



wwPDB EM Validation Summary Report ⓘ

Mar 27, 2026 – 02:15 AM UTC

PDB ID : 6OKR / pdb_00006okr
EMDB ID : EMD-20102
Title : CDTb Pre-Insertion form Modeled from Cryo-EM Map Reconstructed using C7 Symmetry
Authors : Lacy, D.B.; Sheedlo, M.J.; Anderson, D.M.
Deposited on : 2019-04-15
Resolution : 4.20 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.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 EMD 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

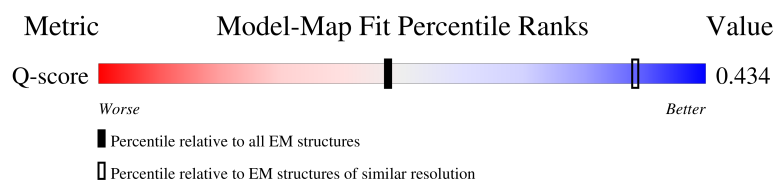
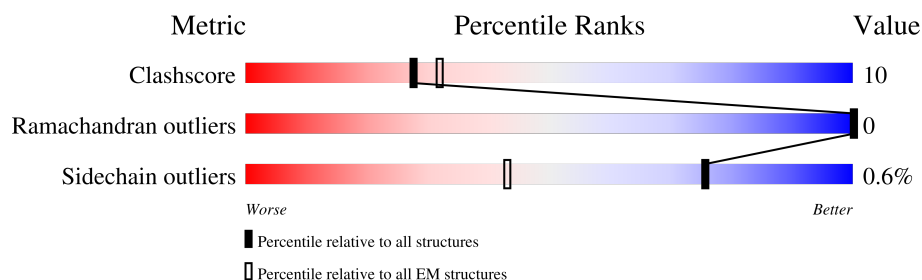
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.20 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	5410 (3.70 - 4.70)

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	876	
1	B	876	
1	C	876	
1	D	876	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	E	876	
1	F	876	
1	G	876	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 18613 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 ADP-ribosyltransferase binding component.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	B	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	C	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	D	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	E	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	F	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		
1	G	342	Total	C	N	O	S	0	0
			2659	1660	433	561	5		

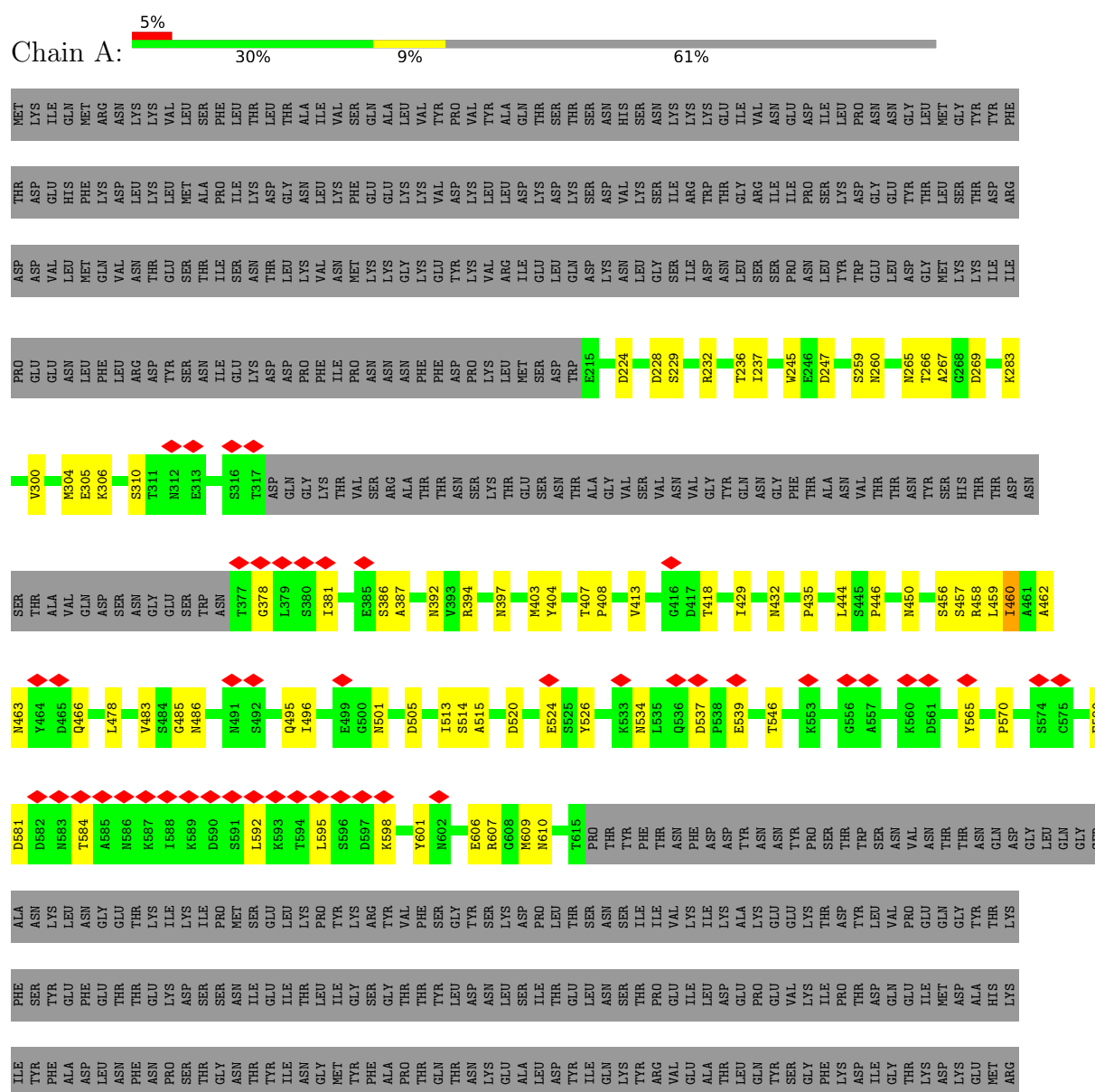
There are 14 discrepancies between the modelled and reference sequences:

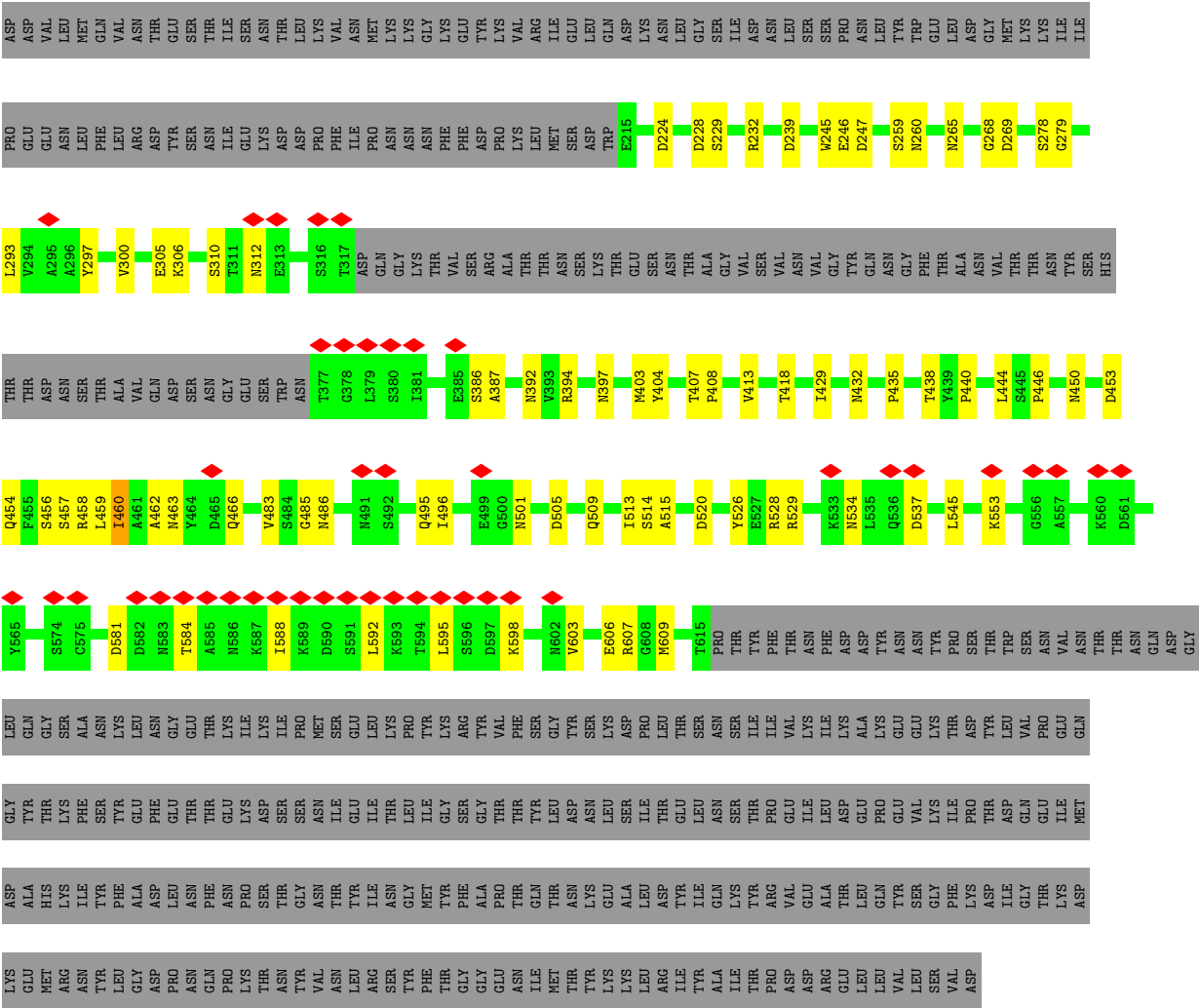
Chain	Residue	Modelled	Actual	Comment	Reference
A	461	ALA	PRO	conflict	UNP A8DS70
A	462	ALA	ILE	conflict	UNP A8DS70
B	461	ALA	PRO	conflict	UNP A8DS70
B	462	ALA	ILE	conflict	UNP A8DS70
C	461	ALA	PRO	conflict	UNP A8DS70
C	462	ALA	ILE	conflict	UNP A8DS70
D	461	ALA	PRO	conflict	UNP A8DS70
D	462	ALA	ILE	conflict	UNP A8DS70
E	461	ALA	PRO	conflict	UNP A8DS70
E	462	ALA	ILE	conflict	UNP A8DS70
F	461	ALA	PRO	conflict	UNP A8DS70
F	462	ALA	ILE	conflict	UNP A8DS70
G	461	ALA	PRO	conflict	UNP A8DS70
G	462	ALA	ILE	conflict	UNP A8DS70

3 Residue-property plots

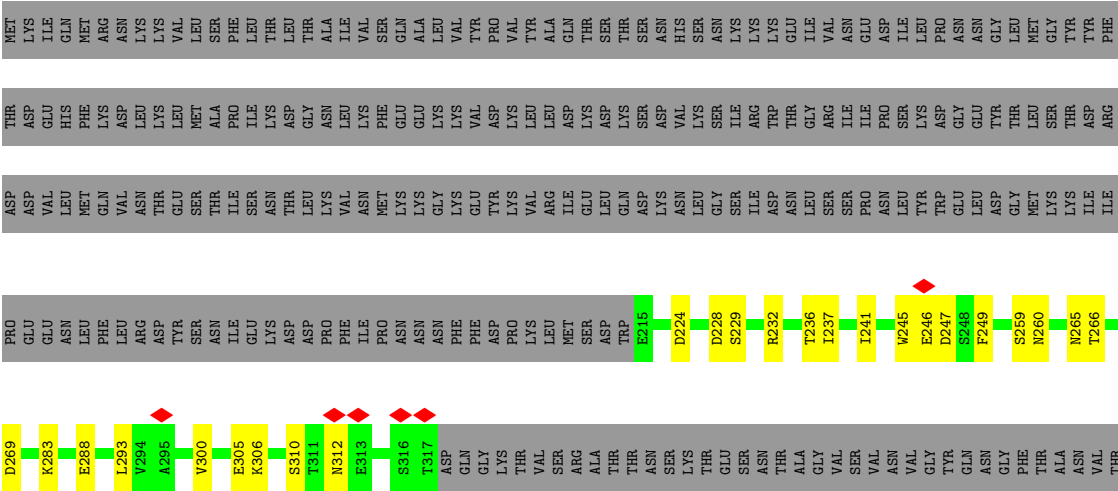
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: ADP-ribosyltransferase binding component





● Molecule 1: ADP-ribosyltransferase binding component



[illegible]

- Molecule 1: ADP-ribosyltransferase binding component

[illegible]

G279	K283	L293	V294	A295	E305	K306	S310	T311	N312	E313	S316	T317	ASP	GLN	LYS	THR	VAL	SER	ARG	ALA	THR	THR	ASN	SER	LYS	THR	GLU	SER	ASN	THR	ALA	GLY	VAL	SER	VAL	ASN	VAL	GLY	TTR	GLN	ASN	GLY	PHE	THR	ALA	ASN	VAL	THR	THR	ASN	TYR	SER
------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

[illegible]

M460	S456	L459	I460	A481	A462	Y464	D465	Q466	V483	S484	C485	N486		M491	S492	Q495	I496	E499	G500	N501		Q509	S512	T513	S514	A515		D520		N523		K533	N534	L536	O536	D537	P538	E539		T546		K553	G556	A557		K560	D561		Y565	F566
------	------	------	------	------	------	------	------	------	------	------	------	------	--	------	------	------	------	------	------	------	--	------	------	------	------	------	--	------	--	------	--	------	------	------	------	------	------	------	--	------	--	------	------	------	--	------	------	--	------	------

Amino acid types: P570, S574, S575, F580, D581, D582, S583, T584, A586, S586, M586, I588, K589, D590, S591, L592, K593, T594, L595, S596, D597, K598, Y601, Y602, E606, R607, G608, M609, M610, T615, PRO, THR, TYR, PHE, THR, ASN, PHE, ASP, ASP, TYR, ASN, ASN, TYR, PRO, PRO, SER, VAL, ASN, THR, THR, ASN.

