



Full wwPDB EM Validation Report ⓘ

Jun 29, 2025 – 12:38 am BST

PDB ID : 8B0I / pdb_00008b0i
EMDB ID : EMD-15784
Title : CryoEM structure of bacterial RapZ.GlmZ complex central to the control of cell envelope biogenesis
Authors : Islam, M.S.; Hardwick, H.W.; Chirgadze, D.Y.; Luisi, B.F.
Deposited on : 2022-09-07
Resolution : 4.28 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev118
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

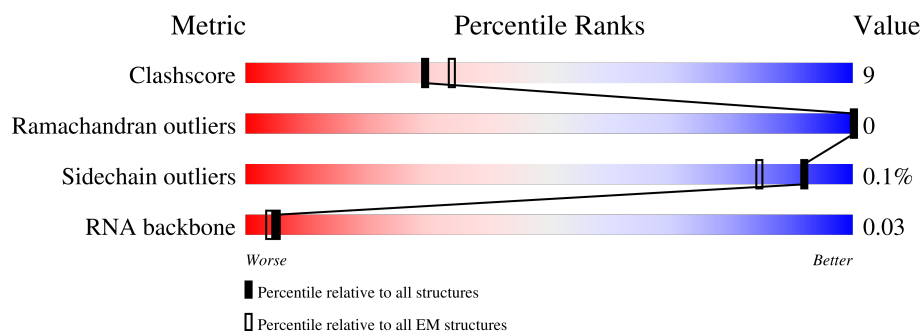
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.28 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	284	 76% 18% • 5%
1	B	284	 70% 23% 6% •
1	C	284	 71% 12% • 15%
1	D	284	 77% 19% • •
2	K	207	 • 18% 23% • 50%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 17636 atoms, of which 7831 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 RNase adapter protein RapZ.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	270	Total	C	H	N	O	S	0	0
			3560	1192	1668	327	369	4		
1	B	281	Total	C	H	N	O	S	0	0
			3825	1253	1831	348	387	6		
1	D	282	Total	C	H	N	O	S	0	0
			3763	1245	1763	356	392	7		
1	C	242	Total	C	H	N	O	S	0	0
			3298	1105	1551	298	341	3		

- Molecule 2 is a RNA chain called GlmZ small regulatory RNA.

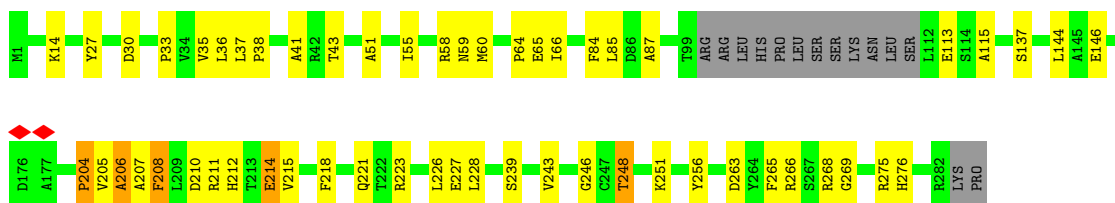
Mol	Chain	Residues	Atoms						AltConf	Trace
2	K	103	Total	C	H	N	O	P	0	0
			3190	972	1018	372	725	103		

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.

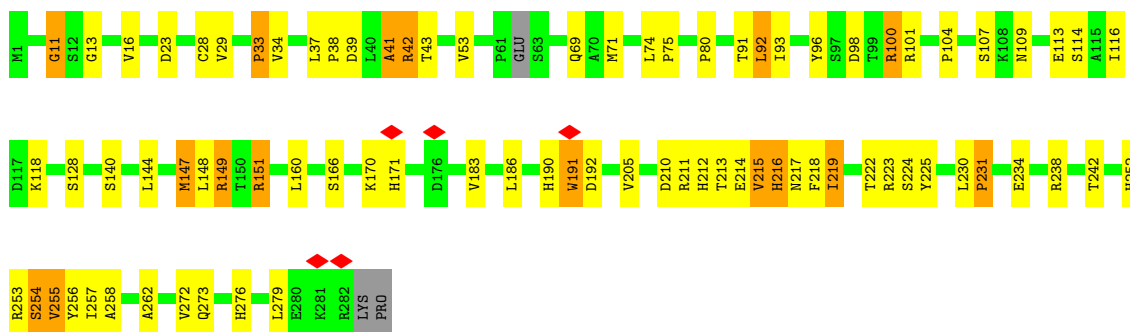
- Molecule 1: RNase adapter protein RapZ

Chain A: 



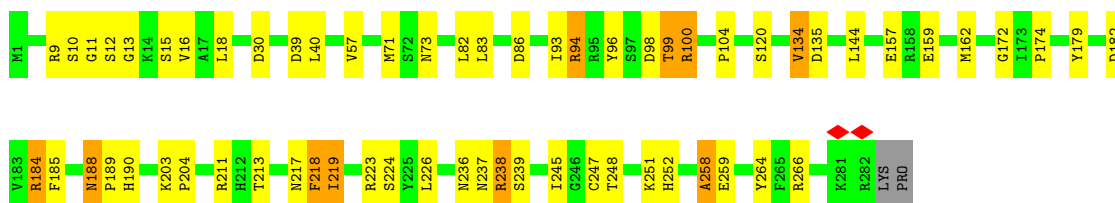
- Molecule 1: RNase adapter protein RapZ

Chain B: 

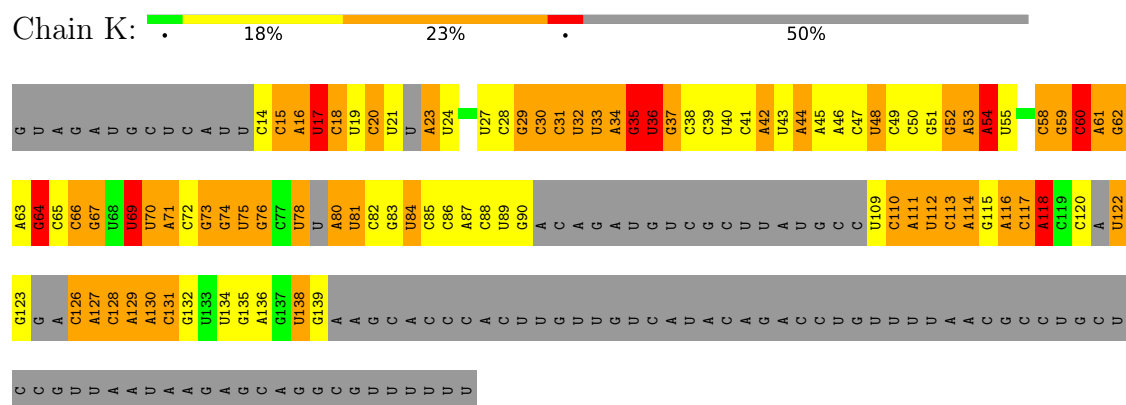
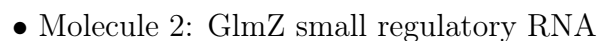


- Molecule 1: RNase adapter protein RapZ

Chain D: 



- Molecule 1: RNase adapter protein RapZ



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	27551	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	47.30	Depositor
Minimum defocus (nm)	100	Depositor
Maximum defocus (nm)	300	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.258	Depositor
Minimum map value	-0.166	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.04	Depositor
Map size ($\text{\AA}$)	299.92, 299.92, 299.92	wwPDB
Map dimensions	460, 460, 460	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.652, 0.652, 0.652	Depositor

5 Model quality

5.1 Standard geometry

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	1.02	4/1927 (0.2%)	1.61	33/2637 (1.3%)
1	B	1.03	1/2027 (0.0%)	1.74	48/2767 (1.7%)
1	C	0.95	0/1780	1.46	21/2437 (0.9%)
1	D	0.94	3/2038 (0.1%)	1.55	36/2786 (1.3%)
2	K	0.49	0/2417	1.07	26/3747 (0.7%)
All	All	0.89	8/10189 (0.1%)	1.48	164/14374 (1.1%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	40	LEU	C-O	-7.20	1.15	1.24
1	A	256	TYR	C-O	-6.70	1.16	1.24
1	B	242	THR	C-O	-6.66	1.15	1.23
1	D	264	TYR	C-O	-6.17	1.16	1.24
1	D	219	ILE	C-O	-5.72	1.17	1.24
1	A	218	PHE	C-O	-5.66	1.16	1.24
1	A	214	GLU	C-O	-5.50	1.17	1.24
1	A	275	ARG	C-O	-5.24	1.17	1.23

