



## wwPDB EM Validation Summary Report ⓘ

Nov 21, 2022 – 11:27 PM EST

PDB ID : 3J4R  
EMDB ID : EMD-5756  
Title : Pseudo-atomic model of the AKAP18-PKA Complex in a linear conformation  
derived from electron microscopy  
Authors : Reichow, S.L.; Gonen, T.  
Deposited on : 2013-09-25  
Resolution : 35.00 Å (reported)  
Based on initial models : 2QVS, 2IZX, 2VFL

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.dev43  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.3

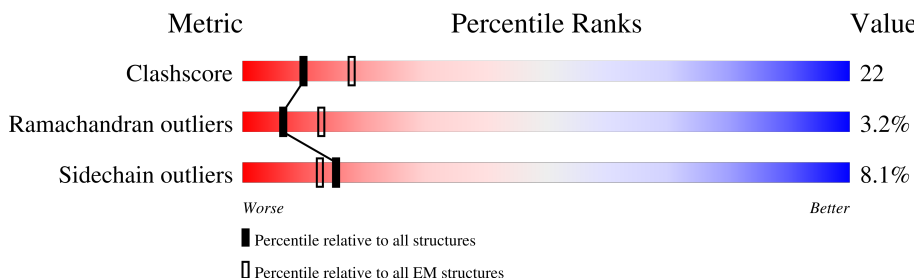
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 35.00 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	353	
2	B	402	
2	C	402	
3	D	351	
3	E	351	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12906 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 A-kinase anchor protein 18.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	230	Total	C	N	O	S	1	0
			1836	1180	312	336	8		

- Molecule 2 is a protein called cAMP-dependent protein kinase type II-alpha regulatory subunit.

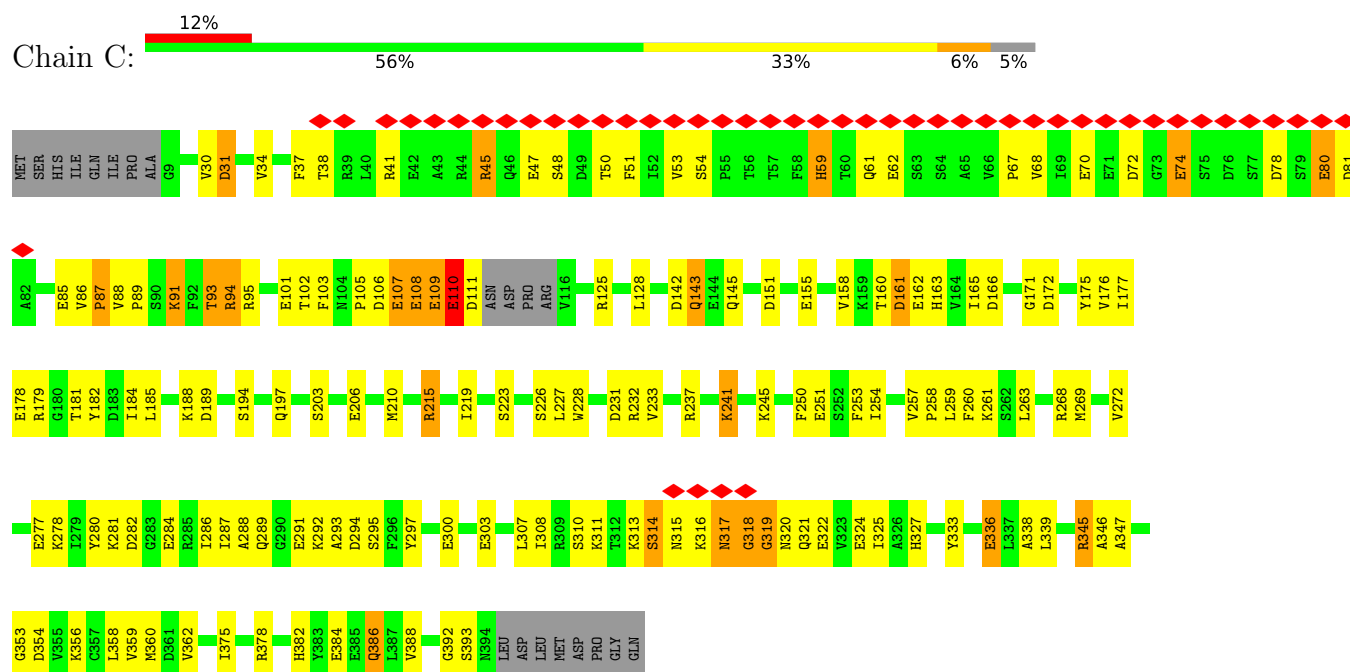
Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	382	Total	C	N	O	S	0	0
			3018	1888	514	601	15		
2	C	382	Total	C	N	O	S	0	0
			3018	1888	514	601	15		

- Molecule 3 is a protein called cAMP-dependent protein kinase catalytic subunit alpha.

