WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Apr 17, 2024 – 03:03 pm BST

PDB ID	:	5NO4
EMDB ID	:	EMD-3663
Title	:	RsgA-GDPNP bound to the 30S ribosomal subunit (RsgA assembly intermediate with uS3)
Authors	:	Lopez-Alonso, J.P.; Kaminishi, T.; Kikuchi, T.; Hirata, Y.; Iturrioz, I.; Dhimole, N.; Schedlbauer, A.; Hase, Y.; Goto, S.; Kurita, D.; Muto, A.; Zhou, S.; Naoe, C.; Mills, D.J.; Gil-Carton, D.; Takemoto, C.; Himeno, H.; Fucini, P.; Connell, S.R.
Deposited on	:	2017-04-10
Resolution	:	5.16 Å(reported)

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

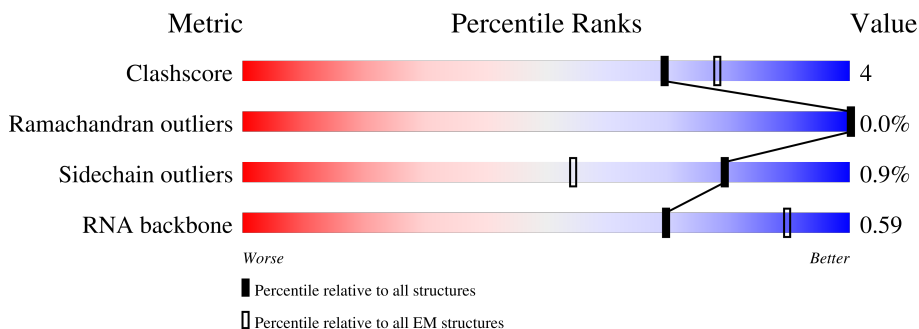|		
EMDB validation analysis	:	0.0.1.dev92
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, 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 5.16 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.
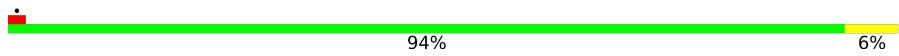
Metric	Percentile Ranks	Value
Clashscore		4
Ramachandran outliers		0.0%
Sidechain outliers		0.9%
RNA backbone		0.59

Worse   *Better*

▌ Percentile relative to all structures

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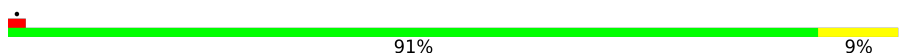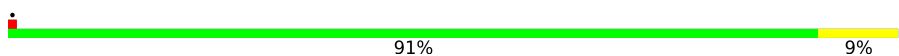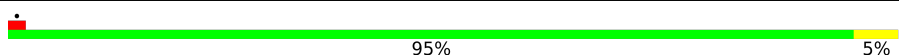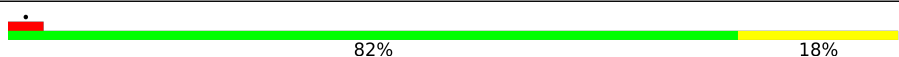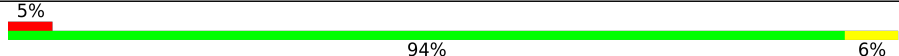
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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 <=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	1534	74% 24% ·
2	C	206	81% / 89% 11%
3	D	205	15% / 84% 16%
4	E	155	· / 84% 16%
5	F	106	7% / 97% ·
6	G	130	78% / 74% 8% 18%

Continued on next page...

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Mol	Chain	Length	Quality of chain
7	H	129	94% · · · · · · · 6%
8	I	127	17% · · · 83% · · · 15% ·
9	J	99	31% · · · 84% · · · 16%
10	K	117	11% · · · 85% · · · 15%
11	L	14	79% · · · 71% · · · 29%
12	M	114	5% · · · 94% · · · 6%
13	N	100	27% · · · 85% · · · 15%
14	O	88	· · · 91% · · · 9%
15	P	82	5% · · · 84% · · · 16%
16	Q	80	· · · 91% · · · 9%
17	R	55	· · · 95% · · · 5%
18	S	79	· · · 82% · · · 18%
19	T	86	5% · · · 94% · · · 6%
20	Z	313	7% · · · 84% · · · 14% ·

2   Entry composition ⓘ

There are 23 unique types of molecules in this entry. The entry contains 50850 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 RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1534	Total	C	N	O	P	0	0
			32930	14694	6041	10661	1534		

- Molecule 2 is a protein called 30S ribosomal protein S3.

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

- Molecule 3 is a protein called 30S ribosomal protein S4.

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

- Molecule 4 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	155	Total	C	N	O	S	0	0
			1144	711	216	211	6		

- Molecule 5 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	106	Total	C	N	O	S	0	0
			862	545	156	154	7		

- Molecule 6 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	107	Total	C	N	O	S	0	0
			841	525	160	153	3		

- Molecule 7 is a protein called 30S ribosomal protein S8.

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

- Molecule 8 is a protein called 30S ribosomal protein S9.

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

- Molecule 9 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	99	Total	C	N	O	S	0	0
			796	498	152	145	1		

- Molecule 10 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	117	Total	C	N	O	S	0	0
			877	540	174	160	3		

- Molecule 11 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms				AltConf	Trace
11	L	14	Total	C	N	O	0	0
			114	70	27	17		

- Molecule 12 is a protein called 30S ribosomal protein S13.

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

- Molecule 13 is a protein called 30S ribosomal protein S14.

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

- Molecule 14 is a protein called 30S ribosomal protein S15.

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

- Molecule 15 is a protein called 30S ribosomal protein S16.

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

- Molecule 16 is a protein called 30S ribosomal protein S17.

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

- Molecule 17 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	R	55	Total 456	C 288	N 86	O 82	0	0

- Molecule 18 is a protein called 30S ribosomal protein S19.

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

- Molecule 19 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	T	86	Total 670	C 414	N 138	O 115	S 3	0	0

- Molecule 20 is a protein called Small ribosomal subunit biogenesis GTPase RsgA.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	Z	313	Total 2448	C 1538	N 432	O 468	S 10	0	0

- Molecule 21 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
21	A	67	Total 67	Mg 67	0
21	E	1	Total 1	Mg 1	0
21	P	1	Total 1	Mg 1	0
21	T	1	Total 1	Mg 1	0
21	Z	1	Total 1	Mg 1	0

- Molecule 22 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
22	Z	1	Total 1	Zn 1	0

- Molecule 23 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: $C_{10}H_{17}N_6O_{13}P_3$).

Mol	Chain	Residues	Atoms					AltConf
23	Z	1	Total 32	C 10	N 6	O 13	P 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: 16S ribosomal RNA

G1432 A1437 G1438 A1441 A1446 U1451 C1452 G1453 G1454 G1455 U1463 G1482 G1491 A1492 A1493 G1494 G1497 U1498 A1499 A1503 G1504 G1505 C1510 G1511 U1512 A1513 G1516 G1517 A1518 A1519 G1525 G1529 G1530 C1533 A1534

• Molecule 2: 30S ribosomal protein S3

Chain C:

81%

89%

11%

G2 Q3 K4 V5 H6 P7 I10 R11 I14 V15 N19 S20 T21 W22 F23 A24 N25 T26 F29 A30 D31 N32 L33 D34 F37 K38 V39 R40 Q41 Y42 L43 T44 K45 E46 L47 A48 K49 A50 S51 V52 S53 R54 I55 V56 I57 E58 R59 P60 A61 K62 S63 I64 R65 V66 T67

I68 H69 T70 A71 R72 P73 G74 I75 V76 I77 G78 K79 K80 G81 E82 D83 V84 E85 K86 L87 R88 K89 V90 V91 A92 D93 I94 A95 G96 V97 P98 A99 Q100 I101 N102 I103 A104 E105 V106 R107 K108 P109 E110 L111 D112 A113 K114 L115 V116 A117 D118 S119 I120 T121 S122 Q123 L124 E125 R126 R127

V128 M129 F130 R131 R132 A133 M134 K135 R136 A137 V138 Q139 N140 A141 M142 R143 L144 G145 A146 K147 G148 I149 K150 V151 E152 V153 S154 G155 R156 L157 G158 G159 A160 A163 R164 T165 E166 W167 Y168 R169 E170 G171 R172 V173 P174 L175 L178 R179 A180 D181 I182 D183 Y184 N185 T186 S187 E188 A189

Y193 I196 G197 V198 K199 V200 W201 I202 F203 K204 G205 E206 I207

• Molecule 3: 30S ribosomal protein S4

Chain D:

15%

84%

16%

A2 R3 Y4 L5 G6 P7 K8 L11 R14 D18 L19 F20 L21 K22 S23 G24 V25 K31 I34 E35 Q36 A37 P38 G42 A43 Q54 L55 R56 E57 Y65 Y75 Y76 K77 N85 E88 L91 E95 G96 R97 L98 D99 N100 R104 F107 G108

A109 T110 R111 Q116 Y135 N140 S144 E147 K148 K151 K167 E179 P186 E187 R188 L191 S192 A193 D194 E197 H198 L199 E202 L203 K206

