



wwPDB EM Validation Summary Report ⓘ

Mar 5, 2026 – 03:24 AM UTC

PDB ID : 3BBV / pdb_00003bbv
EMDB ID : EMD-1455
Title : The tRNA(phe) fitted into the low resolution Cryo-EM map of the 50S.nc-tRNA.Hsp15 complex
Authors : Jiang, L.; Abrahams, J.P.
Deposited on : 2007-11-11
Resolution : 10.00 Å(reported)
Based on initial model : 2OW8

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.dev132
Mogul : 2022.3.0, CSD as543be (2022)
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) : 2.49

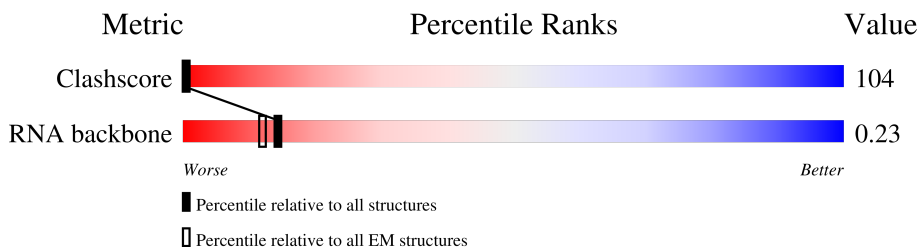
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 10.00 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	229148	23984
RNA backbone	8273	3508

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	z	76	<p style="text-align: center;">96%</p> <p style="text-align: center;">57% 24% 20%</p>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	PSU	z	39	-	-	X	-
1	7MG	z	46	-	-	X	-
1	5MU	z	54	-	-	X	-
1	PSU	z	55	-	-	X	-

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 1628 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.

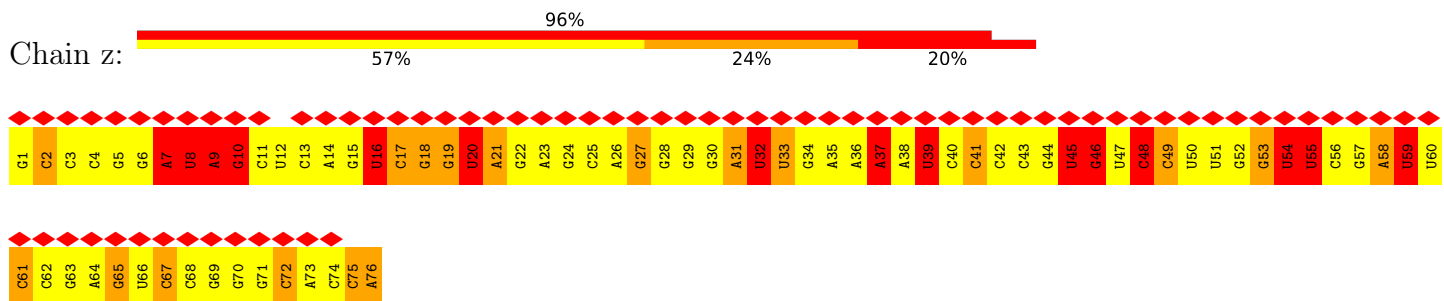
- Molecule 1 is a RNA chain called tRNA(Phe).

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	N	O	P			S
1	z	76	1628	731	290	530	75	2	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: tRNA(Phe)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	Not provided	
Resolution determination method	Not provided	
CTF correction method	CTF correction of each particle	Depositor
Microscope	FEI TECNAI F20	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	Not provided	
Minimum defocus (nm)	1.5	Depositor
Maximum defocus (nm)	3.5	Depositor
Magnification	50000	Depositor
Image detector	KODAK SO-163 FILM	Depositor
Maximum map value	9.232	Depositor
Minimum map value	-0.000	Depositor
Average map value	0.265	Depositor
Map value standard deviation	0.975	Depositor
Recommended contour level	2.48	Depositor
Map size (\AA)	325.12, 325.12, 325.12	wwPDB
Map dimensions	128, 128, 128	wwPDB
Map angles ($^\circ$)	90, 90, 90	wwPDB
Pixel spacing (\AA)	2.54, 2.54, 2.54	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: 7MG, 4SU, H2U, MIA, 5MU, PSU

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	z	1.63	2/1602 (0.1%)	1.30	14/2493 (0.6%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	z	47	U	O3'-P	10.02	1.76	1.61
1	z	53	G	C3'-O3'	5.06	1.49	1.42

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	z	7	A	C2'-C3'-O3'	7.62	125.12	113.70
1	z	31	A	C3'-C2'-C1'	-6.65	94.65	101.30
1	z	10	G	N9-C1'-C2'	6.04	121.07	112.00
1	z	9	A	C2'-C3'-O3'	5.98	118.48	109.50
1	z	31	A	C4'-C3'-O3'	5.91	121.87	113.00

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	z	1628	0	833	251	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	1628	0	833	251	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 104.

