



Full wwPDB EM Validation Report ⓘ

Mar 5, 2026 – 09:16 AM UTC

PDB ID : 6VP6 / pdb_00006vp6
EMDB ID : EMD-21250
Title : Cryo-EM structure of the C-terminal half of the Parkinson's Disease-linked protein Leucine Rich Repeat Kinase 2 (LRRK2)
Authors : Leschziner, A.; Deniston, C.; Lahiri, I.
Deposited on : 2020-02-01
Resolution : 3.47 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.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

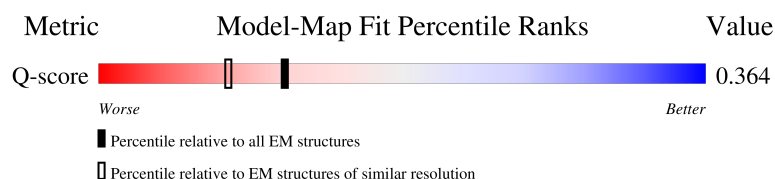
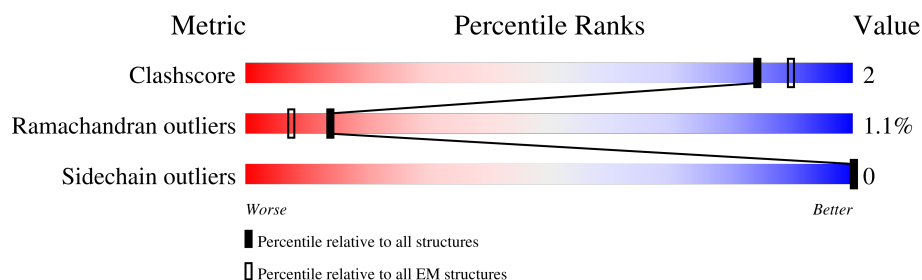
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.47 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	13950 (3.00 - 4.00)

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	1201	 81% 8% • 10%
1	B	1201	 8% 20% • 78%
1	C	1201	 25% • 73%

2 Entry composition [i](#)

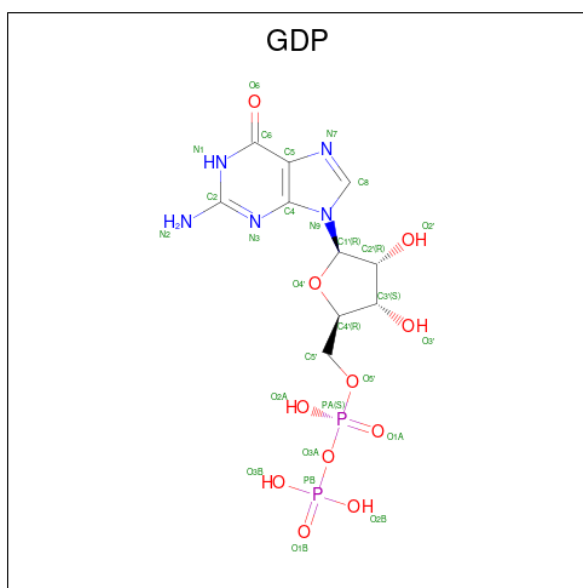
There are 3 unique types of molecules in this entry. The entry contains 13185 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Leucine-rich repeat serine/threonine-protein kinase 2.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	1084	Total	C	N	O	P	S	0	0
			8531	5473	1455	1551	1	51		
1	B	265	Total	C	N	O	S		0	0
			2146	1387	360	385	14			
1	C	319	Total	C	N	O	S		0	0
			2479	1580	420	458	21			

- Molecule 2 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	N	O	P	0
			28	10	5	11	2	

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
3	A	1	Total	Mg	0
			1	1	



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C3	Depositor
Number of particles used	70953	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION; Per-particle CTF values	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	6.65	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	130000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.075	Depositor
Minimum map value	-0.032	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.0267	Depositor
Map size (Å)	380.92, 380.92, 380.92	wwPDB
Map dimensions	356, 356, 356	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.07, 1.07, 1.07	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.84	1/8682 (0.0%)	1.16	96/11746 (0.8%)
1	B	0.70	0/2199	1.23	33/2983 (1.1%)
1	C	0.71	0/2514	1.08	13/3397 (0.4%)
All	All	0.80	1/13395 (0.0%)	1.16	142/18126 (0.8%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	2040	ALA	C-N	9.76	1.45	1.33

