



Full wwPDB EM Validation Report ⓘ

Jul 4, 2026 – 02:25 PM EDT

PDB ID : 9Y3Q / pdb_00009y3q
EMDB ID : EMD-72463
Title : Eukaryotic translation initiation factor 2-B in its apo form (inactive-state)
Authors : Dalwadi, U.; Croll, T.; Subramanian, A.; Lee, D.J.; Arthur, C.; Walter, P.; Frost, A.
Deposited on : 2025-09-02
Resolution : 3.30 Å(reported)
Based on initial model : 7L7G

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:

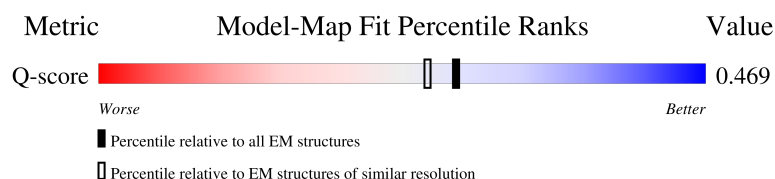
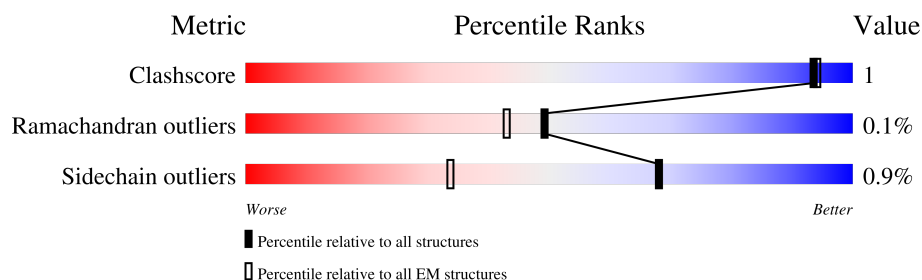
EMDB validation analysis : 0.0.1.dev133
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

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 3.30 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	15087 (2.80 - 3.80)

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	721	
1	B	721	
2	C	368	
2	D	368	

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Mol	Chain	Length	Quality of chain
3	E	523	63% 5% 32%
3	F	523	5% 62% 5% 32%
4	G	305	12% 92% 5%
4	H	305	11% 90% 6%
5	I	452	26% 88% 5% 7%
5	J	452	46% 91% 7%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 28563 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 Translation initiation factor eIF-2B subunit epsilon.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	437	Total	C	N	O	S	0	0
			3423	2167	606	635	15		
1	B	437	Total	C	N	O	S	0	0
			3423	2167	606	635	15		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	587	VAL	ILE	conflict	UNP Q13144
B	587	VAL	ILE	conflict	UNP Q13144

- Molecule 2 is a protein called Translation initiation factor eIF-2B subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	322	Total	C	N	O	S	0	0
			2523	1596	442	470	15		
2	D	322	Total	C	N	O	S	0	0
			2523	1596	442	470	15		

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-16	MET	-	initiating methionine	UNP P49770
C	-15	HIS	-	expression tag	UNP P49770
C	-14	HIS	-	expression tag	UNP P49770
C	-13	HIS	-	expression tag	UNP P49770
C	-12	HIS	-	expression tag	UNP P49770
C	-11	HIS	-	expression tag	UNP P49770
C	-10	HIS	-	expression tag	UNP P49770
C	-9	GLY	-	expression tag	UNP P49770
C	-8	GLY	-	expression tag	UNP P49770
C	-7	GLY	-	expression tag	UNP P49770
C	-6	SER	-	expression tag	UNP P49770

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	GLU	-	expression tag	UNP P49770
C	-4	ASN	-	expression tag	UNP P49770
C	-3	LEU	-	expression tag	UNP P49770
C	-2	TYR	-	expression tag	UNP P49770
C	-1	PHE	-	expression tag	UNP P49770
C	0	GLN	-	expression tag	UNP P49770
C	1	SER	-	expression tag	UNP P49770
D	-16	MET	-	initiating methionine	UNP P49770
D	-15	HIS	-	expression tag	UNP P49770
D	-14	HIS	-	expression tag	UNP P49770
D	-13	HIS	-	expression tag	UNP P49770
D	-12	HIS	-	expression tag	UNP P49770
D	-11	HIS	-	expression tag	UNP P49770
D	-10	HIS	-	expression tag	UNP P49770
D	-9	GLY	-	expression tag	UNP P49770
D	-8	GLY	-	expression tag	UNP P49770
D	-7	GLY	-	expression tag	UNP P49770
D	-6	SER	-	expression tag	UNP P49770
D	-5	GLU	-	expression tag	UNP P49770
D	-4	ASN	-	expression tag	UNP P49770
D	-3	LEU	-	expression tag	UNP P49770
D	-2	TYR	-	expression tag	UNP P49770
D	-1	PHE	-	expression tag	UNP P49770
D	0	GLN	-	expression tag	UNP P49770
D	1	SER	-	expression tag	UNP P49770

- Molecule 3 is a protein called Translation initiation factor eIF-2B subunit delta.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	E	356	Total	C	N	O	S	0	0
			2770	1751	493	512	14		
3	F	356	Total	C	N	O	S	0	0
			2770	1751	493	512	14		

- Molecule 4 is a protein called Translation initiation factor eIF2B subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	296	Total	C	N	O	S	0	0
			2302	1477	381	432	12		
4	H	296	Total	C	N	O	S	0	0
			2302	1477	381	432	12		

- Molecule 5 is a protein called Translation initiation factor eIF-2B subunit gamma.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	420	Total	C	N	O	S	0	0
			3260	2062	560	612	26		
5	J	420	Total	C	N	O	S	0	0
			3260	2062	560	612	26		

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		AltConf
6	E	2	Total	Cl	0
			2	2	
6	B	1	Total	Cl	0
			1	1	
6	F	2	Total	Cl	0
			2	2	

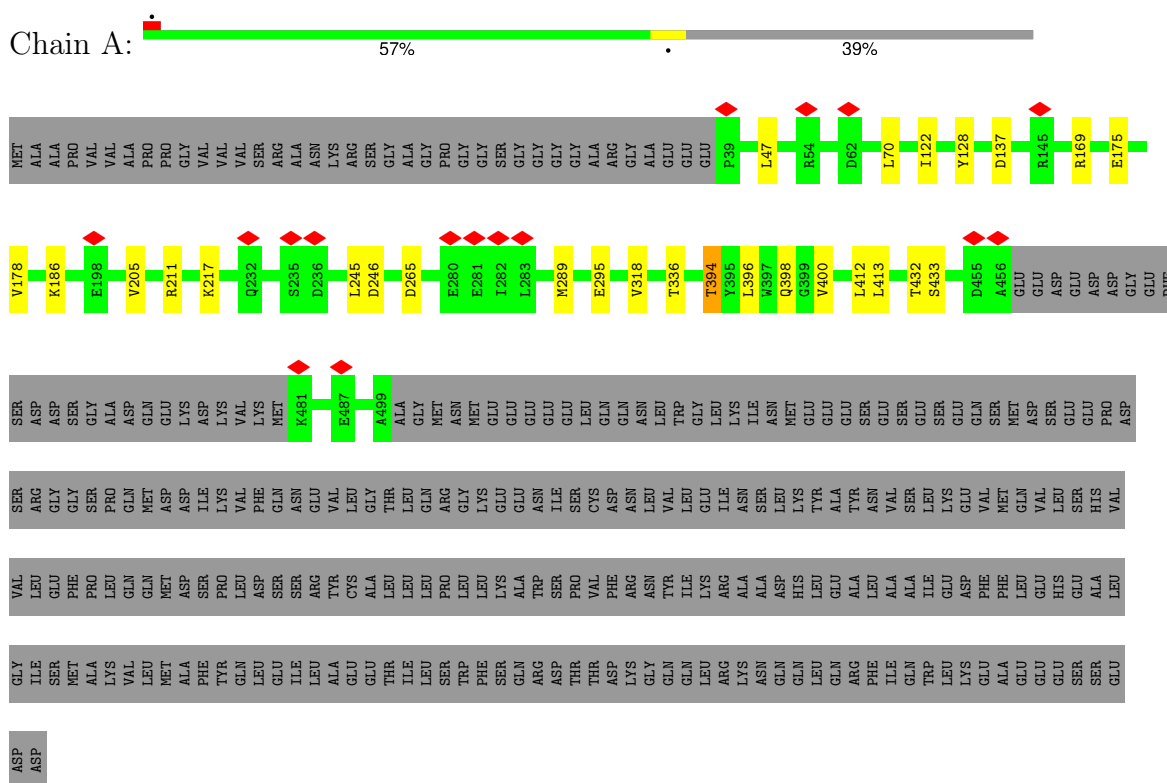
- Molecule 7 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
7	E	1	Total	Zn	0
			1	1	
7	F	1	Total	Zn	0
			1	1	

