



# wwPDB EM Validation Summary Report ⓘ

Jun 2, 2024 – 02:09 PM EDT

PDB ID : 8D4X  
EMDB ID : EMD-27201  
Title : Structure of the human UBR5 HECT-type E3 ubiquitin ligase in a dimeric form  
Authors : Wang, F.; He, Q.; Lin, G.; Li, H.  
Deposited on : 2022-06-02  
Resolution : 2.80 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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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) : 2.36.2

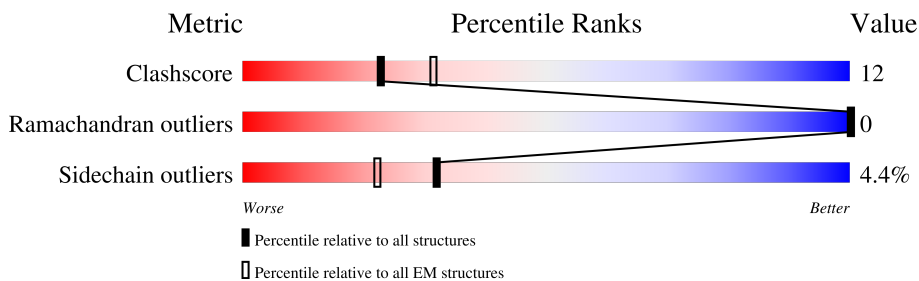
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.80 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  $\geq 3$ , 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	2806	
1	B	2806	

## 2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 26409 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 E3 ubiquitin-protein ligase UBR5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1684	Total	C	N	O	S	0	0
			13260	8374	2321	2465	100		
1	B	1669	Total	C	N	O	S	0	0
			13143	8305	2300	2439	99		

There are 14 discrepancies between the modelled and reference sequences:

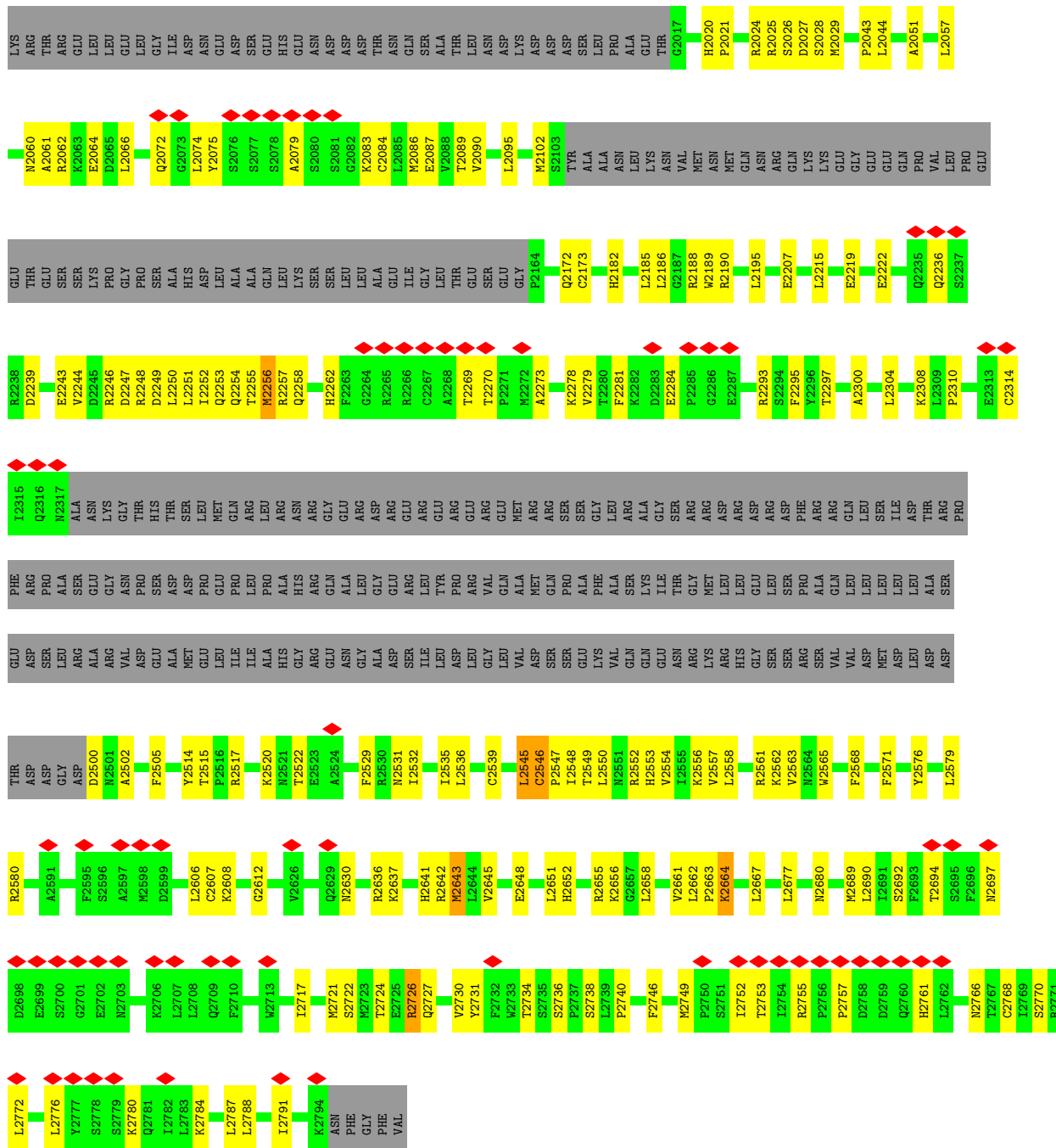
Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	ASP	-	expression tag	UNP O95071
A	-5	TYR	-	expression tag	UNP O95071
A	-4	LYS	-	expression tag	UNP O95071
A	-3	ASP	-	expression tag	UNP O95071
A	-2	ASP	-	expression tag	UNP O95071
A	-1	ASP	-	expression tag	UNP O95071
A	0	LYS	-	expression tag	UNP O95071
B	-6	ASP	-	expression tag	UNP O95071
B	-5	TYR	-	expression tag	UNP O95071
B	-4	LYS	-	expression tag	UNP O95071
B	-3	ASP	-	expression tag	UNP O95071
B	-2	ASP	-	expression tag	UNP O95071
B	-1	ASP	-	expression tag	UNP O95071
B	0	LYS	-	expression tag	UNP O95071