All (164) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	221	GLN	N-CA-C	-11.06	99.24	111.07
1	D	189	PRO	N-CA-C	-9.67	101.27	113.84
2	K	35	G	C2'-C3'-O3'	-9.12	100.02	113.70
1	A	115	ALA	N-CA-C	-9.08	101.38	111.28
1	B	11	GLY	N-CA-C	-9.03	102.51	114.25
1	A	204	PRO	N-CA-C	-8.44	101.80	113.53
2	K	29	G	C4'-C3'-O3'	8.26	121.79	109.40
1	B	255	VAL	N-CA-C	-8.19	102.35	113.00
1	B	213	THR	N-CA-C	-8.13	102.46	112.38
1	B	41	ALA	N-CA-C	-7.80	103.75	113.18
1	A	36	LEU	N-CA-C	-7.62	103.88	113.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	57	VAL	N-CA-C	-7.45	101.74	111.05
1	C	153	LEU	N-CA-C	-7.42	103.20	111.28
1	D	188	ASN	CB-CA-C	-7.36	103.00	110.65
1	A	14	LYS	N-CA-C	-7.36	103.26	111.28
1	C	257	ILE	N-CA-C	-7.29	103.42	110.42
1	B	33	PRO	N-CA-C	-7.18	103.55	113.53
1	B	104	PRO	N-CA-C	-7.18	105.37	114.35
1	B	98	ASP	N-CA-C	-7.18	103.45	111.28
1	D	94	ARG	N-CA-C	-7.09	103.49	111.07
1	B	23	ASP	N-CA-C	-7.06	103.58	111.28
1	B	254	SER	N-CA-C	-7.01	101.77	111.30
1	A	266	ARG	N-CA-C	-6.98	103.67	111.28
1	C	215	VAL	N-CA-C	-6.97	103.54	110.30
1	A	248	THR	N-CA-C	-6.95	103.71	111.28
1	B	92	LEU	N-CA-C	-6.92	103.73	111.28
1	B	69	GLN	N-CA-C	-6.87	103.85	111.82
2	K	30	C	C2'-C3'-O3'	6.84	119.75	109.50
1	A	239	SER	N-CA-C	-6.83	103.83	111.28
1	B	242	THR	CA-C-O	-6.75	113.49	121.11
1	A	146	GLU	N-CA-C	-6.72	104.04	111.36
1	D	40	LEU	N-CA-C	-6.71	103.97	111.28
1	B	219	ILE	N-CA-C	-6.69	104.00	110.42
1	B	96	TYR	N-CA-C	-6.68	104.00	111.28
1	B	43	THR	N-CA-C	-6.65	104.04	111.28
2	K	17	U	C3'-C2'-O2'	-6.64	104.63	114.60
2	K	36	U	C2'-C3'-O3'	6.64	119.46	109.50
1	C	223	ARG	N-CA-C	-6.63	103.97	111.07
1	B	75	PRO	N-CA-C	-6.60	99.39	110.21
1	A	208	PHE	N-CA-C	-6.58	104.10	111.28
1	A	223	ARG	N-CA-C	-6.56	104.12	111.28
1	A	144	LEU	N-CA-C	-6.54	104.23	111.36
1	B	42	ARG	N-CA-C	-6.54	104.56	112.54
1	C	18	LEU	N-CA-C	-6.48	104.22	111.28
1	D	99	THR	N-CA-C	-6.45	100.34	109.96
1	A	37	LEU	N-CA-C	-6.44	104.50	113.45
1	D	184	ARG	N-CA-C	-6.44	103.50	112.25
1	A	65	GLU	N-CA-C	-6.43	104.27	111.28
1	A	206	ALA	N-CA-C	-6.43	104.28	111.28
1	B	231	PRO	N-CA-C	-6.42	104.61	113.53
1	B	109	ASN	N-CA-C	-6.37	104.81	112.58
2	K	81	U	C4'-C3'-O3'	6.31	118.86	109.40
1	D	238	ARG	N-CA-C	-6.22	97.55	110.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	127	ARG	N-CA-C	-6.21	104.61	111.82
1	A	268	ARG	N-CA-C	-6.19	104.53	111.28
1	D	98	ASP	N-CA-C	-6.17	104.62	111.71
1	D	96	TYR	N-CA-C	-6.16	104.56	111.28
1	D	218	PHE	N-CA-C	-6.13	103.54	111.02
1	B	171	HIS	N-CA-C	-6.12	104.69	111.36
2	K	30	C	C4'-C3'-O3'	-6.12	100.23	109.40
1	A	212	HIS	CB-CA-C	6.09	119.39	110.26
1	C	204	PRO	N-CA-C	-6.07	105.10	113.53
1	B	100	ARG	N-CA-C	-6.04	105.77	113.02
1	D	134	VAL	CA-C-O	-6.03	115.73	121.64
1	D	39	ASP	N-CA-C	-6.01	104.73	111.28
1	D	217	ASN	N-CA-C	-6.00	104.82	111.36
1	B	215	VAL	N-CA-C	-5.99	104.52	110.62
1	C	256	TYR	N-CA-C	-5.98	104.84	111.36
2	K	52	G	O4'-C1'-C2'	-5.97	101.63	107.60
1	D	104	PRO	N-CA-C	-5.95	101.21	112.33
1	A	263	ASP	CA-C-N	5.93	128.55	120.54
1	A	263	ASP	C-N-CA	5.93	128.55	120.54
1	B	191	TRP	N-CA-C	-5.91	102.31	110.35
1	D	266	ARG	N-CA-C	-5.91	105.33	112.54
1	B	118	LYS	N-CA-C	-5.90	104.93	111.71
1	D	174	PRO	CB-CA-C	-5.90	103.36	111.21
1	B	258	ALA	N-CA-C	-5.88	104.87	111.28
1	C	77	ALA	N-CA-C	-5.87	104.23	111.75
2	K	60	C	C2'-C3'-O3'	5.85	118.28	109.50
1	D	237	ASN	N-CA-C	-5.85	105.43	113.56
1	B	116	ILE	N-CA-C	-5.83	104.67	110.62
1	D	185	PHE	N-CA-C	-5.78	105.00	112.68
1	D	99	THR	N-CA-CB	5.76	118.62	109.51
1	D	236	ASN	CB-CA-C	-5.75	101.24	110.79
1	B	53	VAL	CA-C-O	-5.75	115.94	121.63
1	B	114	SER	N-CA-C	-5.75	105.02	111.28
1	D	182	ASP	CB-CA-C	-5.74	101.86	110.88
1	C	16	VAL	N-CA-C	-5.73	104.78	110.62
1	D	259	GLU	N-CA-C	-5.72	104.95	111.07
1	A	43	THR	N-CA-C	-5.72	105.04	111.28
2	K	112	U	C4'-C3'-O3'	5.71	121.57	113.00
1	B	140	SER	CA-C-O	-5.71	115.25	121.87
1	D	12	SER	N-CA-C	-5.70	104.93	112.34
2	K	80	A	C4'-C3'-O3'	5.70	121.55	113.00
1	A	263	ASP	CA-C-O	-5.69	114.39	120.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	208	PHE	N-CA-C	-5.68	104.46	111.33
1	C	41	ALA	N-CA-C	-5.67	106.20	113.23
1	C	88	ASP	CA-C-O	-5.65	115.40	121.56
1	A	211	ARG	N-CA-C	-5.63	105.23	111.71
1	D	211	ARG	N-CA-C	-5.63	105.14	111.28
1	B	170	LYS	N-CA-C	-5.63	105.05	111.07
1	C	190	HIS	N-CA-C	-5.62	105.53	112.38
1	C	182	ASP	N-CA-C	-5.60	102.73	110.35
1	A	210	ASP	N-CA-C	-5.59	105.19	111.28
1	B	273	GLN	N-CA-C	-5.57	99.31	108.49
2	K	54	A	C4'-C3'-O3'	5.57	121.35	113.00
1	C	225	TYR	N-CA-C	-5.53	104.47	111.11
1	D	100	ARG	N-CA-C	-5.53	104.64	111.33
2	K	69	U	C4'-C3'-O3'	5.53	117.70	109.40
1	B	190	HIS	N-CA-C	-5.49	105.40	111.71
1	A	226	LEU	N-CA-C	-5.49	105.30	111.28
1	B	222	THR	N-CA-C	-5.49	105.38	111.36
2	K	61	A	C3'-C2'-O2'	5.48	118.92	110.70
1	B	128	SER	N-CA-C	-5.47	105.74	112.90
2	K	80	A	C2'-C3'-O3'	-5.45	105.52	113.70
1	C	247	CYS	N-CA-C	-5.45	100.14	109.24
1	D	162	MET	CA-C-O	-5.45	115.24	121.40
1	B	113	GLU	N-CA-C	-5.44	105.35	111.28
1	B	144	LEU	N-CA-C	-5.42	105.28	111.14
1	D	162	MET	N-CA-C	-5.42	101.06	109.24
1	D	120	SER	N-CA-C	-5.41	105.39	111.28
1	A	113	GLU	N-CA-C	-5.41	106.05	113.56
1	A	58	ARG	N-CA-C	-5.36	105.44	111.28
1	B	223	ARG	N-CA-C	-5.35	105.34	111.07
1	D	144	LEU	N-CA-C	-5.34	105.12	111.69
1	C	233	LEU	N-CA-C	-5.33	105.47	111.28
1	A	246	GLY	CA-C-O	-5.33	116.93	121.57
1	A	251	LYS	CA-C-O	-5.33	114.91	120.55
1	D	213	THR	N-CA-C	-5.32	105.59	111.71
1	C	19	ARG	N-CA-C	-5.32	105.48	111.28
2	K	84	U	C2'-C3'-O3'	-5.32	105.73	113.70
2	K	37	G	C4'-C3'-O3'	5.31	117.37	109.40
1	A	64	PRO	N-CA-C	-5.29	107.53	114.03
1	B	98	ASP	CB-CA-C	5.28	119.55	110.79
1	D	73	ASN	N-CA-C	-5.28	106.54	112.87
1	D	172	GLY	CA-C-O	-5.28	116.25	120.79
1	B	147	MET	N-CA-C	-5.23	105.47	111.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	43	THR	N-CA-C	-5.22	105.67	111.36
2	K	122	U	C4'-C3'-O3'	5.22	117.23	109.40
2	K	53	A	C4'-C3'-O3'	5.21	117.21	109.40
1	B	151	ARG	N-CA-C	-5.20	105.51	111.07
1	A	243	VAL	CA-C-O	-5.19	115.78	121.28
2	K	31	C	C2'-C3'-O3'	-5.19	105.92	113.70
2	K	20	C	C2'-C3'-O3'	-5.17	105.94	113.70
1	B	149	ARG	CB-CA-C	-5.16	102.78	110.88
1	B	216	HIS	N-CA-C	-5.15	105.79	111.71
2	K	126	C	C2'-C3'-O3'	5.14	117.20	109.50
1	A	218	PHE	CA-C-N	-5.13	114.09	120.56
1	A	218	PHE	C-N-CA	-5.13	114.09	120.56
1	B	29	VAL	CA-C-O	-5.13	116.55	121.63
2	K	64	G	C2'-C3'-O3'	-5.13	106.01	113.70
1	B	16	VAL	N-CA-C	-5.12	105.39	110.62
1	B	71	MET	N-CA-C	-5.11	105.71	111.28
1	B	93	ILE	N-CA-C	-5.09	105.53	110.42
2	K	42	A	C2'-C3'-O3'	-5.08	101.89	109.50
1	D	258	ALA	N-CA-C	-5.07	105.75	111.28
1	B	107	SER	N-CA-C	-5.04	106.23	112.38
1	A	276	HIS	CB-CA-C	5.04	119.56	111.91
1	D	179	TYR	CB-CA-C	5.04	118.20	110.14
2	K	118	A	C3'-C2'-O2'	5.03	118.25	110.70
2	K	37	G	C2'-C3'-O3'	5.03	117.05	109.50
1	D	71	MET	N-CA-C	-5.02	105.94	111.71
1	C	214	GLU	N-CA-C	-5.01	105.26	111.33
1	B	205	VAL	N-CA-C	-5.00	105.52	110.62

There are no chirality outliers.

