75
1:I:1911:PSU:O2'	1:I:1912:A:OP1	2.05	0.74
1:I:895:U:O2	1:I:897:C:N4	2.19	0.74
1:I:597:G:O2'	4:L:11:GLY:O	2.05	0.73
6:N:77:ARG:NH1	6:N:200:ASP:OD1	2.22	0.73
1:I:1064:C:N4	1:I:1070:A:OP2	2.22	0.72
1:I:1266:G:OP1	9:Q:16:ARG:NE	2.24	0.70
1:I:271:G:O2'	1:I:272:A:O5'	2.09	0.70
1:I:1799:G:O2'	3:K:180:GLU:OE1	2.05	0.69
1:I:1174:U:O2'	1:I:1176:U:OP2	2.11	0.67
1:I:1536:C:O4'	1:I:1537:G:N2	2.28	0.67
1:I:197:A:N6	1:I:2430:A:O2'	2.27	0.67
1:I:1005:C:O2'	7:O:30:THR:HG21	1.95	0.67
1:I:463:G:N2	1:I:466:A:OP2	2.25	0.66

Continued on next page...

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:1980:G:O2'	1:I:1982:U:OP2	2.13	0.66
3:K:251:GLN:O	3:K:252:THR:HG22	1.97	0.65
1:I:881:G:N2	1:I:882:G:O6	2.29	0.65
1:I:1911:PSU:O3'	1:I:1918:A:N6	2.20	0.65
1:I:630:G:N2	1:I:633:A:OP2	2.29	0.64
1:I:141:G:O2'	1:I:142:A:OP2	2.14	0.61
1:I:2250:G:O2'	1:I:2496:C:OP1	2.18	0.61
4:L:77:ILE:CD1	4:L:101:ILE:HD13	2.31	0.61
1:I:2162:G:OP1	1:I:2164:C:N4	2.34	0.61
8:P:55:ILE:HG23	8:P:66:ILE:HD12	1.81	0.61
1:I:84:A:N1	1:I:98:G:O2'	2.33	0.60
1:I:1063:G:O6	1:I:1075:C:N4	2.33	0.60
1:I:2646:C:OP2	1:I:2732:G:O2'	2.20	0.60
1:I:1174:U:O2'	1:I:1176:U:O4'	2.20	0.60
4:L:77:ILE:HD11	4:L:101:ILE:HD13	1.83	0.59
1:I:1174:U:OP1	1:I:1177:G:N2	2.36	0.59
3:K:29:PRO:HG2	3:K:34:LEU:HD11	1.86	0.58
1:I:2343:U:HO2'	1:I:2373:G:HO2'	1.38	0.58
1:I:1077:A:N6	1:I:1088:A:O2'	2.37	0.58
1:I:227:A:O2'	1:I:228:C:OP2	2.20	0.58
1:I:500:G:N1	1:I:503:A:OP2	2.37	0.58
1:I:278:A:N6	1:I:362:A:N7	2.52	0.57
1:I:475:C:O2	1:I:479:A:N6	2.34	0.57
1:I:1496:A:N3	1:I:1577:C:O2'	2.34	0.57
1:I:307:G:N1	1:I:310:A:OP2	2.36	0.57
1:I:1416:G:O2'	1:I:1417:C:OP2	2.19	0.57
1:I:2116:G:O6	1:I:2165:C:N4	2.39	0.55
3:K:263:THR:OG1	3:K:264:ASP:N	2.40	0.55
7:O:125:TYR:OH	7:O:132:HIS:NE2	2.31	0.55
1:I:586:A:N1	1:I:809:G:O2'	2.36	0.55
1:I:2514:U:O3'	7:O:81:ILE:HG21	2.07	0.55
4:L:75:ALA:HB3	4:L:101:ILE:HD11	1.88	0.55
1:I:1912:A:OP2	1:I:1915:3TD:H3'	2.07	0.55
1:I:2595:G:N2	1:I:2598:A:OP2	2.37	0.54
1:I:1447:C:O2'	1:I:1544:A:N3	2.40	0.54
1:I:1528:A:OP2	1:I:1543:G:N2	2.39	0.54
1:I:1911:PSU:HO2'	1:I:1912:A:P	2.26	0.54
1:I:1754:A:N1	1:I:2716:C:O2'	2.38	0.54
1:I:2581:G:OP2	1:I:2581:G:N2	2.40	0.54
3:K:100:GLU:OE2	3:K:102:ARG:NE	2.40	0.54
1:I:2642:G:OP1	7:O:78:THR:OG1	2.15	0.54

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:276:U:O2'	1:I:278:A:N7	2.41	0.53
1:I:479:A:HO2'	1:I:481:G:H8	1.57	0.53
1:I:2780:G:OP2	7:O:120:ARG:NE	2.41	0.53
4:L:77:ILE:N	4:L:109:LYS:O	2.32	0.53
1:I:2167:U:O2'	1:I:2169:A:N7	2.40	0.53
1:I:1911:PSU:O2'	1:I:1912:A:P	2.68	0.52
5:M:9:GLN:N	5:M:9:GLN:OE1	2.42	0.52
2:J:14:U:OP2	2:J:70:C:O2'	2.24	0.52
6:N:16:THR:OG1	6:N:18:ASP:OD1	2.17	0.52
1:I:2857:G:N2	1:I:2860:A:OP2	2.33	0.51
1:I:1006:C:O4'	7:O:30:THR:HG23	2.10	0.51
1:I:84:A:H62	1:I:101:A:H2	1.59	0.51
1:I:635:C:OP2	4:L:126:ARG:NH1	2.43	0.51
1:I:2029:G:N1	1:I:2033:A:OP2	2.33	0.50
1:I:1475:G:O2'	1:I:1514:G:O6	2.26	0.50
1:I:1869:G:N2	1:I:1871:A:O2'	2.45	0.50
1:I:1827:U:OP1	1:I:1971:U:O2'	2.25	0.50
1:I:1007:C:OP1	7:O:37:ARG:NH1	2.44	0.50
3:K:107:PRO:HD2	3:K:110:LEU:HD22	1.93	0.49
1:I:1527:G:N1	1:I:1544:A:OP2	2.42	0.49
1:I:223:A:N1	1:I:407:G:O2'	2.43	0.49
1:I:2430:A:H2'	1:I:2430:A:N3	2.27	0.49
1:I:1:G:N2	1:I:2903:U:O4	2.45	0.49
1:I:1915:3TD:H6	1:I:1916:A:N6	2.28	0.49
1:I:624:C:O2'	1:I:657:U:OP1	2.30	0.49
3:K:260:ASN:OD1	3:K:262:ARG:N	2.46	0.49
1:I:468:G:N7	10:R:39:ARG:NH2	2.57	0.49
12:I:3001:MUL:H10	12:I:3001:MUL:H14	1.94	0.49
1:I:2751:G:OP1	1:I:2751:G:N2	2.37	0.48
1:I:370:G:O2'	1:I:424:G:OP1	2.32	0.48
1:I:2291:U:OP1	1:I:2380:C:O2'	2.29	0.48
1:I:784:G:H5'	1:I:785:G:OP1	2.14	0.48
9:Q:54:VAL:HG12	9:Q:55:ILE:N	2.29	0.48
5:M:197:GLU:O	5:M:201:ALA:N	2.45	0.48
7:O:62:VAL:HG11	7:O:101:ILE:HD11	1.96	0.48
1:I:2788:C:O2'	1:I:2809:A:N3	2.42	0.48
7:O:31:GLU:OE1	7:O:35:ARG:NH1	2.47	0.48
1:I:1607:C:N4	1:I:1622:G:OP2	2.35	0.48
7:O:41:LYS:NZ	7:O:50:THR:O	2.46	0.47
1:I:1910:G:N2	1:I:1911:PSU:O2	2.48	0.47
1:I:1915:3TD:H6	1:I:1916:A:C6	2.50	0.47

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:2503:2MA:O2'	1:I:2505:G:OP2	2.28	0.47
1:I:2102:G:H22	1:I:2187:U:H3	1.63	0.46
7:O:129:GLU:OE2	7:O:129:GLU:HA	2.16	0.46
5:M:51:GLU:OE2	5:M:88:ARG:NH2	2.49	0.46
3:K:31:ALA:HA	3:K:34:LEU:HD12	1.98	0.46
1:I:2306:C:OP2	1:I:2307:G:O2'	2.29	0.46
1:I:1057:A:N6	1:I:1081:U:O4	2.49	0.46
6:N:129:THR:HG22	6:N:130:GLN:O	2.16	0.46
8:P:59:GLU:OE2	8:P:66:ILE:HD11	2.15	0.46
1:I:27:G:O2'	1:I:28:A:OP2	2.32	0.46
1:I:1068:G:N2	1:I:1096:A:O4'	2.48	0.46
1:I:1509:A:O2'	1:I:1510:G:OP2	2.20	0.46
1:I:1654:A:O2'	6:N:118:PHE:O	2.31	0.46
1:I:1998:A:OP2	6:N:141:ARG:NH2	2.49	0.46
3:K:72:ASP:OD2	3:K:189:ARG:NH2	2.47	0.45
1:I:1142:A:O2'	1:I:1143:A:OP2	2.27	0.45
3:K:245:VAL:HA	3:K:250:VAL:O	2.16	0.45
3:K:98:ASP:OD1	3:K:98:ASP:N	2.37	0.45
4:L:85:VAL:HG21	4:L:90:VAL:HA	1.98	0.45
1:I:1261:C:OP2	8:P:83:LYS:NZ	2.45	0.45
8:P:59:GLU:HG2	8:P:66:ILE:HD11	1.99	0.45
1:I:807:U:O2'	1:I:2060:A:N1	2.43	0.45
1:I:1838:C:N4	1:I:1899:A:OP2	2.29	0.45
1:I:205:G:O2'	1:I:206:U:OP2	2.34	0.45
6:N:104:VAL:HG12	6:N:106:LYS:H	1.81	0.45
1:I:544:C:N4	1:I:548:G:OP2	2.49	0.45
1:I:1378:A:O2'	1:I:1380:G:OP2	2.35	0.45
1:I:1827:U:O2'	1:I:1970:A:N3	2.47	0.45
1:I:2141:G:O2'	1:I:2142:A:O4'	2.32	0.45
5:M:10:SER:OG	5:M:11:ALA:N	2.48	0.45
1:I:1508:A:O2'	1:I:1509:A:O4'	2.16	0.44
1:I:2111:U:O2'	1:I:2113:U:OP1	2.35	0.44
5:M:171:ASP:OD2	5:M:171:ASP:N	2.48	0.44
1:I:1341:G:OP1	1:I:1397:U:N3	2.46	0.44
1:I:2576:G:O2'	1:I:2579:C:OP2	2.23	0.44
5:M:191:ASP:OD1	5:M:191:ASP:N	2.50	0.44
7:O:141:ASP:O	7:O:142:ILE:HD12	2.16	0.44
1:I:1871:A:O2'	1:I:1872:A:OP2	2.35	0.44
1:I:1003:G:O2'	1:I:1010:A:N1	2.42	0.43
1:I:1864:U:OP1	1:I:2410:G:O2'	2.30	0.43
3:K:72:ASP:N	3:K:72:ASP:OD1	2.50	0.43

