



Full wwPDB EM Validation Report ⓘ

Mar 8, 2026 – 03:34 AM UTC

PDB ID : 7JSH / pdb_00007jsh
EMDB ID : EMD-22454
Title : Adeno-Associated Virus 2 Rep68 HD Heptamer-ssAAVS1 with ATPgS
Authors : Escalante, C.R.
Deposited on : 2020-08-14
Resolution : 4.40 Å(reported)
Based on initial model : 1S9H

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:

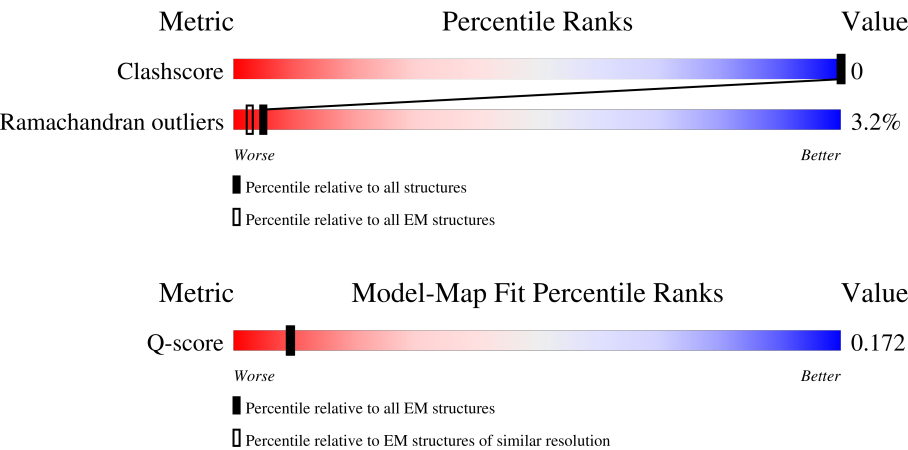
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

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

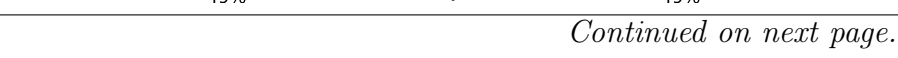
The reported resolution of this entry is 4.40 Å.

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	-
Q-score	-	25397	3132 (3.91 - 4.90)

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	538	
1	B	538	
1	C	538	
1	D	538	
1	E	538	

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Mol	Chain	Length	Quality of chain
1	F	538	 50%49%
1	G	538	 49%49%
2	N	15	 100%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7916 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 Protein Rep68.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	A	272	Total	C	N	O	0	0
			1088	544	272	272		
1	B	272	Total	C	N	O	0	0
			1088	544	272	272		
1	C	272	Total	C	N	O	0	0
			1088	544	272	272		
1	D	272	Total	C	N	O	0	0
			1088	544	272	272		
1	E	272	Total	C	N	O	0	0
			1088	544	272	272		
1	F	272	Total	C	N	O	0	0
			1088	544	272	272		
1	G	272	Total	C	N	O	0	0
			1088	544	272	272		

There are 35 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P03132
A	0	PRO	-	expression tag	UNP P03132
A	1	PRO	-	expression tag	UNP P03132
A	17	GLU	GLY	conflict	UNP P03132
A	151	SER	CYS	engineered mutation	UNP P03132
B	-1	GLY	-	expression tag	UNP P03132
B	0	PRO	-	expression tag	UNP P03132
B	1	PRO	-	expression tag	UNP P03132
B	17	GLU	GLY	conflict	UNP P03132
B	151	SER	CYS	engineered mutation	UNP P03132
C	-1	GLY	-	expression tag	UNP P03132
C	0	PRO	-	expression tag	UNP P03132
C	1	PRO	-	expression tag	UNP P03132
C	17	GLU	GLY	conflict	UNP P03132
C	151	SER	CYS	engineered mutation	UNP P03132
D	-1	GLY	-	expression tag	UNP P03132

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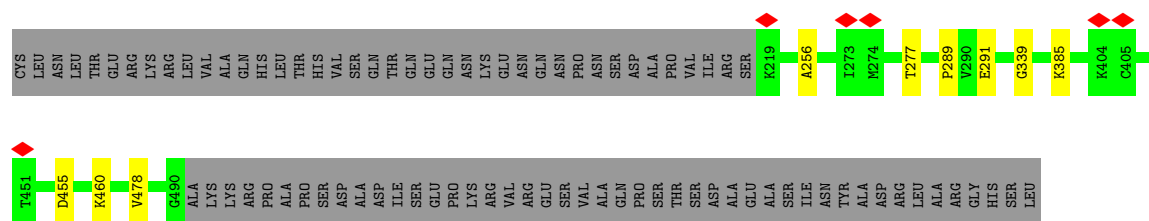
Chain	Residue	Modelled	Actual	Comment	Reference
D	0	PRO	-	expression tag	UNP P03132
D	1	PRO	-	expression tag	UNP P03132
D	17	GLU	GLY	conflict	UNP P03132
D	151	SER	CYS	engineered mutation	UNP P03132
E	-1	GLY	-	expression tag	UNP P03132
E	0	PRO	-	expression tag	UNP P03132
E	1	PRO	-	expression tag	UNP P03132
E	17	GLU	GLY	conflict	UNP P03132
E	151	SER	CYS	engineered mutation	UNP P03132
F	-1	GLY	-	expression tag	UNP P03132
F	0	PRO	-	expression tag	UNP P03132
F	1	PRO	-	expression tag	UNP P03132
F	17	GLU	GLY	conflict	UNP P03132
F	151	SER	CYS	engineered mutation	UNP P03132
G	-1	GLY	-	expression tag	UNP P03132
G	0	PRO	-	expression tag	UNP P03132
G	1	PRO	-	expression tag	UNP P03132
G	17	GLU	GLY	conflict	UNP P03132
G	151	SER	CYS	engineered mutation	UNP P03132

