



Full wwPDB EM Validation Report ⓘ

Apr 23, 2026 – 10:18 am BST

PDB ID : 9RD8 / pdb_00009rd8
EMDB ID : EMD-53929
Title : Structure of DabA2B2 complex under 0.1M bicarbonate
Authors : Lo, Y.K.; Bohn, S.; Schuller, J.
Deposited on : 2025-06-02
Resolution : 3.20 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 : 1.8.4, 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) : 2.49

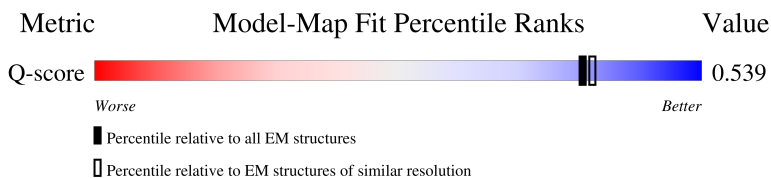
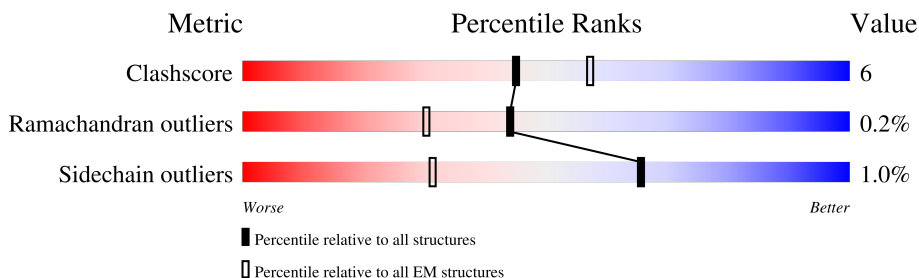
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.20 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	15020 (2.70 - 3.70)

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	870	
2	B	551	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 10329 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 Probable inorganic carbon transporter subunit DabA2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	787	Total	C	N	O	S	0	0
			6176	3889	1136	1137	14		

There are 43 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	828	SER	-	expression tag	UNP D0KWS7
A	829	GLY	-	expression tag	UNP D0KWS7
A	830	SER	-	expression tag	UNP D0KWS7
A	831	LEU	-	expression tag	UNP D0KWS7
A	832	GLU	-	expression tag	UNP D0KWS7
A	833	VAL	-	expression tag	UNP D0KWS7
A	834	LEU	-	expression tag	UNP D0KWS7
A	835	PHE	-	expression tag	UNP D0KWS7
A	836	GLN	-	expression tag	UNP D0KWS7
A	837	GLY	-	expression tag	UNP D0KWS7
A	838	PRO	-	expression tag	UNP D0KWS7
A	839	GLY	-	expression tag	UNP D0KWS7
A	840	GLY	-	expression tag	UNP D0KWS7
A	841	SER	-	expression tag	UNP D0KWS7
A	842	ALA	-	expression tag	UNP D0KWS7
A	843	TRP	-	expression tag	UNP D0KWS7
A	844	SER	-	expression tag	UNP D0KWS7
A	845	HIS	-	expression tag	UNP D0KWS7
A	846	PRO	-	expression tag	UNP D0KWS7
A	847	GLN	-	expression tag	UNP D0KWS7
A	848	PHE	-	expression tag	UNP D0KWS7
A	849	GLU	-	expression tag	UNP D0KWS7
A	850	LYS	-	expression tag	UNP D0KWS7
A	851	GLY	-	expression tag	UNP D0KWS7
A	852	GLY	-	expression tag	UNP D0KWS7
A	853	GLY	-	expression tag	UNP D0KWS7
A	854	SER	-	expression tag	UNP D0KWS7
A	855	GLY	-	expression tag	UNP D0KWS7

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Chain	Residue	Modelled	Actual	Comment	Reference
A	856	GLY	-	expression tag	UNP D0KWS7
A	857	GLY	-	expression tag	UNP D0KWS7
A	858	SER	-	expression tag	UNP D0KWS7
A	859	GLY	-	expression tag	UNP D0KWS7
A	860	GLY	-	expression tag	UNP D0KWS7
A	861	SER	-	expression tag	UNP D0KWS7
A	862	ALA	-	expression tag	UNP D0KWS7
A	863	TRP	-	expression tag	UNP D0KWS7
A	864	SER	-	expression tag	UNP D0KWS7
A	865	HIS	-	expression tag	UNP D0KWS7
A	866	PRO	-	expression tag	UNP D0KWS7
A	867	GLN	-	expression tag	UNP D0KWS7
A	868	PHE	-	expression tag	UNP D0KWS7
A	869	GLU	-	expression tag	UNP D0KWS7
A	870	LYS	-	expression tag	UNP D0KWS7

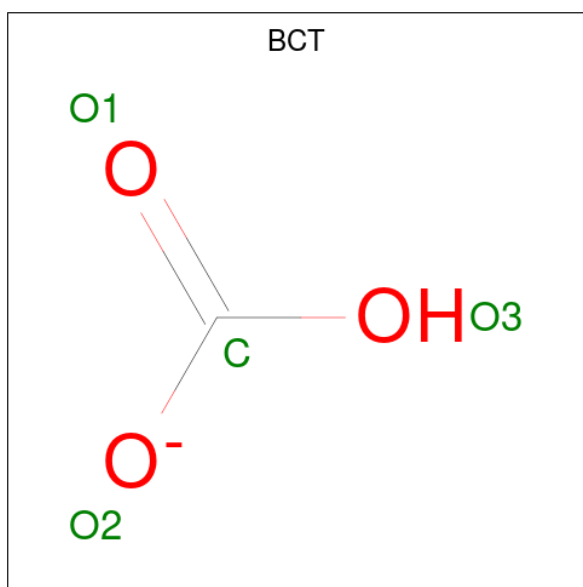
- Molecule 2 is a protein called Probable inorganic carbon transporter subunit DabB2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	524	Total	C	N	O	S	0	0
			3978	2628	664	669	17		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

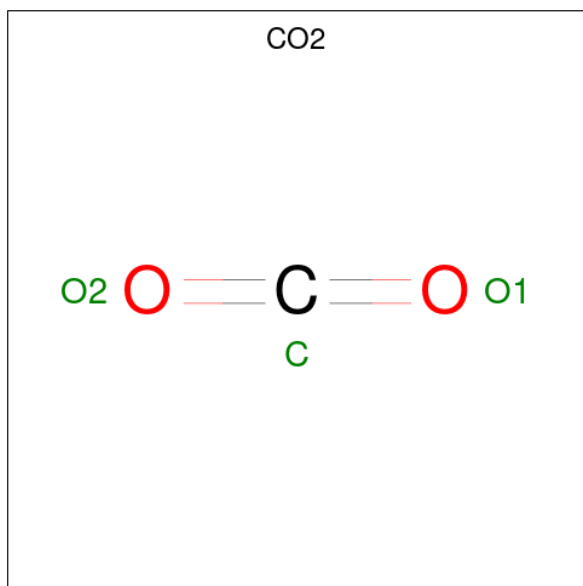
Mol	Chain	Residues	Atoms		AltConf
3	A	1	Total	Zn	0
			1	1	

- Molecule 4 is BICARBONATE ION (CCD ID: BCT) (formula: CHO₃) (labeled as "Ligand of Interest" by depositor).



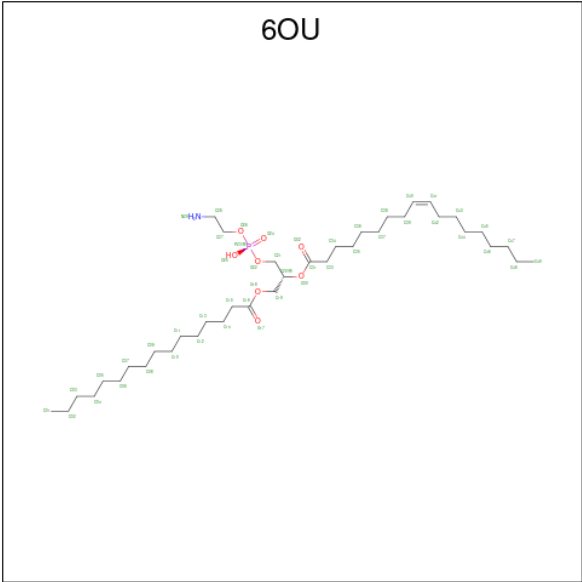
Mol	Chain	Residues	Atoms			AltConf
4	A	1	Total	C	O	0
			4	1	3	

- Molecule 5 is CARBON DIOXIDE (CCD ID: CO2) (formula: CO₂) (labeled as "Ligand of Interest" by depositor).

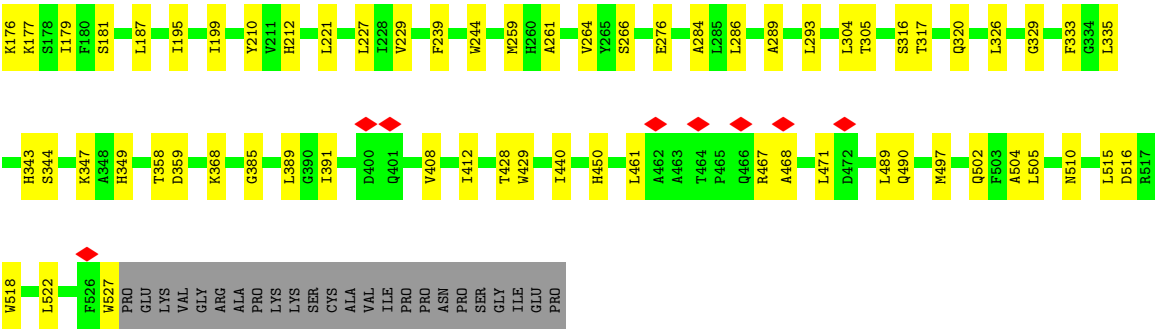


Mol	Chain	Residues	Atoms			AltConf
5	A	1	Total	C	O	0
			3	1	2	

- Molecule 6 is [(2 {R})-1-[2-azanylethoxy(oxidanyl)phosphoryl]oxy-3-hexadecanoyloxy-prop an-2-yl] ({Z})-octadec-9-enoate (CCD ID: 6OU) (formula: C₃₉H₇₆NO₈P).



Mol	Chain	Residues	Atoms					AltConf
6	A	1	Total	C	N	O	P	0
			46	36	1	8	1	
6	B	1	Total	C	N	O	P	0
			40	30	1	8	1	
6	B	1	Total	C	N	O	P	0
			41	31	1	8	1	
6	B	1	Total	C	N	O	P	0
			40	30	1	8	1	



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	226711	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 ($e^-/\text{\AA}^2$)	55	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.873	Depositor
Minimum map value	-0.644	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.021	Depositor
Recommended contour level	0.12	Depositor
Map size (Å)	248.20001, 248.20001, 248.20001	wwPDB
Map dimensions	340, 340, 340	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.73, 0.73, 0.73	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: ZN, BCT, CO2, 6OU

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	0.18	0/6314	0.33	0/8582
2	B	0.19	0/4067	0.38	4/5538 (0.1%)
All	All	0.19	0/10381	0.35	4/14120 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	81	LEU	N-CA-C	-8.87	102.23	113.23
2	B	71	GLY	N-CA-C	-6.26	106.68	115.32
2	B	68	LEU	CA-C-N	-5.68	115.16	123.00
2	B	68	LEU	C-N-CA	-5.68	115.16	123.00

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	6176	0	6073	80	0
2	B	3978	0	4181	55	0
3	A	1	0	0	0	0
4	A	4	0	1	0	0
5	A	3	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	46	0	0	0	0
6	B	121	0	0	0	0
All	All	10329	0	10255	129	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 6.

