



Full wwPDB EM Validation Report ⓘ

Apr 2, 2024 – 10:39 pm BST

PDB ID : 8PR2
EMDB ID : EMD-17832
Title : Cytoplasmic dynein-1 heavy chain bound to JIP3-LZI
Authors : Singh, K.; Lau, C.K.; Manigrasso, G.; Gassmann, R.; Carter, A.P.
Deposited on : 2023-07-12
Resolution : 3.80 Å (reported)
Based on initial model : 7Z8G

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.1.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) : 2.36

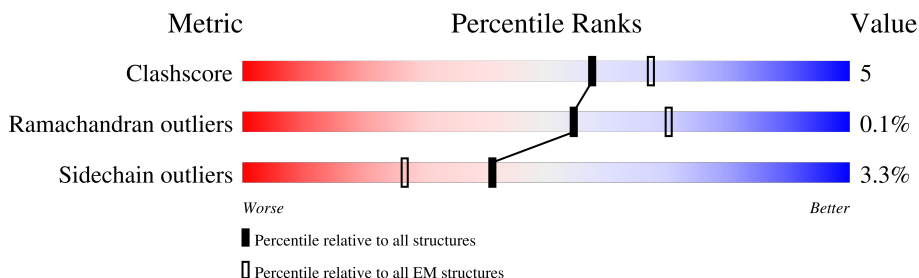
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.80 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 (#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	B	581	15% 82%
1	C	581	15% 82%
2	f	4646	15% 85%
2	m	4646	10% 89%
3	h	612	59% 39%
4	j	492	95%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 14906 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 C-Jun-amino-terminal kinase-interacting protein 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	106	917	563	162	191	1	0	0
1	C	106	917	563	162	191	1	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	SER	-	expression tag	UNP Q9UPT6
B	-5	ASN	-	expression tag	UNP Q9UPT6
B	-4	ILE	-	expression tag	UNP Q9UPT6
B	-3	GLU	-	expression tag	UNP Q9UPT6
B	-2	PHE	-	expression tag	UNP Q9UPT6
B	-1	LEU	-	expression tag	UNP Q9UPT6
B	0	LYS	-	expression tag	UNP Q9UPT6
B	561	GLY	-	expression tag	UNP Q9UPT6
B	562	SER	-	expression tag	UNP Q9UPT6
B	563	GLY	-	expression tag	UNP Q9UPT6
B	564	SER	-	expression tag	UNP Q9UPT6
B	565	GLY	-	expression tag	UNP Q9UPT6
B	566	ARG	-	expression tag	UNP Q9UPT6
B	567	TRP	-	expression tag	UNP Q9UPT6
B	568	SER	-	expression tag	UNP Q9UPT6
B	569	HIS	-	expression tag	UNP Q9UPT6
B	570	PRO	-	expression tag	UNP Q9UPT6
B	571	GLN	-	expression tag	UNP Q9UPT6
B	572	PHE	-	expression tag	UNP Q9UPT6
B	573	GLU	-	expression tag	UNP Q9UPT6
B	574	LYS	-	expression tag	UNP Q9UPT6
C	-6	SER	-	expression tag	UNP Q9UPT6
C	-5	ASN	-	expression tag	UNP Q9UPT6
C	-4	ILE	-	expression tag	UNP Q9UPT6
C	-3	GLU	-	expression tag	UNP Q9UPT6
C	-2	PHE	-	expression tag	UNP Q9UPT6

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-1	LEU	-	expression tag	UNP Q9UPT6
C	0	LYS	-	expression tag	UNP Q9UPT6
C	561	GLY	-	expression tag	UNP Q9UPT6
C	562	SER	-	expression tag	UNP Q9UPT6
C	563	GLY	-	expression tag	UNP Q9UPT6
C	564	SER	-	expression tag	UNP Q9UPT6
C	565	GLY	-	expression tag	UNP Q9UPT6
C	566	ARG	-	expression tag	UNP Q9UPT6
C	567	TRP	-	expression tag	UNP Q9UPT6
C	568	SER	-	expression tag	UNP Q9UPT6
C	569	HIS	-	expression tag	UNP Q9UPT6
C	570	PRO	-	expression tag	UNP Q9UPT6
C	571	GLN	-	expression tag	UNP Q9UPT6
C	572	PHE	-	expression tag	UNP Q9UPT6
C	573	GLU	-	expression tag	UNP Q9UPT6
C	574	LYS	-	expression tag	UNP Q9UPT6

- Molecule 2 is a protein called Cytoplasmic dynein 1 heavy chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	f	711	5865	3722	1059	1065	19	0	0
2	m	497	4108	2601	754	739	14	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
f	1567	GLU	ARG	engineered mutation	UNP Q14204
f	1610	GLU	LYS	engineered mutation	UNP Q14204
m	1567	GLU	ARG	engineered mutation	UNP Q14204
m	1610	GLU	LYS	engineered mutation	UNP Q14204

- Molecule 3 is a protein called Cytoplasmic dynein 1 intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	h	371	2897	1820	508	554	15	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
h	484	SER	THR	conflict	UNP Q13409
h	499	GLY	ASP	conflict	UNP Q13409

- Molecule 4 is a protein called Cytoplasmic dynein 1 light intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	j	25	202	127	34	40	1	0	0

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	236751	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 ($e^-/\text{\AA}^2$)	53	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.038	Depositor
Minimum map value	-0.022	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.004	Depositor
Map size (\AA)	296.52002, 296.52002, 296.52002	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.059, 1.059, 1.059	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	B	0.42	0/927	0.90	5/1239 (0.4%)
1	C	0.40	0/927	0.79	4/1239 (0.3%)
2	f	0.30	0/5967	0.64	4/8046 (0.0%)
2	m	0.29	0/4177	0.64	4/5621 (0.1%)
3	h	0.32	0/2976	0.56	0/4058
4	j	0.35	0/203	0.79	1/270 (0.4%)
All	All	0.32	0/15177	0.66	18/20473 (0.1%)

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
2	f	0	1
2	m	0	1
All	All	0	2

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	113	ASP	CB-CG-OD1	10.24	127.52	118.30
2	f	687	ASP	CB-CG-OD1	9.95	127.25	118.30
2	m	436	ASP	CB-CG-OD1	9.44	126.79	118.30
1	B	83	LEU	CA-CB-CG	7.42	132.36	115.30
1	C	147	ILE	CG1-CB-CG2	-7.32	95.30	111.40
1	B	115	LEU	CB-CG-CD2	-6.96	99.17	111.00
1	C	83	LEU	CA-CB-CG	6.83	131.01	115.30
2	f	746	LEU	CA-CB-CG	6.45	130.13	115.30
2	m	464	ASP	CB-CG-OD1	6.16	123.84	118.30
1	B	80	LEU	CA-CB-CG	5.68	128.37	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	f	392	LEU	CA-CB-CG	5.66	128.31	115.30
2	f	299	LEU	CA-CB-CG	5.41	127.75	115.30
4	j	364	MET	CB-CG-SD	5.39	128.58	112.40
1	C	117	GLN	CA-CB-CG	5.30	125.07	113.40
1	C	115	LEU	CB-CG-CD2	5.10	119.67	111.00
2	m	338	ASP	CB-CG-OD2	5.09	122.88	118.30
1	B	138	LEU	CA-CB-CG	5.05	126.91	115.30
2	m	336	MET	CB-CG-SD	5.02	127.46	112.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	f	339	PHE	Mainchain
2	m	339	PHE	Mainchain

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	B	917	0	876	12	0
1	C	917	0	876	10	0
2	f	5865	0	5980	0	0
2	m	4108	0	4205	0	0
3	h	2897	0	2749	0	0
4	j	202	0	203	0	0
All	All	14906	0	14889	14	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 5.

