



Full wwPDB EM Validation Report ⓘ

Jun 26, 2025 – 05:42 PM JST

PDB ID : 7XT8 / pdb_00007xt8
EMDB ID : EMD-33442
Title : Serotonin 4 (5-HT4) receptor-Gs-Nb35 complex
Authors : Huang, S.; Xu, P.; Shen, D.D.; Simon, I.A.; Mao, C.; Tan, Y.; Zhang, H.; Harpsoe, K.; Li, H.; Zhang, Y.; You, C.; Yu, X.; Jiang, Y.; Zhang, Y.; Gloriam, D.E.; Xu, H.E.
Deposited on : 2022-05-16
Resolution : 3.10 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.dev118
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

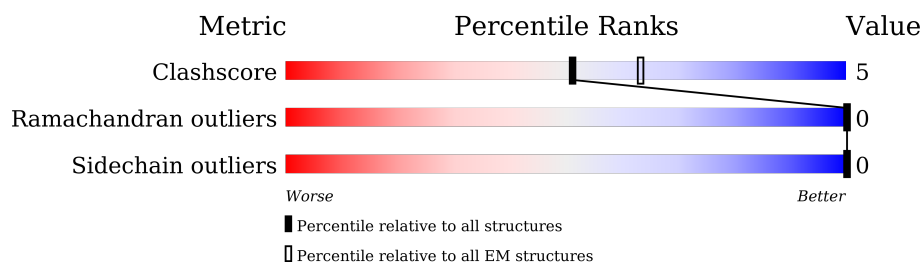
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	9% 53% 7% 40%
2	B	345	11% 86% 12% .
3	G	71	44% 73% 7% 20%
4	N	139	22% 85% 7% 8%
5	R	527	13% 45% 11% 44%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 17116 atoms, of which 8591 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	238	Total	C	H	N	O	S	0	0
			3928	1242	1956	357	365	8		

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	54	ASN	SER	conflict	UNP P63092
A	226	ALA	GLY	conflict	UNP P63092
A	268	ALA	GLU	conflict	UNP P63092
A	271	LYS	ASN	conflict	UNP P63092
A	274	ASP	LYS	conflict	UNP P63092
A	280	LYS	ARG	conflict	UNP P63092
A	284	ASP	THR	conflict	UNP P63092
A	285	THR	ILE	conflict	UNP P63092

- 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	338	Total	C	H	N	O	S	0	0
			5108	1604	2508	467	508	21		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-4	MET	-	initiating methionine	UNP P62873
B	-3	GLY	-	expression tag	UNP P62873
B	-2	SER	-	expression tag	UNP P62873
B	-1	LEU	-	expression tag	UNP P62873
B	0	LEU	-	expression tag	UNP P62873
B	1	GLN	-	expression tag	UNP P62873

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	G	57	Total	C	H	N	O	S	0	0
			885	273	449	77	83	3		

- Molecule 4 is a protein called Nanobody35.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	N	128	Total	C	H	N	O	S	0	0
			1909	605	936	170	192	6		

- Molecule 5 is a protein called Soluble cytochrome b562,5-hydroxytryptamine receptor 4.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	R	294	Total	C	H	N	O	S	0	0
			4793	1571	2438	373	386	25		

There are 37 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	-139	ASP	-	expression tag	UNP P0ABE7
R	-138	TYR	-	expression tag	UNP P0ABE7
R	-137	LYS	-	expression tag	UNP P0ABE7
R	-136	ASP	-	expression tag	UNP P0ABE7
R	-135	ASP	-	expression tag	UNP P0ABE7
R	-134	ASP	-	expression tag	UNP P0ABE7
R	-133	ASP	-	expression tag	UNP P0ABE7
R	-132	ALA	-	expression tag	UNP P0ABE7
R	-131	LYS	-	expression tag	UNP P0ABE7
R	-130	LEU	-	expression tag	UNP P0ABE7
R	-129	GLN	-	expression tag	UNP P0ABE7
R	-128	THR	-	expression tag	UNP P0ABE7
R	-127	MET	-	expression tag	UNP P0ABE7
R	-126	HIS	-	expression tag	UNP P0ABE7
R	-125	HIS	-	expression tag	UNP P0ABE7
R	-124	HIS	-	expression tag	UNP P0ABE7
R	-123	HIS	-	expression tag	UNP P0ABE7
R	-122	HIS	-	expression tag	UNP P0ABE7
R	-121	HIS	-	expression tag	UNP P0ABE7
R	-120	HIS	-	expression tag	UNP P0ABE7
R	-119	HIS	-	expression tag	UNP P0ABE7
R	-118	HIS	-	expression tag	UNP P0ABE7