• Molecule 4: 30S ribosomal protein S5

Chain E:

84%

16%

E10 I16 L36 E55 V56 P57 N70 V74 A75 L76 H89 T90 G91 S92 R93 Q97 E101 I106 V120 L124 A125 K126 A127 Y128 G129 S130 T131 N132 V137 R138 A139 L144 P150 S160 V161 E162 E163 I164

• Molecule 5: 30S ribosomal protein S6

Chain F:

7%

97%

•

M1 E33 G34 K35 D41 E65 S87 P101 M102 V103 K104 A105 K106

• Molecule 6: 30S ribosomal protein S7

Chain G:

78%

74%   8%   18%

P2 R3 R4 R5 G8 Q9 R10 K11 I12 L13 P14 D15 P16 K17 F18 G19 S20 E21 L22 L23 A24 K25 F26 V27 N28 I29 L30 M31 V32 D33 G34 K35 K36 S37 T38 A39 E40 S41 I42 V43 Y44 S45 A46 L47 E48 T49 L50 A51 Q52 R53 S54 G55 K56 S57 E58 L59 E60 A61 F62

E63 V64 A65 L66 E67 N68 V69 R70 PRO THR VAL GLU VAL LYS SER ARG ARG VAL GLY GLY SER THR TYR GLN VAL PRO VAL GLU VAL ARG PRO V94 R95 R96 N97 A98 L99 A100 M101 R102 W103 I104 V105 E106 A107 A108 R109 K110 R111 G112 D113 K114 S115 M116 A117 L118 R119 L120 A121 N122

E123 L124 S125 D126 A127 A128 E129 N130 K131

• Molecule 7: 30S ribosomal protein S8

Chain H:

94%   6%

S2 M3 A23 M27 L59 R88 K89 D90 E91 L99 R114 A130

• Molecule 8: 30S ribosomal protein S9

Chain I:

17%

83%   15%

N4 Q5 Y6 R12 K13 R18 V19 F20 I21 K22 P23 G24 N25 G26 T43 E59 K60 L61 D62 L63 Y64 D91 A101 R106 D107 E112 R113 K114 K115 V116 G117 L118 R119 K120 A121 R122 R123 R124 P125 Q126 F127 S128 K129 R130

• Molecule 9: 30S ribosomal protein S10

Chain J:

31%

84%   16%

Q4 R5 I6 R9 L10 F13 D14 E24 I25 V26 K30 R31 T32 G33 A34 I40 R48 L52 I53 S54 P55 H56 V57 N58 K59 D60 A61 R62 D63 E66 I67 R72 L73 I76 P79 T80 E81 K82 D85 A86 L87 L90 D91 L92 A93 A94 G95

Q99 I100 S101 L102

• Molecule 10: 30S ribosomal protein S11

Chain K:

11%

85%   15%

R13 K14 Q15 V16 S17 H24 N29 T30 I31 L42 G51 R56 K57 S58 A73 V74 Y77 E83 K87 G88 R93 R98 N101 A102 A103 N109 V113 T114 P115 N119 R128 V129

• Molecule 11: 30S ribosomal protein S12

Chain L:

79%

71%   29%

A2 T3 V4 N5 Q6 L7 V8 R9 K10 P11 R12 A13 R14 K15

• Molecule 12: 30S ribosomal protein S13

Chain M:

5%

94%   6%

A2 P10 D11 H12 A18 G24 R29 E47 L48 S49 G67 R70 G84 R98 P115
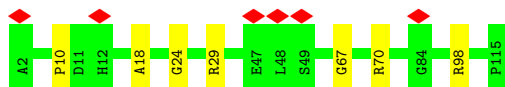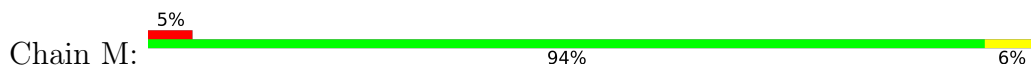
• Molecule 13: 30S ribosomal protein S14

Chain N:

27%

85%   15%

A2 M6 R9 D18 A22 K23 N35 A36 S37 D38 E39 D40 R41 W42 V45 L48 Q49 T50 L51 R63 C64 R65 Q66 T67 G68 R69 P70 H71 F77 G78 L79 S80 R81 R85 E86 M89 R90 G91 E92 I93 P94 G95 L96 K97 K98 A99 S100 W101
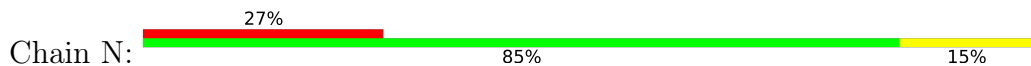
• Molecule 14: 30S ribosomal protein S15

Chain O:

91%   9%

S2 K10 E14 T33 A44 K47 R54 R63 R89
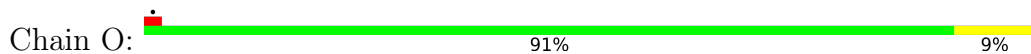
• Molecule 15: 30S ribosomal protein S16

Chain P:

5%

84%   16%

M1 R5 L6 A7 G10 R14 Q18 V19 V20 R28 R31 E34 R35 E45 K46 E47 W60 V61 G62 K76 A82
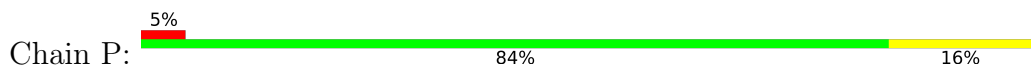
• Molecule 16: 30S ribosomal protein S17

Chain Q:

91%   9%

K4 S14 K19 V22 I25 H31 G35 T42 A82 V83
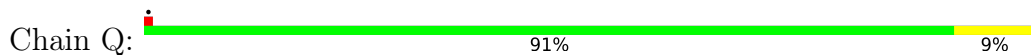
• Molecule 17: 30S ribosomal protein S18

Chain R:

95%   5%

E20 P41 R48 R53 L67 H74

• Molecule 18: 30S ribosomal protein S19

Chain S:

82%   18%

R3 I11 K18 V23 D27 K28 K29 P30 L31 R32 R36 R37 S38 A50 N53 G54 R55 Q56 H57 A75 R78 R81
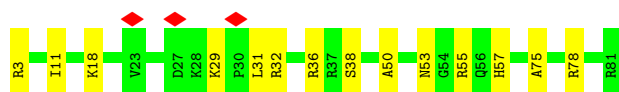
• Molecule 19: 30S ribosomal protein S20

5%

Chain T:

94%   6%

A2 K9 R10 Q13 R29 A41 G42 D43 R74 K85 L86 A87
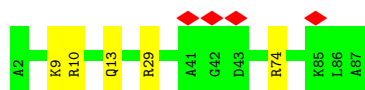
• Molecule 20: Small ribosomal subunit biogenesis GTPase RsgA

7%

Chain Z:

84%   14%

N34 G37 I45 S46 R47 M50 H51 A52 D53 S56 A57 D58 N65 I66 R67 R68 T69 I70 W81 R82 P83 A87 A88 E89 G90 V91 R109 P110 D111 D114 G115 V116 I123 D124 I132 R143 L159 I162 L165 Y180 I183 M189

V190 S191 E203 I209 Q215 K220 A226 L230 Q231 K232 E233 I234 L235 T236 I239 S240 D241 T249 A252 L255 P268 E272 W276 H277 L278 E279 C297 A311 R325 I332 R342 K343 N344 F345 S346
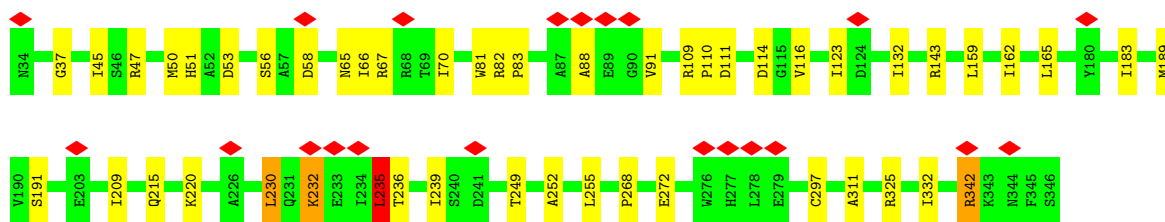
4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	61908	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 $(e^-/\text{Å}^2)$	2.3	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	101000	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.304	Depositor
Minimum map value	-0.102	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.016	Depositor
Recommended contour level	0.06	Depositor
Map size (Å)	355.84, 355.84, 355.84	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.39, 1.39, 1.39	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 2MG, 5MC, GNP, MG, UR3, ZN, MA6, PSU, G7M, 4OC