*Continued on next page...*



*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:781:A:OP1	3:K:217:ARG:NH2	2.46	0.43
1:I:2522:U:O2'	1:I:2647:U:OP1	2.26	0.43
1:I:476:G:N1	1:I:479:A:OP2	2.48	0.43
1:I:1047:G:HO2'	1:I:1110:G:H1	1.64	0.43
4:L:110:VAL:HG12	4:L:110:VAL:O	2.19	0.43
1:I:1141:U:H4'	1:I:1142:A:O4'	2.17	0.43
1:I:2848:G:O2'	1:I:2867:G:N2	2.33	0.43
1:I:1296:G:OP1	1:I:2709:G:O2'	2.23	0.43
1:I:2357:G:N2	1:I:2360:G:OP2	2.45	0.43
4:L:115:GLU:OE2	4:L:115:GLU:HA	2.18	0.43
1:I:1916:A:OP2	1:I:1918:A:N6	2.52	0.42
1:I:299:A:N3	1:I:319:G:O2'	2.42	0.42
1:I:776:G:O2'	1:I:2241:A:OP1	2.37	0.42
3:K:246:THR:HG23	3:K:252:THR:HB	1.99	0.42
1:I:528:A:C2	1:I:2043:C:H4'	2.54	0.42
4:L:101:ILE:HD12	4:L:101:ILE:HA	1.95	0.42
9:Q:23:THR:O	9:Q:23:THR:HG23	2.19	0.42
1:I:259:G:HO2'	1:I:621:A:HO2'	1.65	0.42
1:I:259:G:O2'	1:I:621:A:O2'	2.37	0.42
2:J:66:A:H61	2:J:107:G:H2'	1.84	0.42
1:I:743:A:O2'	1:I:1659:G:OP1	2.33	0.42
6:N:97:SER:OG	6:N:98:VAL:N	2.52	0.42
1:I:1069:A:O2'	1:I:1073:A:N6	2.46	0.41
1:I:1266:G:O2'	1:I:2012:G:O6	2.36	0.41
1:I:1066:U:O2'	1:I:1068:G:N7	2.41	0.41
1:I:177:G:OP2	1:I:177:G:N2	2.39	0.41
1:I:984:A:N3	1:I:984:A:H2'	2.34	0.41
1:I:1394:U:H4'	1:I:1603:A:H4'	2.01	0.41
1:I:1798:U:OP2	3:K:271:ARG:NH1	2.47	0.41
1:I:1789:A:H2'	1:I:1790:C:O4'	2.21	0.41
1:I:2564:A:OP1	1:I:2648:G:O2'	2.25	0.41
1:I:2627:G:O2'	1:I:2781:A:N1	2.44	0.41
5:M:145:ASP:OD2	5:M:145:ASP:C	2.58	0.41
1:I:1510:G:H2'	1:I:1511:G:O4'	2.20	0.41
1:I:271:G:HO2'	1:I:272:A:P	2.43	0.41
1:I:1539:U:N3	1:I:1540:G:N7	2.69	0.41
1:I:1779:U:H5	1:I:1784:A:N7	2.19	0.41
3:K:121:ASP:OD1	3:K:121:ASP:N	2.47	0.41
5:M:119:ILE:HB	5:M:187:VAL:HG22	2.03	0.41
1:I:1128:G:O4'	1:I:2516:A:O2'	2.39	0.40
1:I:1474:U:O4	1:I:1475:G:N1	2.55	0.40

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:479:A:H4'	1:I:480:A:OP1	2.22	0.40
3:K:245:VAL:HG13	3:K:246:THR:O	2.21	0.40
1:I:324:A:N6	1:I:338:G:O2'	2.47	0.40
1:I:668:A:H2'	1:I:670:A:H62	1.87	0.40
1:I:885:C:HO3'	1:I:892:A:H8	1.68	0.40
1:I:2375:G:N2	1:I:2378:A:OP2	2.45	0.40
2:J:66:A:O5'	2:J:108:A:N6	2.54	0.40
1:I:55:G:O2'	1:I:127:A:N1	2.48	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	K	269/271 (99%)	240 (89%)	29 (11%)	0	100	100
4	L	142/144 (99%)	131 (92%)	11 (8%)	0	100	100
5	M	199/201 (99%)	198 (100%)	1 (0%)	0	100	100
6	N	207/209 (99%)	197 (95%)	10 (5%)	0	100	100
7	O	140/142 (99%)	138 (99%)	2 (1%)	0	100	100
8	P	108/110 (98%)	105 (97%)	3 (3%)	0	100	100
9	Q	54/56 (96%)	50 (93%)	4 (7%)	0	100	100
10	R	44/46 (96%)	43 (98%)	1 (2%)	0	100	100
11	B	2/7 (29%)	2 (100%)	0	0	100	100
All	All	1165/1186 (98%)	1104 (95%)	61 (5%)	0	100	100

There are no Ramachandran outliers to report.

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	K	216/216 (100%)	209 (97%)	7 (3%)	34	33
4	L	103/103 (100%)	99 (96%)	4 (4%)	27	25
5	M	165/165 (100%)	159 (96%)	6 (4%)	30	28
6	N	164/164 (100%)	159 (97%)	5 (3%)	36	35
7	O	116/116 (100%)	114 (98%)	2 (2%)	56	60
8	P	93/93 (100%)	91 (98%)	2 (2%)	47	49
9	Q	47/47 (100%)	47 (100%)	0	100	100
10	R	38/38 (100%)	37 (97%)	1 (3%)	41	41
11	B	2/2 (100%)	2 (100%)	0	100	100
All	All	944/944 (100%)	917 (97%)	27 (3%)	39	36

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	K	72	ASP
3	K	117	GLN
3	K	130	LEU
3	K	203	ARG
3	K	242	LYS
3	K	245	VAL
3	K	271	ARG
4	L	2	ARG
4	L	48	ARG
4	L	129	LYS
4	L	141	LYS
5	M	9	GLN
5	M	10	SER
5	M	15	SER
5	M	88	ARG
5	M	122	GLU
5	M	191	ASP
6	N	33	ARG

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
6	N	39	ASP
6	N	43	ASP
6	N	58	ASN
6	N	95	SER
7	O	1	MET
7	O	142	ILE
8	P	28	LYS
8	P	108	SER
10	R	15	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	I	2893/2904 (99%)	337 (11%)	3 (0%)
2	J	117/118 (99%)	7 (5%)	0
All	All	3010/3022 (99%)	344 (11%)	3 (0%)

All (344) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	I	10	A
1	I	34	U
1	I	43	G
1	I	46	G
1	I	71	A
1	I	74	A
1	I	75	G
1	I	84	A
1	I	118	A
1	I	120	U
1	I	138	U
1	I	139	U
1	I	140	C
1	I	141	G
1	I	142	A
1	I	163	C
1	I	181	A
1	I	196	A

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	199	A
1	I	216	A
1	I	221	A
1	I	222	A
1	I	223	A
1	I	228	C
1	I	248	G
1	I	266	G
1	I	272	A
1	I	278	A
1	I	285	G
1	I	311	A
1	I	329	G
1	I	330	A
1	I	346	A
1	I	352	A
1	I	371	A
1	I	372	G
1	I	386	G
1	I	396	G
1	I	404	A
1	I	406	G
1	I	411	G
1	I	412	A
1	I	424	G
1	I	437	U
1	I	448	U
1	I	456	C
1	I	481	G
1	I	491	G
1	I	504	A
1	I	505	A
1	I	509	C
1	I	527	C
1	I	528	A
1	I	529	A
1	I	532	A
1	I	544	C
1	I	546	U
1	I	547	A
1	I	548	G
1	I	549	G

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	550	C
1	I	563	A
1	I	573	U
1	I	575	A
1	I	603	A
1	I	614	A
1	I	627	A
1	I	637	A
1	I	645	C
1	I	647	G
1	I	654	A
1	I	655	A
1	I	677	A
1	I	686	U
1	I	712	G
1	I	716	A
1	I	729	G
1	I	730	A
1	I	747	5MU
1	I	764	A
1	I	775	G
1	I	776	G
1	I	782	A
1	I	784	G
1	I	785	G
1	I	789	A
1	I	792	A
1	I	805	G
1	I	812	C
1	I	819	A
1	I	827	U
1	I	828	U
1	I	845	A
1	I	846	U
1	I	847	U
1	I	858	G
1	I	859	G
1	I	877	A
1	I	885	C
1	I	894	U
1	I	896	A
1	I	910	A

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	914	G
1	I	927	A
1	I	931	U
1	I	941	A
1	I	946	C
1	I	961	C
1	I	974	G
1	I	983	A
1	I	996	A
1	I	1012	U
1	I	1013	C
1	I	1033	U
1	I	1040	A
1	I	1046	A
1	I	1047	G
1	I	1056	G
1	I	1059	G
1	I	1070	A
1	I	1078	U
1	I	1079	C
1	I	1088	A
1	I	1090	A
1	I	1111	A
1	I	1112	G
1	I	1132	U
1	I	1133	A
1	I	1135	C
1	I	1136	G
1	I	1142	A
1	I	1143	A
1	I	1169	A
1	I	1172	C
1	I	1174	U
1	I	1176	U
1	I	1178	C
1	I	1180	U
1	I	1182	G
1	I	1186	G
1	I	1236	G
1	I	1238	G
1	I	1250	G
1	I	1253	A

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	1256	G
1	I	1266	G
1	I	1271	G
1	I	1272	A
1	I	1300	G
1	I	1301	A
1	I	1352	U
1	I	1365	A
1	I	1368	G
1	I	1379	U
1	I	1383	A
1	I	1386	C
1	I	1397	U
1	I	1416	G
1	I	1417	C
1	I	1428	C
1	I	1434	A
1	I	1453	A
1	I	1459	G
1	I	1482	G
1	I	1493	C
1	I	1510	G
1	I	1515	A
1	I	1534	U
1	I	1535	A
1	I	1536	C
1	I	1569	A
1	I	1578	U
1	I	1584	U
1	I	1585	C
1	I	1608	A
1	I	1647	U
1	I	1648	U
1	I	1649	G
1	I	1674	G
1	I	1715	G
1	I	1731	G
1	I	1733	G
1	I	1738	G
1	I	1758	U
1	I	1764	C
1	I	1773	A

*Continued on next page...*



*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	1786	A
1	I	1791	A
1	I	1799	G
1	I	1800	C
1	I	1801	A
1	I	1808	A
1	I	1811	G
1	I	1816	C
1	I	1829	A
1	I	1847	A
1	I	1848	A
1	I	1872	A
1	I	1901	A
1	I	1906	G
1	I	1912	A
1	I	1920	C
1	I	1930	G
1	I	1937	A
1	I	1955	U
1	I	1963	U
1	I	1967	C
1	I	1970	A
1	I	1971	U
1	I	1972	G
1	I	1982	U
1	I	1991	U
1	I	1993	U
1	I	1997	C
1	I	2022	U
1	I	2023	C
1	I	2031	A
1	I	2033	A
1	I	2043	C
1	I	2055	C
1	I	2056	G
1	I	2060	A
1	I	2061	G
1	I	2062	A
1	I	2069	G7M
1	I	2072	C
1	I	2093	G
1	I	2095	A

