WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB EM Validation Report ⓘ

Feb 19, 2026 – 12:35 PM EST

PDB ID	:	9OFA / pdb_00009ofa
EMDB ID	:	EMD-70421
Title	:	The structure of a Fungal Cyanide Hydratase from Gloeocercospora sorghi
Authors	:	Justo Arevalo, S.; Valle-Riestra F, V.; Balan, A.; Farah, C.S.
Deposited on	:	2025-04-29
Resolution	:	2.04 Å(reported)
Based on initial model	:	.

The following versions of software and data (see references ⓘ) were used in the production of this report:
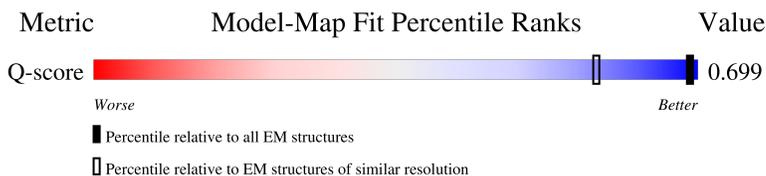
EMDB validation analysis	:	0.0.1.dev131
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48

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 2.04 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.
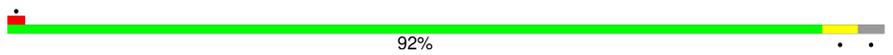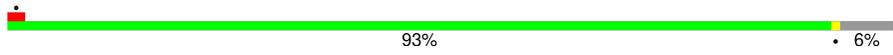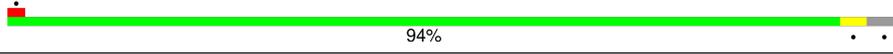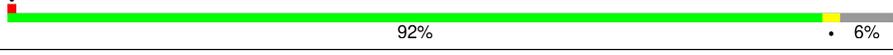
Metric	Percentile Ranks	Value
Clashscore		0
Ramachandran outliers		0.3%
Sidechain outliers		1.0%

Worse   *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures

Metric	Model-Map Fit Percentile Ranks	Value
Q-score		0.699

Worse   *Better*

▮ Percentile relative to all EM structures

▯ Percentile relative to EM structures of similar resolution

Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	1810 (1.55 - 2.54)

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	368	19% — 93% · · ·
1	B	368	8% — 91% · 6%
1	C	368	· — 93% · ·
1	D	368	· — 90% · 6%

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Mol	Chain	Length	Quality of chain
1	E	368	92%
1	F	368	93% 6%
1	G	368	94%
1	H	368	92% 6%
1	I	368	94%
1	J	368	92% 5%
1	K	368	93%
1	L	368	94%
1	M	368	92% 6%
1	N	368	93%
1	O	368	92% 6%
1	P	368	94%
1	Q	368	91% 6%
1	R	368	93%
1	S	368	13% 91% 6%
1	T	368	33% 94%
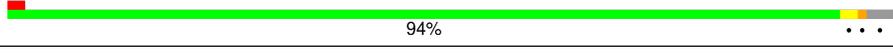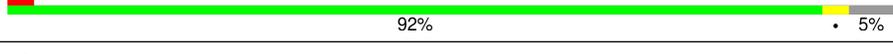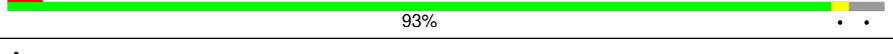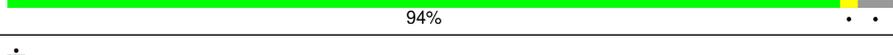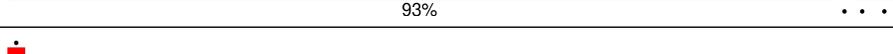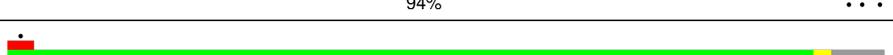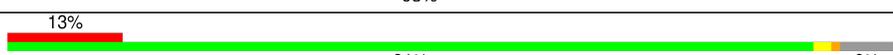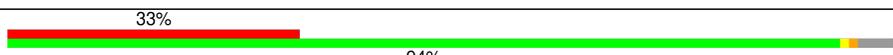
2　Entry composition　ⓘ

There is only 1 type of molecule in this entry. The entry contains 55218 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 Cyanide hydratase.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	O	346	Total	C	N	O	S	0	0
			2720	1734	467	509	10		
1	N	355	Total	C	N	O	S	0	0
			2793	1776	480	527	10		
1	Q	346	Total	C	N	O	S	0	0
			2720	1734	467	509	10		
1	P	356	Total	C	N	O	S	0	0
			2797	1778	481	528	10		
1	S	346	Total	C	N	O	S	0	0
			2720	1734	467	509	10		
1	R	356	Total	C	N	O	S	0	0
			2797	1778	481	528	10		
1	T	353	Total	C	N	O	S	0	0
			2780	1769	478	523	10		
1	M	347	Total	C	N	O	S	0	0
			2729	1739	468	512	10		
1	L	354	Total	C	N	O	S	0	0
			2788	1773	479	526	10		
1	E	356	Total	C	N	O	S	0	0
			2797	1778	481	528	10		
1	D	345	Total	C	N	O	S	0	0
			2711	1729	466	506	10		
1	G	355	Total	C	N	O	S	0	0
			2793	1776	480	527	10		
1	F	346	Total	C	N	O	S	0	0
			2720	1734	467	509	10		
1	I	356	Total	C	N	O	S	0	0
			2797	1778	481	528	10		
1	H	346	Total	C	N	O	S	0	0
			2720	1734	467	509	10		
1	K	353	Total	C	N	O	S	0	0
			2780	1769	478	523	10		
1	J	350	Total	C	N	O	S	0	0
			2760	1758	474	518	10		

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Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	356	Total	C	N	O	S	0	0
			2797	1778	481	528	10		
1	C	354	Total	C	N	O	S	0	0
			2788	1773	479	526	10		
1	B	345	Total	C	N	O	S	0	0
			2711	1729	466	506	10		

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: Cyanide hydratase

Chain O:

• Molecule 1: Cyanide hydratase

Chain N:

• Molecule 1: Cyanide hydratase

Chain Q:

• Molecule 1: Cyanide hydratase

Chain P:

• Molecule 1: Cyanide hydratase

Chain S:

T335 M336 A337 R338 L339 G340 L341 D342 R343 P344 L345 E346 E347 GLU ASP TYR ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain R:

93%

MET P2 L68 V71 R72 R126 P188 H198 Y205 P229 Q230 Y301 L306 L310 R315 G323 G324 G325 D326 N327 G328 D342 R343 T354 D355 A356 G357 GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain T:

33%

94%

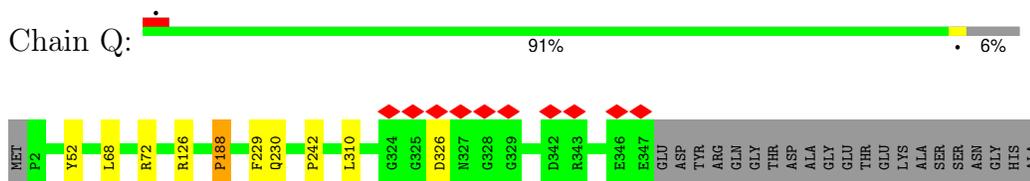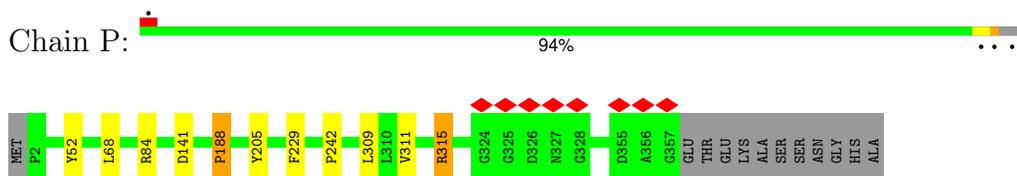MET P2 I3 N4 K5 Y6 K7 E33 A37 L68 H106 D121 R126 T132 S143 G144 D145 S146 F147 E148 T151 E154 N162 C163 W164 E165 N166 M167 N168 P169 F170 L171 K172 S173 L174 A175 V176 A177 R178 D192 L193 S194 K195 Q196 V197 H198 P199 D200

P201 A202 T203 N204 Y205 A206 D207 P208 A209 S210 D211 L212 V213 Y217 A218 I219 E220 T221 G222 R239 G244 V245 E246 T249 D250 R262 P263 D264 Y268 A269 K270 P271 A272 V273 D276 D282 I283 D284 L285 N286 E287 S288 H289 L290 T291 K292 A293 L294 A295 D296 F297 A298

G299 H300 Y301 M302 R303 P304 D305 L306 I307 R308 L309 L310 V311 D312 T313 R314 R315 K316 E317 G323 G324 G325 D326 N327 G328 G329 I330 Q331 S332 M336 A337 R338 L339 G340 L341 D342 R343 P344 L345 E346 E347 E348 D349 Y350 R351 T354 ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN

GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain M:

92%

6%

MET P2 L68 H106 R126 D141 P188 Y205 F229 Q230 G324 G325 D326 N327 G328 E346 E347 E348 ASP TYR ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain L:

94%

MET P2 L68 Q152 P188 Y205 F229 V311 R315 G324 G325 D326 N327 G328 D355 ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain E:

92%

MET P2 L68 D79 R84 H106 L111 Y139 P188 Y205 F229 Q230 P242 R315 G324 G325 D326 N327 G328 R338 L341 E348 R351 D355 A356 G357 GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain D:

90%   •   6%

MET P2 Y52 L68 M78 V101 R126 L137 P188 Y205 F229 Q230 R315 T320 G323 G324 G325 D326 N327 G328 G329 D342 R343 E346 GLU GLU ASP TYR ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain G:

94%   •   •

MET P2 Y52 L68 R126 P188 Y205 F229 Q230 R315 G324 G325 D326 N327 G328 E348 D349 D355 A356 GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain F:

93%   •   6%

MET P2 S117 P188 Y205 F229 R315 G324 G325 D326 N327 G328 E346 E347 GLU ASP TYR ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain I:

94%   • • •

MET P2 Y52 L68 R126 P188 F229 Q230 R315 G324 G325 D326 N327 G328 R343 E347 E348 D355 A356 G357 GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain H:

92%   •   6%

MET P2 L68 H106 R126 P188 Y205 F229 P242 R315 T320 G325 D326 N327 G328 E347 GLU ASP TYR ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain K:

93%   •   •

MET P2 Y52 L68 R126 P188 Y205 F229 Q230 P242 L309 G324 G325 D326 N327 G328 Q331 E347 E348 D349 Y350 R351 Q352 G353 T354 ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain J:

92%   •   5%

MET P2 L68 R91 H106 V176 P188 Y205 Y217 T221 F229 R315 G324 G325 D326 N327 G328 E347 E348 D349 Y350 R351 GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain A:

19%

93%

• • •

MET P2 Y52 P53 Y54 R91 H106 R126 H133 D141 D145 E148 E154 N162 L171 L174 W187 P188 L193 S194 K195 Q196 V197 H198 A202 Y205 A209 L212 E220 P242 P243 G244 D284 L285 N286 E287 S288 H289 L290

T291 K292 A293 L294 A295 D296 F297 A298 G299 H300 Y301 M302 R303 P304 D305 L306 I307 R308 L309 L310 V311 D312 T313 R314 R315 G323 G324 G325 D326 N327 G328 G329 I330 Q331 S332 A337 R338 L339 G340 L341 D342 R343 P344 L345 E346 E347 T354 D355 A356 G357 GLU THR GLU LYS ALA SER SER

ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain C:

93%

• •

MET P2 Y54 L68 S81 R126 P188 Y205 F229 Q230 P242 L306 L310 G324 G325 D326 N327 G328 Q331 D355 ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

• Molecule 1: Cyanide hydratase

Chain B:

8%

91%

• 6%

MET P2 L68 D79 H133 G144 P188 D192 Y205 F229 Q230 P242 V311 R315 K316 E317 L318 V319 T320 E321 V322 G323 G324 G325 D326 N327 G328 G329 I330 Q331 S332 Y333 S334 T335 M336 A337 R338 L339 G340 L341 D342 R343 P344 L345 E346 GLU GLU ASP TYR

ARG GLN GLY THR ASP ALA GLY GLU THR GLU LYS ALA SER SER ASN GLY HIS ALA

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	209895	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/Å^2)$	55.59	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	165000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	3.968	Depositor
Minimum map value	-1.714	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.128	Depositor
Recommended contour level	0.5	Depositor
Map size (Å)	393.66, 393.66, 393.66	wwPDB
Map dimensions	450, 450, 450	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8748, 0.8748, 0.8748	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	0.79	0/2869	1.33	7/3908 (0.2%)
1	B	0.77	0/2782	1.31	3/3791 (0.1%)
1	C	0.77	0/2860	1.31	3/3896 (0.1%)
1	D	0.77	0/2782	1.31	3/3791 (0.1%)
1	E	0.79	0/2869	1.32	8/3908 (0.2%)
1	F	0.78	0/2791	1.32	3/3803 (0.1%)
1	G	0.78	0/2865	1.33	5/3903 (0.1%)
1	H	0.78	0/2791	1.32	2/3803 (0.1%)
1	I	0.78	0/2869	1.32	4/3908 (0.1%)
1	J	0.78	0/2832	1.33	2/3858 (0.1%)
1	K	0.78	0/2852	1.31	4/3885 (0.1%)
1	L	0.78	0/2860	1.31	2/3896 (0.1%)
1	M	0.78	0/2800	1.31	3/3815 (0.1%)
1	N	0.79	0/2865	1.33	7/3903 (0.2%)
1	O	0.77	0/2791	1.31	1/3803 (0.0%)
1	P	0.78	1/2869 (0.0%)	1.31	4/3908 (0.1%)
1	Q	0.77	0/2791	1.31	4/3803 (0.1%)
1	R	0.76	0/2869	1.31	5/3908 (0.1%)
1	S	0.78	0/2791	1.32	4/3803 (0.1%)
1	T	0.80	0/2852	1.32	4/3885 (0.1%)
All	All	0.78	1/56650 (0.0%)	1.32	78/77178 (0.1%)

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	3
1	B	0	2
1	C	0	3
1	D	0	4
1	E	0	2

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	F	0	2
1	G	0	3
1	H	0	3
1	I	0	1
1	J	0	3
1	K	0	2
1	L	0	2
1	M	0	2
1	N	0	3
1	O	0	1
1	P	0	2
1	Q	0	1
1	R	0	5
1	S	0	2
1	T	0	2
All	All	0	48

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	P	242	PRO	CA-C	5.17	1.54	1.51