- Molecule 2 is a DNA chain called DNA (5'-D(P*CP*GP*CP*TP*CP*GP*CP*TP*CP*GP*CP*TP*CP*GP*C)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
2	N	15	Total 300	C 142	N 50	O 93	P 15	0	0

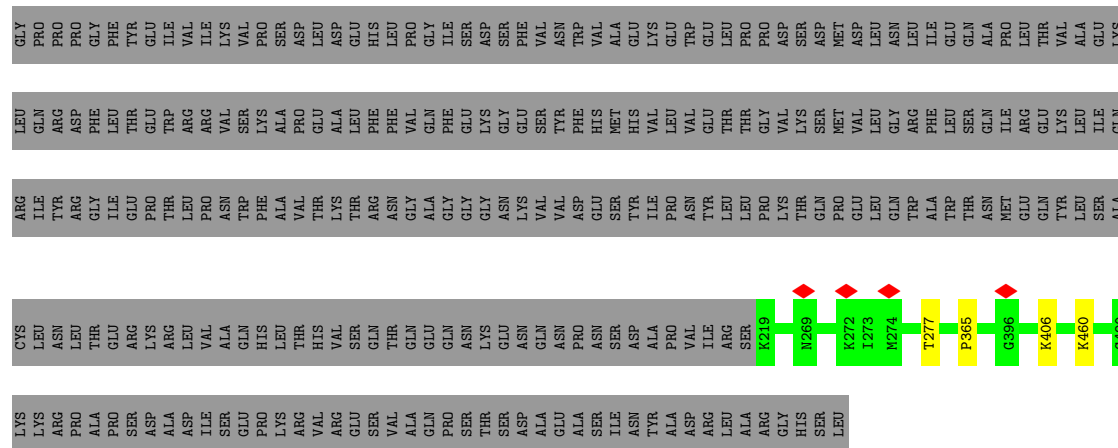
Chain C: 49% 1% 50%





• Molecule 1: Protein Rep68

Chain F: 50% 49%



• Molecule 1: Protein Rep68

Chain G: 49% 49%



• Molecule 2: DNA (5'-D(P*CP*GP*CP*TP*CP*GP*CP*TP*CP*GP*CP*TP*CP*GP*C)-3')

Chain N: 100%

There are no outlier residues recorded for this chain.

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	193869	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	59000	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	2.690	Depositor
Minimum map value	-2.173	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.090	Depositor
Recommended contour level	0.413	Depositor
Map size ($\text{\AA}$)	362.19904, 362.19904, 362.19904	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.41484, 1.41484, 1.41484	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	A	0.04	0/1087	0.08	0/1357
1	B	0.05	0/1087	0.12	0/1357
1	C	0.06	0/1087	0.13	0/1357
1	D	0.05	0/1087	0.11	0/1357
1	E	0.06	0/1087	0.17	0/1357
1	F	0.07	0/1087	0.18	0/1357
1	G	0.05	0/1087	0.11	0/1357
2	N	0.14	0/333	0.25	0/510
All	All	0.06	0/7942	0.14	0/10009

There are no bond length outliers.

There are no bond angle outliers.

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	1088	0	296	0	0
1	B	1088	0	296	0	0
1	C	1088	0	296	0	0
1	D	1088	0	296	0	0
1	E	1088	0	296	0	0
1	F	1088	0	296	0	0
1	G	1088	0	296	0	0
2	N	300	0	169	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7916	0	2241	0	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 0.

There are no clashes within the asymmetric unit.

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	270/538 (50%)	221 (82%)	35 (13%)	14 (5%)	1	15
1	B	270/538 (50%)	223 (83%)	39 (14%)	8 (3%)	3	22
1	C	270/538 (50%)	224 (83%)	36 (13%)	10 (4%)	2	19
1	D	270/538 (50%)	229 (85%)	34 (13%)	7 (3%)	4	25
1	E	270/538 (50%)	233 (86%)	28 (10%)	9 (3%)	3	21
1	F	270/538 (50%)	224 (83%)	42 (16%)	4 (2%)	8	38
1	G	270/538 (50%)	227 (84%)	34 (13%)	9 (3%)	3	21
All	All	1890/3766 (50%)	1581 (84%)	248 (13%)	61 (3%)	5	21

All (61) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	364	PHE
1	B	280	ALA
1	C	365	PRO
1	D	280	ALA
1	F	365	PRO
1	G	365	PRO
1	A	277	THR