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	2102	G
1	I	2103	C
1	I	2104	C
1	I	2110	G
1	I	2111	U
1	I	2112	G
1	I	2115	G
1	I	2118	U
1	I	2119	A
1	I	2127	G
1	I	2129	C
1	I	2131	U
1	I	2132	U
1	I	2133	G
1	I	2136	G
1	I	2137	U
1	I	2139	U
1	I	2145	C
1	I	2147	A
1	I	2150	C
1	I	2153	C
1	I	2156	G
1	I	2157	G
1	I	2158	A
1	I	2159	G
1	I	2160	C
1	I	2165	C
1	I	2171	A
1	I	2173	A
1	I	2175	C
1	I	2189	U
1	I	2198	A
1	I	2199	A
1	I	2204	G
1	I	2211	A
1	I	2225	A
1	I	2238	G
1	I	2239	G
1	I	2250	G
1	I	2278	A
1	I	2283	C
1	I	2287	A

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	2297	A
1	I	2305	U
1	I	2307	G
1	I	2309	A
1	I	2322	A
1	I	2325	G
1	I	2327	A
1	I	2333	A
1	I	2345	G
1	I	2347	C
1	I	2350	C
1	I	2361	G
1	I	2376	A
1	I	2383	G
1	I	2385	C
1	I	2402	U
1	I	2406	A
1	I	2423	U
1	I	2425	A
1	I	2426	A
1	I	2429	G
1	I	2430	A
1	I	2435	A
1	I	2441	U
1	I	2445	2MG
1	I	2448	A
1	I	2452	C
1	I	2476	A
1	I	2491	U
1	I	2498	OMC
1	I	2502	G
1	I	2504	PSU
1	I	2505	G
1	I	2506	U
1	I	2507	C
1	I	2518	A
1	I	2520	C
1	I	2529	G
1	I	2547	A
1	I	2554	U
1	I	2566	A
1	I	2567	G

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	2573	C
1	I	2602	A
1	I	2603	G
1	I	2609	U
1	I	2613	U
1	I	2615	U
1	I	2629	U
1	I	2689	U
1	I	2690	U
1	I	2714	G
1	I	2726	A
1	I	2729	G
1	I	2744	G
1	I	2748	A
1	I	2765	A
1	I	2778	A
1	I	2779	U
1	I	2791	G
1	I	2792	A
1	I	2820	A
1	I	2867	G
1	I	2873	A
1	I	2880	C
1	I	2883	A
1	I	2904	U
2	J	15	A
2	J	35	C
2	J	57	A
2	J	89	U
2	J	90	C
2	J	99	A
2	J	109	A

All (3) RNA pucker outliers are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	I	784	G
1	I	1911	PSU
1	I	2425	A

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

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	5MU	I	747	1	19,22,23	1.03	2 (10%)	27,32,35	2.13	6 (22%)
1	PSU	I	746	1	18,21,22	0.97	1 (5%)	21,30,33	1.86	4 (19%)
11	MEA	B	5	11	11,12,13	0.87	0	13,14,16	1.34	1 (7%)
1	5MU	I	1939	1	19,22,23	1.03	2 (10%)	27,32,35	2.10	6 (22%)
1	PSU	I	1911	1	18,21,22	0.84	0	21,30,33	2.01	4 (19%)
11	DBB	B	3	11	4,5,6	0.71	0	1,5,7	0.06	0
1	5MC	I	1962	1	19,22,23	1.21	2 (10%)	26,32,35	1.11	3 (11%)
1	2MG	I	1835	1	18,26,27	1.25	2 (11%)	16,38,41	1.47	3 (18%)
1	OMG	I	2251	1	19,26,27	1.21	2 (10%)	21,38,41	1.39	4 (19%)
11	MHW	B	1	11	9,9,10	1.26	1 (11%)	10,11,13	1.21	1 (10%)
1	OMU	I	2552	1	19,22,23	0.96	2 (10%)	25,31,34	1.90	6 (24%)
1	PSU	I	955	1	18,21,22	0.94	1 (5%)	21,30,33	1.98	4 (19%)
1	6MZ	I	1618	1	17,25,26	1.17	2 (11%)	15,36,39	2.22	4 (26%)
1	OMC	I	2498	1	19,22,23	0.91	1 (5%)	25,31,34	0.94	1 (4%)
1	G7M	I	2069	1	20,26,27	0.93	1 (5%)	16,39,42	0.50	0
1	2MG	I	2445	1	18,26,27	1.27	2 (11%)	16,38,41	1.51	3 (18%)
1	PSU	I	2504	1	18,21,22	0.92	1 (5%)	21,30,33	2.00	4 (19%)
1	PSU	I	2605	1	18,21,22	0.92	1 (5%)	21,30,33	1.99	4 (19%)
1	PSU	I	1917	1	18,21,22	0.85	0	21,30,33	1.98	4 (19%)
1	PSU	I	2457	1	18,21,22	0.95	1 (5%)	21,30,33	2.00	4 (19%)
1	2MA	I	2503	1	17,25,26	0.89	1 (5%)	16,37,40	1.57	2 (12%)
1	PSU	I	2580	1	18,21,22	0.96	2 (11%)	21,30,33	2.01	5 (23%)
11	MHV	B	6	11	7,9,10	1.19	0	8,11,13	1.19	1 (12%)
11	004	B	7	11	9,10,11	0.88	0	9,12,14	0.96	0
1	1MG	I	745	1	19,26,27	1.24	3 (15%)	18,39,42	1.52	3 (16%)
1	3TD	I	1915	1	19,22,23	1.07	2 (10%)	23,32,35	1.85	3 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	5MU	I	747	1	-	0/7/25/26	0/2/2/2
1	PSU	I	746	1	-	1/7/25/26	0/2/2/2
11	MEA	B	5	11	-	0/5/8/10	0/1/1/1
1	5MU	I	1939	1	-	0/7/25/26	0/2/2/2
1	PSU	I	1911	1	-	2/7/25/26	0/2/2/2
11	DBB	B	3	11	-	0/3/4/6	-
1	5MC	I	1962	1	-	0/7/25/26	0/2/2/2
1	2MG	I	1835	1	-	0/5/27/28	0/3/3/3
1	OMG	I	2251	1	-	1/5/27/28	0/3/3/3
11	MHW	B	1	11	-	0/2/2/4	0/1/1/1
1	OMU	I	2552	1	-	0/9/27/28	0/2/2/2
1	PSU	I	955	1	-	0/7/25/26	0/2/2/2
1	6MZ	I	1618	1	-	2/5/27/28	0/3/3/3
1	OMC	I	2498	1	-	2/9/27/28	0/2/2/2
1	G7M	I	2069	1	-	1/3/25/26	0/3/3/3
1	2MG	I	2445	1	-	2/5/27/28	0/3/3/3
1	PSU	I	2504	1	-	2/7/25/26	0/2/2/2
1	PSU	I	2605	1	-	0/7/25/26	0/2/2/2
1	PSU	I	1917	1	-	0/7/25/26	0/2/2/2
1	PSU	I	2457	1	-	0/7/25/26	0/2/2/2
1	2MA	I	2503	1	-	3/3/25/26	0/3/3/3
1	PSU	I	2580	1	-	0/7/25/26	0/2/2/2
11	MHV	B	6	11	-	0/1/12/14	0/1/1/1
11	004	B	7	11	-	0/4/6/8	0/1/1/1
1	1MG	I	745	1	-	0/3/25/26	0/3/3/3
1	3TD	I	1915	1	-	2/7/25/26	0/2/2/2

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	1962	5MC	C5-C4	-3.85	1.41	1.44
11	B	1	MHW	CA-C	3.21	1.52	1.48
1	I	2251	OMG	C8-N7	-2.91	1.30	1.34
1	I	745	1MG	C8-N7	-2.90	1.30	1.34
1	I	2251	OMG	C5-C6	-2.90	1.41	1.47
1	I	1835	2MG	C5-C6	-2.89	1.41	1.47
1	I	2445	2MG	C5-C6	-2.87	1.41	1.47

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	I	2069	G7M	C8-N9	2.84	1.38	1.33
1	I	2445	2MG	C8-N7	-2.80	1.30	1.34
1	I	1835	2MG	C8-N7	-2.78	1.30	1.34
1	I	1618	6MZ	C6-C5	-2.71	1.40	1.44
1	I	2498	OMC	C2-N1	-2.69	1.34	1.40
1	I	1915	3TD	C4-N3	-2.54	1.35	1.40
1	I	747	5MU	C2-N1	-2.45	1.34	1.38
1	I	2552	OMU	C2-N1	-2.43	1.34	1.38
1	I	1962	5MC	C2-N1	-2.41	1.35	1.40
1	I	1915	3TD	C4-C5	-2.39	1.42	1.47
1	I	2503	2MA	C8-N7	-2.35	1.31	1.34
1	I	1939	5MU	C2-N1	-2.33	1.34	1.38
1	I	1618	6MZ	C8-N7	-2.33	1.30	1.34
1	I	745	1MG	C6-N1	-2.19	1.35	1.39
1	I	1939	5MU	C4-N3	-2.11	1.34	1.38
1	I	745	1MG	C5-C6	-2.10	1.41	1.47
1	I	2552	OMU	C4-N3	-2.10	1.35	1.38
1	I	2457	PSU	C4-N3	-2.07	1.35	1.38
1	I	2605	PSU	C4-N3	-2.06	1.35	1.38
1	I	955	PSU	C4-N3	-2.03	1.35	1.38
1	I	747	5MU	C4-N3	-2.03	1.35	1.38
1	I	746	PSU	O4'-C1'	-2.02	1.41	1.43
1	I	2580	PSU	O4'-C1'	-2.01	1.41	1.43
1	I	2504	PSU	C4-N3	-2.01	1.35	1.38
1	I	2580	PSU	C4-N3	-2.00	1.35	1.38

All (80) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	1915	3TD	N1-C2-N3	6.57	120.90	116.13
1	I	1618	6MZ	C2-N1-C6	5.99	121.25	116.60
1	I	2504	PSU	N1-C2-N3	5.64	121.11	115.17
1	I	2457	PSU	N1-C2-N3	5.60	121.08	115.17
1	I	2580	PSU	N1-C2-N3	5.59	121.06	115.17
1	I	955	PSU	N1-C2-N3	5.56	121.03	115.17
1	I	2605	PSU	N1-C2-N3	5.54	121.01	115.17
1	I	1911	PSU	N1-C2-N3	5.53	121.00	115.17
1	I	1917	PSU	N1-C2-N3	5.50	120.97	115.17
1	I	747	5MU	C4-N3-C2	-5.43	120.23	127.34
1	I	746	PSU	N1-C2-N3	5.37	120.84	115.17
1	I	1939	5MU	C4-N3-C2	-5.35	120.32	127.34
1	I	2552	OMU	C4-N3-C2	-5.13	120.24	126.61

Continued on next page...

