



Full wwPDB EM Validation Report ⓘ

Nov 14, 2022 – 06:12 AM EST

PDB ID : 7K65
EMDB ID : EMD-22689
Title : Hedgehog receptor Patched (PTCH1) in complex with conformation selective nanobody TI23
Authors : Zhang, Y.; Bulkley, D.P.; Liang, J.; Manglik, A.; Cheng, Y.; Beachy, P.A.
Deposited on : 2020-09-18
Resolution : 3.40 Å(reported)
Based on initial model : 6MG8

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.dev43
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

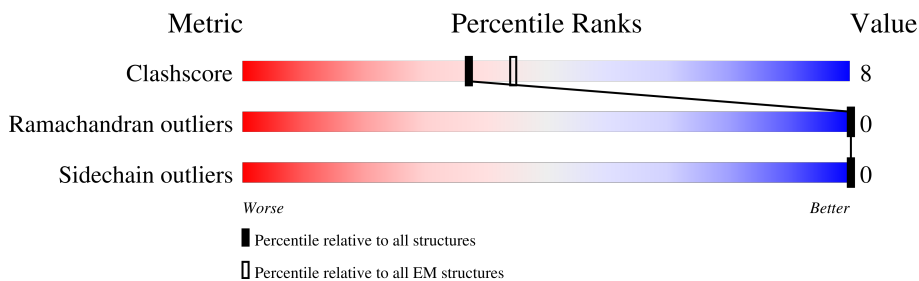
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	1281	 13% (red), 63% (green), 16% (yellow), 22% (grey)
2	B	124	 60% (red), 73% (green), 20% (yellow), 7% (grey)
3	C	2	 100% (red), 100% (green)

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8796 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 Protein patched homolog 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1005	7666	4999	1253	1371	43	0	0

There are 38 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	HIS	deletion	UNP Q61115
A	?	-	SER	deletion	UNP Q61115
A	?	-	ASN	deletion	UNP Q61115
A	?	-	THR	deletion	UNP Q61115
A	?	-	ARG	deletion	UNP Q61115
A	?	-	TYR	deletion	UNP Q61115
A	?	-	SER	deletion	UNP Q61115
A	?	-	PRO	deletion	UNP Q61115
A	?	-	PRO	deletion	UNP Q61115
A	?	-	PRO	deletion	UNP Q61115
A	?	-	PRO	deletion	UNP Q61115
A	?	-	TYR	deletion	UNP Q61115
A	?	-	THR	deletion	UNP Q61115
A	?	-	SER	deletion	UNP Q61115
A	?	-	HIS	deletion	UNP Q61115
A	?	-	SER	deletion	UNP Q61115
A	?	-	PHE	deletion	UNP Q61115
A	?	-	ALA	deletion	UNP Q61115
A	?	-	HIS	deletion	UNP Q61115
A	?	-	GLU	deletion	UNP Q61115
A	?	-	THR	deletion	UNP Q61115
A	?	-	HIS	deletion	UNP Q61115
A	?	-	ILE	deletion	UNP Q61115
A	?	-	THR	deletion	UNP Q61115
A	1292	MET	-	expression tag	UNP Q61115
A	1293	ASP	-	expression tag	UNP Q61115
A	1294	GLU	-	expression tag	UNP Q61115
A	1295	LYS	-	expression tag	UNP Q61115

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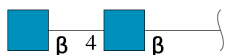
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Chain	Residue	Modelled	Actual	Comment	Reference
A	1296	THR	-	expression tag	UNP Q61115
A	1297	THR	-	expression tag	UNP Q61115
A	1298	GLY	-	expression tag	UNP Q61115
A	1299	TRP	-	expression tag	UNP Q61115
A	1300	ARG	-	expression tag	UNP Q61115
A	1301	GLY	-	expression tag	UNP Q61115
A	1302	GLY	-	expression tag	UNP Q61115
A	1303	HIS	-	expression tag	UNP Q61115
A	1304	VAL	-	expression tag	UNP Q61115
A	1305	VAL	-	expression tag	UNP Q61115

- Molecule 2 is a protein called nanobody TI23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	115	858	539	155	160	4	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



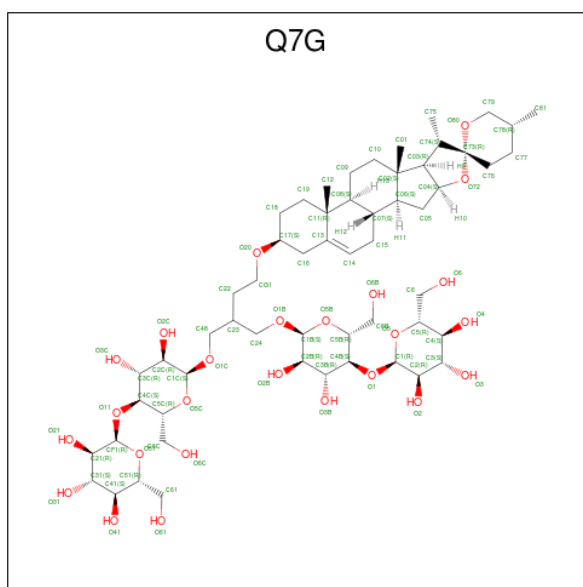
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	C	2	28	16	2	10	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).

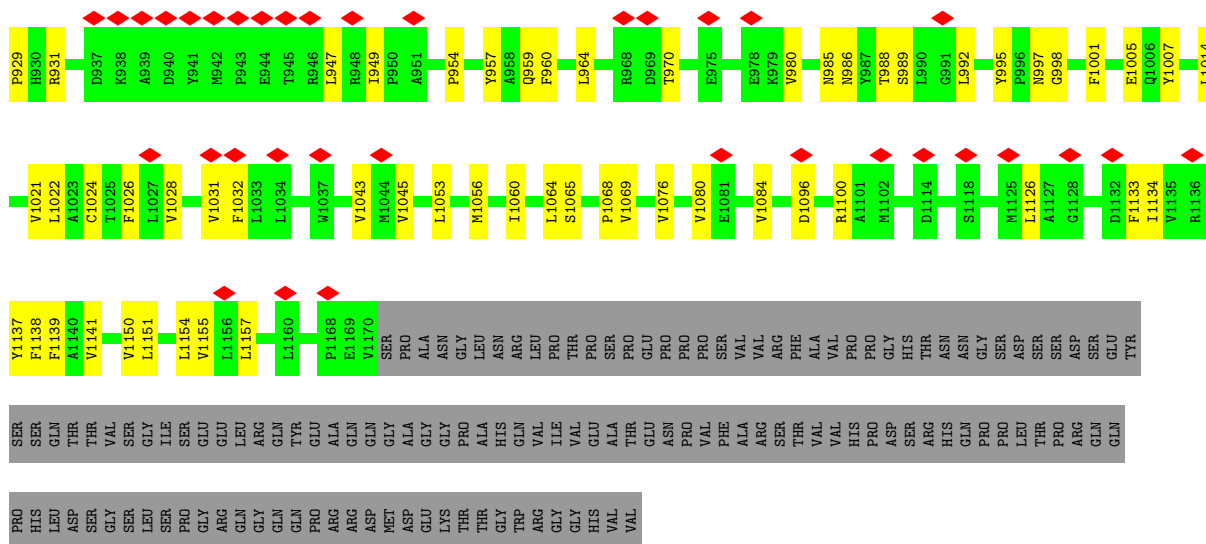


Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
4	A	1	70	40	5	25	0
4	A	1	70	40	5	25	0
4	A	1	70	40	5	25	0
4	A	1	70	40	5	25	0
4	A	1	70	40	5	25	0

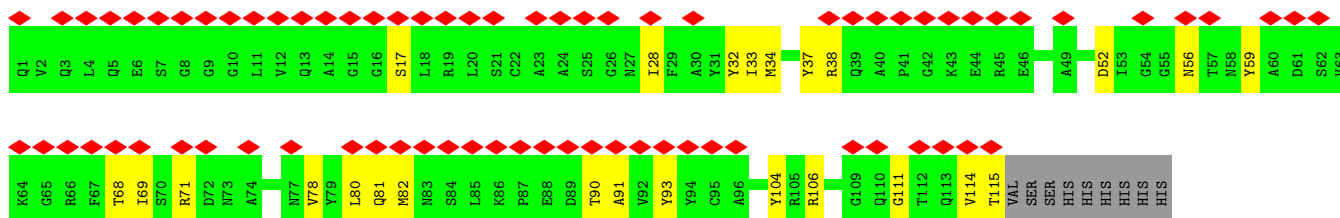
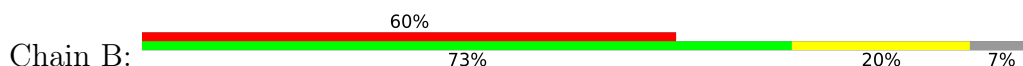
- Molecule 5 is 2-[[[4-O-alpha-D-glucopyranosyl-alpha-D-glucopyranosyl]oxy]methyl]-4-[[[(3beta,9beta,14beta,17beta,25R)-spirost-5-en-3-yl]oxy]butyl 4-O-alpha-D-glucopyranosyl-alpha-D-glucopyranoside (three-letter code: Q7G) (formula: C₅₆H₉₂O₂₅).



Mol	Chain	Residues	Atoms			AltConf
5	A	1	Total	C	O	0
			174	140	34	
5	A	1	Total	C	O	0
			174	140	34	
5	A	1	Total	C	O	0
			174	140	34	
5	A	1	Total	C	O	0
			174	140	34	



• Molecule 2: nanobody TI23



• Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	307652	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	85.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	25.976	Depositor
Minimum map value	-14.967	Depositor
Average map value	-0.021	Depositor
Map value standard deviation	0.878	Depositor
Recommended contour level	4.8	Depositor
Map size (Å)	271.104, 271.104, 271.104	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.059, 1.059, 1.059	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: Q7G, NAG

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	0.27	0/7856	0.41	0/10733
2	B	0.27	0/875	0.48	0/1187
All	All	0.27	0/8731	0.42	0/11920

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	7666	0	7499	125	0
2	B	858	0	811	16	0
3	C	28	0	25	0	0
4	A	70	0	65	1	0
5	A	174	0	0	3	0
All	All	8796	0	8400	140	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 8.

