



## wwPDB EM Validation Summary Report ⓘ

Oct 27, 2024 – 09:00 PM JST

PDB ID : 7XWO  
EMDB ID : EMD-33497  
Title : Neurokinin A bound to active human neurokinin 2 receptor in complex with G324  
Authors : Sun, W.J.; Yuan, Q.N.; Zhang, H.H.; Yang, F.; Ling, S.L.; Lv, P.; Eric, X.; Tian, C.L.; Yin, W.C.; Shi, P.  
Deposited on : 2022-05-26  
Resolution : 2.70 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](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:

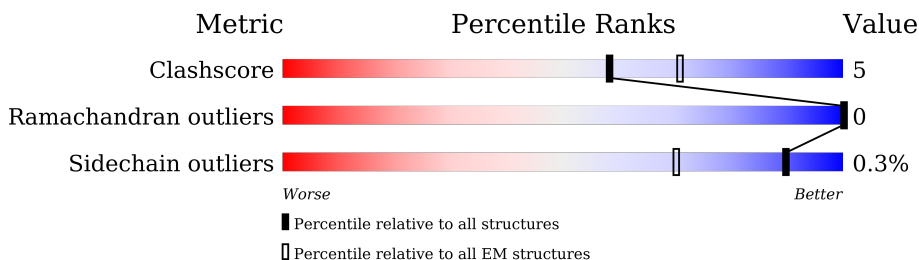
EMDB validation analysis : 0.0.1.dev113  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

# 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 2.70 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	B	505	
2	C	344	
3	E	304	
4	F	361	
5	G	71	
6	D	11	

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 8725 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 Soluble cytochrome b562, Substance-K receptor.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	272	2041	1360	325	339	17	0	0

There are 57 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-153	MET	-	initiating methionine	UNP P0ABE7
B	-152	LYS	-	expression tag	UNP P0ABE7
B	-151	THR	-	expression tag	UNP P0ABE7
B	-150	ILE	-	expression tag	UNP P0ABE7
B	-149	ILE	-	expression tag	UNP P0ABE7
B	-148	ALA	-	expression tag	UNP P0ABE7
B	-147	LEU	-	expression tag	UNP P0ABE7
B	-146	SER	-	expression tag	UNP P0ABE7
B	-145	TYR	-	expression tag	UNP P0ABE7
B	-144	ILE	-	expression tag	UNP P0ABE7
B	-143	PHE	-	expression tag	UNP P0ABE7
B	-142	CYS	-	expression tag	UNP P0ABE7
B	-141	LEU	-	expression tag	UNP P0ABE7
B	-140	VAL	-	expression tag	UNP P0ABE7
B	-139	PHE	-	expression tag	UNP P0ABE7
B	-138	ALA	-	expression tag	UNP P0ABE7
B	-137	ASP	-	expression tag	UNP P0ABE7
B	-136	TYR	-	expression tag	UNP P0ABE7
B	-135	LYS	-	expression tag	UNP P0ABE7
B	-134	ASP	-	expression tag	UNP P0ABE7
B	-133	ASP	-	expression tag	UNP P0ABE7
B	-132	ASP	-	expression tag	UNP P0ABE7
B	-131	ASP	-	expression tag	UNP P0ABE7
B	-130	ALA	-	expression tag	UNP P0ABE7
B	-129	LYS	-	expression tag	UNP P0ABE7
B	-128	LEU	-	expression tag	UNP P0ABE7
B	-127	GLN	-	expression tag	UNP P0ABE7
B	-126	THR	-	expression tag	UNP P0ABE7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-125	MET	-	expression tag	UNP P0ABE7
B	-124	HIS	-	expression tag	UNP P0ABE7
B	-123	HIS	-	expression tag	UNP P0ABE7
B	-122	HIS	-	expression tag	UNP P0ABE7
B	-121	HIS	-	expression tag	UNP P0ABE7
B	-120	HIS	-	expression tag	UNP P0ABE7
B	-119	HIS	-	expression tag	UNP P0ABE7
B	-118	HIS	-	expression tag	UNP P0ABE7
B	-117	HIS	-	expression tag	UNP P0ABE7
B	-116	HIS	-	expression tag	UNP P0ABE7
B	-115	HIS	-	expression tag	UNP P0ABE7
B	-114	GLU	-	expression tag	UNP P0ABE7
B	-113	ASN	-	expression tag	UNP P0ABE7
B	-112	LEU	-	expression tag	UNP P0ABE7
B	-111	TYR	-	expression tag	UNP P0ABE7
B	-110	PHE	-	expression tag	UNP P0ABE7
B	-109	GLN	-	expression tag	UNP P0ABE7
B	-108	GLY	-	expression tag	UNP P0ABE7
B	-107	GLY	-	expression tag	UNP P0ABE7
B	-106	THR	-	expression tag	UNP P0ABE7
B	-99	TRP	MET	conflict	UNP P0ABE7
B	-4	ILE	HIS	conflict	UNP P0ABE7
B	0	LEU	-	linker	UNP P0ABE7
B	346	LYS	-	expression tag	UNP P21452
B	347	LEU	-	expression tag	UNP P21452
B	348	VAL	-	expression tag	UNP P21452
B	349	GLU	-	expression tag	UNP P21452
B	350	LYS	-	expression tag	UNP P21452
B	351	TYR	-	expression tag	UNP P21452

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	336	2568	1586	462	499	21	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	2	GLY	-	expression tag	UNP P54311
C	3	SER	-	expression tag	UNP P54311

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Chain	Residue	Modelled	Actual	Comment	Reference
C	4	LEU	-	expression tag	UNP P54311
C	5	LEU	-	expression tag	UNP P54311
C	6	GLN	-	expression tag	UNP P54311

- Molecule 3 is a protein called scFv.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	E	230	Total	C	N	O	S	0	0
			1760	1119	292	339	10		

- Molecule 4 is a protein called G324.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	F	229	Total	C	N	O	S	0	0
			1867	1181	333	345	8		