The worst 5 of 251 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:z:40:C:O2'	1:z:41:C:H5'	1.40	1.18
1:z:71:G:C3'	1:z:72:C:H5''	1.75	1.17
1:z:3:C:H2'	1:z:4:C:C6	1.83	1.14
1:z:24:G:H2'	1:z:25:C:O4'	1.51	1.09
1:z:9:A:N7	1:z:13:C:N4	2.01	1.07

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

5.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	z	75/76 (98%)	30 (40%)	0

5 of 30 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	z	2	C
1	z	7	A
1	z	8	4SU
1	z	9	A

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Mol	Chain	Res	Type
1	z	10	G

There are no RNA pucker outliers to report.

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

9 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	PSU	z	32	1	18,21,22	2.22	3 (16%)	21,30,33	2.10	7 (33%)
1	4SU	z	8	1	18,21,22	2.44	5 (27%)	25,30,33	2.54	10 (40%)
1	H2U	z	20	1	18,21,22	1.17	2 (11%)	19,30,33	1.11	0
1	PSU	z	39	1	18,21,22	2.52	5 (27%)	21,30,33	2.41	6 (28%)
1	7MG	z	46	1	23,26,27	2.59	7 (30%)	27,39,42	2.26	8 (29%)
1	MIA	z	37	1	28,31,32	2.46	8 (28%)	38,44,47	2.19	6 (15%)
1	H2U	z	16	1	18,21,22	1.52	2 (11%)	19,30,33	1.23	3 (15%)
1	5MU	z	54	1	19,22,23	1.69	2 (10%)	27,32,35	2.12	9 (33%)
1	PSU	z	55	1	18,21,22	2.18	4 (22%)	21,30,33	2.78	7 (33%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	PSU	z	32	1	-	3/7/25/26	0/2/2/2
1	4SU	z	8	1	-	2/7/25/26	0/2/2/2
1	H2U	z	20	1	-	2/7/38/39	0/2/2/2
1	PSU	z	39	1	-	4/7/25/26	0/2/2/2
1	7MG	z	46	1	-	1/7/37/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	MIA	z	37	1	-	5/15/33/34	0/3/3/3
1	H2U	z	16	1	-	2/7/38/39	0/2/2/2
1	5MU	z	54	1	-	0/7/25/26	0/2/2/2
1	PSU	z	55	1	-	2/7/25/26	0/2/2/2

The worst 5 of 38 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	z	46	7MG	C8-N9	-8.71	1.40	1.45
1	z	37	MIA	C13-C14	6.99	1.53	1.32
1	z	37	MIA	C16-C14	6.37	1.67	1.50
1	z	8	4SU	C4-N3	6.31	1.44	1.37
1	z	32	PSU	O2-C2	6.21	1.36	1.23

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	z	37	MIA	C12-C13-C14	-9.66	109.67	127.01
1	z	8	4SU	C5-C4-S4	-6.68	116.67	124.31
1	z	55	PSU	C4-N3-C2	-6.21	117.82	126.37
1	z	46	7MG	N9-C8-N7	5.95	111.79	103.37
1	z	55	PSU	N1-C2-N3	5.68	121.16	115.17

There are no chirality outliers.

5 of 21 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	z	16	H2U	C3'-C4'-C5'-O5'
1	z	37	MIA	O4'-C4'-C5'-O5'
1	z	37	MIA	C5-C6-N6-C12
1	z	37	MIA	C12-C13-C14-C16
1	z	39	PSU	C2'-C1'-C5-C4

There are no ring outliers.

9 monomers are involved in 45 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	z	32	PSU	4	0
1	z	8	4SU	6	0
1	z	20	H2U	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	z	39	PSU	7	0
1	z	46	7MG	9	0
1	z	37	MIA	1	0
1	z	16	H2U	3	0
1	z	54	5MU	7	0
1	z	55	PSU	11	0

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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	z	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	z	9:A	O3'	10:G	P	2.29
1	z	47:U	O3'	48:C	P	1.76

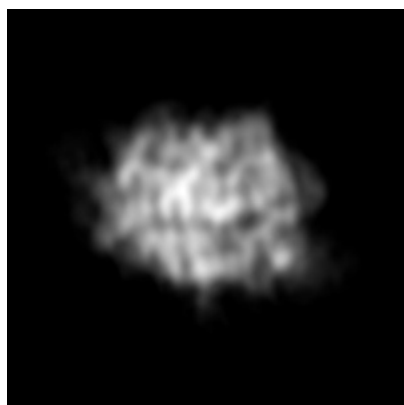
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-1455. These allow visual inspection of the internal detail of the map and identification of artifacts.

