



wwPDB EM Validation Summary Report ⓘ

Nov 8, 2021 – 04:10 pm GMT

PDB ID : 7PQE
EMDB ID : EMD-13591
Title : Structure of SidJ/CaM bound to SdeA in post-catalysis state
Authors : Adams, M.; Bhogaraju, S.
Deposited on : 2021-09-17
Resolution : 3.70 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.0.dev97
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.2

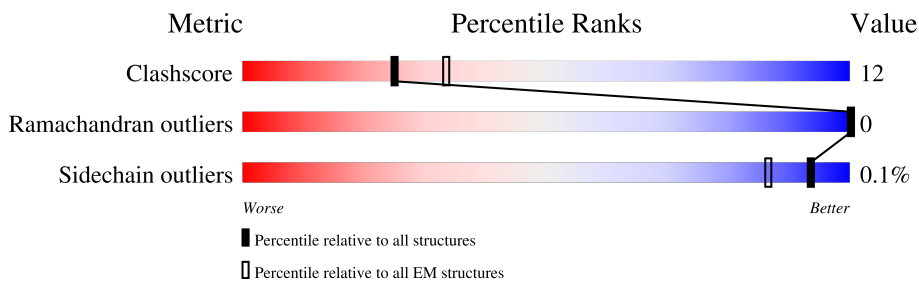
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.70 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	979	
2	C	794	
3	B	168	

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 10746 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 Ubiquitinating/deubiquitinating enzyme SdeA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	492	3870	2446	671	739	14	0	0

There are 19 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	212	HIS	-	expression tag	UNP Q5ZTK4
A	213	HIS	-	expression tag	UNP Q5ZTK4
A	214	HIS	-	expression tag	UNP Q5ZTK4
A	215	HIS	-	expression tag	UNP Q5ZTK4
A	216	HIS	-	expression tag	UNP Q5ZTK4
A	217	HIS	-	expression tag	UNP Q5ZTK4
A	218	SER	-	expression tag	UNP Q5ZTK4
A	219	ALA	-	expression tag	UNP Q5ZTK4
A	220	GLY	-	expression tag	UNP Q5ZTK4
A	221	LEU	-	expression tag	UNP Q5ZTK4
A	222	GLU	-	expression tag	UNP Q5ZTK4
A	223	VAL	-	expression tag	UNP Q5ZTK4
A	224	LEU	-	expression tag	UNP Q5ZTK4
A	225	PHE	-	expression tag	UNP Q5ZTK4
A	226	GLN	-	expression tag	UNP Q5ZTK4
A	227	GLY	-	expression tag	UNP Q5ZTK4
A	228	PRO	-	expression tag	UNP Q5ZTK4
A	229	MET	-	expression tag	UNP Q5ZTK4
A	230	VAL	-	expression tag	UNP Q5ZTK4

- Molecule 2 is a protein called Calmodulin-dependent glutamylase SidJ.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	739	5995	3841	1010	1129	15	0	0

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	81	HIS	-	expression tag	UNP Q5ZTK6
C	82	HIS	-	expression tag	UNP Q5ZTK6
C	83	HIS	-	expression tag	UNP Q5ZTK6
C	84	HIS	-	expression tag	UNP Q5ZTK6
C	85	HIS	-	expression tag	UNP Q5ZTK6
C	86	HIS	-	expression tag	UNP Q5ZTK6
C	87	SER	-	expression tag	UNP Q5ZTK6
C	88	ALA	-	expression tag	UNP Q5ZTK6
C	89	GLY	-	expression tag	UNP Q5ZTK6
C	90	LEU	-	expression tag	UNP Q5ZTK6
C	91	GLU	-	expression tag	UNP Q5ZTK6
C	92	VAL	-	expression tag	UNP Q5ZTK6
C	93	LEU	-	expression tag	UNP Q5ZTK6
C	94	PHE	-	expression tag	UNP Q5ZTK6
C	95	GLN	-	expression tag	UNP Q5ZTK6
C	96	GLY	-	expression tag	UNP Q5ZTK6
C	97	PRO	-	expression tag	UNP Q5ZTK6
C	98	MET	-	expression tag	UNP Q5ZTK6
C	138	THR	ALA	variant	UNP Q5ZTK6
C	151	VAL	ILE	variant	UNP Q5ZTK6
C	153	GLN	LYS	variant	UNP Q5ZTK6
C	200	ILE	THR	variant	UNP Q5ZTK6
C	212	THR	MET	variant	UNP Q5ZTK6
C	371	ARG	LYS	variant	UNP Q5ZTK6
C	383	GLN	GLU	variant	UNP Q5ZTK6
C	393	SER	ARG	conflict	UNP Q5ZTK6
C	398	TYR	HIS	variant	UNP Q5ZTK6
C	433	GLY	ASP	variant	UNP Q5ZTK6
C	447	LEU	GLN	variant	UNP Q5ZTK6
C	448	THR	SER	variant	UNP Q5ZTK6
C	483	MET	VAL	variant	UNP Q5ZTK6
C	565	ALA	GLU	engineered mutation	UNP Q5ZTK6
C	725	THR	VAL	variant	UNP Q5ZTK6
C	767	GLN	GLU	variant	UNP Q5ZTK6
C	798	ARG	GLY	variant	UNP Q5ZTK6
C	834	LYS	ARG	variant	UNP Q5ZTK6
C	848	THR	ALA	variant	UNP Q5ZTK6
C	855	ASN	LYS	variant	UNP Q5ZTK6
C	859	GLU	ASP	variant	UNP Q5ZTK6
C	874	LYS	-	variant	UNP Q5ZTK6

