



wwPDB EM Validation Summary Report ⓘ

Nov 24, 2025 – 01:16 PM EST

PDB ID : 9YOL / pdb_00009yol
EMDB ID : EMD-73261
Title : Tra1 module of ctSAGA
Authors : Mattoo, R.U.H.; Chen, D.H.; Bushnell, D.A.; Tamir, S.; Kornberg, R.D.
Deposited on : 2025-10-13
Resolution : 2.60 Å(reported)

This is a wwPDB EM Validation Summary 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:

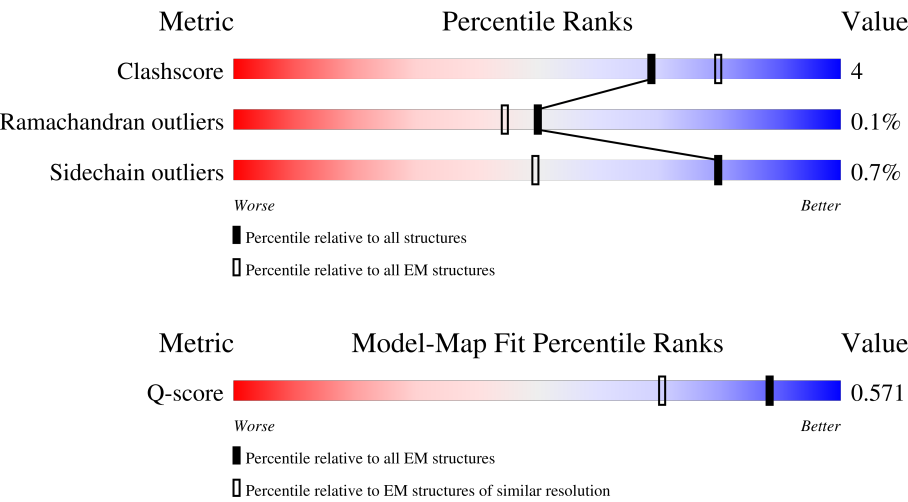
EMDB validation analysis : 0.0.1.dev129
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.46

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.60 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	8728 (2.10 - 3.10)

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	Q	1273	
2	B	1192	
3	C	433	
4	H	485	

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Mol	Chain	Length	Quality of chain
5	I	770	<div><div></div><div>5%</div><div>94%</div></div>
6	A	3893	<div><div></div><div>17%</div><div>84%</div><div>9%</div><div>7%</div></div>

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 62724 atoms, of which 31230 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 SCA7 domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	Q	24	Total	C	H	N	O	0	0
			387	120	193	39	35		

- Molecule 2 is a protein called Spt20-like SEP domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	92	Total	C	H	N	O	0	0
			1479	510	685	135	147		

- Molecule 3 is a protein called Chains: C.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	72	Total	C	H	N	O	0	0
			1130	371	547	97	111		

- Molecule 4 is a protein called Putative transcriptional coactivator HFI1 protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	H	33	Total	C	H	N	O	0	0
			534	169	267	46	49		

- Molecule 5 is a protein called Transcription initiation factor TFIID subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	46	Total	C	H	N	O	0	0
			563	218	226	59	59		

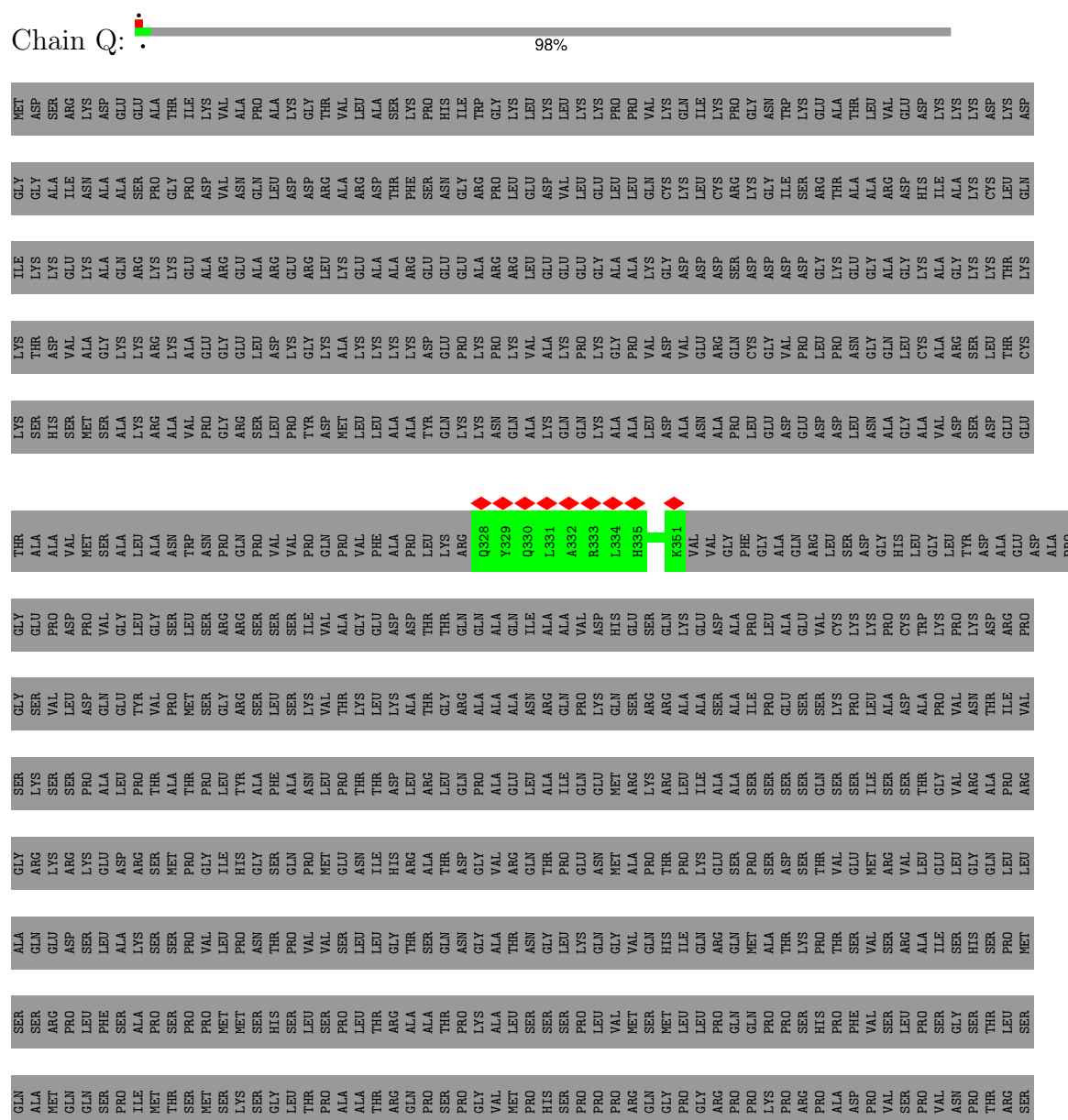
- Molecule 6 is a protein called Non-specific serine/threonine protein kinase.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	A	3617	Total	C	H	N	O	0	0
			58631	18801	29312	5108	5266		

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: SCA7 domain-containing protein



[illegible]

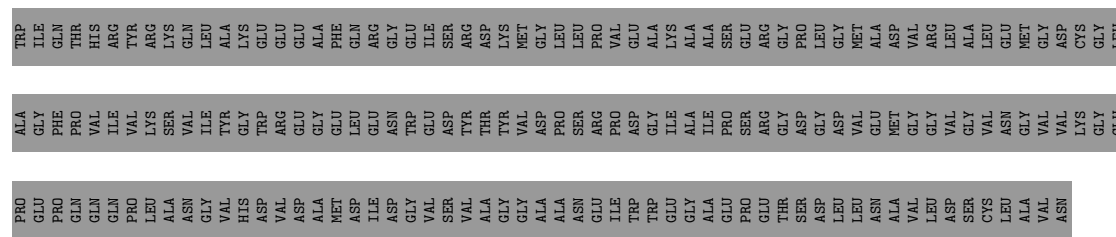
- Molecule 2: Spt20-like SEP domain-containing protein

