



wwPDB EM Validation Summary Report ⓘ

Nov 24, 2022 – 02:51 PM EST

PDB ID : 7S7C
EMDB ID : EMD-24883
Title : Human Nuclear Exosome Targeting (NEXT) complex bound to RNA (substrate 2)
Authors : Puno, M.R.; Lima, C.D.
Deposited on : 2021-09-15
Resolution : 3.62 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:

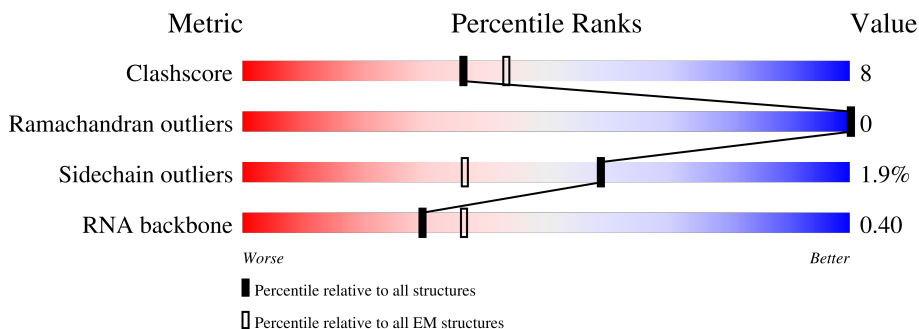
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

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 3.62 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	1045	71% (green), 17% (yellow), 12% (grey)
1	E	1045	12% (red), 86% (green), 2% (yellow), 0% (orange), 0% (grey)
2	B	618	18% (red), 42% (green), 11% (yellow), 47% (grey)
2	F	618	18% (red), 6% (yellow), 76% (green), 0% (orange), 0% (grey)
3	C	83	10% (red), 67% (green), 27% (yellow), 5% (grey)
4	D	28	11% (red), 39% (green), 46% (yellow), 11% (orange), 5% (grey)
4	L	28	18% (red), 14% (yellow), 64% (green), 0% (orange), 0% (grey)

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 13850 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 Exosome RNA helicase MTR4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	924	7376	4700	1256	1369	51	0	0
1	E	147	1166	754	199	209	4	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP P42285
A	-1	GLY	-	expression tag	UNP P42285
A	0	ASP	-	expression tag	UNP P42285
E	-2	SER	-	expression tag	UNP P42285
E	-1	GLY	-	expression tag	UNP P42285
E	0	ASP	-	expression tag	UNP P42285

- Molecule 2 is a protein called Zinc finger CCHC domain-containing protein 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	330	2666	1693	451	508	14	0	0
2	F	149	1211	769	206	233	3	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-2	SER	-	expression tag	UNP Q6NZY4
B	-1	GLY	-	expression tag	UNP Q6NZY4
B	0	ASP	-	expression tag	UNP Q6NZY4
F	-2	SER	-	expression tag	UNP Q6NZY4
F	-1	GLY	-	expression tag	UNP Q6NZY4
F	0	ASP	-	expression tag	UNP Q6NZY4

- Molecule 3 is a protein called RNA-binding protein 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	79	644	424	109	110	1	0	0

There are 3 discrepancies between the modelled and reference sequences:

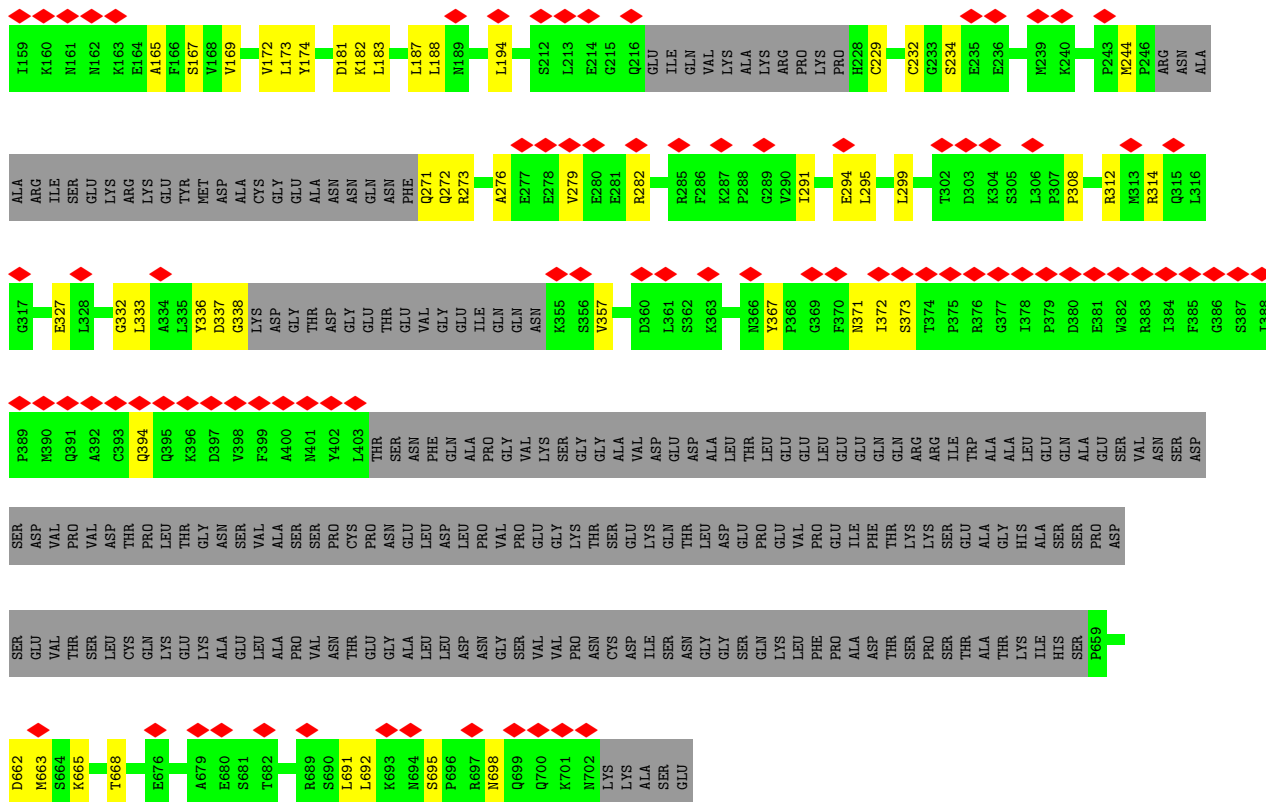
Chain	Residue	Modelled	Actual	Comment	Reference
C	4	SER	-	expression tag	UNP Q9Y580
C	5	GLY	-	expression tag	UNP Q9Y580
C	6	ASP	-	expression tag	UNP Q9Y580