There are no planarity outliers.

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	1892	1668	1668	17	0
1	B	1994	1831	1830	30	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1747	1551	1548	14	0
1	D	2000	1763	1765	22	0
2	K	2172	1018	1112	80	0
All	All	9805	7831	7923	157	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 9.

All (157) 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)
2:K:34:A:C5	2:K:35:G:O6	1.91	1.23
2:K:34:A:C4	2:K:35:G:O6	1.98	1.16
2:K:23:A:C8	2:K:54:A:C2	2.38	1.10
2:K:34:A:C4	2:K:35:G:C6	2.40	1.10
2:K:35:G:OP1	2:K:35:G:N3	1.93	1.00
2:K:35:G:OP1	2:K:35:G:C2	2.20	0.95
2:K:23:A:H8	2:K:54:A:C2	1.83	0.90
2:K:127:A:OP1	2:K:128:C:H2'	1.84	0.77
1:B:262:ALA:O	1:B:272:VAL:HG11	1.86	0.76
2:K:34:A:H1'	2:K:35:G:C2	2.21	0.76
2:K:110:C:H4'	2:K:111:A:H5''	1.68	0.74
2:K:34:A:N9	2:K:35:G:C6	2.56	0.74
2:K:34:A:O2'	2:K:35:G:N2	2.21	0.73
2:K:35:G:OP1	2:K:35:G:N2	2.24	0.71
2:K:34:A:C8	2:K:35:G:N1	2.61	0.69
2:K:34:A:C6	2:K:35:G:O6	2.46	0.68
1:B:186:LEU:HD22	1:B:215:VAL:HG22	1.75	0.68
2:K:34:A:N9	2:K:35:G:N1	2.43	0.66
2:K:127:A:H3'	2:K:128:C:H3'	1.79	0.65
2:K:59:G:H5''	2:K:60:C:H5	1.63	0.64
1:D:245:ILE:HD11	1:D:258:ALA:HB2	1.82	0.62
2:K:62:G:C5	2:K:63:A:H1'	2.33	0.62
2:K:110:C:C4'	2:K:111:A:H5''	2.29	0.61
1:A:35:VAL:HG11	1:A:66:ILE:HG22	1.83	0.61
2:K:59:G:H5''	2:K:60:C:C5	2.36	0.59
2:K:110:C:C5'	2:K:111:A:H5''	2.33	0.58
2:K:16:A:O2'	2:K:17:U:H5'	2.06	0.55
2:K:34:A:H1'	2:K:35:G:N1	2.21	0.55
1:A:55:ILE:HA	1:A:59:ASN:HD22	1.71	0.55
2:K:32:U:H5'	2:K:33:U:C2	2.41	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:276:HIS:CB	1:B:279:LEU:HD12	2.36	0.55
1:D:184:ARG:NH2	2:K:44:A:OP1	2.40	0.55
2:K:135:G:H5'	2:K:136:A:OP2	2.06	0.55
2:K:69:U:H5''	2:K:70:U:C4	2.42	0.54
1:B:166:SER:HB3	1:B:255:VAL:HG12	1.88	0.54
2:K:35:G:H4'	2:K:36:U:O5'	2.08	0.54
1:A:248:THR:HG21	2:K:78:U:H5''	1.90	0.53
2:K:75:U:H2'	2:K:76:G:C5	2.44	0.53
2:K:23:A:H8	2:K:54:A:N1	2.06	0.53
1:B:160:LEU:HD11	1:B:234:GLU:HA	1.91	0.52
2:K:18:C:C5	2:K:19:U:C4	2.97	0.52
2:K:67:G:C2	2:K:138:U:H4'	2.45	0.52
2:K:110:C:H5'	2:K:111:A:H5''	1.92	0.52
2:K:127:A:C3'	2:K:128:C:H5'	2.40	0.52
2:K:75:U:H2'	2:K:76:G:C4	2.45	0.51
1:B:74:LEU:HD11	1:B:80:PRO:HG3	1.93	0.51
1:A:87:ALA:HB1	1:A:137:SER:HB2	1.93	0.50
2:K:63:A:H3'	2:K:64:G:H8	1.77	0.50
1:D:13:GLY:O	1:D:16:VAL:HG22	2.11	0.50
1:B:33:PRO:O	1:B:34:VAL:C	2.55	0.49
1:C:175:ILE:HG21	2:K:48:U:H2'	1.95	0.49
2:K:34:A:C1'	2:K:35:G:N1	2.75	0.49
2:K:18:C:C5	2:K:59:G:C2	3.01	0.49
2:K:23:A:C8	2:K:54:A:N1	2.79	0.49
1:D:11:GLY:C	1:D:13:GLY:N	2.70	0.49
2:K:16:A:H62	2:K:61:A:H5''	1.78	0.48
2:K:114:A:H2'	2:K:114:A:N3	2.28	0.48
2:K:110:C:H5'	2:K:111:A:C5'	2.44	0.48
1:A:59:ASN:O	1:A:60:MET:C	2.56	0.48
2:K:112:U:H5''	2:K:113:C:OP2	2.15	0.47
1:A:207:ALA:O	1:A:208:PHE:C	2.58	0.47
2:K:134:U:H2'	2:K:135:G:O4'	2.15	0.46
1:D:238:ARG:O	1:D:239:SER:C	2.58	0.46
2:K:34:A:C8	2:K:35:G:C6	3.03	0.46
2:K:46:A:C6	2:K:47:C:C2	3.03	0.46
2:K:66:C:H5''	2:K:67:G:H4'	1.97	0.46
1:A:205:VAL:O	1:A:206:ALA:C	2.59	0.46
1:B:210:ASP:O	1:B:211:ARG:C	2.59	0.46
2:K:16:A:C5	2:K:17:U:C4	3.05	0.45
1:D:134:VAL:HG12	1:D:135:ASP:N	2.32	0.45
1:A:33:PRO:HB3	1:A:59:ASN:HA	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:69:U:H1'	2:K:136:A:N1	2.32	0.45
2:K:127:A:C2'	2:K:128:C:H5'	2.46	0.45
1:D:218:PHE:O	1:D:219:ILE:C	2.59	0.45
2:K:15:C:O2	2:K:16:A:N6	2.50	0.45
2:K:70:U:H5'	2:K:135:G:O6	2.17	0.45
1:C:213:THR:O	1:C:214:GLU:C	2.58	0.44
2:K:73:G:C2	2:K:132:G:C2	3.05	0.44
1:D:99:THR:O	1:D:100:ARG:C	2.60	0.44
2:K:67:G:N1	2:K:138:U:H4'	2.31	0.44
2:K:130:A:C6	2:K:131:C:N3	2.85	0.44
1:B:38:PRO:HA	1:B:41:ALA:HB3	1.99	0.44
1:B:254:SER:C	1:B:256:TYR:N	2.72	0.44
1:D:157:GLU:C	1:D:159:GLU:N	2.75	0.44
2:K:130:A:C5	2:K:131:C:C4	3.06	0.44
1:D:82:LEU:C	1:D:83:LEU:HD12	2.42	0.44
1:B:224:SER:O	1:B:225:TYR:C	2.60	0.43
2:K:61:A:H2'	2:K:62:G:C4'	2.49	0.43
1:C:196:ARG:N	1:C:197:PRO:HD2	2.33	0.43
1:B:100:ARG:O	1:B:101:ARG:C	2.60	0.43
1:D:251:LYS:O	1:D:252:HIS:C	2.62	0.43
1:B:11:GLY:C	1:B:13:GLY:N	2.76	0.43
1:B:230:LEU:N	1:B:231:PRO:HD2	2.33	0.43
2:K:36:U:O2	2:K:36:U:H5''	2.19	0.43
1:B:28:CYS:O	1:C:31:ASN:ND2	2.46	0.43
1:A:204:PRO:O	1:A:207:ALA:HB3	2.19	0.43
1:A:30:ASP:HB3	1:D:30:ASP:HB3	2.00	0.43
1:B:253:ARG:O	1:B:254:SER:C	2.61	0.42
1:D:247:CYS:O	1:D:248:THR:C	2.59	0.42
1:B:183:VAL:HB	1:B:186:LEU:HD12	2.01	0.42
2:K:71:A:C6	2:K:134:U:N3	2.87	0.42
1:C:195:LEU:O	1:C:196:ARG:C	2.62	0.42
1:A:35:VAL:HG11	1:A:66:ILE:CG2	2.47	0.42
1:A:227:GLU:O	1:A:228:LEU:C	2.61	0.42
1:B:219:ILE:HG12	1:B:257:ILE:HG23	2.01	0.42
1:D:93:ILE:O	1:D:94:ARG:C	2.60	0.42
2:K:73:G:N3	2:K:132:G:C2	2.88	0.42
2:K:128:C:H1'	2:K:129:A:C6	2.55	0.42
1:B:191:TRP:CE3	1:B:192:ASP:HB2	2.55	0.42
1:B:34:VAL:CB	1:B:37:LEU:CB	2.97	0.42
2:K:59:G:N3	2:K:59:G:H2'	2.33	0.42
2:K:130:A:C6	2:K:131:C:C2	3.08	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:84:PHE:C	1:A:85:LEU:HD12	2.45	0.42
1:D:86:ASP:O	1:D:135:ASP:HA	2.19	0.42
1:B:37:LEU:N	1:B:38:PRO:HD2	2.35	0.42
1:B:252:HIS:O	1:B:253:ARG:C	2.62	0.42
1:C:189:PRO:C	1:C:191:TRP:N	2.75	0.42
1:C:203:LYS:N	1:C:204:PRO:CD	2.83	0.42
1:C:76:ASP:C	1:C:78:PHE:N	2.75	0.42
2:K:46:A:N6	2:K:47:C:N3	2.67	0.42
1:D:9:ARG:O	1:D:10:SER:C	2.61	0.41
1:D:223:ARG:O	1:D:224:SER:C	2.63	0.41
1:C:207:ALA:O	1:C:208:PHE:C	2.61	0.41
2:K:114:A:N3	2:K:114:A:C2'	2.83	0.41
1:D:203:LYS:N	1:D:204:PRO:CD	2.83	0.41
1:C:27:TYR:O	1:C:51:ALA:HA	2.20	0.41
1:C:230:LEU:N	1:C:231:PRO:CD	2.83	0.41
1:D:188:ASN:C	1:D:190:HIS:N	2.74	0.41
1:A:38:PRO:O	1:A:41:ALA:HB3	2.21	0.41
1:C:214:GLU:O	1:C:215:VAL:C	2.59	0.41
2:K:23:A:OP1	2:K:54:A:C2	2.73	0.41
1:B:39:ASP:O	1:B:42:ARG:CB	2.68	0.41
1:B:216:HIS:O	1:B:217:ASN:C	2.62	0.41
1:D:135:ASP:O	1:D:135:ASP:OD1	2.38	0.41
1:B:91:THR:O	1:B:92:LEU:C	2.64	0.41
1:B:212:HIS:C	1:B:214:GLU:N	2.77	0.41
2:K:58:C:C4	2:K:59:G:N7	2.89	0.41
1:A:27:TYR:O	1:A:51:ALA:HB1	2.21	0.41
1:B:147:MET:O	1:B:151:ARG:HG2	2.20	0.41
1:B:238:ARG:HA	2:K:80:A:OP1	2.21	0.41
1:C:224:SER:O	1:C:225:TYR:C	2.63	0.41
2:K:14:C:O3'	2:K:62:G:N1	2.54	0.41
2:K:64:G:H5''	2:K:64:G:C8	2.56	0.41
2:K:32:U:H5'	2:K:33:U:O2	2.21	0.41
2:K:73:G:H2'	2:K:74:G:C8	2.56	0.41
2:K:80:A:C2	2:K:116:A:C4	3.09	0.41
2:K:117:C:C3'	2:K:118:A:H5'	2.50	0.41
1:B:148:LEU:O	1:B:149:ARG:C	2.63	0.40
2:K:127:A:O2'	2:K:128:C:H5'	2.22	0.40
1:B:218:PHE:O	1:B:219:ILE:C	2.63	0.40
1:D:223:ARG:O	1:D:226:LEU:N	2.55	0.40
2:K:16:A:C2'	2:K:17:U:H5'	2.52	0.40
1:A:214:GLU:O	1:A:215:VAL:C	2.65	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:15:SER:O	1:D:18:LEU:HB2	2.22	0.40
1:C:229:TRP:O	1:C:230:LEU:C	2.63	0.40
1:A:265:PHE:O	1:A:269:GLY:C	2.64	0.40
2:K:73:G:N2	2:K:132:G:C4	2.90	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	266/284 (94%)	252 (95%)	14 (5%)	0	100	100
1	B	277/284 (98%)	266 (96%)	11 (4%)	0	100	100
1	C	232/284 (82%)	223 (96%)	9 (4%)	0	100	100
1	D	280/284 (99%)	260 (93%)	20 (7%)	0	100	100
All	All	1055/1136 (93%)	1001 (95%)	54 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	172/254 (68%)	172 (100%)	0	100	100
1	B	190/254 (75%)	190 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	165/254 (65%)	164 (99%)	1 (1%)	84	88
1	D	186/254 (73%)	186 (100%)	0	100	100
All	All	713/1016 (70%)	712 (100%)	1 (0%)	92	95

