



wwPDB EM Validation Summary Report ⓘ

Nov 16, 2022 – 01:50 PM JST

PDB ID : 6LYY
EMDB ID : EMD-30019
Title : Cryo-EM structure of the human MCT1/Basigin-2 complex in the presence of anti-cancer drug candidate AZD3965 in the outward-open conformation.
Authors : Wang, N.; Jiang, X.; Zhang, S.; Zhu, A.; Yuan, Y.; Lei, J.; Yan, C.
Deposited on : 2020-02-16
Resolution : 3.60 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
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

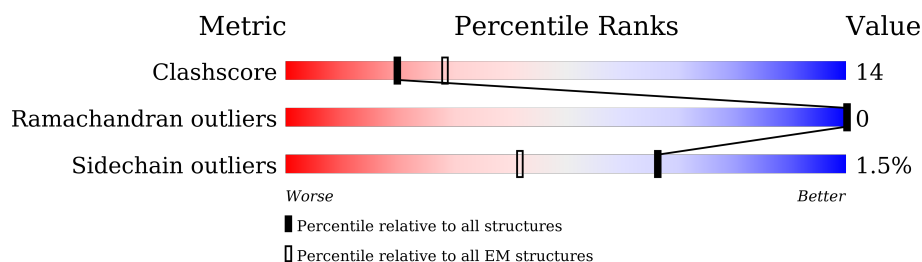
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.60 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

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	500	<div> <div>25%</div> <div>53%</div> <div>23%</div> <div>•</div> <div>24%</div> </div>
2	B	269	<div> <div>75%</div> <div>72%</div> <div>7%</div> <div>20%</div> </div>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 4104 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.

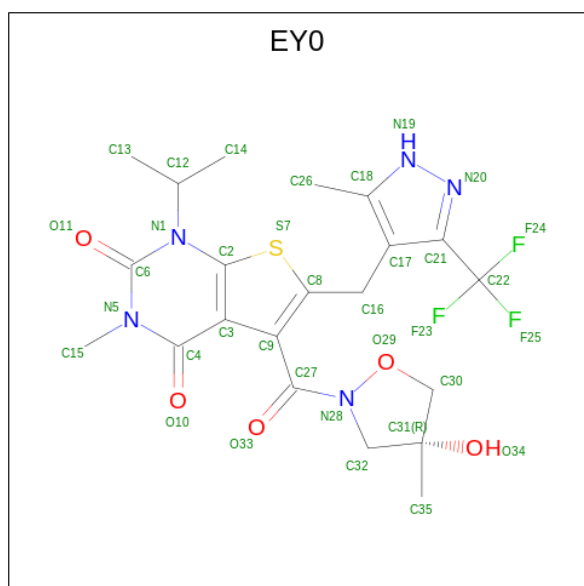
- Molecule 1 is a protein called Monocarboxylate transporter 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	382	Total	C	N	O	S	0	0
			2902	1934	459	484	25		

- Molecule 2 is a protein called Basigin.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	B	215	Total	C	N	O	0	0
			1167	715	230	222		

- Molecule 3 is 3-methyl-5-[[[(4 {R})-4-methyl-4-oxidanyl-1,2-oxazolidin-2-yl]carbonyl]-6-[[5-methyl-3-(trifluoromethyl)-1 {H}-pyrazol-4-yl]methyl]-1-propan-2-yl-thieno[2,3-d]pyrimidine-2,4-dione (three-letter code: EY0) (formula: C₂₁H₂₄F₃N₅O₅S) (labeled as "Ligand of Interest" by depositor).