All (14) 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:B:150:LEU:HG	1:B:153:ARG:HH21	1.62	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:153:ARG:HH22	1:C:154:GLU:HG3	1.64	0.62
1:B:76:HIS:NE2	1:C:77:GLU:OE1	2.37	0.57
1:B:80:LEU:O	1:B:84:ARG:HB2	2.06	0.56
1:B:138:LEU:O	1:B:142:ASN:ND2	2.41	0.53
1:C:81:GLU:OE1	1:C:84:ARG:NH2	2.42	0.52
1:B:153:ARG:NH1	1:C:154:GLU:OE2	2.43	0.52
1:B:168:HIS:HE2	1:C:168:HIS:HB2	1.79	0.47
1:B:150:LEU:HD22	1:C:147:ILE:HD11	1.98	0.45
1:B:143:TYR:CE1	1:C:143:TYR:HB3	2.52	0.45
1:B:146:GLN:HG3	1:B:149:ARG:HH21	1.82	0.44
1:C:67:ASP:OD2	1:C:67:ASP:N	2.52	0.42
1:B:115:LEU:HD21	1:C:115:LEU:HD22	2.01	0.41
1:B:168:HIS:HE1	1:C:164:LEU:HD21	1.85	0.41

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	B	104/581 (18%)	103 (99%)	1 (1%)	0	100	100
1	C	104/581 (18%)	103 (99%)	1 (1%)	0	100	100
2	f	705/4646 (15%)	692 (98%)	13 (2%)	0	100	100
2	m	489/4646 (10%)	478 (98%)	11 (2%)	0	100	100
3	h	369/612 (60%)	349 (95%)	18 (5%)	2 (0%)	29	66
4	j	23/492 (5%)	23 (100%)	0	0	100	100
All	All	1794/11558 (16%)	1748 (97%)	44 (2%)	2 (0%)	54	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	h	497	ASN
3	h	498	ALA

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	B	100/514 (20%)	97 (97%)	3 (3%)	41	66
1	C	100/514 (20%)	93 (93%)	7 (7%)	15	46
2	f	638/4125 (16%)	615 (96%)	23 (4%)	35	63
2	m	446/4125 (11%)	436 (98%)	10 (2%)	52	72
3	h	316/531 (60%)	308 (98%)	8 (2%)	47	70
4	j	22/422 (5%)	19 (86%)	3 (14%)	3	22
All	All	1622/10231 (16%)	1568 (97%)	54 (3%)	41	65

All (54) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	84	ARG
1	B	97	GLU
1	B	167	ARG
1	C	67	ASP
1	C	87	ASN
1	C	111	PHE
1	C	129	TYR
1	C	131	PHE
1	C	137	GLU
1	C	161	TYR
2	f	246	GLN
2	f	274	GLU
2	f	292	ARG
2	f	339	PHE
2	f	342	ASN
2	f	343	ASP
2	f	363	HIS

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Mol	Chain	Res	Type
2	f	409	PHE
2	f	435	ARG
2	f	621	ASP
2	f	622	LYS
2	f	682	LEU
2	f	685	ASP
2	f	689	PHE
2	f	728	ARG
2	f	751	ARG
2	f	773	GLN
2	f	849	ASP
2	f	863	SER
2	f	868	MET
2	f	883	LYS
2	f	1005	GLN
2	f	1010	TYR
3	h	252	LYS
3	h	262	SER
3	h	274	ASN
3	h	378	ASP
3	h	476	PHE
3	h	492	TYR
3	h	495	GLU
3	h	520	MET
4	j	354	LEU
4	j	364	MET
4	j	372	LYS
2	m	263	ASP
2	m	339	PHE
2	m	376	ARG
2	m	403	HIS
2	m	456	HIS
2	m	467	ARG
2	m	552	ARG
2	m	570	ASP
2	m	582	PHE
2	m	583	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	142	ASN

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Mol	Chain	Res	Type
2	f	246	GLN
2	f	579	ASN
2	m	465	GLN

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.

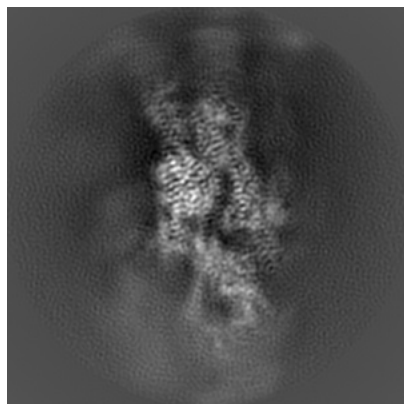
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-17832. These allow visual inspection of the internal detail of the map and identification of artifacts.

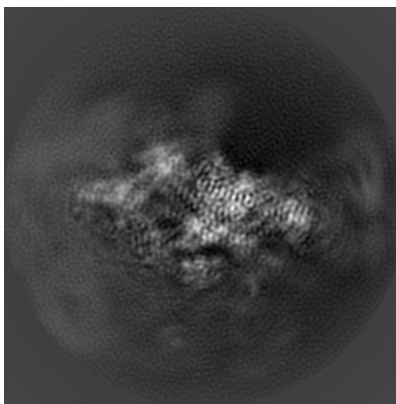
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