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Chain	Residue	Modelled	Actual	Comment	Reference
R	-117	HIS	-	expression tag	UNP P0ABE7
R	-110	TRP	MET	conflict	UNP P0ABE7
R	-15	ILE	HIS	conflict	UNP P0ABE7
R	-11	LEU	-	linker	UNP P0ABE7
R	-10	ALA	-	linker	UNP P0ABE7
R	-9	SER	-	linker	UNP P0ABE7
R	-8	GLU	-	linker	UNP P0ABE7
R	-7	ASN	-	linker	UNP P0ABE7
R	-6	LEU	-	linker	UNP P0ABE7
R	-5	TYR	-	linker	UNP P0ABE7
R	-4	PHE	-	linker	UNP P0ABE7
R	-3	GLN	-	linker	UNP P0ABE7
R	-2	GLY	-	linker	UNP P0ABE7
R	-1	GLY	-	linker	UNP P0ABE7
R	0	THR	-	linker	UNP P0ABE7

-
- The chemical structure of CLR is a complex polycyclic molecule. It features a central bicyclic core with several fused rings. The stereochemistry is indicated by wedged and dashed bonds. Key features include a hydroxyl group (HO) attached to C1, a methyl group (C19) attached to C10(R), and a long side chain (C20(R) to C26) attached to C17(R). The structure is labeled with atom numbers (C1 to C26) and stereochemical configurations (R, S, H).

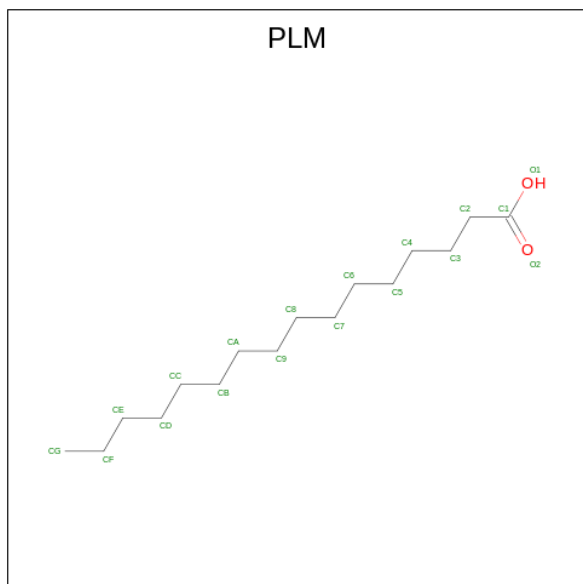
Mol	Chain	Residues	Atoms				AltConf
6	R	1	Total 74	C 27	H 46	O 1	0
6	R	1	Total 74	C 27	H 46	O 1	0
6	R	1	Total 74	C 27	H 46	O 1	0
6	R	1	Total 74	C 27	H 46	O 1	0

WORLDWIDE
PDB
PROTEIN DATA BANK

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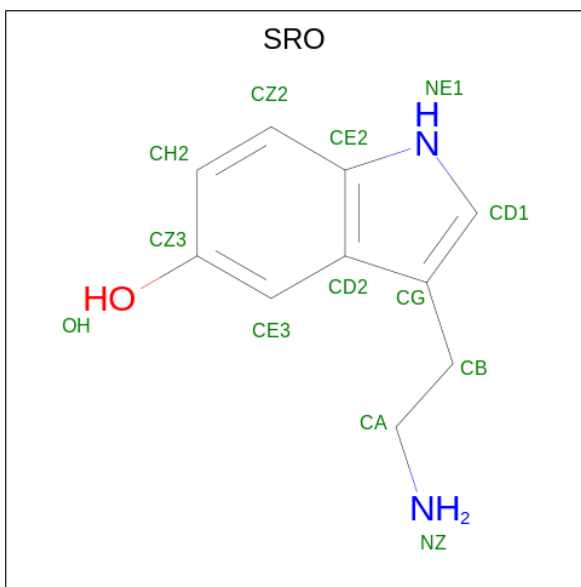
Mol	Chain	Residues	Atoms				AltConf
6	R	1	Total	C	H	O	0
			74	27	46	1	