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	47	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	271	ASN
1	D	142	HIS
1	D	221	GLN
1	C	190	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	K	101/207 (48%)	78 (77%)	26 (25%)

All (78) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	K	15	C
2	K	16	A
2	K	17	U
2	K	18	C
2	K	20	C
2	K	21	U
2	K	24	U
2	K	27	U
2	K	28	C
2	K	29	G
2	K	30	C
2	K	31	C
2	K	32	U
2	K	33	U

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Mol	Chain	Res	Type
2	K	34	A
2	K	35	G
2	K	36	U
2	K	37	G
2	K	38	C
2	K	39	C
2	K	40	U
2	K	41	C
2	K	42	A
2	K	43	U
2	K	44	A
2	K	45	A
2	K	48	U
2	K	49	C
2	K	50	C
2	K	51	G
2	K	52	G
2	K	53	A
2	K	54	A
2	K	55	U
2	K	58	C
2	K	59	G
2	K	60	C
2	K	62	G
2	K	64	G
2	K	65	C
2	K	66	C
2	K	67	G
2	K	69	U
2	K	70	U
2	K	71	A
2	K	72	C
2	K	73	G
2	K	74	G
2	K	75	U
2	K	76	G
2	K	78	U
2	K	81	U
2	K	82	C
2	K	83	G
2	K	84	U
2	K	85	C

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Mol	Chain	Res	Type
2	K	86	C
2	K	87	A
2	K	88	C
2	K	89	U
2	K	90	G
2	K	110	C
2	K	111	A
2	K	113	C
2	K	114	A
2	K	115	G
2	K	116	A
2	K	117	C
2	K	118	A
2	K	120	C
2	K	123	G
2	K	127	A
2	K	128	C
2	K	129	A
2	K	130	A
2	K	131	C
2	K	138	U
2	K	139	G

All (26) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	K	17	U
2	K	23	A
2	K	28	C
2	K	29	G
2	K	34	A
2	K	35	G
2	K	36	U
2	K	37	G
2	K	41	C
2	K	42	A
2	K	49	C
2	K	53	A
2	K	64	G
2	K	66	C
2	K	69	U
2	K	76	G

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Mol	Chain	Res	Type
2	K	81	U
2	K	86	C
2	K	109	U
2	K	110	C
2	K	113	C
2	K	117	C
2	K	122	U
2	K	126	C
2	K	127	A
2	K	128	C

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

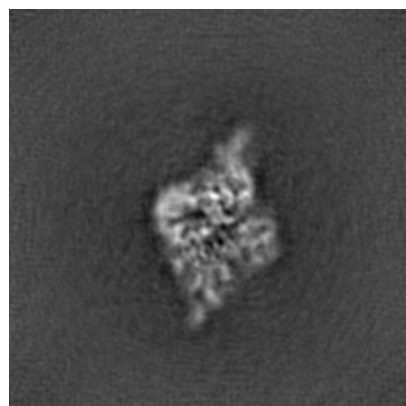
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-15784. These allow visual inspection of the internal detail of the map and identification of artifacts.

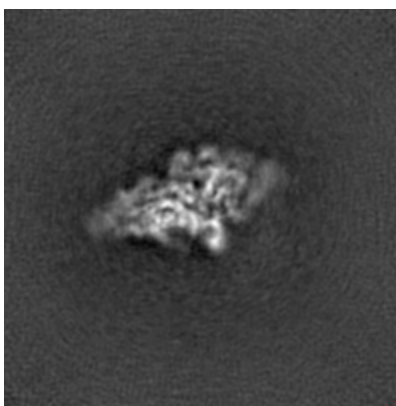
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

