



wwPDB EM Validation Summary Report ⓘ

Aug 18, 2026 – 06:27 PM JST

PDB ID : 23FD / pdb_000023fd
EMDB ID : EMD-68920
Title : Cryo-EM structure of human ATR-ATRIP complex with ATPgammaS, Chk1 and TopBp1
Authors : Wang, L.; Wang, M.; Zhao, L.; Rao, Q.; Wu, H.; Ma, B.; Wang, J.; Zheng, J.; Li, Y.; Xu, Y.; Guo, J.; Cheng, J.; Qiao, S.
Deposited on : 2026-02-04
Resolution : 3.60 Å(reported)

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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.dev133
Mogul : 1.8.5 (274361), CSD as541be (2020)
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) : 2.50

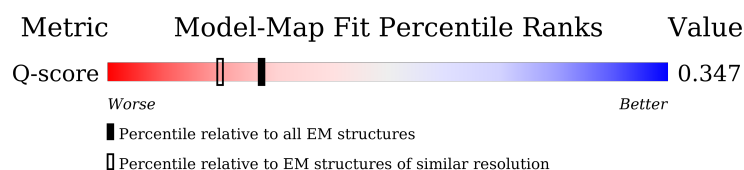
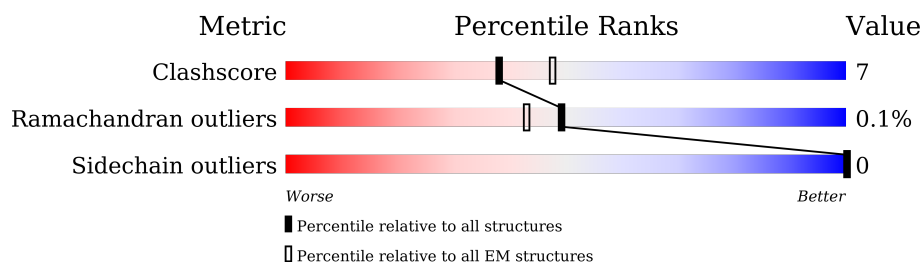
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.60 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	12797 (3.10 - 4.10)

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	2644	
1	B	2644	
2	C	791	
2	D	791	

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Mol	Chain	Length	Quality of chain
3	E	14	 43% 7% 50%
3	F	14	 43% 57%
4	G	545	 10% 89%
4	H	545	 10% 89%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 46339 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 Serine/threonine-protein kinase ATR.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	2486	Total	C	N	O	S	0	0
			19929	12792	3383	3614	140		
1	B	2480	Total	C	N	O	S	0	0
			19896	12774	3375	3607	140		

- Molecule 2 is a protein called ATR-interacting protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	361	Total	C	N	O	S	0	0
			2779	1776	484	494	25		
2	D	361	Total	C	N	O	S	0	0
			2779	1776	484	494	25		

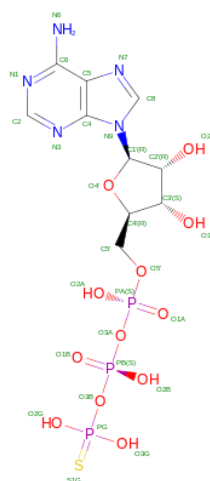
- Molecule 3 is a protein called Serine/threonine-protein kinase Chk1.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	E	7	Total	C	N	O	0	0
			51	31	8	12		
3	F	6	Total	C	N	O	0	0
			39	22	7	10		

- Molecule 4 is a protein called DNA topoisomerase 2-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	62	Total	C	N	O	S	0	0
			405	245	78	81	1		
4	H	60	Total	C	N	O		0	0
			393	239	76	78			

- Molecule 5 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (CCD ID: AGS) (formula: C₁₀H₁₆N₅O₁₂P₃S).



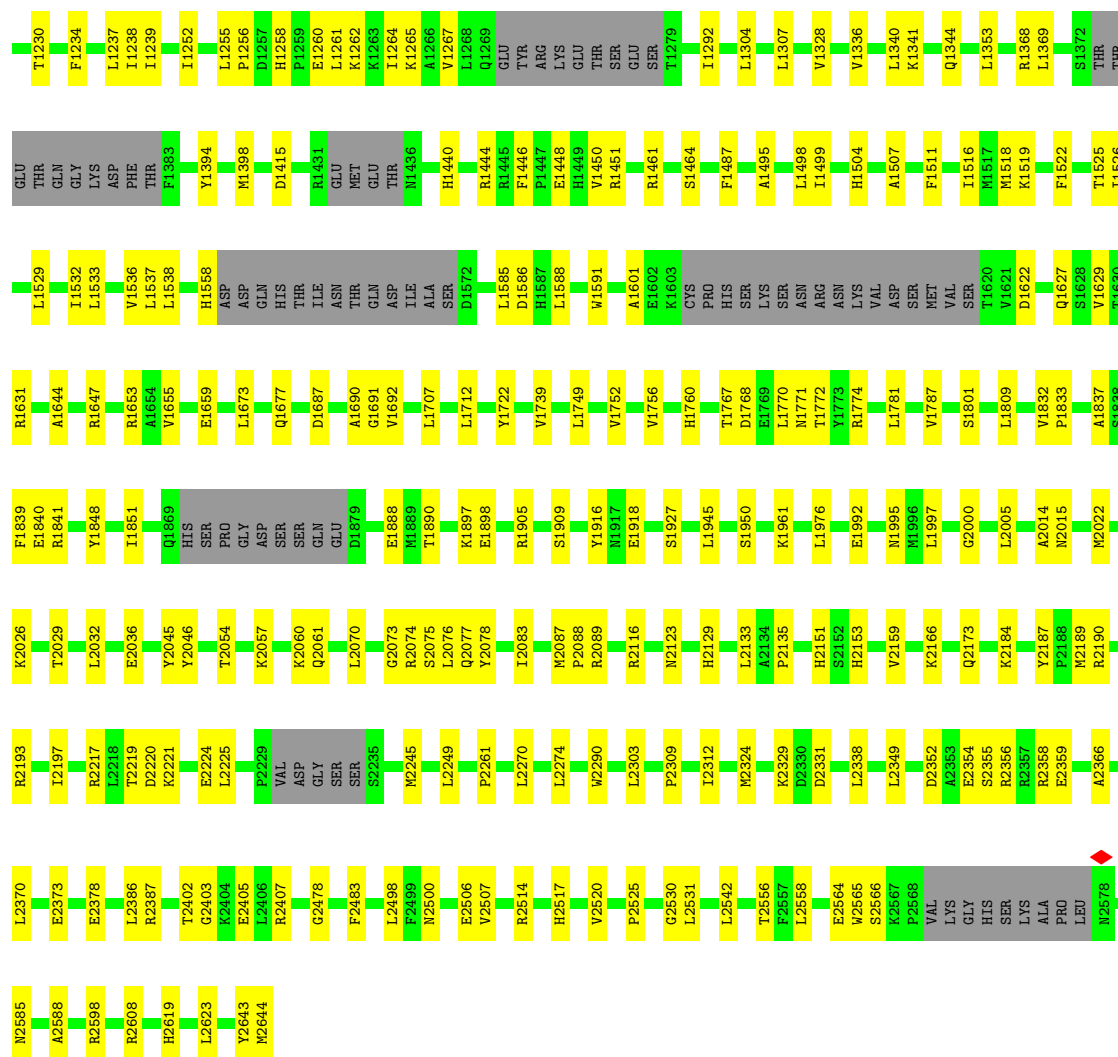
Mol	Chain	Residues	Atoms					AltConf	
5	A	1	Total 31	C 10	N 5	O 12	P 3	S 1	0
5	B	1	Total 31	C 10	N 5	O 12	P 3	S 1	0

- Molecule 6 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	AltConf
6	A	2	Total Mg 2 2	0
6	B	2	Total Mg 2 2	0

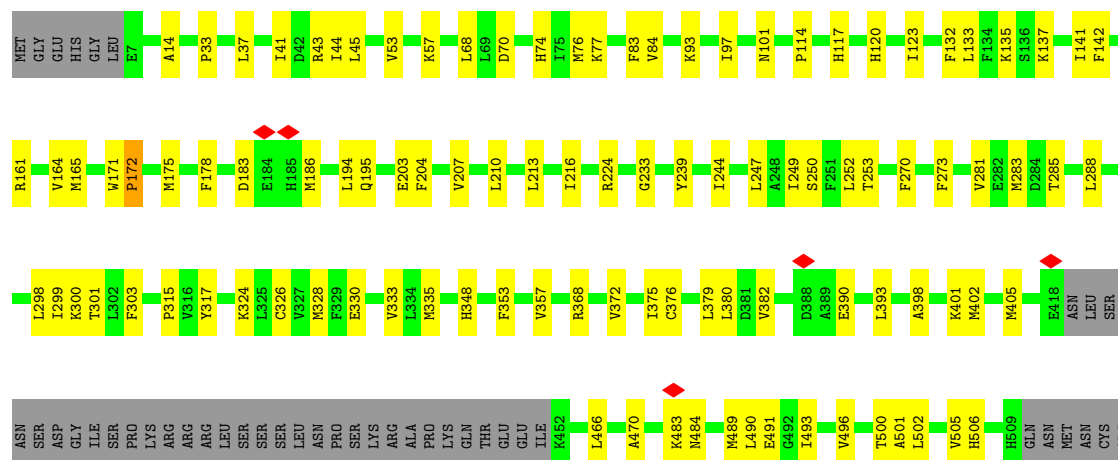
- Molecule 7 is ZINC ION (CCD ID: ZN) (formula: Zn).