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	747	5MU	N3-C2-N1	4.88	121.25	114.89
1	I	1939	5MU	N3-C2-N1	4.78	121.11	114.89
1	I	2552	OMU	N3-C2-N1	4.70	121.01	114.89
1	I	1618	6MZ	N3-C2-N1	-4.62	122.40	128.67
1	I	1939	5MU	C5-C4-N3	4.61	119.33	115.32
1	I	2605	PSU	C4-N3-C2	-4.59	120.05	126.37
1	I	747	5MU	C5-C4-N3	4.54	119.27	115.32
1	I	2504	PSU	C4-N3-C2	-4.53	120.12	126.37
1	I	2457	PSU	C4-N3-C2	-4.51	120.16	126.37
1	I	1917	PSU	C4-N3-C2	-4.50	120.18	126.37
1	I	955	PSU	C4-N3-C2	-4.49	120.19	126.37
1	I	1911	PSU	C4-N3-C2	-4.49	120.19	126.37
1	I	2503	2MA	C4-N3-C2	-4.47	119.87	123.30
1	I	2580	PSU	C4-N3-C2	-4.47	120.22	126.37
1	I	746	PSU	C4-N3-C2	-4.45	120.24	126.37
1	I	747	5MU	O4-C4-C5	-4.09	120.23	124.92
1	I	1915	3TD	C4-N3-C2	-4.09	120.28	124.61
1	I	1939	5MU	O4-C4-C5	-4.02	120.32	124.92
1	I	2251	OMG	C8-N7-C5	4.00	109.36	102.55
1	I	745	1MG	C8-N7-C5	3.97	109.31	102.55
1	I	2445	2MG	C8-N7-C5	3.95	109.27	102.55
1	I	2503	2MA	C8-N7-C5	3.95	109.27	102.55
1	I	1835	2MG	C8-N7-C5	3.90	109.19	102.55
11	B	5	MEA	O-C-CA	-3.50	115.77	124.77
1	I	1939	5MU	C5-C6-N1	-3.39	119.63	123.31
1	I	747	5MU	C5-C6-N1	-3.37	119.65	123.31
1	I	2552	OMU	C5-C4-N3	3.32	119.45	114.80
1	I	1962	5MC	C5-C6-N1	-3.25	119.78	123.31
1	I	745	1MG	C5-C6-N1	3.20	118.59	113.96
1	I	2457	PSU	O2-C2-N1	-3.20	119.49	122.79
1	I	2580	PSU	O2-C2-N1	-3.18	119.51	122.79
1	I	955	PSU	O2-C2-N1	-3.16	119.53	122.79
1	I	2504	PSU	O2-C2-N1	-3.14	119.55	122.79
1	I	1917	PSU	O2-C2-N1	-3.14	119.56	122.79
1	I	1618	6MZ	C9-N6-C6	-3.09	119.98	122.85
1	I	1911	PSU	O2-C2-N1	-3.06	119.63	122.79
1	I	2605	PSU	O2-C2-N1	-2.99	119.70	122.79
1	I	746	PSU	O2-C2-N1	-2.99	119.71	122.79
1	I	2552	OMU	CM2-O2'-C2'	-2.90	107.02	114.47
1	I	2552	OMU	O4-C4-C5	-2.79	120.35	125.16
1	I	747	5MU	O2-C2-N1	-2.73	119.24	122.80
1	I	2251	OMG	C2-N1-C6	-2.73	120.11	125.11

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	B	1	MHW	O-C-CA	-2.72	120.96	124.37
1	I	2445	2MG	N1-C2-N2	2.63	119.24	116.56
1	I	2498	OMC	CM2-O2'-C2'	-2.55	107.93	114.47
1	I	2552	OMU	O2-C2-N1	-2.52	119.51	122.80
1	I	1835	2MG	N1-C2-N2	2.34	118.95	116.56
1	I	745	1MG	O6-C6-C5	-2.34	120.33	124.18
1	I	2580	PSU	C6-N1-C2	-2.34	120.52	122.69
11	B	6	MHV	CB-CA-N	-2.34	107.67	112.50
1	I	2504	PSU	C6-N1-C2	-2.33	120.53	122.69
1	I	2457	PSU	C6-N1-C2	-2.29	120.56	122.69
1	I	2251	OMG	C5-C6-N1	2.29	118.43	114.07
1	I	1962	5MC	O2-C2-N3	-2.27	118.75	122.33
1	I	1939	5MU	O2-C2-N1	-2.27	119.84	122.80
1	I	2445	2MG	C5-C6-N1	2.26	118.38	114.07
1	I	1962	5MC	C5-C4-N3	-2.25	119.45	121.75
1	I	1835	2MG	C5-C6-N1	2.25	118.35	114.07
1	I	955	PSU	C6-N1-C2	-2.23	120.62	122.69
1	I	1911	PSU	C6-N1-C2	-2.22	120.63	122.69
1	I	1618	6MZ	C4-C5-N7	-2.22	106.99	109.34
1	I	1917	PSU	C6-N1-C2	-2.21	120.64	122.69
1	I	2580	PSU	O4'-C1'-C2'	2.18	108.17	105.15
1	I	2605	PSU	C6-N1-C2	-2.13	120.71	122.69
1	I	746	PSU	C6-N1-C2	-2.13	120.71	122.69
1	I	1915	3TD	C1'-C5-C4	2.10	120.79	117.61
1	I	2251	OMG	CM2-O2'-C2'	-2.09	109.11	114.47

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	I	1618	6MZ	C5-C6-N6-C9
1	I	1618	6MZ	N1-C6-N6-C9
1	I	1915	3TD	O4'-C1'-C5-C4
1	I	1915	3TD	O4'-C1'-C5-C6
1	I	2498	OMC	O4'-C4'-C5'-O5'
1	I	1911	PSU	O4'-C4'-C5'-O5'
1	I	2445	2MG	O4'-C4'-C5'-O5'
1	I	2445	2MG	C3'-C4'-C5'-O5'
1	I	2504	PSU	O4'-C4'-C5'-O5'
1	I	1911	PSU	C3'-C4'-C5'-O5'
1	I	2498	OMC	C3'-C4'-C5'-O5'
1	I	2503	2MA	O4'-C4'-C5'-O5'

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms
1	I	2503	2MA	C3'-C4'-C5'-O5'
1	I	2504	PSU	C3'-C4'-C5'-O5'
1	I	2069	G7M	O4'-C4'-C5'-O5'
1	I	2251	OMG	C4'-C5'-O5'-P
1	I	2503	2MA	C4'-C5'-O5'-P
1	I	746	PSU	O4'-C1'-C5-C6

There are no ring outliers.

3 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	I	1911	PSU	5	0
1	I	2503	2MA	1	0
1	I	1915	3TD	3	0

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
12	MUL	I	3001	-	36,36,36	1.36	5 (13%)	55,55,55	1.28	9 (16%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
12	MUL	I	3001	-	-	1/18/79/79	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	I	3001	MUL	C12-C11	3.39	1.59	1.55
12	I	3001	MUL	C10-C11	2.86	1.59	1.56
12	I	3001	MUL	C5-C14	2.65	1.58	1.56
12	I	3001	MUL	C9-C10	2.28	1.58	1.56
12	I	3001	MUL	C13-C14	2.12	1.56	1.53

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
12	I	3001	MUL	C12-C11-C10	3.46	118.13	114.75
12	I	3001	MUL	C9-C10-C11	2.81	115.08	112.46
12	I	3001	MUL	C15-C5-C6	-2.50	108.15	110.94
12	I	3001	MUL	C18-C12-C13	-2.45	103.68	105.51
12	I	3001	MUL	C14-O3-C21	2.38	122.37	118.03
12	I	3001	MUL	O3-C14-C5	2.32	109.93	106.32
12	I	3001	MUL	C9-C4-C3	2.17	104.58	101.86
12	I	3001	MUL	C2-C1-C9	2.02	108.16	105.63
12	I	3001	MUL	C4-C5-C14	2.01	111.33	109.14

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
12	I	3001	MUL	C24-C23-S1-C22

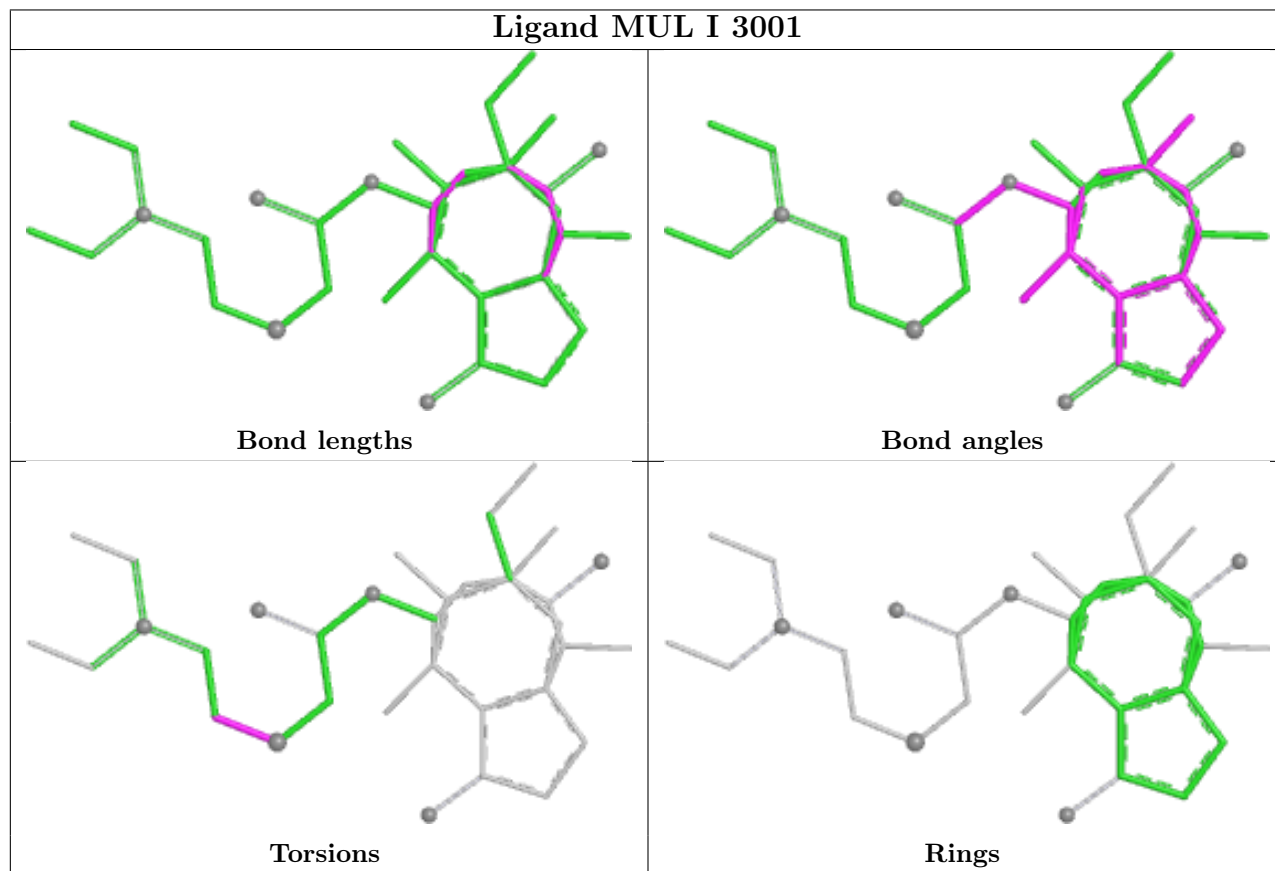
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
12	I	3001	MUL	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be

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



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

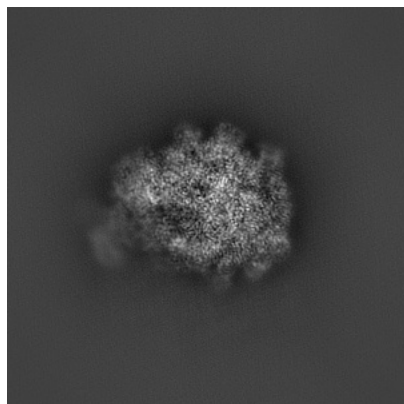
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-27876. These allow visual inspection of the internal detail of the map and identification of artifacts.

