



Full wwPDB EM Validation Report ⓘ

Feb 26, 2024 – 11:17 PM EST

PDB ID : 6VQI
EMDB ID : EMD-21351
Title : Mammalian V-ATPase from rat brain collar and peripheral stalks rotational state 1 (from focused refinement)
Authors : Abbas, Y.M.; Rubinstein, J.L.
Deposited on : 2020-02-05
Resolution : 4.30 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

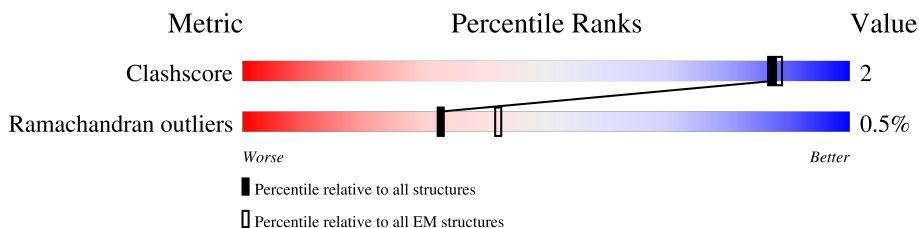
EMDB validation analysis : 0.0.1.dev70
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.30 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

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	G	382	
2	I	226	
2	J	226	
2	K	226	
3	M	118	
3	N	118	
3	O	118	
4	a	838	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 5278 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 V-type proton ATPase subunit C 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	G	360	1790	1070	360	360	0	0

- Molecule 2 is a protein called V-type proton ATPase subunit E 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	I	64	319	191	64	64	0	0
2	J	64	319	191	64	64	0	0
2	K	64	319	191	64	64	0	0

- Molecule 3 is a protein called V-type proton ATPase subunit G.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	M	67	332	198	67	67	0	0
3	N	67	332	198	67	67	0	0
3	O	67	332	198	67	67	0	0

- Molecule 4 is a protein called V-type proton ATPase 116 kDa subunit a isoform 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	a	309	1535	917	309	309	0	0

Position	Residue	Validation
1	F170	✓
2	T211	✓
3	F220	✓
4	I221	✓
5	I222	✓
6	Y245	✓
7	P246	✓
8	S259	✓
9	T315	✓
10	G345	✓
11	S346	✓
12	T347	✓
13	T357	✓
14	ASN	
15	GLN	
16	THR	
17	PRO	
18	PRO	
19	THR	
20	TYR	
21	ASN	
22	LYS	
23	THR	
24	LYS	
25	HIS	
26	GLY	
27	PHE	
28	GLN	
29	ASN	
30	ILE	
31	ASP	
32	VAL	
33	ALA	
34	TYR	
35	GLY	
36	ILE	
37	THR	
38	TYR	
39	ARG	
40	THR	
41	TYR	
42	TRP	
43	VAL	
44	ALA	
45	PHE	
46	THR	
47	LEU	
48	GLU	
49	ARG	
50	THR	
51	GLY	
52	ILE	
53	ASN	
54	ASN	
55	LEU	
56	ASN	
57	GLY	
58	ASN	
59	THR	
60	ASN	
61	GLY	
62	ASN	
63	VAL	
64	LEU	
65	ASP	
66	MET	
67	VAL	
68	THR	
69	TYR	
70	ALA	
71	THR	
72	ARG	
73	THR	
74	VAL	
75	ARG	
76	GLY	
77	ASP	
78	ASN	
79	ASN	
80	TRP	
81	LEU	
82	GLY	
83	LEU	
84	ASN	
85	THR	
86	LEU	
87	LEU	
88	THR	
89	GLY	
90	THR	
91	ASN	
92	ASN	
93	LEU	
94	GLY	
95	THR	
96	GLY	
97	GLU	
98	GLY	
99	ASN	
100	ASN	
101	ASN	
102	ASP	
103	ASN	
104	VAL	
105	ASN	
106	VAL	
107	ASN	
108	ASN	
109	THR	
110	THR	
111	ARG	
112	THR	
113	GLY	
114	ASP	
115	ASP	
116	VAL	
117	THR	
118	ASN	
119	LEU	
120	GLY	
121	GLY	
122	VAL	
123	ASP	
124	GLY	
125	ASP	
126	ASN	
127	ASP	
128	ASN	
129	ASP	
130	GLY	
131	VAL	
132	THR	
133	VAL	
134	ASP	
135	GLY	
136	THR	
137	THR	
138	THR	
139	LEU	
140	GLY	
141	ILE	
142	ASN	
143	ILE	
144	LEU	
145	LEU	
146	LEU	
147	GLY	
148	LEU	
149	GLY	
150	ASN	
151	THR	
152	ASN	
153	THR	
154	ASN	
155	VAL	
156	ALA	
157	THR	
158	ALA	
159	THR	
160	THR	
161	ASN	
162	THR	
163	THR	
164	ASN	
165	ASN	
166	GLY	
167	THR	
168	THR	
169	THR	
170	ASN	
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187	ASN	
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189	ASN	
190	ASN	
191	ASN	
192	ASN	
193	ASN	
194	ASN	
195	ASN	
196	ASN	
197	ASN	
198	ASN	
199	ASN	
200	ASN	