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



• Molecule 1: Serine/threonine-protein kinase ATR

Chain B: 76% 18% 6%



R2514	L2377	L2169	K2022	R1846	R1647	M1553	GLN	L1191	K1057	L896	D739	I624
T2515	E2378	A2175	K2023	V1852	S1660	L1556	GLY	W1196	PHE	L897	L740	
H2517	L2386	K2176	Y2095	R1853	E1664	H1558	ASP	T1060	LYS	G905	F741	Y628
V2520	L2390	W2177	K2026	M1856	Q1677	ASP	THR	L1203	E1063	Y908	R743	R635
M2521	M2178	M2179	T2029	M1860	V1689	ASP	F1383	L1212	S1066	T911	K746	C636
M2523	L2393	Y2187	L2032	H1861	A1690	HIS	S1390	I1216	L1075	V915	Q750	F638
T2528	M2401	R2190	A2043	H1862	G1691	ILE	L1397	A1218	L1079	T641	K759	T641
E2529	T2402	K2193	K2043	K1865	R1696	ASN	T1401	L1219	L1080	A948	A760	F643
G2403	G2404	R2193	Y2046	Q1869	I1706	GLN	E1423	L1230	I1083	LEU	S761	P644
G2405	K2405	K2205	D2063	HIS	I1706	ASP	L1424	F1234	E1085	PRO	L767	R645
M2540	L2406	R2217	R2066	PRO	L1745	ALA	L1424	D1247	H1086	THR	L770	L649
T2556	R2407			GLY	Y1722	SER	R1431		A1101	CYS	K771	L649
P2568	M2410	P2229	H2071	GLY	Y1722	D1572	GLU	D1257	SER	GLN	K772	R652
VAL	K2413	VAL	F2072	ASP	D1723	ASP	MET	H1258	THR	ASN	P777	T653
GLY	S2414	ASP	G2073	SER	A1725	L1585	GLU	P1259	ASP	ALA	L780	Y656
HIS	A2415	GLY	G2073	GLN	A1725	L1588	THR		ASP	VAL	L780	Y656
SER		SER	N2080	GLU	H1737	L1588	N1436		PRO	ARG	L780	Y656
LYS	K2420	SER	Y2084	D1879	G1738	K1600	L1442	K1262	PRO	LYS	I783	E665
ALA	L2421	S2235	Y2084			ALA	L1442	R1272	TYR	GLN	L786	E665
PRO	K2422			M1889	S1742	LYS	V1450	GLY	GLY	D963	L786	E665
LEU		M2239	P2088	M1889	S1742	LYS	V1450	THR	ARG	R968	L789	T562
N2578	E2426		E2105	I1900	M1762	CYS	L1454	GLU	ASP	T974	C790	F675
M2585	F2427	F2243		L1903	R1763	PRO	L1454	SER	I1113			
L2428	K2244	M2245	R2112	L1907	T1767	HIS	K1463	GLU	I1114		E799	L678
R2431	L2249	L2249	L2113	L1907	D1768	LYS	Q1466	THR	S1115	V981	L678	L678
A2588	H2432	K2115	Q2114	L1908	E1769	SER			T900		L679	L679
L2614	P2434	K2115	R2116	L1908	L1770	ASN	W1471	D1280	P1116		D801	Q680
P2434	L2259	L2259	R2116	M1919	N1771	ARG		L1281	E1117	R993	V802	Y570
Y2622	I2435			M1919	N1771	ARG	W1471		L1118	T994	K803	R687
F2436	F2436	P2271	K2124	L1944	T1772	ASN	G1484			L995		
W2439	W2439	N2279	T2127	L1944	Y1773	ASN	G1484	S1288	L1138	L995	N811	K690
F2440	F2440	N2279	E2128	E1949	R1774	LYS	W1490	I1292	LYS	V997		Y575
		A2294	H2129	L1952	E1776	ASP	W1490	N1296	M1150	L998	R821	V703
D2446	D2446	S2305	P2135	L1952	W1779	MET	Y1497		S1157	L999	V822	K704
W2450	W2450	S2305	Y2136	E1958	W1779	VAL	L1498	V1299		A1004	S825	K705
R2454	R2454	P2309	Y2136	W1962	D1785	SER	K1501	V1299	R1171	E706		N579
I2470	I2470	K2315	L2139	W1962		T1620	K1501	K1317	V1172	F707	S834	S580
M2325	M2325			S1965	W1800	V1621	D1505	D1324	K1173	S1011		S581
C2326	C2326				S1801	Y1623	L1506	E1326	M1174	I1014	E838	F582
K2327	K2327				S1801	E1624	L1506	E1326	M1175	I0115		
F2483	F2483				L1804	D1625	S1508	E1326	M1175	I0115		G712
					L1804	D1625	K1509	T1327	T1177	I0116		Q713
L2498	L2498				P1990	Q1812	K1509	E1360	L1178	R1026		L594
V2507	V2507				K1813	K1813	I1510		L1179	L1026		L596
A2365	A2365				R1814	V1629	I1516		R1179	S860		L596
E2509	E2509				R1814	V1629	I1516		T1180	K1034		M721
					M1995	S1628			G1181			
					P1996	S1628	L1533	D1365		K1034		
					Y1820	I1636	L1533		R1182			F732
					E2155	P1637	L1533	S1372	R1183	H1039		SER
					F2157		V1536	THR	F1184	L1040		GLU
					Q1830			THR				HIS
								GLU				GLY

- Molecule 2: ATR-interacting protein

Response	Percentage
Yes, the U.S. is a democracy	37%
No, the U.S. is not a democracy	9%
Don't know	54%

- Molecule 2: ATR-interacting protein

Device Type	Percentage
Smartphone	36%
Tablet	9%
Neither	54%



[illegible]

- Molecule 4: DNA topoisomerase 2-binding protein 1

Chain H: 10% . 89%

[illegible]

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	70253	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.905	Depositor
Minimum map value	-0.622	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.016	Depositor
Recommended contour level	0.05	Depositor
Map size ($\text{\AA}$)	401.76, 401.76, 401.76	wwPDB
Map dimensions	432, 432, 432	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.93, 0.93, 0.93	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, AGS, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.28	0/20341	0.56	2/27488 (0.0%)
1	B	0.25	0/20306	0.56	0/27439
2	C	0.29	0/2826	0.60	0/3837
2	D	0.26	0/2826	0.57	0/3837
3	E	0.11	0/52	0.28	0/70
3	F	0.15	0/39	0.50	0/52
4	G	0.16	0/409	0.44	0/559
4	H	0.22	0/397	0.53	0/543
All	All	0.26	0/47196	0.56	2/63825 (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
1	B	0	1
2	C	0	1
All	All	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	16	ARG	CB-CG-CD	5.55	124.08	111.30
1	A	1601	ALA	CB-CA-C	-5.30	110.45	116.54

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	171	TRP	Peptide
2	C	319	GLN	Peptide

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	19929	0	20229	311	0
1	B	19896	0	20201	294	0
2	C	2779	0	2872	49	0
2	D	2779	0	2872	46	0
3	E	51	0	40	1	0
3	F	39	0	31	0	0
4	G	405	0	297	4	0
4	H	393	0	287	7	0
5	A	31	0	12	0	0
5	B	31	0	12	1	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
All	All	46339	0	46853	688	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 7.

