



wwPDB EM Validation Summary Report ⓘ

Apr 1, 2024 – 12:52 PM JST

PDB ID : 8W8E
EMDB ID : EMD-37352
Title : human co-transcriptional RNA capping enzyme RNGTT
Authors : Li, Y.; Wang, Q.; Xu, Y.; Li, Z.
Deposited on : 2023-09-02
Resolution : 3.90 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
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

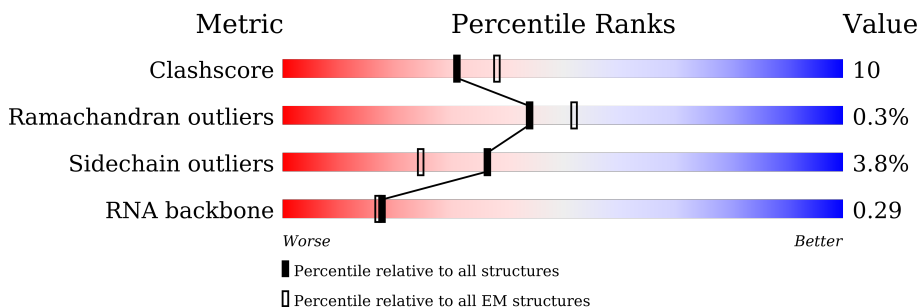
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.90 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	A	1970	52% (green), 18% (yellow), 28% (grey)
2	B	1174	72% (green), 23% (yellow), 5% (grey)
3	C	271	80% (green), 15% (yellow), 5% (grey)
4	D	142	80% (green), 11% (yellow), 10% (grey)
5	E	210	78% (green), 21% (yellow), 1% (grey)
6	F	127	50% (green), 15% (yellow), 35% (grey)
7	G	172	79% (green), 19% (yellow), 2% (grey)

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Mol	Chain	Length	Quality of chain
8	H	150	 65% 33% ..
9	I	125	 73% 19% • 6%
10	J	67	 81% 18% •
11	K	117	 81% 16% ..
12	L	58	 59% 21% 21%
13	N	48	 35% 33% • 29%
14	P	16	 12% 56% 31%
15	T	48	 56% 33% • 6%
16	U	528	 26% 8% 65%
17	V	580	 83% 10% • 5%
18	W	584	 72% 17% • 9%
19	X	380	 7% • 90%
20	Y	121	 30% 83% 13% •
21	Z	1087	 28% 5% 67%
22	a	597	 15% 76% 9% • 15%

2 Entry composition [i](#)

There are 25 unique types of molecules in this entry. The entry contains 50912 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 DNA-directed RNA polymerase subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1426	11299	7111	2020	2099	69	0	0

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	1133	9046	5723	1594	1665	64	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerase II subunit RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	258	2072	1301	353	412	6	0	0

- Molecule 4 is a protein called DNA-directed RNA polymerase II subunit RPB4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	128	997	629	169	195	4	0	0

- Molecule 5 is a protein called DNA-directed RNA polymerase II subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	209	1721	1089	300	324	8	0	0

- Molecule 6 is a protein called DNA-directed RNA polymerase II subunit F.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	82	658	418	113	122	5	0	0

- Molecule 7 is a protein called DNA-directed RNA polymerase II subunit RPB7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	G	171	1305	852	205	240	8	0	0

- Molecule 8 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	148	1186	750	194	237	5	0	0

- Molecule 9 is a protein called DNA-directed RNA polymerase II subunit RPB9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	I	117	950	587	169	183	11	0	0

- Molecule 10 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	J	67	533	345	90	92	6	0	0

- Molecule 11 is a protein called DNA-directed RNA polymerase II subunit RPB11-a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	K	115	920	593	152	173	2	0	0

- Molecule 12 is a protein called RPB12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	L	46	389	241	75	67	6	0	0

- Molecule 13 is a DNA chain called DNA (36-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
13	N	34	714	333	147	200	34	0	0

- Molecule 14 is a RNA chain called RNA (5'-D*(GTP))-R(P*AP*GP*AP*GP*AP*GP*G

P*GP*AP*AP*CP*CP*CP*AP*CP*U)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
14	P	16	347	155	69	107	16	0	0

- Molecule 15 is a DNA chain called DNA (45-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
15	T	45	910	432	156	277	45	0	0

- Molecule 16 is a protein called Negative elongation factor A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	U	183	1410	895	239	269	7	0	0

- Molecule 17 is a protein called Negative elongation factor B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	V	550	4411	2825	752	810	24	0	0

- Molecule 18 is a protein called Negative elongation factor C/D.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	W	532	3823	2419	664	720	20	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
W	7	SER	-	expression tag	UNP Q8IXH7
W	8	ASN	-	expression tag	UNP Q8IXH7
W	9	ALA	-	expression tag	UNP Q8IXH7

- Molecule 19 is a protein called Negative elongation factor E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	X	37	293	191	50	51	1	0	0

- Molecule 20 is a protein called Transcription elongation factor SPT4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	Y	116	911	570	159	173	9	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Y	-3	GLY	-	expression tag	UNP P63272
Y	-2	PRO	-	expression tag	UNP P63272
Y	-1	GLY	-	expression tag	UNP P63272
Y	0	SER	-	expression tag	UNP P63272

- Molecule 21 is a protein called Transcription elongation factor SPT5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	Z	360	2880	1835	495	537	13	0	0

- Molecule 22 is a protein called mRNA-capping enzyme.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	a	506	4096	2614	710	740	32	5	0

- Molecule 23 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
23	A	1	Total	Mg	0
			1	1	

- Molecule 24 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

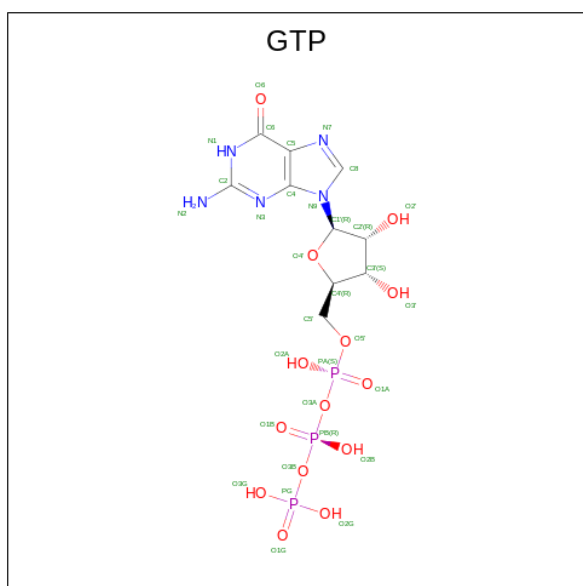
Mol	Chain	Residues	Atoms		AltConf
24	A	2	Total	Zn	0
			2	2	
24	B	1	Total	Zn	0
			1	1	
24	C	1	Total	Zn	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
24	I	2	Total	Zn	0
			2	2	
24	L	1	Total	Zn	0
			1	1	
24	Y	1	Total	Zn	0
			1	1	

- Molecule 25 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$) (labeled as "Ligand of Interest" by depositor).

