



wwPDB EM Validation Summary Report ⓘ

Mar 29, 2026 – 10:42 PM UTC

PDB ID : 7Z16 / pdb_00007z16
EMDB ID : EMD-14442
Title : E. coli C-P lyase bound to PhnK/PhnL dual ABC dimer with AMPPNP and PhnK E171Q mutation
Authors : Amstrup, S.K.; Sofus, N.; Karlsen, J.L.; Skjerning, R.B.; Boesen, T.; Enghild, J.J.; Hove-Jensen, B.; Brodersen, D.E.
Deposited on : 2022-02-24
Resolution : 2.09 Å (reported)
Based on initial model : 4XB6

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 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.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

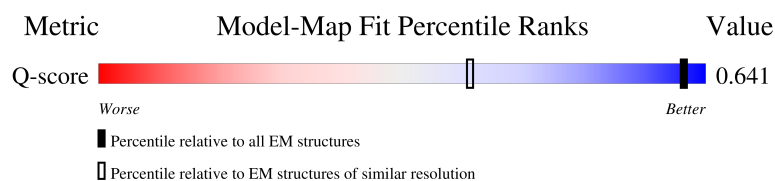
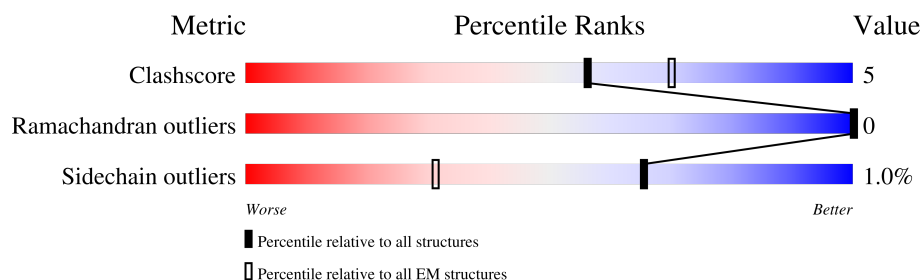
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.09 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	2022 (1.60 - 2.59)

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	150	
1	E	150	
2	B	194	

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Mol	Chain	Length	Quality of chain
2	F	194	 96%
3	C	354	 89% 11%
3	G	354	 89% 11%
4	D	281	 86% 12%
4	H	281	 87% 12%
5	I	291	 79% 7% 14%
5	J	291	 78% 8% 14%
6	K	226	 15% 75% 23%
6	L	226	 14% 75% 23%

2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 44716 atoms, of which 22266 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 Phosphonate C-P lyase system protein PhnG.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	143	Total	C	H	N	O	S	0	0
			2187	682	1083	209	207	6		
1	E	143	Total	C	H	N	O	S	0	0
			2187	682	1083	209	207	6		

- Molecule 2 is a protein called Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnH.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	193	Total	C	H	N	O	S	0	0
			2956	926	1489	256	278	7		
2	F	193	Total	C	H	N	O	S	0	0
			2956	926	1489	256	278	7		

- Molecule 3 is a protein called Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnI.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	C	353	Total	C	H	N	O	S	0	0
			5395	1713	2662	478	531	11		
3	G	353	Total	C	H	N	O	S	0	0
			5395	1713	2662	478	531	11		

- Molecule 4 is a protein called Alpha-D-ribose 1-methylphosphonate 5-phosphate C-P lyase.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	D	278	Total	C	H	N	O	S	0	0
			4357	1399	2145	378	421	14		
4	H	278	Total	C	H	N	O	S	0	0
			4357	1399	2145	378	421	14		

- Molecule 5 is a protein called Putative phosphonates utilization ATP-binding protein PhnK.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	I	250	Total	C	H	N	O	S	0	0
			3899	1217	1959	357	361	5		
5	J	250	Total	C	H	N	O	S	0	0
			3899	1217	1959	357	361	5		

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	171	GLN	GLU	engineered mutation	UNP P16678
I	253	GLU	-	expression tag	UNP P16678
I	254	ASN	-	expression tag	UNP P16678
I	255	LEU	-	expression tag	UNP P16678
I	256	TYR	-	expression tag	UNP P16678
I	257	PHE	-	expression tag	UNP P16678
I	258	GLN	-	expression tag	UNP P16678
I	259	GLY	-	expression tag	UNP P16678
I	260	GLN	-	expression tag	UNP P16678
I	261	PHE	-	expression tag	UNP P16678
I	262	GLY	-	expression tag	UNP P16678
I	263	SER	-	expression tag	UNP P16678
I	264	TRP	-	expression tag	UNP P16678
I	265	SER	-	expression tag	UNP P16678
I	266	HIS	-	expression tag	UNP P16678
I	267	PRO	-	expression tag	UNP P16678
I	268	GLN	-	expression tag	UNP P16678
I	269	PHE	-	expression tag	UNP P16678
I	270	GLU	-	expression tag	UNP P16678
I	271	LYS	-	expression tag	UNP P16678
I	272	GLY	-	expression tag	UNP P16678
I	273	GLY	-	expression tag	UNP P16678
I	274	GLY	-	expression tag	UNP P16678
I	275	SER	-	expression tag	UNP P16678
I	276	GLY	-	expression tag	UNP P16678
I	277	GLY	-	expression tag	UNP P16678
I	278	GLY	-	expression tag	UNP P16678
I	279	SER	-	expression tag	UNP P16678
I	280	GLY	-	expression tag	UNP P16678
I	281	GLY	-	expression tag	UNP P16678
I	282	GLY	-	expression tag	UNP P16678
I	283	SER	-	expression tag	UNP P16678
I	284	TRP	-	expression tag	UNP P16678
I	285	SER	-	expression tag	UNP P16678
I	286	HIS	-	expression tag	UNP P16678

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Chain	Residue	Modelled	Actual	Comment	Reference
I	287	PRO	-	expression tag	UNP P16678
I	288	GLN	-	expression tag	UNP P16678
I	289	PHE	-	expression tag	UNP P16678
I	290	GLU	-	expression tag	UNP P16678
I	291	LYS	-	expression tag	UNP P16678
J	171	GLN	GLU	engineered mutation	UNP P16678
J	253	GLU	-	expression tag	UNP P16678
J	254	ASN	-	expression tag	UNP P16678
J	255	LEU	-	expression tag	UNP P16678
J	256	TYR	-	expression tag	UNP P16678
J	257	PHE	-	expression tag	UNP P16678
J	258	GLN	-	expression tag	UNP P16678
J	259	GLY	-	expression tag	UNP P16678
J	260	GLN	-	expression tag	UNP P16678
J	261	PHE	-	expression tag	UNP P16678
J	262	GLY	-	expression tag	UNP P16678
J	263	SER	-	expression tag	UNP P16678
J	264	TRP	-	expression tag	UNP P16678
J	265	SER	-	expression tag	UNP P16678
J	266	HIS	-	expression tag	UNP P16678
J	267	PRO	-	expression tag	UNP P16678
J	268	GLN	-	expression tag	UNP P16678
J	269	PHE	-	expression tag	UNP P16678
J	270	GLU	-	expression tag	UNP P16678
J	271	LYS	-	expression tag	UNP P16678
J	272	GLY	-	expression tag	UNP P16678
J	273	GLY	-	expression tag	UNP P16678
J	274	GLY	-	expression tag	UNP P16678
J	275	SER	-	expression tag	UNP P16678
J	276	GLY	-	expression tag	UNP P16678
J	277	GLY	-	expression tag	UNP P16678
J	278	GLY	-	expression tag	UNP P16678
J	279	SER	-	expression tag	UNP P16678
J	280	GLY	-	expression tag	UNP P16678
J	281	GLY	-	expression tag	UNP P16678
J	282	GLY	-	expression tag	UNP P16678
J	283	SER	-	expression tag	UNP P16678
J	284	TRP	-	expression tag	UNP P16678
J	285	SER	-	expression tag	UNP P16678
J	286	HIS	-	expression tag	UNP P16678
J	287	PRO	-	expression tag	UNP P16678
J	288	GLN	-	expression tag	UNP P16678

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Chain	Residue	Modelled	Actual	Comment	Reference
J	289	PHE	-	expression tag	UNP P16678
J	290	GLU	-	expression tag	UNP P16678
J	291	LYS	-	expression tag	UNP P16678

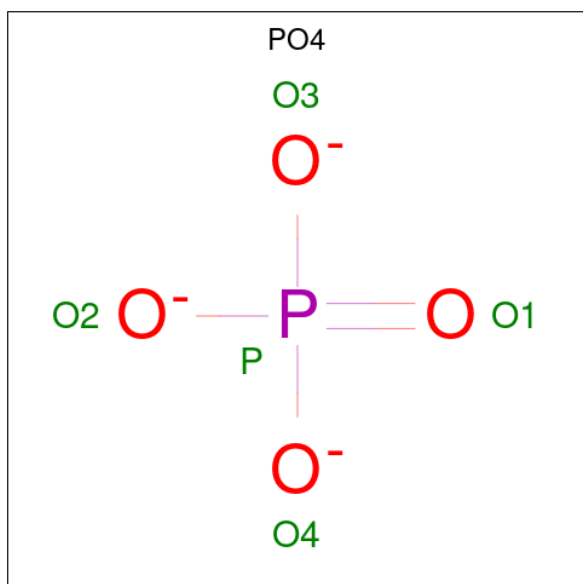
- Molecule 6 is a protein called Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnL.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	K	224	Total	C	H	N	O	S	0	0
			3503	1090	1776	319	313	5		
6	L	224	Total	C	H	N	O	S	0	0
			3503	1090	1776	319	313	5		

- Molecule 7 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
7	C	1	Total	Zn	0
			1	1	
7	D	1	Total	Zn	0
			1	1	
7	G	1	Total	Zn	0
			1	1	
7	H	1	Total	Zn	0
			1	1	

- Molecule 8 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).

