

wwPDB EM Validation Summary Report (i)

May 14, 2025 – 01:19 AM EDT

PDB ID : 6V1S / pdb 00006v1s

EMDB ID : EMD-21016

Title : Structure of the Clostridioides difficile transferase toxin Authors : Sheedlo, M.J.; Anderson, D.M.; Thomas, A.K.; Lacy, D.B.

Deposited on : 2019-11-21

Resolution : 3.80 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 (i) 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 (1)) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev118

MolProbity : 4-5-2 with Phenix2.0rc1

Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)

 $MapQ \quad : \quad 1.9.13$

Ideal geometry (proteins) : Engh & Huber (2001) Ideal geometry (DNA, RNA) : Parkinson et al. (1996)

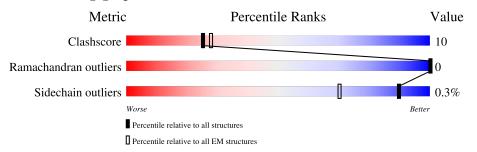
Validation Pipeline (wwPDB-VP) : 2.43.1

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 3.80 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	EM structures
	$(\# \mathrm{Entries})$	$(\# ext{Entries})$
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=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	26%	5%	69%		
1	В	876	23%	8%	69%		
1	С	876	21%	9%	70%		
1	D	876	23%	8%	69%		
1	Е	876	24%	8%	68%		
1	F	876	25%	7%	69%		
1	G	876	24%	7%	69%		
2	Z	463	17%	62%		23%	15%



2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 17964 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.

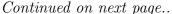
Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	272	Total	C	N 244	O 440	S	0	0
			2114	1318	344	449	3		
1	В	268	Total	\mathbf{C}	N	O	S	0	0
1	Б	200	2081	1299	340	439	3		
1	С	265	Total	С	N	О	S	0	0
1		200	2058	1287	336	432	3	0	U
1	D	273	Total	С	N	О	S	0	0
1	D	213	2122	1322	345	452	3	U	0
1	E	276	Total	С	N	О	S	0	0
1	E	270	2153	1342	349	459	3	U	0
1	F	272	Total	С	N	О	S	0	0
1	Г	212	2114	1318	344	449	3	U	0
1	G	273	Total	С	N	О	S	0	0
	G	213	2122	1322	345	452	3	U	U

• Molecule 2 is a protein called ADP-ribosylating binary toxin enzymatic subunit CdtA.

Mol	Chain	Residues	Atoms				AltConf	Trace	
2	Z	394	Total 3186	C 2027	N 532	O 622	S 5	0	0

• Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	AltConf
3	A	2	Total Ca 2 2	0
3	В	2	Total Ca 2 2	0
3	С	2	Total Ca 2 2	0
3	D	2	Total Ca 2 2	0
3	Е	2	Total Ca 2 2	0





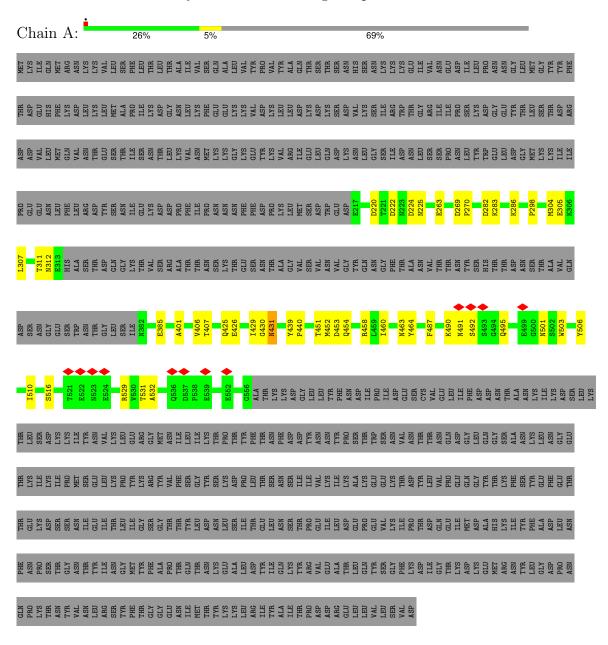
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Mol	Chain	Residues	Atoms	AltConf
3	F	2	Total Ca 2 2	0
3	G	2	Total Ca 2 2	0

