wwPDB EM Validation Summary Report (i)

Jun 20, 2024 – 06:58 AM JST

PDB ID	:	7WXF
EMDB ID	:	EMD-32877
Title	:	GPR domain of Drosophila P5CS filament with glutamate
Authors	:	Liu, J.L.; Zhong, J.; Guo, C.J.; Zhou, X.
Deposited on	:	2022-02-14
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 (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 (i)) were used in the production of this report:

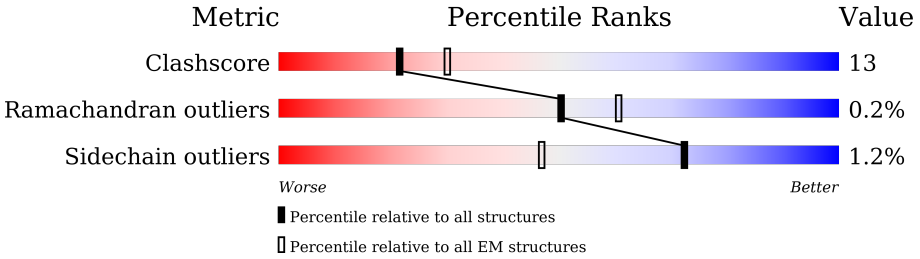
EMDB validation analysis	:	0.0.1.dev92
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

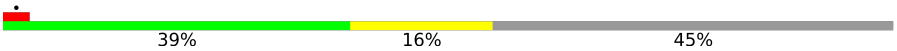
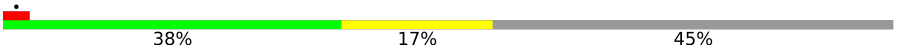
The reported resolution of this entry is 3.60 Å.

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 <=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	776	
1	B	776	

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 6494 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 Delta-1-pyrroline-5-carboxylate synthase.

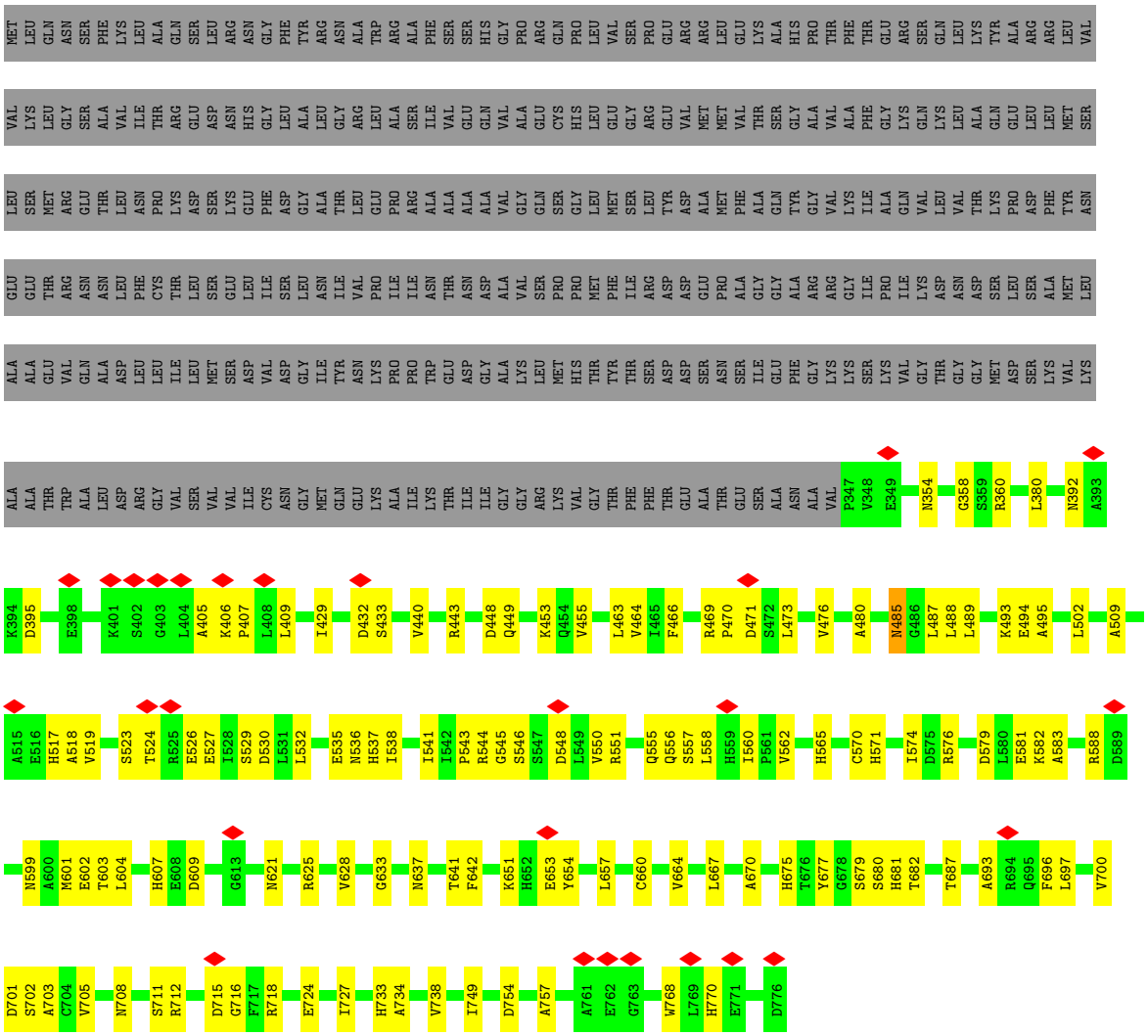
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	430	3247	2027	586	619	15	0	0
1	B	430	3247	2027	586	619	15	0	0

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.

