



## Full wwPDB EM Validation Report ⓘ

Dec 14, 2021 – 06:19 am GMT

PDB ID : 7OBA  
EMDB ID : EMD-12796  
Title : Cryo-EM structure of human RNA Polymerase I in complex with RRN3  
Authors : Misiaszek, A.D.; Girbig, M.; Mueller, C.W.  
Deposited on : 2021-04-21  
Resolution : 3.10 Å (reported)  
Based on initial model : 7AEI

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

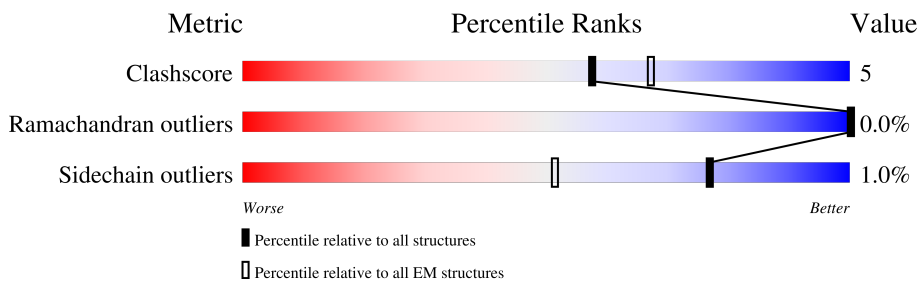
EMDB validation analysis : 0.0.0.dev97  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.24

# 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 3.10 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.








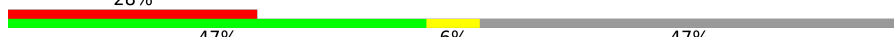
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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

Mol	Chain	Length	Quality of chain
1	A	1720	
2	B	1135	
3	C	346	
4	E	210	
5	F	127	
6	G	338	
7	H	150	
8	I	126	

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Mol	Chain	Length	Quality of chain
9	J	67	 85% 10%
10	K	133	 70% 11% 20%
11	L	58	 62% 17% 21%
12	M	419	 21% 75%
13	N	510	 25% 5% 71%
14	O	651	 28% 47% 6% 47%

## 2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 35679 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 I subunit RPA1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1522	12123	7706	2124	2213	80	0	0

- Molecule 2 is a protein called DNA-directed RNA polymerase I subunit RPA2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	1127	8949	5736	1520	1620	73	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerases I and III subunit RPAC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	309	2474	1561	440	462	11	0	0

- Molecule 4 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	E	210	1728	1094	301	324	9	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	44	PHE	SER	conflict	UNP P19388

- Molecule 5 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	F	78	627	402	106	114	5	0	0

- Molecule 6 is a protein called DNA-directed RNA polymerase I subunit RPA43.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	159	Total	C	N	O	S	0	0
			1241	786	217	231	7		

- Molecule 7 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	149	Total	C	N	O	S	0	0
			1197	759	195	238	5		

- Molecule 8 is a protein called DNA-directed RNA polymerase I subunit RPA12.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	105	Total	C	N	O	S	0	0
			813	496	146	160	11		

- Molecule 9 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	64	Total	C	N	O	S	0	0
			507	328	86	87	6		

- Molecule 10 is a protein called DNA-directed RNA polymerases I and III subunit RPAC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	107	Total	C	N	O	S	0	0
			856	531	153	165	7		

- Molecule 11 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	46	Total	C	N	O	S	0	0
			388	241	75	66	6		

- Molecule 12 is a protein called DNA-directed RNA polymerase I subunit RPA49.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	105	Total	C	N	O	S	0	0
			837	522	154	155	6		

- Molecule 13 is a protein called DNA-directed RNA polymerase I subunit RPA34.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	149	Total	C	N	O	S	0	0
			1083	684	193	201	5		

- Molecule 14 is a protein called RNA polymerase I-specific transcription initiation factor RRN3.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	347	Total	C	N	O	S	0	0
			2849	1882	471	479	17		

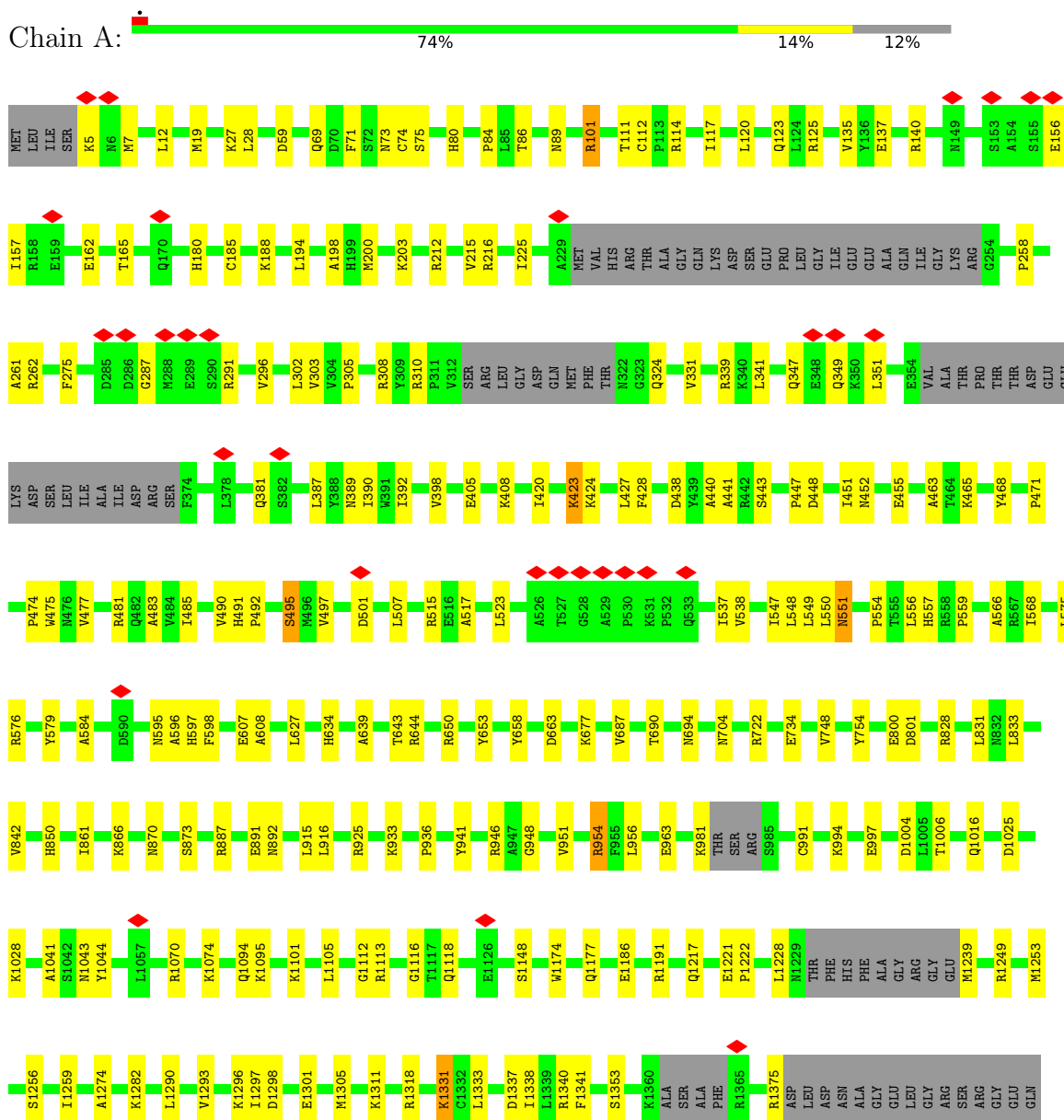
- Molecule 15 is ZINC ION (three-letter code: ZN) (formula: Zn).

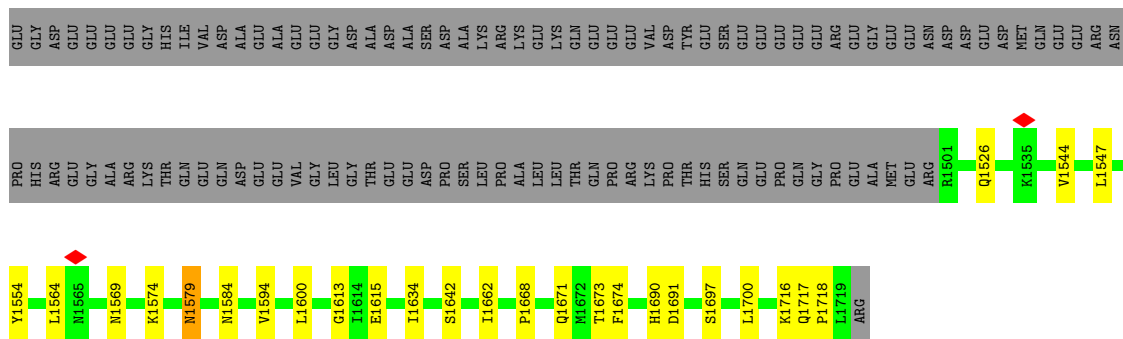
Mol	Chain	Residues	Atoms		AltConf
15	A	2	Total	Zn	0
			2	2	
15	B	1	Total	Zn	0
			1	1	
15	I	2	Total	Zn	0
			2	2	
15	J	1	Total	Zn	0
			1	1	
15	L	1	Total	Zn	0
			1	1	

### 3 Residue-property plots i

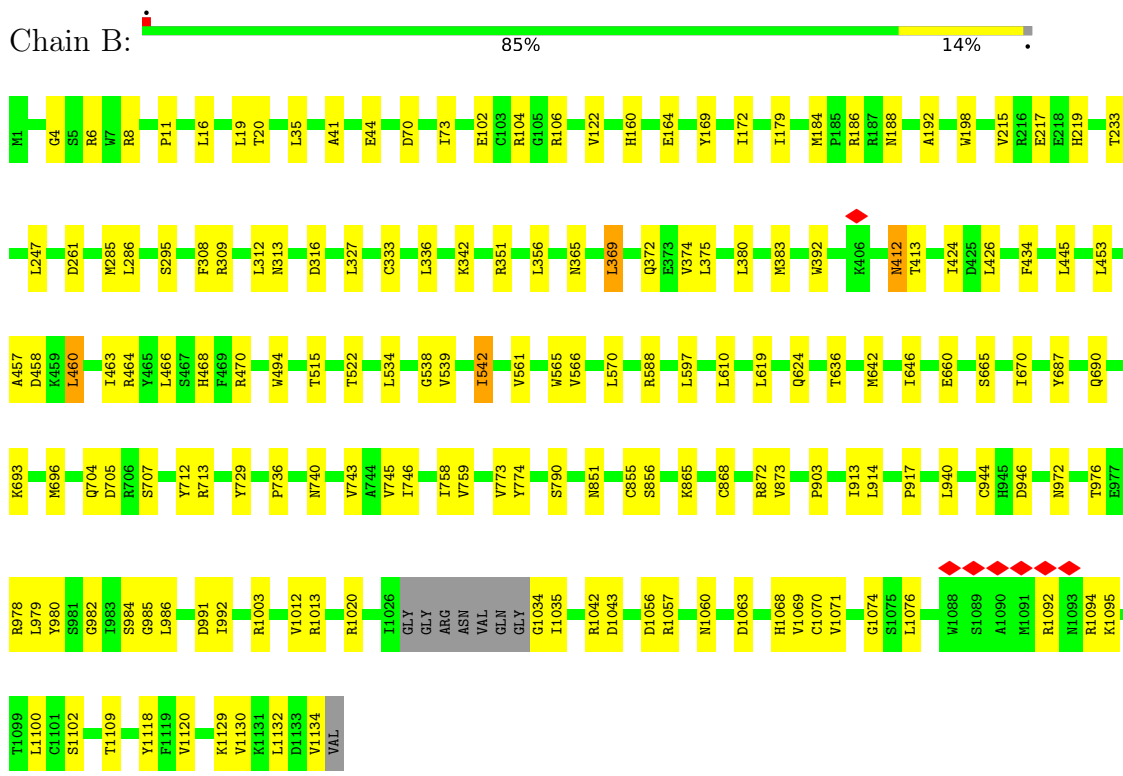
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: DNA-directed RNA polymerase I subunit RPA1