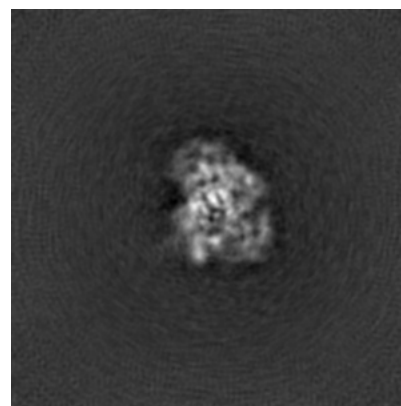
6.1.1 Primary map



X

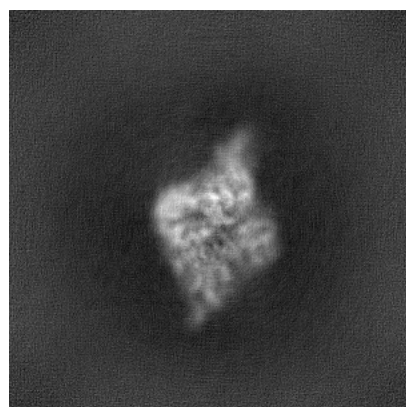


Y

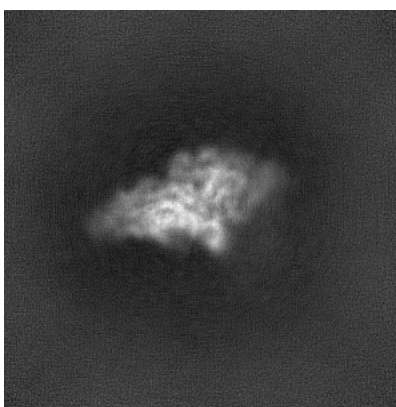


Z

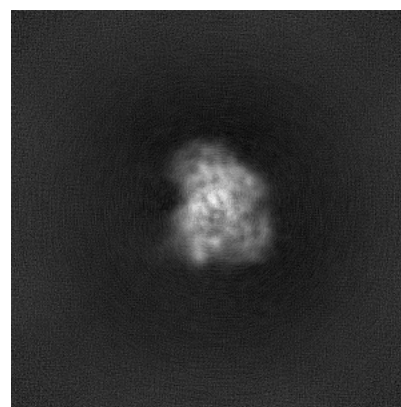
6.1.2 Raw map



X



Y

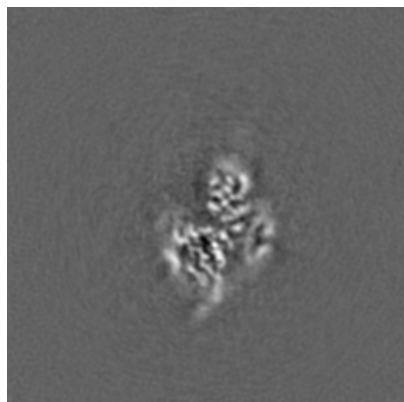


Z

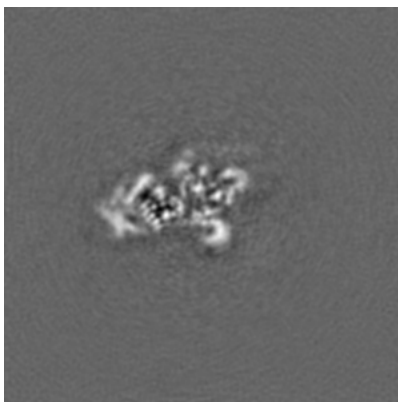
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

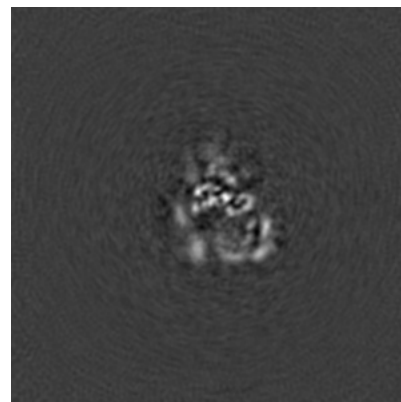
6.2.1 Primary map



X Index: 230

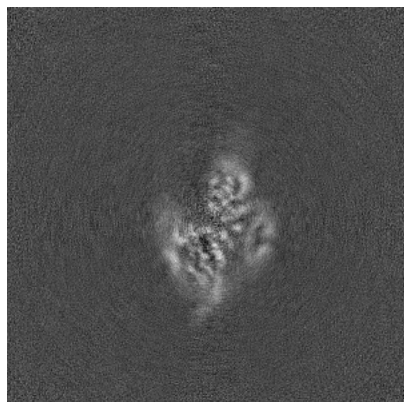


Y Index: 230

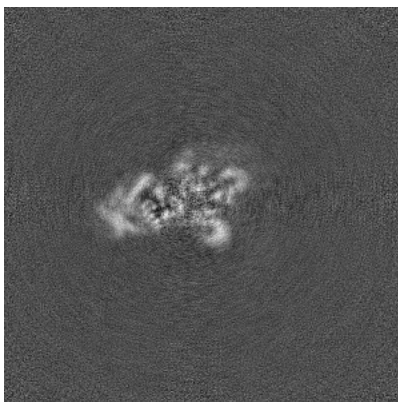


Z Index: 230

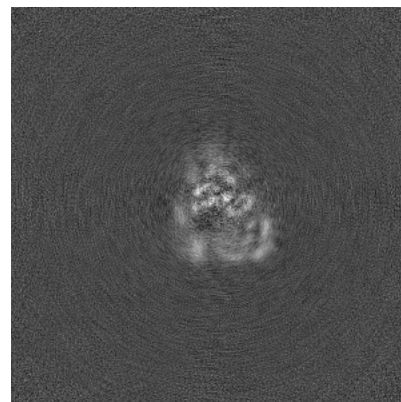
6.2.2 Raw map



X Index: 230



Y Index: 230

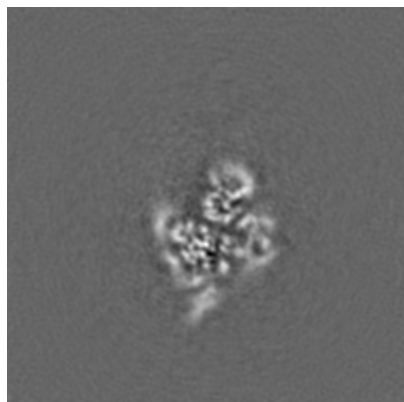


Z Index: 230

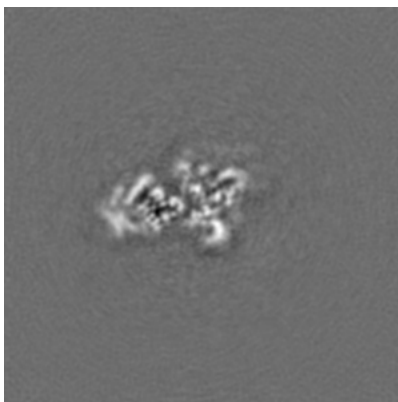
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

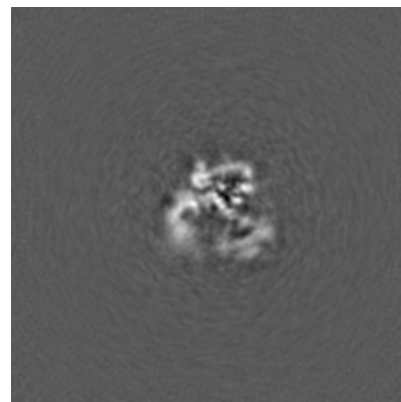
6.3.1 Primary map



X Index: 222

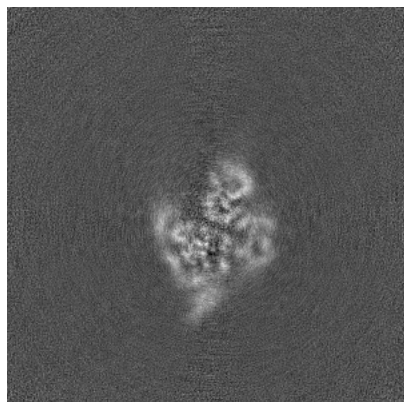


Y Index: 232

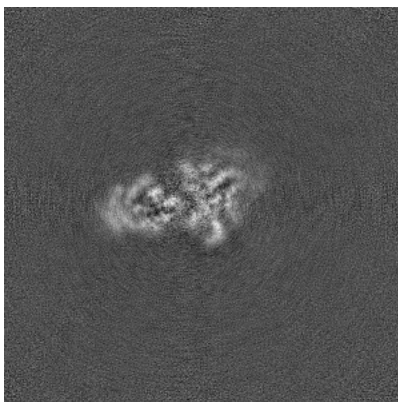


Z Index: 244

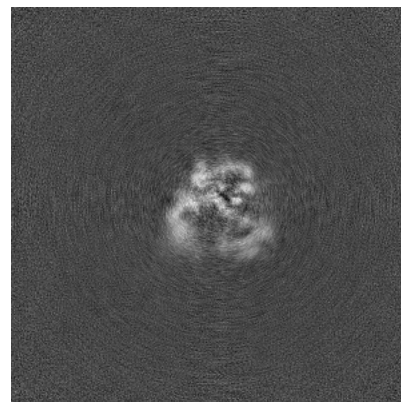
6.3.2 Raw map



X Index: 223



Y Index: 235



Z Index: 244

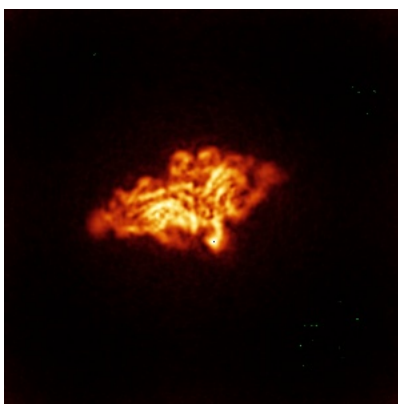
The images above show the largest variance slices of the map in three orthogonal directions.