The worst 5 of 688 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1340:LEU:HB3	1:A:1839:PHE:CE1	1.79	1.17
1:A:1340:LEU:HB3	1:A:1839:PHE:HE1	1.12	1.04
1:A:127:ILE:HD12	1:A:130:LEU:HD12	1.46	0.95
1:A:1340:LEU:CB	1:A:1839:PHE:CE1	2.50	0.93
1:A:1340:LEU:CB	1:A:1839:PHE:HE1	1.86	0.82

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	2460/2644 (93%)	2370 (96%)	89 (4%)	1 (0%)	100	100
1	B	2452/2644 (93%)	2372 (97%)	78 (3%)	2 (0%)	48	79
2	C	349/791 (44%)	337 (97%)	12 (3%)	0	100	100
2	D	349/791 (44%)	341 (98%)	8 (2%)	0	100	100
3	E	5/14 (36%)	5 (100%)	0	0	100	100
3	F	4/14 (29%)	3 (75%)	1 (25%)	0	100	100
4	G	56/545 (10%)	55 (98%)	1 (2%)	0	100	100
4	H	54/545 (10%)	50 (93%)	4 (7%)	0	100	100
All	All	5729/7988 (72%)	5533 (97%)	193 (3%)	3 (0%)	49	79

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2565	TRP
1	B	614	ALA
1	B	172	PRO

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	2216/2363 (94%)	2216 (100%)	0	100	100
1	B	2213/2363 (94%)	2213 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	319/678 (47%)	319 (100%)	0	100	100
2	D	319/678 (47%)	319 (100%)	0	100	100
3	E	6/13 (46%)	6 (100%)	0	100	100
3	F	5/13 (38%)	5 (100%)	0	100	100
4	G	27/482 (6%)	27 (100%)	0	100	100
4	H	25/482 (5%)	25 (100%)	0	100	100
All	All	5130/7072 (72%)	5130 (100%)	0	100	100

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 48 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1153	ASN
1	B	1970	HIS
1	B	1205	HIS
1	B	1587	HIS
1	B	2080	ASN

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](#)

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 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
5	AGS	B	5001	6	29,33,33	0.49	1 (3%)	39,52,52	0.82	1 (2%)
5	AGS	A	5001	6	29,33,33	0.48	0	39,52,52	0.88	1 (2%)

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
5	AGS	B	5001	6	-	5/21/38/38	0/3/3/3
5	AGS	A	5001	6	-	3/21/38/38	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	5001	AGS	PG-S1G	2.06	1.95	1.90

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	5001	AGS	PA-O3A-PB	-4.77	116.45	132.83
5	B	5001	AGS	PA-O3A-PB	-4.52	117.31	132.83

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

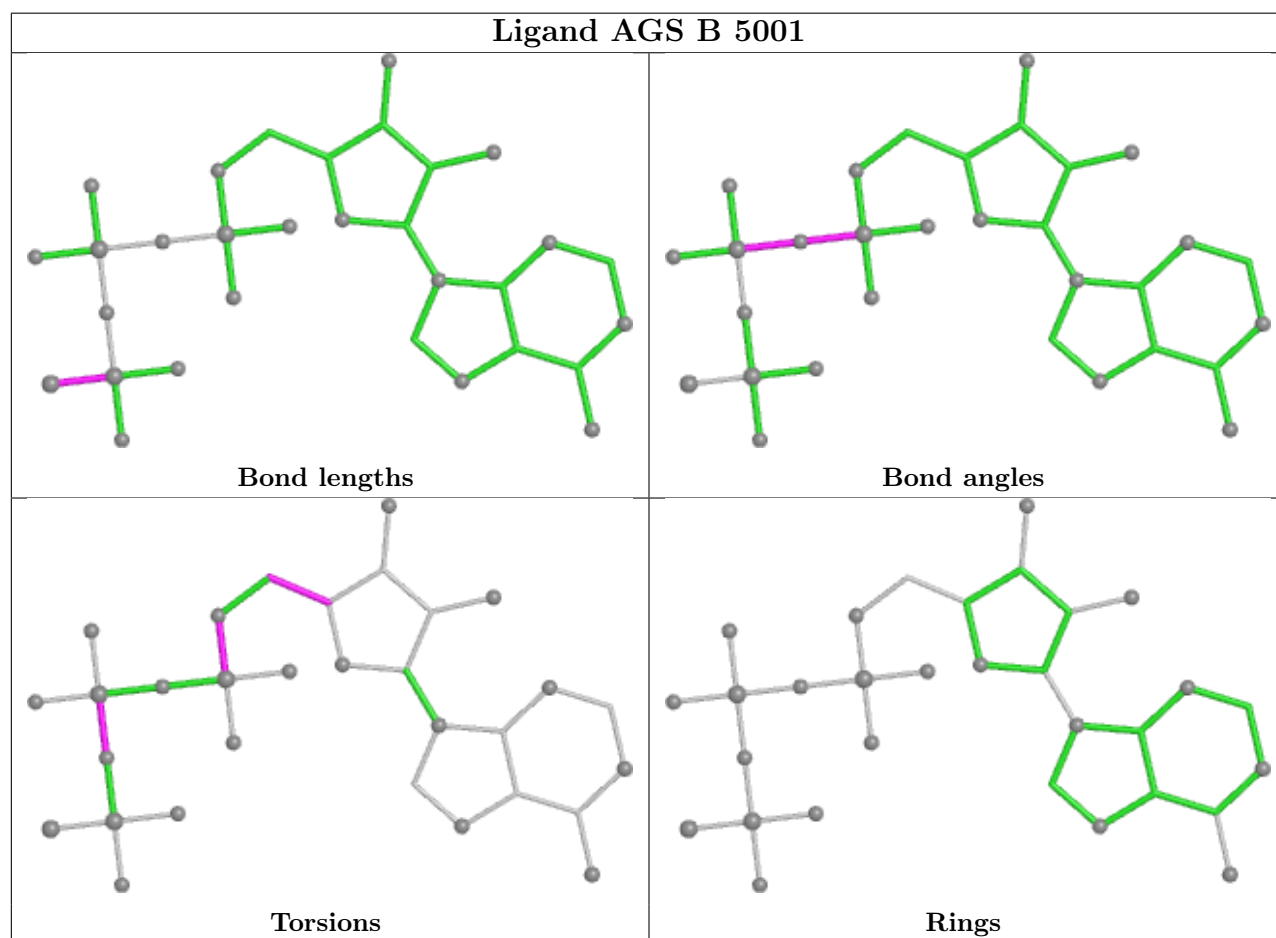
Mol	Chain	Res	Type	Atoms
5	B	5001	AGS	O4'-C4'-C5'-O5'
5	B	5001	AGS	C3'-C4'-C5'-O5'
5	B	5001	AGS	PG-O3B-PB-O1B
5	A	5001	AGS	PB-O3A-PA-O2A
5	A	5001	AGS	O4'-C4'-C5'-O5'

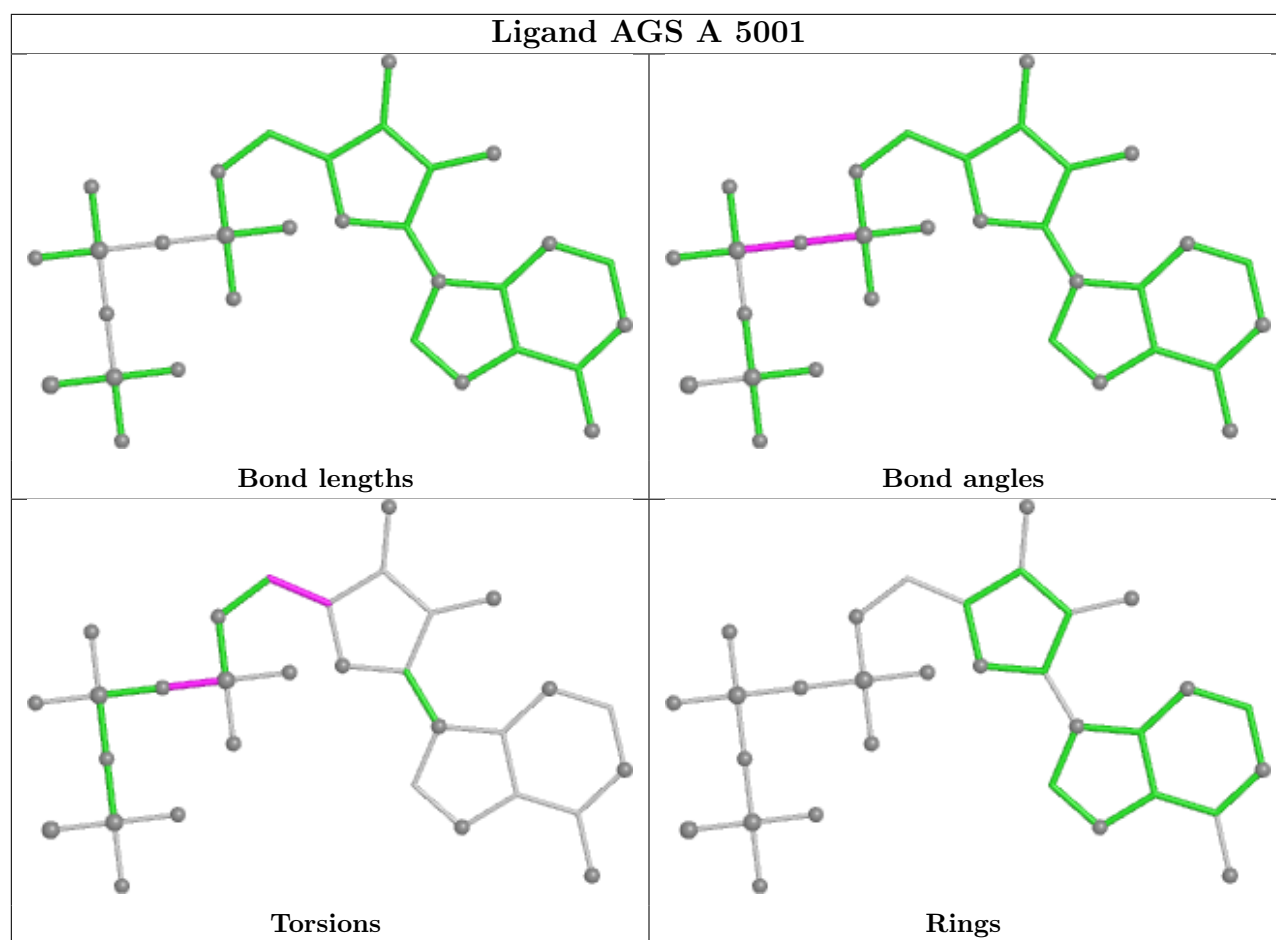
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	5001	AGS	1	0

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.