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	0.19	0/36593	0.79	10/57081 (0.0%)
2	C	0.25	0/1652	0.45	0/2225
3	D	0.24	0/1665	0.42	0/2227
4	E	0.26	0/1157	0.50	0/1557
5	F	0.24	0/881	0.47	0/1189
6	G	0.25	0/848	0.47	0/1132
7	H	0.26	0/989	0.48	0/1326
8	I	0.26	0/1034	0.55	0/1375
9	J	0.25	0/806	0.51	0/1089
10	K	0.25	0/893	0.46	0/1205
11	L	0.22	0/114	0.40	0/151
12	M	0.26	0/893	0.49	0/1193
13	N	0.24	0/817	0.43	0/1088
14	O	0.23	0/722	0.46	0/964
15	P	0.25	0/659	0.47	0/884
16	Q	0.25	0/658	0.50	0/881
17	R	0.22	0/463	0.41	0/621
18	S	0.26	0/653	0.48	0/877
19	T	0.24	0/676	0.42	0/895
20	Z	0.26	0/2493	0.55	2/3376 (0.1%)
All	All	0.21	0/54666	0.71	12/81336 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
9	J	0	1
20	Z	0	2
All	All	0	3

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1158	C	C2-N1-C1'	9.22	128.94	118.80
1	A	1158	C	N1-C2-O2	9.19	124.42	118.90
1	A	1158	C	N3-C2-O2	-7.47	116.67	121.90
20	Z	230	LEU	CA-CB-CG	6.90	131.16	115.30
20	Z	235	LEU	CA-CB-CG	6.58	130.44	115.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
9	J	57	VAL	Peptide
20	Z	235	LEU	Peptide
20	Z	342	ARG	Peptide

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	32930	0	16591	112	0
2	C	1625	0	1696	13	0
3	D	1643	0	1707	20	0
4	E	1144	0	1185	14	0
5	F	862	0	864	2	0
6	G	841	0	886	7	0
7	H	979	0	1031	5	0
8	I	1022	0	1070	16	0
9	J	796	0	836	10	0
10	K	877	0	887	10	0
11	L	114	0	131	2	0
12	M	884	0	941	5	0
13	N	805	0	844	11	0
14	O	714	0	734	4	0
15	P	649	0	666	11	0
16	Q	649	0	691	4	0
17	R	456	0	478	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	S	638	0	665	10	0
19	T	670	0	719	5	0
20	Z	2448	0	2419	25	0
21	A	67	0	0	0	0
21	E	1	0	0	0	0
21	P	1	0	0	0	0
21	T	1	0	0	0	0
21	Z	1	0	0	0	0
22	Z	1	0	0	0	0
23	Z	32	0	13	0	0
All	All	50850	0	35054	240	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 4.

The worst 5 of 240 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)
4:E:89:HIS:HB2	4:E:139:ALA:HB2	1.76	0.68
20:Z:252:ALA:HA	20:Z:268:PRO:HG3	1.78	0.66
1:A:1438:G:H1	1:A:1463:U:H3	1.44	0.65
1:A:683:G:H1	1:A:707:U:H3	1.46	0.64
2:C:189:ALA:HB3	2:C:196:ILE:HB	1.83	0.61

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	
2	C	204/206 (99%)	201 (98%)	3 (2%)	0	100	100
3	D	203/205 (99%)	196 (97%)	7 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	E	153/155 (99%)	147 (96%)	6 (4%)	0	100	100
5	F	104/106 (98%)	102 (98%)	2 (2%)	0	100	100
6	G	103/130 (79%)	100 (97%)	3 (3%)	0	100	100
7	H	127/129 (98%)	124 (98%)	3 (2%)	0	100	100
8	I	125/127 (98%)	118 (94%)	7 (6%)	0	100	100
9	J	97/99 (98%)	91 (94%)	6 (6%)	0	100	100
10	K	115/117 (98%)	112 (97%)	3 (3%)	0	100	100
11	L	12/14 (86%)	12 (100%)	0	0	100	100
12	M	112/114 (98%)	104 (93%)	8 (7%)	0	100	100
13	N	98/100 (98%)	96 (98%)	2 (2%)	0	100	100
14	O	86/88 (98%)	84 (98%)	2 (2%)	0	100	100
15	P	80/82 (98%)	77 (96%)	3 (4%)	0	100	100
16	Q	78/80 (98%)	76 (97%)	2 (3%)	0	100	100
17	R	53/55 (96%)	53 (100%)	0	0	100	100
18	S	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
19	T	84/86 (98%)	83 (99%)	1 (1%)	0	100	100
20	Z	311/313 (99%)	295 (95%)	15 (5%)	1 (0%)	41	76
All	All	2222/2285 (97%)	2145 (96%)	76 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
20	Z	236	THR

5.3.2   Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	170/170 (100%)	169 (99%)	1 (1%)	86	91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	D	172/172 (100%)	172 (100%)	0	100	100
4	E	118/118 (100%)	117 (99%)	1 (1%)	81	89
5	F	92/92 (100%)	91 (99%)	1 (1%)	73	84
6	G	88/109 (81%)	87 (99%)	1 (1%)	73	84
7	H	104/104 (100%)	103 (99%)	1 (1%)	76	86
8	I	105/105 (100%)	102 (97%)	3 (3%)	42	64
9	J	87/87 (100%)	87 (100%)	0	100	100
10	K	90/90 (100%)	89 (99%)	1 (1%)	73	84
11	L	12/12 (100%)	11 (92%)	1 (8%)	11	36
12	M	92/92 (100%)	92 (100%)	0	100	100
13	N	83/83 (100%)	82 (99%)	1 (1%)	71	84
14	O	76/76 (100%)	75 (99%)	1 (1%)	69	82
15	P	65/65 (100%)	65 (100%)	0	100	100
16	Q	74/74 (100%)	74 (100%)	0	100	100
17	R	48/48 (100%)	48 (100%)	0	100	100
18	S	70/70 (100%)	68 (97%)	2 (3%)	42	64
19	T	65/65 (100%)	65 (100%)	0	100	100
20	Z	267/267 (100%)	264 (99%)	3 (1%)	73	84
All	All	1878/1899 (99%)	1861 (99%)	17 (1%)	79	87

5 of 17 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
20	Z	50	MET
20	Z	232	LYS
8	I	123	ARG
10	K	128	ARG
11	L	5	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
18	S	52	HIS
19	T	84	ASN
8	I	75	GLN

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Mol	Chain	Res	Type
8	I	126	GLN
10	K	15	GLN

5.3.3   RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1530/1534 (99%)	238 (15%)	2 (0%)

5 of 238 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	5	U
1	A	9	G
1	A	22	G
1	A	39	G
1	A	47	C

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	209	U
1	A	1031	C

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

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
1	5MC	A	1407	1	18,22,23	0.94	2 (11%)	26,32,35	1.10	3 (11%)
1	G7M	A	527	1	20,26,27	1.11	2 (10%)	17,39,42	0.83	0
1	UR3	A	1498	1,21	19,22,23	0.98	1 (5%)	26,32,35	1.44	1 (3%)
1	2MG	A	1516	1	18,26,27	0.89	1 (5%)	16,38,41	1.11	2 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
1	2MG	A	1207	1	18,26,27	0.89	1 (5%)	16,38,41	1.12	2 (12%)
1	MA6	A	1519	1	18,26,27	0.97	1 (5%)	19,38,41	1.86	6 (31%)
1	PSU	A	516	1,21	18,21,22	1.37	2 (11%)	22,30,33	1.86	3 (13%)
1	MA6	A	1518	1	18,26,27	1.00	1 (5%)	19,38,41	1.90	6 (31%)
1	5MC	A	967	1	18,22,23	0.95	2 (11%)	26,32,35	1.11	3 (11%)
1	4OC	A	1402	1	20,23,24	0.77	0	26,32,35	0.99	1 (3%)
1	2MG	A	966	1	18,26,27	1.01	1 (5%)	16,38,41	1.10	2 (12%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	5MC	A	1407	1	-	0/7/25/26	0/2/2/2
1	G7M	A	527	1	-	3/3/25/26	0/3/3/3
1	UR3	A	1498	1,21	-	0/7/25/26	0/2/2/2
1	2MG	A	1516	1	-	0/5/27/28	0/3/3/3
1	2MG	A	1207	1	-	0/5/27/28	0/3/3/3
1	MA6	A	1519	1	-	4/7/29/30	0/3/3/3
1	PSU	A	516	1,21	-	0/7/25/26	0/2/2/2
1	MA6	A	1518	1	-	4/7/29/30	0/3/3/3
1	5MC	A	967	1	-	0/7/25/26	0/2/2/2
1	4OC	A	1402	1	-	0/9/29/30	0/2/2/2
1	2MG	A	966	1	-	2/5/27/28	0/3/3/3

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	516	PSU	C6-C5	3.27	1.39	1.35
1	A	966	2MG	C6-N1	-3.00	1.33	1.37
1	A	527	G7M	C5-C4	2.92	1.44	1.39
1	A	967	5MC	C6-C5	2.73	1.39	1.34
1	A	1407	5MC	C6-C5	2.73	1.39	1.34

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	1498	UR3	C4-N3-C2	-5.97	118.94	124.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	516	PSU	N1-C2-N3	5.96	121.89	115.13
1	A	1518	MA6	N1-C6-N6	4.94	122.25	117.06
1	A	516	PSU	C4-N3-C2	-3.77	120.91	126.34
1	A	1519	MA6	C10-N6-C6	-3.53	108.83	119.51

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	527	G7M	O4'-C4'-C5'-O5'
1	A	527	G7M	C3'-C4'-C5'-O5'
1	A	966	2MG	N1-C2-N2-CM2
1	A	966	2MG	N3-C2-N2-CM2
1	A	1518	MA6	C5-C6-N6-C9

There are no ring outliers.