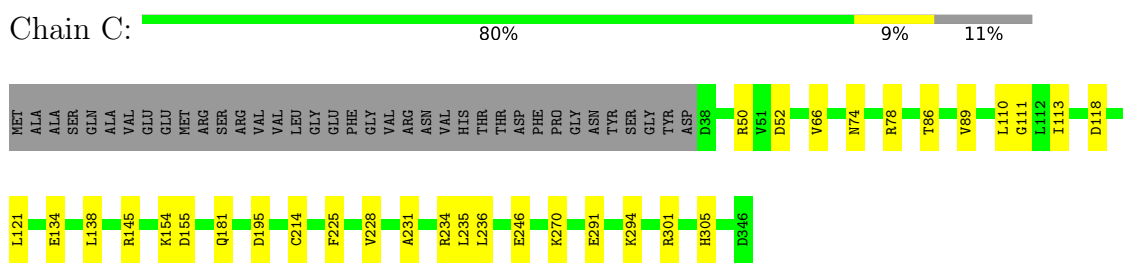




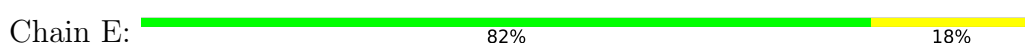
• Molecule 2: DNA-directed RNA polymerase I subunit RPA2



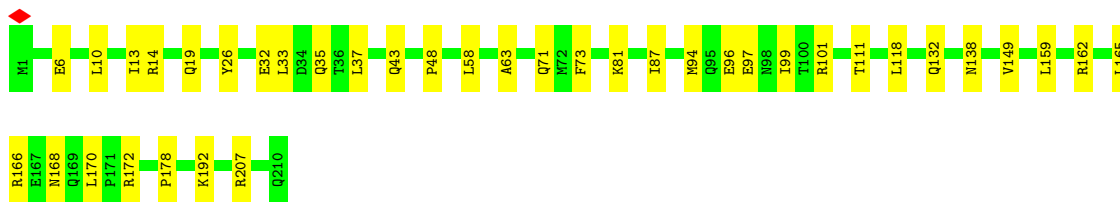
• Molecule 3: DNA-directed RNA polymerases I and III subunit RPAC1



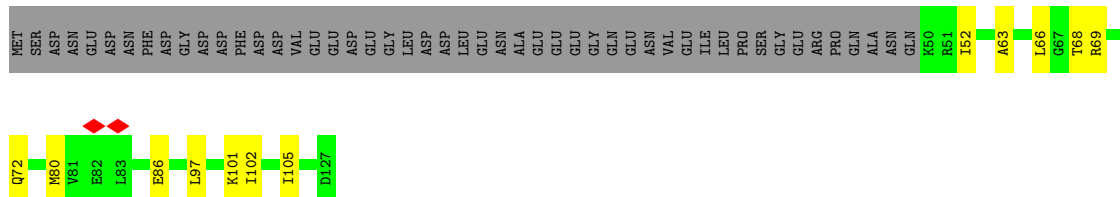
• Molecule 4: DNA-directed RNA polymerases I, II, and III subunit RPABC1



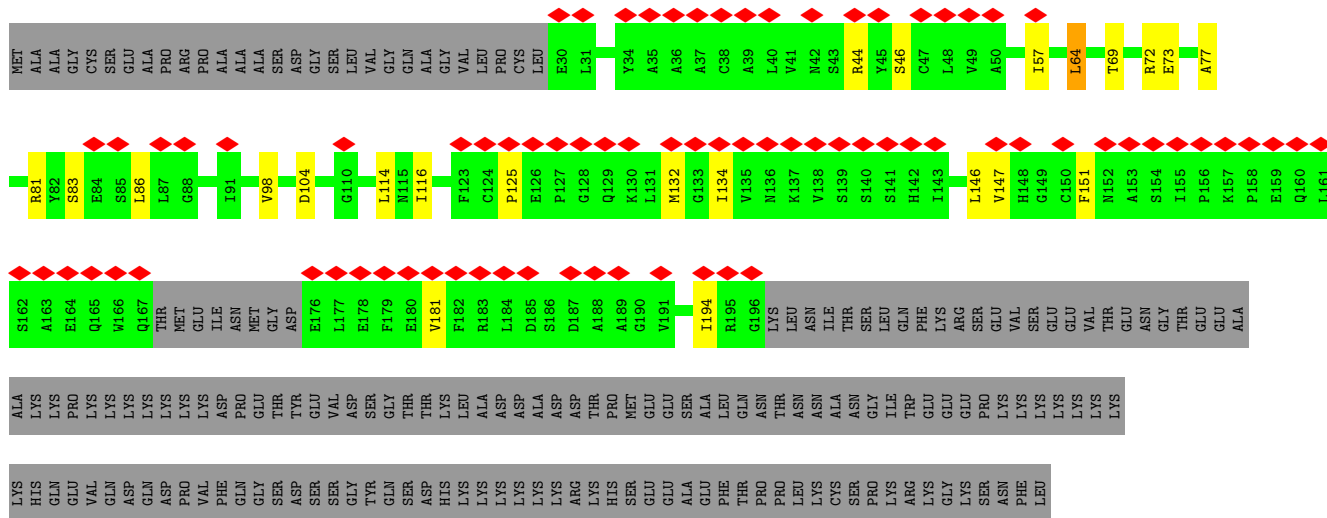
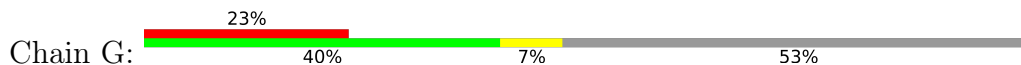




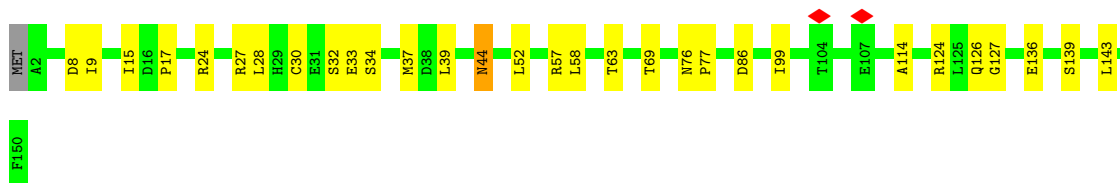
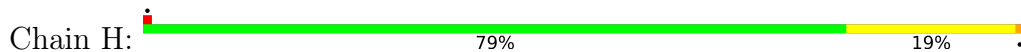
• Molecule 5: DNA-directed RNA polymerases I, II, and III subunit RPABC2



• Molecule 6: DNA-directed RNA polymerase I subunit RPA43



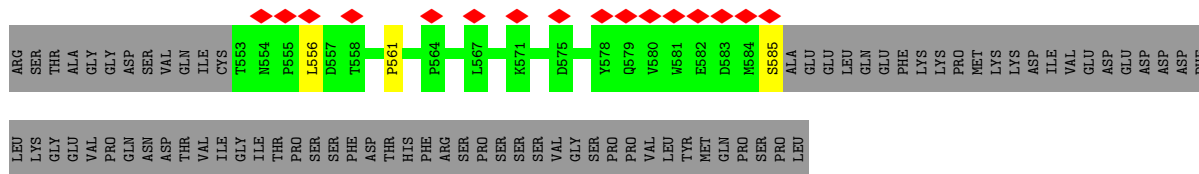
• Molecule 7: DNA-directed RNA polymerases I, II, and III subunit RPABC3



• Molecule 8: DNA-directed RNA polymerase I subunit RPA12







## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	260363	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 ( $e^-/\text{\AA}^2$ )	41.2	Depositor
Minimum defocus (nm)	750	Depositor
Maximum defocus (nm)	2250	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.026	Depositor
Minimum map value	-0.008	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.00386	Depositor
Map size ( $\text{\AA}$ )	236.73601, 236.73601, 236.73601	wwPDB
Map dimensions	288, 288, 288	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.822, 0.822, 0.822	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

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	0.47	0/12374	0.66	5/16713 (0.0%)
2	B	0.62	1/9169 (0.0%)	0.68	8/12410 (0.1%)
3	C	0.54	0/2522	0.69	2/3418 (0.1%)
4	E	0.42	0/1759	0.66	3/2376 (0.1%)
5	F	0.45	0/637	0.62	0/861
6	G	0.29	0/1267	0.60	0/1716
7	H	0.52	0/1219	0.63	1/1644 (0.1%)
8	I	0.49	0/827	0.62	0/1112
9	J	0.72	0/516	0.76	0/696
10	K	0.53	0/871	0.64	0/1174
11	L	0.56	0/394	0.60	0/524
12	M	0.36	0/852	0.61	0/1146
13	N	0.37	0/1118	0.59	0/1532
14	O	0.28	0/2922	0.53	0/3957
All	All	0.50	1/36447 (0.0%)	0.65	19/49279 (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
1	A	0	5
4	E	0	1
6	G	0	1
8	I	0	1
13	N	0	1
14	O	0	1
All	All	0	10

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	566	VAL	CB-CG2	-5.47	1.41	1.52

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	195	ASP	CB-CG-OD1	8.98	126.38	118.30
2	B	466	LEU	CA-CB-CG	6.70	130.70	115.30
2	B	426	LEU	CA-CB-CG	6.18	129.52	115.30
2	B	70	ASP	CB-CG-OD1	6.09	123.78	118.30
1	A	351	LEU	CA-CB-CG	6.00	129.09	115.30
7	H	52	LEU	CA-CB-CG	5.93	128.94	115.30
2	B	940	LEU	CA-CB-CG	5.79	128.63	115.30
4	E	37	LEU	CA-CB-CG	5.74	128.50	115.30
4	E	33	LEU	CA-CB-CG	5.64	128.28	115.30
2	B	1063	ASP	CB-CG-OD1	5.58	123.32	118.30
2	B	986	LEU	CA-CB-CG	5.38	127.67	115.30
2	B	369	LEU	CA-CB-CG	5.33	127.56	115.30
1	A	1600	LEU	CA-CB-CG	5.25	127.38	115.30
2	B	460	LEU	CA-CB-CG	5.24	127.36	115.30
3	C	155	ASP	CB-CG-OD1	5.22	123.00	118.30
1	A	477	VAL	C-N-CA	5.12	134.51	121.70
1	A	663	ASP	CB-CG-OD1	5.11	122.90	118.30
4	E	159	LEU	CA-CB-CG	5.08	126.99	115.30
1	A	1105	LEU	CA-CB-CG	5.02	126.84	115.30