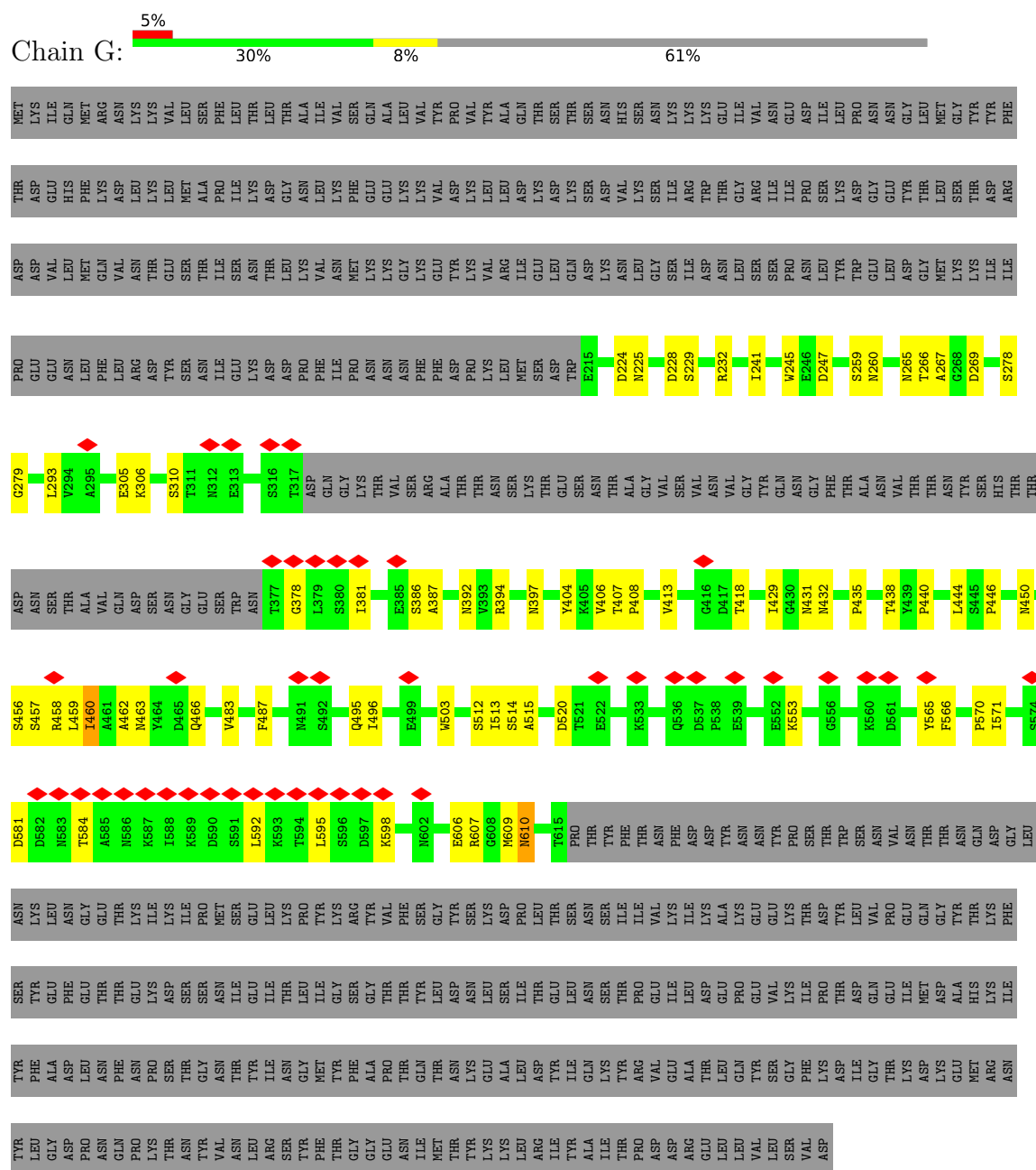
ASP	GLY	LEU	GLN	GLY	SER	ALA	ASN	LYS	LEU	ASN	GLY	GLU	THR	LYS	ILE	LYS	ILE	PRO	MET	SER	GLU	LEU	LYS	PRO	TYR	LYS	ARG	TYR	VAL	PHE	SER	GLY	TYR	SER	LYS	ASP	PRO	LEU	THR	SER	ASN	ILE	SER	ILE	ILE	VAL	VAL	LYS	ILE	LYS	ALA	LYS	GLU	GLY	LYS	THR	ASP	TYR	LEU	VAL	PRO
-----	-----	-----	-----	-----	-----	-----	-----	-----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

GLU	GLN	GLY	TYR	THR	LYS	PHE	SER	TYR	GLU	PHE	GLU	THR	THR	GLU	LYS	ASP	SER	SER	ASN	ILE	GLU	GLY	THR	THR	TYR	LEU	GLY	GLY	THR	THR	TYR	ASP	ASN	LEU	LEU	SER	SER	ILE	THR	THR	GLU	LEU	ASN	ASN	SER	THR	PRO	GLU	PRO	GLU	GLU	VAL	LYS	ILE	LEU	ASP	GLU	PRO	PRO	THR	THR	ASP	GLN	GLN
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

ILE	NET	NET	ASP	ALA	HIS	LYS	ILE	TYR	PHE	ALA	ASP	LEU	ASN	PHE	ASN	PRO	SER	THR	GLY	ASN	THR	TYR	ILE	ASN	GLY	NET	TYR	PHE	ALA	ALA	PRO	THR	GLN	THR	ASN	LYS	GLU	ALA	LEU	ASP	TYR	ILE	GLN	LYS	TYR	ARG	VAL	GLU	ALA	ALA	THR	LEU	GLN	SER	TYR	GLY	PHE	LYS	ILE	GLY	THR
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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

- Molecule 1: ADP-ribosyltransferase binding component



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C7	Depositor
Number of particles used	19844	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 ($e^-/\text{\AA}^2$)	73.44	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.048	Depositor
Minimum map value	-0.038	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	248.6, 248.6, 248.6	wwPDB
Map dimensions	220, 220, 220	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.13, 1.13, 1.13	Depositor

5 Model quality

5.1 Standard geometry

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	0.33	0/2699	0.64	0/3655
1	B	0.34	0/2699	0.64	0/3655
1	C	0.34	0/2699	0.66	0/3655
1	D	0.33	0/2699	0.65	0/3655
1	E	0.33	0/2699	0.66	0/3655
1	F	0.33	0/2699	0.65	0/3655
1	G	0.33	0/2699	0.64	0/3655
All	All	0.33	0/18893	0.65	0/25585

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
1	C	0	2
1	D	0	2
1	E	0	2
1	F	0	2
1	G	0	2
All	All	0	14

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	456	SER	Peptide
1	A	460	ILE	Peptide

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Group
1	B	456	SER	Peptide
1	B	460	ILE	Peptide
1	C	456	SER	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	2659	0	2602	51	0
1	B	2659	0	2602	55	0
1	C	2659	0	2602	52	0
1	D	2659	0	2602	54	0
1	E	2659	0	2602	56	0
1	F	2659	0	2602	54	0
1	G	2659	0	2602	52	0
All	All	18613	0	18214	356	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 10.