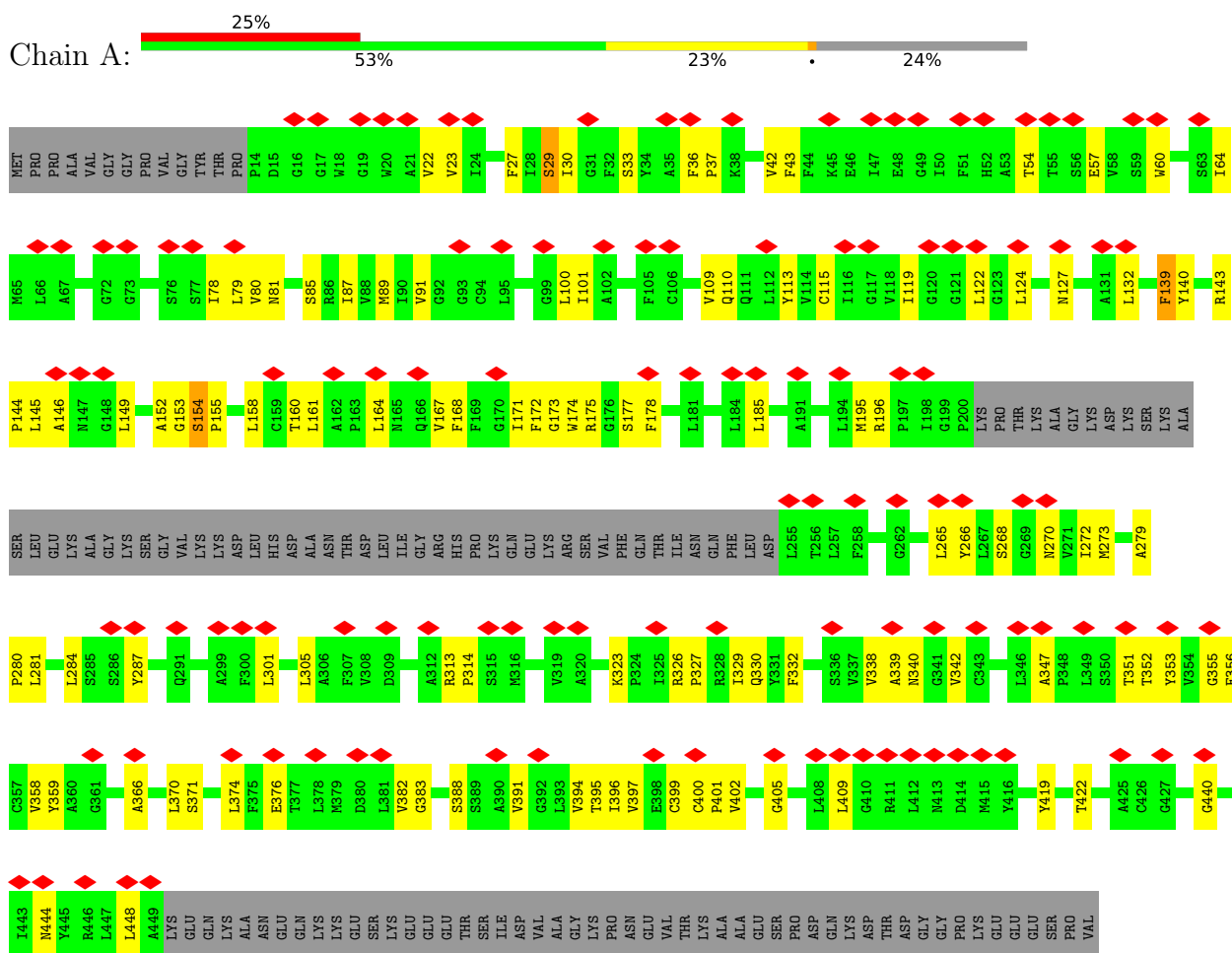


Mol	Chain	Residues	Atoms						AltConf
3	A	1	Total	C	F	N	O	S	0
			35	21	3	5	5	1	

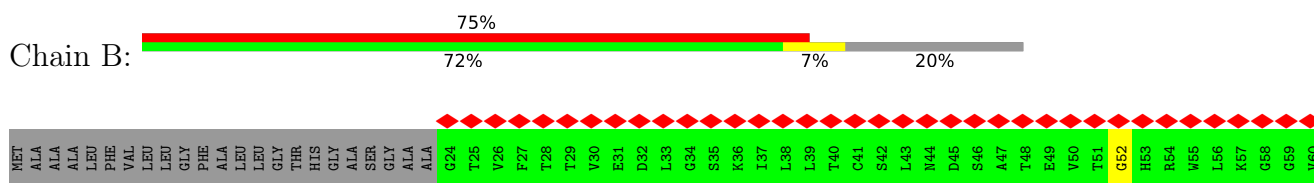
3 Residue-property plots

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: Monocarboxylate transporter 1



• Molecule 2: Basigin



ASP	G181	T121	V61
ALA	Q182	A122	L62
GLY	Y183	M123	K63
SER	A184	L124	E64
ALA	C185	V125	D65
LEU	M186	C126	A66
LYS	G187	K127	L67
SER	T188	S128	P68
SER	S189	E129	G69
GLY	S190	S130	Q70
HIS	K191	V131	K71
GLN	G192	P132	T72
ASN	S193	P133	E73
ASP	G194	V134	F74
LYS	L195	T135	K75
LYS	T196	D136	V76
ASN	T199	W137	D77
VAL	L200	A138	S78
ARG	R201	W139	D79
GLN	V202	Y140	D80
ARG	R203	K141	Q81
ASN	S204	L142	W82
SER	H205	T143	G83
SER	L206	D144	E84
SER	A207	S145	Y85
ARG	A208	E146	S86
GLN	L209	D147	C87
GLN	W210	K148	V88
GLY	P211	L150	L90
ASP	F212	A149	F89
ASP	L213	L150	L90
ASP	G214	M151	P91
ASP	T215	N152	E92
ASP	V216	G153	P93
ASP	A217	S154	M94
ASP	E218	E155	G95
ASP	V219	S156	T96
ASP	L220	R157	A97
ASP	V221	F158	I99
ASP	L222	F159	I99
ASP	V223	V160	L101
ASP	T224	S161	H102
ASP	L225	S162	G103
ASP	T226	S163	P104
ASP	F227	Q164	P105
ASP	L228	G165	R106
ASP	V229	S167	V107
ASP	E230	E168	K108
ASP	K231	L169	A109
ASP	R232	H170	V110
ASP	R233	I171	K111
ASP	K234	E172	S112
ASP	P235	N173	E114
ASP	E236	L174	E115
ASP	D237	N175	I116
ASP	V238	M176	N117
ASP	LEU	E177	E118
ASP	ASP	A178	G119
ASP	ASP	D179	F120

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	1326285	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	37.6	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	5.126	Depositor
Minimum map value	-3.357	Depositor
Average map value	0.007	Depositor
Map value standard deviation	0.120	Depositor
Recommended contour level	1.14	Depositor
Map size (\AA)	218.2, 218.2, 218.2	wwPDB
Map dimensions	200, 200, 200	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.091, 1.091, 1.091	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: EY0

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	0/2984	0.46	0/4052
2	B	0.47	0/1174	0.70	0/1623
All	All	0.38	0/4158	0.54	0/5675

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	2902	0	2958	88	0
2	B	1167	0	685	22	0
3	A	35	0	0	4	0
All	All	4104	0	3643	107	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 14.