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Mol	Chain	Res	Type
1	B	385	LYS
1	C	234	LYS
1	D	352	PRO
1	E	289	PRO
1	G	335	PRO
1	G	385	LYS
1	A	245	GLU
1	B	245	GLU
1	B	322	LYS
1	C	245	GLU
1	D	245	GLU
1	D	256	ALA
1	E	256	ALA
1	F	277	THR
1	A	279	THR
1	A	367	ASN
1	A	385	LYS
1	A	396	GLY
1	A	403	GLN
1	A	457	ASP
1	B	234	LYS
1	B	295	SER
1	B	460	LYS
1	C	256	ALA
1	C	385	LYS
1	C	460	LYS
1	C	484	PHE
1	D	371	ASP
1	D	403	GLN
1	E	277	THR
1	E	291	GLU
1	E	385	LYS
1	E	455	ASP
1	E	478	VAL
1	F	460	LYS
1	G	279	THR
1	G	291	GLU
1	G	336	ALA
1	G	405	CYS
1	A	280	ALA
1	A	361	ASN
1	C	309	PRO

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Mol	Chain	Res	Type
1	C	478	VAL
1	E	460	LYS
1	G	280	ALA
1	A	460	LYS
1	C	352	PRO
1	F	406	LYS
1	B	478	VAL
1	A	309	PRO
1	A	339	GLY
1	D	478	VAL
1	E	339	GLY
1	G	309	PRO

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

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 ⓘ

There are no chain breaks in this entry.

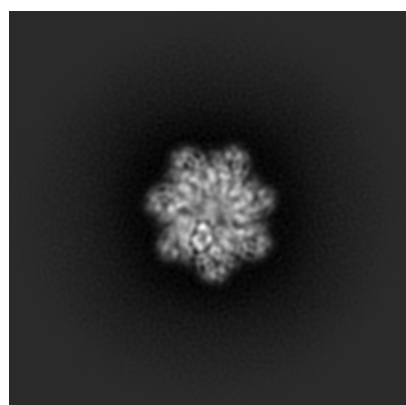
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-22454. These allow visual inspection of the internal detail of the map and identification of artifacts.

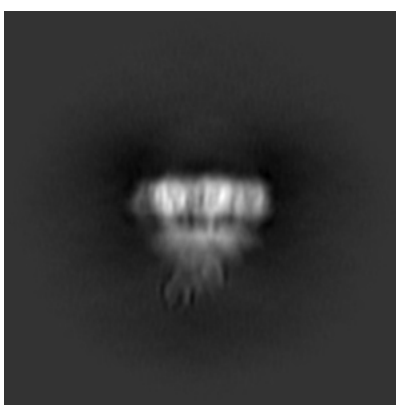
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

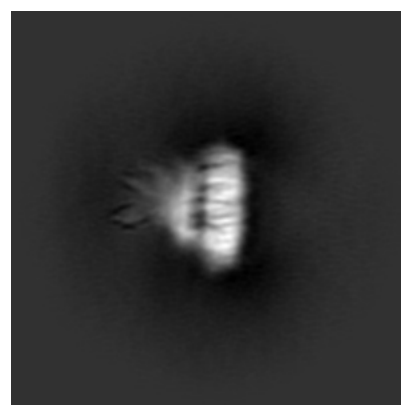
6.1.1 Primary map



X



Y

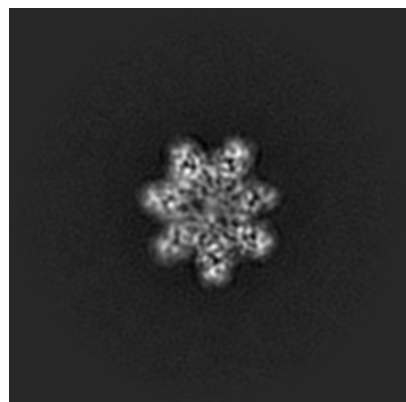


Z

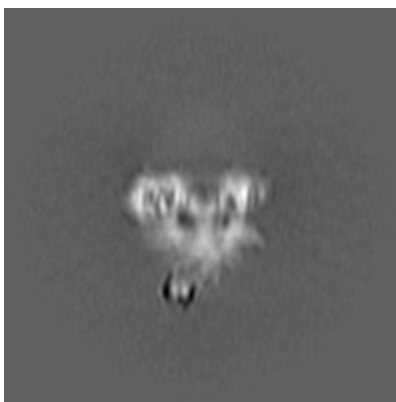
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