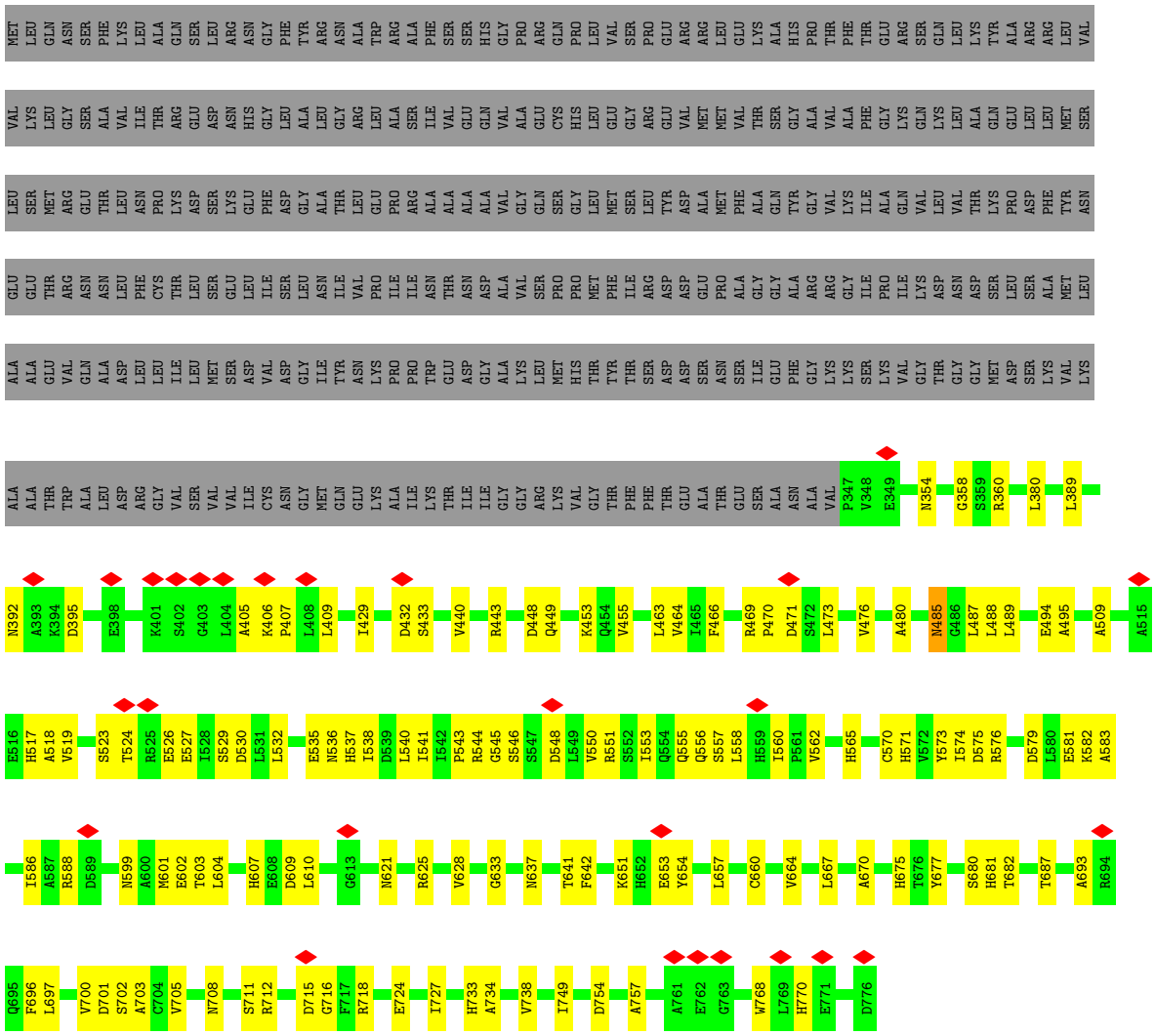
• Molecule 1: Delta-1-pyrroline-5-carboxylate synthase

Chain A: 39% 16% 45%



• Molecule 1: Delta-1-pyrroline-5-carboxylate synthase

Chain B: 38% 17% 45%


MET LEU GLN ASN SER PHE LYS LEU ALA GLN SER LEU ARG ASN GLY PHE TYR ARG ASN ALA TRP ARG ALA PHE SER SER HIS GLY PRO ARG GLN PRO LEU VAL SER PRO GLU ARG ARG LEU GLU LYS ALA HIS PRO THR PHE THR GLU ARG SER GLN LEU LYS TYR ALA ARG ARG LEU VAL
VAL LYS LEU GLY SER ALA VAL ILE THR ARG GLU ASP ASN HIS GLY LEU ALA LEU GLY ARG LEU ALA SER ILE VAL GLU GLN VAL ALA GLU CYS HIS LEU GLU GLY ARG GLU VAL MET MET VAL THR SER GLY ALA VAL ALA PHE GLY LYS GLN LYS ILE VAL LEU LEU ALA GLN GLU LEU LEU MET SER
LEU SER MET ARG GLU THR LEU ASN PRO LYS ASP SER LYS GLU PHE ASP GLY ALA THR LEU GLU PRO ARG ALA ALA ALA VAL GLY GLN SER GLY LEU MET SER LEU TYR ASP ALA MET PHE ALA GLN TYR GLY VAL LYS ILE ALA GLN VAL LEU VAL THR LYS PRO ASP PHE TYR ASN
GLU GLU THR ARG ASN ASN LEU PHE CYS THR LEU SER GLU LEU ILE SER LEU ASN ILE LEU VAL PRO ILE ILE ASN THR ASN ASP ALA VAL SER PRO PRO MET PHE ILE ARG ASP ASP GLU PRO ALA GLY GLY ILE PRO ILE LYS ASP ASN ASP SER LEU SER ALA MET LEU
ALA ALA GLU VAL GLN ALA ASP LEU LEU ILE LEU MET SER ASP VAL ASP GLY ILE TYR ASN LYS PRO PRO TRP GLU ASP GLY ALA LEU LYS LEU MET HIS THR TYR THR SER ASP ASP SER ASN SER ILE GLU PHE GLY LYS LYS SER LYS VAL GLY THR GLY GLY MET ASP SER LYS VAL LYS
ALA ALA THR TRP ALA LEU ASP ARG GLY VAL SER VAL VAL ILE CYS ASN GLY MET GLN GLU LYS ALA ILE LYS THR ILE ILE GLY GLY GLY ARG LYS VAL GLY THR PHE PHE THR GLU ALA THR GLU SER ALA ASN ALA VAL P347 V348 E349 N354 G358 S359 R360 L380 L389
N392 A393 K394 D395 E398 K401 S402 G403 L404 A405 K406 P407 L408 L409 I429 D432 S433 V440 R443 D448 Q449 K453 Q454 V455 L463 V464 I465 F466 R469 P470 D471 S472 L473 V476 A480 N485 G486 L487 L488 L489 E494 A495 A509 A515
E516 H517 A518 V519 S523 T524 R525 E526 E527 I528 S529 D530 L531 L532 E535 N536 H537 I538 D539 L540 I541 I542 P543 R544 G545 S546 S547 D548 L549 V550 R551 S552 I553 Q554 Q555 Q556 S557 L558 H559 I560 P561 V562 H565 C570 H571 Y572 Y573 I574 D575 R576 D579 L580 E581 K582 A583
I586 A587 R588 D589 N599 A600 M601 E602 T603 L604 H607 E608 D609 L610 G613 N621 R625 V628 G633 N637 T641 F642 K651 H652 E653 Y654 L657 C660 V664 L667 A670 H675 T676 Y677 S680 H681 T682 T687 A693 R694
Q695 F696 L697 V700 D701 S702 A703 C704 V705 N708 S711 R712 D715 G716 F717 R718 E724 I727 H733 A734 V738 I749 D754 A757 A761 E762 G763 W768 L769 H770 E771 D776

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	286291	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 ($e^-/Å^2$)	72	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.251	Depositor
Minimum map value	-0.147	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.035	Depositor
Map size (Å)	317.99997, 317.99997, 317.99997	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	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	0.36	0/3297	0.50	0/4462
1	B	0.36	0/3297	0.50	0/4462
All	All	0.36	0/6594	0.50	0/8924

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	3247	0	3285	87	0
1	B	3247	0	3285	91	0
All	All	6494	0	6570	170	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 13.