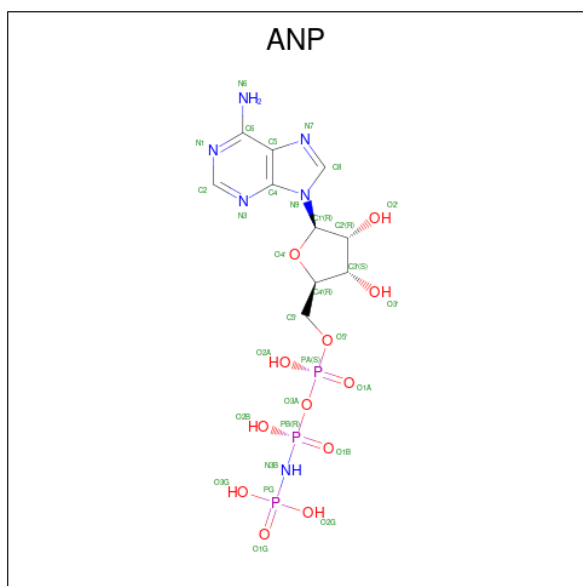


Mol	Chain	Residues	Atoms			AltConf
8	D	1	Total	O	P	0
			5	4	1	
8	H	1	Total	O	P	0
			5	4	1	

- Molecule 9 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
9	I	1	Total	Mg	0
			1	1	
9	J	1	Total	Mg	0
			1	1	

- Molecule 10 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: C₁₀H₁₇N₆O₁₂P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						AltConf
10	I	1	Total 44	C 10	H 13	N 6	O 12	P 3	0
10	J	1	Total 44	C 10	H 13	N 6	O 12	P 3	0

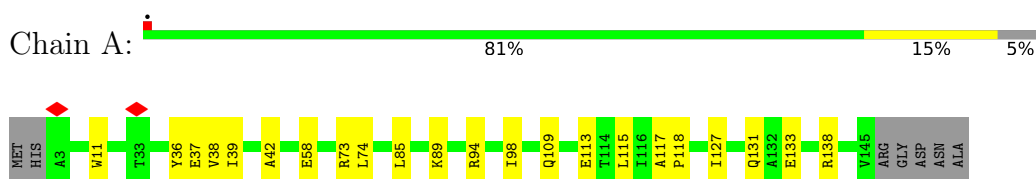
- Molecule 11 is water.

Mol	Chain	Residues	Atoms			AltConf
11	I	3	Total	H	O	0
			9	6	3	
11	J	3	Total	H	O	0
			9	6	3	

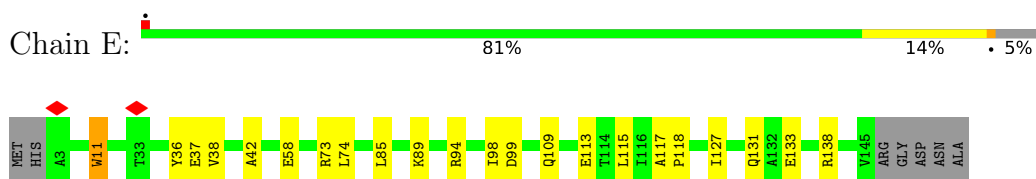
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

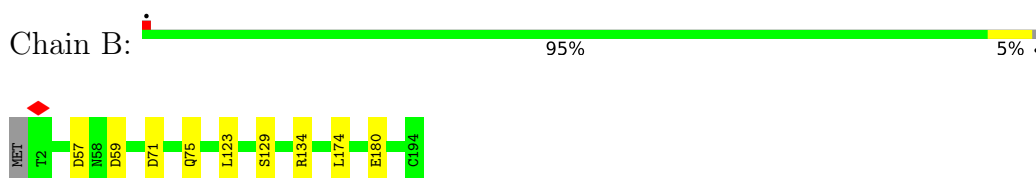
- Molecule 1: Phosphonate C-P lyase system protein PhnG



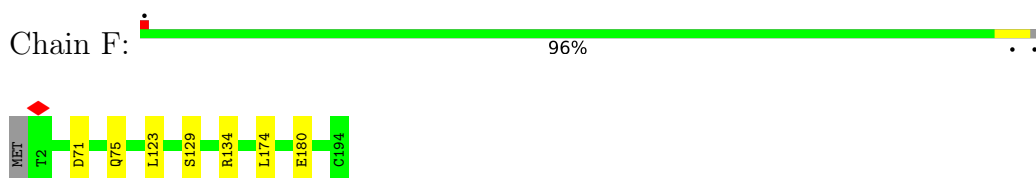
- Molecule 1: Phosphonate C-P lyase system protein PhnG



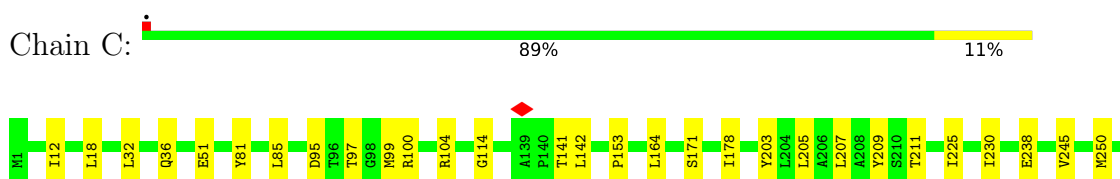
- Molecule 2: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnH



- Molecule 2: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnH



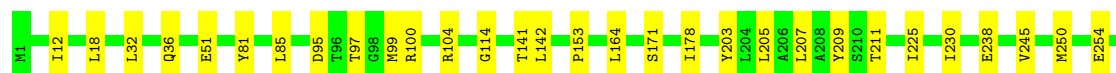
- Molecule 3: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnI





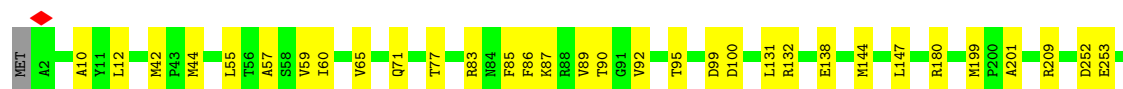
- Molecule 3: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnI

Chain G: 89% 11%



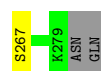
- Molecule 4: Alpha-D-ribose 1-methylphosphonate 5-phosphate C-P lyase

Chain D: 86% 12%



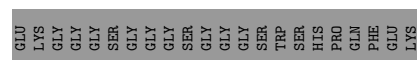
- Molecule 4: Alpha-D-ribose 1-methylphosphonate 5-phosphate C-P lyase

Chain H: 87% 12%



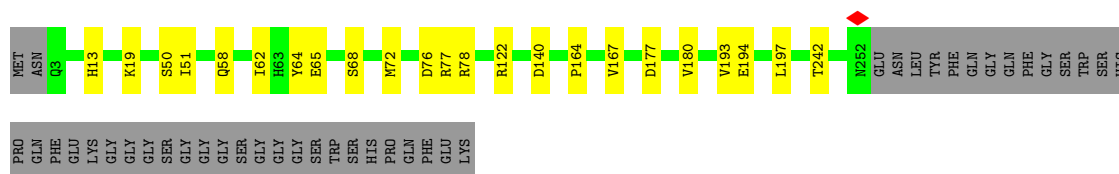
- Molecule 5: Putative phosphonates utilization ATP-binding protein PhnK