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	90648	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 ($e^-/\text{\AA}^2$)	43	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	1.733	Depositor
Minimum map value	-0.481	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.055	Depositor
Recommended contour level	0.3	Depositor
Map size (\AA)	360.4, 360.4, 360.4	wwPDB
Map dimensions	340, 340, 340	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.06, 1.06, 1.06	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	G	0.31	0/1788	0.56	0/2494
2	I	0.30	0/318	0.46	0/443
2	J	0.42	0/318	0.54	0/443
2	K	0.38	0/318	0.51	0/443
3	M	0.32	0/331	0.46	0/460
3	N	0.41	0/331	0.50	0/460
3	O	0.31	0/331	0.50	0/460
4	a	0.35	0/1533	0.62	0/2137
All	All	0.34	0/5268	0.55	0/7340

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	G	1790	0	794	9	0
2	I	319	0	149	0	0
2	J	319	0	149	0	0
2	K	319	0	149	1	0
3	M	332	0	166	0	0
3	N	332	0	166	0	0
3	O	332	0	166	1	0
4	a	1535	0	661	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	5278	0	2400	10	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 2.

All (10) 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:G:196:ASP:O	1:G:200:GLN:N	2.34	0.56
1:G:275:GLN:O	1:G:279:LEU:N	2.39	0.56
1:G:23:HIS:O	1:G:27:THR:N	2.37	0.55
1:G:35:SER:HA	1:G:320:LEU:O	2.06	0.55
1:G:7:ILE:HA	1:G:370:VAL:O	2.07	0.54
1:G:18:THR:O	1:G:22:LEU:N	2.43	0.51
2:K:34:ALA:HB1	3:O:29:LYS:HA	1.97	0.47
1:G:312:LEU:HA	1:G:313:PRO:C	2.37	0.45
1:G:182:LEU:HA	1:G:229:LEU:O	2.19	0.42
1:G:187:VAL:HA	1:G:248:VAL:HA	2.02	0.41

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	G	356/382 (93%)	346 (97%)	7 (2%)	3 (1%)	19	60
2	I	62/226 (27%)	62 (100%)	0	0	100	100
2	J	62/226 (27%)	62 (100%)	0	0	100	100
2	K	62/226 (27%)	62 (100%)	0	0	100	100
3	M	65/118 (55%)	65 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	N	65/118 (55%)	65 (100%)	0	0	100	100
3	O	65/118 (55%)	65 (100%)	0	0	100	100
4	a	305/838 (36%)	296 (97%)	7 (2%)	2 (1%)	22	62
All	All	1042/2252 (46%)	1023 (98%)	14 (1%)	5 (0%)	32	68

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	a	245	TYR
1	G	365	GLU
1	G	344	SER
1	G	314	VAL
4	a	79	ILE

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

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

There are no chain breaks in this entry.

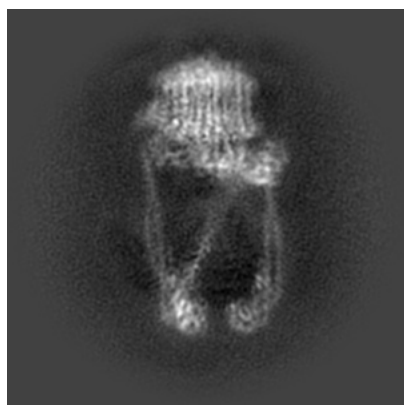
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21351. These allow visual inspection of the internal detail of the map and identification of artifacts.

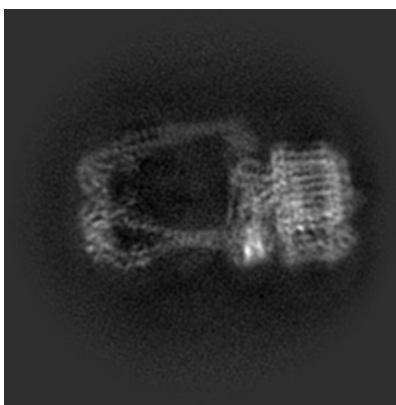
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