The worst 5 of 107 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:284:LEU:HD21	1:A:301:LEU:HD22	1.36	1.04
2:B:211:PRO:O	2:B:215:ILE:HG12	1.60	1.02
2:B:115:HIS:ND1	2:B:203:ARG:NH2	2.22	0.86
1:A:313:ARG:NH1	1:A:371:SER:HB3	1.96	0.80
2:B:212:PHE:O	2:B:216:VAL:HG23	1.82	0.77

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	378/500 (76%)	343 (91%)	35 (9%)	0	100	100
2	B	213/269 (79%)	199 (93%)	14 (7%)	0	100	100
All	All	591/769 (77%)	542 (92%)	49 (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	306/405 (76%)	302 (99%)	4 (1%)	69	86
2	B	28/225 (12%)	27 (96%)	1 (4%)	35	67
All	All	334/630 (53%)	329 (98%)	5 (2%)	66	84

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

Mol	Chain	Res	Type
1	A	29	SER
1	A	139	PHE
1	A	154	SER
1	A	323	LYS
2	B	115	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	ASN
1	A	127	ASN
1	A	270	ASN
1	A	330	GLN
1	A	340	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is 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
3	EY0	A	601	-	35,38,38	4.40	11 (31%)	33,61,61	2.31	10 (30%)

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
3	EY0	A	601	-	-	1/18/33/33	0/4/4/4

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	601	EY0	C30-C31	-14.15	1.32	1.53
3	A	601	EY0	C27-N28	13.28	1.48	1.34
3	A	601	EY0	O10-C4	9.49	1.41	1.22
3	A	601	EY0	O29-C30	8.42	1.61	1.44
3	A	601	EY0	C16-C8	5.81	1.55	1.51

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	601	EY0	C22-C21-N20	5.82	126.65	119.69
3	A	601	EY0	C4-N5-C6	-5.30	121.40	125.63
3	A	601	EY0	C22-C21-C17	-5.17	126.46	129.54
3	A	601	EY0	C17-C16-C8	-3.41	109.33	115.96
3	A	601	EY0	O29-N28-C27	3.15	127.06	116.94

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	601	EY0	C17-C16-C8-C9

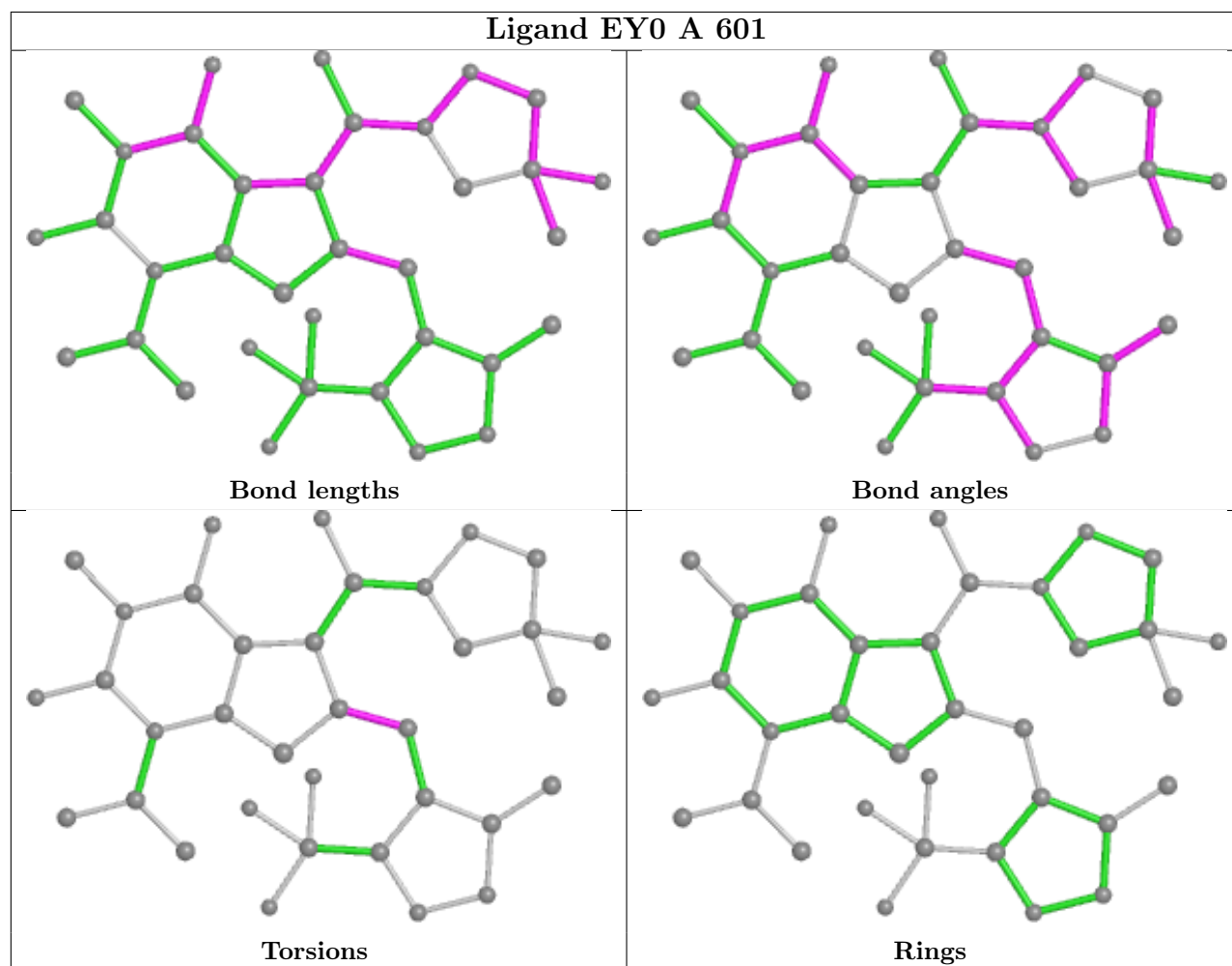
There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	EY0	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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.

