Full wwPDB EM Validation Report (i)

Feb 26, 2024 – 08:20 AM EST

PDB ID	:	6WDM
EMDB ID	:	EMD-21641
Title	:	Cryo-EM of elongating ribosome with EF-Tu*GTP elucidates tRNA proof-reading (Non-cognate Structure V-B2)
Authors	:	Loveland, A.B.; Demo, G.; Korostelev, A.A.
Deposited on	:	2020-03-31
Resolution	:	3.60 Å(reported)

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

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

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

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

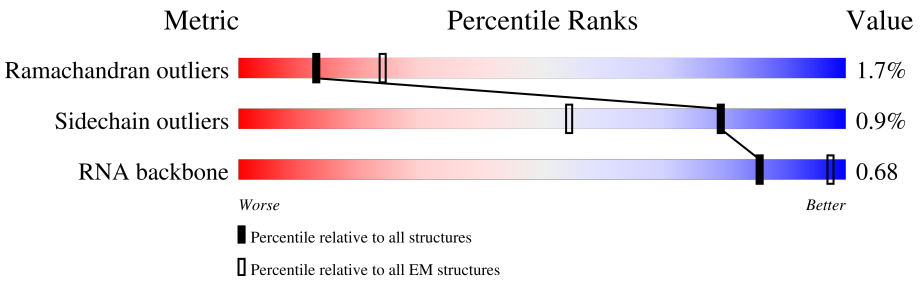
EMDB validation analysis	:	0.0.1.dev70
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.60 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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

Mol	Chain	Length	Quality of chain
1	b	271	98%
2	c	209	100%
3	d	201	99%
4	e	177	98%
5	f	176	99%
6	g	149	6% 97%
7	h	131	24% 96%
8	i	141	21% 96%

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Mol	Chain	Length	Quality of chain
9	j	142	97%
10	k	122	99%
11	l	143	97%
12	m	136	98%
13	n	120	98%
14	o	116	98%
15	p	114	100%
16	q	117	99%
17	r	103	97%
18	s	110	95% 5%
19	t	93	99%
20	u	102	95% 5%
21	v	94	100%
22	w	75	100%
23	x	77	99%
24	y	63	100%
25	z	58	98%
26	B	56	96%
27	C	50	100%
28	D	46	100%
29	E	64	98%
30	F	38	97%
31	G	225	100%
32	H	206	99%
33	I	205	98%

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Mol	Chain	Length	Quality of chain
34	J	157	96%
35	K	100	94% 6%
36	L	151	97%
37	M	129	99%
38	N	127	94% 6%
39	O	98	93% 7%
40	P	116	95% 5%
41	Q	123	96%
42	R	114	96%
43	S	100	99%
44	T	88	99%
45	U	82	99%
46	V	80	96%
47	W	65	97%
48	X	79	97%
49	Y	85	99%
50	Z	65	88% 11%
51	a	223	60% 40%
52	3	1539	91% 9%
53	1	2903	88% 12%
54	2	120	90% 10%
55	5	77	90% 10%
55	6	77	5% 91% 9%
56	4	18	6% 89% 11%
57	7	77	81% 18%

2 Entry composition (i)

There are 59 unique types of molecules in this entry. The entry contains 150220 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 L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	b	271	2083	1288	423	365	7	0	0

- Molecule 2 is a protein called 50S ribosomal protein L3.

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

- Molecule 3 is a protein called 50S ribosomal protein L4.

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

- Molecule 4 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	e	177	1411	899	249	257	6	0	0

- Molecule 5 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	f	176	1323	832	243	246	2	0	0

- Molecule 6 is a protein called 50S ribosomal protein L9.

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

- Molecule 7 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	h	131	989	625	175	184	5	0	0

- Molecule 8 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	i	141	1032	651	179	196	6	0	0

- Molecule 9 is a protein called 50S ribosomal protein L13.

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

- Molecule 10 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	k	122	939	587	180	166	6	0	0

- Molecule 11 is a protein called 50S ribosomal protein L15.

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

- Molecule 12 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	m	136	1074	686	205	177	6	0	0

- Molecule 13 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	n	120	961	593	196	167	5	0	0

- Molecule 14 is a protein called 50S ribosomal protein L18.

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

- Molecule 15 is a protein called 50S ribosomal protein L19.

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

- Molecule 16 is a protein called 50S ribosomal protein L20.

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

- Molecule 17 is a protein called 50S ribosomal protein L21.

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

- Molecule 18 is a protein called 50S ribosomal protein L22.

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

- Molecule 19 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	t	93	739	466	139	132	2	0	0

- Molecule 20 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
20	u	102	780	492	146	142	0	0

- Molecule 21 is a protein called 50S ribosomal protein L25.

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

- Molecule 22 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	w	75	575	356	116	102	1	0	0

- Molecule 23 is a protein called 50S ribosomal protein L28.

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

- Molecule 24 is a protein called 50S ribosomal protein L29.

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

- Molecule 25 is a protein called 50S ribosomal protein L30.

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

- Molecule 26 is a protein called 50S ribosomal protein L32.

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

- Molecule 27 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
27	C	50	410	263	75	72	0	0

- Molecule 28 is a protein called 50S ribosomal protein L34.

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

- Molecule 29 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	E	64	504	323	105	74	2	0	0

- Molecule 30 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	F	38	302	185	65	48	4	0	0

- Molecule 31 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	G	225	1757	1111	315	323	8	0	0

- Molecule 32 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	H	206	1625	1028	305	289	3	0	0

- Molecule 33 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	I	205	1643	1026	315	298	4	0	0

- Molecule 34 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	J	157	1157	719	218	214	6	0	0

- Molecule 35 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	K	100	818	515	148	149	6	0	0

- Molecule 36 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	L	151	1182	735	227	216	4	0	0

- Molecule 37 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	M	129	979	616	173	184	6	0	0

- Molecule 38 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	N	127	1022	634	206	179	3	0	0

- Molecule 39 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
39	O	98	787	493	150	143	1	0	0

- Molecule 40 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	P	116	870	535	173	159	3	0	0

- Molecule 41 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	Q	123	955	590	196	165	4	0	0

- Molecule 42 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	R	114	884	546	178	157	3	0	0

- Molecule 43 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	S	100	805	499	164	139	3	0	0

- Molecule 44 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	T	88	714	439	144	130	1	0	0

- Molecule 45 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
45	U	82	649	406	128	114	1	0	0

- Molecule 46 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	V	80	649	411	121	114	3	0	0

- Molecule 47 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	W	65	536	339	100	96	1	0	0

- Molecule 48 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	X	79	638	408	120	108	2	0	0

- Molecule 49 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	Y	85	665	411	137	114	3	0	0

- Molecule 50 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	Z	65	545	335	117	92	1	0	0

- Molecule 51 is a protein called 50S ribosomal protein L1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	a	134	1027	645	186	194	2	0	0

- Molecule 52 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
52	3	1539	33012	14725	6052	10697	1538	0	0

- Molecule 53 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
53	1	2903	62317	27801	11468	20146	2902	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	747	C	U	conflict	GB 802133627

- Molecule 54 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
54	2	120	2568	1145	471	833	119	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	120	A	-	insertion	GB 1266961702

- Molecule 55 is a RNA chain called tRNAfMet.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
55	5	77	1640	732	297	535	76	0	0
55	6	77	1640	732	297	535	76	0	0

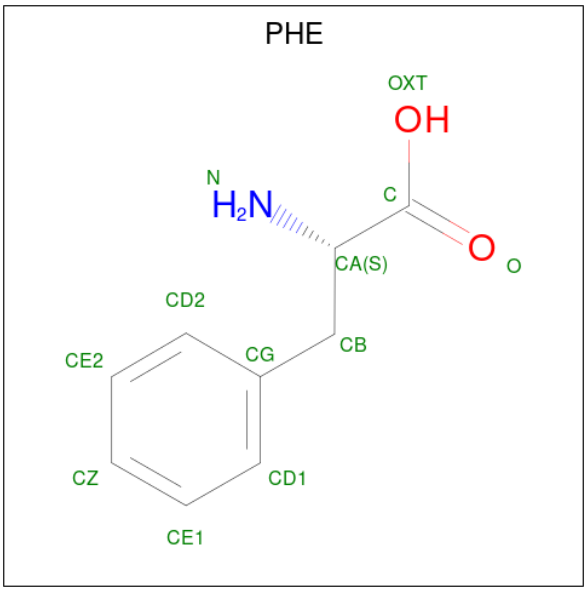
- Molecule 56 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
56	4	18	388	175	77	119	17	0	0

- Molecule 57 is a RNA chain called tRNAPhe.

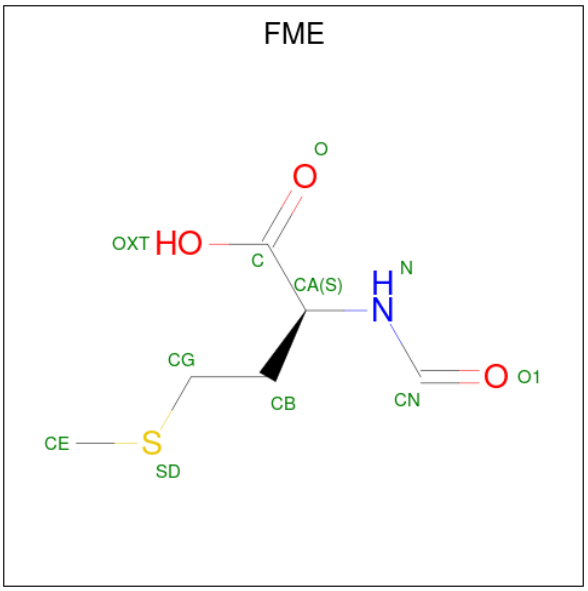
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
57	7	76	1619	723	290	531	75	0	0

- Molecule 58 is PHENYLALANINE (three-letter code: PHE) (formula: $C_9H_{11}NO_2$).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
58	7	1	11	9	1	1	0

- Molecule 59 is N-FORMYLMETHIONINE (three-letter code: FME) (formula: $C_6H_{11}NO_3S$).



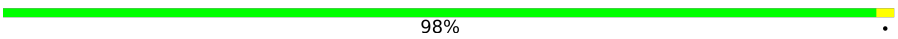
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
59	7	1	8	5	1	1	1	0

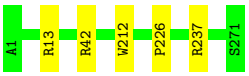
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: 50S ribosomal protein L2

Chain b:



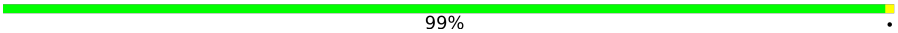


- Molecule 2: 50S ribosomal protein L3

Chain c:

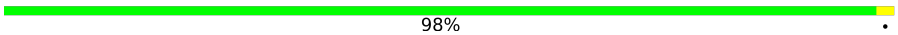
- Molecule 3: 50S ribosomal protein L4

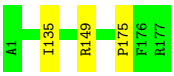
Chain d:



- Molecule 4: 50S ribosomal protein L5

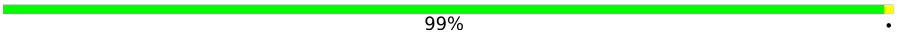
Chain e:

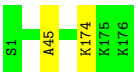




- Molecule 5: 50S ribosomal protein L6

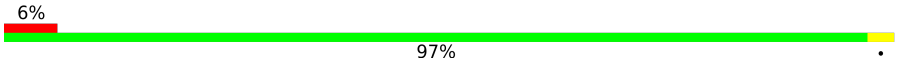
Chain f:

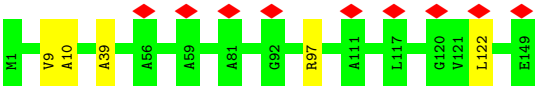




- Molecule 6: 50S ribosomal protein L9

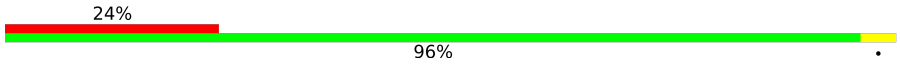
Chain g:

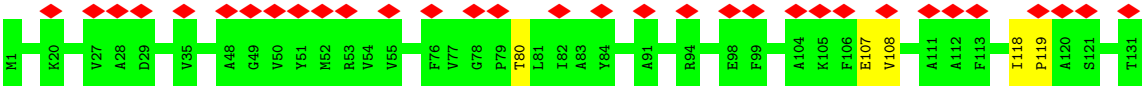




• Molecule 7: 50S ribosomal protein L10

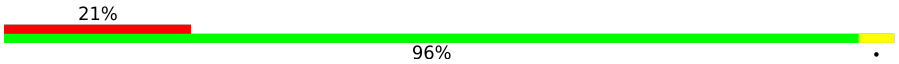
Chain h:

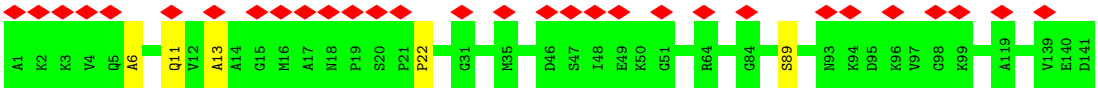




• Molecule 8: 50S ribosomal protein L11

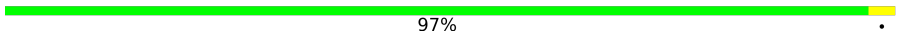
Chain i:





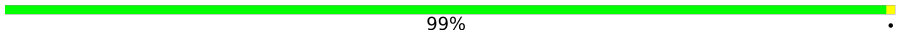
• Molecule 9: 50S ribosomal protein L13

Chain j:



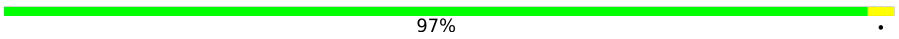
• Molecule 10: 50S ribosomal protein L14

Chain k:



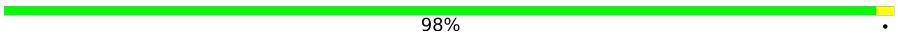
• Molecule 11: 50S ribosomal protein L15

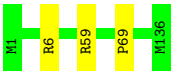
Chain l:



• Molecule 12: 50S ribosomal protein L16

Chain m:





• Molecule 13: 50S ribosomal protein L17

Chain n: 98%

M1 T70 D117 E120

• Molecule 14: 50S ribosomal protein L18

Chain o: 98%

D2 H34 T65 F117

• Molecule 15: 50S ribosomal protein L19

Chain p: 100%

There are no outlier residues recorded for this chain.