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

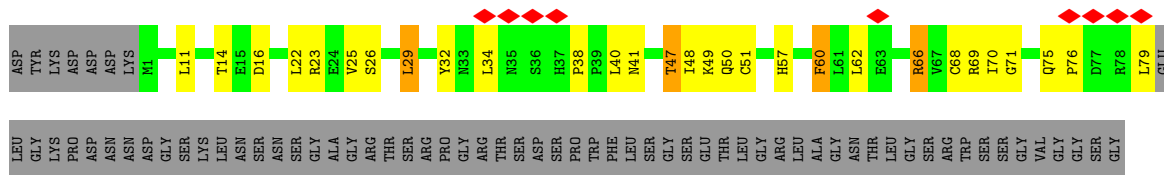
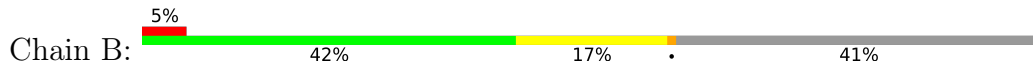
Mol	Chain	Residues	Atoms		AltConf
2	A	3	Total	Zn	0
			3	3	
2	B	3	Total	Zn	0
			3	3	







• Molecule 1: E3 ubiquitin-protein ligase UBR5









ALA	ALA
MET	ASP
GLN	SER
PRO	SER
ALA	GLU
PHE	LYS
ALA	VAL
SER	GLN
LYS	GLN
THR	GLU
ILE	ASN
THR	ASN
GLY	ARG
MET	LYS
LEU	ARG
LEU	HIS
LEU	GLY
LEU	SER
LEU	SER
SER	ARG
PRO	SER
ALA	ALA
GLN	VAL
LEU	VAL
LEU	ASP
LEU	MET
LEU	ASP
LEU	LEU
ALA	ASP
GLU	THR
GLY	SER
ASP	ASP
LEU	GLY
ARG	ASP
ALA	D2500
ARG	L2504
VAL	F2505
ASP	K2510
GLU	Y2514
ALA	P2518
MET	G2519
GLU	K2520
LEU	C2528
ILE	F2529
ALA	R2530
GLY	N2531
ASN	I2532
GLY	I2535
ASP	C2539
SER	L2540
ILE	L2541
LEU	Q2542
LEU	N2543
GLY	E2544
LEU	
L2545	
C2546	
P2547	
I2548	
T2549	
L2550	
N2551	
R2552	
L2558	
L2559	
F2568	
A2569	
Y2576	
L2579	
I2583	
S2586	
Q2587	
S2588	
S2589	
D2590	
A2591	
Y2594	
M2598	
A2601	
F2602	
L2606	
C2607	
K2608	
E2609	
E2610	
G2611	
G2612	
P2625	
E2633	
Y2634	
V2635	
R2636	
K2637	
Y2638	
A2639	
E2640	
H2641	
V2645	
V2646	
A2647	
E2648	
Q2649	
P2650	
A2653	
M2654	
R2655	
K2656	
G2657	
L2658	
V2661	
L2662	
L2667	
R2676	
L2677	
L2678	
V2679	
N2680	
E2684	
Q2688	
M2689	
L2690	
I2691	
S2692	
S2695	
D2698	
E2699	
S2700	
L2707	
K2711	
W2715	
S2716	
I2717	
V2718	
E2719	
K2720	
M2721	
R2726	
F2732	
H2733	
T2734	
S2735	
P2740	
A2741	
S2742	
F2746	
Q2747	
P2748	
M2749	
R2755	
Q2760	
H2761	
L2762	
P2763	
V2774	
K2780	
K2784	
Q2785	
K2786	
K2794	
ASN	
PHE	
GLY	
PHE	
PHE	
VAL	

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	844403	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 ( $e^-/\text{\AA}^2$ )	65	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.744	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.024	Depositor
Recommended contour level	0.02	Depositor
Map size ( $\text{\AA}$ )	331.2, 331.2, 331.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.828, 0.828, 0.828	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:  
ZN

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	0.28	0/13536	0.53	0/18339
1	B	0.27	0/13417	0.52	0/18177
All	All	0.27	0/26953	0.53	0/36516

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	13260	0	13247	358	0
1	B	13143	0	13138	331	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
All	All	26409	0	26385	660	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 660 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:2505:PHE:CE2	1:A:2548:ILE:HD11	1.45	1.48
1:A:2505:PHE:HE2	1:A:2548:ILE:CD1	1.53	1.22
1:A:2300:ALA:CB	1:A:2547:PRO:HG2	1.74	1.17
1:A:2304:LEU:HD21	1:A:2548:ILE:HG13	1.29	1.06
1:A:2300:ALA:HB3	1:A:2547:PRO:HG2	1.27	1.06

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	1658/2806 (59%)	1589 (96%)	69 (4%)	0	100	100
1	B	1643/2806 (59%)	1568 (95%)	75 (5%)	0	100	100
All	All	3301/5612 (59%)	3157 (96%)	144 (4%)	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	1482/2426 (61%)	1422 (96%)	60 (4%)	31	65
1	B	1468/2426 (60%)	1397 (95%)	71 (5%)	25	58
All	All	2950/4852 (61%)	2819 (96%)	131 (4%)	32	61

5 of 131 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	2218	PHE
1	B	2510	LYS
1	B	2749	MET
1	A	2256	MET
1	A	2255	THR

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	501	GLN
1	A	924	HIS
1	A	1508	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 6 ligands modelled in this entry, 6 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.

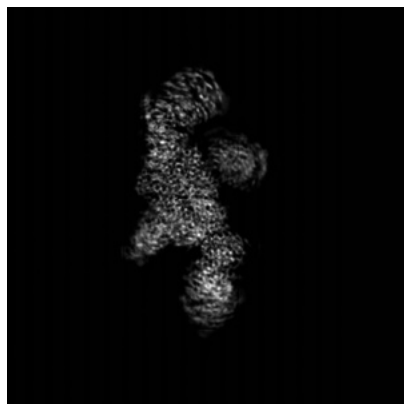
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-27201. These allow visual inspection of the internal detail of the map and identification of artifacts.