Chain I: 79% 7% 14%

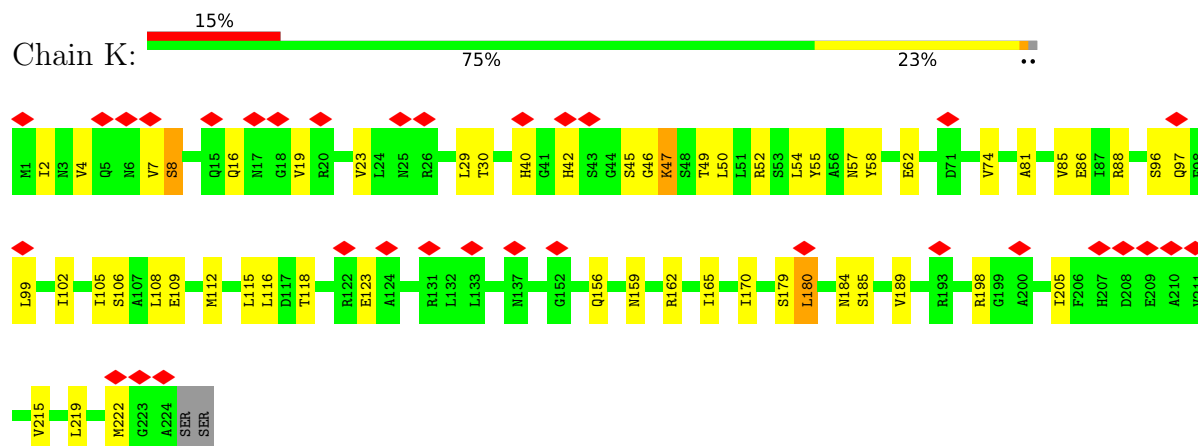


- Molecule 5: Putative phosphonates utilization ATP-binding protein PhnK

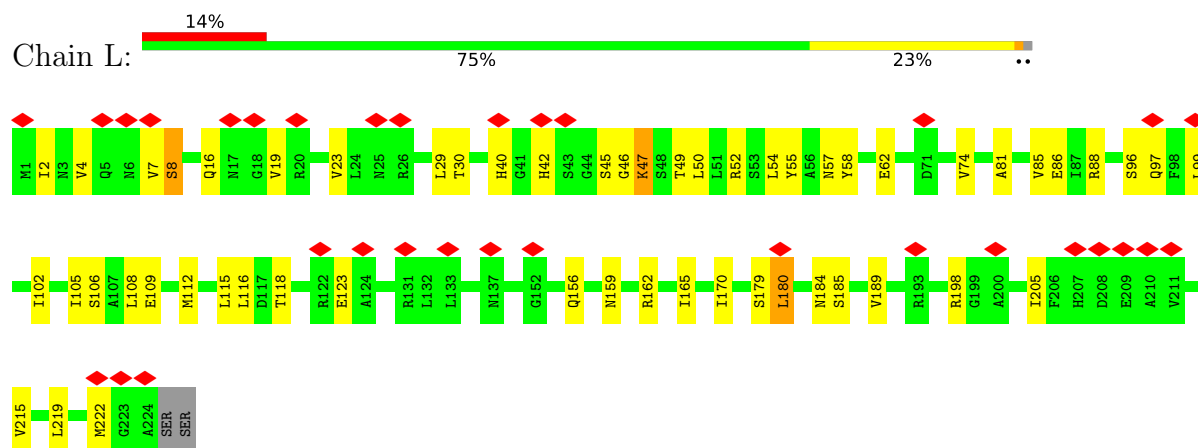
Chain J: 78% 8% 14%



- Molecule 6: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnL



- Molecule 6: Alpha-D-ribose 1-methylphosphonate 5-triphosphate synthase subunit PhnL



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	59737	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 ($e^-/\text{\AA}^2$)	62	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1400	Depositor
Magnification	135000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	6.364	Depositor
Minimum map value	-2.208	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.127	Depositor
Recommended contour level	0.7	Depositor
Map size (Å)	401.13998, 401.13998, 401.13998	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.9550952, 0.9550952, 0.9550952	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: PO4, MG, ZN, ANP

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	0.14	0/1120	0.32	0/1516
1	E	0.14	0/1120	0.32	0/1516
2	B	0.14	0/1495	0.38	0/2044
2	F	0.14	0/1495	0.38	0/2044
3	C	0.13	0/2787	0.28	0/3779
3	G	0.13	0/2787	0.28	0/3779
4	D	0.11	0/2265	0.29	0/3078
4	H	0.11	0/2265	0.29	0/3078
5	I	0.12	0/1974	0.30	0/2680
5	J	0.12	0/1974	0.30	0/2680
6	K	0.25	1/1758 (0.1%)	0.47	0/2391
6	L	0.25	1/1758 (0.1%)	0.47	0/2391
All	All	0.15	2/22798 (0.0%)	0.34	0/30976

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	L	86	GLU	C-O	-6.40	1.16	1.24
6	K	86	GLU	C-O	-6.28	1.16	1.24

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	1104	1083	1091	15	0
1	E	1104	1083	1091	16	0
2	B	1467	1489	1494	5	0
2	F	1467	1489	1494	4	0
3	C	2733	2662	2679	29	0
3	G	2733	2662	2679	29	0
4	D	2212	2145	2153	22	0
4	H	2212	2145	2153	20	0
5	I	1940	1959	1962	11	0
5	J	1940	1959	1962	12	0
6	K	1727	1776	1776	42	0
6	L	1727	1776	1776	41	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
7	G	1	0	0	0	0
7	H	1	0	0	0	0
8	D	5	0	0	0	0
8	H	5	0	0	0	0
9	I	1	0	0	0	0
9	J	1	0	0	0	0
10	I	31	13	13	0	0
10	J	31	13	13	0	0
11	I	3	6	0	0	0
11	J	3	6	0	0	0
All	All	22450	22266	22336	220	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 220 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:E:37:GLU:OE2	1:E:73:ARG:NH1	2.19	0.75
1:A:37:GLU:OE2	1:A:73:ARG:NH1	2.19	0.73
6:K:97:GLN:HA	6:K:156:GLN:NE2	2.05	0.71
6:L:97:GLN:HA	6:L:156:GLN:NE2	2.05	0.71
6:K:156:GLN:OE1	6:K:159:ASN:HB3	1.91	0.70

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	141/150 (94%)	140 (99%)	1 (1%)	0	100	100
1	E	141/150 (94%)	139 (99%)	2 (1%)	0	100	100
2	B	191/194 (98%)	186 (97%)	5 (3%)	0	100	100
2	F	191/194 (98%)	186 (97%)	5 (3%)	0	100	100
3	C	351/354 (99%)	345 (98%)	6 (2%)	0	100	100
3	G	351/354 (99%)	345 (98%)	6 (2%)	0	100	100
4	D	276/281 (98%)	268 (97%)	8 (3%)	0	100	100
4	H	276/281 (98%)	268 (97%)	8 (3%)	0	100	100
5	I	248/291 (85%)	243 (98%)	5 (2%)	0	100	100
5	J	248/291 (85%)	243 (98%)	5 (2%)	0	100	100
6	K	222/226 (98%)	218 (98%)	4 (2%)	0	100	100
6	L	222/226 (98%)	218 (98%)	4 (2%)	0	100	100
All	All	2858/2992 (96%)	2799 (98%)	59 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	110/115 (96%)	108 (98%)	2 (2%)	51	60
1	E	110/115 (96%)	109 (99%)	1 (1%)	70	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	163/164 (99%)	162 (99%)	1 (1%)	78	86
2	F	163/164 (99%)	162 (99%)	1 (1%)	78	86
3	C	286/286 (100%)	284 (99%)	2 (1%)	76	83
3	G	286/286 (100%)	284 (99%)	2 (1%)	76	83
4	D	241/244 (99%)	241 (100%)	0	100	100
4	H	241/244 (99%)	241 (100%)	0	100	100
5	I	211/242 (87%)	208 (99%)	3 (1%)	59	67
5	J	211/242 (87%)	208 (99%)	3 (1%)	59	67
6	K	186/188 (99%)	181 (97%)	5 (3%)	39	45
6	L	186/188 (99%)	181 (97%)	5 (3%)	39	45
All	All	2394/2478 (97%)	2369 (99%)	25 (1%)	65	76

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	J	242	THR
6	K	74	VAL
6	L	180	LEU
6	K	47	LYS
6	K	179	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
3	G	257	ASN
4	H	236	GLN
6	K	137	ASN
4	H	230	HIS
4	H	261	ASN

5.3.3 RNA ⓘ

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](#)

Of 10 ligands modelled in this entry, 6 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
10	ANP	J	1002	9	33,33,33	3.59	15 (45%)	45,52,52	2.99	14 (31%)
8	PO4	D	1001	-	4,4,4	1.00	0	6,6,6	0.46	0
8	PO4	H	1001	-	4,4,4	1.00	0	6,6,6	0.47	0
10	ANP	I	1002	9	33,33,33	3.60	15 (45%)	45,52,52	2.98	14 (31%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	ANP	J	1002	9	-	3/18/38/38	0/3/3/3
10	ANP	I	1002	9	-	3/18/38/38	0/3/3/3

The worst 5 of 30 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	I	1002	ANP	C2'-C3'	-11.24	1.22	1.53
10	J	1002	ANP	C2'-C3'	-11.22	1.23	1.53
10	I	1002	ANP	PA-O3A	7.73	1.67	1.59
10	J	1002	ANP	PA-O3A	7.72	1.67	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	I	1002	ANP	O3'-C3'	5.70	1.57	1.43

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	J	1002	ANP	C1'-N9-C8	-11.64	101.25	127.09
10	I	1002	ANP	C1'-N9-C8	-11.62	101.31	127.09
10	J	1002	ANP	C4-N9-C1'	9.55	148.97	126.63
10	I	1002	ANP	C4-N9-C1'	9.52	148.89	126.63
10	J	1002	ANP	N3-C2-N1	-5.85	119.73	128.58

There are no chirality outliers.