- Molecule 4 is a RNA chain called RNA (30-MER).

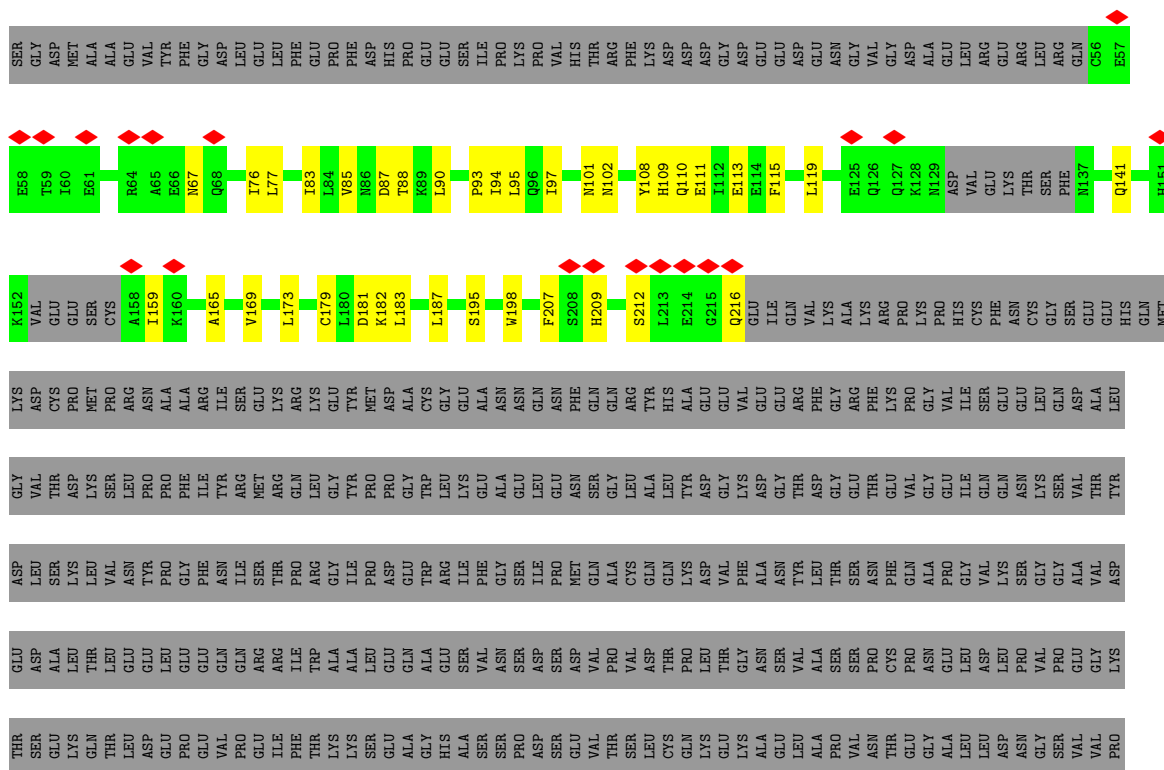
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	D	27	574	261	113	175	25	0	0
4	L	10	212	95	40	68	9	0	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
5	B	1	1	1	0



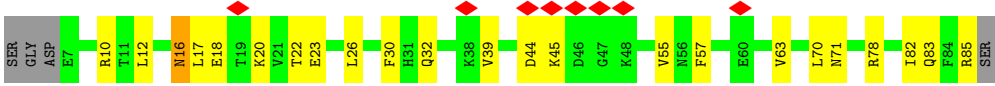
• Molecule 2: Zinc finger CCHC domain-containing protein 8