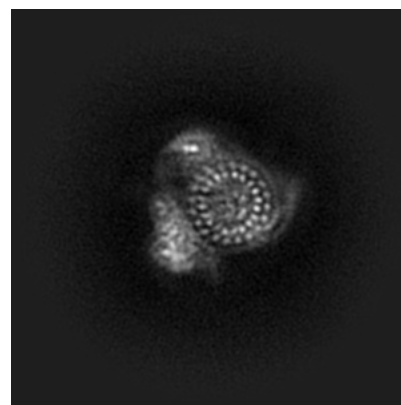
6.1.1 Primary map



X



Y

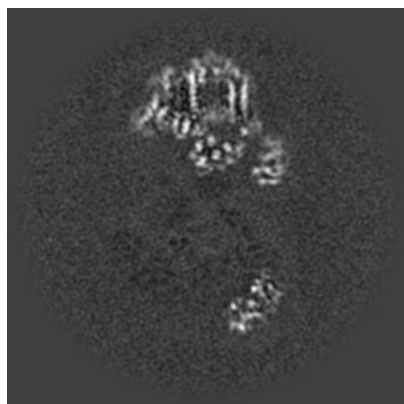


Z

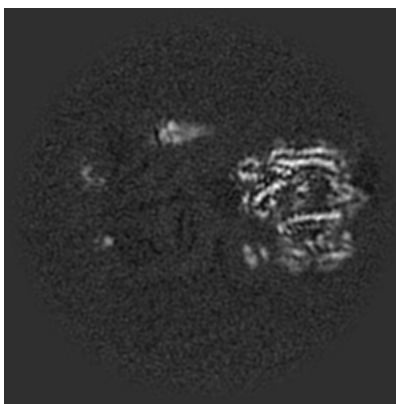
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

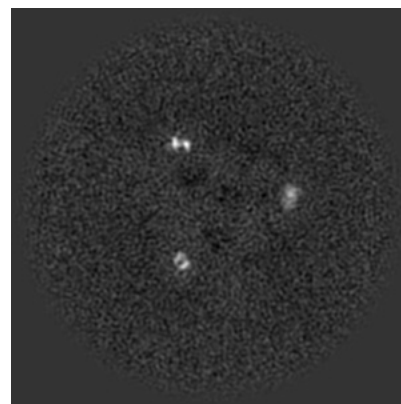
6.2.1 Primary map



X Index: 170



Y Index: 170

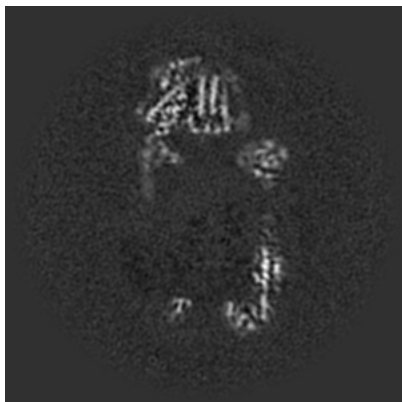


Z Index: 170

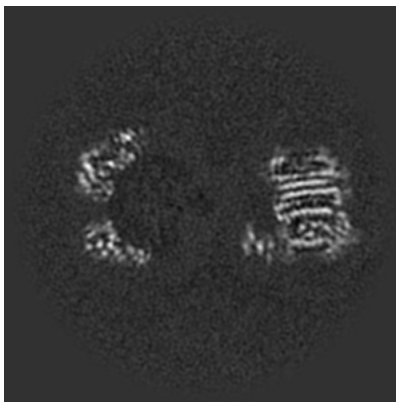
The images above show central slices of the map in three orthogonal directions.

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

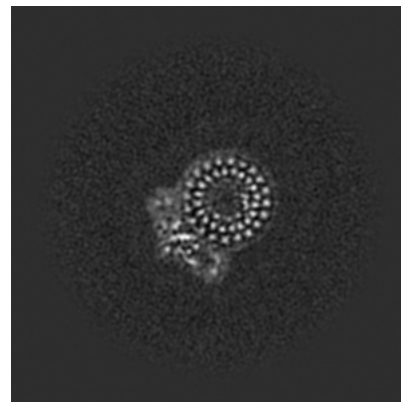
6.3.1 Primary map



X Index: 154



Y Index: 150

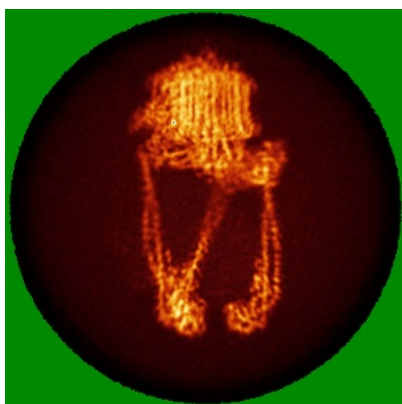


Z Index: 243

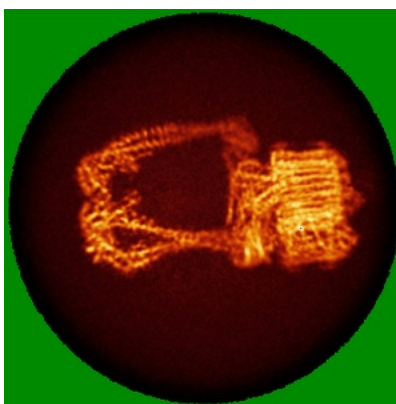
The images above show the largest variance slices of the map in three orthogonal directions.