All (78) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	349	ASP	N-CA-C	6.73	120.82	112.47
1	N	79	ASP	CA-CB-CG	6.57	119.17	112.60
1	T	326	ASP	CA-CB-CG	6.50	119.10	112.60
1	R	343	ARG	NE-CZ-NH2	6.43	124.99	119.20
1	I	343	ARG	NE-CZ-NH2	6.41	124.96	119.20
1	G	349	ASP	CA-CB-CG	6.38	118.98	112.60
1	R	326	ASP	CA-CB-CG	6.36	118.96	112.60
1	D	315	ARG	NE-CZ-NH2	6.26	124.84	119.20
1	K	309	LEU	CB-CA-C	6.12	120.40	109.38
1	O	315	ARG	NE-CZ-NH2	6.08	124.67	119.20
1	A	141	ASP	CA-CB-CG	6.03	118.63	112.60
1	K	242	PRO	N-CA-CB	6.00	106.55	103.19
1	S	315	ARG	NE-CZ-NH2	5.90	124.51	119.20
1	S	343	ARG	NE-CZ-NH2	5.90	124.51	119.20
1	E	315	ARG	NE-CZ-NH2	5.87	124.49	119.20
1	R	315	ARG	NE-CZ-NH2	5.80	124.42	119.20
1	S	192	ASP	CA-CB-CG	5.79	118.39	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	H	242	PRO	N-CA-CB	5.75	106.41	103.19
1	C	331	GLN	OE1-CD-NE2	-5.69	116.91	122.60
1	Q	242	PRO	N-CA-CB	5.66	106.36	103.19
1	I	315	ARG	NE-CZ-NH2	5.64	124.28	119.20
1	N	242	PRO	N-CA-CB	5.62	106.34	103.19
1	N	84	ARG	NE-CZ-NH2	5.59	124.23	119.20
1	R	72	ARG	NE-CZ-NH2	5.58	124.22	119.20
1	P	315	ARG	NE-CZ-NH2	5.56	124.20	119.20
1	L	152	GLN	OE1-CD-NE2	-5.56	117.04	122.60
1	L	315	ARG	NE-CZ-NH2	5.55	124.19	119.20
1	J	315	ARG	NE-CZ-NH2	5.54	124.18	119.20
1	C	242	PRO	N-CA-CB	5.49	106.26	103.19
1	A	242	PRO	N-CA-CB	5.49	106.26	103.19
1	E	242	PRO	N-CA-CB	5.45	106.24	103.19
1	A	126	ARG	NE-CZ-NH2	5.43	124.09	119.20
1	E	79	ASP	CA-CB-CG	5.41	118.01	112.60
1	F	315	ARG	NE-CZ-NH2	5.38	124.04	119.20
1	N	315	ARG	NE-CZ-NH2	5.37	124.03	119.20
1	B	242	PRO	N-CA-CB	5.36	106.19	103.19
1	G	315	ARG	NE-CZ-NH2	5.35	124.01	119.20
1	N	106	HIS	CB-CG-CD2	-5.34	124.26	131.20
1	E	84	ARG	NE-CZ-NH2	5.32	123.99	119.20
1	C	230	GLN	OE1-CD-NE2	-5.32	117.28	122.60
1	J	106	HIS	CB-CG-CD2	-5.28	124.33	131.20
1	B	230	GLN	OE1-CD-NE2	-5.28	117.32	122.60
1	I	230	GLN	OE1-CD-NE2	-5.27	117.33	122.60
1	D	343	ARG	NE-CZ-NH2	5.25	123.92	119.20
1	G	328	GLY	N-CA-C	5.25	117.67	110.69
1	N	152	GLN	OE1-CD-NE2	-5.24	117.36	122.60
1	M	141	ASP	CA-CB-CG	5.24	117.84	112.60
1	M	230	GLN	OE1-CD-NE2	-5.23	117.37	122.60
1	A	187	TRP	CA-C-N	5.22	126.37	119.84
1	A	187	TRP	C-N-CA	5.22	126.37	119.84
1	D	230	GLN	OE1-CD-NE2	-5.22	117.38	122.60
1	G	230	GLN	OE1-CD-NE2	-5.21	117.39	122.60
1	N	230	GLN	OE1-CD-NE2	-5.19	117.41	122.60
1	E	326	ASP	CA-CB-CG	5.17	117.77	112.60
1	K	331	GLN	OE1-CD-NE2	-5.17	117.43	122.60
1	K	230	GLN	OE1-CD-NE2	-5.16	117.44	122.60
1	E	351	ARG	NE-CZ-NH2	5.16	123.84	119.20
1	Q	230	GLN	OE1-CD-NE2	-5.14	117.46	122.60
1	I	126	ARG	NE-CZ-NH2	5.14	123.83	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	Q	326	ASP	CA-CB-CG	5.10	117.70	112.60
1	M	106	HIS	CB-CG-CD2	-5.10	124.57	131.20
1	T	106	HIS	CB-CG-CD2	-5.10	124.57	131.20
1	P	84	ARG	NE-CZ-NH2	5.08	123.78	119.20
1	A	91	ARG	NE-CZ-NH2	5.07	123.77	119.20
1	R	230	GLN	OE1-CD-NE2	-5.07	117.53	122.60
1	E	338	ARG	NE-CZ-NH2	5.06	123.76	119.20
1	E	230	GLN	OE1-CD-NE2	-5.06	117.54	122.60
1	A	315	ARG	NE-CZ-NH2	5.06	123.75	119.20
1	P	242	PRO	N-CA-CB	5.06	106.02	103.19
1	T	315	ARG	NE-CZ-NH2	5.05	123.74	119.20
1	Q	72	ARG	NE-CZ-NH2	5.04	123.74	119.20
1	B	192	ASP	CA-CB-CG	5.04	117.64	112.60
1	P	141	ASP	CA-CB-CG	5.02	117.62	112.60
1	S	342	ASP	CA-CB-CG	5.02	117.62	112.60
1	H	106	HIS	CB-CG-CD2	-5.02	124.67	131.20
1	F	117	SER	CA-C-N	5.01	124.73	119.82
1	F	117	SER	C-N-CA	5.01	124.73	119.82
1	T	126	ARG	NE-CZ-NH2	5.00	123.70	119.20

There are no chirality outliers.

All (48) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	205	TYR	Sidechain
1	A	315	ARG	Sidechain
1	A	54	TYR	Sidechain
1	B	205	TYR	Sidechain
1	B	315	ARG	Sidechain
1	C	126	ARG	Sidechain
1	C	205	TYR	Sidechain
1	C	54	TYR	Sidechain
1	D	126	ARG	Sidechain
1	D	205	TYR	Sidechain
1	D	315	ARG	Sidechain
1	D	52	TYR	Sidechain
1	E	205	TYR	Sidechain
1	E	315	ARG	Sidechain
1	F	205	TYR	Sidechain
1	F	315	ARG	Sidechain
1	G	126	ARG	Sidechain
1	G	205	TYR	Sidechain

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Mol	Chain	Res	Type	Group
1	G	52	TYR	Sidechain
1	H	126	ARG	Sidechain
1	H	205	TYR	Sidechain
1	H	315	ARG	Sidechain
1	I	315	ARG	Sidechain
1	J	205	TYR	Sidechain
1	J	315	ARG	Sidechain
1	J	91	ARG	Sidechain
1	K	126	ARG	Sidechain
1	K	205	TYR	Sidechain
1	L	205	TYR	Sidechain
1	L	315	ARG	Sidechain
1	M	126	ARG	Sidechain
1	M	205	TYR	Sidechain
1	N	126	ARG	Sidechain
1	N	205	TYR	Sidechain
1	N	315	ARG	Sidechain
1	O	315	ARG	Sidechain
1	P	205	TYR	Sidechain
1	P	315	ARG	Sidechain
1	Q	126	ARG	Sidechain
1	R	126	ARG	Sidechain
1	R	205	TYR	Sidechain
1	R	301	TYR	Sidechain
1	R	315	ARG	Sidechain
1	R	71	TYR	Sidechain
1	S	205	TYR	Sidechain
1	S	315	ARG	Sidechain
1	T	205	TYR	Sidechain
1	T	315	ARG	Sidechain

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2797	0	2744	1	0
1	B	2711	0	2676	1	0
1	C	2788	0	2736	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2711	0	2676	1	0
1	E	2797	0	2744	1	0
1	F	2720	0	2682	0	0
1	G	2793	0	2741	0	0
1	H	2720	0	2682	0	0
1	I	2797	0	2744	1	0
1	J	2760	0	2714	2	0
1	K	2780	0	2732	1	0
1	L	2788	0	2736	0	0
1	M	2729	0	2688	0	0
1	N	2793	0	2741	0	0
1	O	2720	0	2682	1	0
1	P	2797	0	2744	1	0
1	Q	2720	0	2682	1	0
1	R	2797	0	2744	1	0
1	S	2720	0	2682	1	0
1	T	2780	0	2732	0	0
All	All	55218	0	54302	12	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 0.

All (12) 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:52:TYR:CD1	1:A:188:PRO:HB3	2.49	0.46
1:J:217:TYR:CE1	1:J:221:THR:HG21	2.52	0.45
1:C:306:LEU:HD22	1:B:144:GLY:HA2	1.98	0.45
1:S:144:GLY:HA2	1:R:306:LEU:HD22	1.99	0.44
1:J:176:VAL:HG12	1:J:221:THR:HA	2.02	0.41
1:O:217:TYR:CE1	1:O:221:THR:HG21	2.56	0.41
1:K:52:TYR:CG	1:K:188:PRO:HB2	2.55	0.41
1:I:52:TYR:CG	1:I:188:PRO:HB2	2.56	0.41
1:E:111:LEU:HD11	1:E:139:TYR:CD2	2.56	0.40
1:P:52:TYR:CG	1:P:188:PRO:HB2	2.57	0.40
1:D:78:MET:HE1	1:D:101:VAL:HG21	2.04	0.40
1:Q:52:TYR:CG	1:Q:188:PRO:HB2	2.57	0.40

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	
1	A	354/368 (96%)	340 (96%)	12 (3%)	2 (1%)	22	13
1	B	343/368 (93%)	330 (96%)	11 (3%)	2 (1%)	22	13
1	C	352/368 (96%)	339 (96%)	12 (3%)	1 (0%)	37	30
1	D	343/368 (93%)	334 (97%)	8 (2%)	1 (0%)	37	30
1	E	354/368 (96%)	341 (96%)	11 (3%)	2 (1%)	22	13
1	F	344/368 (94%)	332 (96%)	11 (3%)	1 (0%)	37	30
1	G	353/368 (96%)	338 (96%)	14 (4%)	1 (0%)	37	30
1	H	344/368 (94%)	332 (96%)	11 (3%)	1 (0%)	37	30
1	I	354/368 (96%)	341 (96%)	12 (3%)	1 (0%)	37	30
1	J	348/368 (95%)	335 (96%)	12 (3%)	1 (0%)	37	30
1	K	351/368 (95%)	339 (97%)	11 (3%)	1 (0%)	37	30
1	L	352/368 (96%)	339 (96%)	12 (3%)	1 (0%)	37	30
1	M	345/368 (94%)	333 (96%)	11 (3%)	1 (0%)	37	30
1	N	353/368 (96%)	340 (96%)	12 (3%)	1 (0%)	37	30
1	O	344/368 (94%)	334 (97%)	9 (3%)	1 (0%)	37	30
1	P	354/368 (96%)	342 (97%)	11 (3%)	1 (0%)	37	30
1	Q	344/368 (94%)	331 (96%)	12 (4%)	1 (0%)	37	30
1	R	354/368 (96%)	343 (97%)	10 (3%)	1 (0%)	37	30
1	S	344/368 (94%)	332 (96%)	10 (3%)	2 (1%)	22	13
1	T	351/368 (95%)	337 (96%)	13 (4%)	1 (0%)	37	30
All	All	6981/7360 (95%)	6732 (96%)	225 (3%)	24 (0%)	38	30