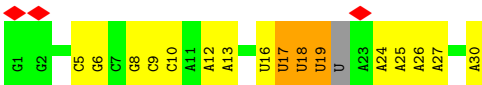
ASN CYS ASP ASP ILE SER SER ASN GLY GLY SER GLN LYS LYS LEU PHE PRO ALA THR SER PRO SER THR THR ALA THR LYS ILE HIS SER ILE PRO PRO ASP MET SER LYS PHE ALA THR GLY ILE THR PHE PHE GLU PHE GLU ASN MET ALA GLU SER THR THR MET TYR LEU ARG ARG SER LEU

LEU LYS ASN SER PRO ARG ASN GLN LYS ASN LYS LYS ALA SER GLU

• Molecule 3: RNA-binding protein 7



• Molecule 4: RNA (30-MER)



• Molecule 4: RNA (30-MER)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	252638	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	77.5, 66	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k), GATAN K3 (6k x 4k)	Depositor
Maximum map value	72.188	Depositor
Minimum map value	-43.078	Depositor
Average map value	0.001	Depositor
Map value standard deviation	1.065	Depositor
Recommended contour level	8.0	Depositor
Map size (\AA)	308.0, 308.0, 308.0	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.1, 1.1, 1.1	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.27	0/7516	0.46	0/10139
1	E	0.27	0/1187	0.46	0/1599
2	B	0.26	0/2725	0.45	0/3676
2	F	0.27	0/1231	0.45	0/1660
3	C	0.26	0/659	0.45	0/886
4	D	0.32	0/644	0.90	2/1001 (0.2%)
4	L	0.22	0/236	0.80	0/367
All	All	0.27	0/14198	0.50	2/19328 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
4	D	9	C	N3-C2-O2	-5.63	117.96	121.90
4	D	9	C	N1-C2-O2	5.50	122.20	118.90

There are no chirality outliers.

There are no planarity outliers.

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	7376	0	7472	116	0
1	E	1166	0	1229	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	2666	0	2603	62	0
2	F	1211	0	1207	30	0
3	C	644	0	670	18	0
4	D	574	0	294	7	0
4	L	212	0	112	6	0
5	B	1	0	0	0	0
All	All	13850	0	13587	231	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 8.

The worst 5 of 231 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:1001:GLU:HG2	1:A:1027:ILE:HD11	1.60	0.83
1:A:192:LYS:NZ	1:A:215:ASP:OD2	2.11	0.83
1:E:640:ILE:HD11	1:E:797:VAL:HG21	1.60	0.82
1:A:393:SER:HG	1:A:499:THR:HG1	1.25	0.81
2:B:272:GLN:NE2	2:B:276:ALA:O	2.14	0.79

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	918/1045 (88%)	855 (93%)	63 (7%)	0	100	100
1	E	141/1045 (14%)	123 (87%)	18 (13%)	0	100	100
2	B	320/618 (52%)	292 (91%)	28 (9%)	0	100	100
2	F	143/618 (23%)	125 (87%)	18 (13%)	0	100	100
3	C	77/83 (93%)	71 (92%)	6 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1599/3409 (47%)	1466 (92%)	133 (8%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	815/911 (90%)	799 (98%)	16 (2%)	55	79
1	E	133/911 (15%)	133 (100%)	0	100	100
2	B	300/545 (55%)	295 (98%)	5 (2%)	60	82
2	F	139/545 (26%)	135 (97%)	4 (3%)	42	71
3	C	70/73 (96%)	68 (97%)	2 (3%)	42	71
All	All	1457/2985 (49%)	1430 (98%)	27 (2%)	59	80

5 of 27 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1001	GLU
2	B	127	GLN
2	F	110	GLN
2	B	109	HIS
2	B	229	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
4	D	25/28 (89%)	10 (40%)	1 (4%)
4	L	9/28 (32%)	1 (11%)	0
All	All	34/56 (60%)	11 (32%)	1 (2%)

5 of 11 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
4	D	10	C
4	D	12	A
4	D	13	A
4	D	16	U
4	D	17	U

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
4	D	18	U

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is 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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

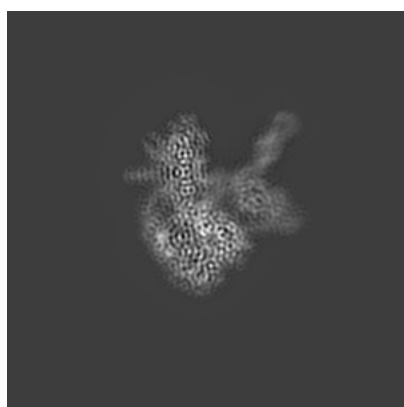
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-24883. These allow visual inspection of the internal detail of the map and identification of artifacts.