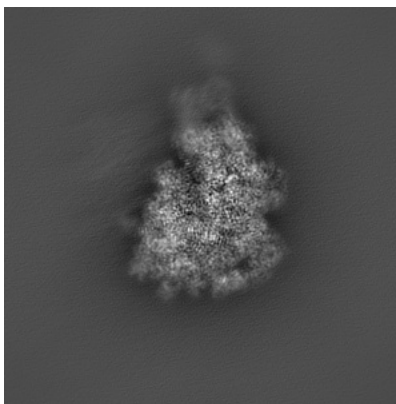
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

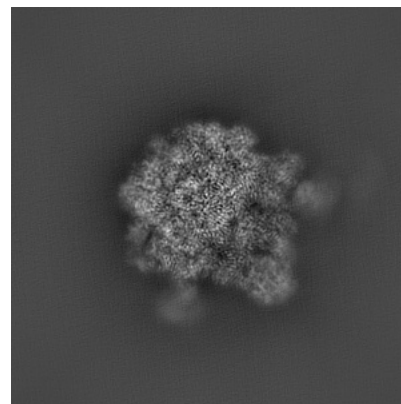
#### 6.1.1 Primary map



X

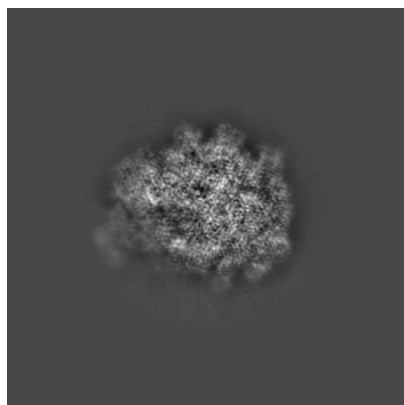


Y

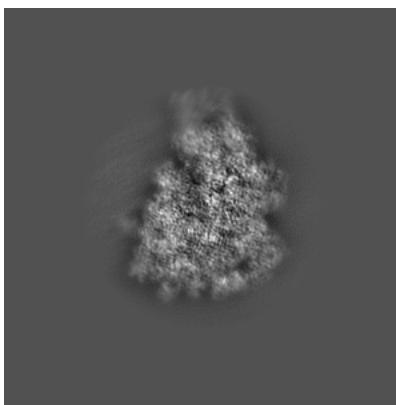


Z

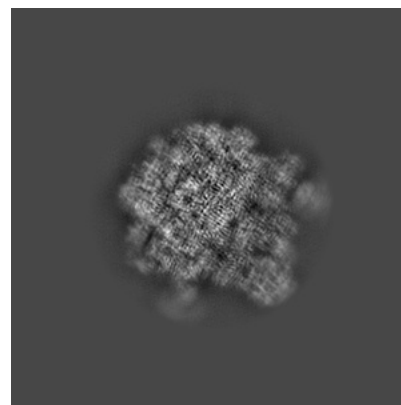
#### 6.1.2 Raw map



X



Y

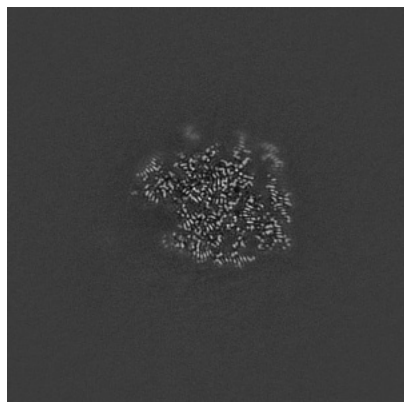


Z

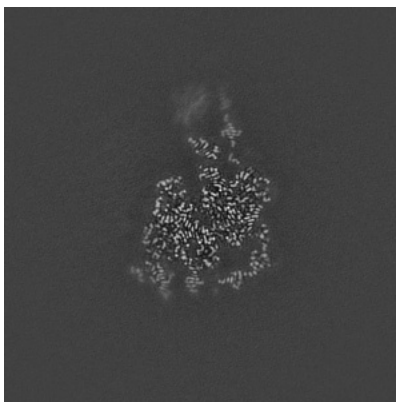
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

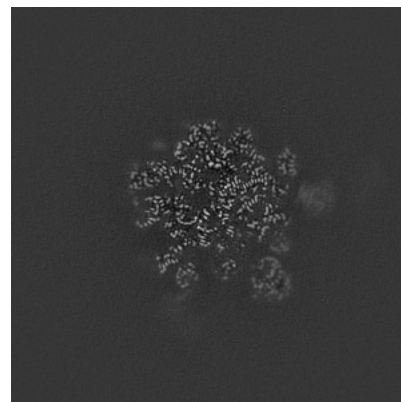
### 6.2.1 Primary map



X Index: 250

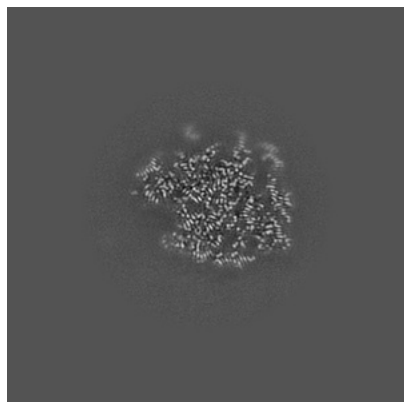


Y Index: 250

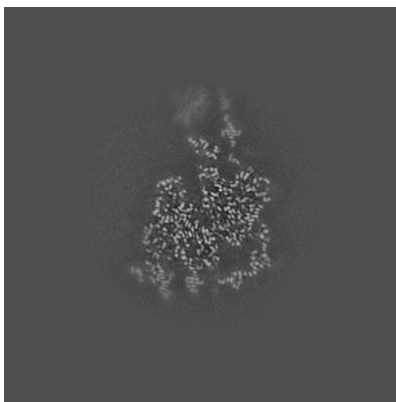


Z Index: 250

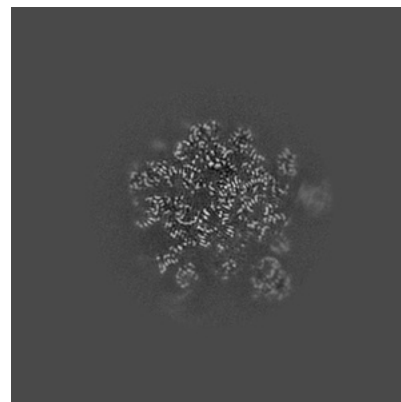
### 6.2.2 Raw map



X Index: 250



Y Index: 250

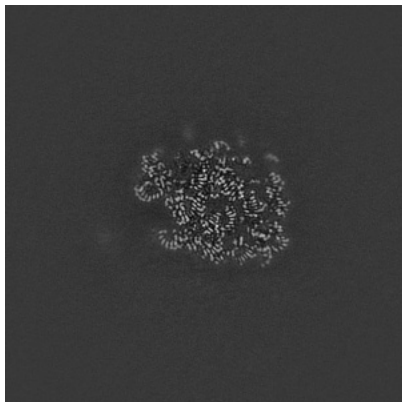


Z Index: 250

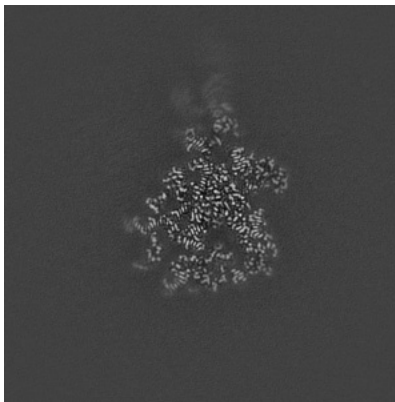
The images above show central slices of the map in three orthogonal directions.