3 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	1516	2MG	1	0
1	A	1519	MA6	1	0
1	A	1402	4OC	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 73 ligands modelled in this entry, 72 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	#$\|Z\|>2$
23	GNP	Z	402	21	29,34,34	1.71	6 (20%)	33,54,54	2.36	9 (27%)

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
23	GNP	Z	402	21	-	6/14/38/38	0/3/3/3

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
23	Z	402	GNP	PB-O3A	-4.79	1.53	1.59
23	Z	402	GNP	C6-N1	3.79	1.39	1.33
23	Z	402	GNP	PB-O2B	-3.16	1.48	1.56
23	Z	402	GNP	PG-O1G	3.11	1.51	1.46
23	Z	402	GNP	C8-N7	-2.23	1.30	1.34

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
23	Z	402	GNP	C5-C6-N1	-8.62	111.64	123.43
23	Z	402	GNP	C2-N1-C6	5.59	124.82	115.93
23	Z	402	GNP	O3G-PG-O1G	-3.70	104.16	113.45
23	Z	402	GNP	O2B-PB-O1B	3.66	117.60	109.92
23	Z	402	GNP	C2-N3-C4	-3.18	111.72	115.36

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
23	Z	402	GNP	PG-N3B-PB-O1B
23	Z	402	GNP	PG-N3B-PB-O3A
23	Z	402	GNP	PA-O3A-PB-O1B
23	Z	402	GNP	PA-O3A-PB-O2B
23	Z	402	GNP	C5'-O5'-PA-O1A

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 then 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.

Ligand GNP Z 402

Bond lengths   Bond angles

Torsions   Rings
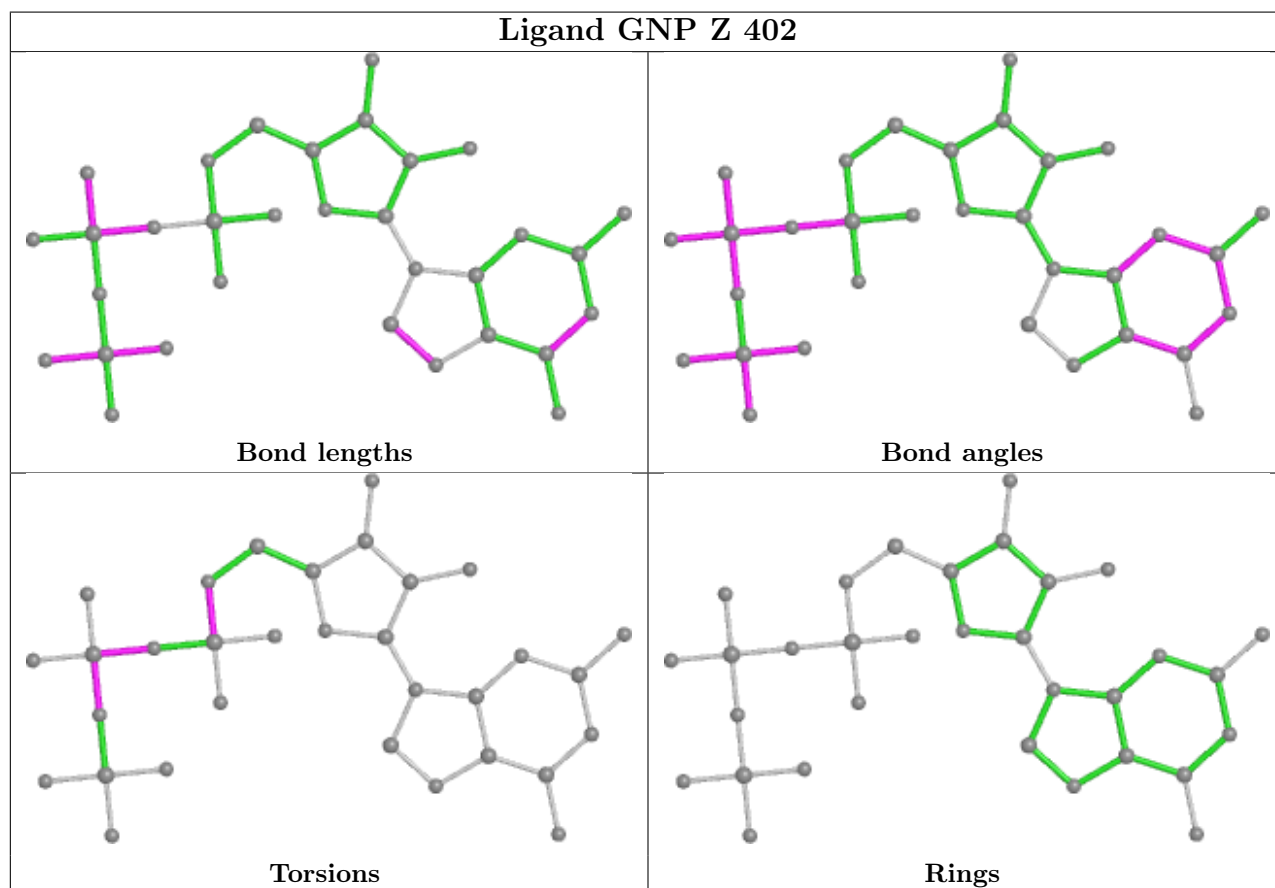
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-3663. 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 ⓘ
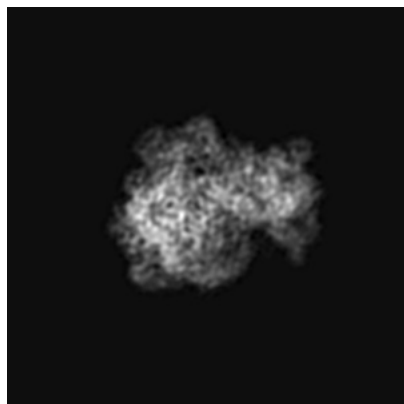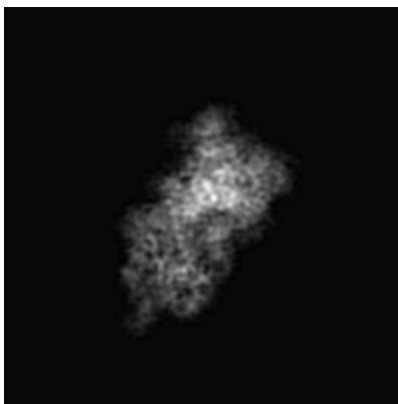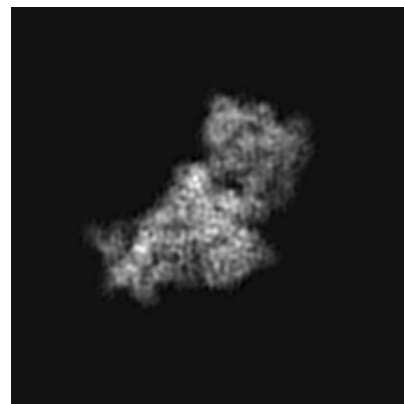
6.1.1 Primary map

X   Y   Z

6.1.2 Raw map

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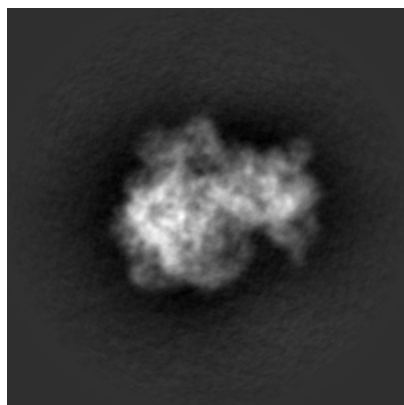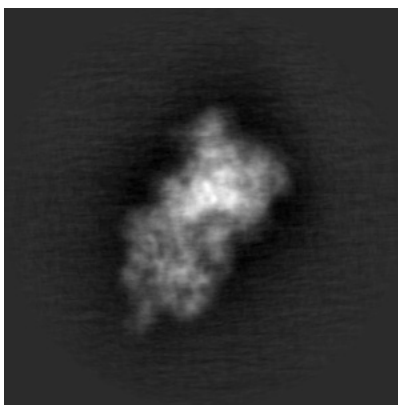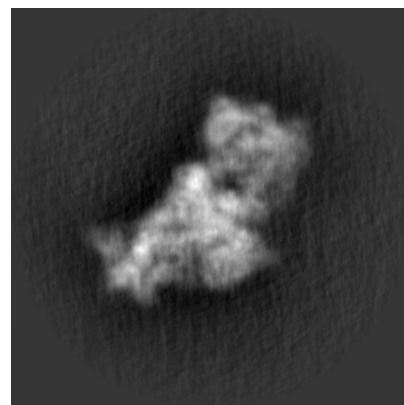
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
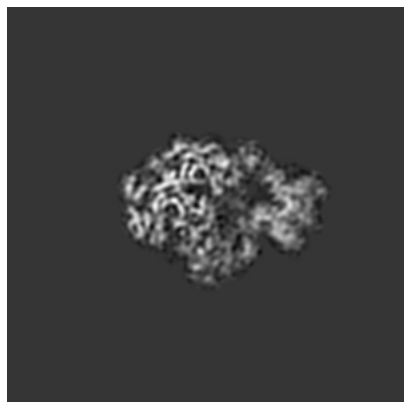
6.2.1 Primary map