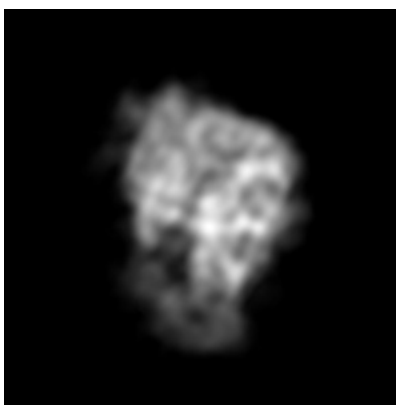
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

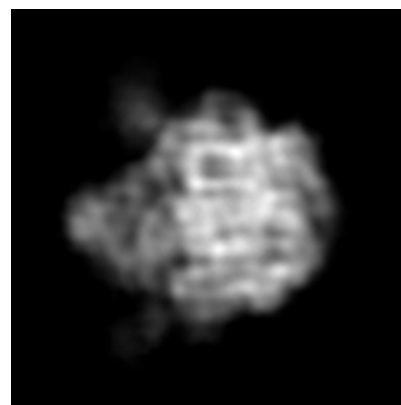
6.1.1 Primary map



X



Y

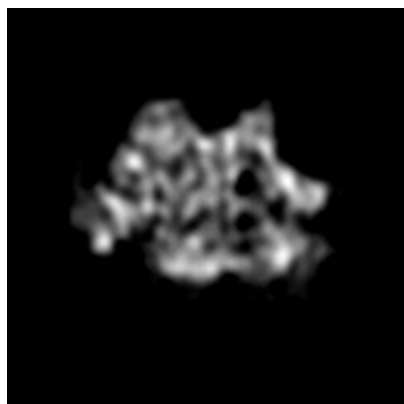


Z

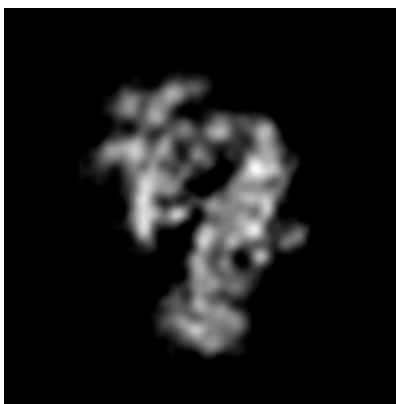
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 64



Y Index: 64



Z Index: 64

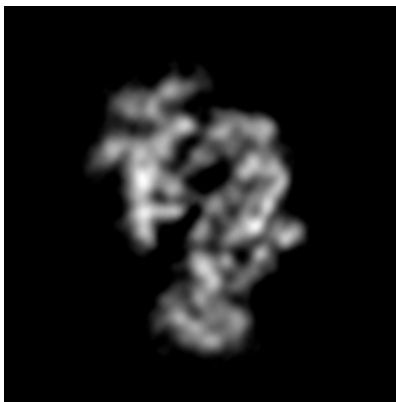
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [\(i\)](#)

6.3.1 Primary map



X Index: 58



Y Index: 62



Z Index: 64

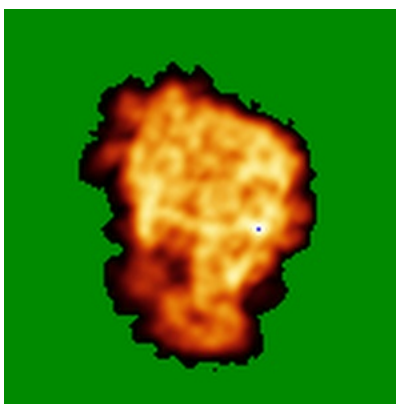
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