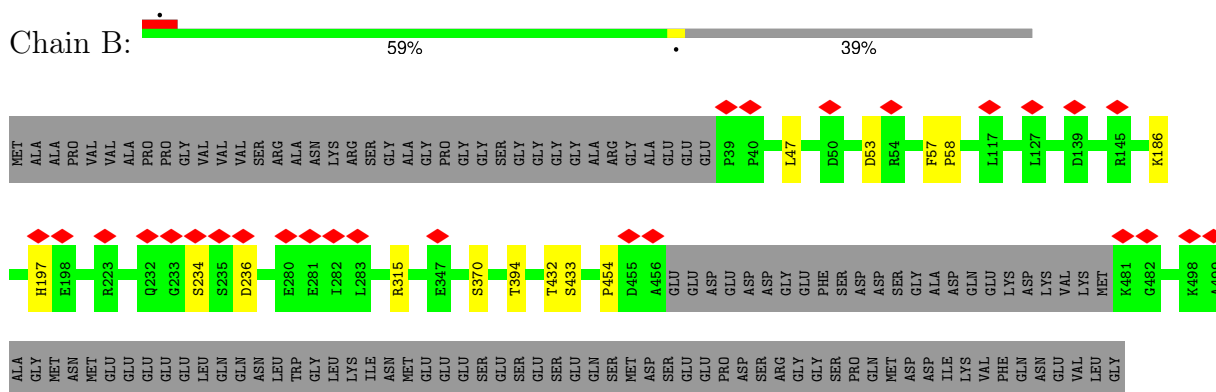
3 Residue-property plots

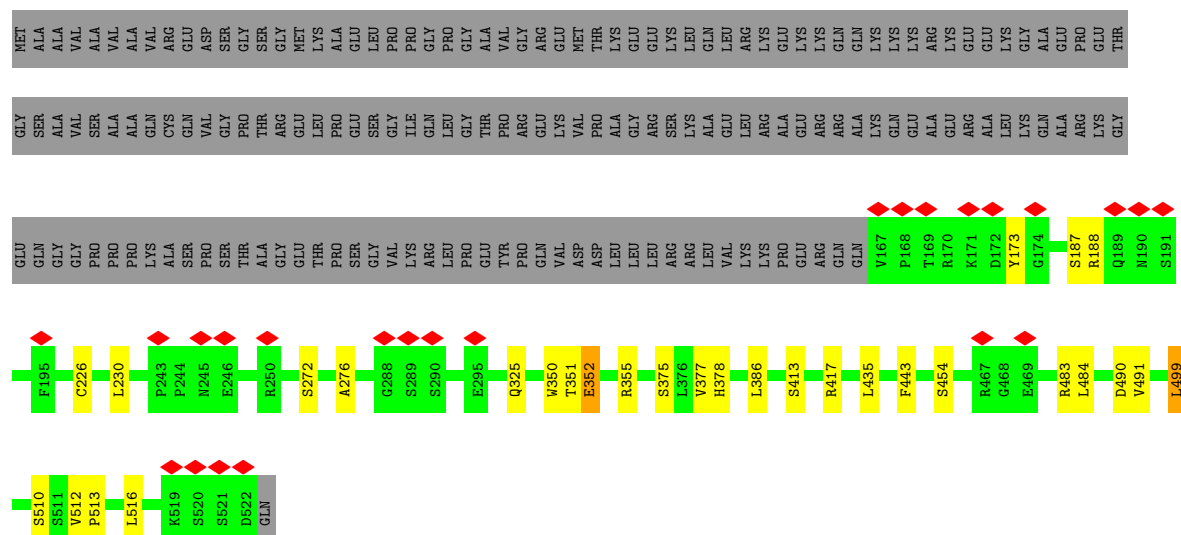
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Translation initiation factor eIF-2B subunit epsilon

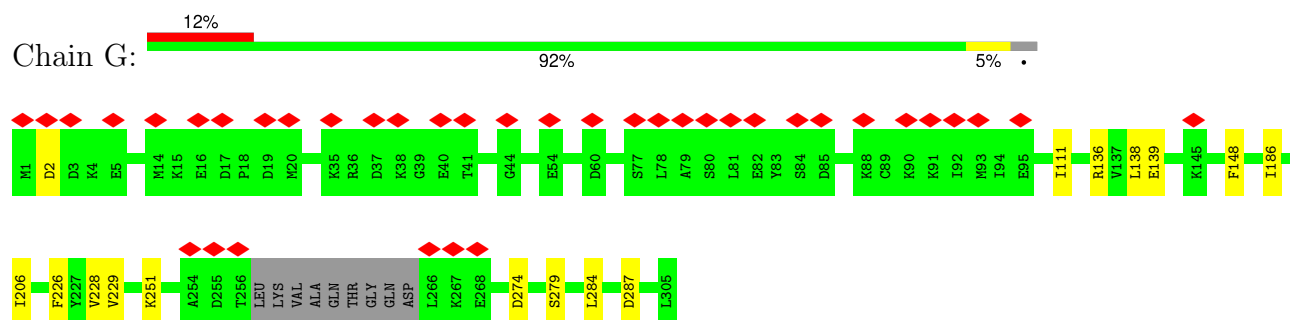


- Molecule 1: Translation initiation factor eIF-2B subunit epsilon

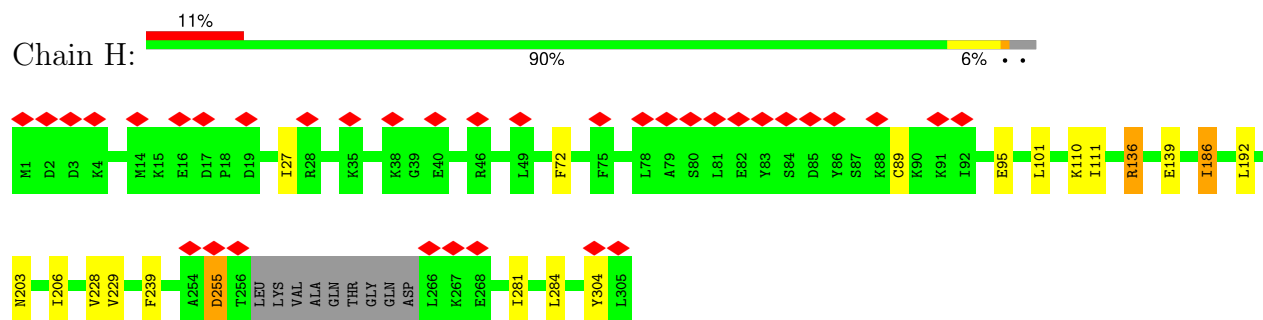




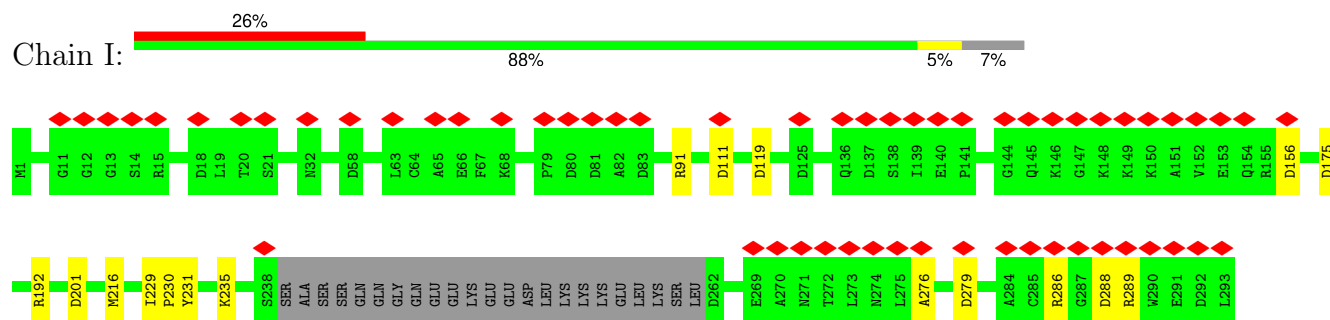
• Molecule 4: Translation initiation factor eIF2B subunit alpha

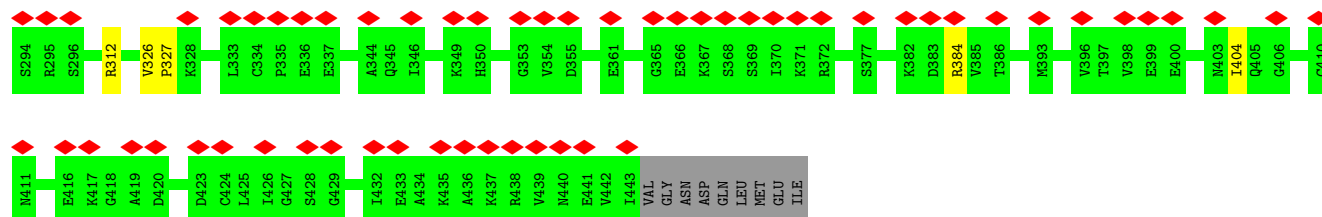


• Molecule 4: Translation initiation factor eIF2B subunit alpha

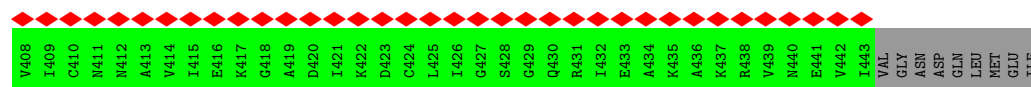
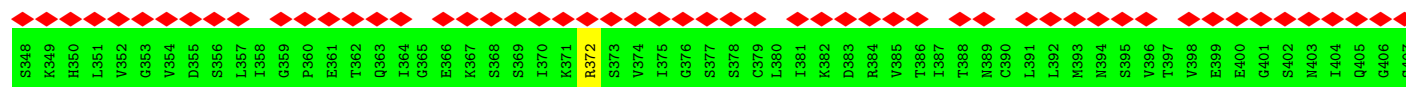
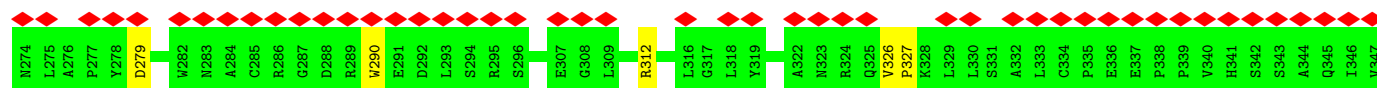
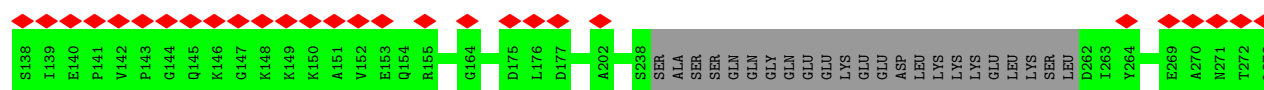
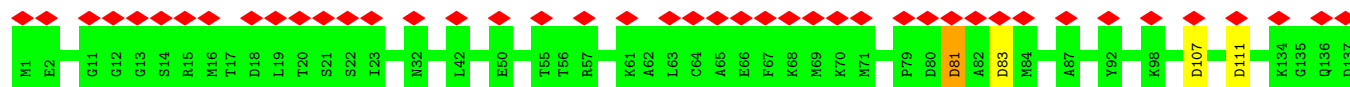
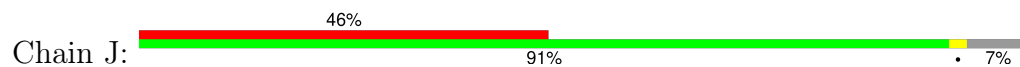