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1041	ALA	Peptide
1	A	387	LEU	Mainchain
1	A	491	HIS	Peptide
1	A	495	SER	Peptide
1	A	501	ASP	Mainchain
4	E	43	GLN	Peptide
6	G	64	LEU	Peptide
8	I	77	GLU	Peptide
13	N	154	GLY	Mainchain
14	O	138	SER	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	12123	0	12251	148	0
2	B	8949	0	8931	101	0
3	C	2474	0	2469	20	0
4	E	1728	0	1749	22	0
5	F	627	0	659	9	0
6	G	1241	0	1219	14	0
7	H	1197	0	1156	18	0
8	I	813	0	756	12	0
9	J	507	0	523	5	0
10	K	856	0	840	12	0
11	L	388	0	393	4	0
12	M	837	0	819	13	0
13	N	1083	0	1079	14	0
14	O	2849	0	2906	21	0
15	A	2	0	0	0	0
15	B	1	0	0	0	0
15	I	2	0	0	0	0
15	J	1	0	0	0	0
15	L	1	0	0	0	0
All	All	35679	0	35750	360	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (360) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:547:ILE:HG21	1:A:608:ALA:HB1	1.74	0.69
14:O:471:HIS:HE2	14:O:585:SER:HG	1.42	0.67
2:B:312:LEU:HD21	2:B:327:LEU:HB3	1.79	0.65
13:N:76:LYS:HB3	13:N:79:ARG:HB2	1.79	0.64
2:B:979:LEU:HB2	2:B:992:ILE:HD13	1.78	0.64
1:A:162:GLU:HA	1:A:165:THR:HG22	1.78	0.64
1:A:1094:GLN:HG3	1:A:1095:LYS:HG2	1.80	0.63
2:B:463:ILE:HG23	2:B:670:ILE:HD12	1.80	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:979:LEU:HD13	2:B:992:ILE:HB	1.81	0.62
1:A:548:LEU:HD23	1:A:596:ALA:HB1	1.81	0.62
2:B:4:GLY:H	2:B:8:ARG:HD3	1.64	0.62
2:B:104:ARG:NH2	2:B:169:TYR:OH	2.33	0.61
13:N:44:LEU:HB3	13:N:114:THR:HG22	1.82	0.61
1:A:1662:ILE:HG13	1:A:1671:GLN:HG2	1.82	0.61
1:A:1239:MET:SD	1:A:1579:ASN:ND2	2.75	0.60
2:B:704:GLN:OE1	2:B:851:ASN:ND2	2.33	0.60
13:N:45:ILE:HG12	13:N:115:LEU:HB2	1.84	0.60
1:A:946:ARG:NH1	1:A:963:GLU:OE2	2.35	0.60
4:E:94:MET:HG2	4:E:99:ILE:HD11	1.84	0.59
8:I:22:ASP:O	12:M:30:ASN:ND2	2.35	0.59
1:A:933:LYS:NZ	2:B:642:MET:O	2.36	0.59
1:A:1353:SER:OG	1:A:1547:LEU:HD21	2.03	0.59
1:A:866:LYS:HE2	8:I:77:GLU:HG2	1.84	0.58
8:I:37:THR:HG22	8:I:44:ASN:HB3	1.85	0.58
6:G:98:VAL:HG21	6:G:114:LEU:HD22	1.84	0.58
1:A:1222:PRO:HB2	1:A:1634:ILE:HD13	1.86	0.58
1:A:951:VAL:HG13	1:A:963:GLU:HB3	1.85	0.58
2:B:984:SER:O	3:C:74:ASN:ND2	2.36	0.58
12:M:43:LEU:HD12	12:M:58:ARG:HD3	1.86	0.58
13:N:73:LEU:HB2	13:N:79:ARG:HH22	1.69	0.58
1:A:137:GLU:OE2	1:A:140:ARG:NH1	2.37	0.58
1:A:1569:ASN:HD22	1:A:1574:LYS:H	1.49	0.57
2:B:470:ARG:NH2	2:B:515:THR:O	2.37	0.57
1:A:347:GLN:HG3	1:A:349:GLN:H	1.69	0.57
1:A:551:ASN:HB3	1:A:595:ASN:HB2	1.87	0.57
5:F:72:GLN:HE21	6:G:64:LEU:HG	1.68	0.57
1:A:471:PRO:HA	1:A:537:ILE:HG22	1.86	0.57
9:J:10:CYS:SG	9:J:42:ARG:NH2	2.74	0.56
10:K:77:GLU:OE1	10:K:79:LYS:NZ	2.38	0.56
1:A:490:VAL:HG12	1:A:492:PRO:HD3	1.87	0.56
1:A:1148:SER:O	4:E:162:ARG:NH2	2.35	0.56
13:N:55:CYS:SG	13:N:79:ARG:NH1	2.78	0.56
1:A:1375:ARG:HH12	2:B:198:TRP:HD1	1.54	0.56
6:G:134:ILE:HB	6:G:146:LEU:HB2	1.88	0.56
12:M:92:LEU:HD22	13:N:43:TRP:HE1	1.70	0.56
1:A:443:SER:HB3	1:A:575:LEU:HG	1.88	0.56
2:B:333:CYS:O	2:B:342:LYS:NZ	2.37	0.56
3:C:138:LEU:HB2	3:C:214:CYS:HB2	1.86	0.56
1:A:800:GLU:OE1	1:A:887:ARG:NE	2.37	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:50:ARG:NH1	3:C:52:ASP:OD2	2.39	0.55
4:E:19:GLN:OE1	4:E:138:ASN:ND2	2.39	0.55
5:F:80:MET:O	5:F:101:LYS:NZ	2.32	0.55
14:O:483:LEU:HD21	14:O:488:SER:H	1.70	0.55
2:B:538:GLY:HA3	2:B:570:LEU:HD23	1.88	0.55
1:A:1217:GLN:NE2	2:B:1043:ASP:OD2	2.33	0.55
4:E:170:LEU:O	4:E:172:ARG:NH1	2.39	0.55
14:O:347:LEU:HD22	14:O:371:LEU:HD22	1.88	0.55
8:I:115:CYS:SG	8:I:116:THR:N	2.79	0.55
1:A:302:LEU:HD11	1:A:398:VAL:HG22	1.89	0.55
2:B:696:MET:HG3	2:B:712:TYR:HB3	1.89	0.55
7:H:30:CYS:HB2	7:H:39:LEU:HB3	1.88	0.55
9:J:40:LEU:HD22	9:J:45:CYS:HB3	1.87	0.55
1:A:1112:GLY:O	4:E:14:ARG:NH2	2.40	0.54
1:A:559:PRO:HG2	1:A:627:LEU:HD21	1.87	0.54
14:O:405:ASN:ND2	14:O:556:LEU:O	2.41	0.54
4:E:73:PHE:HD2	4:E:99:ILE:HD13	1.73	0.54
12:M:7:PRO:HB2	13:N:63:LEU:HB2	1.89	0.54
1:A:405:GLU:O	1:A:408:LYS:NZ	2.37	0.54
2:B:903:PRO:HB2	2:B:979:LEU:HD23	1.90	0.54
1:A:101:ARG:O	1:A:212:ARG:NH1	2.41	0.53
6:G:132:MET:HB2	6:G:147:VAL:HA	1.90	0.53
13:N:82:VAL:HG22	13:N:117:ILE:HG12	1.90	0.53
1:A:428:PHE:HB3	1:A:1673:THR:HG23	1.90	0.53
1:A:916:LEU:HD22	1:A:951:VAL:HG11	1.90	0.53
4:E:168:ASN:HA	4:E:172:ARG:HH22	1.72	0.53
1:A:438:ASP:O	2:B:1057:ARG:NH1	2.39	0.53
2:B:295:SER:O	8:I:40:ARG:NH2	2.42	0.53
1:A:1296:LYS:NZ	1:A:1298:ASP:OD2	2.42	0.53
1:A:1700:LEU:HB2	2:B:1042:ARG:HH22	1.71	0.53
2:B:106:ARG:HG3	2:B:855:CYS:HB3	1.90	0.53
3:C:291:GLU:HA	3:C:294:LYS:HE3	1.90	0.53
7:H:124:ARG:NH1	7:H:126:GLN:OE1	2.34	0.53
8:I:38:CYS:SG	8:I:39:ILE:N	2.81	0.53
1:A:71:PHE:O	1:A:308:ARG:NH1	2.42	0.53
1:A:74:CYS:SG	1:A:75:SER:N	2.81	0.53
2:B:972:ASN:ND2	2:B:976:THR:OG1	2.40	0.53
1:A:549:LEU:HB3	1:A:597:HIS:HB2	1.91	0.53
1:A:1297:ILE:HD13	1:A:1544:VAL:HG12	1.89	0.53
2:B:179:ILE:HD11	2:B:434:PHE:HE1	1.73	0.52
10:K:98:ARG:O	10:K:102:GLU:HB2	2.08	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1318:ARG:HD2	1:A:1526:GLN:HE21	1.74	0.52
1:A:1718:PRO:HD3	5:F:105:ILE:HG12	1.90	0.52
2:B:351:ARG:HH12	2:B:565:TRP:HZ2	1.57	0.52
6:G:147:VAL:HG21	6:G:194:ILE:HD12	1.90	0.52
1:A:954:ARG:HG3	1:A:956:LEU:HB3	1.91	0.52
8:I:27:LEU:HD11	8:I:45:ILE:HD12	1.90	0.52
1:A:483:ALA:O	1:A:495:SER:OG	2.26	0.52
2:B:233:THR:HG23	2:B:285:MET:HG2	1.91	0.52
4:E:32:GLU:OE1	4:E:35:GLN:NE2	2.43	0.52
1:A:123:GLN:NE2	1:A:135:VAL:O	2.42	0.52
2:B:460:LEU:HD11	2:B:1003:ARG:HG2	1.91	0.52
1:A:203:LYS:O	1:A:212:ARG:NH2	2.43	0.52
1:A:1282:LYS:HB2	1:A:1564:LEU:HD23	1.91	0.52
12:M:24:VAL:HG23	13:N:95:LEU:HB2	1.92	0.52
1:A:933:LYS:HE2	1:A:936:PRO:HA	1.92	0.52
1:A:12:LEU:HD21	2:B:1132:LEU:HD13	1.92	0.52
1:A:27:LYS:HE2	2:B:1100:LEU:HD12	1.92	0.51
1:A:639:ALA:O	1:A:643:THR:OG1	2.29	0.51
5:F:66:LEU:HD11	5:F:97:LEU:HD22	1.91	0.51
1:A:557:HIS:HB3	1:A:1221:GLU:HG2	1.92	0.51
1:A:1113:ARG:HG3	1:A:1118:GLN:HE21	1.75	0.51
1:A:89:ASN:ND2	1:A:296:VAL:O	2.39	0.51
2:B:991:ASP:N	2:B:991:ASP:OD1	2.42	0.51
2:B:374:VAL:HG13	2:B:619:LEU:HD11	1.93	0.51
1:A:828:ARG:HE	1:A:842:VAL:HG21	1.76	0.51
1:A:101:ARG:NE	1:A:200:MET:O	2.40	0.51
1:A:548:LEU:HD13	1:A:566:ALA:HB2	1.93	0.51
8:I:79:GLN:O	8:I:98:HIS:NE2	2.44	0.51
2:B:1071:VAL:HG13	2:B:1134:VAL:HB	1.93	0.50
3:C:134:GLU:HG3	3:C:181:GLN:HG3	1.93	0.50
3:C:228:VAL:HG11	3:C:231:ALA:HB2	1.93	0.50
14:O:253:LYS:O	14:O:257:ASN:ND2	2.45	0.50
1:A:185:CYS:HA	1:A:188:LYS:HG2	1.93	0.50
12:M:23:ALA:HB1	13:N:94:LEU:HD11	1.93	0.50
14:O:414:ALA:H	14:O:470:ARG:HH22	1.59	0.50
2:B:624:GLN:NE2	13:N:131:GLN:OE1	2.45	0.50
1:A:86:THR:HG21	1:A:262:ARG:HD2	1.92	0.50
1:A:156:GLU:HG3	1:A:157:ILE:HG23	1.94	0.50
1:A:997:GLU:OE1	1:A:1697:SER:OG	2.25	0.50
2:B:19:LEU:HD12	2:B:20:THR:HG23	1.93	0.50
12:M:79:LEU:HD23	12:M:108:ASN:HB2	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:59:ASP:HA	2:B:1020:ARG:HH12	1.76	0.50
1:A:1101:LYS:HD3	1:A:1116:GLY:HA3	1.94	0.49
2:B:707:SER:HG	2:B:868:CYS:HG	1.58	0.49
11:L:24:THR:OG1	11:L:36:CYS:SG	2.70	0.49
1:A:1615:GLU:OE2	4:E:207:ARG:NE	2.39	0.49
1:A:481:ARG:HH22	14:O:556:LEU:HD21	1.77	0.49
2:B:494:TRP:NE1	2:B:660:GLU:OE2	2.42	0.49
2:B:184:MET:HE2	2:B:375:LEU:HD13	1.95	0.49
2:B:740:ASN:HB2	9:J:47:ARG:HD3	1.94	0.49
8:I:103:ARG:NH2	8:I:125:ASP:O	2.45	0.49
1:A:215:VAL:HG12	1:A:225:ILE:HG22	1.95	0.49
2:B:978:ARG:HH21	2:B:991:ASP:HB3	1.78	0.49
2:B:773:VAL:HG13	2:B:873:VAL:HB	1.93	0.49
2:B:856:SER:HB2	11:L:34:ILE:HG13	1.95	0.49
14:O:365:GLN:HE21	14:O:561:PRO:HB3	1.78	0.49
2:B:758:ILE:HB	2:B:914:LEU:HB2	1.93	0.49
1:A:74:CYS:O	1:A:308:ARG:NH1	2.46	0.48
1:A:287:GLY:HA2	1:A:291:ARG:HB3	1.95	0.48
1:A:448:ASP:HB2	1:A:576:ARG:HD2	1.94	0.48
1:A:584:ALA:HB2	1:A:627:LEU:HD13	1.94	0.48
1:A:722:ARG:HH11	7:H:17:PRO:HA	1.78	0.48
4:E:26:TYR:OH	4:E:101:ARG:NH1	2.46	0.48
12:M:69:TYR:HB3	12:M:109:MET:HB3	1.96	0.48
1:A:84:PRO:HB3	1:A:339:ARG:HE	1.78	0.48
1:A:305:PRO:O	1:A:310:ARG:NH1	2.46	0.48
2:B:984:SER:OG	2:B:985:GLY:N	2.45	0.48
2:B:534:LEU:HB3	2:B:539:VAL:HG21	1.96	0.48
8:I:11:SER:OG	12:M:66:ARG:NH2	2.46	0.48
8:I:15:SER:OG	12:M:30:ASN:O	2.27	0.48
1:A:1274:ALA:HB1	1:A:1594:VAL:HA	1.96	0.48
2:B:743:VAL:HG22	2:B:913:ILE:HB	1.96	0.48
1:A:111:THR:HG21	1:A:212:ARG:HH22	1.78	0.48
1:A:341:LEU:HD22	1:A:390:ILE:HD12	1.95	0.48
1:A:850:HIS:ND1	1:A:941:TYR:OH	2.34	0.48
4:E:96:GLU:HG3	4:E:97:GLU:HG3	1.95	0.47
1:A:468:TYR:HB2	1:A:598:PHE:CE2	2.50	0.47
1:A:485:ILE:O	1:A:515:ARG:NH1	2.47	0.47
2:B:380:LEU:HD11	2:B:453:LEU:HD13	1.97	0.47
2:B:1076:LEU:HD13	2:B:1120:VAL:HG11	1.95	0.47
2:B:160:HIS:ND1	2:B:705:ASP:OD2	2.41	0.47