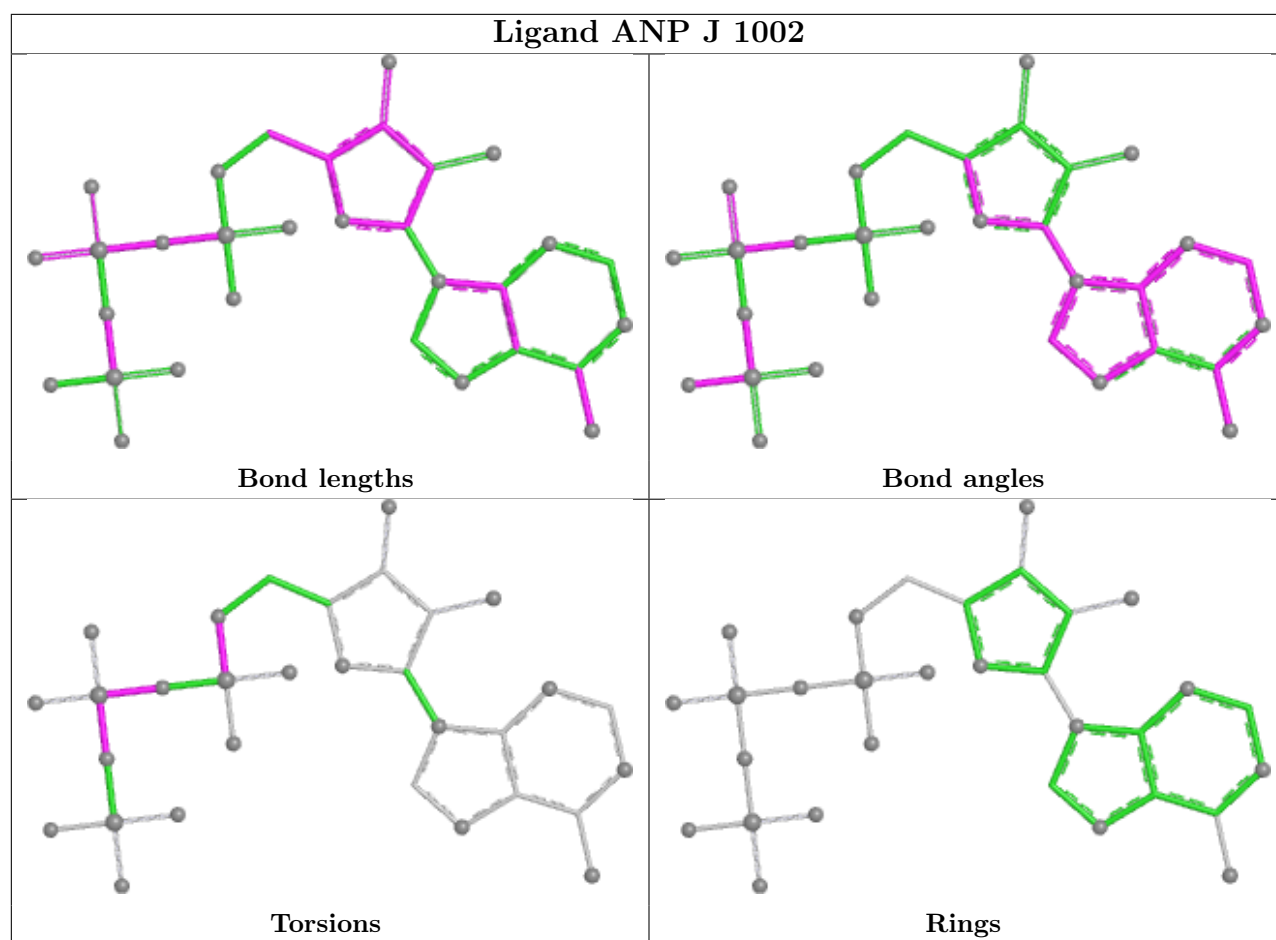
5 of 6 torsion outliers are listed below:

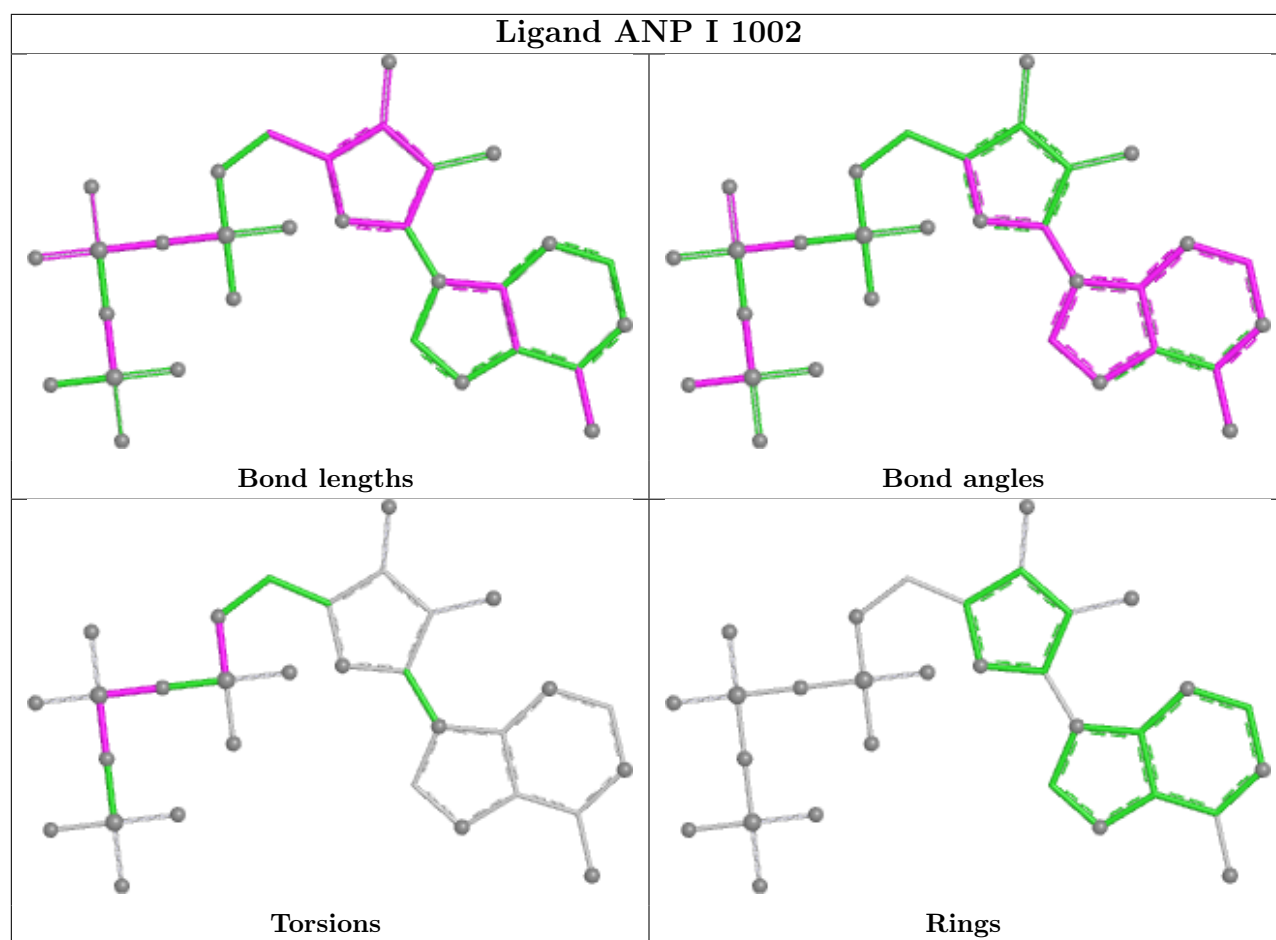
Mol	Chain	Res	Type	Atoms
10	I	1002	ANP	PG-N3B-PB-O1B
10	I	1002	ANP	PA-O3A-PB-O2B
10	J	1002	ANP	PG-N3B-PB-O1B
10	J	1002	ANP	PA-O3A-PB-O2B
10	I	1002	ANP	C5'-O5'-PA-O1A

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





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.

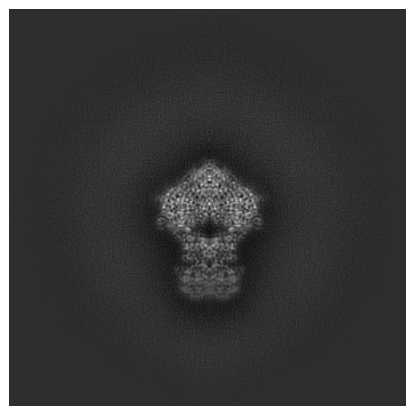
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14442. These allow visual inspection of the internal detail of the map and identification of artifacts.

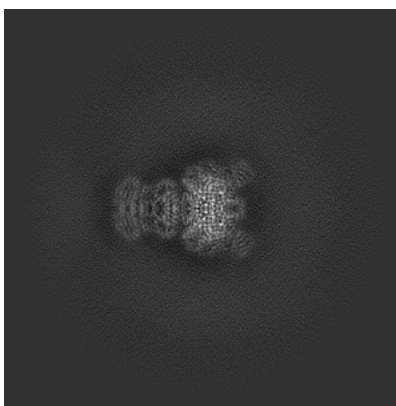
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