All (140) 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:222:TRP:HE1	1:A:282:CYS:HB3	1.38	0.89
2:B:34:MET:SD	2:B:71:ARG:NH1	2.49	0.85
2:B:17:SER:HA	2:B:82:MET:O	1.77	0.84
1:A:910:THR:HG22	1:A:931:ARG:HD2	1.63	0.80
1:A:519:PHE:CZ	1:A:586:LEU:HD21	2.21	0.75
1:A:929:PRO:O	1:A:931:ARG:NH1	2.21	0.73
1:A:146:GLN:O	1:A:345:ALA:HA	1.90	0.71
1:A:875:GLN:NE2	1:A:947:LEU:O	2.23	0.71
1:A:300:THR:HG22	1:A:301:LYS:H	1.56	0.70
1:A:1026:PHE:HB2	1:A:1043:VAL:HG21	1.72	0.70
1:A:231:THR:HG22	1:A:241:ARG:HG2	1.73	0.70
1:A:760:GLY:HA3	1:A:970:THR:HG21	1.73	0.70
1:A:838:LEU:HD22	1:A:893:LEU:HD13	1.73	0.70
1:A:1096:ASP:O	1:A:1100:ARG:N	2.25	0.69
1:A:219:ASP:O	1:A:280:ARG:NH1	2.28	0.66
1:A:175:HIS:HB3	1:A:184:LYS:HG2	1.78	0.65
1:A:335:ASN:OD1	4:A:1405:NAG:N2	2.30	0.65
2:B:90:THR:HG22	2:B:115:THR:HA	1.79	0.64
1:A:913:VAL:HG11	1:A:931:ARG:HG3	1.81	0.63
1:A:1045:VAL:HG21	1:A:1157:LEU:HD13	1.81	0.62
1:A:448:CYS:SG	1:A:449:SER:N	2.72	0.62
1:A:329:VAL:HG11	1:A:340:LEU:HD11	1.81	0.61
1:A:907:ILE:HG23	1:A:949:ILE:HD13	1.81	0.60
1:A:812:PHE:HE2	1:A:980:VAL:HG13	1.67	0.60
1:A:82:LYS:NZ	1:A:520:GLU:OE2	2.35	0.60
1:A:519:PHE:CZ	1:A:586:LEU:CD2	2.85	0.60
1:A:835:ARG:HG3	1:A:894:VAL:HG21	1.83	0.60
1:A:743:PHE:HZ	1:A:1151:LEU:HB3	1.66	0.59
1:A:829:MET:HG2	1:A:831:LEU:H	1.68	0.59
1:A:272:GLU:HG2	1:A:318:ARG:HB2	1.84	0.58
1:A:234:LEU:HD13	1:A:237:LYS:HD2	1.86	0.57
1:A:801:ILE:HD12	1:A:992:LEU:HD13	1.86	0.57
1:A:928:ARG:HB2	1:A:957:TYR:HB3	1.86	0.57
1:A:237:LYS:NZ	1:A:253:GLU:OE2	2.37	0.56
1:A:222:TRP:NE1	1:A:282:CYS:HB3	2.14	0.56
1:A:191:LYS:NZ	1:A:207:GLU:O	2.34	0.56
1:A:215:ILE:HB	1:A:349:MET:HB3	1.87	0.56
1:A:387:ARG:NH1	1:A:415:ASP:OD1	2.38	0.55
1:A:157:THR:HG23	1:A:160:ALA:H	1.70	0.55
2:B:37:TYR:OH	2:B:106:ARG:NH1	2.40	0.55
1:A:221:PHE:HE1	1:A:308:VAL:HG21	1.72	0.55
1:A:1056:MET:O	1:A:1060:ILE:HG13	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:791:ILE:HB	1:A:960:PHE:HB2	1.88	0.54
1:A:997:ASN:OD1	1:A:998:GLY:N	2.42	0.53
1:A:87:PHE:HA	1:A:90:VAL:HG12	1.90	0.53
1:A:121:ARG:NH2	1:A:1005:GLU:OE2	2.42	0.53
1:A:508:PHE:CD1	1:A:582:LEU:HD13	2.44	0.52
1:A:591:ASP:OD1	1:A:592:ARG:N	2.42	0.52
1:A:179:TYR:HB3	1:A:371:ILE:HG21	1.91	0.52
1:A:77:GLY:HA3	1:A:524:GLY:HA2	1.91	0.52
1:A:788:ASN:ND2	5:A:1406:Q7G:O6	2.44	0.51
2:B:90:THR:HA	2:B:114:VAL:O	2.10	0.51
1:A:129:THR:HG1	1:A:995:TYR:HH	1.58	0.51
1:A:203:ASP:OD2	1:A:203:ASP:N	2.44	0.51
1:A:307:LEU:O	1:A:310:ASN:ND2	2.44	0.51
1:A:821:GLU:HG3	1:A:822:GLU:H	1.75	0.51
1:A:737:VAL:HA	1:A:740:ILE:HG22	1.93	0.51
2:B:93:TYR:O	2:B:111:GLY:CA	2.59	0.50
1:A:985:ASN:HA	1:A:988:THR:HG22	1.92	0.50
1:A:1126:LEU:HB2	1:A:1139:PHE:HB2	1.93	0.50
1:A:1133:PHE:O	1:A:1137:TYR:HB2	2.12	0.50
1:A:1080:VAL:HG22	1:A:1084:VAL:HB	1.94	0.50
1:A:443:MET:CE	1:A:506:HIS:CE1	2.94	0.49
1:A:240:LEU:HD13	1:A:245:PHE:HE1	1.77	0.49
1:A:810:LYS:O	1:A:813:SER:OG	2.26	0.49
2:B:32:TYR:CD2	2:B:33:ILE:HG13	2.48	0.49
1:A:114:LEU:HB3	1:A:555:ALA:HB2	1.95	0.49
1:A:262:ASP:OD1	1:A:263:SER:N	2.45	0.48
1:A:780:GLN:NE2	5:A:1406:Q7G:O3B	2.39	0.48
1:A:887:GLN:HA	1:A:890:LYS:HB2	1.96	0.48
1:A:907:ILE:HG23	1:A:949:ILE:HG21	1.95	0.48
1:A:278:MET:O	1:A:293:THR:OG1	2.23	0.48
1:A:1053:LEU:HD11	1:A:1141:VAL:HG23	1.96	0.48
1:A:240:LEU:HD22	1:A:245:PHE:HD1	1.79	0.48
1:A:1150:VAL:O	1:A:1154:LEU:HB2	2.13	0.48
1:A:416:ILE:HG21	1:A:767:VAL:HG12	1.96	0.48
1:A:986:ASN:O	1:A:989:SER:OG	2.32	0.47
1:A:121:ARG:O	1:A:125:GLU:HG2	2.13	0.47
1:A:1151:LEU:O	1:A:1155:VAL:HB	2.14	0.47
1:A:1021:VAL:HG11	1:A:1076:VAL:HG13	1.96	0.47
1:A:490:PRO:HG3	5:A:1407:Q7G:C75	2.44	0.47
1:A:733:PRO:O	1:A:737:VAL:HG23	2.15	0.47
1:A:96:GLY:O	1:A:100:VAL:HG23	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:424:SER:OG	1:A:427:ARG:HB2	2.13	0.47
1:A:517:ILE:O	1:A:519:PHE:N	2.45	0.47
1:A:906:TYR:CE2	1:A:954:PRO:HA	2.50	0.47
1:A:314:GLN:HG3	1:A:318:ARG:HG2	1.96	0.47
1:A:95:PHE:HB3	1:A:465:LEU:CD2	2.45	0.46
2:B:34:MET:HB2	2:B:78:VAL:HG11	1.97	0.46
1:A:536:LEU:HD21	1:A:1032:PHE:CG	2.50	0.46
1:A:216:THR:HB	1:A:348:THR:HG23	1.99	0.45
1:A:829:MET:SD	1:A:832:HIS:HB2	2.57	0.45
1:A:225:ALA:HB2	1:A:277:TYR:CG	2.52	0.45
1:A:217:PRO:HA	1:A:313:CYS:SG	2.56	0.45
1:A:964:LEU:HD11	1:A:1001:PHE:HE1	1.81	0.45
1:A:925:ALA:HA	1:A:959:GLN:HB2	1.99	0.45
1:A:842:GLN:HG2	1:A:895:ASP:HB3	1.98	0.45
1:A:111:VAL:HG21	1:A:413:LEU:HD21	1.99	0.45
1:A:763:LEU:HG	1:A:777:ILE:HD13	1.99	0.45
1:A:222:TRP:CZ2	1:A:290:CYS:HA	2.51	0.44
1:A:1014:LEU:HD13	1:A:1069:VAL:HG22	1.99	0.44
1:A:443:MET:HE1	1:A:506:HIS:CE1	2.52	0.44
1:A:760:GLY:HA2	1:A:1007:TYR:CZ	2.53	0.44
1:A:440:CYS:SG	1:A:457:LEU:HD23	2.58	0.44
1:A:556:LEU:HD23	1:A:556:LEU:HA	1.73	0.43
1:A:1022:LEU:HD22	1:A:1043:VAL:HG13	2.00	0.43
1:A:165:LEU:HD13	1:A:223:GLU:HB3	2.01	0.43
1:A:427:ARG:NH2	1:A:487:GLN:OE1	2.50	0.43
1:A:802:GLN:OE1	1:A:900:ILE:HD12	2.18	0.43
2:B:38:ARG:HH21	2:B:91:ALA:HB2	1.83	0.43
1:A:838:LEU:HD23	1:A:838:LEU:HA	1.87	0.43
1:A:1064:LEU:HD12	1:A:1068:PRO:HG2	2.01	0.43
1:A:283:LEU:HA	1:A:303:LEU:HD13	2.00	0.43
1:A:300:THR:HG22	1:A:301:LYS:N	2.30	0.43
2:B:68:THR:O	2:B:80:LEU:HA	2.19	0.43
1:A:90:VAL:O	1:A:94:ILE:HG12	2.19	0.43
1:A:519:PHE:CE2	1:A:586:LEU:HD21	2.54	0.42
1:A:493:ALA:HB1	1:A:566:VAL:HG11	2.00	0.42
1:A:543:THR:HG21	1:A:1024:CYS:HB3	2.01	0.42
1:A:750:SER:O	1:A:754:THR:OG1	2.38	0.42
1:A:1028:VAL:HA	1:A:1031:VAL:HG12	2.02	0.42
1:A:1065:SER:H	1:A:1068:PRO:CG	2.33	0.42
1:A:416:ILE:HD13	1:A:416:ILE:HA	1.91	0.42
2:B:104:TYR:OH	2:B:106:ARG:NH2	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:389:TYR:O	1:A:393:VAL:HG23	2.21	0.41
1:A:335:ASN:HA	1:A:338:GLY:H	1.86	0.41
1:A:235:LEU:HB2	2:B:28:ILE:O	2.21	0.41
2:B:52:ASP:OD1	2:B:56:ASN:N	2.53	0.41
2:B:59:TYR:CZ	2:B:69:ILE:HG22	2.56	0.41
1:A:197:THR:HG21	1:A:202:MET:HB2	2.03	0.41
2:B:68:THR:OG1	2:B:81:GLN:HB3	2.21	0.41
2:B:93:TYR:O	2:B:111:GLY:HA2	2.21	0.41
1:A:372:ASN:HB3	1:A:377:ARG:HH21	1.85	0.41
1:A:501:VAL:HG13	1:A:578:PHE:CZ	2.56	0.41
1:A:240:LEU:HD22	1:A:245:PHE:CD1	2.56	0.40
1:A:77:GLY:O	1:A:80:ILE:HG22	2.21	0.40
1:A:504:LEU:HD23	1:A:504:LEU:HA	1.83	0.40
1:A:455:VAL:HG11	1:A:582:LEU:HD23	2.03	0.40
1:A:1134:ILE:HA	1:A:1138:PHE:HD1	1.86	0.40
1:A:834:PHE:CE1	1:A:909:LEU:HA	2.57	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	1001/1281 (78%)	975 (97%)	26 (3%)	0	100	100
2	B	113/124 (91%)	107 (95%)	6 (5%)	0	100	100
All	All	1114/1405 (79%)	1082 (97%)	32 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	787/1090 (72%)	787 (100%)	0	100	100
2	B	81/100 (81%)	81 (100%)	0	100	100
All	All	868/1190 (73%)	868 (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 (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	163	GLN
1	A	513	GLN
1	A	832	HIS
1	A	936	HIS
1	A	1085	HIS