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

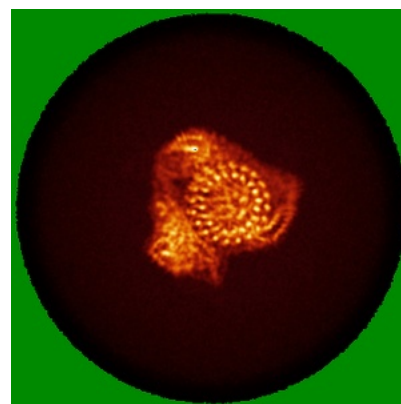
6.4.1 Primary map



X



Y



Z

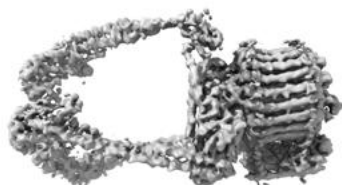
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

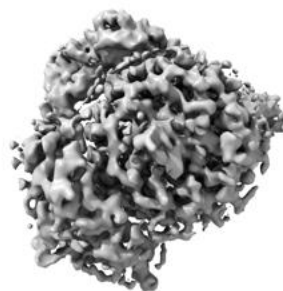
6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.3. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

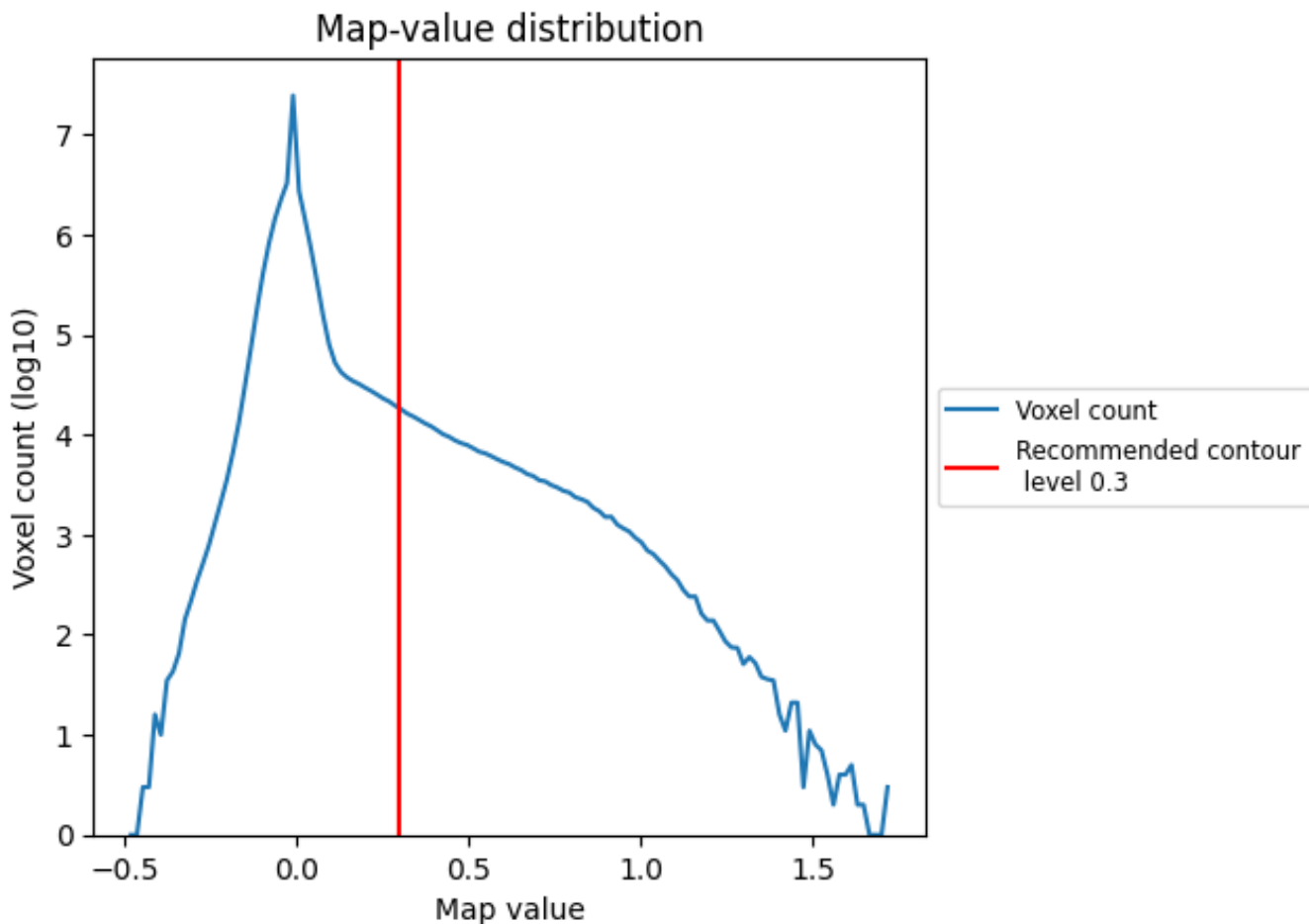
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