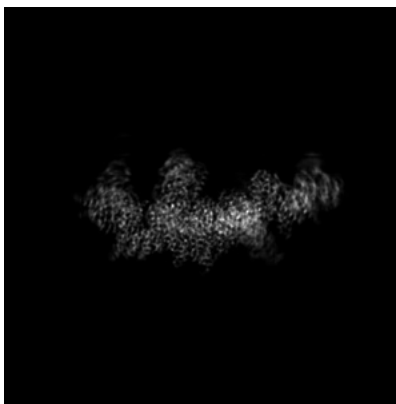
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

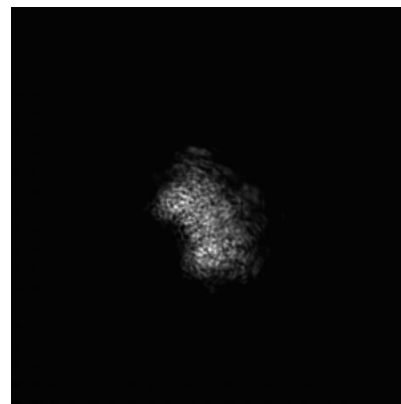
#### 6.1.1 Primary map



X

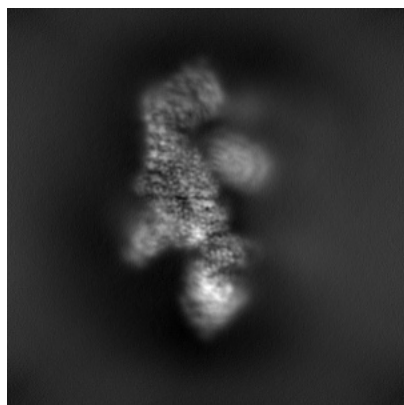


Y

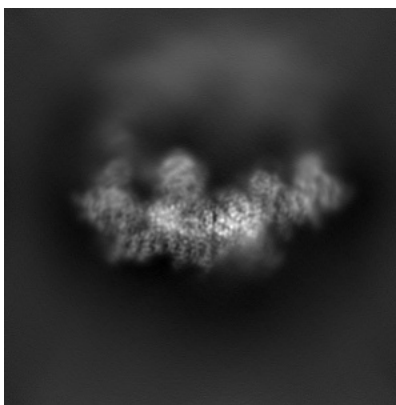


Z

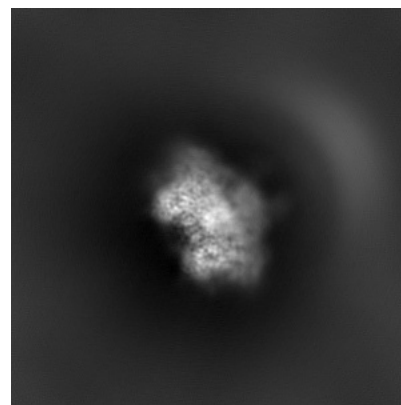
#### 6.1.2 Raw map



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: 200

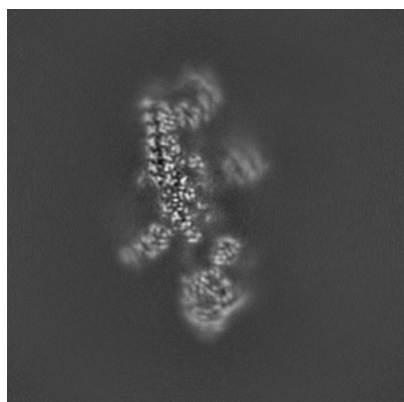


Y Index: 200

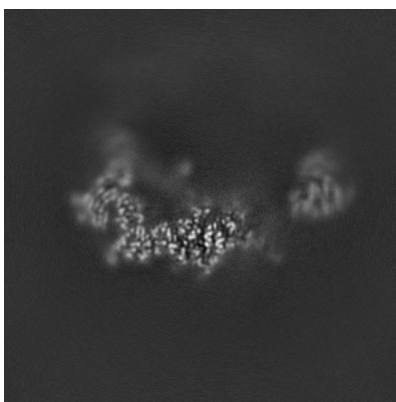


Z Index: 200

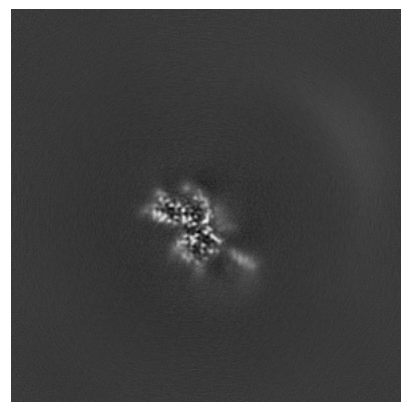
### 6.2.2 Raw map



X Index: 200



Y Index: 200



Z Index: 200

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: 187

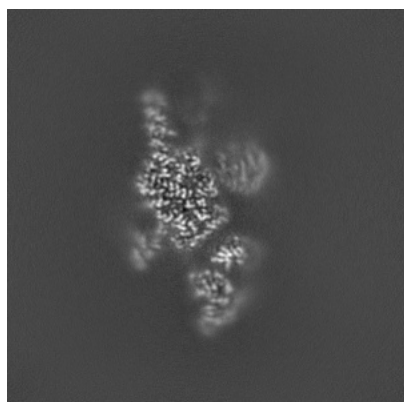


Y Index: 197

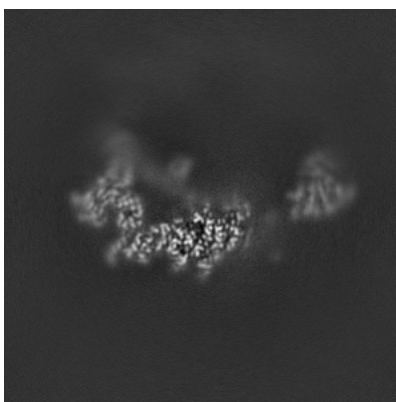


Z Index: 168

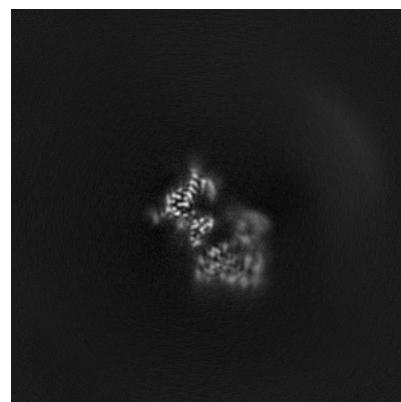