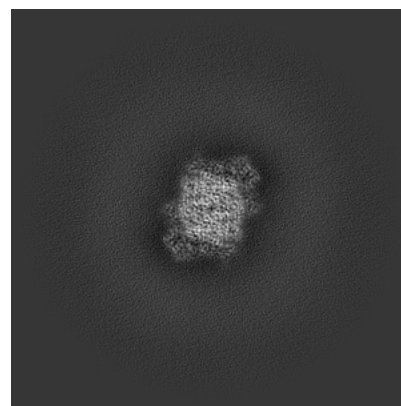
6.1.1 Primary map



X

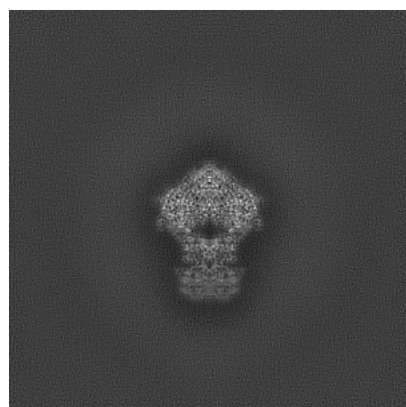


Y

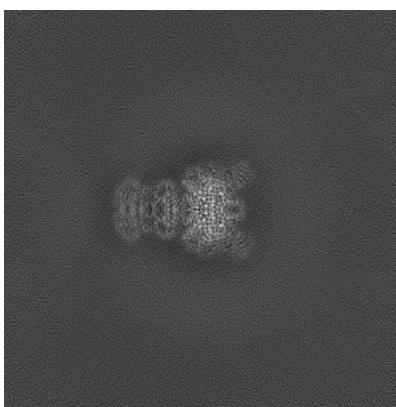


Z

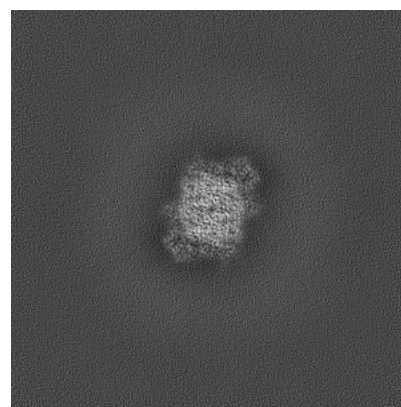
6.1.2 Raw map



X



Y

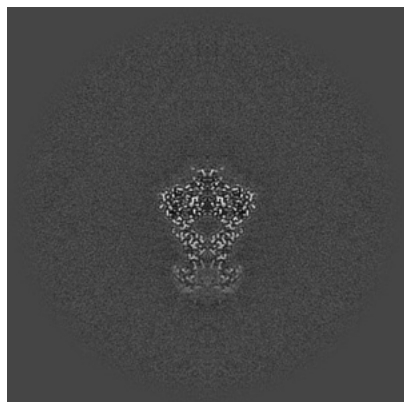


Z

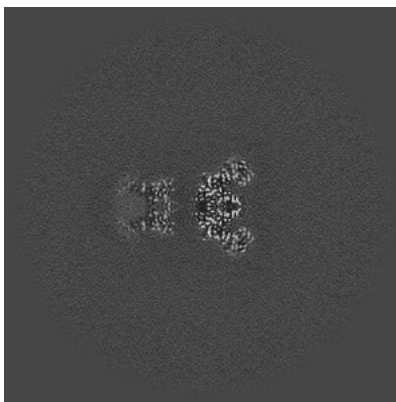
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

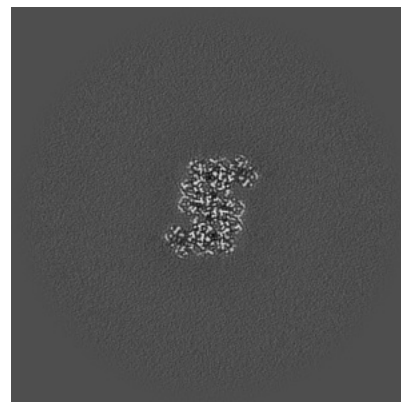
6.2.1 Primary map



X Index: 210

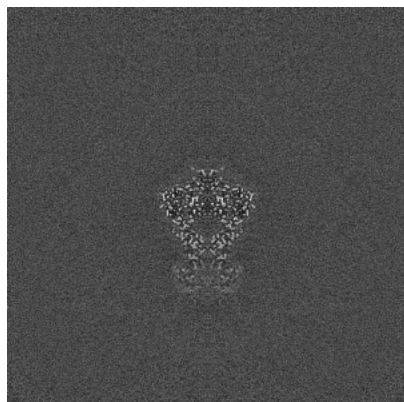


Y Index: 210

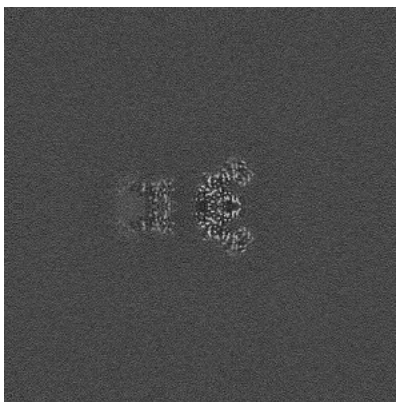


Z Index: 210

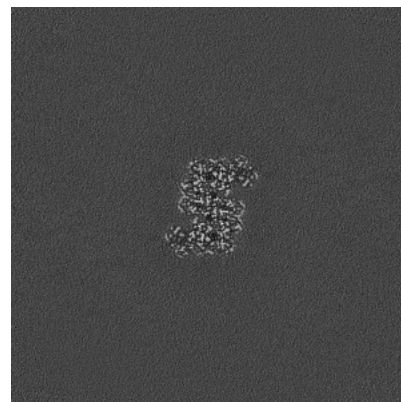
6.2.2 Raw map



X Index: 210



Y Index: 210

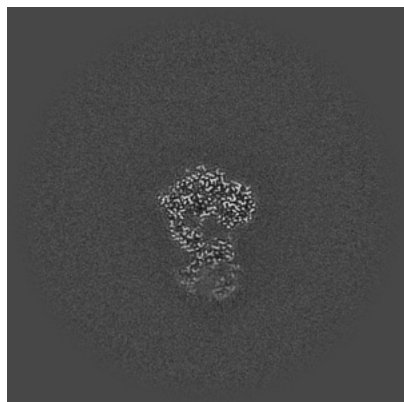


Z Index: 210

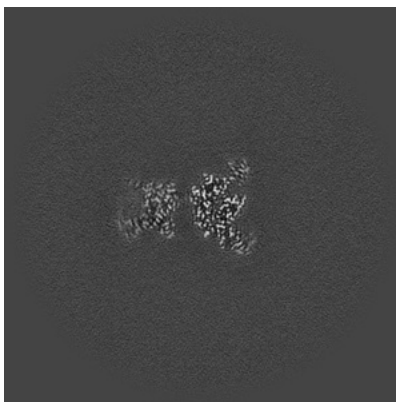
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

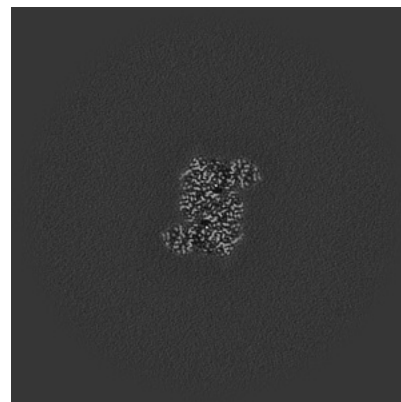
6.3.1 Primary map



X Index: 218

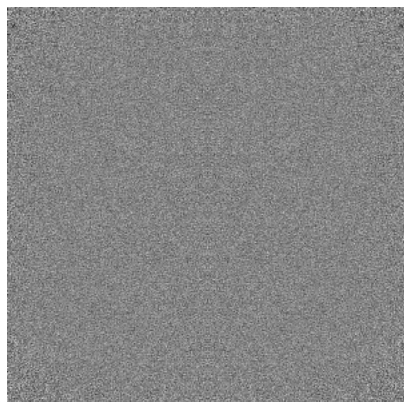


Y Index: 205

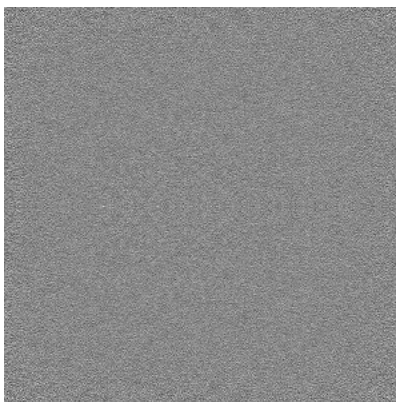


Z Index: 216

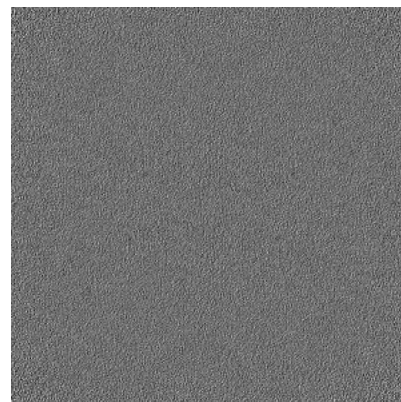
6.3.2 Raw map



X Index: 0



Y Index: 0

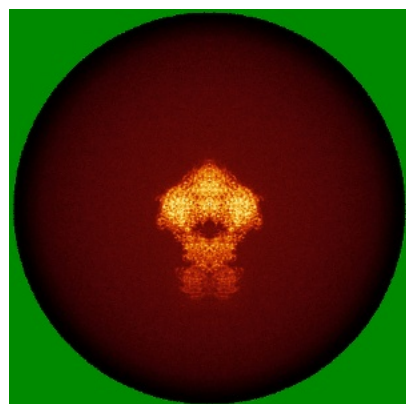


Z Index: 0

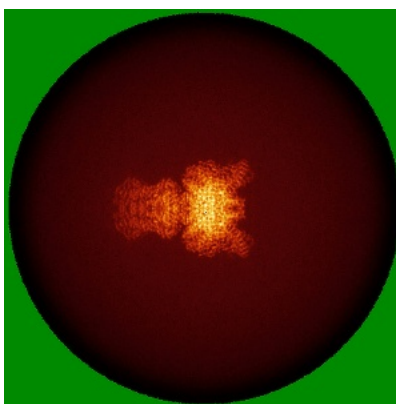
The images above show the largest variance slices of the map in three orthogonal directions.