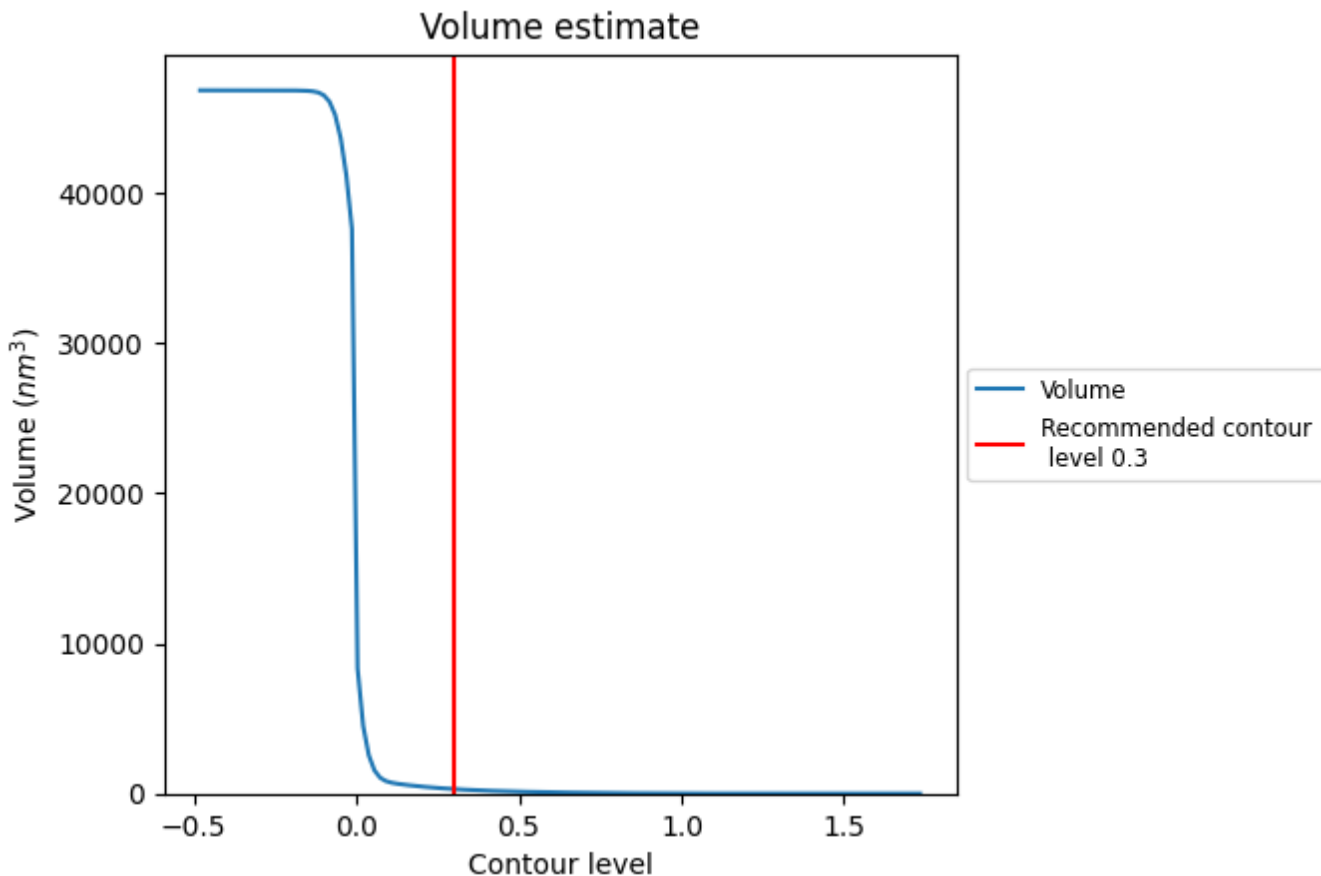
This section contains the results of statistical analysis of the map.