All (24) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	J	188	PRO

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Mol	Chain	Res	Type
1	O	188	PRO
1	Q	188	PRO
1	P	188	PRO
1	M	188	PRO
1	L	188	PRO
1	E	188	PRO
1	D	188	PRO
1	G	188	PRO
1	F	188	PRO
1	I	188	PRO
1	H	188	PRO
1	K	188	PRO
1	B	188	PRO
1	N	188	PRO
1	S	188	PRO
1	R	188	PRO
1	A	106	HIS
1	A	133	HIS
1	B	133	HIS
1	S	133	HIS
1	T	106	HIS
1	E	106	HIS
1	C	188	PRO

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	
1	A	298/307 (97%)	297 (100%)	1 (0%)	91	92
1	B	290/307 (94%)	287 (99%)	3 (1%)	73	74
1	C	298/307 (97%)	294 (99%)	4 (1%)	65	66
1	D	290/307 (94%)	286 (99%)	4 (1%)	62	63
1	E	298/307 (97%)	294 (99%)	4 (1%)	65	66
1	F	291/307 (95%)	290 (100%)	1 (0%)	91	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	298/307 (97%)	296 (99%)	2 (1%)	81	83
1	H	291/307 (95%)	288 (99%)	3 (1%)	73	74
1	I	298/307 (97%)	295 (99%)	3 (1%)	73	74
1	J	295/307 (96%)	292 (99%)	3 (1%)	73	74
1	K	297/307 (97%)	295 (99%)	2 (1%)	81	83
1	L	298/307 (97%)	295 (99%)	3 (1%)	73	74
1	M	292/307 (95%)	290 (99%)	2 (1%)	81	83
1	N	298/307 (97%)	293 (98%)	5 (2%)	56	55
1	O	291/307 (95%)	288 (99%)	3 (1%)	73	74
1	P	298/307 (97%)	294 (99%)	4 (1%)	65	66
1	Q	291/307 (95%)	288 (99%)	3 (1%)	73	74
1	R	298/307 (97%)	294 (99%)	4 (1%)	65	66
1	S	291/307 (95%)	287 (99%)	4 (1%)	62	63
1	T	297/307 (97%)	296 (100%)	1 (0%)	91	92
All	All	5898/6140 (96%)	5839 (99%)	59 (1%)	71	74

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	O	68	LEU
1	O	137	LEU
1	O	229	PHE
1	N	68	LEU
1	N	79	ASP
1	N	137	LEU
1	N	229	PHE
1	N	320	THR
1	Q	68	LEU
1	Q	229	PHE
1	Q	310	LEU
1	P	68	LEU
1	P	229	PHE
1	P	309	LEU
1	P	311	VAL
1	S	68	LEU
1	S	192	ASP
1	S	229	PHE

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Mol	Chain	Res	Type
1	S	310	LEU
1	R	68	LEU
1	R	229	PHE
1	R	310	LEU
1	R	326	ASP
1	T	68	LEU
1	M	68	LEU
1	M	229	PHE
1	L	68	LEU
1	L	229	PHE
1	L	311	VAL
1	E	68	LEU
1	E	229	PHE
1	E	341	LEU
1	E	348	GLU
1	D	68	LEU
1	D	137	LEU
1	D	229	PHE
1	D	320	THR
1	G	68	LEU
1	G	229	PHE
1	F	229	PHE
1	I	68	LEU
1	I	229	PHE
1	I	348	GLU
1	H	68	LEU
1	H	229	PHE
1	H	320	THR
1	K	68	LEU
1	K	229	PHE
1	J	68	LEU
1	J	229	PHE
1	J	351	ARG
1	A	141	ASP
1	C	68	LEU
1	C	81	SER
1	C	229	PHE
1	C	310	LEU
1	B	68	LEU
1	B	229	PHE
1	B	311	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (52)

such sidechains are listed below:

Mol	Chain	Res	Type
1	O	93	ASN
1	N	93	ASN
1	N	152	GLN
1	N	352	GLN
1	Q	4	ASN
1	Q	93	ASN
1	Q	152	GLN
1	Q	300	HIS
1	P	93	ASN
1	R	93	ASN
1	R	106	HIS
1	R	300	HIS
1	T	93	ASN
1	T	106	HIS
1	T	204	ASN
1	M	93	ASN
1	L	93	ASN
1	L	300	HIS
1	E	93	ASN
1	E	327	ASN
1	E	352	GLN
1	D	4	ASN
1	D	93	ASN
1	D	152	GLN
1	D	162	ASN
1	D	286	ASN
1	D	300	HIS
1	G	93	ASN
1	G	352	GLN
1	F	4	ASN
1	F	19	ASN
1	F	93	ASN
1	F	113	GLN
1	F	300	HIS
1	I	93	ASN
1	I	352	GLN
1	H	4	ASN
1	H	93	ASN
1	K	93	ASN
1	K	152	GLN
1	K	162	ASN
1	J	93	ASN

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Mol	Chain	Res	Type
1	A	93	ASN
1	A	286	ASN
1	A	352	GLN
1	C	19	ASN
1	C	196	GLN
1	C	352	GLN
1	B	4	ASN
1	B	93	ASN
1	B	133	HIS
1	B	162	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

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-70421. 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 ⓘ
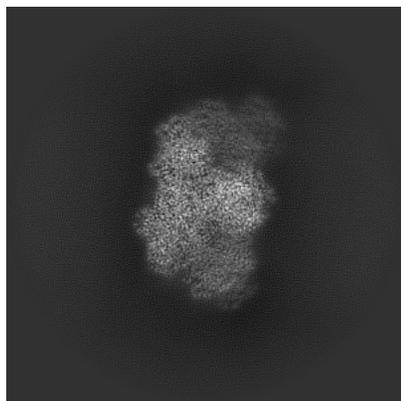
6.1.1 Primary map

X
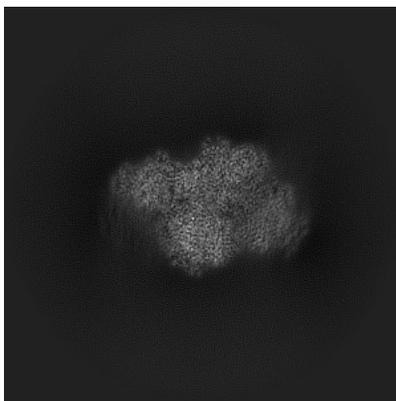
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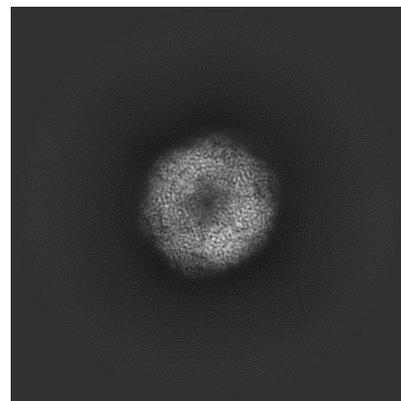
Z

6.1.2 Raw map

X

Y

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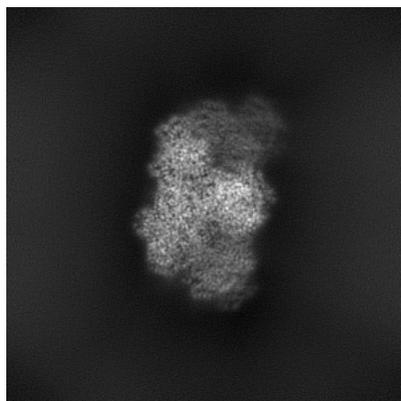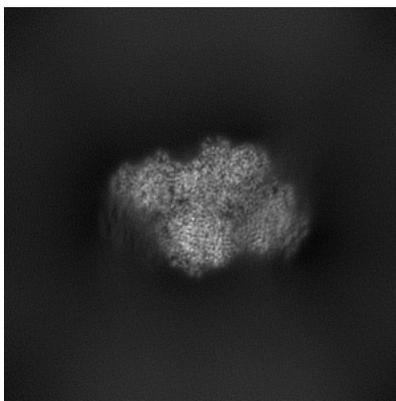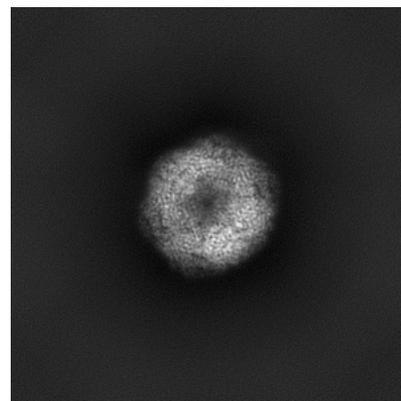
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
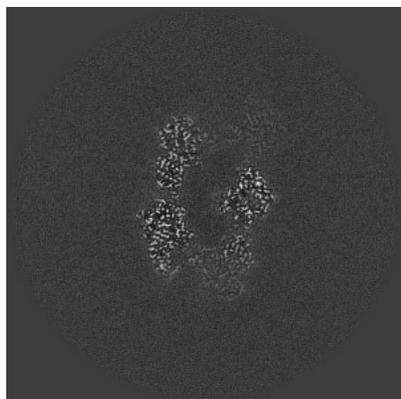
6.2.1 Primary map
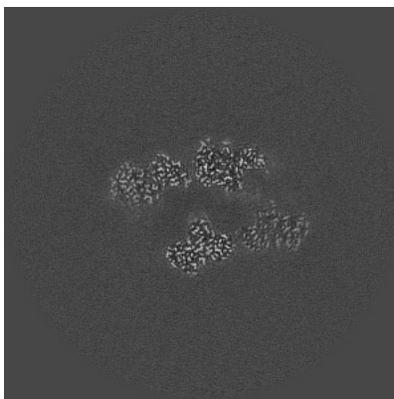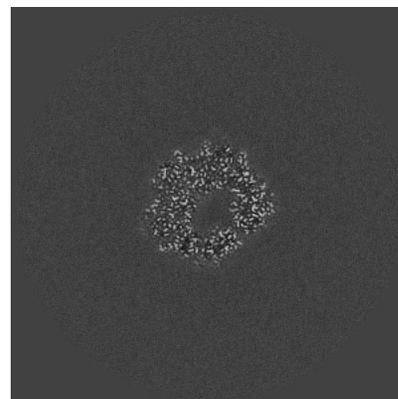
| X Index: 225 | Y Index: 225 | Z Index: 225 |