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

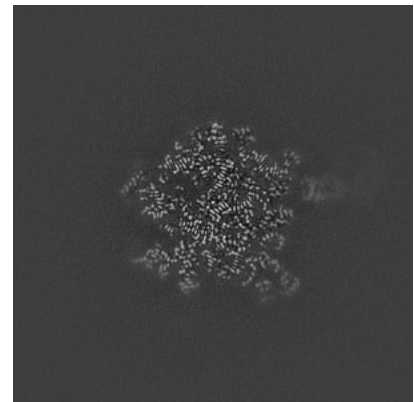
### 6.3.1 Primary map



X Index: 244

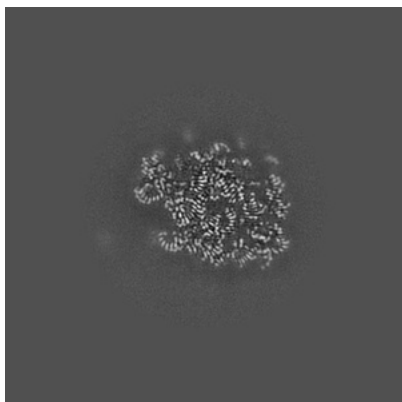


Y Index: 279

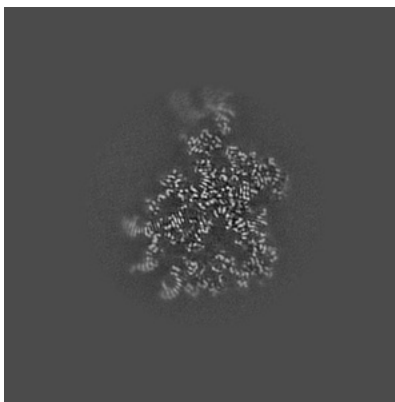


Z Index: 260

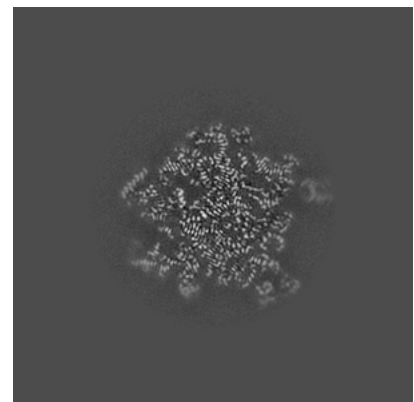
### 6.3.2 Raw map



X Index: 244



Y Index: 275

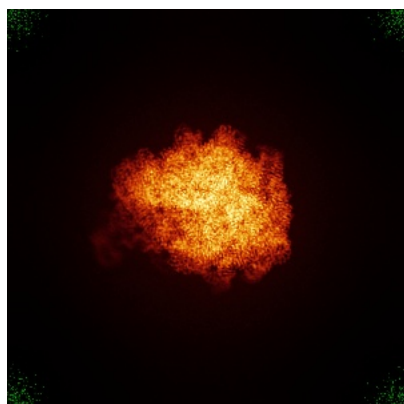


Z Index: 262

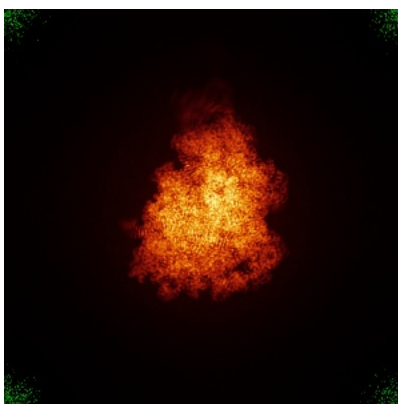
The images above show the largest variance slices of the map in three orthogonal directions.

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

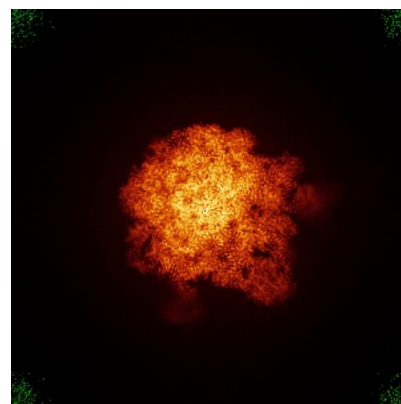
### 6.4.1 Primary map



X

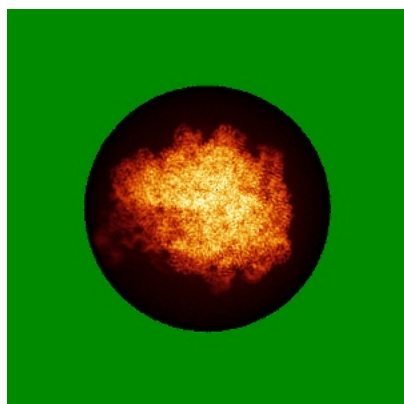


Y

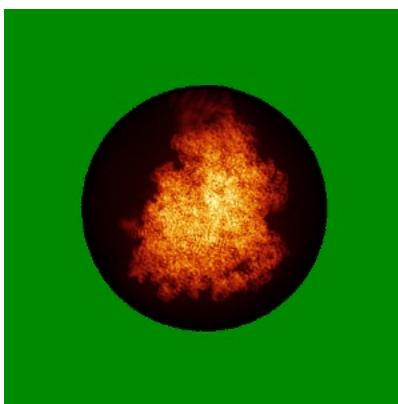


Z

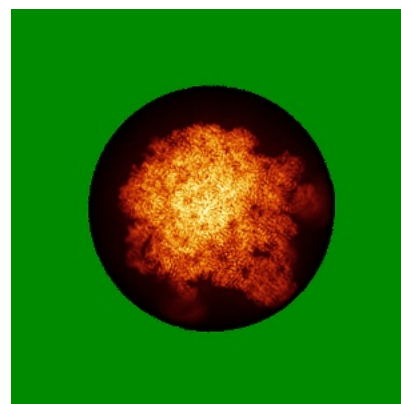
### 6.4.2 Raw map



X



Y



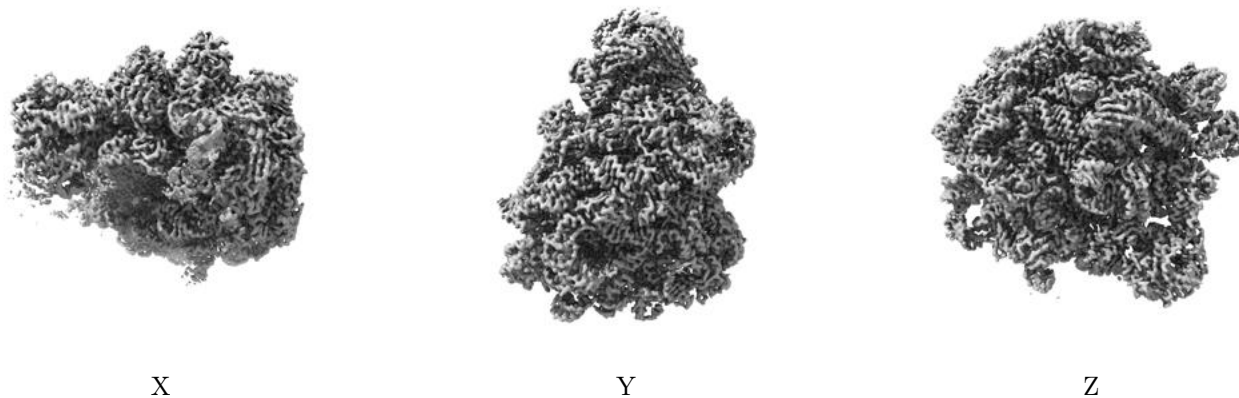
Z

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.



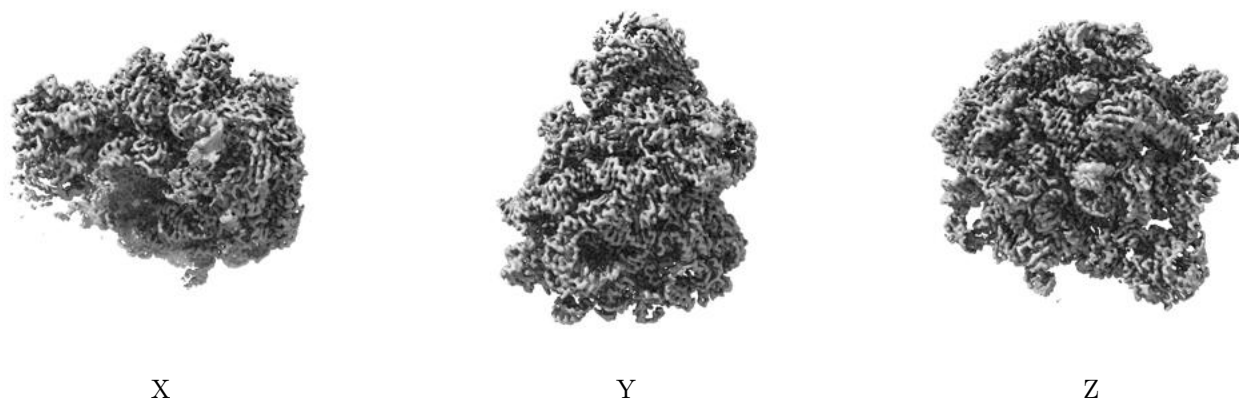
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 3.8. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

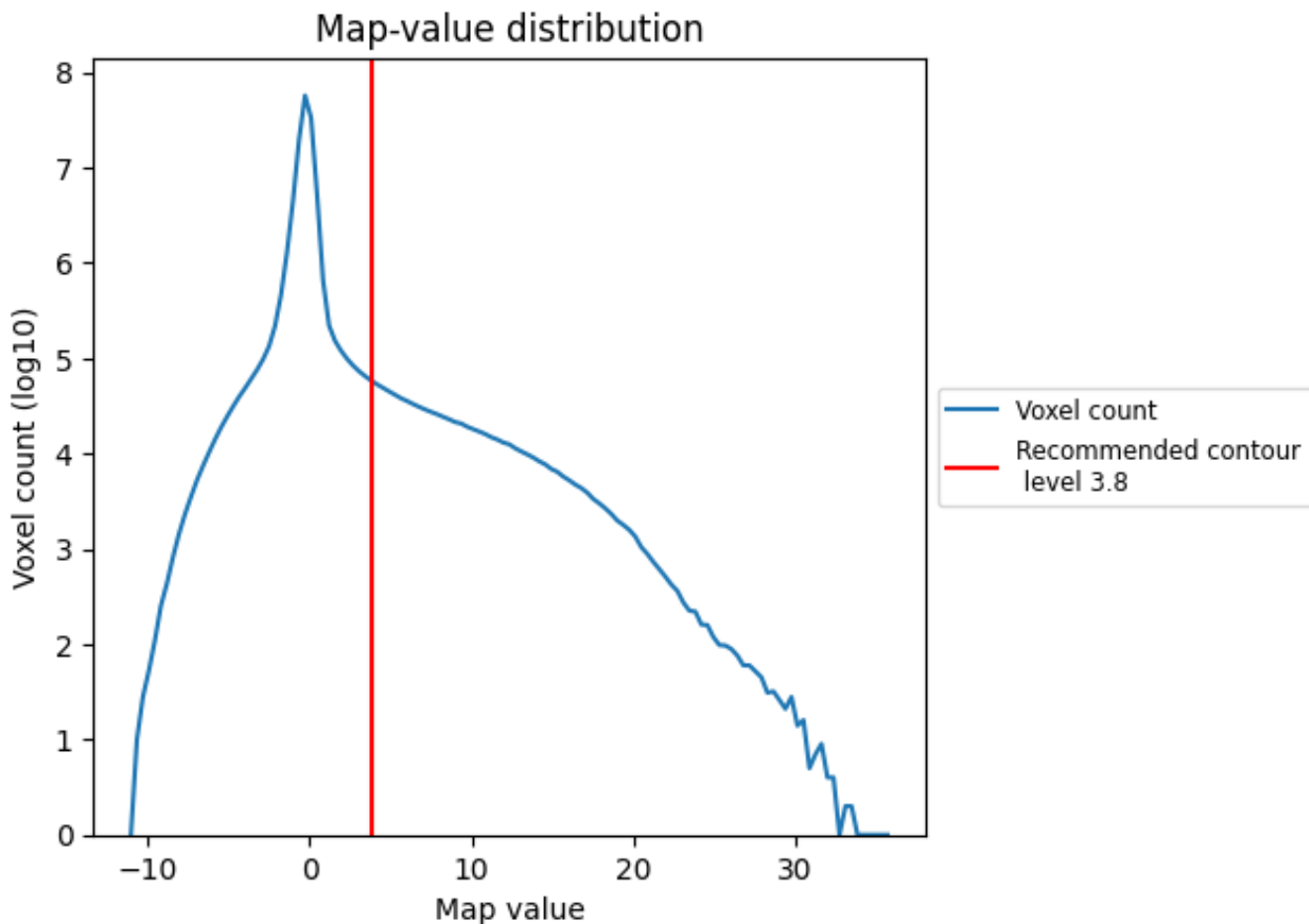
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