- Molecule 3 is a protein called Calmodulin.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	B	134	879	546	147	180	6	0	0

There are 19 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	HIS	-	expression tag	UNP P0DP24
B	-17	HIS	-	expression tag	UNP P0DP24
B	-16	HIS	-	expression tag	UNP P0DP24
B	-15	HIS	-	expression tag	UNP P0DP24
B	-14	HIS	-	expression tag	UNP P0DP24
B	-13	HIS	-	expression tag	UNP P0DP24
B	-12	SER	-	expression tag	UNP P0DP24
B	-11	SER	-	expression tag	UNP P0DP24
B	-10	GLY	-	expression tag	UNP P0DP24
B	-9	LEU	-	expression tag	UNP P0DP24
B	-8	GLU	-	expression tag	UNP P0DP24
B	-7	VAL	-	expression tag	UNP P0DP24
B	-6	LEU	-	expression tag	UNP P0DP24
B	-5	PHE	-	expression tag	UNP P0DP24
B	-4	GLN	-	expression tag	UNP P0DP24
B	-3	GLY	-	expression tag	UNP P0DP24
B	-2	PRO	-	expression tag	UNP P0DP24
B	-1	HIS	-	expression tag	UNP P0DP24
B	0	MET	-	expression tag	UNP P0DP24

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
4	C	1	Total	Mg	0
			1	1	

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
5	B	1	Total	Ca	0
			1	1	

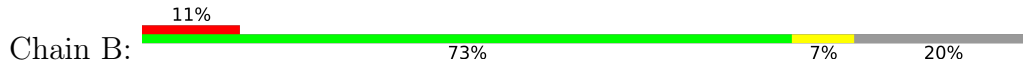
LYS	THR	GLU	LEU	THR	GLY	LYS	LEU	ASP	ALA	VAL	THR	LYS	GLY	ILE	SER	ASN	LEU	LYS	GLN	GLU	VAL	THR	VAL	ARG	ASN	GLY	THR	LYS	ASP	VAL	ASP	PHE	SER	VAL	GLU	LYS	GLU	GLN	ILE	GLN	GLN
VAL	ILE	ASP	THR	LEU	ALA	ASP	ALA	TYR	PRO	LEU	LEU	VAL	VAL	THR	LYS	GLN	THR	VAL	VAL	ILE	ALA																				

● Molecule 2: Calmodulin-dependent glutamylase SidJ



HIS	HIS	HIS	HIS	HIS	HIS	SER	ALA	GLY	LEU	PRO	VAL	K100	Q101	Y102	A105	H113	P119	P120	V121	L124	S125	G126	R127	S128	I129	E133	V151	D152	Q153	K156	S157	N158	A169	S170	H171	Y172	L173	F174	L175	A176	S177	L178	A179	M180			
G185	I186	K187	K188	N189	O190	L191	L192	K196	P197	K205	E206	I213	S220	E221	Y222	P223	L224	I225	N230	N231	A233	H234	S235	N236	F237	N238	L241	H246	K247	E248	P249	L250	T251	Q254	D263	S264	S265	V266	F267	L268	F269	F174	Y274	N277	M289	A179	P290
H291	F292	R293	R294	R295	T298	Y301	H302	S303	T304	L305	T306	L310	K316	L320	H324	H325	Y326	F332	I333	D334	S335	R338	Y339	Q340	R341	S342	S343	D344	R345	I349	L354	L355	T358	P359	Q360	Y363	Y366	K367	V368	Q369	K370	R371	T377	E380			
E381	F382	K384	L388	R394	S399	H302	P404	L405	S409	F417	I418	S419	R420	L423	H325	D424	F425	F428	K429	I432	G433	R438	Y339	D437	L438	E439	V440	Y441	V442	L453	H454	Q458	D459	L460	T464	Y467	D473	L474	F475	V368	Q369	G481	I482	M483	A488	D489	
I490	F491	HIS	THR	PHE	GLY	ASP	GLU	ARG	GLU	D502	Y506	L520	I523	D524	K525	K528	V533	G539	D542	L543	S546	L547	P548	I549	T550	S551	L552	T559	K560	S564	L567	S585	T588	G589	K590	R591	Y597	L598	L600	I603							
Y606	L607	L608	W609	O611	L612	T613	L614	G615	K620	D627	K630	K631	E632	W635	T654	D792	R660	E672	H674	F675	R676	Q679	N682	D692	T693	Q698	Y699	S700	I701	Y702	S703	G704	E705	P706	E707	Y708	T711	Y715	V718	L598	D723	G724	L729				
G730	G731	H732	N733	E740	L741	E742	T750	L751	I752	W756	D759	E786	Q790	L791	L792	D793	R796	C799	W806	L807	E811	D823	A824	Y825	D826	Q830	K834	T835	N836	A837	A838	R839	T840	I841	Q842	T846	ARG	LYS	ASN	LEU	SER	GLU	ASN	ASP			
ILE	GLU	SER	GLU	PRO	GLU	SER	GLU	THR	THR	ASP	LYS	ARG	LEU	LYS																																	