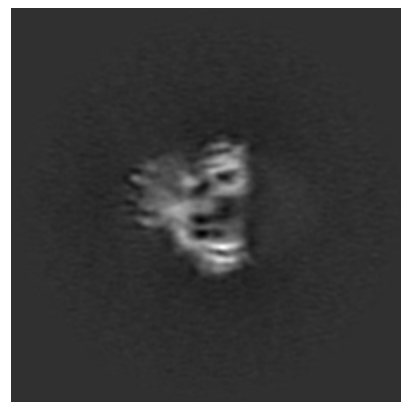
6.2.1 Primary map



X Index: 128



Y Index: 128

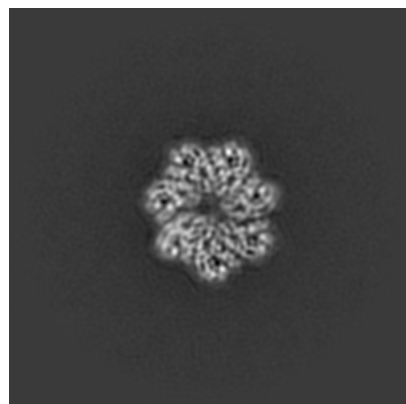


Z Index: 128

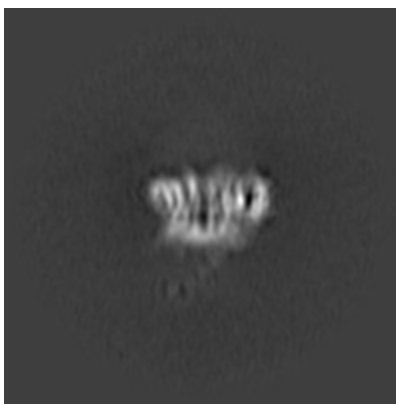
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

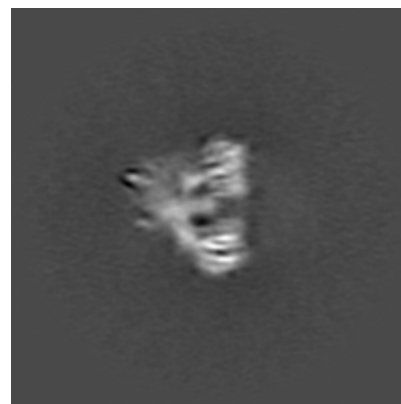
6.3.1 Primary map



X Index: 136



Y Index: 112

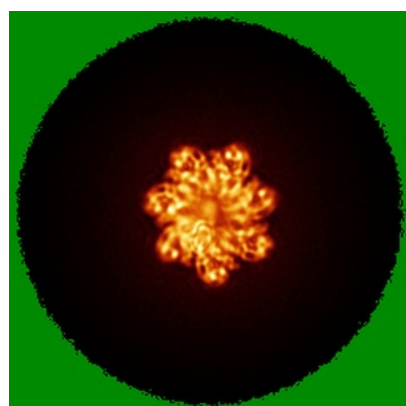


Z Index: 130

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

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

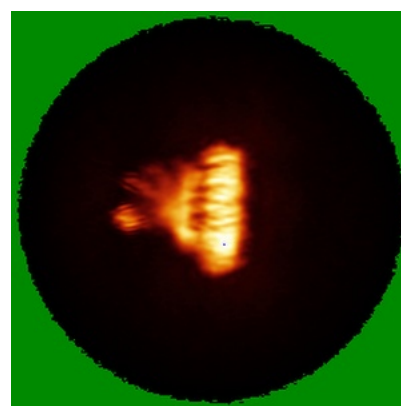
6.4.1 Primary map



X



Y

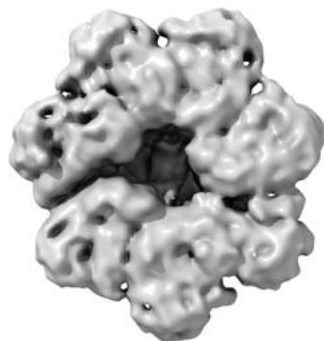


Z

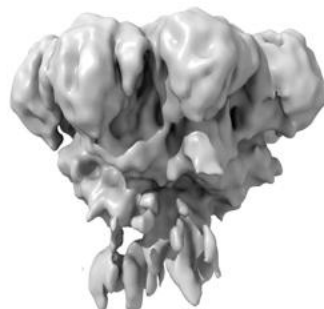
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

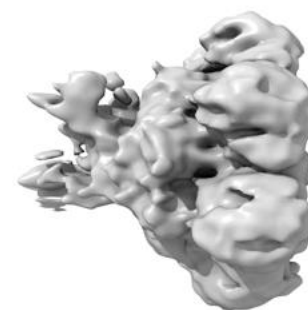
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.413. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