- Molecule 7 is PALMITIC ACID (CCD ID: PLM) (formula: $C_{16}H_{32}O_2$).



Mol	Chain	Residues	Atoms				AltConf
7	R	1	Total	C	H	O	0
			49	16	31	2	
7	R	1	Total	C	H	O	0
			49	16	31	2	

- Molecule 8 is SEROTONIN (CCD ID: SRO) (formula: $C_{10}H_{12}N_2O$) (labeled as "Ligand of Interest" by depositor).

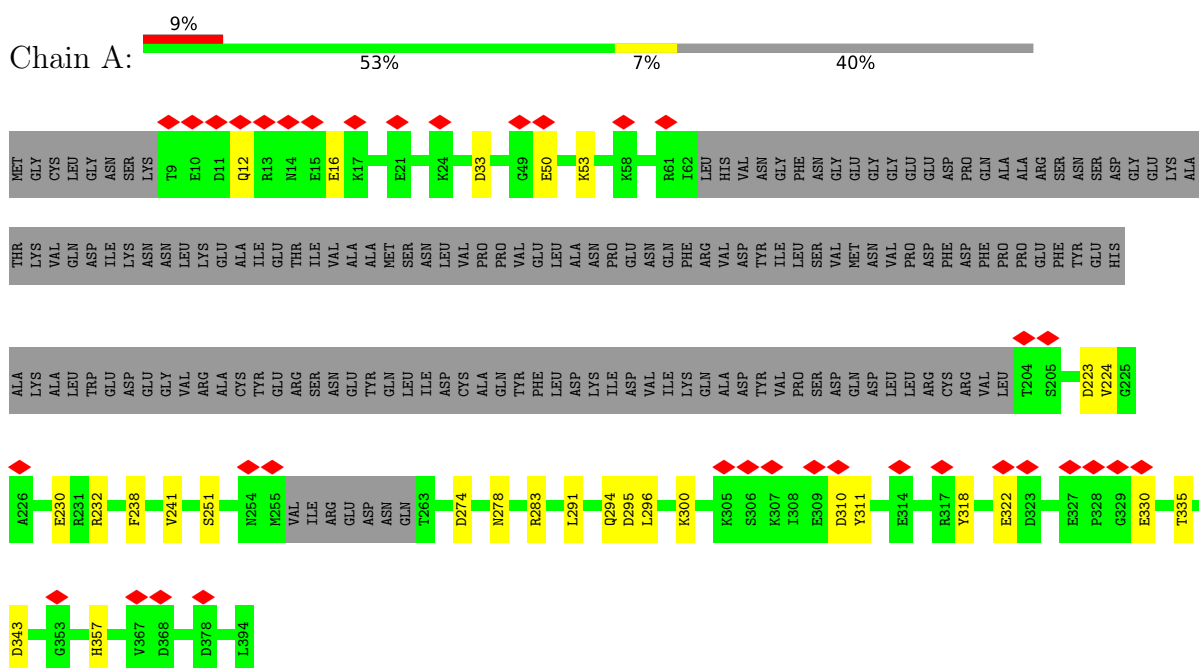


Mol	Chain	Residues	Atoms					AltConf
			Total	C	H	N	O	
8	R	1	25	10	12	2	1	0

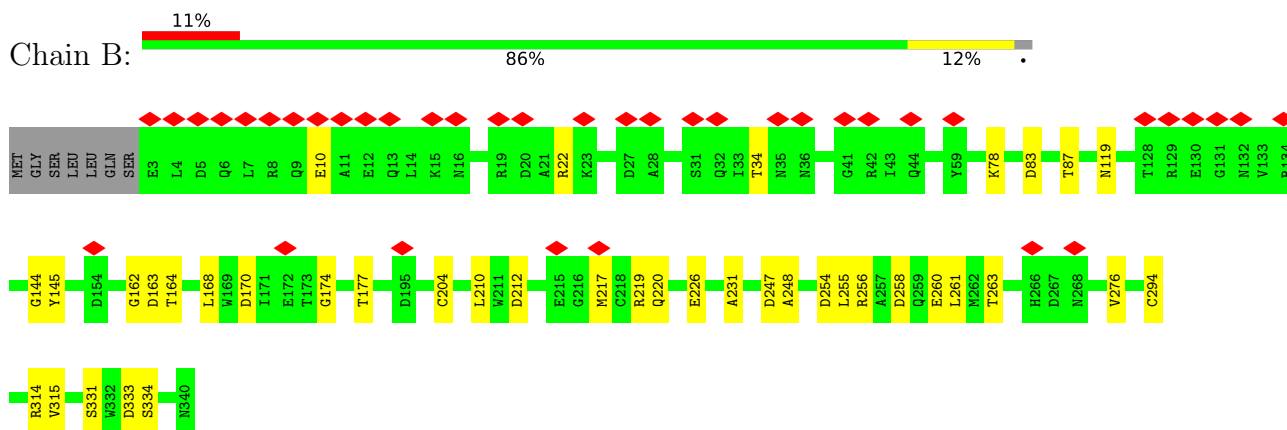