● Molecule 3: Calmodulin



HIS	HIS	HIS	HIS	HIS	HIS	SER	GLY	GLU	GLU	VAL	PHE	GLN	GLY	PRO	HIS	MET	MET	ALA	D3	E15	Q42	N43	P44	A47	E48	L49	Q50	I53	N54	D57	A58	D59	G62	K78	D81	S82	E83	A89	V92	F93	D94	LYS	ASP	N98	A103
A104	M110	T111	M112	L113	L117	E120	D123	R127	E128	A129	ASP	ILE	ASP	GLY	ASP	GLN	VAL	M138	M146	THR	ALA	LYS																							

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	58448	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	35	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.407	Depositor
Minimum map value	-0.234	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.045	Depositor
Map size (Å)	301.12, 301.12, 301.12	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.941, 0.941, 0.941	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, MG

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	0.30	0/3952	0.46	0/5339
2	C	0.37	0/6131	0.48	0/8295
3	B	0.27	0/885	0.46	0/1202
All	All	0.34	0/10968	0.47	0/14836

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	3870	0	3741	92	0
2	C	5995	0	5969	151	0
3	B	879	0	717	9	0
4	C	1	0	0	0	0
5	B	1	0	0	0	0
All	All	10746	0	10427	245	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 12.

The worst 5 of 245 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)
2:C:627:ASP:HB3	2:C:630:LYS:HE2	1.64	0.79
1:A:298:LYS:HD2	1:A:787:ALA:HA	1.66	0.77
2:C:366:VAL:HG22	2:C:442:VAL:HG22	1.68	0.73
2:C:676:ARG:HB3	2:C:701:ILE:HG22	1.69	0.73
2:C:113:HIS:NE2	2:C:316:LYS:O	2.23	0.72

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	484/979 (49%)	446 (92%)	38 (8%)	0	100	100
2	C	735/794 (93%)	706 (96%)	29 (4%)	0	100	100
3	B	128/168 (76%)	119 (93%)	9 (7%)	0	100	100
All	All	1347/1941 (69%)	1271 (94%)	76 (6%)	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	409/852 (48%)	409 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	665/721 (92%)	664 (100%)	1 (0%)	93	97
3	B	67/144 (46%)	67 (100%)	0	100	100
All	All	1141/1717 (66%)	1140 (100%)	1 (0%)	93	98

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	158	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	250	ASN
1	A	550	ASN
1	A	851	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](#)

Of 2 ligands modelled in this entry, 2 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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

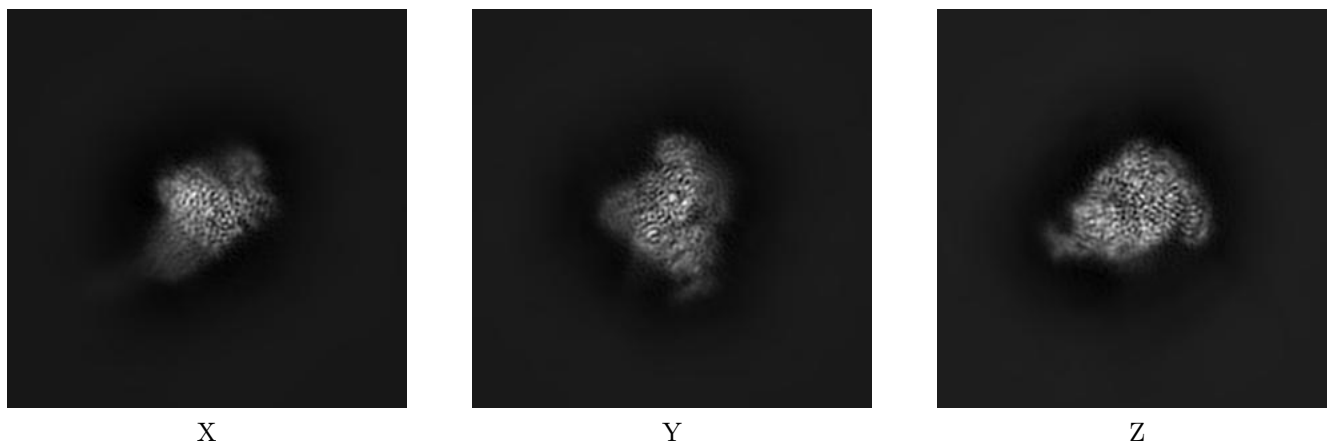
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13591. 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](#)