### 6.3.2 Raw map



X Index: 188



Y Index: 197

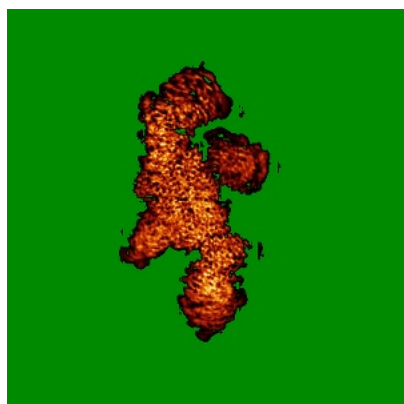


Z Index: 168

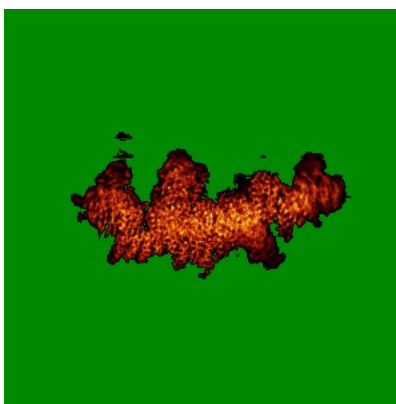
The images above show the largest variance slices of the map in three orthogonal directions.

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

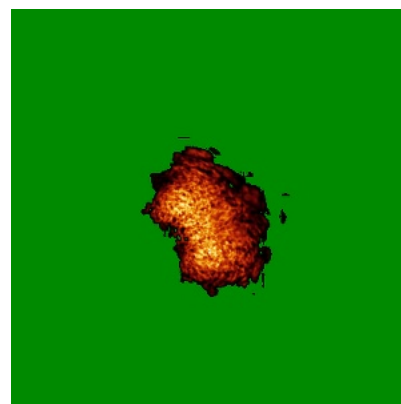
### 6.4.1 Primary map



X

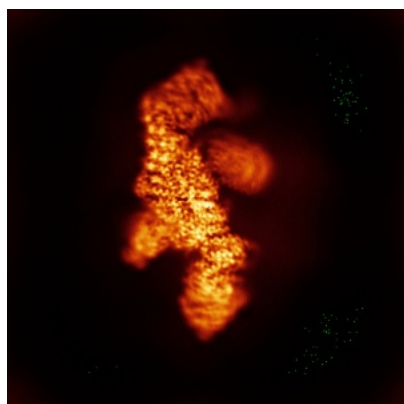


Y

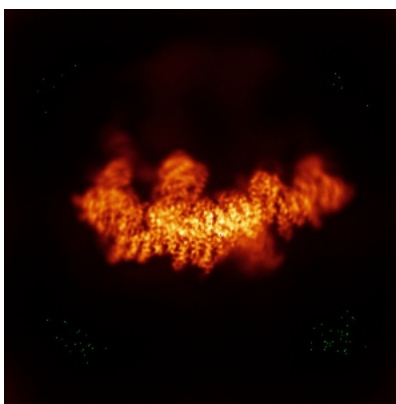


Z

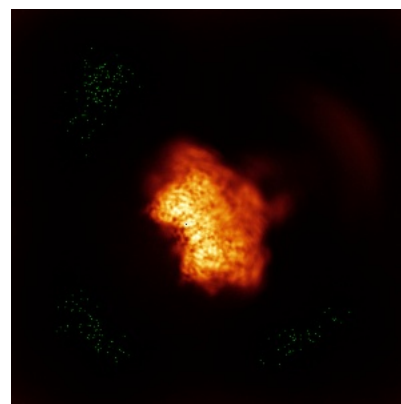
### 6.4.2 Raw map



X



Y

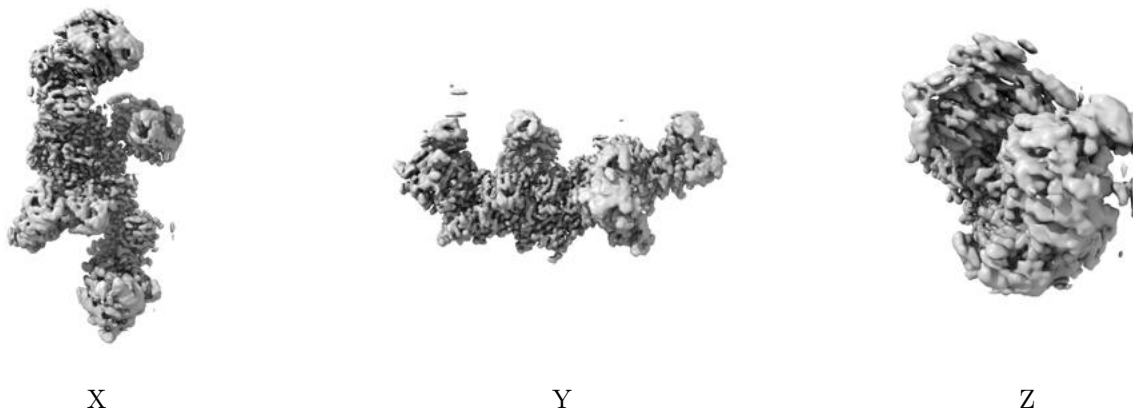


Z

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



The images above show the 3D surface view of the map at the recommended contour level 0.02. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 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.