6.2.2 Raw map
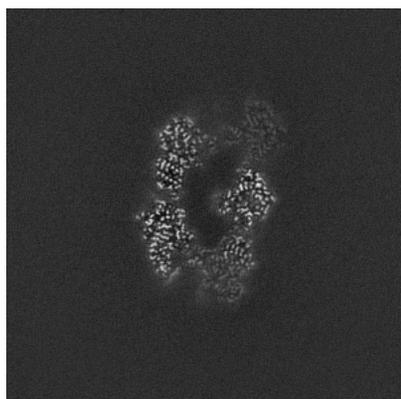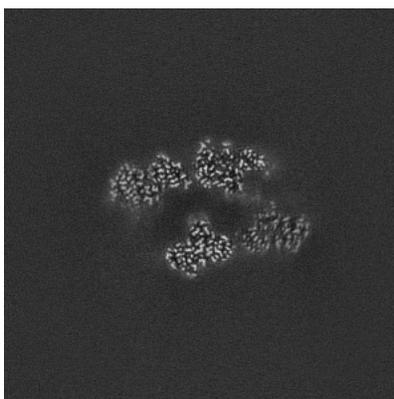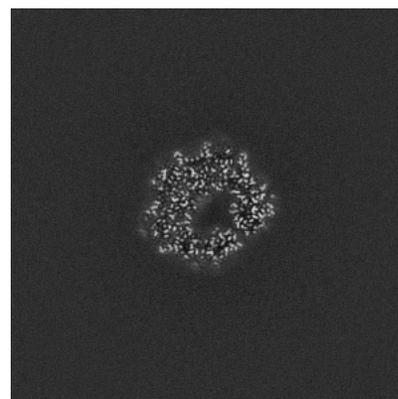
| X Index: 225 | Y Index: 225 | Z Index: 225 |

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

6.3 Largest variance slices (i)

6.3.1 Primary map
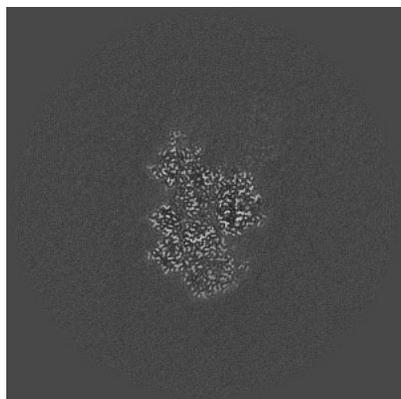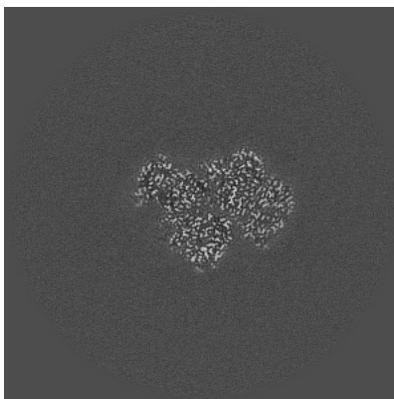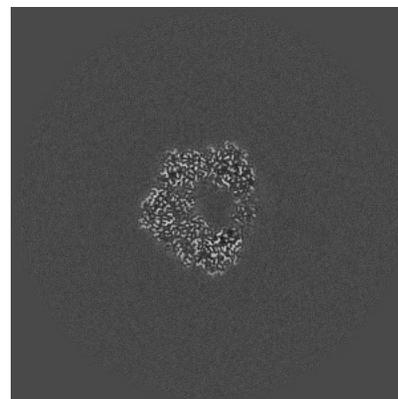
X Index: 255	Y Index: 192	Z Index: 213

6.3.2 Raw map
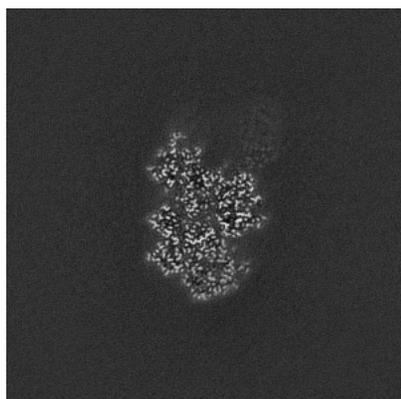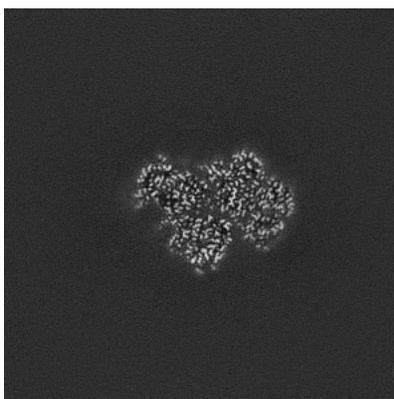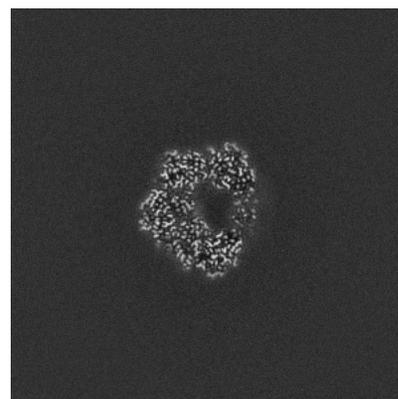
X Index: 255	Y Index: 192	Z Index: 213