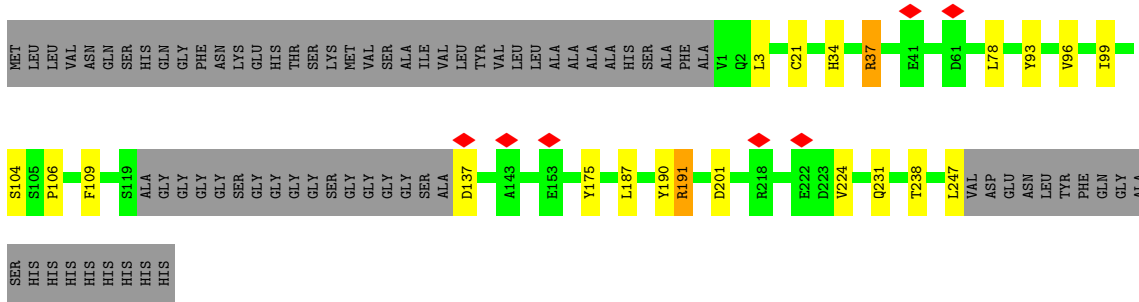
- Molecule 5 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	G	53	Total	C	N	O	S	0	0
			410	257	73	77	3		

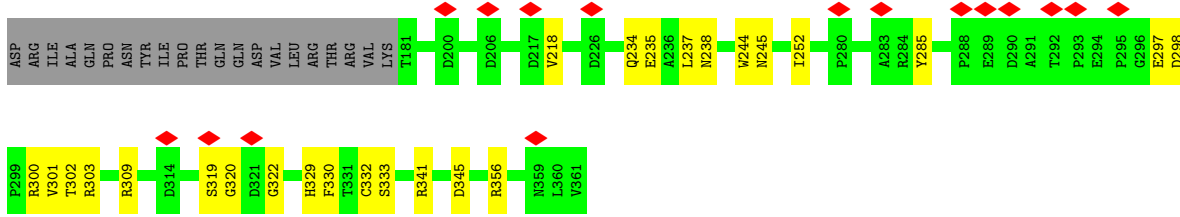
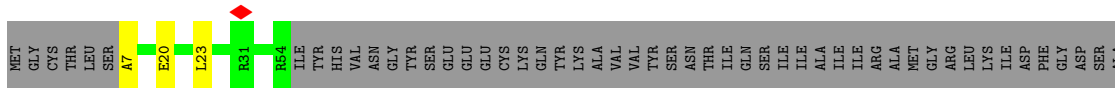
- Molecule 6 is a protein called HIS-LYS-THR-ASP-SER-PHE-VAL-GLY-LEU-MET-NH2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	D	11	Total	C	N	O	S	0	1
			79	50	14	14	1		





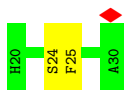
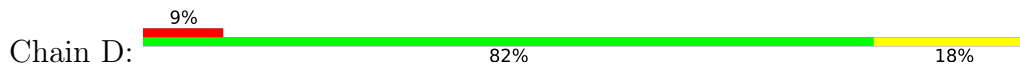
• Molecule 4: G324



• Molecule 5: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



• Molecule 6: HIS-LYS-THR-ASP-SER-PHE-VAL-GLY-LEU-MET-NH2



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	610257	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 ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.767	Depositor
Minimum map value	-0.027	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.024	Depositor
Recommended contour level	0.13	Depositor
Map size ( $\text{\AA}$ )	247.2, 247.2, 247.2	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.824, 0.824, 0.824	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	0.37	0/2096	0.55	1/2874 (0.0%)
2	C	0.41	0/2615	0.57	0/3546
3	E	0.41	0/1804	0.56	0/2446
4	F	0.36	0/1901	0.48	0/2562
5	G	0.32	0/416	0.47	0/561
6	D	0.30	0/80	0.61	0/106
All	All	0.39	0/8912	0.54	1/12095 (0.0%)

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	C	0	2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	B	254	LEU	CA-CB-CG	5.35	127.59	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	165	SER	Peptide
2	C	315	GLY	Peptide

## 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	2041	0	1985	20	0
2	C	2568	0	2465	25	0
3	E	1760	0	1694	15	0
4	F	1867	0	1840	20	0
5	G	410	0	420	1	0
6	D	79	0	76	1	0
All	All	8725	0	8480	78	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.

The worst 5 of 78 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)
3:E:175:TYR:HH	4:F:7:ALA:N	1.74	0.85
2:C:276:CYS:HB2	2:C:295:ASP:HB2	1.71	0.73
2:C:325:VAL:HG22	2:C:332:VAL:HG22	1.82	0.61
4:F:332:CYS:SG	4:F:333:SER:N	2.74	0.60
2:C:299:CYS:HB2	2:C:313:LEU:HB2	1.83	0.60

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	264/505 (52%)	246 (93%)	18 (7%)	0	<b>100</b> <b>100</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	C	334/344 (97%)	312 (93%)	22 (7%)	0	100	100
3	E	226/304 (74%)	213 (94%)	13 (6%)	0	100	100
4	F	225/361 (62%)	217 (96%)	8 (4%)	0	100	100
5	G	51/71 (72%)	50 (98%)	1 (2%)	0	100	100
6	D	9/11 (82%)	8 (89%)	1 (11%)	0	100	100
All	All	1109/1596 (70%)	1046 (94%)	63 (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	B	199/425 (47%)	199 (100%)	0	100	100
2	C	275/286 (96%)	274 (100%)	1 (0%)	89	96
3	E	192/245 (78%)	190 (99%)	2 (1%)	73	89
4	F	201/316 (64%)	201 (100%)	0	100	100
5	G	43/58 (74%)	43 (100%)	0	100	100
6	D	9/9 (100%)	9 (100%)	0	100	100
All	All	919/1339 (69%)	916 (100%)	3 (0%)	90	97

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	13	ARG
3	E	37	ARG
3	E	191	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
4	F	238	ASN
4	F	245	ASN
2	C	235	ASN
2	C	300	ASN
4	F	204	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 oligosaccharides 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.