All (142) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1728	ARG	CA-C-N	9.44	129.27	120.21
1	B	1728	ARG	C-N-CA	9.44	129.27	120.21
1	B	1677	ARG	CA-C-N	9.04	129.12	119.90
1	B	1677	ARG	C-N-CA	9.04	129.12	119.90
1	A	2122	ARG	CA-C-N	8.97	129.02	119.78
1	A	2122	ARG	C-N-CA	8.97	129.02	119.78
1	A	2079	PHE	CA-C-N	8.76	128.49	119.56
1	A	2079	PHE	C-N-CA	8.76	128.49	119.56
1	A	1845	GLN	CA-C-N	8.67	129.53	119.47
1	A	1845	GLN	C-N-CA	8.67	129.53	119.47
1	A	2298	THR	CA-C-N	8.63	128.57	119.85
1	A	2298	THR	C-N-CA	8.63	128.57	119.85
1	B	1758	HIS	CA-C-N	8.57	128.30	119.56
1	B	1758	HIS	C-N-CA	8.57	128.30	119.56
1	C	2360	ASP	CA-CB-CG	8.19	120.79	112.60
1	B	1856	ALA	CA-C-N	8.09	128.85	119.47
1	B	1856	ALA	C-N-CA	8.09	128.85	119.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1677	ARG	CA-C-N	8.06	128.11	119.89
1	A	1677	ARG	C-N-CA	8.06	128.11	119.89
1	A	1880	ALA	CA-C-N	7.99	128.43	119.32
1	A	1880	ALA	C-N-CA	7.99	128.43	119.32
1	C	2207	LEU	CA-C-N	7.94	127.66	119.56
1	C	2207	LEU	C-N-CA	7.94	127.66	119.56
1	B	1845	GLN	CA-C-N	7.89	129.71	119.84
1	B	1845	GLN	C-N-CA	7.89	129.71	119.84
1	B	1697	MET	CA-C-N	7.77	128.18	119.32
1	B	1697	MET	C-N-CA	7.77	128.18	119.32
1	A	2102	ALA	CA-C-N	7.77	127.82	119.90
1	A	2102	ALA	C-N-CA	7.77	127.82	119.90
1	A	2118	ASN	CA-C-N	7.69	128.39	119.47
1	A	2118	ASN	C-N-CA	7.69	128.39	119.47
1	B	1880	ALA	CA-C-N	7.61	128.30	119.47
1	B	1880	ALA	C-N-CA	7.61	128.30	119.47
1	A	1599	GLU	CA-C-N	7.58	127.96	119.32
1	A	1599	GLU	C-N-CA	7.58	127.96	119.32
1	A	1728	ARG	CA-C-N	7.54	127.47	119.85
1	A	1728	ARG	C-N-CA	7.54	127.47	119.85
1	B	1716	SER	CA-C-N	7.54	127.17	119.56
1	B	1716	SER	C-N-CA	7.54	127.17	119.56
1	A	1734	TRP	CB-CA-C	-7.52	97.47	110.17
1	B	1842	ASN	CA-C-N	7.49	127.20	119.56
1	B	1842	ASN	C-N-CA	7.49	127.20	119.56
1	A	1856	ALA	CA-C-N	7.48	128.43	120.12
1	A	1856	ALA	C-N-CA	7.48	128.43	120.12
1	A	1546	PRO	N-CA-CB	7.47	111.10	103.25
1	A	1524	PRO	N-CA-CB	7.47	111.09	103.25
1	A	2006	TYR	CA-C-N	7.47	127.83	119.32
1	A	2006	TYR	C-N-CA	7.47	127.83	119.32
1	A	1842	ASN	CA-C-N	7.47	127.18	119.56
1	A	1842	ASN	C-N-CA	7.47	127.18	119.56
1	C	2286	ALA	CA-C-N	7.38	127.31	119.85
1	C	2286	ALA	C-N-CA	7.38	127.31	119.85
1	A	1716	SER	CA-C-N	7.27	127.43	119.87
1	A	1716	SER	C-N-CA	7.27	127.43	119.87
1	A	2092	LEU	CA-C-N	7.24	127.40	120.31
1	A	2092	LEU	C-N-CA	7.24	127.40	120.31
1	A	1542	PRO	N-CA-CB	7.19	110.80	103.25
1	A	2207	LEU	CA-C-N	7.18	126.89	119.56
1	A	2207	LEU	C-N-CA	7.18	126.89	119.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	2286	ALA	CA-C-N	7.17	127.13	120.03
1	A	2286	ALA	C-N-CA	7.17	127.13	120.03
1	C	2298	THR	CA-C-N	7.16	127.73	120.14
1	C	2298	THR	C-N-CA	7.16	127.73	120.14
1	B	1929	HIS	CA-C-N	7.09	127.70	119.47
1	B	1929	HIS	C-N-CA	7.09	127.70	119.47
1	A	1996	LYS	CA-C-N	6.98	128.57	119.84
1	A	1996	LYS	C-N-CA	6.98	128.57	119.84
1	B	1743	SER	CA-C-N	6.98	126.96	119.28
1	B	1743	SER	C-N-CA	6.98	126.96	119.28
1	A	2040	ALA	CA-C-N	6.98	126.68	119.56
1	A	2040	ALA	C-N-CA	6.98	126.68	119.56
1	A	1700	PHE	CA-C-N	6.81	126.79	119.78
1	A	1700	PHE	C-N-CA	6.81	126.79	119.78
1	A	1330	VAL	CA-C-N	6.79	128.32	119.84
1	A	1330	VAL	C-N-CA	6.79	128.32	119.84
1	A	2094	ASP	CA-C-N	6.73	126.43	119.56
1	A	2094	ASP	C-N-CA	6.73	126.43	119.56
1	A	1445	SER	CA-C-N	6.67	127.19	119.99
1	A	1445	SER	C-N-CA	6.67	127.19	119.99
1	A	1479	PHE	CA-C-N	6.62	128.11	119.84
1	A	1479	PHE	C-N-CA	6.62	128.11	119.84
1	A	1864	LEU	CA-C-N	6.53	126.51	119.78
1	A	1864	LEU	C-N-CA	6.53	126.51	119.78
1	B	1682	LEU	CA-C-N	6.49	126.94	120.52
1	B	1682	LEU	C-N-CA	6.49	126.94	120.52
1	A	1641	PHE	CA-C-N	6.44	126.39	119.76
1	A	1641	PHE	C-N-CA	6.44	126.39	119.76
1	A	1518	VAL	CB-CA-C	-6.40	106.27	111.71
1	A	1792	PHE	CA-C-N	6.39	126.30	119.85
1	A	1792	PHE	C-N-CA	6.39	126.30	119.85
1	C	2345	SER	CB-CA-C	-6.38	109.22	116.63
1	A	1929	HIS	CA-C-N	6.35	126.83	119.47
1	A	1929	HIS	C-N-CA	6.35	126.83	119.47
1	A	1758	HIS	CA-C-N	6.34	127.77	119.84
1	A	1758	HIS	C-N-CA	6.34	127.77	119.84
1	A	1697	MET	CA-C-N	6.32	126.02	119.64
1	A	1697	MET	C-N-CA	6.32	126.02	119.64
1	A	1762	PHE	N-CA-C	6.32	118.15	108.42
1	A	2146	LEU	CA-C-N	6.31	126.28	119.78
1	A	2146	LEU	C-N-CA	6.31	126.28	119.78
1	A	1669	VAL	CA-C-N	6.29	127.70	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1669	VAL	C-N-CA	6.29	127.70	119.84
1	C	2361	THR	N-CA-C	-6.27	105.94	113.97
1	A	1376	TRP	CA-C-N	6.22	126.55	119.83
1	A	1376	TRP	C-N-CA	6.22	126.55	119.83
1	A	1583	LEU	N-CA-C	6.12	118.73	108.02
1	A	2345	SER	CB-CA-C	-6.11	109.55	116.63
1	A	1743	SER	CA-C-N	6.08	126.52	119.47
1	A	1743	SER	C-N-CA	6.08	126.52	119.47
1	A	1767	VAL	CA-C-N	6.08	126.58	120.14
1	A	1767	VAL	C-N-CA	6.08	126.58	120.14
1	C	2146	LEU	CA-C-N	6.07	126.03	119.78
1	C	2146	LEU	C-N-CA	6.07	126.03	119.78
1	A	2038	PHE	CA-C-N	5.96	131.28	121.39
1	A	2038	PHE	C-N-CA	5.96	131.28	121.39
1	A	1548	ILE	N-CA-C	5.93	116.47	108.17
1	B	1792	PHE	CA-CB-CG	5.87	119.67	113.80
1	A	1663	GLY	N-CA-C	-5.86	103.64	112.60
1	A	1682	LEU	CA-C-N	5.85	126.34	120.14
1	A	1682	LEU	C-N-CA	5.85	126.34	120.14
1	C	2370	SER	CA-C-N	5.74	127.83	120.89
1	C	2370	SER	C-N-CA	5.74	127.83	120.89
1	A	2500	LEU	CA-C-N	5.67	125.78	119.32
1	A	2500	LEU	C-N-CA	5.67	125.78	119.32
1	A	1545	PHE	CA-C-N	5.55	126.77	119.84
1	A	1545	PHE	C-N-CA	5.55	126.77	119.84
1	B	1850	ILE	CA-C-N	5.54	126.41	119.98
1	B	1850	ILE	C-N-CA	5.54	126.41	119.98
1	B	1767	VAL	CA-C-N	5.39	125.29	119.85
1	B	1767	VAL	C-N-CA	5.39	125.29	119.85
1	B	1864	LEU	CA-C-N	5.33	125.63	119.93
1	B	1864	LEU	C-N-CA	5.33	125.63	119.93
1	A	1569	LEU	CA-C-N	5.23	124.85	119.05
1	A	1569	LEU	C-N-CA	5.23	124.85	119.05
1	B	1700	PHE	CA-C-N	5.16	126.29	119.84
1	B	1700	PHE	C-N-CA	5.16	126.29	119.84
1	A	1598	VAL	N-CA-C	5.16	115.90	108.48
1	A	2326	PHE	N-CA-C	5.12	117.59	109.50
1	A	1666	TYR	N-CA-C	5.09	117.11	109.23
1	A	1962	ASP	N-CA-C	5.06	116.86	107.60
1	A	2104	TRP	CA-C-N	5.00	126.09	119.84
1	A	2104	TRP	C-N-CA	5.00	126.09	119.84