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

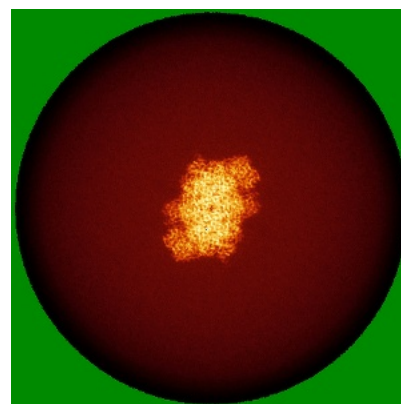
6.4.1 Primary map



X

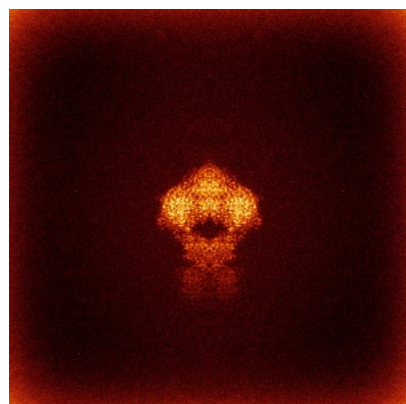


Y

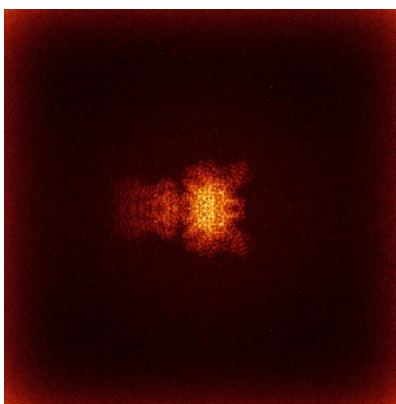


Z

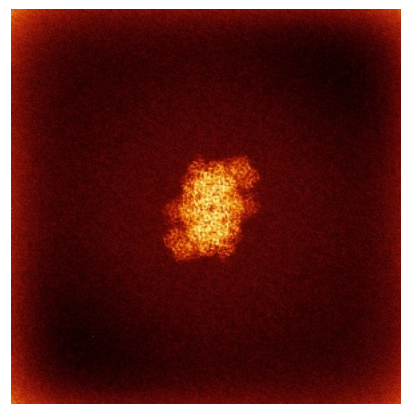
6.4.2 Raw map



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



X



Y



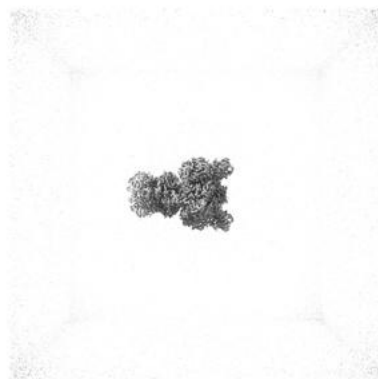
Z

The images above show the 3D surface view of the map at the recommended contour level 0.7. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

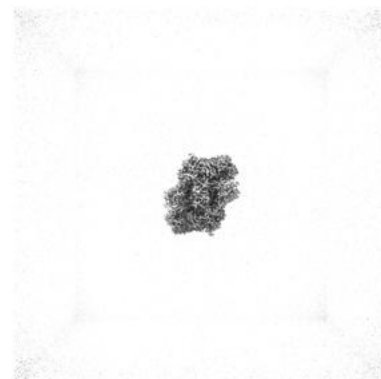
6.5.2 Raw map



X



Y



Z

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.

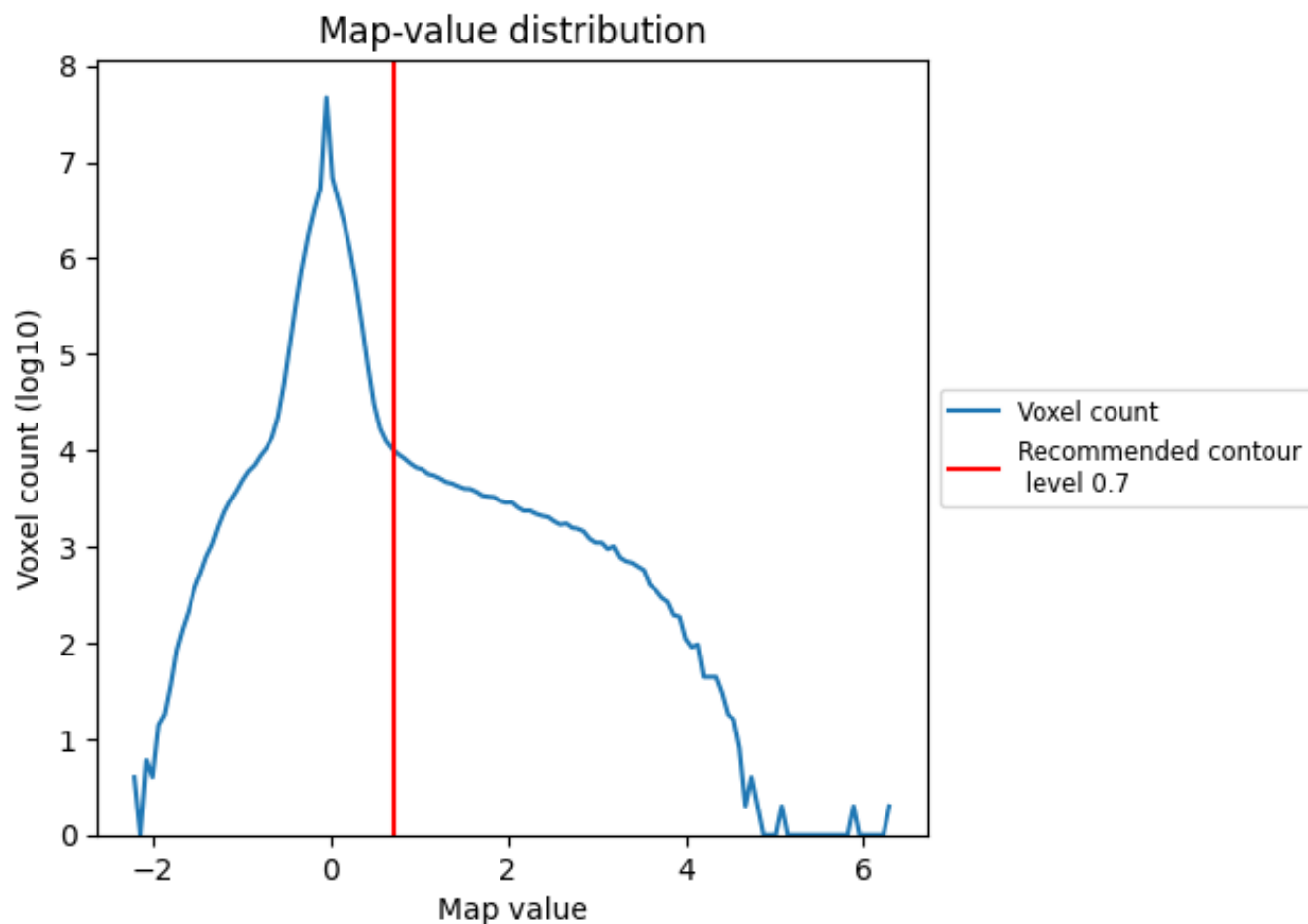
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

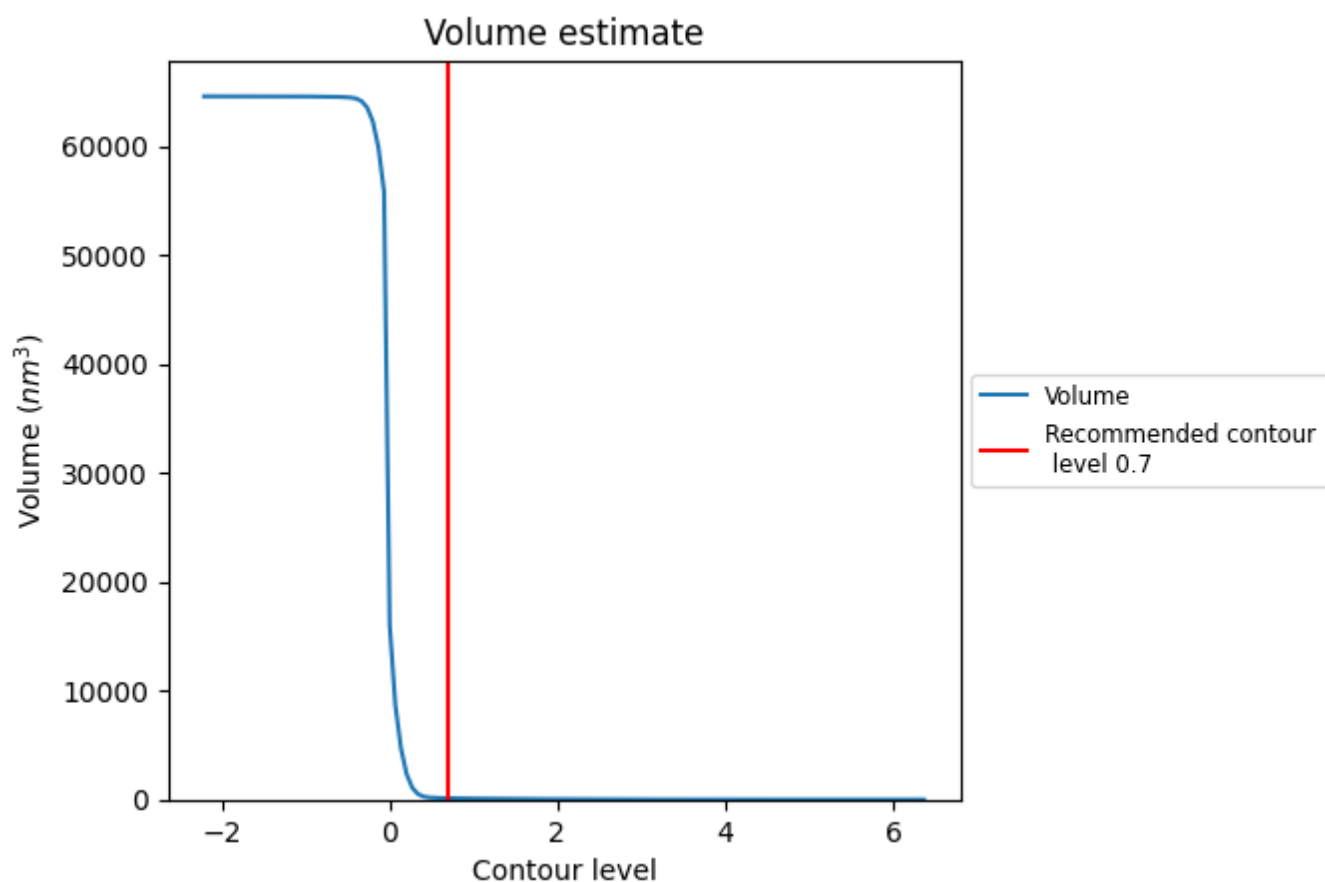
This section contains the results of statistical analysis of the map.