The worst 5 of 170 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:532:LEU:HD21	1:A:557:SER:HA	1.58	0.85
1:B:532:LEU:HD21	1:B:557:SER:HA	1.58	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:681:HIS:HD1	1:B:682:THR:HG1	1.37	0.72
1:A:681:HIS:HD1	1:A:682:THR:HG1	1.36	0.71
1:B:570:CYS:O	1:B:571:HIS:ND1	2.24	0.70

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	428/776 (55%)	373 (87%)	54 (13%)	1 (0%)	47	79
1	B	428/776 (55%)	373 (87%)	54 (13%)	1 (0%)	47	79
All	All	856/1552 (55%)	746 (87%)	108 (13%)	2 (0%)	50	79

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	526	GLU
1	B	526	GLU

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	345/630 (55%)	341 (99%)	4 (1%)	71	87

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	B	345/630 (55%)	341 (99%)	4 (1%)	71 87
All	All	690/1260 (55%)	682 (99%)	8 (1%)	72 87

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	588	ARG
1	B	485	ASN
1	B	360	ARG
1	A	588	ARG
1	B	432	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	708	ASN
1	B	652	HIS
1	B	354	ASN
1	B	708	ASN
1	B	565	HIS

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)

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.

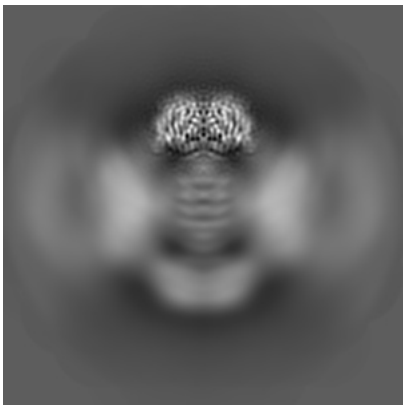
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-32877. These allow visual inspection of the internal detail of the map and identification of artifacts.

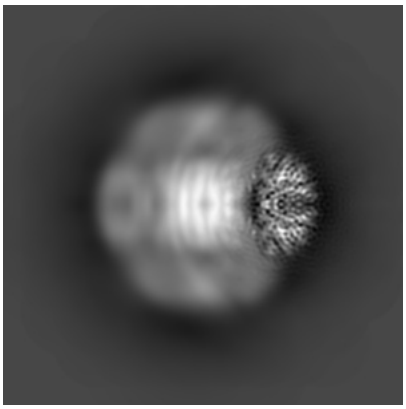
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

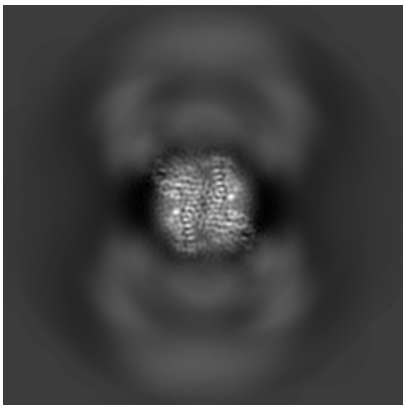
6.1.1 Primary map



X

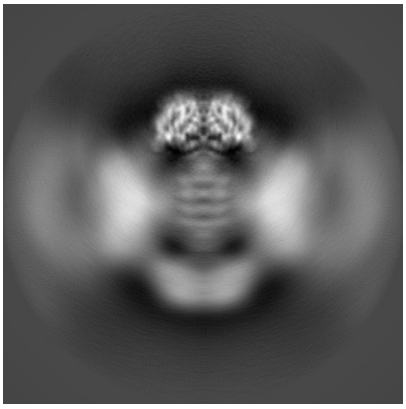


Y

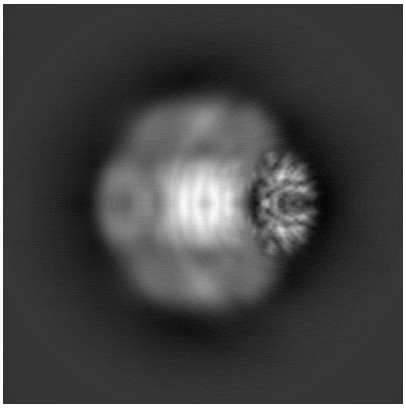


Z

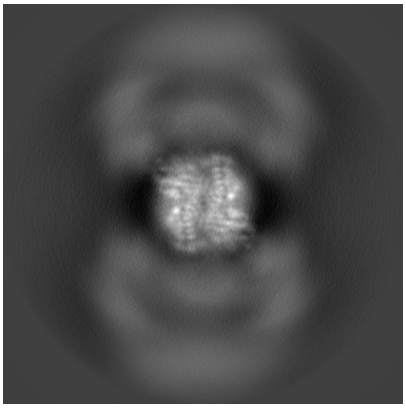
6.1.2 Raw map



X



Y



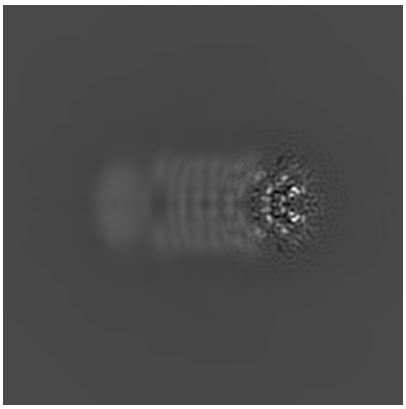
Z

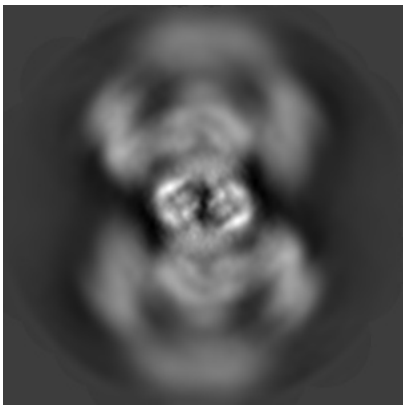
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