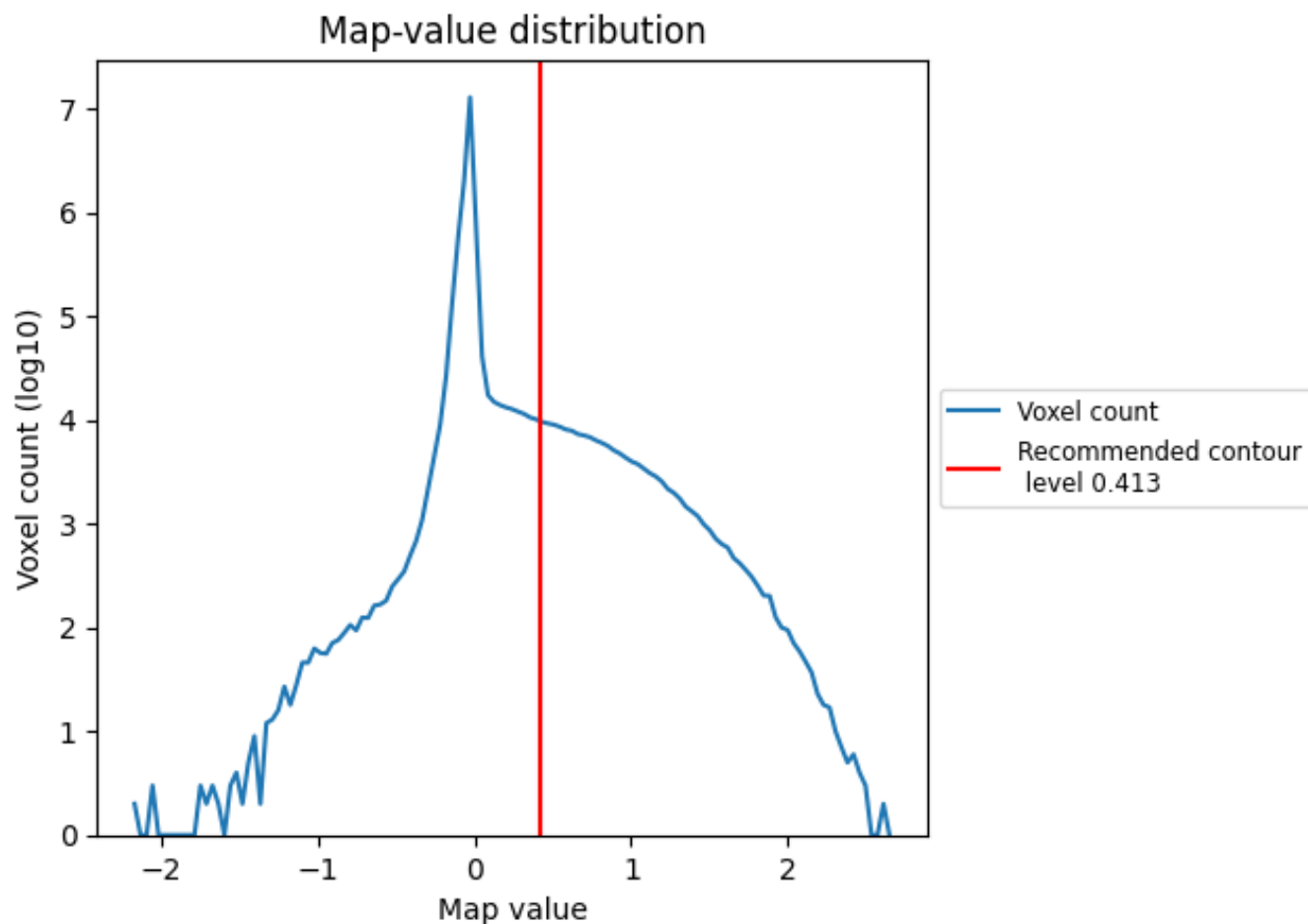
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

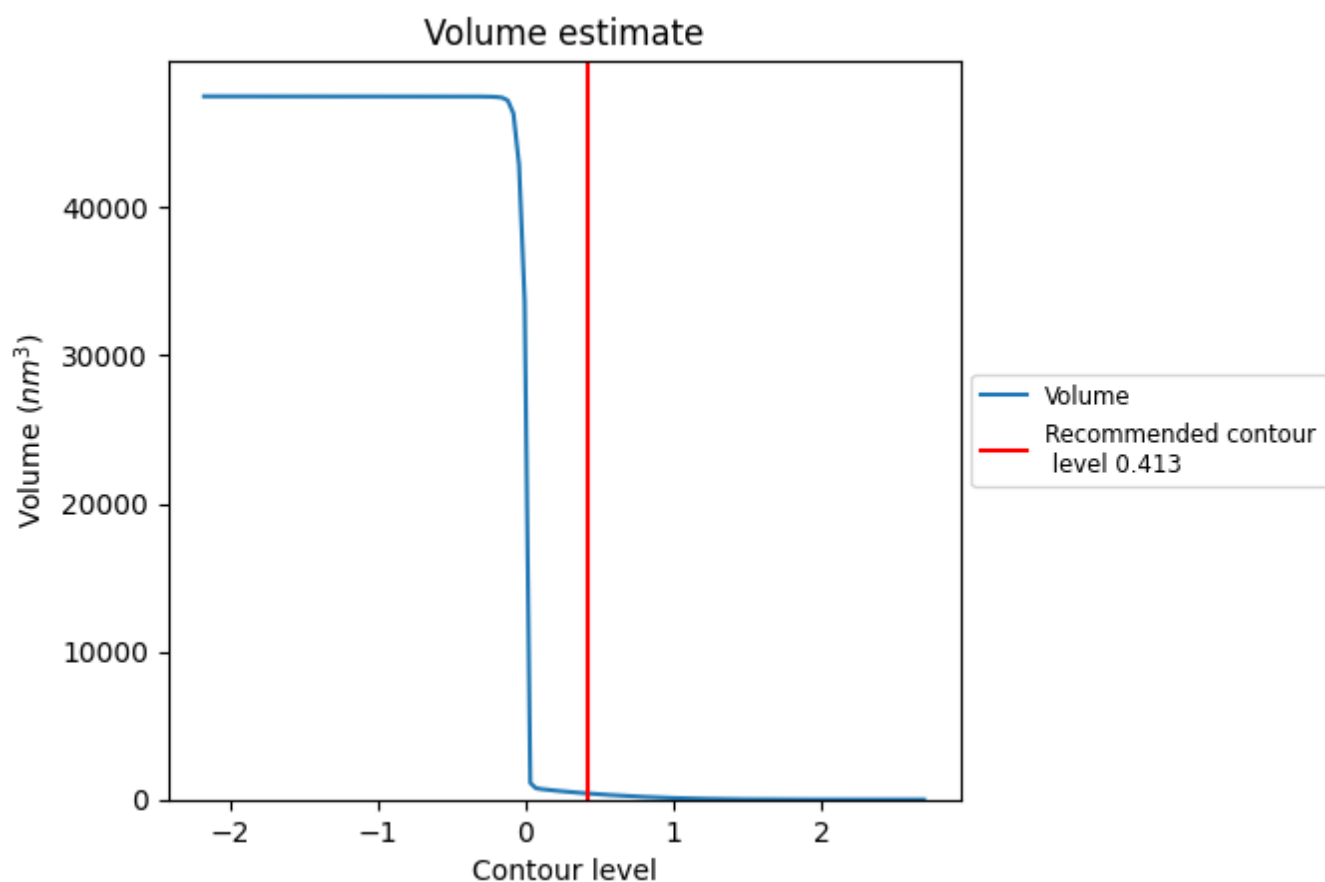
This section contains the results of statistical analysis of the map.