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](#)

2 monosaccharides are 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
3	NAG	C	1	3,1	14,14,15	0.27	0	17,19,21	0.46	0
3	NAG	C	2	3	14,14,15	0.23	0	17,19,21	0.44	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
3	NAG	C	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	C	2	3	-	3/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

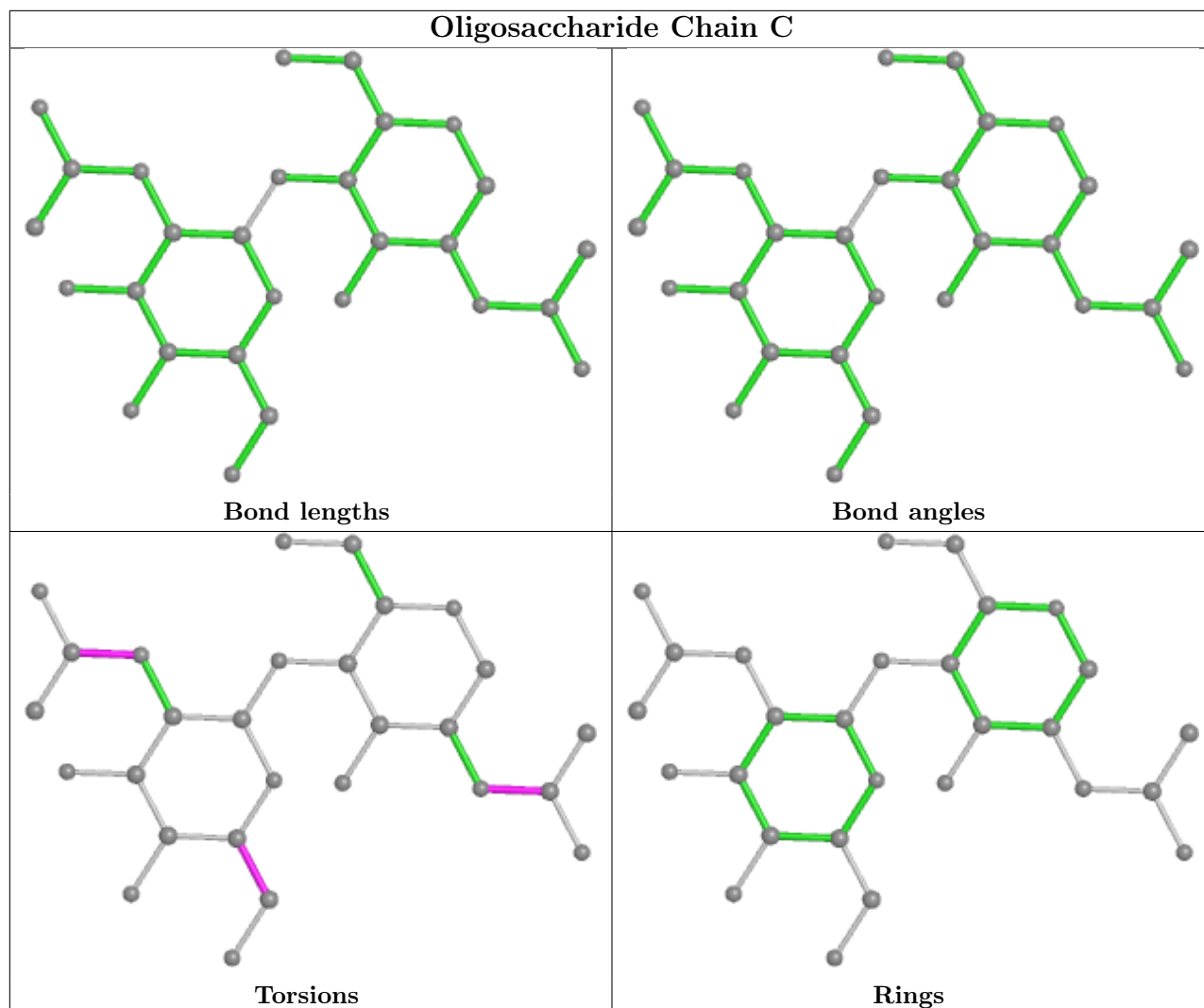
All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1	NAG	C8-C7-N2-C2
3	C	1	NAG	O7-C7-N2-C2
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
3	C	2	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



5.6 Ligand geometry [i](#)

9 ligands are 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
4	NAG	A	1404	1	14,14,15	0.25	0	17,19,21	0.53	0
4	NAG	A	1405	1	14,14,15	0.44	0	17,19,21	0.52	0
5	Q7G	A	1409	-	36,36,90	1.94	8 (22%)	59,59,138	1.78	15 (25%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	A	1403	1	14,14,15	0.29	0	17,19,21	0.46	0
5	Q7G	A	1408	-	36,36,90	2.01	7 (19%)	59,59,138	1.82	14 (23%)
4	NAG	A	1402	1	14,14,15	0.19	0	17,19,21	0.36	0
4	NAG	A	1401	1	14,14,15	0.22	0	17,19,21	0.43	0
5	Q7G	A	1407	-	36,36,90	1.96	7 (19%)	59,59,138	1.80	15 (25%)
5	Q7G	A	1406	-	90,90,90	1.44	11 (12%)	136,138,138	1.49	21 (15%)

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
4	NAG	A	1404	1	-	3/6/23/26	0/1/1/1
4	NAG	A	1405	1	-	3/6/23/26	0/1/1/1
5	Q7G	A	1409	-	-	0/2/90/200	0/6/6/10
4	NAG	A	1403	1	-	4/6/23/26	0/1/1/1
5	Q7G	A	1408	-	-	0/2/90/200	0/6/6/10
4	NAG	A	1402	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1401	1	-	0/6/23/26	0/1/1/1
5	Q7G	A	1407	-	-	0/2/90/200	0/6/6/10
5	Q7G	A	1406	-	-	12/32/200/200	0/10/10/10

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1406	Q7G	C11-C13	-6.67	1.39	1.52
5	A	1408	Q7G	C11-C13	-6.13	1.40	1.52
5	A	1407	Q7G	C11-C13	-6.12	1.40	1.52
5	A	1409	Q7G	C11-C13	-6.02	1.40	1.52
5	A	1406	Q7G	C16-C13	-5.33	1.40	1.51
5	A	1408	Q7G	C16-C13	-5.25	1.40	1.51
5	A	1409	Q7G	C16-C13	-5.18	1.40	1.51
5	A	1407	Q7G	C16-C13	-5.16	1.40	1.51
5	A	1406	Q7G	C15-C14	-4.94	1.39	1.50
5	A	1407	Q7G	C15-C14	-4.89	1.39	1.50
5	A	1408	Q7G	C15-C14	-4.89	1.39	1.50
5	A	1409	Q7G	C15-C14	-4.83	1.39	1.50
5	A	1406	Q7G	C11-C08	-3.39	1.50	1.56
5	A	1407	Q7G	C14-C13	3.14	1.39	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1409	Q7G	C14-C13	3.14	1.39	1.33
5	A	1408	Q7G	C14-C13	3.05	1.39	1.33
5	A	1406	Q7G	C02-C06	-3.01	1.49	1.55
5	A	1408	Q7G	C02-C06	-3.00	1.49	1.55
5	A	1406	Q7G	C14-C13	2.98	1.39	1.33
5	A	1407	Q7G	C02-C06	-2.83	1.49	1.55
5	A	1408	Q7G	C11-C08	-2.73	1.51	1.56
5	A	1407	Q7G	C11-C08	-2.67	1.51	1.56
5	A	1409	Q7G	C02-C06	-2.64	1.50	1.55
5	A	1409	Q7G	C11-C08	-2.57	1.51	1.56
5	A	1408	Q7G	C02-C03	-2.46	1.51	1.56
5	A	1406	Q7G	C73-C74	-2.44	1.48	1.53
5	A	1406	Q7G	C19-C11	-2.27	1.49	1.54
5	A	1409	Q7G	C02-C03	-2.27	1.51	1.56
5	A	1407	Q7G	C02-C03	-2.24	1.51	1.56
5	A	1409	Q7G	O80-C73	2.20	1.45	1.42
5	A	1406	Q7G	C19-C18	-2.19	1.48	1.53
5	A	1406	Q7G	O1C-C1C	2.11	1.43	1.40
5	A	1406	Q7G	C02-C03	-2.09	1.51	1.56