• Molecule 5: Translation initiation factor eIF-2B subunit gamma





• Molecule 5: Translation initiation factor eIF-2B subunit gamma



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	55475	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	130000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	0.763	Depositor
Minimum map value	-0.344	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.020	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	457.52002, 457.52002, 457.52002	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.1438, 1.1438, 1.1438	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, CL

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	0.61	0/3497	1.08	5/4758 (0.1%)
1	B	0.60	0/3497	1.07	2/4758 (0.0%)
2	C	0.66	0/2572	1.13	7/3477 (0.2%)
2	D	0.64	0/2572	1.15	5/3477 (0.1%)
3	E	0.66	0/2822	1.12	4/3835 (0.1%)
3	F	0.64	0/2822	1.11	4/3835 (0.1%)
4	G	0.64	0/2338	1.15	4/3155 (0.1%)
4	H	0.62	0/2338	1.15	3/3155 (0.1%)
5	I	0.63	1/3310 (0.0%)	1.01	6/4470 (0.1%)
5	J	0.57	0/3310	1.00	4/4470 (0.1%)
All	All	0.63	1/29078 (0.0%)	1.09	44/39390 (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	2
1	B	0	2
2	C	0	4
2	D	0	4
3	E	0	5
3	F	0	5
4	G	0	2
4	H	0	1
5	I	0	3
5	J	0	3
All	All	0	31

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	I	384	ARG	NE-CZ	12.68	1.47	1.33

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	490	ASP	CA-CB-CG	8.86	121.46	112.60
2	D	48	ASP	CA-CB-CG	7.45	120.05	112.60
2	D	160	HIS	CA-CB-CG	-7.39	106.41	113.80
3	E	490	ASP	CA-CB-CG	6.72	119.32	112.60
5	I	288	ASP	CA-CB-CG	6.57	119.17	112.60
3	E	310	GLU	CB-CA-C	-6.42	100.75	110.90
3	E	440	THR	CA-CB-OG1	-6.30	100.15	109.60
2	C	283	ASP	CA-CB-CG	6.25	118.84	112.60
5	J	279	ASP	CA-CB-CG	6.24	118.84	112.60
1	B	53	ASP	CA-CB-CG	6.20	118.80	112.60
5	I	111	ASP	CA-CB-CG	6.17	118.77	112.60
3	E	431	ASN	CB-CA-C	5.95	120.80	112.11
1	B	197	HIS	CA-CB-CG	5.88	119.68	113.80
2	C	314	ASP	CA-CB-CG	5.82	118.42	112.60
3	F	378	HIS	CA-CB-CG	-5.76	108.03	113.80
1	A	217	LYS	N-CA-CB	-5.68	101.80	110.65
2	C	48	ASP	CA-CB-CG	5.67	118.27	112.60
5	I	384	ARG	NE-CZ-NH2	5.63	124.27	119.20
1	A	394	THR	CA-CB-OG1	-5.61	101.19	109.60
2	D	75	GLU	N-CA-CB	-5.60	103.70	110.53
1	A	289	MET	CB-CA-C	-5.58	99.66	109.71
3	F	352	GLU	CB-CA-C	-5.54	102.08	110.06
1	A	398	GLN	N-CA-CB	-5.52	100.93	109.48
2	C	253	THR	CA-CB-OG1	-5.51	101.34	109.60
3	F	325	GLN	CB-CA-C	-5.47	99.06	109.95
2	C	160	HIS	CA-CB-CG	-5.45	108.35	113.80
4	G	139	GLU	CB-CA-C	-5.41	102.15	110.81
5	I	201	ASP	CA-CB-CG	5.40	118.00	112.60
4	G	251	LYS	CB-CA-C	-5.35	102.48	110.88
2	D	340	MET	CG-SD-CE	5.35	112.66	100.90
4	G	274	ASP	CA-CB-CG	5.32	117.92	112.60
5	J	83	ASP	CA-CB-CG	5.32	117.92	112.60
5	J	111	ASP	CA-CB-CG	5.27	117.87	112.60
5	J	107	ASP	CA-CB-CG	5.25	117.85	112.60
4	H	304	TYR	CA-CB-CG	5.25	123.35	113.90
5	I	175	ASP	CA-CB-CG	5.23	117.83	112.60
2	C	278	PHE	CA-CB-CG	-5.21	108.58	113.80
1	A	265	ASP	CA-CB-CG	5.15	117.75	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	213	GLU	N-CA-CB	5.13	117.61	109.71
4	H	110	LYS	CB-CA-C	-5.09	102.34	110.79
4	H	255	ASP	CA-CB-CG	5.04	117.64	112.60
4	G	226	PHE	N-CA-CB	-5.04	102.79	110.65
5	I	156	ASP	CA-CB-CG	5.02	117.62	112.60
2	D	84	ARG	NE-CZ-NH2	5.02	123.72	119.20

There are no chirality outliers.

All (31) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	169	ARG	Sidechain
1	A	211	ARG	Sidechain
1	B	315	ARG	Sidechain
1	B	454	PRO	Peptide
2	C	172	ARG	Sidechain
2	C	228	ARG	Sidechain
2	C	24	ARG	Peptide
2	C	36	ARG	Sidechain
2	D	183	ARG	Sidechain
2	D	228	ARG	Sidechain
2	D	245	LEU	Peptide
2	D	47	THR	Peptide
3	E	188	ARG	Sidechain
3	E	250	ARG	Sidechain
3	E	364	ARG	Sidechain
3	E	417	ARG	Sidechain
3	E	499	LEU	Peptide
3	F	188	ARG	Sidechain
3	F	350	TRP	Peptide
3	F	355	ARG	Sidechain
3	F	417	ARG	Sidechain
3	F	499	LEU	Peptide
4	G	136	ARG	Sidechain
4	G	2	ASP	Peptide
4	H	136	ARG	Sidechain
5	I	192	ARG	Sidechain
5	I	286	ARG	Sidechain
5	I	312	ARG	Sidechain
5	J	290	TRP	Peptide
5	J	312	ARG	Sidechain
5	J	81	ASP	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	3423	0	3419	12	0
1	B	3423	0	3419	5	0
2	C	2523	0	2527	9	0
2	D	2523	0	2527	9	0
3	E	2770	0	2829	11	0
3	F	2770	0	2830	13	0
4	G	2302	0	2378	5	0
4	H	2302	0	2378	9	0
5	I	3260	0	3357	7	0
5	J	3260	0	3357	1	0
6	B	1	0	0	0	0
6	E	2	0	0	0	0
6	F	2	0	0	0	0
7	E	1	0	0	0	0
7	F	1	0	0	0	0
All	All	28563	0	29021	75	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 1.