The worst 5 of 356 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:E:460:ILE:HG22	1:E:466:GLN:HB3	1.79	0.64
1:A:460:ILE:HG22	1:A:466:GLN:HB3	1.81	0.62
1:D:460:ILE:HG22	1:D:466:GLN:HB3	1.82	0.61
1:G:460:ILE:HG22	1:G:466:GLN:HB3	1.84	0.60
1:F:460:ILE:HG22	1:F:466:GLN:HB3	1.84	0.59

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	338/876 (39%)	288 (85%)	50 (15%)	0	100	100
1	B	338/876 (39%)	286 (85%)	52 (15%)	0	100	100
1	C	338/876 (39%)	286 (85%)	52 (15%)	0	100	100
1	D	338/876 (39%)	285 (84%)	53 (16%)	0	100	100
1	E	338/876 (39%)	287 (85%)	51 (15%)	0	100	100
1	F	338/876 (39%)	286 (85%)	52 (15%)	0	100	100
1	G	338/876 (39%)	285 (84%)	53 (16%)	0	100	100
All	All	2366/6132 (39%)	2003 (85%)	363 (15%)	0	100	100

There are no Ramachandran outliers to report.

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	297/788 (38%)	296 (100%)	1 (0%)	86	84
1	B	297/788 (38%)	295 (99%)	2 (1%)	76	78
1	C	297/788 (38%)	296 (100%)	1 (0%)	86	84
1	D	297/788 (38%)	295 (99%)	2 (1%)	76	78
1	E	297/788 (38%)	296 (100%)	1 (0%)	86	84
1	F	297/788 (38%)	295 (99%)	2 (1%)	76	78
1	G	297/788 (38%)	294 (99%)	3 (1%)	68	75

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	2079/5516 (38%)	2067 (99%)	12 (1%)	76 80

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	580	PHE
1	F	610	ASN
1	G	610	ASN
1	G	406	VAL
1	C	246	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 41 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	486	ASN
1	F	509	GLN
1	E	586	ASN
1	F	397	ASN
1	G	314	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

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.

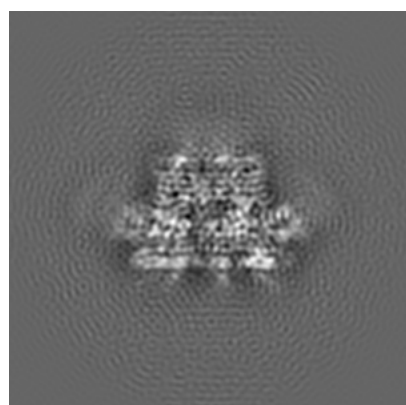
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-20102. These allow visual inspection of the internal detail of the map and identification of artifacts.

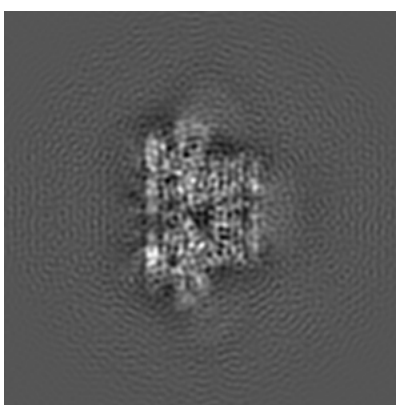
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

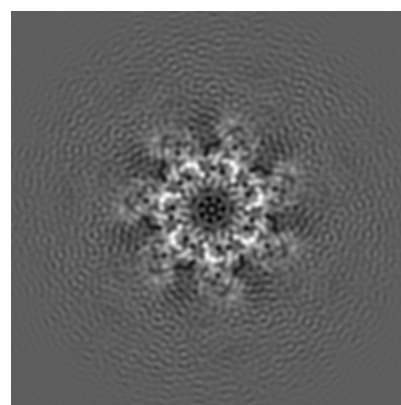
6.1.1 Primary map



X



Y

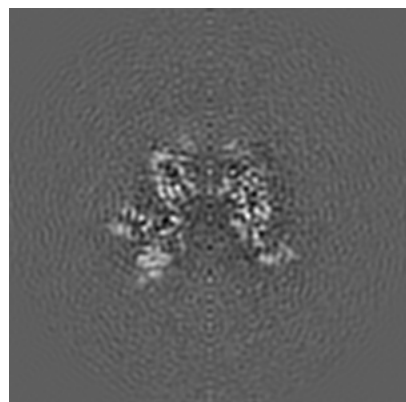


Z

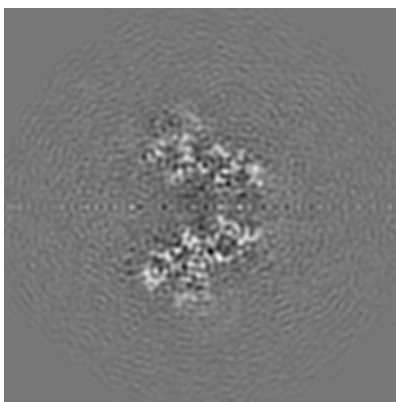
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

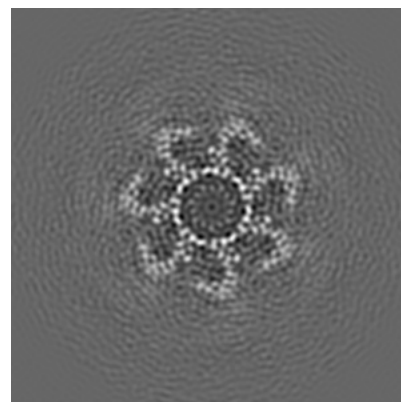
6.2.1 Primary map



X Index: 110



Y Index: 110

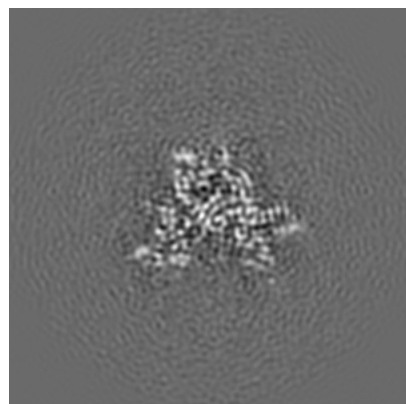


Z Index: 110

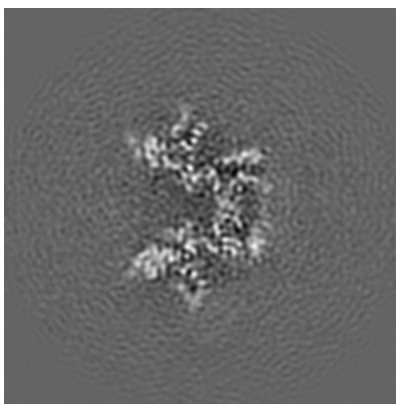
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