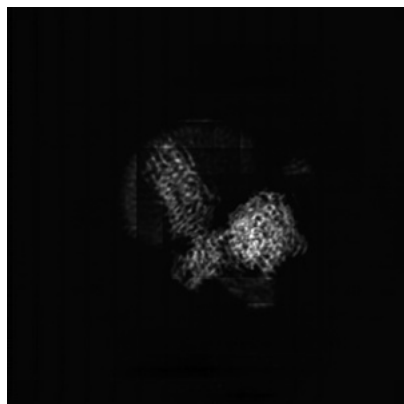
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-33497. These allow visual inspection of the internal detail of the map and identification of artifacts.

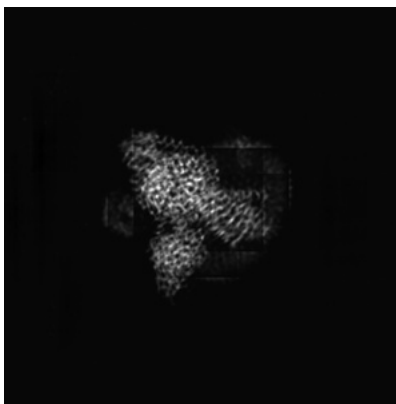
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

#### 6.1.1 Primary map



X

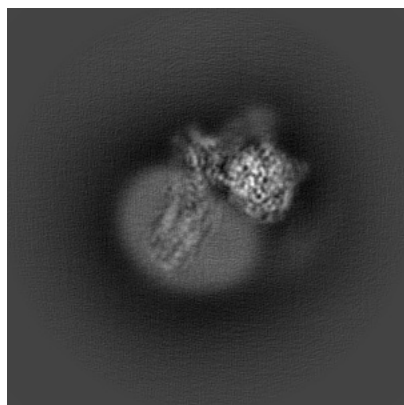


Y

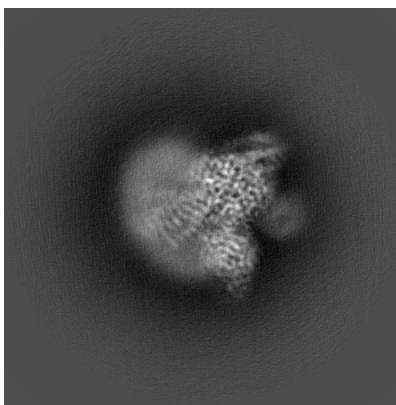


Z

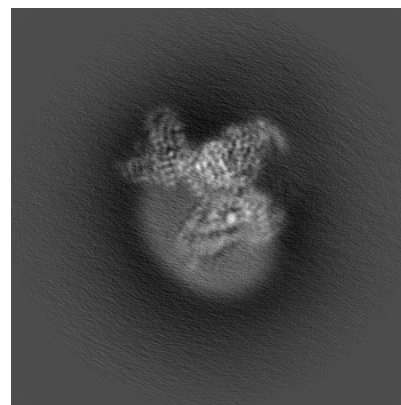
#### 6.1.2 Raw map



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

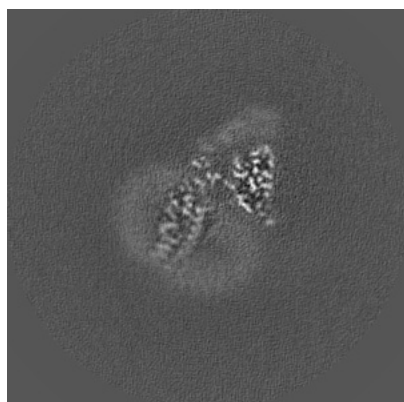


Y Index: 150

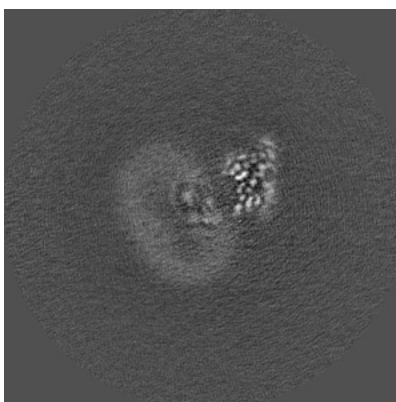


Z Index: 150

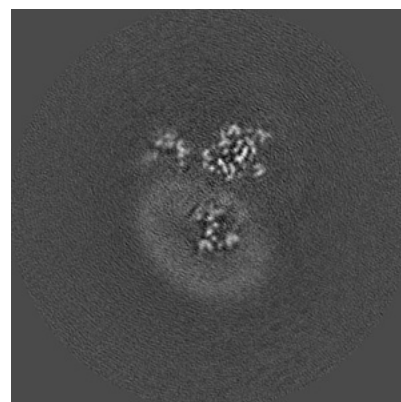
### 6.2.2 Raw map



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](#)