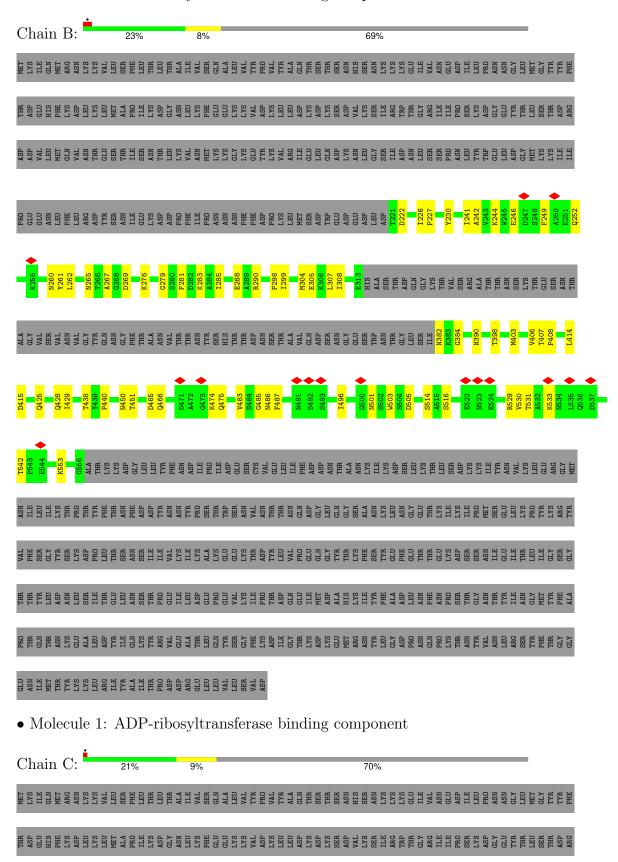


3 Residue-property plots (i)

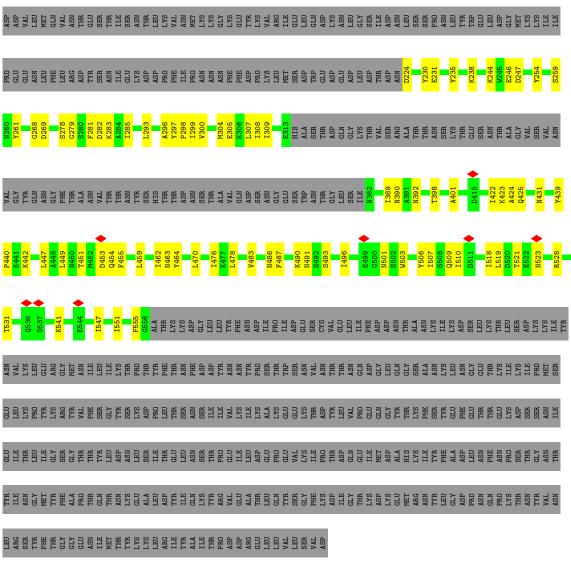
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