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	8531	0	8567	50	0
1	B	2146	0	2156	4	0
1	C	2479	0	2549	8	0
2	A	28	0	12	1	0
3	A	1	0	0	0	0
All	All	13185	0	13284	62	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 (62) 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:1490:ALA:HA	2:A:2601:GDP:O6	1.46	1.14
1:A:2037:GLY:O	1:A:2083:PHE:CE2	2.40	0.74
1:A:2037:GLY:O	1:A:2083:PHE:HE2	1.74	0.69
1:A:1398:ARG:O	1:A:1398:ARG:HG3	1.93	0.67
1:A:1677:ARG:O	1:A:1677:ARG:HG3	1.94	0.65
1:A:2408:MET:O	1:A:2408:MET:SD	2.62	0.58
1:A:2489:ILE:HG22	1:A:2489:ILE:O	2.06	0.56
1:A:1582:LEU:C	1:A:1582:LEU:HD12	2.30	0.55
1:A:1912:THR:HG22	1:A:1912:THR:O	2.07	0.54
1:A:1592:LEU:HD23	1:A:1592:LEU:O	2.10	0.52
1:A:2105:PRO:O	1:A:2106:MET:HB2	2.09	0.52
1:A:1569:LEU:HB3	1:A:1570:PRO:HD3	1.92	0.50
1:A:2004:THR:O	1:A:2004:THR:HG23	2.12	0.50
1:A:1683:PRO:O	1:A:1684:HIS:HB2	2.10	0.50
1:A:2040:ALA:HB3	1:A:2043:VAL:HG22	1.94	0.49
1:A:1535:LEU:C	1:A:1535:LEU:HD23	2.37	0.48
1:C:2388:ASP:OD1	1:C:2388:ASP:C	2.56	0.48
1:A:1962:ASP:OD1	1:A:1962:ASP:C	2.56	0.48
1:A:1584:HIS:ND1	1:A:1584:HIS:C	2.74	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1481:ALA:O	1:A:1482:ILE:C	2.59	0.46
1:A:1677:ARG:O	1:A:1677:ARG:CG	2.61	0.46
1:A:1402:TYR:CD1	1:A:1402:TYR:C	2.94	0.45
1:A:2377:ASP:HB2	1:A:2384:CYS:SG	2.57	0.45
1:A:2333:GLN:O	1:A:2334:LYS:HB3	2.17	0.45
1:A:1515:ASP:O	1:A:1519:VAL:N	2.50	0.45
1:A:1398:ARG:O	1:A:1398:ARG:CG	2.61	0.44
1:A:1936:LEU:O	1:A:1937:ALA:HB3	2.17	0.44
1:C:2377:ASP:HB2	1:C:2384:CYS:SG	2.57	0.44
1:A:1492:GLU:O	1:A:1493:GLU:CB	2.65	0.44
1:B:1814:TYR:CD2	1:B:1814:TYR:C	2.96	0.43
1:A:2422:ASN:OD1	1:A:2422:ASN:C	2.57	0.43
1:C:2408:MET:C	1:C:2408:MET:SD	3.01	0.43
1:A:1432:LYS:HB2	1:A:1433:PRO:HD3	2.00	0.43
1:A:1676:HIS:O	1:A:1677:ARG:C	2.61	0.43
1:A:1592:LEU:HD23	1:A:1592:LEU:C	2.44	0.43
1:A:1671:SER:O	1:A:1672:SER:CB	2.67	0.43
1:A:1814:TYR:CD2	1:A:1814:TYR:C	2.96	0.43
1:A:1507:GLU:OE1	1:A:1507:GLU:HA	2.19	0.43
1:A:1593:SER:OG	1:A:1594:ASP:N	2.52	0.43
1:A:1376:TRP:CD1	1:A:1376:TRP:C	2.96	0.42
1:A:1734:TRP:O	1:A:1735:ARG:HB3	2.19	0.42
1:A:2039:ARG:NH2	1:A:2084:ASP:OD1	2.38	0.42
1:A:2498:ILE:O	1:A:2498:ILE:HG13	2.19	0.42
1:A:2500:LEU:HB3	1:A:2501:PRO:HD3	2.00	0.42
1:A:1454:LEU:HB3	1:A:1489:ASN:HA	2.02	0.41
1:C:2351:ASP:C	1:C:2351:ASP:OD1	2.62	0.41
1:C:2153:GLU:HG2	1:C:2172:GLY:HA3	2.02	0.41
1:A:2003:PHE:O	1:A:2004:THR:HB	2.19	0.41
1:A:1420:ASP:OD1	1:A:1420:ASP:C	2.61	0.41
1:A:2429:THR:OG1	1:A:2430:GLY:N	2.53	0.41
1:A:1492:GLU:O	1:A:1493:GLU:HB2	2.21	0.41
1:A:2419:LEU:HD23	1:A:2419:LEU:C	2.45	0.41
1:A:1405:HIS:N	1:A:1406:PRO:HD3	2.36	0.41
1:B:1936:LEU:O	1:B:1937:ALA:HB3	2.21	0.41
1:C:2274:ILE:O	1:C:2288:LEU:N	2.52	0.41
1:A:1941:ARG:HB3	1:A:1942:PRO:HD3	2.02	0.40
1:A:2388:ASP:OD1	1:A:2388:ASP:C	2.63	0.40
1:B:1917:LEU:C	1:B:1917:LEU:HD23	2.46	0.40
1:C:2141:THR:N	1:C:2495:VAL:O	2.53	0.40
1:B:1913:SER:O	1:B:1914:LEU:HB2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1336:LYS:HE2	1:A:1336:LYS:HB2	1.84	0.40
1:C:2327:SER:OG	1:C:2329:ASP:OD1	2.35	0.40

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	A	1055/1201 (88%)	974 (92%)	68 (6%)	13 (1%)	10	41
1	B	259/1201 (22%)	236 (91%)	20 (8%)	3 (1%)	10	41
1	C	307/1201 (26%)	295 (96%)	10 (3%)	2 (1%)	18	51
All	All	1621/3603 (45%)	1505 (93%)	98 (6%)	18 (1%)	14	42

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1493	GLU
1	A	2004	THR
1	A	1546	PRO
1	A	2334	LYS
1	A	2489	ILE
1	B	1701	PRO
1	B	1742	TRP
1	C	2421	LYS
1	A	1482	ILE
1	A	1524	PRO
1	A	1542	PRO
1	A	1942	PRO
1	A	2177	GLY
1	B	1938	ALA
1	C	2177	GLY

Continued on next page...

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Mol	Chain	Res	Type
1	A	2038	PHE
1	A	1852	ILE
1	A	1677	ARG

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	926/1073 (86%)	926 (100%)	0	100	100
1	B	240/1073 (22%)	240 (100%)	0	100	100
1	C	283/1073 (26%)	283 (100%)	0	100	100
All	All	1449/3219 (45%)	1449 (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. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1333	ASN
1	A	1657	GLN
1	A	1676	HIS
1	A	1822	HIS
1	A	2089	GLN
1	A	2333	GLN
1	B	1676	HIS
1	B	1741	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](#)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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	$\# Z > 2$
1	TPO	A	1343	1	8,10,11	0.87	0	10,14,16	0.87	0

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
1	TPO	A	1343	1	-	0/9/11/13	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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
2	GDP	A	2601	3	29,30,30	1.51	4 (13%)	45,47,47	1.87	10 (22%)

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
2	GDP	A	2601	3	-	4/16/32/32	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	2601	GDP	PA-O3A	-4.62	1.54	1.59
2	A	2601	GDP	C5-C4	3.49	1.48	1.38
2	A	2601	GDP	C4-N9	-2.70	1.31	1.38
2	A	2601	GDP	C5-N7	-2.14	1.34	1.39

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2601	GDP	C5-C4-N3	-4.51	121.20	128.39
2	A	2601	GDP	C2-N3-C4	4.00	119.19	112.30
2	A	2601	GDP	N9-C4-N3	3.98	133.92	125.95
2	A	2601	GDP	C1'-N9-C8	-3.86	115.77	126.73
2	A	2601	GDP	O2A-PA-O3A	3.54	116.84	107.27
2	A	2601	GDP	C6-C5-N7	3.15	136.03	130.29
2	A	2601	GDP	O4'-C1'-C2'	-2.46	101.36	106.62
2	A	2601	GDP	O3A-PA-O1A	-2.24	103.95	110.70
2	A	2601	GDP	O2A-PA-O1A	2.16	122.51	112.44
2	A	2601	GDP	O6-C6-C5	-2.16	120.83	126.53

There are no chirality outliers.

All (4) torsion outliers are listed below:

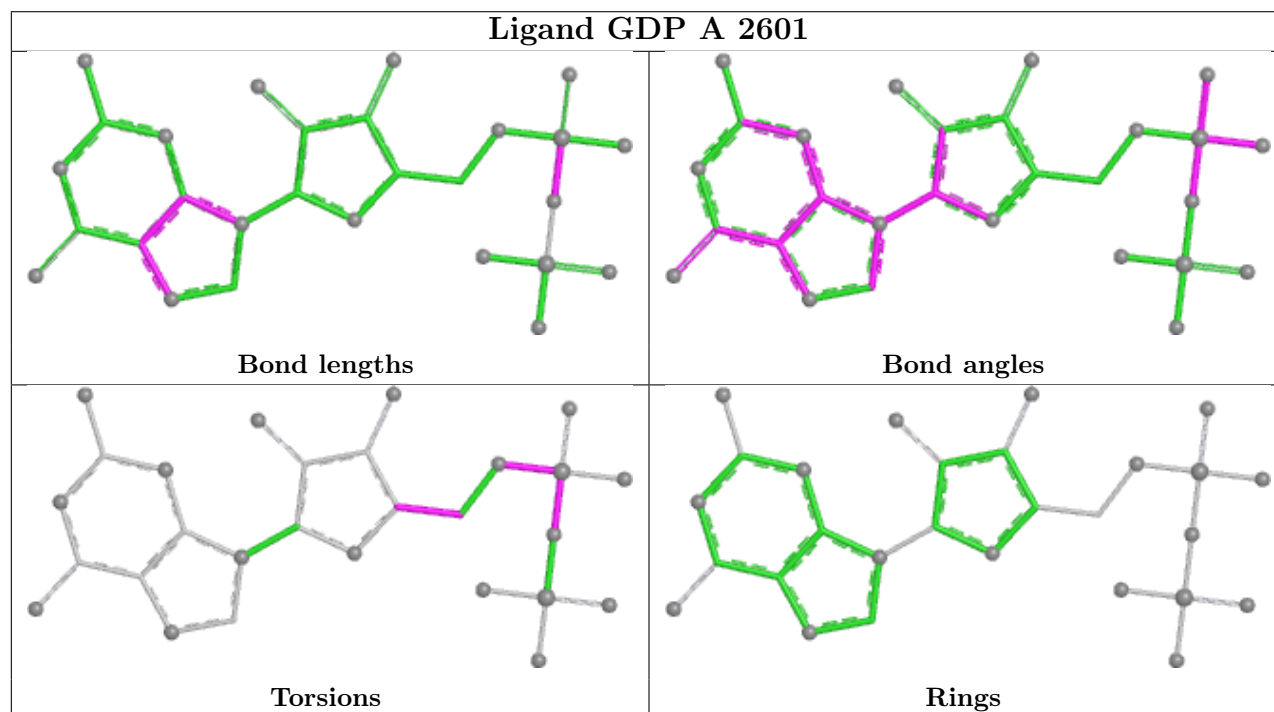
Mol	Chain	Res	Type	Atoms
2	A	2601	GDP	C3'-C4'-C5'-O5'
2	A	2601	GDP	C5'-O5'-PA-O1A
2	A	2601	GDP	PB-O3A-PA-O1A
2	A	2601	GDP	O4'-C4'-C5'-O5'

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2601	GDP	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 ⓘ

There are no chain breaks in this entry.