3 Residue-property plots

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.

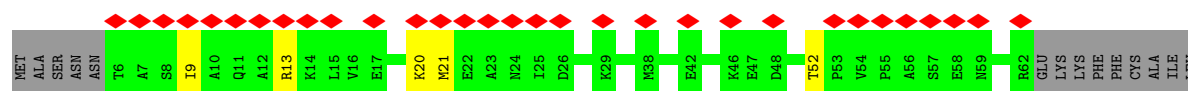
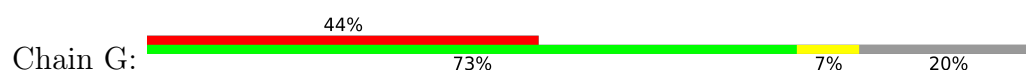
- Molecule 1: Guanine nucleotide-binding protein G(s) subunit alpha isoforms short



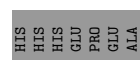
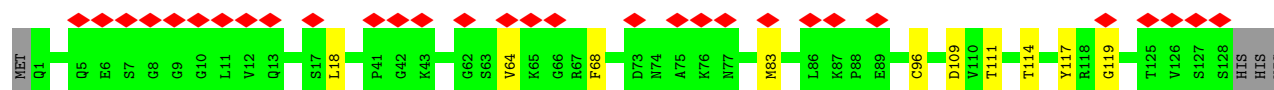
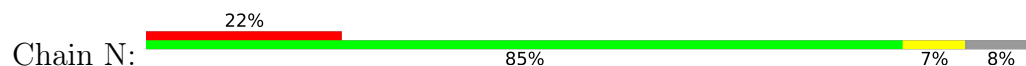
- Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1