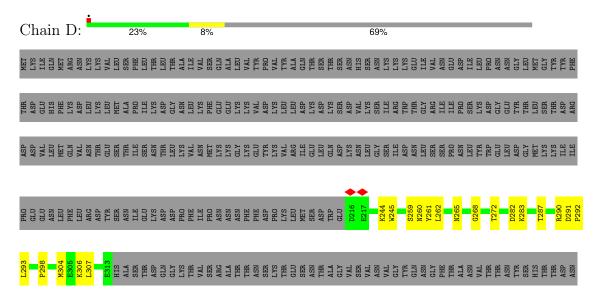




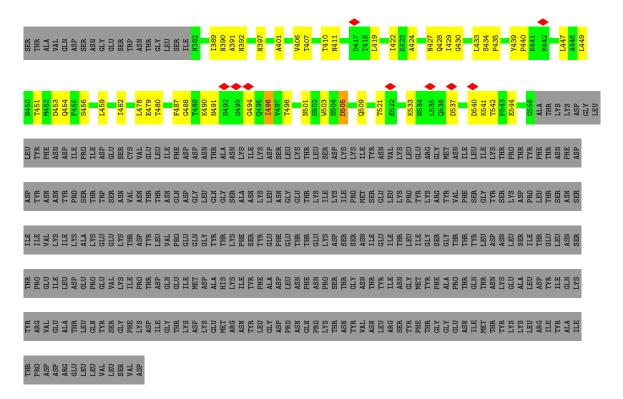


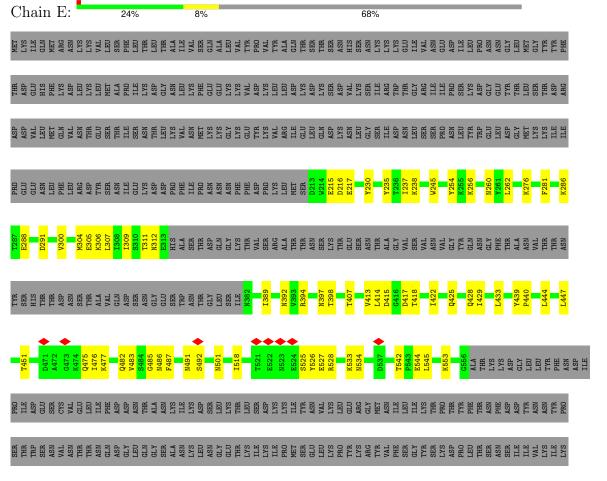




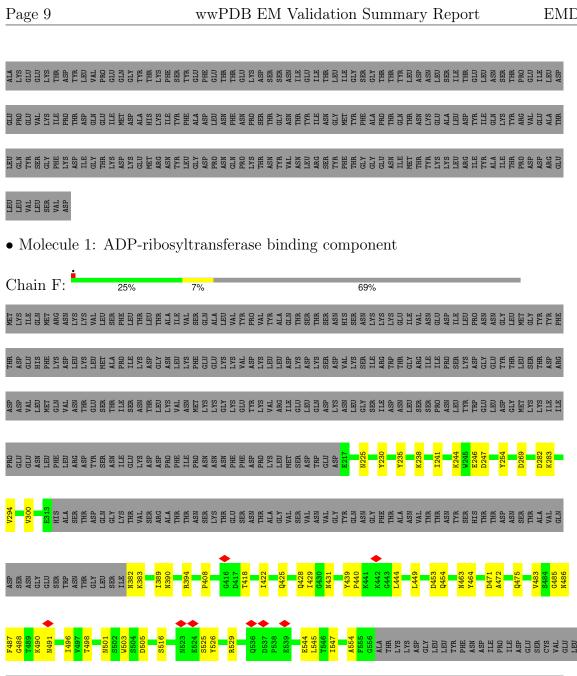


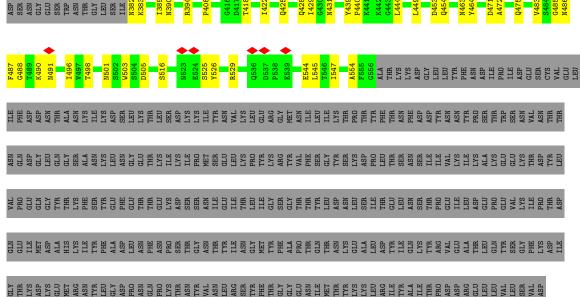






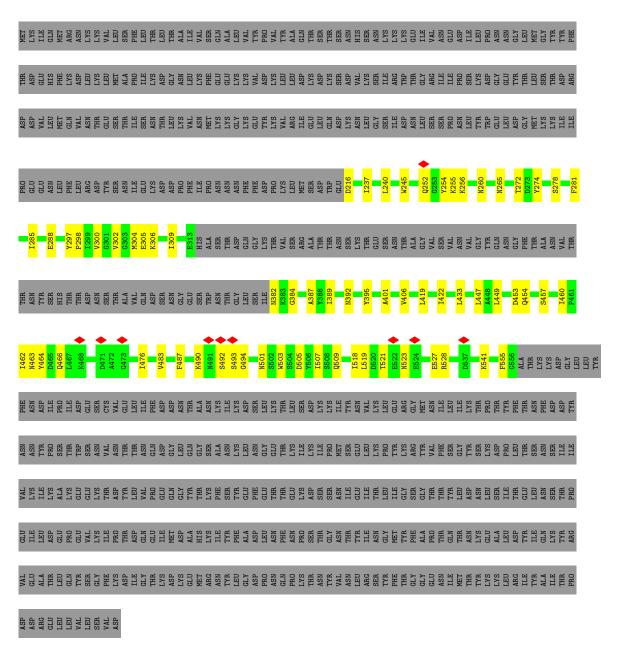




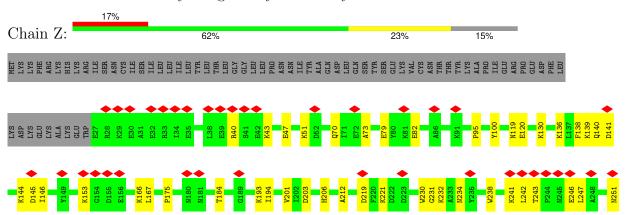


Chain G: 24% 7% 69%

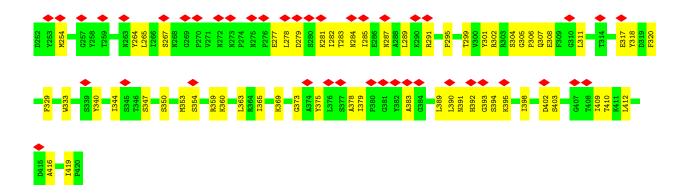




• Molecule 2: ADP-ribosylating binary toxin enzymatic subunit CdtA









4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	31377	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE	Depositor
	CORRECTION	
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	61.34	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	0.102	Depositor
Minimum map value	-0.057	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.02	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 (i)

5.1 Standard geometry (i)

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

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).

Mal	Mol Chain		lengths	Bond angles	
IVIOI	Chain	RMSZ	# Z > 5	RMSZ	# Z > 5
1	A	0.30	0/2149	0.42	0/2915
1	В	0.31	0/2116	0.46	0/2870
1	С	0.31	0/2093	0.47	0/2838