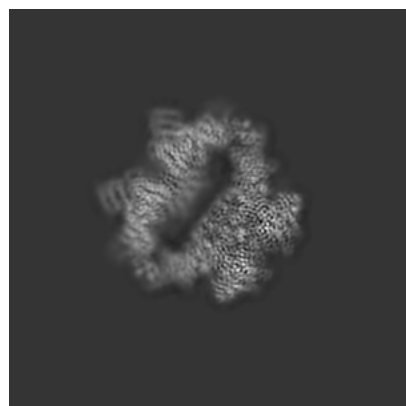
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-68920. These allow visual inspection of the internal detail of the map and identification of artifacts.

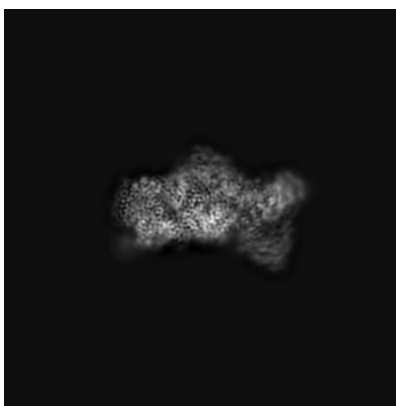
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

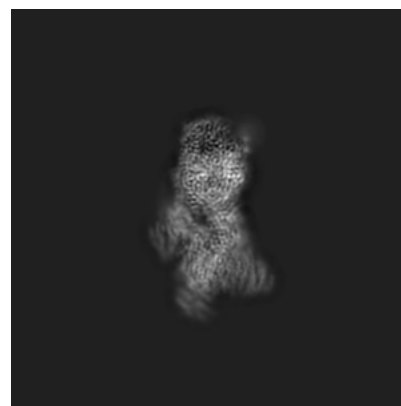
6.1.1 Primary map



X

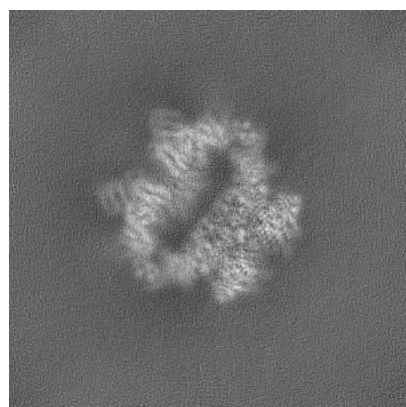


Y

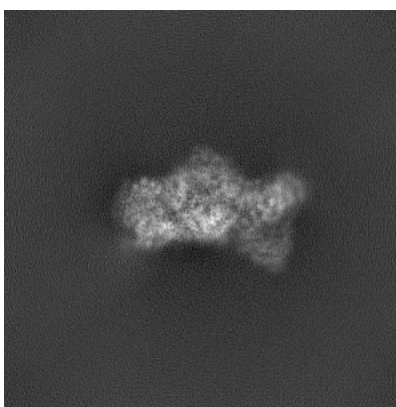


Z

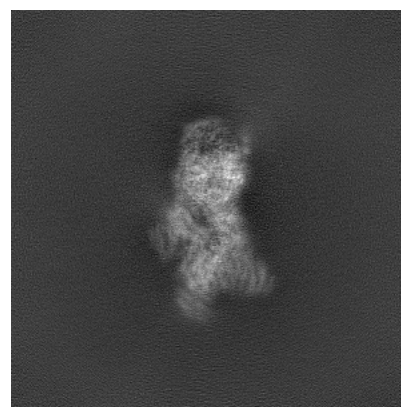
6.1.2 Raw map



X



Y

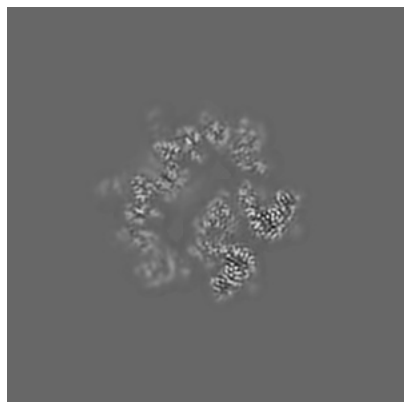


Z

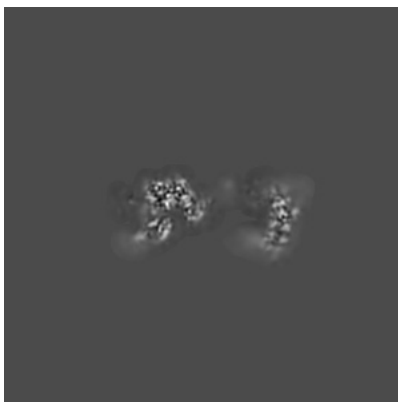
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