All (75) 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:D:317:PRO:HD2	2:D:320:LEU:HD12	1.67	0.75
3:E:443:PHE:HB2	3:E:516:LEU:HD23	1.69	0.72
2:C:21:THR:CG2	2:C:27:GLY:HA2	2.34	0.58
4:G:228:VAL:HB	4:G:284:LEU:HD23	1.88	0.56
3:F:499:LEU:HD23	4:H:239:PHE:CZ	2.41	0.54
1:A:175:GLU:HG2	1:A:178:VAL:HG21	1.90	0.53
3:F:483:ARG:C	3:F:484:LEU:HD12	2.33	0.53
2:C:297:PHE:CD2	1:B:186:LYS:HE3	2.44	0.52
3:E:512:VAL:N	3:E:513:PRO:CD	2.73	0.52
4:H:111:ILE:HG21	4:H:229:VAL:HG13	1.92	0.51
4:H:206:ILE:HG21	4:H:228:VAL:HG11	1.92	0.51
4:H:27:ILE:HG23	4:H:72:PHE:CD1	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:513:PRO:O	3:E:517:ARG:HB3	2.11	0.50
1:B:432:THR:HG22	1:B:433:SER:H	1.77	0.50
4:H:136:ARG:HH21	4:H:139:GLU:HB2	1.77	0.49
3:F:443:PHE:HB2	3:F:516:LEU:HD23	1.94	0.49
1:A:47:LEU:C	1:A:47:LEU:HD23	2.38	0.49
5:I:276:ALA:HB1	5:I:279:ASP:OD2	2.13	0.49
3:F:512:VAL:N	3:F:513:PRO:CD	2.76	0.49
2:C:309:HIS:HB2	3:F:386:LEU:HD21	1.94	0.48
1:A:186:LYS:HE3	2:D:297:PHE:CD2	2.49	0.48
1:A:318:VAL:HG12	1:A:318:VAL:O	2.14	0.47
4:G:287:ASP:OD1	4:G:287:ASP:N	2.46	0.46
4:H:186:ILE:HD13	4:H:186:ILE:HA	1.66	0.46
3:E:210:LEU:HD11	3:E:214:TYR:CZ	2.51	0.46
2:D:236:THR:HG21	2:D:245:LEU:HD22	1.98	0.46
2:D:288:PHE:CE1	2:D:311:PRO:HB3	2.51	0.46
3:E:350:TRP:C	3:E:351:THR:O	2.58	0.46
3:E:354:ARG:O	3:E:355:ARG:NH2	2.46	0.46
2:C:302:ILE:HG22	3:F:377:VAL:HG11	1.98	0.45
1:B:47:LEU:C	1:B:47:LEU:HD23	2.42	0.45
1:B:234:SER:OG	1:B:236:ASP:OD1	2.33	0.45
1:A:186:LYS:NZ	1:A:295:GLU:O	2.43	0.45
3:F:351:THR:O	3:F:352:GLU:HB2	2.16	0.45
5:I:231:TYR:OH	5:I:235:LYS:HE3	2.16	0.45
2:D:249:THR:HA	2:D:314:ASP:HB2	1.98	0.45
2:D:241:ALA:HA	2:D:340:MET:HE3	1.99	0.44
1:B:57:PHE:CD1	1:B:58:PRO:HA	2.52	0.44
1:A:396:LEU:HG	1:A:400:VAL:HG11	1.99	0.44
4:G:111:ILE:HG21	4:G:229:VAL:HG13	1.99	0.44
2:D:93:TYR:CZ	2:D:122:PHE:HA	2.52	0.44
3:F:230:LEU:HD21	3:F:276:ALA:HB1	2.00	0.44
4:G:206:ILE:HG21	4:G:228:VAL:HG11	1.99	0.44
4:H:281:ILE:HG21	4:H:284:LEU:HD23	1.98	0.44
3:E:402:LEU:HD11	3:E:437:CYS:SG	2.57	0.44
3:E:443:PHE:HB2	3:E:516:LEU:CD2	2.42	0.43
3:F:435:LEU:HD12	3:F:435:LEU:N	2.34	0.43
5:I:91:ARG:HA	5:I:216:MET:HE1	1.99	0.43
2:D:204:ALA:CB	2:D:216:VAL:CG2	2.97	0.43
3:E:395:LEU:HD12	3:E:426:VAL:HG12	2.01	0.43
1:A:432:THR:HG22	1:A:433:SER:H	1.84	0.43
1:A:70:LEU:C	1:A:70:LEU:HD23	2.44	0.42
5:J:326:VAL:N	5:J:327:PRO:CD	2.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:241:ALA:HA	2:C:340:MET:HE3	2.01	0.42
3:E:435:LEU:N	3:E:435:LEU:HD12	2.34	0.42
2:C:193:GLU:O	2:C:194:CYS:HB3	2.18	0.42
1:A:412:LEU:C	1:A:413:LEU:HD12	2.45	0.42
2:C:266:ILE:HG12	2:C:323:LEU:HB3	2.02	0.42
5:I:229:ILE:HB	5:I:230:PRO:HD3	2.02	0.42
3:F:226:CYS:CB	3:F:272:SER:OG	2.68	0.42
3:F:173:TYR:CG	3:F:187:SER:HB2	2.55	0.41
5:I:231:TYR:CZ	5:I:235:LYS:HE3	2.55	0.41
1:A:245:LEU:HD12	1:A:246:ASP:N	2.36	0.41
2:D:204:ALA:CB	2:D:216:VAL:HG22	2.51	0.41
5:I:326:VAL:N	5:I:327:PRO:CD	2.84	0.41
4:H:192:LEU:N	4:H:192:LEU:HD23	2.35	0.41
4:H:203:ASN:HB3	4:H:239:PHE:CZ	2.56	0.41
1:A:128:TYR:OH	1:A:137:ASP:OD2	2.34	0.41
2:C:62:ARG:NH2	2:C:351:LEU:O	2.54	0.41
3:F:413:SER:HB3	3:F:491:VAL:HG13	2.02	0.41
1:A:122:ILE:H	1:A:122:ILE:HD12	1.86	0.40
3:E:193:THR:HG21	5:I:119:ASP:OD2	2.21	0.40
4:G:138:LEU:HD22	4:G:148:PHE:CE1	2.55	0.40
2:C:81:MET:HE3	2:C:272:PHE:HB2	2.03	0.40
3:F:226:CYS:HB2	3:F:272:SER:OG	2.21	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	433/721 (60%)	415 (96%)	18 (4%)	0	100	100
1	B	433/721 (60%)	410 (95%)	23 (5%)	0	100	100
2	C	318/368 (86%)	308 (97%)	10 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	D	318/368 (86%)	309 (97%)	9 (3%)	0	100	100
3	E	354/523 (68%)	345 (98%)	9 (2%)	0	100	100
3	F	354/523 (68%)	342 (97%)	12 (3%)	0	100	100
4	G	292/305 (96%)	286 (98%)	6 (2%)	0	100	100
4	H	292/305 (96%)	285 (98%)	6 (2%)	1 (0%)	36	65
5	I	416/452 (92%)	390 (94%)	26 (6%)	0	100	100
5	J	416/452 (92%)	386 (93%)	29 (7%)	1 (0%)	43	71
All	All	3626/4738 (76%)	3476 (96%)	148 (4%)	2 (0%)	49	75

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	H	89	CYS
5	J	372	ARG

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	384/626 (61%)	381 (99%)	3 (1%)	73	79
1	B	384/626 (61%)	382 (100%)	2 (0%)	81	83
2	C	274/312 (88%)	268 (98%)	6 (2%)	45	66
2	D	274/312 (88%)	271 (99%)	3 (1%)	65	76
3	E	312/444 (70%)	309 (99%)	3 (1%)	68	76
3	F	312/444 (70%)	309 (99%)	3 (1%)	68	76
4	G	253/260 (97%)	251 (99%)	2 (1%)	73	79
4	H	253/260 (97%)	249 (98%)	4 (2%)	55	72
5	I	369/398 (93%)	367 (100%)	2 (0%)	81	83
5	J	369/398 (93%)	368 (100%)	1 (0%)	86	86
All	All	3184/4080 (78%)	3155 (99%)	29 (1%)	68	78

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	205	VAL
1	A	336	THR
1	A	394	THR
2	C	175	GLU
2	C	246	ARG
2	C	271	MET
2	C	282	GLU
2	C	294	VAL
2	C	350	VAL
3	E	190	ASN
3	E	396	PRO
3	E	435	LEU
4	G	186	ILE
4	G	279	SER
5	I	289	ARG
5	I	404	ILE
1	B	370	SER
1	B	394	THR
2	D	175	GLU
2	D	225	VAL
2	D	292	GLU
3	F	375	SER
3	F	454	SER
3	F	510	SER
4	H	95	GLU
4	H	101	LEU
4	H	186	ILE
4	H	255	ASP
5	J	81	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	216	GLN
1	A	352	HIS
1	A	359	ASN
1	A	376	ASN
1	A	388	ASN
2	C	150	ASN
2	C	160	HIS
4	G	222	GLN

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Mol	Chain	Res	Type
4	G	270	HIS
5	I	115	HIS
5	I	403	ASN
5	I	405	GLN
1	B	101	GLN
1	B	352	HIS
1	B	440	ASN
2	D	44	GLN
2	D	132	ASN
2	D	154	GLN
2	D	252	HIS
3	F	235	GLN
4	H	222	GLN
5	J	271	ASN
5	J	297	GLN
5	J	405	GLN
5	J	440	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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.

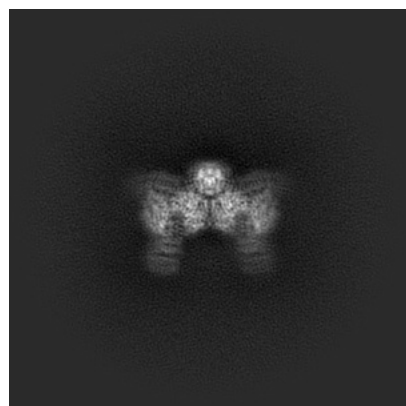
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-72463. These allow visual inspection of the internal detail of the map and identification of artifacts.

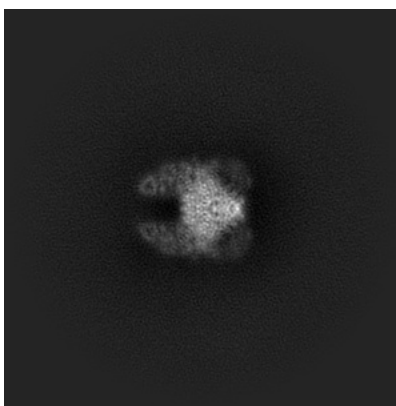
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