All (129) 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:658:LEU:HD22	1:A:711:ILE:HG21	1.70	0.74
1:A:630:GLU:OE2	1:A:641:GLN:NE2	2.21	0.74
1:A:739:THR:HG22	2:B:358:THR:HG23	1.72	0.71
1:A:588:THR:O	1:A:625:ARG:NH2	2.24	0.70
2:B:468:ALA:HB3	2:B:471:LEU:HB2	1.74	0.69
1:A:658:LEU:O	1:A:661:ASN:ND2	2.22	0.68
1:A:743:ILE:HD12	1:A:747:GLY:HA2	1.75	0.67
1:A:722:ASN:ND2	1:A:756:MET:SD	2.68	0.66
1:A:541:ALA:HB2	5:A:903:CO2:C	2.26	0.65
1:A:534:ARG:NH2	2:B:359:ASP:OD1	2.31	0.64
1:A:134:GLU:O	1:A:138:GLU:HG2	1.97	0.64
2:B:212:HIS:HE1	2:B:276:GLU:HG2	1.61	0.64
2:B:150:ILE:HD11	2:B:266:SER:HB2	1.79	0.64
1:A:344:PRO:HB2	1:A:516:ALA:HB2	1.81	0.62
2:B:293:LEU:HB2	2:B:326:LEU:HD13	1.81	0.62
1:A:351:CYS:SG	1:A:352:ILE:N	2.73	0.61
2:B:212:HIS:CE1	2:B:276:GLU:HG2	2.36	0.61
1:A:202:LEU:HB2	1:A:256:ILE:HG12	1.81	0.61
1:A:360:ARG:HG2	1:A:372:THR:HG21	1.82	0.60
2:B:195:ILE:HG23	2:B:199:ILE:HD12	1.82	0.60
1:A:602:ILE:HD12	1:A:607:LEU:HB2	1.83	0.60
2:B:177:LYS:NZ	2:B:181:SER:OG	2.36	0.59
1:A:703:ALA:HB3	1:A:704:PRO:HD3	1.84	0.59
1:A:527:SER:OG	1:A:586:ASP:OD2	2.21	0.57
1:A:710:TRP:HE1	1:A:792:MET:HE1	1.70	0.57
1:A:77:ILE:HD12	1:A:107:LEU:HD11	1.86	0.57
1:A:191:LEU:HD13	1:A:264:LEU:HD11	1.86	0.56
1:A:737:GLY:HA3	1:A:740:VAL:HB	1.87	0.56
1:A:653:ARG:NH2	1:A:760:HIS:O	2.32	0.56
2:B:286:LEU:HD11	2:B:467:ARG:HE	1.69	0.56
1:A:775:TYR:HB3	1:A:807:ILE:HD11	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:140:SER:HB2	2:B:145:LEU:HD23	1.88	0.56
2:B:261:ALA:HB2	2:B:347:LYS:HB3	1.88	0.56
1:A:500:ASP:OD1	1:A:570:ARG:NH2	2.39	0.55
1:A:525:GLY:O	1:A:587:THR:OG1	2.24	0.55
1:A:364:GLU:OE1	1:A:669:ARG:NH2	2.39	0.54
2:B:229:VAL:HG21	2:B:284:ALA:HB1	1.90	0.54
2:B:428:THR:HG22	2:B:429:TRP:H	1.73	0.54
1:A:383:ILE:HD12	1:A:407:ALA:HB2	1.88	0.54
1:A:9:ARG:NH2	1:A:207:ASP:OD1	2.42	0.53
1:A:548:ASP:HB3	1:A:584:LEU:HD13	1.91	0.52
2:B:187:LEU:HD22	2:B:227:LEU:HD22	1.90	0.52
2:B:497:MET:O	2:B:502:GLN:NE2	2.40	0.52
1:A:467:PRO:O	1:A:471:PRO:HD3	2.09	0.52
1:A:581:VAL:HG11	1:A:594:LEU:HD23	1.92	0.52
1:A:68:MET:HE2	1:A:769:PRO:HG3	1.92	0.52
2:B:316:SER:O	2:B:320:GLN:HG2	2.09	0.52
1:A:175:ILE:HG21	2:B:504:ALA:HA	1.91	0.51
1:A:390:GLU:HG2	1:A:392:GLU:H	1.74	0.51
1:A:435:SER:HB3	1:A:438:SER:OG	2.10	0.51
2:B:391:ILE:HD11	2:B:440:ILE:HG23	1.92	0.51
1:A:213:GLU:O	1:A:216:LEU:HB2	2.11	0.51
2:B:135:LEU:HA	2:B:138:VAL:HG22	1.92	0.51
1:A:106:GLN:HA	1:A:109:VAL:HG23	1.94	0.50
2:B:176:LYS:NZ	2:B:516:ASP:OD1	2.41	0.50
1:A:39:ALA:HB3	1:A:711:ILE:HG12	1.94	0.50
1:A:383:ILE:HG22	1:A:405:TYR:HB2	1.94	0.49
2:B:157:LEU:HD21	2:B:259:MET:SD	2.52	0.49
1:A:774:ALA:HB3	1:A:804:ILE:HD13	1.95	0.49
1:A:797:ILE:HG21	1:A:816:ARG:HD3	1.94	0.49
2:B:147:THR:O	2:B:150:ILE:HG22	2.13	0.49
2:B:305:THR:O	2:B:510:ASN:ND2	2.45	0.49
1:A:330:ASN:O	1:A:671:ARG:NH1	2.46	0.48
2:B:98:LEU:HD11	2:B:344:SER:HB3	1.95	0.48
1:A:354:VAL:HG11	1:A:661:ASN:HB3	1.95	0.48
2:B:71:GLY:O	2:B:72:ALA:C	2.56	0.48
2:B:518:TRP:O	2:B:522:LEU:HD12	2.13	0.48
1:A:564:ARG:NH2	1:A:578:THR:O	2.44	0.47
1:A:665:ILE:HA	1:A:775:TYR:HB2	1.96	0.47
1:A:809:ASP:OD1	1:A:809:ASP:N	2.40	0.46
1:A:106:GLN:C	1:A:108:ALA:N	2.72	0.46
1:A:137:ILE:HG12	1:A:258:ARG:HH12	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:700:ILE:O	1:A:704:PRO:HD2	2.15	0.46
2:B:489:LEU:HD21	2:B:505:LEU:HD21	1.97	0.46
1:A:460:GLY:HA3	1:A:644:PHE:HE1	1.81	0.45
2:B:259:MET:O	2:B:264:VAL:HB	2.16	0.45
1:A:227:ILE:HG23	1:A:231:ALA:HB2	1.98	0.45
2:B:286:LEU:HD21	2:B:471:LEU:HD13	1.98	0.45
1:A:354:VAL:HG11	1:A:661:ASN:CB	2.46	0.45
1:A:435:SER:OG	2:B:490:GLN:NE2	2.50	0.45
2:B:329:GLY:O	2:B:467:ARG:NH2	2.49	0.45
1:A:266:ILE:HG23	1:A:274:ARG:HG2	1.99	0.45
1:A:73:PHE:CD2	1:A:313:LEU:HD23	2.52	0.44
2:B:16:MET:HE2	2:B:16:MET:HB3	1.79	0.44
1:A:128:ASP:OD1	1:A:128:ASP:N	2.49	0.44
2:B:71:GLY:O	2:B:73:GLY:N	2.51	0.44
1:A:664:PHE:HD1	1:A:682:PHE:HB2	1.83	0.44
1:A:722:ASN:OD1	1:A:726:GLY:HA3	2.18	0.44
2:B:289:ALA:HB2	2:B:329:GLY:HA3	1.99	0.44
1:A:143:PHE:CE2	1:A:169:TRP:HB2	2.53	0.43
1:A:106:GLN:C	1:A:108:ALA:H	2.27	0.43
1:A:506:LEU:HD11	1:A:574:ILE:HD11	2.00	0.43
1:A:170:ARG:HE	1:A:194:VAL:HG13	1.84	0.43
2:B:29:LYS:HB3	2:B:29:LYS:HE3	1.70	0.43
1:A:467:PRO:HA	1:A:534:ARG:NH2	2.34	0.42
1:A:31:ILE:HG12	1:A:752:VAL:HG12	2.00	0.42
1:A:47:ILE:O	1:A:799:ASN:ND2	2.49	0.42
2:B:408:VAL:O	2:B:412:ILE:HG23	2.19	0.42
2:B:467:ARG:HG3	2:B:468:ALA:H	1.84	0.42
1:A:75:ASP:O	1:A:79:GLN:HG2	2.20	0.42
2:B:24:ALA:HB1	2:B:129:VAL:HG23	2.02	0.42
2:B:82:LEU:HD12	2:B:83:ALA:H	1.83	0.42
1:A:62:VAL:HG21	1:A:225:LYS:HG3	2.02	0.42
1:A:539:CYS:HB3	1:A:542:CYS:HB2	2.02	0.42
1:A:800:ARG:HE	1:A:800:ARG:HB2	1.73	0.42
2:B:335:LEU:HD11	2:B:450:HIS:ND1	2.34	0.42
1:A:14:ARG:O	1:A:18:VAL:HG23	2.19	0.42
1:A:424:SER:O	1:A:428:ILE:HG23	2.19	0.42
2:B:385:GLY:O	2:B:389:LEU:HG	2.19	0.42
1:A:132:VAL:HG12	1:A:184:LEU:HD21	2.02	0.41
1:A:154:LEU:HB2	2:B:304:LEU:HD22	2.03	0.41
2:B:317:THR:HG23	2:B:343:HIS:CE1	2.55	0.41
2:B:177:LYS:HG3	2:B:244:TRP:CE3	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:710:TRP:NE1	1:A:792:MET:HE1	2.35	0.41
2:B:136:LEU:O	2:B:140:SER:HB3	2.20	0.41
1:A:94:LEU:HD12	1:A:312:ILE:HA	2.03	0.41
1:A:241:ALA:O	1:A:245:GLY:N	2.54	0.41
1:A:225:LYS:HD2	1:A:225:LYS:HA	1.87	0.41
2:B:239:PHE:CE2	2:B:515:LEU:HD12	2.56	0.41
2:B:333:PHE:HB2	2:B:461:LEU:HB3	2.03	0.41
2:B:368:LYS:HD3	2:B:368:LYS:HA	1.85	0.41
1:A:453:ARG:HG2	2:B:349:HIS:CD2	2.56	0.40
2:B:179:ILE:HG12	2:B:527:TRP:CG	2.56	0.40
1:A:364:GLU:OE2	1:A:669:ARG:NE	2.49	0.40
2:B:134:PHE:O	2:B:138:VAL:HG13	2.21	0.40
1:A:77:ILE:HD13	1:A:87:LEU:HD11	2.03	0.40
2:B:12:LEU:HD22	2:B:52:LEU:HD22	2.03	0.40
2:B:36:ARG:O	2:B:39:ARG:HG2	2.22	0.40
2:B:210:TYR:HE2	2:B:221:LEU:HD11	1.87	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	779/870 (90%)	752 (96%)	27 (4%)	0	100	100
2	B	522/551 (95%)	503 (96%)	17 (3%)	2 (0%)	30	62
All	All	1301/1421 (92%)	1255 (96%)	44 (3%)	2 (0%)	44	73