1	D	0.33	0/2157	0.46	0/2926
1	Е	0.33	0/2190	0.44	0/2972
1	F	0.34	0/2149	0.46	0/2915
1	G	0.30	0/2157	0.43	0/2926
2	Z	0.22	0/3253	0.37	0/4391
All	All	0.30	0/18264	0.44	0/24753

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	2114	0	2045	32	0
1	В	2081	0	2020	45	0
1	С	2058	0	2003	52	0
1	D	2122	0	2049	46	0
1	Е	2153	0	2069	47	0

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COHABABACA		DIEUIUU	DUIUE
0 0 1000100000			

Mol	Chain	Non-H	H(model)	$\mathbf{H}(\mathbf{added})$	Clashes	Symm-Clashes
1	F	2114	0	2045	43	0
1	G	2122	0	2049	40	0
2	Z	3186	0	3169	69	0
3	A	2	0	0	0	0
3	В	2	0	0	0	0
3	С	2	0	0	0	0
3	D	2	0	0	0	0
3	Ε	2	0	0	0	0
3	F	2	0	0	0	0
3	G	2	0	0	0	0
All	All	17964	0	17449	360	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 360 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	$\begin{array}{c} {\rm Interatomic} \\ {\rm distance} \ ({\rm \AA}) \end{array}$	$egin{aligned} ext{Clash} \ ext{overlap } (ext{Å}) \end{aligned}$
2:Z:311:LEU:HD21	2:Z:317:GLU:HB2	1.64	0.77
1:A:283:LYS:HB2	1:G:509:GLN:HG3	1.67	0.76
2:Z:340:TYR:O	2:Z:393:GLY:HA2	1.85	0.75
1:G:490:LYS:HG3	1:G:492:SER:H	1.53	0.74
1:D:304:MET:HG2	1:D:478:LEU:HB3	1.69	0.74