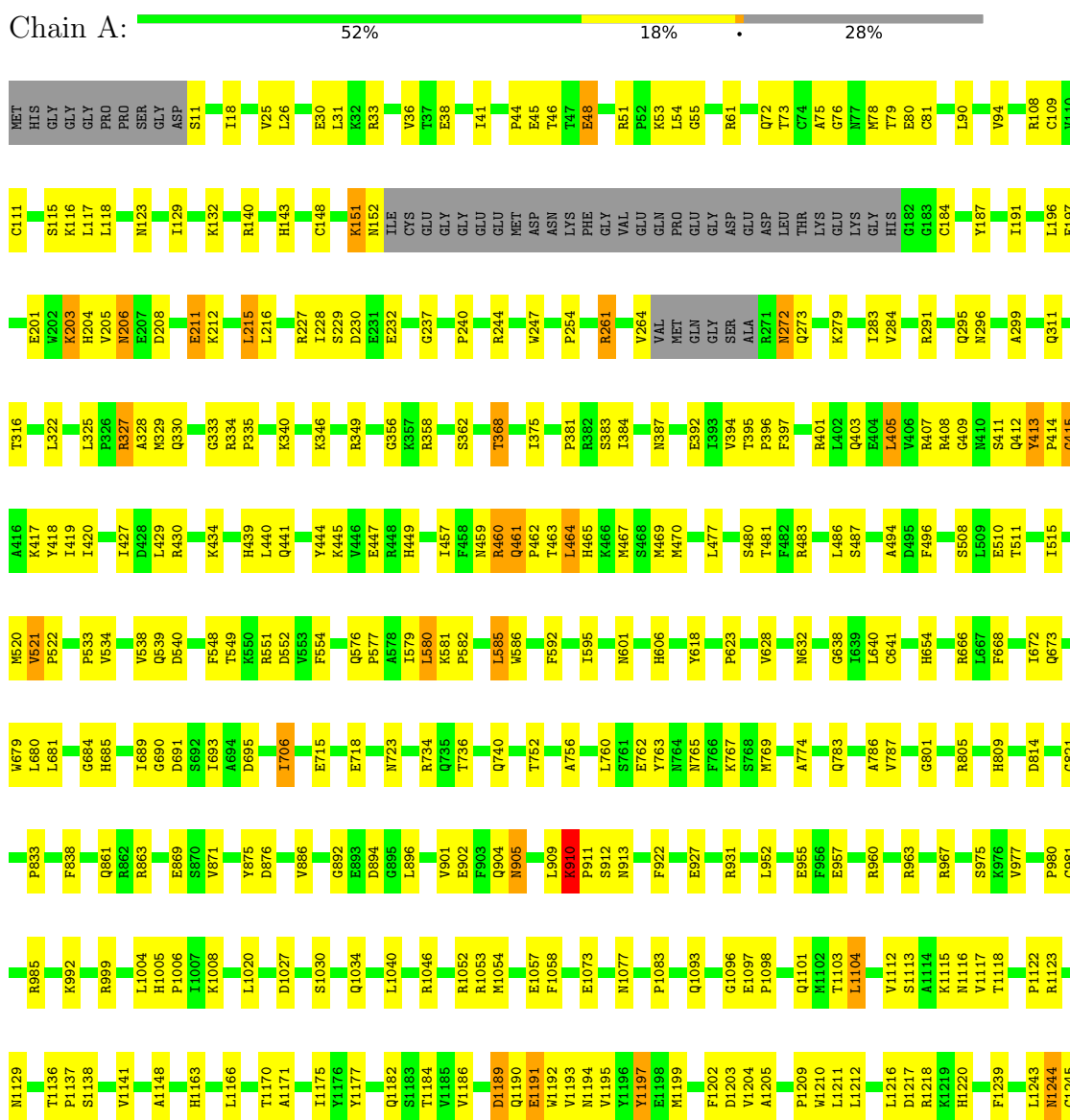


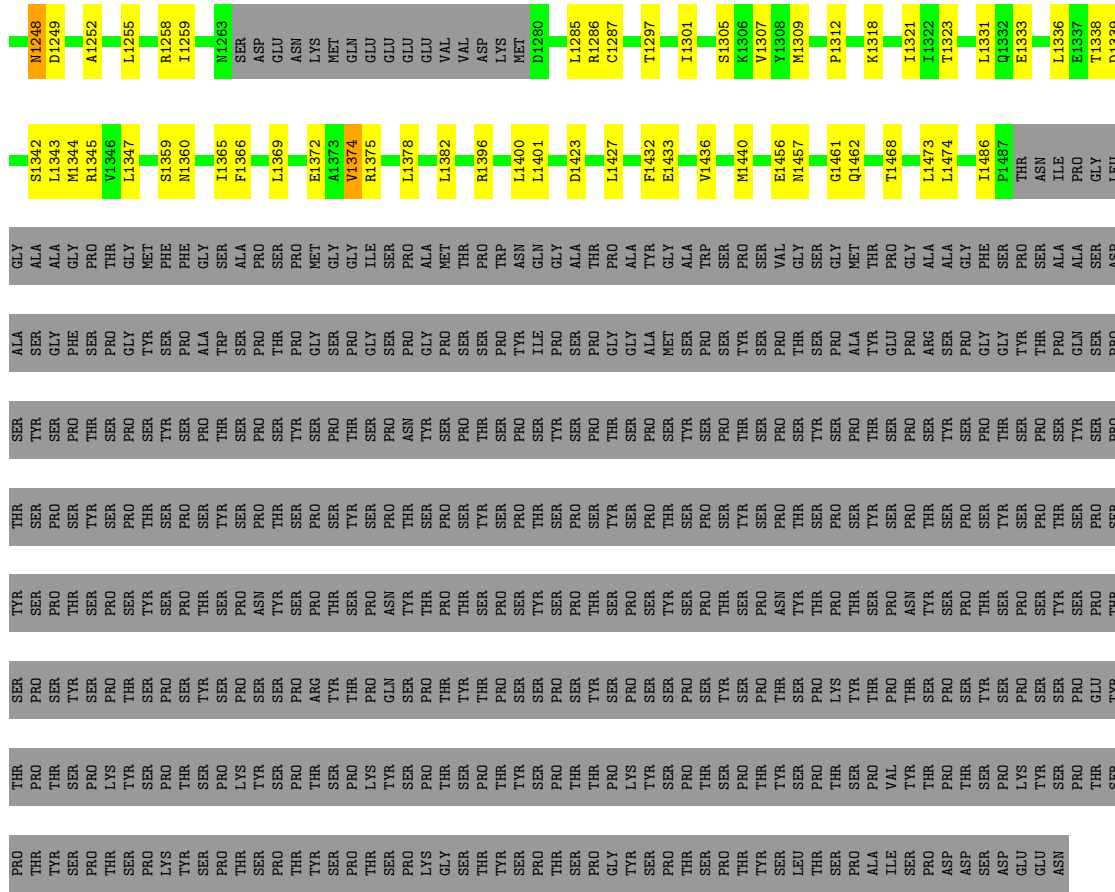
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
25	P	1	32	10	5	14	3	0

3 Residue-property plots

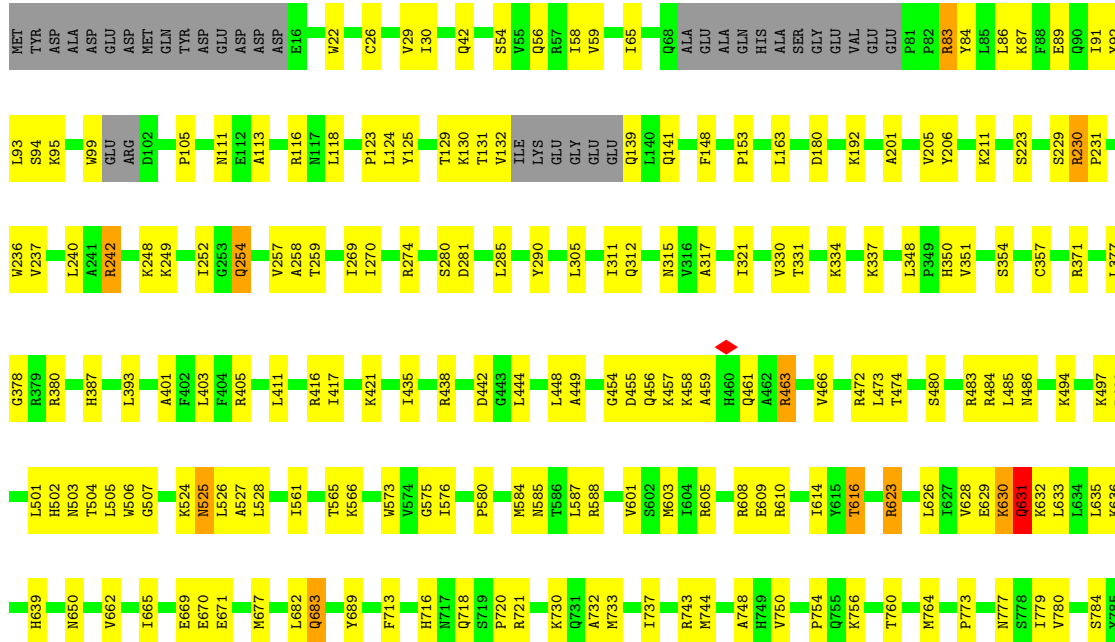
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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





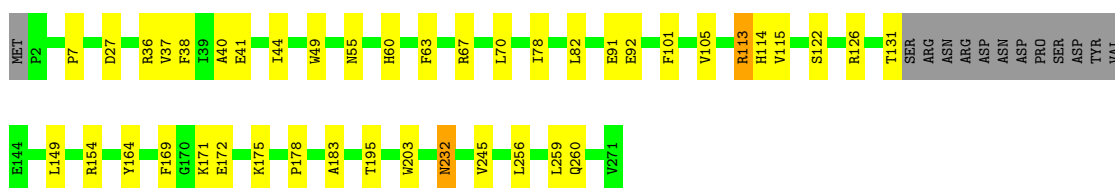
● Molecule 2: DNA-directed RNA polymerase subunit beta





- Molecule 3: DNA-directed RNA polymerase II subunit RPB3

Chain C: 80% 15% 5%



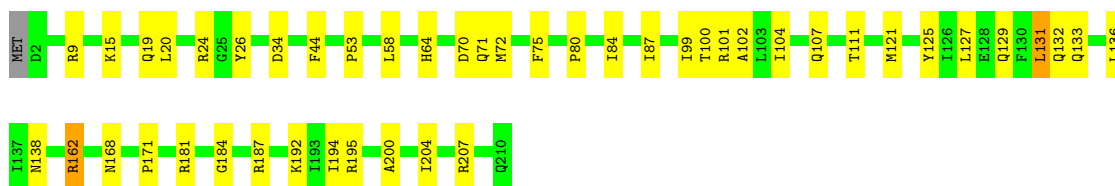
- Molecule 4: DNA-directed RNA polymerase II subunit RPB4

Chain D: 80% 11% 10%



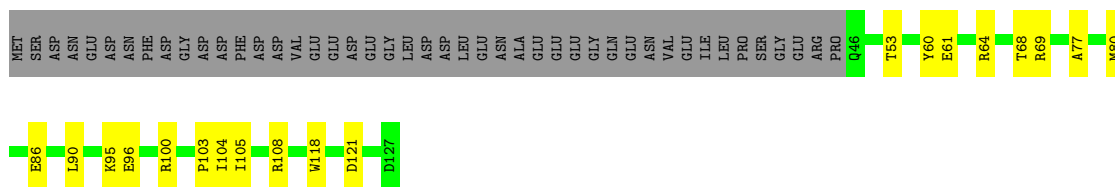
- Molecule 5: DNA-directed RNA polymerase II subunit E

Chain E: 78% 21%




- Molecule 6: DNA-directed RNA polymerase II subunit F

Chain F: 50% 15% 35%



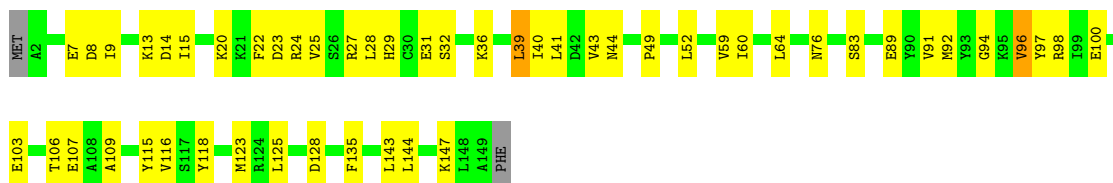
- Molecule 7: DNA-directed RNA polymerase II subunit RPB7

Chain G:  79% 19% ..



- Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3

Chain H:  65% 33% ..




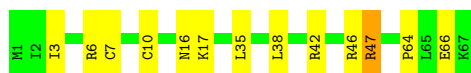
- Molecule 9: DNA-directed RNA polymerase II subunit RPB9

Chain I:  73% 19% 6% ..




- Molecule 10: DNA-directed RNA polymerases I, II, and III subunit RPABC5

Chain J:  81% 18% .



- Molecule 11: DNA-directed RNA polymerase II subunit RPB11-a

Chain K:  81% 16% ..