X



Y

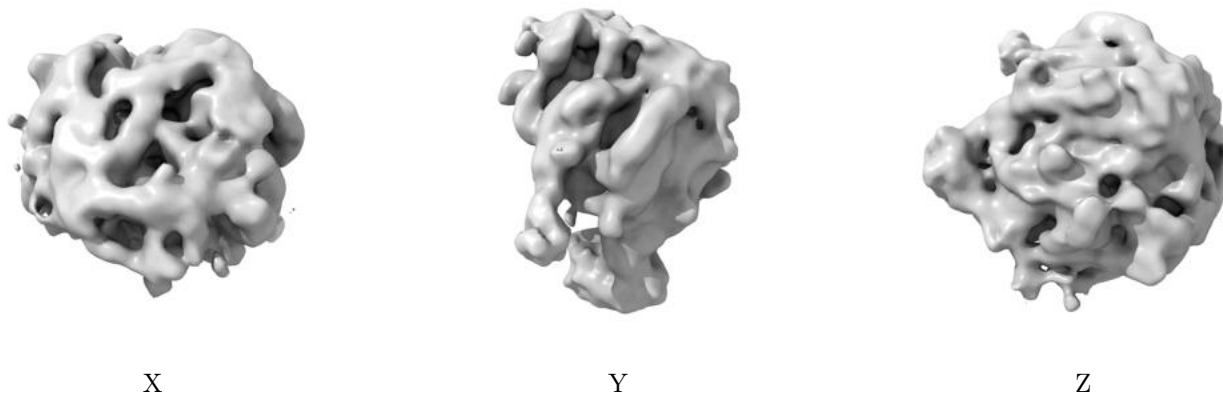


Z

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 2.48. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

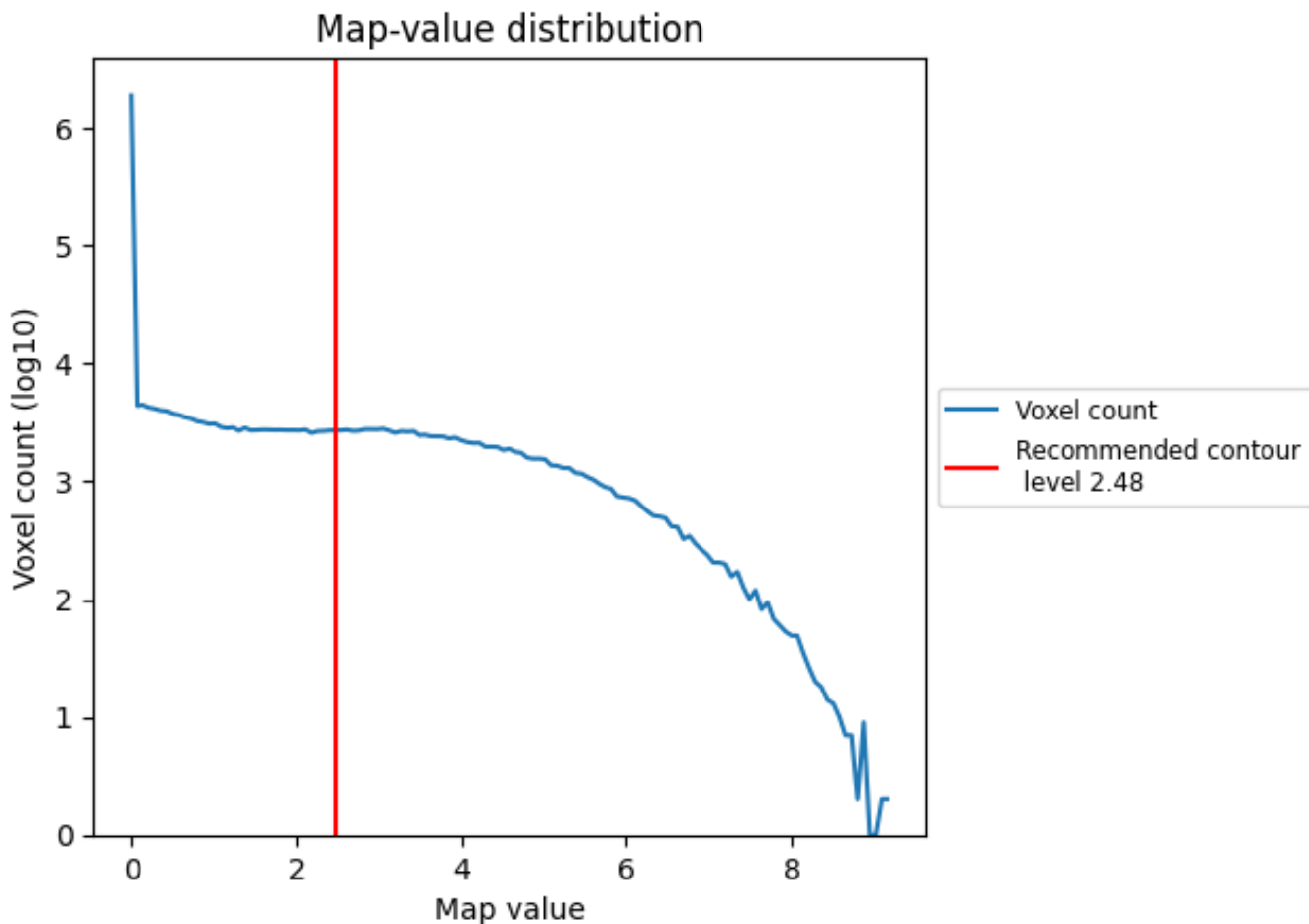
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