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.

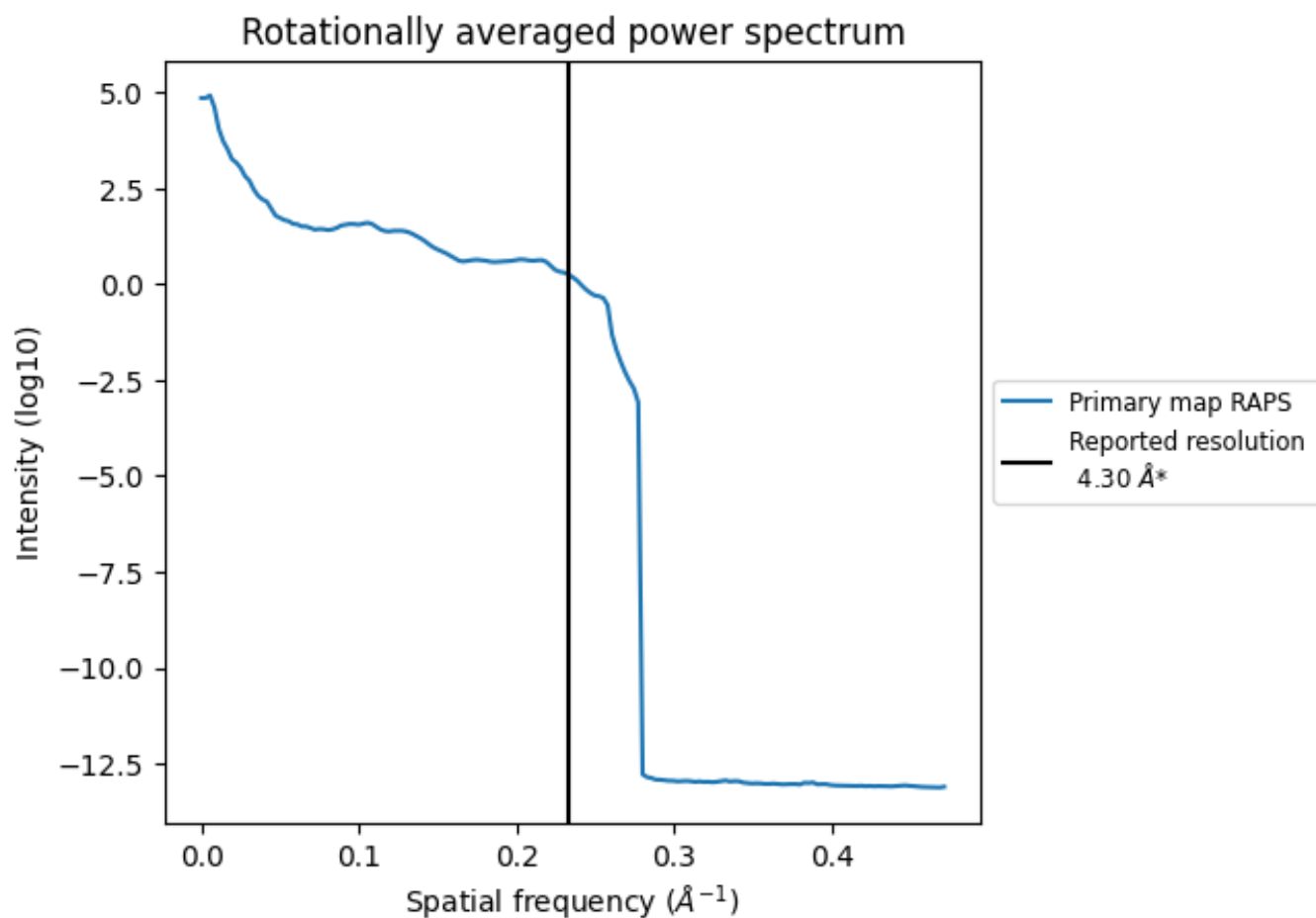
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 299 nm³; this corresponds to an approximate mass of 270 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 0.233 Å⁻¹