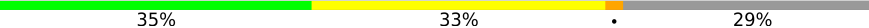


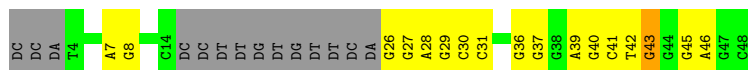
- Molecule 12: RPB12

Chain L:  59% 21% 21%

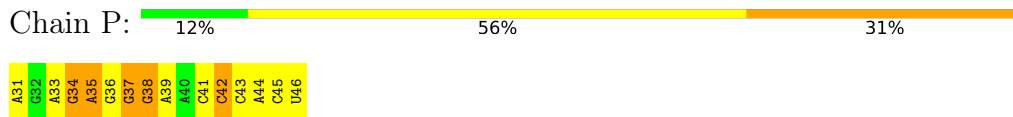


- Molecule 13: DNA (36-MER)

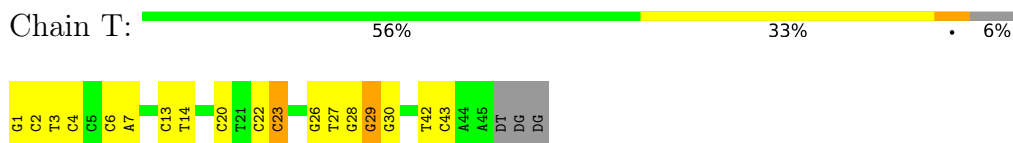
Chain N:  35% 33% 29%



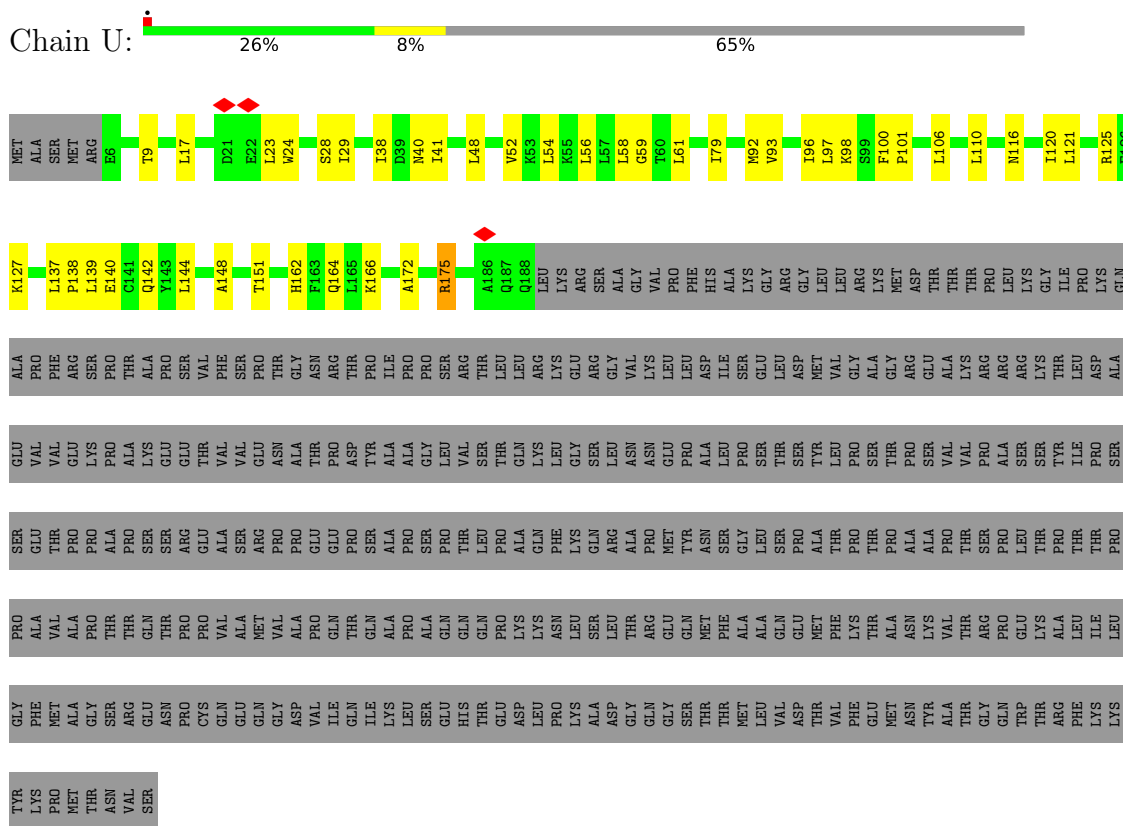
- Molecule 14: RNA (5'-D*(GTP))-R(P*AP*GP*AP*GP*AP*GP*GP*GP*AP*AP*CP*CP*C P*AP*CP*U)-3')



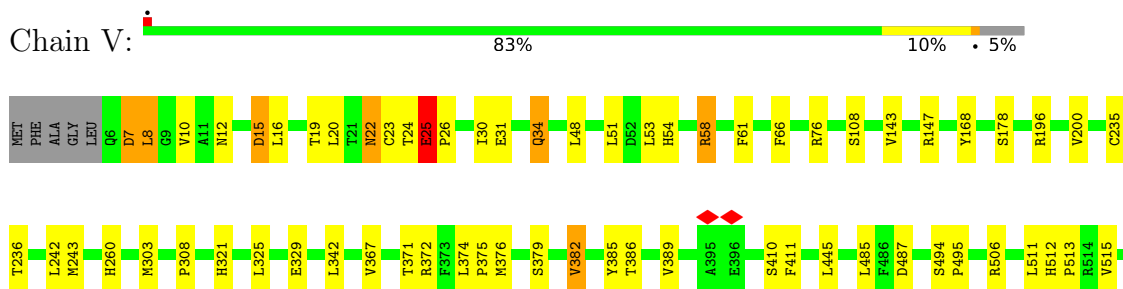
- Molecule 15: DNA (45-MER)



- Molecule 16: Negative elongation factor A

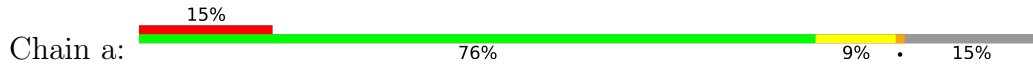


- Molecule 17: Negative elongation factor B



GLU
ASP
ARG
GLU
ASN
K5
I6
THR
ALA
THR
GLY
VAL
LEU
LEU
LEU
SER
ILE
ASP
GLY
GLU
ASP
GLY
ILE
VAL
ARG
MET
ASP
LEU
LEU
ASP
GLU
GLN
LEU
LEU
ILE
LEU
LEU
ASN
LEU
LEU
ARG
PHE
LEU
GLY
LEU
LEU
LEU
ALA

• Molecule 22: mRNA-capping enzyme



MET
ALA
HIS
ASN
K5
I6
R9
W10
L11
M12
S37
Q38
V39
A40
E41
E42
M43
R44
K55
S56
L57
K58
V59
K60
M61
G62
L63
E80
C97
F113
GLU
ARG
ASN
PRO
P119
K144
M145
I164
L188
W192
C193
F194
E198
ASP
GLU
ASP
GLU
ASP

GLU
ASP
GLY
LYS
LYS
GLU
SER
GLU
PRO
GLY
SER
SER
ALA
SER
PHE
GLY
LYS
ARG
ARG
LYS
GLU
ARG
LEU
LEU
LYS
LEU
G229
A230
I231
F232
L233
E234
G235
V236
T237
V238
K239
L250
H258
S275
M276
D277
K278
Q279
N280
I281
K282
L283
L284
D285
L286
K287
P288
D305
G306
T307
N308

E509
E326
F327
P328
F329
R330
K331
D332
L333
R334
M335
H336
L337
S338
V351
N352
G353
Q354
A355
R358
Y362
N368
S369
Q370
P371
D374
G375
D376
F377
N378
L381
Q382
R386
E387
I388
I389
S390
P391
R392
H393
E394
K395
M396
K397
T398
G399
L400
I401
D402
K403
T404
Q405

F416
C419
R422
E426
GLY
ASN
PHE
ALA
LYS
GLU
VAL
SER
H435
D454
P461
P462
S463
L464
N465
S466
V467
D468
F469
R470
R475
E479
G480
L481
L482
P483
V503
Y510
L514
L515
R528
Q529
R530
F535
P536
L549
S550
N551
P552
V553
THR
LYS

GLU
MET
LEU
PHE
GLU
PHE
ILE
ASP
ARG
CYS
THR
ALA
ALA
SER
GLN
GLY
LYS
ARG
LYS
HIS
HIS
LEU
LEU
ASP
PRO
ASP
THR
GLU
LEU
MET
PRO
PRO
PRO
PRO
LYS
ARG
PRO
ARG
LEU
THR

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	69000	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	2.963	Depositor
Minimum map value	-1.420	Depositor
Average map value	0.008	Depositor
Map value standard deviation	0.077	Depositor
Recommended contour level	0.22	Depositor
Map size (Å)	426.88, 426.88, 426.88	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.334, 1.334, 1.334	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: ZN, GTP, MG

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	A	0.25	0/11509	0.51	1/15542 (0.0%)
2	B	0.25	0/9226	0.51	1/12451 (0.0%)
3	C	0.24	0/2115	0.48	0/2873
4	D	0.24	0/1011	0.45	0/1364
5	E	0.24	0/1752	0.50	0/2366
6	F	0.23	0/668	0.50	0/901
7	G	0.25	0/1336	0.46	0/1820
8	H	0.25	0/1207	0.52	0/1628
9	I	0.24	0/973	0.48	0/1316
10	J	0.24	0/542	0.46	0/730
11	K	0.25	0/939	0.46	0/1271
12	L	0.24	0/395	0.58	0/524
13	N	0.57	1/804 (0.1%)	0.91	0/1240
14	P	0.25	0/389	0.85	0/605
15	T	0.56	0/1015	1.06	2/1562 (0.1%)
16	U	0.23	0/1434	0.47	0/1948
17	V	0.25	0/4496	0.46	0/6074
18	W	0.26	0/3891	0.48	0/5307
19	X	0.27	0/295	0.53	0/388
20	Y	0.23	0/927	0.48	0/1250
21	Z	0.24	0/2928	0.48	0/3940
22	a	0.28	0/4213	0.57	4/5687 (0.1%)
All	All	0.27	1/52065 (0.0%)	0.53	8/70787 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	N	43	DG	N9-C4	-5.88	1.33	1.38

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
22	a	535	PHE	CB-CA-C	7.84	126.08	110.40
1	A	415	GLY	C-N-CA	6.13	137.04	121.70
2	B	631	GLN	C-N-CA	-6.04	106.61	121.70
15	T	23	DC	O5 ² -P-OP1	-5.81	100.47	105.70
22	a	284	LEU	CA-CB-CG	5.70	128.40	115.30

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	A	11299	0	11416	272	0
2	B	9046	0	9078	206	0
3	C	2072	0	2016	35	0
4	D	997	0	953	11	0
5	E	1721	0	1737	31	0
6	F	658	0	684	13	0
7	G	1305	0	1267	22	0
8	H	1186	0	1147	40	0
9	I	950	0	880	18	0
10	J	533	0	557	9	0
11	K	920	0	942	15	0
12	L	389	0	395	10	0
13	N	714	0	379	22	0
14	P	347	0	175	10	0
15	T	910	0	507	21	0
16	U	1410	0	1455	36	0
17	V	4411	0	4503	67	0
18	W	3823	0	3520	89	0
19	X	293	0	340	17	0
20	Y	911	0	905	12	0
21	Z	2880	0	2925	38	0
22	a	4096	0	4076	0	0
23	A	1	0	0	0	0
24	A	2	0	0	0	0
24	B	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
24	C	1	0	0	0	0
24	I	2	0	0	0	0
24	L	1	0	0	0	0
24	Y	1	0	0	0	0
25	P	32	0	11	0	0
All	All	50912	0	49868	819	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 10.