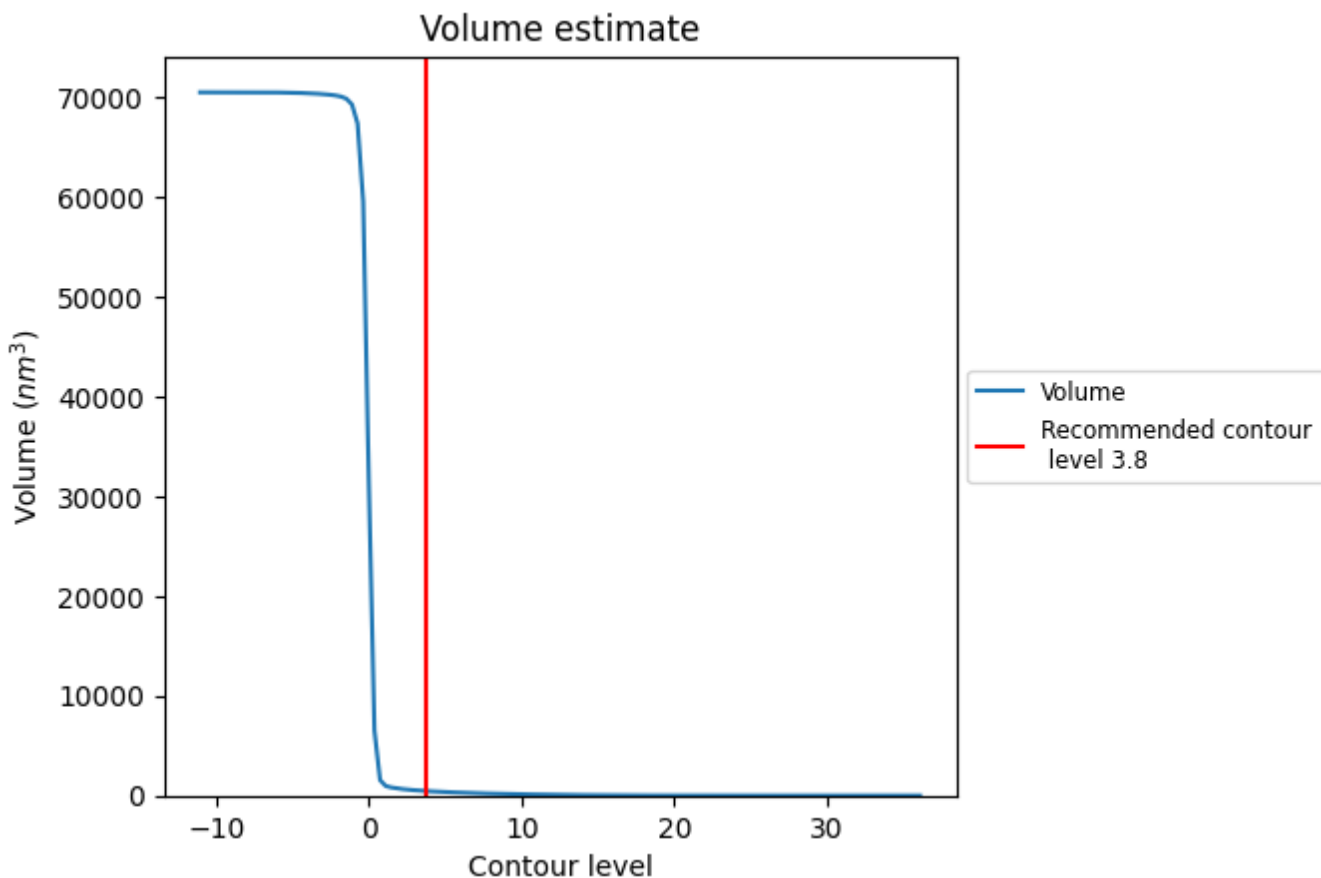
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

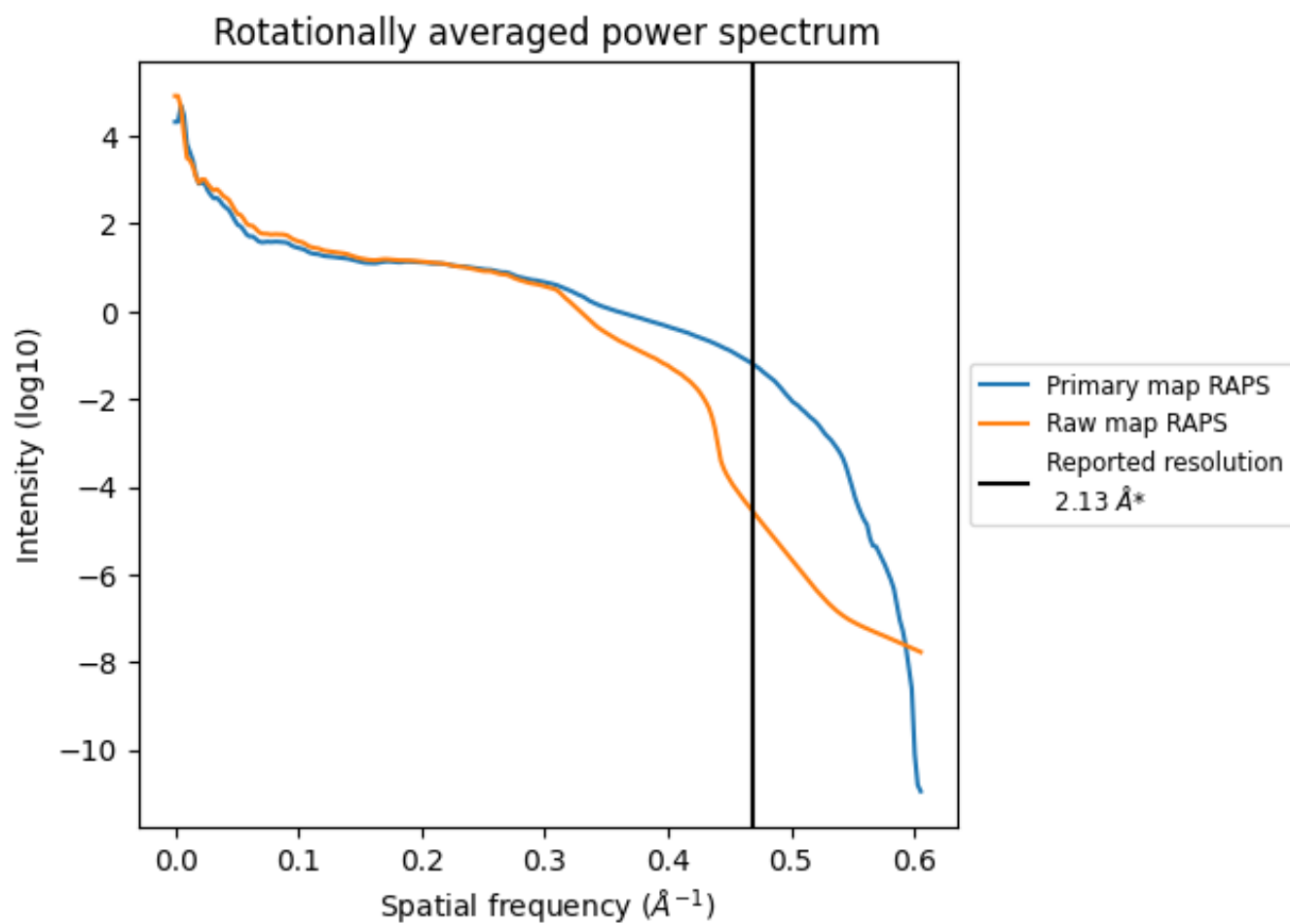
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 450 nm<sup>3</sup>; this corresponds to an approximate mass of 407 kDa.

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

### 7.3 Rotationally averaged power spectrum i

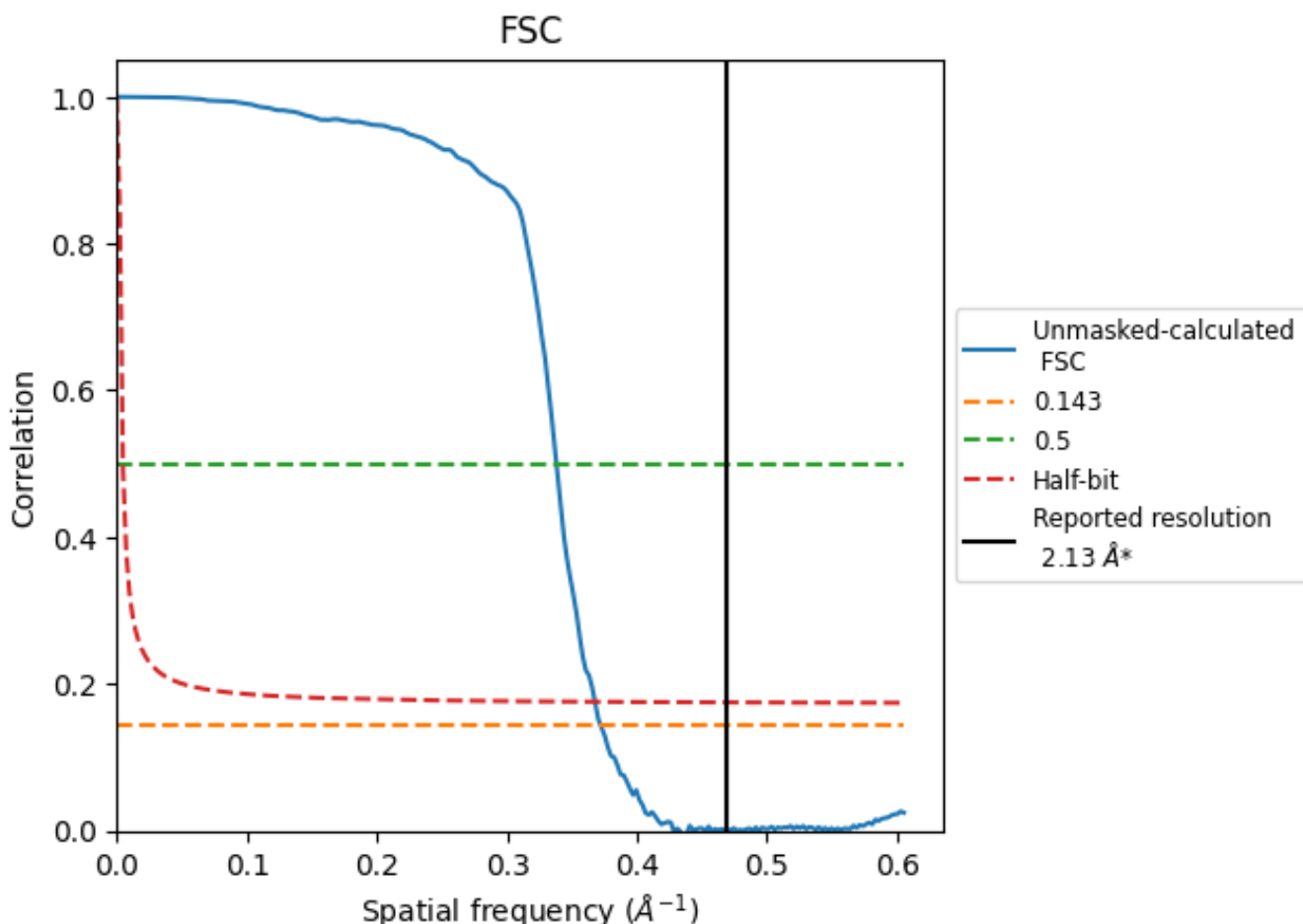


\*Reported resolution corresponds to spatial frequency of 0.469 Å<sup>-1</sup>

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

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of  $0.469 \text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