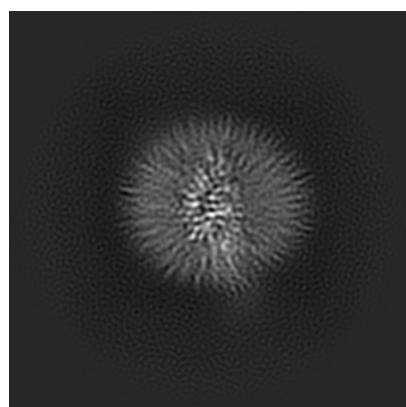
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-30019. These allow visual inspection of the internal detail of the map and identification of artifacts.

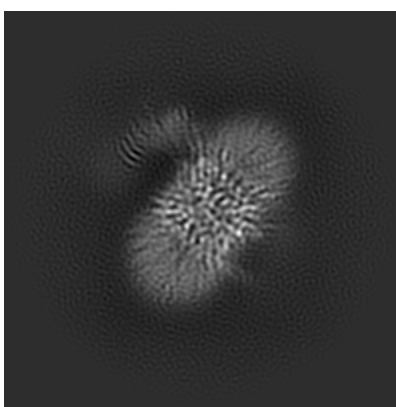
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

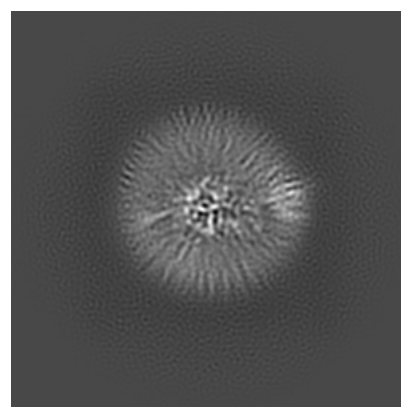
6.1.1 Primary map



X



Y

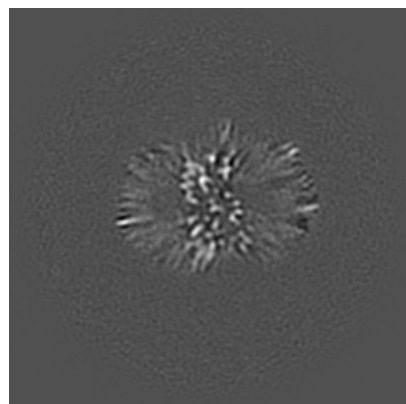


Z

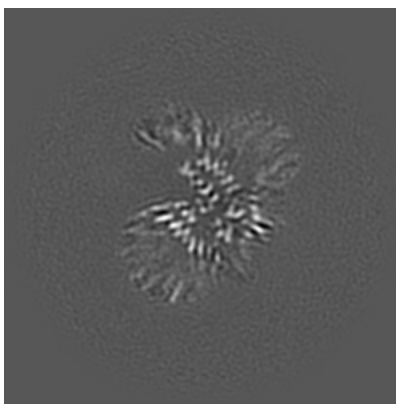
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

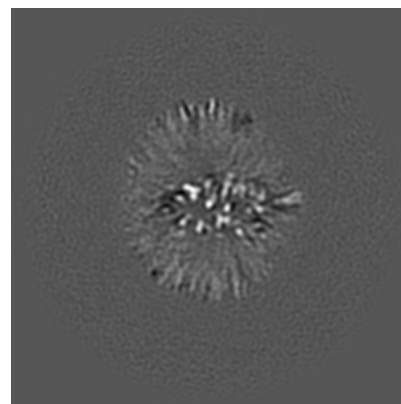
6.2.1 Primary map



X Index: 100



Y Index: 100

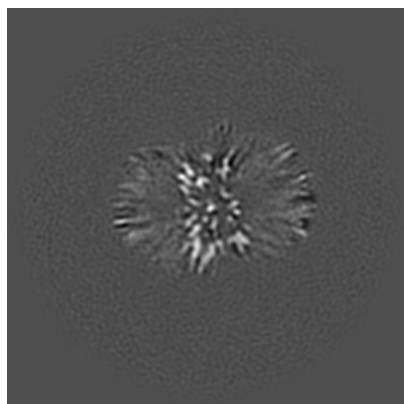


Z Index: 100

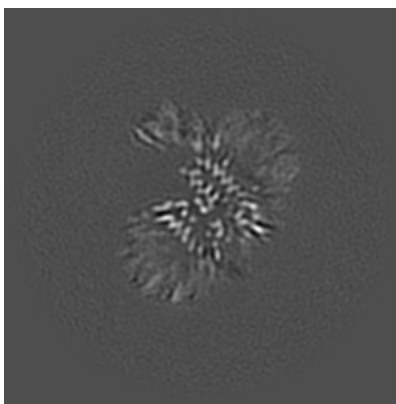
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