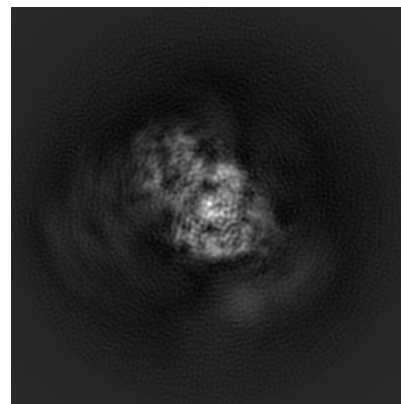
6.1.1 Primary map



X

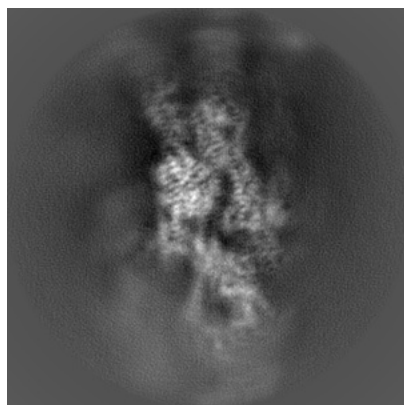


Y

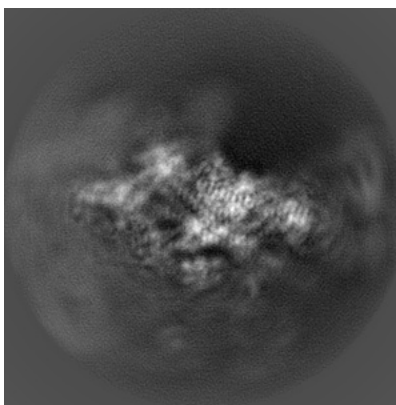


Z

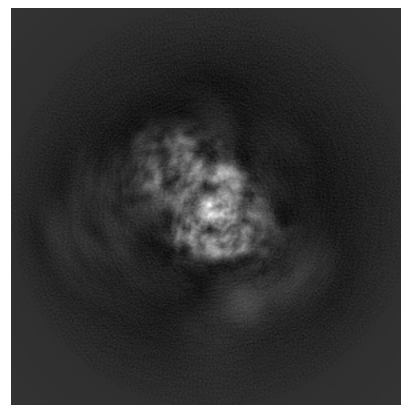
6.1.2 Raw map



X



Y

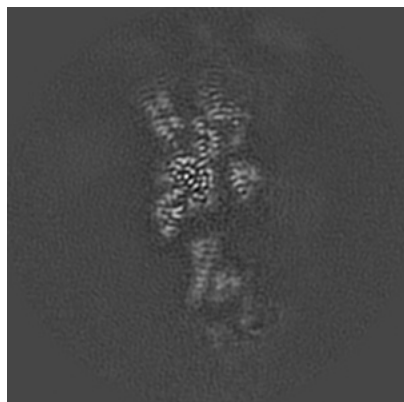


Z

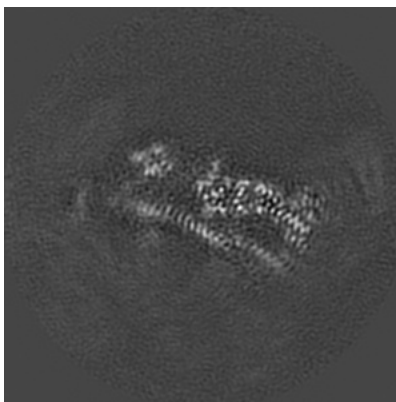
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

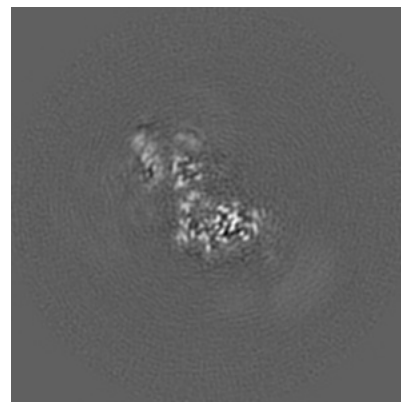
6.2.1 Primary map



X Index: 140

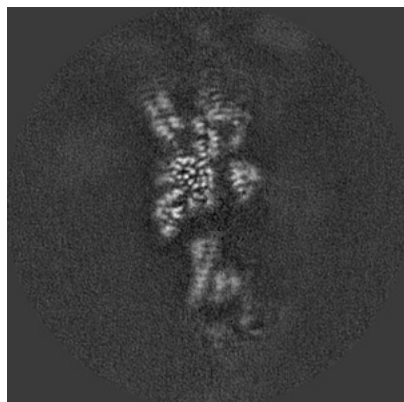


Y Index: 140

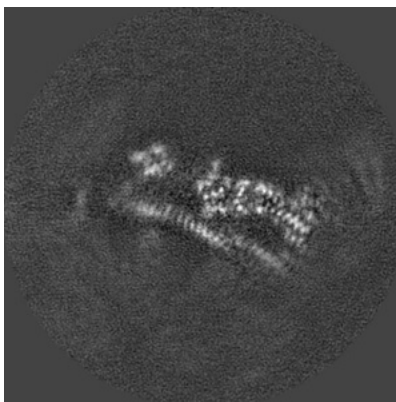


Z Index: 140

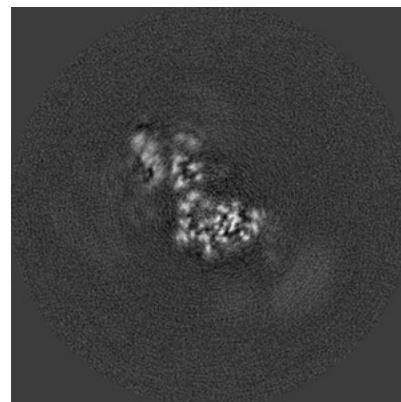
6.2.2 Raw map



X Index: 140



Y Index: 140

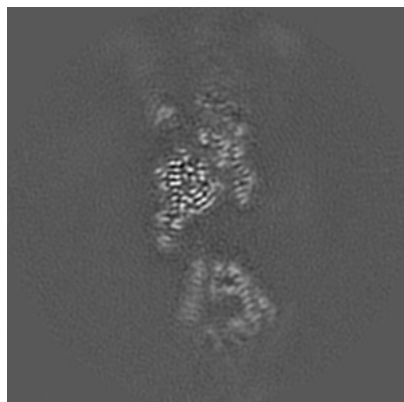


Z Index: 140

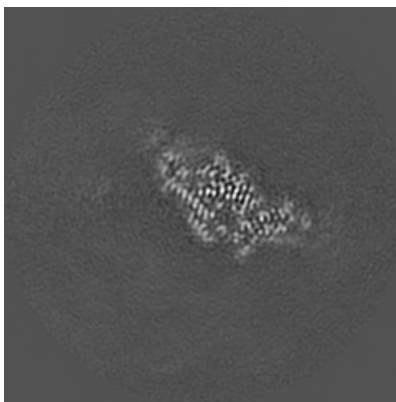
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