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.

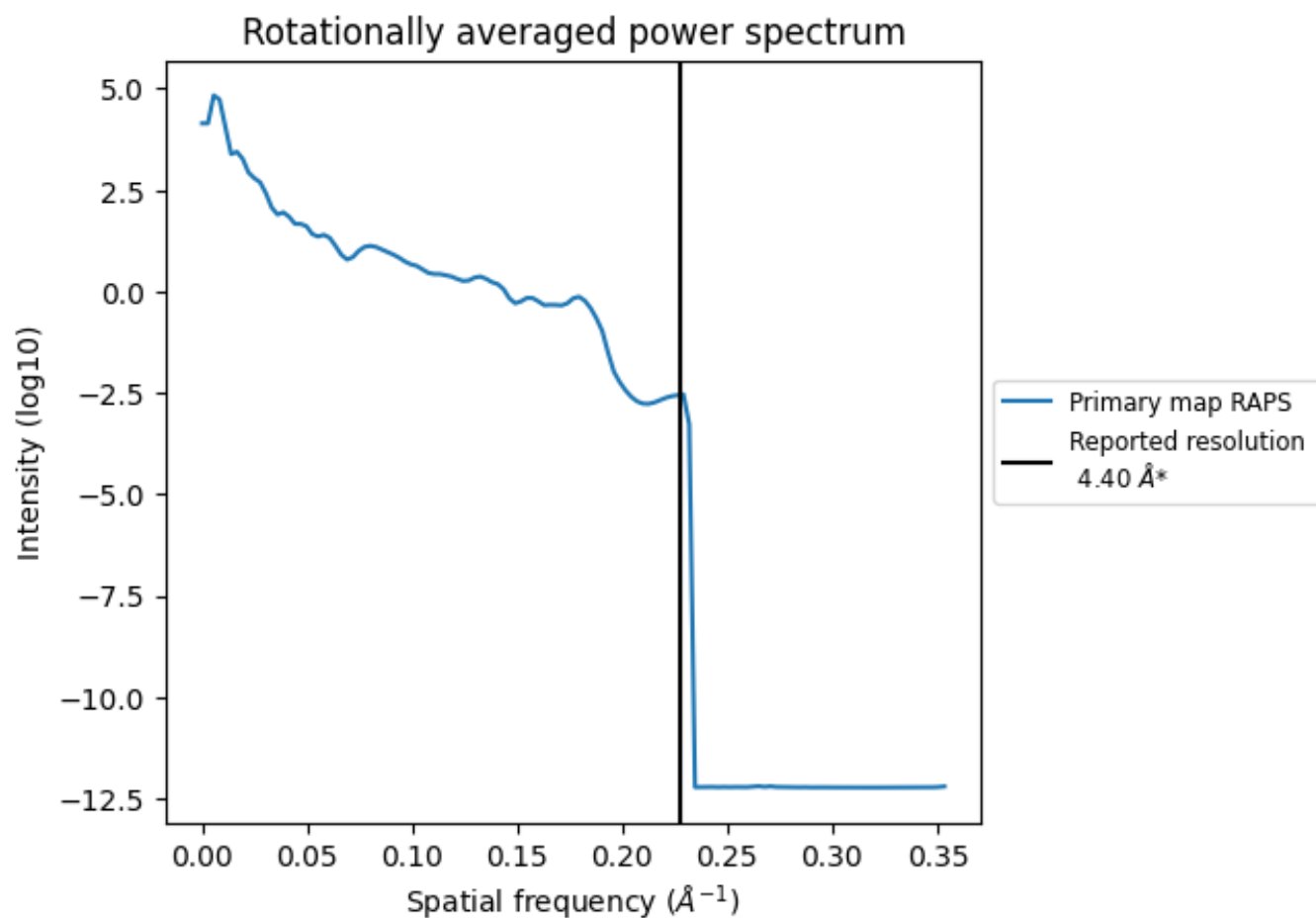
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 417 nm³; this corresponds to an approximate mass of 376 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 0.227 $\text{\AA}^{-1}$