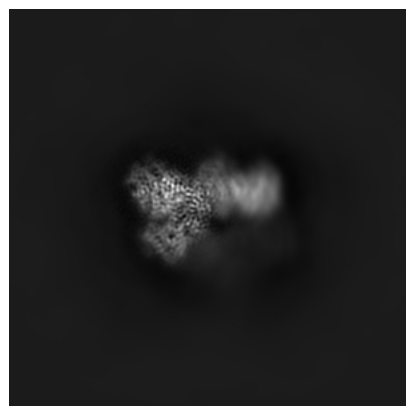
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21250. These allow visual inspection of the internal detail of the map and identification of artifacts.

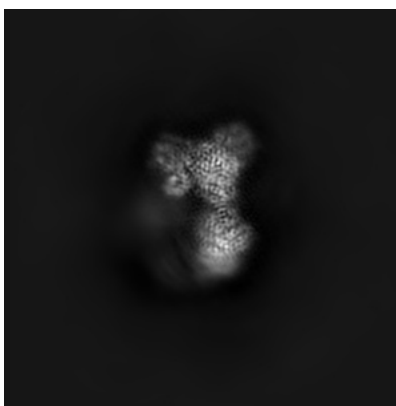
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

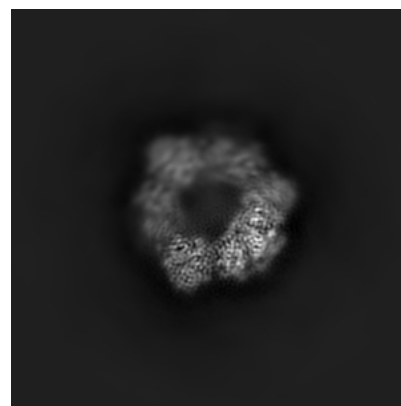
6.1.1 Primary map



X

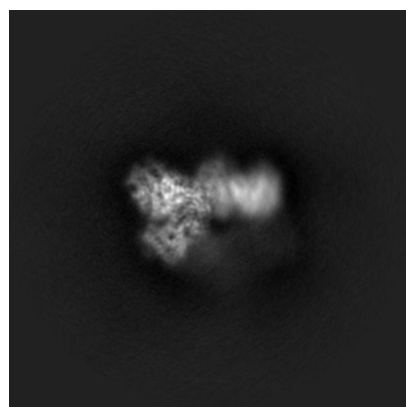


Y

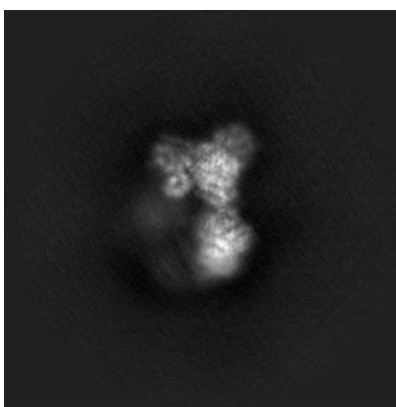


Z

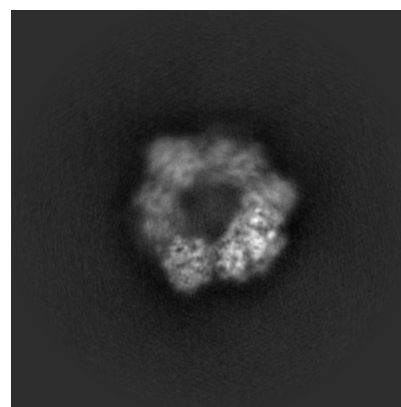
6.1.2 Raw map



X



Y

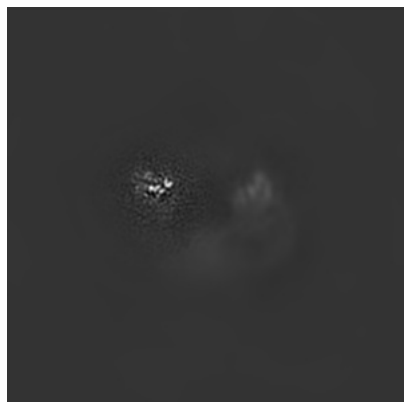


Z

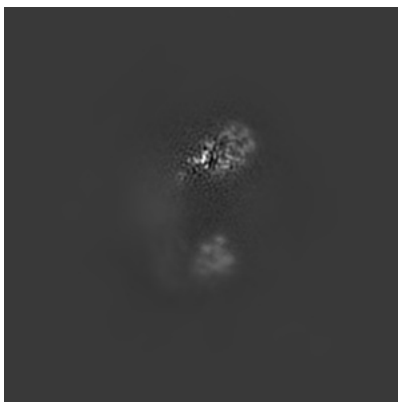
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

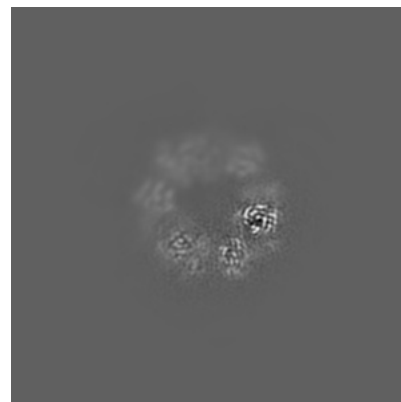
6.2.1 Primary map



X Index: 178

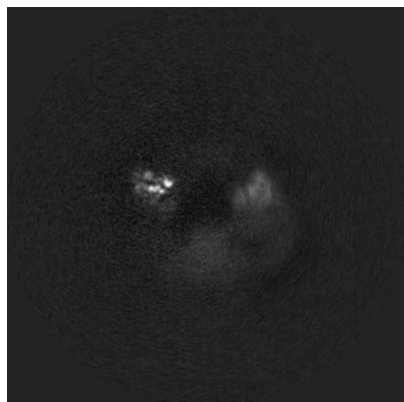


Y Index: 178

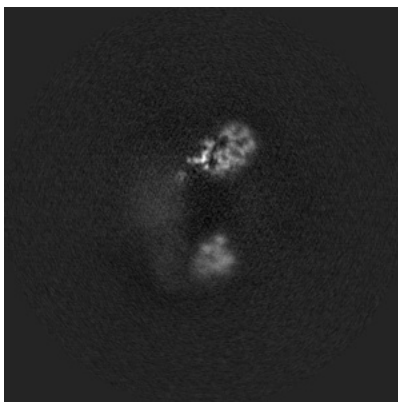


Z Index: 178

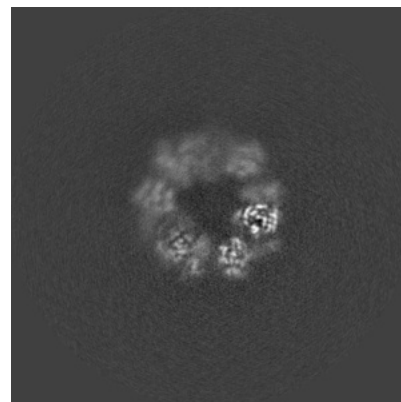
6.2.2 Raw map



X Index: 178



Y Index: 178

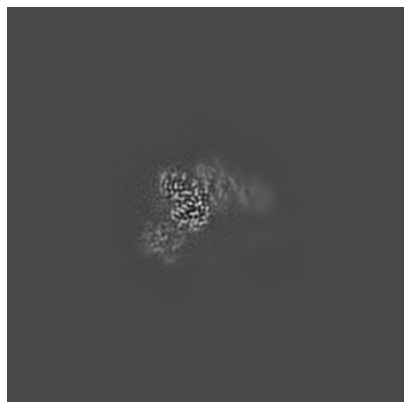


Z Index: 178

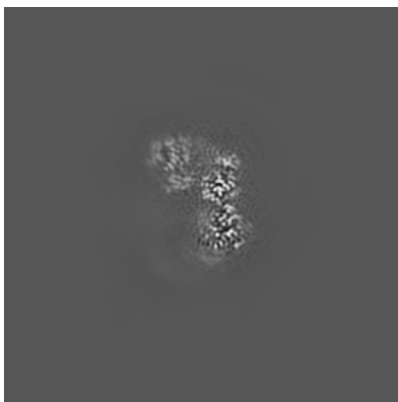
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