All (65) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1406	Q7G	C73-C74-C03	-4.76	95.61	103.37
5	A	1406	Q7G	C05-C06-C02	-4.10	98.45	103.91
5	A	1407	Q7G	C16-C13-C11	3.94	121.66	116.42
5	A	1408	Q7G	C16-C13-C11	3.94	121.65	116.42
5	A	1406	Q7G	C09-C08-C11	-3.91	107.94	113.08
5	A	1406	Q7G	CF1-O11-C4C	-3.90	108.32	117.96
5	A	1409	Q7G	C16-C13-C11	3.80	121.47	116.42
5	A	1406	Q7G	C06-C05-C04	-3.76	95.14	102.37
5	A	1406	Q7G	C16-C13-C11	3.67	121.30	116.42
5	A	1409	Q7G	C05-C06-C02	-3.63	99.08	103.91
5	A	1407	Q7G	C11-C08-C07	-3.61	107.32	112.73
5	A	1408	Q7G	C11-C08-C07	-3.55	107.41	112.73
5	A	1408	Q7G	C05-C06-C02	-3.54	99.20	103.91
5	A	1409	Q7G	O72-C73-C74	-3.52	99.25	104.47
5	A	1409	Q7G	C09-C08-C11	-3.49	108.48	113.08
5	A	1407	Q7G	C05-C06-C02	-3.40	99.38	103.91
5	A	1408	Q7G	O72-C73-C74	-3.39	99.43	104.47
5	A	1408	Q7G	C09-C08-C11	-3.39	108.62	113.08
5	A	1407	Q7G	C73-O72-C04	-3.37	98.86	108.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1409	Q7G	C11-C08-C07	-3.37	107.68	112.73
5	A	1408	Q7G	C02-C03-C74	-3.36	109.14	120.56
5	A	1408	Q7G	C73-O72-C04	-3.32	99.01	108.28
5	A	1406	Q7G	C02-C06-C07	-3.29	109.51	114.38
5	A	1407	Q7G	C09-C08-C11	-3.27	108.77	113.08
5	A	1406	Q7G	O72-C73-C74	-3.23	99.68	104.47
5	A	1409	Q7G	C73-O72-C04	-3.20	99.34	108.28
5	A	1407	Q7G	C05-C06-C07	-3.16	112.71	119.48
5	A	1406	Q7G	CG1-O20-C17	-3.15	108.15	115.40
5	A	1407	Q7G	O72-C73-C74	-3.15	99.80	104.47
5	A	1407	Q7G	C02-C03-C74	-3.10	110.01	120.56
5	A	1409	Q7G	C02-C03-C74	-3.09	110.07	120.56
5	A	1408	Q7G	C05-C06-C07	-3.08	112.89	119.48
5	A	1409	Q7G	C02-C06-C07	-3.01	109.92	114.38
5	A	1406	Q7G	C1-O1-C4B	-2.97	110.61	117.96
5	A	1409	Q7G	C05-C06-C07	-2.95	113.16	119.48
5	A	1406	Q7G	C11-C08-C07	-2.94	108.32	112.73
5	A	1408	Q7G	C02-C06-C07	-2.91	110.07	114.38
5	A	1408	Q7G	C09-C10-C02	-2.88	107.85	112.78
5	A	1407	Q7G	C12-C11-C08	-2.86	108.27	111.68
5	A	1407	Q7G	C02-C06-C07	-2.85	110.16	114.38
5	A	1407	Q7G	C09-C10-C02	-2.80	107.97	112.78
5	A	1408	Q7G	C76-C73-C74	-2.77	109.98	115.69
5	A	1409	Q7G	C12-C11-C08	-2.72	108.44	111.68
5	A	1408	Q7G	C12-C11-C08	-2.67	108.50	111.68
5	A	1406	Q7G	C02-C03-C74	-2.61	111.68	120.56
5	A	1409	Q7G	C09-C10-C02	-2.60	108.33	112.78
5	A	1406	Q7G	C09-C10-C02	-2.59	108.33	112.78
5	A	1406	Q7G	C73-O72-C04	-2.55	101.17	108.28
5	A	1409	Q7G	C16-C13-C14	-2.51	116.99	120.61
5	A	1408	Q7G	C16-C13-C14	-2.51	117.00	120.61
5	A	1407	Q7G	C16-C13-C14	-2.50	117.00	120.61
5	A	1406	Q7G	C05-C06-C07	-2.49	114.14	119.48
5	A	1408	Q7G	C19-C18-C17	-2.47	106.11	110.33
5	A	1406	Q7G	C19-C18-C17	-2.42	106.20	110.33
5	A	1407	Q7G	C76-C73-C74	-2.37	110.81	115.69
5	A	1409	Q7G	C73-C74-C03	-2.33	99.58	103.37
5	A	1409	Q7G	C19-C18-C17	-2.32	106.38	110.33
5	A	1407	Q7G	C19-C18-C17	-2.29	106.42	110.33
5	A	1406	Q7G	C12-C11-C08	-2.29	108.95	111.68
5	A	1407	Q7G	C75-C74-C73	-2.21	110.89	114.92
5	A	1406	Q7G	C24-O1B-C1B	-2.19	109.46	113.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1409	Q7G	C76-C73-C74	-2.14	111.29	115.69
5	A	1406	Q7G	C15-C07-C06	-2.10	107.86	110.91
5	A	1406	Q7G	C16-C13-C14	-2.06	117.64	120.61
5	A	1406	Q7G	C76-C77-C78	-2.03	107.53	111.81

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1406	Q7G	C2B-C1B-O1B-C24
5	A	1406	Q7G	O5B-C1B-O1B-C24
5	A	1406	Q7G	CG1-C22-C23-C48
5	A	1406	Q7G	C22-C23-C24-O1B
5	A	1406	Q7G	C48-C23-C24-O1B
5	A	1406	Q7G	C23-C24-O1B-C1B
5	A	1406	Q7G	C23-C48-O1C-C1C
4	A	1403	NAG	O5-C5-C6-O6
4	A	1403	NAG	C4-C5-C6-O6
4	A	1402	NAG	C8-C7-N2-C2
4	A	1402	NAG	O7-C7-N2-C2
4	A	1403	NAG	C8-C7-N2-C2
4	A	1403	NAG	O7-C7-N2-C2
4	A	1404	NAG	C8-C7-N2-C2
4	A	1404	NAG	O7-C7-N2-C2
4	A	1402	NAG	C4-C5-C6-O6
4	A	1402	NAG	O5-C5-C6-O6
4	A	1404	NAG	O5-C5-C6-O6
5	A	1406	Q7G	CG1-C22-C23-C24
4	A	1405	NAG	C4-C5-C6-O6
5	A	1406	Q7G	C2C-C1C-O1C-C48
5	A	1406	Q7G	C22-C23-C48-O1C
5	A	1406	Q7G	O5C-C1C-O1C-C48
4	A	1405	NAG	C1-C2-N2-C7
5	A	1406	Q7G	C24-C23-C48-O1C
4	A	1405	NAG	O5-C5-C6-O6

There are no ring outliers.

3 monomers are involved in 4 short contacts:

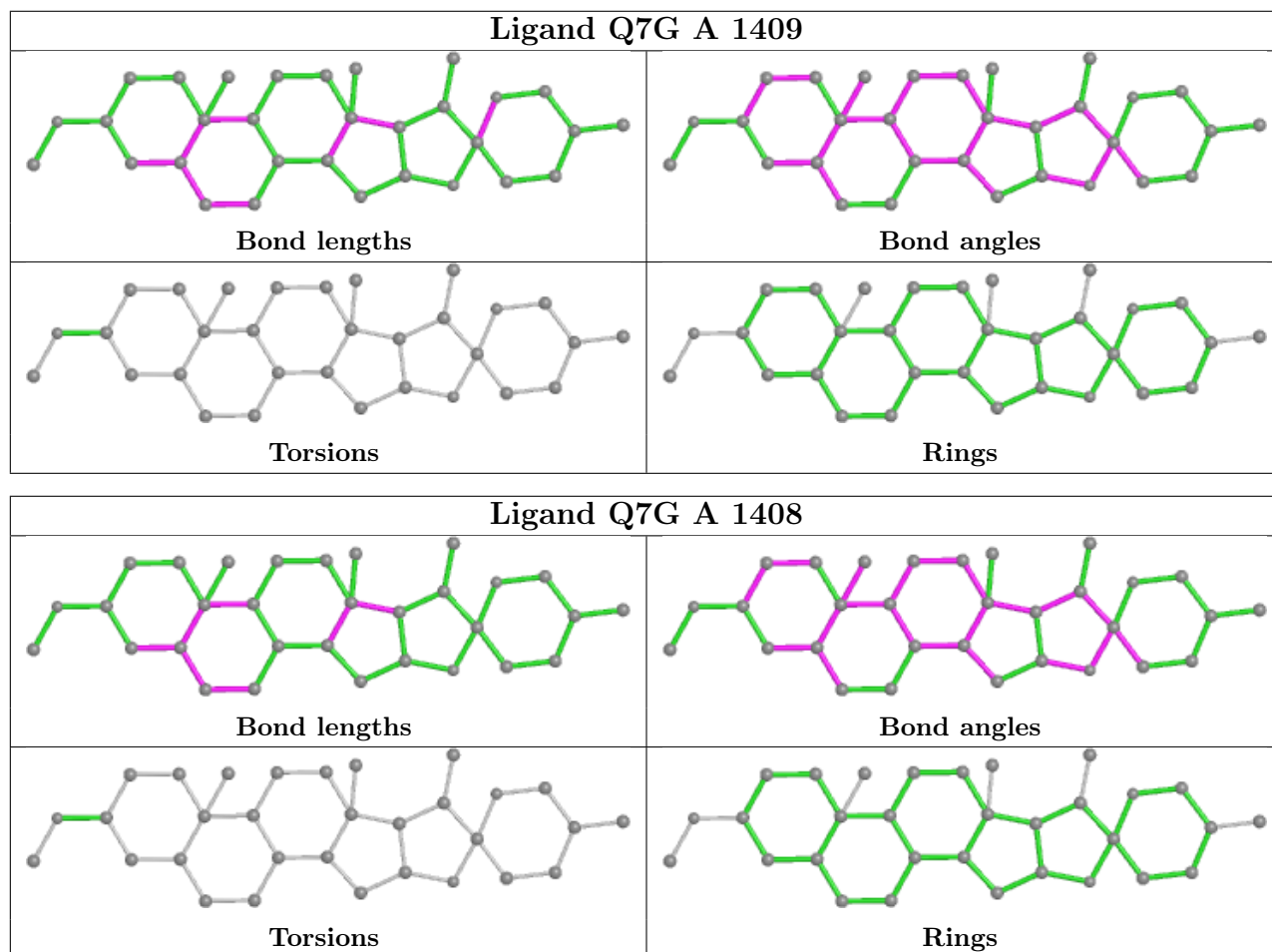
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1405	NAG	1	0