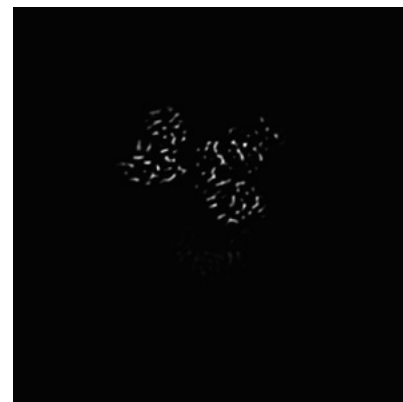
### 6.3.1 Primary map



X Index: 158

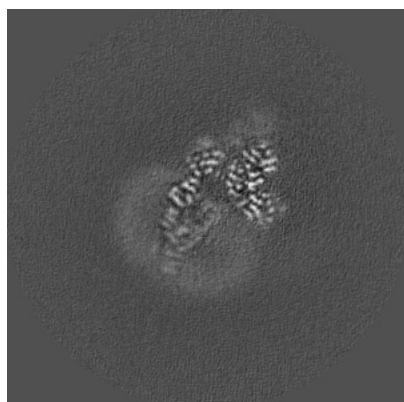


Y Index: 184

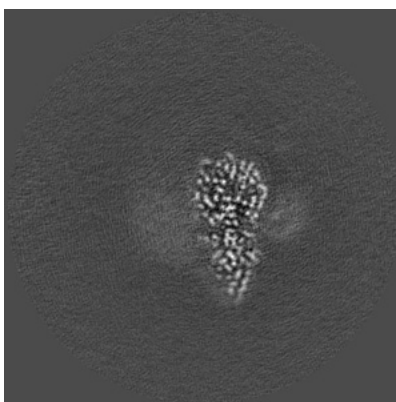


Z Index: 124

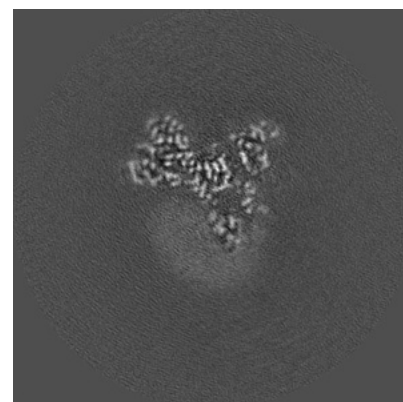
### 6.3.2 Raw map



X Index: 157



Y Index: 183



Z Index: 169

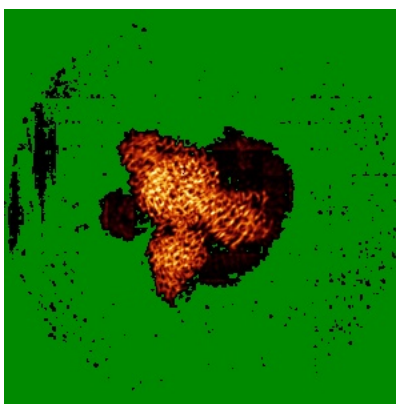
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



X

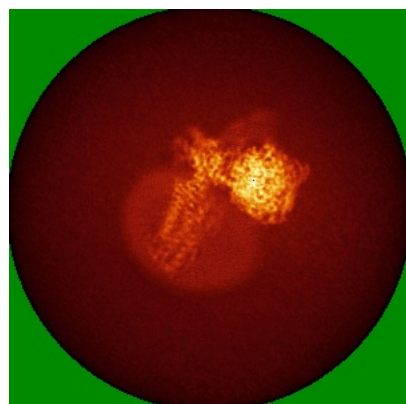


Y

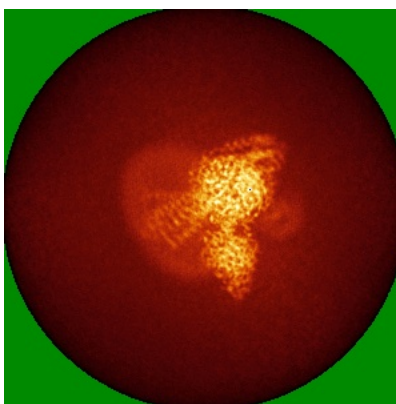


Z

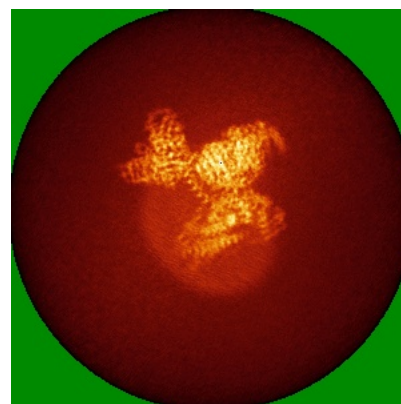
### 6.4.2 Raw map



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.



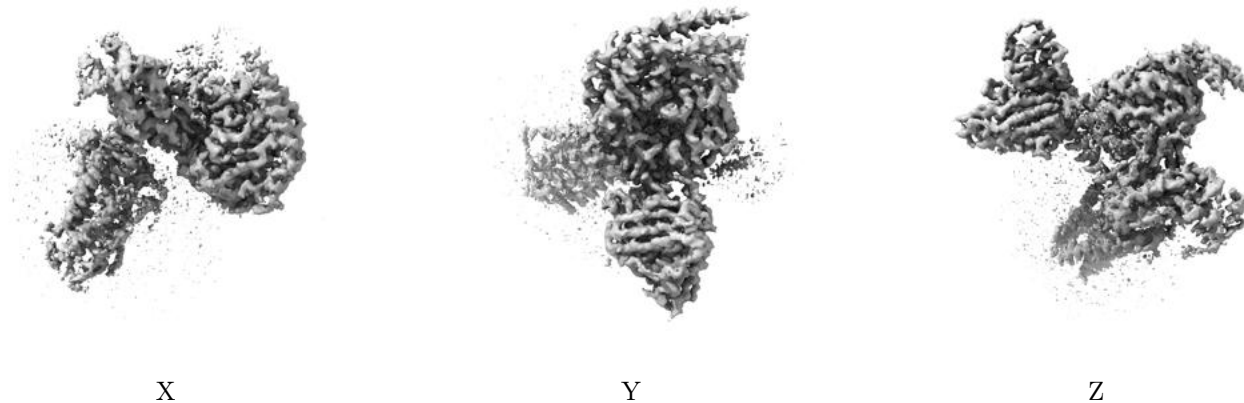
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.13. 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.