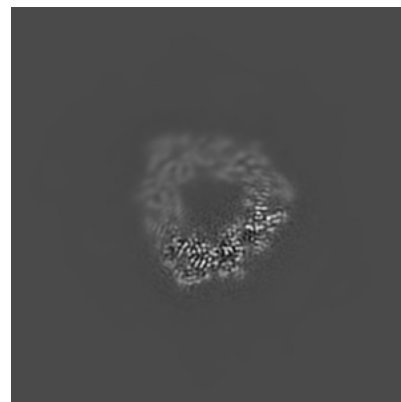
6.3.1 Primary map



X Index: 218

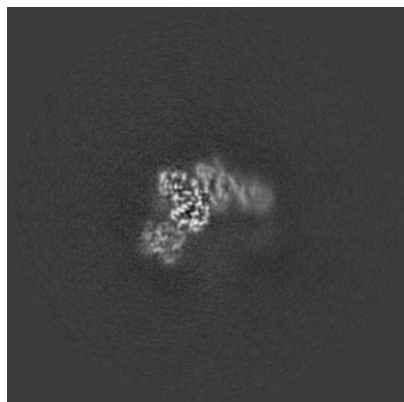


Y Index: 141

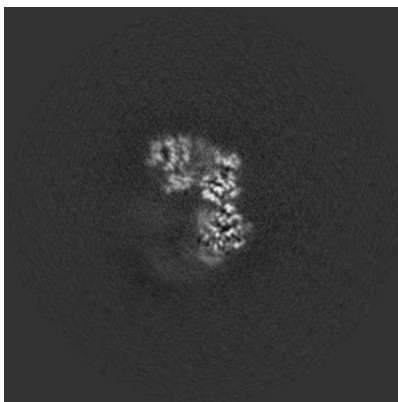


Z Index: 191

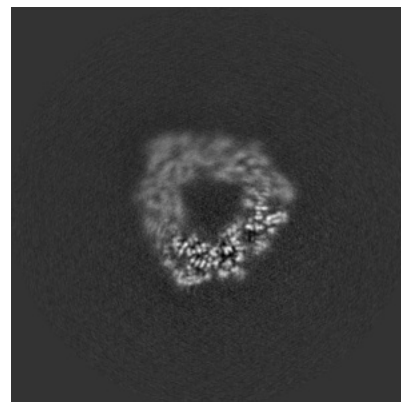
6.3.2 Raw map



X Index: 218



Y Index: 141

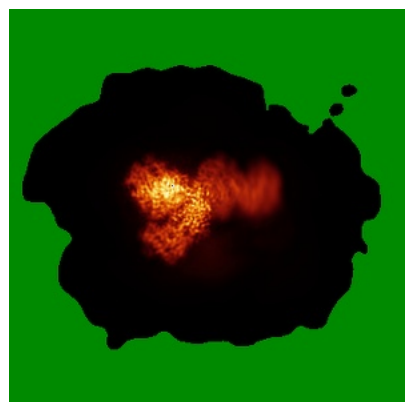


Z Index: 191

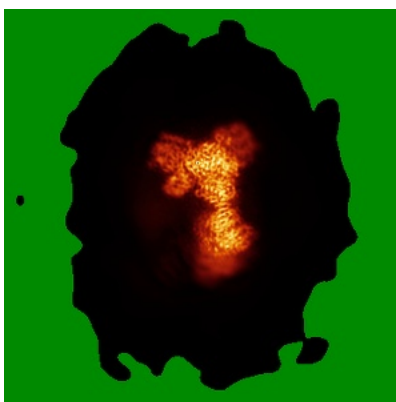
The images above show the largest variance slices of the map in three orthogonal directions.

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

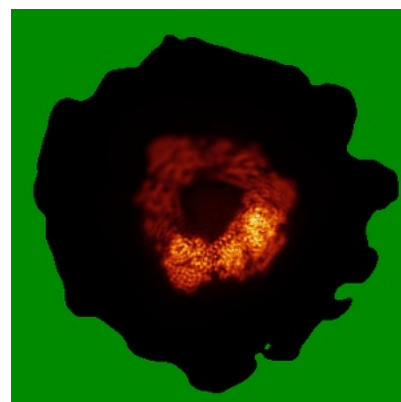
6.4.1 Primary map



X

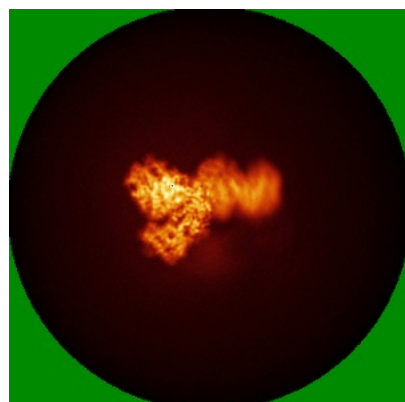


Y

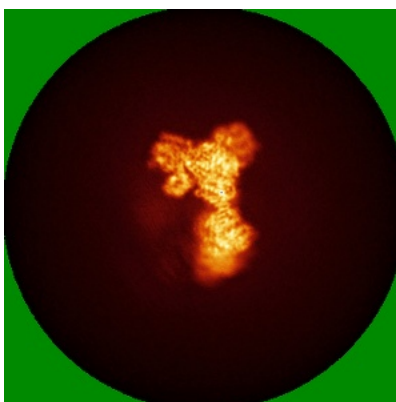


Z

6.4.2 Raw map



X



Y

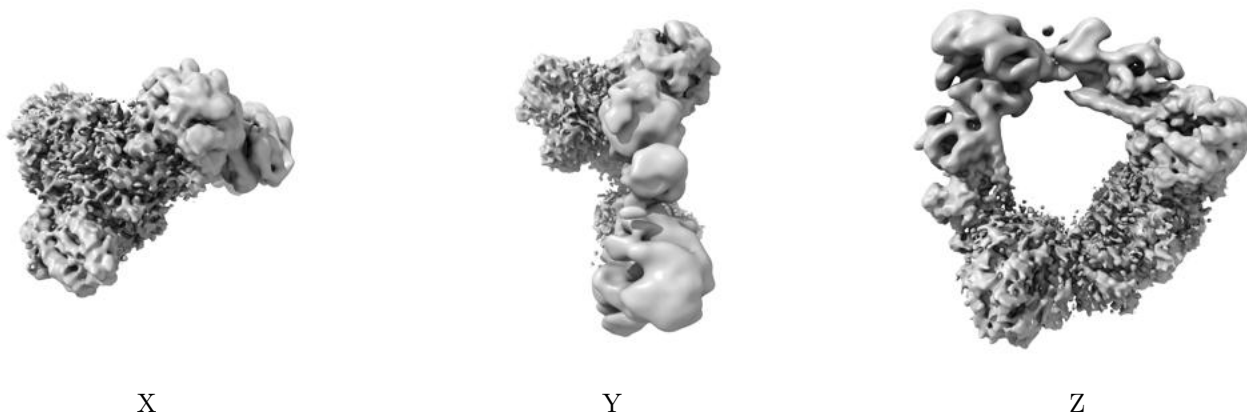


Z

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.

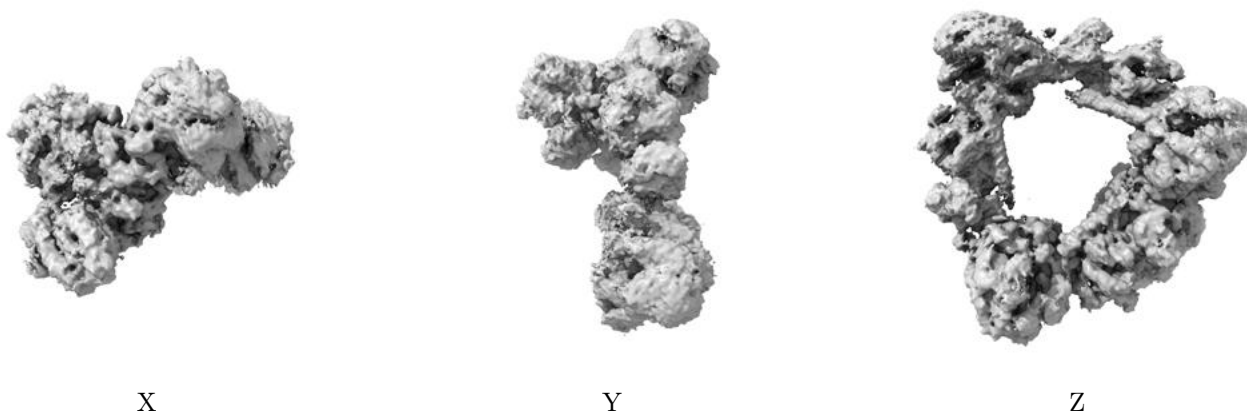
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0267. 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.

