



Full wwPDB EM Validation Report ⓘ

Dec 22, 2025 – 08:24 PM JST

PDB ID : 9L8L / pdb_00009181
EMDB ID : EMD-62885
Title : Structure of GPCR megacomplex bound to agonists
Authors : He, G.; Sun, Q.; Liu, X.
Deposited on : 2024-12-27
Resolution : 3.22 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:

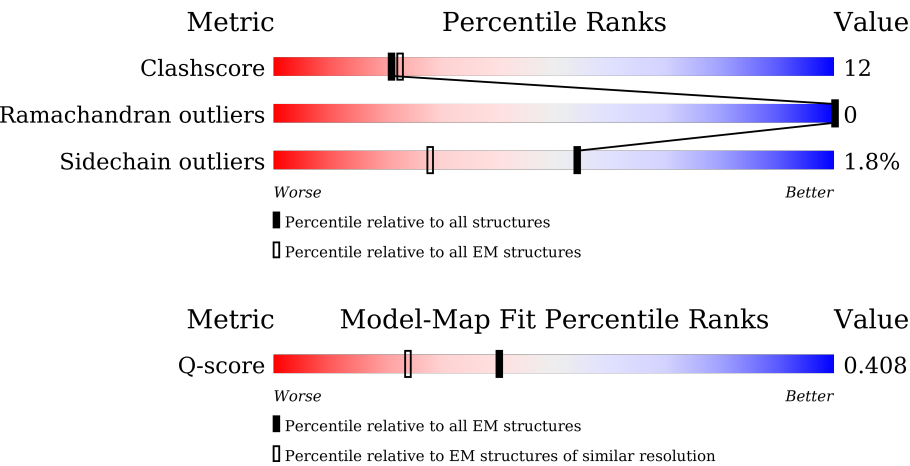
EMDB validation analysis : 0.0.1.dev129
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive 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) : 2.47

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.22 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	14612 (2.72 - 3.72)

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	394	
2	B	351	
3	C	392	
4	G	68	

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Mol	Chain	Length	Quality of chain
5	R	421	53% 13% 33%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 8997 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 Guanine nucleotide-binding protein G(s) subunit alpha isoforms short.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	229	Total	C	N	O	S	0	0
			1631	1039	294	295	3		

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	340	Total	C	N	O	S	0	0
			2425	1514	439	453	19		

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-10	MET	-	initiating methionine	UNP P54311
B	-9	HIS	-	expression tag	UNP P54311
B	-8	HIS	-	expression tag	UNP P54311
B	-7	HIS	-	expression tag	UNP P54311
B	-6	HIS	-	expression tag	UNP P54311
B	-5	HIS	-	expression tag	UNP P54311
B	-4	HIS	-	expression tag	UNP P54311
B	-3	GLY	-	expression tag	UNP P54311
B	-2	SER	-	expression tag	UNP P54311
B	-1	LEU	-	expression tag	UNP P54311
B	0	LEU	-	expression tag	UNP P54311
B	1	GLN	-	expression tag	UNP P54311

- Molecule 3 is a protein called Beta-arrestin-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	339	Total	C	N	O	S	0	0
			2375	1499	413	454	9		

- Molecule 4 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	53	Total	C	N	O	S	0	0
			357	224	66	66	1		

- Molecule 5 is a protein called Beta-2 adrenergic receptor.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	R	281	Total	C	N	O	S	0	0
			2131	1409	348	359	15		

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	-7	ASP	-	expression tag	UNP P07550
R	-6	TYR	-	expression tag	UNP P07550
R	-5	LYS	-	expression tag	UNP P07550
R	-4	ASP	-	expression tag	UNP P07550
R	-3	ASP	-	expression tag	UNP P07550
R	-2	ASP	-	expression tag	UNP P07550
R	-1	ASP	-	expression tag	UNP P07550
R	0	ALA	-	expression tag	UNP P07550
R	16	ARG	GLY	variant	UNP P07550
R	27	GLN	GLU	variant	UNP P07550
R	273	ARG	LYS	engineered mutation	UNP P07550
R	276	SER	GLY	engineered mutation	UNP P07550
R	277	VAL	ILE	engineered mutation	UNP P07550

- Molecule 6 is (3S,8S,9S,12S)-3,12-BIS(1,1-DIMETHYLETHYL)-8-HYDROXY-4,11-DIOXO-9-(PHENYLMETHYL)-6-[[4-(2-PYRIDINYL)PHENYL]METHYL]-2,5, 6,10,13-PENTAAZATETRADECANEDIOIC ACID DIMETHYL ESTER (CCD ID: DR7) (formula: C₃₈H₅₂N₆O₇) (labeled as "Ligand of Interest" by depositor).



- Molecule 7 is 8-[(1R)-2-{[1,1-dimethyl-2-(2-methylphenyl)ethyl]amino}-1-hydroxyethyl]-5-hydroxy-2H-1,4-benzoxazin-3(4H)-one (CCD ID: P0G) (formula: C₂₁H₂₆N₂O₄) (labeled as "Ligand of Interest" by depositor).

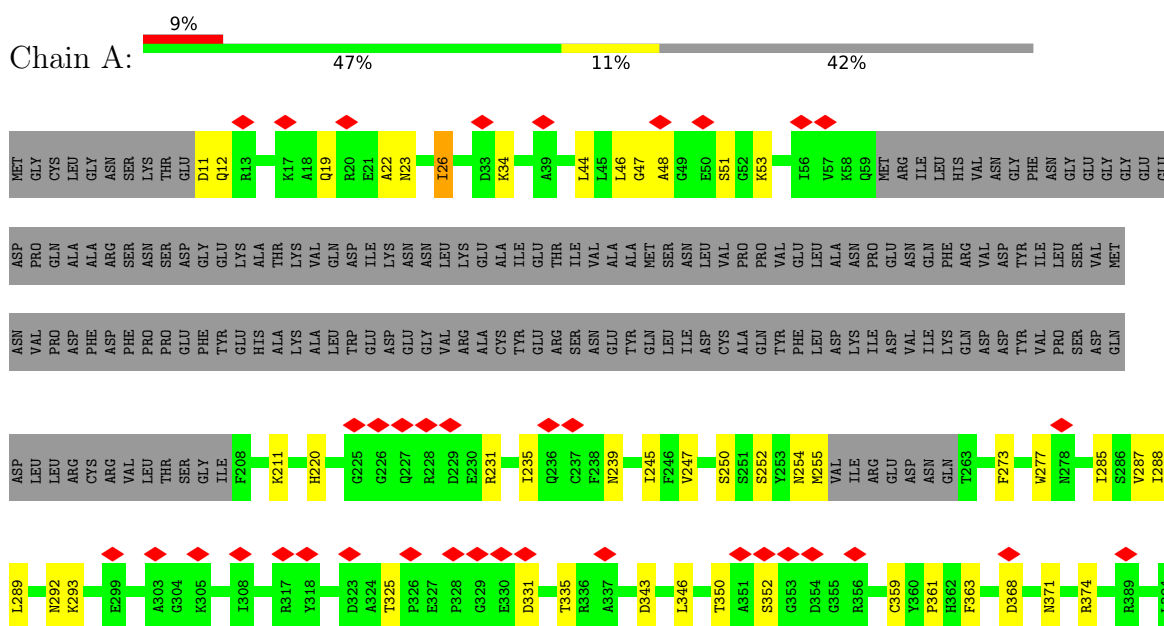


7	R	1	Total	C	N	O	0
			27	21	2	4	

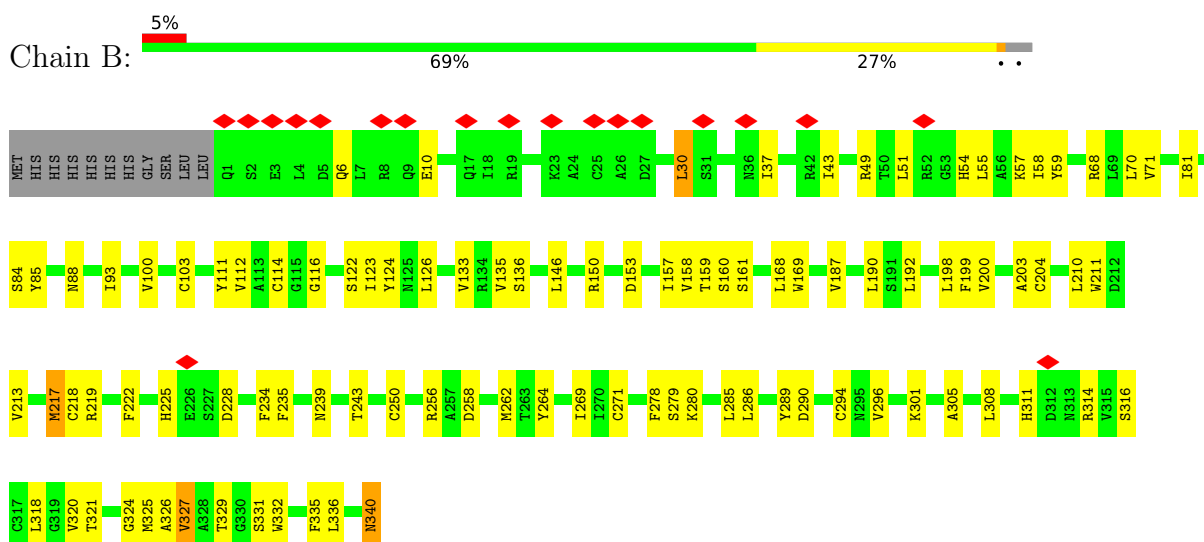
3 Residue-property plots

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

- Molecule 1: Guanine nucleotide-binding protein G(s) subunit alpha isoforms short



- Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1



Chain C:

25% 68% 18% 14%

GLY ASP LYS GLY T6 V8 F9 K10 K11 R25 D29 H30 I31 D32 L33 V34 D35 P36 V37 V40 V43 E46 E50 R51 T56 A60 F61 R62 Y63 GLY ARG GLU ASP LEU ASP VAL LEU GLY LEU THR F75 R76 R77 D78 A82 Q85 P91 E92

D93 K94 R95 P96 L97 T98 R99 L100 Q101 S102 L103 L104 L108 H111 A112 F117 E118 L119 P120 P121 N122 L123 C125 L129 Q130 P133 E134 D135 T136 G137 K138 A139 A148 F149 C150 A151 E152 M153 L154 E155 V164 Q172 Y173 A174 P175 E176 L177 P178 G179 P180 D181