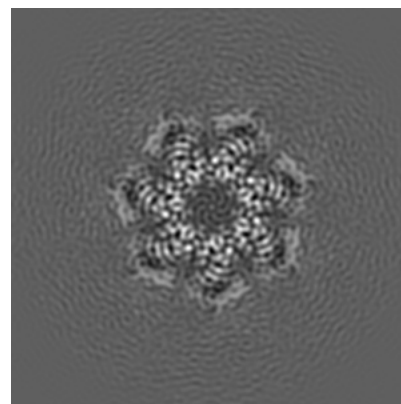
6.3.1 Primary map



X Index: 90



Y Index: 118

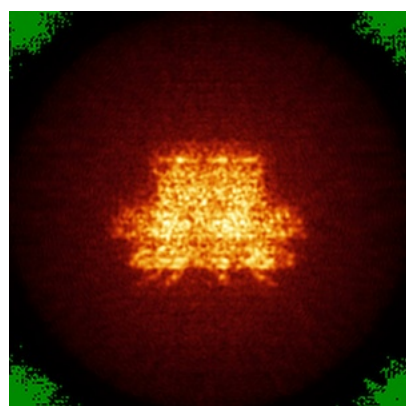


Z Index: 103

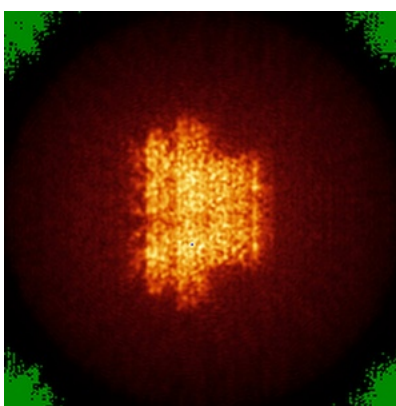
The images above show the largest variance slices of the map in three orthogonal directions.

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

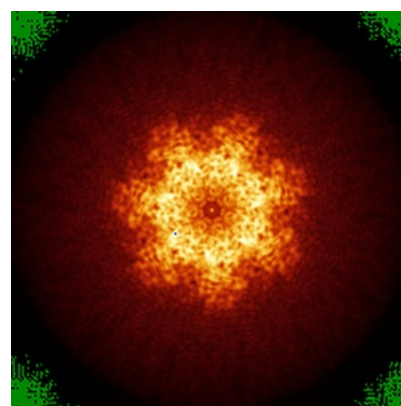
6.4.1 Primary map



X



Y

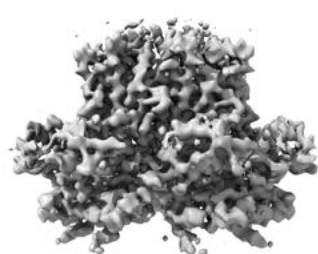


Z

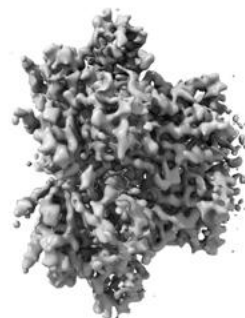
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

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

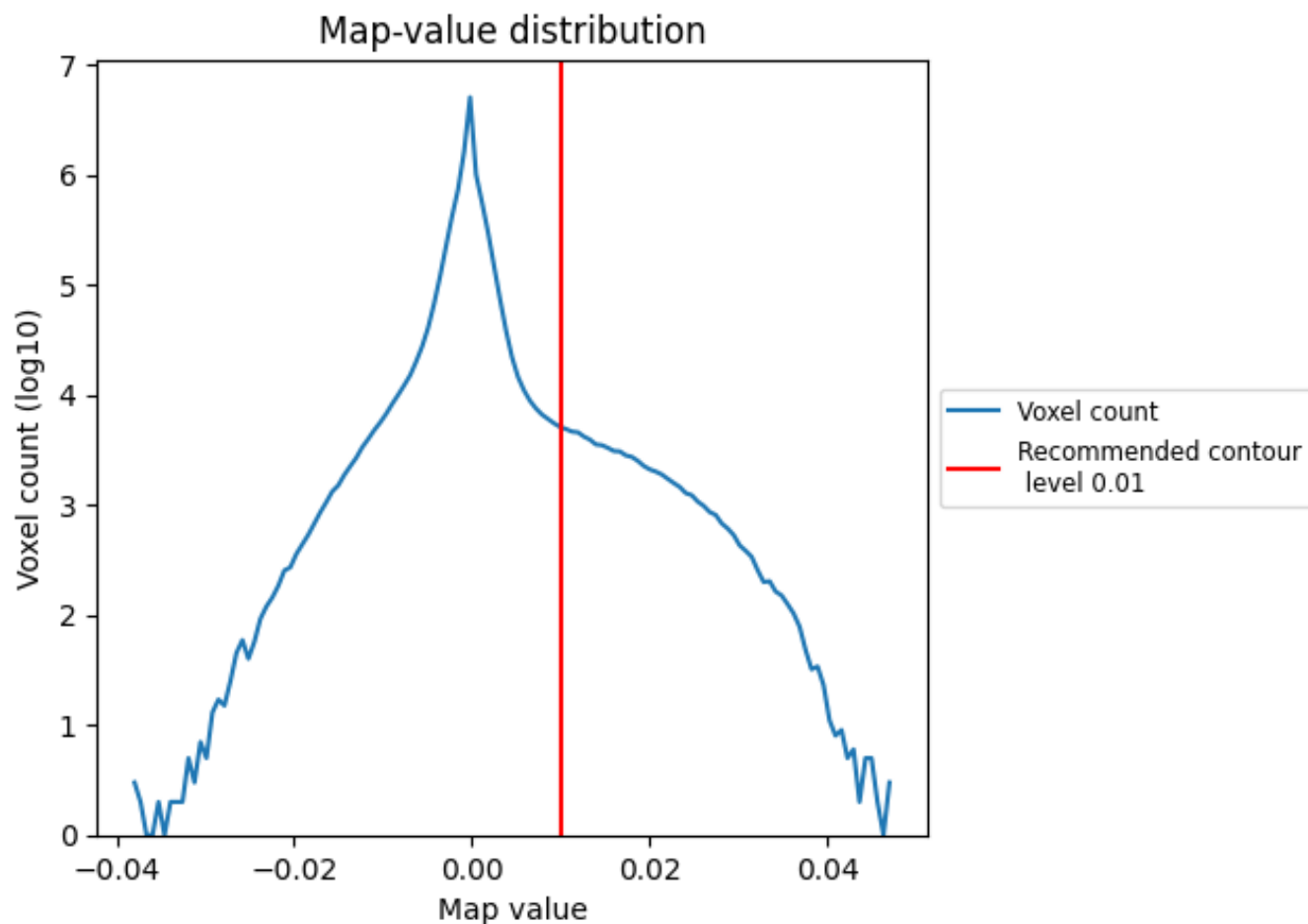
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