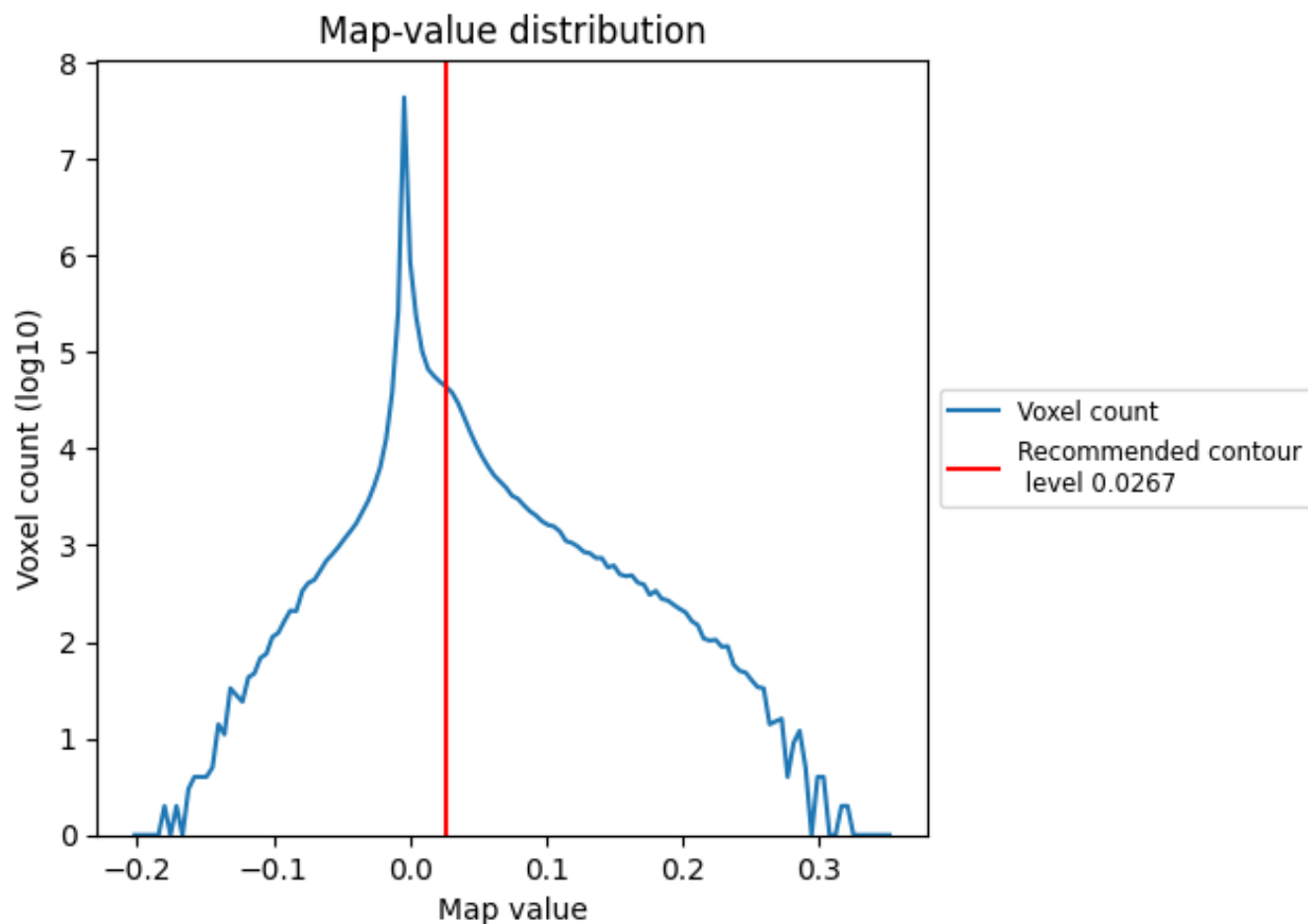
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

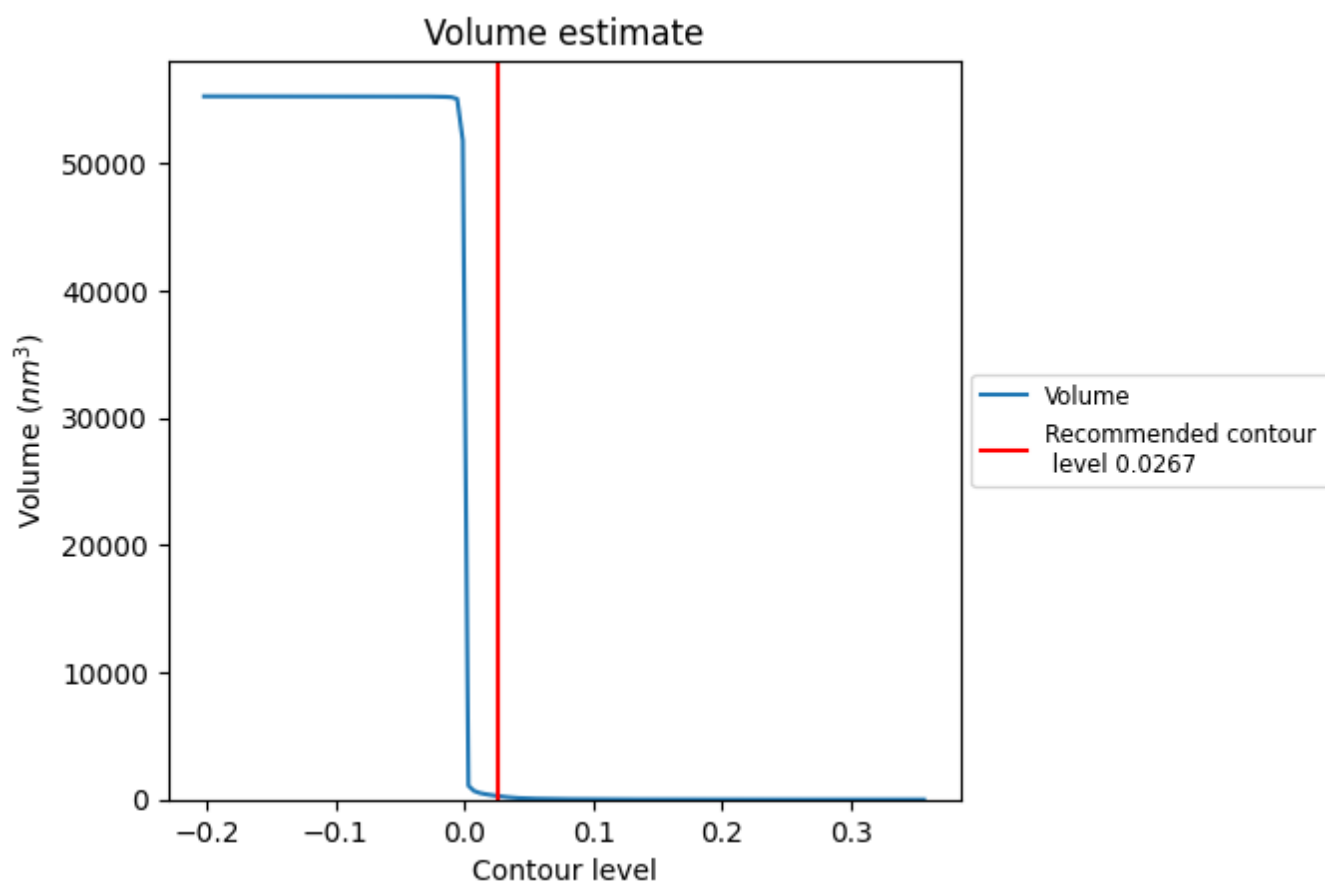
This section contains the results of statistical analysis of the map.

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.