• Molecule 16: 50S ribosomal protein L20

Chain q: 99%

A1 F56 A117

• Molecule 17: 50S ribosomal protein L21

Chain r: 97%

M1 Q11 A28 V54 A103

• Molecule 18: 50S ribosomal protein L22

Chain s: 95% 5%

M1 E2 T3 V17 D22 D77 L97 R110

• Molecule 19: 50S ribosomal protein L23

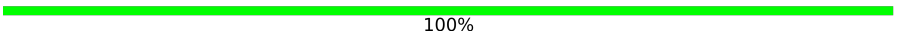
Chain t: 99%

M1 L61 L93

• Molecule 20: 50S ribosomal protein L24

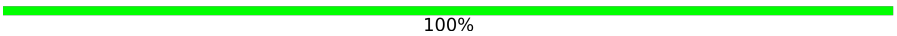
Chain u: 95% 5%

• Molecule 21: 50S ribosomal protein L25

Chain v: 

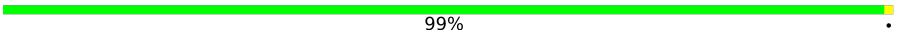
There are no outlier residues recorded for this chain.

• Molecule 22: 50S ribosomal protein L27

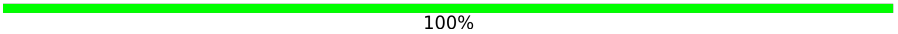
Chain w: 

There are no outlier residues recorded for this chain.

• Molecule 23: 50S ribosomal protein L28

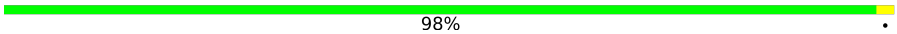
Chain x: 

• Molecule 24: 50S ribosomal protein L29

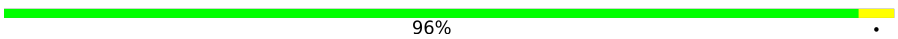
Chain y: 

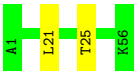
There are no outlier residues recorded for this chain.

• Molecule 25: 50S ribosomal protein L30

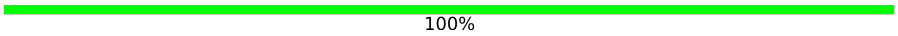
Chain z: 

• Molecule 26: 50S ribosomal protein L32

Chain B: 

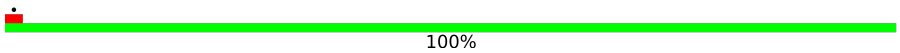


• Molecule 27: 50S ribosomal protein L33

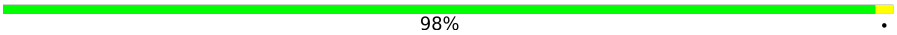
Chain C: 

There are no outlier residues recorded for this chain.

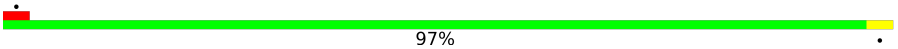
• Molecule 28: 50S ribosomal protein L34

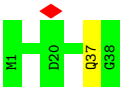
Chain D: 

• Molecule 29: 50S ribosomal protein L35

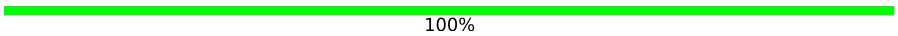
Chain E: 

• Molecule 30: 50S ribosomal protein L36

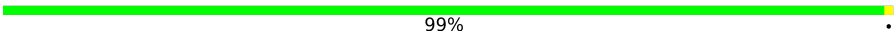
Chain F: 



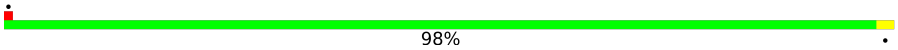
• Molecule 31: 30S ribosomal protein S2

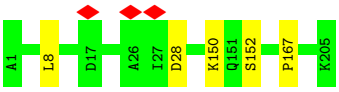
Chain G: 

• Molecule 32: 30S ribosomal protein S3

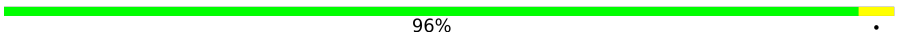
Chain H: 

• Molecule 33: 30S ribosomal protein S4

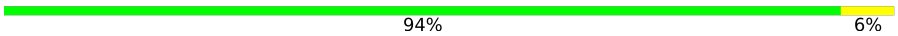
Chain I: 

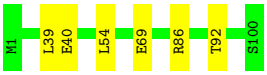


• Molecule 34: 30S ribosomal protein S5

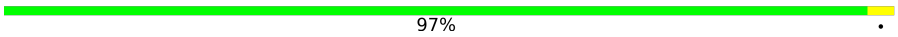
Chain J: 

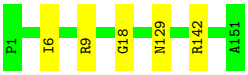
• Molecule 35: 30S ribosomal protein S6

Chain K: 

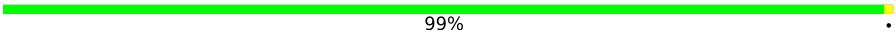


• Molecule 36: 30S ribosomal protein S7

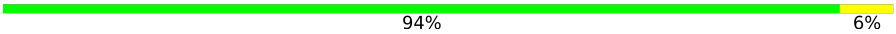
Chain L: 

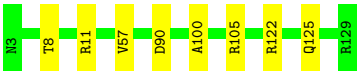


• Molecule 37: 30S ribosomal protein S8

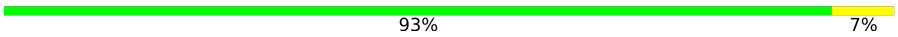
Chain M: 

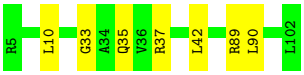
• Molecule 38: 30S ribosomal protein S9

Chain N: 

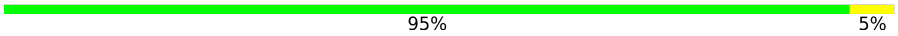


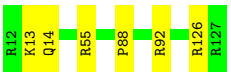
• Molecule 39: 30S ribosomal protein S10

Chain O: 

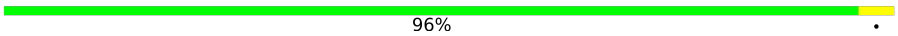


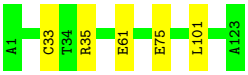
• Molecule 40: 30S ribosomal protein S11

Chain P: 

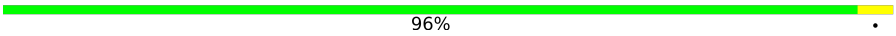


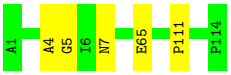
• Molecule 41: 30S ribosomal protein S12

Chain Q: 

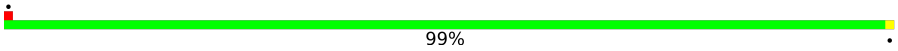


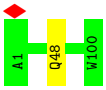
• Molecule 42: 30S ribosomal protein S13

Chain R: 

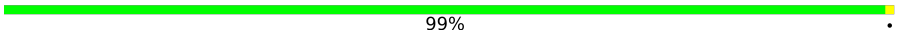


• Molecule 43: 30S ribosomal protein S14

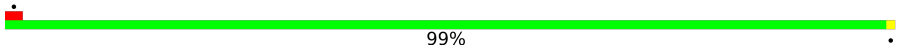
Chain S: 

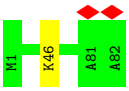


• Molecule 44: 30S ribosomal protein S15

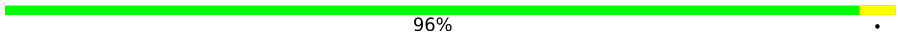
Chain T: 

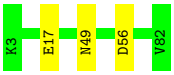
• Molecule 45: 30S ribosomal protein S16

Chain U: 

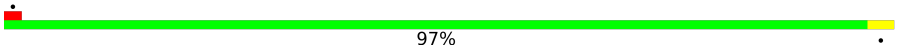


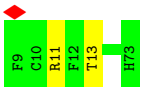
• Molecule 46: 30S ribosomal protein S17

Chain V: 

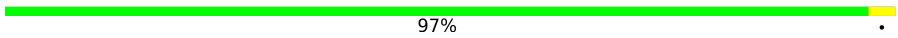


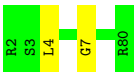
• Molecule 47: 30S ribosomal protein S18

Chain W: 

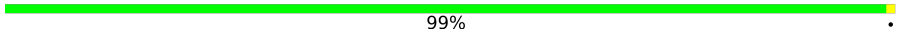


• Molecule 48: 30S ribosomal protein S19

Chain X: 

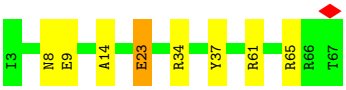


• Molecule 49: 30S ribosomal protein S20

Chain Y: 

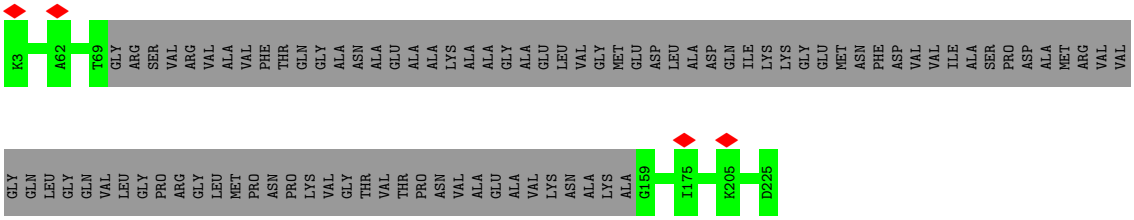
• Molecule 50: 30S ribosomal protein S21

Chain Z:



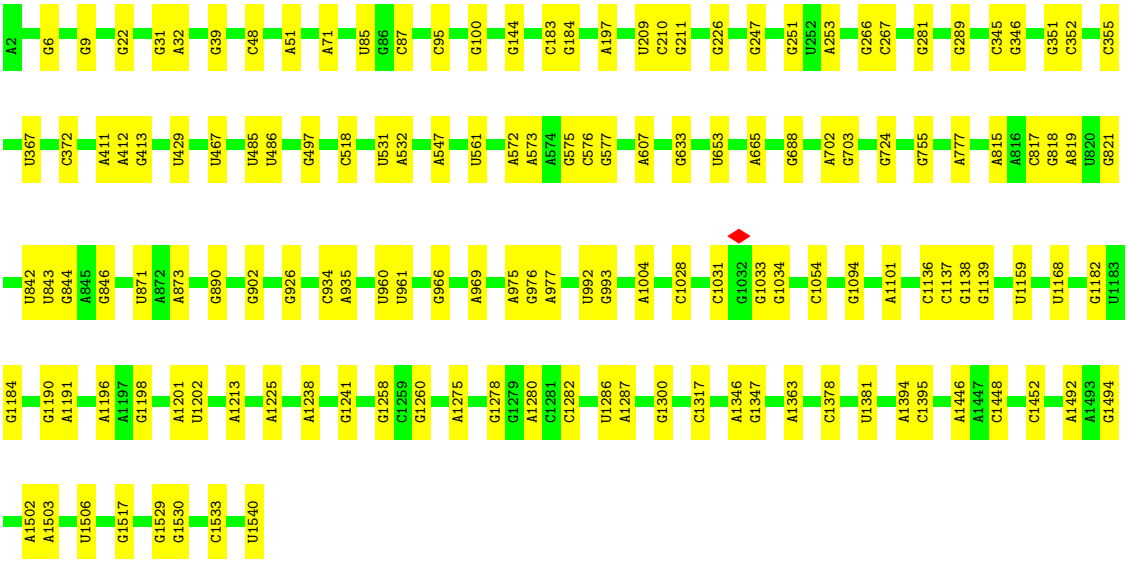
• Molecule 51: 50S ribosomal protein L1

Chain a:



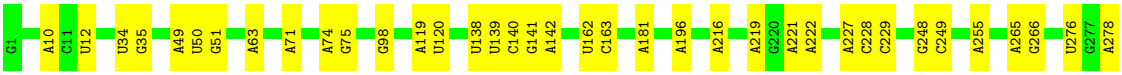
• Molecule 52: 16S ribosomal RNA

Chain 3:



• Molecule 53: 23S ribosomal RNA

Chain 1:



C281 A294 G301 A311 C323 G329 A330 G361 A371 G372 G386 U387 A404 U405 G406 G411 G424 U451 C455 G458 G481 C490 G491 A504 A505 A529 G530 C531 A532 G543 C544 U545 U546 A547 A563 U573 A574

U588 A603 A616 A627 A637 U646 A654 G669 U686 C687 G695 A730 C747 A752 A764 G775 G776 A782 A783 G784 G785 G805 C812 A819 G822 U827 U828 A829 G830 A845 U846 U847 G859 U860 A878 U887

A896 C897 A910 U932 A941 C946 C961 G974 A975 A983 C995 A996 A1009 U1012 C1013 A1020 A1021 G1022 G1026 U1033 C1045 A1046 G1047 A1054 U1060 U1061 G1062 U1065 U1066 A1070 G1071 U1078 C1079 A1084 A1088 A1089 A1090

C1104 U1105 G1106 A1111 U1130 G1131 U1132 A1133 A1134 C1135 A1143 G1157 A1175 U1176 G1177 C1178 G1179 U1180 G1212 G1250 C1251 G1252 A1253 G1256 G1271 A1272 A1275 G1300 A1301 A1302 A1321 U1329 C1330 G1331 G1332 C1345 A1365 U1379 A1383 A1395 C1398

G1416 A1419 A1420 C1461 G1475 U1476 G1482 A1490 C1498 A1515 G1524 A1535 C1536 G1537 G1555 G1560 A1569 G1581 U1584 C1585 A1608 C1611 A1616 U1647 U1648 A1654 G1674 G1699 G1715 U1729 C1730 G1731 C1732 G1738

U1758 C1764 A1773 A1780 A1791 C1800 A1801 A1808 C1816 A1829 A1871 A1901 G1906 G1907 A1913 C1914 G1929 G1930 A1937 A1938 U1944 U1955 U1963 C1967 A1970 U1971 G1972 U1993 C1997 U2022 C2023 A2030 A2031 C2036 C2043

G2049 C2055 G2056 A2060 G2061 A2062 G2069 C2072 C2096 G2110 U2111 G2112 U2118 A2119 U2132 G2133 C2145 G2162 U2172 A2173 U2189 A2198 U2203 G2204 A2211 A2212 U2213 A2225 A2278 C2283 G2286 A2287 U2296 A2297 U2305 A2309

G2325 C2326 A2327 U2334 G2337 C2350 G2383 U2384 C2385 G2391 A2392 U2402 A2406 A2407 U2423 C2424 G2429 A2430 A2435 U2441 A2448 A2476 U2491 C2498 G2502 A2503 U2504 G2505 A2518 A2547 U2554 A2566 G2567 A2572 A2602 U2609

U2613 U2629 G2655 A2682 U2689 U2690 G2714 G2718 G2744 A2748 A2764 A2765 A2778 U2779 G2791 U2797 A2800 A2809 A2820 A2821 U2833 U2849 A2850 G2867 A2868 A2872 C2880 A2883 U2884 U2903

- Molecule 54: 5S ribosomal RNA

Chain 2: 90% 10%

U1 C4 G13 G24 C35 G41 G44 G67 C88 U89 C90 A108 A109 A120

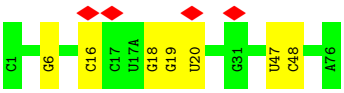
- Molecule 55: tRNAfMet

Chain 5: 90% 10%

C1 G9 G18 G19 U20 U47 C48 C61 A76

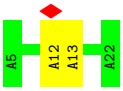
- Molecule 55: tRNAfMet

Chain 6: 5% 91% 9%



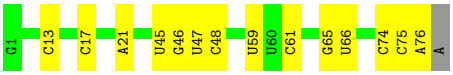
• Molecule 56: mRNA

Chain 4:



• Molecule 57: tRNAPhe

Chain 7:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	12171	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	35	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	20.155	Depositor
Minimum map value	-11.482	Depositor
Average map value	0.121	Depositor
Map value standard deviation	0.992	Depositor
Recommended contour level	1.0	Depositor
Map size (Å)	383.904, 383.904, 383.904	wwPDB
Map dimensions	288, 288, 288	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.333, 1.333, 1.333	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: FME

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	b	0.25	0/2122	0.58	0/2852
2	c	0.29	0/1586	0.54	0/2134
3	d	0.27	0/1571	0.54	0/2113
4	e	0.32	0/1435	0.53	0/1926
5	f	0.26	0/1343	0.54	0/1816
6	g	0.30	0/1122	0.58	0/1515
7	h	0.32	0/1002	0.64	0/1350
8	i	0.30	0/1046	0.56	0/1410
9	j	0.26	0/1152	0.53	0/1551
10	k	0.28	0/948	0.55	0/1268
11	l	0.28	0/1054	0.57	0/1403
12	m	0.30	0/1093	0.54	0/1460
13	n	0.30	0/974	0.52	0/1301
14	o	0.28	0/902	0.51	0/1209
15	p	0.28	0/929	0.52	0/1242
16	q	0.30	0/960	0.47	0/1278
17	r	0.31	0/829	0.59	0/1107
18	s	0.24	0/864	0.58	0/1156
19	t	0.25	0/745	0.54	0/994
20	u	0.31	0/788	0.57	0/1051
21	v	0.29	0/766	0.51	0/1025
22	w	0.34	0/582	0.51	0/769
23	x	0.29	0/635	0.53	0/848
24	y	0.28	0/510	0.51	0/677
25	z	0.26	0/453	0.50	0/605
26	B	0.24	0/450	0.51	0/599
27	C	0.33	0/417	0.54	0/554
28	D	0.32	0/380	0.55	0/498
29	E	0.30	0/513	0.56	0/676
30	F	0.26	0/303	0.55	0/397
31	G	0.30	0/1788	0.53	0/2408
32	H	0.28	0/1652	0.51	0/2225

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	I	0.27	0/1665	0.53	0/2227
34	J	0.28	0/1170	0.62	0/1573
35	K	0.28	0/836	0.59	0/1128
36	L	0.27	0/1196	0.52	0/1602
37	M	0.27	0/989	0.54	0/1326
38	N	0.29	0/1034	0.59	0/1375
39	O	0.27	0/797	0.61	0/1077
40	P	0.29	0/886	0.55	0/1195
41	Q	0.25	0/969	0.59	0/1300
42	R	0.25	0/893	0.56	0/1193
43	S	0.29	0/817	0.50	0/1088
44	T	0.27	0/722	0.52	0/964
45	U	0.33	0/659	0.53	0/884
46	V	0.28	0/658	0.60	0/881
47	W	0.29	0/545	0.56	0/731
48	X	0.32	0/653	0.55	0/877
49	Y	0.28	0/671	0.45	0/888
50	Z	0.31	0/551	0.57	0/728
51	a	0.27	0/1034	0.51	0/1387
52	3	0.29	0/36963	0.63	0/57662
53	1	0.27	0/69796	0.62	0/108888
54	2	0.27	0/2872	0.62	0/4479
55	5	0.29	0/1832	0.62	0/2855
55	6	0.29	0/1832	0.64	0/2855
56	4	0.26	0/436	0.60	0/679
57	7	0.28	0/1809	0.63	0/2819
All	All	0.28	0/163199	0.61	0/244078

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)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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	b	269/271 (99%)	241 (90%)	25 (9%)	3 (1%)	14	53
2	c	207/209 (99%)	186 (90%)	21 (10%)	0	100	100
3	d	199/201 (99%)	179 (90%)	18 (9%)	2 (1%)	15	55
4	e	175/177 (99%)	154 (88%)	19 (11%)	2 (1%)	14	53
5	f	174/176 (99%)	161 (92%)	12 (7%)	1 (1%)	25	64
6	g	147/149 (99%)	127 (86%)	16 (11%)	4 (3%)	5	35
7	h	129/131 (98%)	96 (74%)	28 (22%)	5 (4%)	3	27
8	i	139/141 (99%)	123 (88%)	11 (8%)	5 (4%)	3	29
9	j	140/142 (99%)	133 (95%)	4 (3%)	3 (2%)	7	40
10	k	120/122 (98%)	102 (85%)	17 (14%)	1 (1%)	19	59
11	l	141/143 (99%)	120 (85%)	16 (11%)	5 (4%)	3	30
12	m	134/136 (98%)	119 (89%)	12 (9%)	3 (2%)	6	39
13	n	118/120 (98%)	102 (86%)	15 (13%)	1 (1%)	19	59
14	o	114/116 (98%)	103 (90%)	10 (9%)	1 (1%)	17	57
15	p	112/114 (98%)	98 (88%)	14 (12%)	0	100	100
16	q	115/117 (98%)	109 (95%)	6 (5%)	0	100	100
17	r	101/103 (98%)	94 (93%)	5 (5%)	2 (2%)	7	41
18	s	108/110 (98%)	96 (89%)	11 (10%)	1 (1%)	17	57
19	t	91/93 (98%)	78 (86%)	13 (14%)	0	100	100
20	u	100/102 (98%)	82 (82%)	14 (14%)	4 (4%)	3	26
21	v	92/94 (98%)	85 (92%)	7 (8%)	0	100	100
22	w	73/75 (97%)	63 (86%)	10 (14%)	0	100	100
23	x	75/77 (97%)	72 (96%)	3 (4%)	0	100	100
24	y	61/63 (97%)	58 (95%)	3 (5%)	0	100	100
25	z	56/58 (97%)	53 (95%)	3 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
26	B	54/56 (96%)	47 (87%)	5 (9%)	2 (4%)	3	28
27	C	48/50 (96%)	45 (94%)	3 (6%)	0	100	100
28	D	44/46 (96%)	36 (82%)	8 (18%)	0	100	100
29	E	62/64 (97%)	50 (81%)	11 (18%)	1 (2%)	9	46
30	F	36/38 (95%)	27 (75%)	8 (22%)	1 (3%)	5	34
31	G	223/225 (99%)	206 (92%)	17 (8%)	0	100	100
32	H	204/206 (99%)	192 (94%)	11 (5%)	1 (0%)	29	68
33	I	203/205 (99%)	180 (89%)	19 (9%)	4 (2%)	7	41
34	J	155/157 (99%)	128 (83%)	23 (15%)	4 (3%)	5	35
35	K	98/100 (98%)	84 (86%)	10 (10%)	4 (4%)	3	26
36	L	149/151 (99%)	136 (91%)	10 (7%)	3 (2%)	7	41
37	M	127/129 (98%)	119 (94%)	7 (6%)	1 (1%)	19	59
38	N	125/127 (98%)	105 (84%)	15 (12%)	5 (4%)	3	26
39	O	96/98 (98%)	81 (84%)	11 (12%)	4 (4%)	3	25
40	P	114/116 (98%)	94 (82%)	15 (13%)	5 (4%)	2	23
41	Q	121/123 (98%)	94 (78%)	23 (19%)	4 (3%)	4	31
42	R	112/114 (98%)	95 (85%)	12 (11%)	5 (4%)	2	23
43	S	98/100 (98%)	85 (87%)	13 (13%)	0	100	100
44	T	86/88 (98%)	76 (88%)	9 (10%)	1 (1%)	13	51
45	U	80/82 (98%)	66 (82%)	13 (16%)	1 (1%)	12	50
46	V	78/80 (98%)	62 (80%)	14 (18%)	2 (3%)	5	35
47	W	63/65 (97%)	57 (90%)	5 (8%)	1 (2%)	9	46
48	X	77/79 (98%)	68 (88%)	7 (9%)	2 (3%)	5	35
49	Y	83/85 (98%)	78 (94%)	4 (5%)	1 (1%)	13	51
50	Z	63/65 (97%)	42 (67%)	15 (24%)	6 (10%)	0	8
51	a	130/223 (58%)	122 (94%)	8 (6%)	0	100	100
All	All	5919/6112 (97%)	5209 (88%)	609 (10%)	101 (2%)	13	45