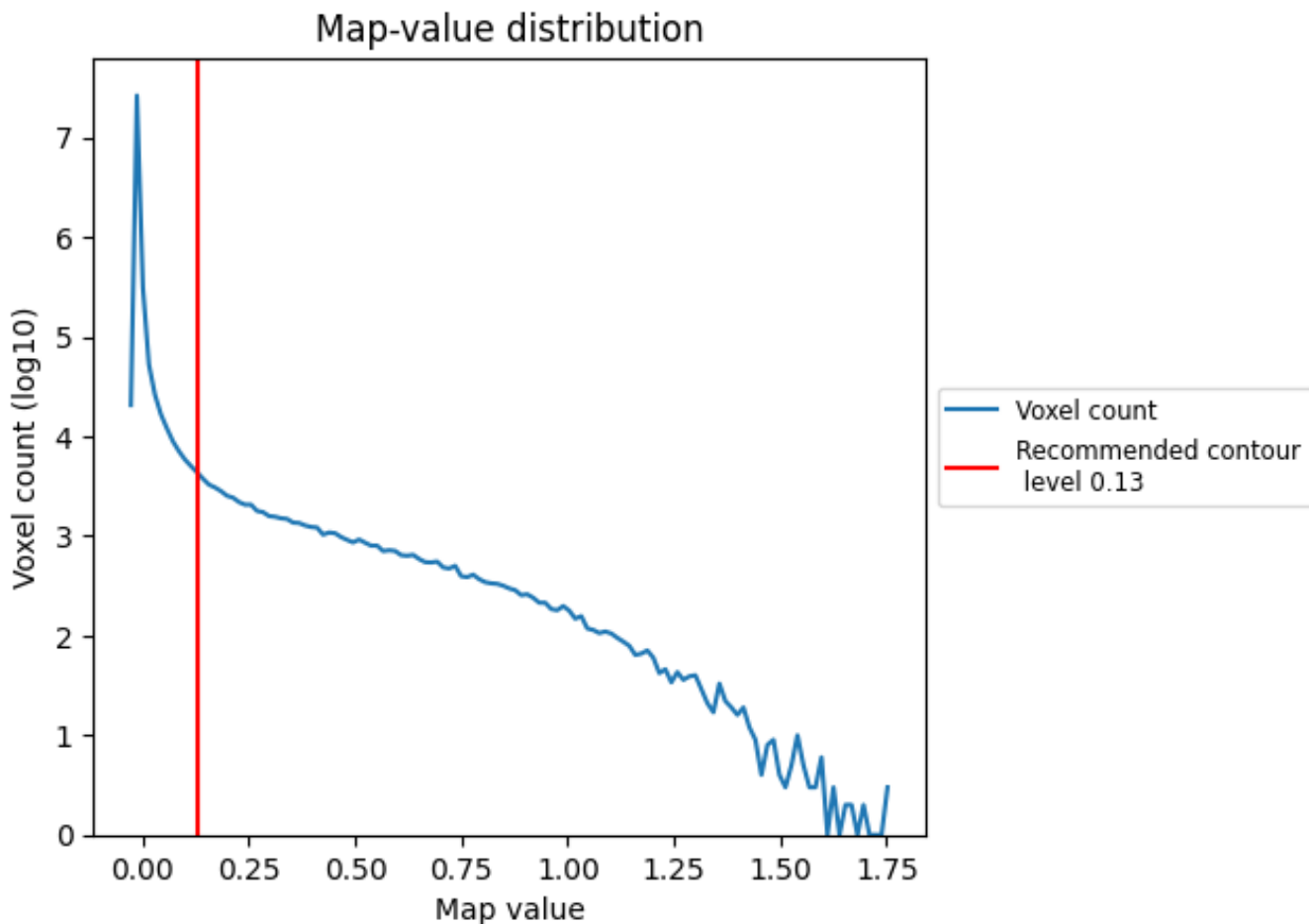
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

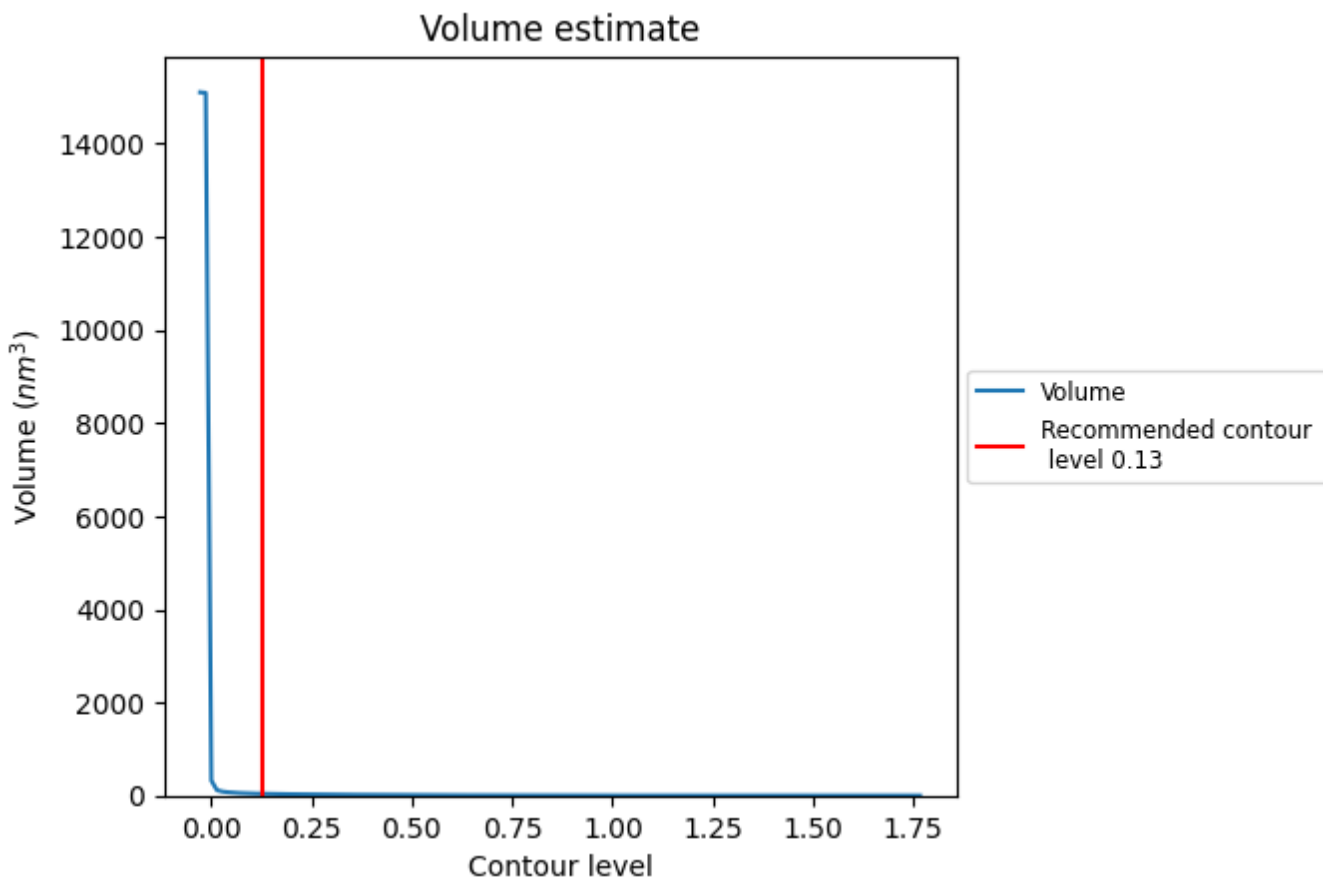
This section contains the results of statistical analysis of the map.