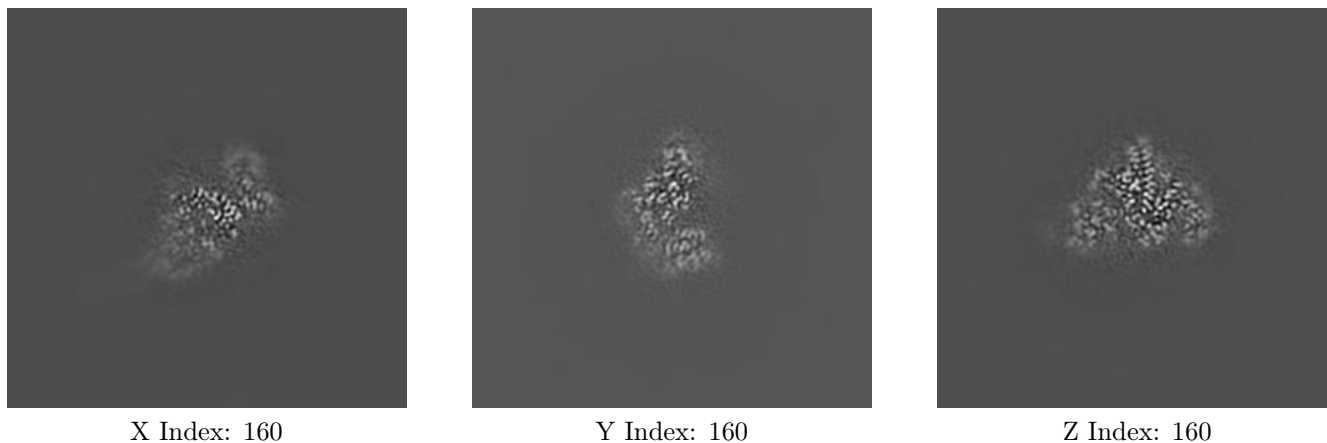
6.1.1 Primary map



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

6.2 Central slices [i](#)

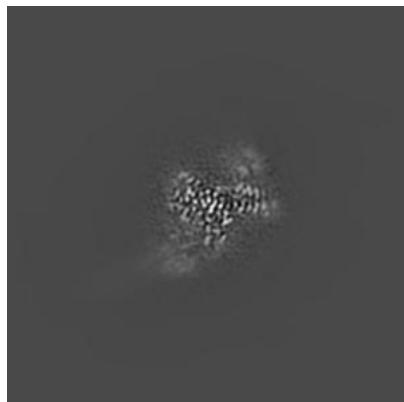
6.2.1 Primary map



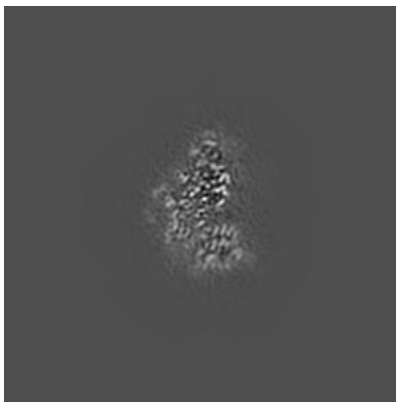
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

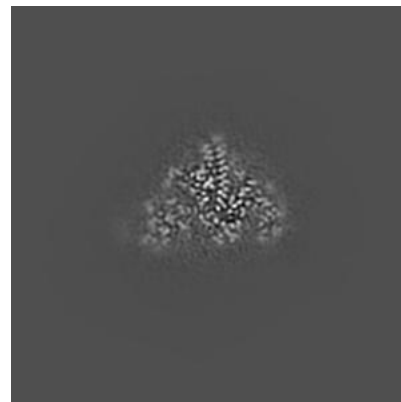
6.3.1 Primary map



X Index: 166



Y Index: 158

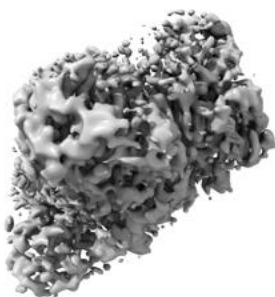


Z Index: 160

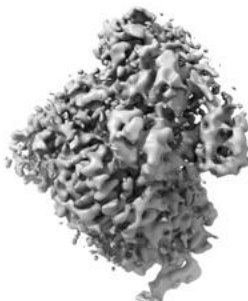
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

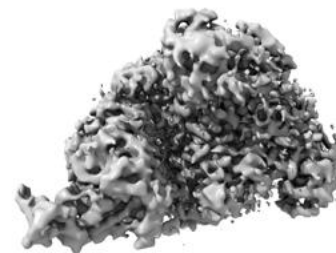
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.045. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

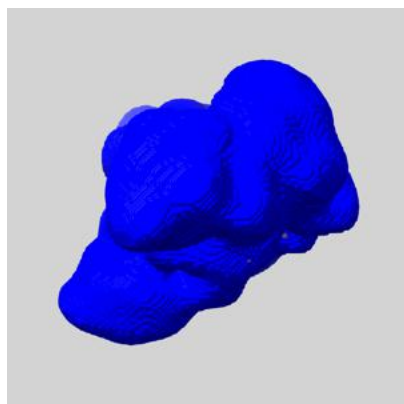
6.5 Mask visualisation [i](#)

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

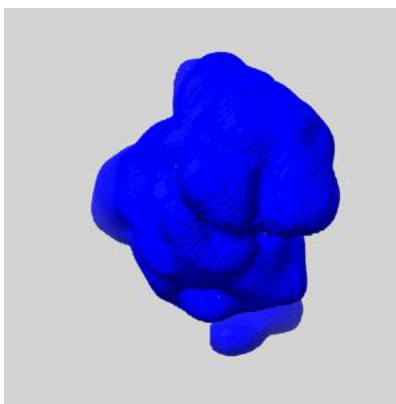
A mask typically either:

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

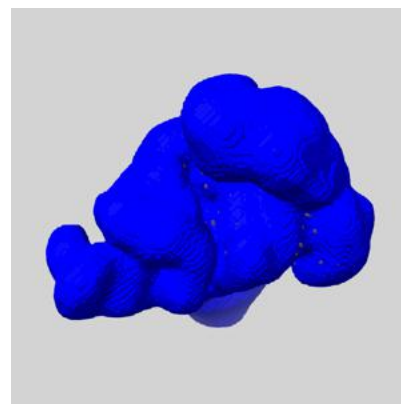
6.5.1 emd_13591_msk_1.map [i](#)