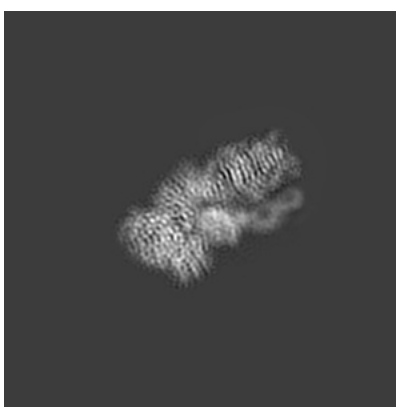
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

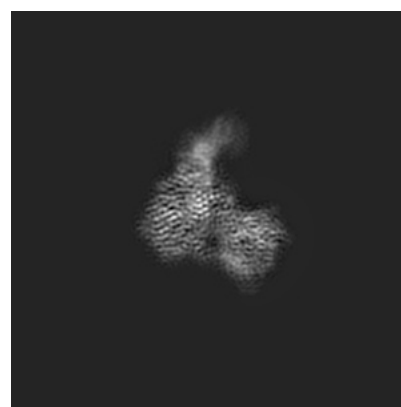
6.1.1 Primary map



X



Y

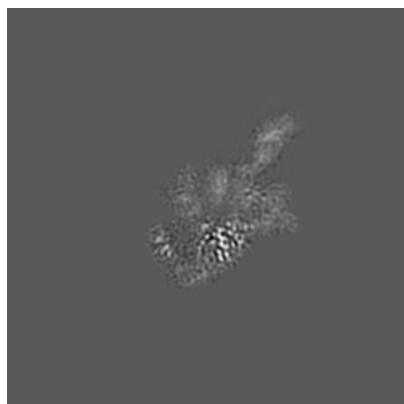


Z

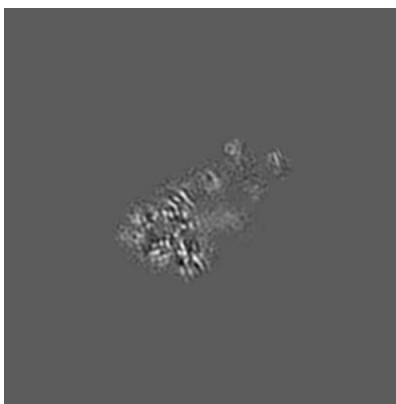
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

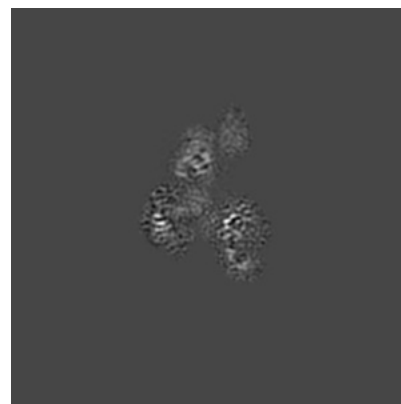
6.2.1 Primary map



X Index: 140



Y Index: 140

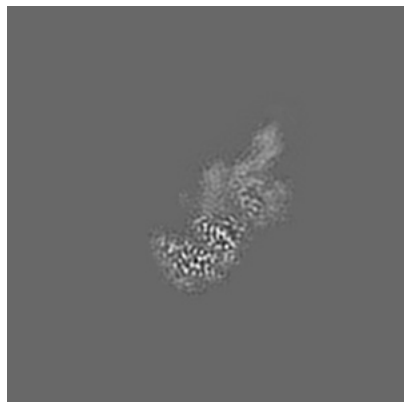


Z Index: 140

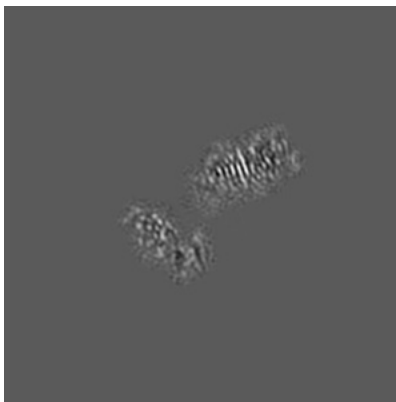
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

6.3.1 Primary map



X Index: 132



Y Index: 123



Z Index: 124

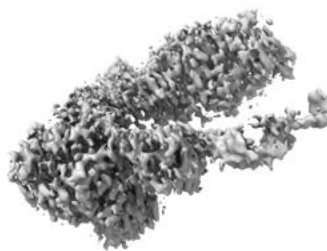
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 8.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