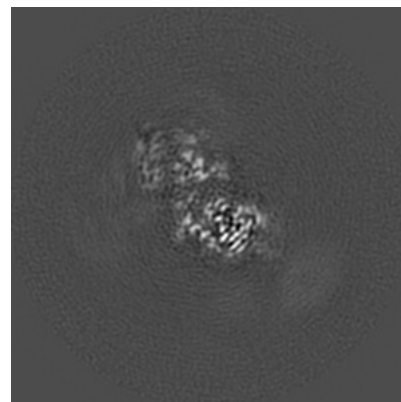
6.3.1 Primary map



X Index: 147

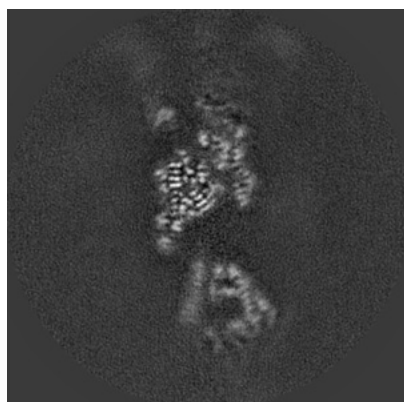


Y Index: 119

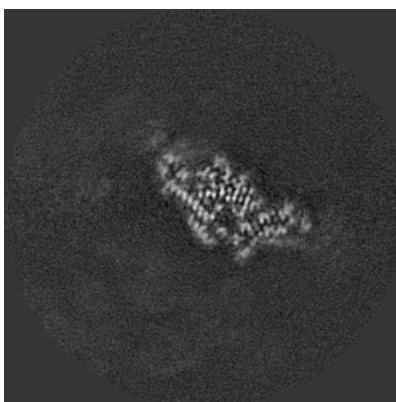


Z Index: 146

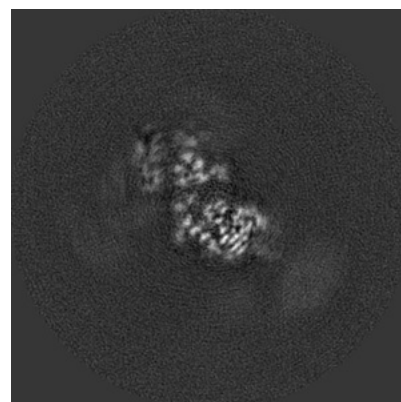
6.3.2 Raw map



X Index: 147



Y Index: 119

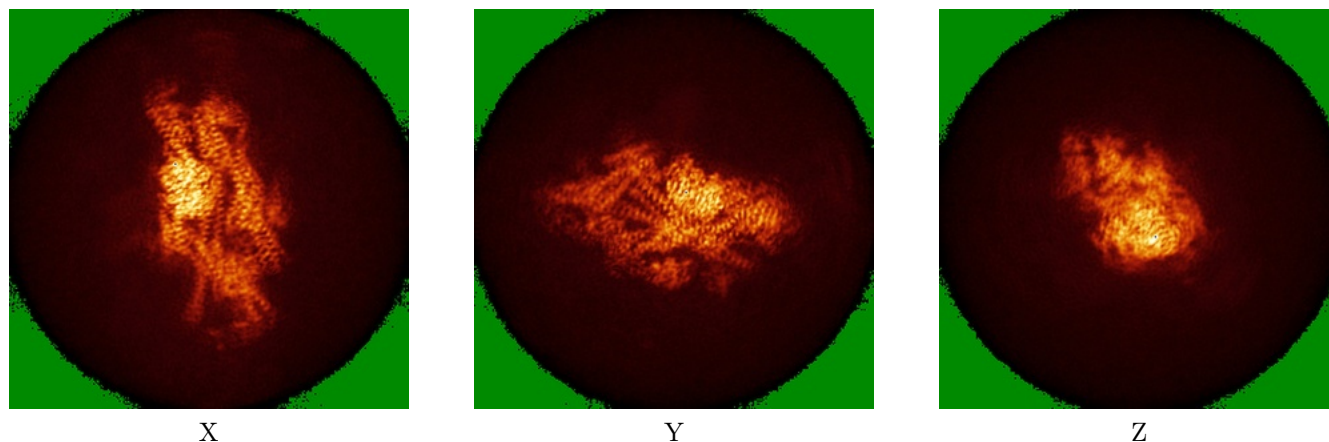


Z Index: 146

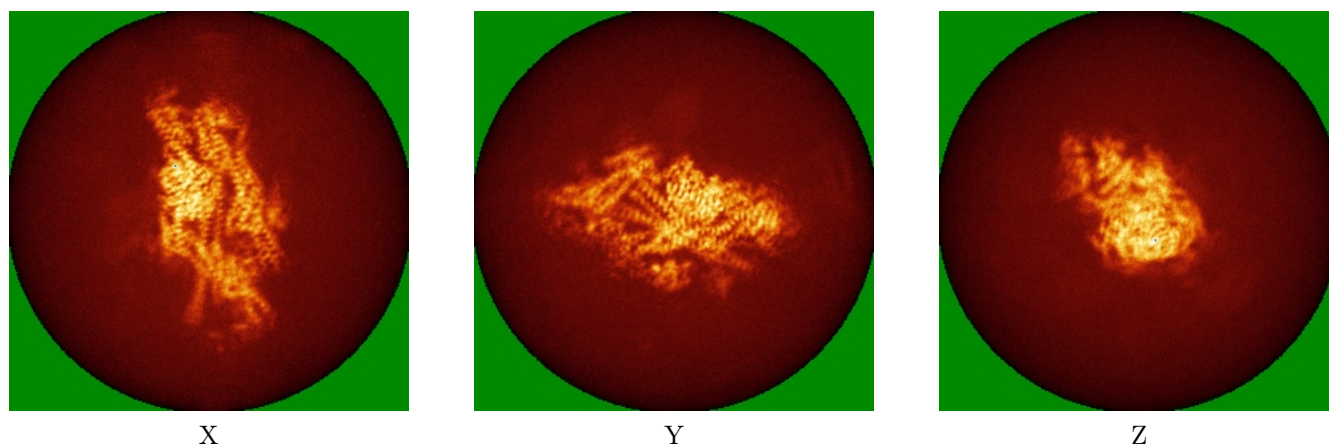
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



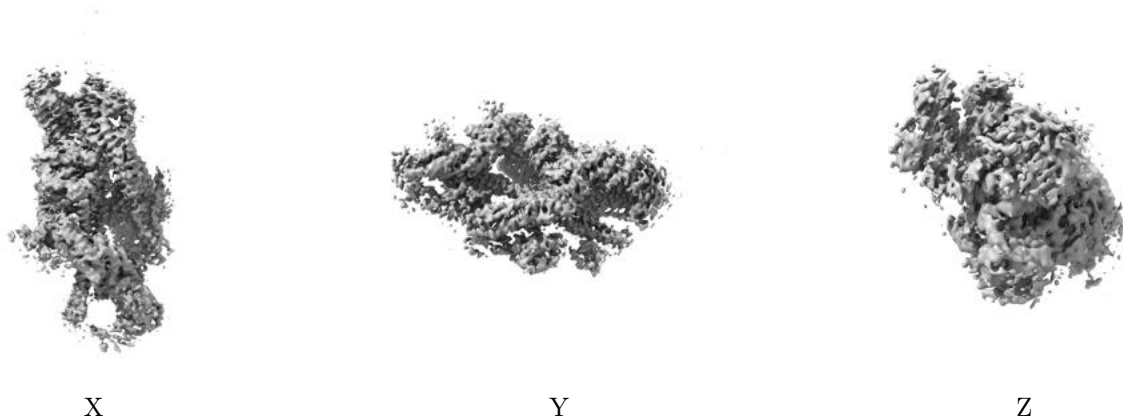
6.4.2 Raw map



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.