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

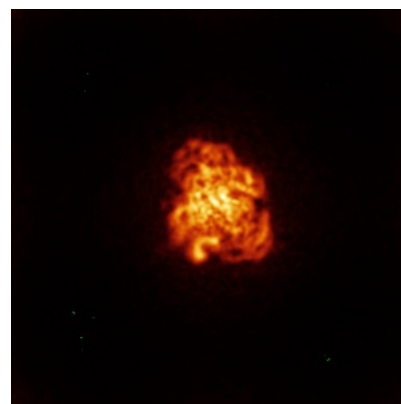
6.4.1 Primary map



X

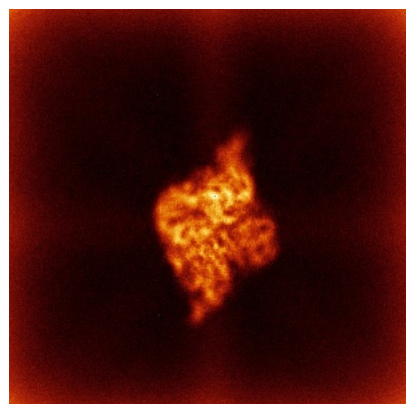


Y

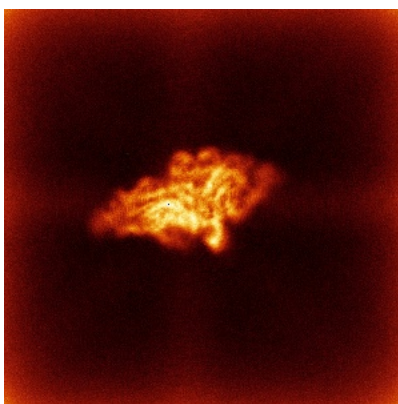


Z

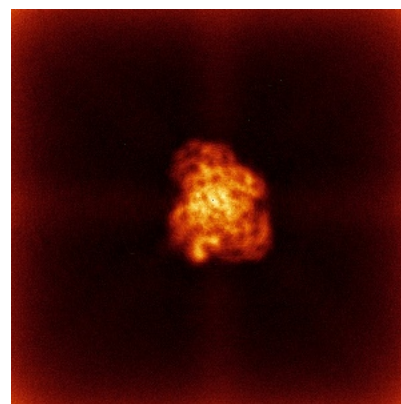
6.4.2 Raw map



X



Y

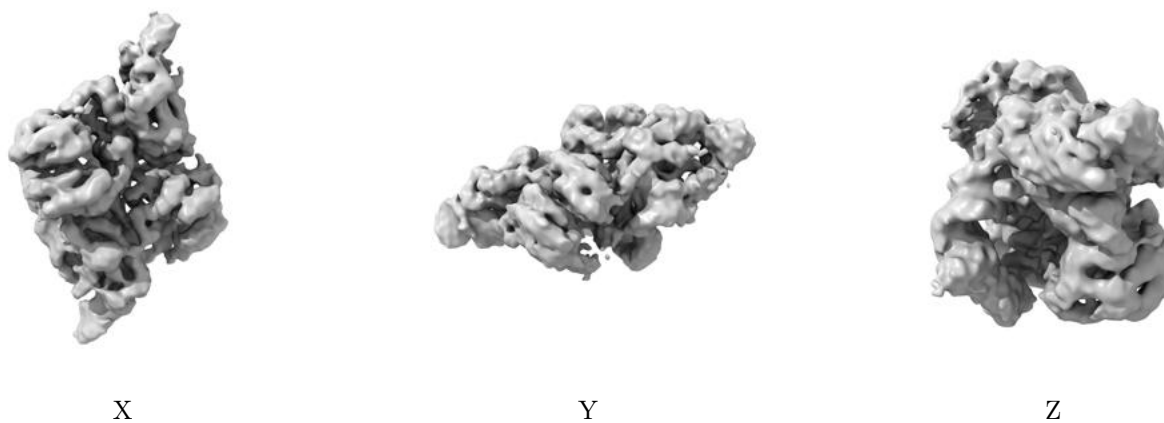


Z

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

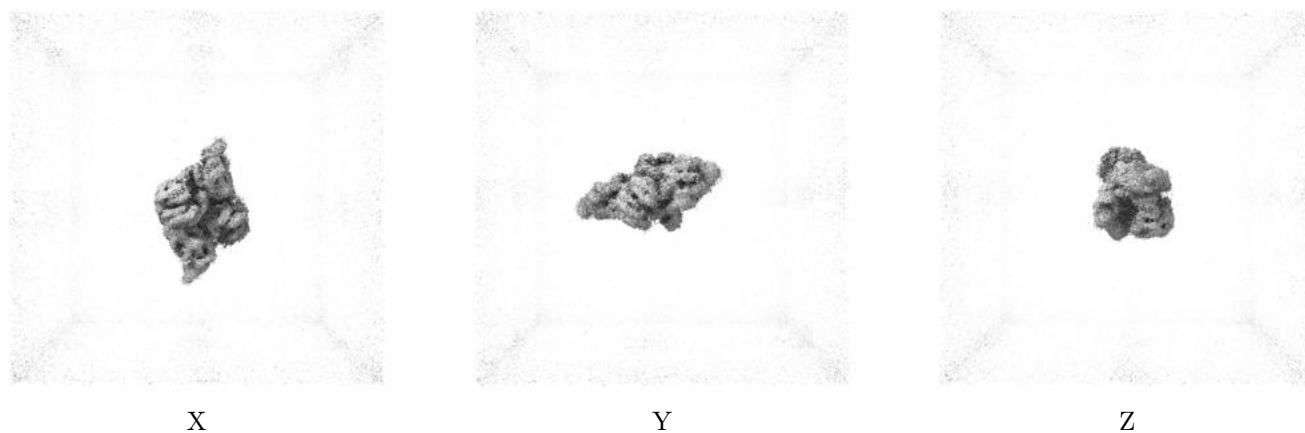
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.04. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

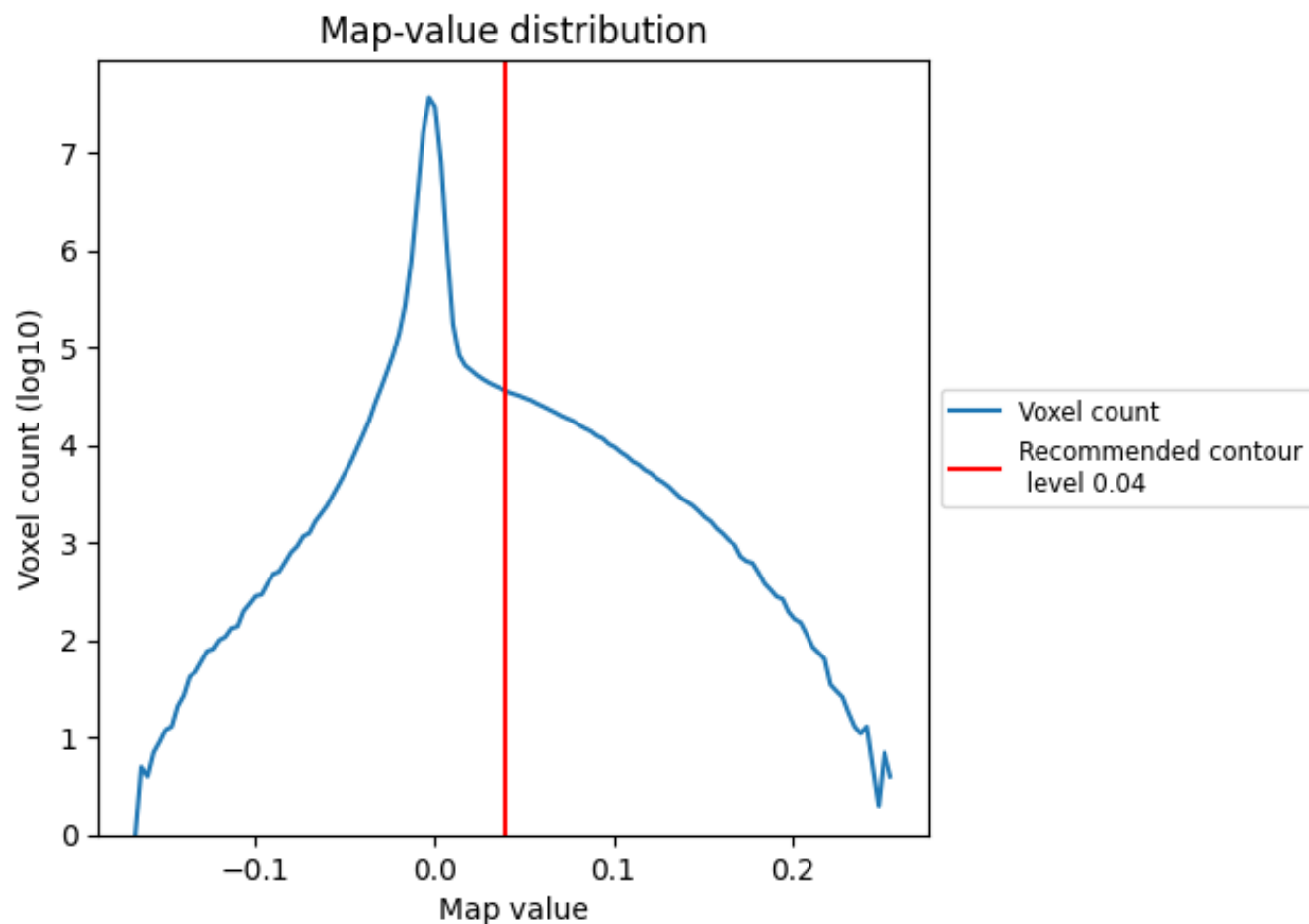
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