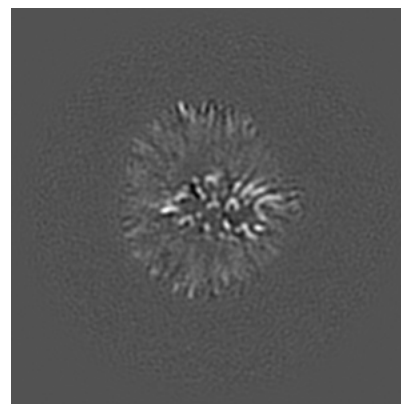
6.3.1 Primary map



X Index: 99



Y Index: 101

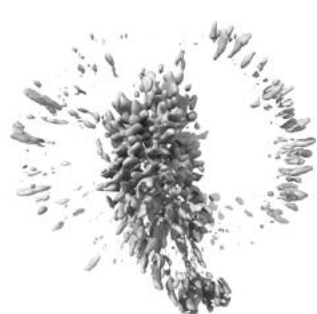


Z Index: 98

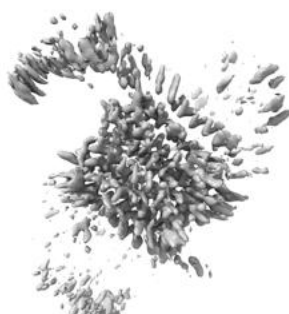
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

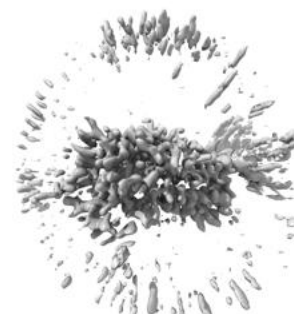
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 1.14. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