The worst 5 of 819 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)
18:W:404:ALA:HB1	18:W:407:LEU:HB3	1.30	1.06
17:V:54:HIS:HA	18:W:129:PRO:HG2	1.40	1.02
2:B:630:LYS:C	2:B:632:LYS:H	1.64	1.00
13:N:43:DG:N2	15:T:6:DC:N3	2.11	0.96
1:A:1115:LYS:HE3	1:A:1339:ASP:HA	1.47	0.96

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	1418/1970 (72%)	1308 (92%)	106 (8%)	4 (0%)	41 75
2	B	1123/1174 (96%)	1054 (94%)	68 (6%)	1 (0%)	51 84
3	C	254/271 (94%)	248 (98%)	6 (2%)	0	100 100
4	D	126/142 (89%)	121 (96%)	5 (4%)	0	100 100
5	E	207/210 (99%)	199 (96%)	8 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	F	80/127 (63%)	79 (99%)	1 (1%)	0	100	100
7	G	169/172 (98%)	163 (96%)	6 (4%)	0	100	100
8	H	146/150 (97%)	138 (94%)	8 (6%)	0	100	100
9	I	115/125 (92%)	108 (94%)	7 (6%)	0	100	100
10	J	65/67 (97%)	64 (98%)	1 (2%)	0	100	100
11	K	113/117 (97%)	110 (97%)	3 (3%)	0	100	100
12	L	44/58 (76%)	42 (96%)	2 (4%)	0	100	100
16	U	181/528 (34%)	178 (98%)	3 (2%)	0	100	100
17	V	548/580 (94%)	529 (96%)	18 (3%)	1 (0%)	47	79
18	W	530/584 (91%)	462 (87%)	62 (12%)	6 (1%)	14	51
19	X	35/380 (9%)	35 (100%)	0	0	100	100
20	Y	114/121 (94%)	113 (99%)	1 (1%)	0	100	100
21	Z	348/1087 (32%)	335 (96%)	13 (4%)	0	100	100
22	a	503/597 (84%)	457 (91%)	42 (8%)	4 (1%)	19	57
All	All	6119/8460 (72%)	5743 (94%)	360 (6%)	16 (0%)	44	75

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	910	LYS
1	A	1205	ALA
17	V	25	GLU
18	W	400	GLU
18	W	401	ASN

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	A	1255/1749 (72%)	1193 (95%)	62 (5%)	25	54
2	B	989/1027 (96%)	956 (97%)	33 (3%)	38	63

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	C	235/248 (95%)	232 (99%)	3 (1%)	69	82
4	D	104/126 (82%)	104 (100%)	0	100	100
5	E	191/192 (100%)	186 (97%)	5 (3%)	46	68
6	F	71/111 (64%)	70 (99%)	1 (1%)	67	81
7	G	138/153 (90%)	130 (94%)	8 (6%)	20	50
8	H	129/131 (98%)	124 (96%)	5 (4%)	32	59
9	I	105/112 (94%)	101 (96%)	4 (4%)	33	59
10	J	56/56 (100%)	54 (96%)	2 (4%)	35	61
11	K	104/106 (98%)	101 (97%)	3 (3%)	42	65
12	L	43/55 (78%)	43 (100%)	0	100	100
16	U	158/451 (35%)	156 (99%)	2 (1%)	69	82
17	V	493/515 (96%)	483 (98%)	10 (2%)	55	74
18	W	359/511 (70%)	347 (97%)	12 (3%)	38	63
19	X	33/331 (10%)	29 (88%)	4 (12%)	5	24
20	Y	102/105 (97%)	102 (100%)	0	100	100
21	Z	319/940 (34%)	318 (100%)	1 (0%)	92	95
22	a	456/534 (85%)	405 (89%)	51 (11%)	6	27
All	All	5340/7453 (72%)	5134 (96%)	206 (4%)	36	59

5 of 206 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
8	H	96	VAL
18	W	264	GLU
22	a	510	TYR
9	I	119	CYS
17	V	15	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 73 such sidechains are listed below:

Mol	Chain	Res	Type
17	V	22	ASN
22	a	465	ASN
17	V	119	HIS
20	Y	12	HIS

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Mol	Chain	Res	Type
1	A	1457	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
14	P	15/16 (93%)	10 (66%)	0

5 of 10 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
14	P	33	A
14	P	34	G
14	P	35	A
14	P	36	G
14	P	37	G

There are no RNA pucker outliers to report.

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](#)

Of 10 ligands modelled in this entry, 9 are monoatomic - leaving 1 for Mogul analysis.

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
25	GTP	P	101	14	26,34,34	1.12	2 (7%)	32,54,54	1.85	7 (21%)

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
25	GTP	P	101	14	-	5/18/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	P	101	GTP	C5-C6	-3.98	1.39	1.47
25	P	101	GTP	C2-N3	2.15	1.38	1.33

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
25	P	101	GTP	PA-O3A-PB	-5.42	114.23	132.83
25	P	101	GTP	PB-O3B-PG	-4.87	116.11	132.83
25	P	101	GTP	C5-C6-N1	3.16	119.53	113.95
25	P	101	GTP	C8-N7-C5	3.04	108.78	102.99
25	P	101	GTP	C2-N1-C6	-2.79	119.97	125.10

There are no chirality outliers.

All (5) torsion outliers are listed below:

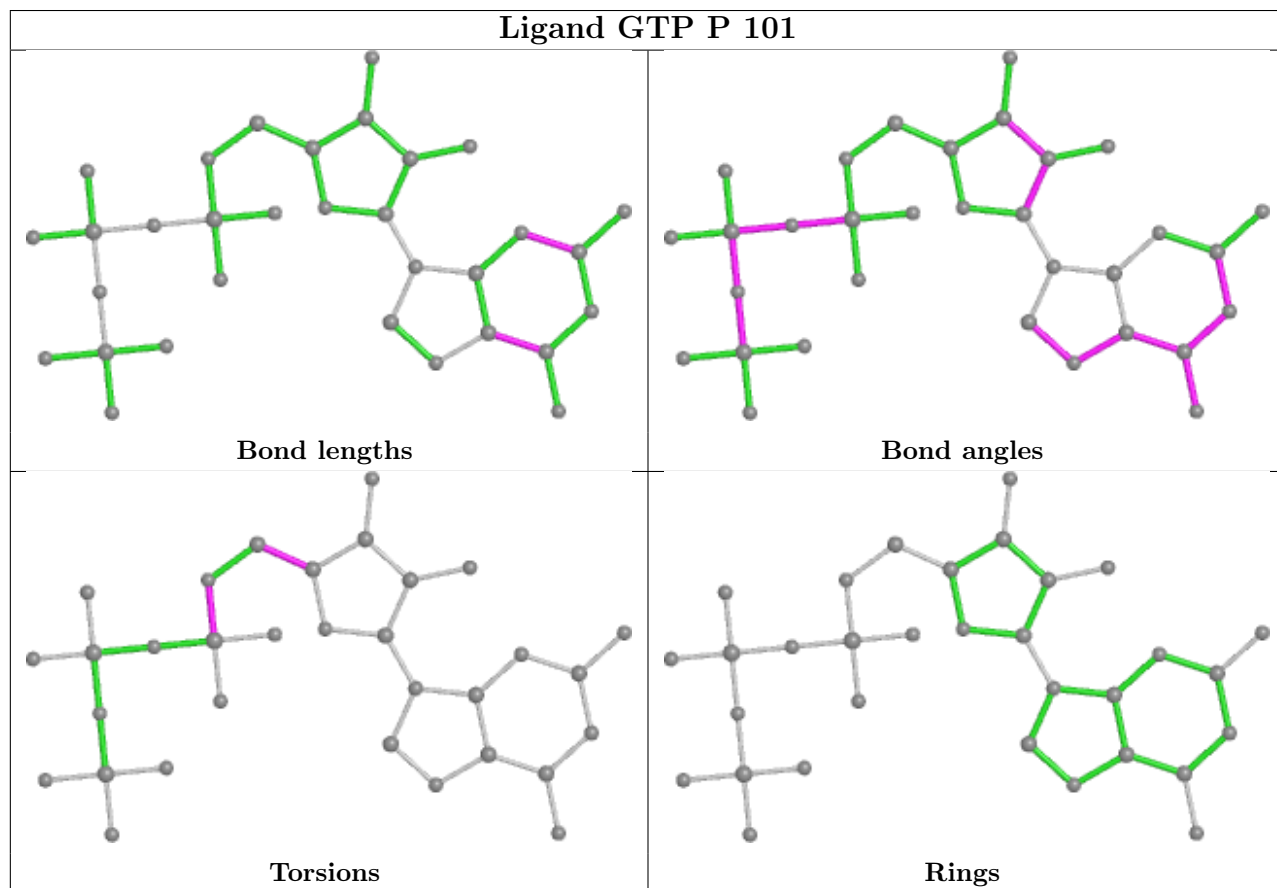
Mol	Chain	Res	Type	Atoms
25	P	101	GTP	C5'-O5'-PA-O1A
25	P	101	GTP	C5'-O5'-PA-O2A
25	P	101	GTP	O4'-C4'-C5'-O5'
25	P	101	GTP	C3'-C4'-C5'-O5'
25	P	101	GTP	C5'-O5'-PA-O3A

There are no ring outliers.

No monomer is involved in short contacts.

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.

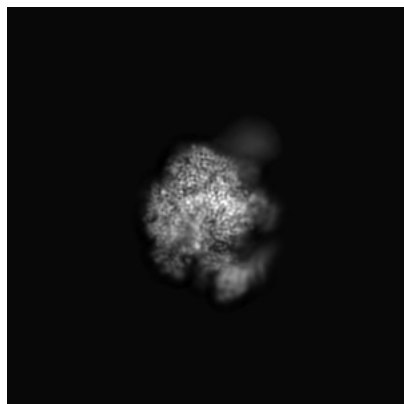
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-37352. These allow visual inspection of the internal detail of the map and identification of artifacts.