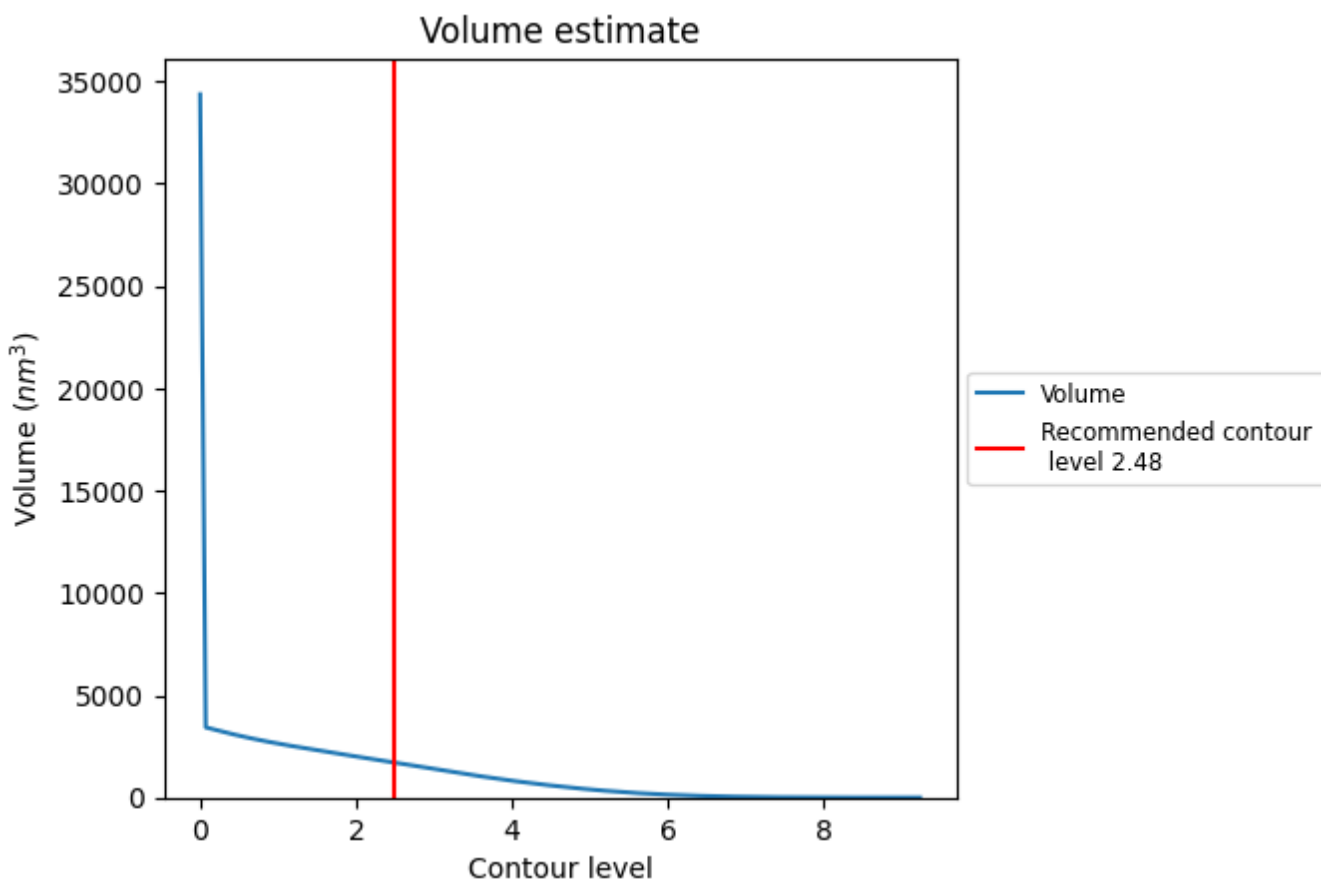
This section contains the results of statistical analysis of the map.