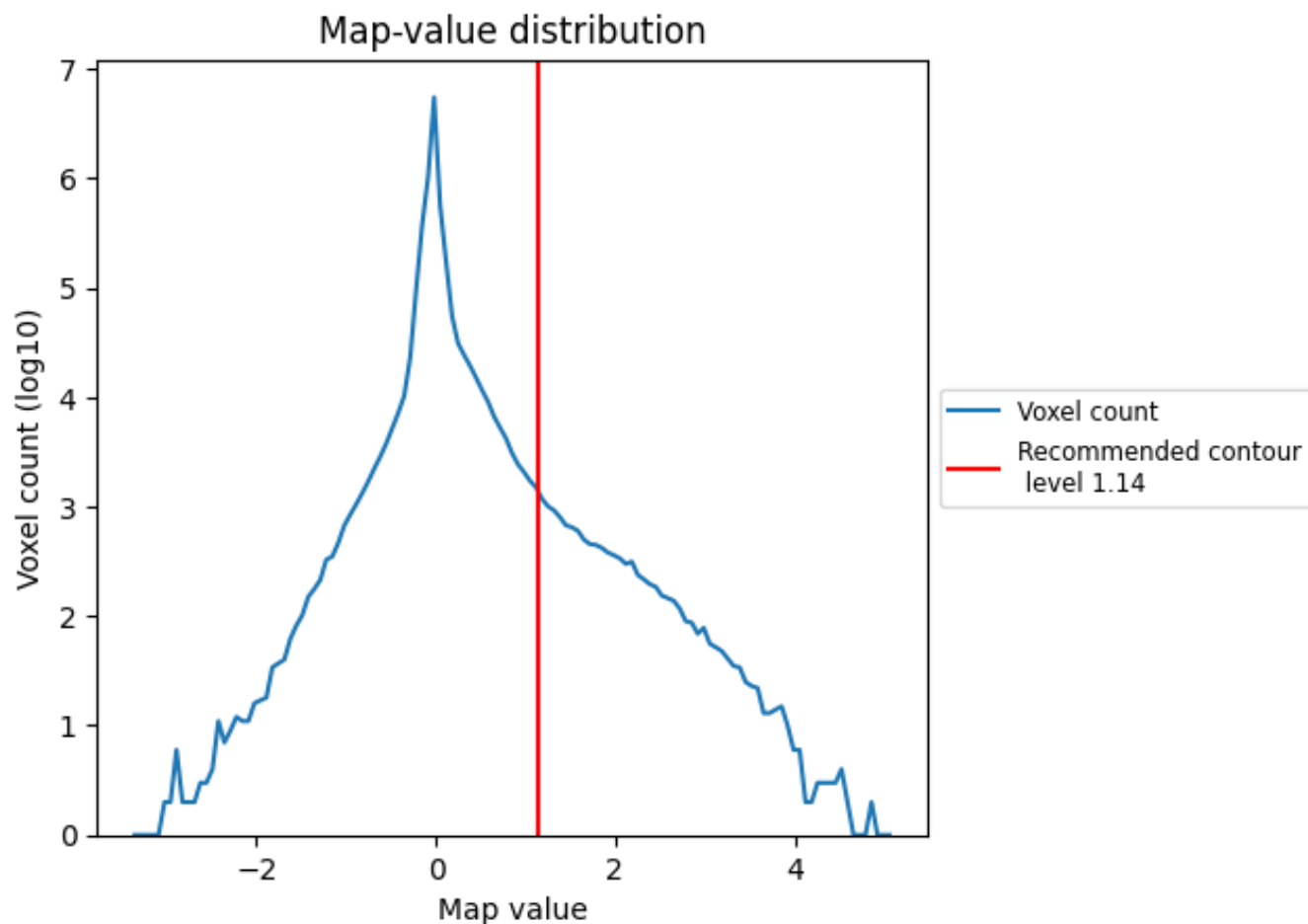
6.5 Mask visualisation

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

7 Map analysis [i](#)

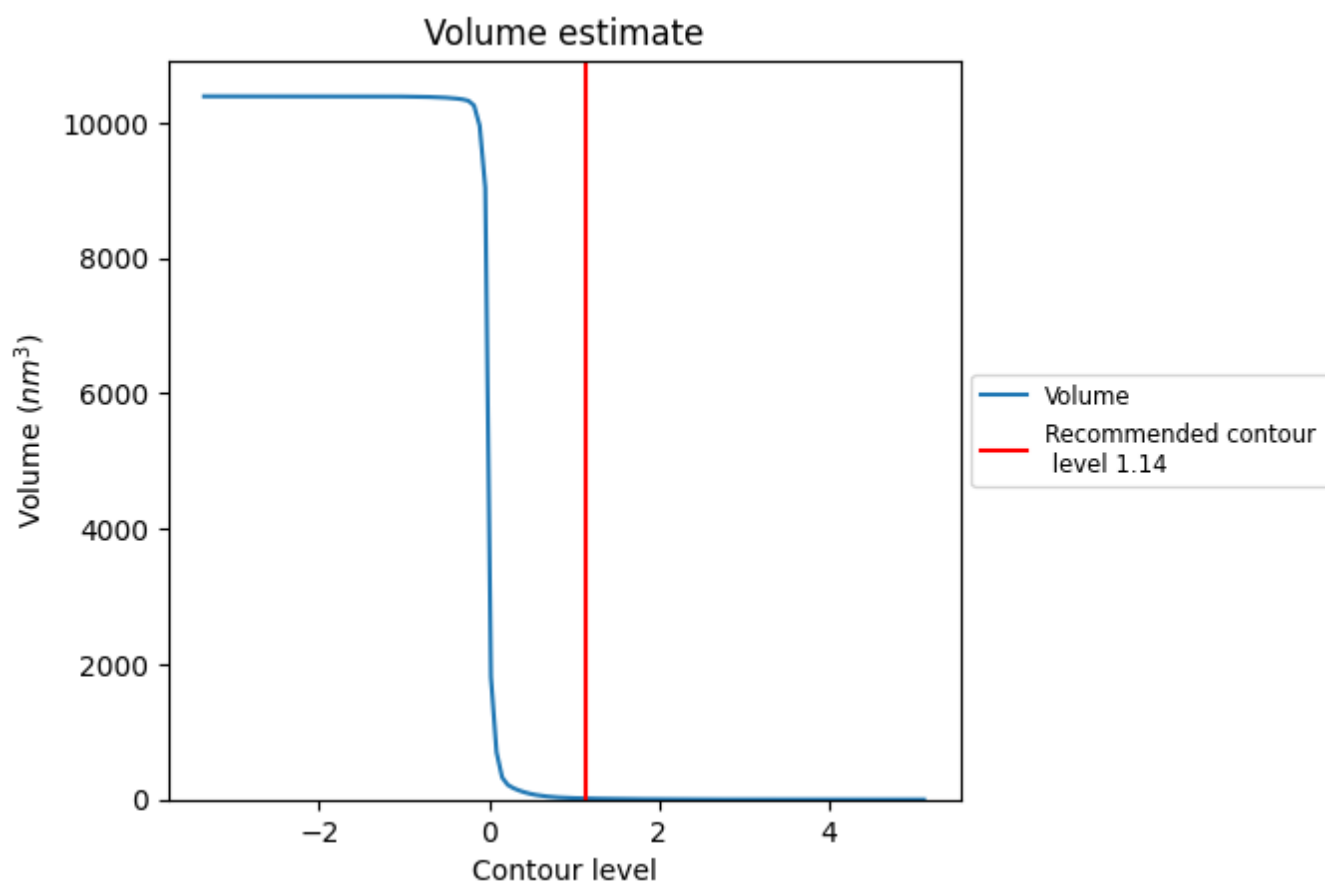
This section contains the results of statistical analysis of the map.

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.

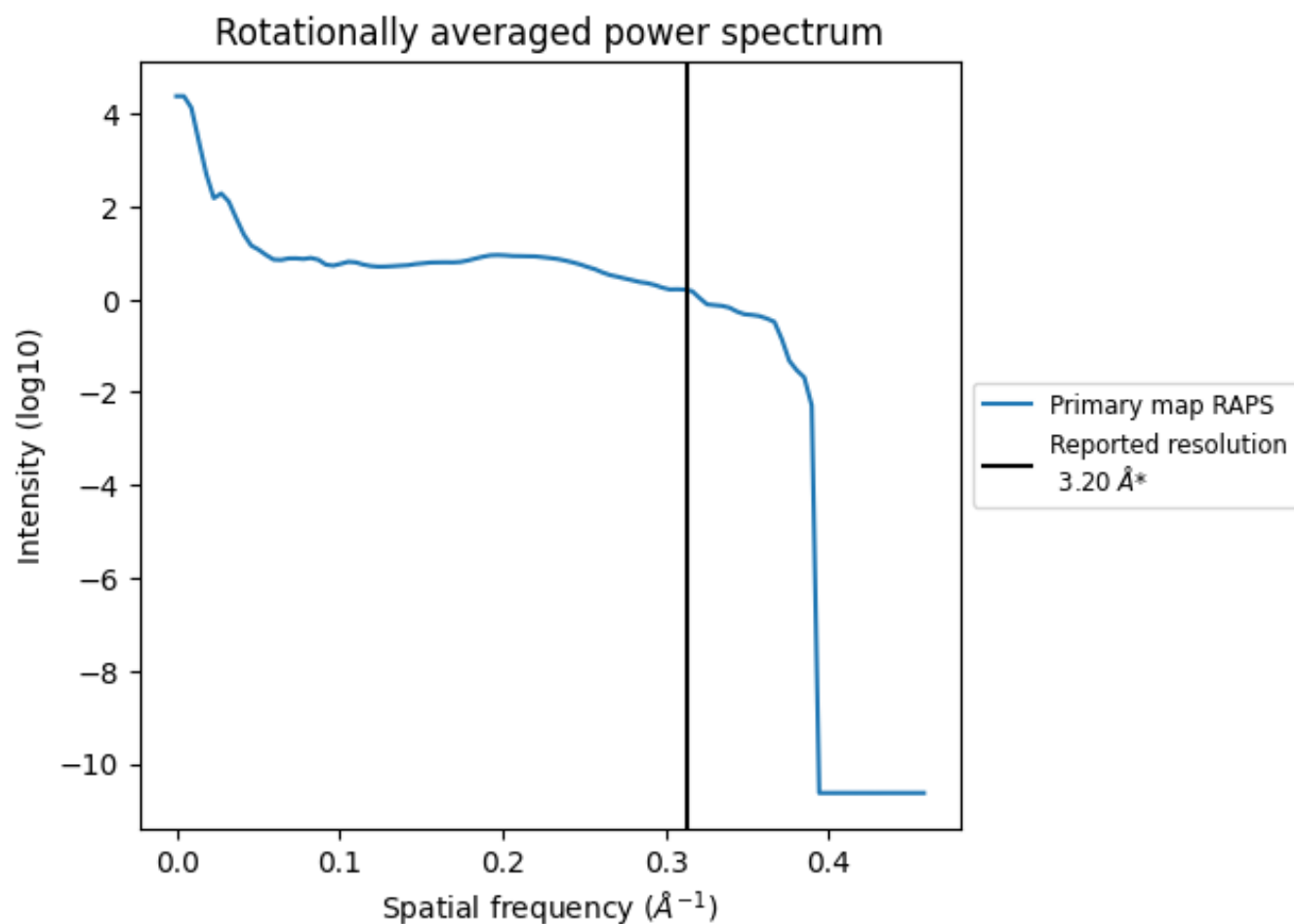
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 16 nm³; this corresponds to an approximate mass of 15 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 0.312 Å⁻¹