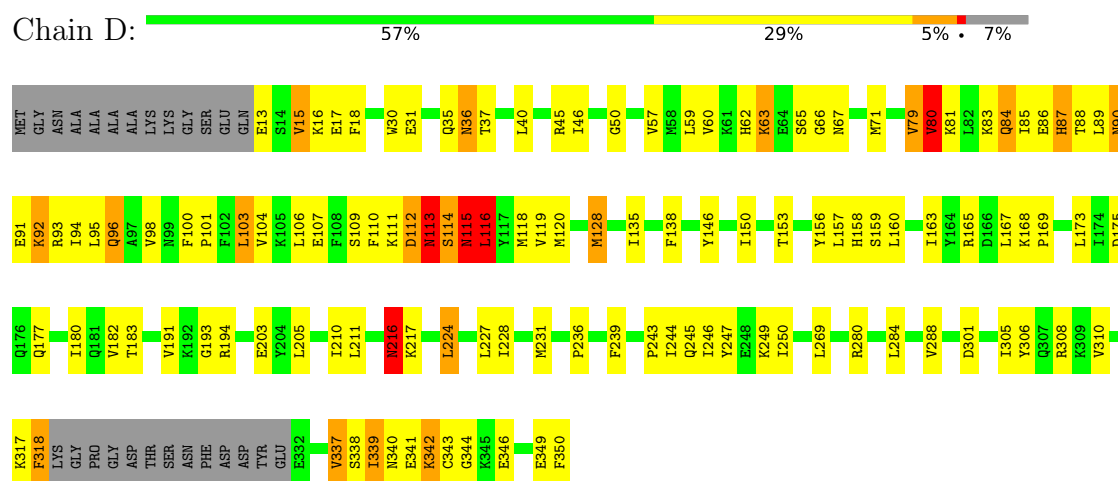
Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	325	Total	C	N	O	S	0	0
			2517	1632	430	450	5		
3	E	325	Total	C	N	O	S	0	0
			2517	1632	430	450	5		



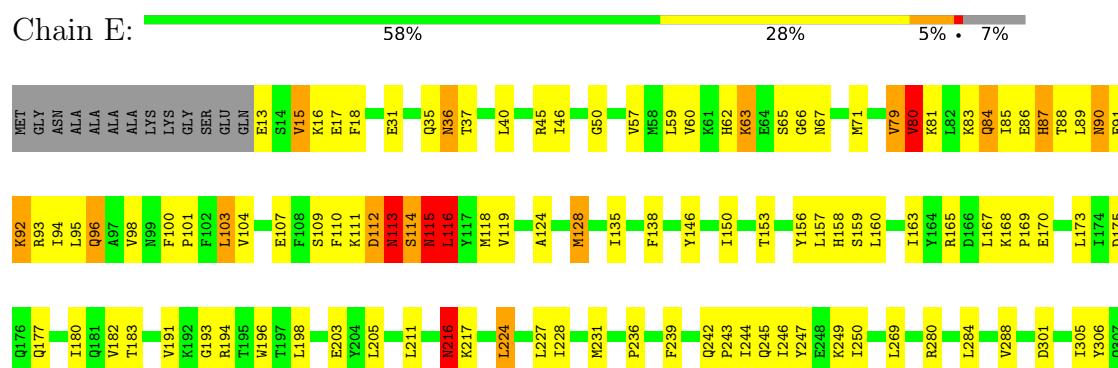
- Molecule 2: cAMP-dependent protein kinase type II-alpha regulatory subunit



- Molecule 3: cAMP-dependent protein kinase catalytic subunit alpha



- Molecule 3: cAMP-dependent protein kinase catalytic subunit alpha



E308	K309	V310	K317	F318	LYS	GLY	PRO	GLY	ASP	THR	SER	ASN	PHE	ASP	ASP	TYR	GLU	E332	V337	S338	I339	K340	E341	K342	C343	G344	K345	E346	E349	F350
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## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	1000	Depositor
Resolution determination method	FSC 0.5 CUT-OFF	Depositor
CTF correction method	Each Micrograph	Depositor
Microscope	FEI TECNAI 12	Depositor
Voltage (kV)	120	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	15	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	52000	Depositor
Image detector	GENERIC GATAN	Depositor
Maximum map value	13.734	Depositor
Minimum map value	-4.080	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	4.5	Depositor
Map size ( $\text{\AA}$ )	503.99997, 503.99997, 503.99997	wwPDB
Map dimensions	120, 120, 120	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	4.2, 4.2, 4.2	Depositor

## 5 Model quality

### 5.1 Standard geometry

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	0.50	0/1872	0.58	0/2518
2	B	0.50	0/3065	0.73	8/4135 (0.2%)
2	C	0.52	1/3065 (0.0%)	0.74	7/4135 (0.2%)
3	D	0.38	0/2581	0.80	14/3498 (0.4%)
3	E	0.38	0/2581	0.80	14/3498 (0.4%)
All	All	0.46	1/13164 (0.0%)	0.74	43/17784 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	87	PRO	N-CD	-5.68	1.39	1.47

The worst 5 of 43 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	116	LEU	CA-C-O	11.07	143.34	120.10
3	E	116	LEU	CA-C-O	11.06	143.32	120.10
3	E	116	LEU	CA-C-N	-10.74	93.56	117.20
3	D	116	LEU	CA-C-N	-10.74	93.57	117.20
3	E	114	SER	CA-C-N	-9.85	95.53	117.20

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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	1836	0	1893	56	0
2	B	3018	0	2929	151	0
2	C	3018	0	2929	143	0
3	D	2517	0	2349	109	0
3	E	2517	0	2349	112	0
All	All	12906	0	12449	551	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 22.