Chain B: 

GLN	GLY	GLU	GLY	PRO	VAL	TYR	SER	MET
GLN	PRO	LEU	PRO	ALA	GLN	ILE	ALA	ALA
GLN	PRO	LEU	PRO	PRO	VAL	LEU	GLY	PRO
ALA	THR	ALA	PRO	PRO	PHE	LYS	THR	THR
ALA	THR	HIS	PRO	ALA	HIS	PHE	THR	THR
VAL	ALA	GLU	PRO	ALA	ARG	ALA	PRO	ALA
VAL	ALA	HIS	ALA	ASP	THR	GLY	GLY	ALA
GLN	ALA	SER	ALA	GLY	VAL	HIS	ALA	ALA
GLN	GLY	HIS	GLY	GLN	ASN	PRO	THR	PRO
ALA	MET	LYS	MET	LYS	GLN	PRO	ARG	PRO
GLN	PRO	PRO	PRO	ALA	THR	SER	PRO	VAL
ALA	PRO	PRO	PRO	LYS	LYS	LEU	THR	ASN
GLN	PRO	GLU	PRO	GLY	GLU	ILE	ILE	PRO
GLN	ALA	LYS	LYS	PRO	ALA	V135	ARG	PRO
GLN	LYS	VAL	LYS	ALA	LYS	H136	ILE	ALA
ALA	GLN	ARG	GLN	LYS	PRO	L137	ARG	THR
ALA	LYS	LYS	LYS	PRO	SER	Y138	ASP	LYS
GLN	ARG	ARG	ARG	THR	SER	Q139	PRO	VAL
GLN	THR	THR	ASP	VAL	GLU	N140	GLY	LYS
GLN	VAL	VAL	HIS	TYR	SER		PRO	ARG
GLN	ALA	ALA	MET	THR	LYS	D145	GLY	PRO
GLN	GLU	GLU	GLU	VAL	SER		PRO	ILE
ALA	VAL	VAL	VAL	VAL	T215		PRO	PRO
GLN	ASP	HIS	ASP	LEU	V216		K154	PRO
LYS	PRO	MET	PRO	MET	P217		S155	GLY
GLN	LYS	THR	LYS	THR			P156	ILE
ALA	ASN	THR	ASN	THR	I220		MET	GLN
ALA	ILE	ALA	TYR	ALA			ARG	THR
ALA	TYR	GLN	GLU	GLN	T228		GLN	ASN
LEU	VAL	ALA	VAL	ALA	Y235		ALA	VAL
ALA	GLU	HIS	GLU	THR	P236		GLY	ALA
ALA	LYS	THR	LYS	LYS			LEU	PRO
ALA	ASP	ASP	LEU	ASP	GLU		ARG	SER
ILE	ILE	LEU	ILE	THR	ASP		SER	ARG
LEU	LEU	LEU	LEU	LEU	THR		ALA	SER
ALA	LEU	ALA	LEU	LYS	ALA		ILE	PRO
ALA	ALA	ALA	THR	THR	ASP		VAL	SER
ALA	TYR	VAL	THR	VAL	GLY		PRO	PRO
ALA	PRO	THR	PRO	THR	SER		THR	PRO
GLN	LYS	GLN	LYS	GLN	GLN		ASP	MET
LYS	LEU	GLY	LEU	THR	THR		VAL	ALA
ALA	ASP	GLY	ASP	GLY	PRO		THR	ALA
ALA	LEU	ALA	LEU	ALA	ALA		THR	LYS
ALA	GLU	ALA	GLU	SER	SER		PRO	ARG
ASN	PRO	ASN	PRO	ASP	GLU		THR	ARG
ALA	LYS	LYS	LYS	LYS	LYS		LEU	ALA
ALA	ASN	ASP	ASN	PRO	SER		THR	VAL
ALA	VAL	GLY	VAL	GLY	GLY		GLY	GLN
VAL	ASP	GLY	GLY	PRO	GLU		PHE	SER
VAL	GLY	GLY	GLY	GLY	GLY		ALA	PRO
GLN	GLN	GLY	GLN	PRO	GLU		ALA	VAL
GLN	GLN	ASP	ALA	PRO	ASP		PRO	ARG
GLN	GLU	GLY	GLU	PRO	LYS		TYR	GLN
ALA	THR	GLN	THR	THR	ASP		PHE	PRO
ALA	ILE	ALA	ILE	THR	LYS		ILE	SER
ALA	PRO	PRO	ALA	HIS	GLU		THR	ASN
ALA	SER	ALA	LYS	THR	ASN		PRO	PRO
ALA	SER	SER	LEU	ALA	MET		GLU	PRO
ARG	ARG	V453		ALA			GLU	PRO

- Molecule 3: Chains: C

[illegible]

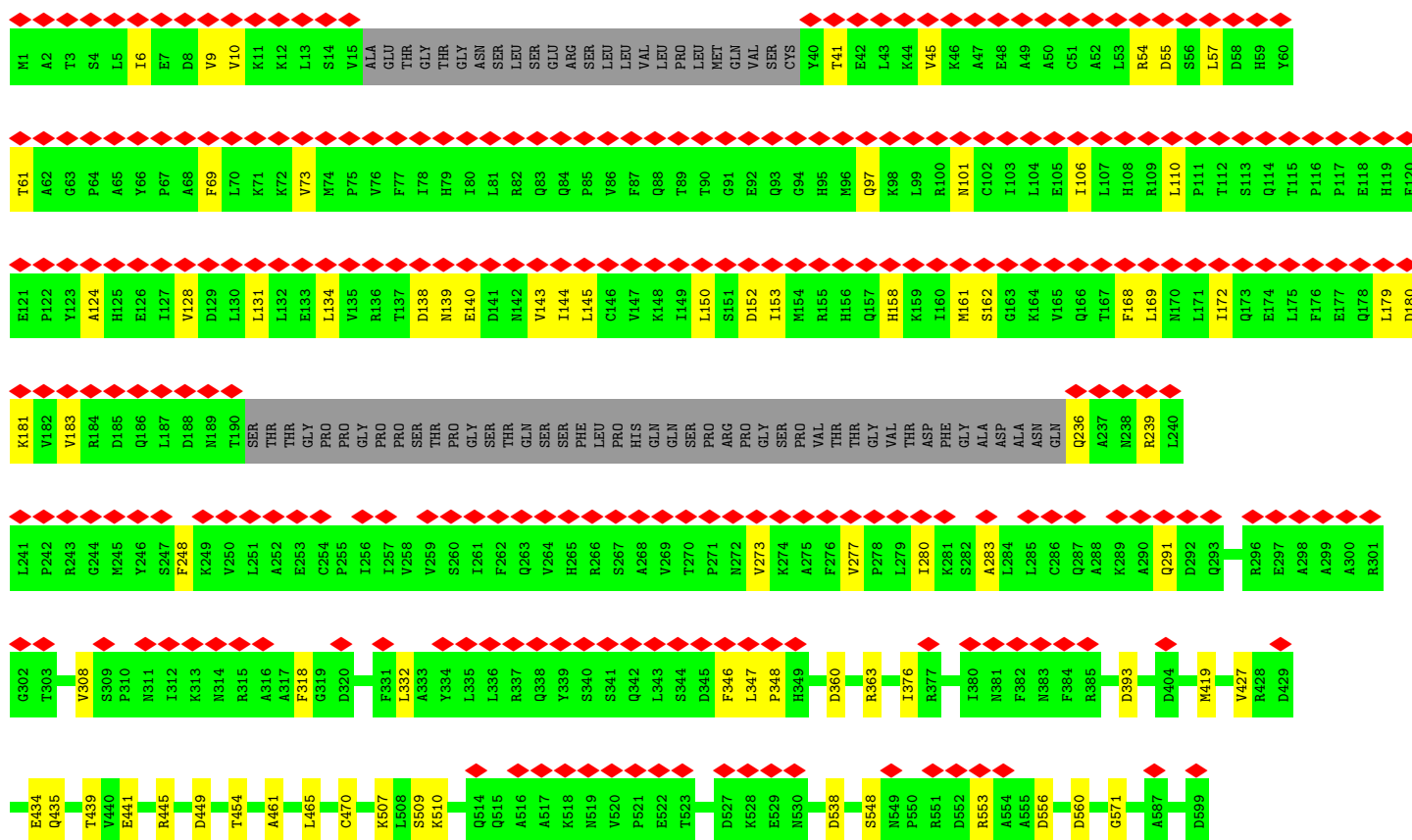
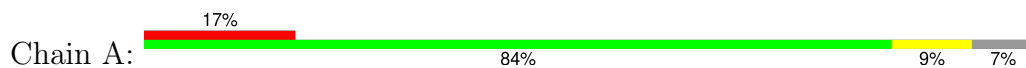