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.

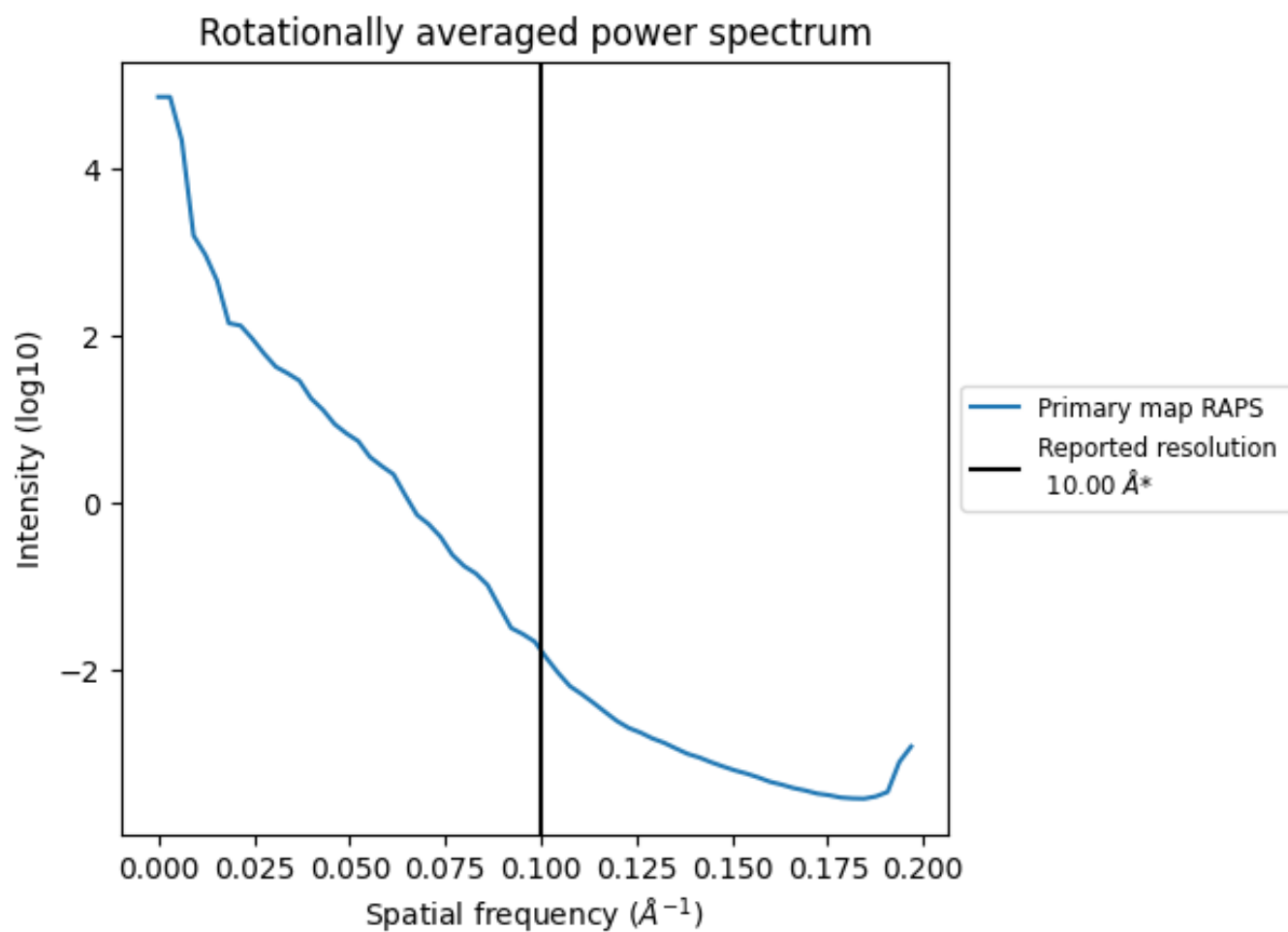
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1718 nm^3 ; this corresponds to an approximate mass of 1552 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 0.100 Å⁻¹