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	Perce	ntiles
1	A	268/876 (31%)	236 (88%)	32 (12%)	0	100	100
1	В	264/876 (30%)	234 (89%)	30 (11%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Perce	ntiles
1	С	261/876 (30%)	227 (87%)	34 (13%)	0	100	100
1	D	269/876 (31%)	230 (86%)	39 (14%)	0	100	100
1	E	272/876 (31%)	236 (87%)	36 (13%)	0	100	100
1	F	268/876 (31%)	233 (87%)	35 (13%)	0	100	100
1	G	269/876 (31%)	238 (88%)	31 (12%)	0	100	100
2	Z	392/463 (85%)	343 (88%)	49 (12%)	0	100	100
All	All	2263/6595 (34%)	1977 (87%)	286 (13%)	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	Perce	ntiles
1	A	$235/790 \ (30\%)$	234 (100%)	1 (0%)	89	91
1	В	231/790 (29%)	231 (100%)	0	100	100
1	С	228/790 (29%)	228 (100%)	0	100	100
1	D	236/790 (30%)	234 (99%)	2 (1%)	79	84
1	E	239/790 (30%)	239 (100%)	0	100	100
1	F	$235/790 \ (30\%)$	235 (100%)	0	100	100
1	G	$236/790 \ (30\%)$	234 (99%)	2 (1%)	79	84
2	Z	354/418 (85%)	354 (100%)	0	100	100
All	All	1994/5948 (34%)	1989 (100%)	5 (0%)	90	92

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	431	ASN
1	D	496	ILE
1	D	505	ASP
1	G	447	LEU

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Mol	Chain	Res	Type
1	G	476	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	428	GLN
2	Z	284	ASN
1	D	509	GLN
2	Z	127	ASN
1	D	501	ASN

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)

Of 14 ligands modelled in this entry, 14 are 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 (i)

There are no chain breaks in this entry.



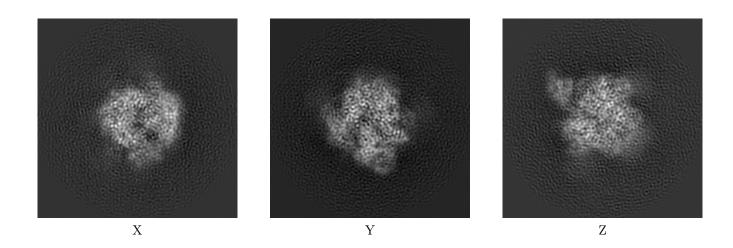
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-21016. 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)

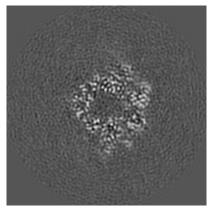
6.1.1 Primary map



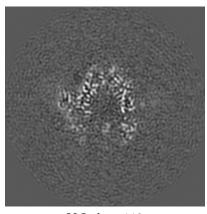
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