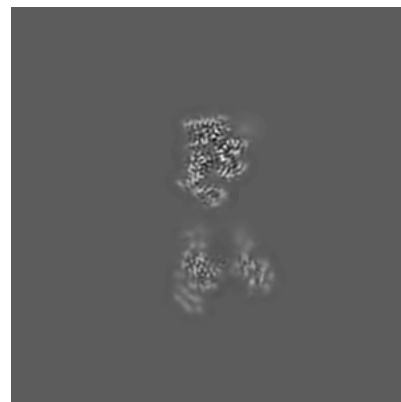
6.2.1 Primary map



X Index: 216

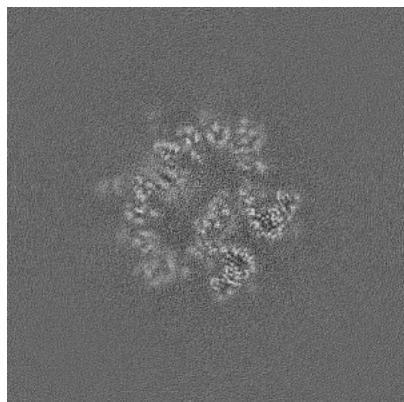


Y Index: 216

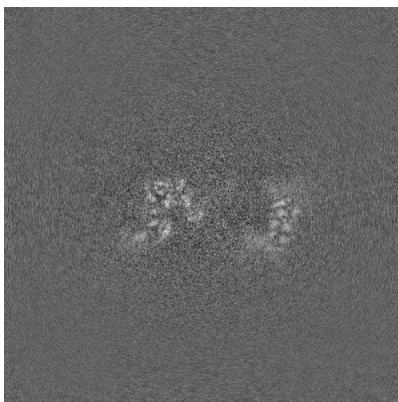


Z Index: 216

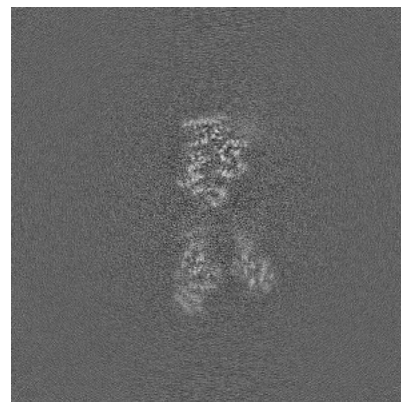
6.2.2 Raw map



X Index: 216



Y Index: 216

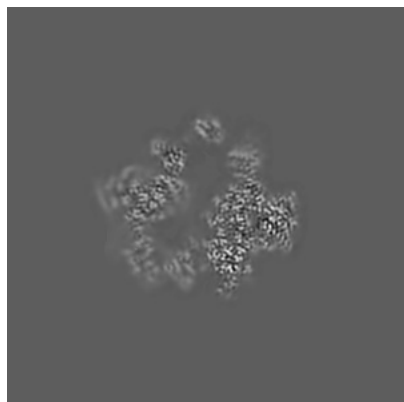


Z Index: 216

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

6.3 Largest variance slices [i](#)

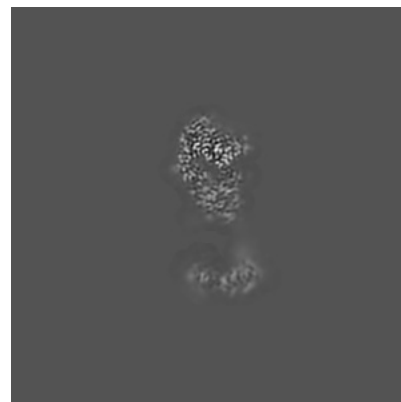
6.3.1 Primary map



X Index: 201

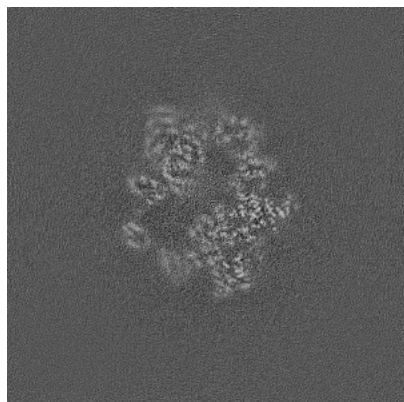


Y Index: 252

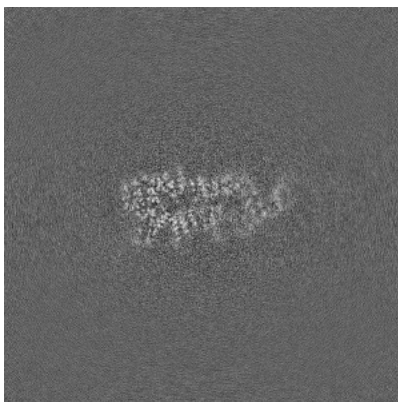


Z Index: 195

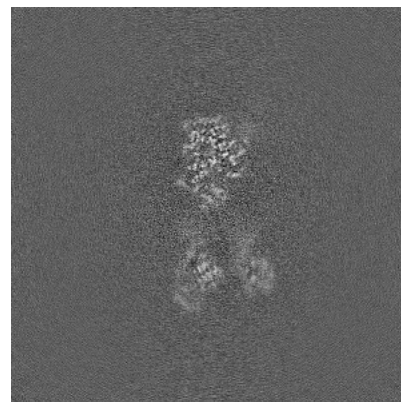
6.3.2 Raw map



X Index: 230



Y Index: 251

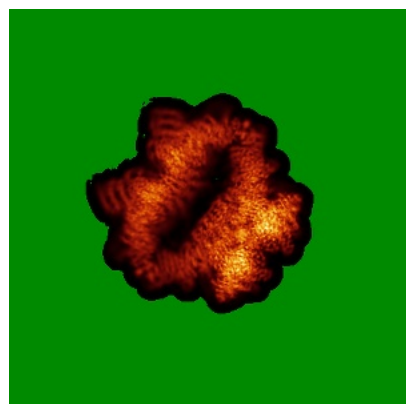


Z Index: 213

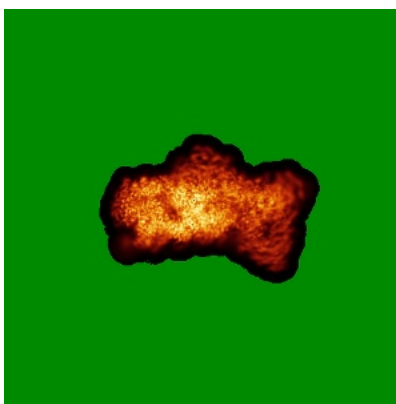
The images above show the largest variance slices of the map in three orthogonal directions.

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

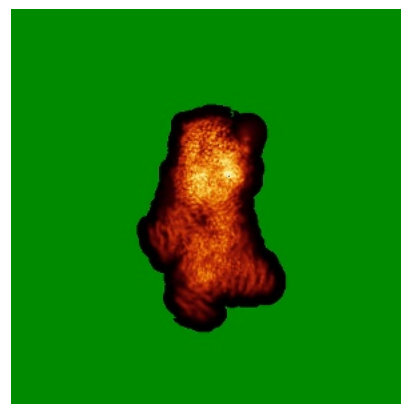
6.4.1 Primary map



X

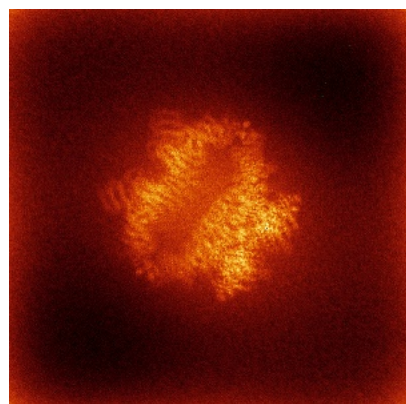


Y

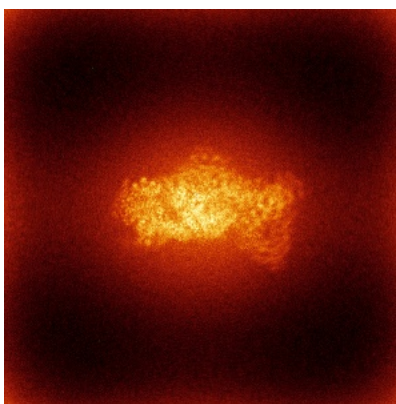


Z

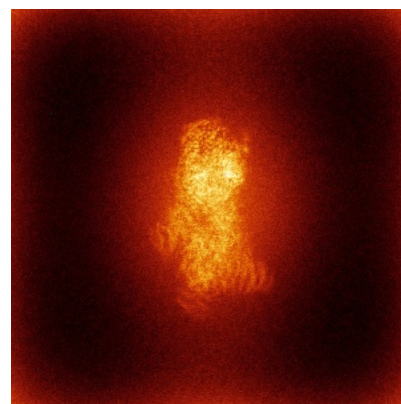
6.4.2 Raw map



X



Y

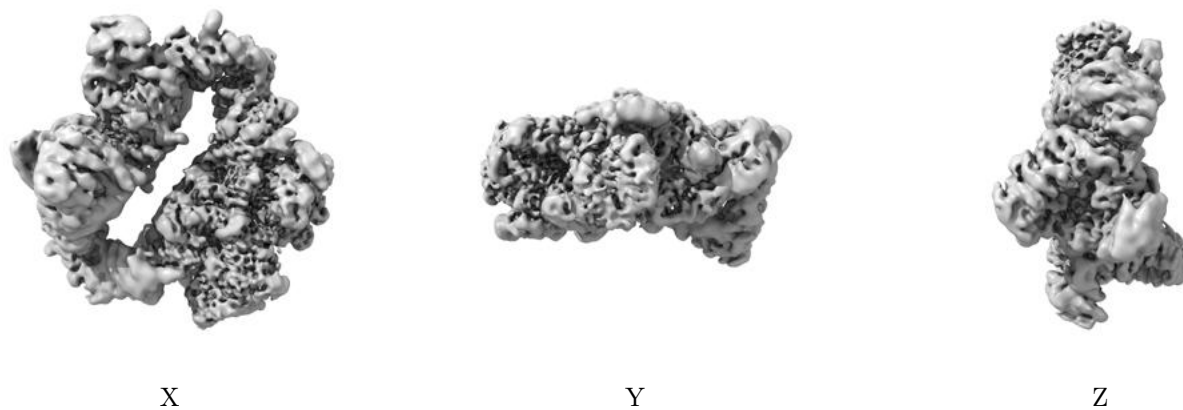


Z

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.

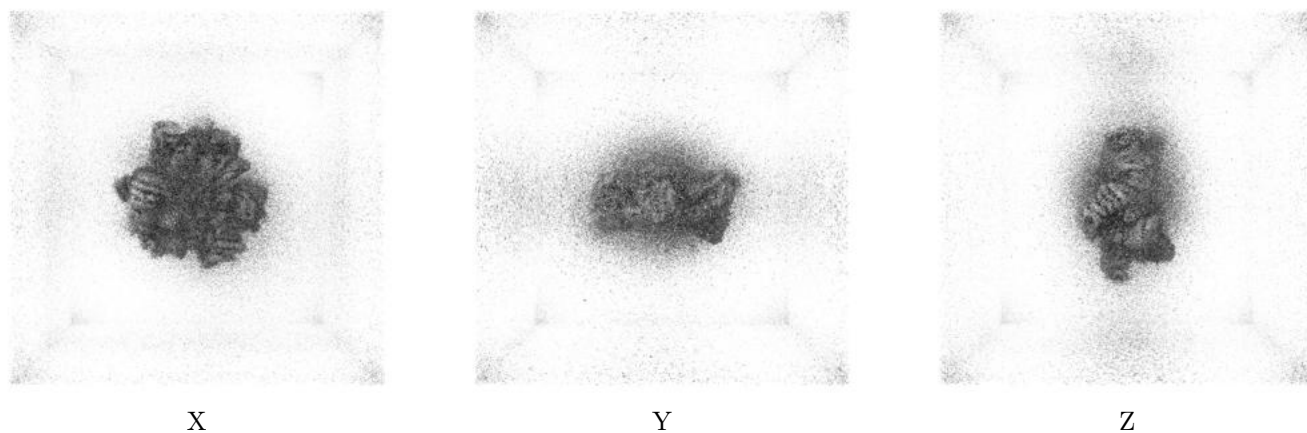
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.05. 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.