| X Index: 128 | Y Index: 128 | Z Index: 128 |

6.2.2 Raw map
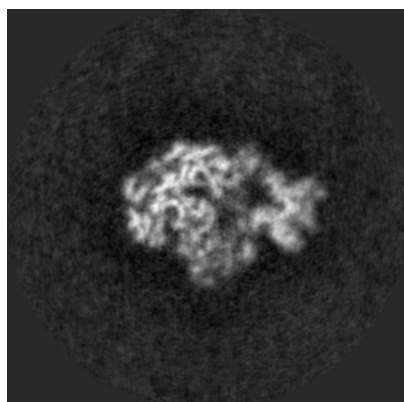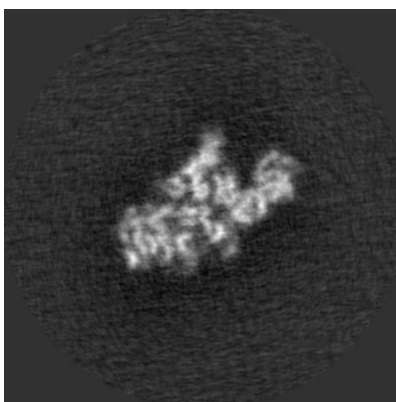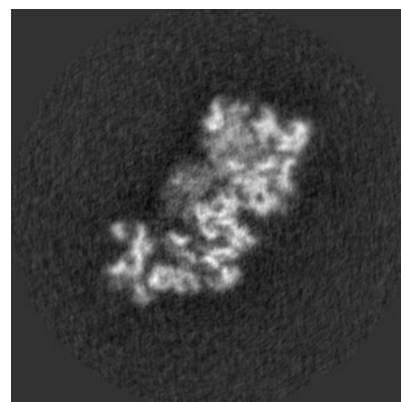
| X Index: 128 | Y Index: 128 | Z Index: 128 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
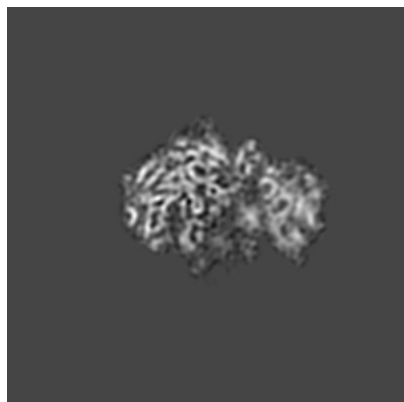
| X Index: 132 | Y Index: 106 | Z Index: 132 |
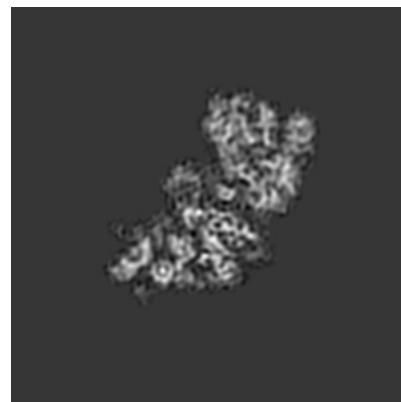
6.3.2 Raw map
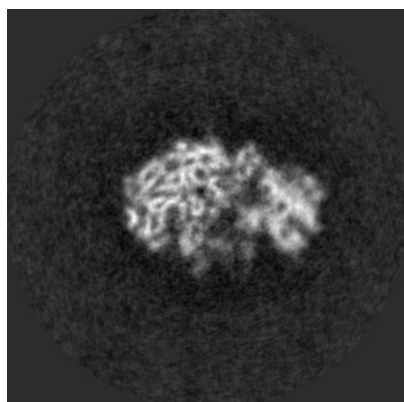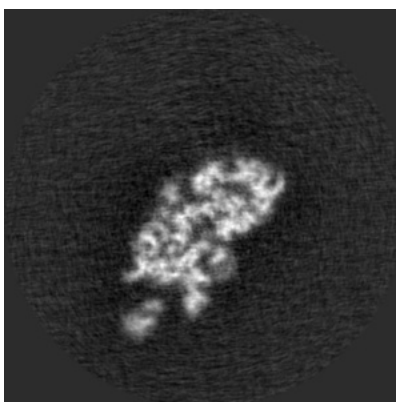
| X Index: 131 | Y Index: 110 | Z Index: 132 |
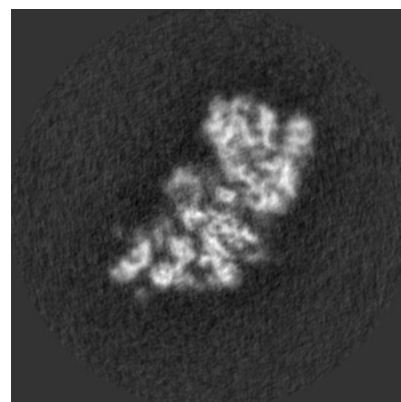
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map
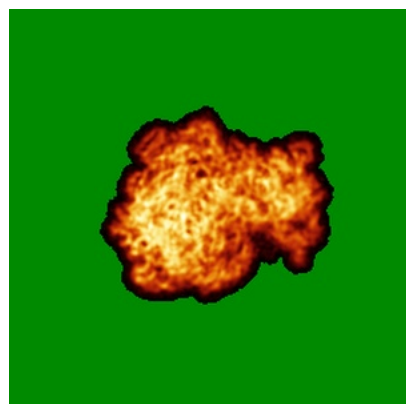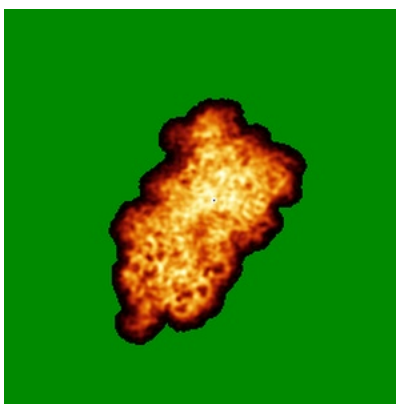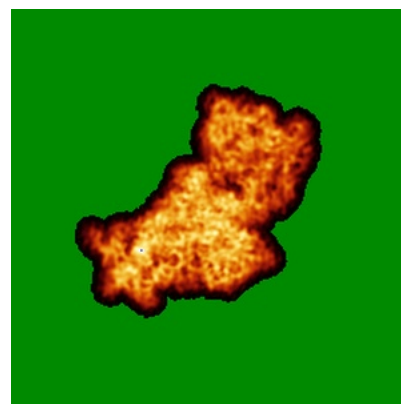
| X | Y | Z |

6.4.2 Raw map

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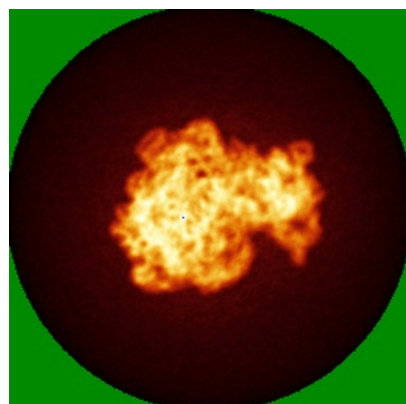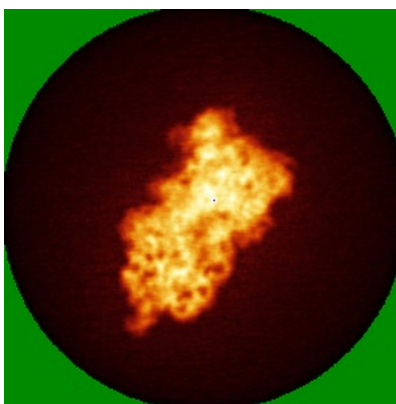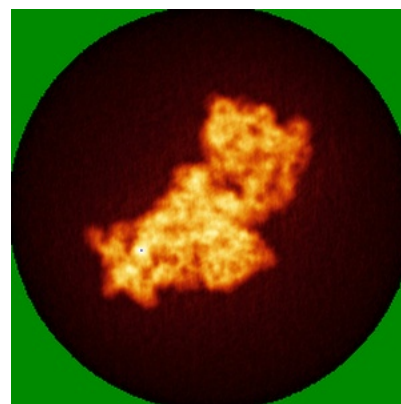
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X   Y   Z
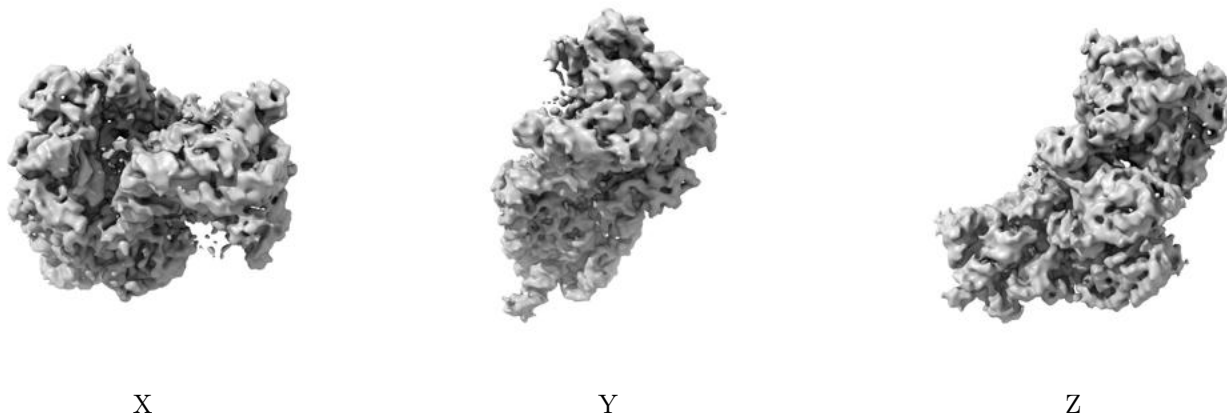
The images above show the 3D surface view of the map at the recommended contour level 0.06. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