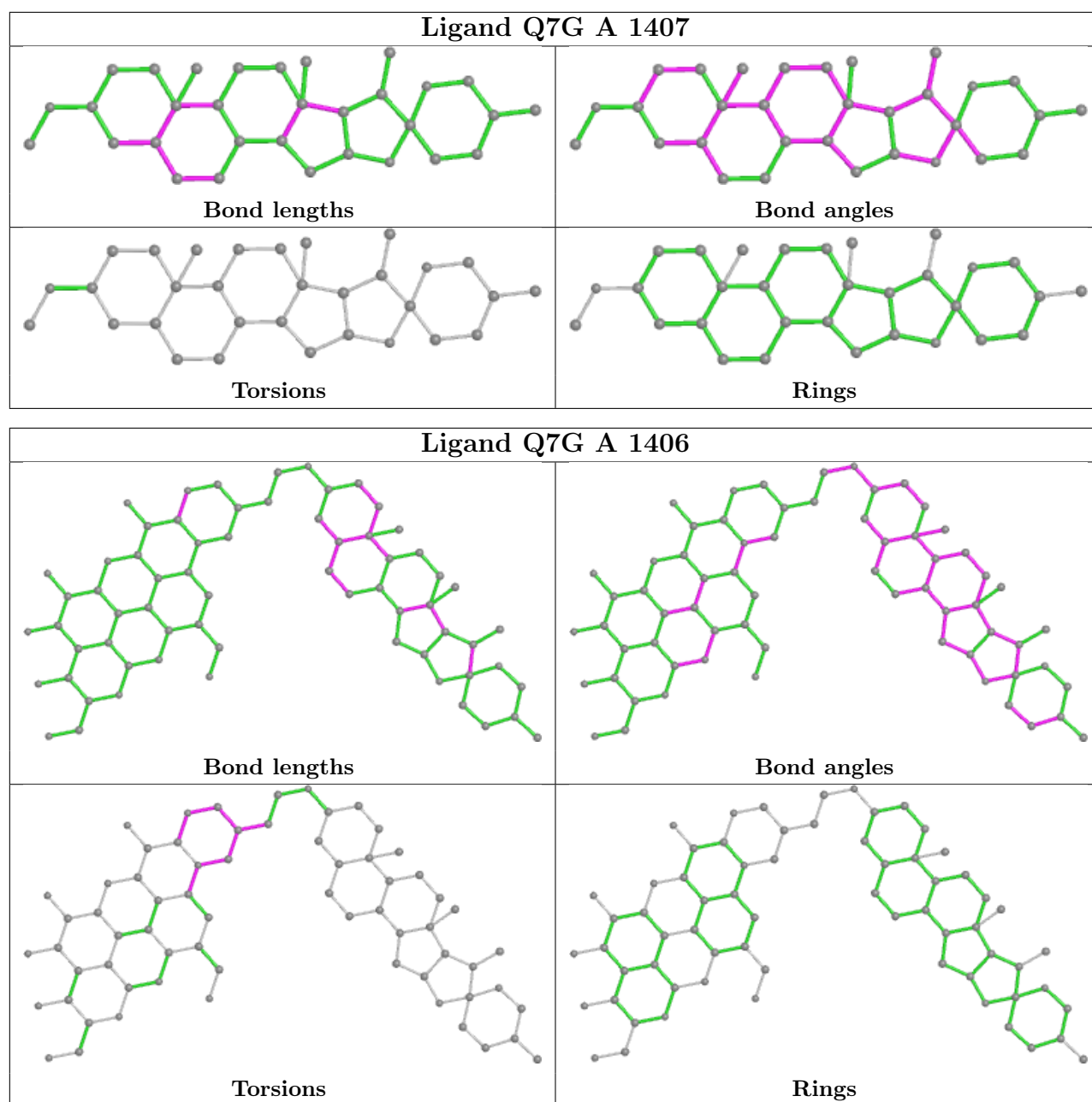
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1407	Q7G	1	0
5	A	1406	Q7G	2	0

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.

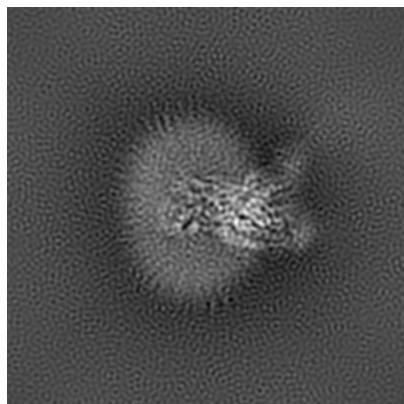
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-22689. These allow visual inspection of the internal detail of the map and identification of artifacts.

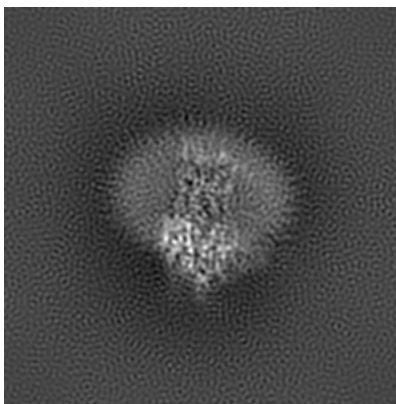
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

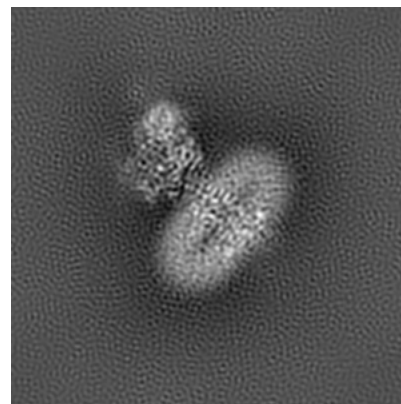
6.1.1 Primary map



X

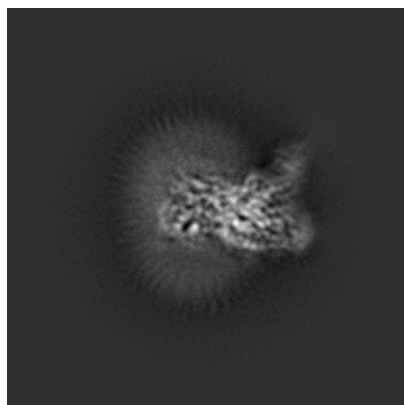


Y

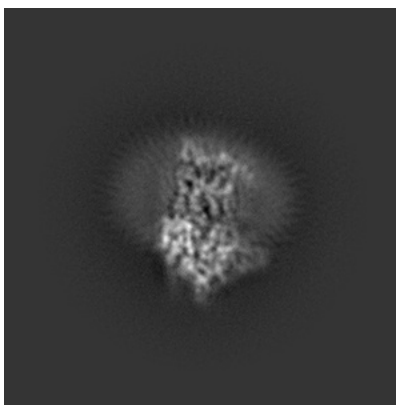


Z

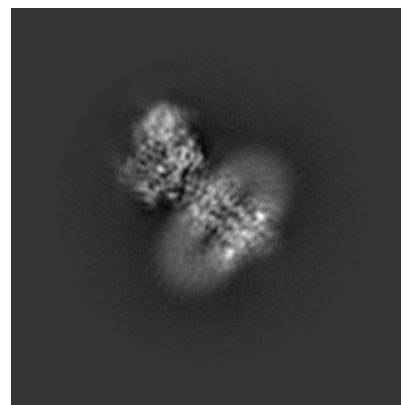
6.1.2 Raw map



X



Y

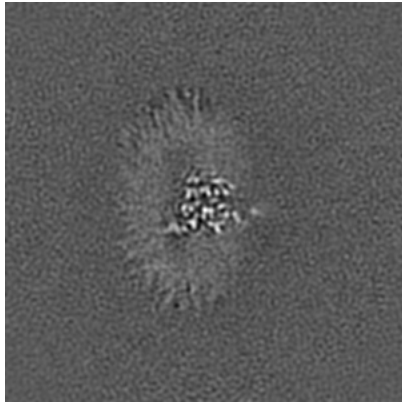


Z

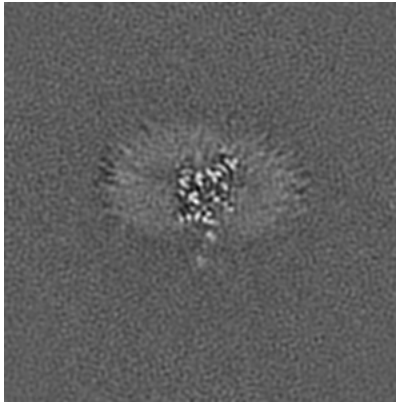
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