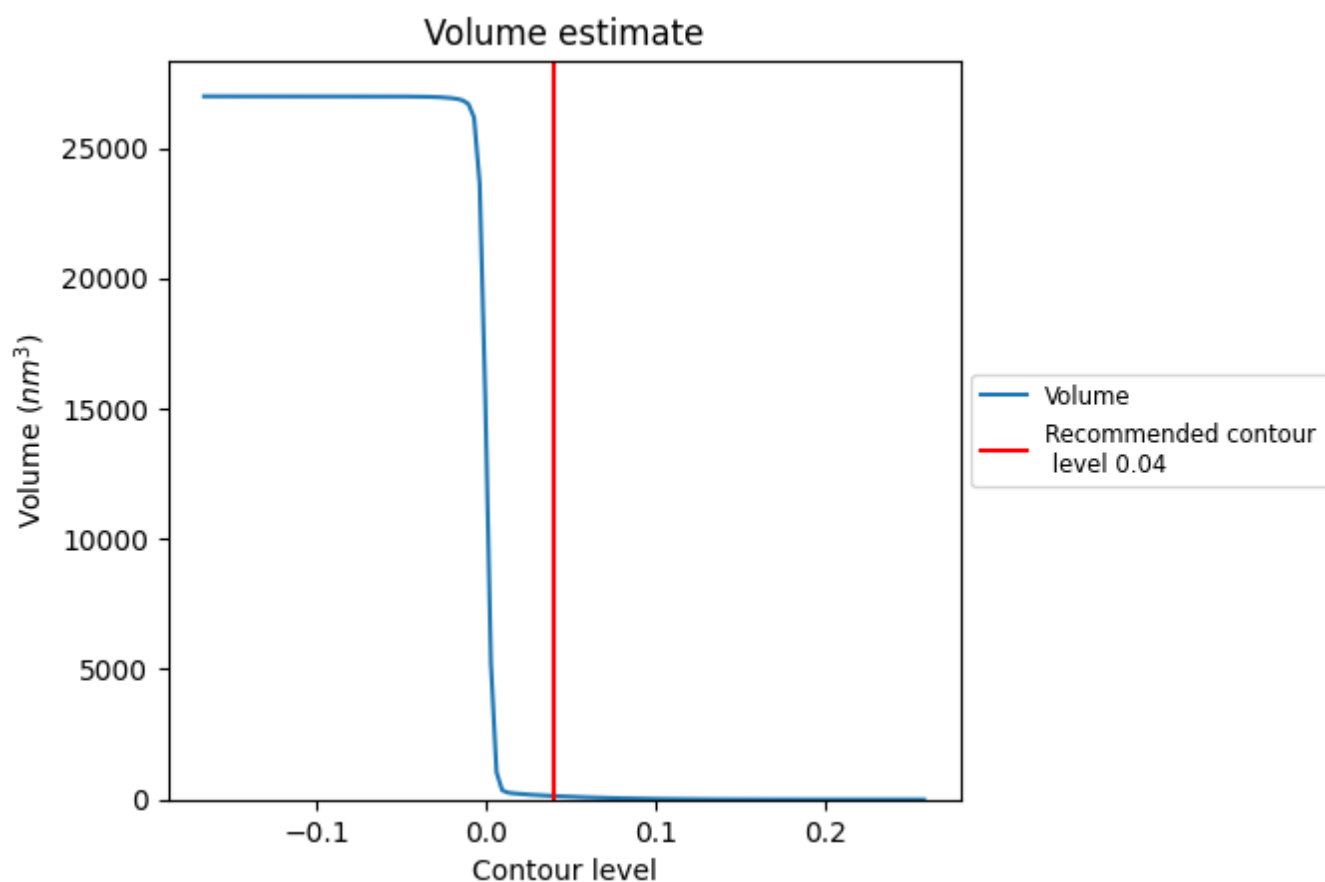
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

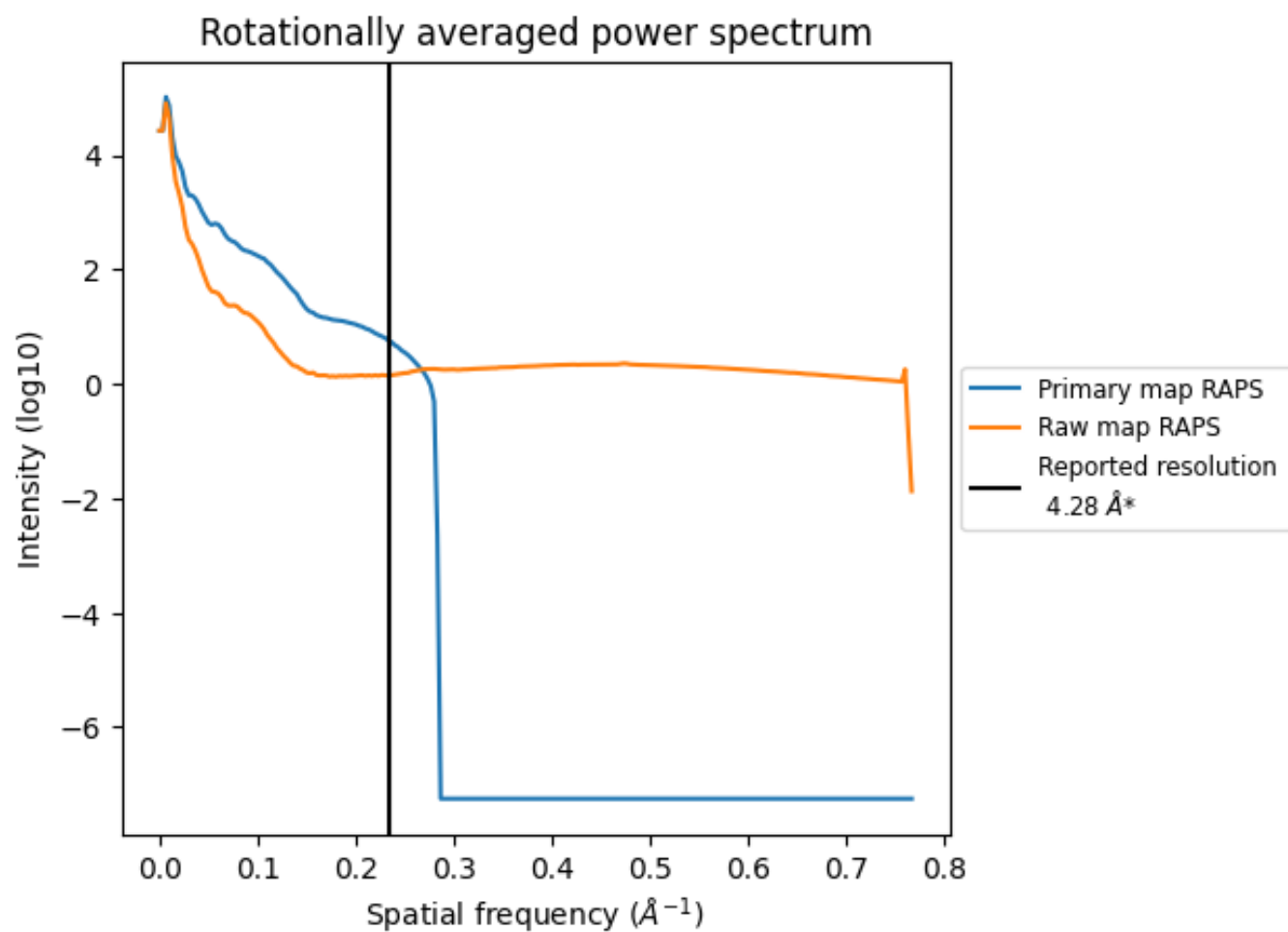
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 135 nm³; this corresponds to an approximate mass of 122 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 ⓘ

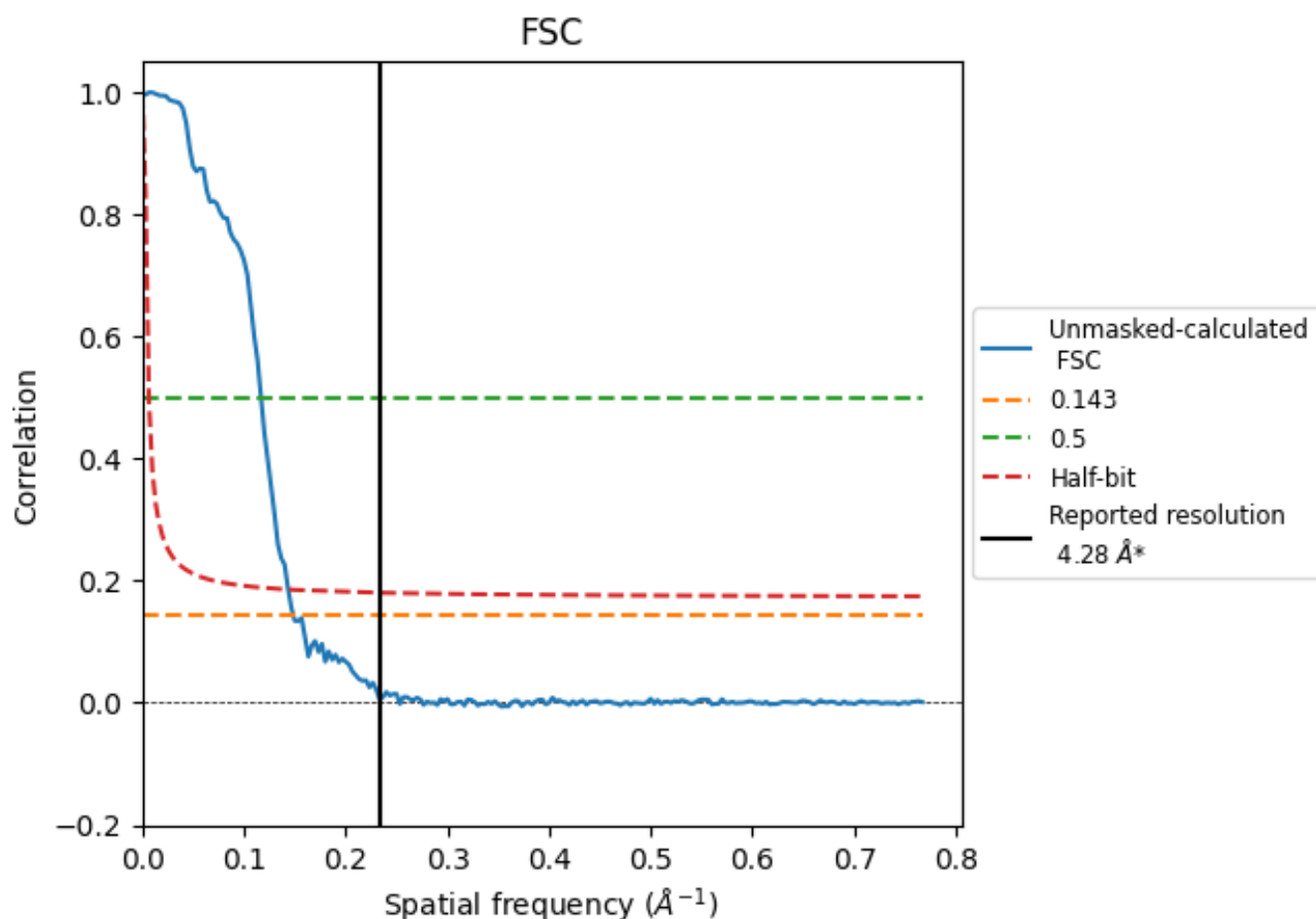


*Reported resolution corresponds to spatial frequency of 0.234 $\text{\AA}^{-1}$

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of $0.234 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