All (101) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	d	83	VAL
5	f	45	ALA

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Mol	Chain	Res	Type
6	g	9	VAL
6	g	10	ALA
7	h	118	ILE
17	r	54	VAL
20	u	98	ASN
30	F	37	GLN
34	J	93	VAL
34	J	122	VAL
38	N	57	VAL
38	N	90	ASP
39	O	37	ARG
39	O	42	LEU
42	R	4	ALA
42	R	65	GLU
46	V	49	ASN
50	Z	8	ASN
50	Z	14	ALA
6	g	39	ALA
7	h	107	GLU
9	j	81	ILE
10	k	35	VAL
11	l	87	GLY
11	l	94	THR
12	m	59	ARG
18	s	3	THR
20	u	51	LEU
20	u	56	GLY
29	E	31	ILE
34	J	98	ALA
35	K	86	ARG
36	L	6	ILE
38	N	8	THR
41	Q	33	CYS
41	Q	101	LEU
46	V	17	GLU
50	Z	23	GLU
1	b	13	ARG
3	d	53	THR
6	g	122	LEU
8	i	13	ALA
8	i	89	SER
11	l	29	LYS

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Mol	Chain	Res	Type
13	n	117	ASP
14	o	34	HIS
26	B	25	THR
32	H	156	LEU
33	I	28	ASP
34	J	11	GLN
35	K	54	LEU
38	N	100	ALA
38	N	125	GLN
40	P	88	PRO
40	P	92	ARG
40	P	126	ARG
42	R	7	ASN
44	T	46	LYS
48	X	4	LEU
50	Z	9	GLU
50	Z	34	ARG
1	b	237	ARG
4	e	149	ARG
7	h	108	VAL
8	i	6	ALA
11	l	85	VAL
11	l	88	GLY
12	m	69	PRO
20	u	97	SER
33	I	152	SER
35	K	39	LEU
36	L	129	ASN
40	P	13	LYS
40	P	14	GLN
41	Q	35	ARG
41	Q	75	GLU
8	i	11	GLN
8	i	22	PRO
9	j	110	PRO
12	m	6	ARG
17	r	28	ALA
26	B	21	LEU
33	I	8	LEU
35	K	40	GLU
39	O	35	GLN
45	U	46	LYS

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Mol	Chain	Res	Type
47	W	13	THR
49	Y	67	HIS
7	h	80	THR
37	M	47	ASP
42	R	5	GLY
50	Z	65	ARG
48	X	7	GLY
1	b	226	PRO
4	e	175	PRO
42	R	111	PRO
7	h	119	PRO
36	L	18	GLY
9	j	82	GLY
33	I	167	PRO
39	O	33	GLY

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	b	216/216 (100%)	214 (99%)	2 (1%)	78	90
2	c	164/164 (100%)	163 (99%)	1 (1%)	86	94
3	d	165/165 (100%)	165 (100%)	0	100	100
4	e	148/148 (100%)	147 (99%)	1 (1%)	84	93
5	f	137/137 (100%)	136 (99%)	1 (1%)	84	93
6	g	114/114 (100%)	113 (99%)	1 (1%)	78	90
7	h	100/100 (100%)	100 (100%)	0	100	100
8	i	109/109 (100%)	109 (100%)	0	100	100
9	j	116/116 (100%)	115 (99%)	1 (1%)	78	90
10	k	103/103 (100%)	103 (100%)	0	100	100
11	l	102/102 (100%)	102 (100%)	0	100	100
12	m	109/109 (100%)	109 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
13	n	100/100 (100%)	99 (99%)	1 (1%)	76	88
14	o	86/86 (100%)	85 (99%)	1 (1%)	71	87
15	p	99/99 (100%)	99 (100%)	0	100	100
16	q	89/89 (100%)	88 (99%)	1 (1%)	73	88
17	r	84/84 (100%)	83 (99%)	1 (1%)	71	87
18	s	93/93 (100%)	89 (96%)	4 (4%)	29	63
19	t	80/80 (100%)	79 (99%)	1 (1%)	69	86
20	u	83/83 (100%)	82 (99%)	1 (1%)	71	87
21	v	78/78 (100%)	78 (100%)	0	100	100
22	w	57/57 (100%)	57 (100%)	0	100	100
23	x	67/67 (100%)	66 (98%)	1 (2%)	65	84
24	y	55/55 (100%)	55 (100%)	0	100	100
25	z	48/48 (100%)	47 (98%)	1 (2%)	53	78
26	B	47/47 (100%)	47 (100%)	0	100	100
27	C	45/45 (100%)	45 (100%)	0	100	100
28	D	38/38 (100%)	38 (100%)	0	100	100
29	E	51/51 (100%)	51 (100%)	0	100	100
30	F	34/34 (100%)	34 (100%)	0	100	100
31	G	186/186 (100%)	185 (100%)	1 (0%)	88	95
32	H	170/170 (100%)	169 (99%)	1 (1%)	86	94
33	I	172/172 (100%)	171 (99%)	1 (1%)	86	94
34	J	119/119 (100%)	117 (98%)	2 (2%)	60	82
35	K	87/87 (100%)	85 (98%)	2 (2%)	50	76
36	L	124/124 (100%)	122 (98%)	2 (2%)	62	83
37	M	104/104 (100%)	104 (100%)	0	100	100
38	N	105/105 (100%)	102 (97%)	3 (3%)	42	72
39	O	86/86 (100%)	83 (96%)	3 (4%)	36	68
40	P	89/89 (100%)	88 (99%)	1 (1%)	73	88
41	Q	103/103 (100%)	102 (99%)	1 (1%)	76	88
42	R	92/92 (100%)	92 (100%)	0	100	100
43	S	83/83 (100%)	82 (99%)	1 (1%)	71	87

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
44	T	76/76 (100%)	76 (100%)	0	100	100
45	U	65/65 (100%)	65 (100%)	0	100	100
46	V	74/74 (100%)	73 (99%)	1 (1%)	67	85
47	W	56/56 (100%)	55 (98%)	1 (2%)	59	81
48	X	70/70 (100%)	70 (100%)	0	100	100
49	Y	65/65 (100%)	65 (100%)	0	100	100
50	Z	55/55 (100%)	52 (94%)	3 (6%)	21	57
51	a	110/174 (63%)	110 (100%)	0	100	100
All	All	4908/4972 (99%)	4866 (99%)	42 (1%)	79	90

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	b	42	ARG
1	b	212	TRP
2	c	142	VAL
4	e	135	ILE
5	f	174	LYS
6	g	97	ARG
9	j	32	LEU
13	n	70	THR
14	o	65	THR
16	q	56	PHE
17	r	11	GLN
18	s	17	VAL
18	s	22	ASP
18	s	77	ASP
18	s	97	LEU
19	t	61	LEU
20	u	5	ARG
23	x	76	LYS
25	z	57	GLU
31	G	22	TRP
32	H	81	GLU
33	I	150	LYS
34	J	55	VAL
34	J	67	ARG
35	K	69	GLU
35	K	92	THR

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Mol	Chain	Res	Type
36	L	9	ARG
36	L	142	ARG
38	N	11	ARG
38	N	105	ARG
38	N	122	ARG
39	O	10	LEU
39	O	89	ARG
39	O	90	LEU
40	P	55	ARG
41	Q	61	GLU
43	S	48	GLN
46	V	56	ASP
47	W	11	ARG
50	Z	23	GLU
50	Z	37	TYR
50	Z	61	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (82) such sidechains are listed below:

Mol	Chain	Res	Type
1	b	20	ASN
1	b	36	ASN
1	b	52	HIS
1	b	89	ASN
1	b	116	GLN
1	b	127	ASN
1	b	225	ASN
2	c	49	GLN
2	c	136	ASN
3	d	90	GLN
3	d	97	ASN
3	d	165	HIS
4	e	126	ASN
5	f	29	ASN
5	f	138	GLN
6	g	33	GLN
6	g	145	ASN
7	h	57	ASN
7	h	103	ASN
8	i	5	GLN
8	i	29	GLN
8	i	33	ASN

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Mol	Chain	Res	Type
8	i	93	ASN
9	j	40	HIS
9	j	58	ASN
12	m	13	HIS
12	m	17	ASN
13	n	3	HIS
14	o	61	GLN
14	o	98	GLN
15	p	9	GLN
15	p	11	GLN
16	q	36	GLN
16	q	51	GLN
16	q	55	GLN
18	s	9	HIS
19	t	28	ASN
19	t	59	ASN
20	u	52	ASN
20	u	73	ASN
21	v	24	ASN
21	v	49	ASN
22	w	8	ASN
24	y	25	GLN
24	y	27	ASN
24	y	31	GLN
24	y	58	ASN
25	z	33	HIS
26	B	5	ASN
27	C	44	GLN
30	F	37	GLN
31	G	57	ASN
31	G	121	GLN
32	H	31	ASN
32	H	184	ASN
33	I	88	ASN
33	I	130	ASN
34	J	11	GLN
34	J	81	GLN
35	K	55	HIS
35	K	68	GLN
36	L	85	GLN
36	L	129	ASN
37	M	17	GLN

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Mol	Chain	Res	Type
38	N	36	GLN
38	N	74	GLN
38	N	125	GLN
39	O	58	ASN
41	Q	4	ASN
41	Q	45	ASN
43	S	3	GLN
43	S	42	ASN
44	T	19	ASN
44	T	27	GLN
44	T	41	HIS
44	T	49	HIS
45	U	29	ASN
46	V	30	HIS
47	W	51	GLN
49	Y	74	HIS
51	a	67	HIS
51	a	188	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
52	3	1538/1539 (99%)	143 (9%)	2 (0%)
53	1	2902/2903 (99%)	329 (11%)	10 (0%)
54	2	119/120 (99%)	11 (9%)	1 (0%)
55	5	76/77 (98%)	8 (10%)	0
55	6	76/77 (98%)	7 (9%)	0
56	4	17/18 (94%)	2 (11%)	0
57	7	75/77 (97%)	13 (17%)	1 (1%)
All	All	4803/4811 (99%)	513 (10%)	14 (0%)

All (513) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
52	3	6	G
52	3	9	G
52	3	22	G
52	3	31	G
52	3	32	A
52	3	39	G
52	3	48	C

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Mol	Chain	Res	Type
52	3	51	A
52	3	71	A
52	3	85	U
52	3	87	C
52	3	95	C
52	3	100	G
52	3	144	G
52	3	183	C
52	3	184	G
52	3	197	A
52	3	209	U
52	3	210	C
52	3	211	G
52	3	226	G
52	3	247	G
52	3	251	G
52	3	253	A
52	3	266	G
52	3	267	C
52	3	281	G
52	3	289	G
52	3	345	C
52	3	346	G
52	3	351	G
52	3	352	C
52	3	355	C
52	3	367	U
52	3	372	C
52	3	411	A
52	3	412	A
52	3	413	G
52	3	429	U
52	3	467	U
52	3	485	U
52	3	486	U
52	3	497	G
52	3	518	C
52	3	531	U
52	3	532	A
52	3	547	A
52	3	561	U
52	3	572	A

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Mol	Chain	Res	Type
52	3	573	A
52	3	575	G
52	3	576	C
52	3	577	G
52	3	607	A
52	3	633	G
52	3	653	U
52	3	665	A
52	3	688	G
52	3	702	A
52	3	703	G
52	3	724	G
52	3	755	G
52	3	777	A
52	3	815	A
52	3	817	C
52	3	818	G
52	3	819	A
52	3	821	G
52	3	842	U
52	3	843	U
52	3	844	G
52	3	846	G
52	3	871	U
52	3	873	A
52	3	890	G
52	3	902	G
52	3	926	G
52	3	934	C
52	3	935	A
52	3	960	U
52	3	961	U
52	3	966	G
52	3	969	A
52	3	975	A
52	3	976	G
52	3	977	A
52	3	992	U
52	3	993	G
52	3	1004	A
52	3	1028	C
52	3	1031	C

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Mol	Chain	Res	Type
52	3	1033	G
52	3	1034	G
52	3	1054	C
52	3	1094	G
52	3	1101	A
52	3	1136	C
52	3	1137	C
52	3	1138	G
52	3	1139	G
52	3	1159	U
52	3	1168	U
52	3	1182	G
52	3	1184	G
52	3	1191	A
52	3	1196	A
52	3	1198	G
52	3	1201	A
52	3	1202	U
52	3	1213	A
52	3	1225	A
52	3	1238	A
52	3	1241	G
52	3	1258	G
52	3	1260	G
52	3	1275	A
52	3	1278	G
52	3	1280	A
52	3	1282	C
52	3	1286	U
52	3	1287	A
52	3	1300	G
52	3	1317	C
52	3	1346	A
52	3	1347	G
52	3	1363	A
52	3	1378	C
52	3	1381	U
52	3	1394	A
52	3	1395	C
52	3	1446	A
52	3	1448	C
52	3	1452	C