X



Y

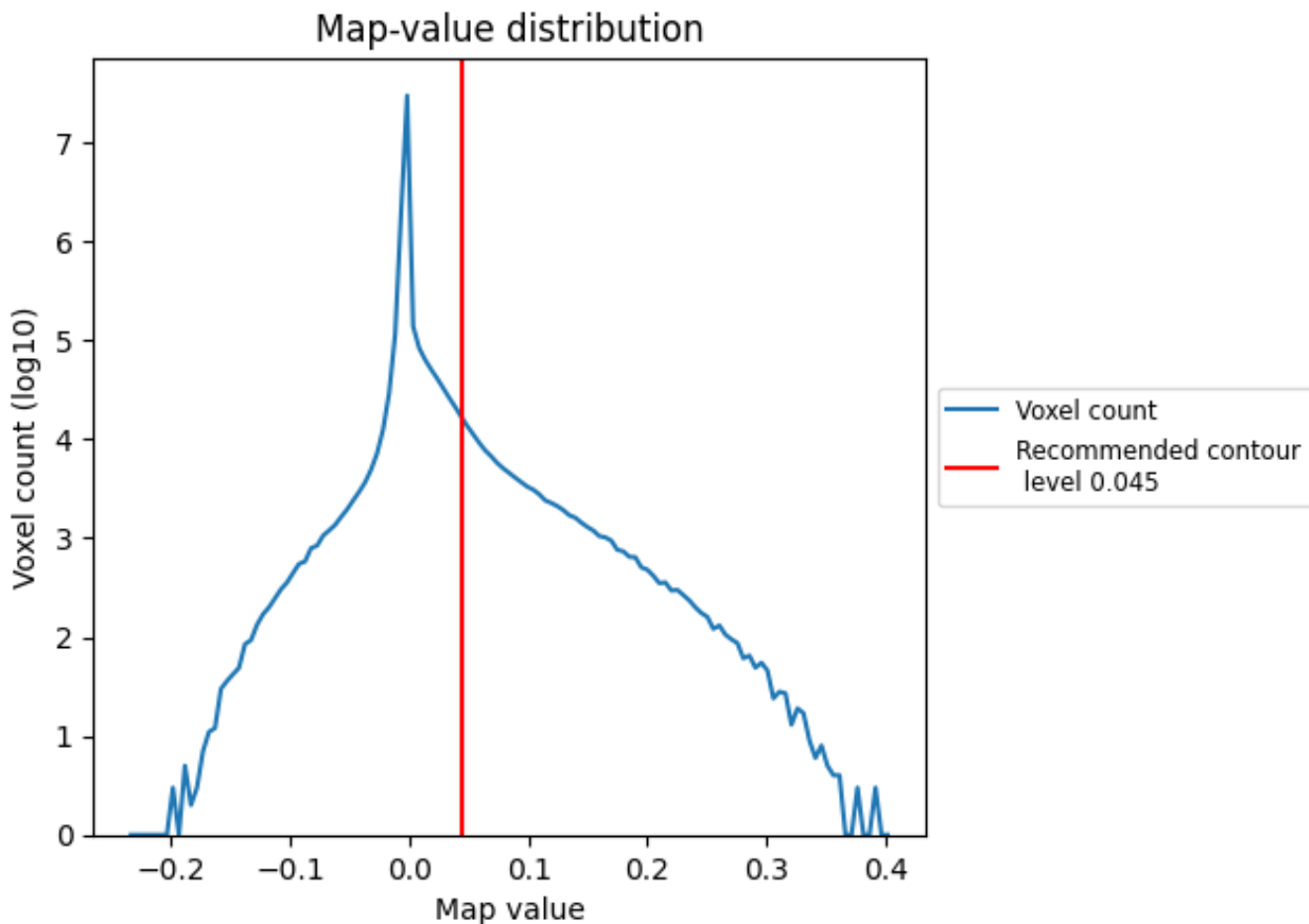


Z

7 Map analysis [i](#)

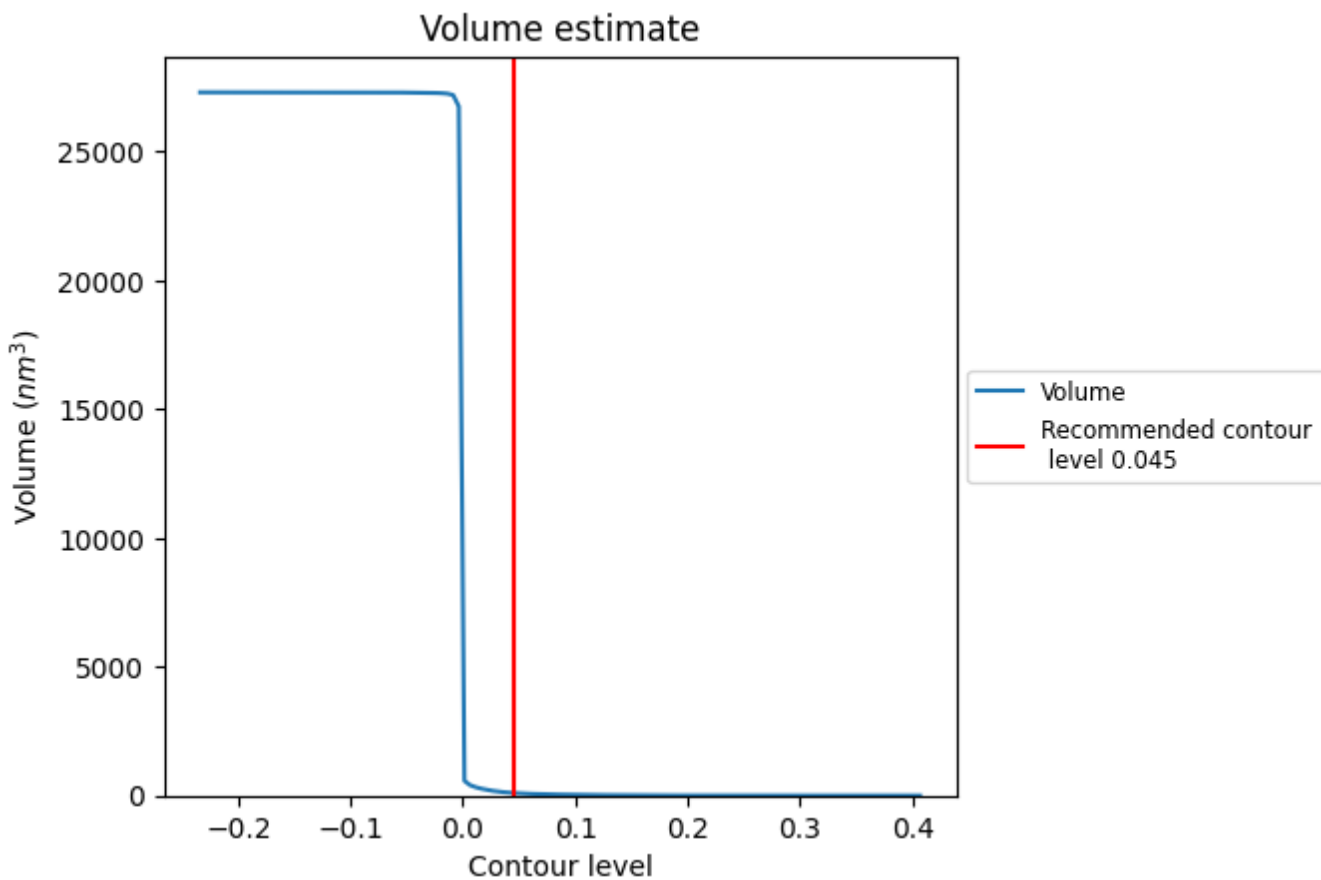
This section contains the results of statistical analysis of the map.

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.