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	72	ALA
2	B	76	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	640/702 (91%)	631 (99%)	9 (1%)	59	77
2	B	409/432 (95%)	408 (100%)	1 (0%)	87	89
All	All	1049/1134 (92%)	1039 (99%)	10 (1%)	65	80

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	79	GLN
1	A	109	VAL
1	A	110	HIS
1	A	281	LEU
1	A	282	ASN
1	A	283	ASP
1	A	335	ASP
1	A	354	VAL
1	A	760	HIS
2	B	70	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	16	HIS
1	A	152	GLN
1	A	156	HIS
1	A	208	GLN
1	A	276	GLN
1	A	282	ASN
1	A	332	GLN
1	A	347	GLN
1	A	396	GLN
1	A	397	ASN
1	A	531	ASN
1	A	651	GLN

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Mol	Chain	Res	Type
1	A	709	ASN
1	A	798	ASN
2	B	30	GLN
2	B	142	ASN
2	B	214	GLN
2	B	369	ASN
2	B	510	ASN
2	B	511	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 7 ligands modelled in this entry, 1 is monoatomic - leaving 6 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	$\# Z > 2$
6	6OU	B	601	-	39,39,48	0.38	0	42,44,53	0.38	0
6	6OU	A	904	-	45,45,48	0.33	0	48,50,53	0.31	0
6	6OU	B	603	-	39,39,48	0.53	0	42,44,53	0.54	0
4	BCT	A	902	3	2,3,3	1.28	0	2,3,3	4.08	2 (100%)
6	6OU	B	602	-	40,40,48	0.40	0	43,45,53	0.40	0
5	CO2	A	903	-	2,2,2	0.12	0	1,1,1	0.47	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
6	6OU	B	601	-	-	25/43/43/52	-
6	6OU	B	603	-	-	19/43/43/52	-
6	6OU	A	904	-	-	26/49/49/52	-
6	6OU	B	602	-	-	26/44/44/52	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	902	BCT	O2-C-O1	5.38	133.49	119.55
4	A	902	BCT	O3-C-O1	-2.10	114.09	119.55

There are no chirality outliers.

All (96) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	904	6OU	C27-O26-P23-O24
6	B	601	6OU	C27-O26-P23-O24
6	B	601	6OU	O32-C31-O30-C20
6	B	601	6OU	C33-C31-O30-C20
6	B	602	6OU	C15-C16-O18-C19
6	B	602	6OU	O17-C16-O18-C19
6	B	602	6OU	C21-O22-P23-O24
6	B	602	6OU	C27-O26-P23-O24
6	B	602	6OU	O26-C27-C28-N29
6	B	603	6OU	C21-O22-P23-O24
6	B	603	6OU	O17-C16-O18-C19
6	B	603	6OU	C15-C16-O18-C19
6	A	904	6OU	C06-C07-C08-C09
6	B	602	6OU	C36-C37-C38-C39
6	A	904	6OU	C13-C14-C15-C16
6	B	601	6OU	C31-C33-C34-C35
6	A	904	6OU	C12-C13-C14-C15
6	B	602	6OU	C06-C07-C08-C09
6	A	904	6OU	O18-C19-C20-O30
6	A	904	6OU	C31-C33-C34-C35
6	A	904	6OU	C21-O22-P23-O26

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Mol	Chain	Res	Type	Atoms
6	B	601	6OU	C27-O26-P23-O22
6	B	602	6OU	C21-O22-P23-O26
6	B	603	6OU	C13-C14-C15-C16
6	B	601	6OU	C10-C11-C12-C13
6	A	904	6OU	C36-C37-C38-C39
6	B	601	6OU	C36-C37-C38-C39
6	B	602	6OU	C33-C34-C35-C36
6	B	603	6OU	C33-C34-C35-C36
6	A	904	6OU	C20-C21-O22-P23
6	B	602	6OU	C04-C05-C06-C07
6	B	602	6OU	C05-C06-C07-C08
6	B	602	6OU	C02-C03-C04-C05
6	B	601	6OU	C09-C10-C11-C12
6	B	603	6OU	C31-C33-C34-C35
6	A	904	6OU	C08-C09-C10-C11
6	B	601	6OU	C08-C09-C10-C11
6	B	601	6OU	C34-C35-C36-C37
6	B	601	6OU	C03-C04-C05-C06
6	B	603	6OU	C34-C35-C36-C37
6	B	603	6OU	C33-C31-O30-C20
6	B	602	6OU	O30-C20-C21-O22
6	B	601	6OU	C01-C02-C03-C04
6	B	601	6OU	C02-C03-C04-C05
6	A	904	6OU	C43-C44-C45-C46
6	B	601	6OU	C33-C34-C35-C36
6	B	603	6OU	O32-C31-O30-C20
6	B	602	6OU	O18-C19-C20-C21
6	A	904	6OU	C11-C12-C13-C14
6	A	904	6OU	C34-C35-C36-C37
6	B	602	6OU	C01-C02-C03-C04
6	B	601	6OU	C37-C38-C39-C40
6	B	602	6OU	C19-C20-C21-O22
6	A	904	6OU	C46-C47-C48-C49
6	B	602	6OU	C09-C10-C11-C12
6	A	904	6OU	O18-C19-C20-C21
6	B	601	6OU	O18-C19-C20-C21
6	A	904	6OU	C35-C36-C37-C38
6	B	601	6OU	O18-C19-C20-O30
6	B	603	6OU	O18-C19-C20-O30
6	B	602	6OU	C35-C36-C37-C38
6	B	603	6OU	O30-C20-C21-O22
6	A	904	6OU	C39-C40-C41-C42

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Mol	Chain	Res	Type	Atoms
6	B	601	6OU	C07-C08-C09-C10
6	B	602	6OU	O18-C19-C20-O30
6	A	904	6OU	C37-C38-C39-C40
6	B	601	6OU	C05-C06-C07-C08
6	A	904	6OU	C27-O26-P23-O22
6	B	602	6OU	C27-O26-P23-O22
6	B	603	6OU	C21-O22-P23-O26
6	A	904	6OU	C21-O22-P23-O24
6	A	904	6OU	C21-O22-P23-O25
6	B	601	6OU	C27-O26-P23-O25
6	B	602	6OU	C21-O22-P23-O25
6	B	602	6OU	C27-O26-P23-O25
6	B	603	6OU	C27-O26-P23-O24
6	B	603	6OU	C19-C20-C21-O22
6	B	603	6OU	C42-C43-C44-C45
6	B	601	6OU	C35-C36-C37-C38
6	B	603	6OU	O18-C19-C20-C21
6	B	601	6OU	C04-C05-C06-C07
6	A	904	6OU	C09-C10-C11-C12
6	A	904	6OU	C44-C45-C46-C47
6	B	601	6OU	C06-C07-C08-C09
6	B	603	6OU	C12-C13-C14-C15
6	B	603	6OU	C35-C36-C37-C38
6	B	601	6OU	C12-C13-C14-C15
6	B	602	6OU	O30-C31-C33-C34
6	A	904	6OU	O17-C16-O18-C19
6	B	602	6OU	C38-C39-C40-C41
6	A	904	6OU	C15-C16-O18-C19
6	B	602	6OU	C03-C04-C05-C06
6	B	603	6OU	C41-C42-C43-C44
6	B	602	6OU	O32-C31-C33-C34
6	B	601	6OU	C14-C15-C16-O18
6	A	904	6OU	C33-C34-C35-C36

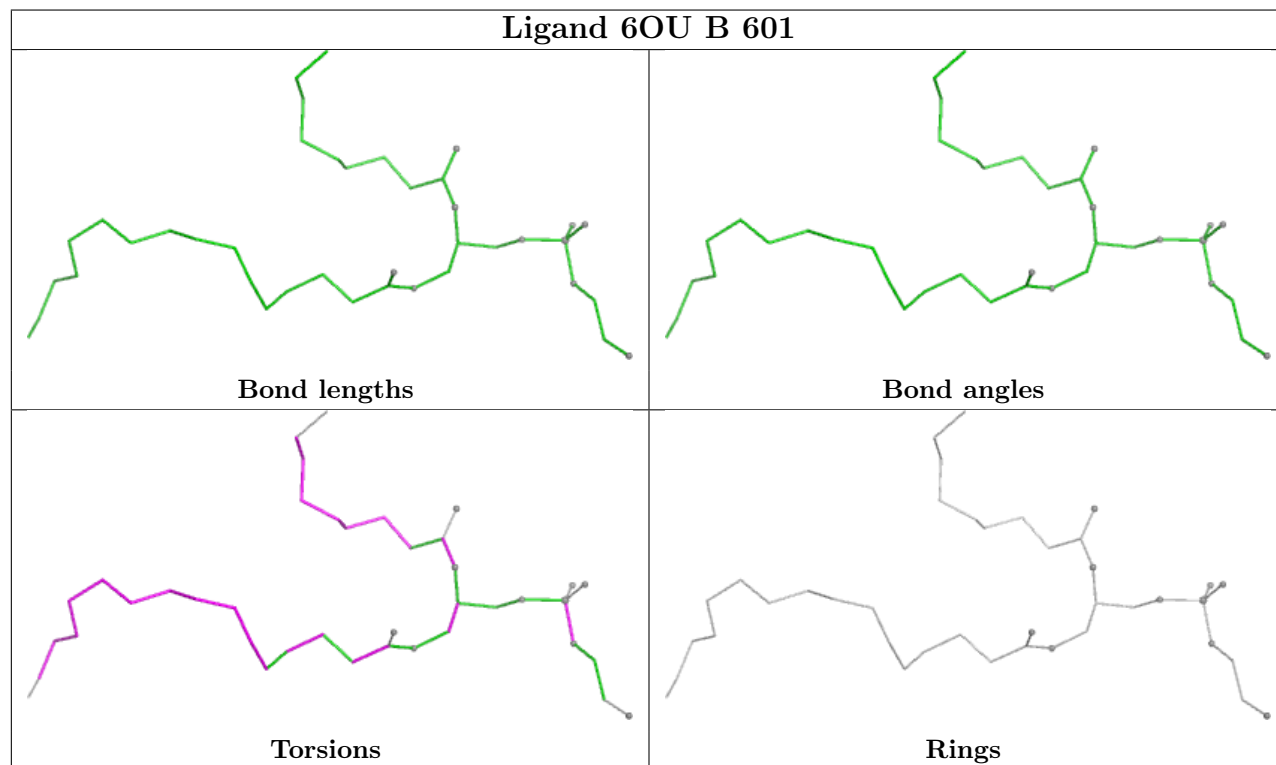
There are no ring outliers.