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Mol	Chain	Res	Type
52	3	1492	A
52	3	1494	G
52	3	1502	A
52	3	1503	A
52	3	1506	U
52	3	1517	G
52	3	1529	G
52	3	1530	G
52	3	1533	C
52	3	1540	U
53	1	10	A
53	1	12	U
53	1	34	U
53	1	35	G
53	1	49	A
53	1	50	U
53	1	51	G
53	1	63	A
53	1	71	A
53	1	74	A
53	1	75	G
53	1	98	G
53	1	119	A
53	1	120	U
53	1	138	U
53	1	139	U
53	1	140	C
53	1	141	G
53	1	142	A
53	1	162	U
53	1	163	C
53	1	181	A
53	1	196	A
53	1	216	A
53	1	219	A
53	1	221	A
53	1	222	A
53	1	228	C
53	1	229	C
53	1	248	G
53	1	249	C
53	1	255	A

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Mol	Chain	Res	Type
53	1	265	A
53	1	266	G
53	1	276	U
53	1	278	A
53	1	281	C
53	1	294	A
53	1	301	G
53	1	311	A
53	1	323	C
53	1	329	G
53	1	330	A
53	1	361	G
53	1	371	A
53	1	372	G
53	1	386	G
53	1	387	U
53	1	404	A
53	1	406	G
53	1	411	G
53	1	424	G
53	1	451	U
53	1	455	C
53	1	458	G
53	1	481	G
53	1	491	G
53	1	504	A
53	1	505	A
53	1	529	A
53	1	531	C
53	1	532	A
53	1	543	G
53	1	545	U
53	1	547	A
53	1	563	A
53	1	573	U
53	1	574	A
53	1	588	U
53	1	603	A
53	1	616	A
53	1	627	A
53	1	637	A
53	1	646	U

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Mol	Chain	Res	Type
53	1	654	A
53	1	669	G
53	1	686	U
53	1	687	C
53	1	695	G
53	1	730	A
53	1	747	C
53	1	752	A
53	1	764	A
53	1	775	G
53	1	776	G
53	1	782	A
53	1	784	G
53	1	785	G
53	1	805	G
53	1	812	C
53	1	819	A
53	1	822	G
53	1	827	U
53	1	828	U
53	1	830	G
53	1	845	A
53	1	846	U
53	1	847	U
53	1	859	G
53	1	860	U
53	1	878	A
53	1	887	U
53	1	896	A
53	1	897	C
53	1	910	A
53	1	932	U
53	1	941	A
53	1	946	C
53	1	961	C
53	1	974	G
53	1	975	A
53	1	983	A
53	1	995	C
53	1	996	A
53	1	1009	A
53	1	1012	U

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Mol	Chain	Res	Type
53	1	1013	C
53	1	1021	A
53	1	1022	G
53	1	1026	G
53	1	1033	U
53	1	1045	C
53	1	1046	A
53	1	1047	G
53	1	1054	A
53	1	1060	U
53	1	1062	G
53	1	1066	U
53	1	1070	A
53	1	1071	G
53	1	1079	C
53	1	1084	A
53	1	1088	A
53	1	1090	A
53	1	1104	C
53	1	1106	G
53	1	1111	A
53	1	1131	G
53	1	1132	U
53	1	1133	A
53	1	1135	C
53	1	1143	A
53	1	1157	G
53	1	1175	A
53	1	1177	G
53	1	1180	U
53	1	1212	G
53	1	1250	G
53	1	1251	C
53	1	1253	A
53	1	1256	G
53	1	1271	G
53	1	1272	A
53	1	1275	A
53	1	1300	G
53	1	1301	A
53	1	1302	A
53	1	1321	A

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Mol	Chain	Res	Type
53	1	1329	U
53	1	1330	C
53	1	1332	G
53	1	1345	C
53	1	1365	A
53	1	1379	U
53	1	1383	A
53	1	1395	A
53	1	1398	C
53	1	1416	G
53	1	1419	A
53	1	1420	A
53	1	1461	C
53	1	1476	U
53	1	1482	G
53	1	1490	A
53	1	1498	C
53	1	1515	A
53	1	1524	G
53	1	1535	A
53	1	1536	C
53	1	1537	G
53	1	1555	G
53	1	1560	G
53	1	1569	A
53	1	1581	G
53	1	1584	U
53	1	1585	C
53	1	1608	A
53	1	1611	C
53	1	1616	A
53	1	1647	U
53	1	1648	U
53	1	1654	A
53	1	1674	G
53	1	1699	G
53	1	1715	G
53	1	1729	U
53	1	1730	C
53	1	1732	C
53	1	1738	G
53	1	1758	U

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Mol	Chain	Res	Type
53	1	1764	C
53	1	1773	A
53	1	1780	A
53	1	1791	A
53	1	1800	C
53	1	1801	A
53	1	1808	A
53	1	1816	C
53	1	1829	A
53	1	1871	A
53	1	1901	A
53	1	1906	G
53	1	1907	G
53	1	1913	A
53	1	1914	C
53	1	1929	G
53	1	1930	G
53	1	1937	A
53	1	1938	A
53	1	1944	U
53	1	1955	U
53	1	1963	U
53	1	1967	C
53	1	1970	A
53	1	1971	U
53	1	1972	G
53	1	1993	U
53	1	1997	C
53	1	2022	U
53	1	2023	C
53	1	2030	A
53	1	2031	A
53	1	2036	C
53	1	2043	C
53	1	2049	G
53	1	2055	C
53	1	2056	G
53	1	2060	A
53	1	2061	G
53	1	2062	A
53	1	2069	G
53	1	2072	C

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Mol	Chain	Res	Type
53	1	2096	C
53	1	2110	G
53	1	2111	U
53	1	2112	G
53	1	2118	U
53	1	2119	A
53	1	2132	U
53	1	2133	G
53	1	2145	C
53	1	2162	G
53	1	2172	U
53	1	2173	A
53	1	2189	U
53	1	2198	A
53	1	2203	U
53	1	2204	G
53	1	2211	A
53	1	2212	A
53	1	2213	U
53	1	2225	A
53	1	2278	A
53	1	2283	C
53	1	2287	A
53	1	2297	A
53	1	2305	U
53	1	2309	A
53	1	2325	G
53	1	2327	A
53	1	2334	U
53	1	2337	G
53	1	2350	C
53	1	2383	G
53	1	2385	C
53	1	2392	A
53	1	2402	U
53	1	2406	A
53	1	2407	A
53	1	2423	U
53	1	2424	C
53	1	2429	G
53	1	2430	A
53	1	2435	A

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Mol	Chain	Res	Type
53	1	2441	U
53	1	2448	A
53	1	2476	A
53	1	2491	U
53	1	2498	C
53	1	2502	G
53	1	2504	U
53	1	2505	G
53	1	2518	A
53	1	2547	A
53	1	2554	U
53	1	2566	A
53	1	2567	G
53	1	2572	A
53	1	2602	A
53	1	2609	U
53	1	2613	U
53	1	2629	U
53	1	2655	G
53	1	2682	A
53	1	2689	U
53	1	2690	U
53	1	2714	G
53	1	2718	G
53	1	2744	G
53	1	2748	A
53	1	2764	A
53	1	2765	A
53	1	2778	A
53	1	2779	U
53	1	2791	G
53	1	2797	U
53	1	2800	A
53	1	2809	A
53	1	2820	A
53	1	2821	A
53	1	2833	U
53	1	2849	U
53	1	2850	A
53	1	2867	G
53	1	2868	A
53	1	2872	A

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Mol	Chain	Res	Type
53	1	2880	C
53	1	2883	A
53	1	2884	U
54	2	4	C
54	2	13	G
54	2	24	G
54	2	35	C
54	2	41	G
54	2	44	G
54	2	67	G
54	2	89	U
54	2	90	C
54	2	108	A
54	2	109	A
55	5	9	G
55	5	18	G
55	5	19	G
55	5	20	U
55	5	47	U
55	5	48	C
55	5	61	C
55	5	76	A
55	6	6	G
55	6	16	C
55	6	18	G
55	6	19	G
55	6	20	U
55	6	47	U
55	6	48	C
56	4	12	A
56	4	13	A
57	7	13	C
57	7	17	C
57	7	21	A
57	7	45	U
57	7	46	G
57	7	47	U
57	7	48	C
57	7	59	U
57	7	61	C
57	7	66	U
57	7	74	C

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Mol	Chain	Res	Type
57	7	75	C
57	7	76	A

All (14) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
52	3	1190	G
52	3	1201	A
53	1	227	A
53	1	490	C
53	1	859	G
53	1	1020	A
53	1	1130	U
53	1	1475	G
53	1	2286	G
53	1	2296	U
53	1	2326	C
53	1	2391	G
54	2	88	C
57	7	65	G

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands 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	$\#\|Z\| > 2$
58	PHE	7	101	59,57	10,11,12	0.64	0	10,13,15	0.39	0
59	FME	7	102	58	6,7,10	0.46	0	2,7,11	0.18	0

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
58	PHE	7	101	59,57	-	2/5/6/8	0/1/1/1
59	FME	7	102	58	-	0/5/6/11	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
58	7	101	PHE	CA-CB-CG-CD1
58	7	101	PHE	CA-CB-CG-CD2

There are no ring outliers.

No monomer is involved in short contacts.

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.

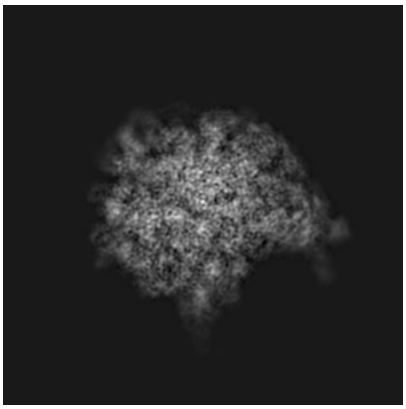
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-21641. These allow visual inspection of the internal detail of the map and identification of artifacts.

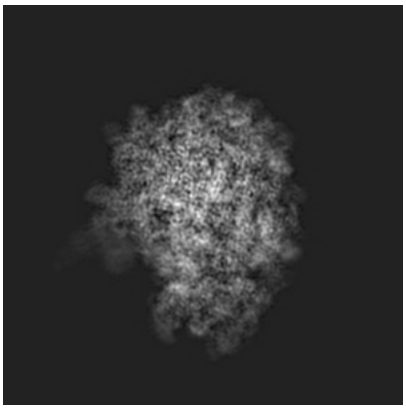
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

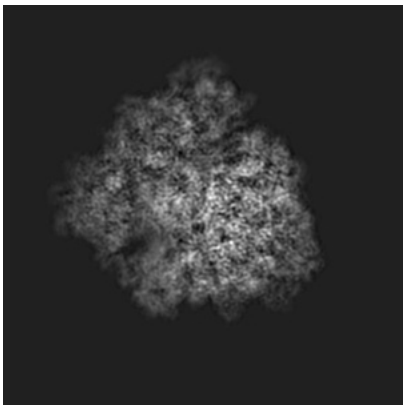
6.1.1 Primary map



X

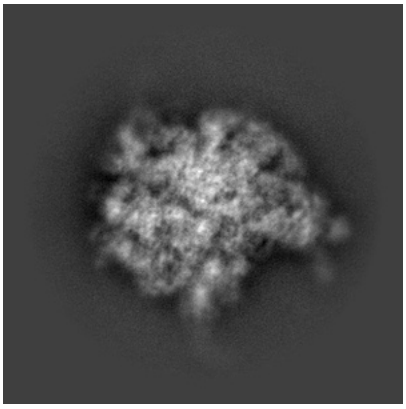


Y

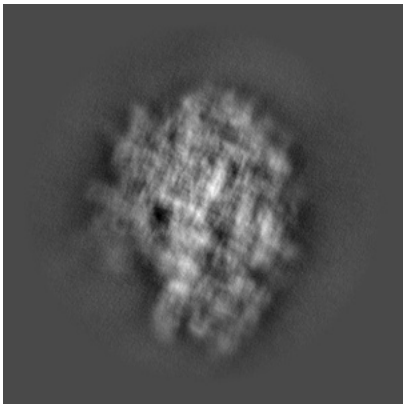


Z

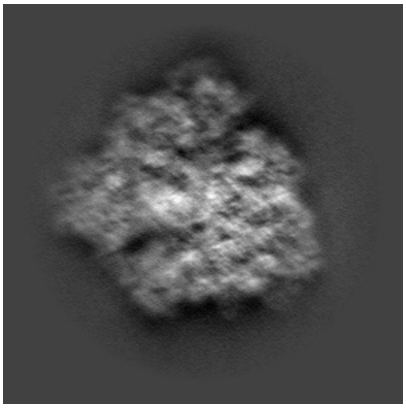
6.1.2 Raw map



X



Y

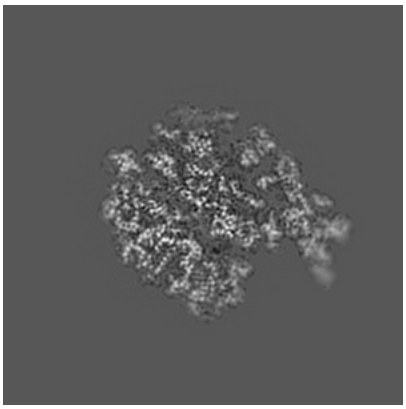


Z

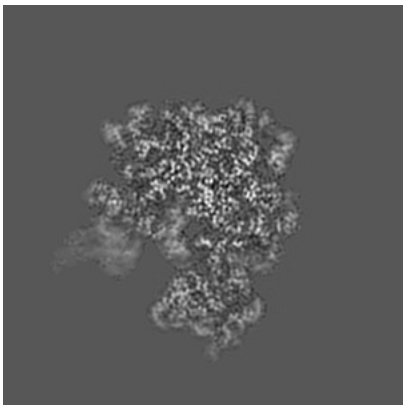
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