P182 T183 A184 E185 T186 L187 A188 Q189 F190 S193 D194 K195 P196 L197 L203 E206 E212 F213 I214 N222 N223 T224 T227 V228 K229 R230 I231 K232 T233 S234 V235 R236 Q237 D240 I241 F244 N245 C251 P252 V253 A254 M255 E256 E257 A258 D259 D260

T261 V262 A263 P264 C269 Y272 R285 G286 L287 A288 L289 L293 K294 G295 H296 N299 L300 L305 L306 R307 E308 G309 A310 L311 N312 E313 I314 L315 G316 L317 I318 V319 S320 V323 K324 V325 K326 L327 V328 V329 S330 R331 G332 G333 L334 L335 G336 D337 S340 S341 D342 V343

Chain G:

Chain R:

53% 13% 33%

ASP	Tyr	Lys	ASP	ASP	ASP	ASP	ALA	MET	GLY	GLN	PRO	GLY	PRO	GLY	ASN	GLY	SER	ALA	PHE	LEU	LEU	ALA	PRO	ASN	ARG	SER	HIS	ALA	PRO	ASP	THR	GLN	GLN	ARG	ASP	E30	M40	S41	L42	L43	Y44	L45	N61	A57	F61	E62	F71	A78	D79	L80	W81	M82																																																
V86	F89	W99	F108	S111	I112	D113	Y114	L115	C116	V117	I121	V126	R131	Y132	I135	Q142	R151	I154	L155	M156	V157	T164	S165	F166	L167	M171	H172	Y173	Y174	R175	ALA	THR	HIS	Q179	I192	M197	F193	A198	I201	A202	S203	S204	I205	V218	Y219	V222	R239	PHE	HIS	VAL	GLN	ASN	LEU	SER	GLN	VAL	GLU	GLN	ASP	GLY	ARG	THR	LEU	ASN	CYS	SER	THR	LEU	ASN	ASP	LYS	ALA	TYR	ASN	SER	ASN	GLY	THR	GLY	GLU	GLN	SER	GLY	TYR	HIS	VAL	GLU	GLN	LYS	GLU	ASN	LEU	LEU	CYS	GLU	ASP	LEU	PRO	GLY	THR

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	154185	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	4.155	Depositor
Minimum map value	-1.977	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.056	Depositor
Recommended contour level	0.32	Depositor
Map size ($\text{\AA}$)	324.0, 324.0, 324.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.08, 1.08, 1.08	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: DR7, P0G

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	0.13	0/1663	0.31	0/2271
2	B	0.16	0/2469	0.37	0/3365
3	C	0.22	0/2421	0.51	2/3322 (0.1%)
4	G	0.17	0/362	0.46	0/497
5	R	0.29	1/2184 (0.0%)	0.52	6/2990 (0.2%)
All	All	0.21	1/9099 (0.0%)	0.45	8/12445 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	R	164	THR	N-CA	7.08	1.55	1.45

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	R	166	PHE	CA-C-O	-6.99	111.51	119.41
5	R	166	PHE	CA-CB-CG	6.75	120.55	113.80
3	C	35	ASP	CA-CB-CG	5.75	118.35	112.60
5	R	164	THR	CA-CB-OG1	-5.65	101.12	109.60
5	R	142	GLN	CA-C-N	-5.48	113.50	122.54
5	R	142	GLN	C-N-CA	-5.48	113.50	122.54
5	R	187	ASN	CB-CA-C	-5.34	101.31	110.22
3	C	333	GLY	N-CA-C	5.03	117.37	110.58

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	1631	0	1419	36	0
2	B	2425	0	2245	77	0
3	C	2375	0	2142	48	0
4	G	357	0	325	10	0
5	R	2131	0	2051	42	0
6	C	51	0	52	10	0
7	R	27	0	25	6	0
All	All	8997	0	8259	202	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 12.