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.

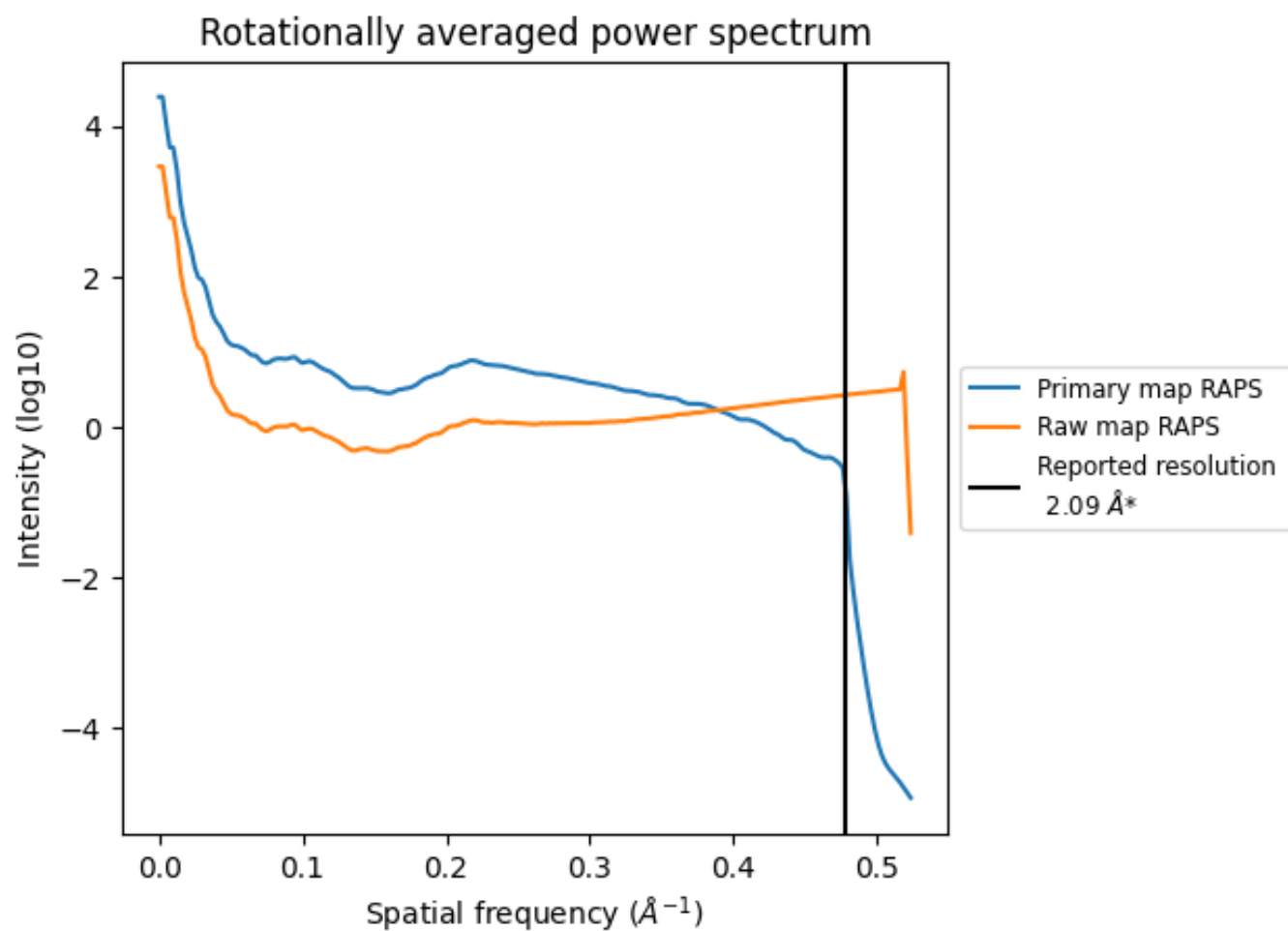
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 124 nm^3 ; this corresponds to an approximate mass of 112 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 ⓘ

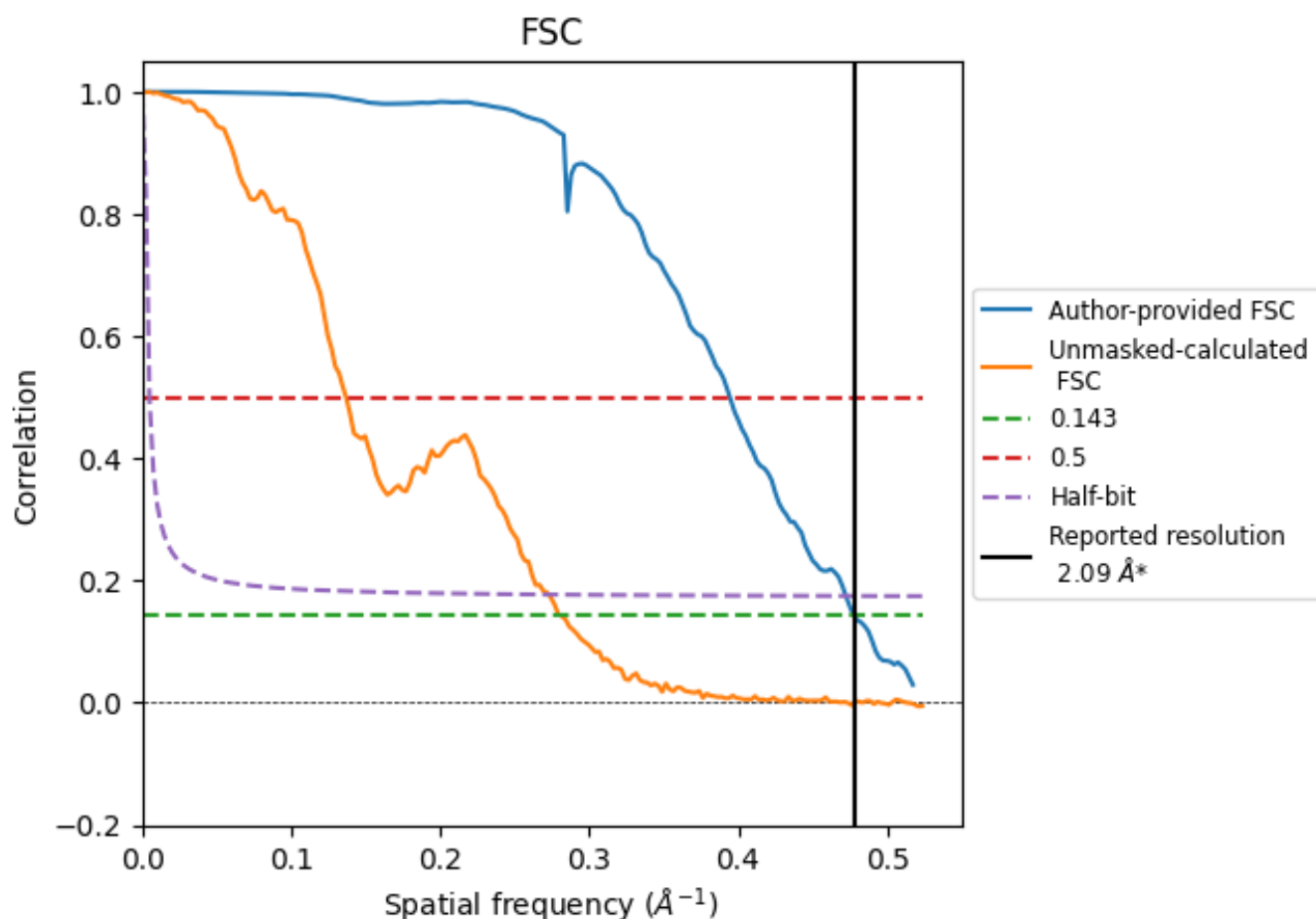


*Reported resolution corresponds to spatial frequency of 0.478 Å⁻¹

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 0.478 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