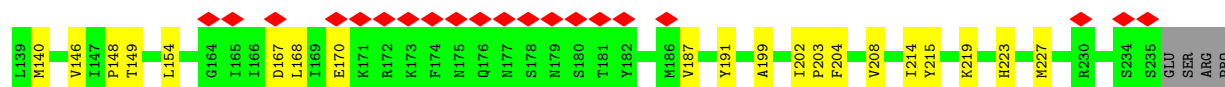
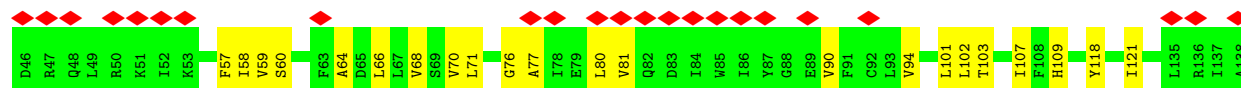
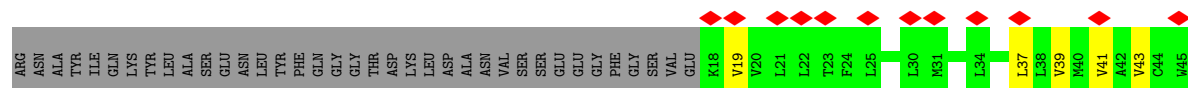
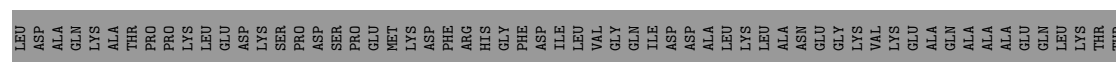
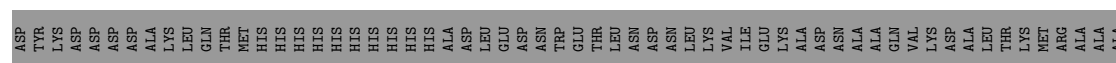
- Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



• Molecule 4: Nanobody35



• Molecule 5: Soluble cytochrome b562,5-hydroxytryptamine receptor 4



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	359535	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 ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.202	Depositor
Minimum map value	-0.120	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.04	Depositor
Map size ($\text{\AA}$)	216.00002, 216.00002, 216.00002	wwPDB
Map dimensions	200, 200, 200	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: PLM, CLR, SRO

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	0.10	0/2008	0.29	0/2698
2	B	0.10	0/2647	0.29	0/3589
3	G	0.12	0/442	0.23	0/597
4	N	0.12	0/993	0.32	0/1345
5	R	0.15	0/2416	0.30	0/3290
All	All	0.12	0/8506	0.29	0/11519

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	1972	1956	1953	17	0
2	B	2600	2508	2505	26	0
3	G	436	449	448	5	0
4	N	973	936	938	7	0
5	R	2355	2438	2436	37	0
6	R	140	230	230	5	0
7	R	36	62	62	0	0
8	R	13	12	12	0	0
All	All	8525	8591	8584	91	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 5.