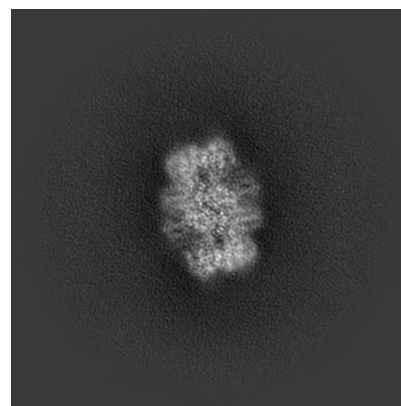
6.1.1 Primary map



X

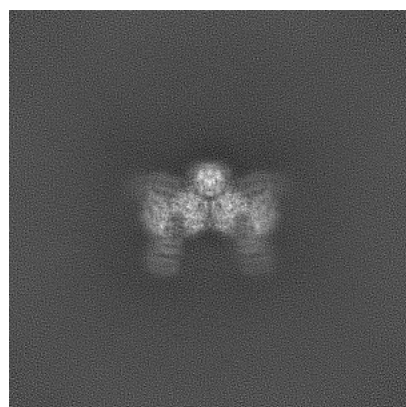


Y

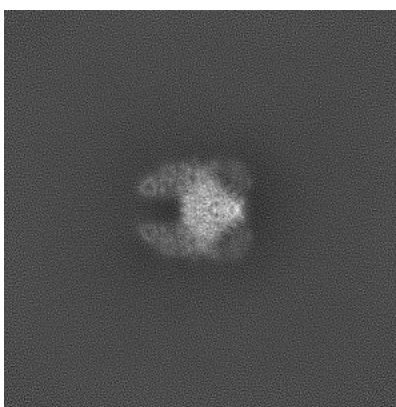


Z

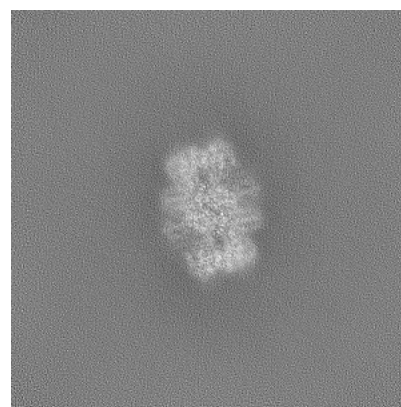
6.1.2 Raw map



X



Y

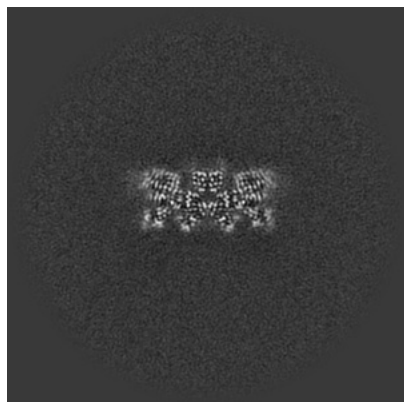


Z

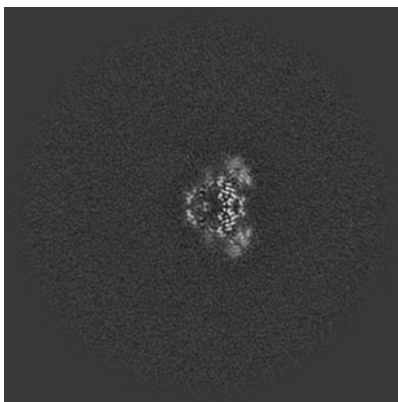
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

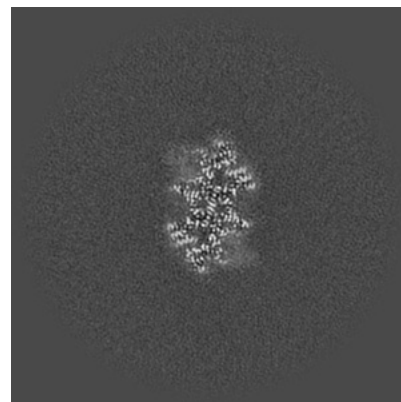
6.2.1 Primary map



X Index: 200

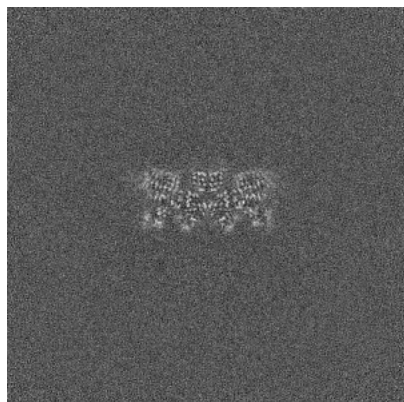


Y Index: 200

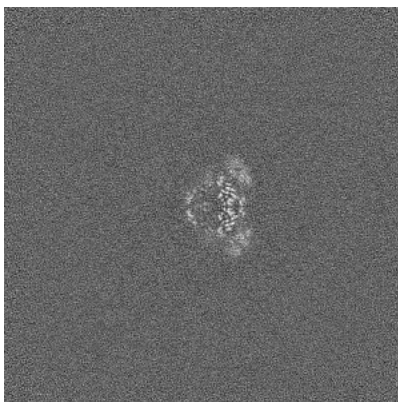


Z Index: 200

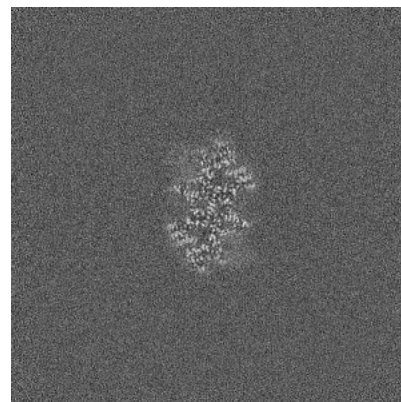
6.2.2 Raw map



X Index: 200



Y Index: 200

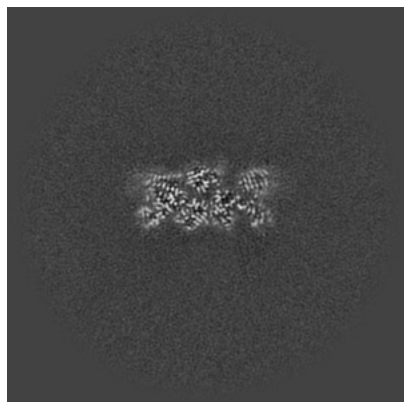


Z Index: 200

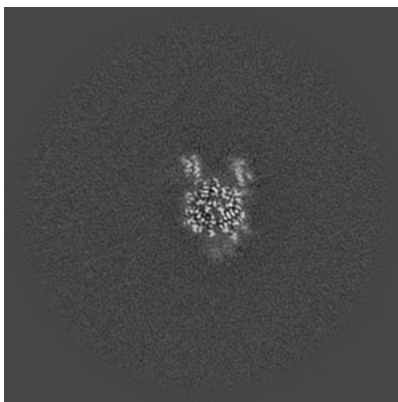
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

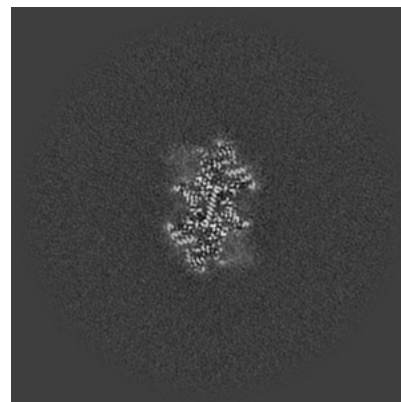
6.3.1 Primary map



X Index: 196

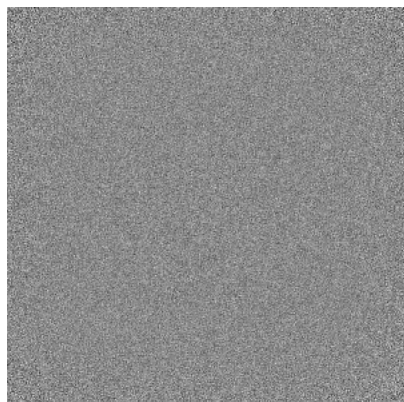


Y Index: 191

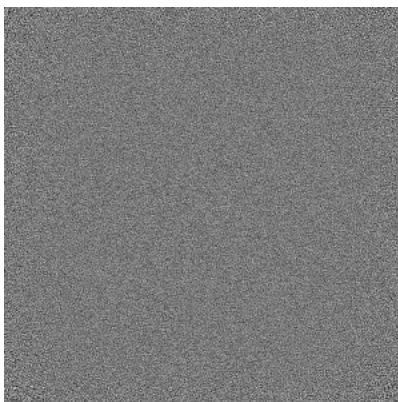


Z Index: 201

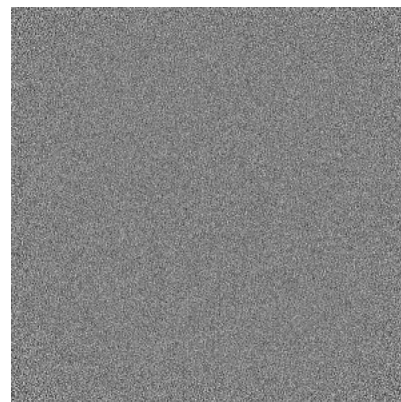
6.3.2 Raw map



X Index: 0



Y Index: 0

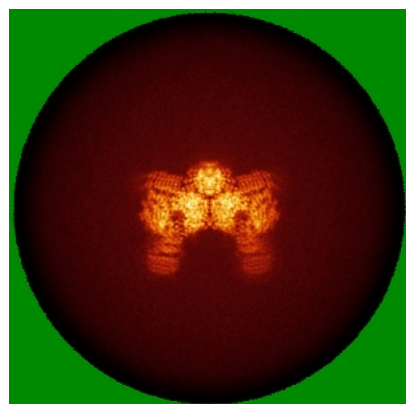


Z Index: 0

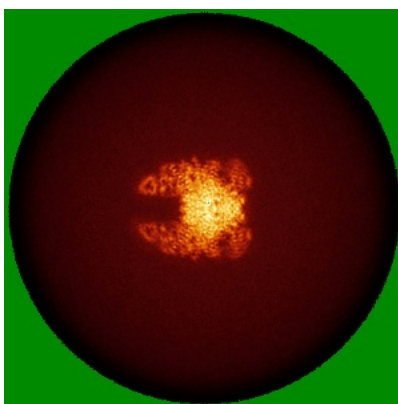
The images above show the largest variance slices of the map in three orthogonal directions.