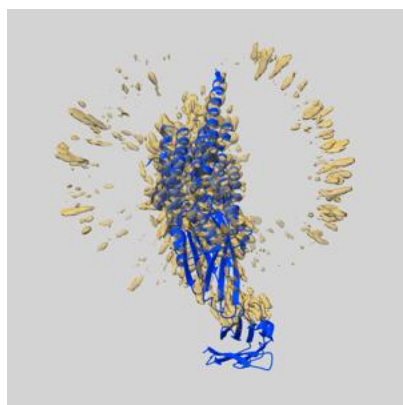
8 Fourier-Shell correlation

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

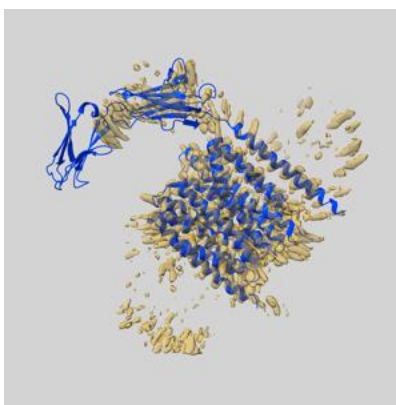
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-30019 and PDB model 6LYY. Per-residue inclusion information can be found in section [3](#) on page [4](#).

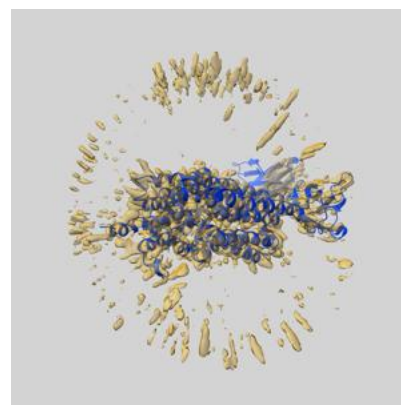
9.1 Map-model overlay [i](#)