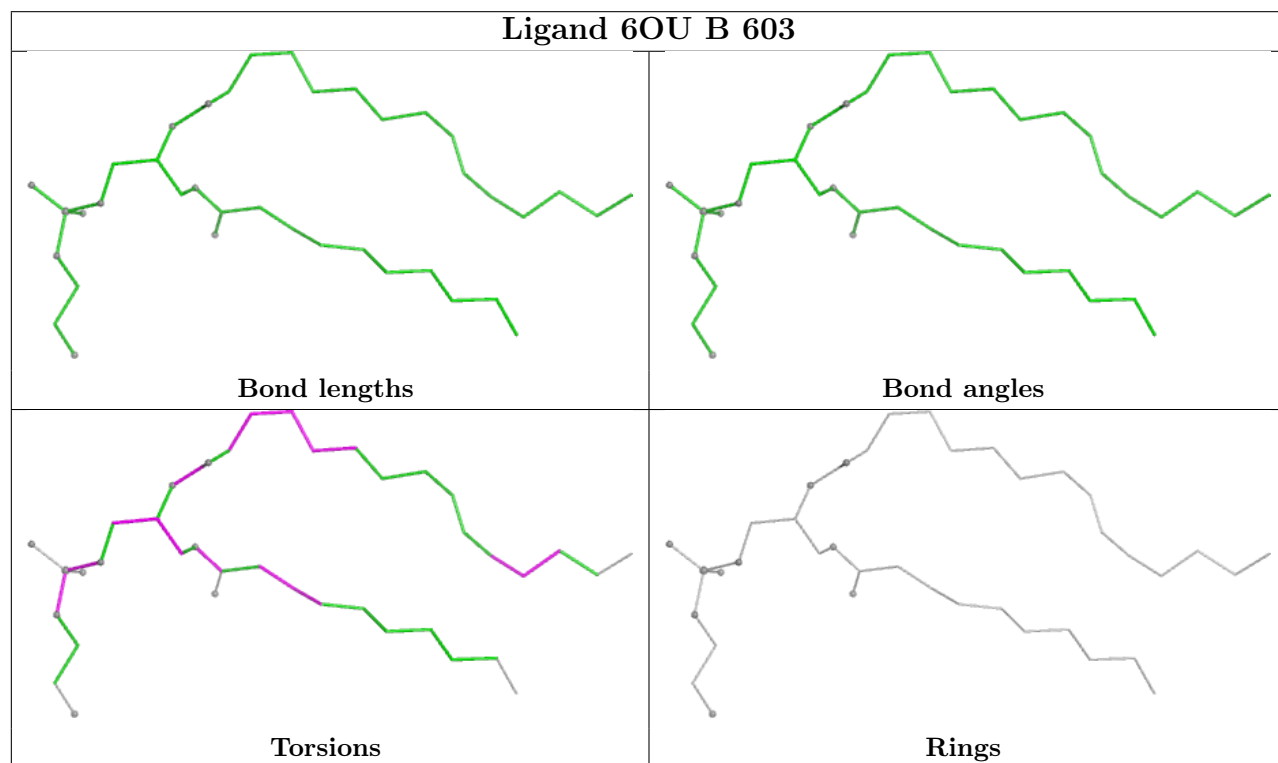
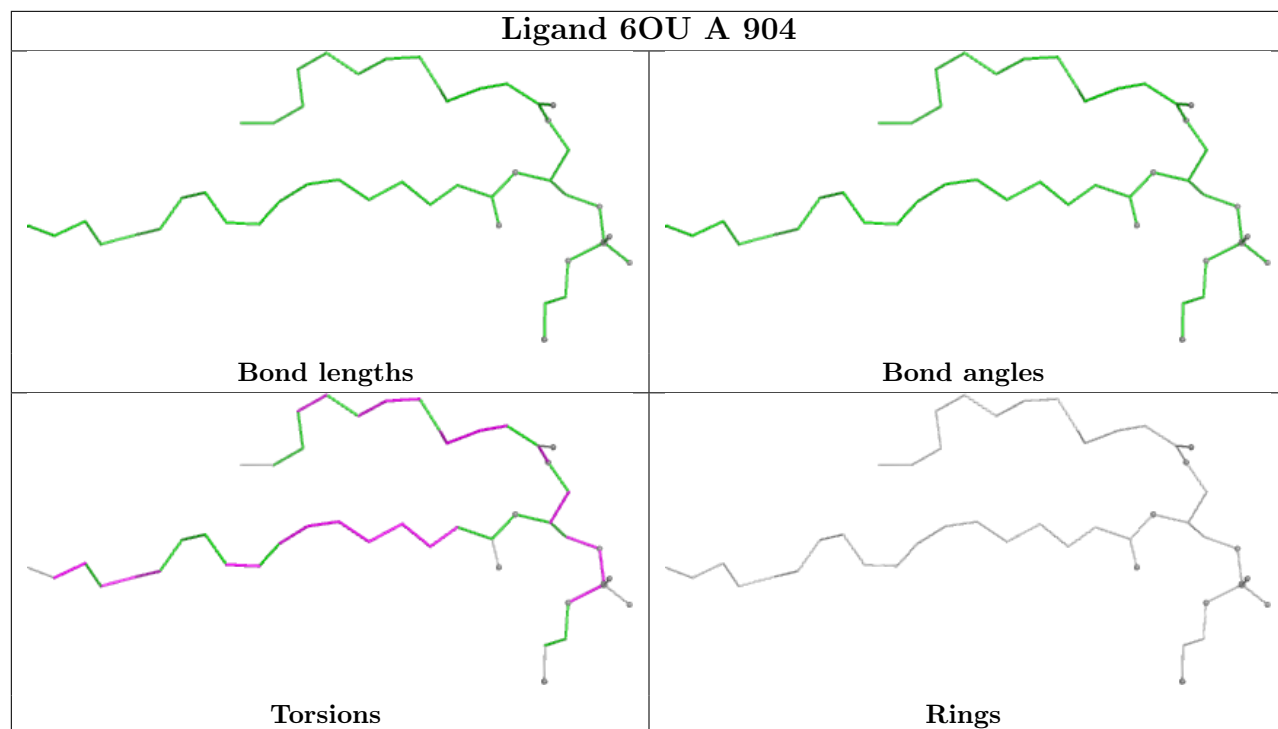
1 monomer is involved in 1 short contact:

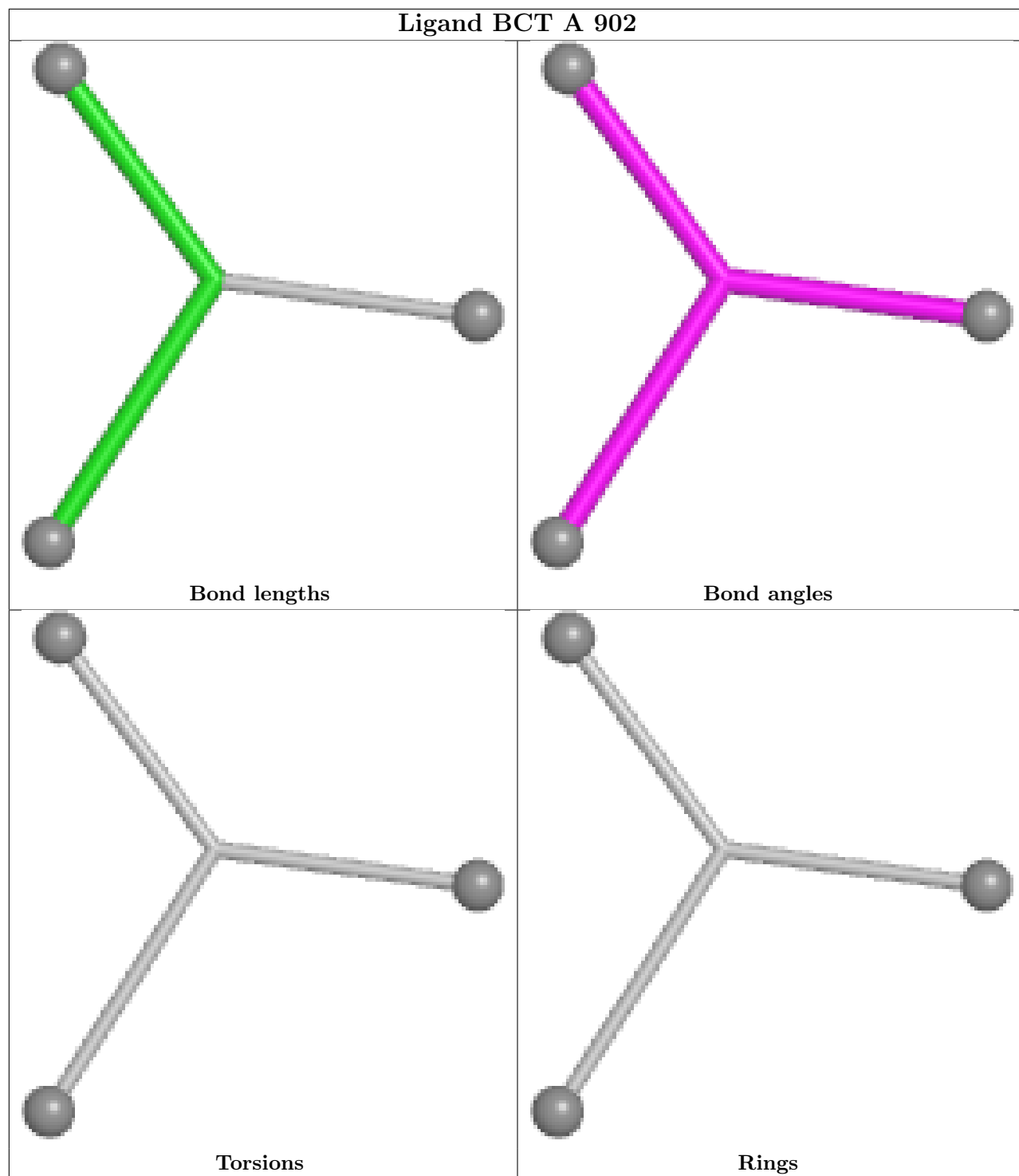
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	903	CO2	1	0