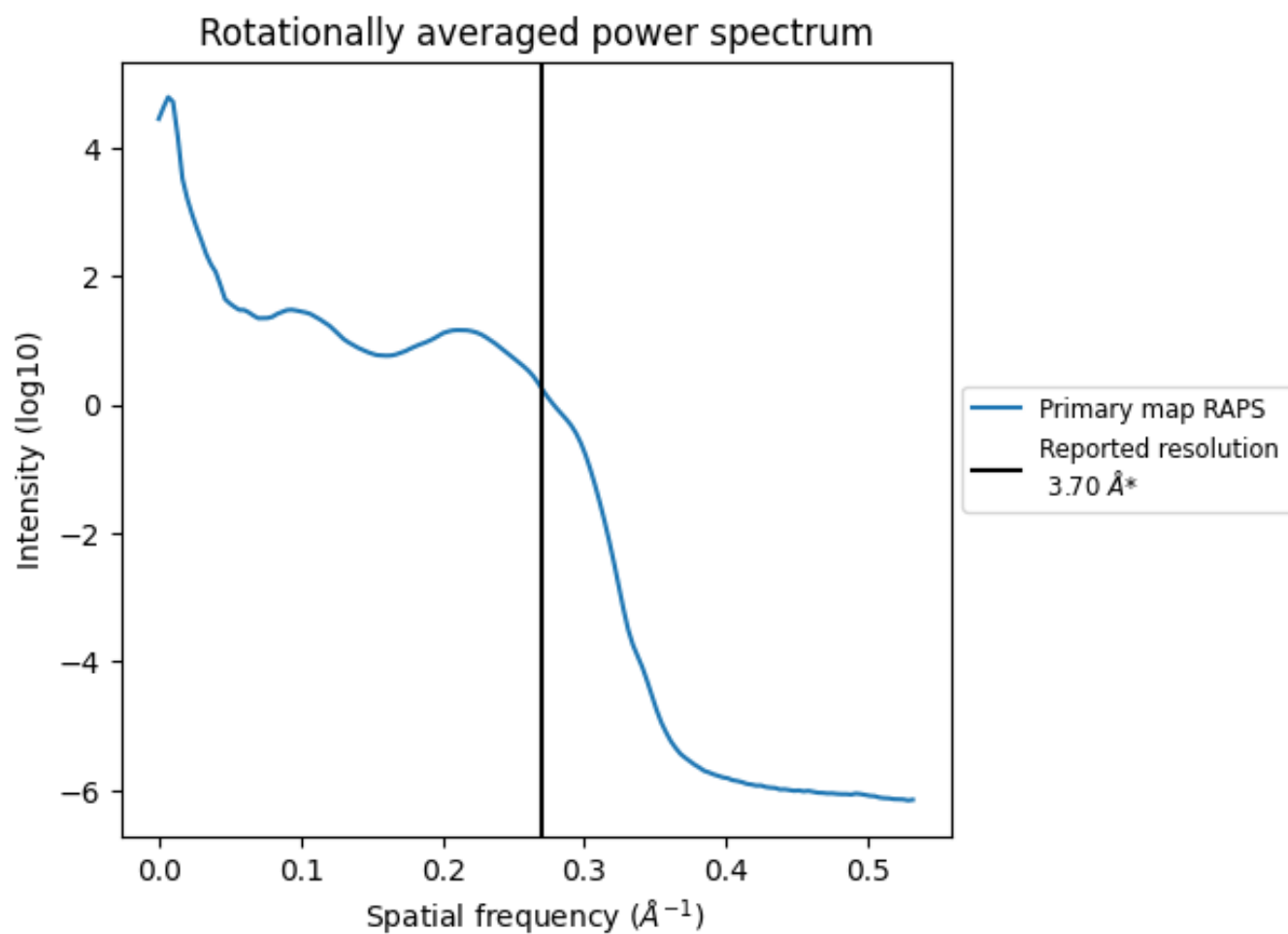
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 100 nm³; this corresponds to an approximate mass of 90 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](#)