All (202) 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)
5:R:111:SER:HB3	5:R:166:PHE:HD1	1.37	0.88
3:C:195:LYS:HB2	3:C:224:THR:HA	1.55	0.87
3:C:194:ASP:OD2	6:C:401:DR7:HBS	1.74	0.87
5:R:132:TYR:HB2	5:R:218:VAL:HG13	1.62	0.81
3:C:188:ARG:HA	3:C:193:SER:HB2	1.63	0.80
2:B:271:CYS:HB2	2:B:290:ASP:HB2	1.68	0.75
2:B:51:LEU:HB2	2:B:336:LEU:HB2	1.71	0.72
6:C:401:DR7:HAW	6:C:401:DR7:HBA2	1.72	0.71
5:R:43:ILE:HD11	5:R:317:VAL:HG12	1.70	0.71
5:R:111:SER:HB3	5:R:166:PHE:CD1	2.24	0.71
1:A:277:TRP:HE1	1:A:352:SER:HB3	1.56	0.70
1:A:368:ASP:OD2	1:A:371:ASN:ND2	2.26	0.68
5:R:219:TYR:HA	5:R:222:VAL:HG22	1.74	0.68
3:C:188:ARG:HA	3:C:193:SER:CB	2.24	0.67
3:C:189:GLN:HG3	3:C:190:PHE:H	1.60	0.67
5:R:117:VAL:HG21	7:R:501:P0G:HAL	1.75	0.66
4:G:44:HIS:ND1	4:G:44:HIS:O	2.29	0.66
2:B:340:ASN:HD22	2:B:340:ASN:C	2.04	0.66
3:C:222:ASN:HD22	3:C:262:VAL:HG12	1.62	0.65
5:R:51:ASN:HB3	5:R:80:LEU:HB2	1.79	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:241:ILE:HG22	3:C:317:ILE:HG23	1.81	0.62
3:C:299:ASN:ND2	3:C:300:LEU:O	2.33	0.61
2:B:311:HIS:NE2	2:B:335:PHE:O	2.31	0.61
3:C:235:VAL:HG22	3:C:323:VAL:HG12	1.82	0.61
2:B:160:SER:HB3	2:B:190:LEU:HD23	1.83	0.61
3:C:37:VAL:HB	3:C:117:PHE:HB2	1.84	0.60
2:B:235:PHE:HE2	4:G:41:CYS:HG	1.50	0.60
2:B:114:CYS:SG	2:B:122:SER:OG	2.60	0.60
5:R:289:PHE:HE1	5:R:308:TYR:HE1	1.48	0.60
2:B:43:ILE:HD11	4:G:51:LEU:HD23	1.84	0.60
2:B:111:TYR:HB3	2:B:123:ILE:HD11	1.84	0.60
2:B:320:VAL:HG22	2:B:327:VAL:HG12	1.85	0.59
1:A:343:ASP:HA	1:A:346:LEU:HB2	1.85	0.59
2:B:239:ASN:HD21	2:B:256:ARG:HD2	1.68	0.59
2:B:204:CYS:HA	2:B:228:ASP:HB2	1.85	0.58
3:C:25:ARG:HH21	3:C:293:LEU:HD22	1.67	0.58
1:A:247:VAL:HG13	1:A:292:ASN:HD22	1.69	0.58
1:A:19:GLN:HE22	2:B:88:ASN:HB2	1.69	0.57
2:B:49:ARG:NH2	2:B:85:TYR:O	2.30	0.57
6:C:401:DR7:HAW	6:C:401:DR7:CBA	2.33	0.57
1:A:346:LEU:HD21	1:A:361:PRO:HG3	1.87	0.57
2:B:58:ILE:O	2:B:316:SER:OG	2.23	0.57
5:R:126:VAL:HG21	5:R:157:VAL:HG21	1.86	0.57
2:B:225:HIS:NE2	2:B:243:THR:OG1	2.38	0.57
1:A:245:ILE:HA	1:A:288:ILE:HG23	1.87	0.56
2:B:49:ARG:NH1	4:G:61:PHE:O	2.39	0.56
3:C:189:GLN:HG3	3:C:190:PHE:N	2.20	0.56
1:A:11:ASP:OD1	1:A:12:GLN:N	2.29	0.56
3:C:99:ARG:O	3:C:103:ARG:NH2	2.39	0.56
2:B:57:LYS:HD2	2:B:59:TYR:HE1	1.71	0.56
5:R:82:MET:HG3	5:R:86:VAL:HB	1.88	0.55
1:A:247:VAL:HG13	1:A:292:ASN:ND2	2.20	0.55
2:B:6:GLN:O	2:B:10:GLU:HG2	2.07	0.55
2:B:325:MET:HA	4:G:49:PRO:HG2	1.88	0.54
5:R:41:SER:O	5:R:45:LEU:HG	2.07	0.54
6:C:401:DR7:HAS	5:R:280:GLY:C	2.32	0.54
5:R:337:GLN:HA	5:R:340:LEU:HD23	1.91	0.53
1:A:254:ASN:OD1	1:A:255:MET:N	2.42	0.53
2:B:340:ASN:C	2:B:340:ASN:ND2	2.66	0.53
3:C:194:ASP:CG	6:C:401:DR7:HAG2	2.34	0.53
3:C:188:ARG:CA	3:C:193:SER:HB2	2.36	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:23:ASN:HB2	2:B:88:ASN:HB3	1.90	0.53
1:A:211:LYS:HD3	1:A:220:HIS:HB3	1.90	0.53
2:B:153:ASP:N	2:B:153:ASP:OD1	2.41	0.53
2:B:200:VAL:HG13	2:B:234:PHE:HE1	1.74	0.53
2:B:150:ARG:HB2	2:B:192:LEU:HD23	1.91	0.52
5:R:117:VAL:HG21	7:R:501:P0G:CAL	2.39	0.52
2:B:81:ILE:HD11	2:B:112:VAL:HG21	1.91	0.52
3:C:129:LEU:HD12	3:C:286:GLY:HA2	1.92	0.52
1:A:250:SER:O	1:A:250:SER:OG	2.28	0.52
2:B:68:ARG:HG2	2:B:85:TYR:CE2	2.45	0.52
5:R:89:PHE:HB3	5:R:99:TRP:HH2	1.75	0.52
2:B:279:SER:OG	2:B:280:LYS:N	2.43	0.52
5:R:115:LEU:HB2	5:R:165:SER:OG	2.10	0.52
1:A:44:LEU:O	1:A:245:ILE:N	2.43	0.52
5:R:203:SER:HB3	7:R:501:P0G:HNAQ	1.75	0.51
3:C:124:PRO:HG3	3:C:317:ILE:H	1.75	0.51
1:A:48:ALA:HB3	1:A:51:SER:HB3	1.93	0.51
2:B:37:ILE:HG13	2:B:37:ILE:O	2.10	0.51
2:B:126:LEU:HA	2:B:133:VAL:HG22	1.92	0.51
2:B:57:LYS:HB2	2:B:332:TRP:HA	1.92	0.51
2:B:200:VAL:HG12	2:B:210:LEU:HA	1.92	0.51
3:C:125:CYS:SG	3:C:172:GLN:HG3	2.51	0.51
1:A:34:LYS:HB2	2:B:55:LEU:HD22	1.92	0.51
2:B:103:CYS:O	2:B:150:ARG:NH1	2.42	0.51
5:R:108:PHE:O	5:R:112:ILE:HG22	2.10	0.51
1:A:289:LEU:HB2	1:A:361:PRO:HA	1.92	0.50
2:B:93:ILE:HD11	2:B:133:VAL:HB	1.93	0.50
3:C:189:GLN:N	3:C:193:SER:HB2	2.25	0.50
1:A:22:ALA:O	1:A:26:ILE:HD12	2.11	0.50
5:R:201:ILE:O	5:R:205:ILE:HG23	2.11	0.50
3:C:101:GLN:HA	3:C:104:LEU:HB2	1.94	0.50
5:R:171:MET:HE1	5:R:173:TRP:CZ3	2.46	0.50
1:A:331:ASP:O	1:A:335:THR:HG23	2.12	0.50
2:B:123:ILE:HG23	2:B:136:SER:HB3	1.92	0.50
2:B:296:VAL:HG12	2:B:305:ALA:HB3	1.94	0.50
2:B:210:LEU:HD23	2:B:219:ARG:HB2	1.94	0.50
5:R:289:PHE:O	5:R:292:VAL:HG12	2.12	0.49
1:A:346:LEU:O	1:A:350:THR:HG23	2.13	0.49
3:C:194:ASP:OD1	6:C:401:DR7:HAG2	2.13	0.49
1:A:47:GLY:HA3	1:A:53:LYS:HD2	1.94	0.49
2:B:100:VAL:HA	2:B:116:GLY:HA3	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:231:ILE:HG22	3:C:327:LEU:HD13	1.94	0.49
5:R:113:ASP:O	5:R:117:VAL:HG22	2.13	0.48
1:A:325:THR:HG21	1:A:335:THR:HB	1.95	0.48
2:B:250:CYS:HB2	2:B:264:TYR:HB2	1.95	0.48
1:A:51:SER:O	1:A:293:LYS:NZ	2.47	0.48
2:B:222:PHE:HE1	2:B:258:ASP:HA	1.79	0.48
2:B:331:SER:OG	2:B:332:TRP:N	2.46	0.48
5:R:71:PHE:HD1	5:R:154:ILE:HD11	1.78	0.48
3:C:7:ARG:HH21	3:C:9:PHE:HE1	1.62	0.48
3:C:50:GLU:HG2	3:C:151:ALA:HA	1.96	0.48
5:R:113:ASP:OD1	5:R:316:TYR:OH	2.27	0.48
1:A:239:ASN:HD21	2:B:57:LYS:HZ3	1.62	0.48
5:R:142:GLN:H	5:R:142:GLN:CD	2.20	0.47
2:B:70:LEU:HD23	2:B:84:SER:HB3	1.96	0.47
3:C:31:ILE:HA	3:C:305:LEU:HD22	1.95	0.47
3:C:212:GLU:HG2	3:C:213:PRO:HD2	1.96	0.47
5:R:131:ARG:O	5:R:135:ILE:HG12	2.15	0.47
2:B:286:LEU:HD21	4:G:50:LEU:HD21	1.97	0.47
1:A:285:ILE:HD13	1:A:285:ILE:HA	1.80	0.46
3:C:11:LYS:HG2	3:C:164:VAL:HG23	1.98	0.46
3:C:40:VAL:HG11	3:C:112:ALA:HB1	1.97	0.46
5:R:289:PHE:HE1	5:R:308:TYR:CE1	2.31	0.46
5:R:309:ILE:HG12	7:R:501:P0G:HAH	1.98	0.46
2:B:37:ILE:HD11	2:B:301:LYS:HG3	1.99	0.45
2:B:294:CYS:HB3	2:B:308:LEU:HB2	1.97	0.45
2:B:217:MET:SD	2:B:217:MET:N	2.87	0.45
5:R:111:SER:CB	5:R:166:PHE:HD1	2.18	0.45
1:A:252:SER:O	1:A:252:SER:OG	2.35	0.45
2:B:124:TYR:HD1	2:B:135:VAL:HA	1.81	0.45
1:A:273:PHE:HE1	1:A:287:VAL:HG11	1.82	0.45
2:B:30:LEU:HD13	2:B:262:MET:HE2	1.99	0.45
2:B:192:LEU:HD13	2:B:199:PHE:HB3	1.99	0.45
3:C:195:LYS:O	3:C:196:PRO:C	2.59	0.45
5:R:193:PHE:HB2	7:R:501:P0G:HAAA	1.99	0.45
2:B:222:PHE:CE1	2:B:258:ASP:HA	2.52	0.44
2:B:85:TYR:CE1	4:G:60:PRO:HB2	2.53	0.44
6:C:401:DR7:HBA1	6:C:401:DR7:HBC1	1.73	0.44
2:B:200:VAL:HG13	2:B:234:PHE:CE1	2.52	0.44
3:C:60:ALA:HA	3:C:78:ASP:HA	1.98	0.44
3:C:203:LEU:HD21	3:C:214:ILE:HD11	2.00	0.44
2:B:159:THR:OG1	2:B:169:TRP:NE1	2.49	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:R:111:SER:CB	5:R:166:PHE:CD1	2.99	0.44
3:C:194:ASP:OD2	6:C:401:DR7:HAG2	2.18	0.43
3:C:335:LEU:N	3:C:337:ASP:OD1	2.51	0.43
5:R:40:MET:O	5:R:43:ILE:HG22	2.18	0.43
2:B:198:LEU:HD23	2:B:210:LEU:HD11	2.00	0.43
3:C:11:LYS:HG2	3:C:164:VAL:CG2	2.48	0.43
5:R:117:VAL:O	5:R:121:ILE:HG12	2.18	0.43
5:R:305:LYS:O	5:R:309:ILE:HG13	2.18	0.43
5:R:311:LEU:HA	5:R:314:ILE:HG12	2.00	0.43
2:B:54:HIS:CG	2:B:58:ILE:HD11	2.53	0.43
2:B:146:LEU:HD23	2:B:161:SER:HB2	2.00	0.43
3:C:130:GLN:HG3	3:C:289:LEU:HD11	2.01	0.43
5:R:167:LEU:O	5:R:171:MET:HB3	2.19	0.43
7:R:501:P0G:HABB	7:R:501:P0G:HANA	1.77	0.43
5:R:171:MET:HB3	5:R:171:MET:HE3	1.75	0.43
2:B:314:ARG:HE	2:B:314:ARG:HB3	1.47	0.43
3:C:194:ASP:OD2	6:C:401:DR7:CBN	2.67	0.43
3:C:314:ILE:HG12	3:C:318:ILE:HG13	2.01	0.43
2:B:71:VAL:HG23	2:B:81:ILE:HG12	2.00	0.43
3:C:229:LYS:N	3:C:328:VAL:O	2.44	0.43
2:B:168:LEU:HD12	2:B:213:VAL:HB	2.01	0.42
5:R:335:ALA:O	5:R:339:LEU:HG	2.19	0.42
2:B:157:ILE:HG23	2:B:169:TRP:HB2	2.01	0.42
1:A:46:LEU:HD12	1:A:46:LEU:HA	1.86	0.42
2:B:85:TYR:HE1	4:G:60:PRO:HB2	1.84	0.42
3:C:148:ALA:HB3	3:C:164:VAL:HG13	1.99	0.42
2:B:279:SER:HB2	4:G:50:LEU:HD23	2.01	0.42
2:B:211:TRP:CZ3	2:B:218:CYS:HB2	2.55	0.42
3:C:43:VAL:O	3:C:111:HIS:HB3	2.20	0.42
3:C:188:ARG:HD3	6:C:401:DR7:HAA1	2.02	0.42
3:C:285:ARG:HD2	3:C:285:ARG:HA	1.70	0.42
5:R:328:ARG:O	5:R:328:ARG:HG2	2.19	0.42
1:A:239:ASN:N	1:A:239:ASN:OD1	2.53	0.42
2:B:278:PHE:CZ	2:B:285:LEU:HD13	2.54	0.42
1:A:231:ARG:O	1:A:235:ILE:HG12	2.20	0.41
2:B:57:LYS:HD2	2:B:59:TYR:CE1	2.52	0.41
3:C:203:LEU:HD12	3:C:203:LEU:HA	1.93	0.41
5:R:171:MET:HE1	5:R:173:TRP:CE3	2.55	0.41
2:B:112:VAL:HG23	2:B:126:LEU:HD11	2.03	0.41
2:B:321:THR:OG1	2:B:324:GLY:N	2.53	0.41
2:B:187:VAL:HA	2:B:203:ALA:HA	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:227:THR:HG22	3:C:264:PRO:HD3	2.02	0.41
1:A:289:LEU:HD23	1:A:359:CYS:SG	2.61	0.41
2:B:235:PHE:HE2	4:G:41:CYS:SG	2.43	0.41
2:B:318:LEU:CD1	2:B:329:THR:HG22	2.50	0.41
3:C:182:PRO:HB2	3:C:347:LEU:HD23	2.03	0.41
1:A:363:PHE:O	1:A:374:ARG:NH1	2.53	0.41
2:B:71:VAL:HG21	2:B:112:VAL:HG11	2.03	0.41
2:B:269:ILE:HG21	2:B:289:TYR:CE2	2.55	0.41
3:C:56:THR:OG1	3:C:82:ALA:O	2.25	0.41
3:C:130:GLN:OE1	3:C:287:LEU:HB3	2.21	0.41
5:R:121:ILE:HD12	5:R:282:PHE:HE1	1.87	0.40
1:A:289:LEU:HD13	1:A:289:LEU:HA	1.91	0.40
1:A:23:ASN:C	1:A:23:ASN:OD1	2.64	0.40
1:A:23:ASN:ND2	2:B:88:ASN:OD1	2.55	0.40
1:A:239:ASN:HD21	2:B:57:LYS:NZ	2.19	0.40
2:B:321:THR:HG23	2:B:326:ALA:O	2.21	0.40
3:C:188:ARG:C	3:C:193:SER:HB2	2.46	0.40
5:R:330:PRO:HG3	5:R:333:ARG:HH22	1.85	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	223/394 (57%)	203 (91%)	20 (9%)	0	100	100
2	B	338/351 (96%)	311 (92%)	27 (8%)	0	100	100
3	C	335/392 (86%)	295 (88%)	40 (12%)	0	100	100
4	G	51/68 (75%)	46 (90%)	5 (10%)	0	100	100
5	R	275/421 (65%)	264 (96%)	11 (4%)	0	100	100
All	All	1222/1626 (75%)	1119 (92%)	103 (8%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	139/351 (40%)	138 (99%)	1 (1%)	81	90
2	B	229/293 (78%)	224 (98%)	5 (2%)	47	71
3	C	222/349 (64%)	217 (98%)	5 (2%)	45	70
4	G	29/56 (52%)	29 (100%)	0	100	100
5	R	213/369 (58%)	209 (98%)	4 (2%)	52	74
All	All	832/1418 (59%)	817 (98%)	15 (2%)	54	75