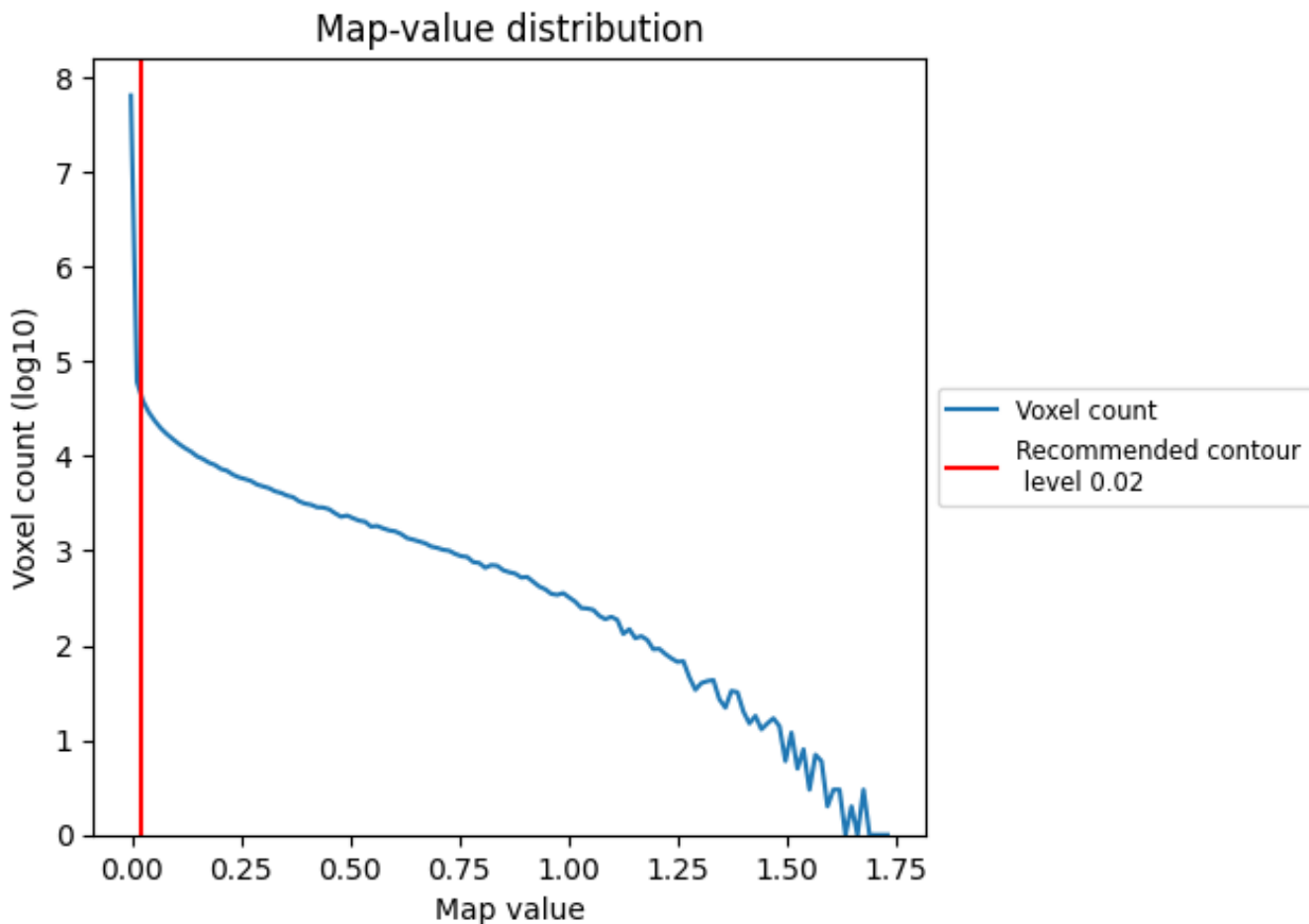
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

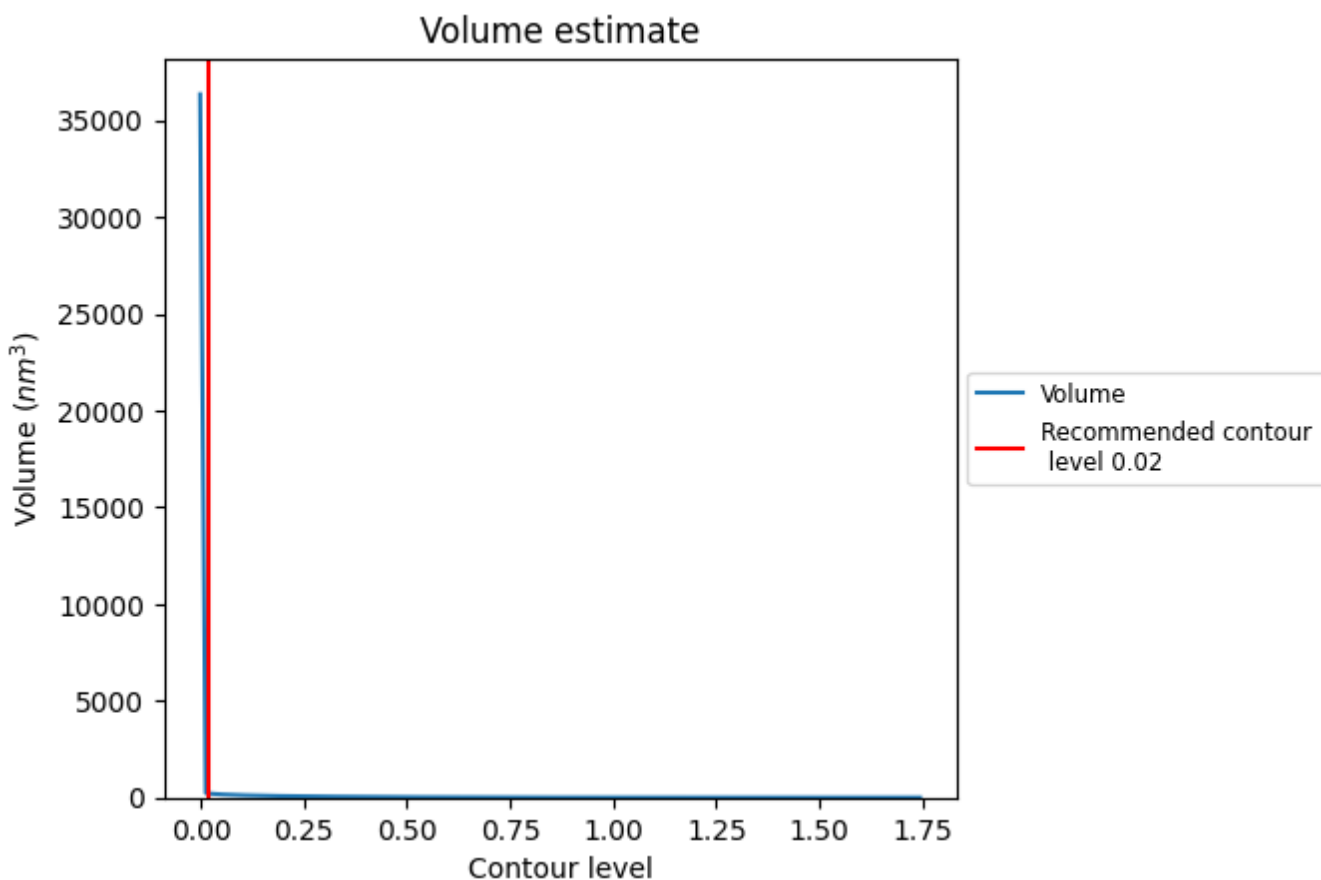
This section contains the results of statistical analysis of the map.