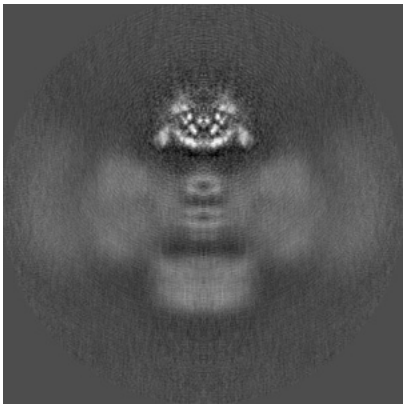
6.2.1 Primary map

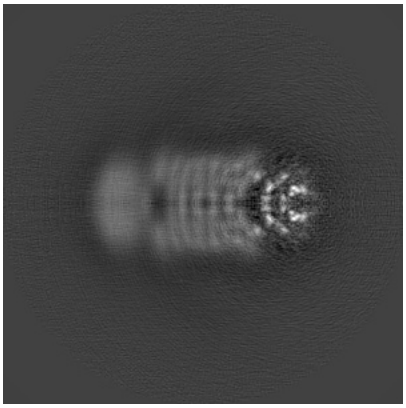

X Index: 150

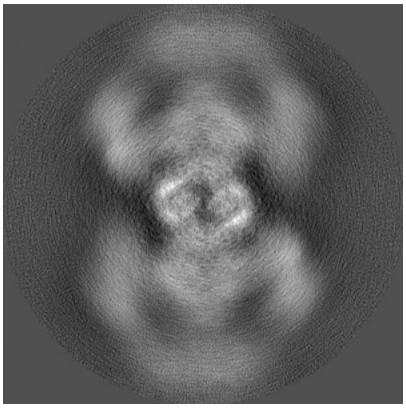

Y Index: 150


Z Index: 150

6.2.2 Raw map


X Index: 150


Y Index: 150

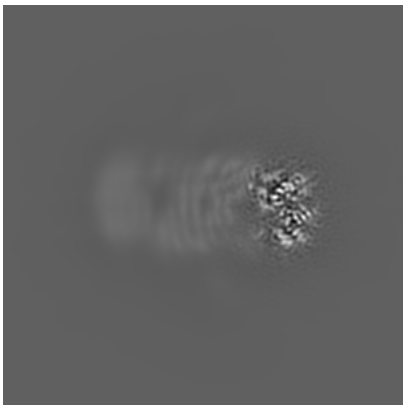

Z Index: 150

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

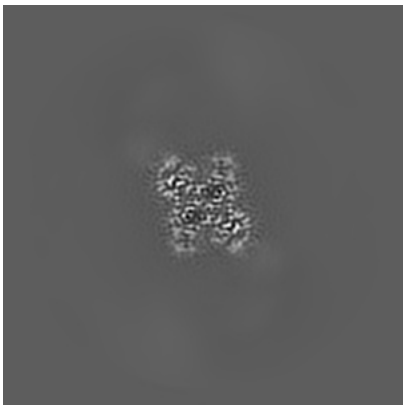
6.3 Largest variance slices (i)

6.3.1 Primary map

X Index: 160

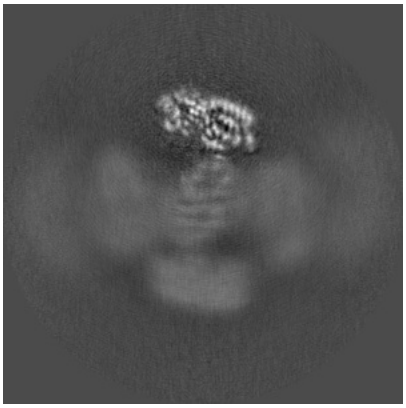


Y Index: 158

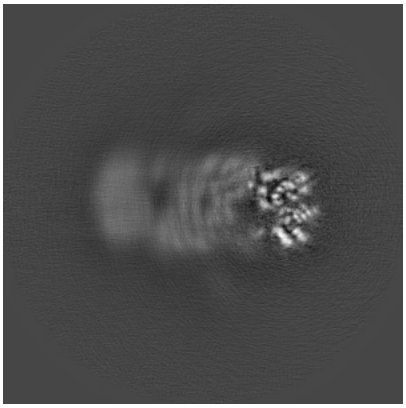


Z Index: 210

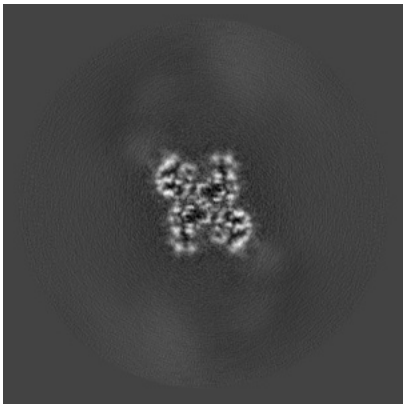
6.3.2 Raw map



X Index: 160



Y Index: 158



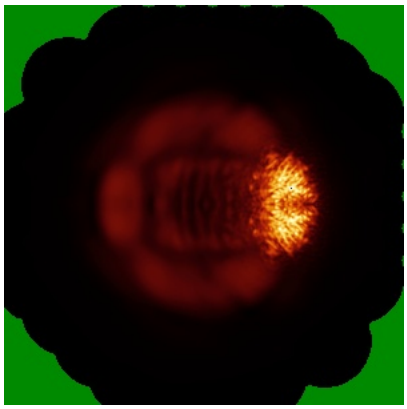
Z Index: 211

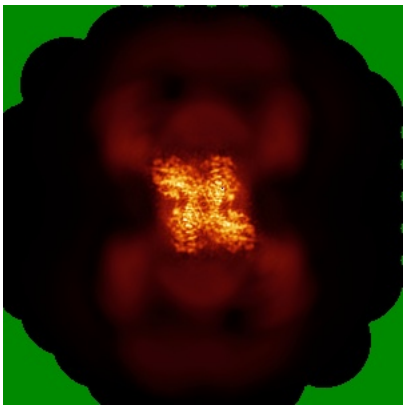
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

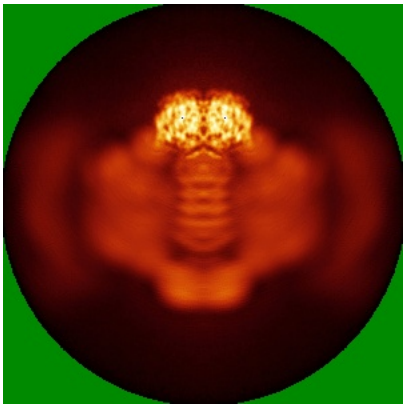
6.4.1 Primary map

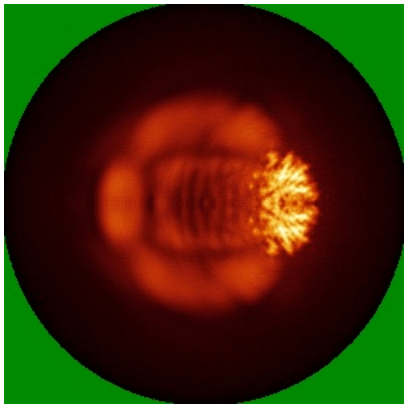

X

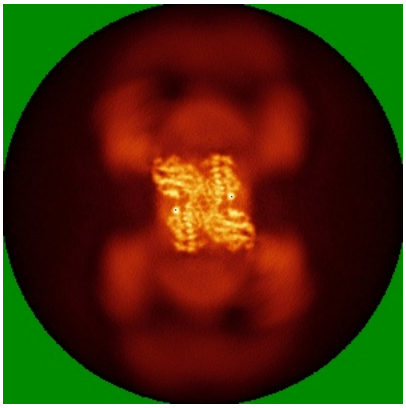

Y


Z

6.4.2 Raw map


X

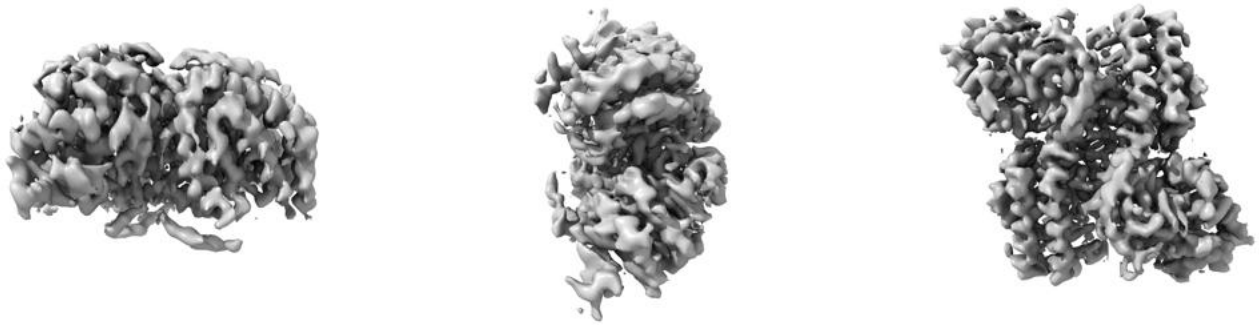

Y


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)