The worst 5 of 551 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:B:34:VAL:CG2	2:C:41:ARG:HD3	1.55	1.35
2:B:34:VAL:HG21	2:C:41:ARG:CD	1.57	1.34
2:B:86:VAL:HB	2:B:87:PRO:HD3	1.17	1.15
1:A:289:GLY:HA2	1:A:292:ASP:HB2	1.30	1.14
2:B:92:PHE:HA	2:B:93:THR:HB	1.34	1.09

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	229/353 (65%)	223 (97%)	6 (3%)	0	100	100
2	B	378/402 (94%)	353 (93%)	15 (4%)	10 (3%)	5	31
2	C	378/402 (94%)	353 (93%)	15 (4%)	10 (3%)	5	31
3	D	321/351 (92%)	277 (86%)	28 (9%)	16 (5%)	2	20
3	E	321/351 (92%)	277 (86%)	28 (9%)	16 (5%)	2	20
All	All	1627/1859 (88%)	1483 (91%)	92 (6%)	52 (3%)	7	26

5 of 52 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	109	GLU
2	B	310	SER
2	B	314	SER
2	B	317	ASN
2	B	319	GLY

### 5.3.2 Protein sidechains ⓘ

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	202/302 (67%)	196 (97%)	6 (3%)	41	63
2	B	330/357 (92%)	296 (90%)	34 (10%)	7	25
2	C	330/357 (92%)	296 (90%)	34 (10%)	7	25
3	D	240/306 (78%)	223 (93%)	17 (7%)	14	39
3	E	240/306 (78%)	223 (93%)	17 (7%)	14	39
All	All	1342/1628 (82%)	1234 (92%)	108 (8%)	15	35

5 of 108 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	107	GLU
2	C	354	ASP
3	E	103	LEU
2	C	110	GLU
2	C	231	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 55 such sidechains are listed below:

Mol	Chain	Res	Type
3	D	36	ASN
3	D	176	GLN
3	E	293	ASN
3	E	176	GLN

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
3	D	39	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.

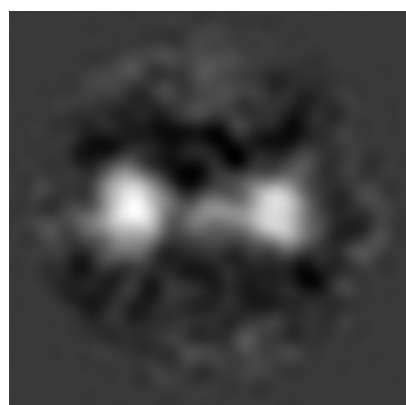
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-5756. These allow visual inspection of the internal detail of the map and identification of artifacts.

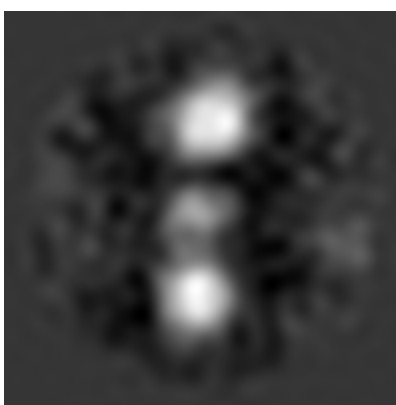
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

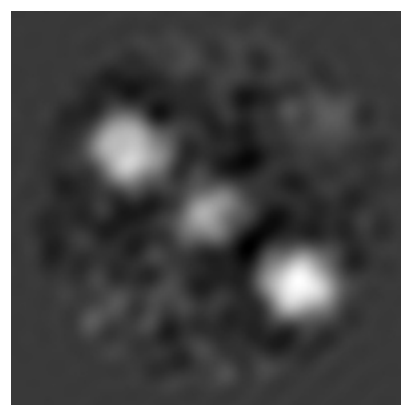
#### 6.1.1 Primary map



X



Y

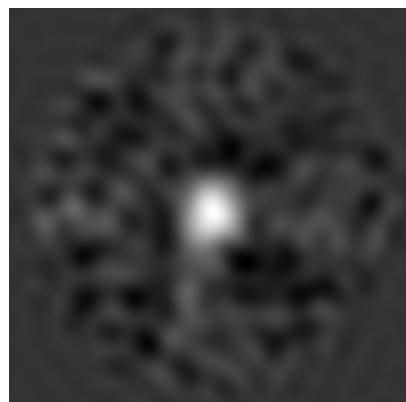


Z

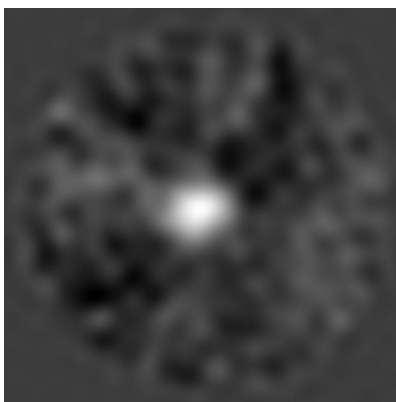
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