Chain I: 5% 94%

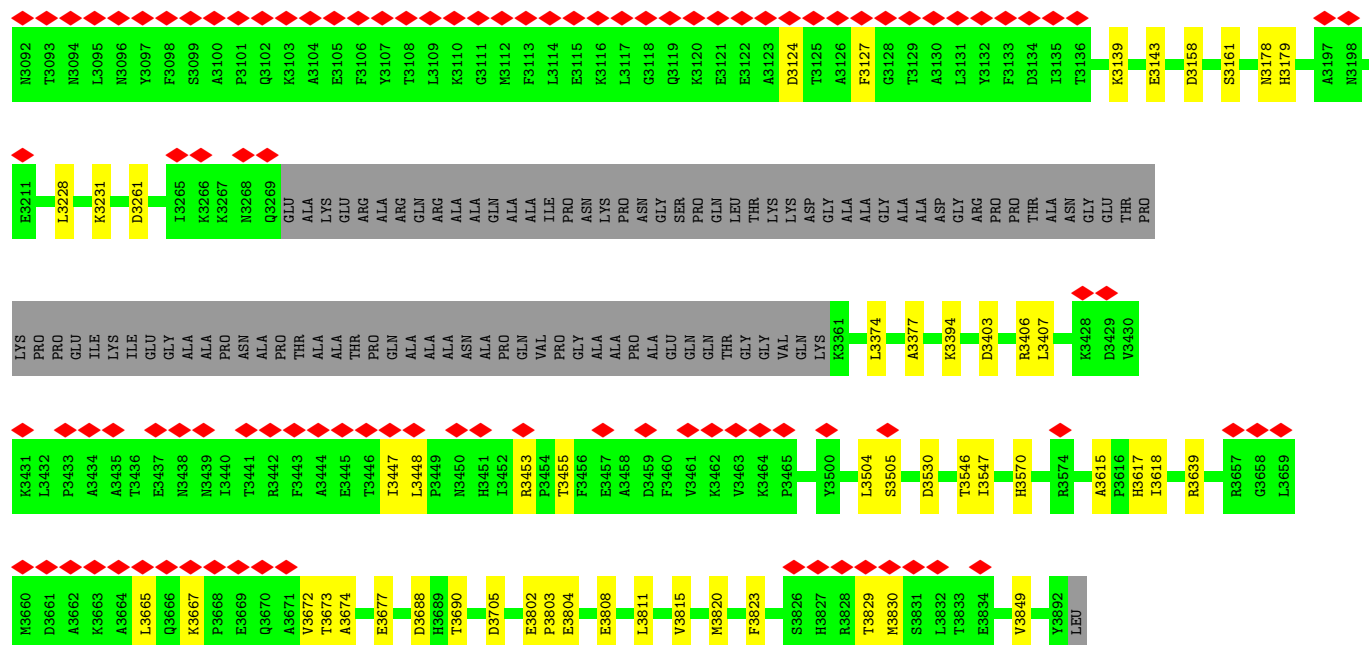




• Molecule 6: Non-specific serine/threonine protein kinase







4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1886619	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	68.9	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	8.598	Depositor
Minimum map value	-5.619	Depositor
Average map value	0.007	Depositor
Map value standard deviation	0.156	Depositor
Recommended contour level	0.8	Depositor
Map size (\AA)	374.76, 374.76, 374.76	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.041, 1.041, 1.041	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	Q	0.05	0/196	0.16	0/262
2	B	0.12	0/817	0.26	0/1101
3	C	0.11	0/598	0.22	0/804
4	H	0.11	0/270	0.23	0/357
5	I	0.10	0/347	0.27	0/474
6	A	0.11	0/29994	0.27	0/40664
All	All	0.11	0/32222	0.26	0/43662

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
6	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	A	2682	ARG	Peptide

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	Q	194	193	192	0	0
2	B	794	685	747	7	0
3	C	583	547	544	7	0
4	H	267	267	265	2	0
5	I	337	226	350	7	0
6	A	29319	29312	29602	206	0
All	All	31494	31230	31700	221	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

The worst 5 of 221 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)
5:I:628:TYR:OH	6:A:2756:ASP:OD1	1.92	0.88
6:A:798:GLY:O	6:A:805:TYR:OH	1.95	0.82
6:A:509:SER:OG	6:A:556:ASP:OD1	1.96	0.82
2:B:228:THR:O	6:A:2765:ARG:NH2	2.12	0.81
6:A:1888:HIS:O	6:A:1928:TYR:OH	1.98	0.81

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	Q	22/1273 (2%)	22 (100%)	0	0	100	100
2	B	84/1192 (7%)	82 (98%)	2 (2%)	0	100	100
3	C	66/433 (15%)	61 (92%)	5 (8%)	0	100	100
4	H	29/485 (6%)	29 (100%)	0	0	100	100
5	I	42/770 (6%)	39 (93%)	3 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	A	3595/3893 (92%)	3466 (96%)	127 (4%)	2 (0%)	48	71
All	All	3838/8046 (48%)	3699 (96%)	137 (4%)	2 (0%)	50	71

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	A	2683	PRO
6	A	2959	VAL

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	Q	19/1047 (2%)	19 (100%)	0	100	100
2	B	87/928 (9%)	86 (99%)	1 (1%)	70	86
3	C	61/377 (16%)	61 (100%)	0	100	100
4	H	29/387 (8%)	28 (97%)	1 (3%)	32	58
5	I	37/620 (6%)	36 (97%)	1 (3%)	40	66
6	A	3195/3412 (94%)	3175 (99%)	20 (1%)	84	94
All	All	3428/6771 (51%)	3405 (99%)	23 (1%)	80	93

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	A	1809	MET
6	A	2696	THR
6	A	1921	ILE
6	A	2978	MET
6	A	644	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 31 such sidechains are listed below:

Mol	Chain	Res	Type
6	A	1913	ASN
6	A	3622	GLN
6	A	2329	HIS
6	A	3745	ASN
6	A	3076	HIS

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](#)

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.

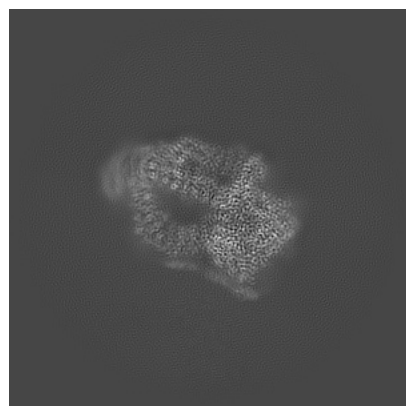
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-73261. These allow visual inspection of the internal detail of the map and identification of artifacts.