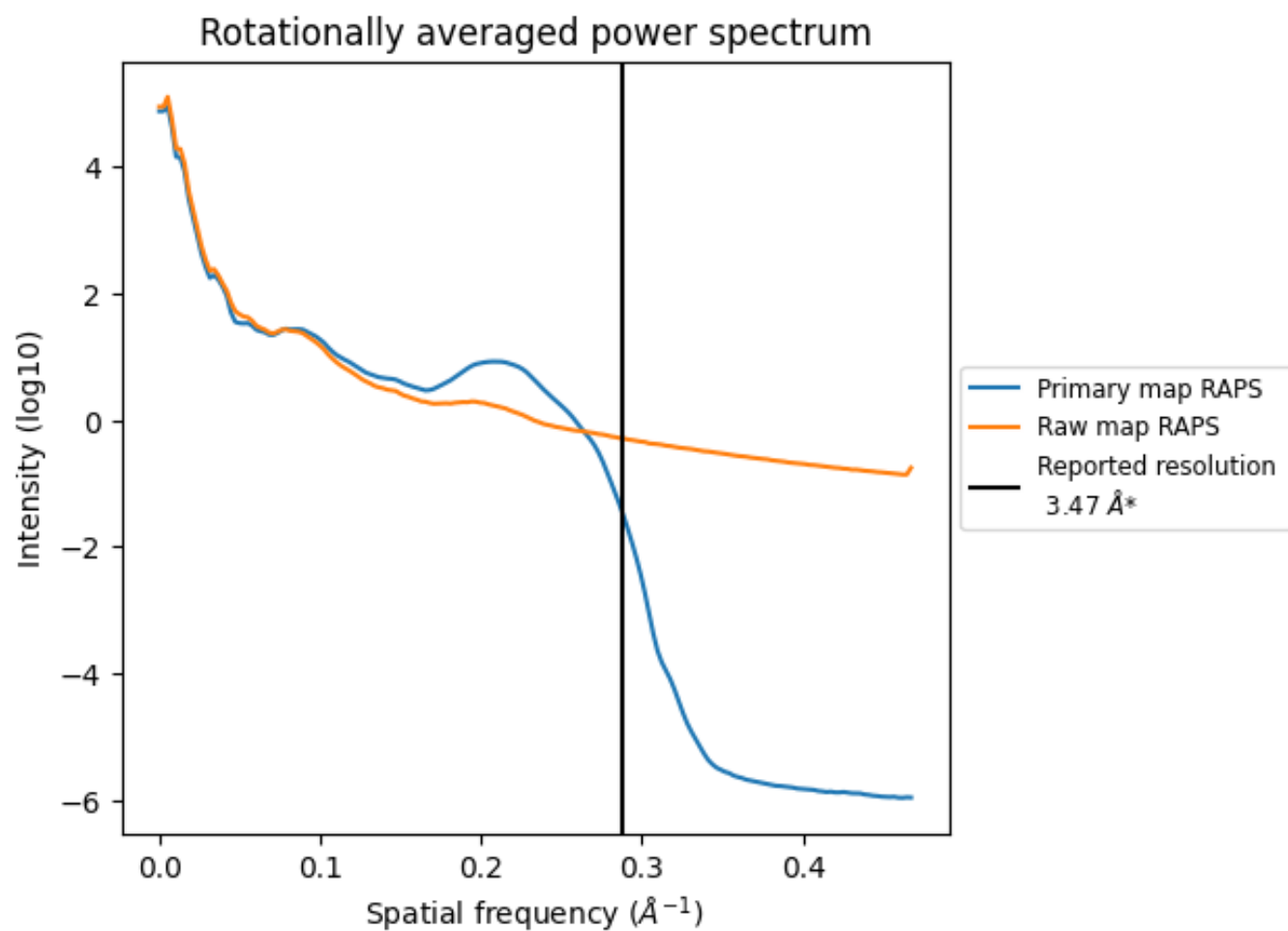
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 270 nm^3 ; this corresponds to an approximate mass of 244 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 ⓘ

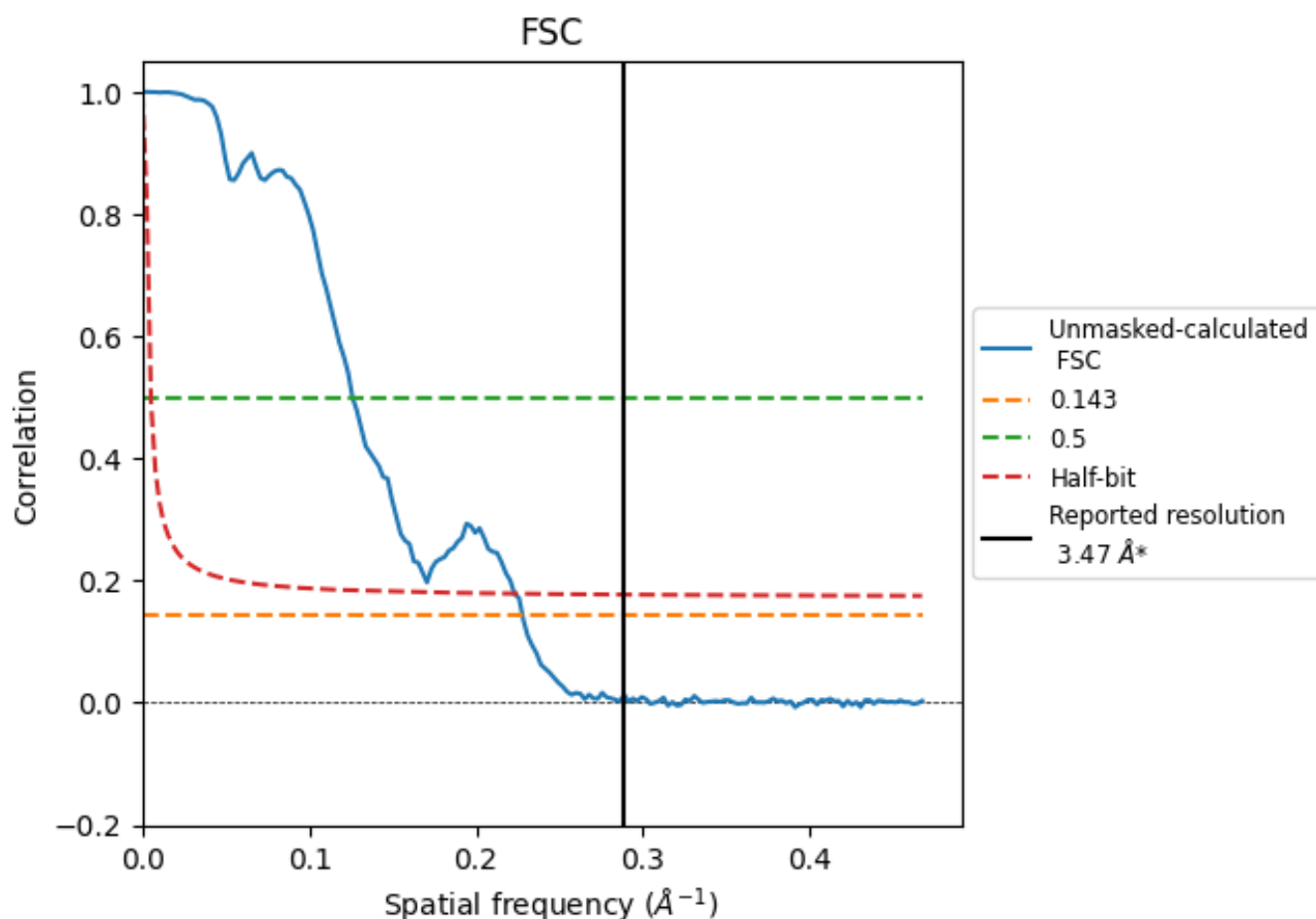


*Reported resolution corresponds to spatial frequency of $0.288 \text{ \AA}^{-1}$

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 0.288 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

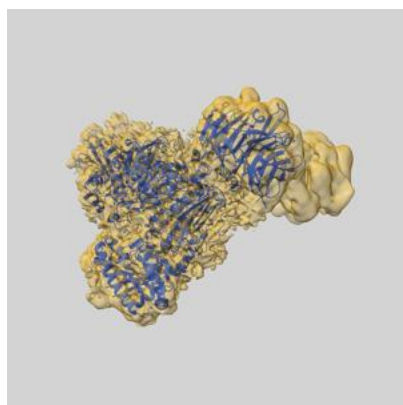
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.47	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.39	7.94	4.48

*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 4.39 differs from the reported value 3.47 by more than 10 %

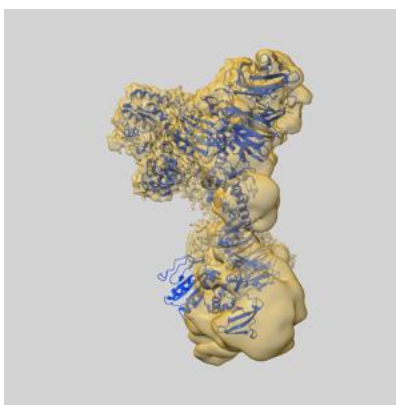
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-21250 and PDB model 6VP6. Per-residue inclusion information can be found in section [3](#) on page [5](#).