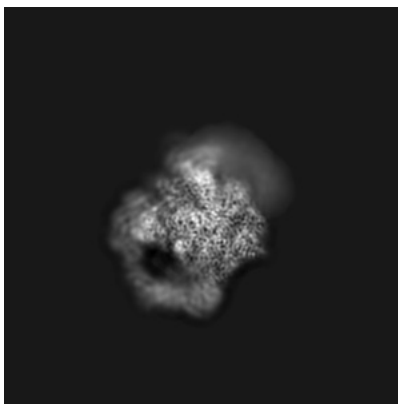
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

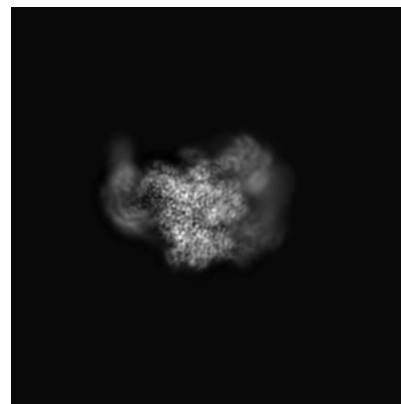
6.1.1 Primary map



X

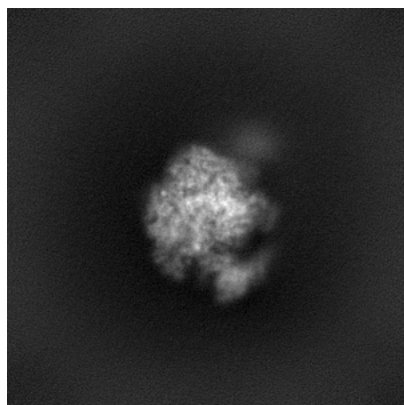


Y

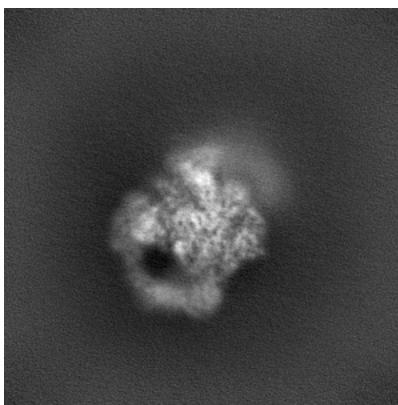


Z

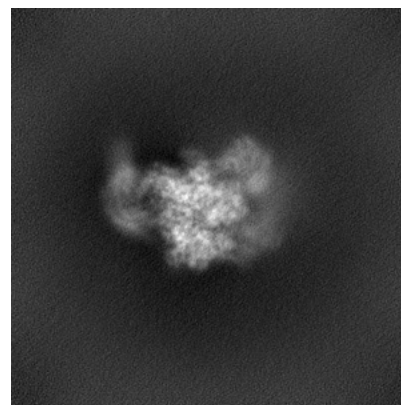
6.1.2 Raw map



X



Y

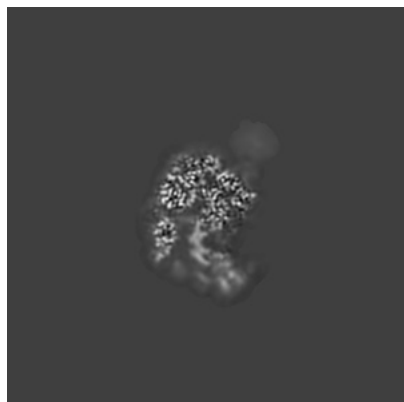


Z

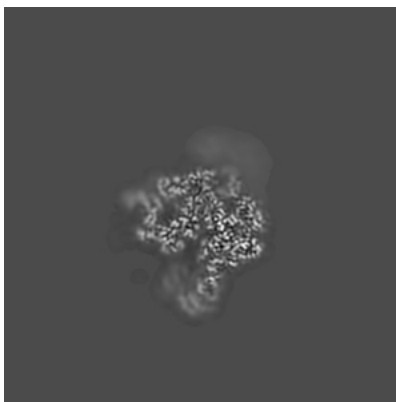
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

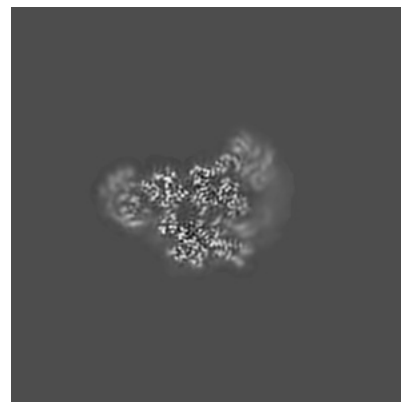
6.2.1 Primary map



X Index: 160

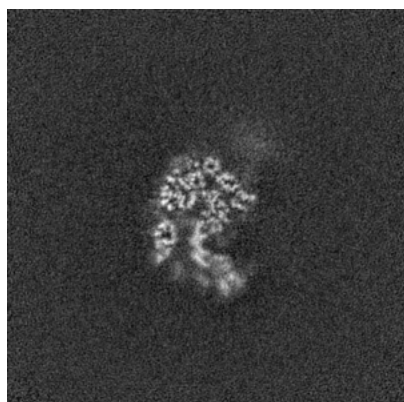


Y Index: 160

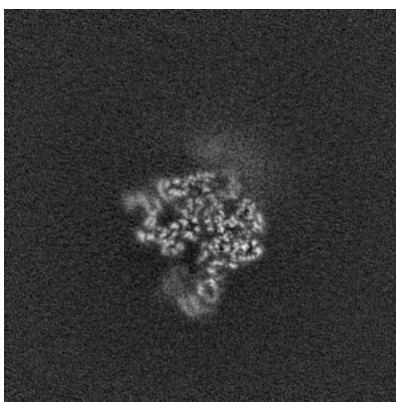


Z Index: 160

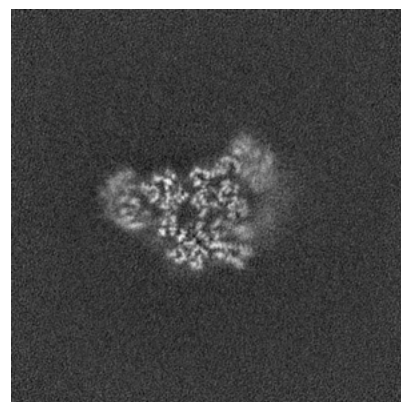
6.2.2 Raw map



X Index: 160



Y Index: 160

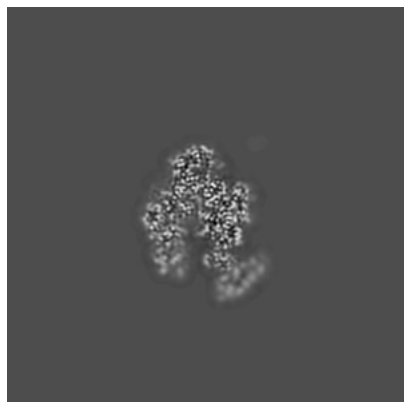


Z Index: 160

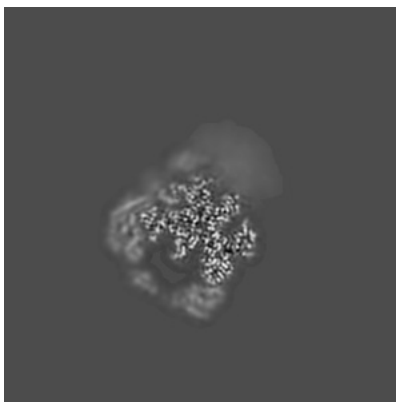
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

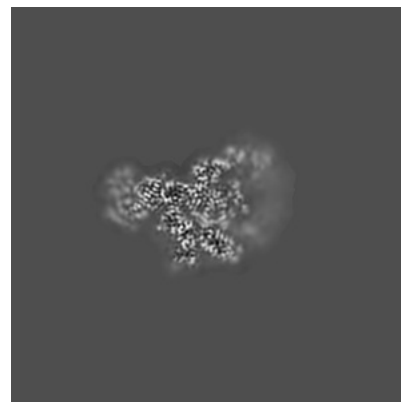
6.3.1 Primary map



X Index: 150

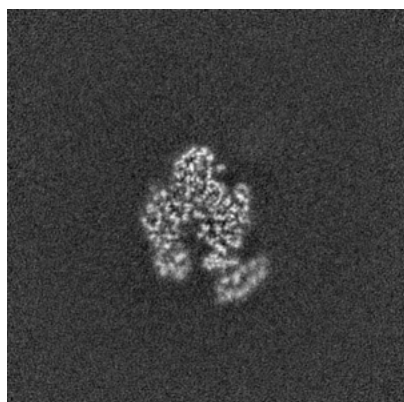


Y Index: 173

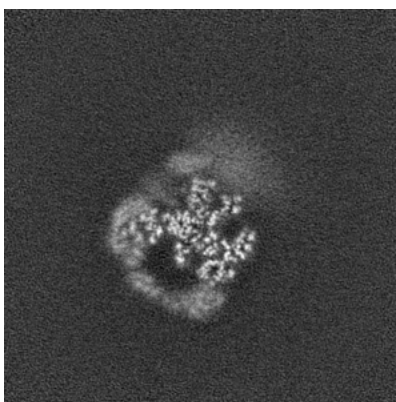


Z Index: 166

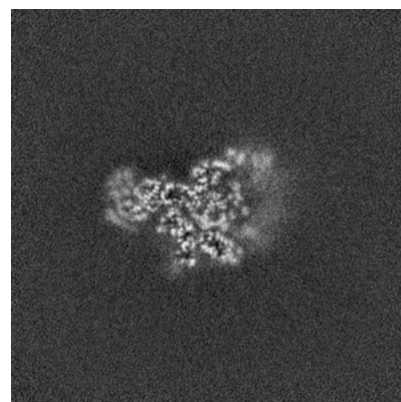
6.3.2 Raw map



X Index: 148



Y Index: 176

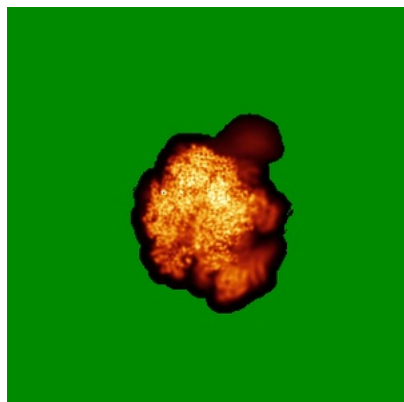


Z Index: 166

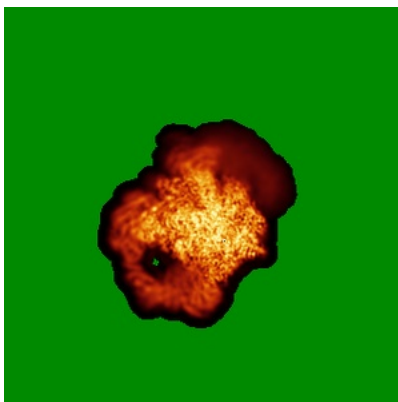
The images above show the largest variance slices of the map in three orthogonal directions.