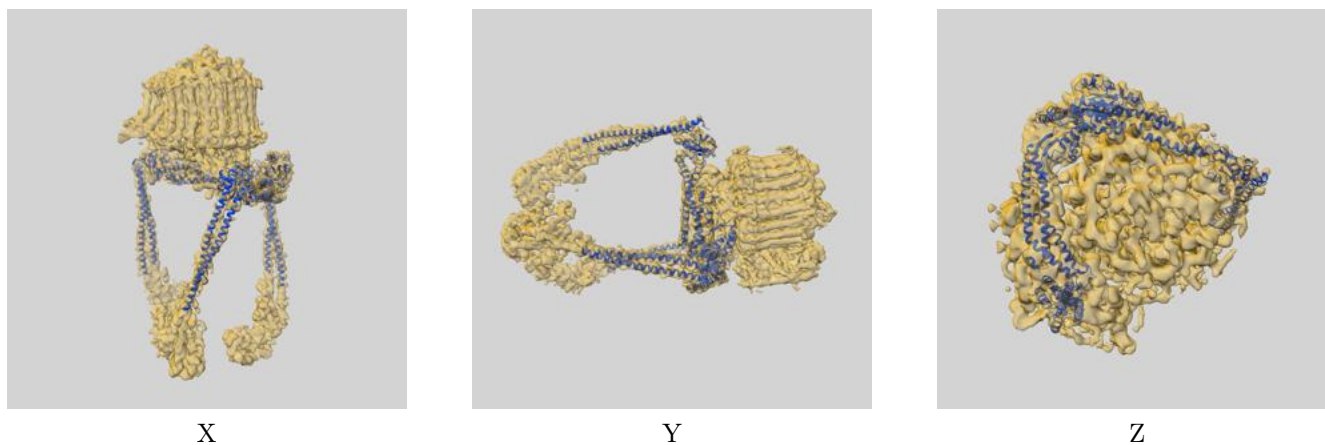
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

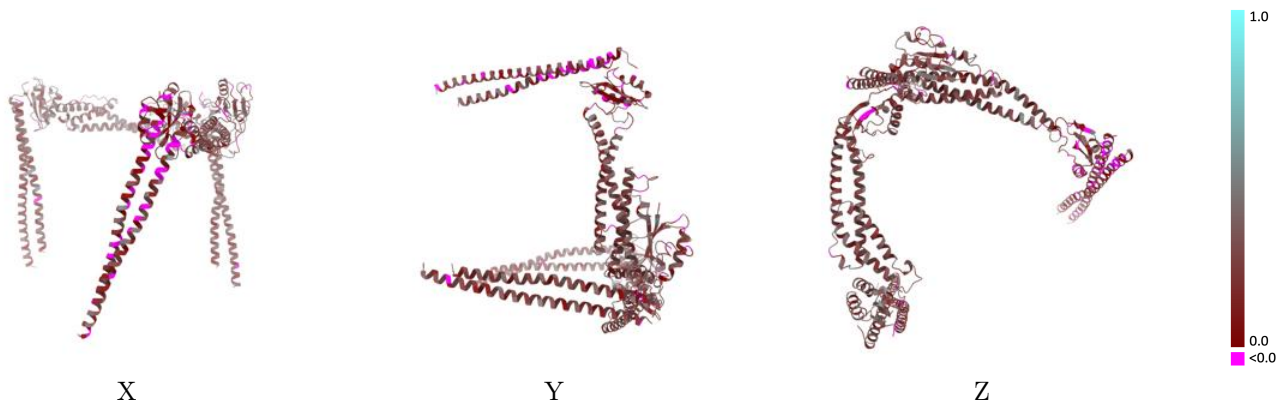
This section contains information regarding the fit between EMDB map EMD-21351 and PDB model 6VQI. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



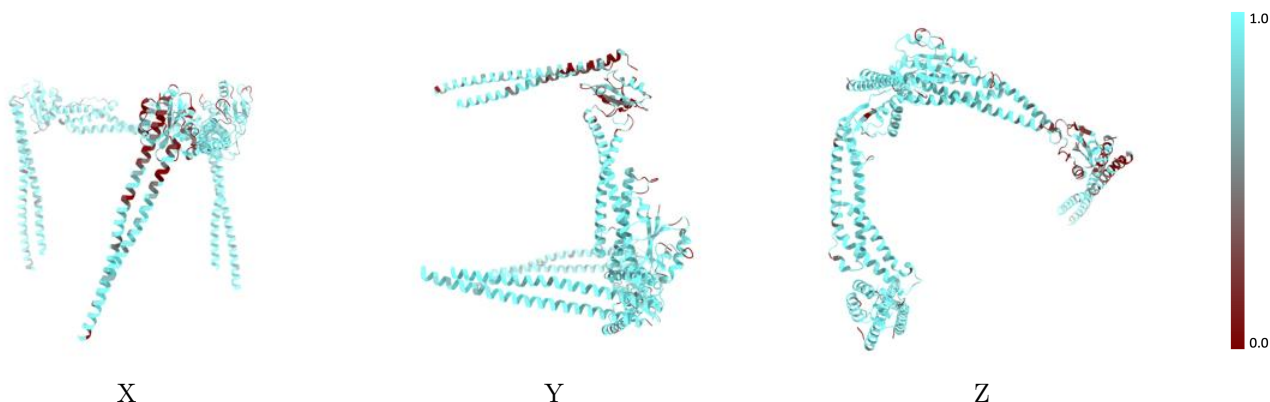
The images above show the 3D surface view of the map at the recommended contour level 0.3 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