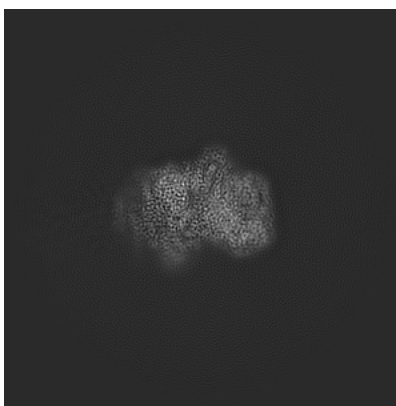
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

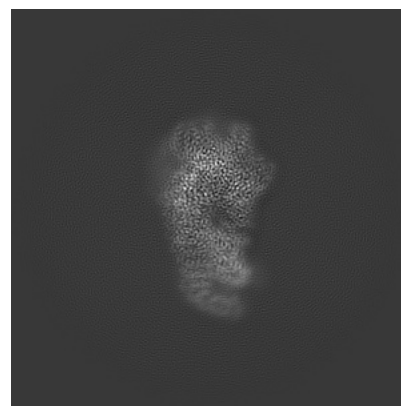
6.1.1 Primary map



X

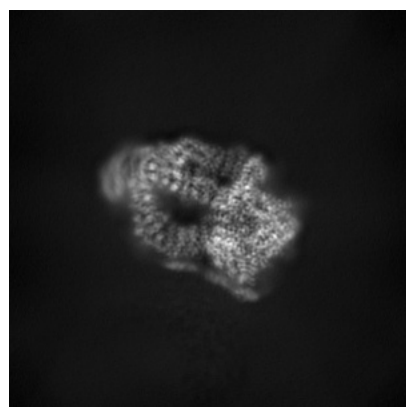


Y

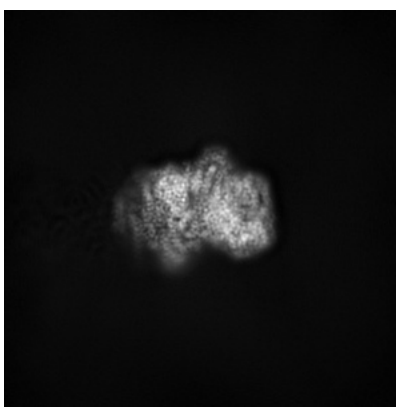


Z

6.1.2 Raw map



X



Y



Z

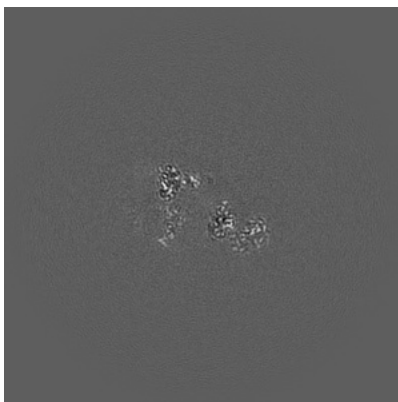
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

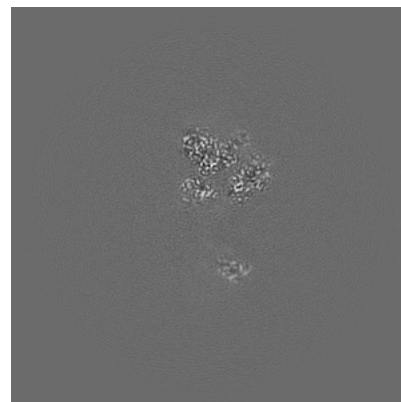
6.2.1 Primary map



X Index: 180

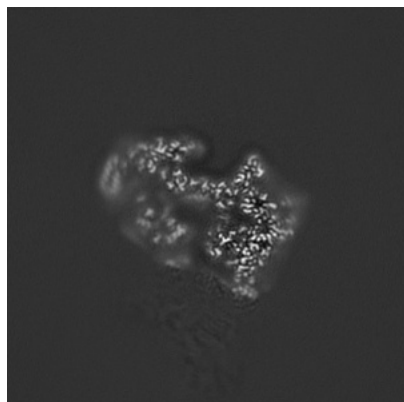


Y Index: 180

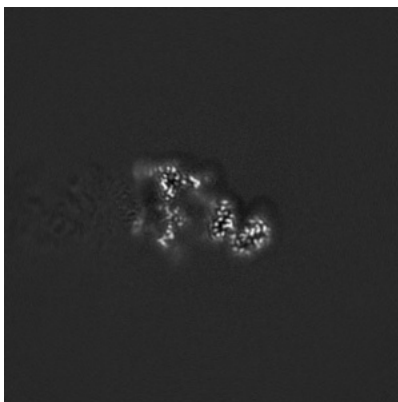


Z Index: 180

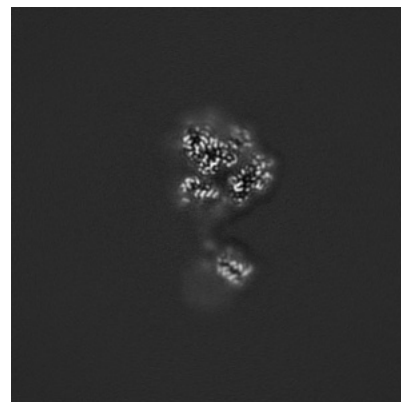
6.2.2 Raw map



X Index: 180



Y Index: 180

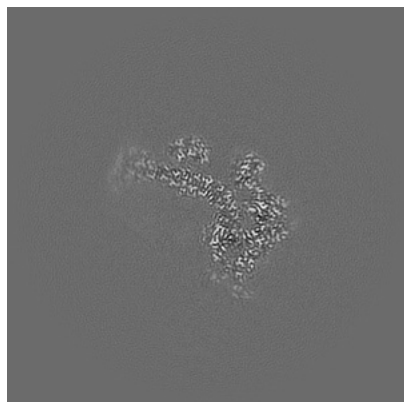


Z Index: 180

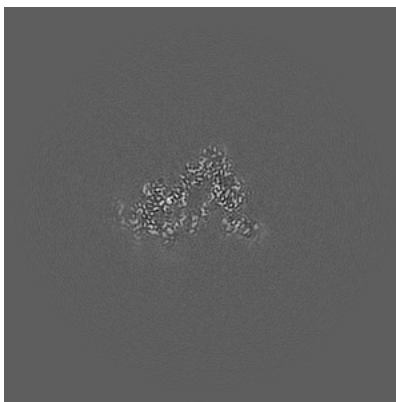
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

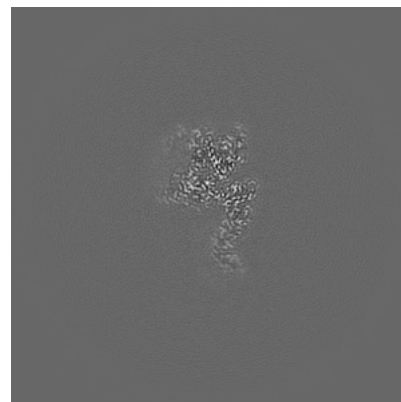
6.3.1 Primary map



X Index: 167

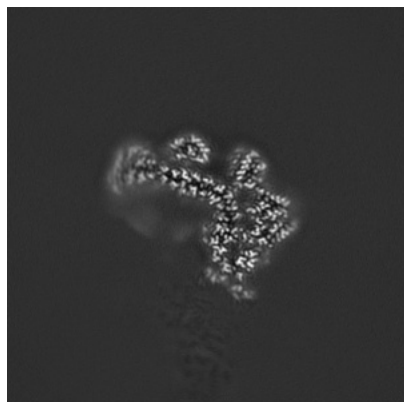


Y Index: 210

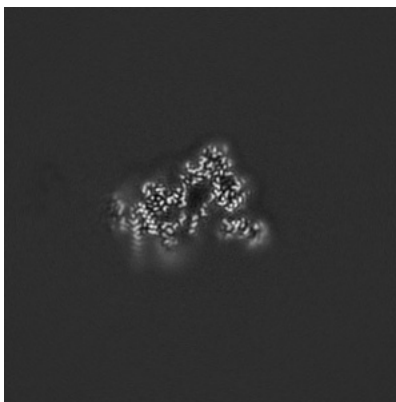


Z Index: 153

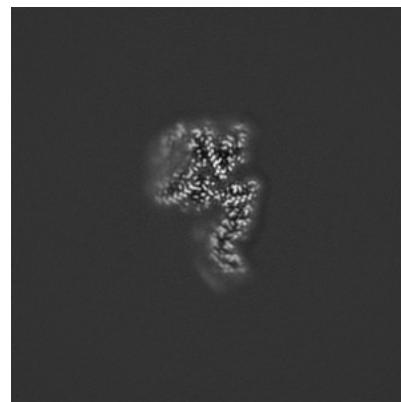
6.3.2 Raw map



X Index: 166



Y Index: 210

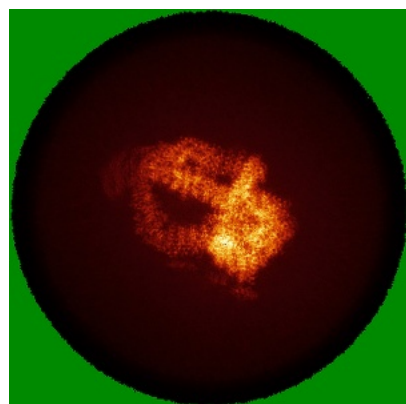


Z Index: 153

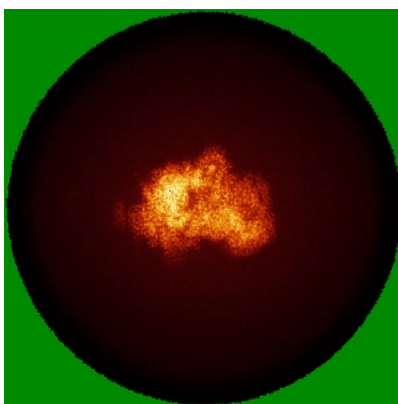
The images above show the largest variance slices of the map in three orthogonal directions.