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	ILE
2	B	30	LEU
2	B	158	VAL
2	B	217	MET
2	B	327	VAL
2	B	340	ASN
3	C	164	VAL
3	C	197	LEU
3	C	219	HIS
3	C	237	GLN
3	C	352	MET
5	R	156	MET
5	R	165	SER
5	R	187	ASN
5	R	312	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	23	ASN
2	B	176	GLN
2	B	259	GLN
3	C	210	HIS
3	C	222	ASN
3	C	237	GLN
3	C	299	ASN
3	C	311	ASN
3	C	353	HIS
4	G	59	ASN
5	R	312	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](#)

2 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	$\# Z > 2$
7	P0G	R	501	-	27,29,29	1.09	3 (11%)	32,42,42	0.88	2 (6%)
6	DR7	C	401	-	51,53,53	0.75	1 (1%)	67,74,74	1.96	8 (11%)

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
7	P0G	R	501	-	-	5/15/24/24	0/3/3/3
6	DR7	C	401	-	-	36/56/60/60	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	R	501	P0G	CAK-CAU	-3.15	1.33	1.39
7	R	501	P0G	CAL-CAW	-2.44	1.36	1.39
6	C	401	DR7	CBR-NBD	-2.35	1.33	1.37
7	R	501	P0G	CAS-NAQ	-2.32	1.32	1.35

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	401	DR7	CBV-CBN-NBH	7.44	125.13	114.23
6	C	401	DR7	CBY-CBV-CBN	7.02	119.40	112.81
6	C	401	DR7	OAL-CBN-NBH	-6.01	113.81	123.49
6	C	401	DR7	CBN-NBH-NBW	5.66	133.40	121.73
6	C	401	DR7	CBT-NBG-C	4.05	130.22	123.07
6	C	401	DR7	CBY-CBV-NBF	-3.21	107.82	111.84
6	C	401	DR7	CAF-CBY-CBV	3.07	115.91	109.70
6	C	401	DR7	CBA-CBT-NBG	2.43	113.62	110.07
7	R	501	P0G	CAN-NAP-CBA	-2.16	113.98	116.36
7	R	501	P0G	CAB-CBA-NAP	-2.16	104.87	109.91

There are no chirality outliers.

All (41) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	C	401	DR7	OBI-CBK-N-CA
6	C	401	DR7	CB-CA-N-CBK
6	C	401	DR7	C-CA-N-CBK
6	C	401	DR7	N-CA-CB-CG2
6	C	401	DR7	C-CA-CB-CAE
6	C	401	DR7	C-CA-CB-CG2
6	C	401	DR7	C-CA-CB-CG1
6	C	401	DR7	CBA-CBT-NBG-C

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Mol	Chain	Res	Type	Atoms
6	C	401	DR7	CBC-CBS-CBT-NBG
6	C	401	DR7	OAM-CBS-CBT-CBA
6	C	401	DR7	CBC-CBS-CBT-CBA
6	C	401	DR7	NBW-CBC-CBS-CBT
6	C	401	DR7	NBW-CBC-CBS-OAM
6	C	401	DR7	CBN-NBH-NBW-CBB
6	C	401	DR7	CBP-CBB-NBW-CBC
6	C	401	DR7	CBP-CBB-NBW-NBH
6	C	401	DR7	OAL-CBN-NBH-NBW
6	C	401	DR7	CBV-CBN-NBH-NBW
6	C	401	DR7	CBN-CBV-CBY-CAH
6	C	401	DR7	CBN-CBV-CBY-CAF
6	C	401	DR7	CBN-CBV-CBY-CAG
6	C	401	DR7	NBF-CBV-CBY-CAG
6	C	401	DR7	NBF-CBL-OBJ-CAB
6	C	401	DR7	OAJ-CBL-OBJ-CAB
7	R	501	P0G	CAV-CAO-CBA-CAB
7	R	501	P0G	CAV-CAO-CBA-CAC
7	R	501	P0G	CAV-CAO-CBA-NAP
6	C	401	DR7	OAI-CBK-N-CA
6	C	401	DR7	N-CA-CB-CAE
6	C	401	DR7	NBF-CBV-CBY-CAH
6	C	401	DR7	OAJ-CBL-NBF-CBV
6	C	401	DR7	N-CA-CB-CG1
6	C	401	DR7	NBF-CBV-CBY-CAF
6	C	401	DR7	OBJ-CBL-NBF-CBV
6	C	401	DR7	CBN-NBH-NBW-CBC
6	C	401	DR7	OAM-CBS-CBT-NBG
6	C	401	DR7	NBH-CBN-CBV-CBY
6	C	401	DR7	OAL-CBN-CBV-CBY
7	R	501	P0G	CAZ-CAN-NAP-CBA
6	C	401	DR7	N-CBK-OBI-CAA
7	R	501	P0G	CAL-CAW-CAZ-OAF

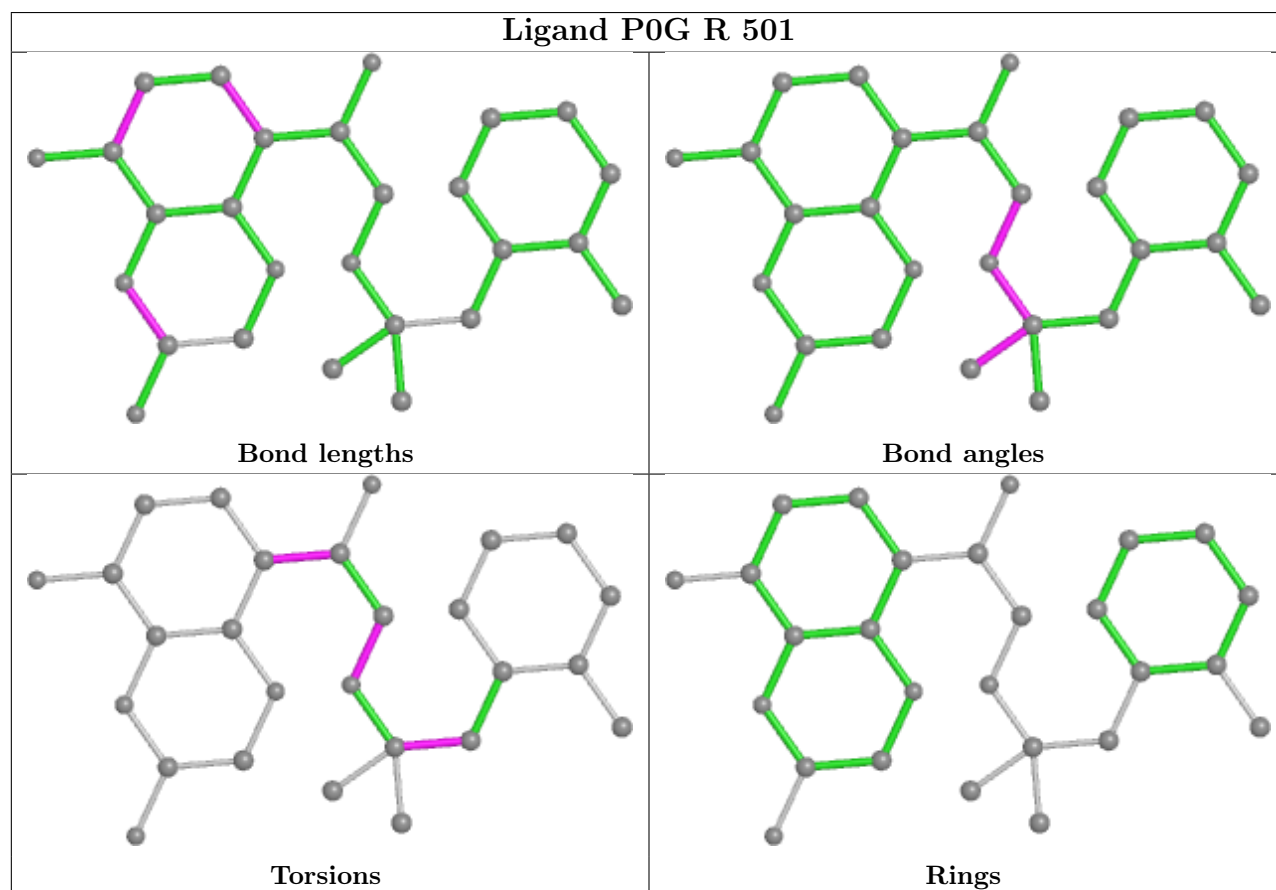
There are no ring outliers.