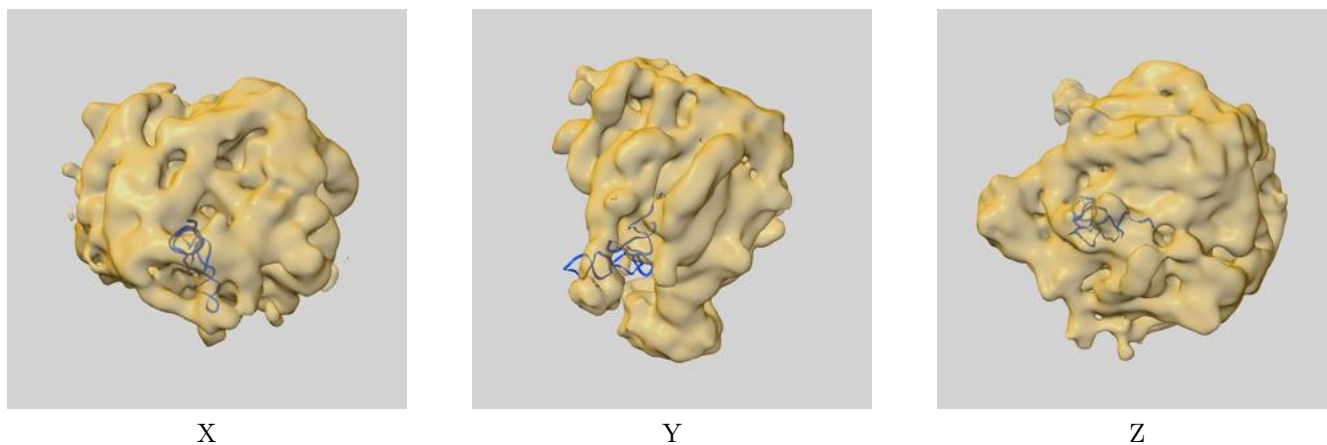
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

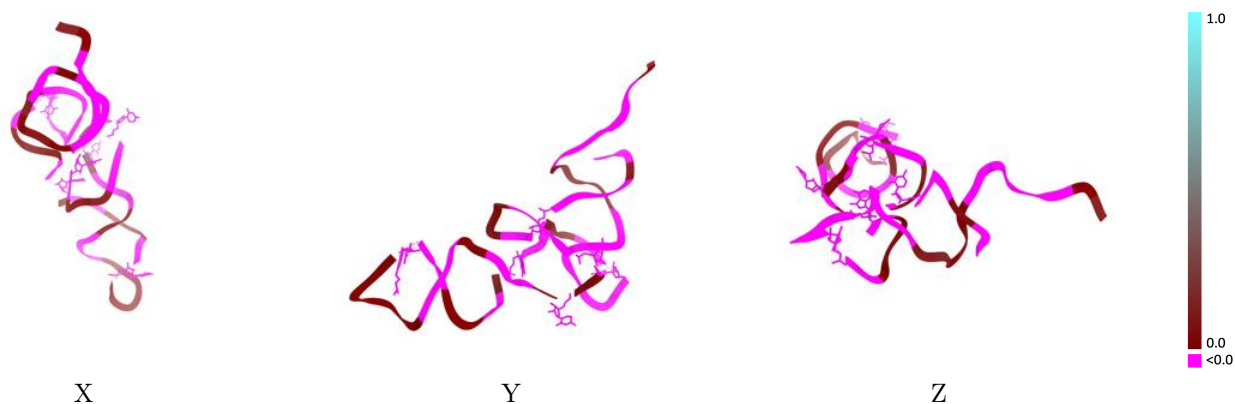
This section contains information regarding the fit between EMDB map EMD-1455 and PDB model 3BBV. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



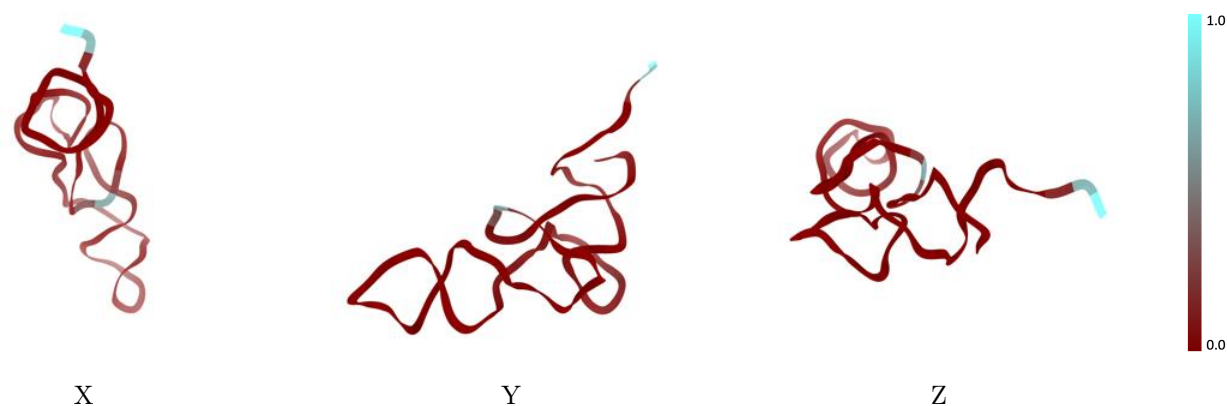
The images above show the 3D surface view of the map at the recommended contour level 2.48 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