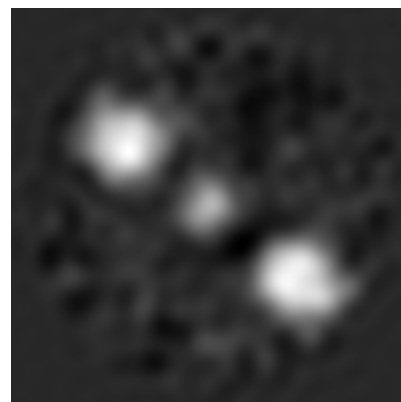
#### 6.2.1 Primary map



X Index: 60



Y Index: 60

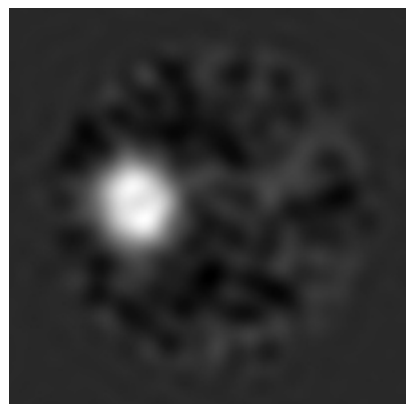


Z Index: 60

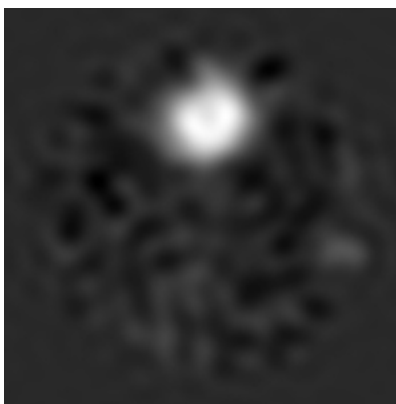
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

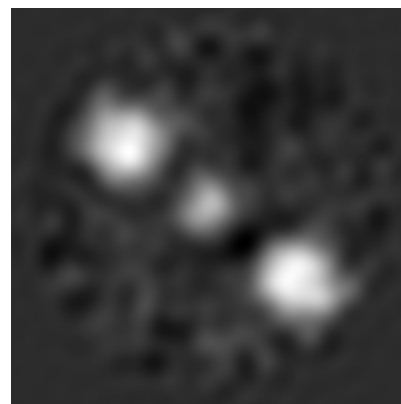
### 6.3.1 Primary map



X Index: 86



Y Index: 37

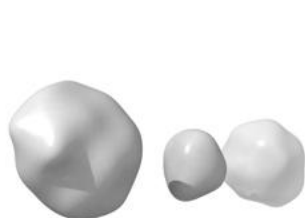


Z Index: 59

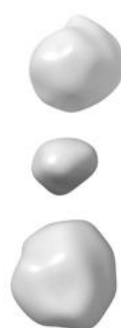
The images above show the largest variance slices of the map in three orthogonal directions.

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

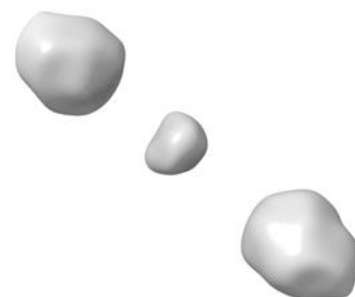
### 6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