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

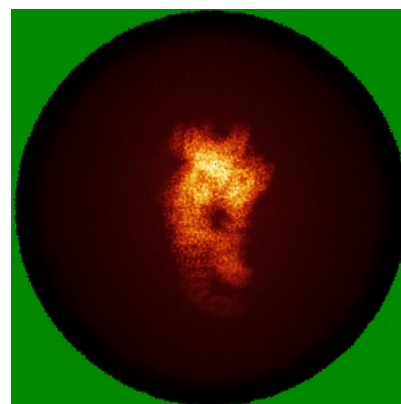
6.4.1 Primary map



X

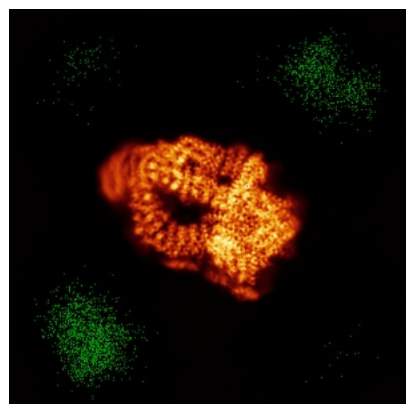


Y

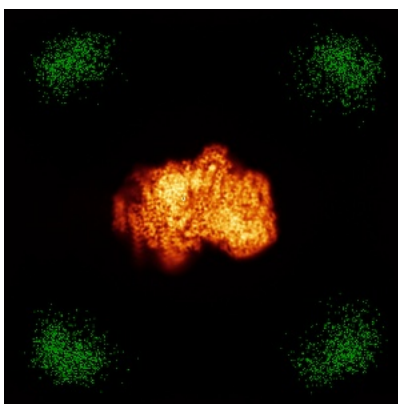


Z

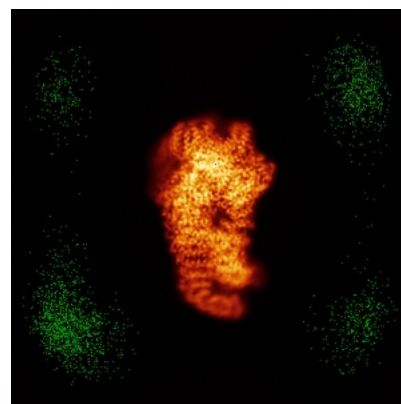
6.4.2 Raw map



X



Y

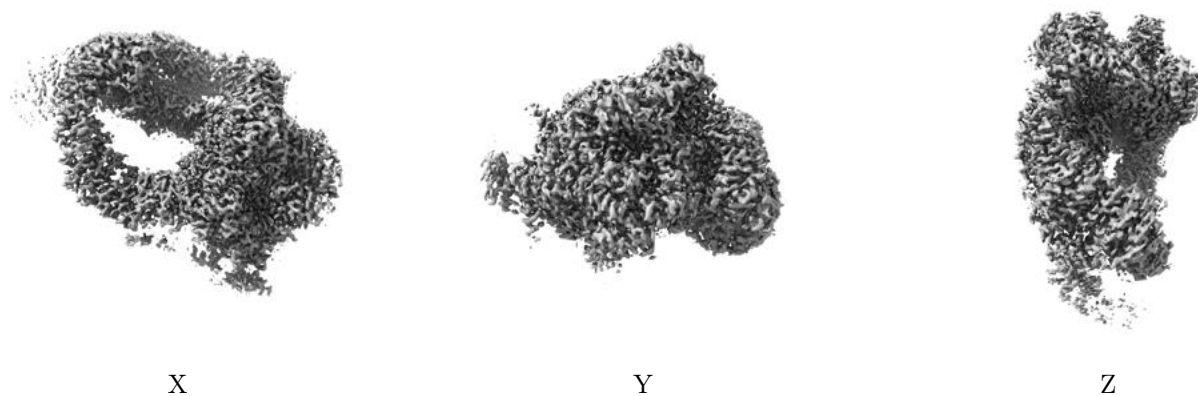


Z

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.

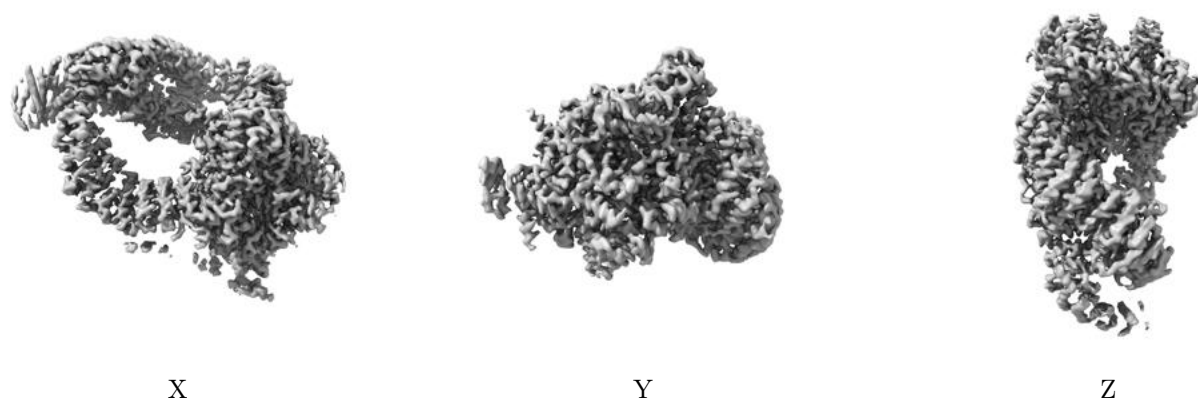
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.8. 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.