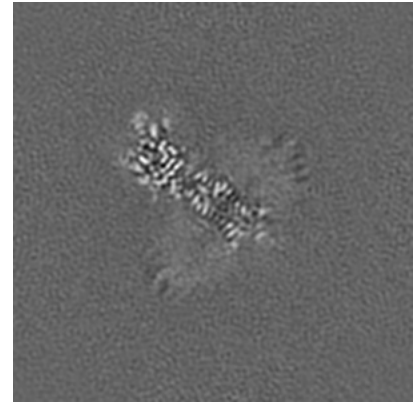
6.2.1 Primary map



X Index: 128

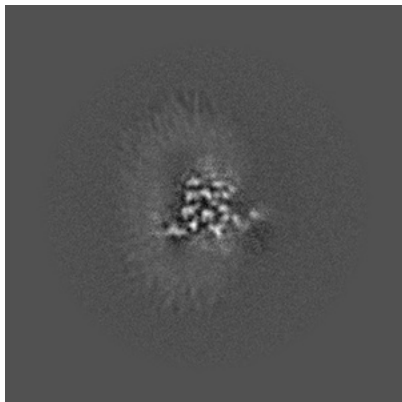


Y Index: 128

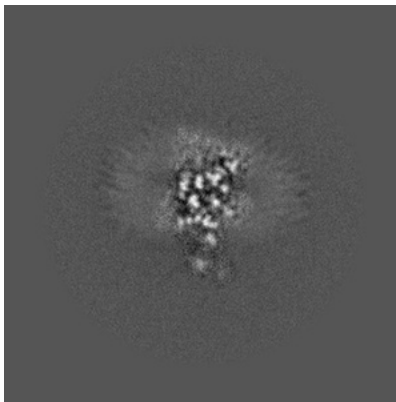


Z Index: 128

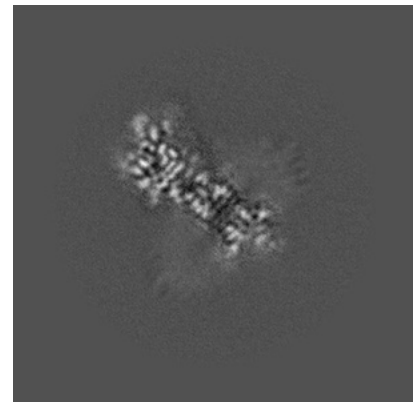
6.2.2 Raw map



X Index: 128



Y Index: 128

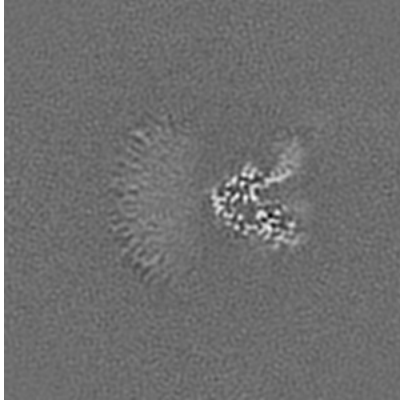


Z Index: 128

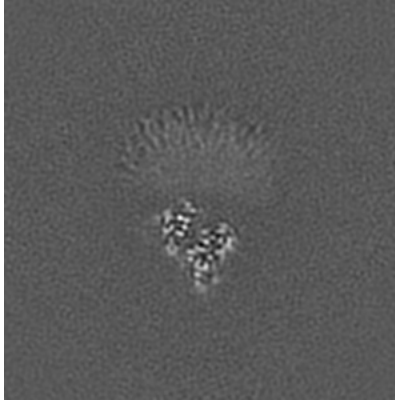
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

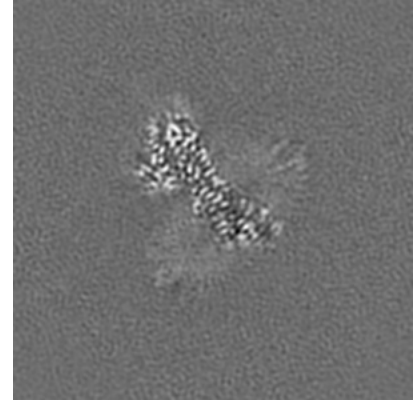
6.3.1 Primary map



X Index: 102

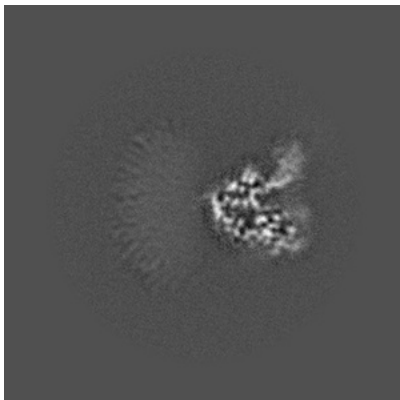


Y Index: 153

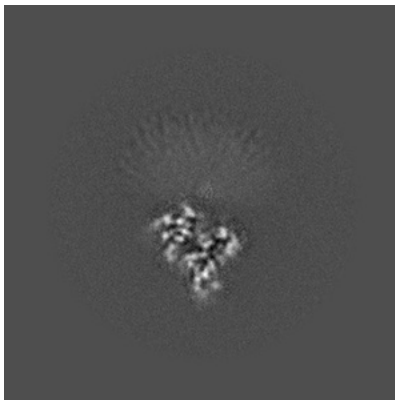


Z Index: 119

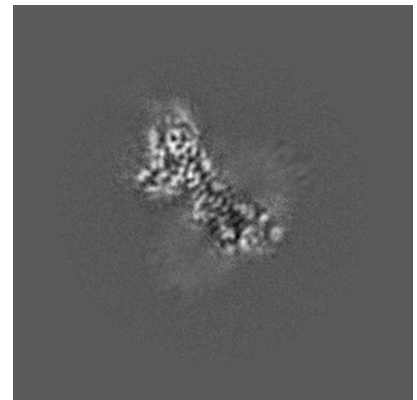
6.3.2 Raw map



X Index: 102



Y Index: 154

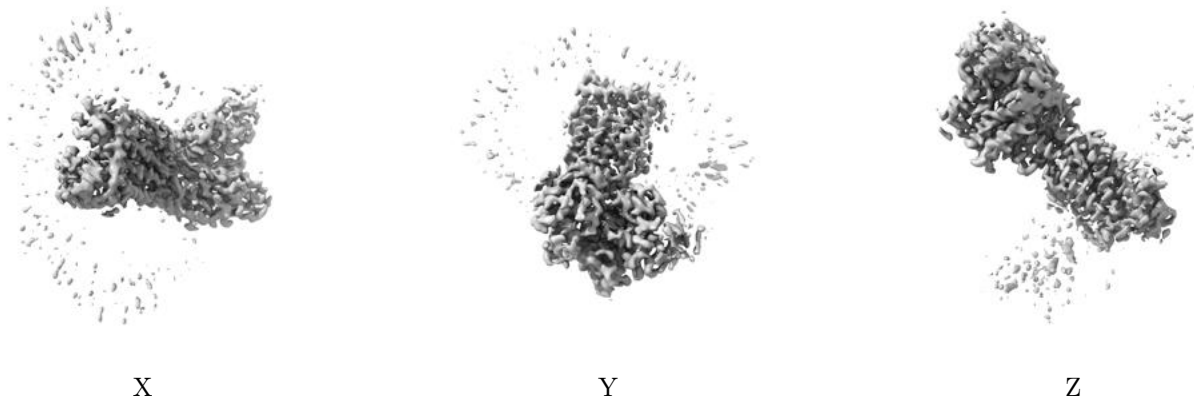


Z Index: 118

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

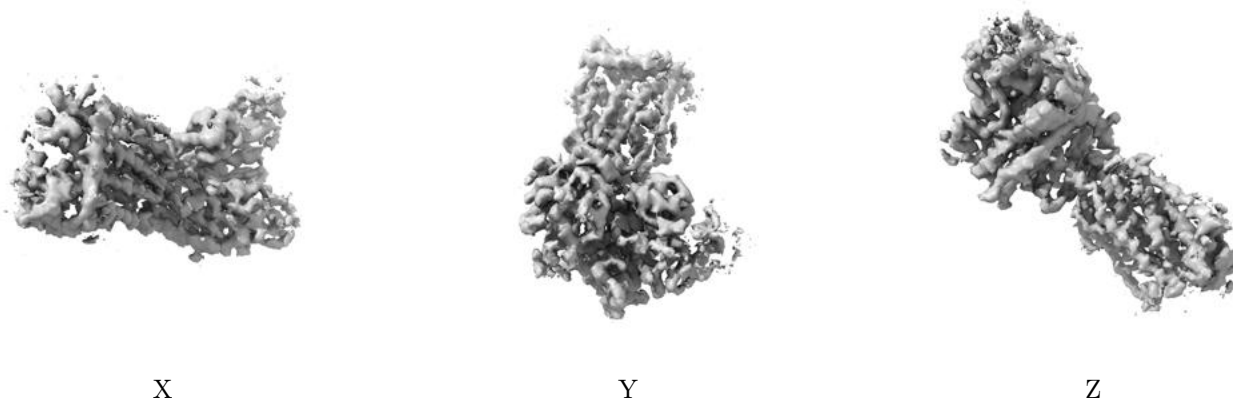
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 4.8. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

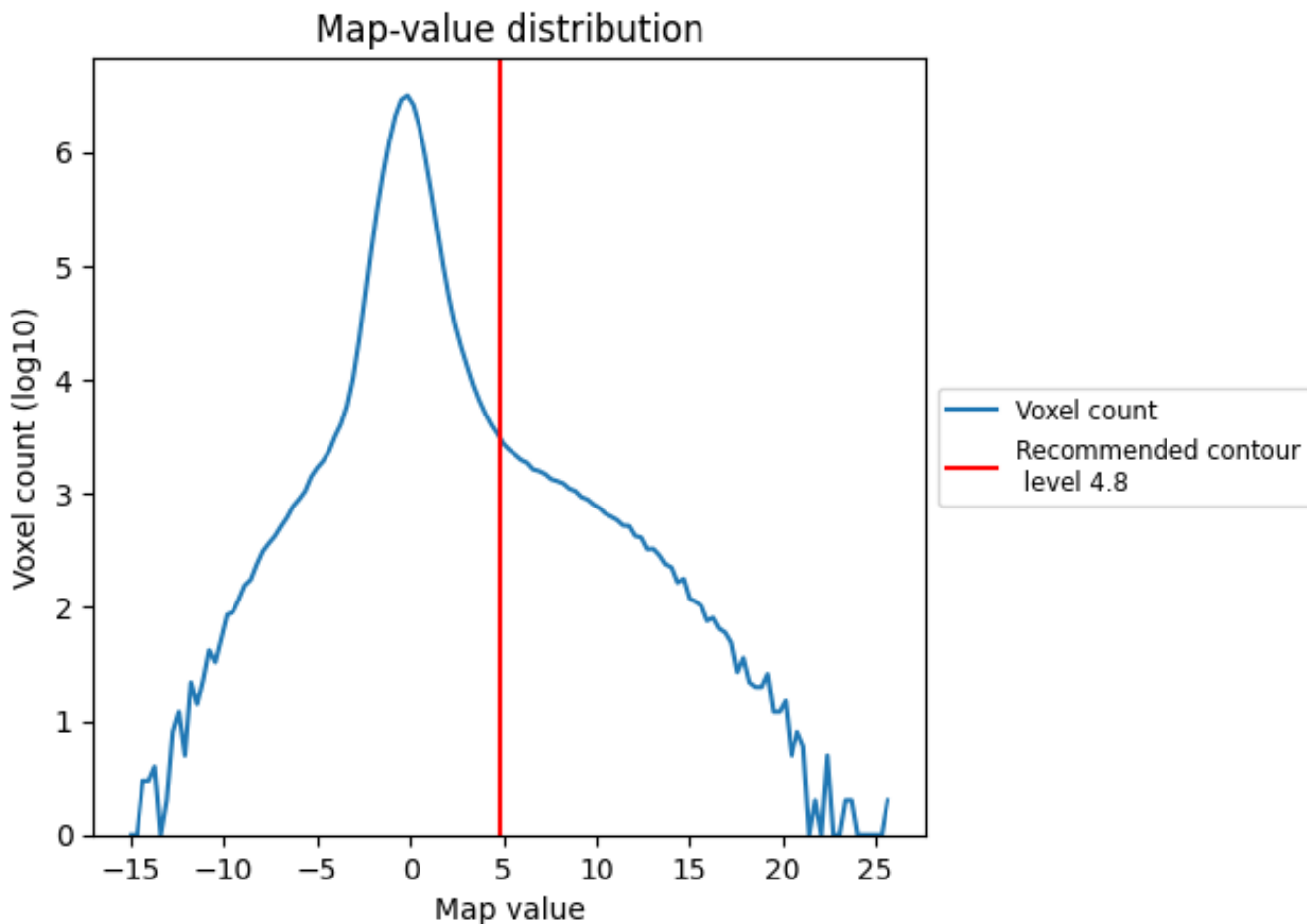
6.5 Mask visualisation [i](#)