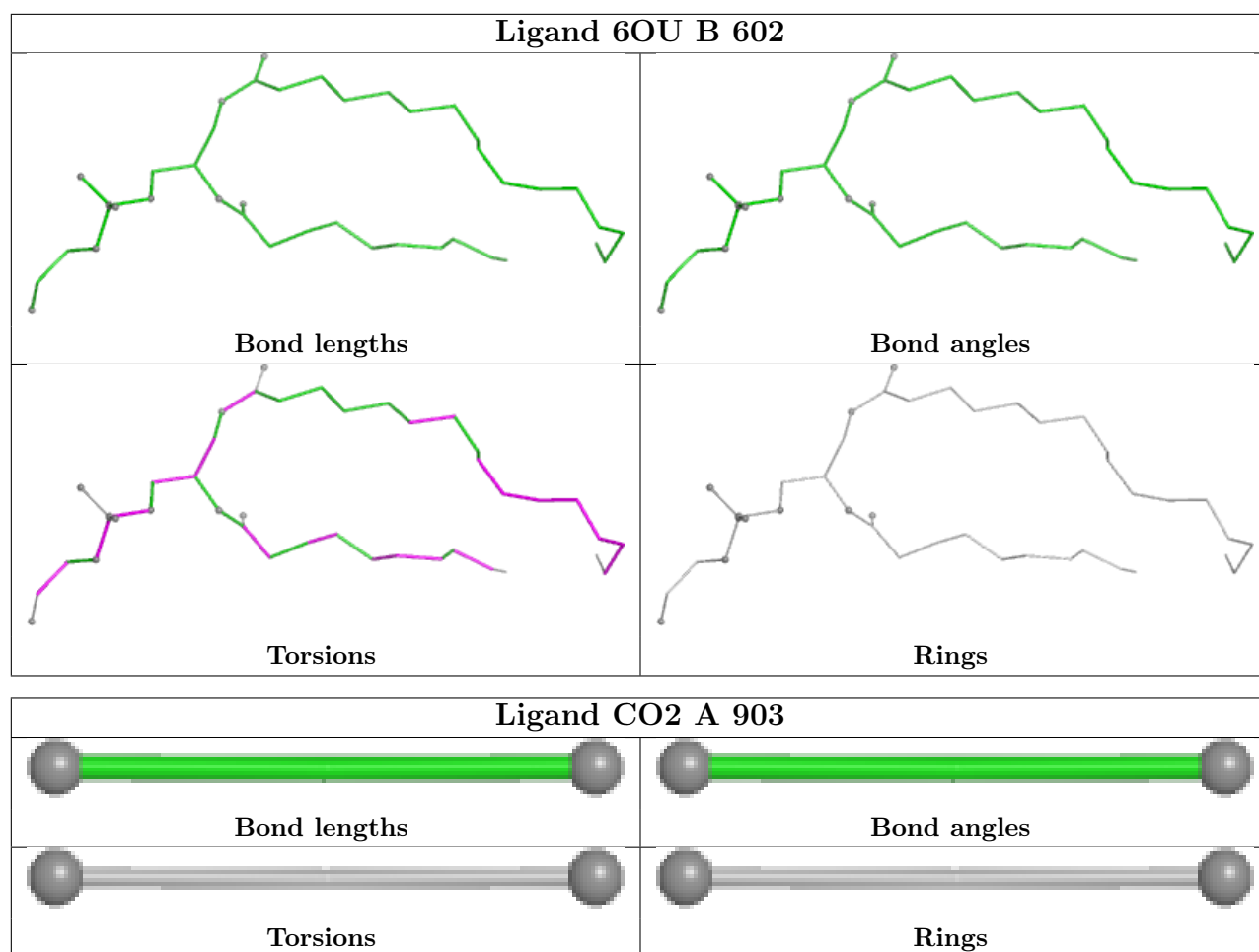
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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.

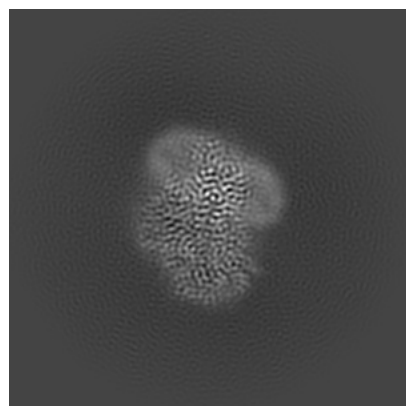
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-53929. These allow visual inspection of the internal detail of the map and identification of artifacts.

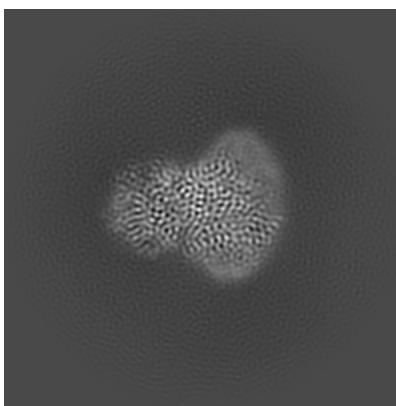
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

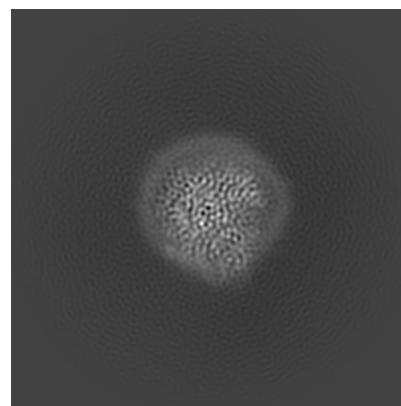
6.1.1 Primary map



X

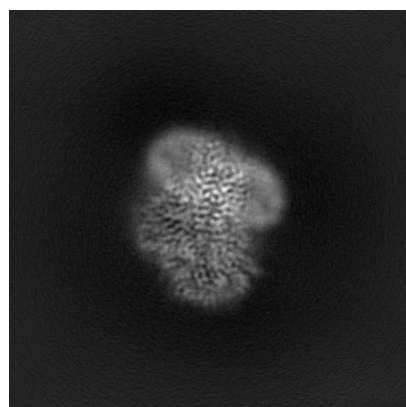


Y

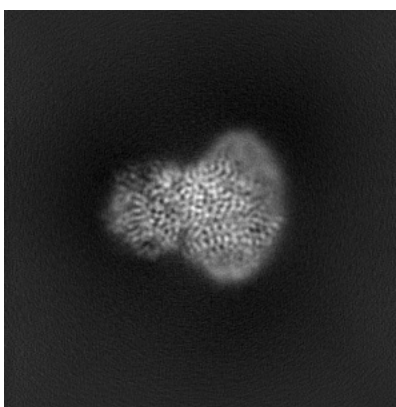


Z

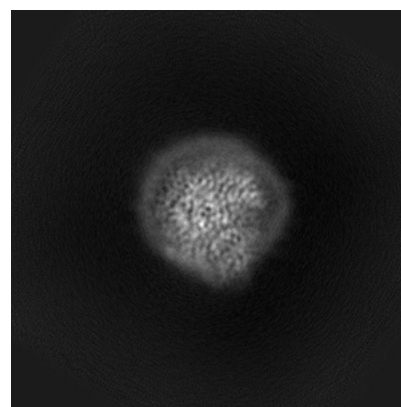
6.1.2 Raw map



X



Y

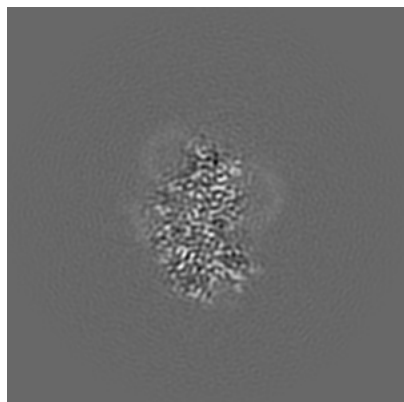


Z

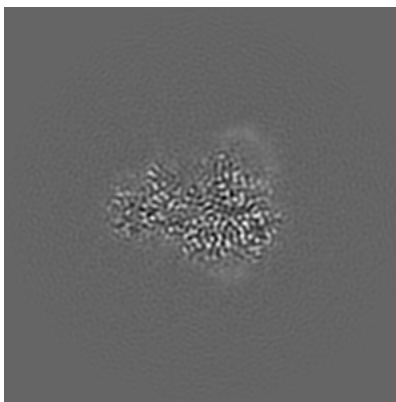
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

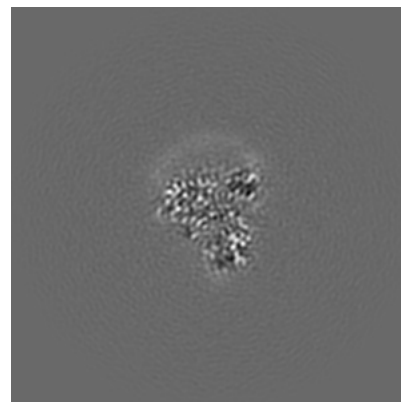
6.2.1 Primary map



X Index: 170

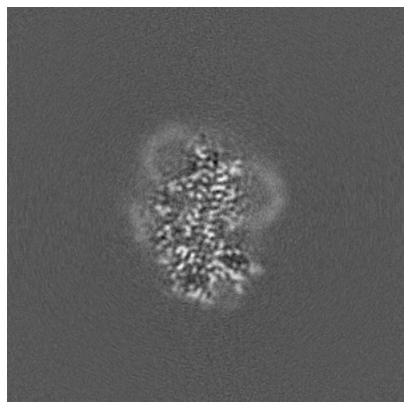


Y Index: 170

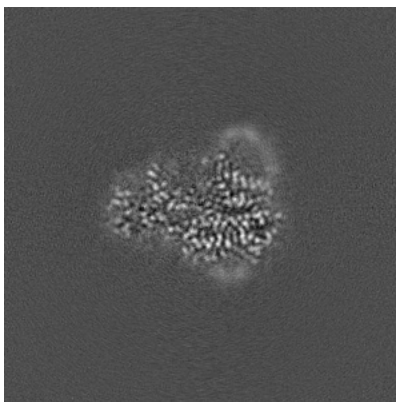


Z Index: 170

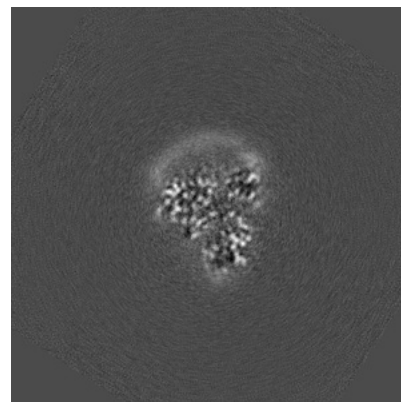
6.2.2 Raw map



X Index: 170



Y Index: 170

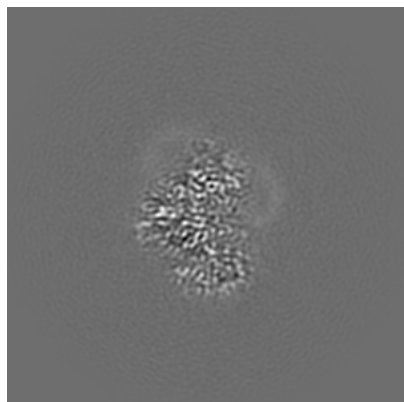


Z Index: 170

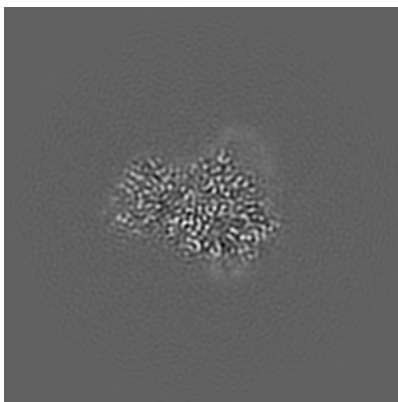
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