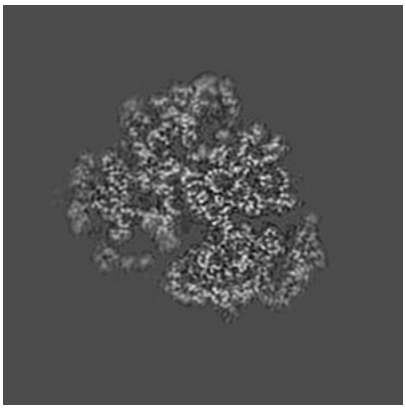
6.2.1 Primary map



X Index: 144

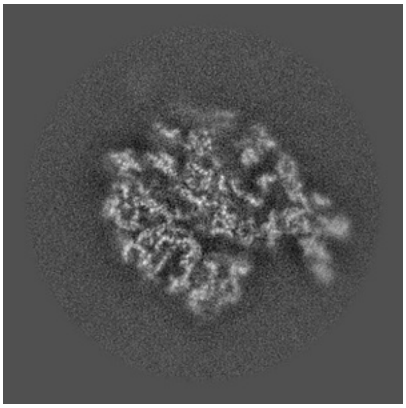


Y Index: 144

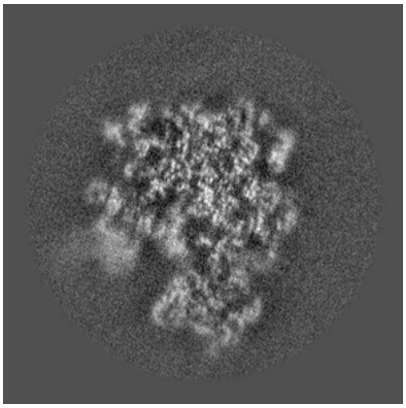


Z Index: 144

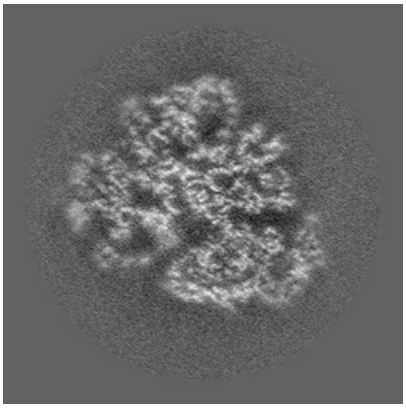
6.2.2 Raw map



X Index: 144



Y Index: 144

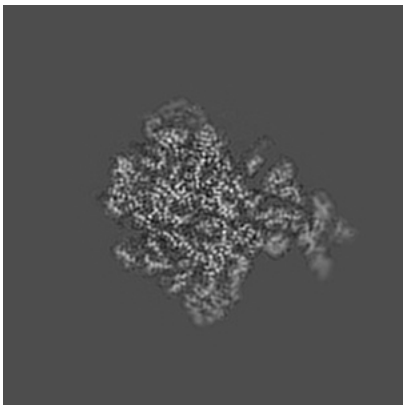


Z Index: 144

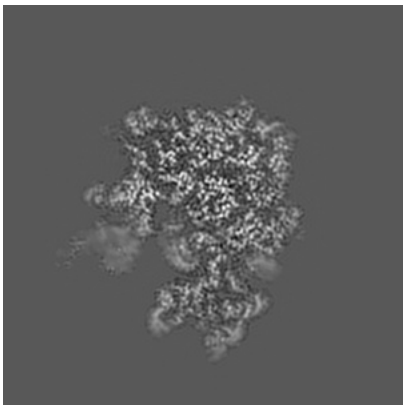
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

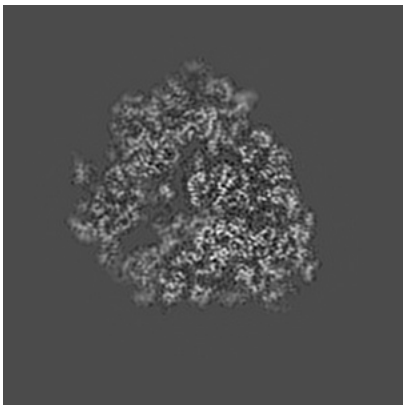
6.3.1 Primary map



X Index: 150

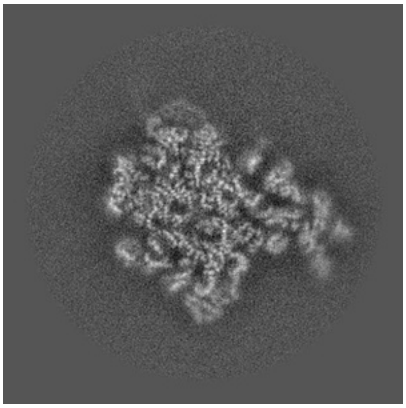


Y Index: 149

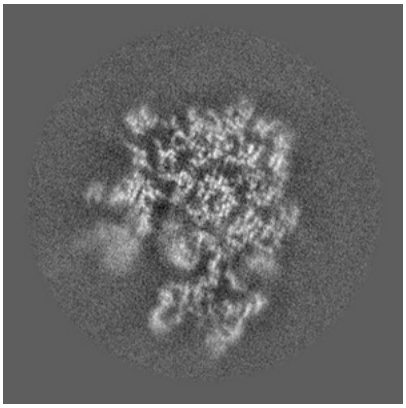


Z Index: 135

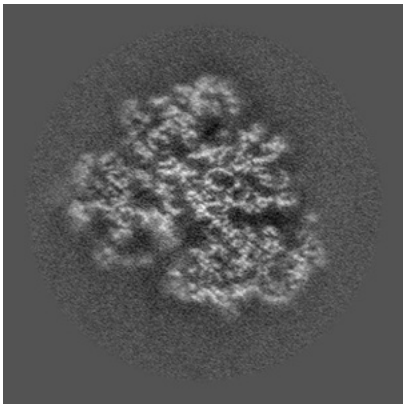
6.3.2 Raw map



X Index: 150



Y Index: 149

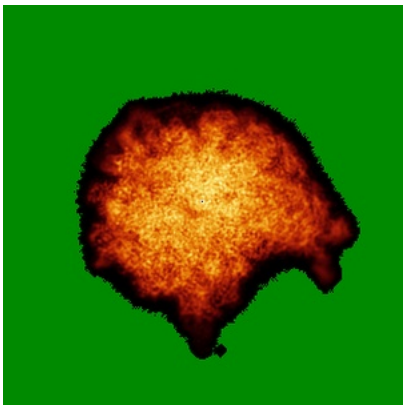


Z Index: 145

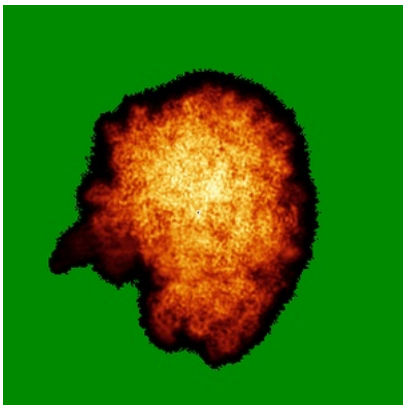
The images above show the largest variance slices of the map in three orthogonal directions.

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

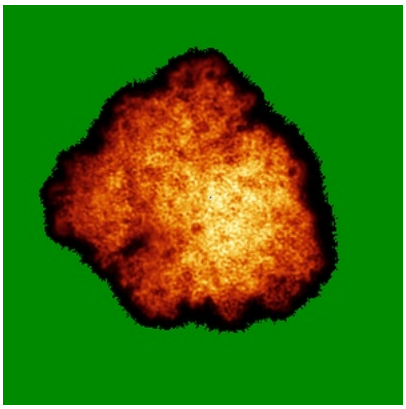
6.4.1 Primary map



X

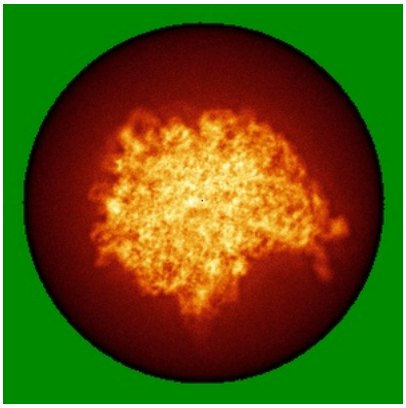


Y

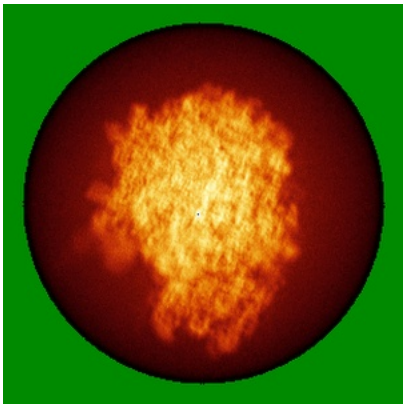


Z

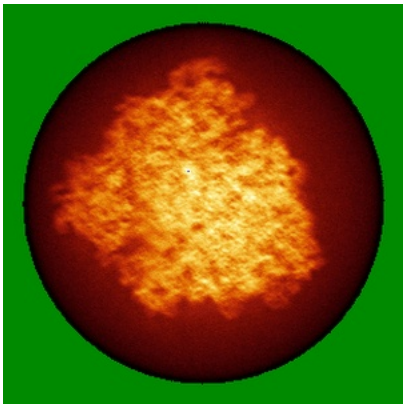
6.4.2 Raw map



X



Y



Z

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

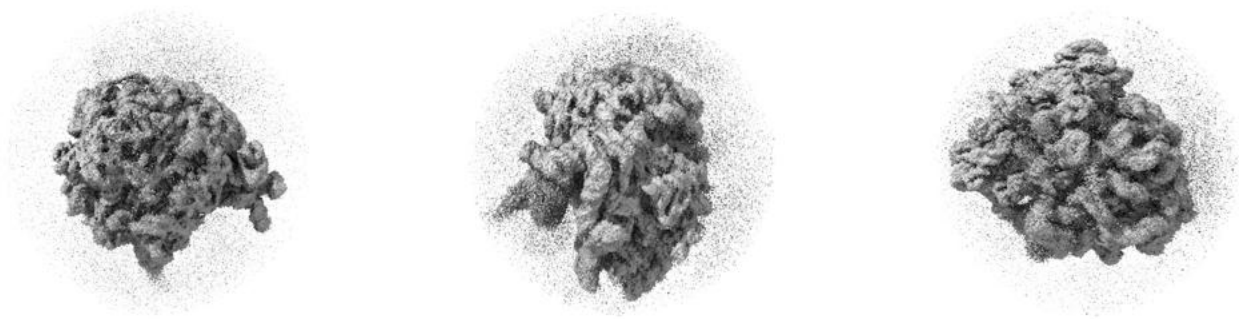
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 1.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