### 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.

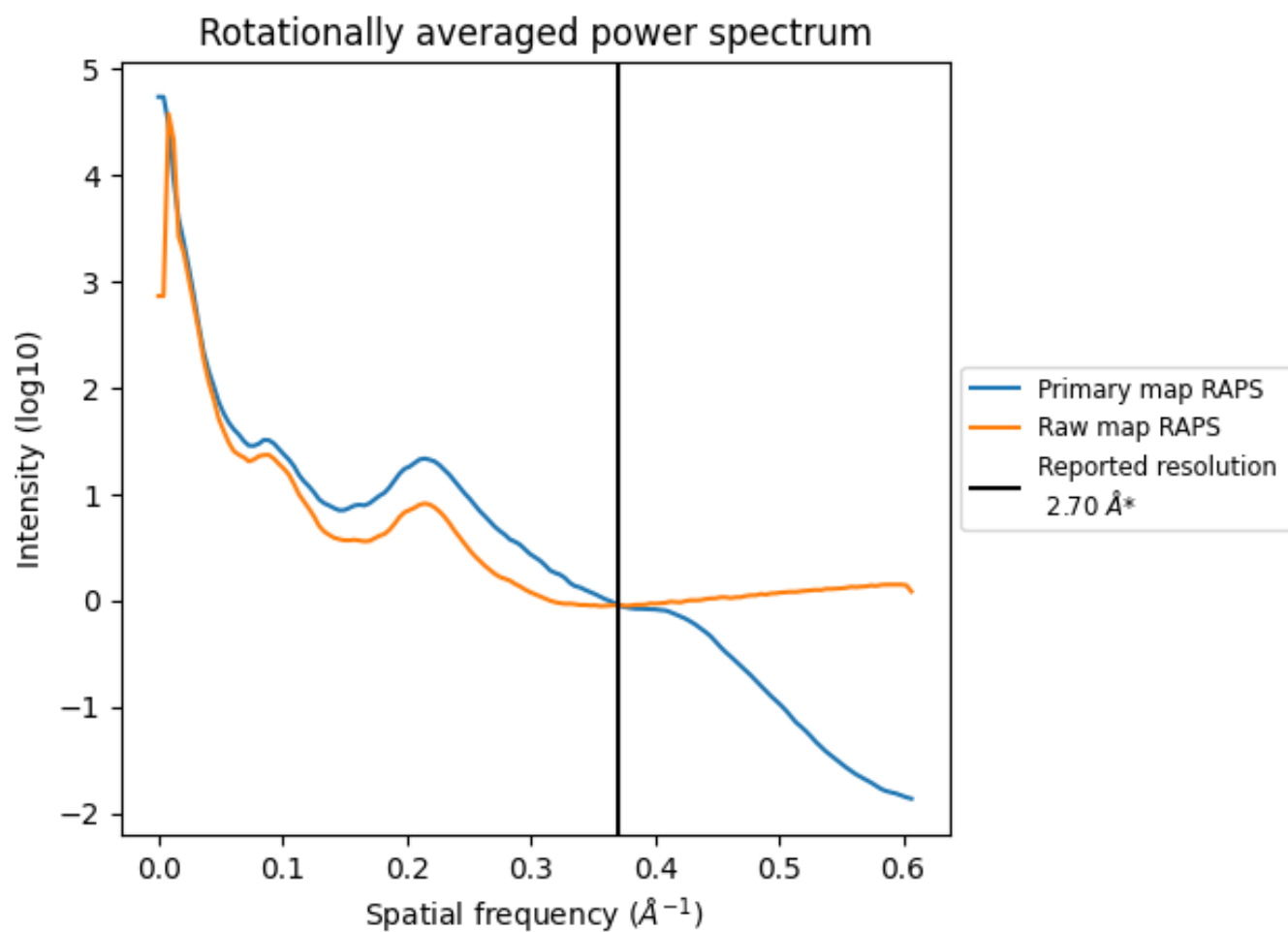
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is  $38 \text{ nm}^3$ ; this corresponds to an approximate mass of 35 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](#)