7:H:8:ASP:OD1	7:H:34:SER:OG	2.28	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:H:37:MET:HG2	7:H:127:GLY:HA3	1.97	0.47
2:B:980:TYR:HE2	3:C:234:ARG:HA	1.78	0.47
3:C:118:ASP:HB3	3:C:121:LEU:HD23	1.95	0.47
4:E:166:ARG:HH12	4:E:168:ASN:HD22	1.61	0.47
10:K:40:VAL:HG12	10:K:92:ALA:HB3	1.96	0.47
3:C:246:GLU:HG2	3:C:270:LYS:HD2	1.95	0.47
12:M:73:ASN:ND2	12:M:105:GLU:OE2	2.48	0.47
3:C:89:VAL:HB	3:C:111:GLY:HA2	1.96	0.47
6:G:77:ALA:O	6:G:81:ARG:NH2	2.48	0.47
1:A:1668:PRO:HD2	1:A:1691:ASP:HB3	1.96	0.47
2:B:790:SER:OG	2:B:865:LYS:NZ	2.48	0.47
3:C:235:LEU:HB2	3:C:301:ARG:HD3	1.96	0.47
14:O:412:ALA:O	14:O:470:ARG:NH1	2.47	0.47
1:A:381:GLN:H	1:A:389:ASN:HD21	1.63	0.47
2:B:44:GLU:OE1	2:B:522:THR:OG1	2.33	0.47
7:H:24:ARG:O	7:H:44:ASN:ND2	2.48	0.46
2:B:746:ILE:HD12	2:B:992:ILE:HG12	1.97	0.46
1:A:389:ASN:HA	1:A:392:ILE:HG22	1.98	0.46
1:A:704:ASN:N	1:A:1043:ASN:OD1	2.36	0.46
1:A:994:LYS:NZ	1:A:1697:SER:OG	2.47	0.46
2:B:774:TYR:CE1	2:B:872:ARG:HG2	2.50	0.46
6:G:46:SER:OG	6:G:132:MET:SD	2.73	0.46
10:K:67:PHE:HB3	10:K:85:GLN:HB3	1.96	0.46
1:A:69:GLN:HB3	1:A:73:ASN:HB2	1.97	0.46
1:A:1716:LYS:NZ	6:G:104:ASP:OD1	2.38	0.46
1:A:1256:SER:HB2	1:A:1259:ILE:HG22	1.97	0.46
7:H:99:ILE:HG22	7:H:114:ALA:HA	1.97	0.46
13:N:55:CYS:SG	13:N:72:LYS:N	2.87	0.46
2:B:186:ARG:NH2	2:B:636:THR:OG1	2.32	0.46
7:H:9:ILE:HG13	7:H:57:ARG:HG2	1.98	0.46
10:K:41:THR:HG1	10:K:83:ARG:HE	1.63	0.46
1:A:194:LEU:O	1:A:198:ALA:HB3	2.16	0.46
1:A:1249:ARG:HG2	1:A:1253:MET:HB2	1.98	0.46
2:B:707:SER:OG	2:B:868:CYS:SG	2.70	0.46
1:A:19:MET:SD	1:A:19:MET:N	2.88	0.46
1:A:447:PRO:HB3	1:A:579:TYR:CE1	2.51	0.46
1:A:1290:LEU:HD22	1:A:1341:PHE:HE2	1.81	0.46
2:B:1069:VAL:HG11	2:B:1132:LEU:HD12	1.97	0.46
5:F:69:ARG:HG2	5:F:102:ILE:HG12	1.98	0.46
2:B:1120:VAL:HG22	2:B:1130:VAL:HG11	1.98	0.46
4:E:81:LYS:HE2	4:E:111:THR:HG22	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:494:TRP:HZ2	2:B:646:ILE:HD11	1.80	0.45
7:H:76:ASN:OD1	10:K:87:ARG:NH2	2.49	0.45
2:B:660:GLU:OE1	2:B:665:SER:OG	2.35	0.45
1:A:833:LEU:HD22	1:A:842:VAL:HG22	1.99	0.45
1:A:1174:TRP:HA	1:A:1177:GLN:HG2	1.98	0.45
2:B:687:TYR:HD1	2:B:690:GLN:HE21	1.64	0.45
6:G:125:PRO:HB2	6:G:181:VAL:HG11	1.99	0.45
7:H:136:GLU:HG2	7:H:139:SER:HB2	1.97	0.45
13:N:98:SER:OG	13:N:100:GLU:OE1	2.34	0.45
1:A:180:HIS:CE1	1:A:1690:HIS:HB2	2.52	0.45
3:C:78:ARG:NH1	10:K:49:HIS:HB2	2.32	0.45
2:B:1070:CYS:O	2:B:1074:GLY:N	2.50	0.45
2:B:369:LEU:HA	2:B:372:GLN:HB2	1.99	0.45
6:G:69:THR:O	6:G:73:GLU:HB2	2.17	0.45
7:H:63:THR:HG21	7:H:69:THR:HA	1.98	0.45
14:O:187:HIS:NE2	14:O:228:ASN:OD1	2.50	0.45
1:A:120:LEU:HD23	1:A:275:PHE:HZ	1.82	0.45
2:B:412:ASN:HD22	2:B:413:THR:H	1.64	0.45
1:A:634:HIS:O	1:A:754:TYR:OH	2.32	0.45
1:A:644:ARG:HH22	7:H:27:ARG:NH2	2.14	0.45
1:A:831:LEU:HD21	1:A:861:ILE:HD11	1.98	0.45
10:K:44:LEU:HD22	10:K:80:ILE:HD11	1.98	0.45
14:O:414:ALA:O	14:O:470:ARG:NH2	2.49	0.45
12:M:89:VAL:HG23	12:M:104:ALA:HB2	1.99	0.44
14:O:419:LEU:HG	14:O:423:LYS:HE3	1.99	0.44
1:A:1337:ASP:HA	1:A:1340:ARG:HG2	1.98	0.44
2:B:309:ARG:HH22	2:B:316:ASP:HA	1.81	0.44
1:A:1331:LYS:HE2	1:A:1554:TYR:HB2	1.99	0.44
1:A:1186:GLU:O	1:A:1191:ARG:NH1	2.50	0.44
2:B:73:ILE:HG12	2:B:122:VAL:HG12	1.98	0.44
6:G:69:THR:HA	6:G:72:ARG:HG2	2.00	0.44
1:A:991:CYS:HA	1:A:1674:PHE:HE1	1.83	0.44
2:B:192:ALA:HB1	2:B:356:LEU:HD22	1.99	0.44
2:B:336:LEU:HD23	2:B:561:VAL:HG22	2.00	0.44
3:C:66:VAL:HG22	3:C:305:HIS:CD2	2.53	0.44
3:C:78:ARG:HH12	10:K:49:HIS:HB2	1.83	0.44
7:H:15:ILE:HG12	7:H:28:LEU:HD13	1.99	0.44
1:A:1375:ARG:HH12	2:B:198:TRP:HA	1.83	0.44
2:B:1056:ASP:HA	2:B:1060:ASN:HD22	1.82	0.44
1:A:180:HIS:HE1	1:A:1690:HIS:HB2	1.82	0.43
1:A:517:ALA:HA	14:O:256:VAL:HG12	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:112:CYS:HB3	1:A:117:ILE:HD11	2.01	0.43
1:A:497:VAL:HG23	1:A:538:VAL:HA	1.99	0.43
1:A:1305:MET:HG3	1:A:1311:LYS:HB3	2.00	0.43
2:B:383:MET:HB3	2:B:445:LEU:HD22	2.00	0.43
2:B:392:TRP:HD1	2:B:424:ILE:HG22	1.82	0.43
4:E:13:ILE:HG21	4:E:132:GLN:HE21	1.83	0.43
7:H:58:LEU:HD11	7:H:143:LEU:HD11	1.99	0.43
12:M:51:ASN:OD1	12:M:53:ARG:NH2	2.51	0.43
1:A:463:ALA:HB2	1:A:568:ILE:HD12	2.01	0.43
1:A:1070:ARG:O	1:A:1074:LYS:HB2	2.19	0.43
1:A:125:ARG:HH21	1:A:165:THR:HG23	1.83	0.43
2:B:542:ILE:H	2:B:542:ILE:HG13	1.55	0.43
4:E:149:VAL:HG23	4:E:192:LYS:HB3	2.00	0.43
1:A:475:TRP:NE1	5:F:86:GLU:O	2.52	0.43
1:A:1004:ASP:O	1:A:1006:THR:N	2.51	0.43
2:B:759:VAL:HG22	2:B:913:ILE:HG12	2.00	0.43
5:F:68:THR:O	5:F:72:GLN:N	2.51	0.43
1:A:423:LYS:H	1:A:423:LYS:HD2	1.83	0.43
2:B:11:PRO:HD3	2:B:729:TYR:HD1	1.83	0.43
2:B:16:LEU:HD22	2:B:944:CYS:HB2	2.00	0.43
2:B:1013:ARG:HE	2:B:1034:GLY:N	2.17	0.43
7:H:76:ASN:HA	10:K:87:ARG:HH22	1.83	0.43
2:B:172:ILE:HG13	2:B:434:PHE:HB3	2.01	0.43
2:B:736:PRO:HG3	9:J:53:VAL:HG11	2.01	0.43
3:C:236:LEU:HD13	3:C:305:HIS:CE1	2.54	0.43
1:A:114:ARG:HD3	1:A:117:ILE:HD12	2.00	0.43
1:A:427:LEU:HD11	2:B:1118:TYR:HE2	1.84	0.43
1:A:507:LEU:HD12	1:A:515:ARG:HG2	2.01	0.43
1:A:653:TYR:HD1	1:A:687:VAL:HG22	1.83	0.43
1:A:1613:GLY:HA2	4:E:178:PRO:HD2	2.00	0.43
1:A:302:LEU:HD12	1:A:331:VAL:HG11	2.00	0.42
2:B:41:ALA:HA	2:B:522:THR:HG21	2.01	0.42
1:A:474:PRO:HB3	1:A:523:LEU:HD21	2.02	0.42
2:B:458:ASP:HB3	2:B:464:ARG:HE	1.83	0.42
4:E:165:LEU:HD21	4:E:170:LEU:HD13	2.00	0.42
1:A:80:HIS:HA	1:A:303:VAL:HA	2.00	0.42
1:A:258:PRO:HA	1:A:261:ALA:HB3	2.00	0.42
4:E:87:ILE:HD11	4:E:118:LEU:HD12	1.99	0.42
1:A:452:ASN:HB2	1:A:455:GLU:HB2	2.02	0.42
2:B:713:ARG:NH2	9:J:1:MET:SD	2.93	0.42
14:O:219:GLU:HG2	14:O:313:ARG:HG2	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:O:412:ALA:HB1	14:O:469:PHE:HB2	2.01	0.42
1:A:690:THR:O	1:A:694:ASN:ND2	2.52	0.42
1:A:451:ILE:HB	1:A:455:GLU:HG2	2.02	0.42
1:A:550:LEU:HD13	1:A:550:LEU:HA	1.90	0.42
3:C:235:LEU:HB2	3:C:301:ARG:HH11	1.83	0.42
1:A:734:GLU:HB3	1:A:748:VAL:HG23	2.02	0.42
2:B:102:GLU:OE2	2:B:106:ARG:NH1	2.53	0.42
2:B:217:GLU:HB2	2:B:219:HIS:CE1	2.54	0.42
4:E:63:ALA:HA	4:E:71:GLN:HG2	2.01	0.42
2:B:1098:CYS:O	2:B:1102:SER:N	2.53	0.42
3:C:78:ARG:HE	3:C:78:ARG:HB3	1.62	0.42
2:B:261:ASP:HB3	2:B:286:LEU:HD23	2.01	0.42
2:B:982:GLY:O	3:C:78:ARG:NH1	2.53	0.42
3:C:110:LEU:HA	3:C:113:ILE:HD12	2.02	0.42
1:A:427:LEU:HD21	2:B:1118:TYR:CD2	2.55	0.42
2:B:1069:VAL:HG21	2:B:1134:VAL:HG21	2.02	0.41
1:A:873:SER:HA	1:A:915:LEU:HD21	2.02	0.41
2:B:597:LEU:HD13	2:B:610:LEU:HD12	2.02	0.41
6:G:57:ILE:HG13	6:G:116:ILE:HG12	2.02	0.41
1:A:677:LYS:HE2	7:H:86:ASP:HB3	2.02	0.41
2:B:457:ALA:HA	2:B:468:HIS:ND1	2.35	0.41
6:G:147:VAL:HB	6:G:151:PHE:HB2	2.02	0.41
7:H:77:PRO:HD2	10:K:87:ARG:HH22	1.84	0.41
14:O:411:LEU:HD22	14:O:422:VAL:HG22	2.02	0.41
1:A:801:ASP:HB2	1:A:892:ASN:OD1	2.19	0.41
1:A:887:ARG:NH2	1:A:891:GLU:O	2.53	0.41
2:B:35:LEU:HD12	2:B:164:GLU:HG2	2.02	0.41
2:B:946:ASP:OD1	2:B:946:ASP:N	2.54	0.41
11:L:26:ASN:HB2	11:L:44:MET:HE1	2.00	0.41
1:A:1717:GLN:OE1	5:F:72:GLN:NE2	2.52	0.41
6:G:83:SER:OG	6:G:86:LEU:O	2.34	0.41
1:A:1016:GLN:NE2	1:A:1642:SER:O	2.53	0.41
1:A:1301:GLU:HB3	8:I:55:VAL:HG13	2.02	0.41
2:B:1068:HIS:CD2	2:B:1109:THR:HG22	2.55	0.41
7:H:32:SER:OG	7:H:33:GLU:N	2.54	0.41
14:O:260:ARG:NH2	14:O:262:GLY:O	2.53	0.41
4:E:6:GLU:HB3	4:E:48:PRO:HG2	2.01	0.41
4:E:10:LEU:HD13	4:E:58:LEU:HD11	2.03	0.41
14:O:144:LEU:HD12	14:O:147:CYS:HB2	2.03	0.41
1:A:440:ALA:HB3	2:B:1035:ILE:HG21	2.03	0.41
1:A:658:TYR:HB2	10:K:67:PHE:HZ	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1044:TYR:OH	1:A:1191:ARG:HB3	2.21	0.41
13:N:52:ALA:HA	13:N:53:PRO:HD3	1.93	0.41
1:A:28:LEU:HD21	2:B:1100:LEU:HB2	2.02	0.41
1:A:324:GLN:NE2	1:A:420:ILE:HG13	2.36	0.41
1:A:866:LYS:O	1:A:870:ASN:ND2	2.54	0.41
1:A:925:ARG:HH21	1:A:948:GLY:HA3	1.86	0.41
2:B:463:ILE:HG22	2:B:693:LYS:HG2	2.02	0.40
2:B:745:VAL:HG12	2:B:917:PRO:HG3	2.03	0.40
4:E:10:LEU:HD23	4:E:13:ILE:HD11	2.03	0.40
11:L:28:ILE:HD13	11:L:34:ILE:HG22	2.03	0.40
1:A:441:ALA:HA	2:B:1012:VAL:HA	2.03	0.40
2:B:6:ARG:O	2:B:729:TYR:OH	2.40	0.40
2:B:247:LEU:HD13	2:B:308:PHE:HE2	1.85	0.40
14:O:197:VAL:HA	14:O:198:PRO:HD3	1.92	0.40
14:O:252:LEU:HD23	14:O:364:VAL:HG21	2.03	0.40
1:A:71:PHE:HE1	1:A:308:ARG:HB2	1.86	0.40
1:A:607:GLU:HG3	5:F:63:ALA:HB1	2.04	0.40
1:A:1025:ASP:OD2	1:A:1028:LYS:NZ	2.51	0.40
14:O:111:SER:O	14:O:115:ARG:NE	2.54	0.40
1:A:981:LYS:HD2	1:A:1228:LEU:HB2	2.02	0.40
1:A:1293:VAL:HG21	1:A:1338:ILE:HG21	2.02	0.40
2:B:188:ASN:HD21	2:B:215:VAL:H	1.70	0.40
3:C:86:THR:OG1	3:C:225:PHE:O	2.38	0.40
1:A:554:PRO:HB2	1:A:556:LEU:HG	2.02	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [\(i\)](#)