### 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.

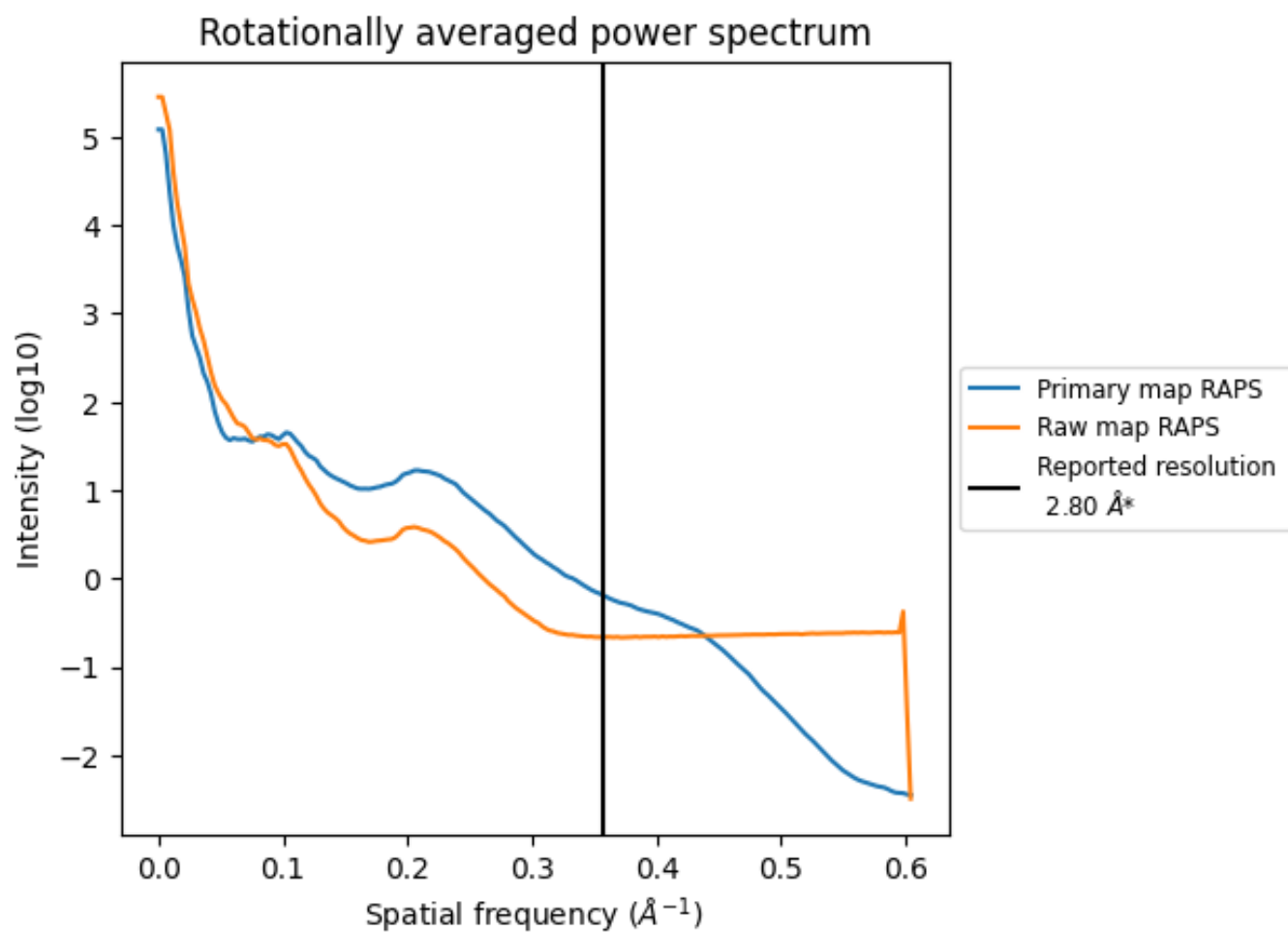
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 211  $\text{nm}^3$ ; this corresponds to an approximate mass of 191 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