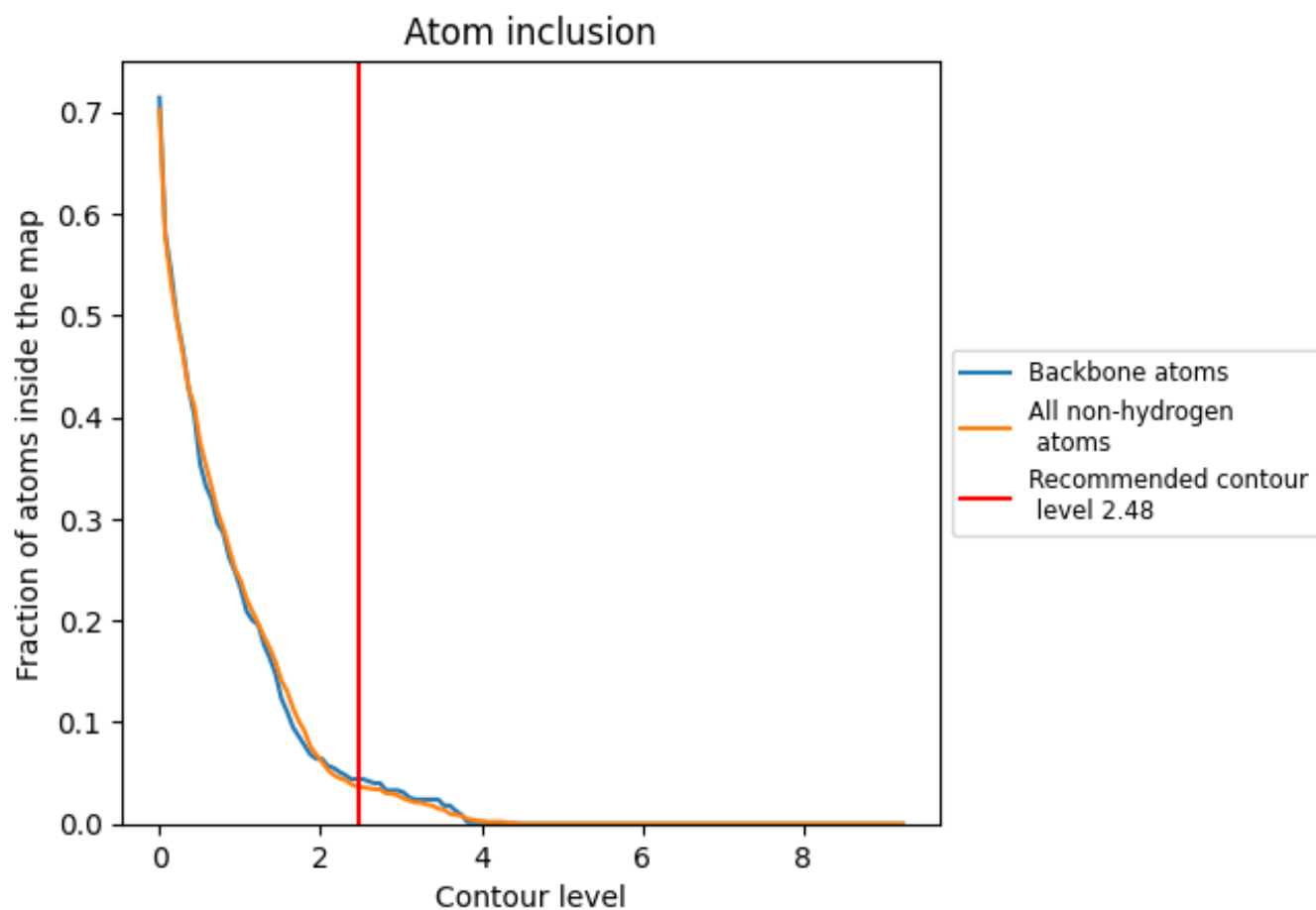
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (2.48).





9.4 Atom inclusion [i](#)



At the recommended contour level, 4% of all backbone atoms, 4% 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 (2.48) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.0360	 -0.0500
z	 0.0360	 -0.0500