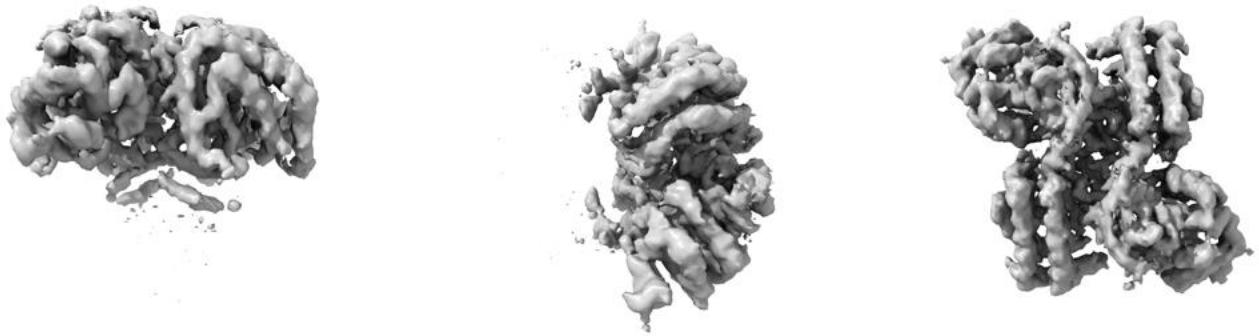
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

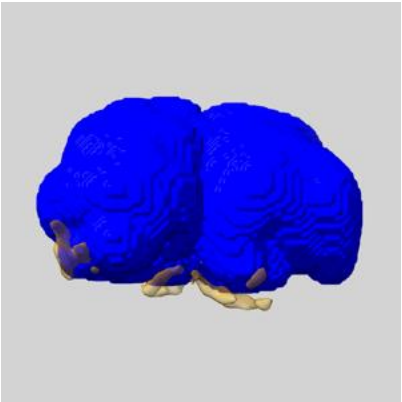
6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

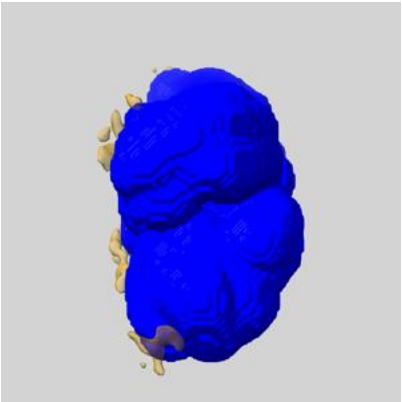
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

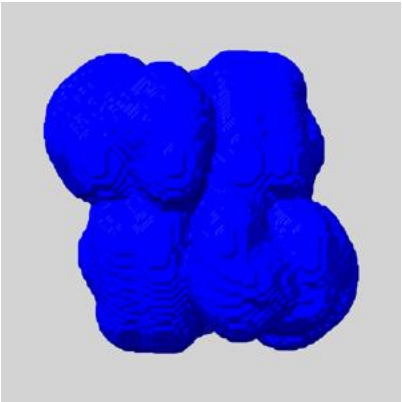
6.6.1 emd_32877_msk_1.map (i)