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

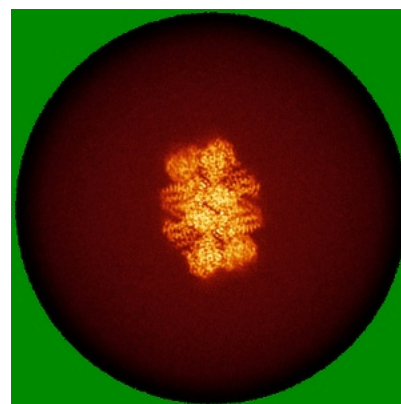
6.4.1 Primary map



X

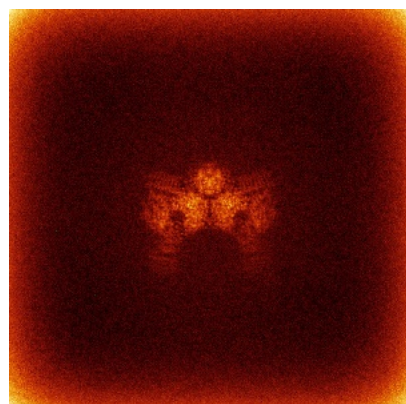


Y

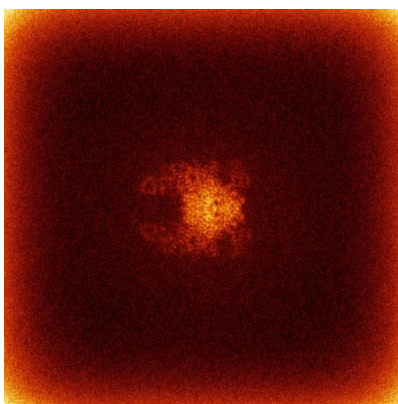


Z

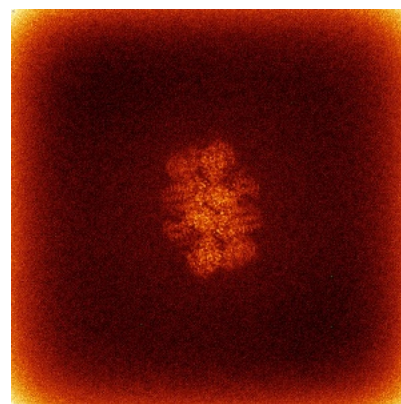
6.4.2 Raw map



X



Y

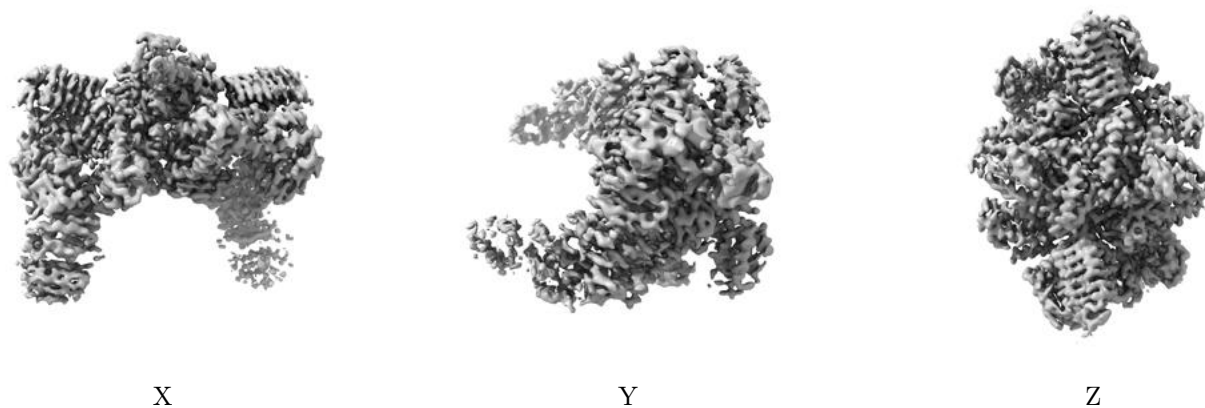


Z

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.

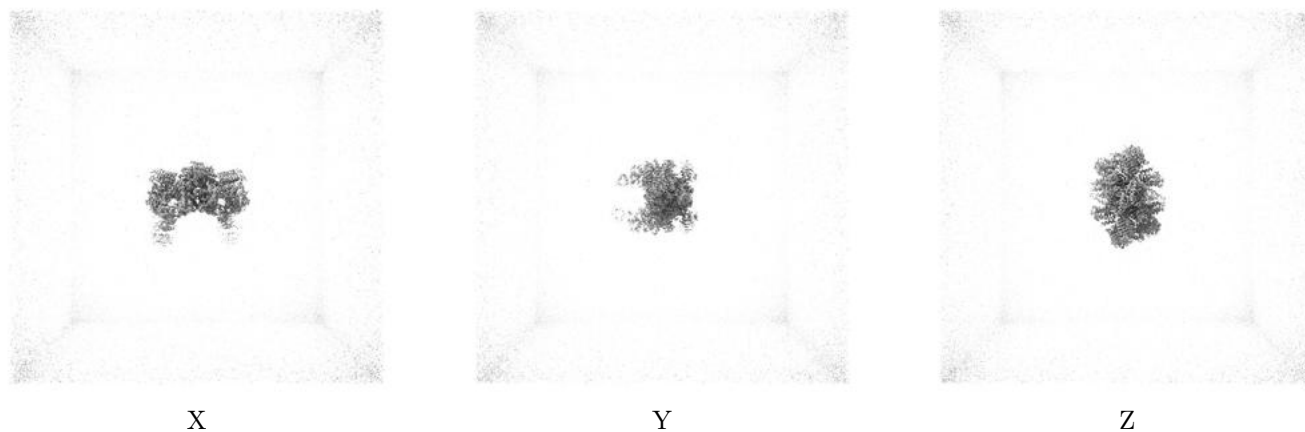
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.2. 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.

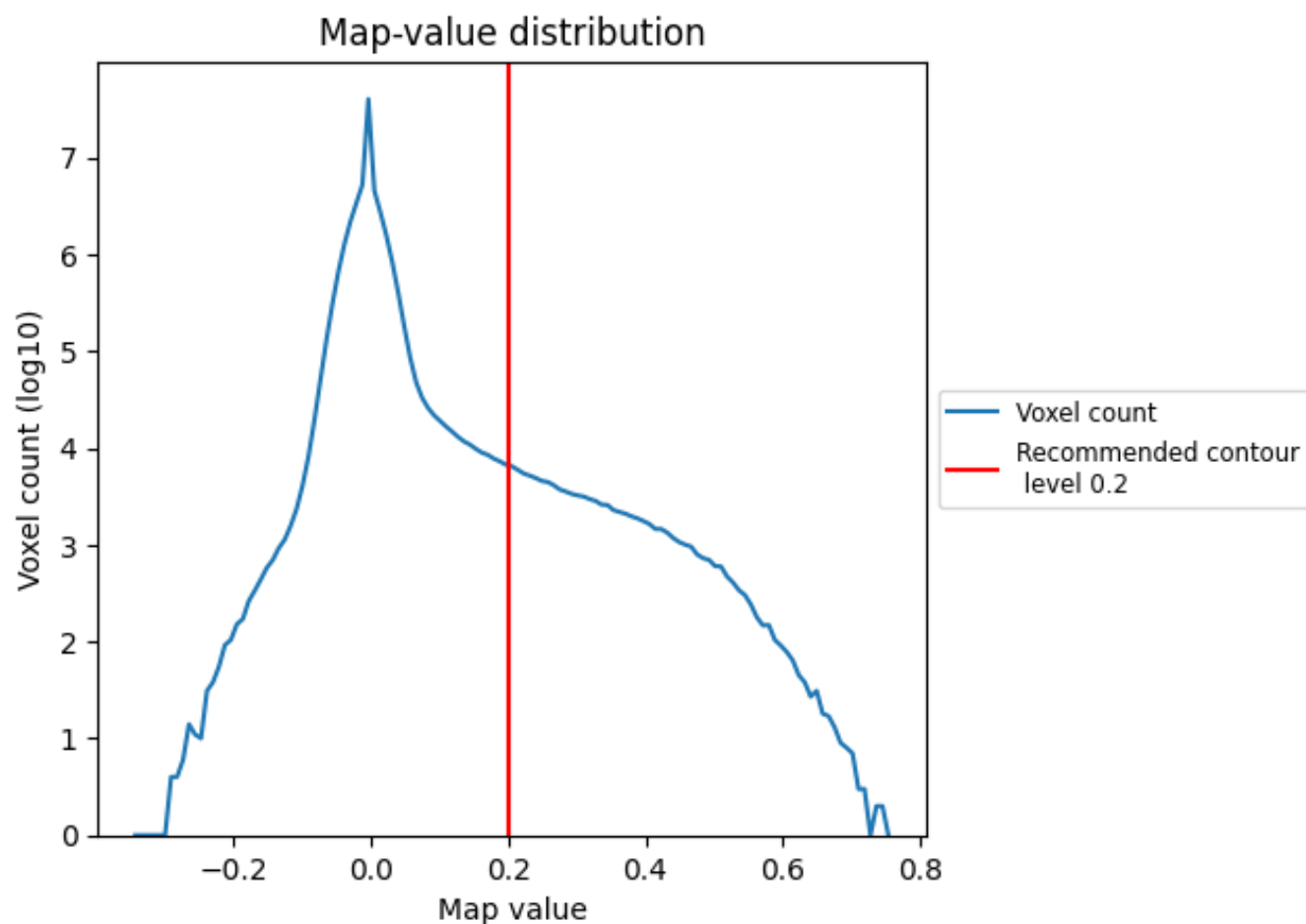
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