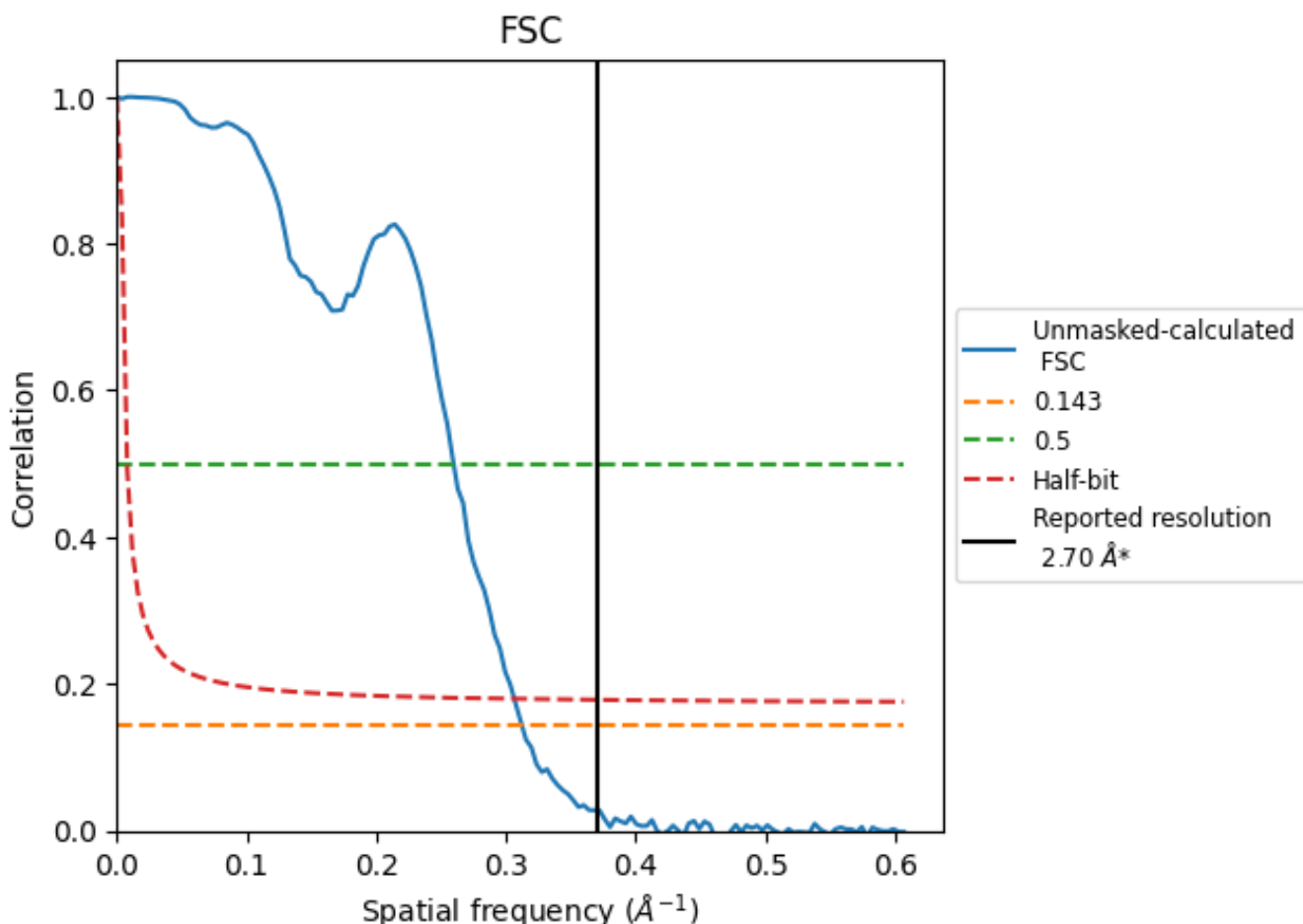


\*Reported resolution corresponds to spatial frequency of 0.370 Å<sup>-1</sup>

## 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  $0.370 \text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

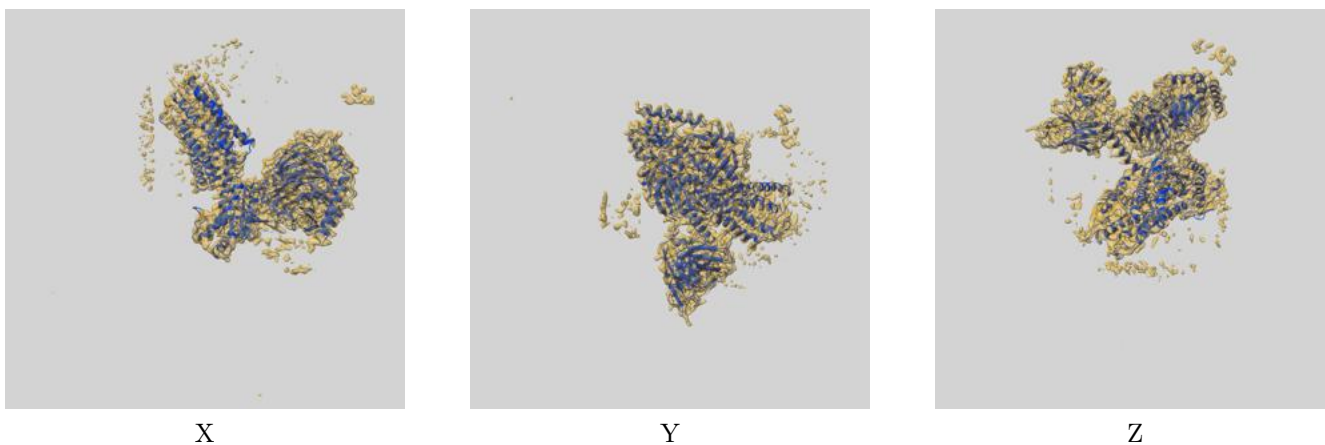
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.70	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.20	3.85	3.26

\*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 3.20 differs from the reported value 2.7 by more than 10 %

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

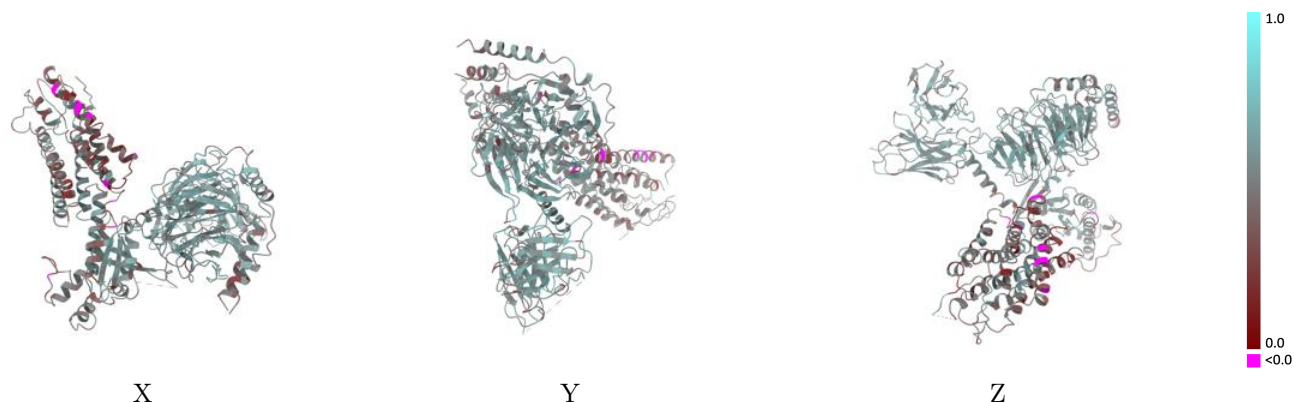
This section contains information regarding the fit between EMDB map EMD-33497 and PDB model 7XWO. Per-residue inclusion information can be found in section [3](#) on page [6](#).