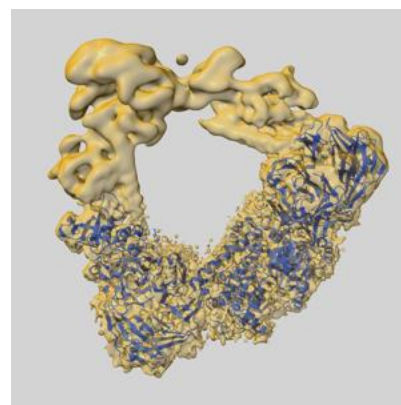
9.1 Map-model overlay [i](#)



X



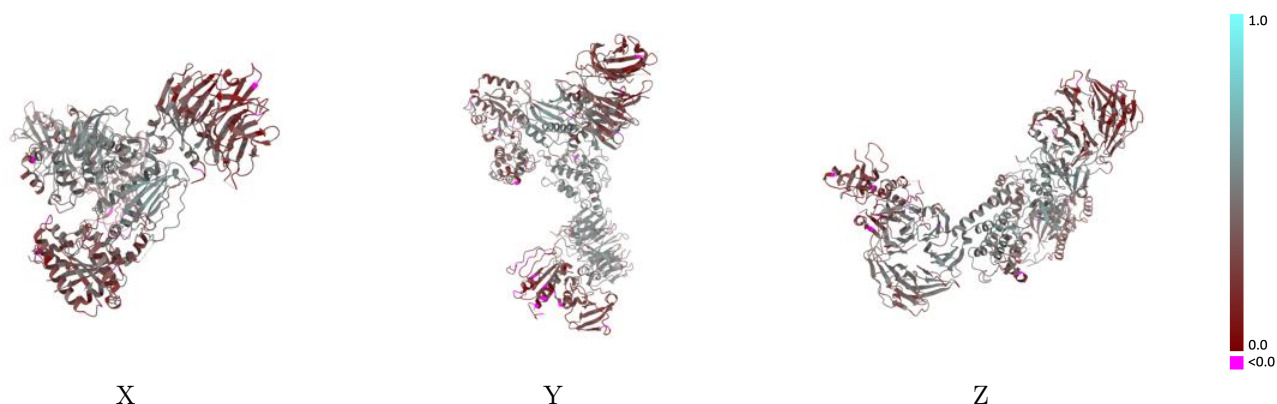
Y



Z

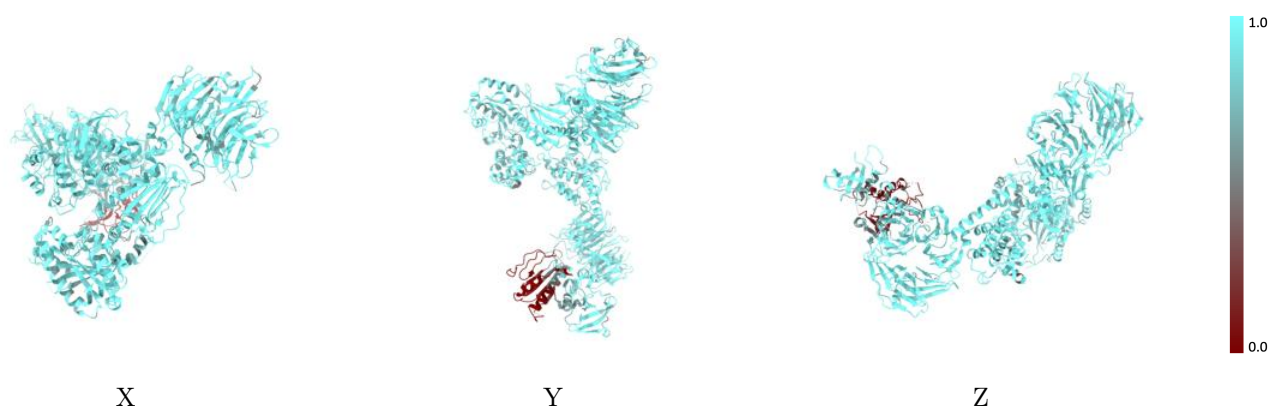
The images above show the 3D surface view of the map at the recommended contour level 0.0267 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



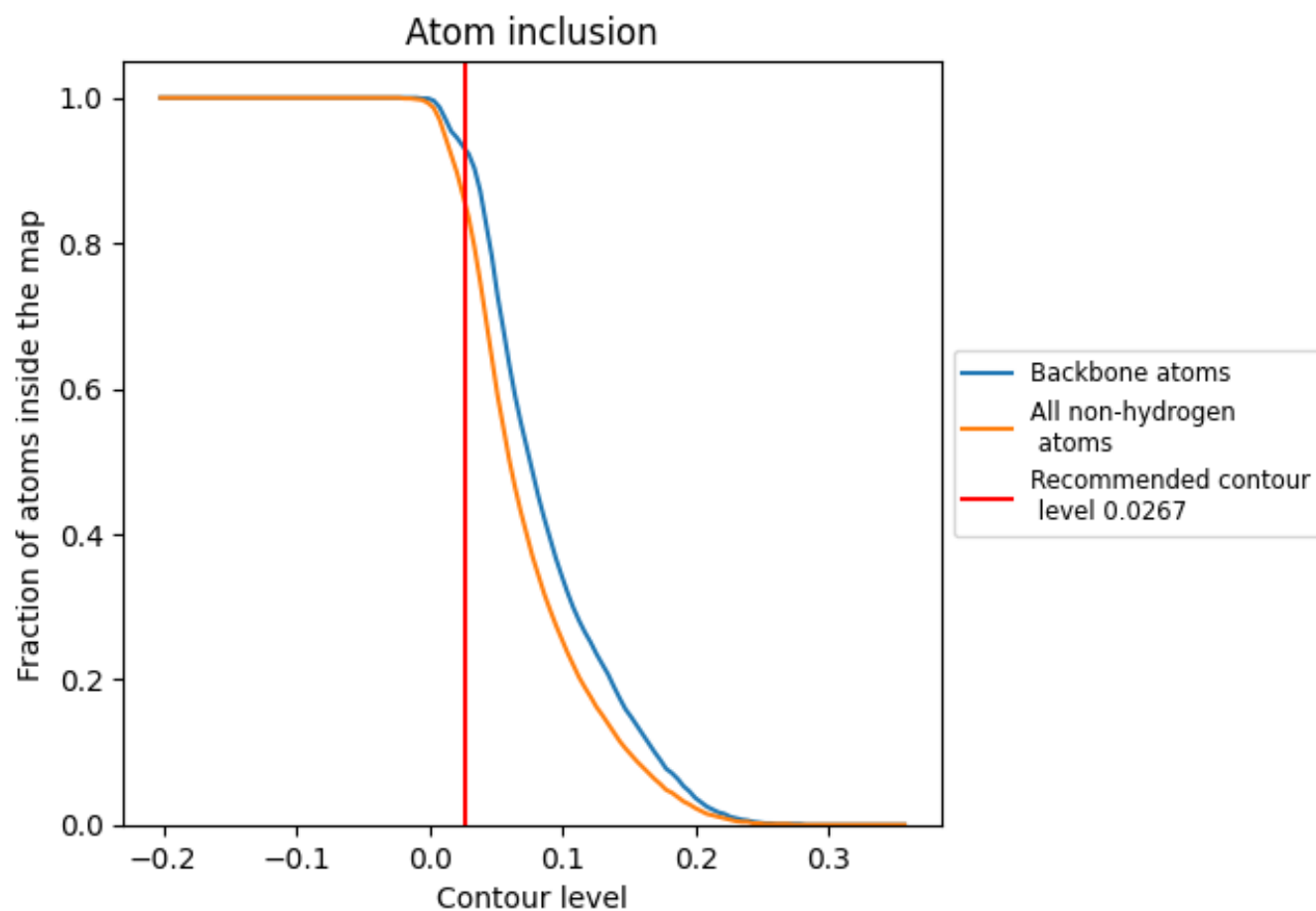
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0267).

9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 86% 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 (0.0267) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8550	0.3640
A	0.9260	0.4150
B	0.5110	0.2330
C	0.9070	0.3020