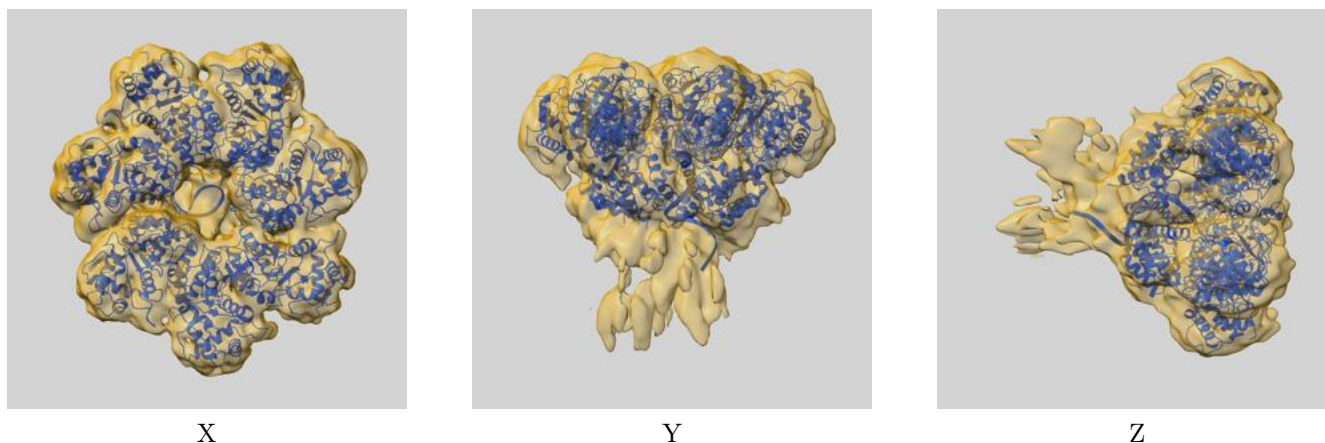
8 Fourier-Shell correlation ⓘ

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

9 Map-model fit [i](#)

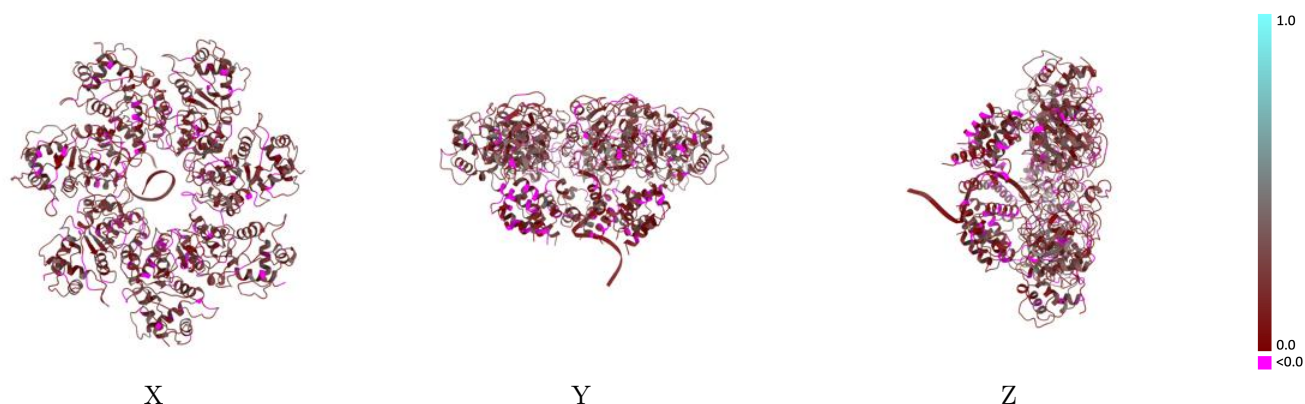
This section contains information regarding the fit between EMDB map EMD-22454 and PDB model 7JSH. Per-residue inclusion information can be found in section [3](#) on page [6](#).