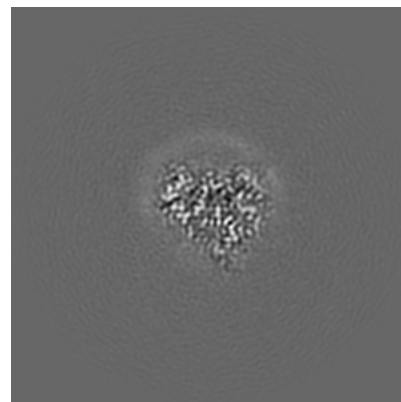
6.3.1 Primary map



X Index: 181

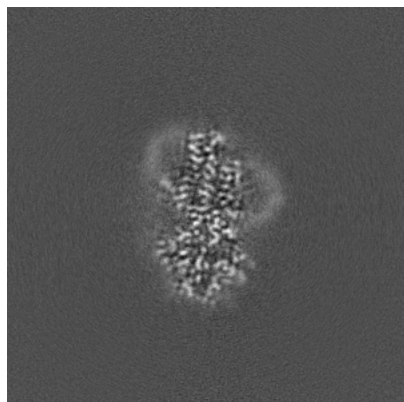


Y Index: 178

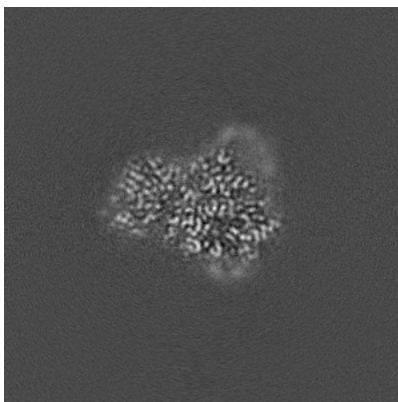


Z Index: 182

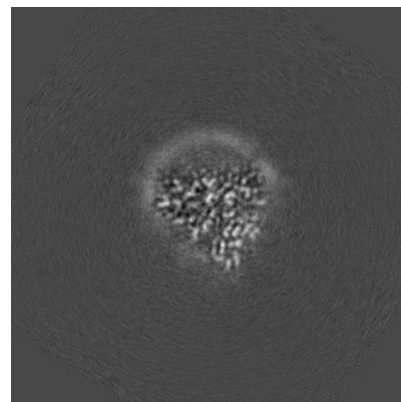
6.3.2 Raw map



X Index: 157



Y Index: 178

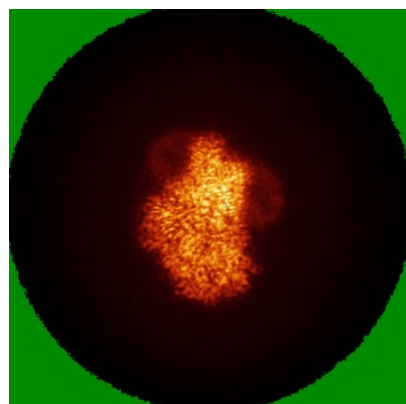


Z Index: 178

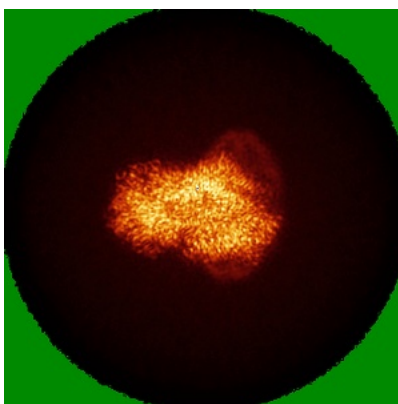
The images above show the largest variance slices of the map in three orthogonal directions.

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

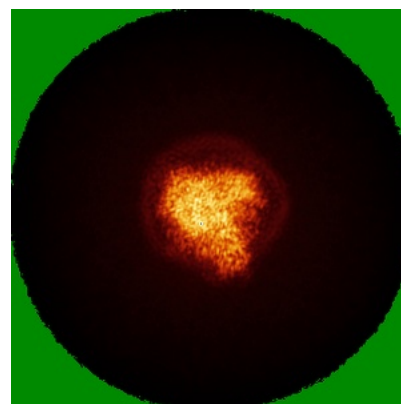
6.4.1 Primary map



X



Y

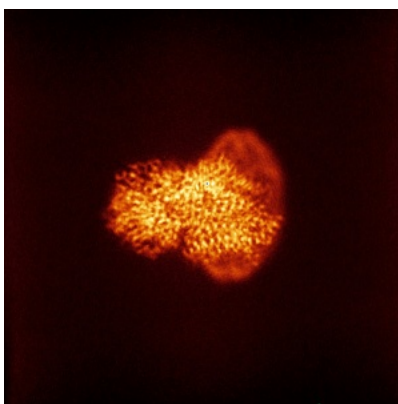


Z

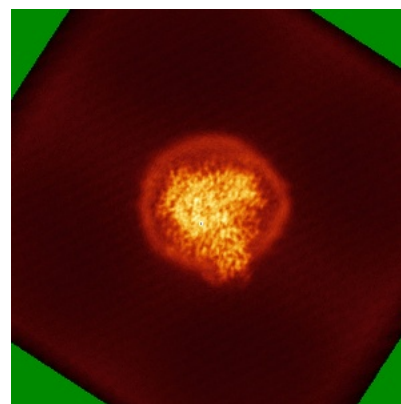
6.4.2 Raw map



X



Y

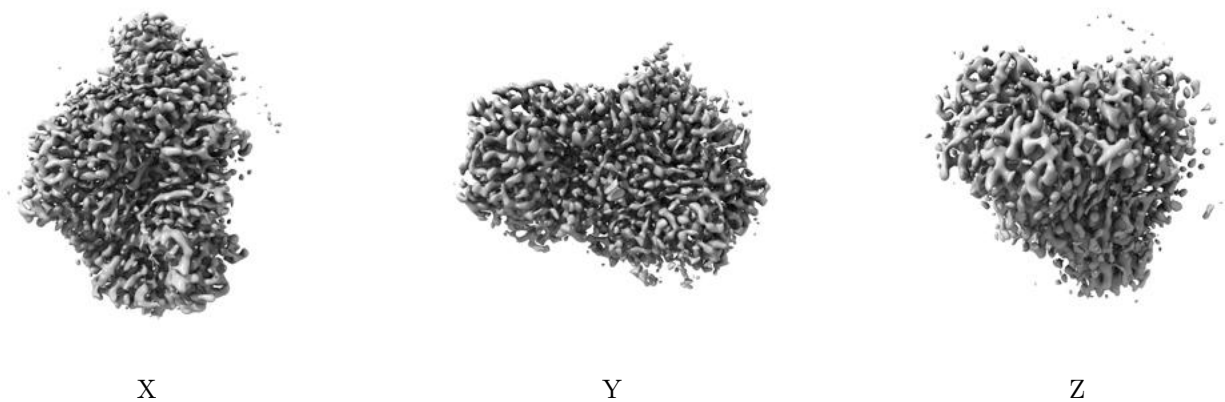


Z

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.

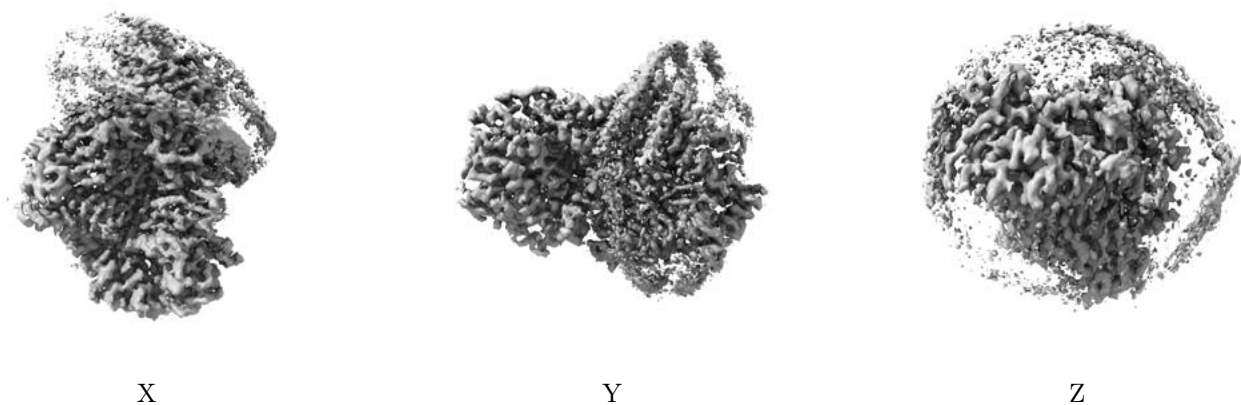
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.12. 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.

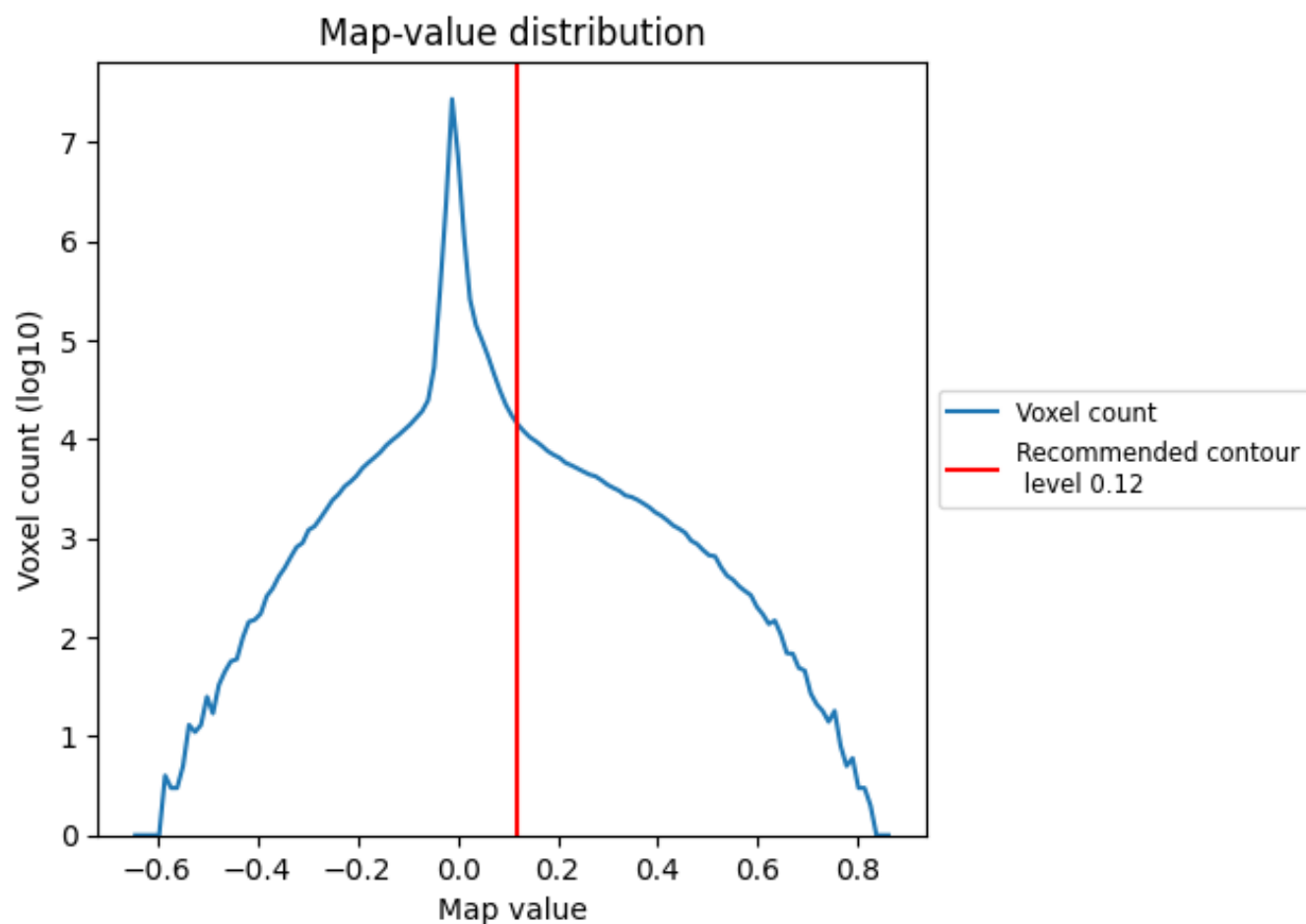
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