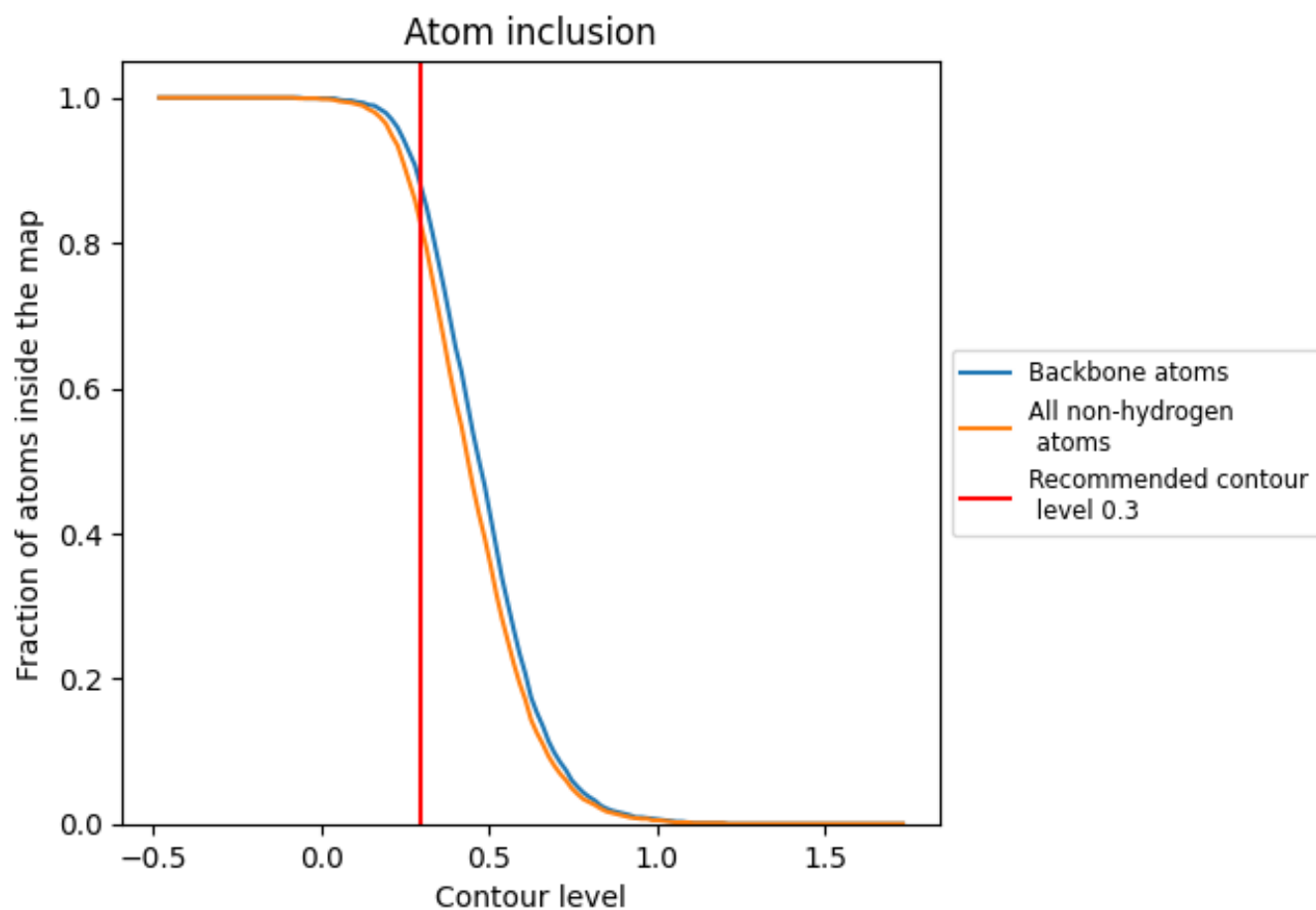
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.3).



















9.4 Atom inclusion [i](#)



At the recommended contour level, 87% of all backbone atoms, 82% 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 (0.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8210	 0.2510
G	 0.7590	 0.2510
I	 0.8870	 0.2540
J	 0.9440	 0.2670
K	 0.6430	 0.1560
M	 0.8740	 0.2250
N	 0.9160	 0.2460
O	 0.7170	 0.1590
a	 0.8830	 0.2920