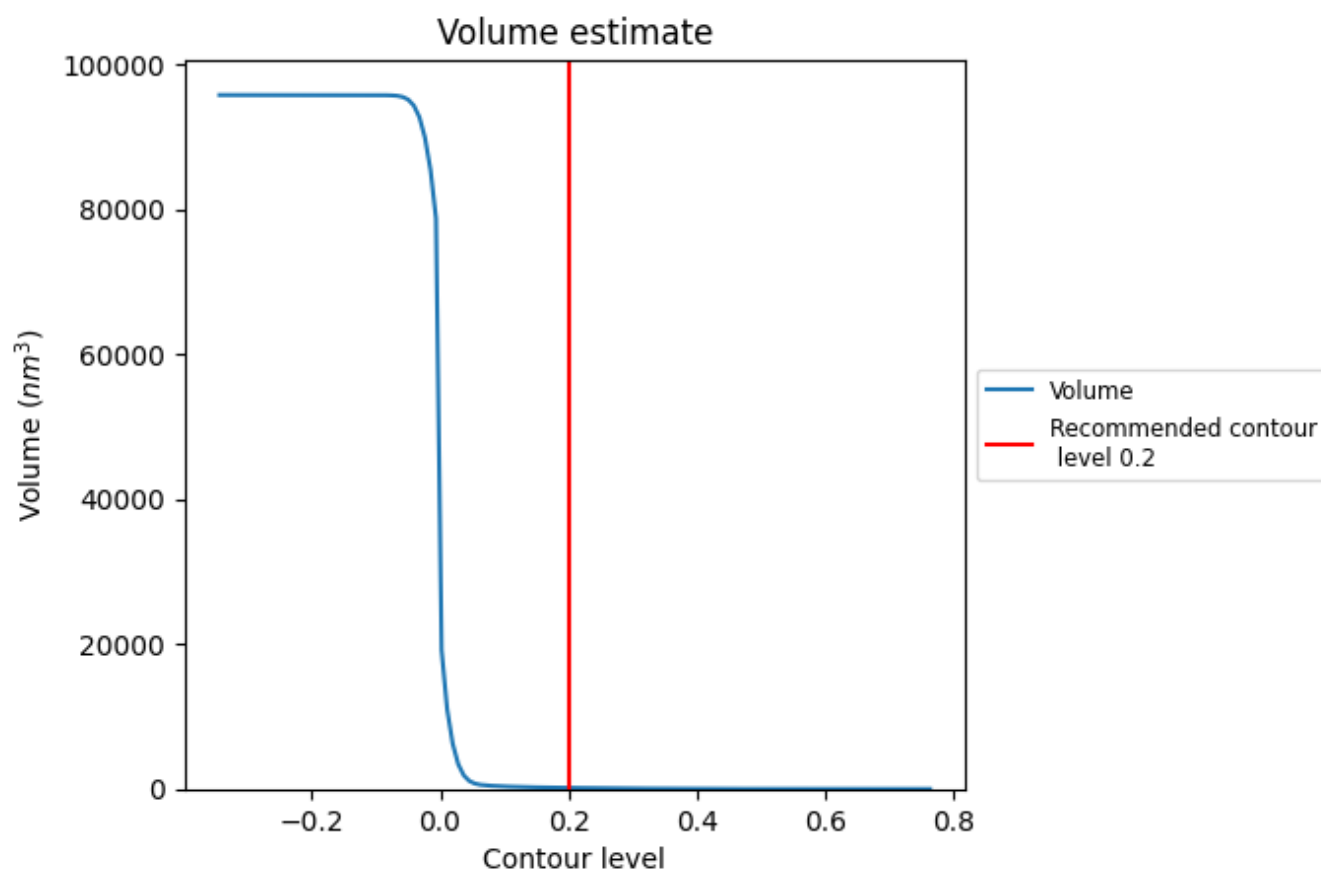
This section contains the results of statistical analysis of the map.

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.

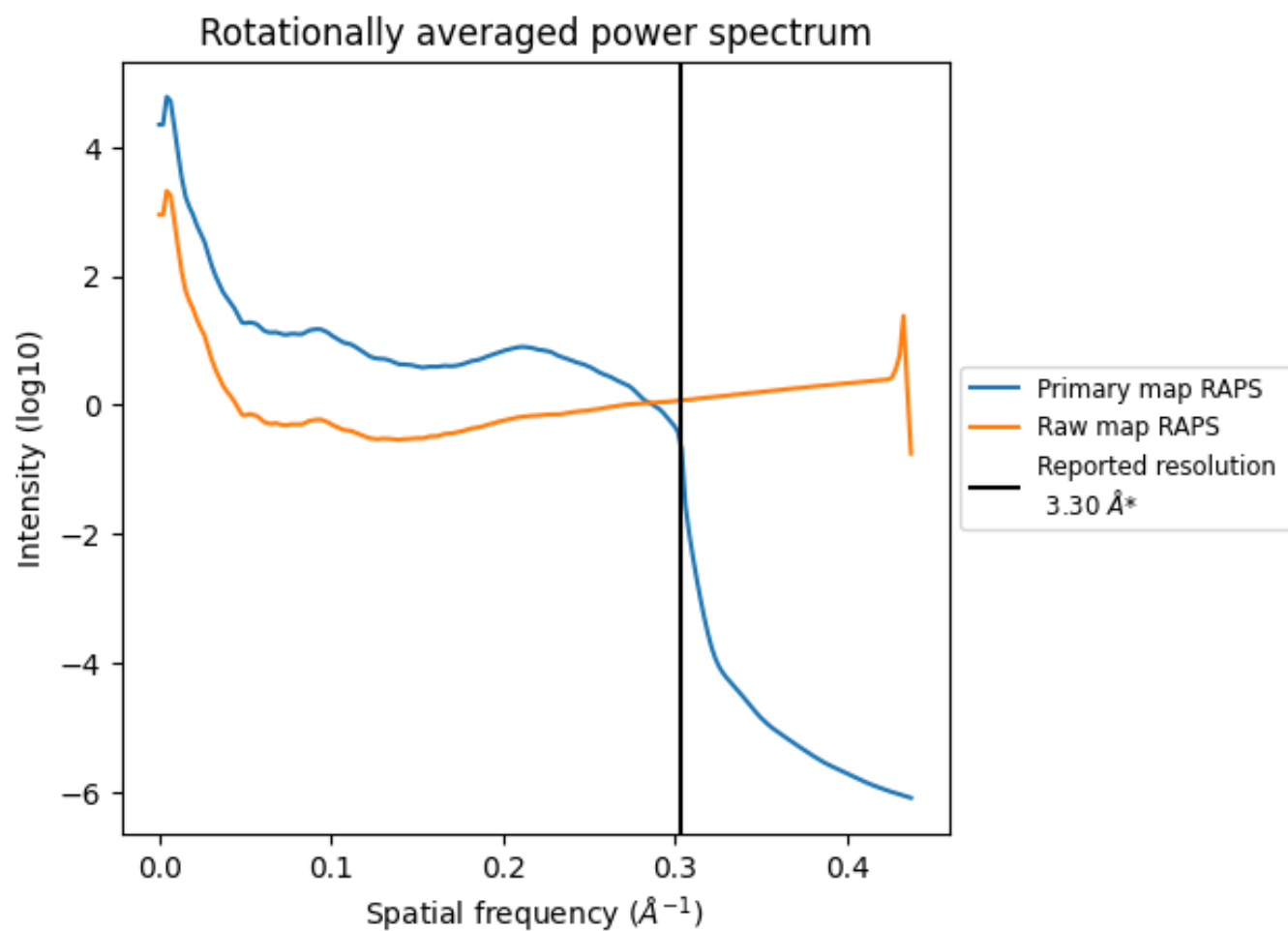
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 152 nm³; this corresponds to an approximate mass of 137 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](#)

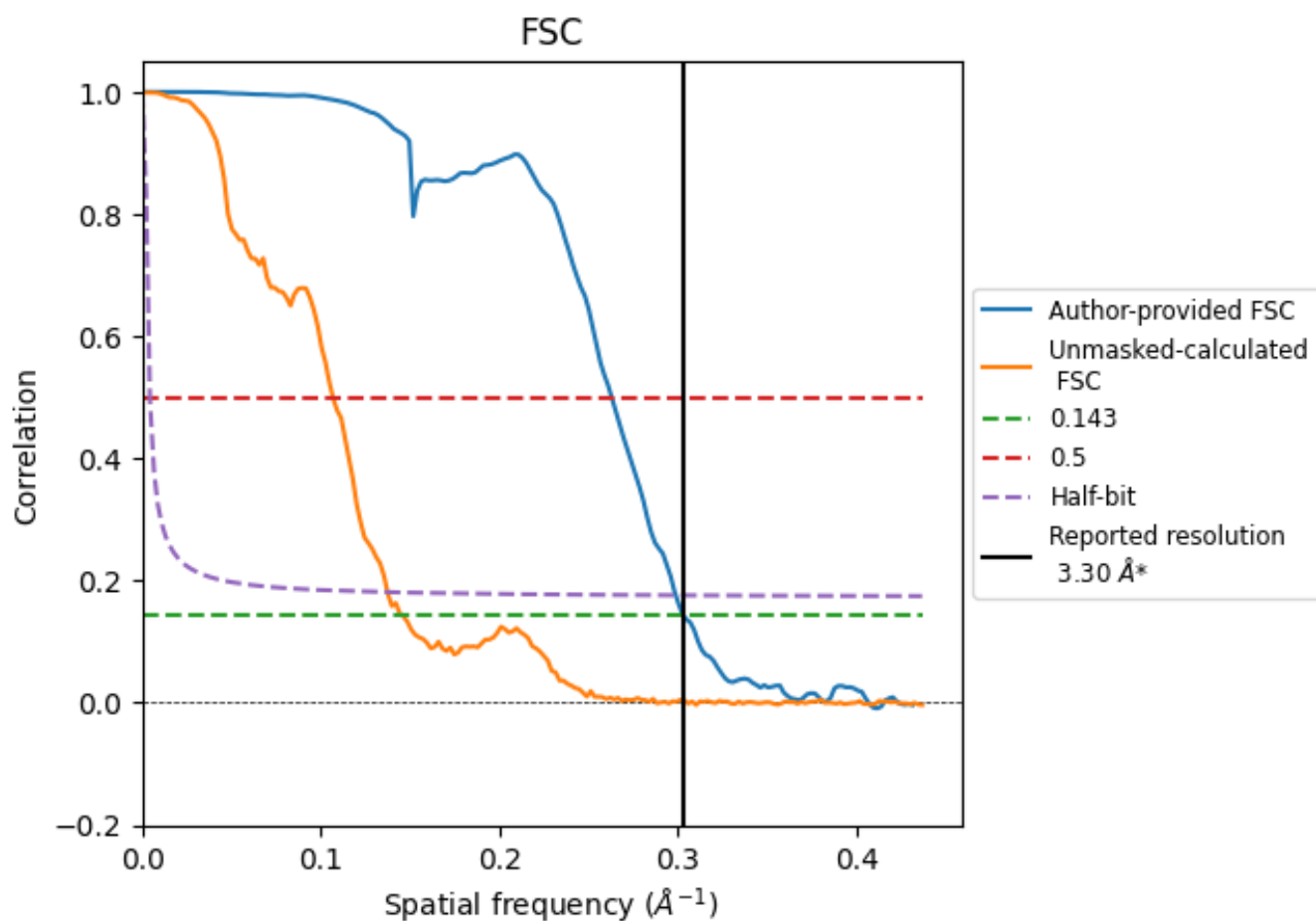


*Reported resolution corresponds to spatial frequency of 0.303 $\text{\AA}^{-1}$

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 $0.303 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