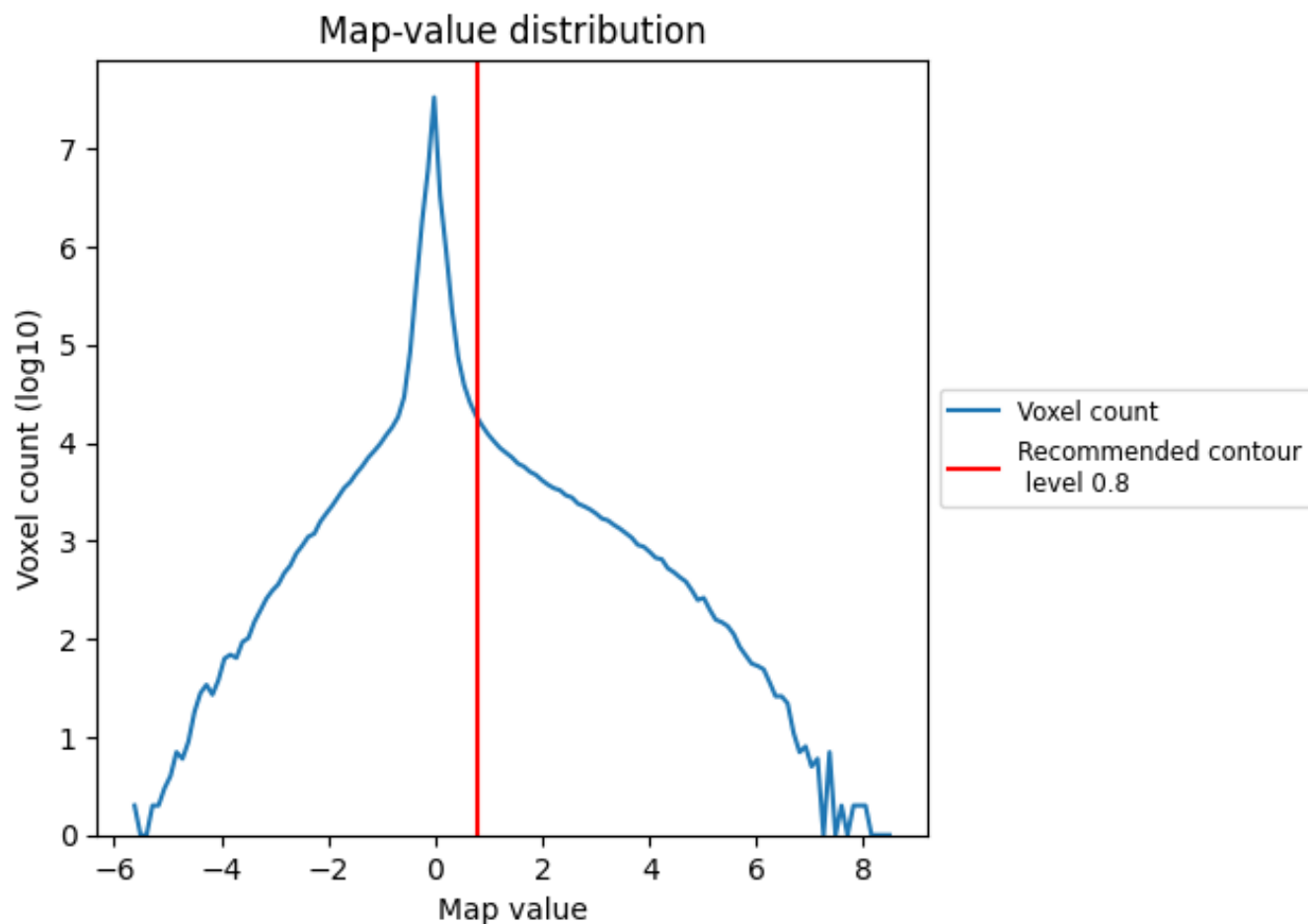
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

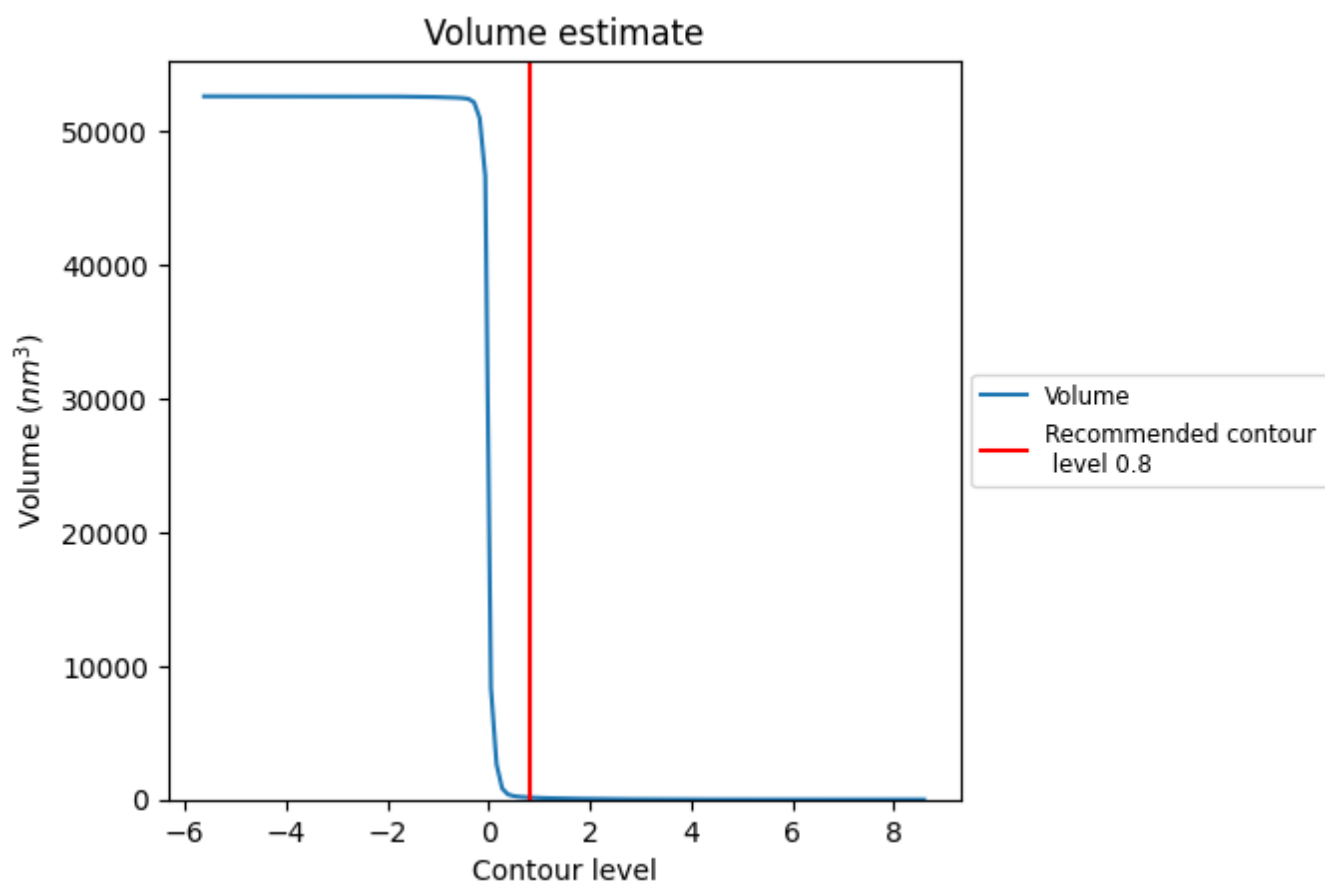
This section contains the results of statistical analysis of the map.

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.