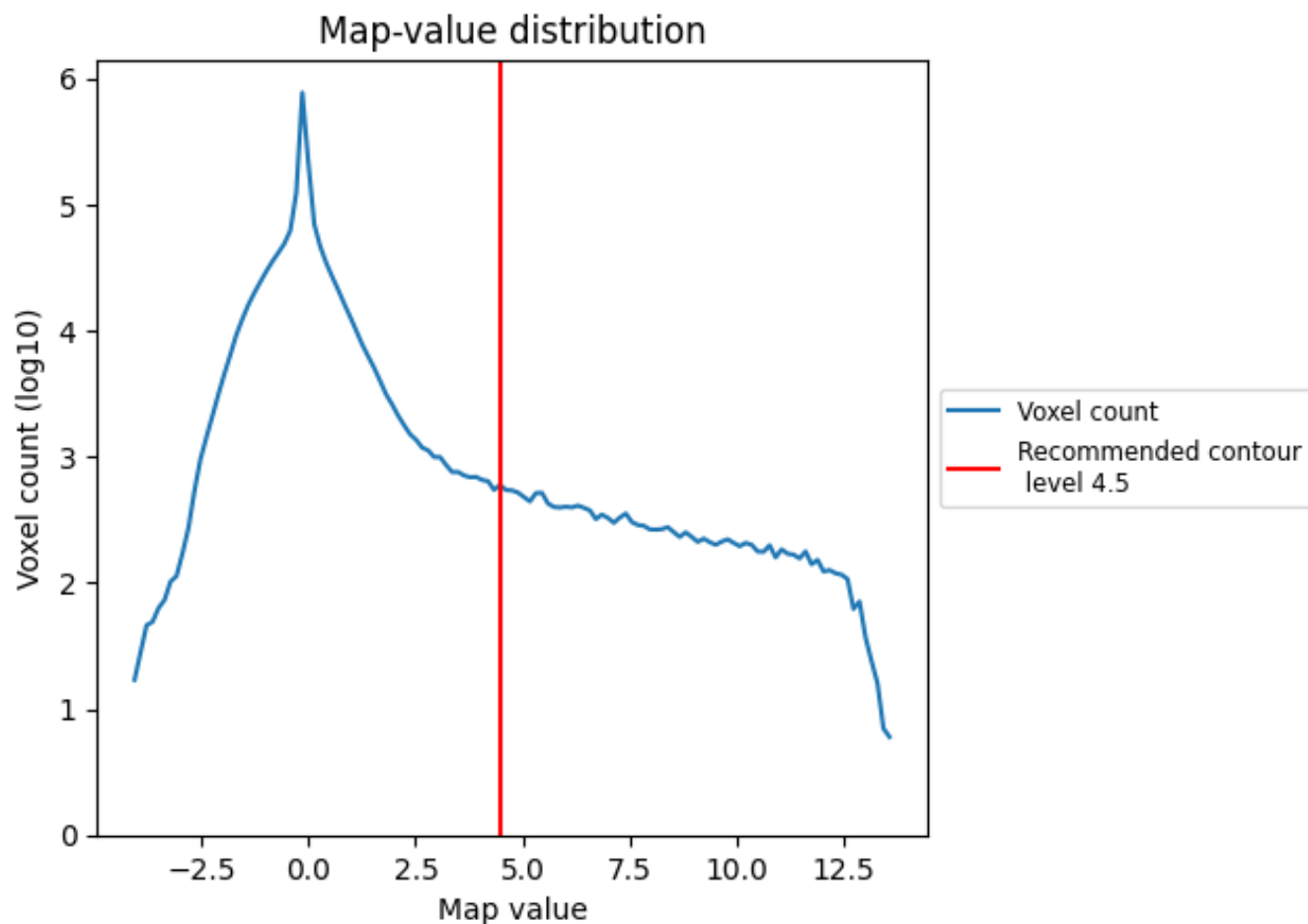
## 6.5 Mask visualisation

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

## 7 Map analysis [i](#)

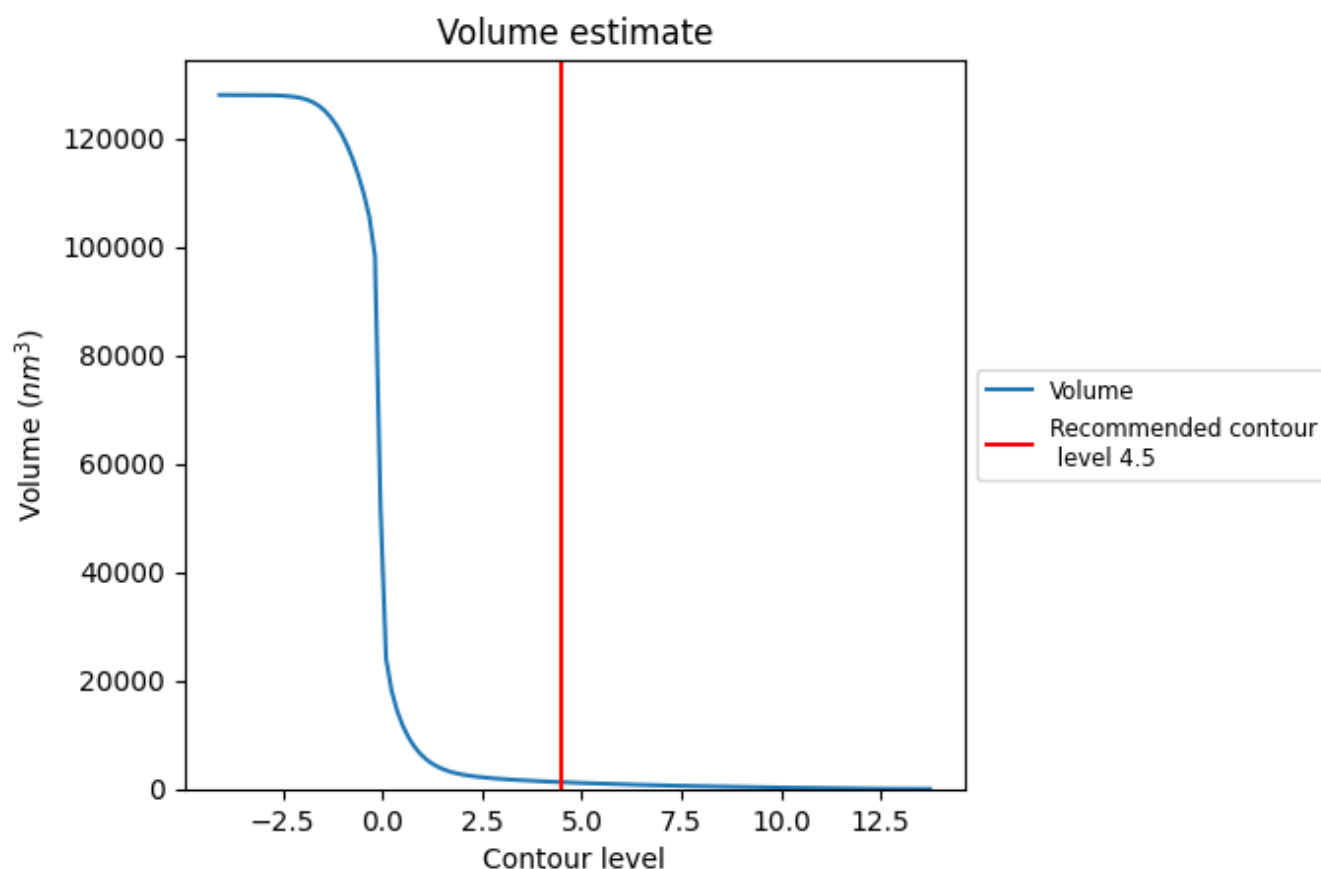
This section contains the results of statistical analysis of the map.