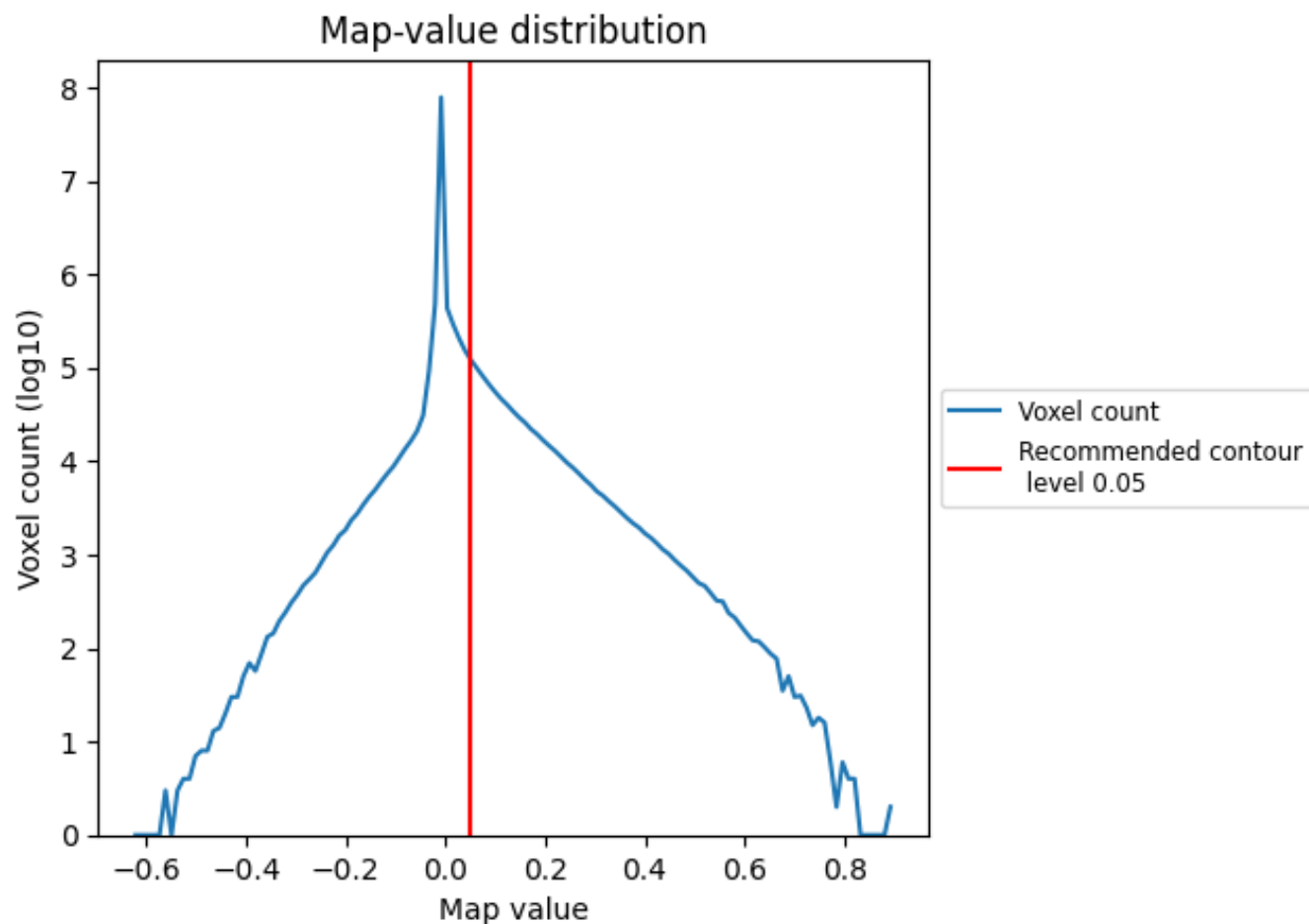
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

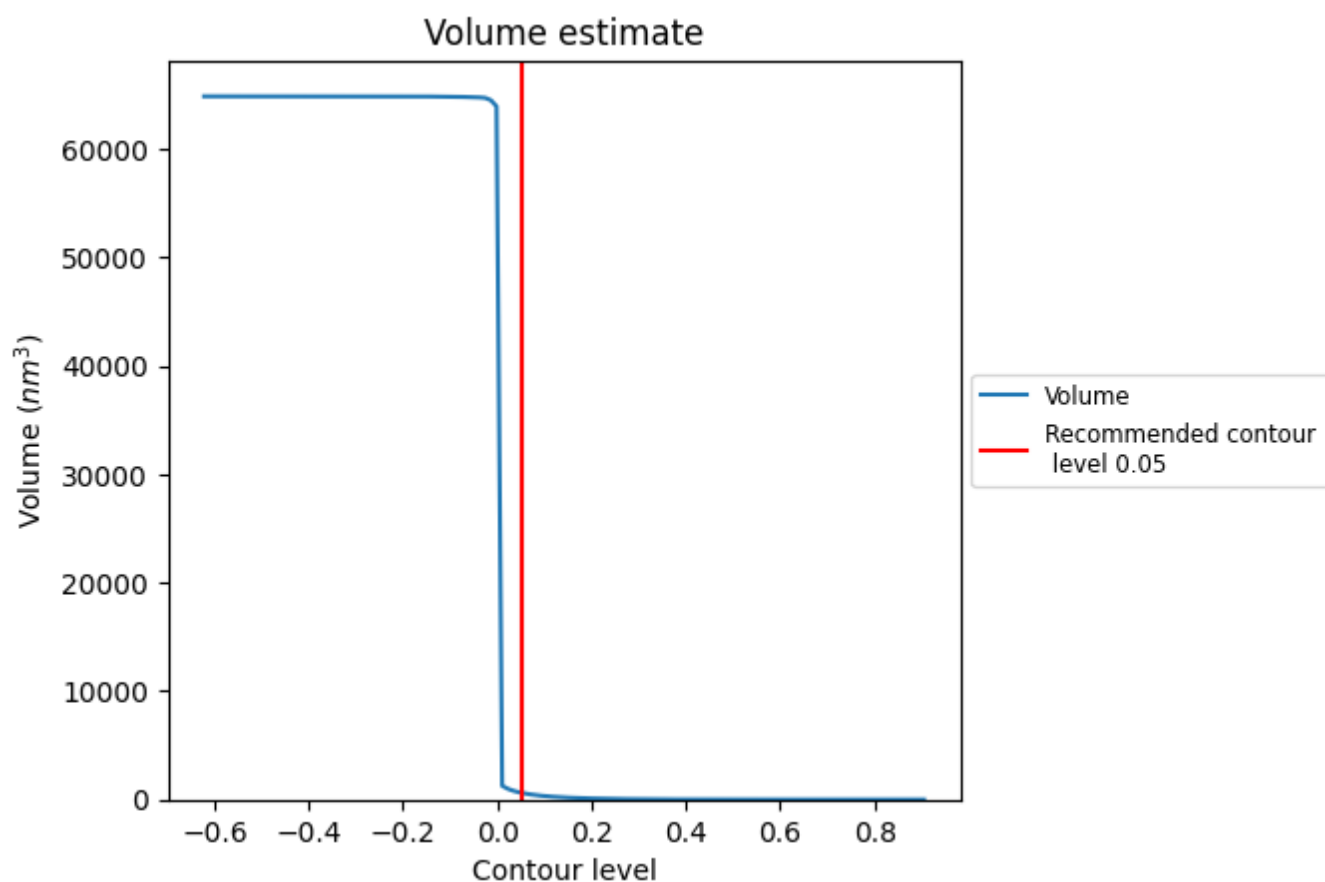
This section contains the results of statistical analysis of the map.

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.