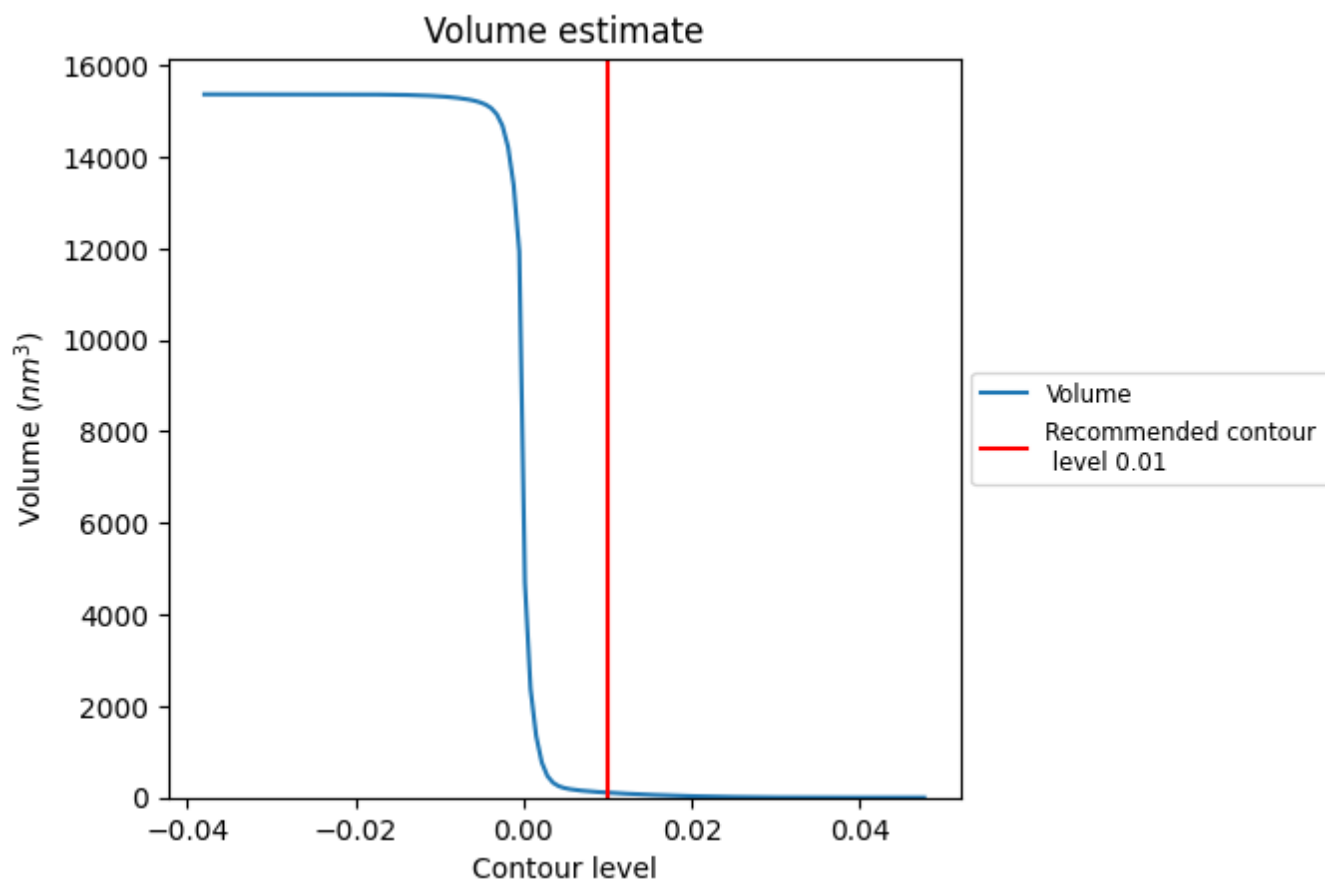
This section contains the results of statistical analysis of the map.

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.

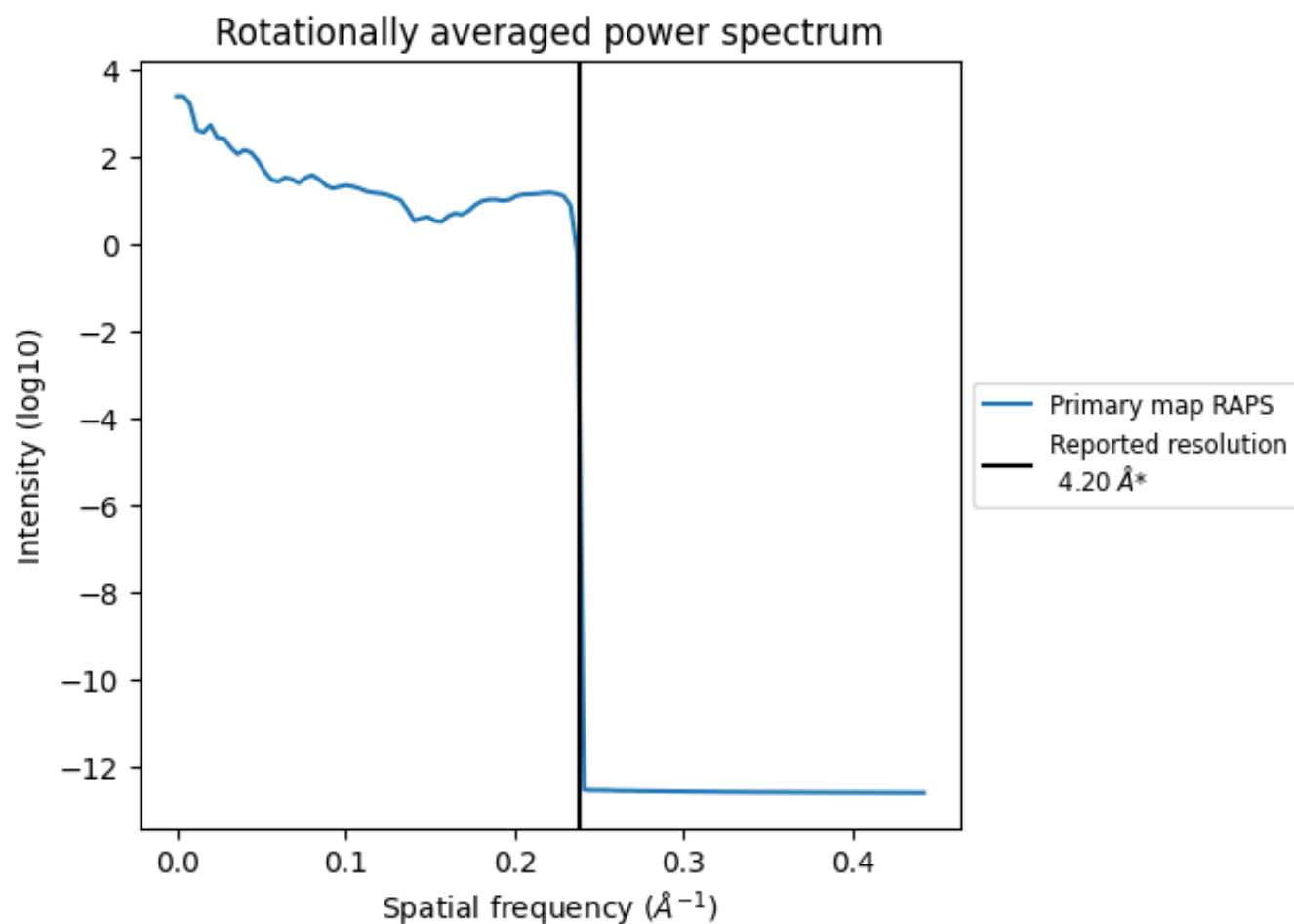
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 108 nm³; this corresponds to an approximate mass of 98 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 ⓘ