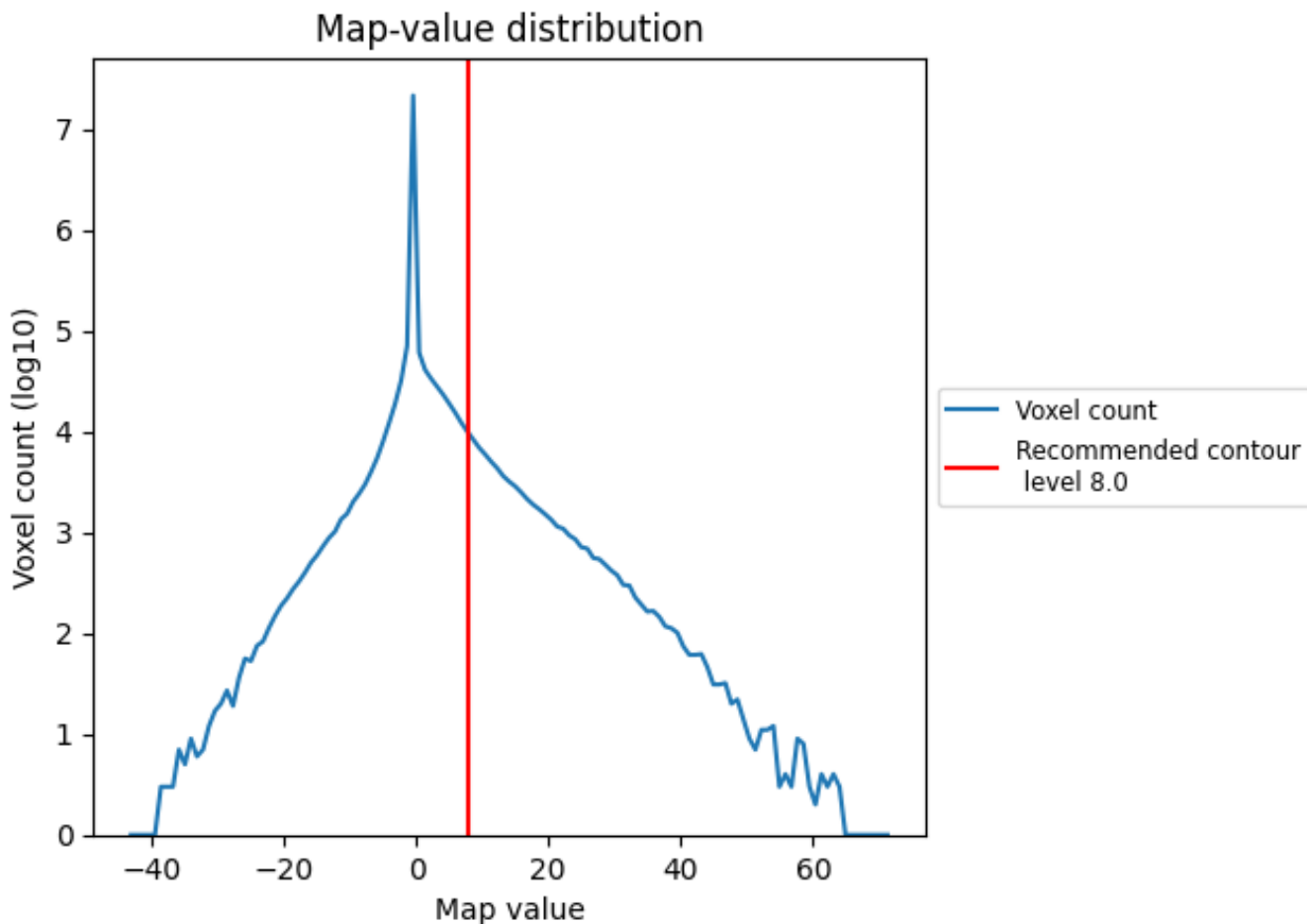
6.5 Mask visualisation

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

7 Map analysis [i](#)

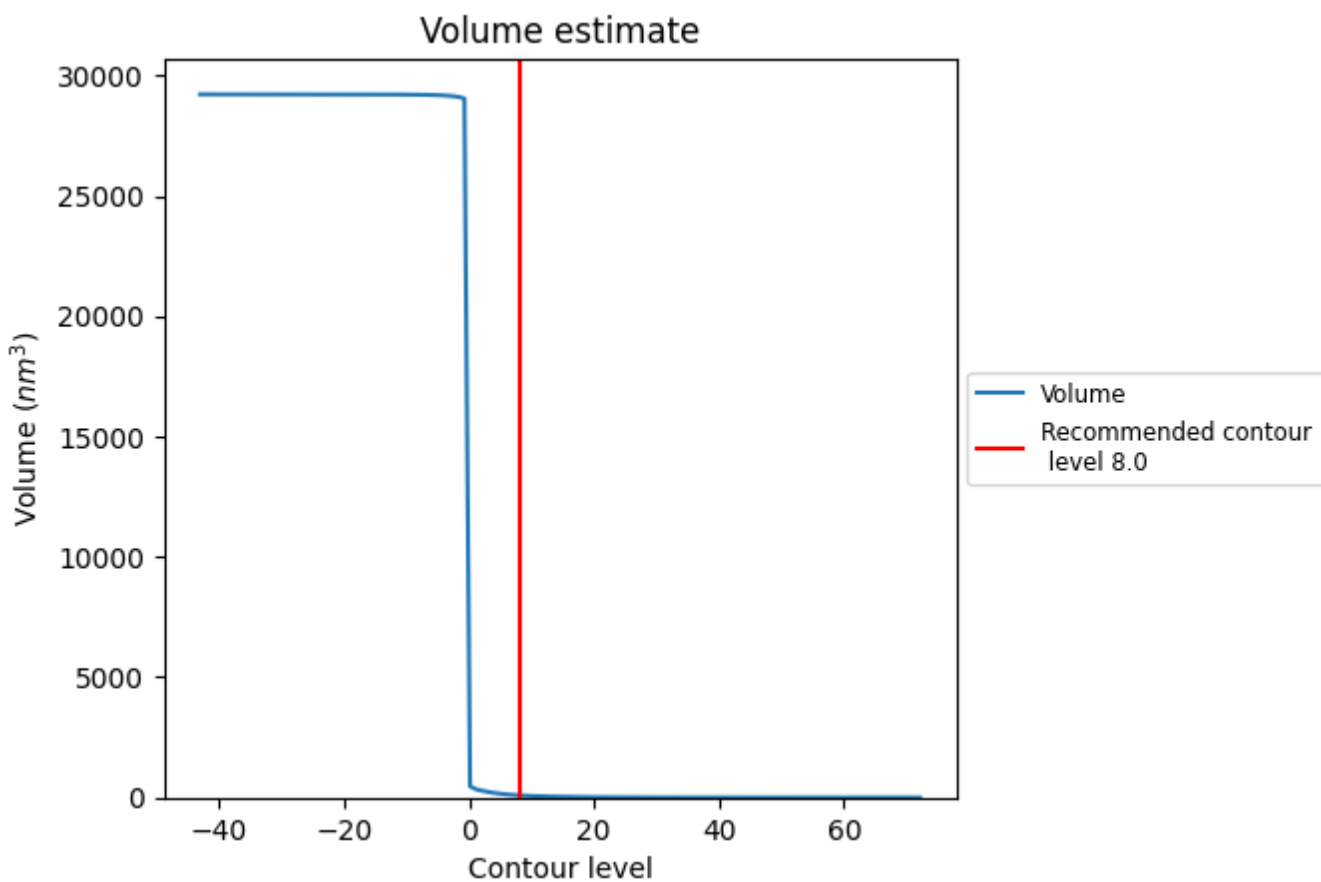
This section contains the results of statistical analysis of the map.