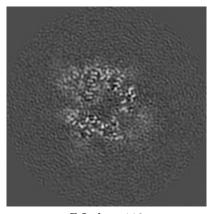
6.2.1 Primary map







Y Index: 110



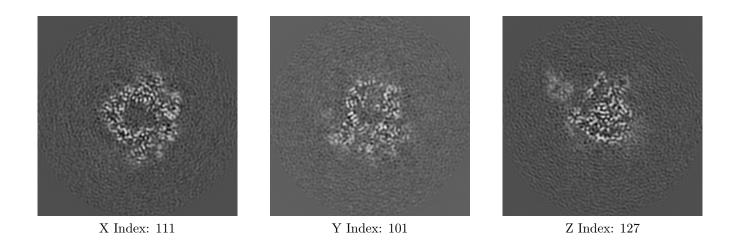
Z Index: 110



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

6.3 Largest variance slices (i)

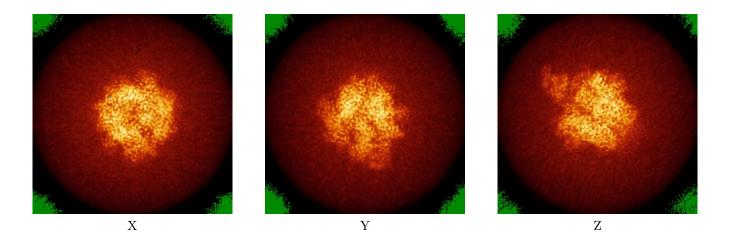
6.3.1 Primary map



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

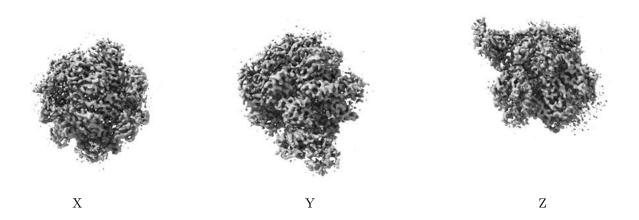


The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.



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 0.02. 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)

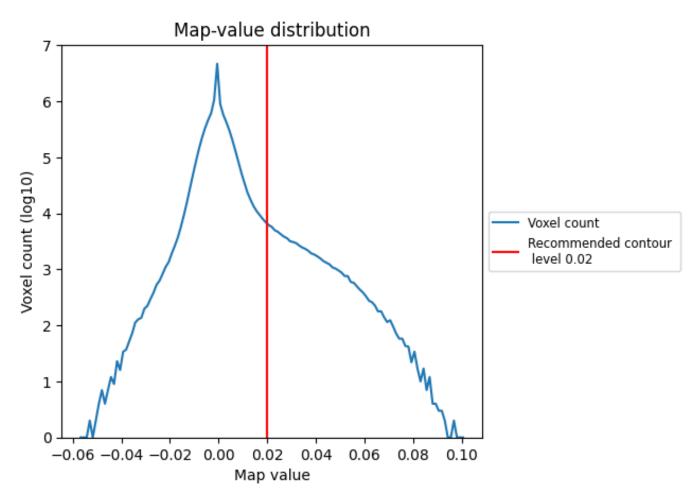
This section was not generated. No masks/segmentation were deposited.



7 Map analysis (i)

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

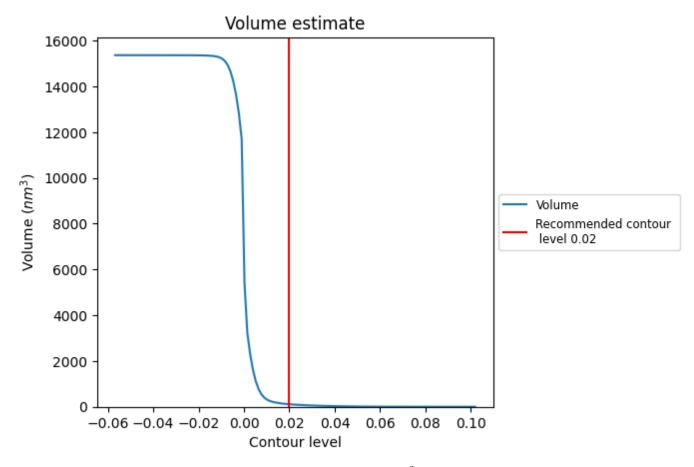
7.1 Map-value distribution (i)



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)

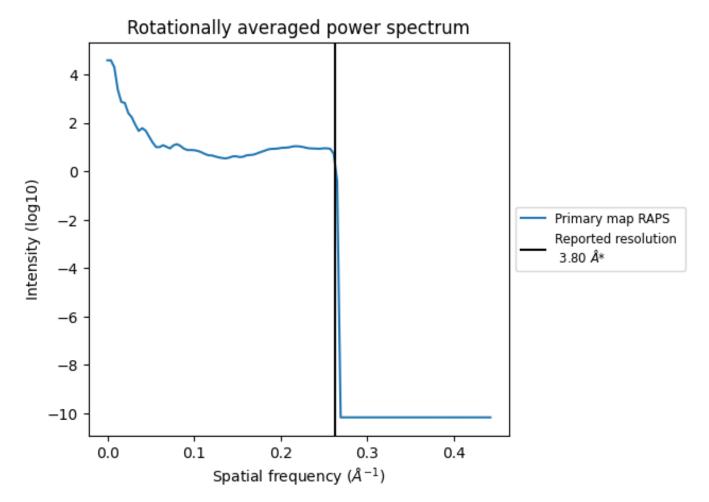


The volume at the recommended contour level is $111~\mathrm{nm}^3$; this corresponds to an approximate mass of $101~\mathrm{kDa}$.