X



Y

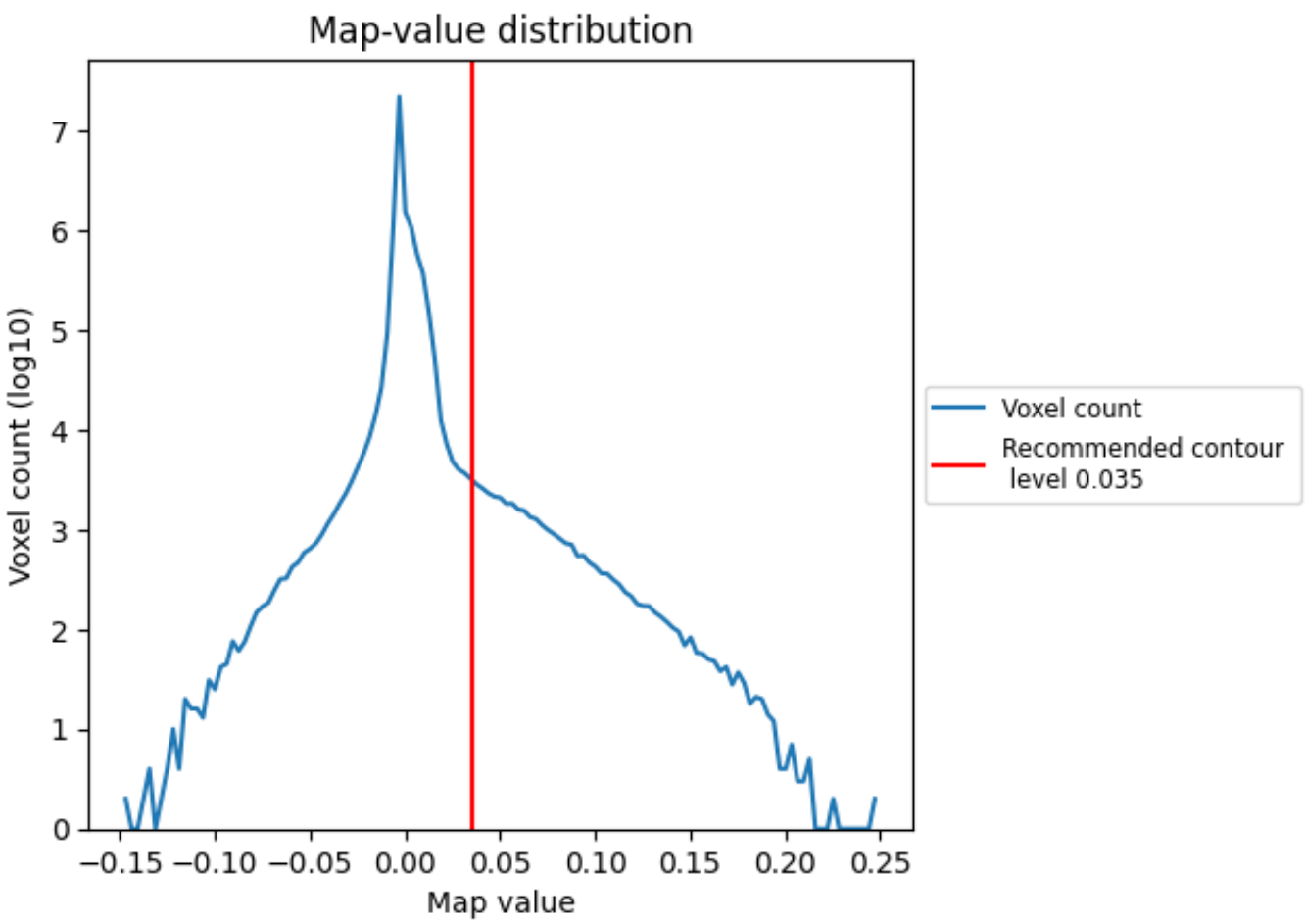


Z

7 Map analysis (i)

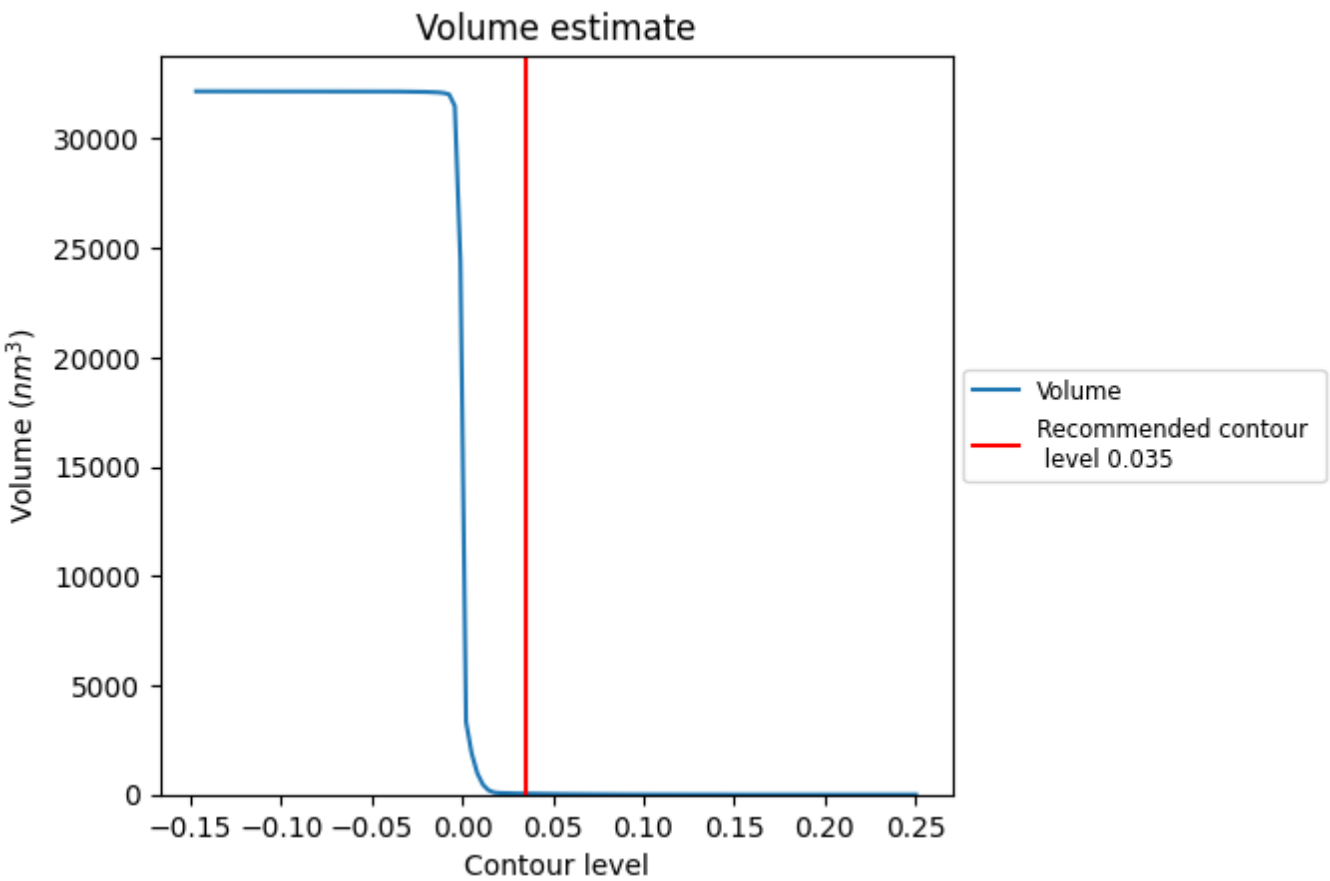
This section contains the results of statistical analysis of the map.

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.

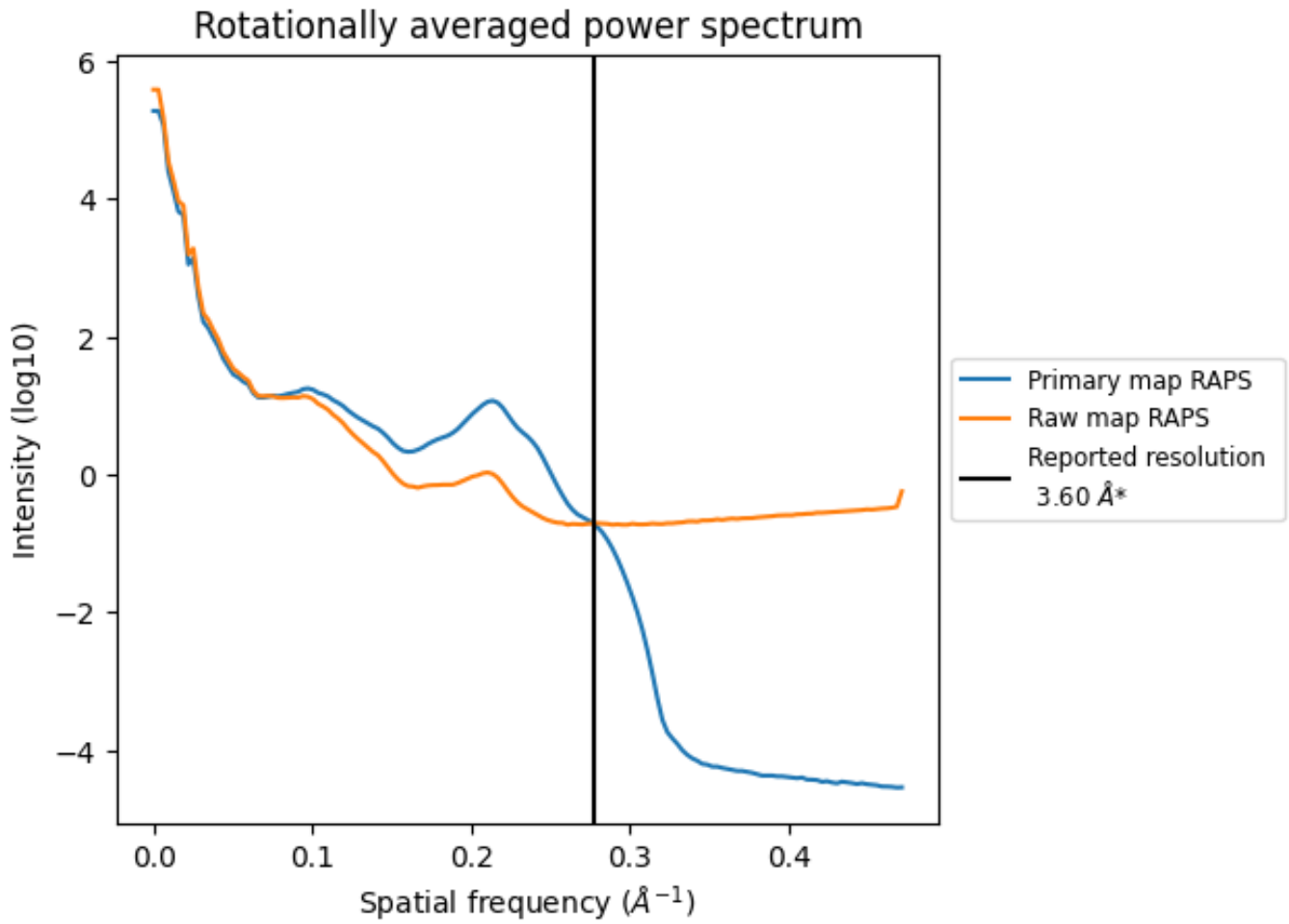
7.2 Volume estimate (i)