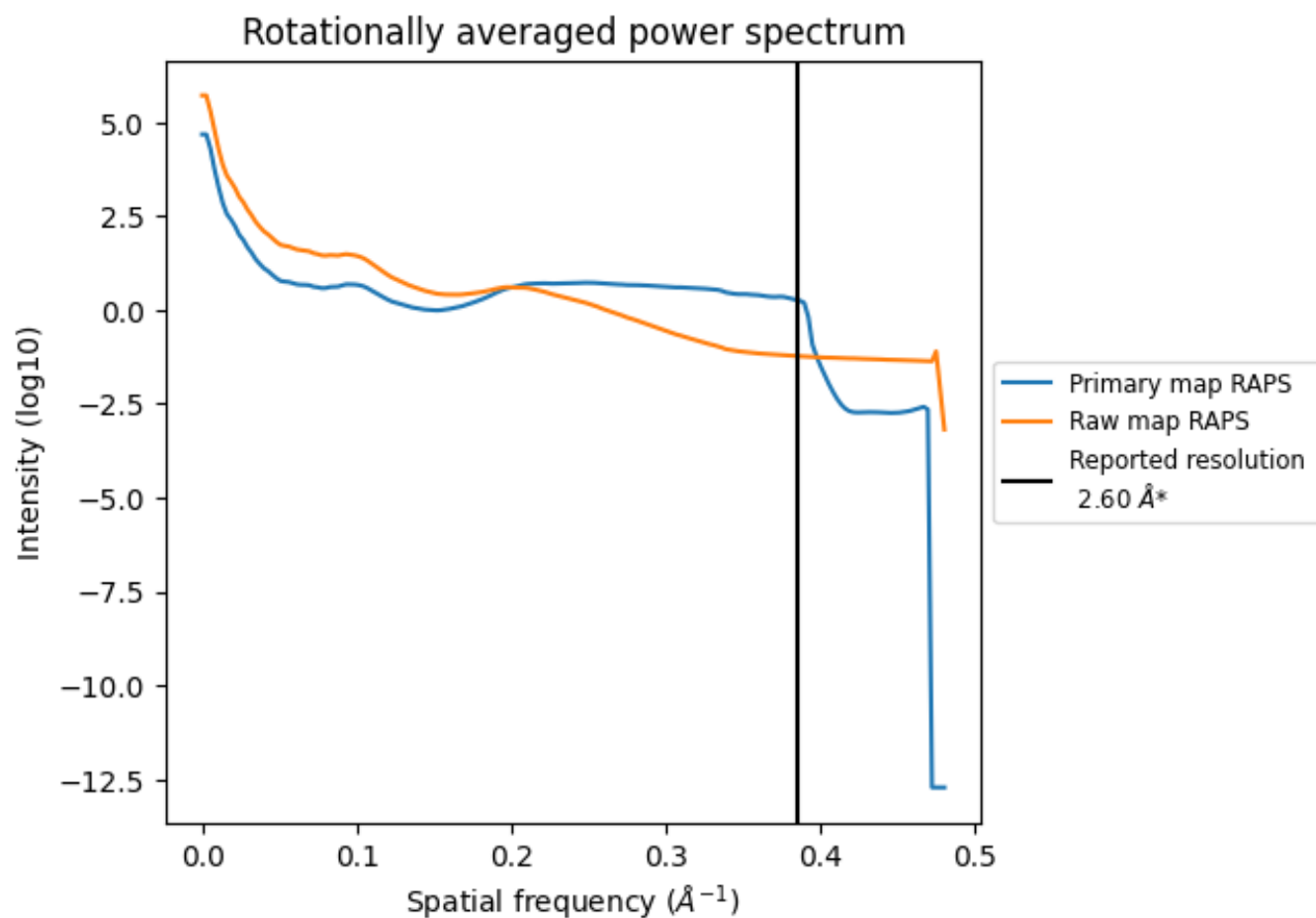
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 158 nm³; this corresponds to an approximate mass of 143 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 ⓘ

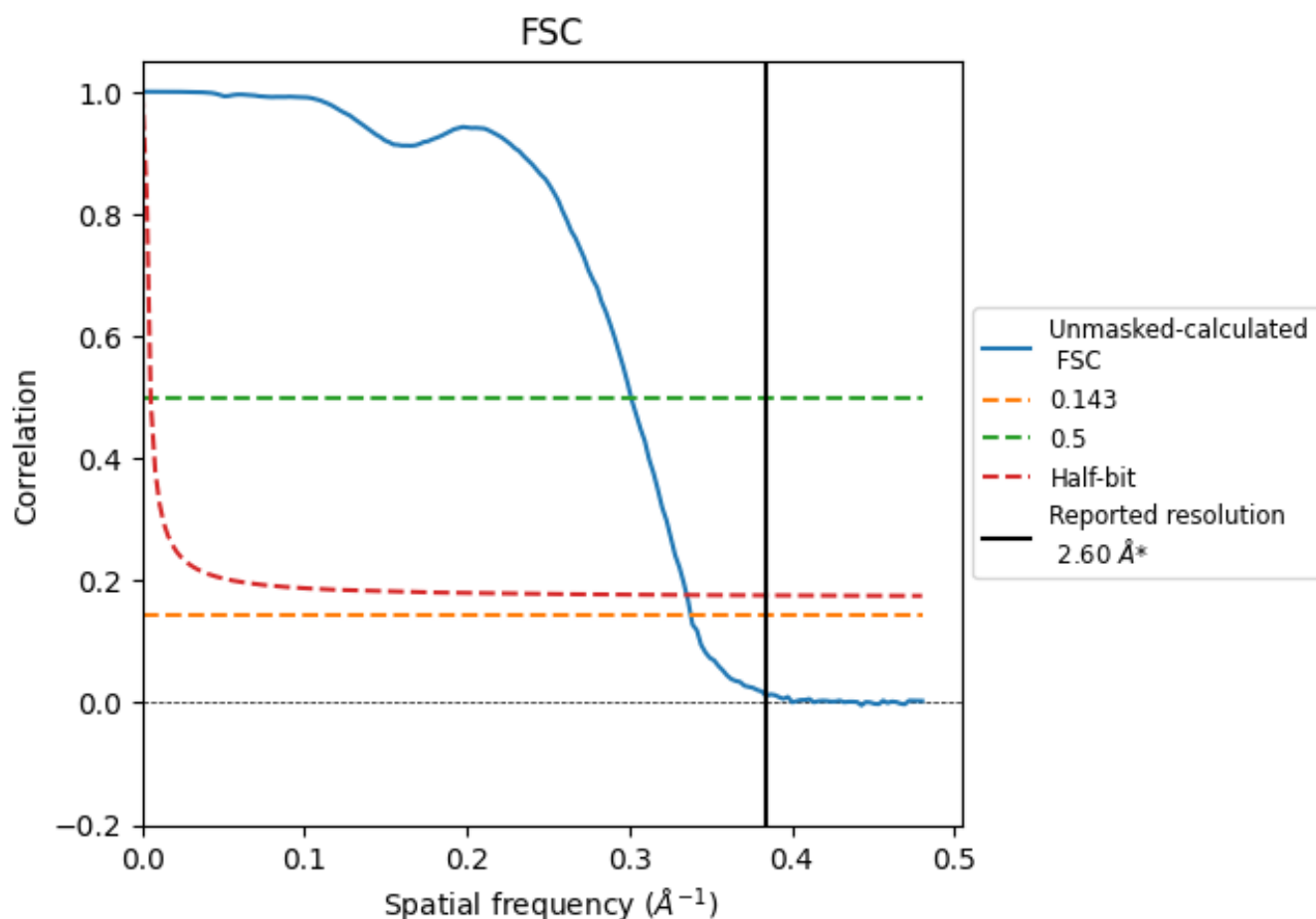


*Reported resolution corresponds to spatial frequency of 0.385 Å⁻¹

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 0.385 Å⁻¹

8.2 Resolution estimates [i](#)

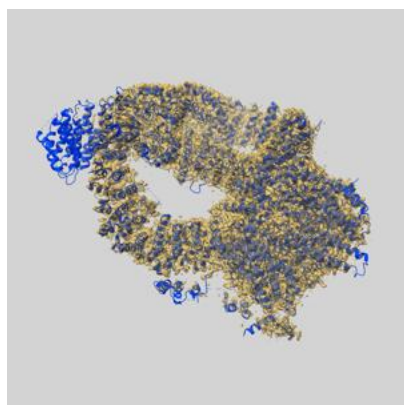
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.60	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.96	3.32	2.98

*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 2.96 differs from the reported value 2.6 by more than 10 %

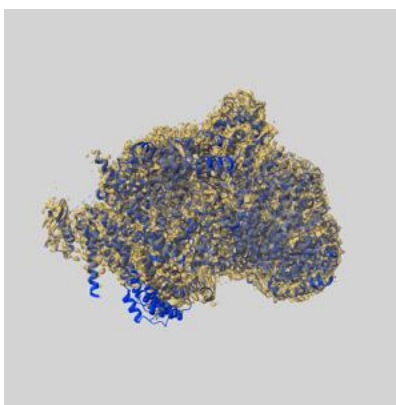
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-73261 and PDB model 9YOL. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

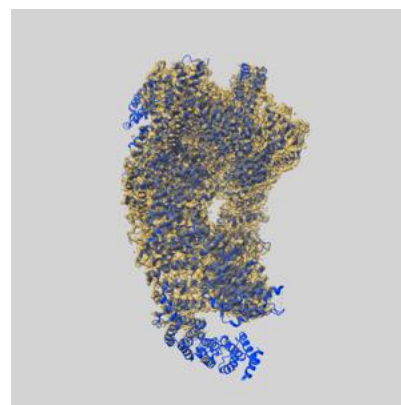
9.1 Map-model overlay [i](#)