9.1 Map-model overlay [i](#)



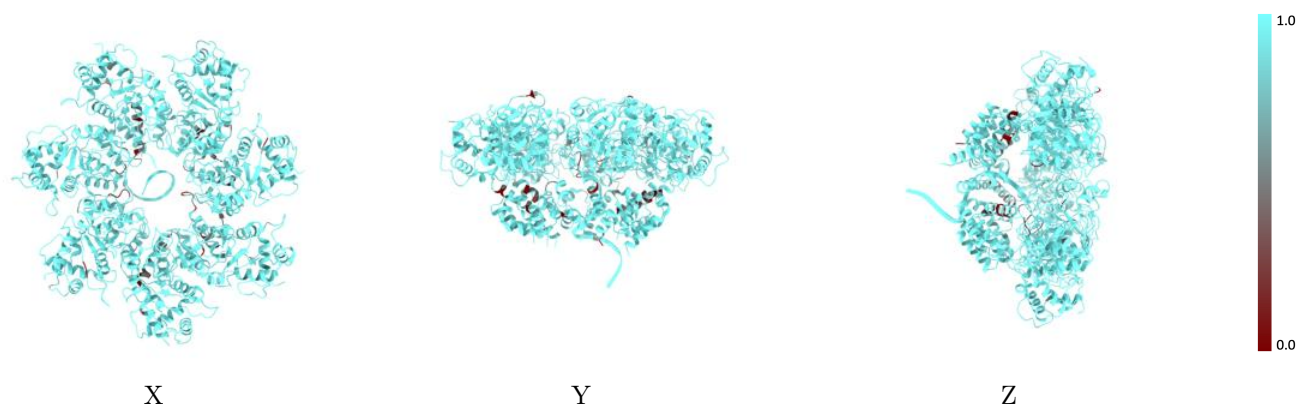
The images above show the 3D surface view of the map at the recommended contour level 0.413 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



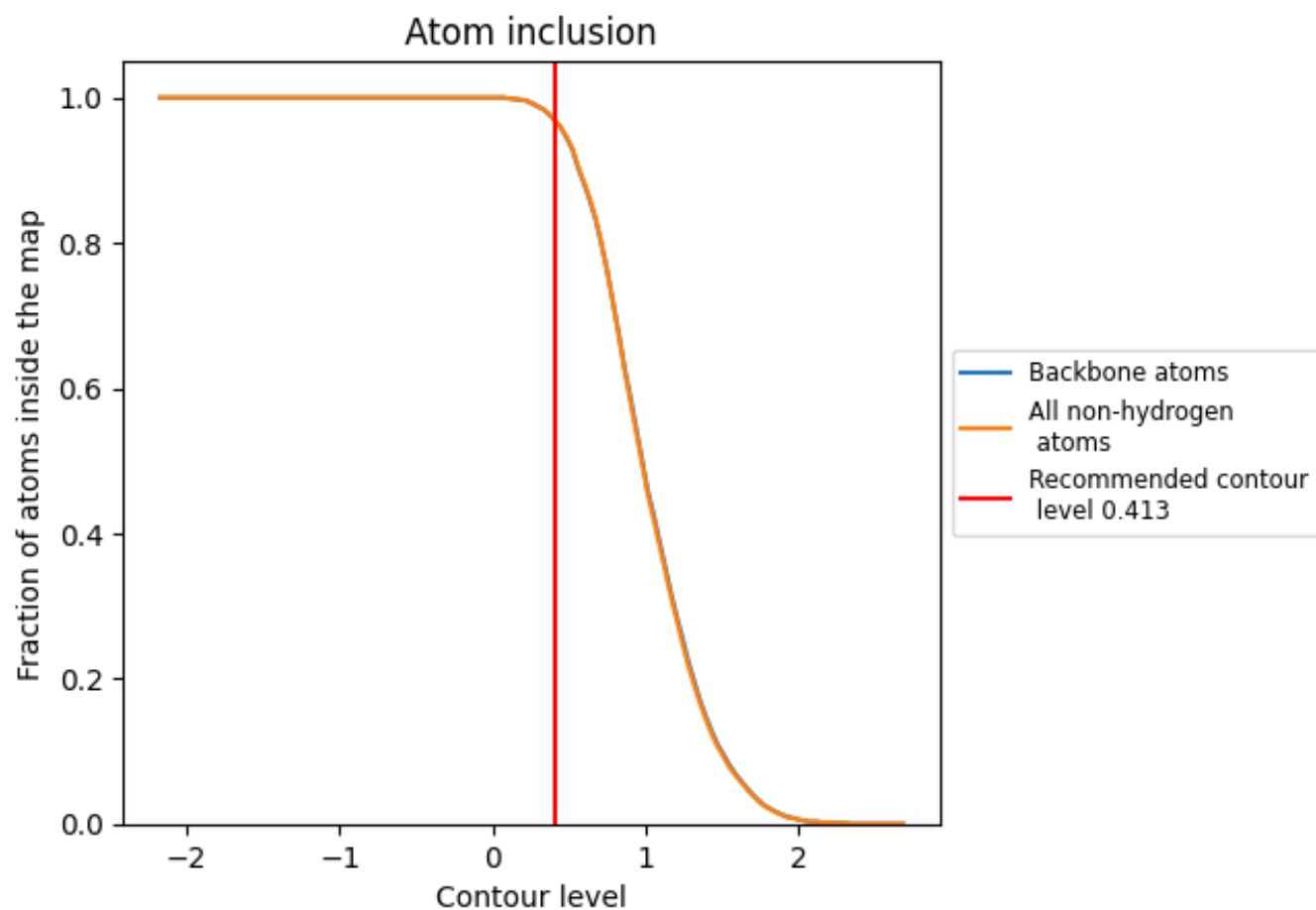
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.413).

9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 97% 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 (0.413) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9680	0.1720
A	0.9770	0.1640
B	0.9700	0.1670
C	0.9670	0.1710
D	0.9610	0.1910
E	0.9640	0.1800
F	0.9720	0.1700
G	0.9620	0.1770
N	0.9900	0.1170

1.0

0.0

<0.0