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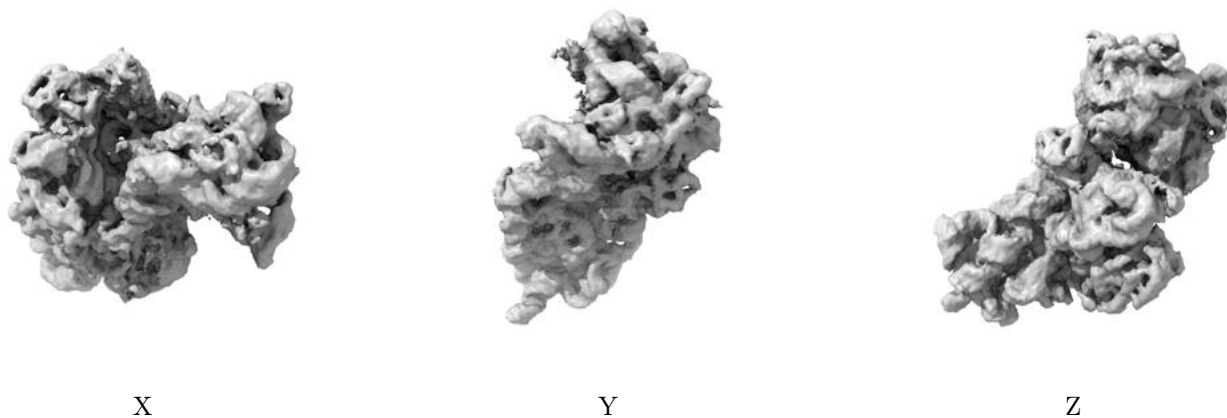
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation (i)

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

7   Map analysis ⓘ

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

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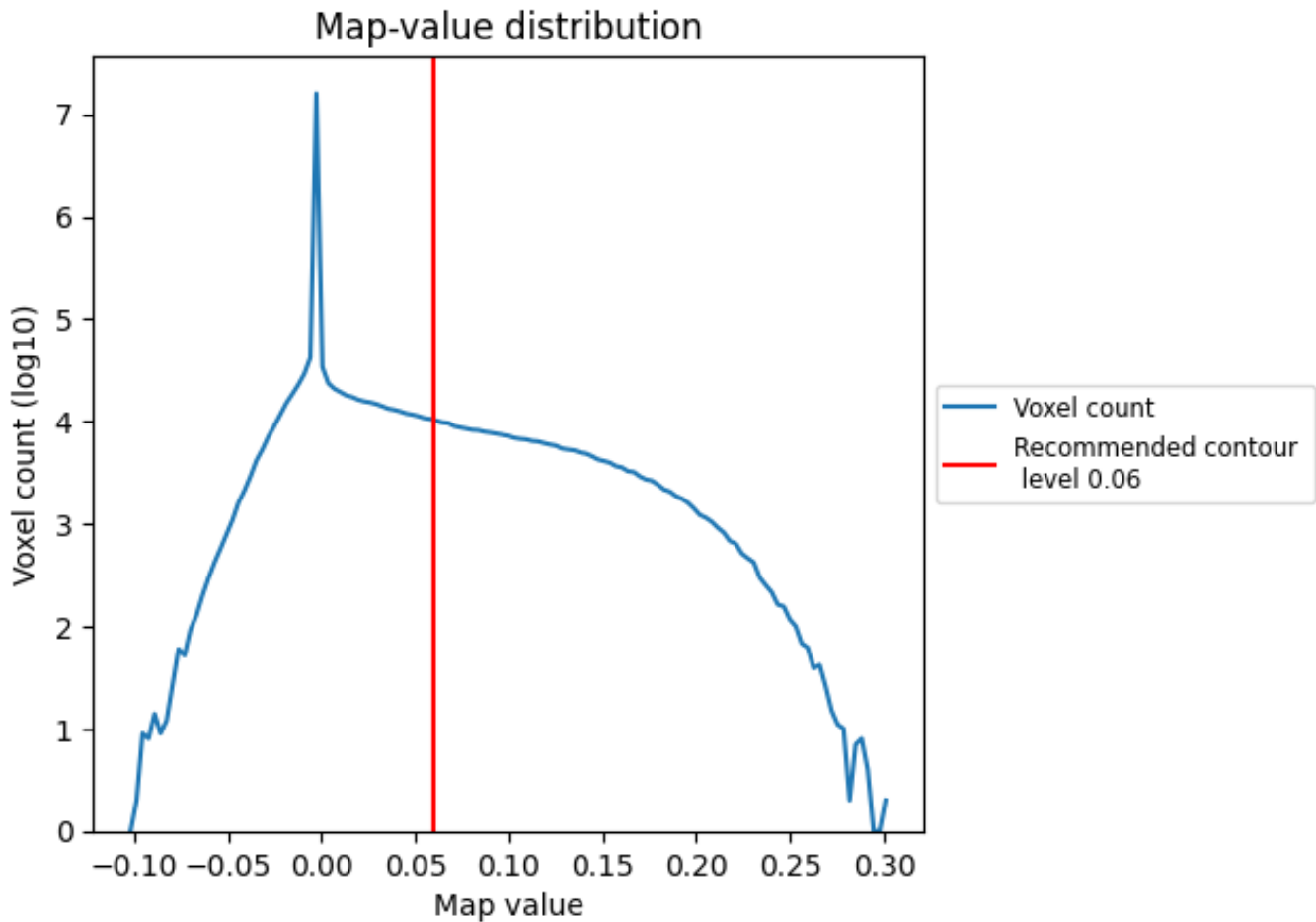
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
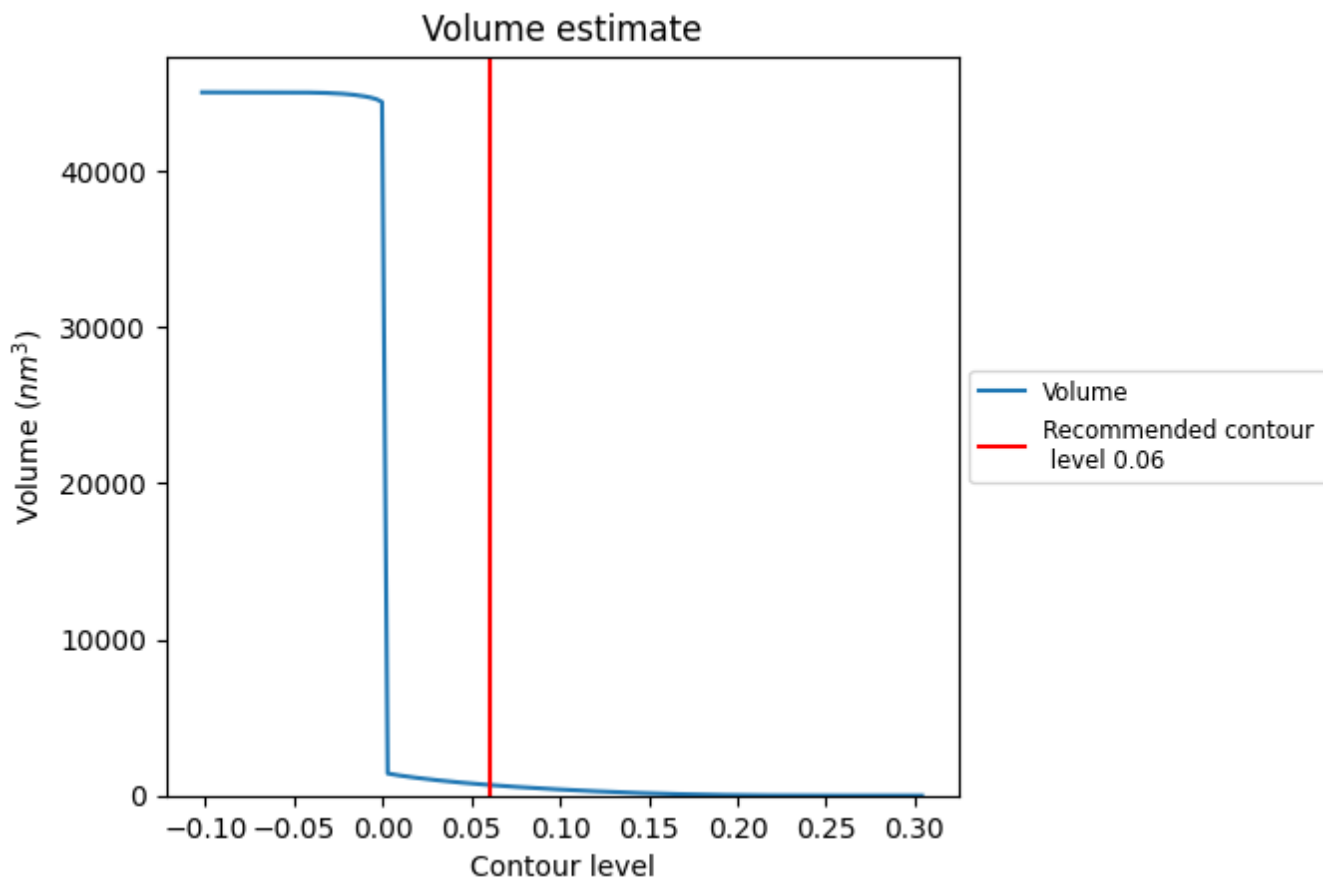
The volume at the recommended contour level is 681 nm^3; this corresponds to an approximate mass of 615 kDa.