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

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	1506/1720 (88%)	1369 (91%)	137 (9%)	0	<b>100</b> <b>100</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	1123/1135 (99%)	1039 (92%)	84 (8%)	0	100	100
3	C	307/346 (89%)	289 (94%)	18 (6%)	0	100	100
4	E	208/210 (99%)	193 (93%)	15 (7%)	0	100	100
5	F	76/127 (60%)	71 (93%)	5 (7%)	0	100	100
6	G	155/338 (46%)	137 (88%)	18 (12%)	0	100	100
7	H	147/150 (98%)	134 (91%)	13 (9%)	0	100	100
8	I	101/126 (80%)	91 (90%)	10 (10%)	0	100	100
9	J	62/67 (92%)	56 (90%)	6 (10%)	0	100	100
10	K	105/133 (79%)	101 (96%)	4 (4%)	0	100	100
11	L	44/58 (76%)	41 (93%)	3 (7%)	0	100	100
12	M	101/419 (24%)	88 (87%)	13 (13%)	0	100	100
13	N	147/510 (29%)	134 (91%)	13 (9%)	0	100	100
14	O	333/651 (51%)	317 (95%)	14 (4%)	2 (1%)	25	59
All	All	4415/5990 (74%)	4060 (92%)	353 (8%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
14	O	139	ALA
14	O	141	THR

### 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	1339/1504 (89%)	1325 (99%)	14 (1%)	76	90
2	B	987/992 (100%)	978 (99%)	9 (1%)	78	91
3	C	272/302 (90%)	270 (99%)	2 (1%)	84	93
4	E	192/192 (100%)	192 (100%)	0	100	100
5	F	68/111 (61%)	67 (98%)	1 (2%)	65	85

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
6	G	134/288 (46%)	133 (99%)	1 (1%)	84	93
7	H	130/131 (99%)	129 (99%)	1 (1%)	81	92
8	I	93/111 (84%)	92 (99%)	1 (1%)	73	89
9	J	53/56 (95%)	53 (100%)	0	100	100
10	K	96/119 (81%)	96 (100%)	0	100	100
11	L	43/55 (78%)	39 (91%)	4 (9%)	9	32
12	M	91/366 (25%)	91 (100%)	0	100	100
13	N	118/427 (28%)	115 (98%)	3 (2%)	47	75
14	O	319/589 (54%)	316 (99%)	3 (1%)	78	91
All	All	3935/5243 (75%)	3896 (99%)	39 (1%)	77	90

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	LYS
1	A	7	MET
1	A	101	ARG
1	A	216	ARG
1	A	423	LYS
1	A	424	LYS
1	A	465	LYS
1	A	551	ASN
1	A	650	ARG
1	A	954	ARG
1	A	1331	LYS
1	A	1333	LEU
1	A	1579	ASN
1	A	1584	ASN
2	B	313	ASN
2	B	365	ASN
2	B	412	ASN
2	B	542	ILE
2	B	588	ARG
2	B	1092	ARG
2	B	1094	ARG
2	B	1095	LYS
2	B	1129	LYS
3	C	145	ARG
3	C	154	LYS

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Mol	Chain	Res	Type
5	F	52	ILE
6	G	44	ARG
7	H	44	ASN
8	I	103	ARG
11	L	15	MET
11	L	29	LYS
11	L	37	ARG
11	L	42	ARG
13	N	21	LYS
13	N	29	ARG
13	N	57	ASN
14	O	188	ARG
14	O	260	ARG
14	O	478	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (49) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	80	HIS
1	A	108	HIS
1	A	133	GLN
1	A	180	HIS
1	A	199	HIS
1	A	264	HIS
1	A	381	GLN
1	A	521	GLN
1	A	595	ASN
1	A	700	HIS
1	A	704	ASN
1	A	1097	GLN
1	A	1109	ASN
1	A	1118	GLN
1	A	1225	GLN
1	A	1526	GLN
1	A	1569	ASN
1	A	1579	ASN
1	A	1584	ASN
1	A	1610	ASN
1	A	1717	GLN
2	B	188	ASN
2	B	263	GLN
2	B	313	ASN

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Mol	Chain	Res	Type
2	B	365	ASN
2	B	412	ASN
2	B	643	ASN
2	B	679	HIS
2	B	685	ASN
2	B	690	GLN
2	B	740	ASN
2	B	846	ASN
2	B	1004	HIS
3	C	305	HIS
4	E	168	ASN
5	F	72	GLN
6	G	113	HIS
6	G	152	ASN
6	G	165	GLN
7	H	29	HIS
7	H	44	ASN
8	I	92	HIS
8	I	117	ASN
13	N	57	ASN
14	O	154	HIS
14	O	257	ASN
14	O	405	ASN
14	O	440	GLN
14	O	478	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 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

Of 7 ligands modelled in this entry, 7 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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.

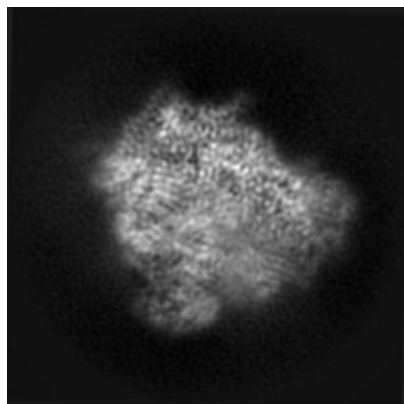
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12796. These allow visual inspection of the internal detail of the map and identification of artifacts.