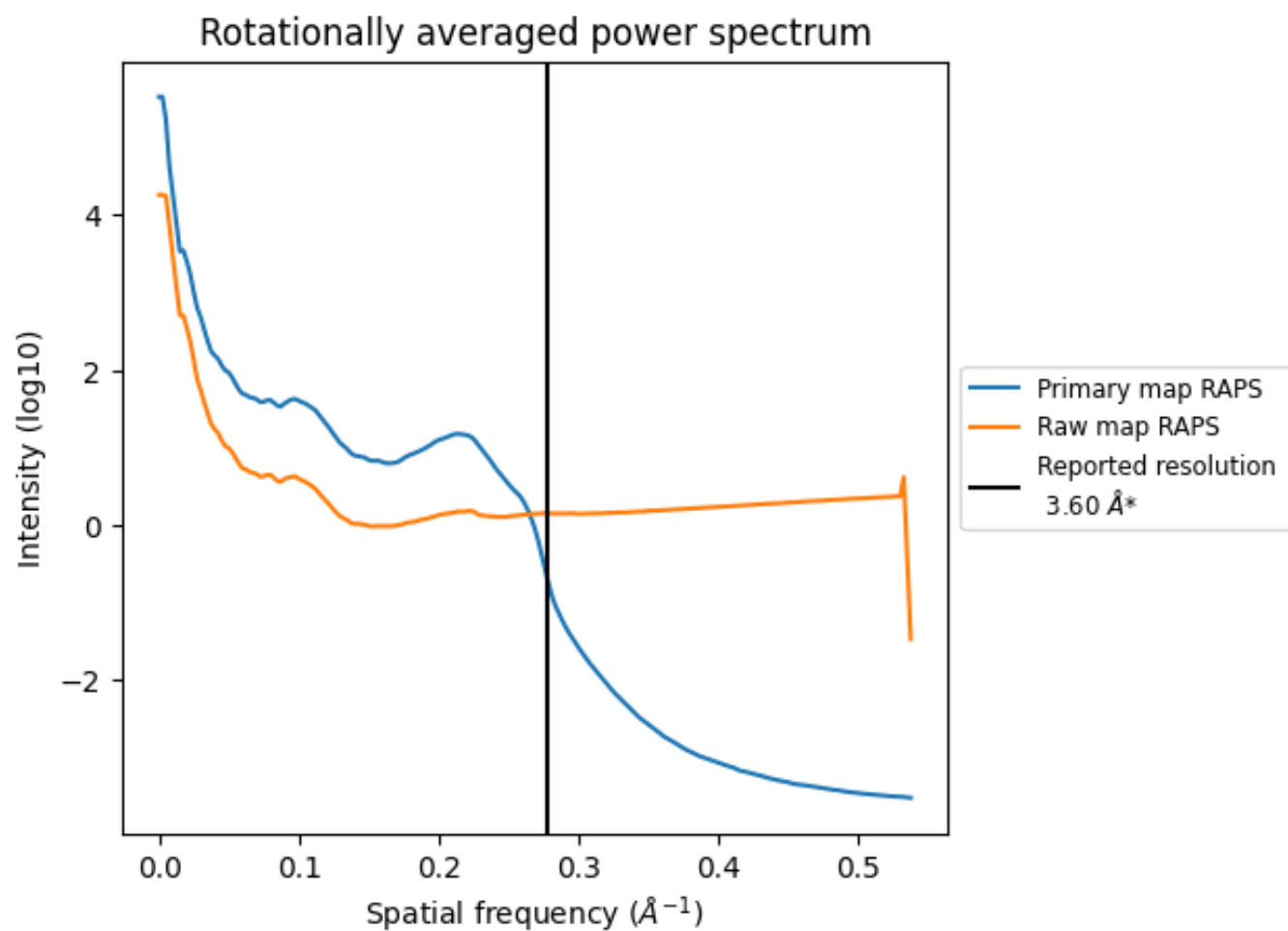
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 635 nm³; this corresponds to an approximate mass of 573 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](#)

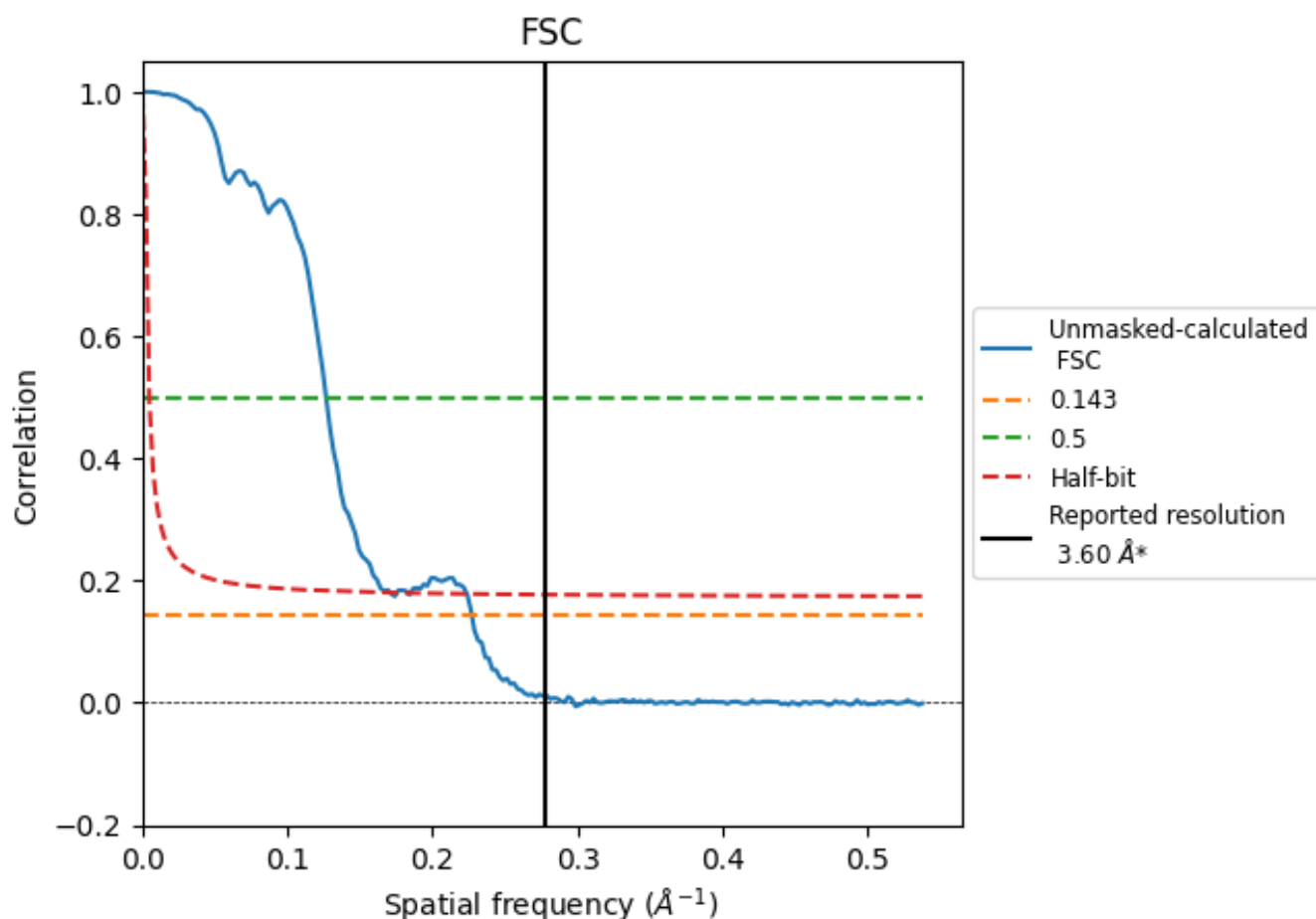


*Reported resolution corresponds to spatial frequency of 0.278 $\text{\AA}^{-1}$

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 0.278 Å⁻¹

8.2 Resolution estimates [i](#)

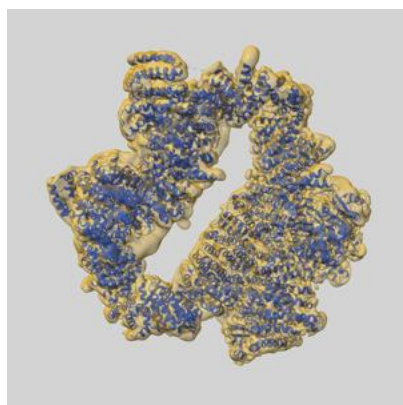
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.60	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.40	7.89	5.85

*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 4.40 differs from the reported value 3.6 by more than 10 %

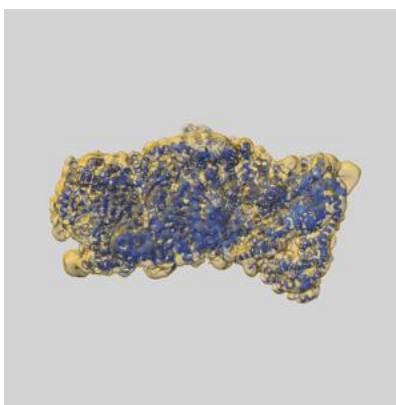
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-68920 and PDB model 23FD. Per-residue inclusion information can be found in section [3](#) on page [6](#).