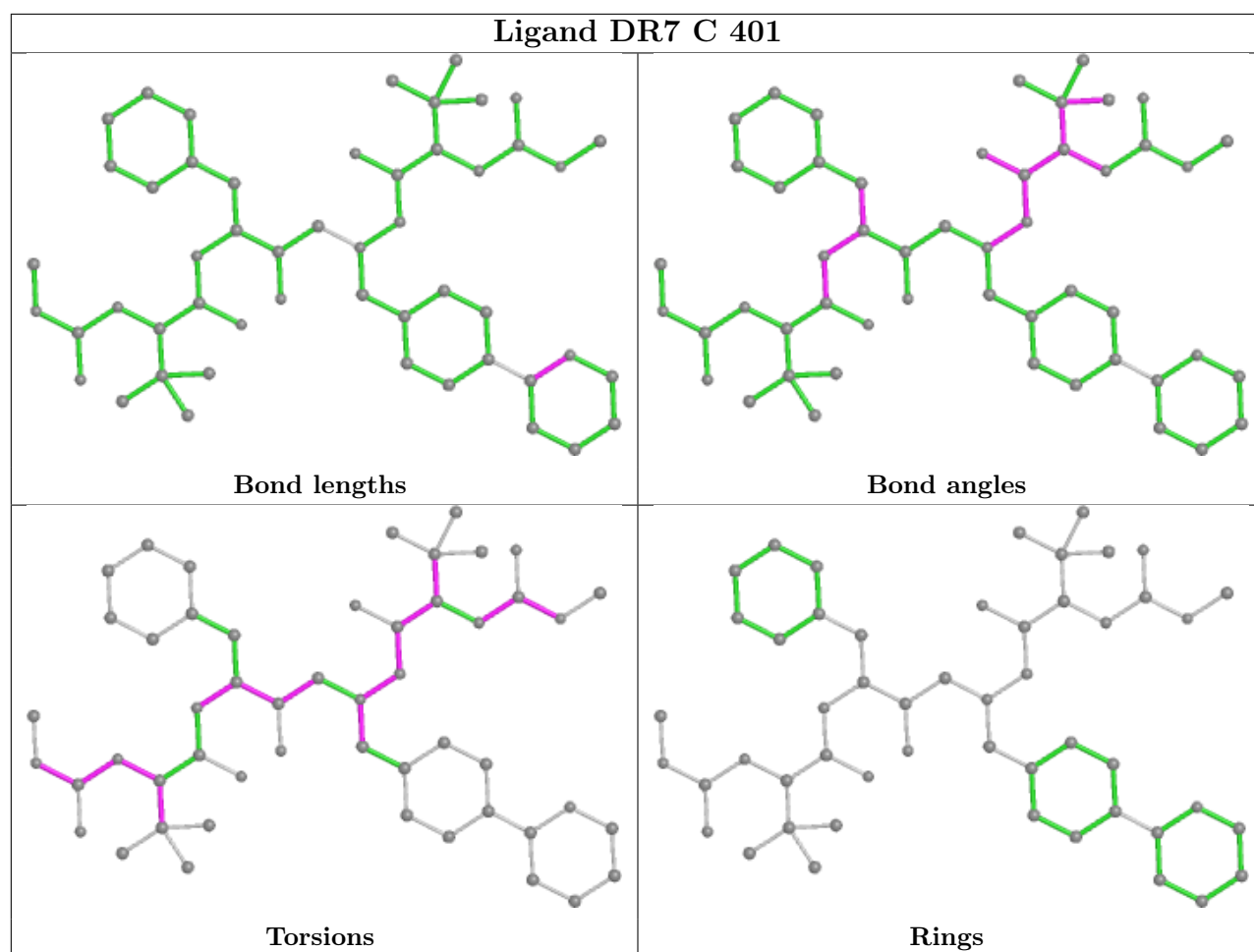
2 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	R	501	P0G	6	0
6	C	401	DR7	10	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.

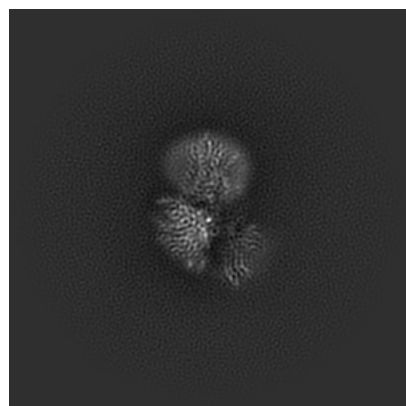
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-62885. These allow visual inspection of the internal detail of the map and identification of artifacts.

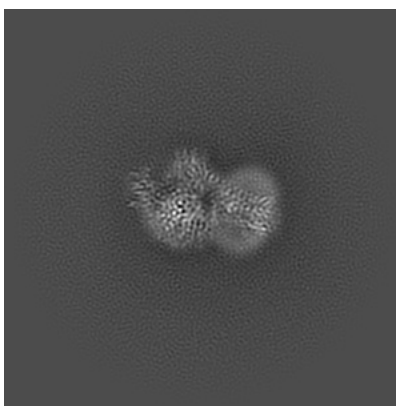
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

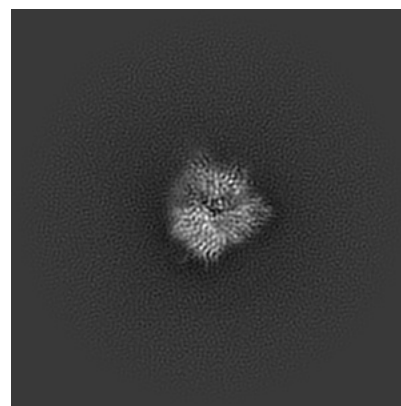
6.1.1 Primary map



X

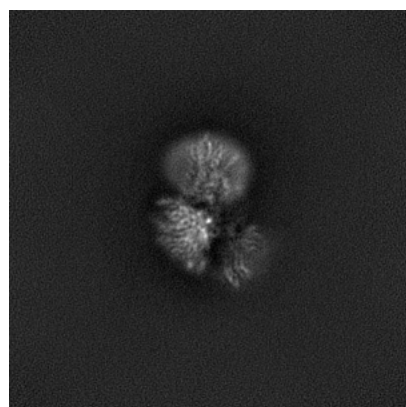


Y

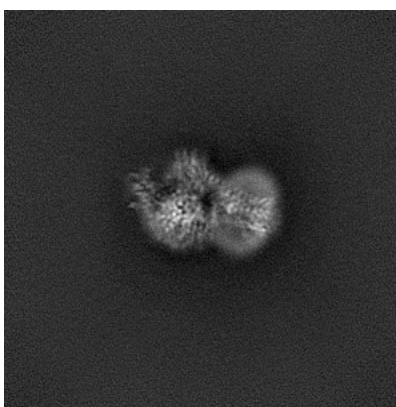


Z

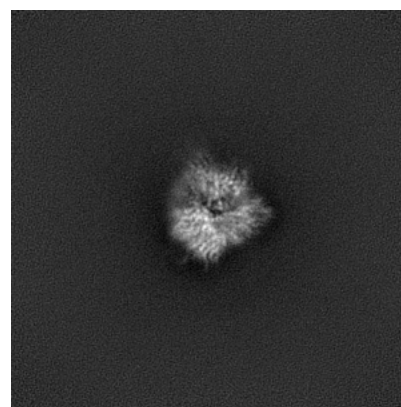
6.1.2 Raw map



X



Y

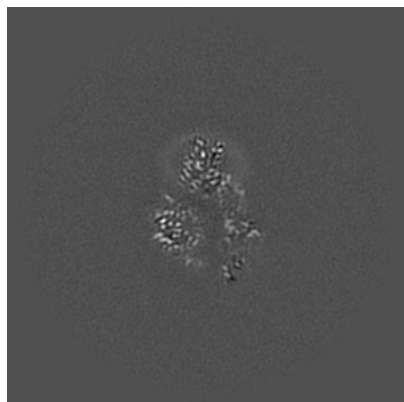


Z

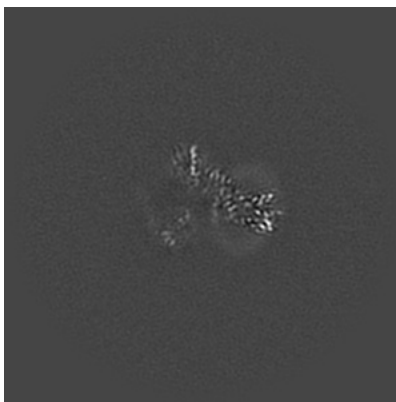
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

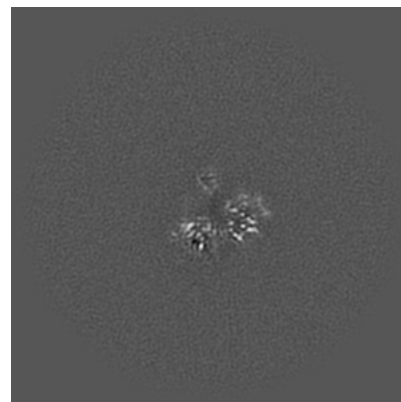
6.2.1 Primary map



X Index: 150

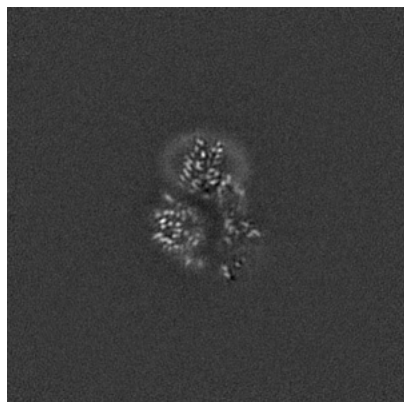


Y Index: 150

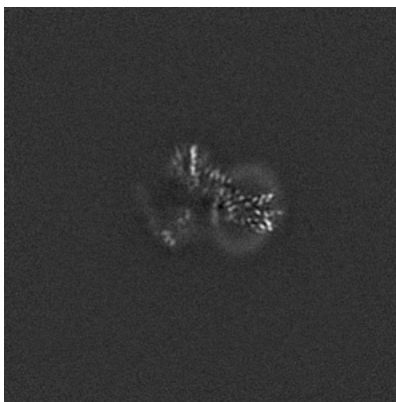


Z Index: 150

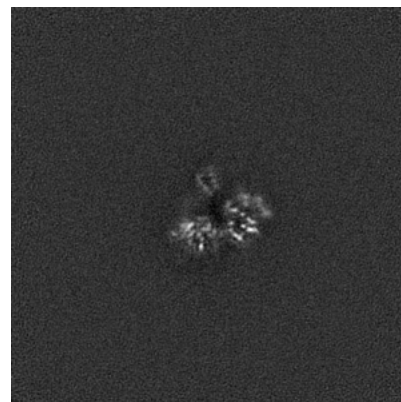
6.2.2 Raw map



X Index: 150



Y Index: 150

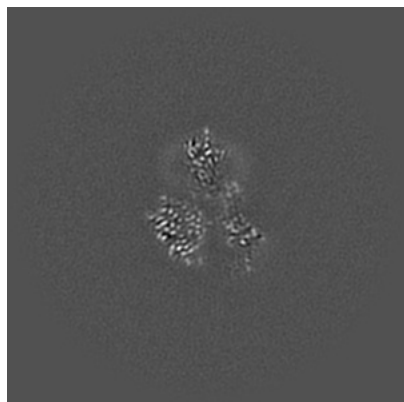


Z Index: 150

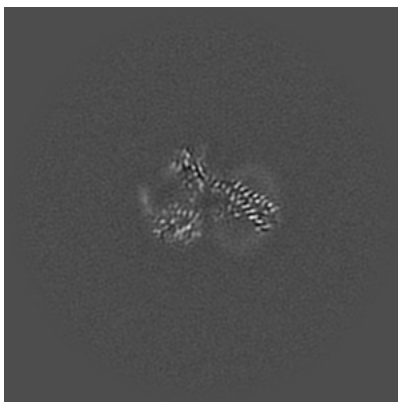
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