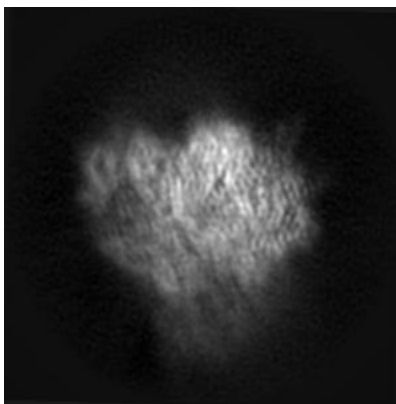
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

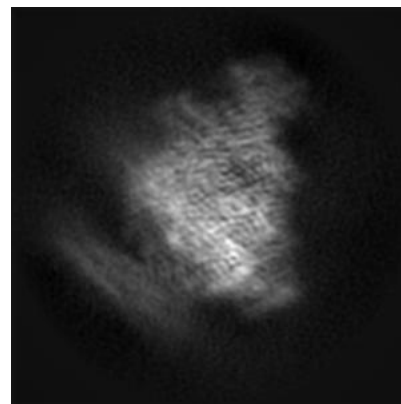
#### 6.1.1 Primary map



X

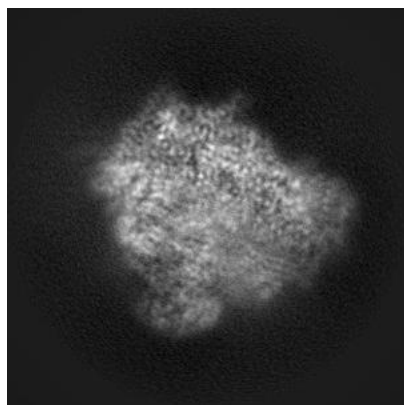


Y

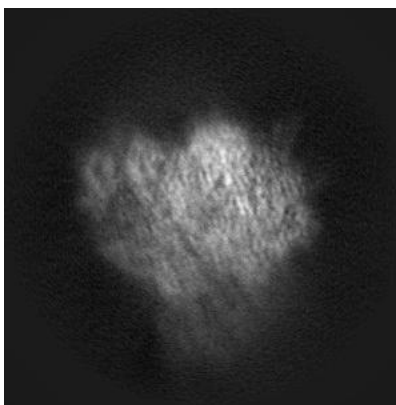


Z

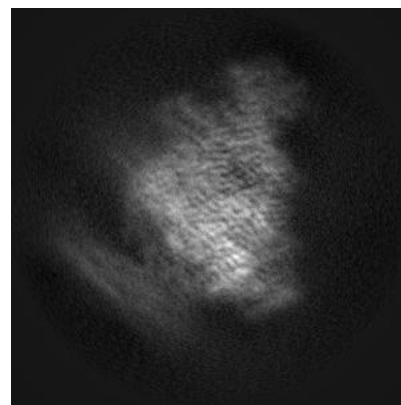
#### 6.1.2 Raw map



X



Y

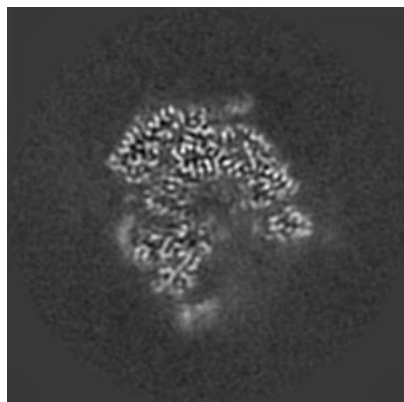


Z

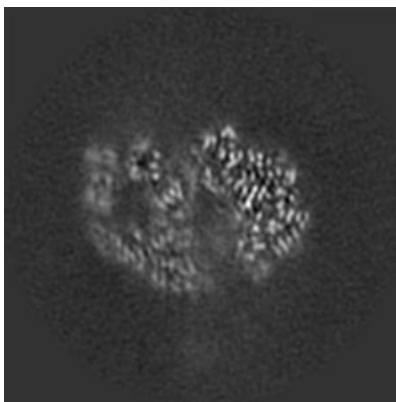
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

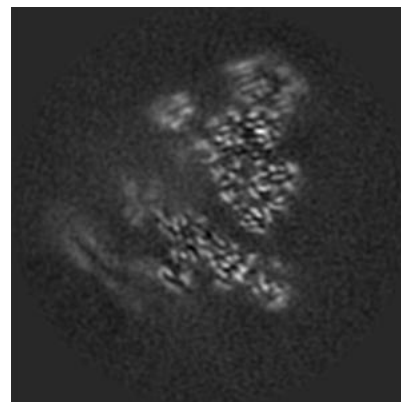
### 6.2.1 Primary map



X Index: 144

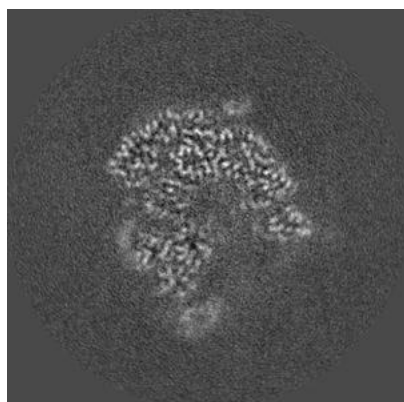


Y Index: 144

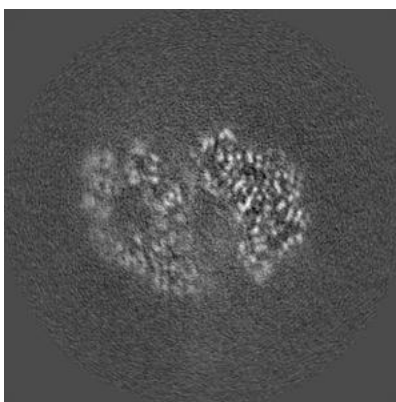


Z Index: 144

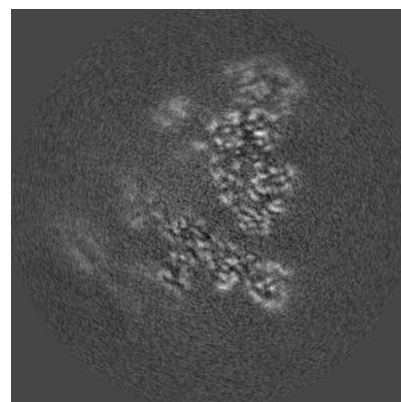
### 6.2.2 Raw map



X Index: 144



Y Index: 144



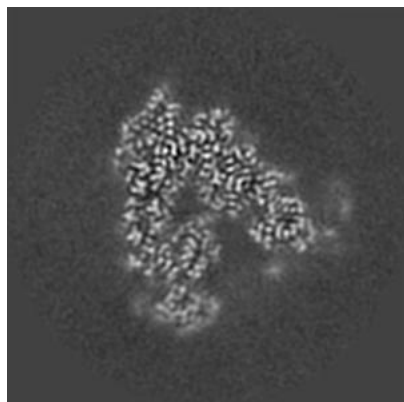
Z Index: 144

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

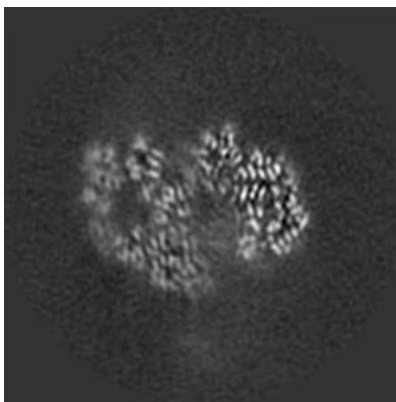


## 6.3 Largest variance slices [i](#)

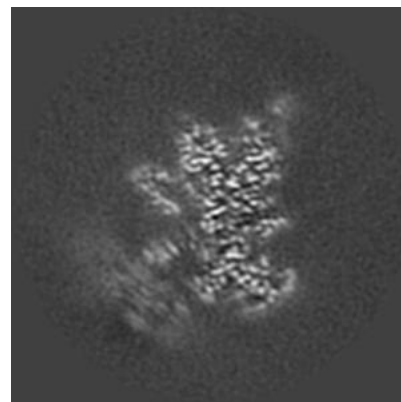
### 6.3.1 Primary map



X Index: 157

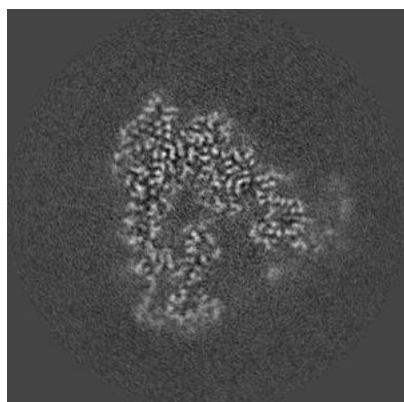


Y Index: 142

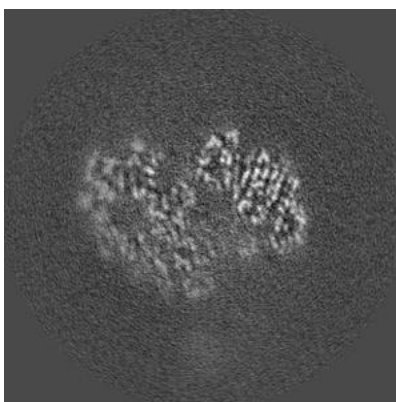


Z Index: 171

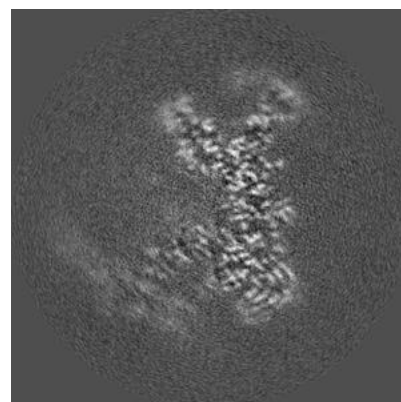
### 6.3.2 Raw map



X Index: 158



Y Index: 138

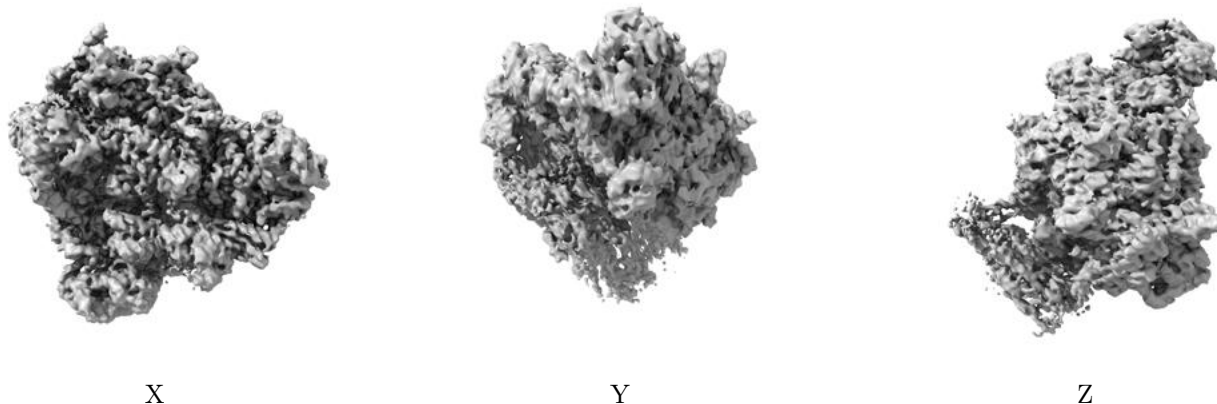


Z Index: 160

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

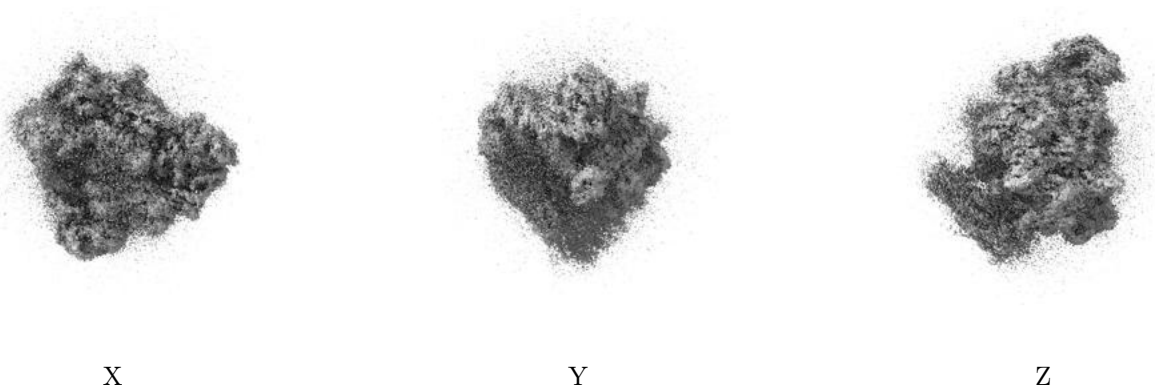
## 6.4 Orthogonal surface views [i](#)

### 6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.00386. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 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.