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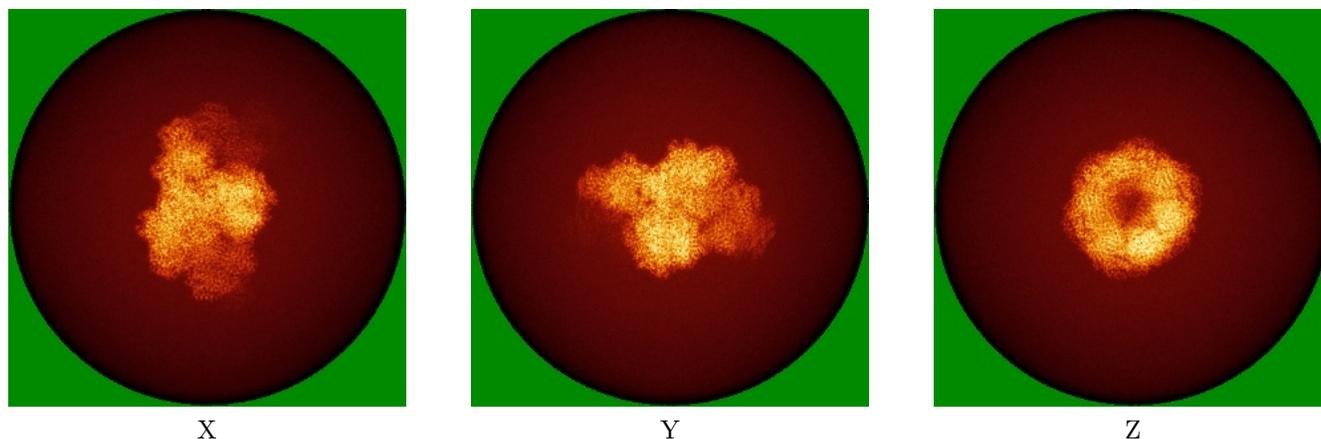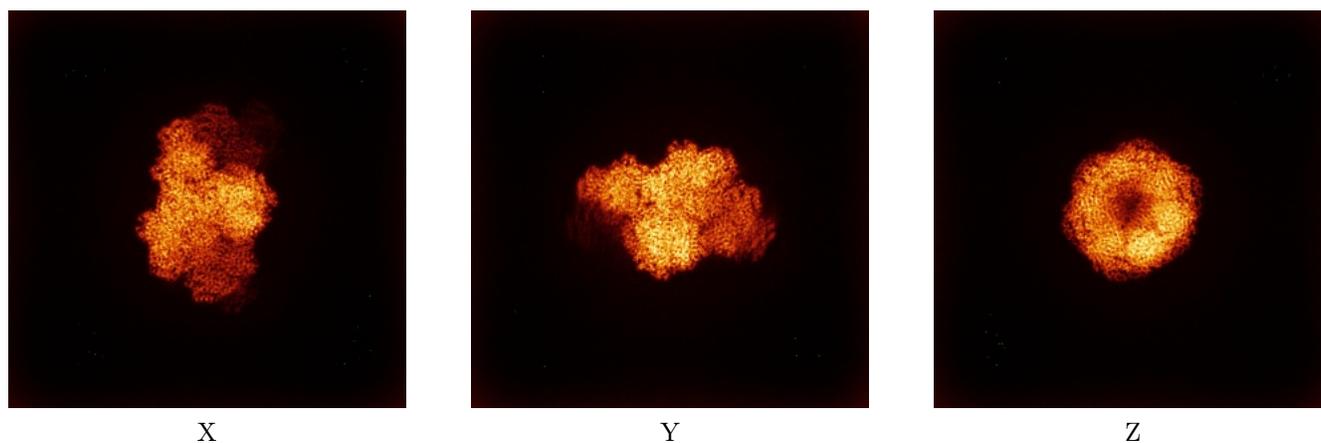
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.5. 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
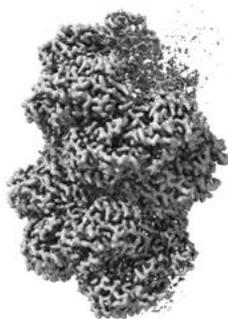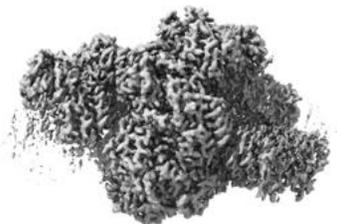
| X | Y | Z |

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 ⓘ

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

6.6.1　emd_70421_msk_1.map ⓘ

X　　　　　　　　　　　　Y　　　　　　　　　　　　Z
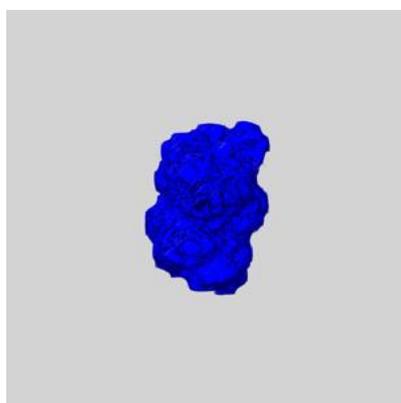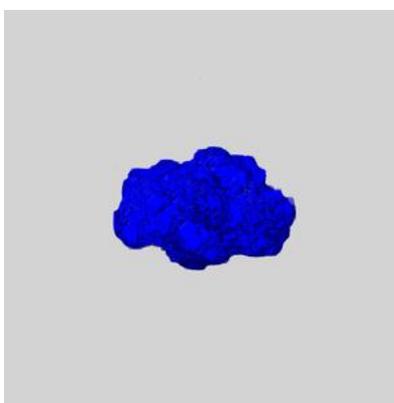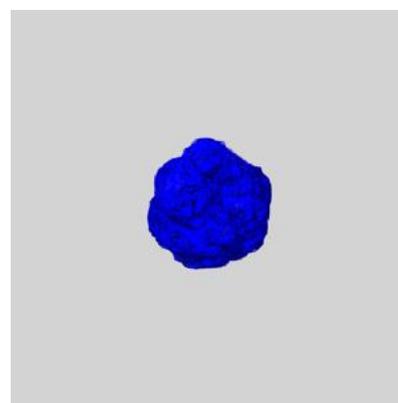
7 Map analysis ⓘ

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 ⓘ
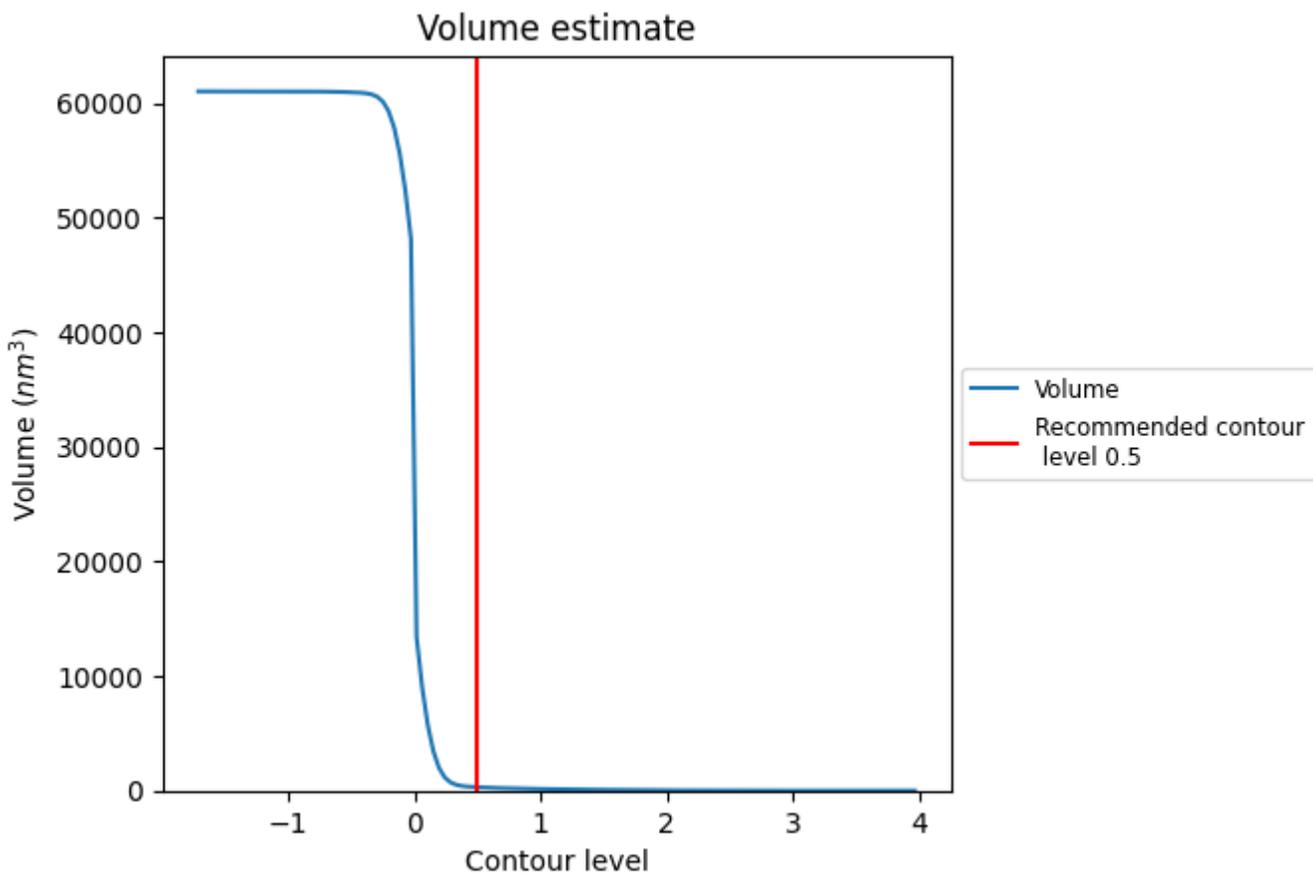
The volume at the recommended contour level is 297 nm^3; this corresponds to an approximate mass of 268 kDa.