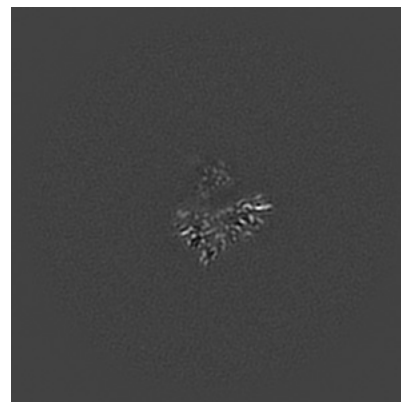
6.3.1 Primary map



X Index: 145

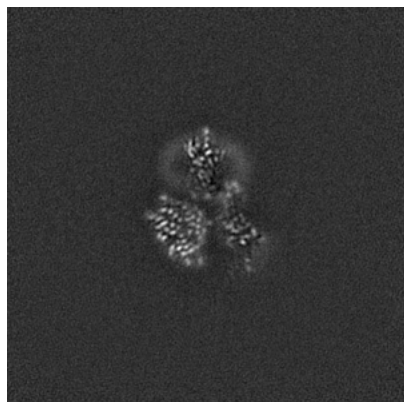


Y Index: 143

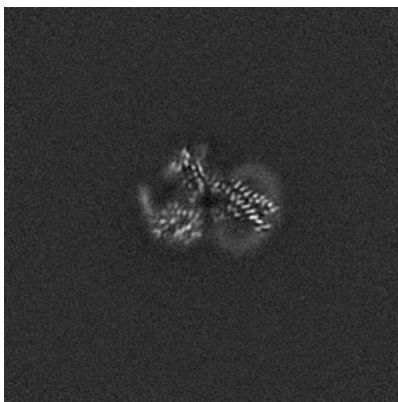


Z Index: 141

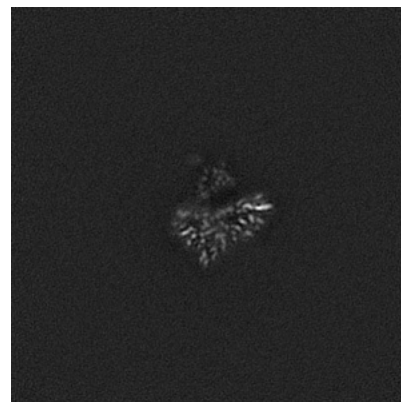
6.3.2 Raw map



X Index: 145



Y Index: 143

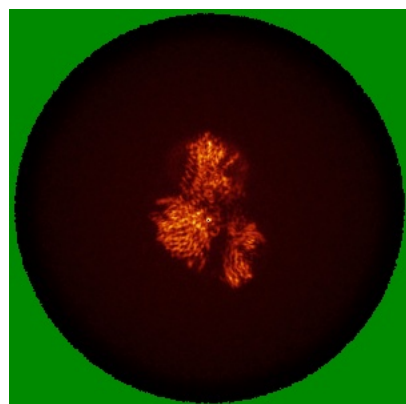


Z Index: 141

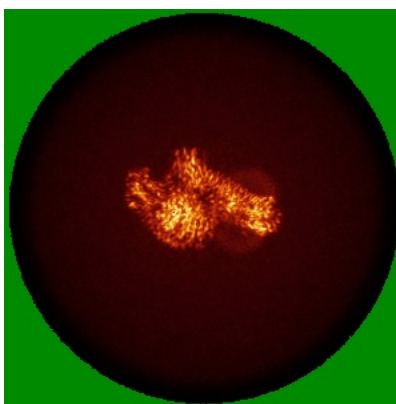
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

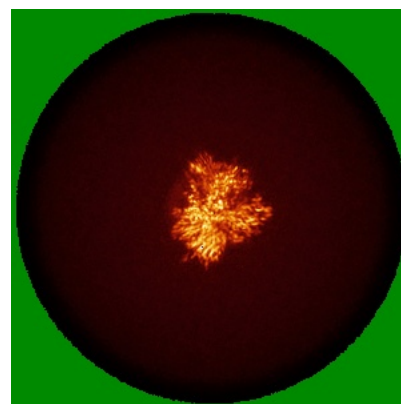
6.4.1 Primary map



X

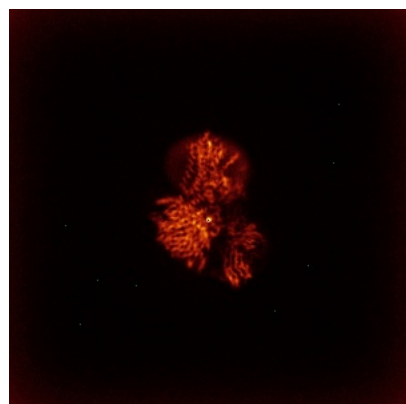


Y

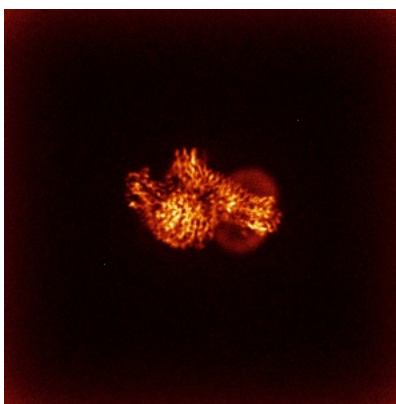


Z

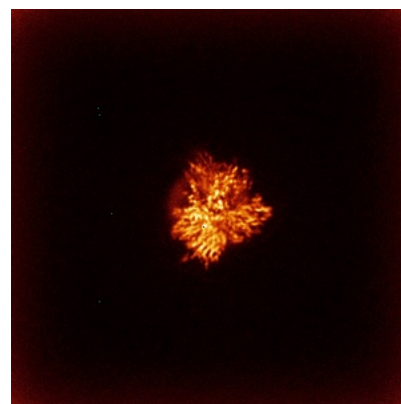
6.4.2 Raw map



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.

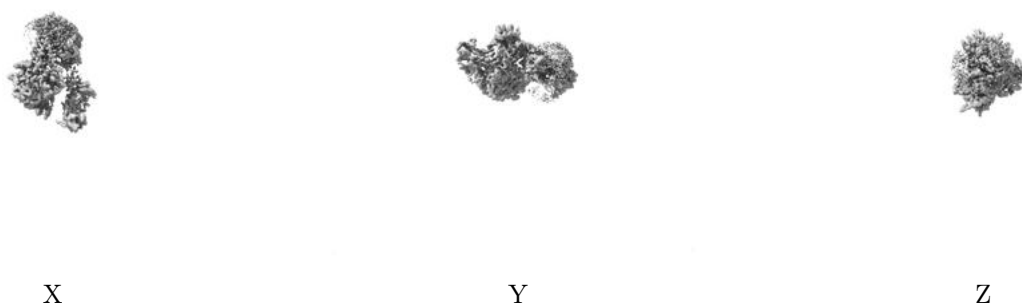
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.32. 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.

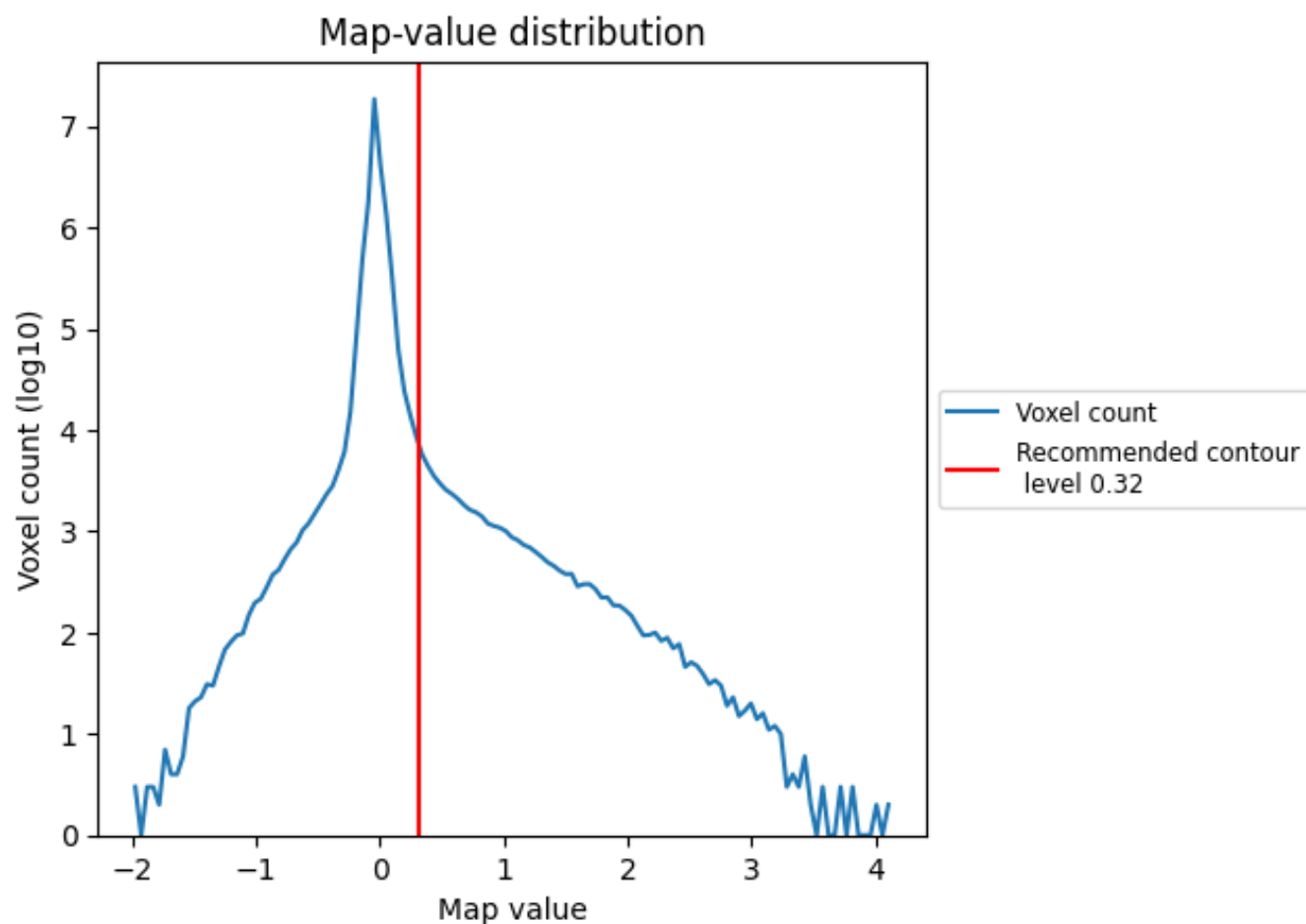
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