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

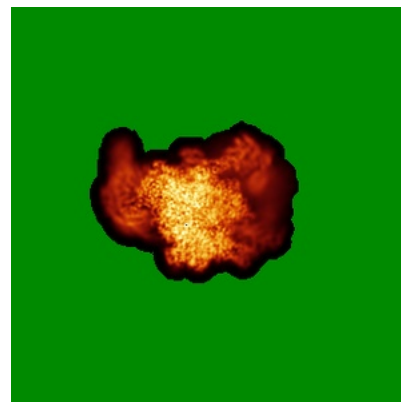
6.4.1 Primary map



X

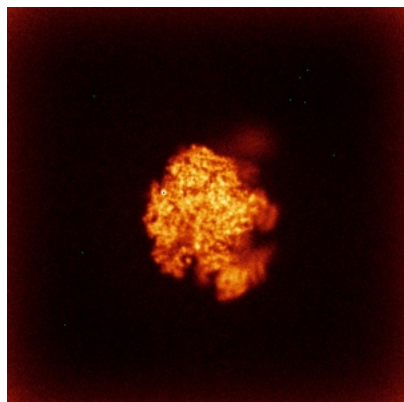


Y

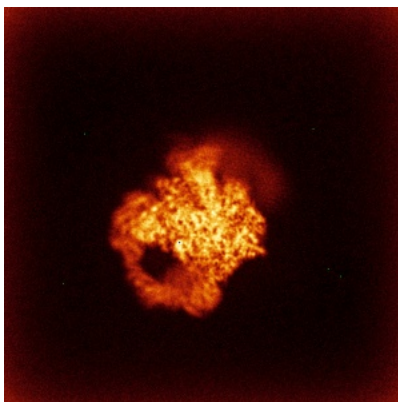


Z

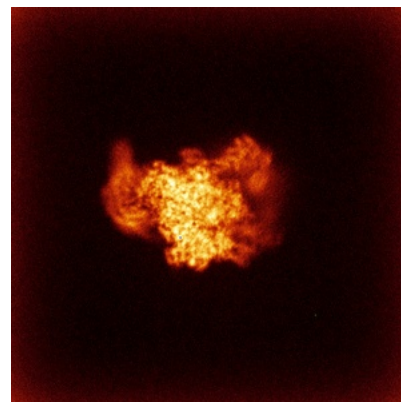
6.4.2 Raw map



X



Y

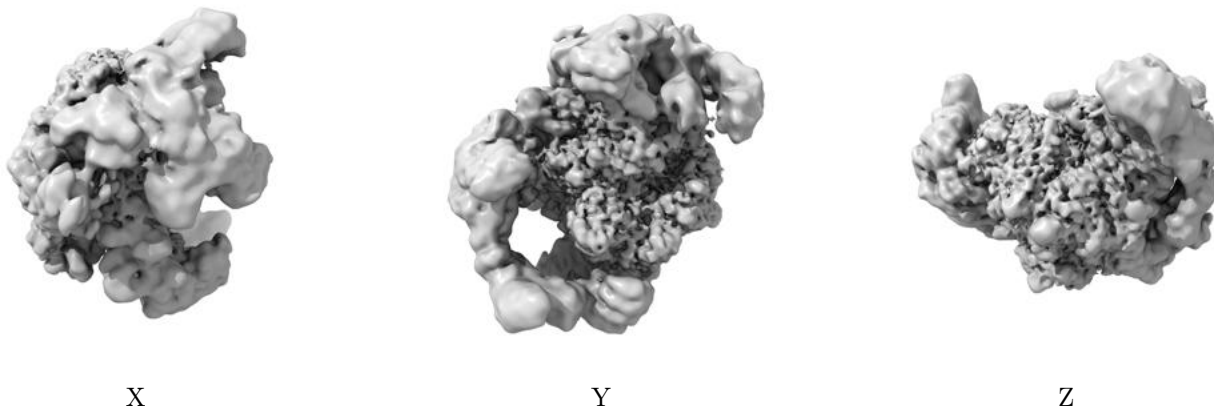


Z

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

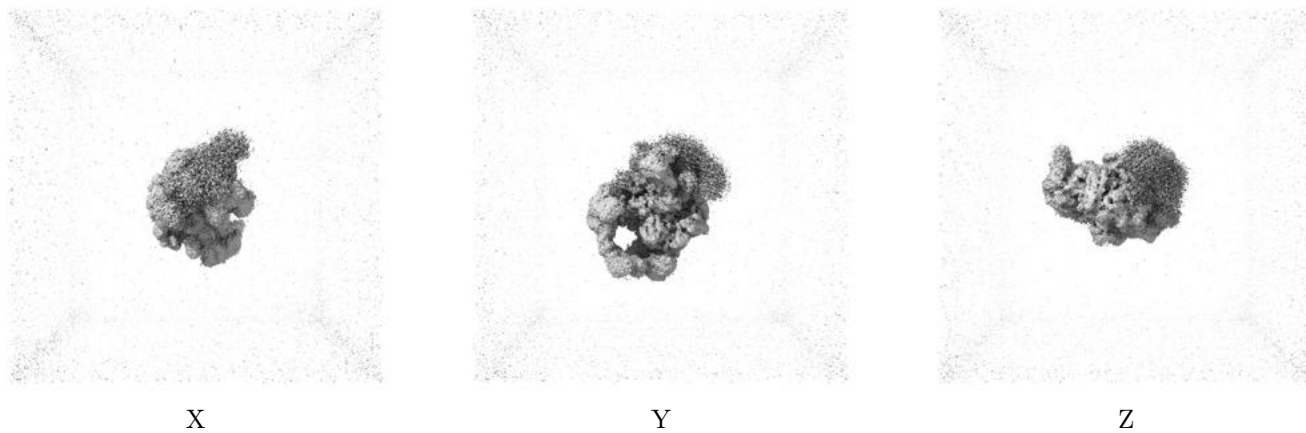
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.22. 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.

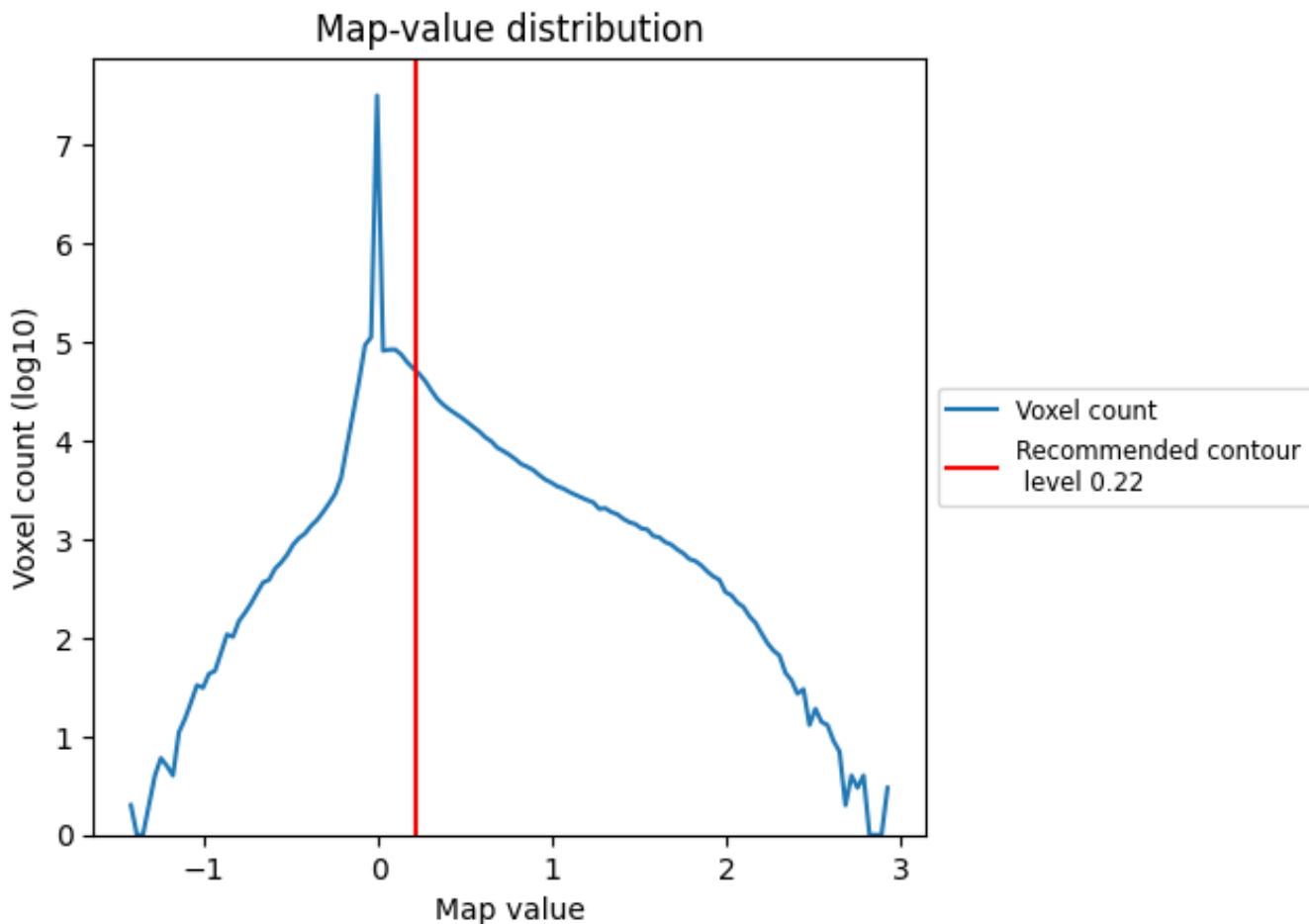
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