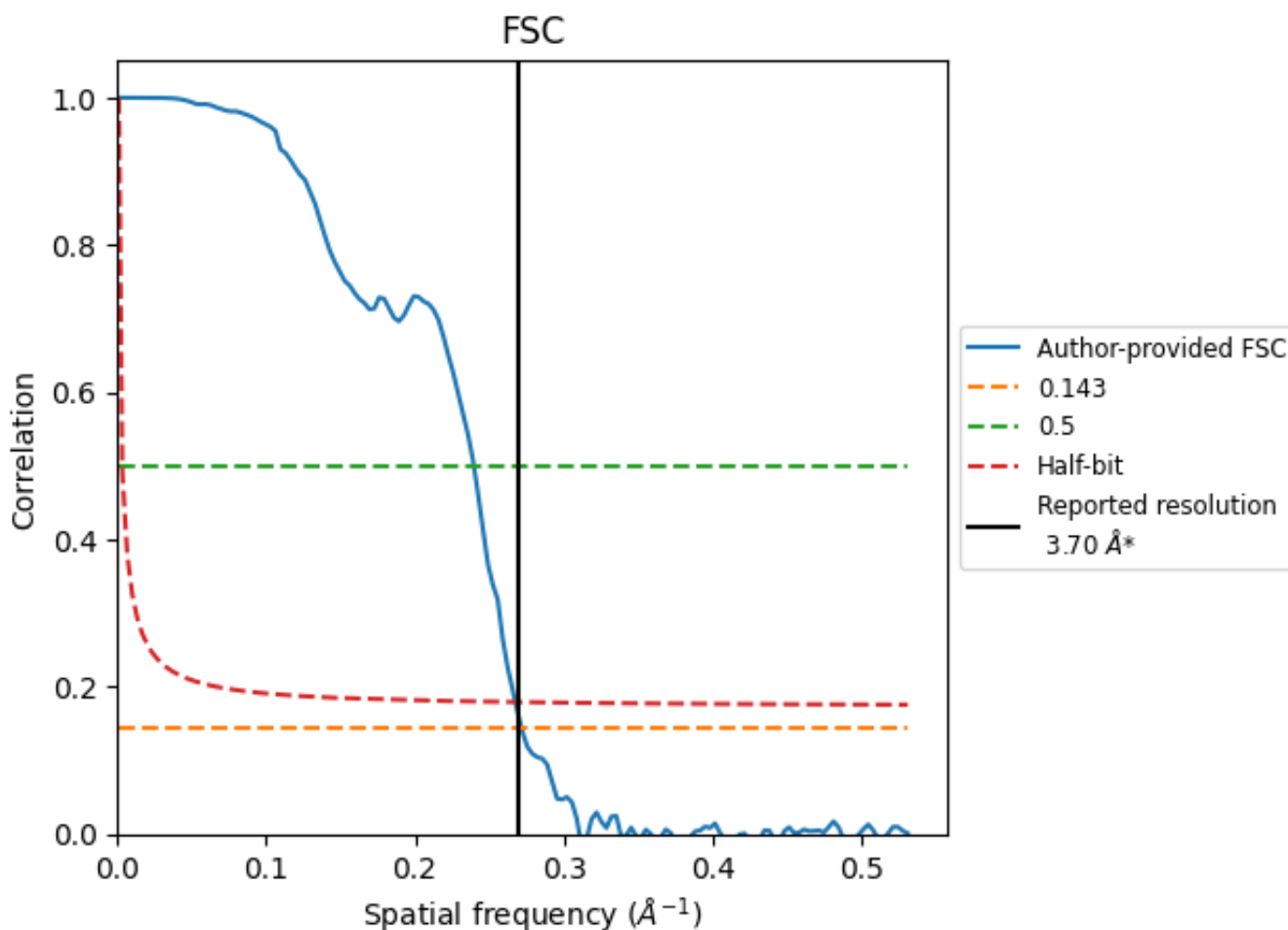


*Reported resolution corresponds to spatial frequency of 0.270\AA^{-1}

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 0.270 Å⁻¹

8.2 Resolution estimates [i](#)

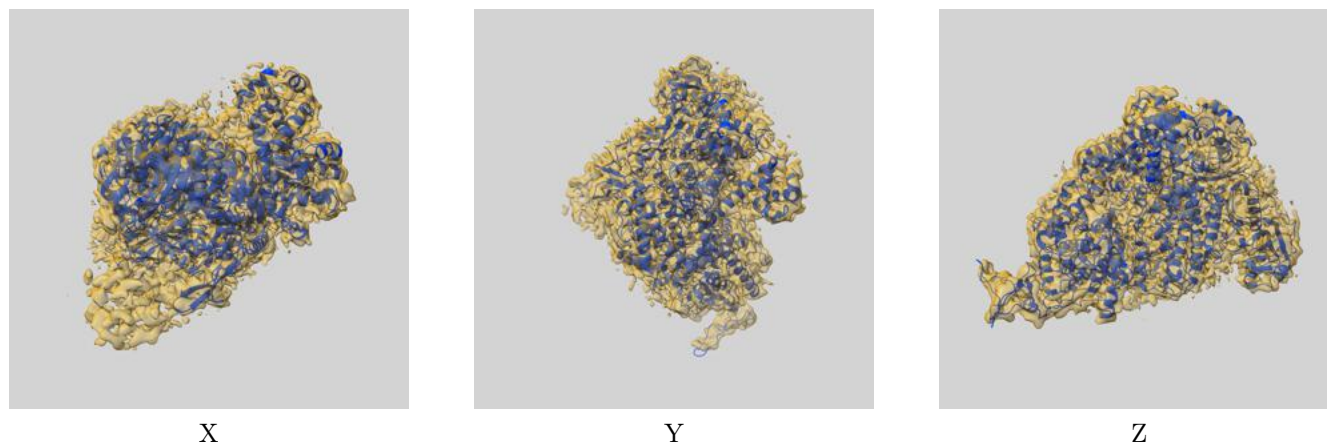
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.70	-	-
Author-provided FSC curve	3.68	4.17	3.74
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