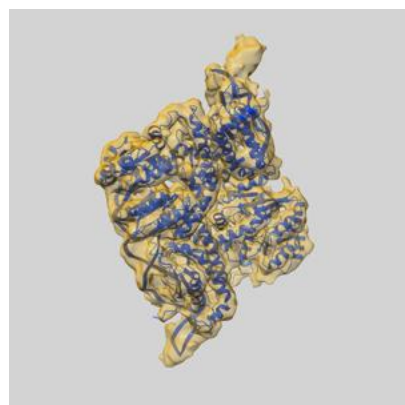
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.28	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.73	8.55	6.97

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 6.73 differs from the reported value 4.28 by more than 10 %

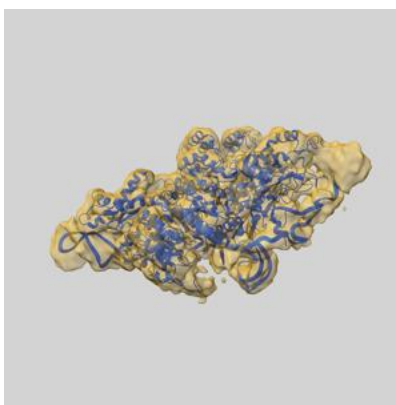
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-15784 and PDB model 8B0I. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

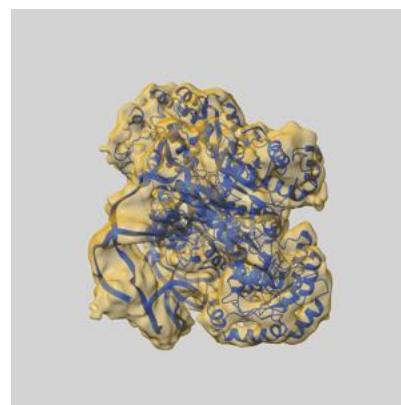
9.1 Map-model overlay [i](#)



X



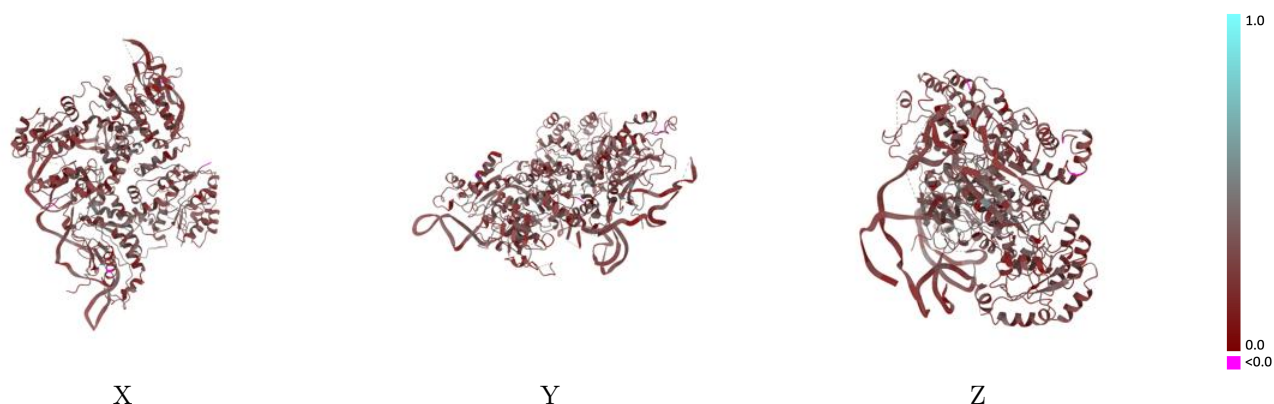
Y



Z

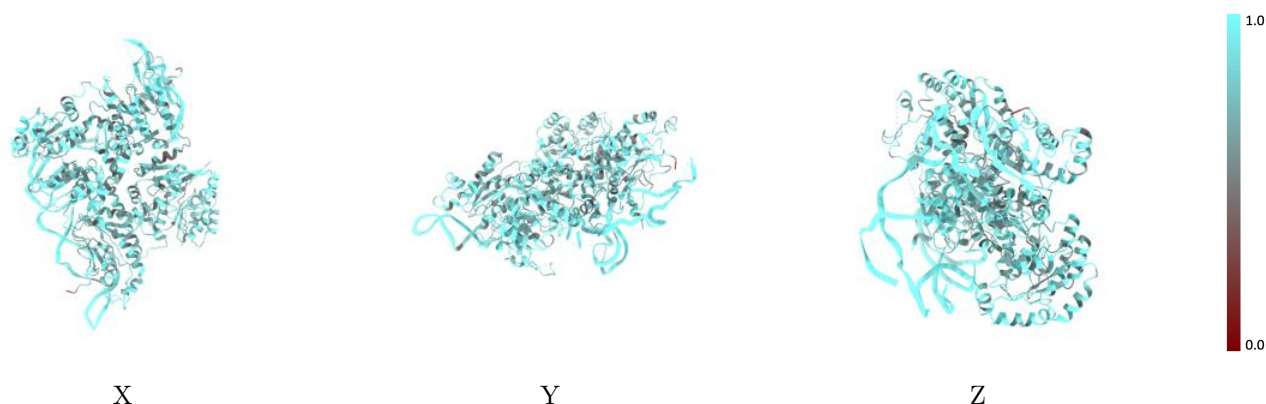
The images above show the 3D surface view of the map at the recommended contour level 0.04 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



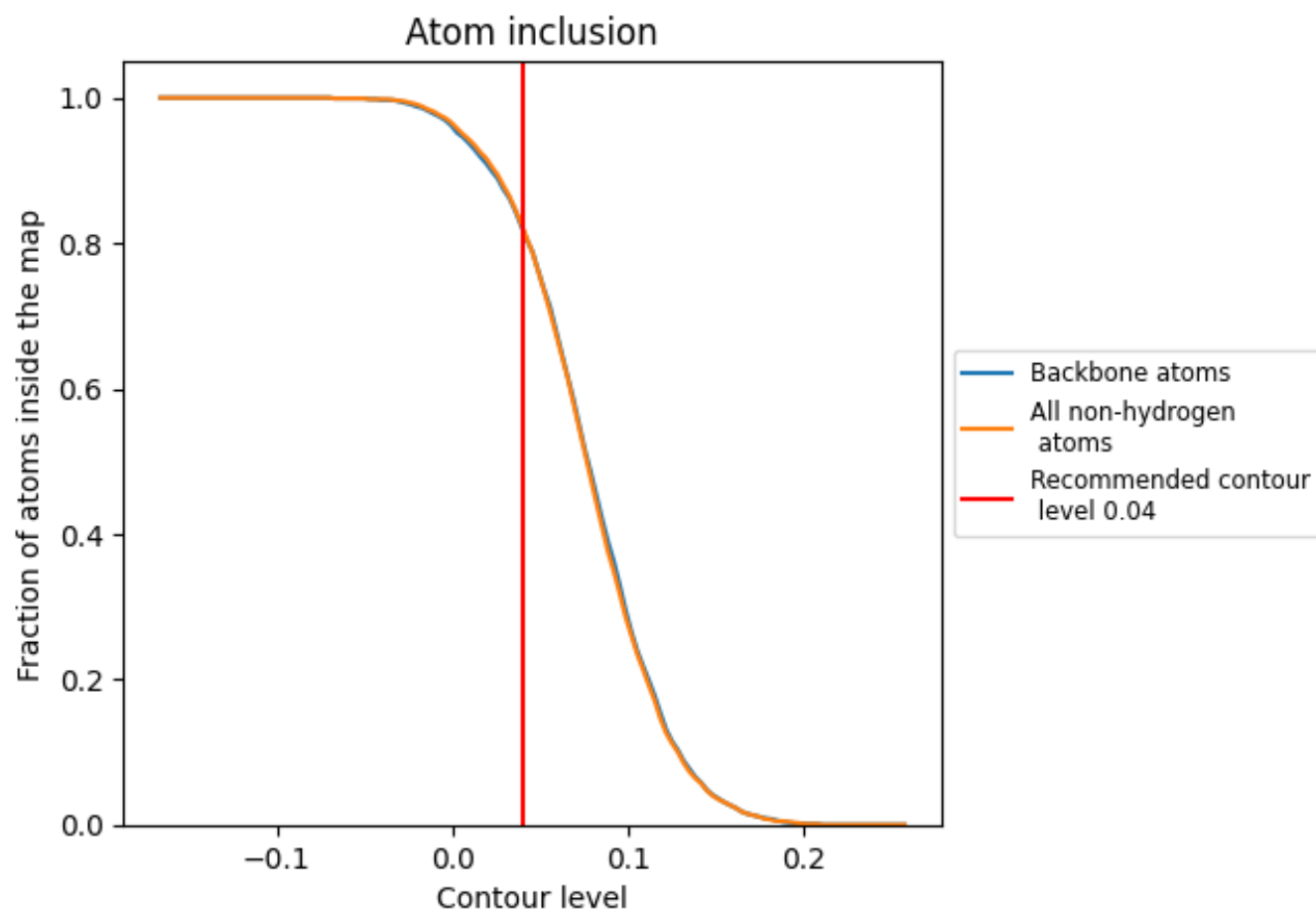
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.04).

9.4 Atom inclusion [i](#)



At the recommended contour level, 82% of all backbone atoms, 82% 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 (0.04) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8220	0.2770
A	0.8060	0.2920
B	0.7970	0.2720
C	0.8130	0.3000
D	0.7910	0.2790
K	0.9630	0.2460