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 0.263 $\rm \mathring{A}^{-1}$



8 Fourier-Shell correlation (i)

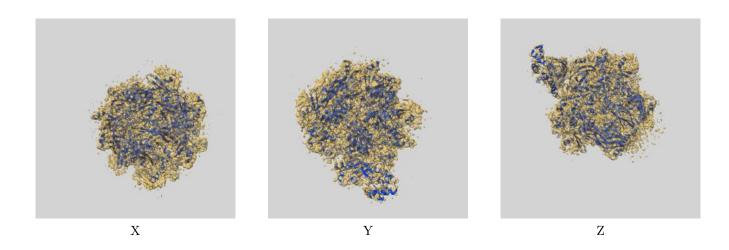
This section was not generated. No FSC curve or half-maps provided.



9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-21016 and PDB model 6V1S. Per-residue inclusion information can be found in section 3 on page 5.

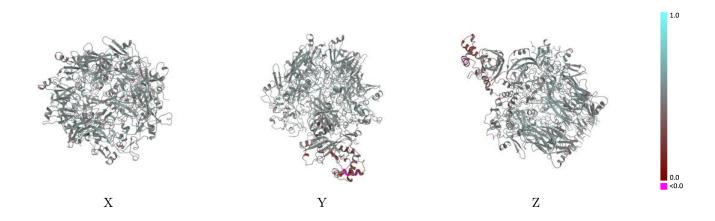
9.1 Map-model overlay (i)



The images above show the 3D surface view of the map at the recommended contour level 0.02 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.

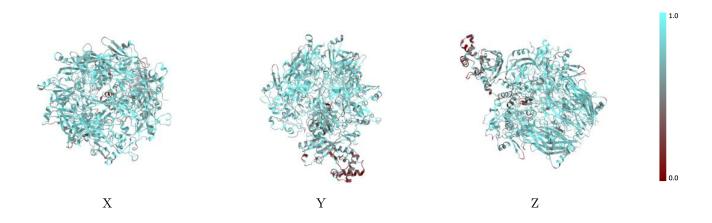


9.2 Q-score mapped to coordinate model (i)



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.

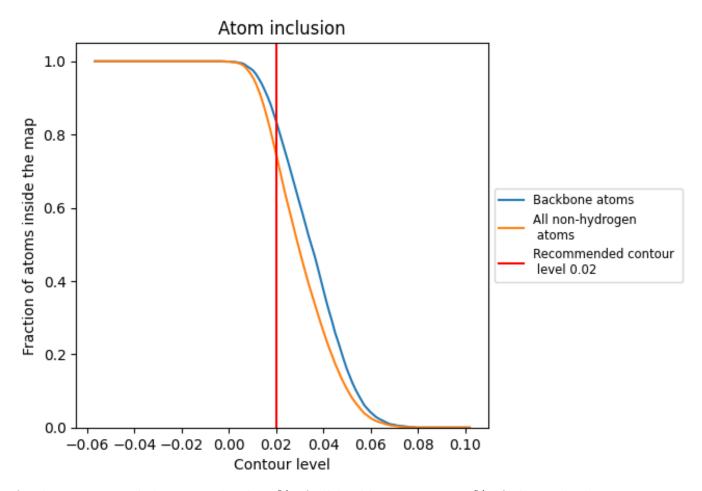
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.02).



9.4 Atom inclusion (i)



At the recommended contour level, 84% of all backbone atoms, 74% 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 (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7450	0.5020
A	0.7620	0.5110
В	0.7460	0.5070
С	0.7620	0.5080
D	0.7800	0.5180
E	0.7820	0.5180
F	0.7990	0.5160
G	0.7860	0.5110
Z	0.6070	0.4520