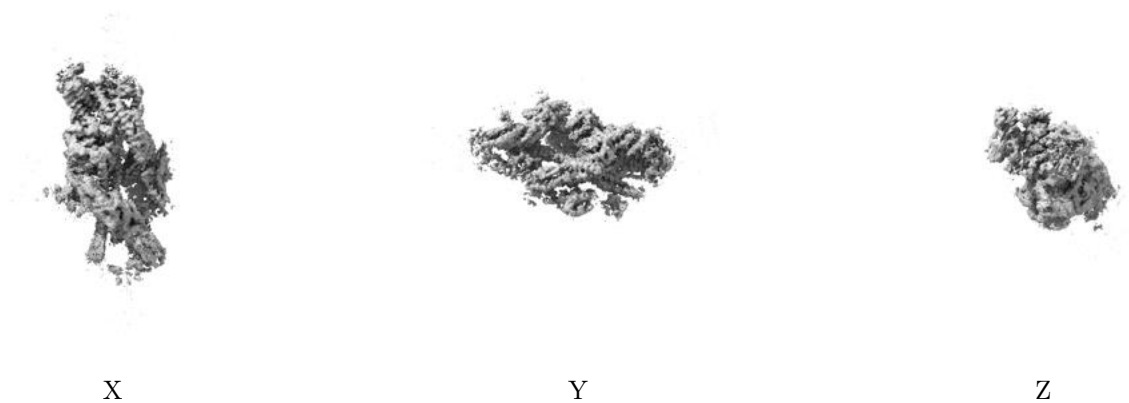
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.004. 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



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.

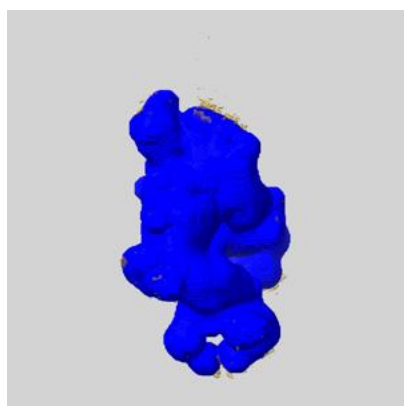
6.6 Mask visualisation [i](#)

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

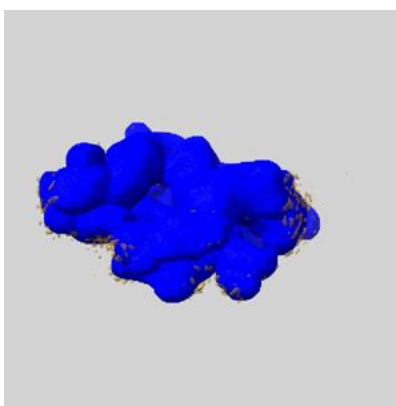
A mask typically either:

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

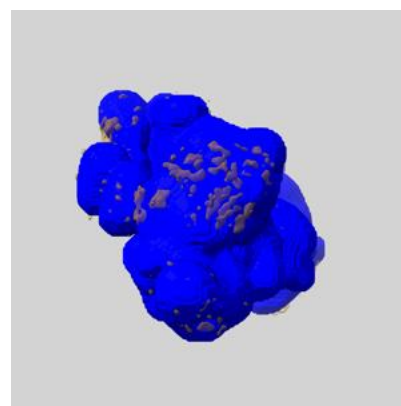
6.6.1 emd_17832_msk_1.map [i](#)