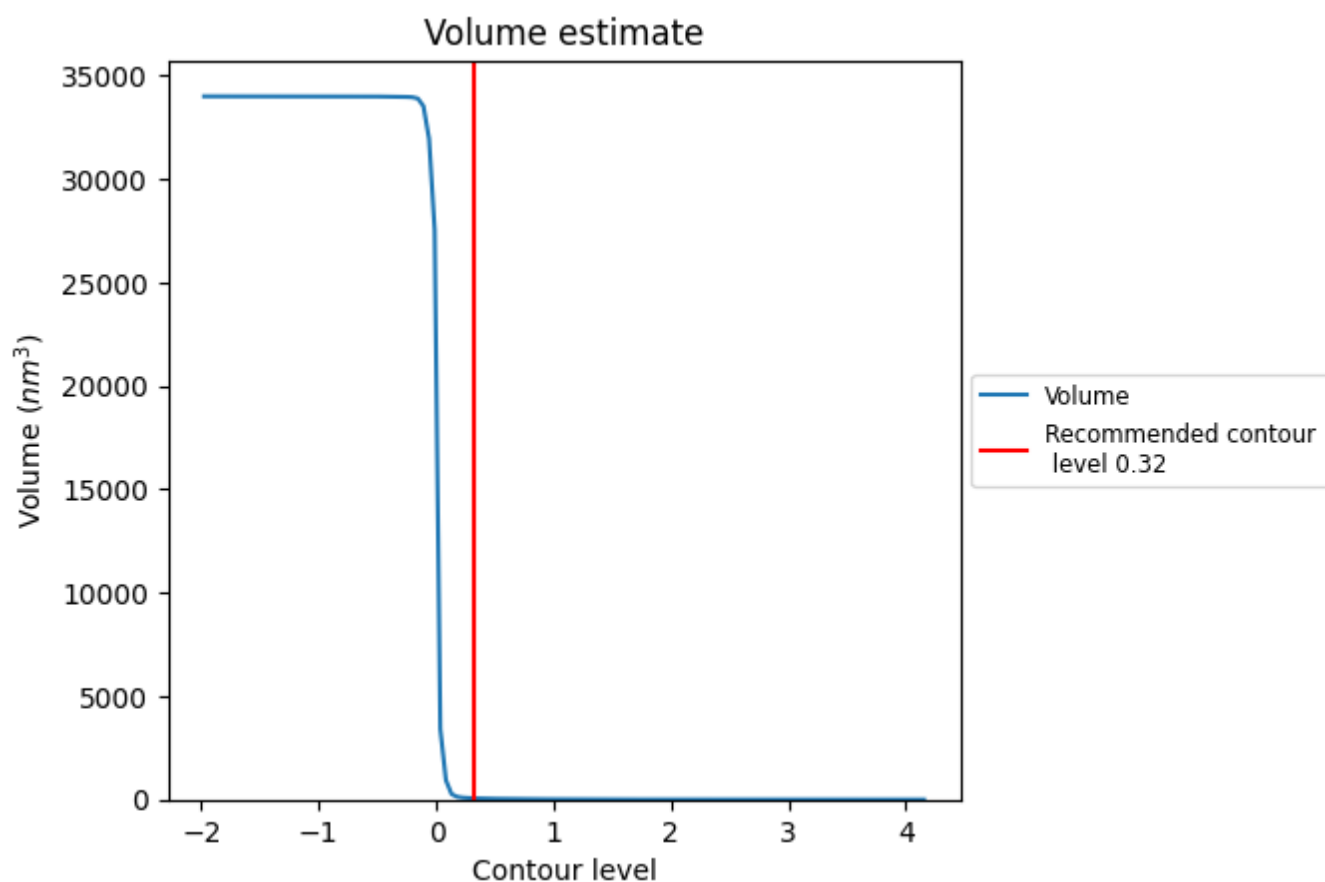
This section contains the results of statistical analysis of the map.

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.

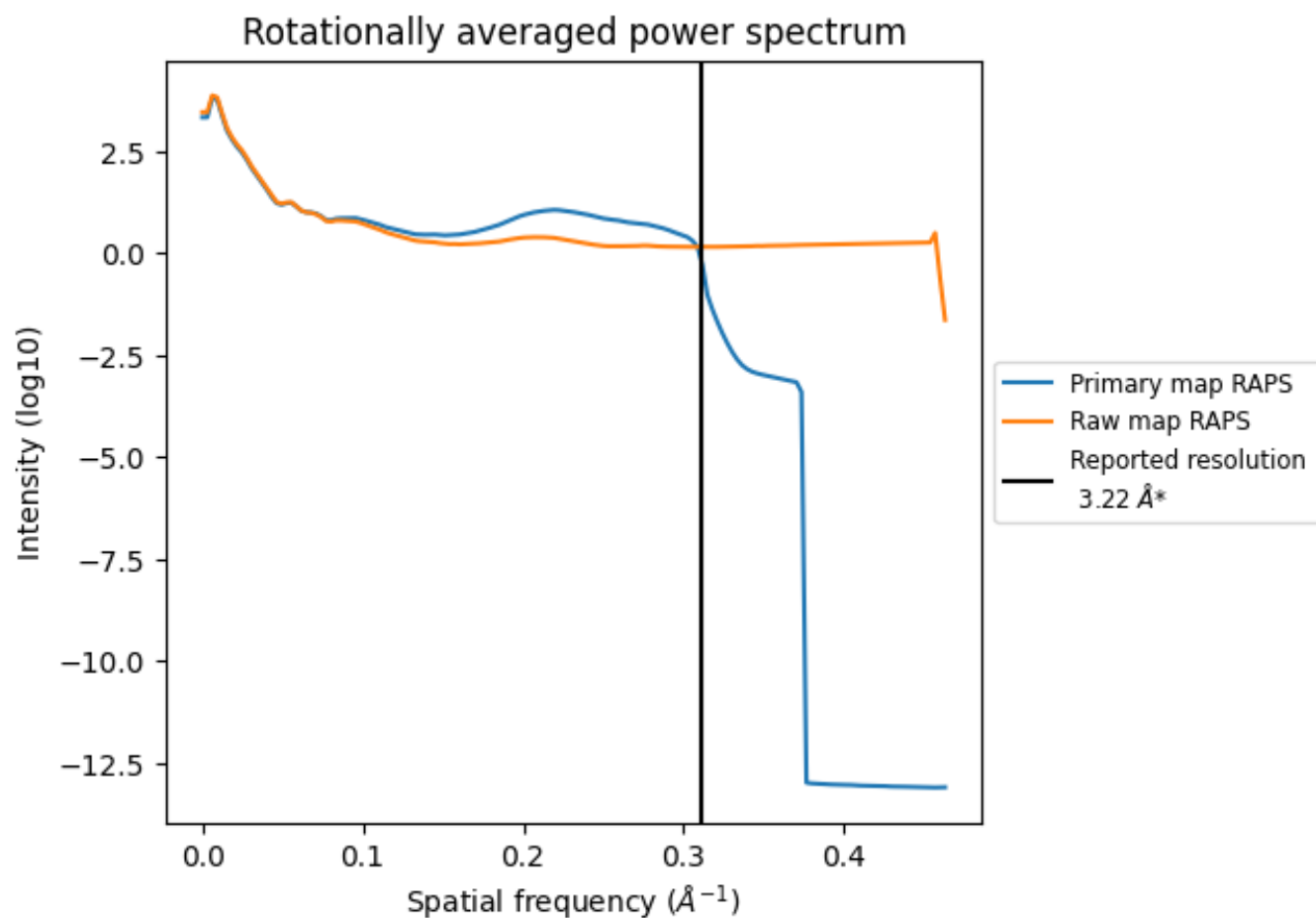
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 60 nm^3 ; this corresponds to an approximate mass of 54 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 ⓘ