### 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](#)

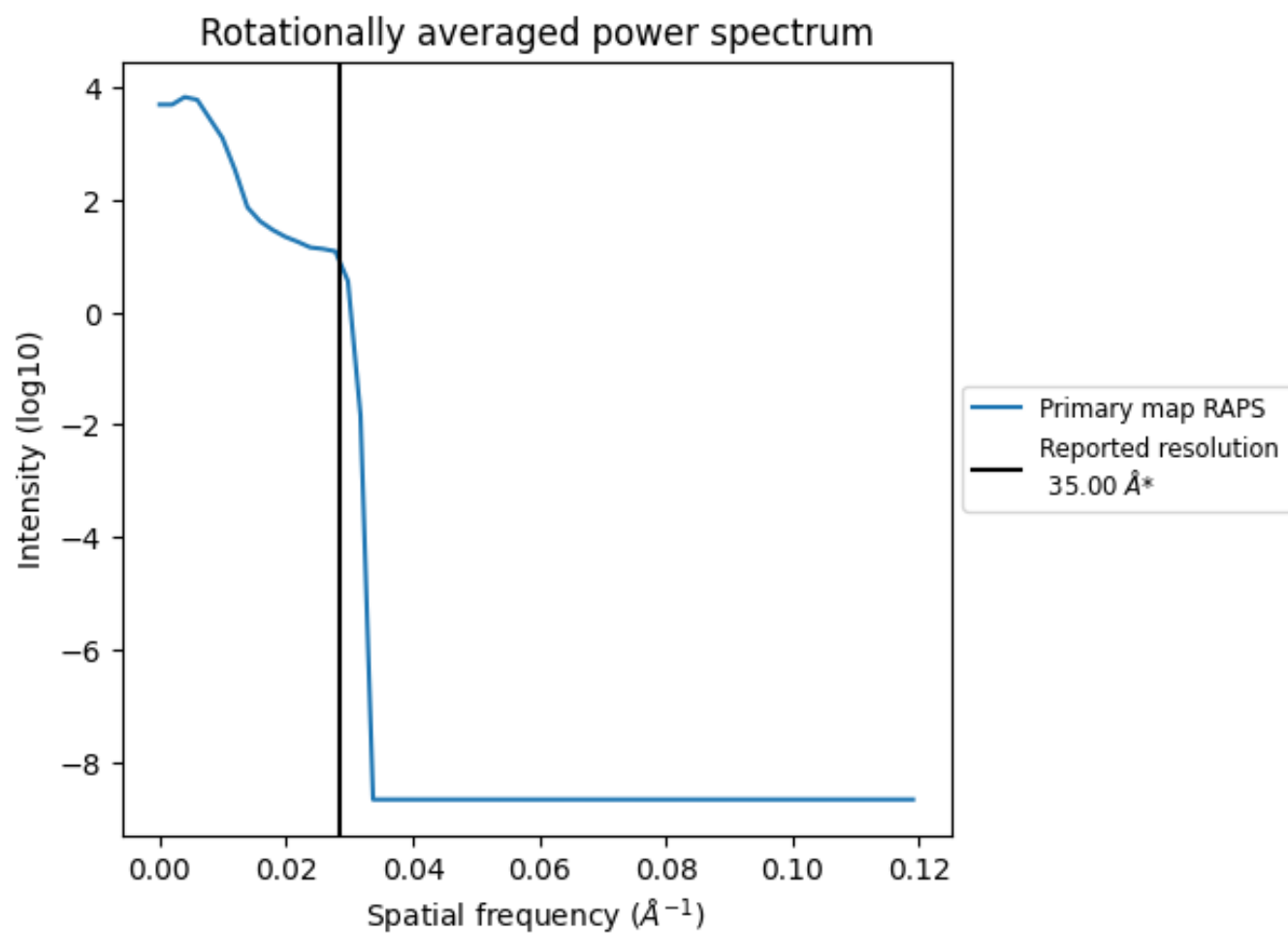


The volume at the recommended contour level is 1251 nm<sup>3</sup>; this corresponds to an approximate mass of 1130 kDa.