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



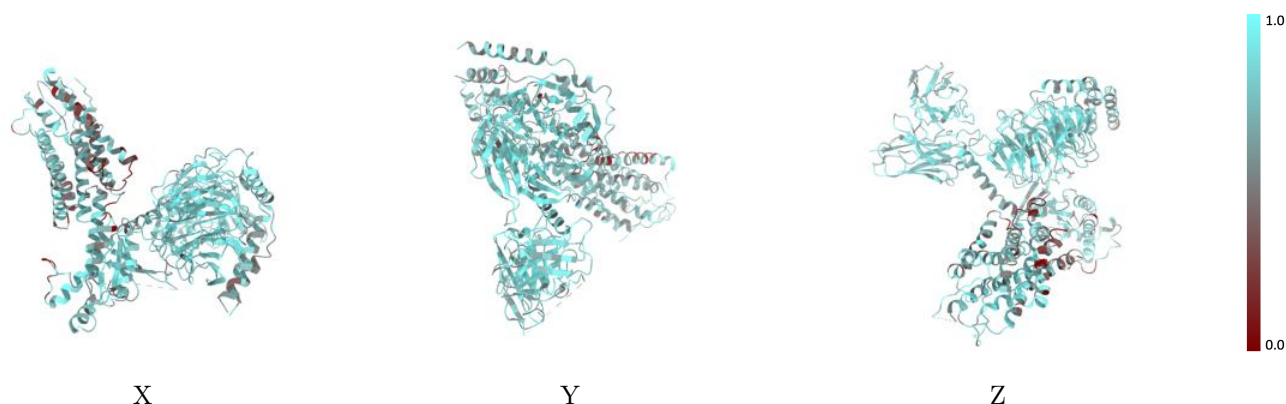
The images above show the 3D surface view of the map at the recommended contour level 0.13 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

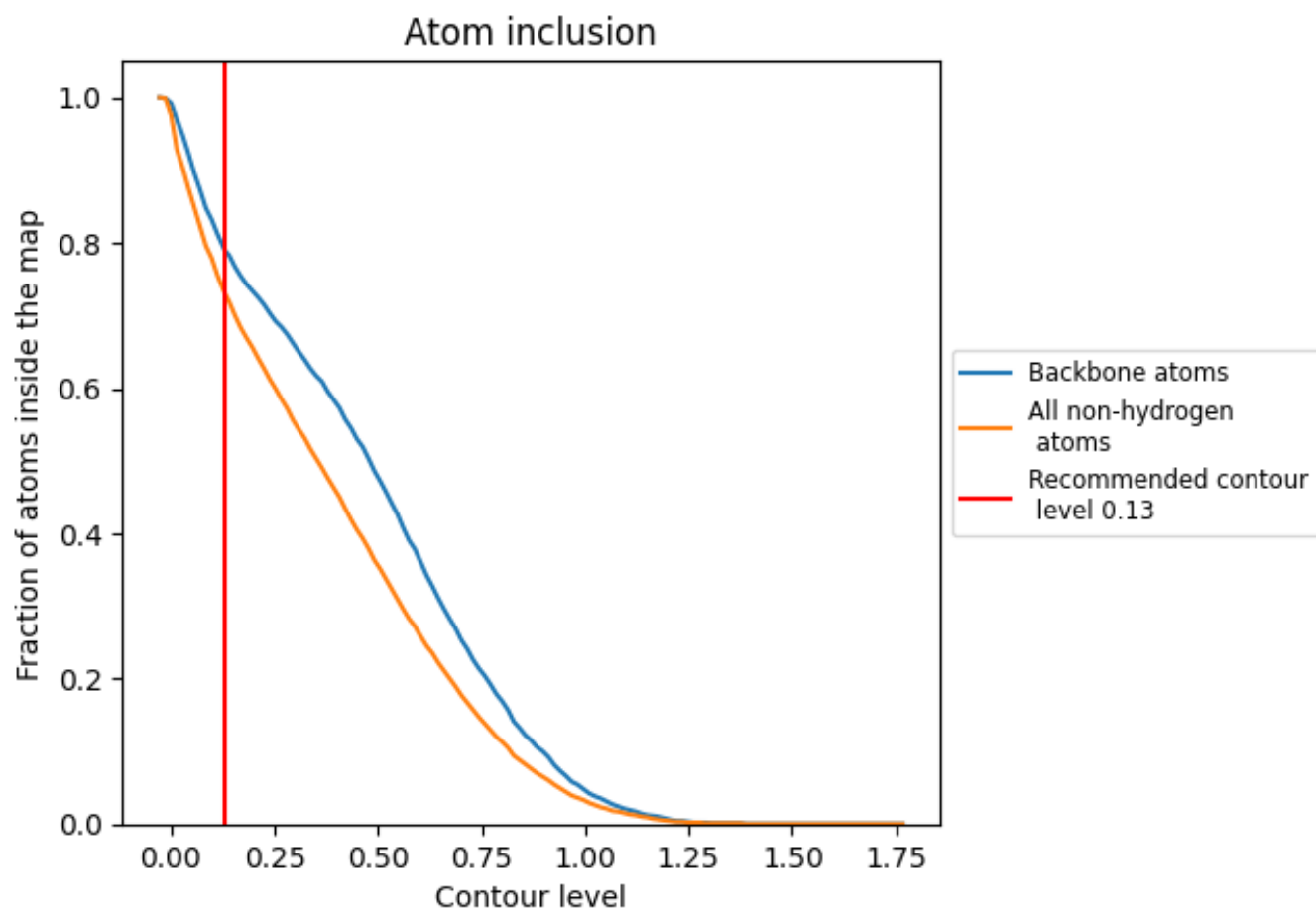
## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



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 (0.13).

















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 79% of all backbone atoms, 73% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.13) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7310	 0.5090
B	 0.6500	 0.4230
C	 0.7910	 0.5570
D	 0.6580	 0.4740
E	 0.7680	 0.5480
F	 0.7200	 0.5060
G	 0.6770	 0.4900