X



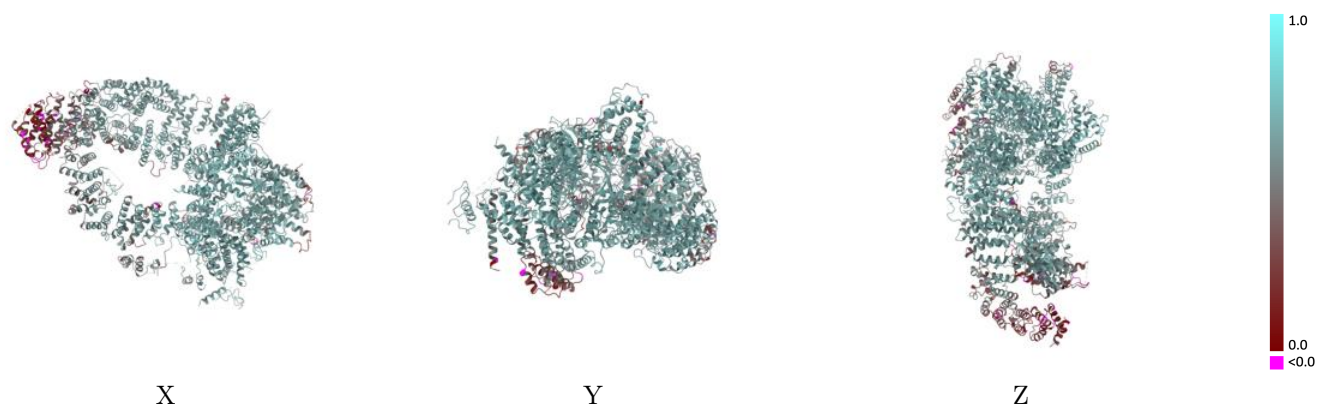
Y



Z

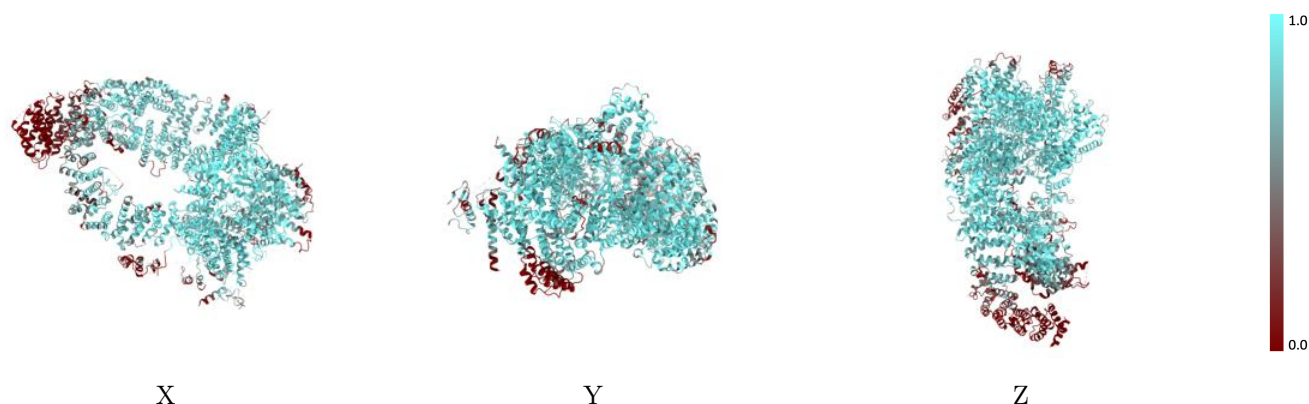
The images above show the 3D surface view of the map at the recommended contour level 0.8 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



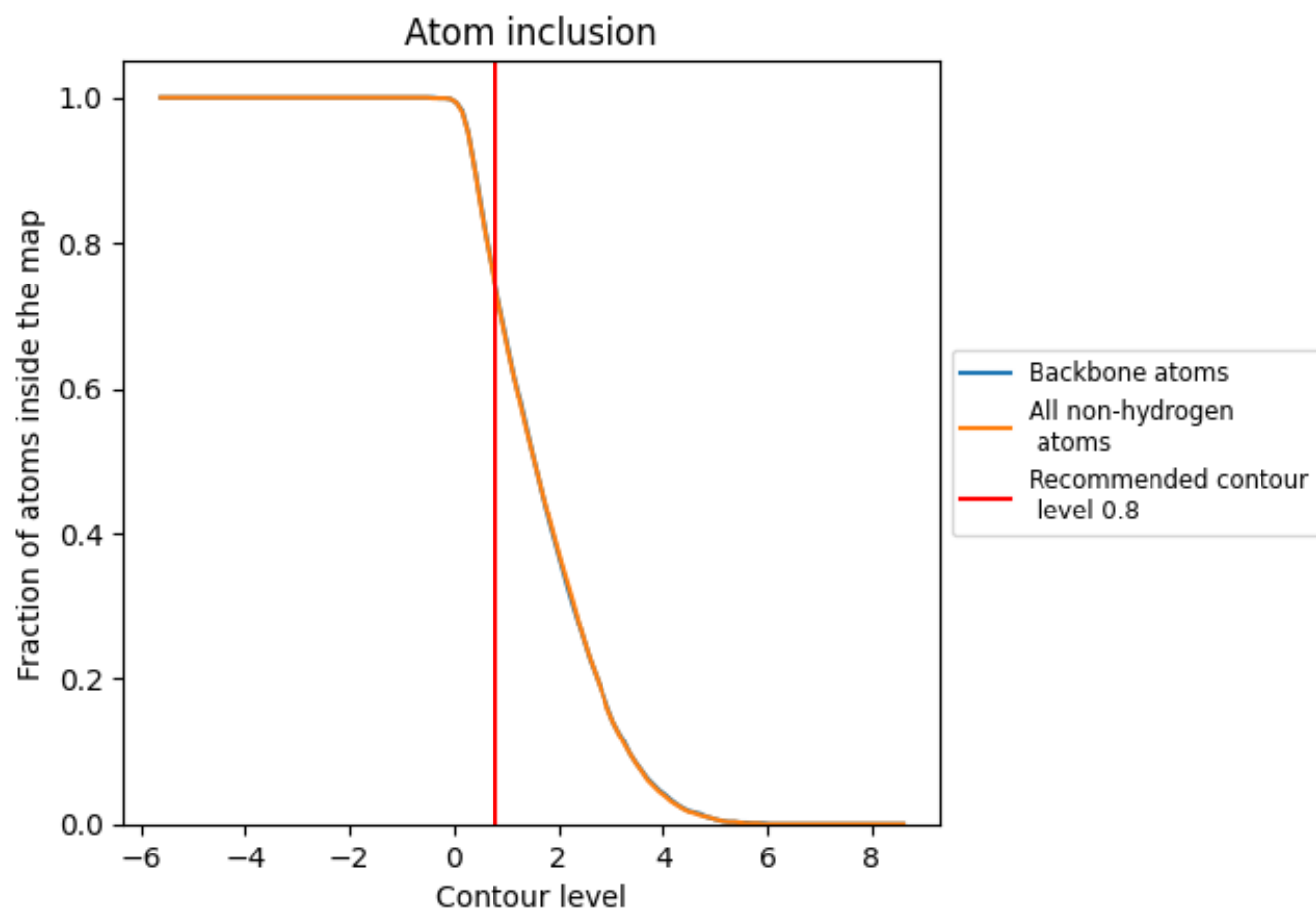
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.8).

9.4 Atom inclusion [i](#)



At the recommended contour level, 74% of all backbone atoms, 74% 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 (0.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div>0.7370</div>	<div><div></div>0.5710</div>
A	<div><div></div>0.7570</div>	<div><div></div>0.5720</div>
B	<div><div></div>0.7210</div>	<div><div></div>0.5840</div>
C	<div><div></div>0.2060</div>	<div><div></div>0.4570</div>
H	<div><div></div>0.3860</div>	<div><div></div>0.5470</div>
I	<div><div></div>0.8470</div>	<div><div></div>0.6230</div>
Q	<div><div></div>0.4340</div>	<div><div></div>0.5750</div>

1.0

0.0

<0.0