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

7.3   Rotationally averaged power spectrum ⓘ
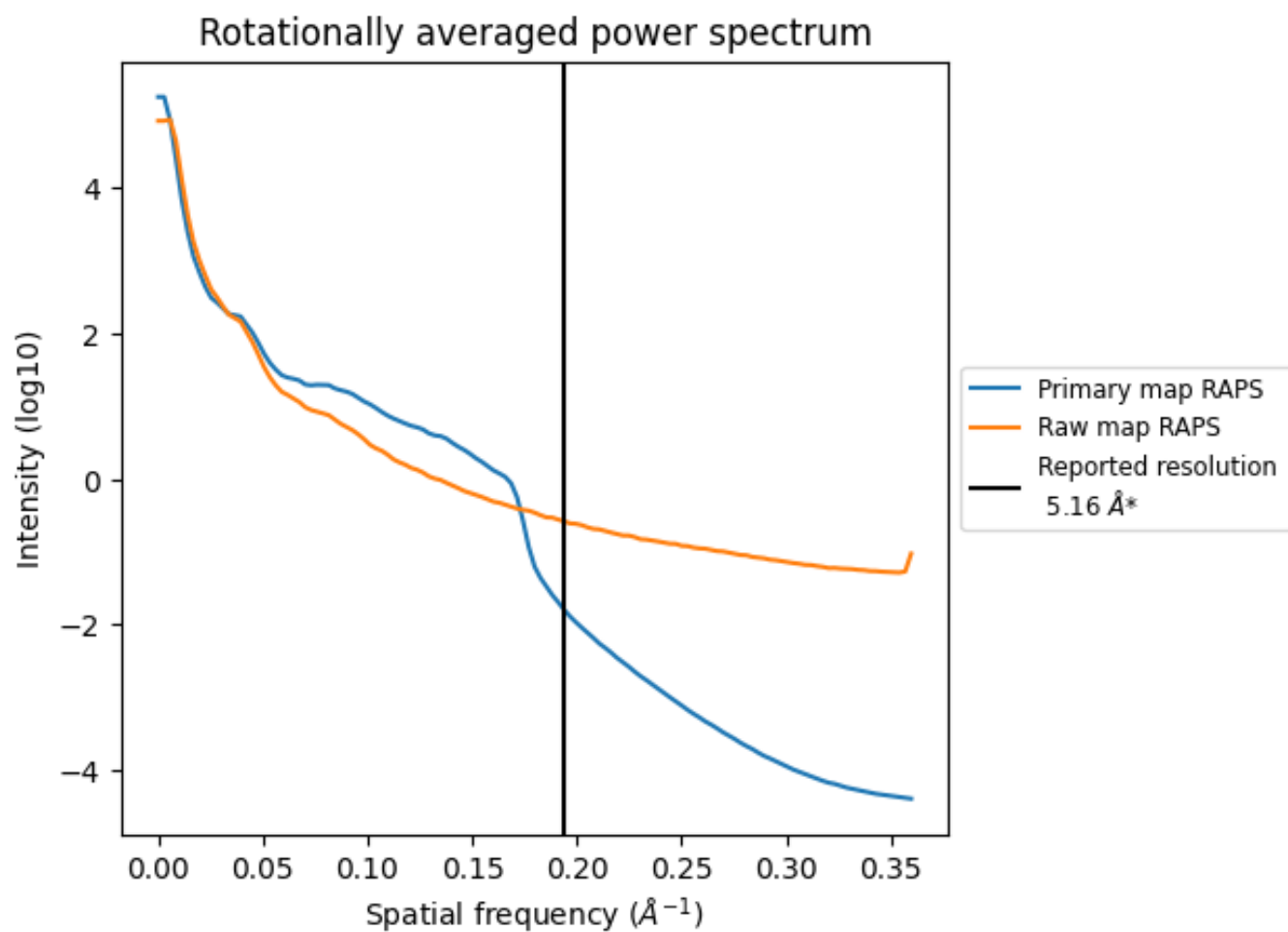
*Reported resolution corresponds to spatial frequency of 0.194 Å^{-1}

8 Fourier-Shell correlation ⓘ

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 ⓘ
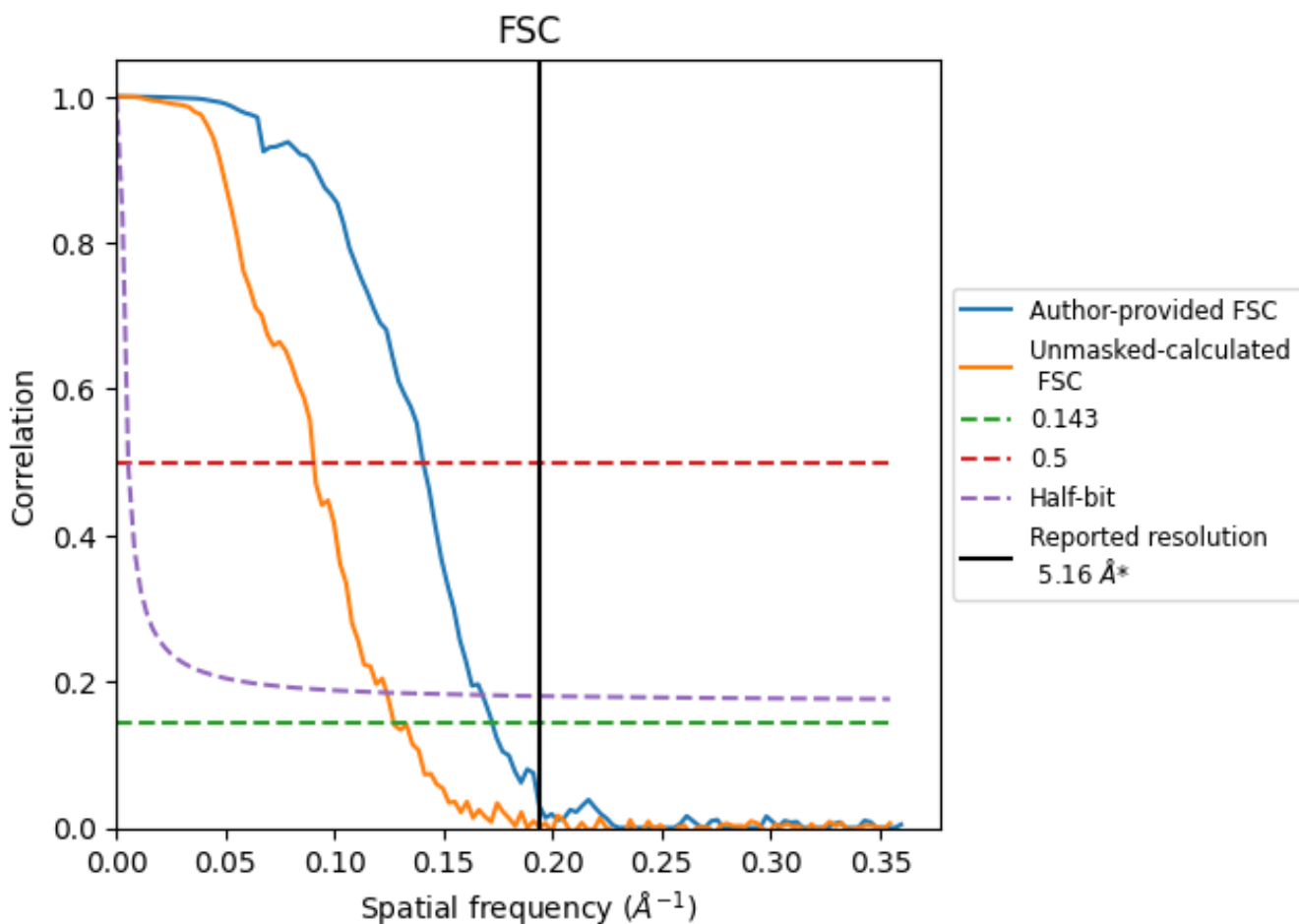
*Reported resolution corresponds to spatial frequency of 0.194 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	5.16	-	-
Author-provided FSC curve	5.80	7.11	5.96
Unmasked-calculated*	7.86	11.05	8.08