The volume at the recommended contour level is 42 nm^3; this corresponds to an approximate mass of 38 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)

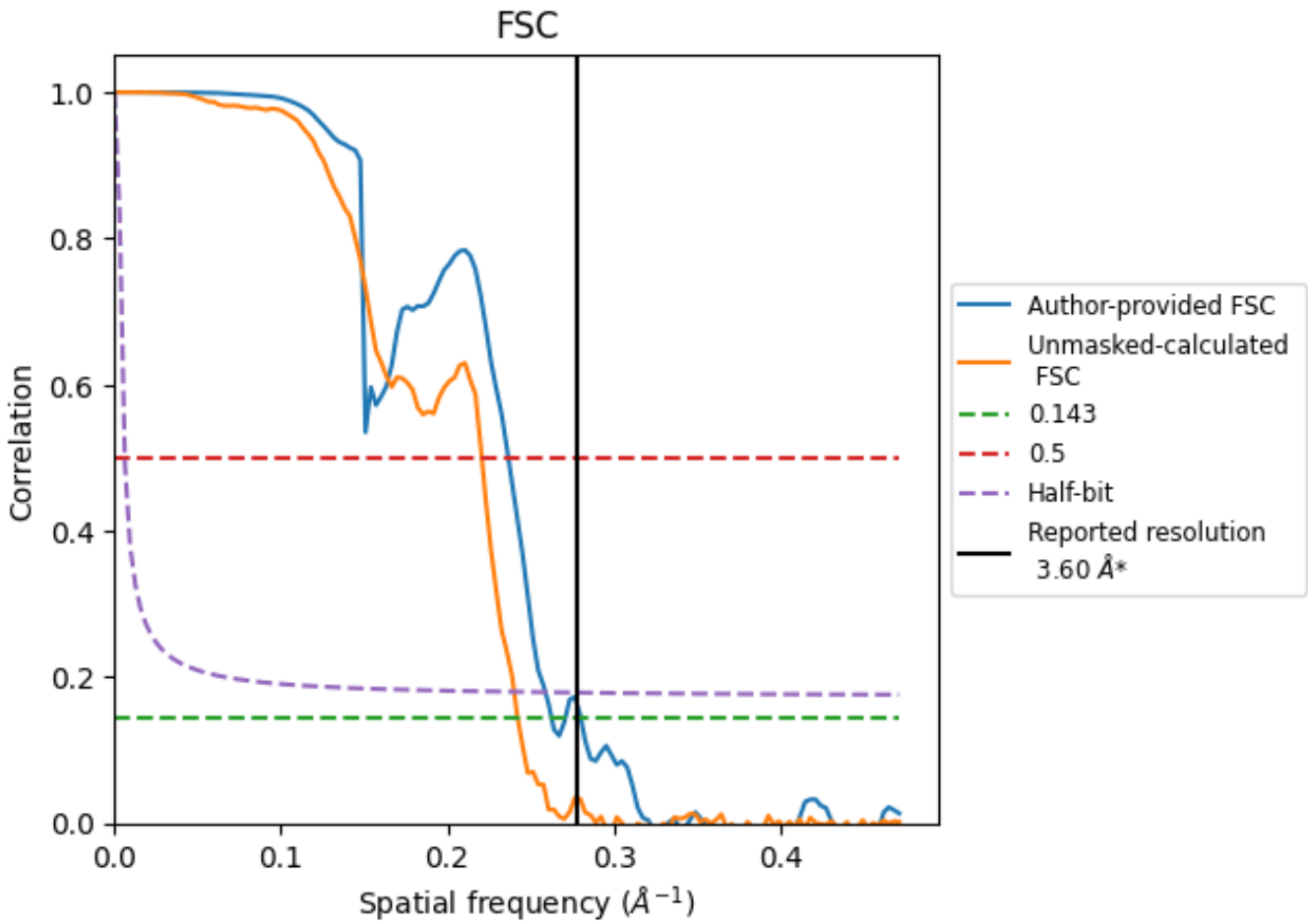


*Reported resolution corresponds to spatial frequency of 0.278 Å^{-1}

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 0.278 Å^{-1}

8.2 Resolution estimates (i)

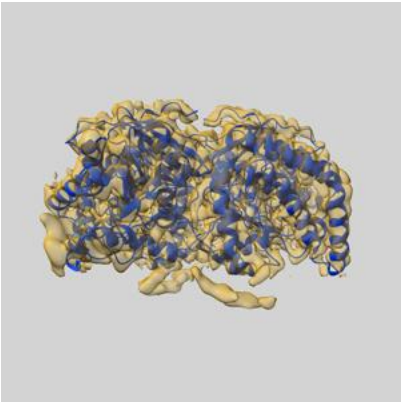
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.60	-	-
Author-provided FSC curve	3.81	4.22	3.86
Unmasked-calculated*	4.13	4.53	4.16

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.13 differs from the reported value 3.6 by more than 10 %

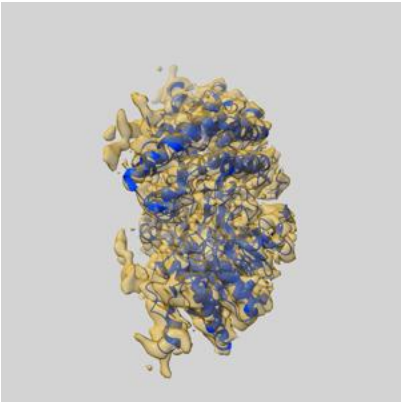
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-32877 and PDB model 7WXF. Per-residue inclusion information can be found in section 3 on page 4.