X



Y

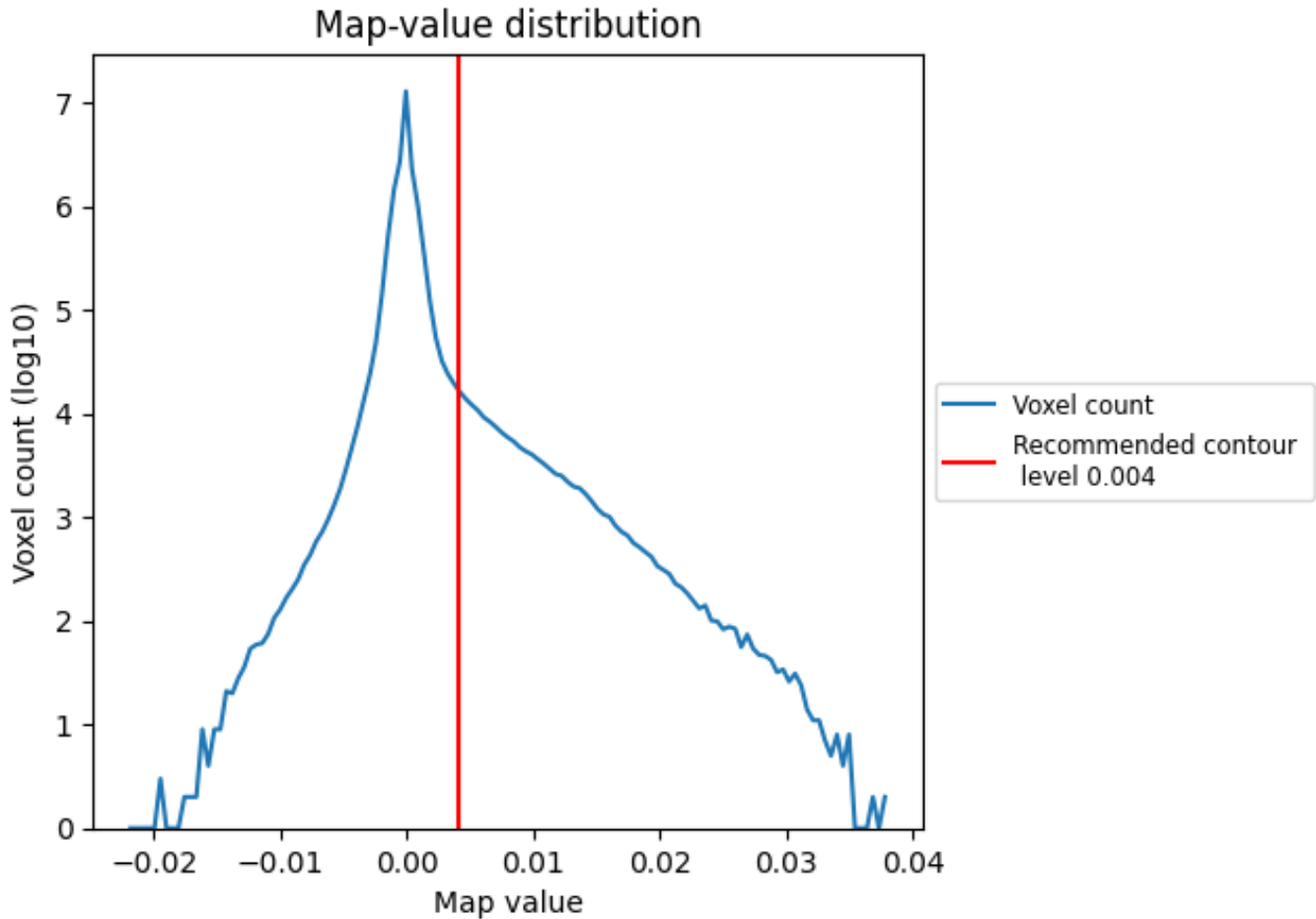


Z

7 Map analysis [i](#)

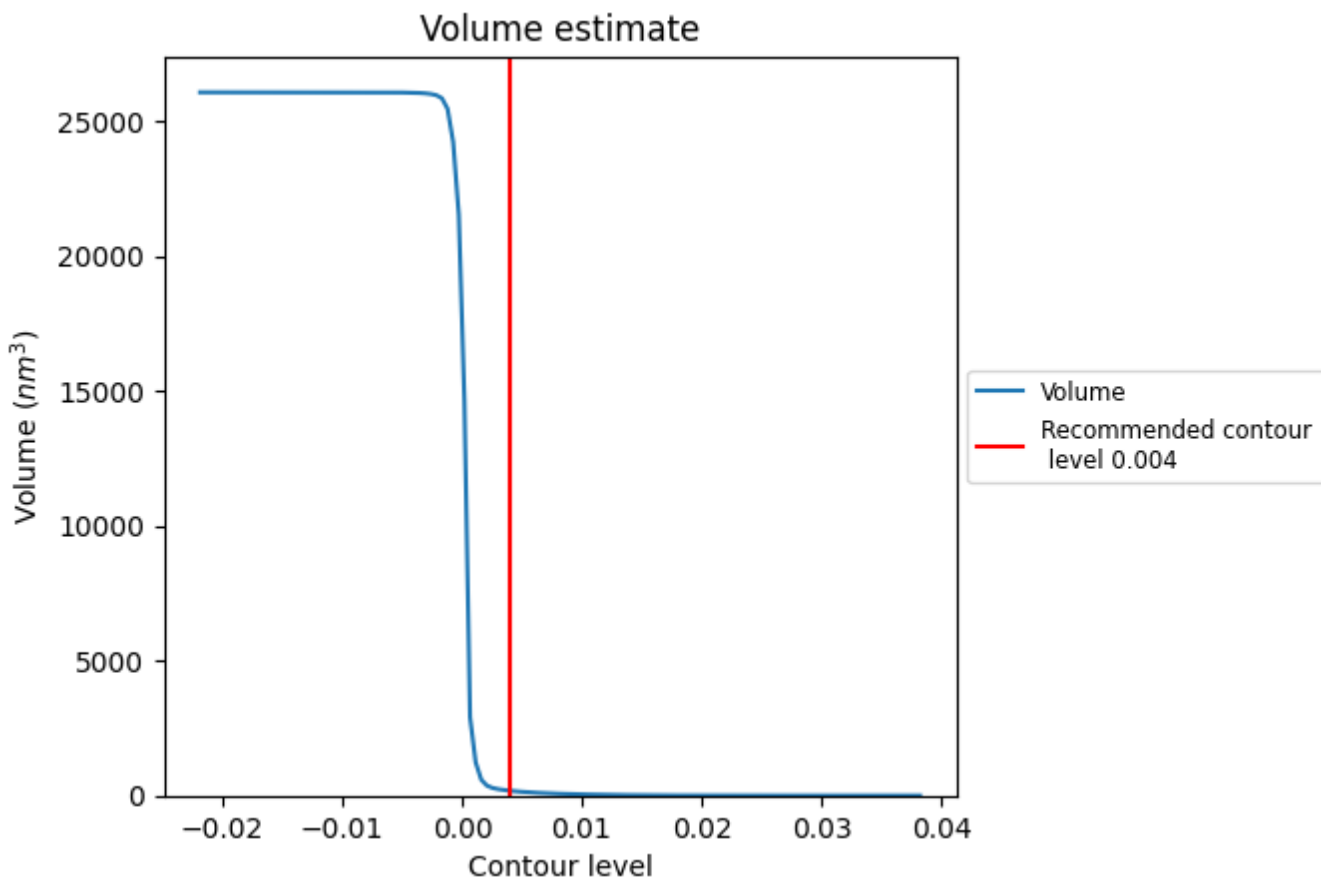
This section contains the results of statistical analysis of the map.

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.

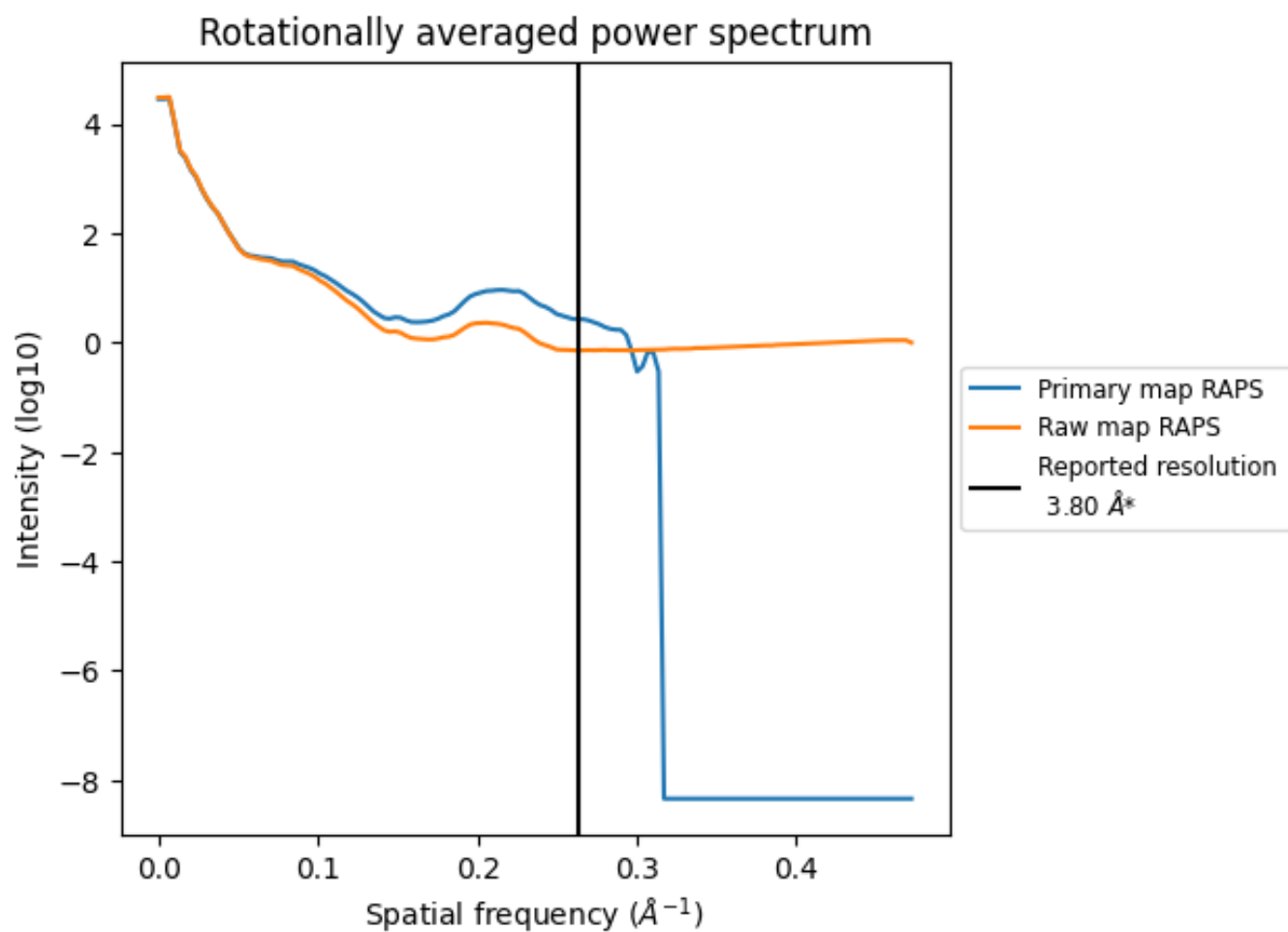
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 179 nm^3 ; this corresponds to an approximate mass of 162 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](#)