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 ⓘ
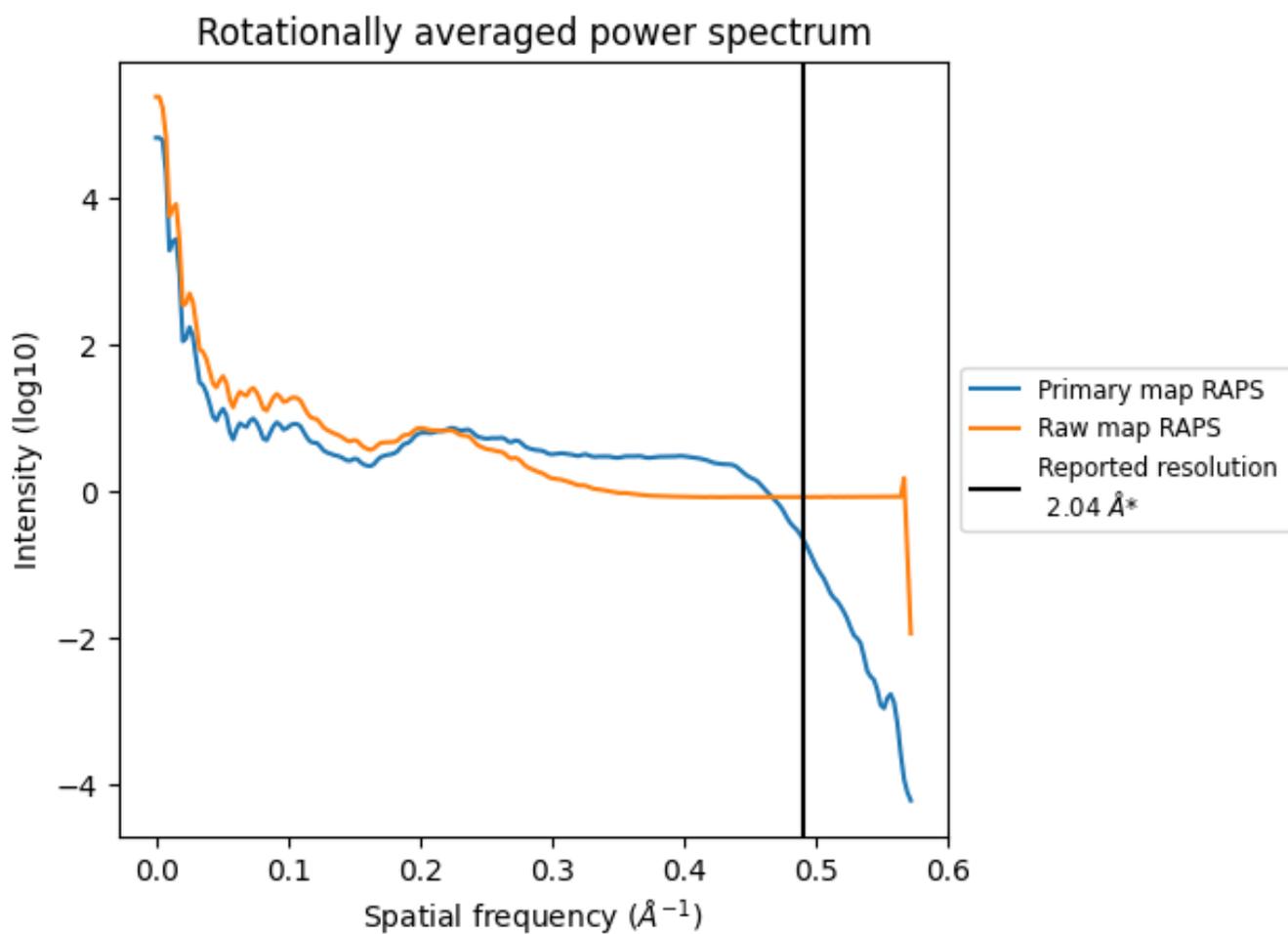
*Reported resolution corresponds to spatial frequency of 0.490 Å^{-1}

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　ⓘ
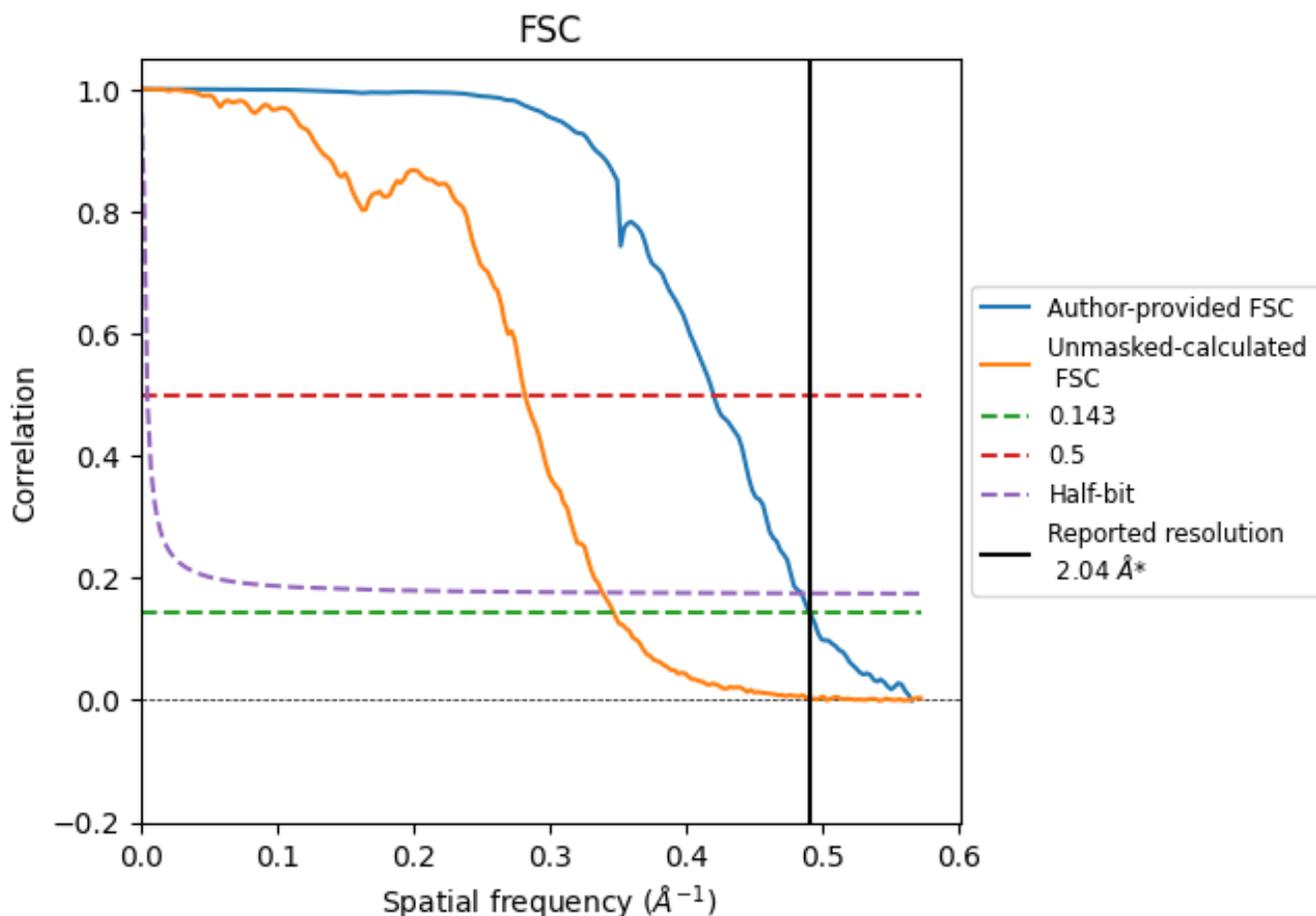
*Reported resolution corresponds to spatial frequency of 0.490 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.04	-	-
Author-provided FSC curve	2.04	2.38	2.06
Unmasked-calculated*	2.89	3.55	2.96

*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 2.89 differs from the reported value 2.04 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-70421 and PDB model 9OFA. Per-residue inclusion information can be found in section 3 on page 6.

## 9.1 Map-model overlay ⓘ

| X | Y | Z |
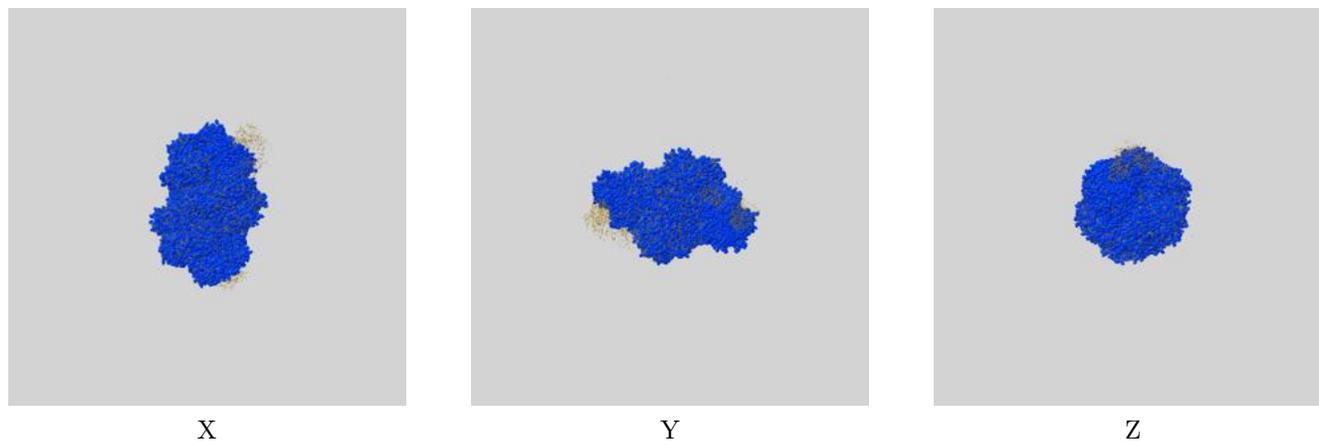
The images above show the 3D surface view of the map at the recommended contour level 0.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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