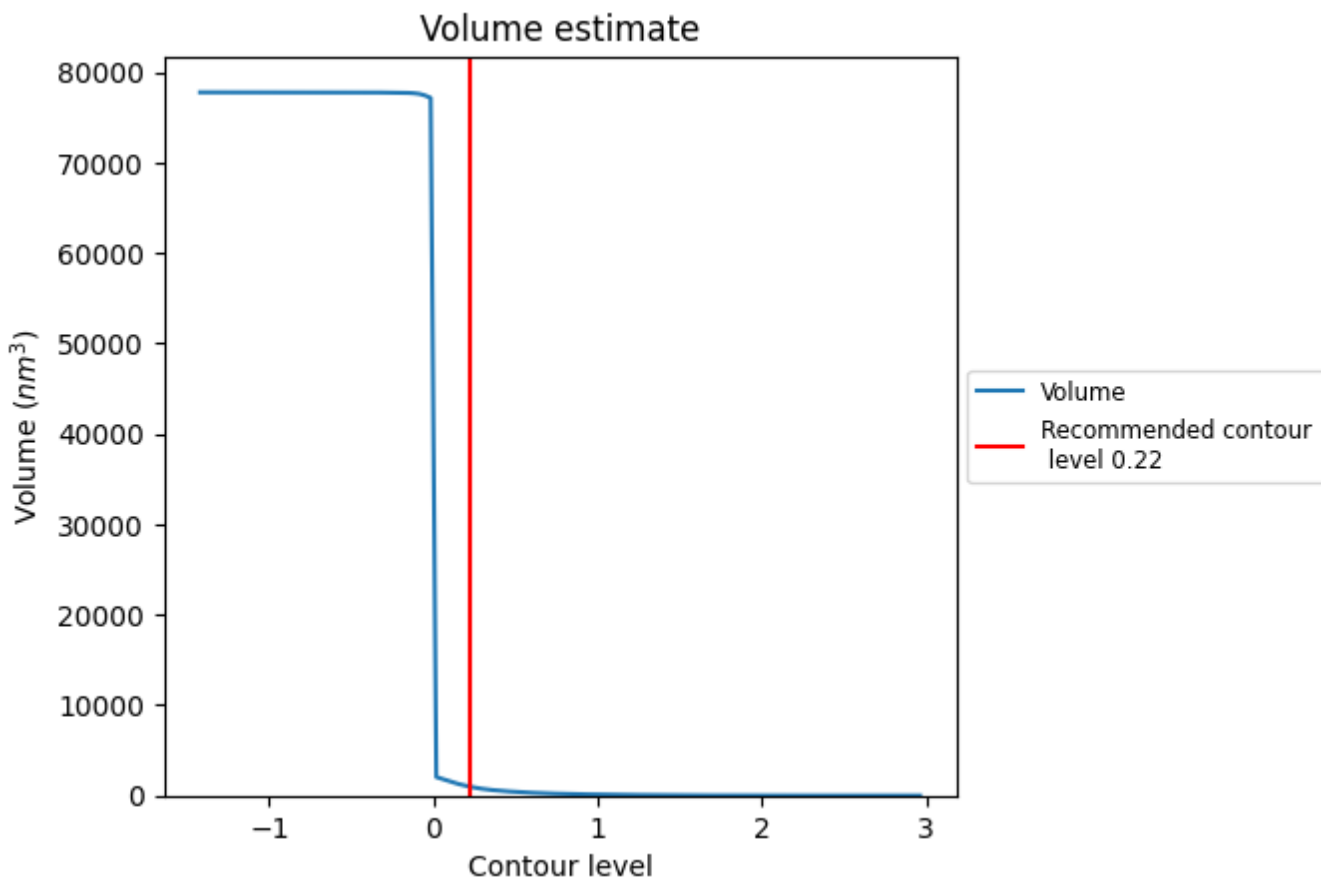
This section contains the results of statistical analysis of the map.

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.

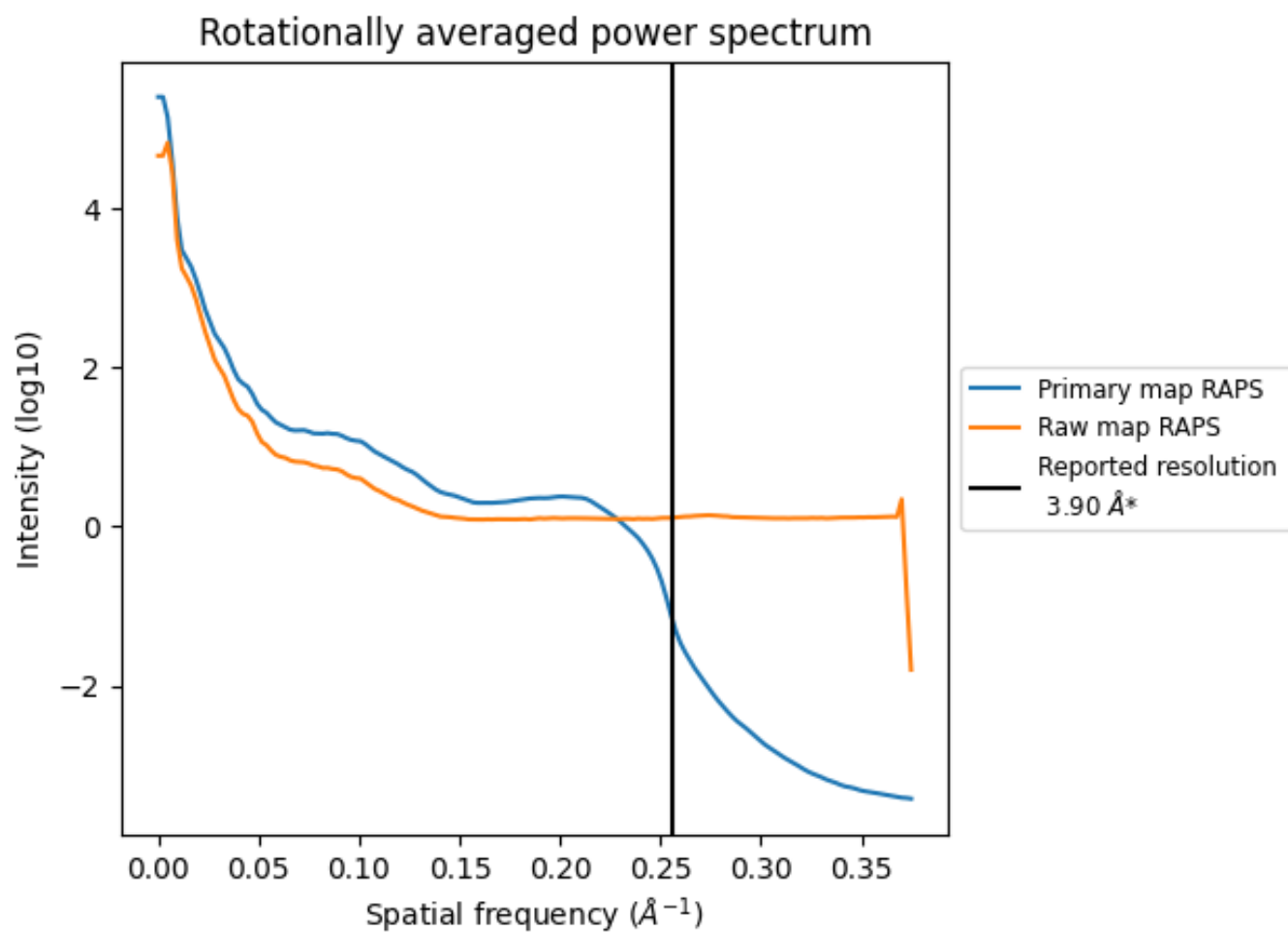
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 991 nm³; this corresponds to an approximate mass of 896 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](#)