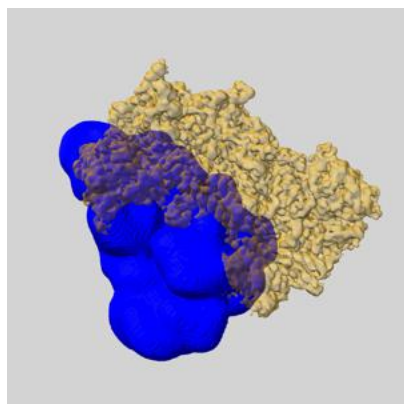
## 6.5 Mask visualisation [i](#)

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

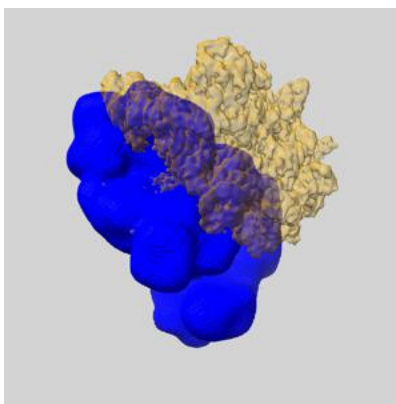
A mask typically either:

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

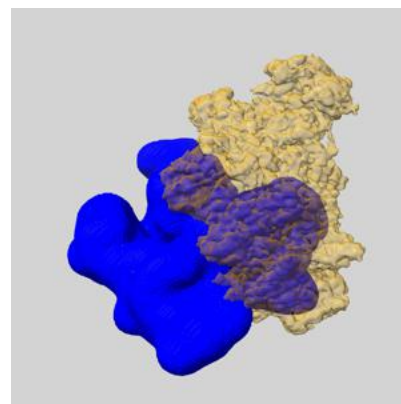
### 6.5.1 emd\_12796\_msk\_1.map [i](#)



X

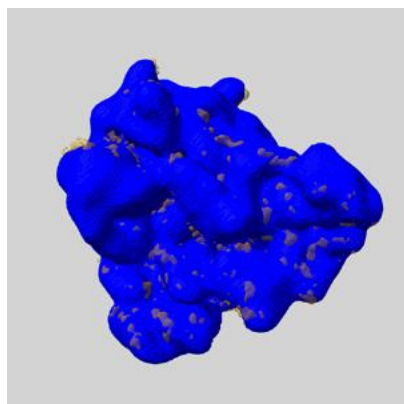


Y

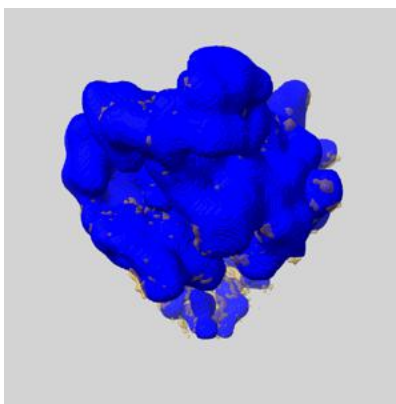


Z

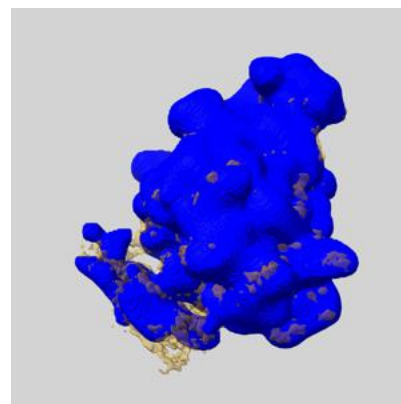
### 6.5.2 emd\_12796\_msk\_2.map [i](#)



X



Y

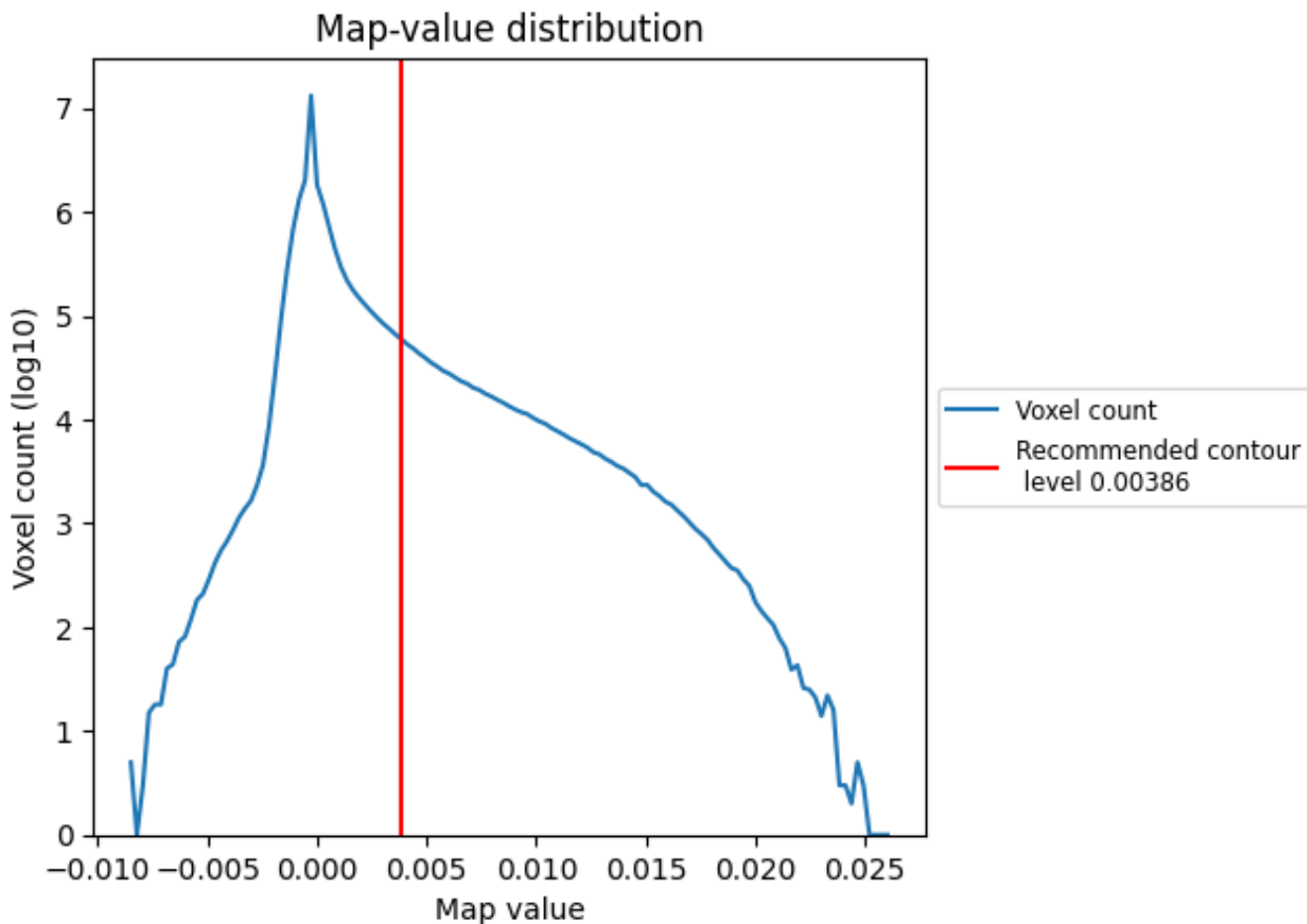


Z

## 7 Map analysis [i](#)

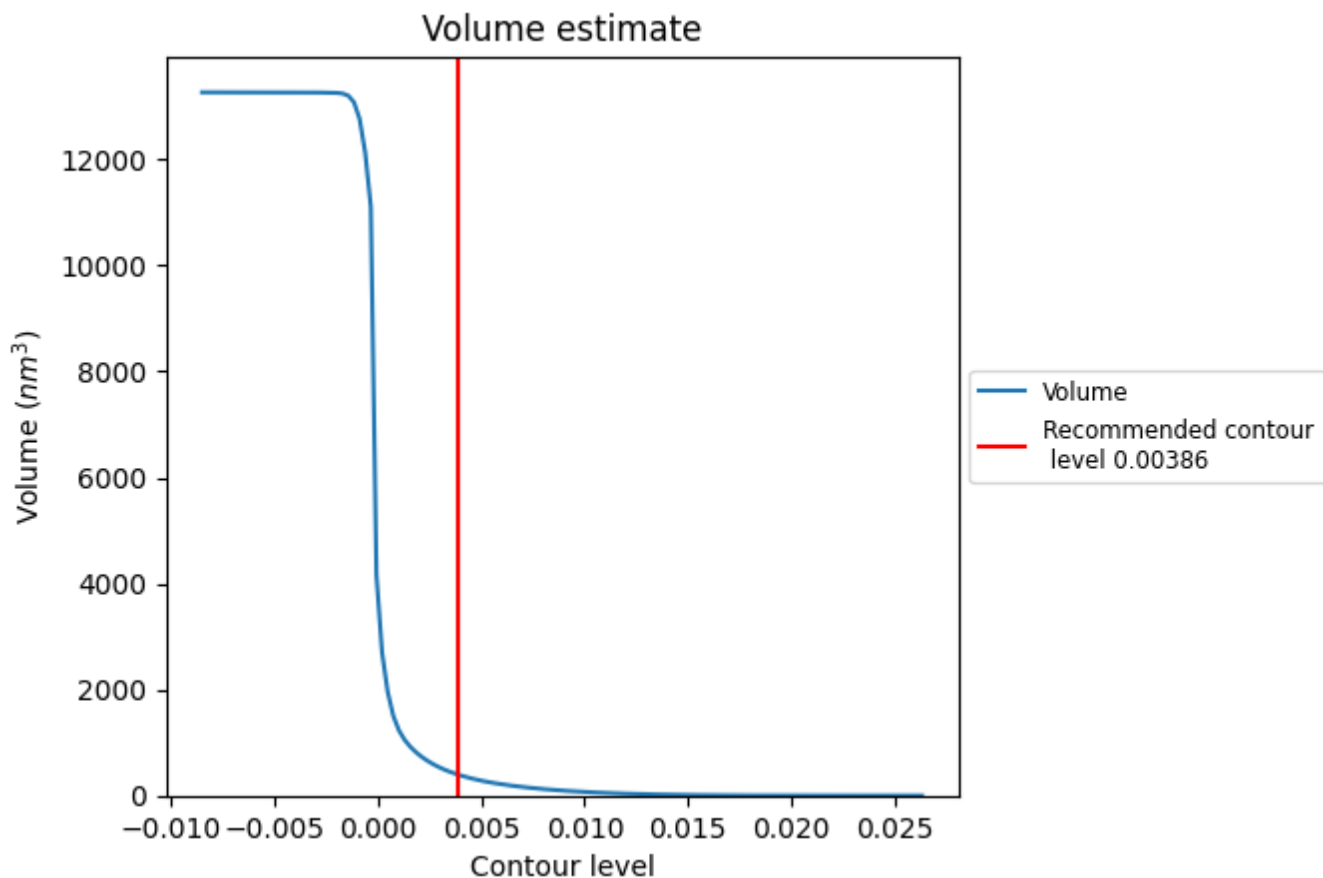
This section contains the results of statistical analysis of the map.