X



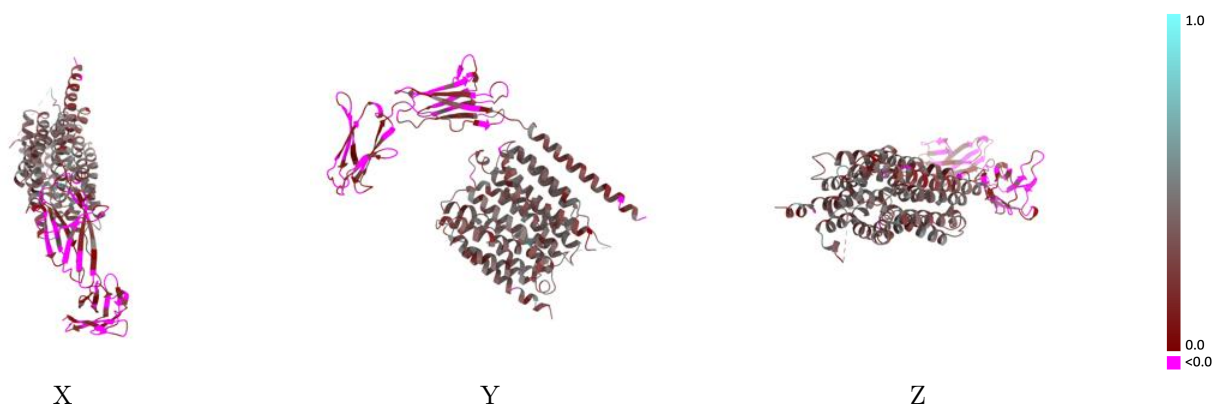
Y



Z

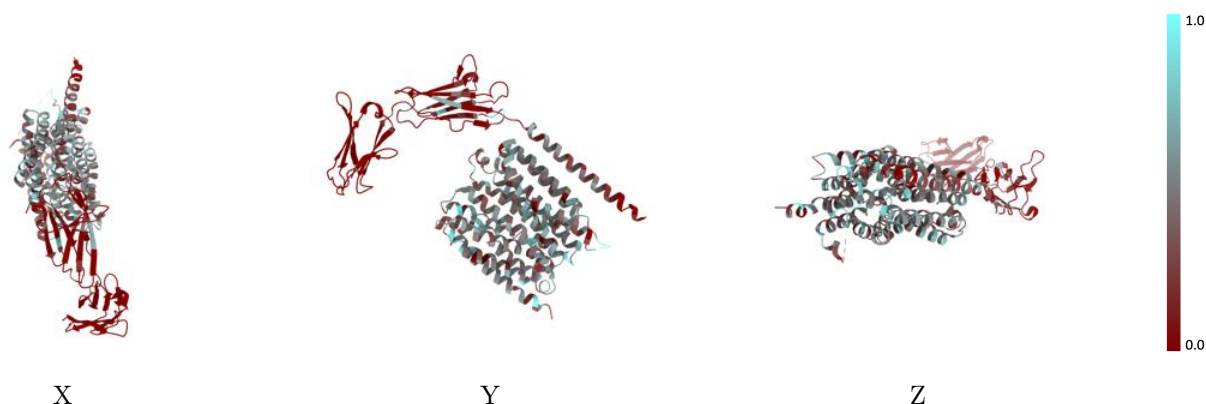
The images above show the 3D surface view of the map at the recommended contour level 1.14 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



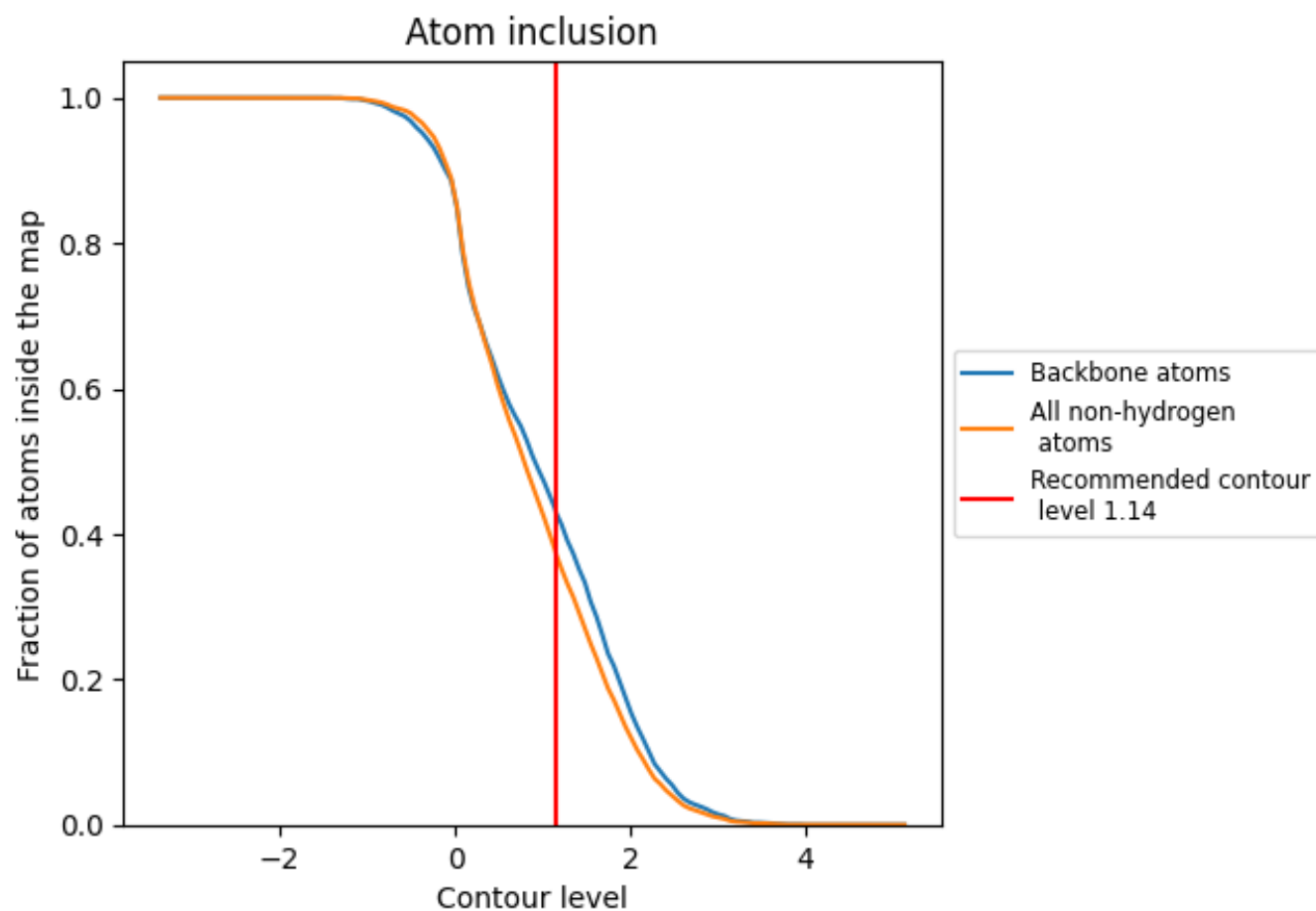
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (1.14).

9.4 Atom inclusion [i](#)



At the recommended contour level, 44% of all backbone atoms, 38% 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 (1.14) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.3782	<div></div> 0.2830
A	<div></div> 0.4832	<div></div> 0.3620
B	<div></div> 0.1165	<div></div> 0.0850