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.

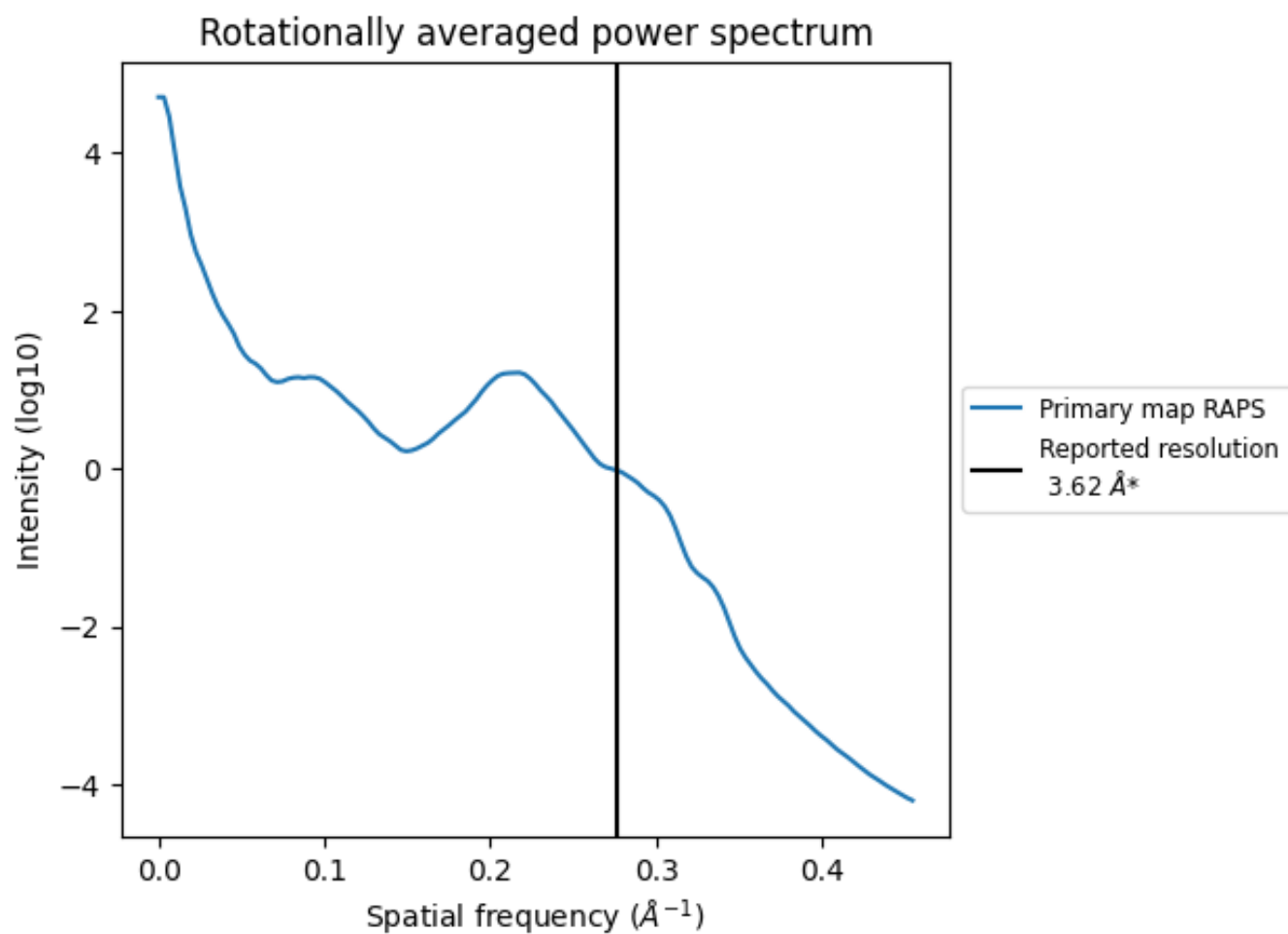
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 91 nm³; this corresponds to an approximate mass of 83 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 0.276 Å⁻¹