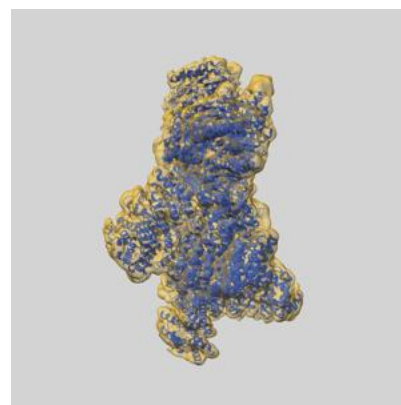
9.1 Map-model overlay [i](#)



X



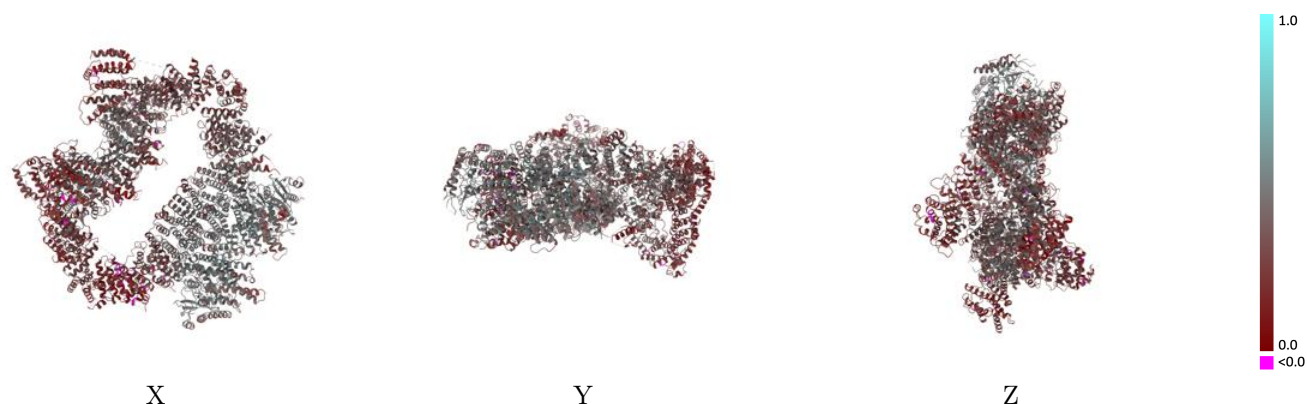
Y



Z

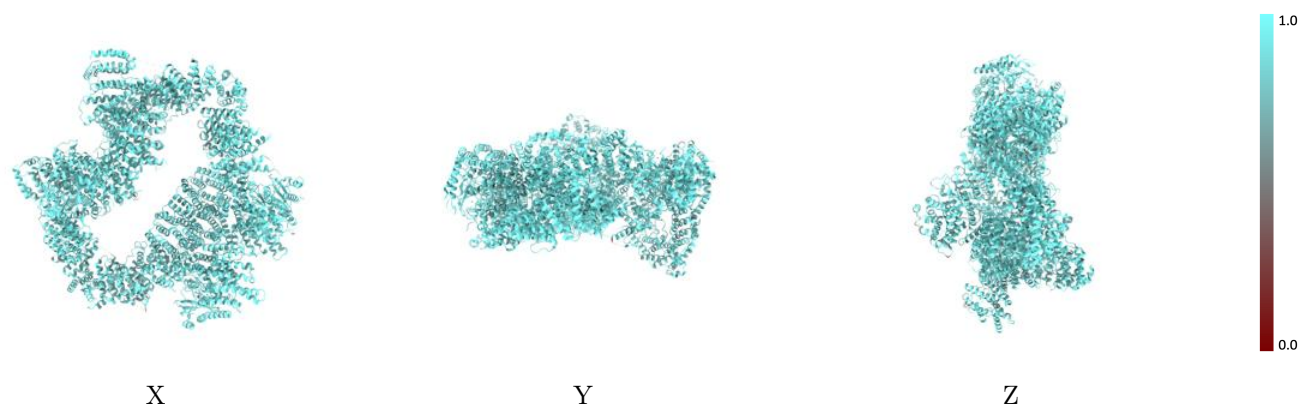
The images above show the 3D surface view of the map at the recommended contour level 0.05 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



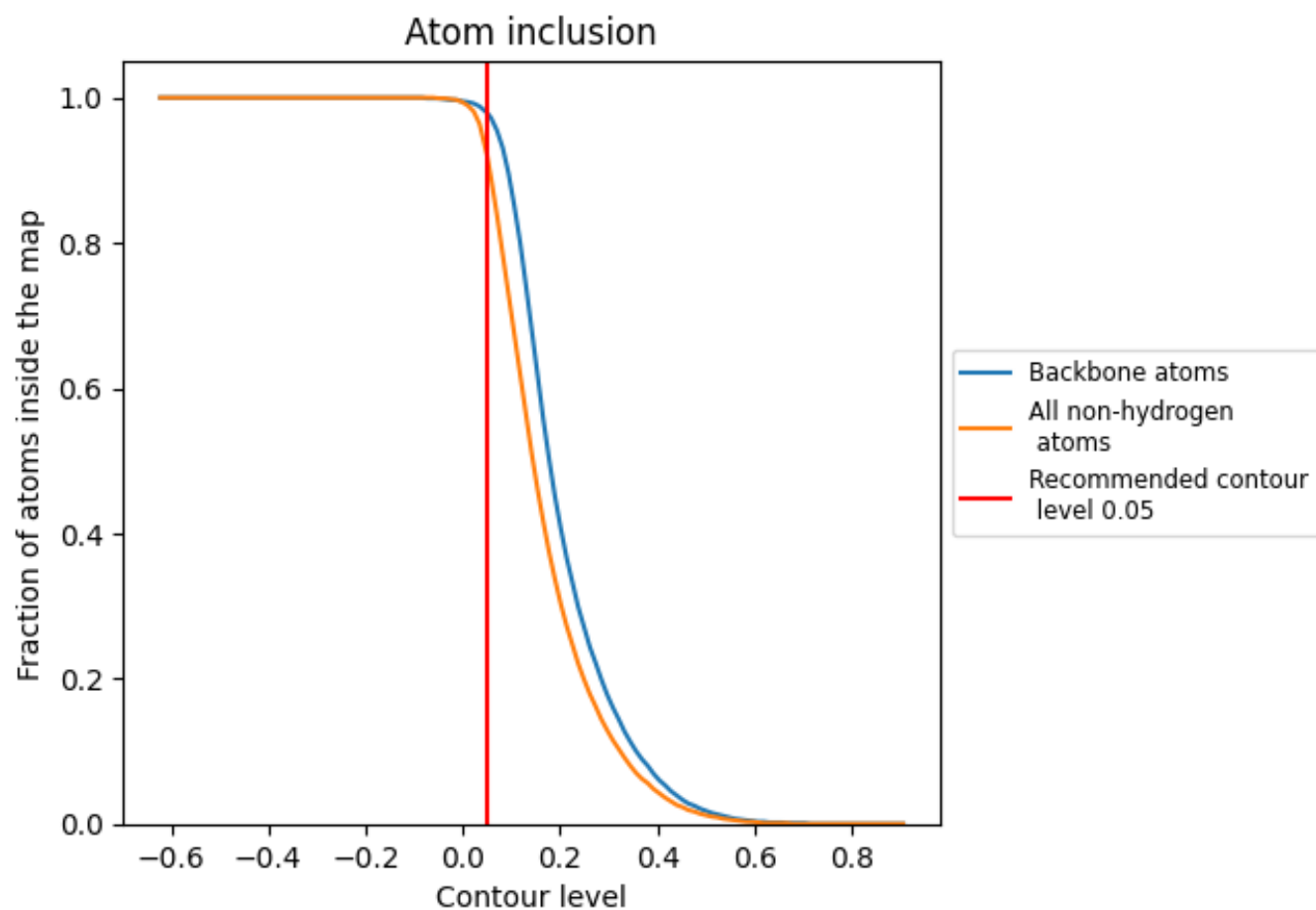
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.05).

9.4 Atom inclusion [i](#)



At the recommended contour level, 98% of all backbone atoms, 92% 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 (0.05) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9200	0.3470
A	0.9200	0.3630
B	0.9140	0.3320
C	0.9450	0.3670
D	0.9470	0.3590
E	0.8000	0.3010
F	0.7950	0.3120
G	0.8990	0.2190
H	0.9430	0.2650

1.0

0.0

<0.0