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

7 Map analysis [i](#)

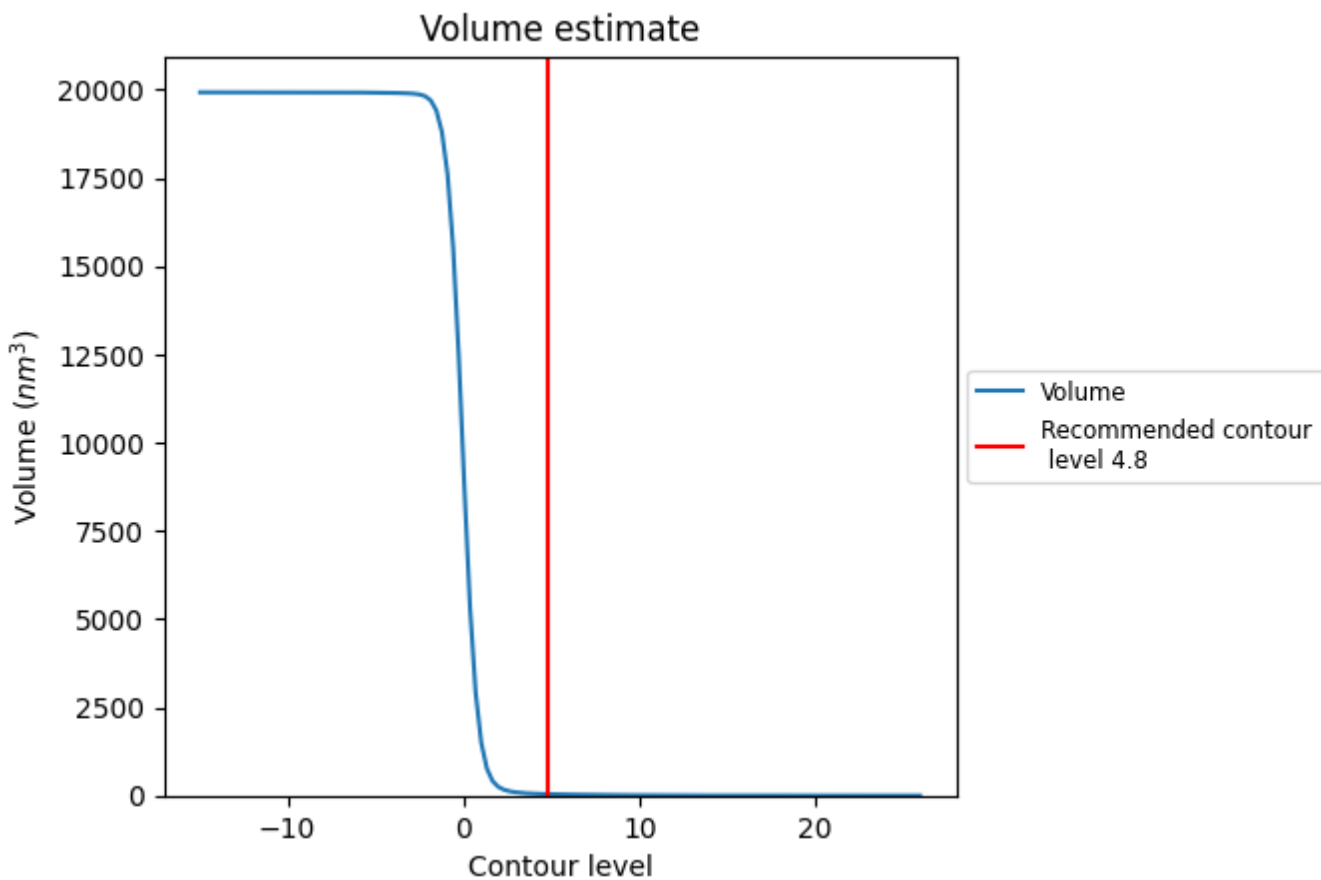
This section contains the results of statistical analysis of the map.

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.

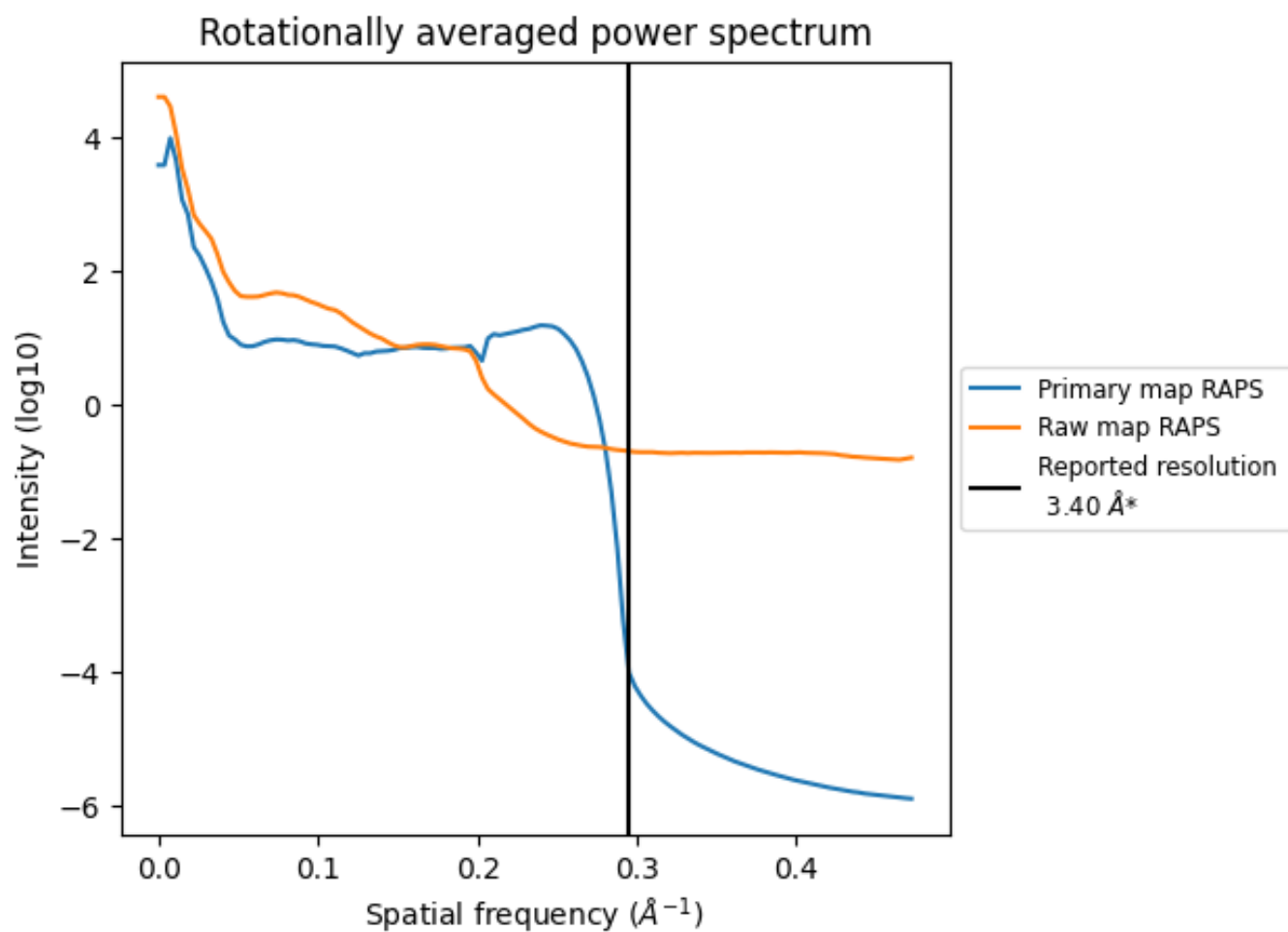
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 40 nm³; this corresponds to an approximate mass of 36 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](#)