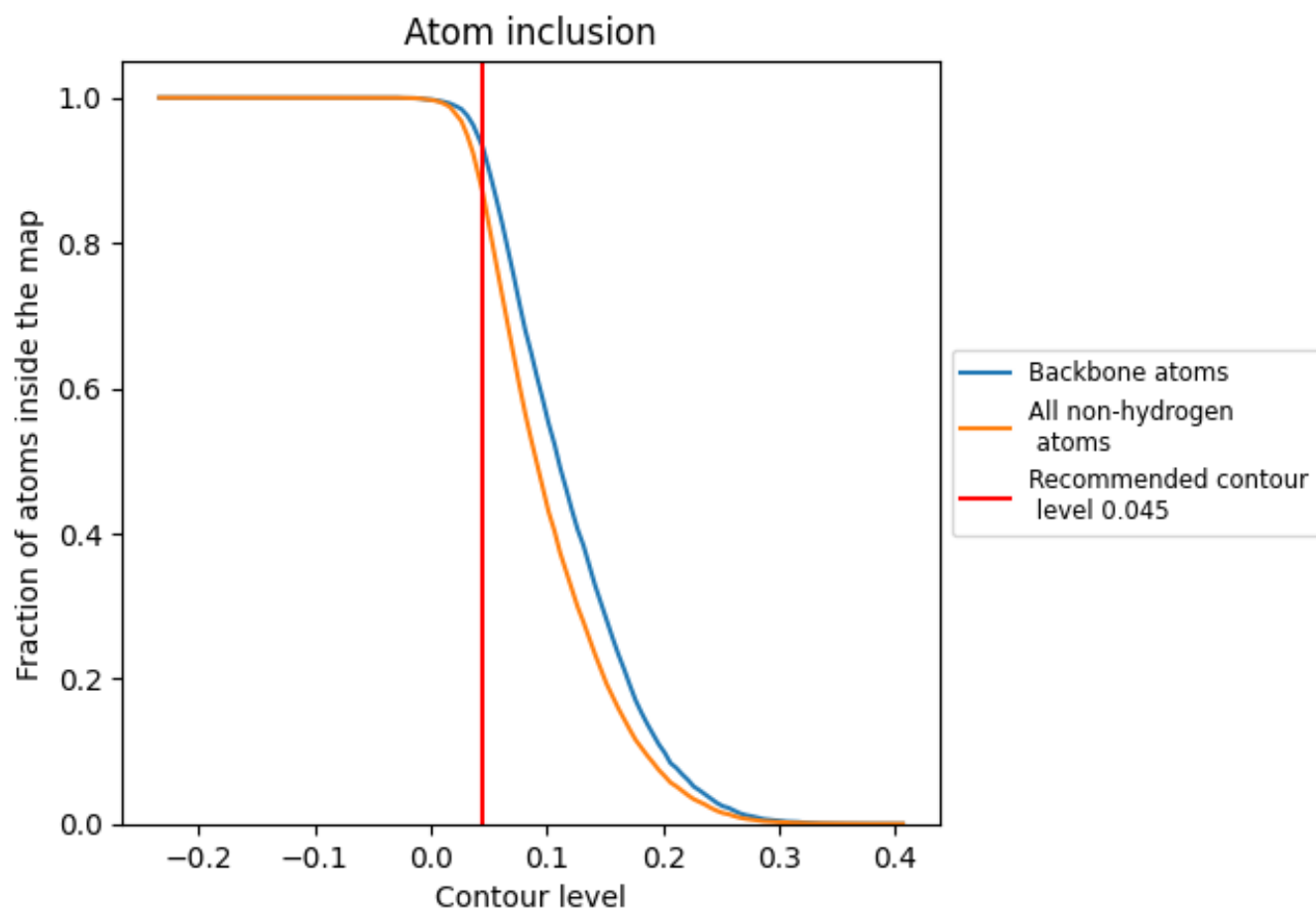
This section contains information regarding the fit between EMDB map EMD-13591 and PDB model 7PQE. Per-residue inclusion information can be found in section 3 on page 6.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.045 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 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 87% of all non-hydrogen atoms, are inside the map.