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

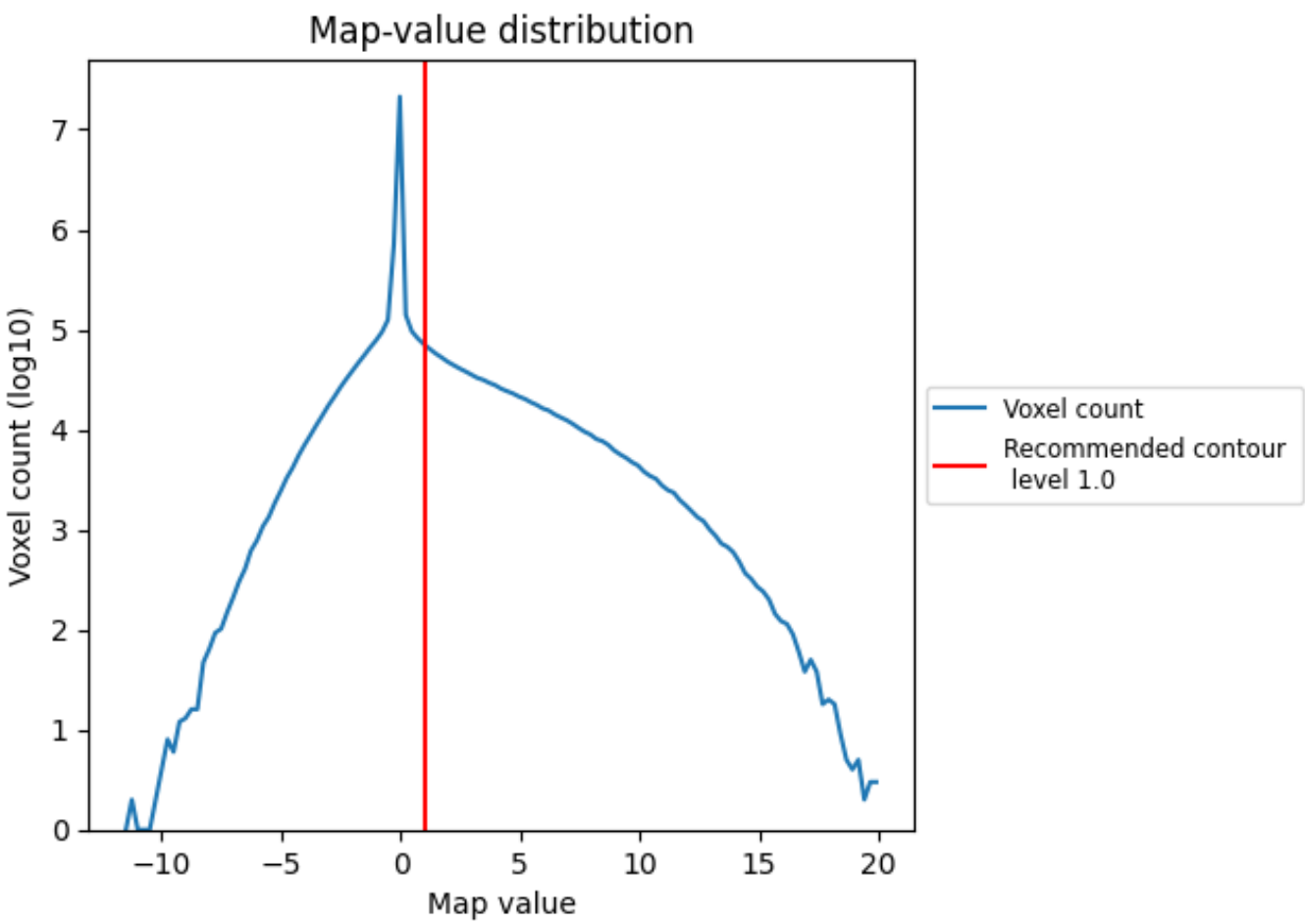
6.6 Mask visualisation (i)

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

7 Map analysis (i)

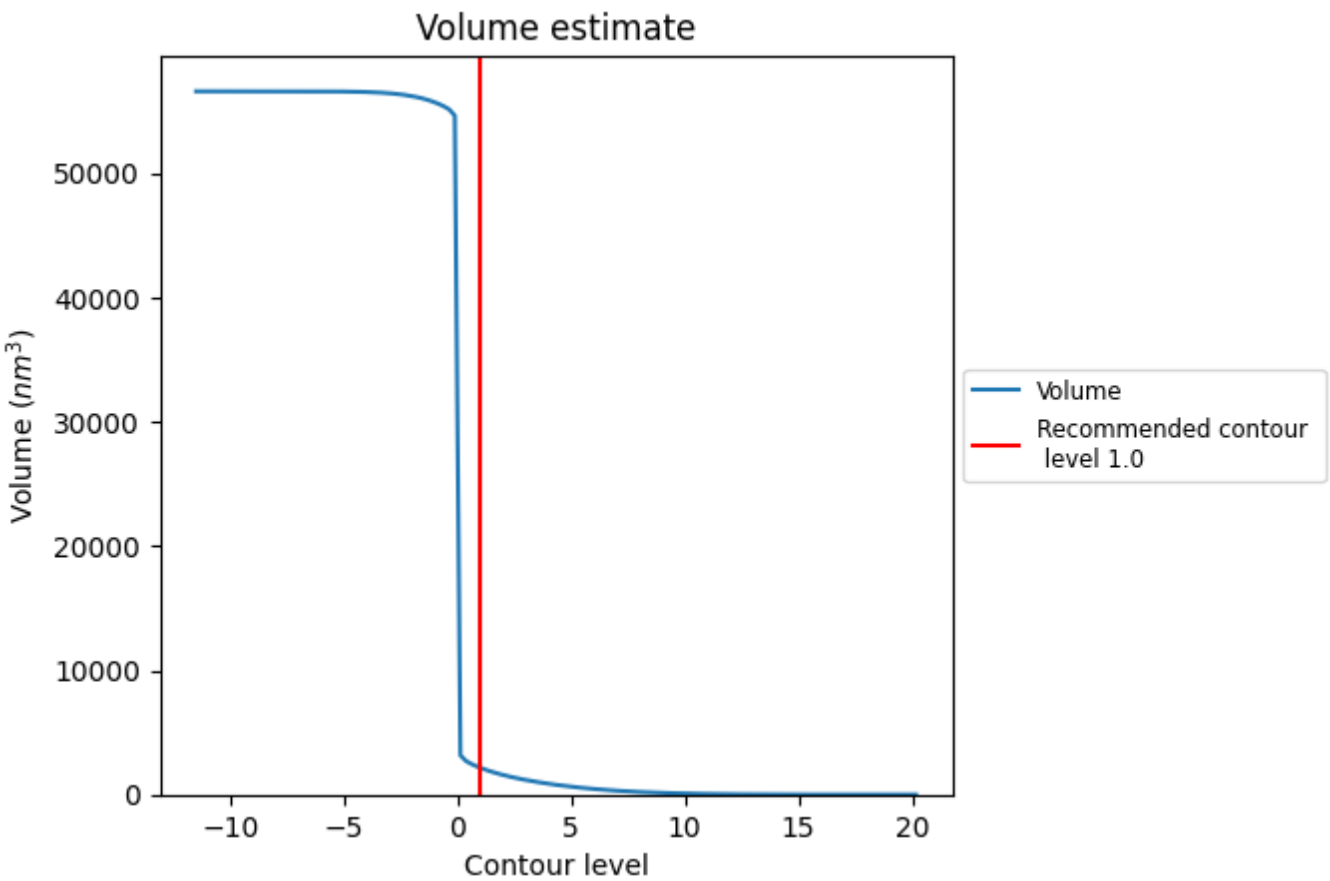
This section contains the results of statistical analysis of the map.

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.

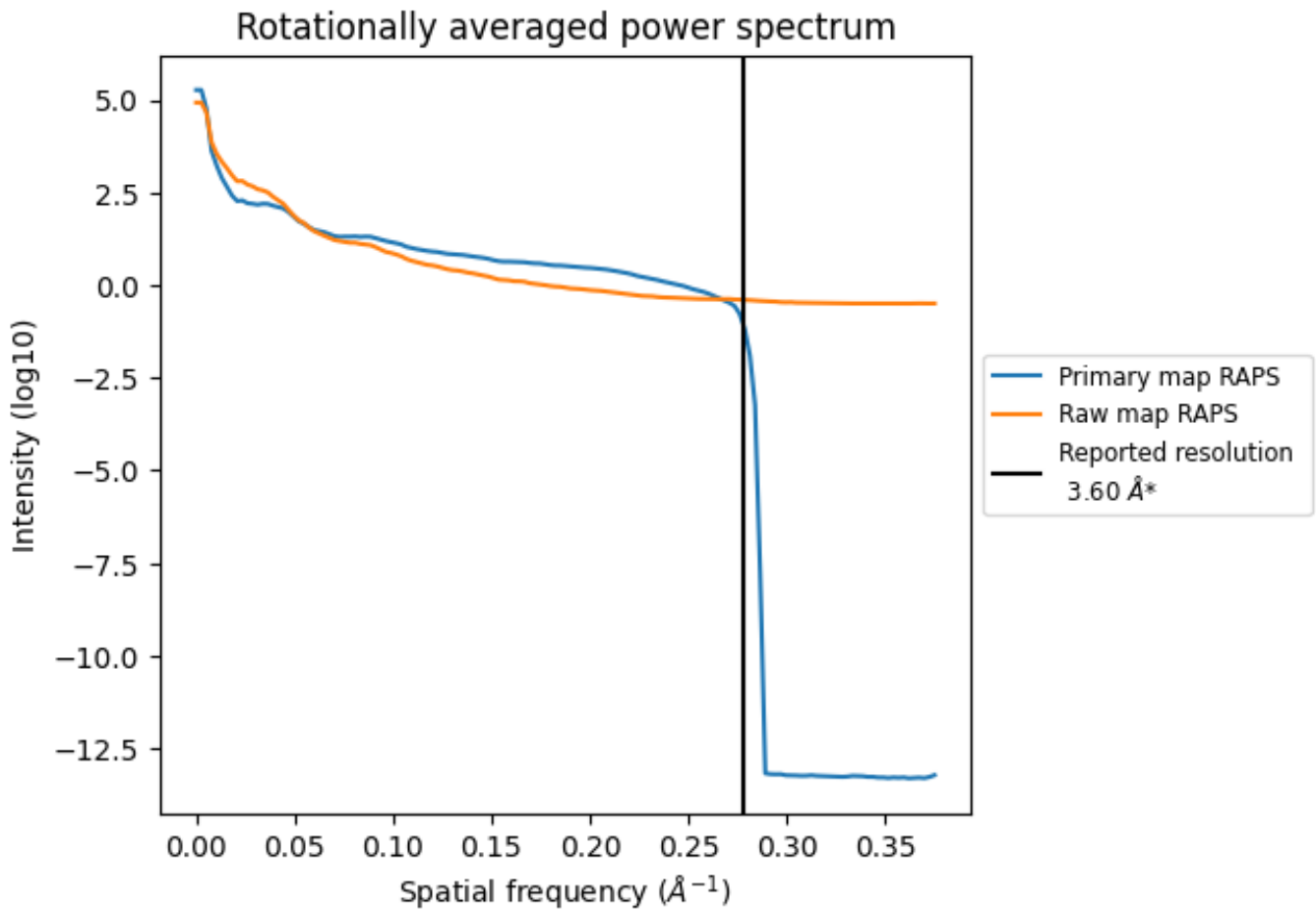
7.2 Volume estimate (i)



The volume at the recommended contour level is 2159 nm^3; this corresponds to an approximate mass of 1951 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)