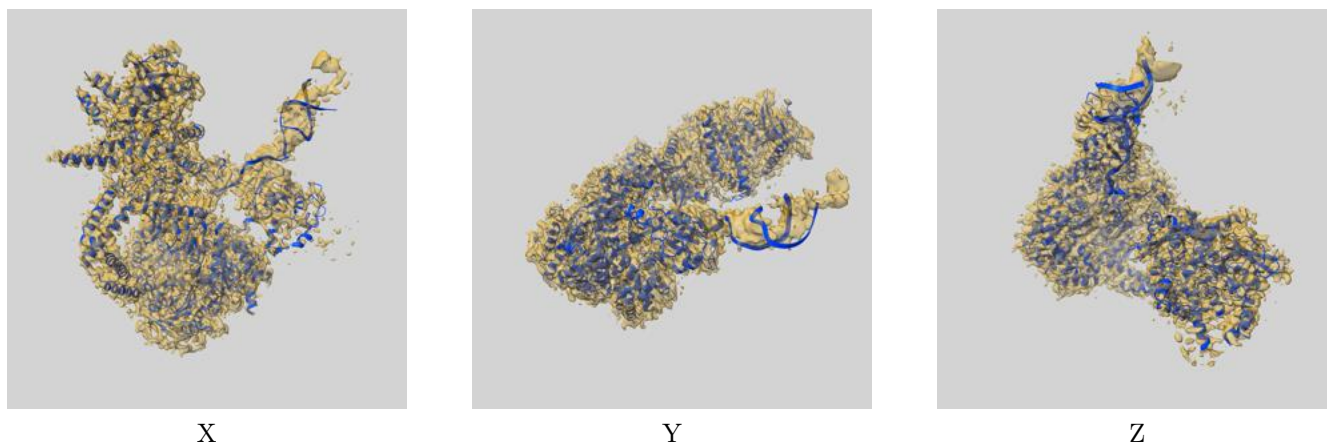
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

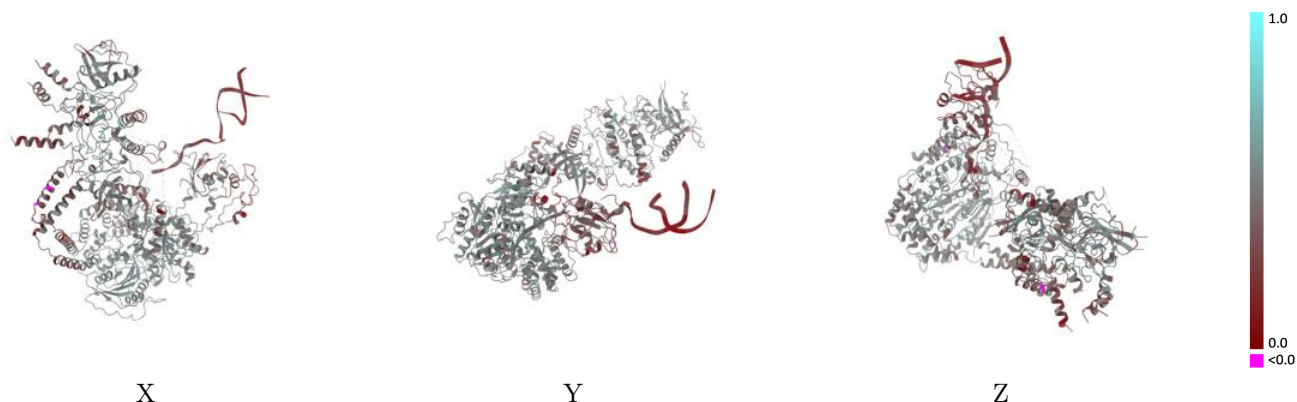
This section contains information regarding the fit between EMDB map EMD-24883 and PDB model 7S7C. Per-residue inclusion information can be found in section 3 on page 5.