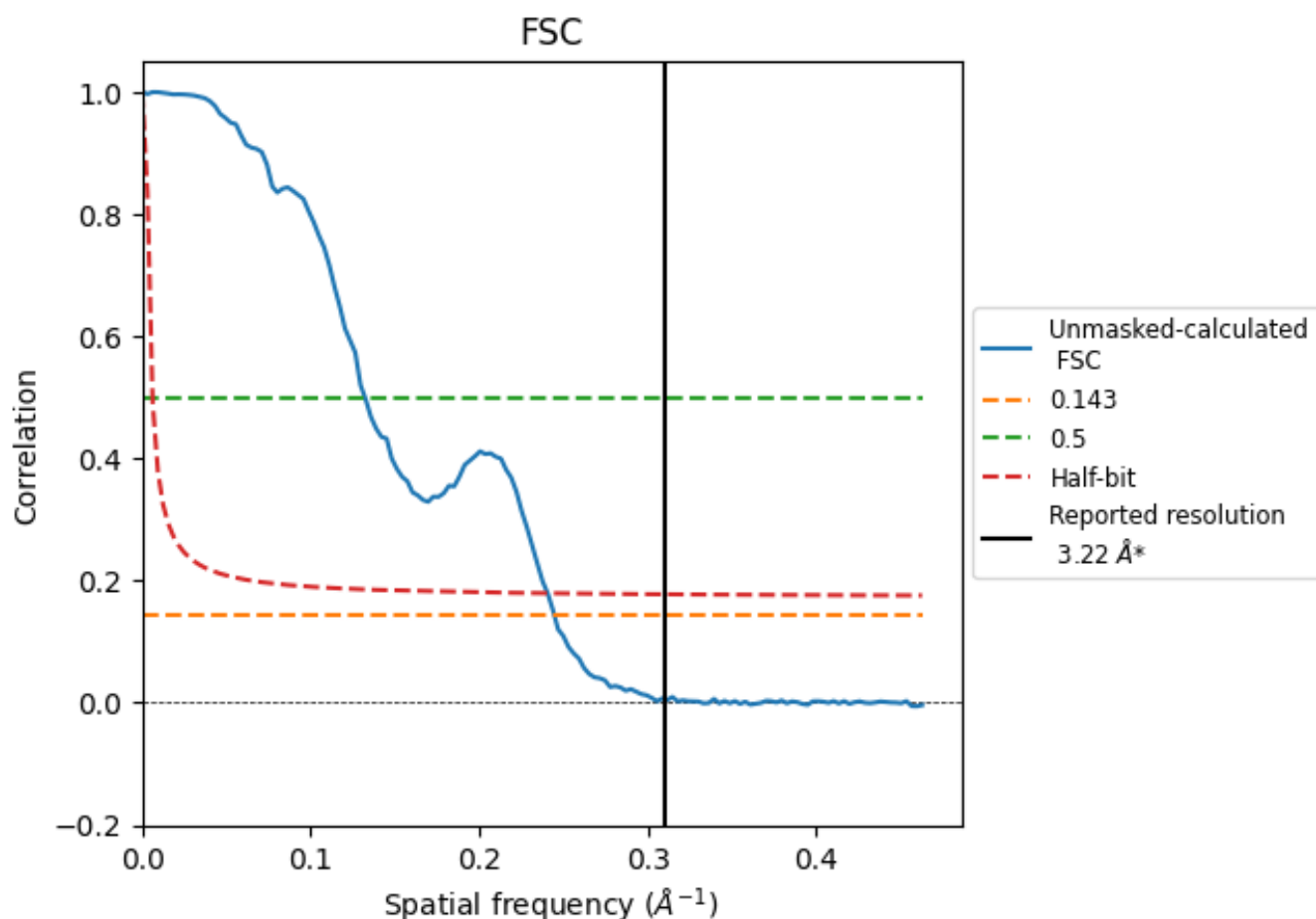


*Reported resolution corresponds to spatial frequency of 0.311 Å⁻¹

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 0.311 Å⁻¹

8.2 Resolution estimates [i](#)

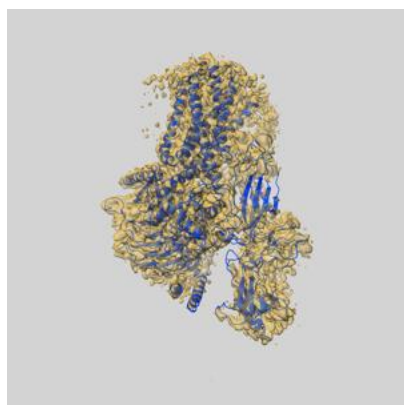
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.22	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.09	7.56	4.15

*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 4.09 differs from the reported value 3.22 by more than 10 %

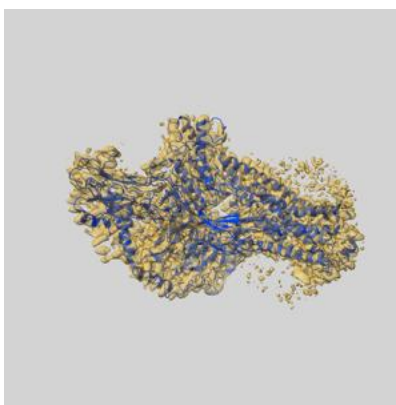
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-62885 and PDB model 9L8L. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

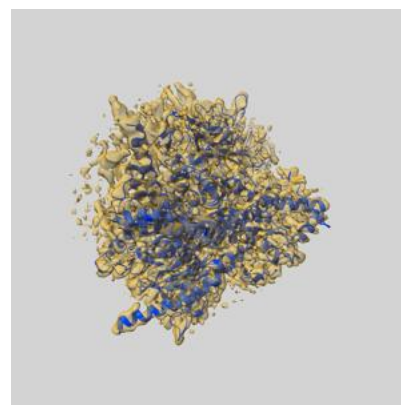
9.1 Map-model overlay [i](#)



X



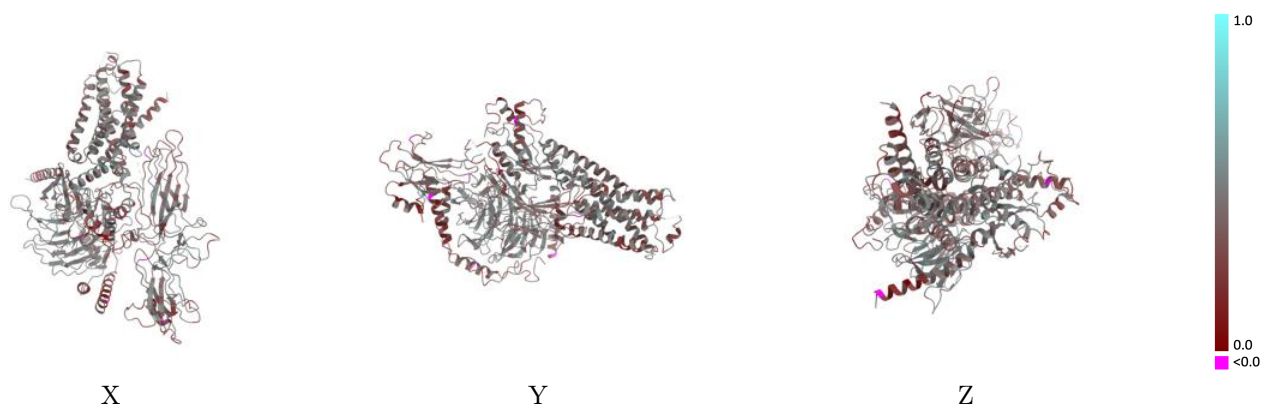
Y



Z

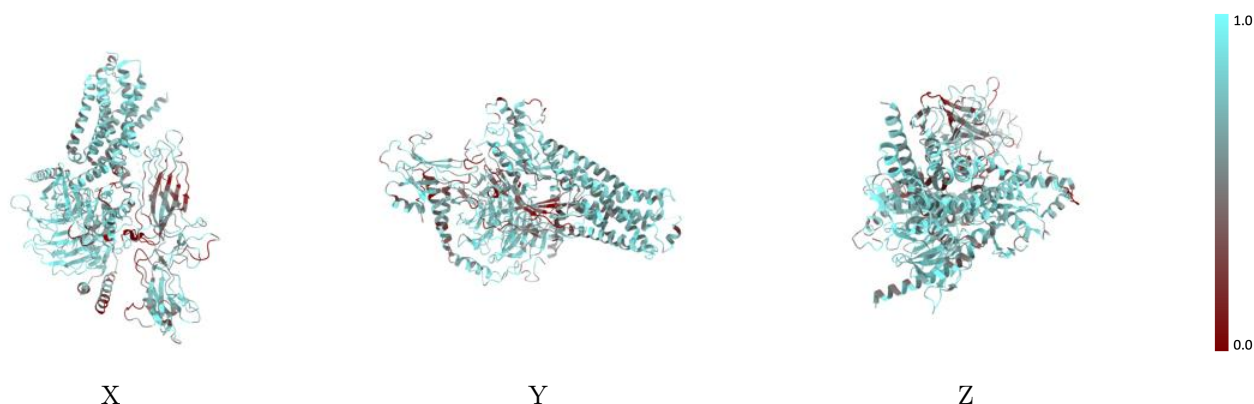
The images above show the 3D surface view of the map at the recommended contour level 0.32 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



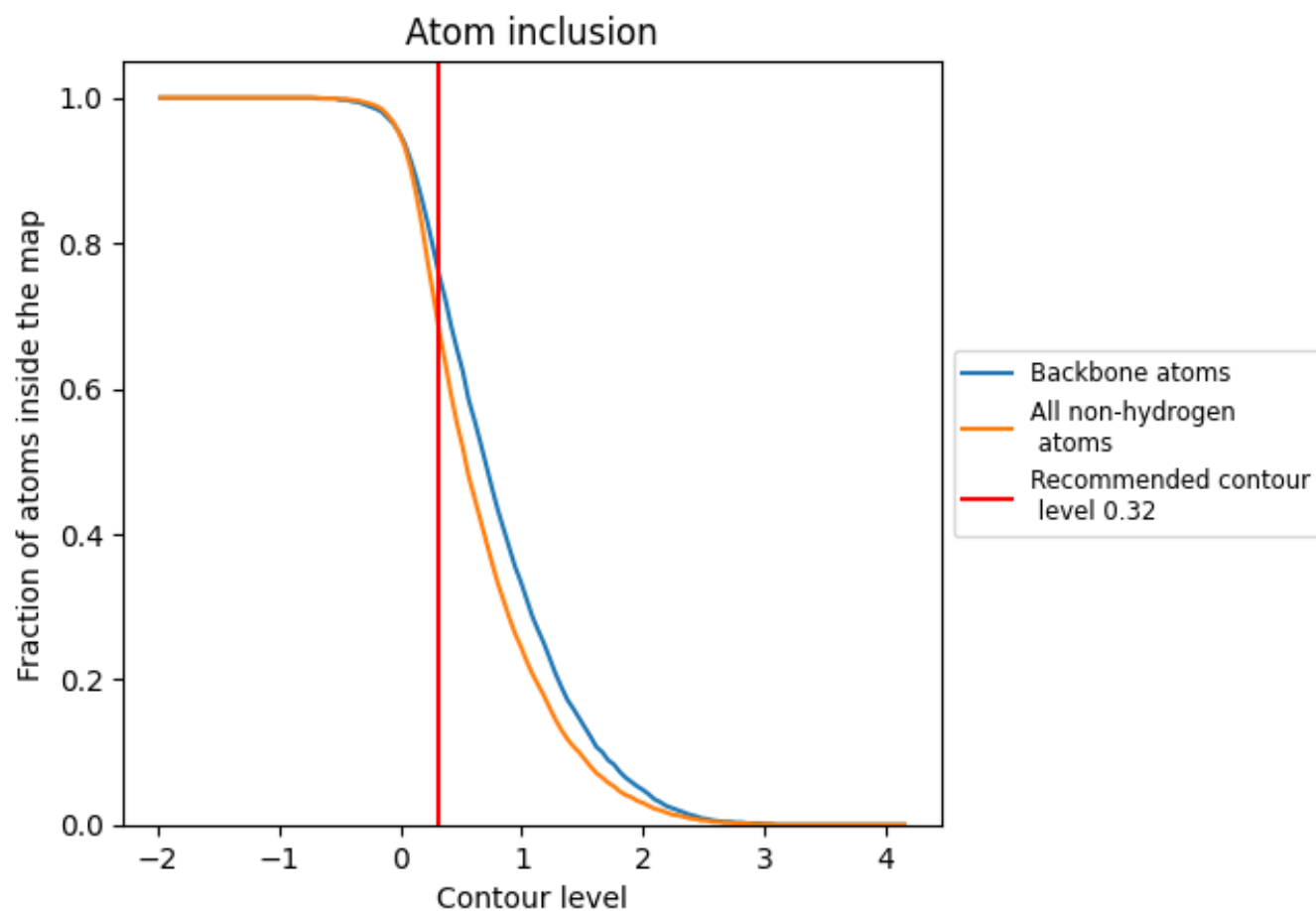
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.32).

9.4 Atom inclusion [i](#)



At the recommended contour level, 76% of all backbone atoms, 68% 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 (0.32) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6800	0.4080
A	0.6940	0.3930
B	0.7770	0.4400
C	0.5450	0.3950
G	0.6630	0.3320
R	0.7170	0.4120