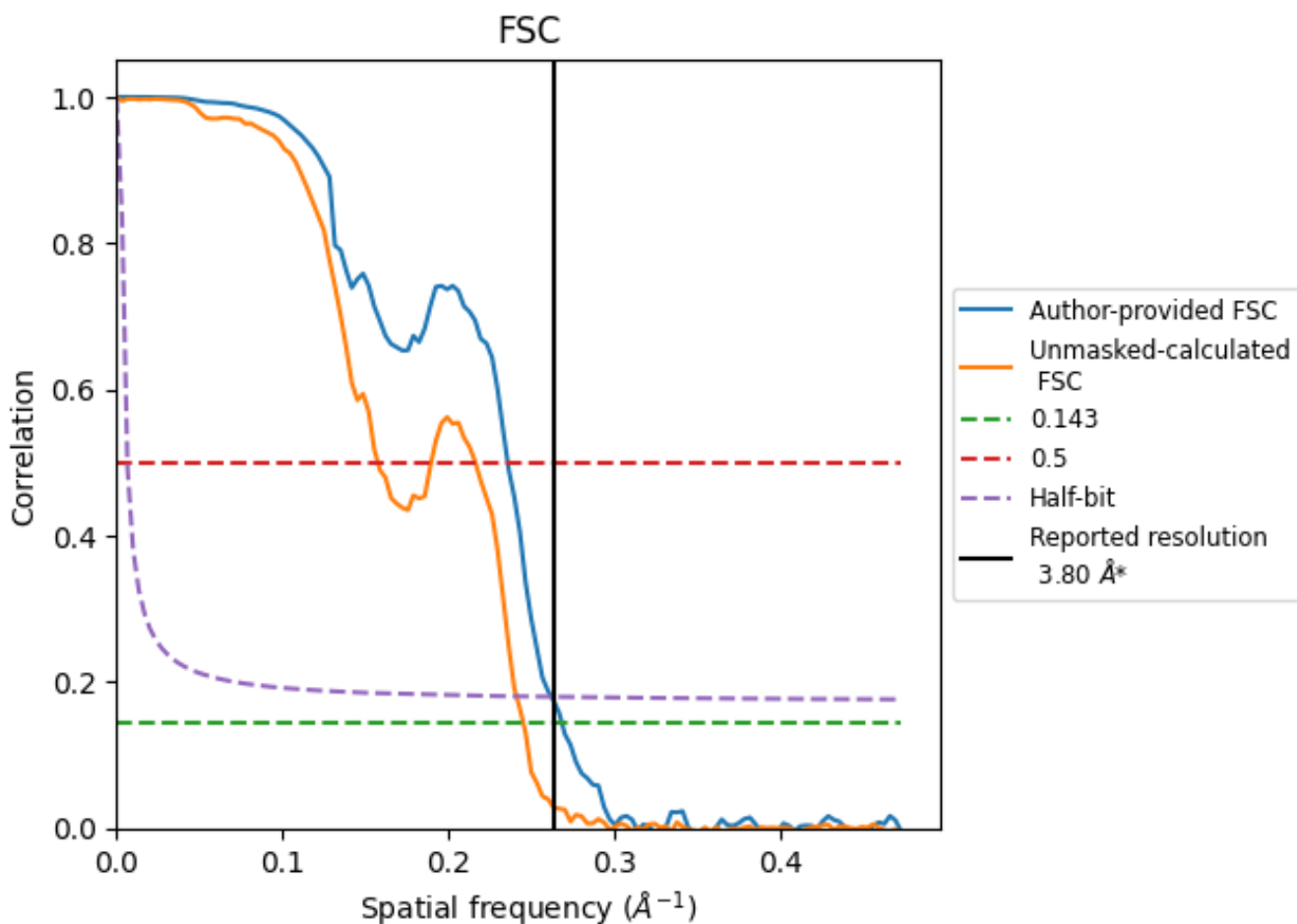


*Reported resolution corresponds to spatial frequency of 0.263 Å⁻¹

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 0.263 Å⁻¹

8.2 Resolution estimates [i](#)

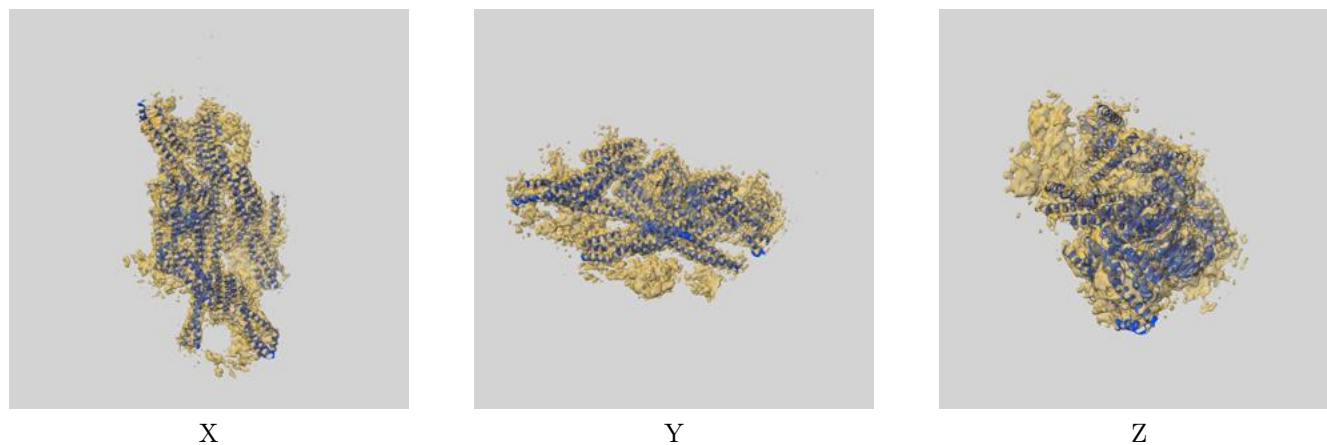
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.80	-	-
Author-provided FSC curve	3.73	4.25	3.82
Unmasked-calculated*	4.08	6.36	4.15