9.1 Map-model overlay [i](#)



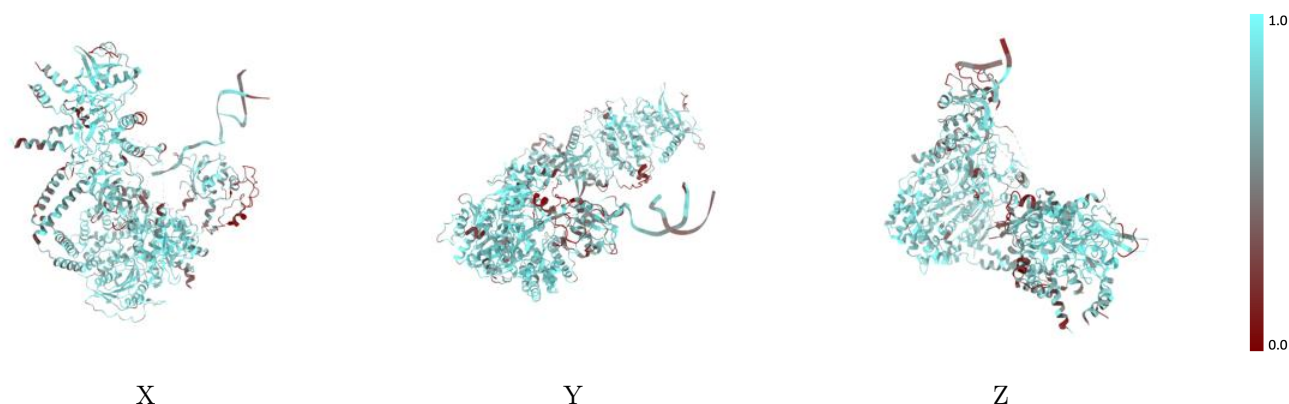
The images above show the 3D surface view of the map at the recommended contour level 8.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



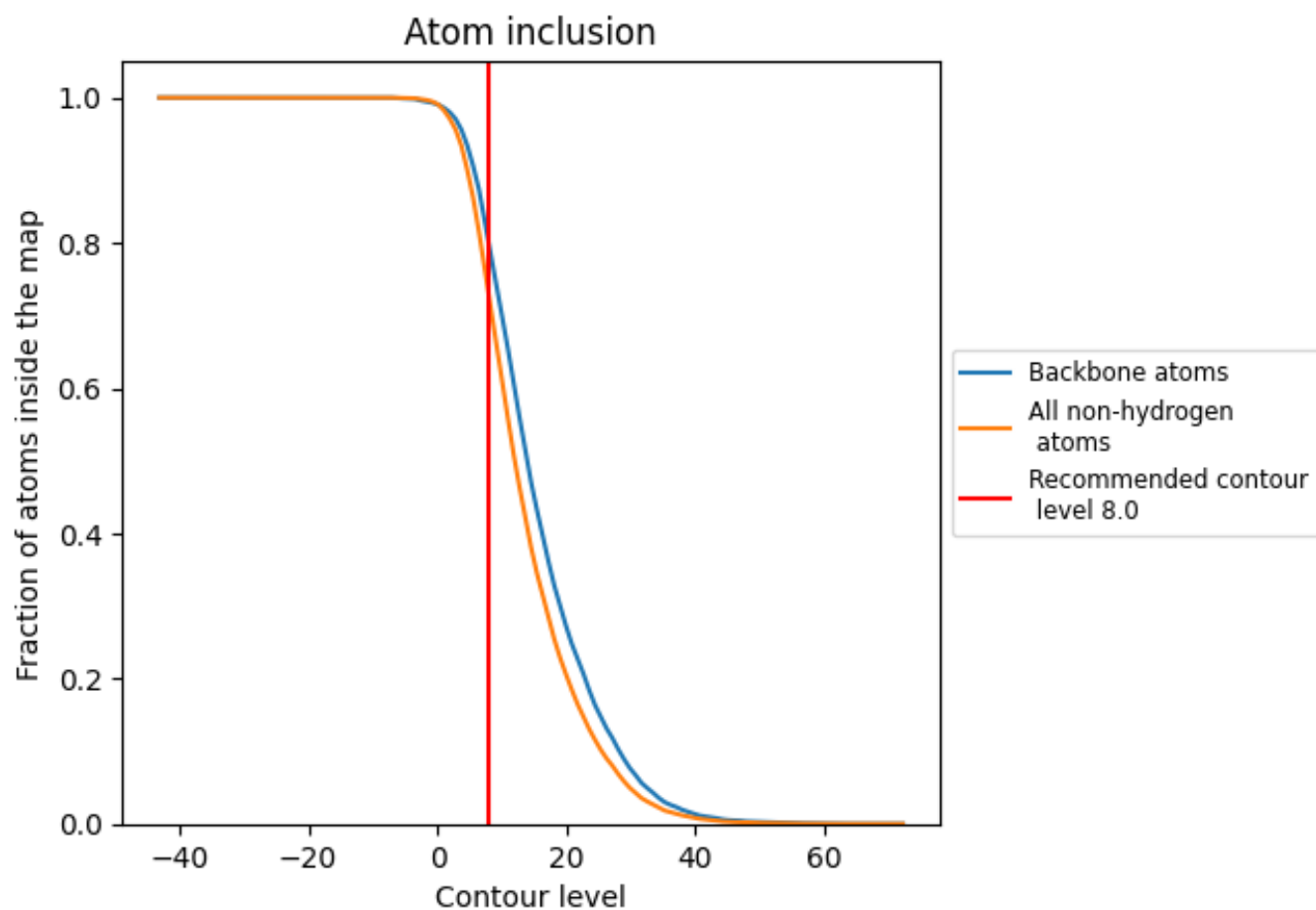
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (8.0).

















9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 73% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (8.0) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7272	 0.4490
A	 0.7983	 0.4840
B	 0.5501	 0.4110
C	 0.6965	 0.3840
D	 0.6882	 0.3040
E	 0.7694	 0.4660
F	 0.7198	 0.4590
L	 0.5000	 0.1750