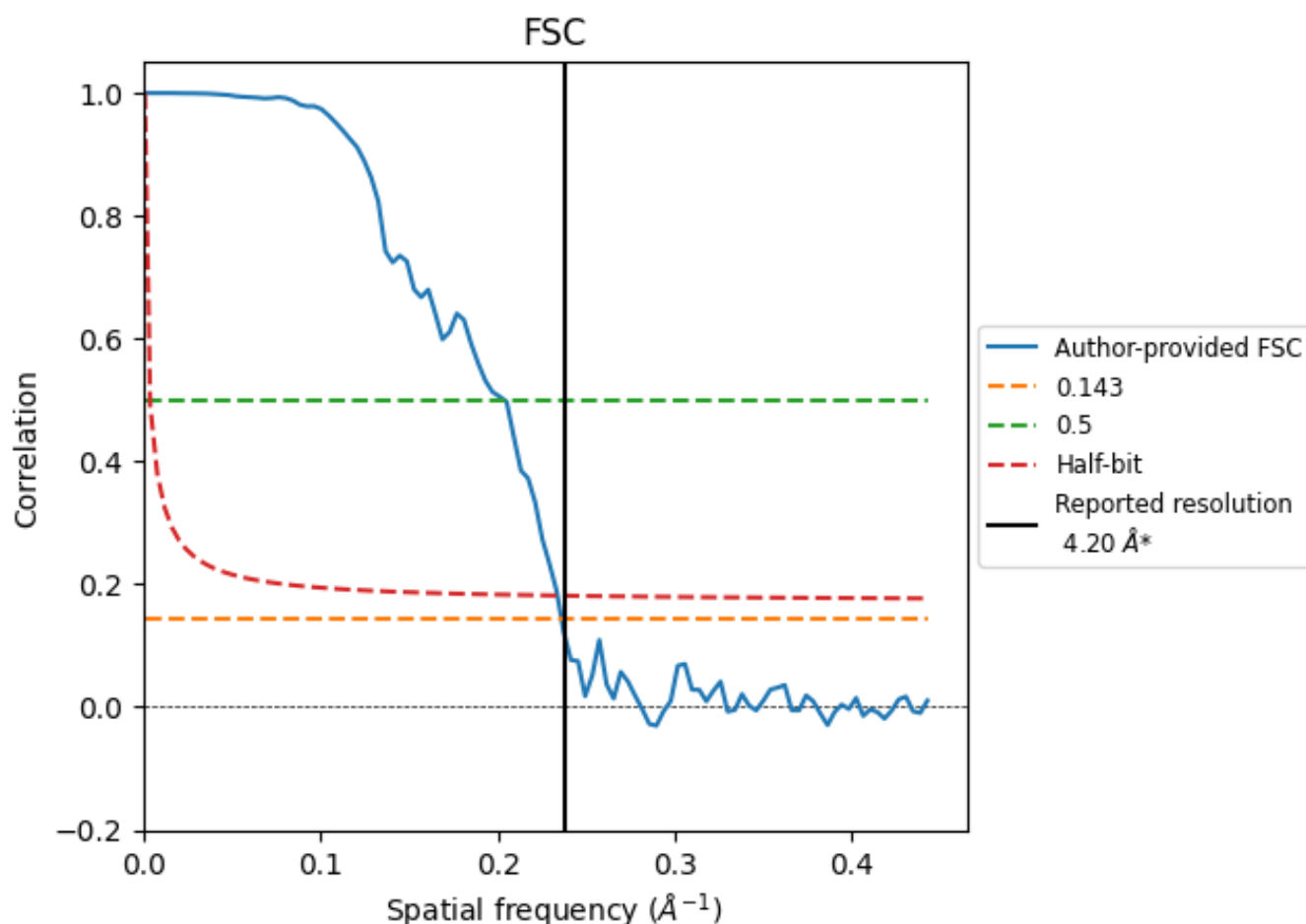


*Reported resolution corresponds to spatial frequency of 0.238 Å⁻¹

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 0.238 Å⁻¹

8.2 Resolution estimates [i](#)

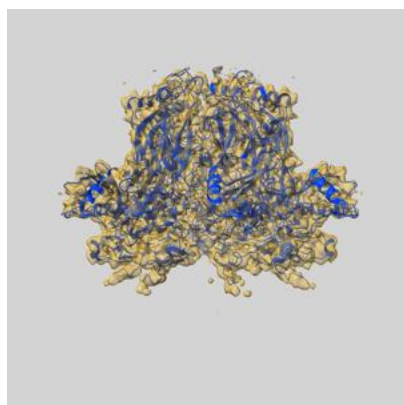
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.20	-	-
Author-provided FSC curve	4.24	4.91	4.28
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

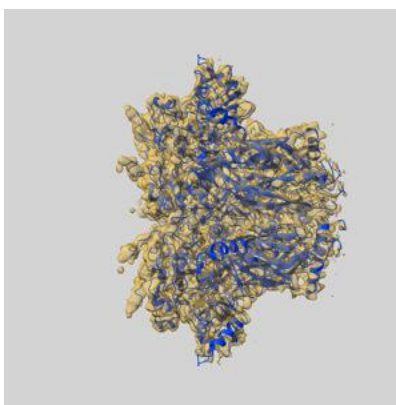
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-20102 and PDB model 6OKR. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

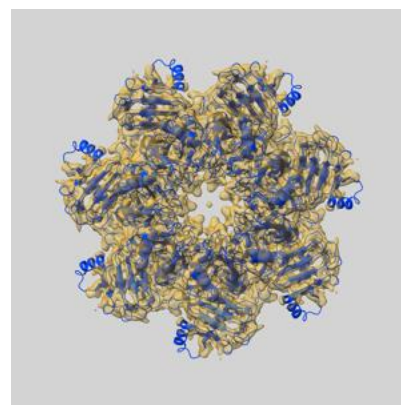
9.1 Map-model overlay [i](#)