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 ⓘ



\*Reported resolution corresponds to spatial frequency of 0.029 Å<sup>-1</sup>

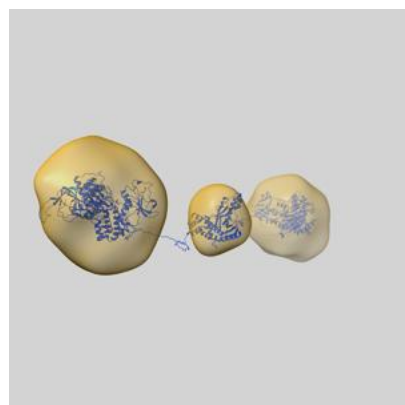
## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

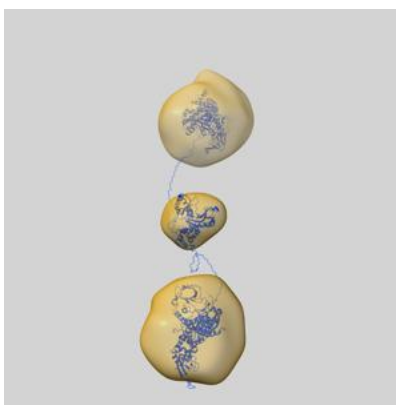
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-5756 and PDB model 3J4R. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

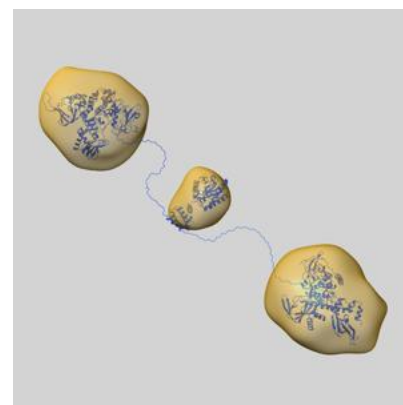
### 9.1 Map-model overlay [i](#)



X



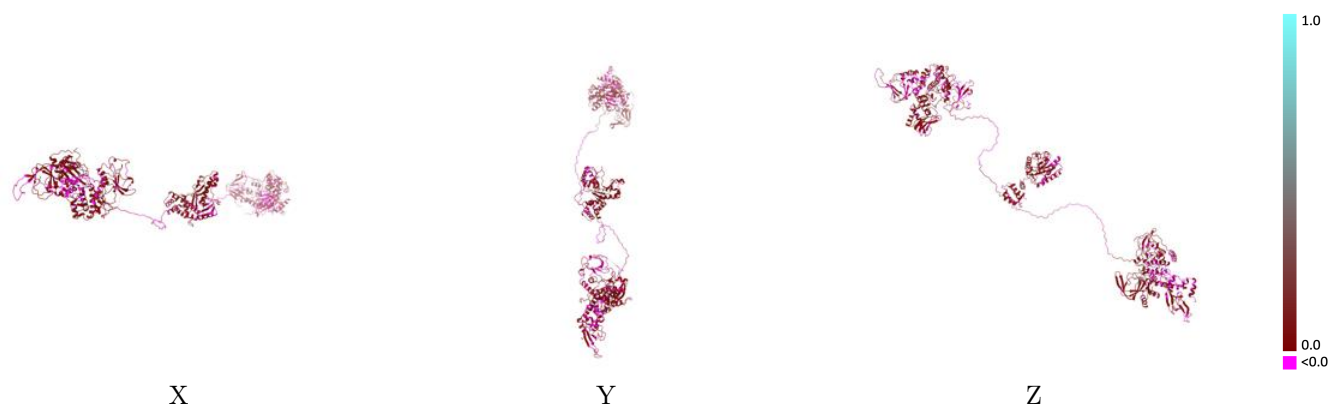
Y



Z

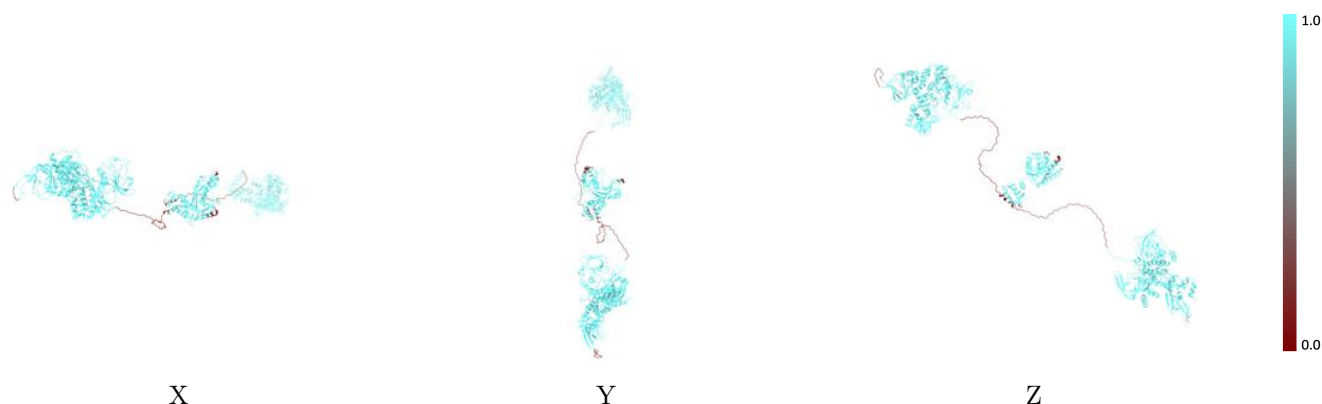
The images above show the 3D surface view of the map at the recommended contour level 4.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