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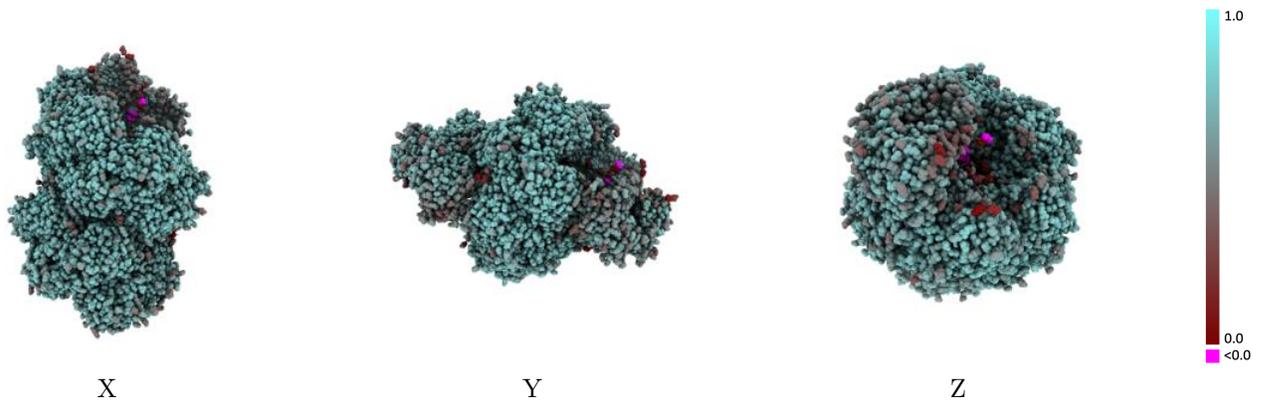
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

9.3　Atom inclusion mapped to coordinate model (i)

X　　　　　　　　　　Y　　　　　　　　　　Z
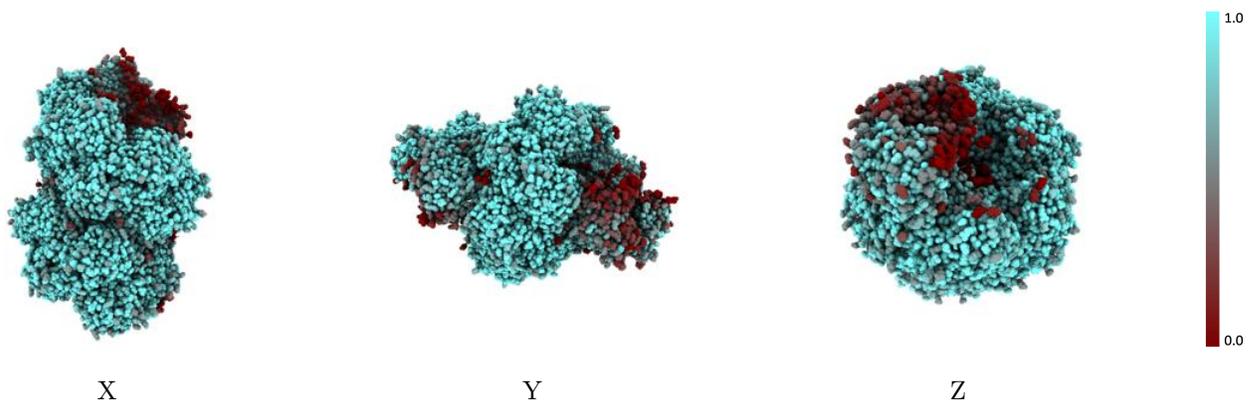
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.5).

WORLDWIDE
wwPDB
PROTEIN DATA BANK
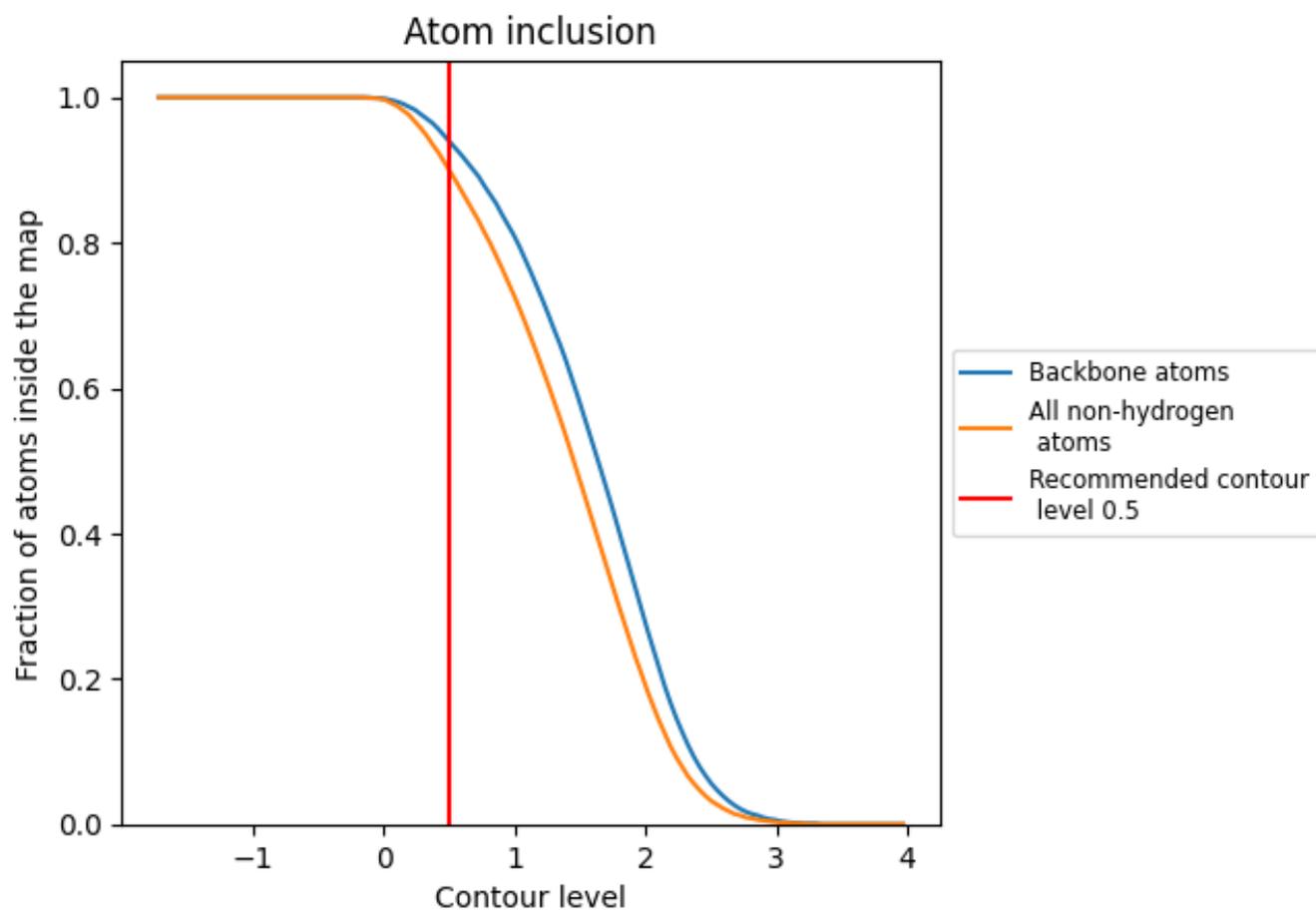
9.4   Atom inclusion ⓘ

At the recommended contour level, 94% of all backbone atoms, 90% 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 (0.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9010	0.6990
A	0.7160	0.6180
B	0.8660	0.6620
C	0.9450	0.7140
D	0.9430	0.7090
E	0.9550	0.7250
F	0.9500	0.7200
G	0.9550	0.7290
H	0.9530	0.7200
I	0.9510	0.7190
J	0.9420	0.7190
K	0.9360	0.7160
L	0.9540	0.7240
M	0.9500	0.7210
N	0.9520	0.7250
O	0.9460	0.7140
P	0.9480	0.7200
Q	0.9280	0.6920
R	0.9100	0.6910
S	0.7540	0.6340
T	0.5620	0.6070

1.0

0.0
<0.0