X



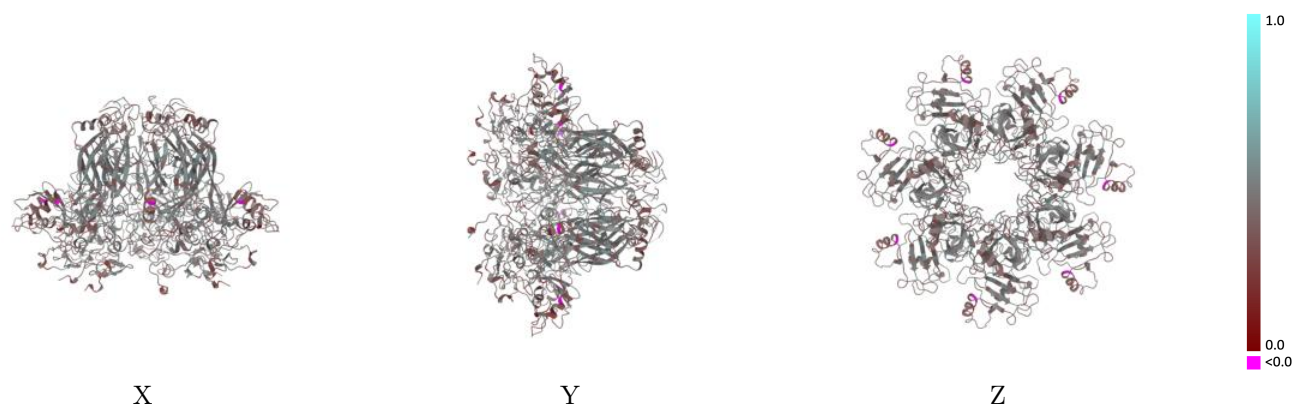
Y



Z

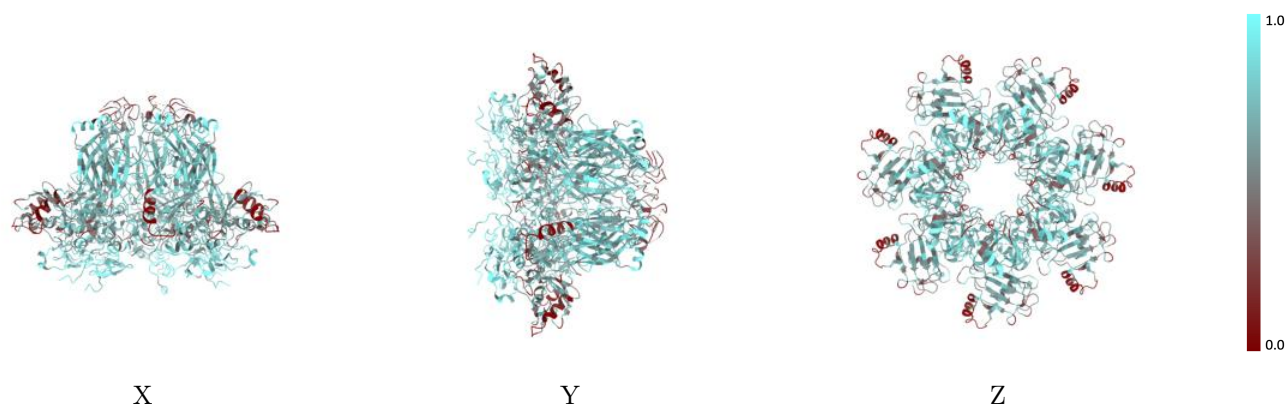
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



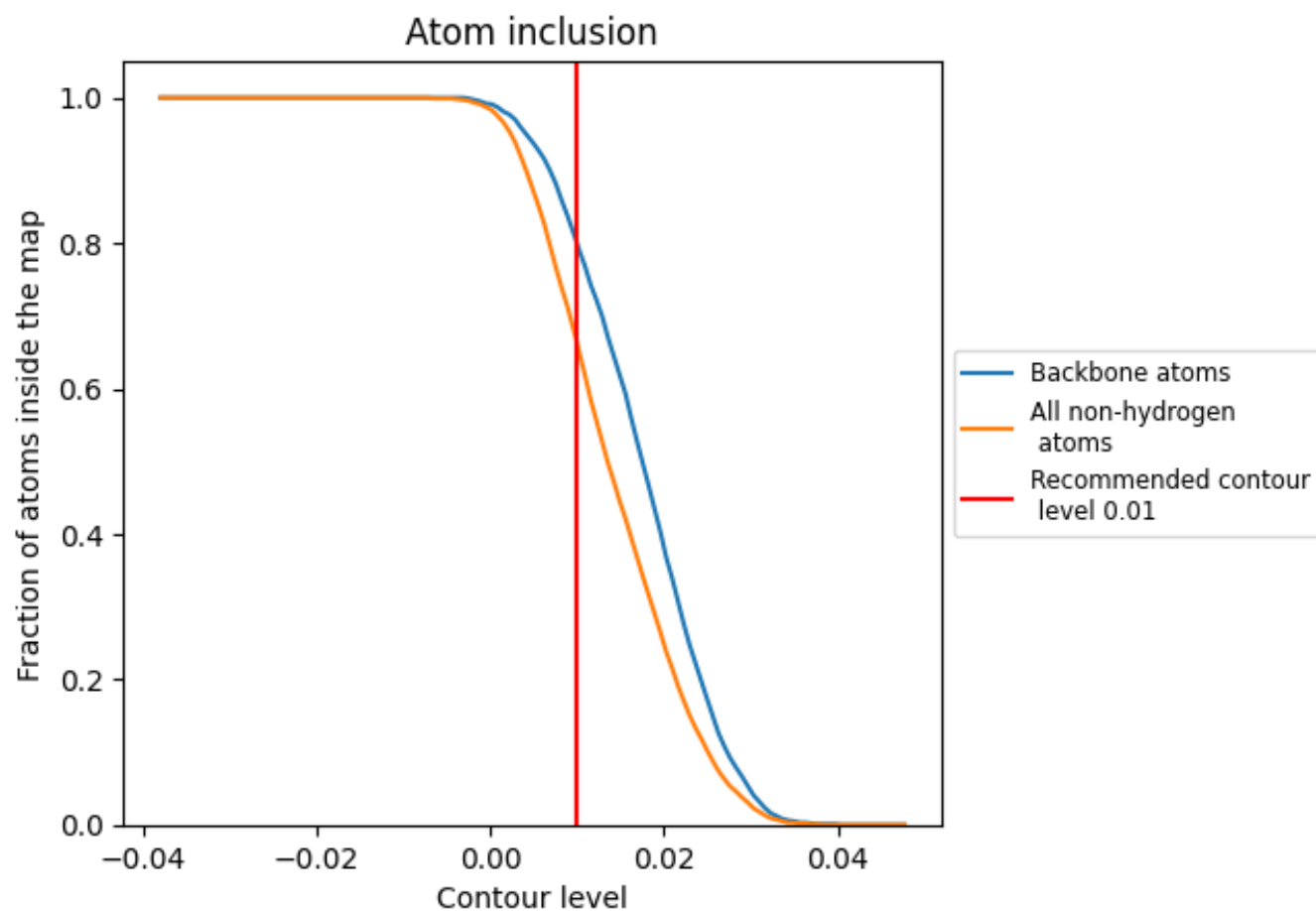
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.01).

9.4 Atom inclusion [i](#)



At the recommended contour level, 80% 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 (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6630	0.4340
A	0.6610	0.4340
B	0.6640	0.4330
C	0.6640	0.4330
D	0.6580	0.4340
E	0.6620	0.4350
F	0.6640	0.4360
G	0.6670	0.4350

1.0

0.0

<0.0