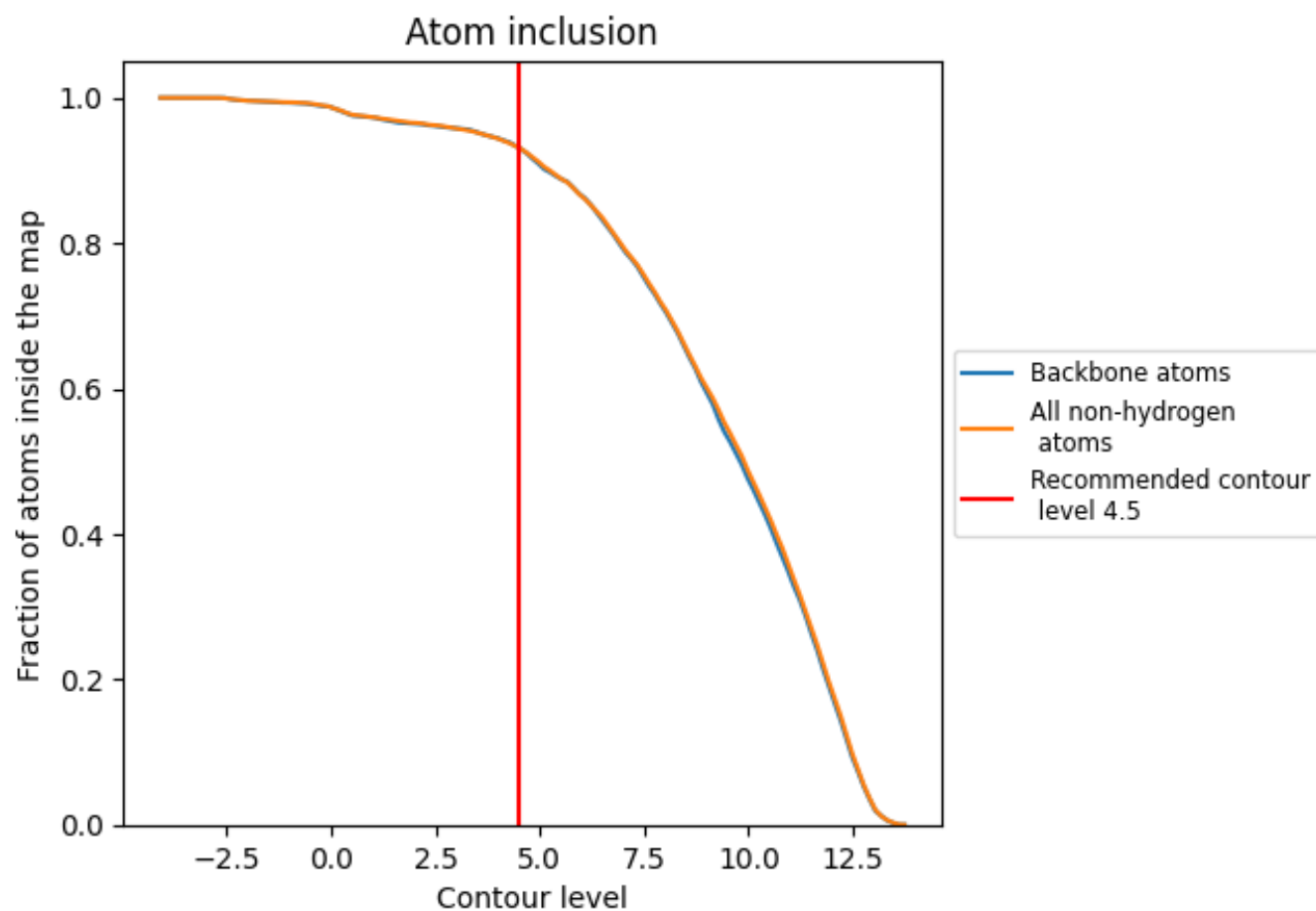
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.5).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 93% 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 (4.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.9310	<div></div> 0.0420
A	<div></div> 0.9475	<div></div> 0.0560
B	<div></div> 0.8605	<div></div> 0.0320
C	<div></div> 0.8760	<div></div> 0.0430
D	<div></div> 1.0000	<div></div> 0.0390
E	<div></div> 1.0000	<div></div> 0.0440