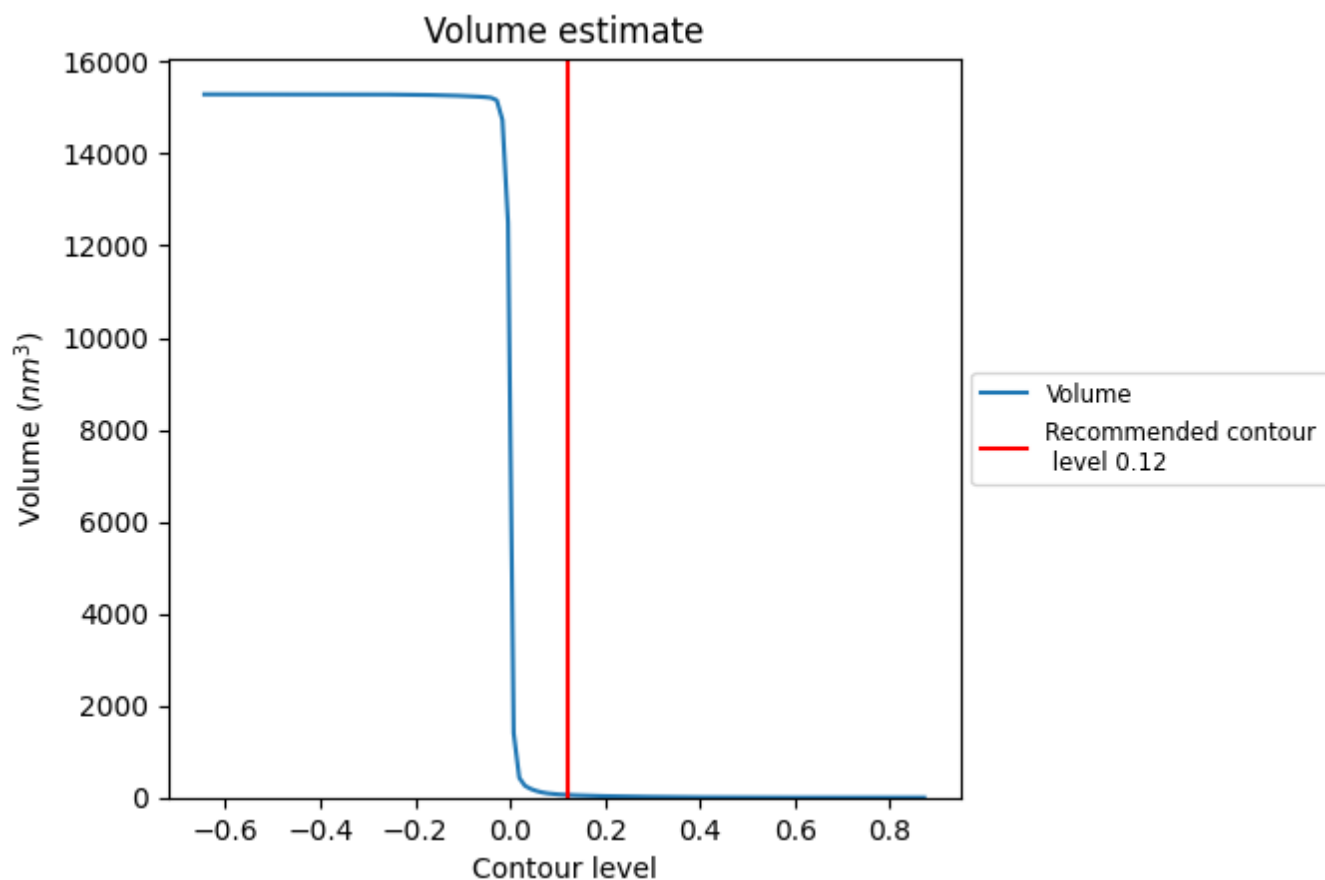
This section contains the results of statistical analysis of the map.

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.

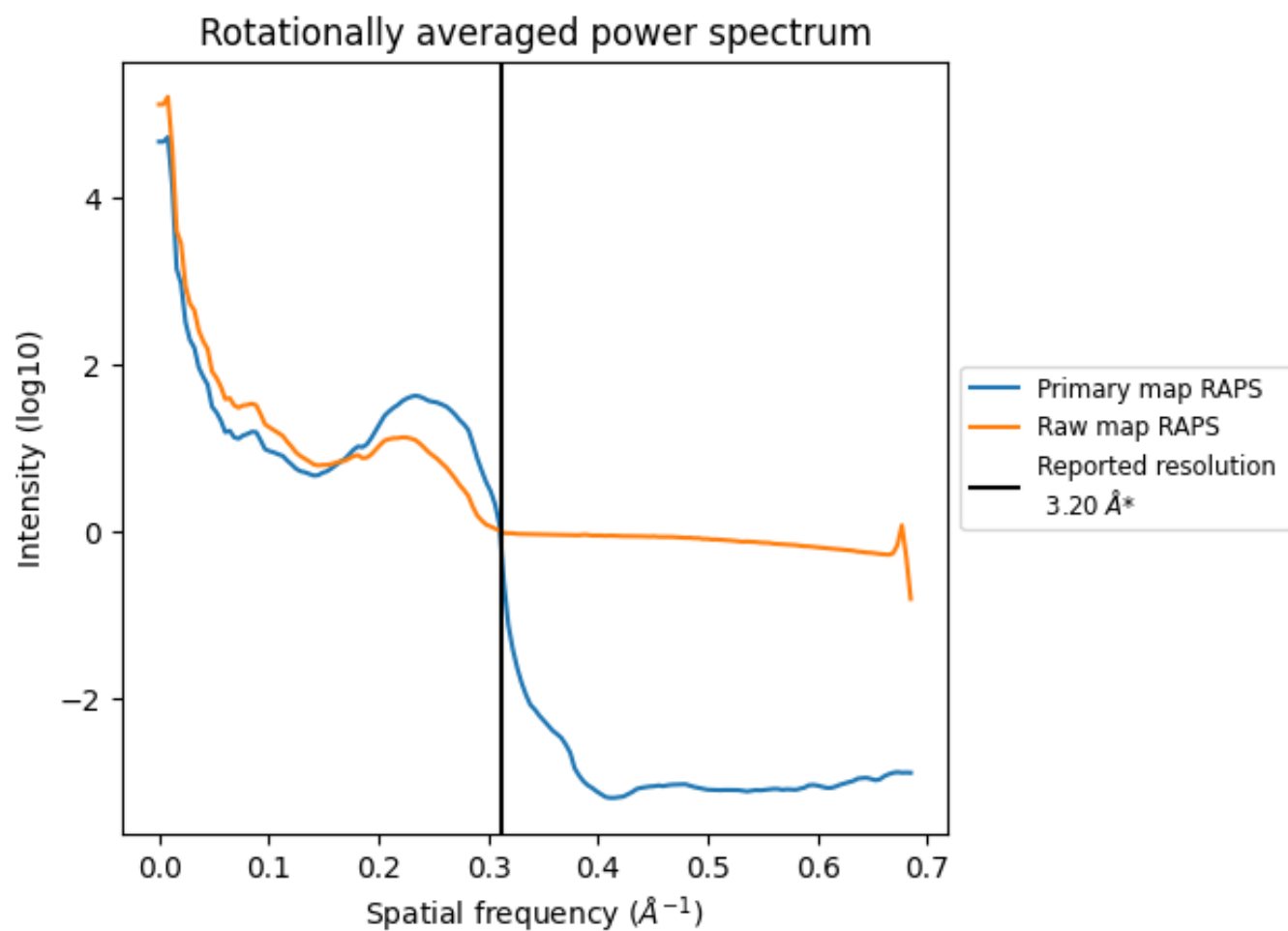
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 57 nm³; this corresponds to an approximate mass of 52 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 ⓘ