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

9 Map-model fit [i](#)

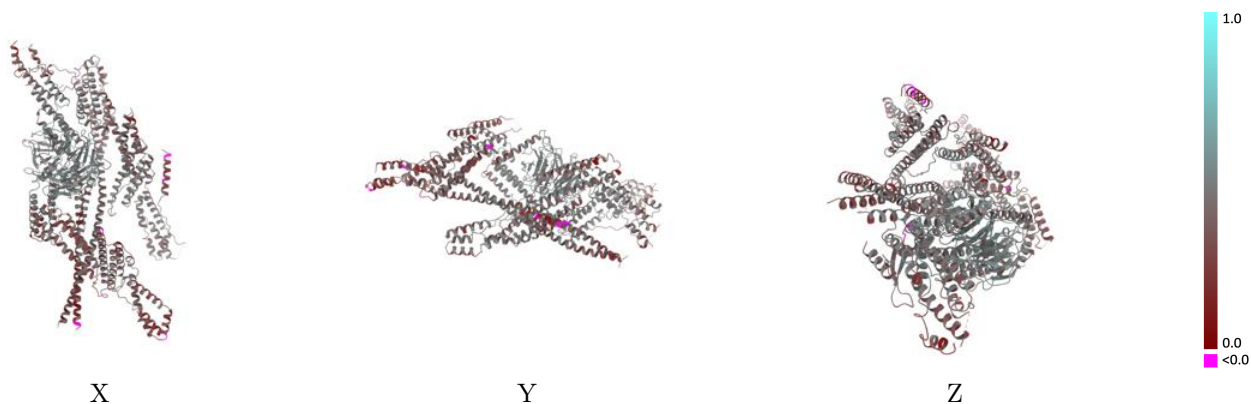
This section contains information regarding the fit between EMDB map EMD-17832 and PDB model 8PR2. Per-residue inclusion information can be found in section 3 on page 6.

9.1 Map-model overlay [i](#)



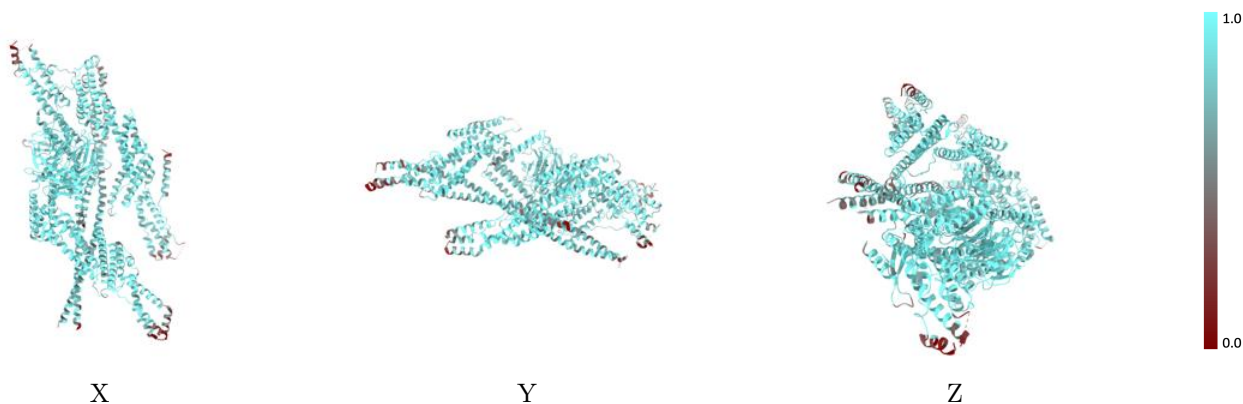
The images above show the 3D surface view of the map at the recommended contour level 0.004 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



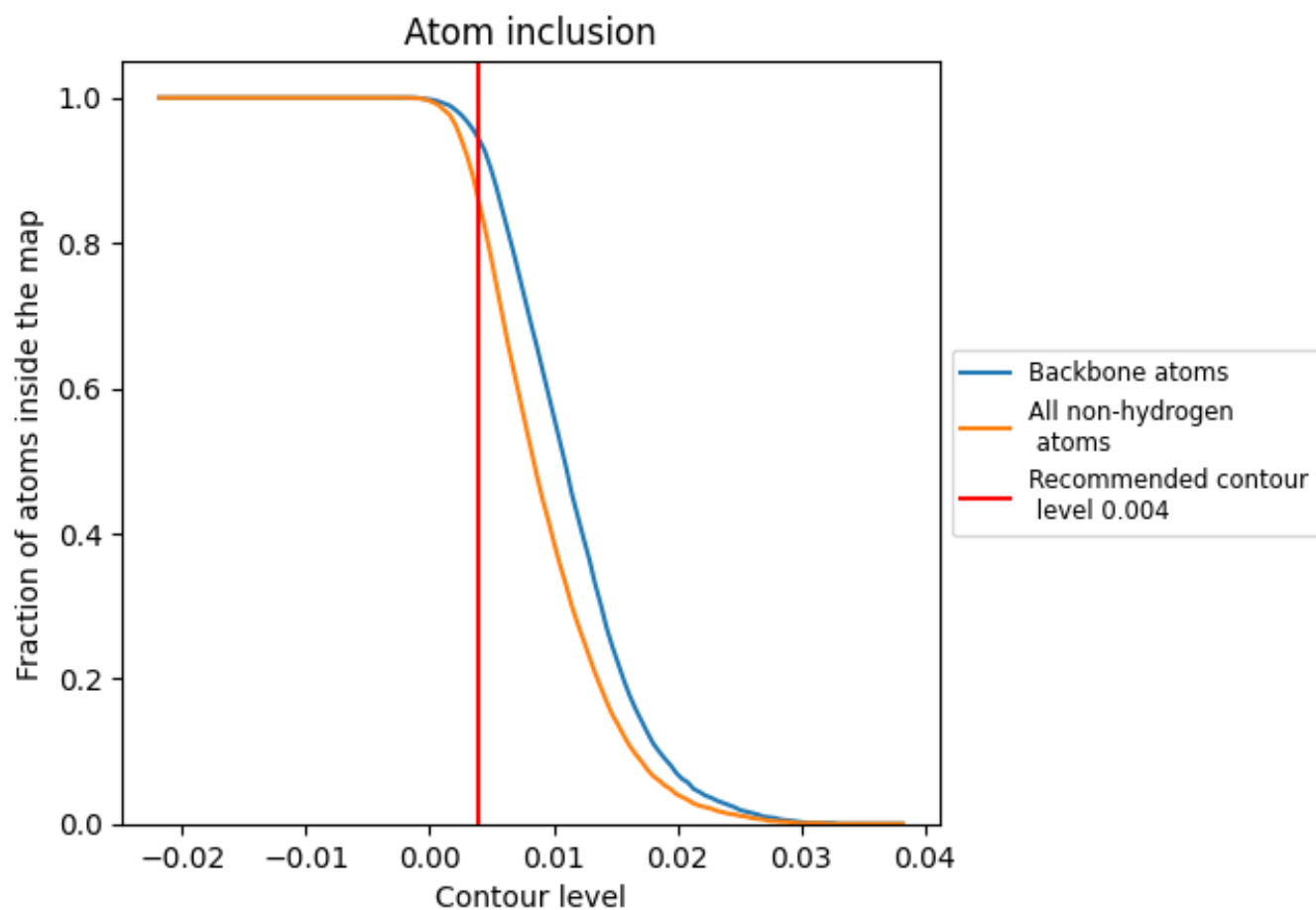
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.004).















9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 86% 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 (0.004) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8550	 0.4180
B	 0.7930	 0.3530
C	 0.7770	 0.3770
f	 0.8470	 0.3960
h	 0.9370	 0.4960
j	 0.8170	 0.4090
m	 0.8420	 0.4190