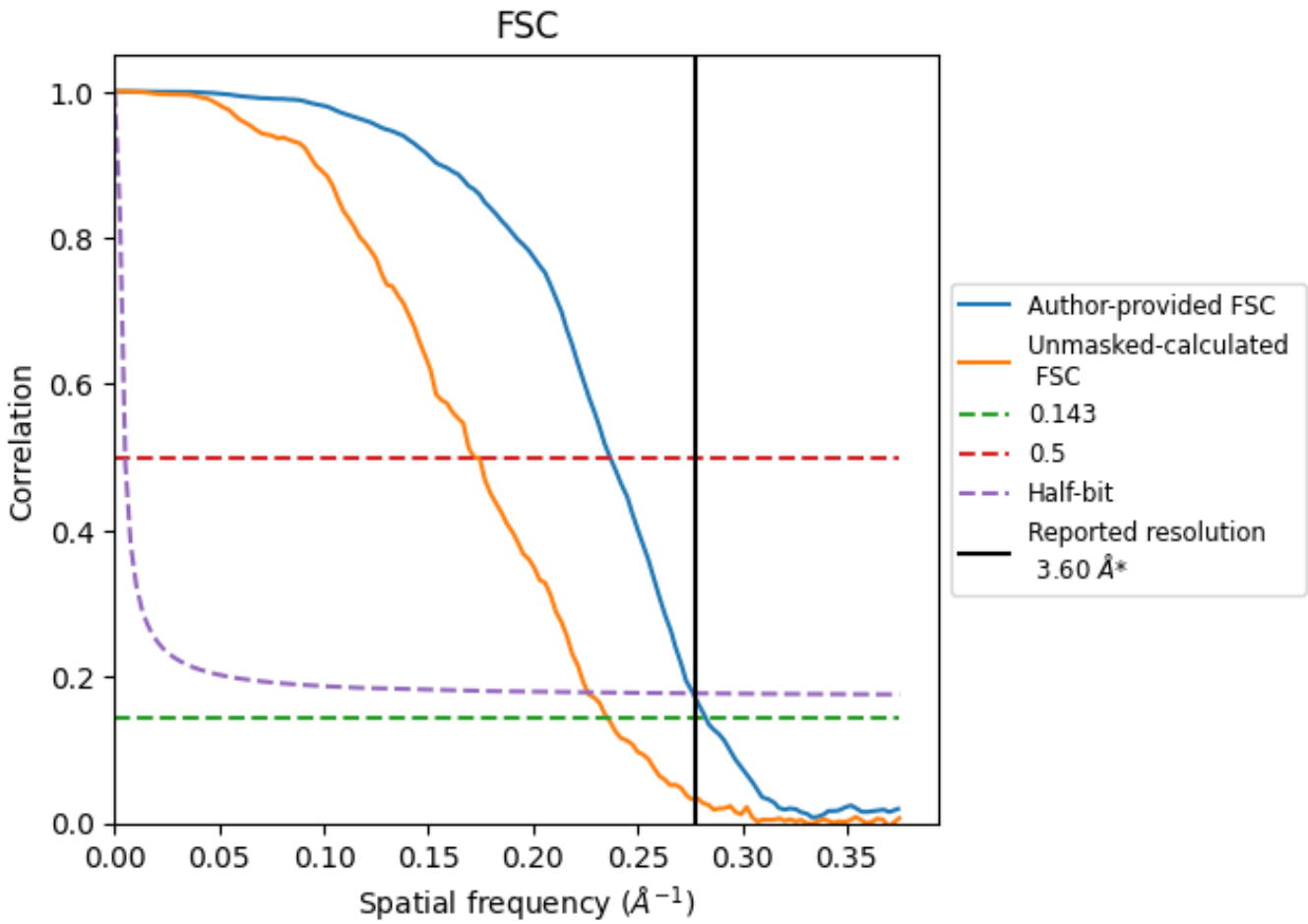


*Reported resolution corresponds to spatial frequency of 0.278 Å^{-1}

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 0.278 Å^{-1}

8.2 Resolution estimates (i)

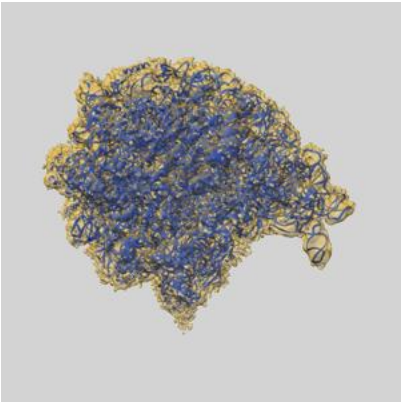
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.60	-	-
Author-provided FSC curve	3.54	4.22	3.62
Unmasked-calculated*	4.24	5.82	4.42

*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 4.24 differs from the reported value 3.6 by more than 10 %

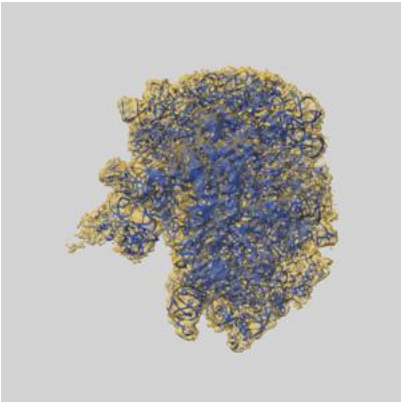
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-21641 and PDB model 6WDM. Per-residue inclusion information can be found in section 3 on page 15.

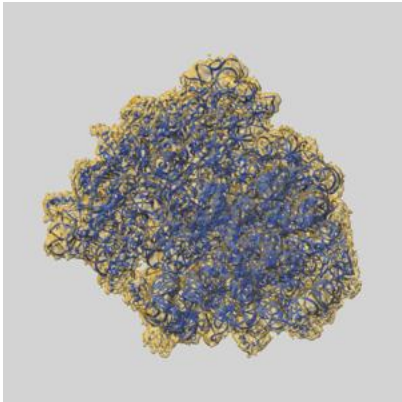
9.1 Map-model overlay (i)



X



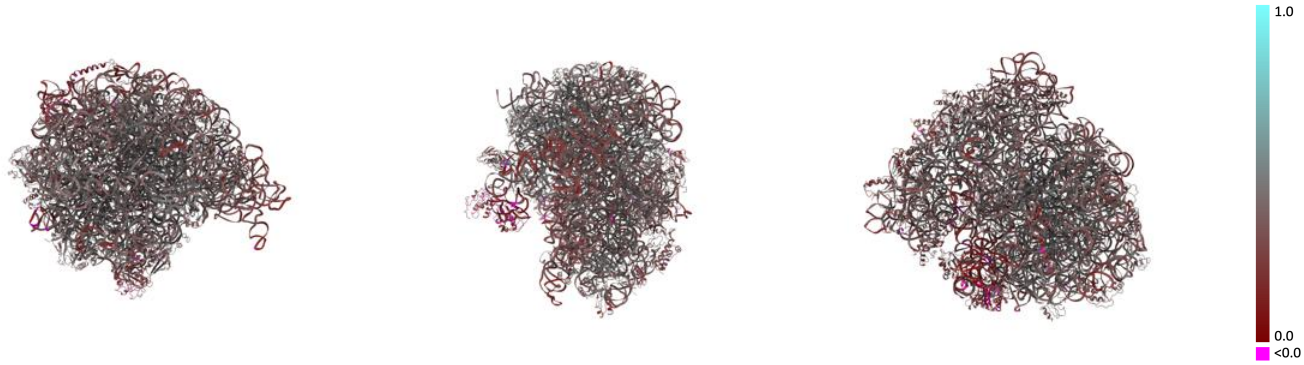
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 1.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

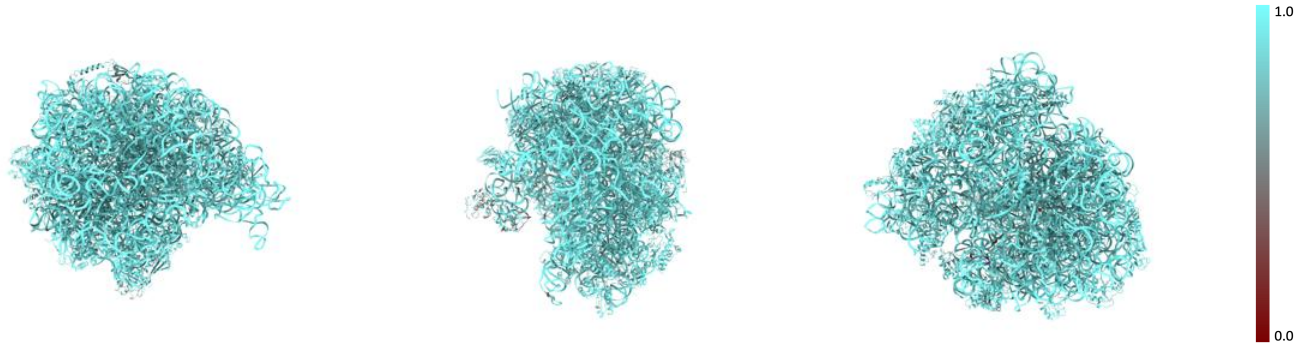
9.2 Q-score mapped to coordinate model (i)



X Y Z

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

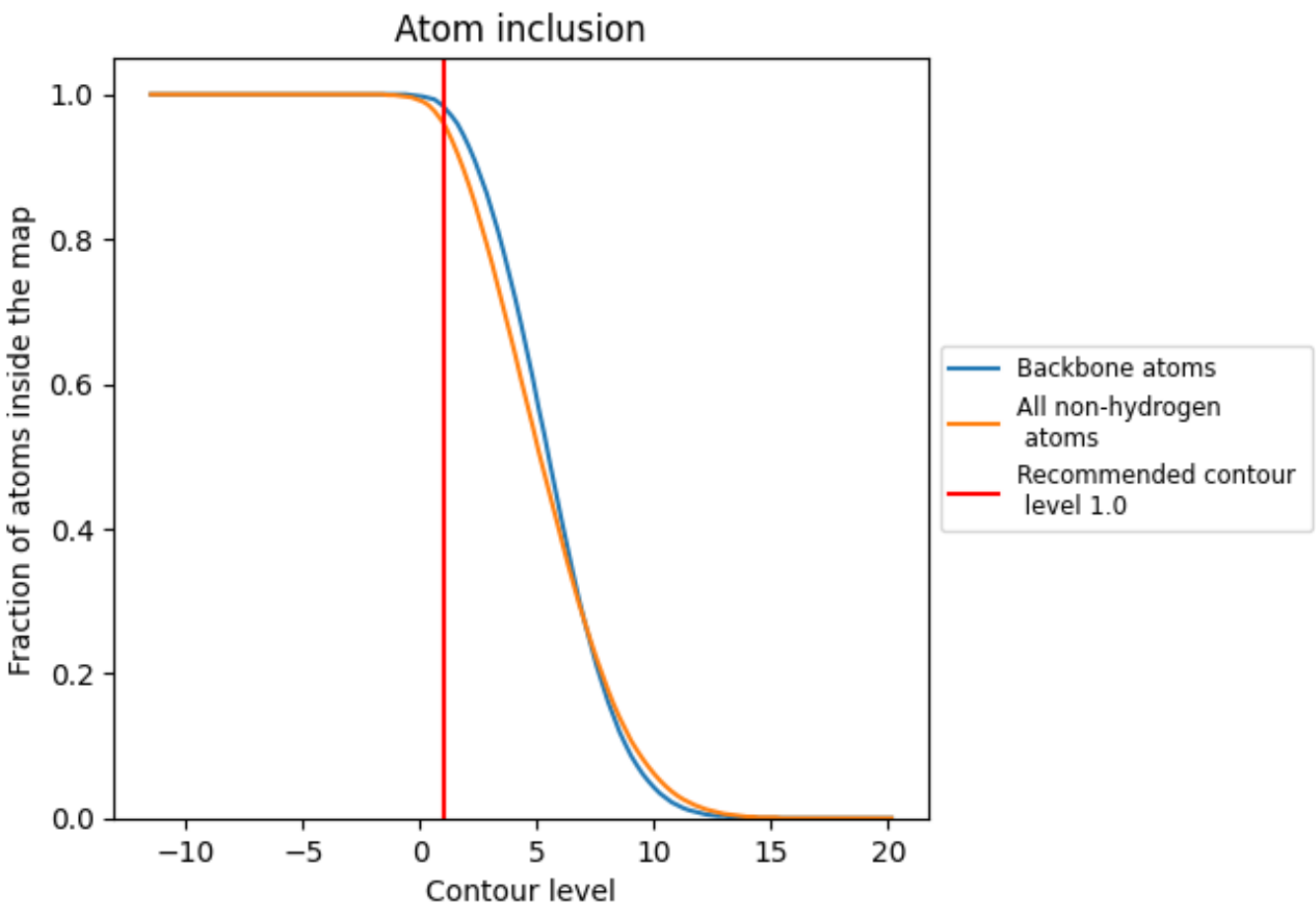
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (1.0).

9.4 Atom inclusion (i)



At the recommended contour level, 98% of all backbone atoms, 96% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (1.0) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9610	0.3760
1	0.9810	0.3890
2	0.9840	0.3490
3	0.9820	0.3680
4	0.9200	0.3060
5	0.9590	0.3040
6	0.8560	0.1400
7	0.9190	0.2230
B	0.9560	0.4540
C	0.9230	0.4160
D	0.9380	0.4500
E	0.9450	0.4700
F	0.9040	0.4240
G	0.9220	0.3560
H	0.9350	0.4130
I	0.9070	0.3390
J	0.9330	0.4020
K	0.9540	0.3920
L	0.9350	0.3470
M	0.9390	0.4150
N	0.9270	0.3640
O	0.8570	0.3380
P	0.9570	0.4000
Q	0.9340	0.4330
R	0.9470	0.3320
S	0.8940	0.3680
T	0.9480	0.3900
U	0.9380	0.3860
V	0.9370	0.4050
W	0.9300	0.3770
X	0.9700	0.3740
Y	0.8880	0.3550
Z	0.8630	0.3040
a	0.8800	0.1610
b	0.9500	0.4630

Continued on next page...

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Chain	Atom inclusion	Q-score
c	0.9470	0.4530
d	0.9530	0.4140
e	0.9470	0.3170
f	0.9630	0.3640
g	0.8200	0.2770
h	0.6720	0.1330
i	0.7100	0.1100
j	0.9480	0.4550
k	0.9480	0.4590
l	0.9440	0.4340
m	0.9310	0.4480
n	0.9450	0.4430
o	0.9480	0.3730
p	0.9430	0.4380
q	0.9380	0.4440
r	0.9540	0.4350
s	0.9190	0.4390
t	0.9280	0.4240
u	0.9450	0.4090
v	0.9580	0.4200
w	0.9450	0.4590
x	0.9620	0.4470
y	0.9400	0.3550
z	0.9500	0.4370