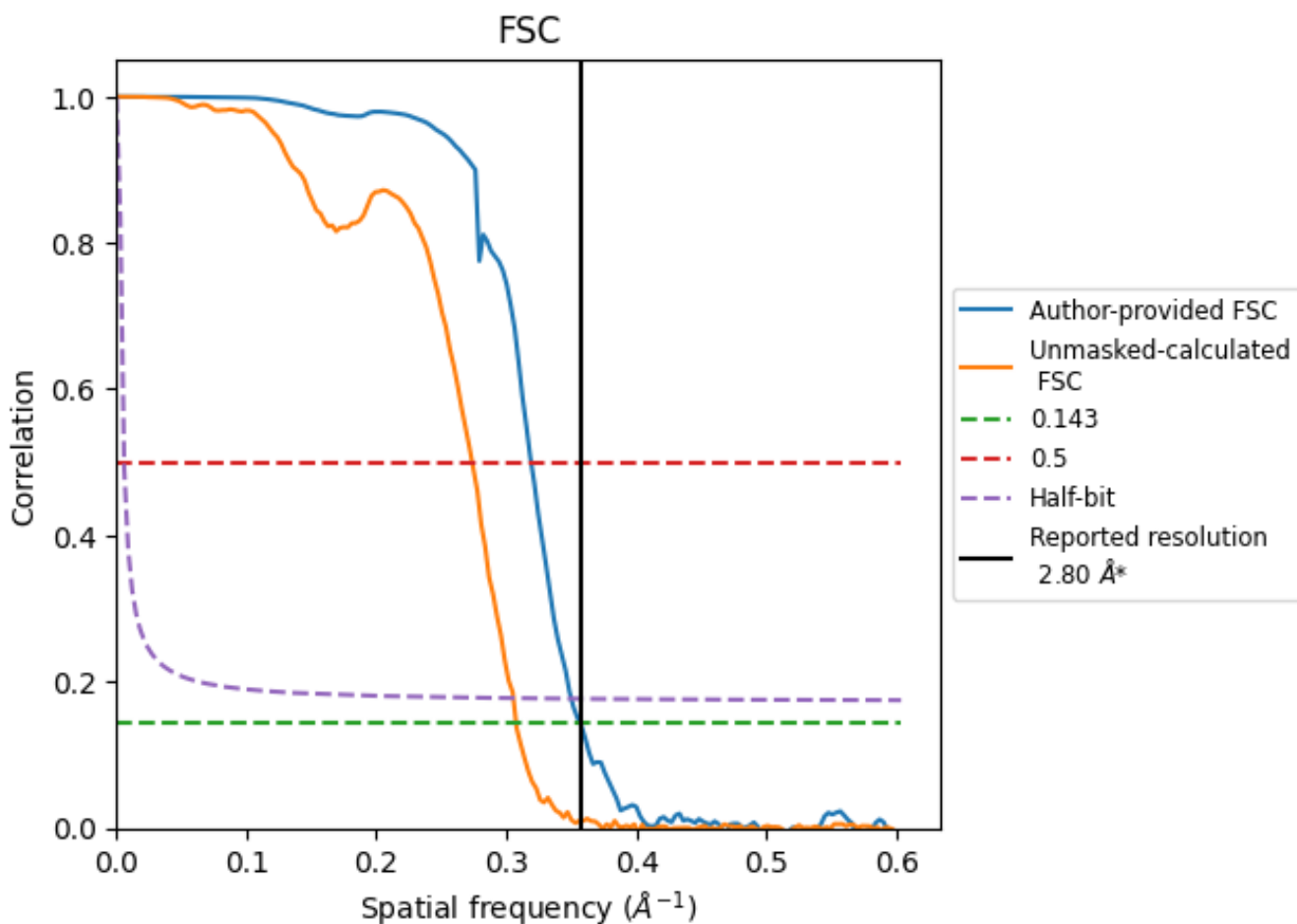


\*Reported resolution corresponds to spatial frequency of 0.357 Å<sup>-1</sup>

## 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 0.357 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.80	-	-
Author-provided FSC curve	2.80	3.13	2.86
Unmasked-calculated*	3.25	3.65	3.27

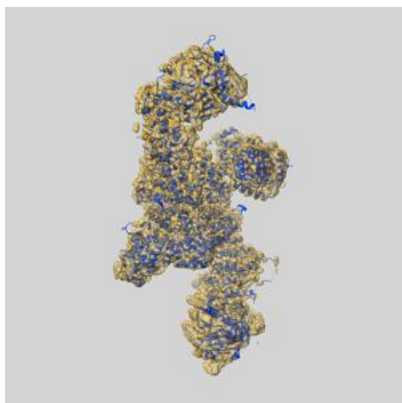
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.25 differs from the reported value 2.8 by more than 10 %



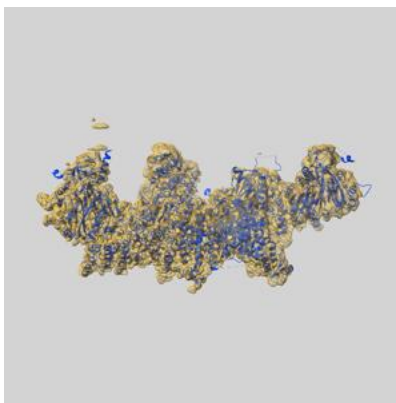
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-27201 and PDB model 8D4X. Per-residue inclusion information can be found in section 3 on page 4.

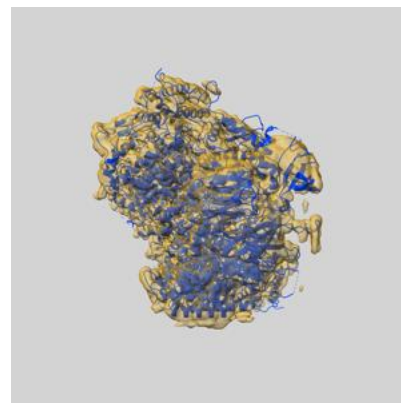
### 9.1 Map-model overlay [i](#)