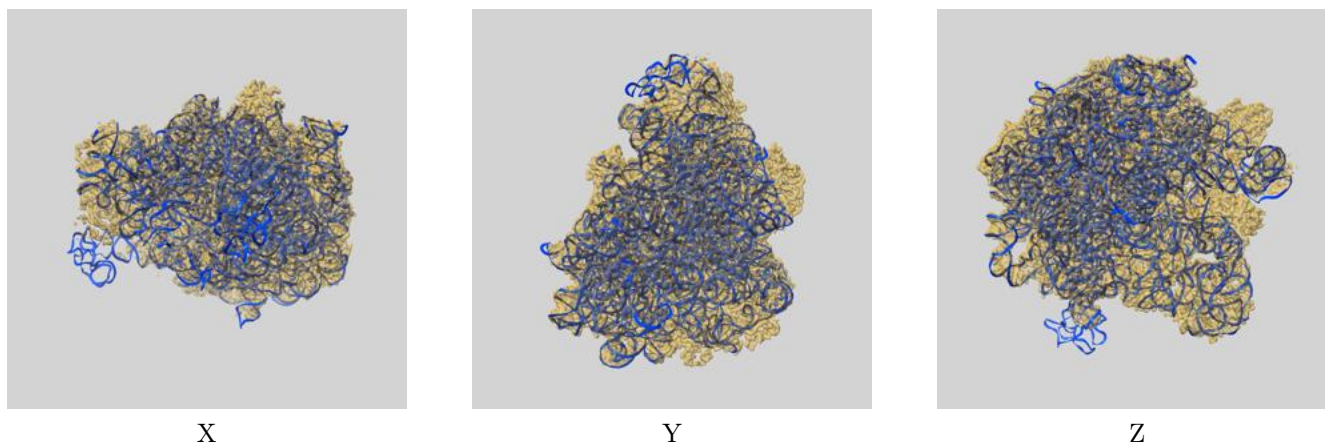
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.13	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.69	2.96	2.72

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.69 differs from the reported value 2.13 by more than 10 %

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

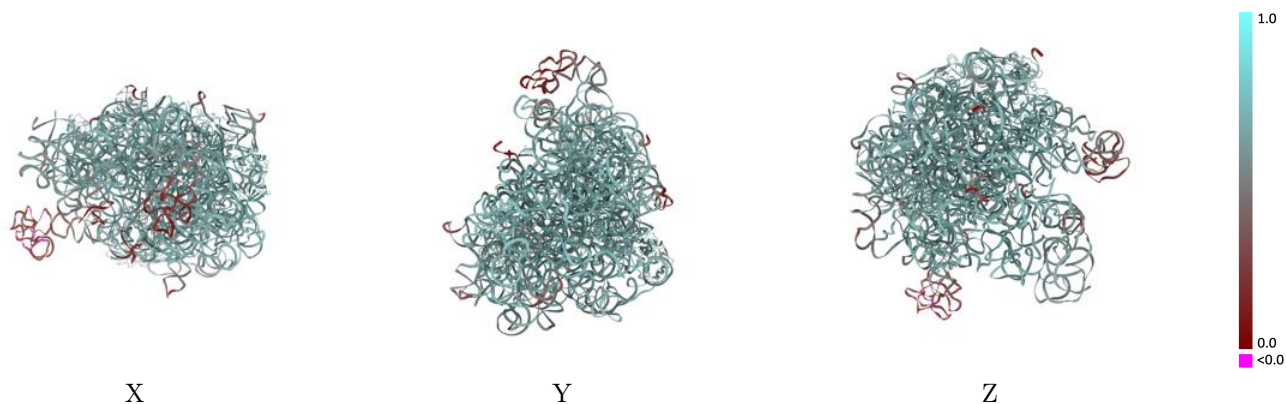
This section contains information regarding the fit between EMDB map EMD-27876 and PDB model 8E41. Per-residue inclusion information can be found in section 3 on page 7.

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



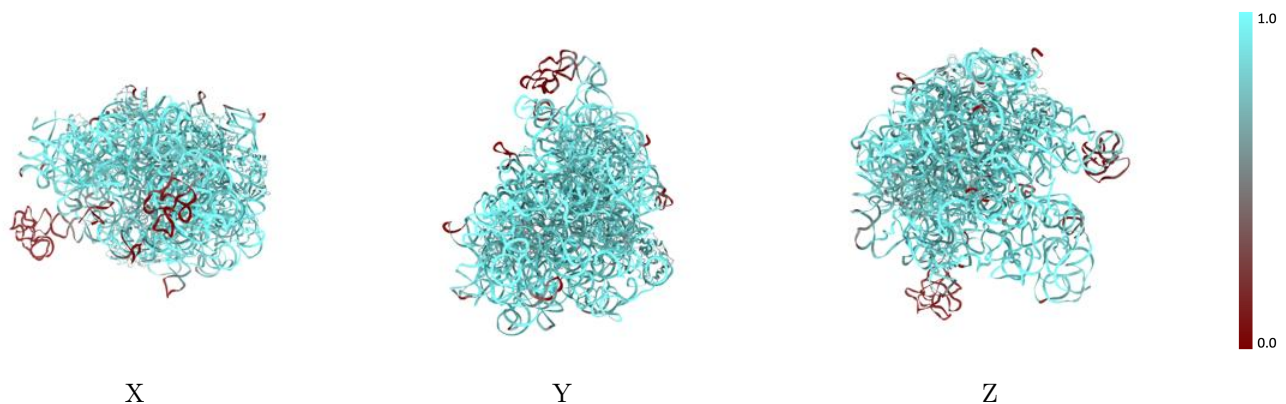
The images above show the 3D surface view of the map at the recommended contour level 3.8 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

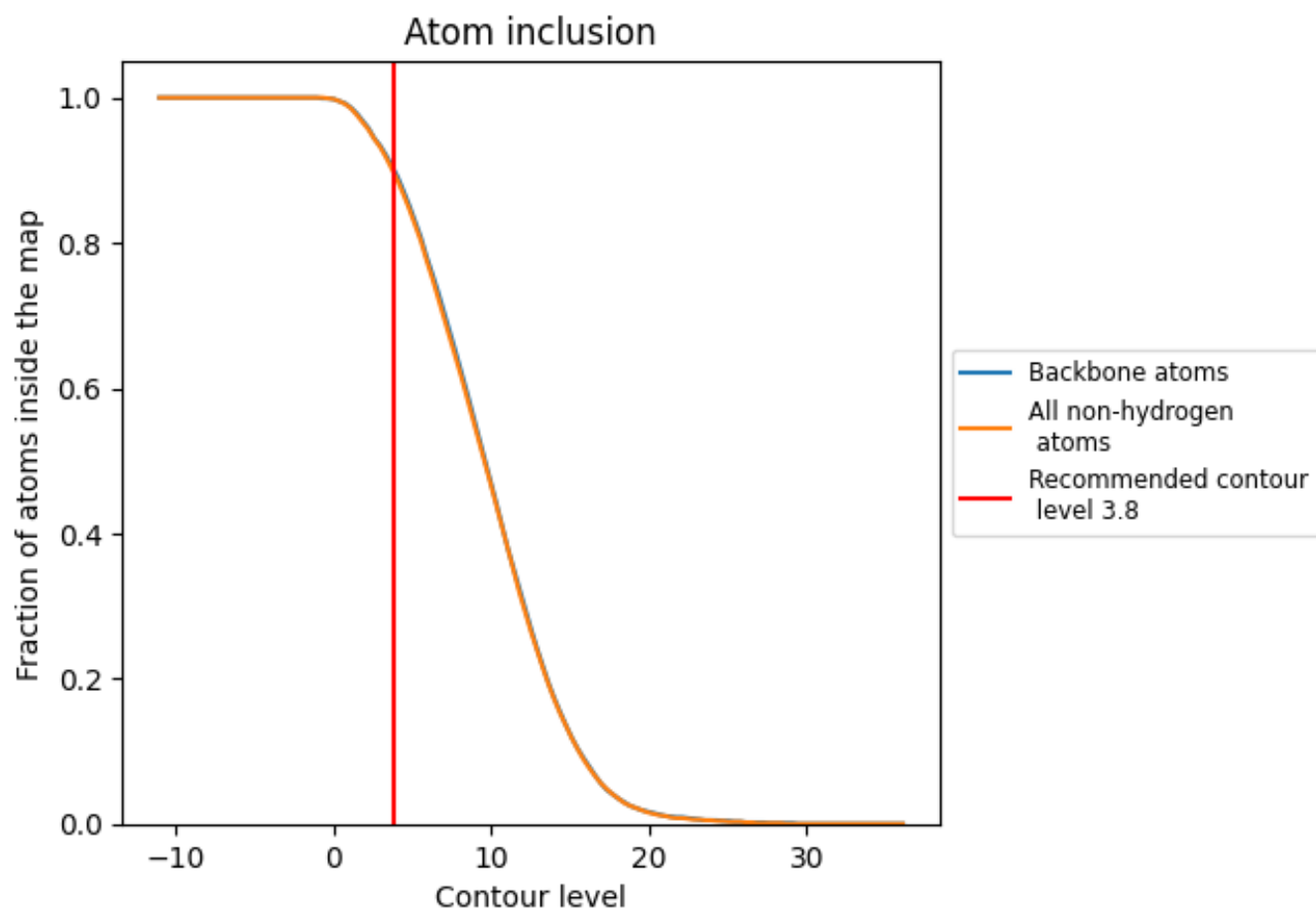
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (3.8).



























## 9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 90% 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 (3.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8970	 0.6110
B	 0.9670	 0.6690
I	 0.9020	 0.6080
J	 0.8750	 0.5780
K	 0.8690	 0.6360
L	 0.8710	 0.6370
M	 0.8200	 0.6270
N	 0.8860	 0.6500
O	 0.8910	 0.6470
P	 0.8850	 0.6510
Q	 0.8550	 0.6350
R	 0.9300	 0.6770