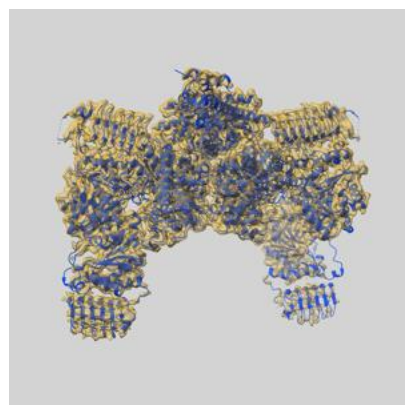
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.30	3.80	3.34
Unmasked-calculated*	6.86	9.35	7.27

*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 6.86 differs from the reported value 3.3 by more than 10 %

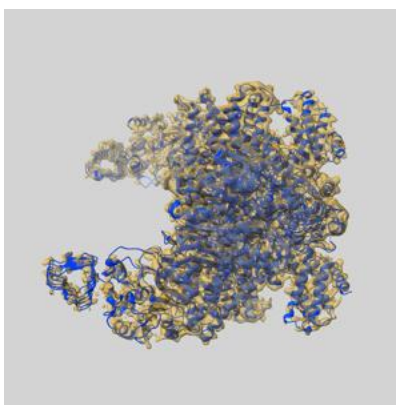
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-72463 and PDB model 9Y3Q. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

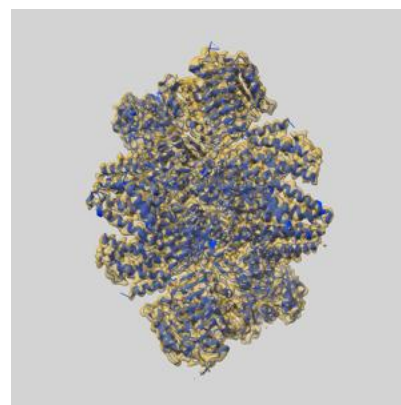
9.1 Map-model overlay [i](#)



X



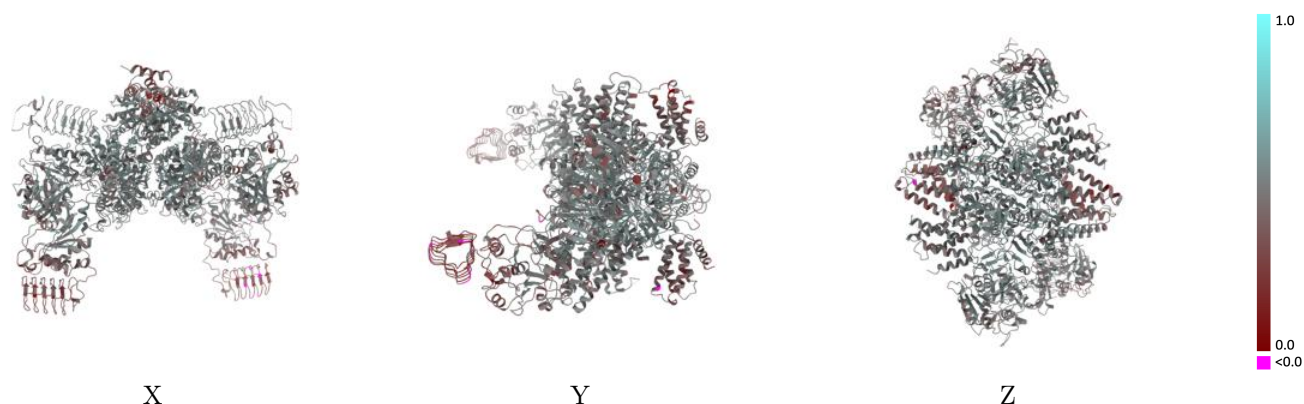
Y



Z

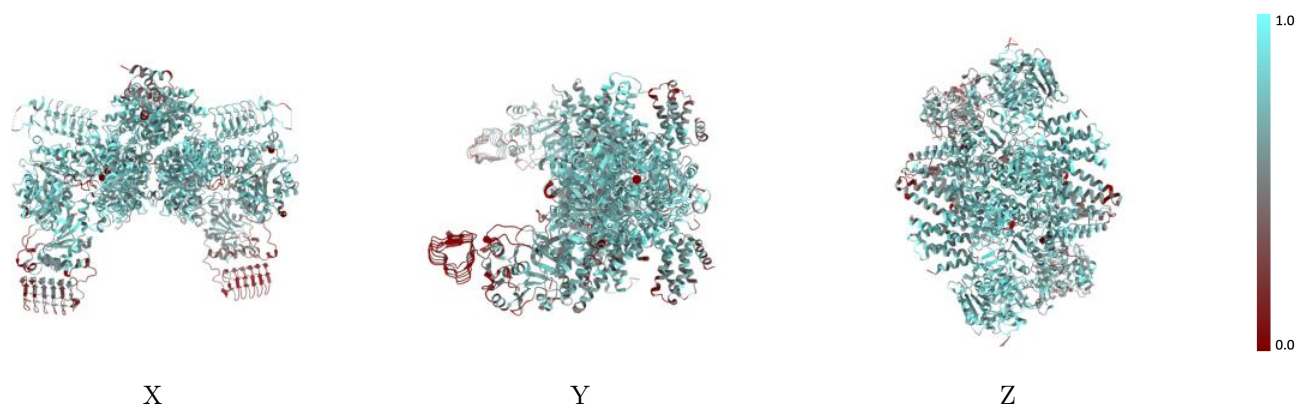
The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



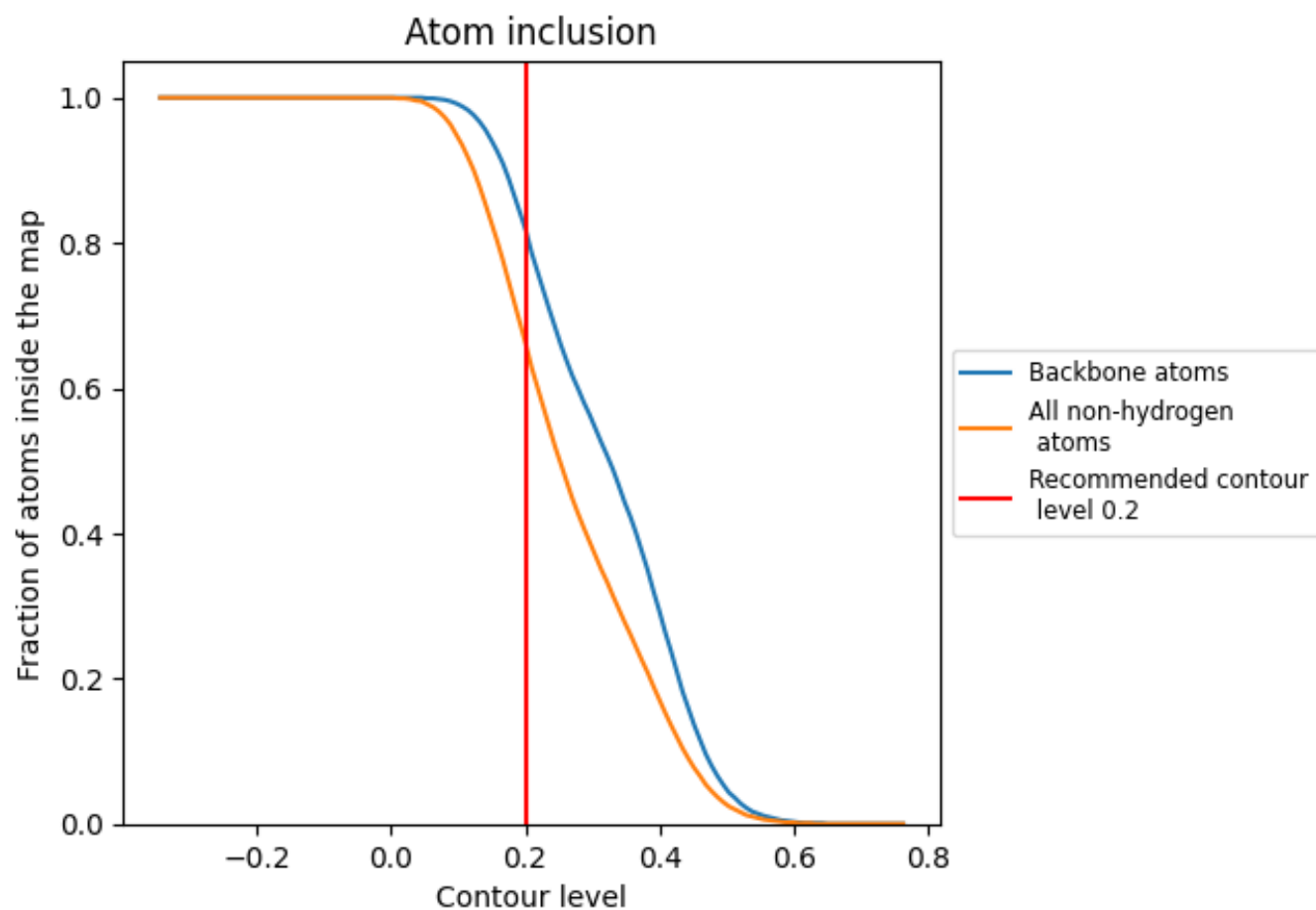
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.2).

9.4 Atom inclusion [i](#)



At the recommended contour level, 82% of all backbone atoms, 66% 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 (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6630	0.4690
A	0.7520	0.4920
B	0.6940	0.4760
C	0.7480	0.5000
D	0.7590	0.5030
E	0.7550	0.5080
F	0.6860	0.5030
G	0.6730	0.4650
H	0.6730	0.4600
I	0.5510	0.4220
J	0.4010	0.3760