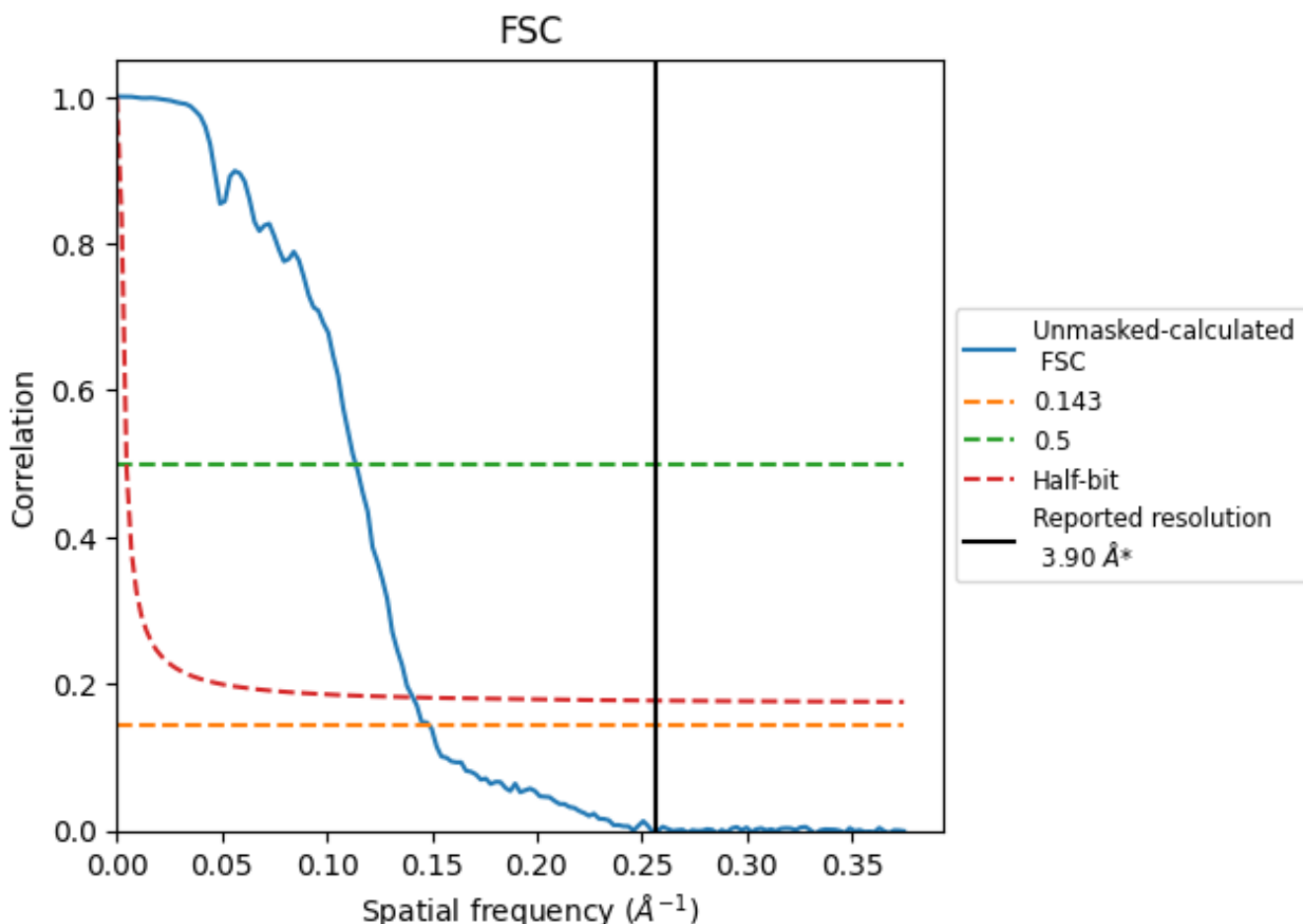


*Reported resolution corresponds to spatial frequency of 0.256 Å⁻¹

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 0.256 Å⁻¹

8.2 Resolution estimates [i](#)

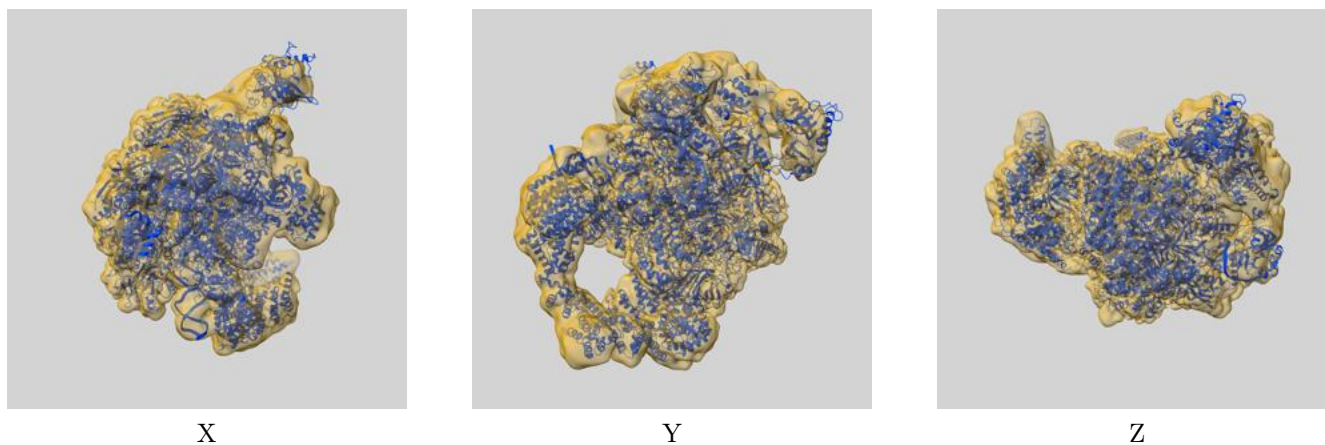
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.72	8.80	7.10

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 6.72 differs from the reported value 3.9 by more than 10 %

9 Map-model fit [i](#)

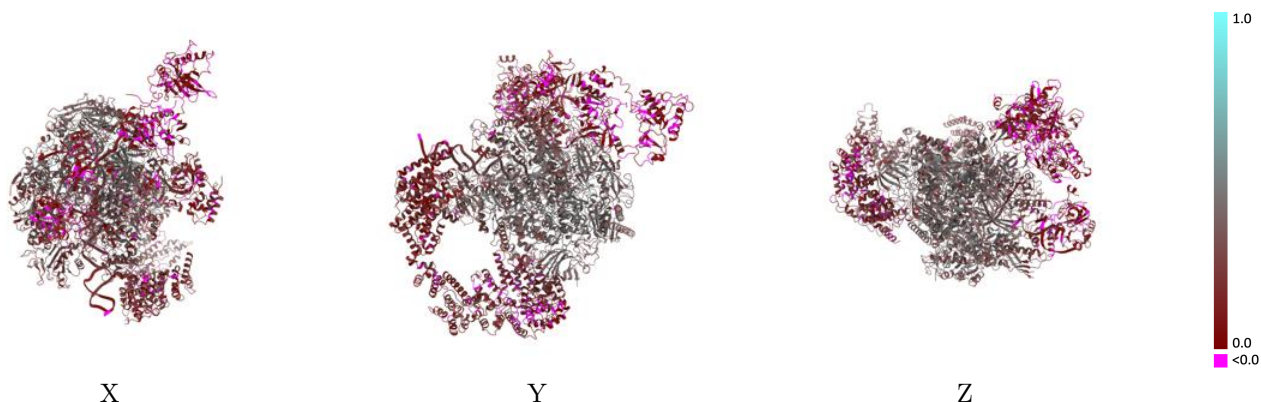
This section contains information regarding the fit between EMDB map EMD-37352 and PDB model 8W8E. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



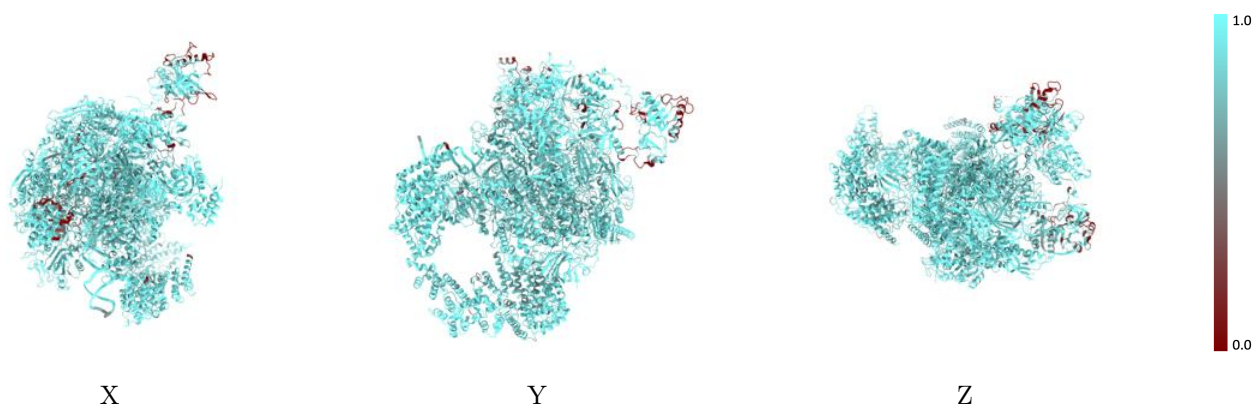
The images above show the 3D surface view of the map at the recommended contour level 0.22 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



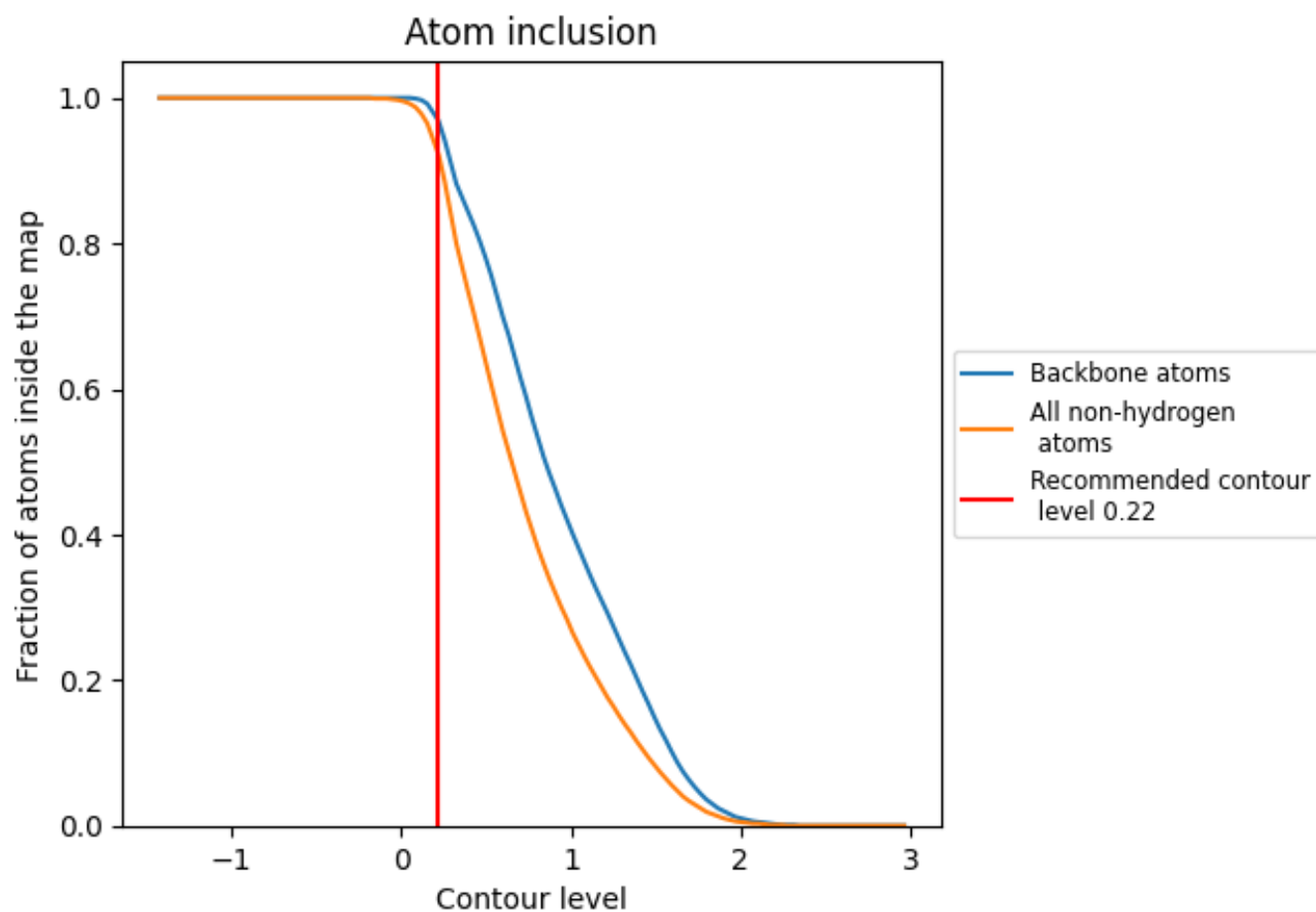
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.22).















































9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.22) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9240	 0.2650
A	 0.9410	 0.3600
B	 0.9550	 0.3700
C	 0.9640	 0.3770
D	 0.9690	 0.1650
E	 0.9530	 0.3450
F	 0.9300	 0.3680
G	 0.9640	 0.2120
H	 0.9580	 0.3910
I	 0.9650	 0.3180
J	 0.9460	 0.3840
K	 0.9560	 0.3890
L	 0.9810	 0.3530
N	 0.9230	 0.2000
P	 0.9840	 0.2490
T	 0.9570	 0.2330
U	 0.9420	 0.1020
V	 0.9480	 0.1600
W	 0.9310	 0.1380
X	 0.9730	 0.1600
Y	 0.6420	 0.0910
Z	 0.8380	 0.1200
a	 0.7870	 0.0560