X



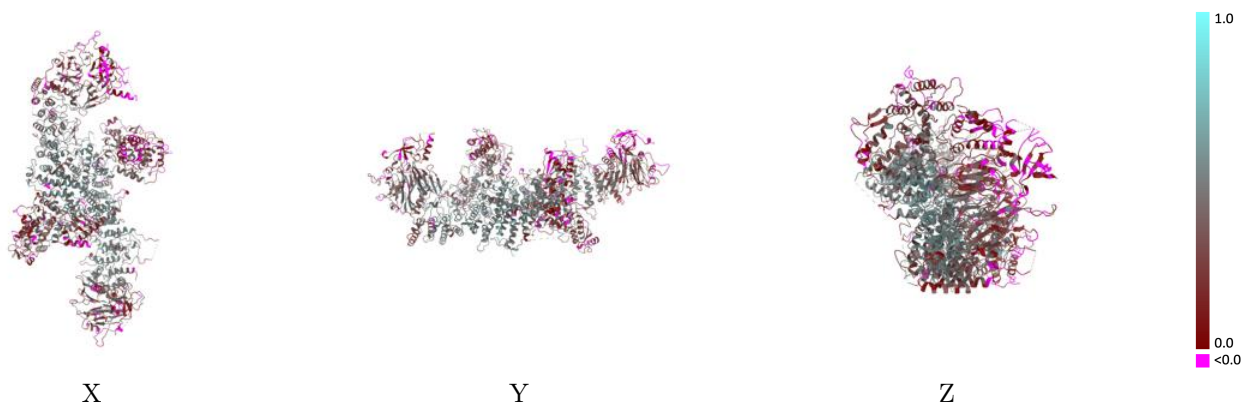
Y



Z

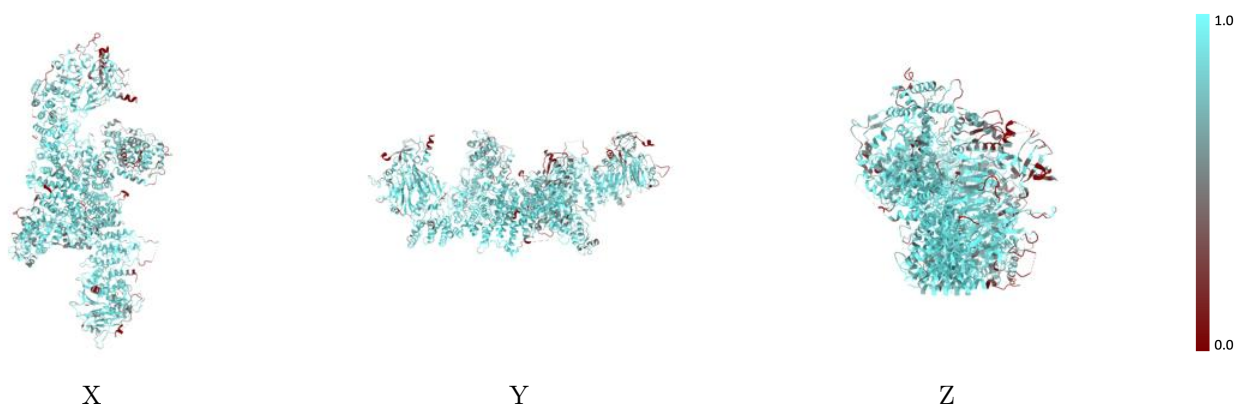
The images above show the 3D surface view of the map at the recommended contour level 0.02 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



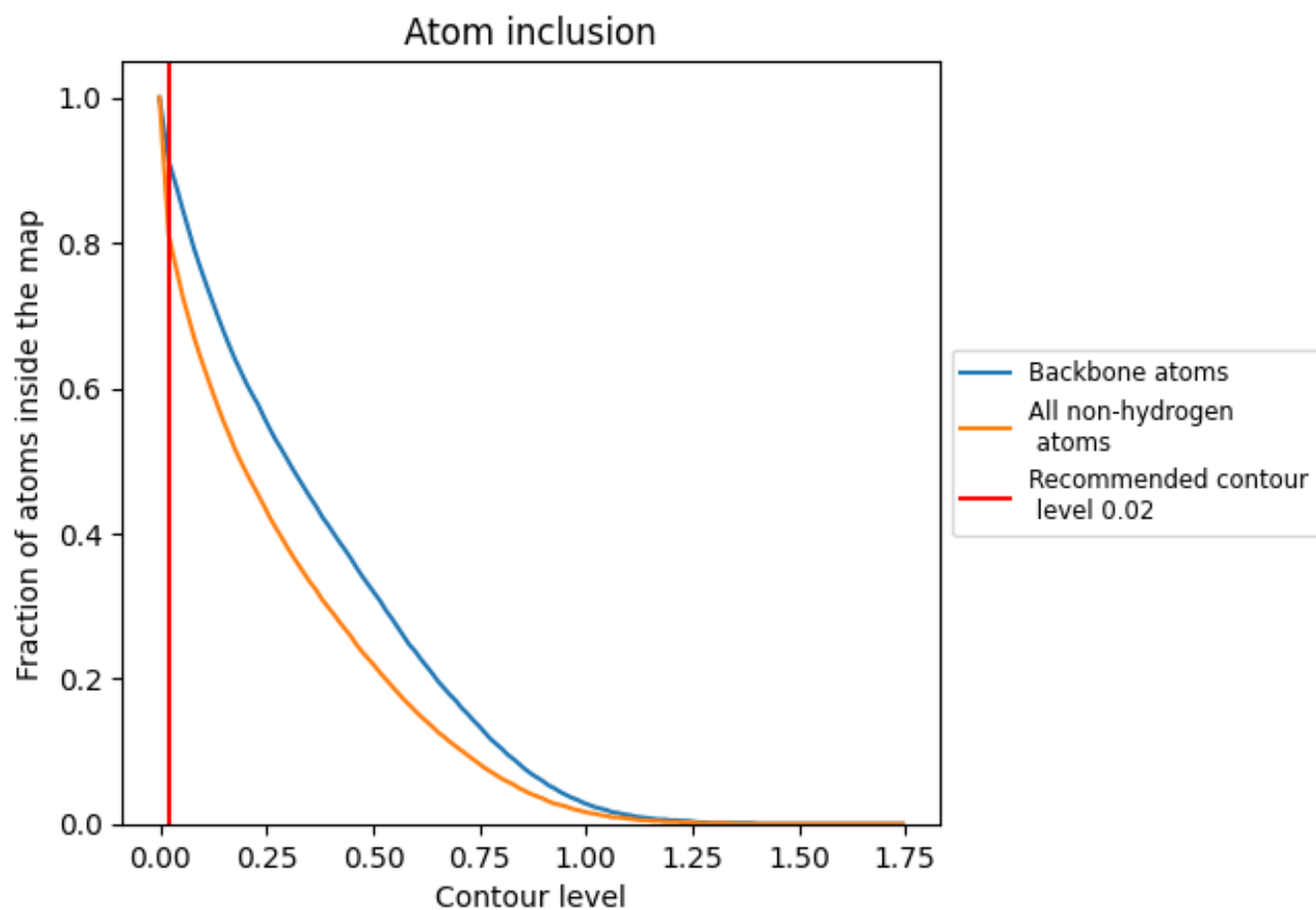
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.02).







## 9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 81% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8110	 0.3580
A	 0.8090	 0.3680
B	 0.8130	 0.3490