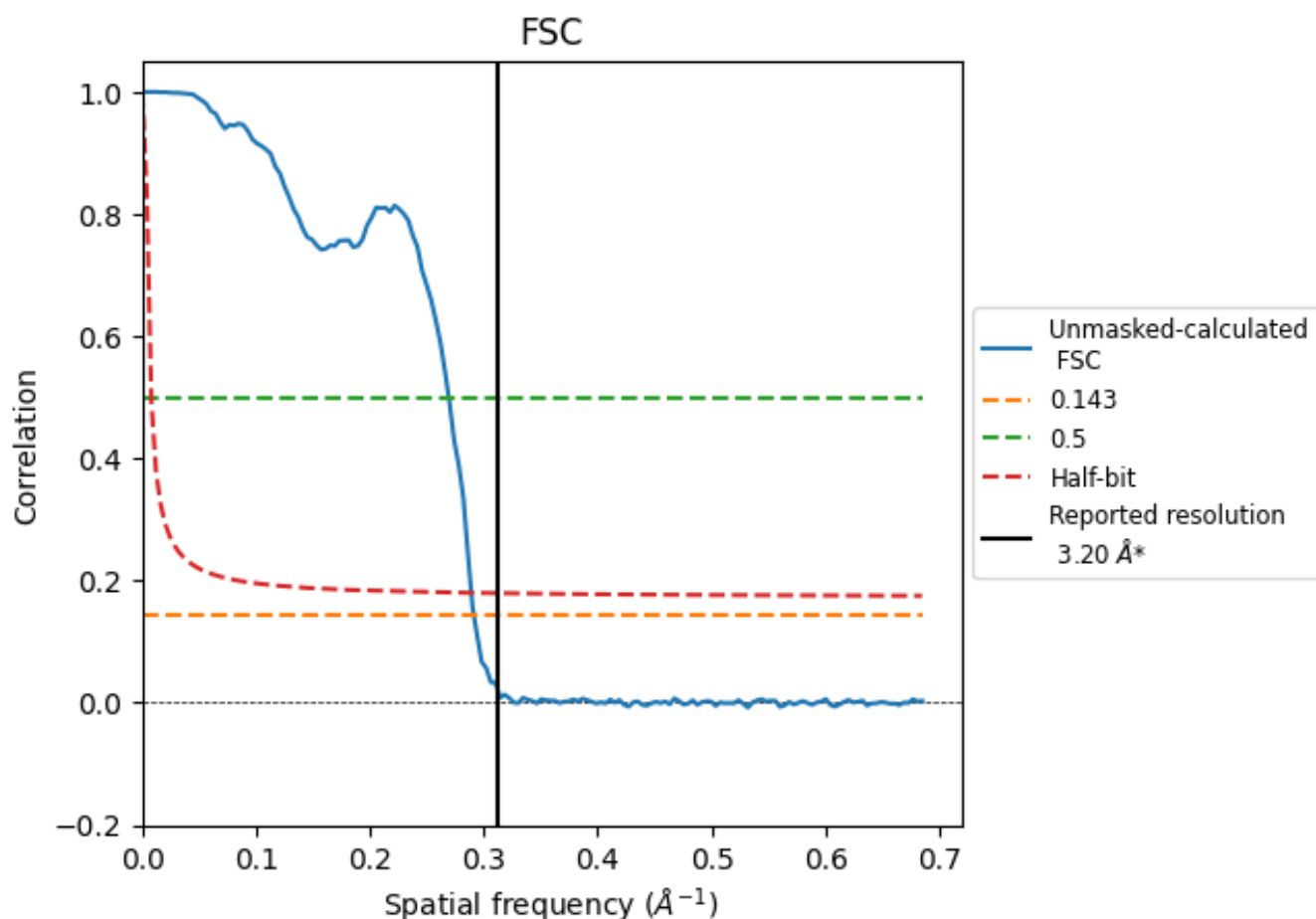


*Reported resolution corresponds to spatial frequency of 0.312 Å⁻¹

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 0.312 \AA^{-1}

8.2 Resolution estimates [i](#)

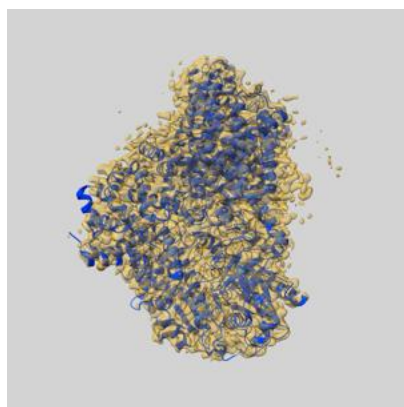
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.43	3.71	3.46

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

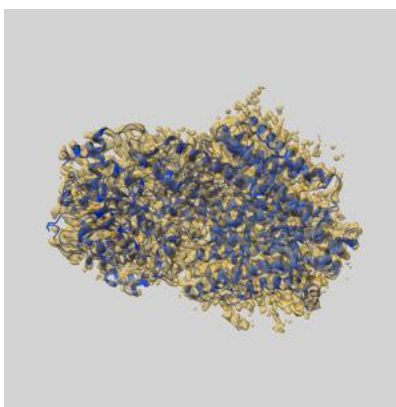
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-53929 and PDB model 9RD8. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

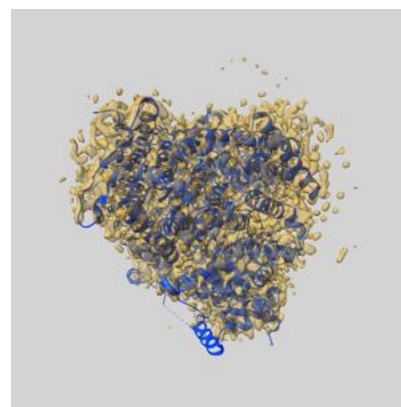
9.1 Map-model overlay [i](#)



X



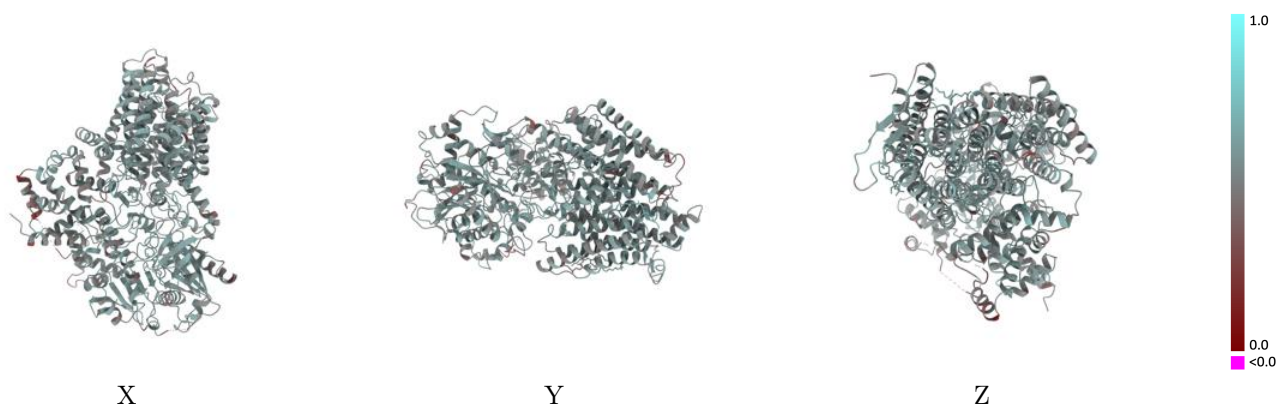
Y



Z

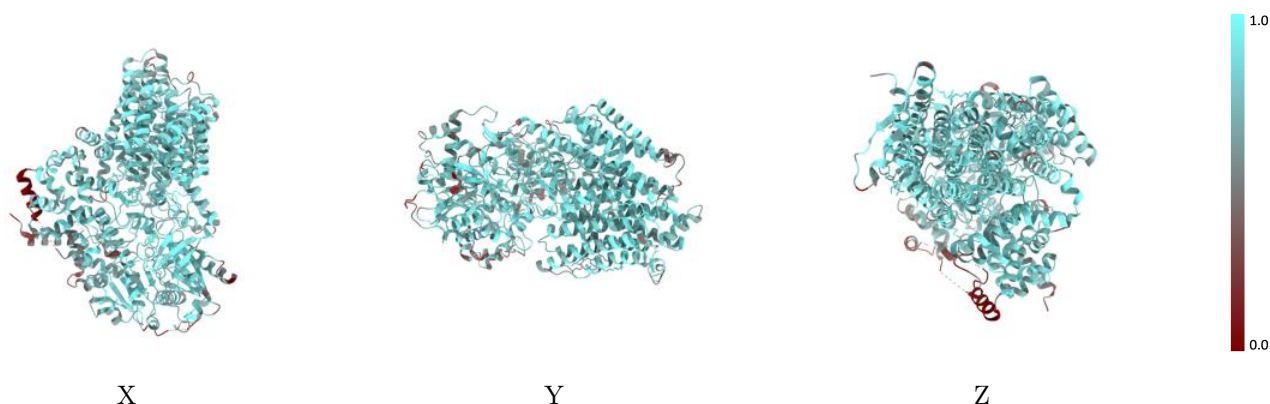
The images above show the 3D surface view of the map at the recommended contour level 0.12 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



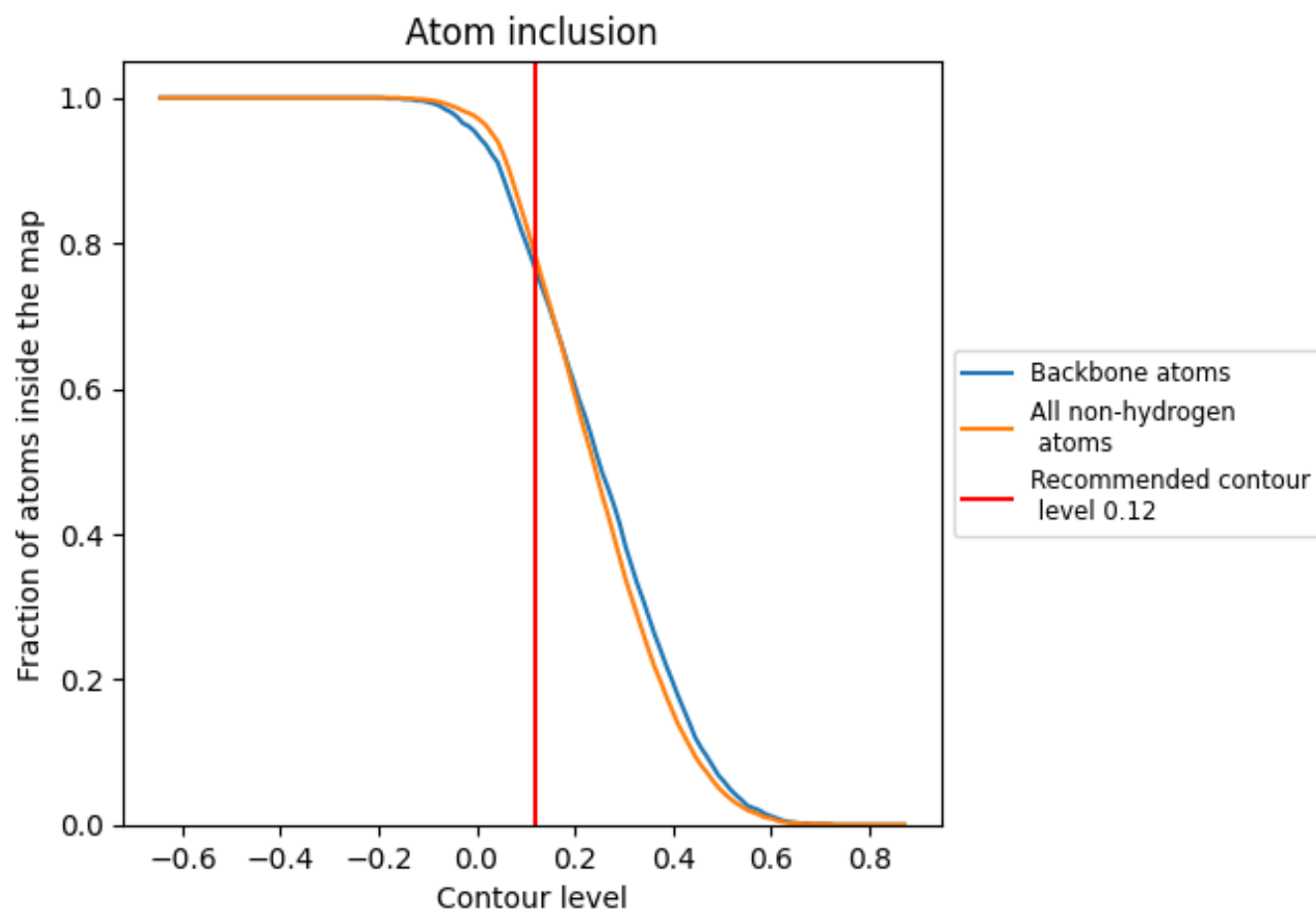
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.12).

9.4 Atom inclusion [i](#)



At the recommended contour level, 76% of all backbone atoms, 78% 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 (0.12) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.7820	<div></div> 0.5390
A	<div></div> 0.7610	<div></div> 0.5380
B	<div></div> 0.8150	<div></div> 0.5390