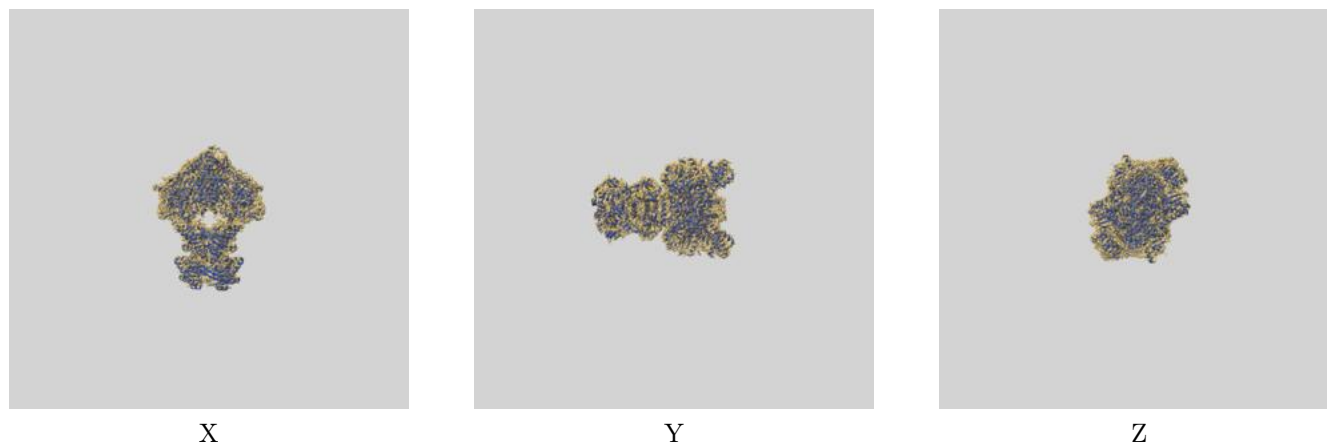
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.09	-	-
Author-provided FSC curve	2.09	2.53	2.12
Unmasked-calculated*	3.56	7.31	3.67

*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 3.56 differs from the reported value 2.09 by more than 10 %

9 Map-model fit [i](#)

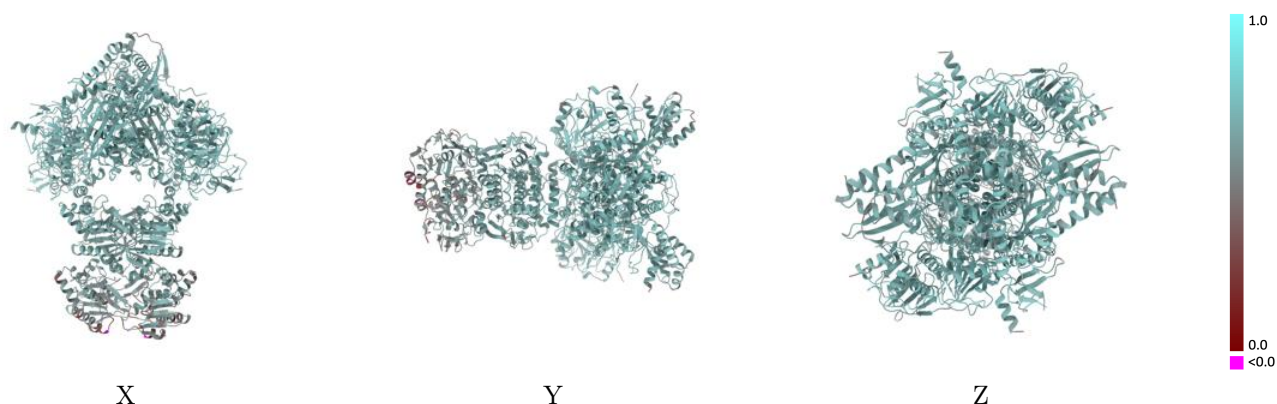
This section contains information regarding the fit between EMDB map EMD-14442 and PDB model 7Z16. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay [i](#)



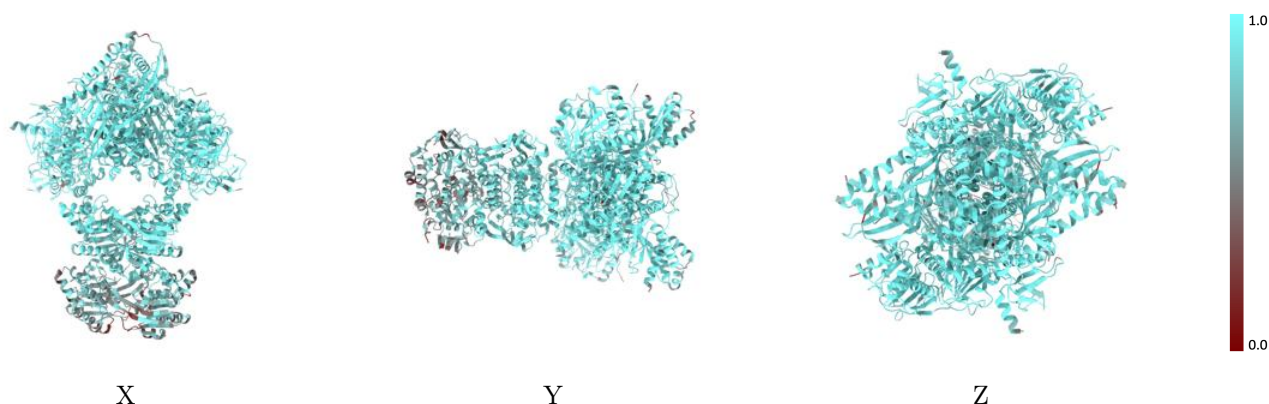
The images above show the 3D surface view of the map at the recommended contour level 0.7 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



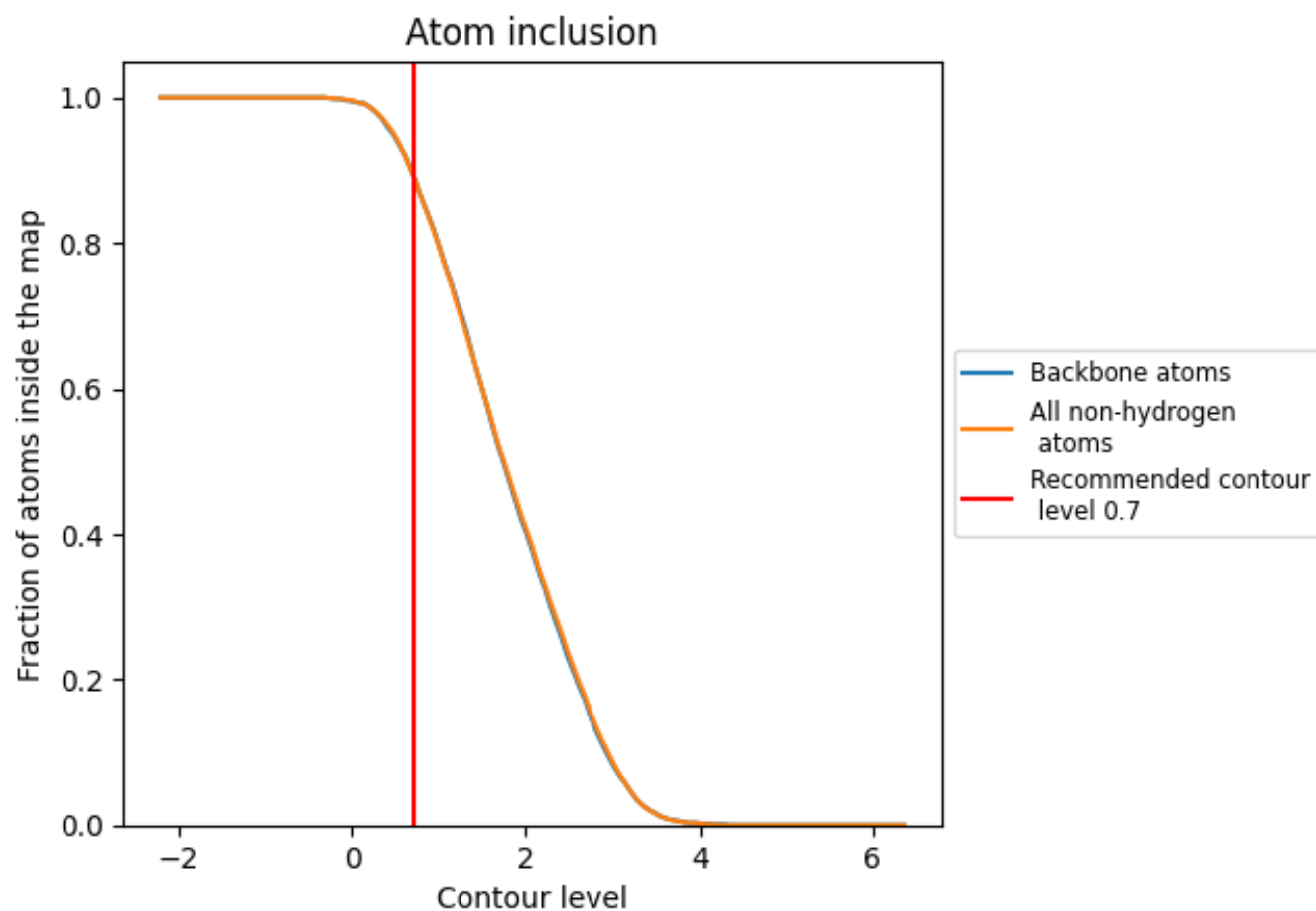
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.7).

9.4 Atom inclusion [i](#)



At the recommended contour level, 89% of all backbone atoms, 89% 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 (0.7) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8940	0.6410
A	0.8930	0.6380
B	0.9330	0.6540
C	0.9610	0.6780
D	0.9640	0.6830
E	0.8950	0.6330
F	0.9340	0.6550
G	0.9610	0.6790
H	0.9640	0.6830
I	0.9180	0.6400
J	0.9150	0.6420
K	0.6460	0.5180
L	0.6420	0.5180

1.0

0.0

<0.0