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 5.80 differs from the reported value 5.16 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 7.86 differs from the reported value 5.16 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-3663 and PDB model 5NO4. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay ⓘ
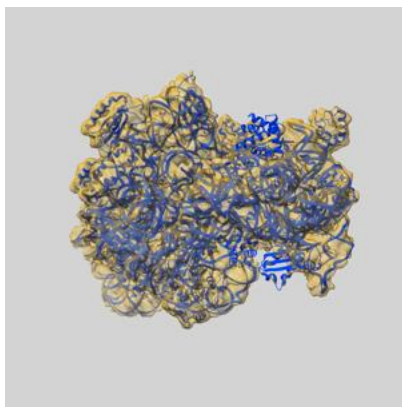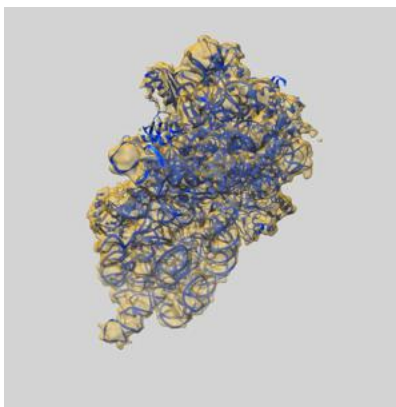
| X | Y | Z |
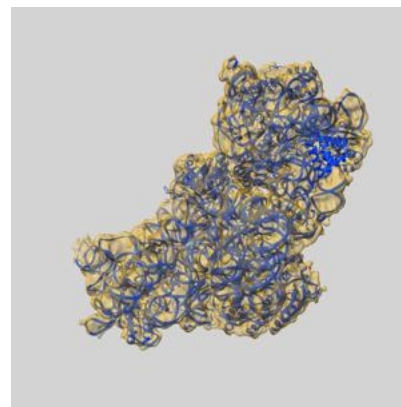
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2　Q-score mapped to coordinate model ⓘ

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 ⓘ
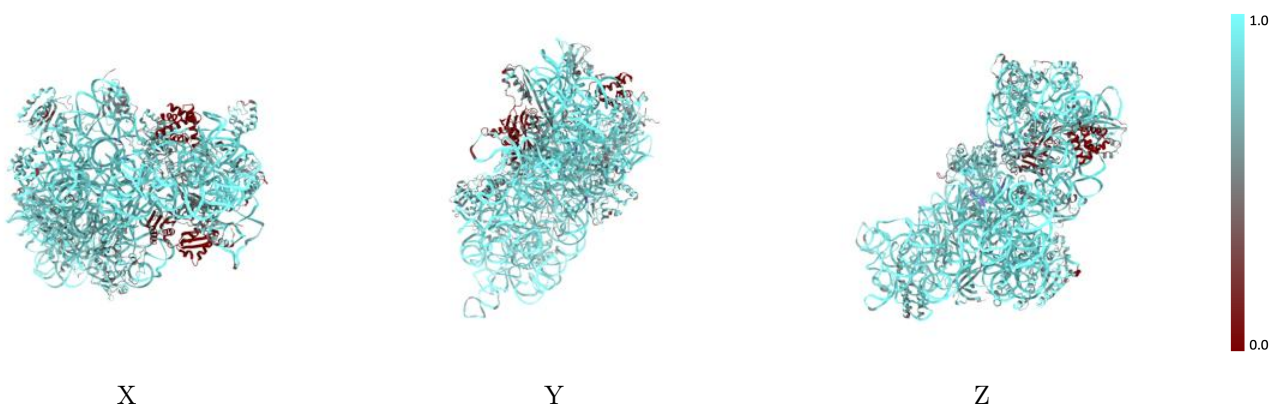
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.06).

9.4 Atom inclusion (i)
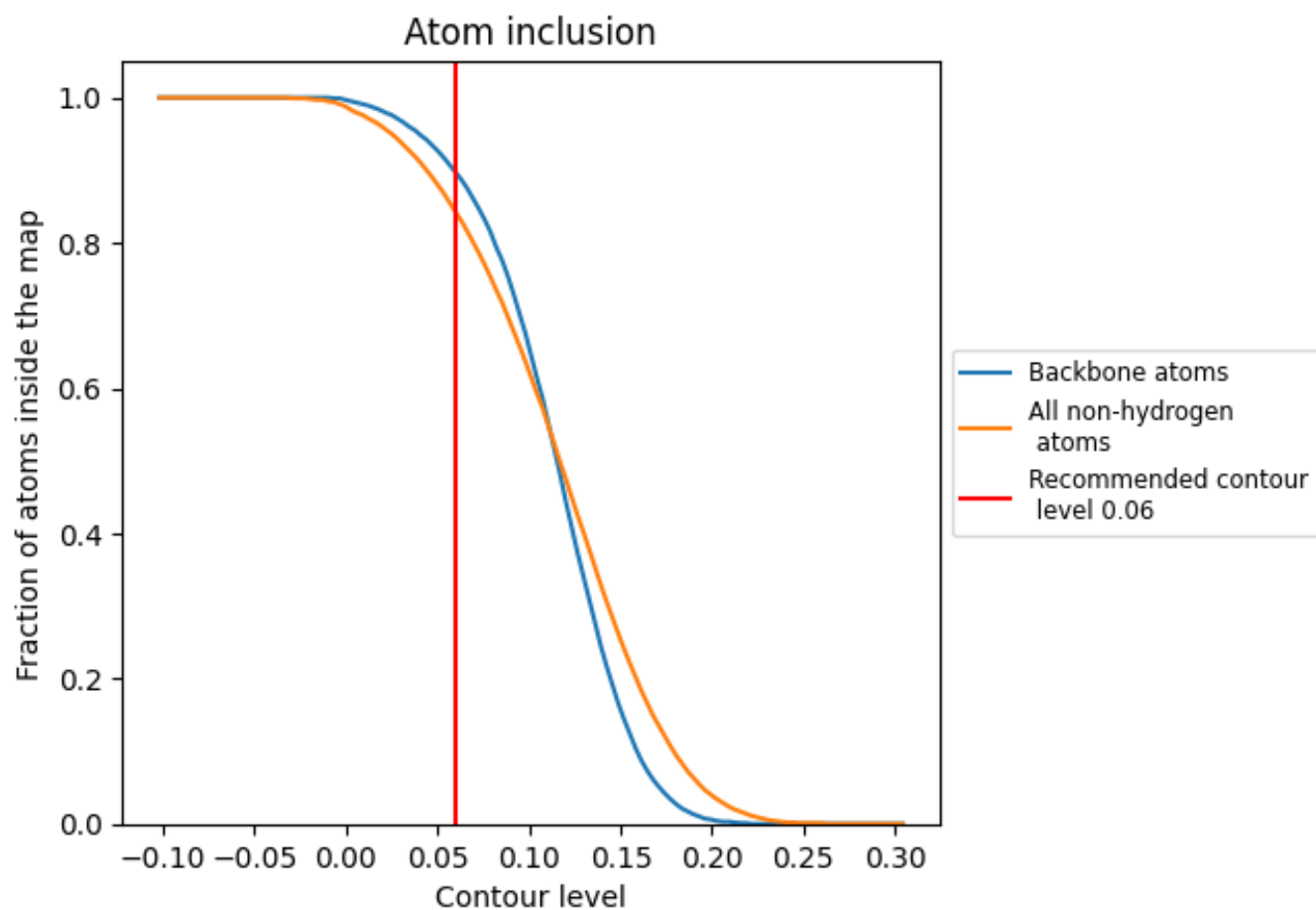
At the recommended contour level, 90% of all backbone atoms, 84% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.06) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8420	0.1990
A	0.9560	0.2300
C	0.1890	0.0950
D	0.6650	0.1220
E	0.7430	0.1800
F	0.7100	0.1490
G	0.0680	0.0520
H	0.7550	0.1670
I	0.6360	0.1070
J	0.5430	0.1410
K	0.6950	0.1620
L	0.2040	0.0700
M	0.7370	0.1500
N	0.5880	0.1130
O	0.7940	0.1640
P	0.7450	0.1600
Q	0.7490	0.1750
R	0.7280	0.1540
S	0.7780	0.1680
T	0.7620	0.1610
Z	0.7150	0.1610

1.0

0.0
<0.0