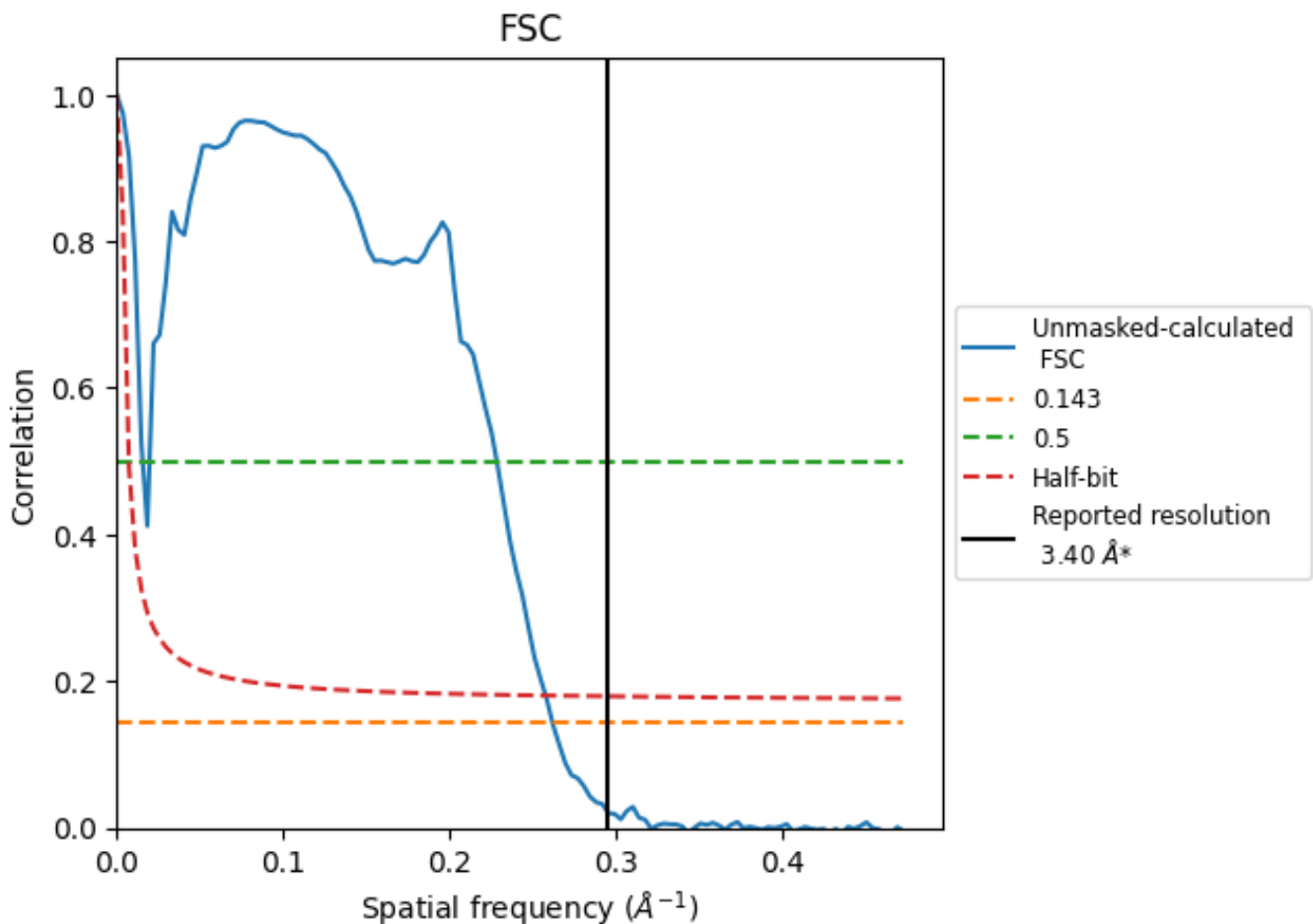


*Reported resolution corresponds to spatial frequency of 0.294 \AA^{-1}

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 0.294 Å⁻¹

8.2 Resolution estimates [i](#)

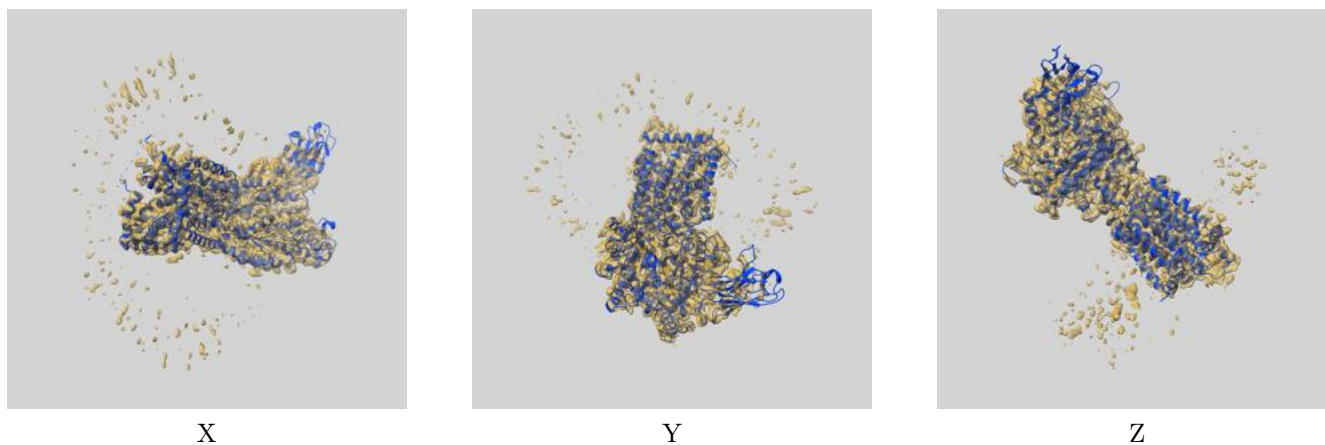
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.82	64.10	3.88

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.82 differs from the reported value 3.4 by more than 10 %

9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-22689 and PDB model 7K65. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay [i](#)



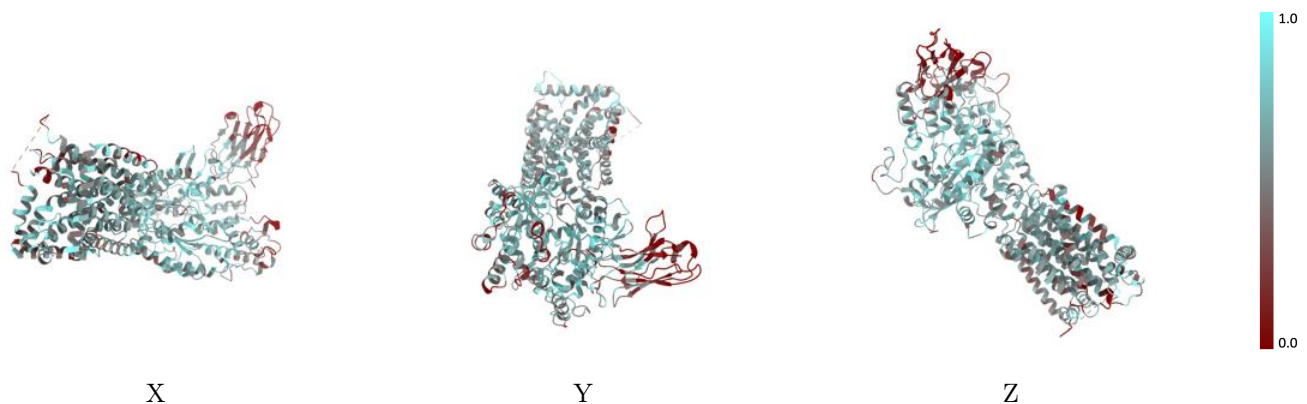
The images above show the 3D surface view of the map at the recommended contour level 4.8 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



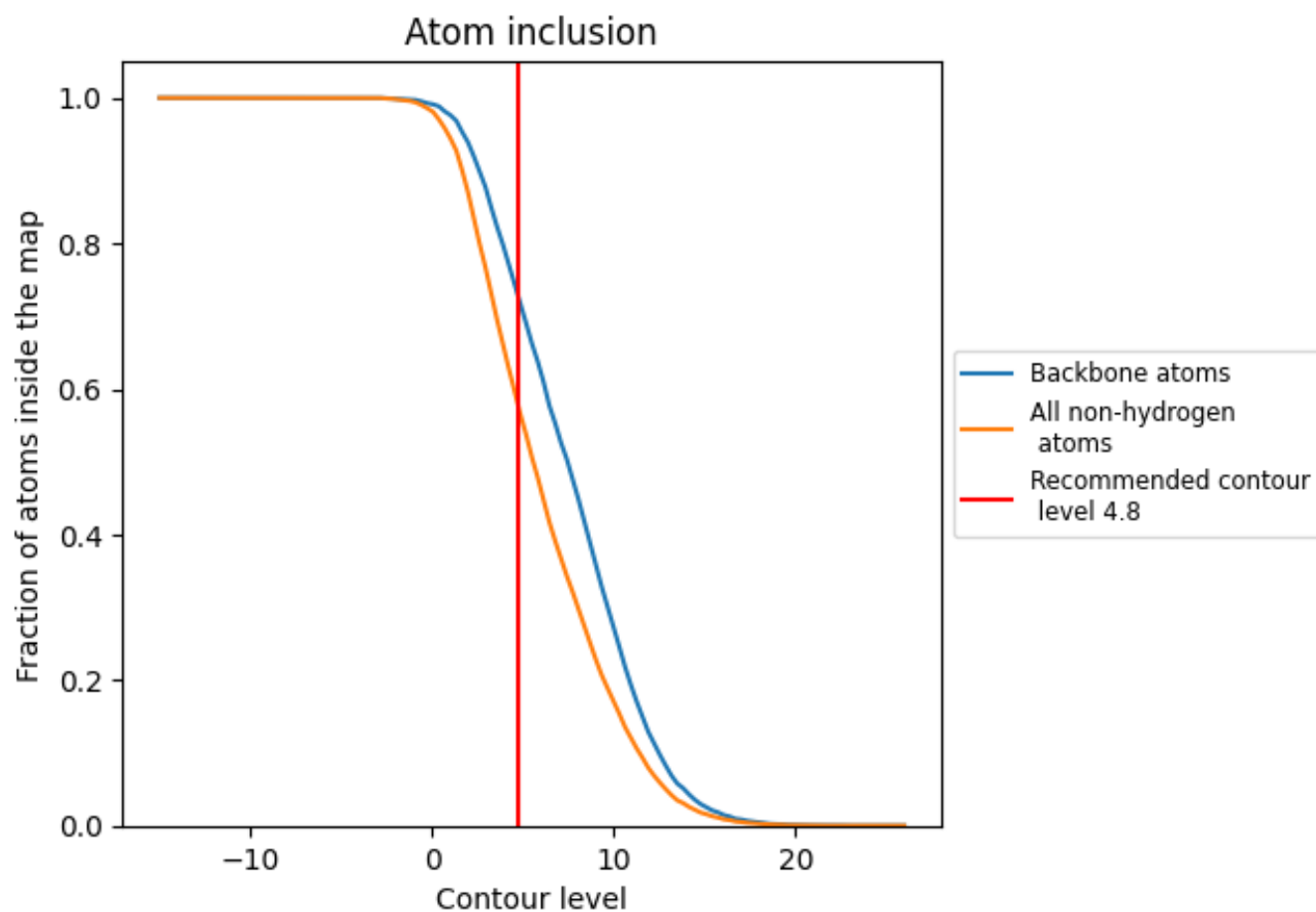
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.8).









9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 57% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (4.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5712	 0.4360
A	 0.5989	 0.4450
B	 0.3289	 0.3590
C	 0.0714	 0.3850