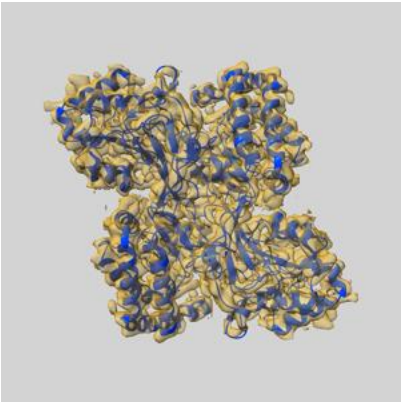
9.1 Map-model overlay (i)



X



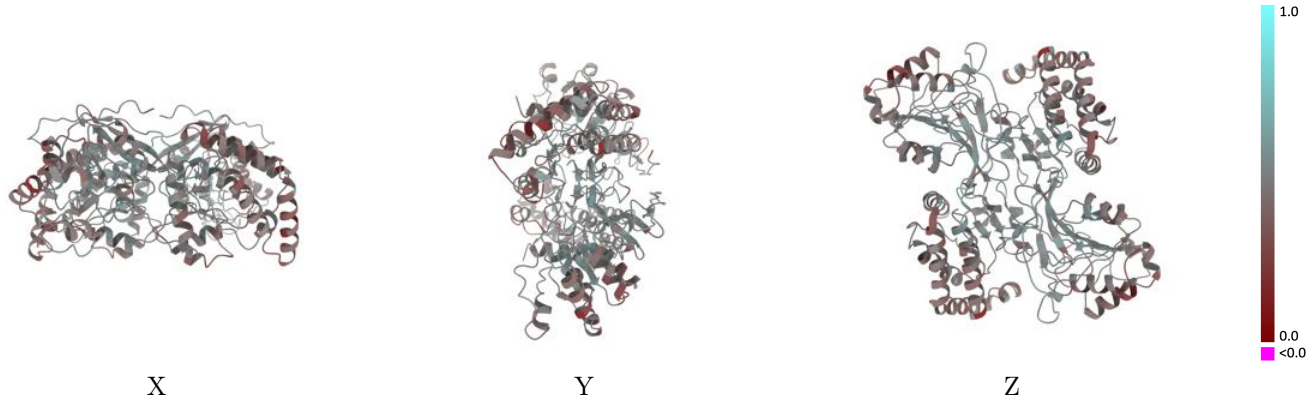
Y



Z

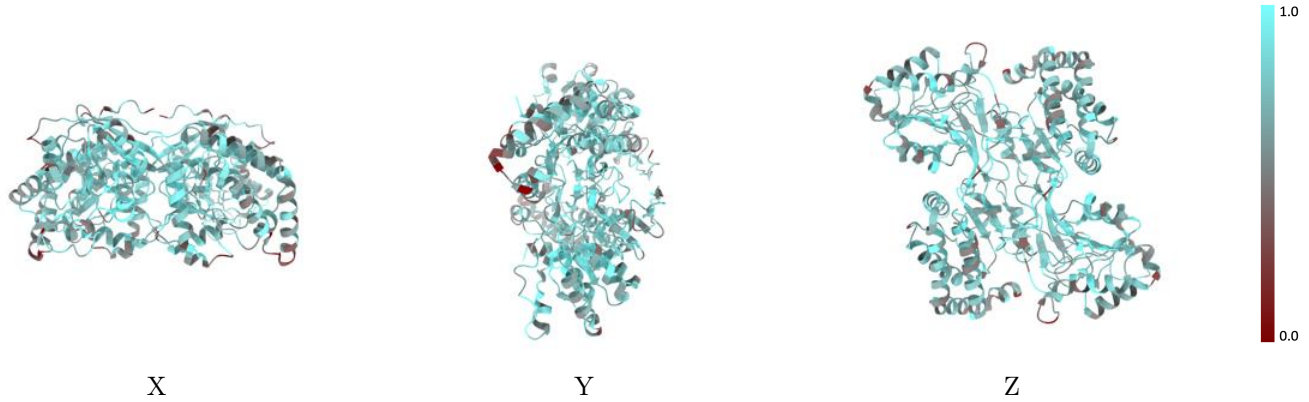
The images above show the 3D surface view of the map at the recommended contour level 0.035 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model (i)



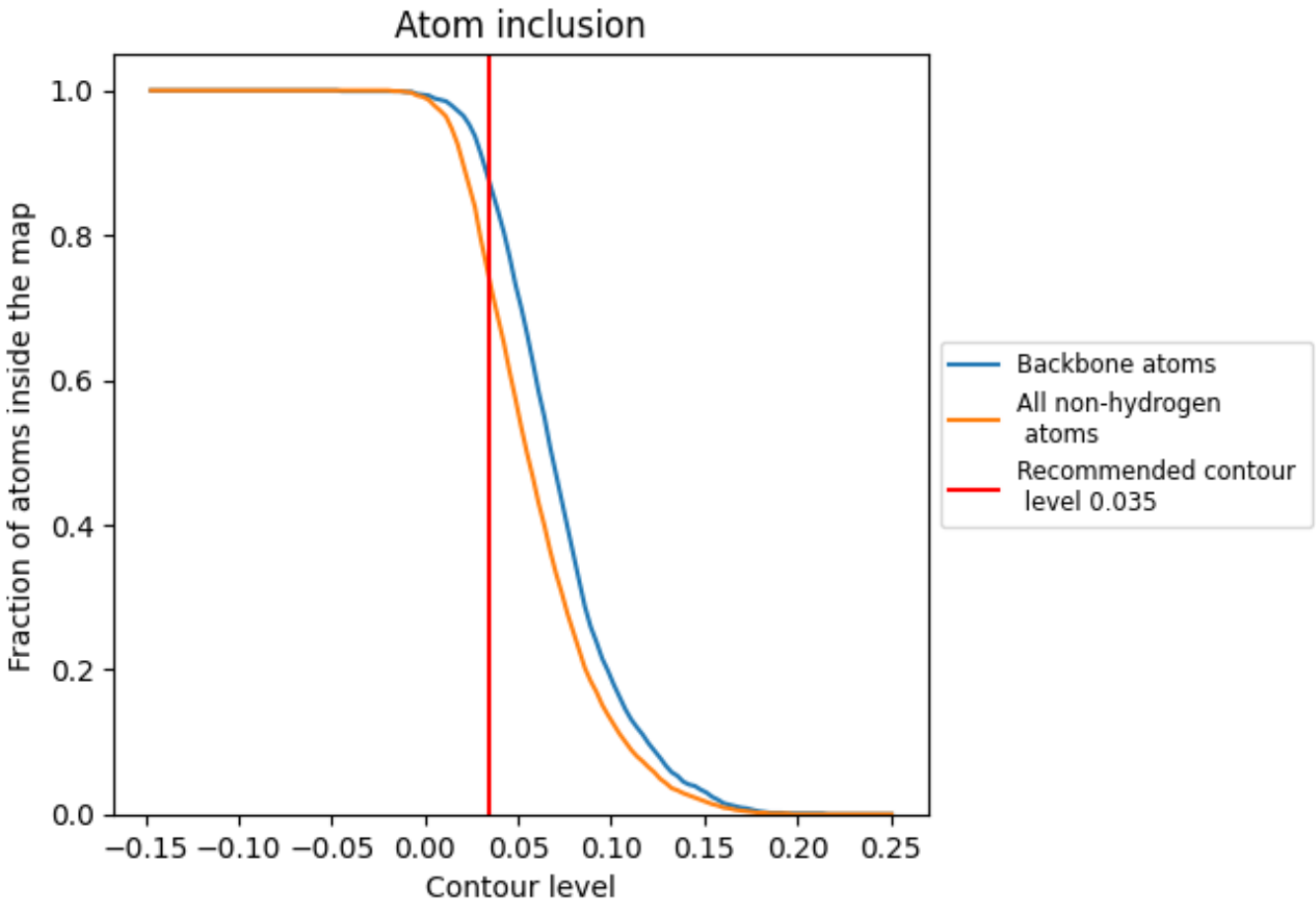
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.035).

9.4 Atom inclusion (i)



At the recommended contour level, 87% 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 (0.035) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7350	0.4570
A	0.7350	0.4560
B	0.7350	0.4580