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



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

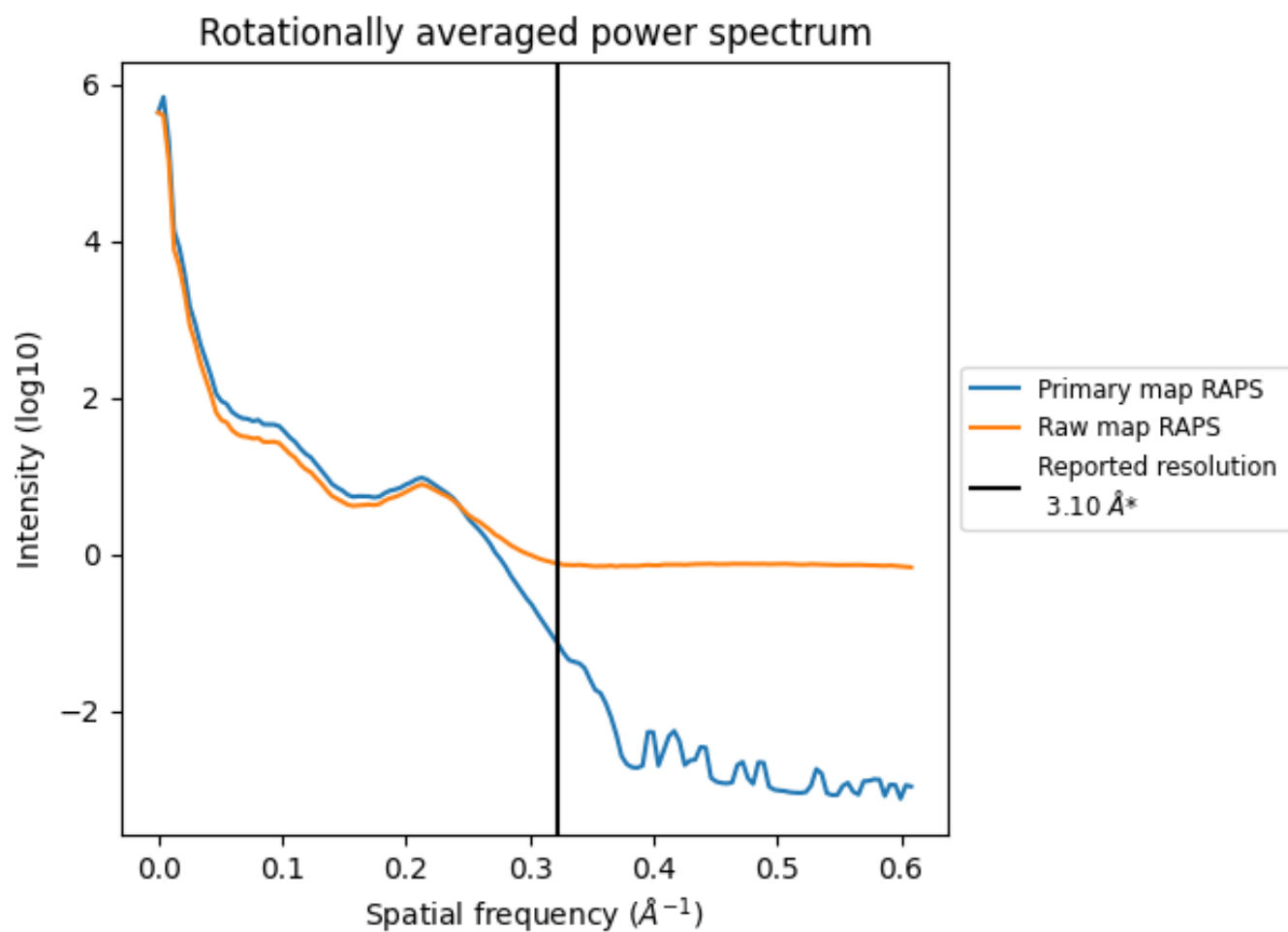
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 398  $\text{nm}^3$ ; this corresponds to an approximate mass of 360 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

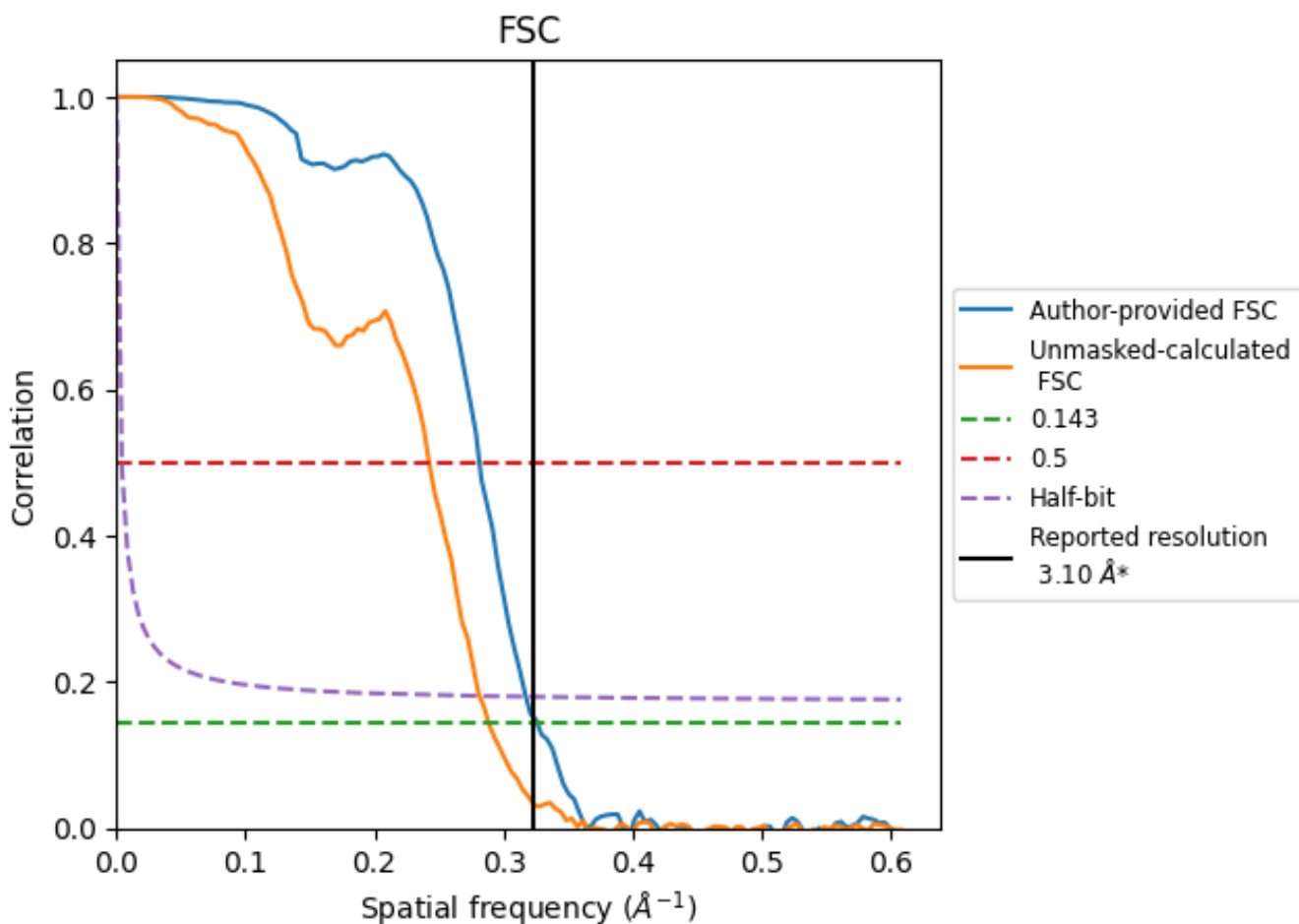


\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

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

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.07	3.55	3.15
Unmasked-calculated*	3.46	4.13	3.55

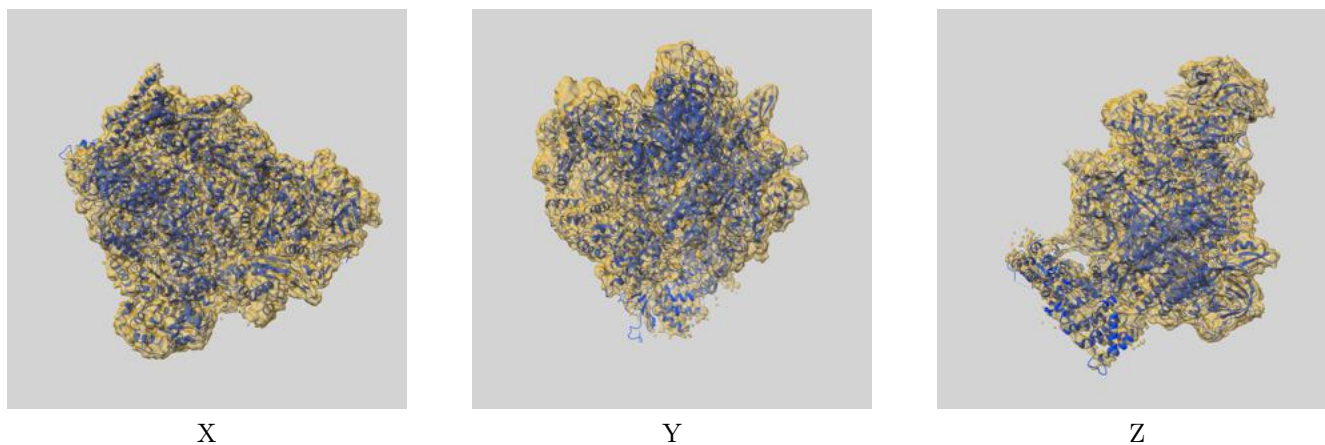
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.46 differs from the reported value 3.1 by more than 10 %



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

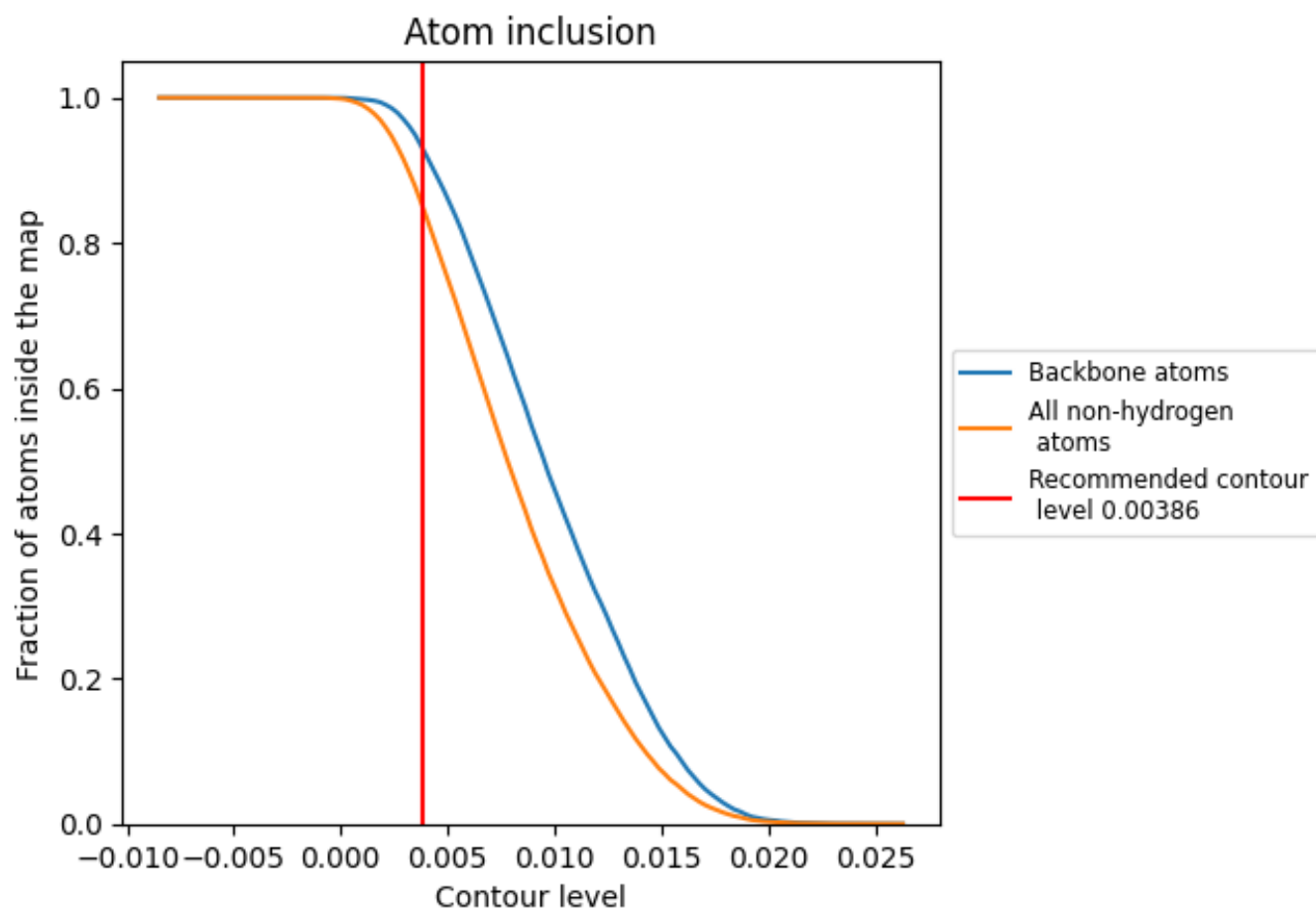
This section contains information regarding the fit between EMDB map EMD-12796 and PDB model 7OBA. Per-residue inclusion information can be found in section 3 on page 7.

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



The images above show the 3D surface view of the map at the recommended contour level 0.00386 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 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 85% of all non-hydrogen atoms, are inside the map.