All (91) 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:274:ASP:OD1	1:A:278:ASN:ND2	2.08	0.87
2:B:119:ASN:ND2	2:B:144:GLY:O	2.09	0.85
5:R:76:GLY:O	5:R:80:LEU:HD12	1.81	0.80
1:A:330:GLU:OE2	1:A:335:THR:OG1	2.04	0.74
5:R:146:VAL:O	5:R:149:THR:OG1	2.06	0.74
2:B:333:ASP:O	2:B:334:SER:OG	2.08	0.72
2:B:260:GLU:OE2	2:B:263:THR:OG1	2.12	0.67
2:B:254:ASP:HB2	2:B:261:LEU:HD11	1.75	0.66
5:R:118:TYR:HA	5:R:214:ILE:HD11	1.77	0.65
2:B:217:MET:HE1	3:G:21:MET:HE2	1.79	0.65
5:R:167:ASP:OD1	5:R:168:LEU:HD12	1.99	0.63
5:R:70:VAL:HG13	5:R:71:LEU:HG	1.81	0.61
5:R:60:SER:HG	5:R:109:HIS:CD2	2.18	0.61
5:R:284:ILE:HD11	5:R:288:VAL:HG23	1.82	0.60
2:B:34:THR:HG22	2:B:34:THR:O	2.01	0.60
5:R:101:LEU:HD12	5:R:148:PRO:HB2	1.83	0.59
2:B:294:CYS:SG	2:B:315:VAL:HG11	2.43	0.58
5:R:77:ALA:O	5:R:81:VAL:HG22	2.04	0.58
4:N:114:THR:HG22	4:N:114:THR:O	2.04	0.58
2:B:83:ASP:O	2:B:87:THR:N	2.37	0.57
5:R:215:TYR:OH	5:R:219:LYS:NZ	2.38	0.57
2:B:87:THR:O	2:B:87:THR:HG22	2.05	0.56
6:R:402:CLR:H212	6:R:402:CLR:H121	1.87	0.55
1:A:224:VAL:HG13	1:A:224:VAL:O	2.06	0.55
1:A:318:TYR:OH	1:A:343:ASP:OD2	2.14	0.54
5:R:313:PHE:O	5:R:319:ARG:NH2	2.36	0.54
4:N:96:CYS:O	4:N:119:GLY:N	2.37	0.54
6:R:404:CLR:H121	6:R:404:CLR:H212	1.90	0.53
6:R:405:CLR:H212	6:R:405:CLR:H121	1.91	0.53
1:A:238:PHE:O	1:A:241:VAL:HG22	2.09	0.53
2:B:231:ALA:HB1	2:B:276:VAL:HG22	1.91	0.52
1:A:230:GLU:OE2	1:A:232:ARG:NH2	2.39	0.52
5:R:103:THR:HG23	5:R:271:TRP:CH2	2.45	0.52
1:A:53:LYS:NZ	1:A:223:ASP:OD1	2.42	0.51
3:G:52:THR:O	3:G:52:THR:HG23	2.10	0.51
6:R:401:CLR:H212	6:R:401:CLR:H121	1.93	0.50
5:R:57:PHE:HZ	5:R:140:MET:HE3	1.77	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:254:ASP:OD1	2:B:256:ARG:N	2.45	0.50
6:R:403:CLR:H121	6:R:403:CLR:H212	1.93	0.50
5:R:64:ALA:O	5:R:68:VAL:HG23	2.12	0.49
2:B:314:ARG:C	2:B:331:SER:HG	2.20	0.49
4:N:111:THR:O	4:N:111:THR:HG22	2.10	0.49
5:R:43:VAL:HG11	5:R:59:VAL:HG21	1.94	0.49
5:R:202:ILE:HB	5:R:203:PRO:HD3	1.94	0.49
2:B:10:GLU:OE1	3:G:20:LYS:NZ	2.32	0.49
5:R:80:LEU:HD21	5:R:294:THR:HG23	1.95	0.49
5:R:107:ILE:HG21	5:R:199:ALA:O	2.13	0.49
5:R:43:VAL:HG11	5:R:59:VAL:CG2	2.43	0.48
1:A:33:ASP:OD2	2:B:78:LYS:NZ	2.44	0.48
5:R:80:LEU:HD21	5:R:294:THR:CG2	2.44	0.47
5:R:277:THR:HA	5:R:280:VAL:HG12	1.97	0.47
2:B:170:ASP:O	2:B:174:GLY:N	2.43	0.47
5:R:60:SER:OG	5:R:109:HIS:NE2	2.29	0.46
5:R:154:LEU:C	5:R:154:LEU:HD23	2.39	0.46
5:R:121:ILE:CD1	5:R:214:ILE:HD12	2.45	0.46
5:R:68:VAL:HG22	5:R:102:LEU:HB3	1.97	0.46
5:R:204:PHE:O	5:R:208:VAL:HG23	2.16	0.46
1:A:283:ARG:O	1:A:357:HIS:ND1	2.49	0.45
1:A:12:GLN:O	1:A:16:GLU:HG3	2.17	0.45
5:R:39:VAL:O	5:R:43:VAL:HG23	2.16	0.45
2:B:220:GLN:NE2	2:B:255:LEU:O	2.41	0.45
5:R:223:HIS:CD2	5:R:227:MET:HE2	2.52	0.45
1:A:291:LEU:O	1:A:294:GLN:NE2	2.47	0.44
1:A:232:ARG:NH2	4:N:109:ASP:OD2	2.46	0.44
2:B:168:LEU:O	2:B:177:THR:N	2.48	0.44
1:A:322:GLU:N	1:A:322:GLU:OE2	2.52	0.43
4:N:18:LEU:O	4:N:83:MET:N	2.47	0.43
5:R:37:LEU:O	5:R:41:VAL:HG22	2.18	0.43
5:R:58:ILE:H	5:R:58:ILE:HD12	1.84	0.43
2:B:22:ARG:NE	2:B:258:ASP:O	2.52	0.43
5:R:254:THR:HG22	5:R:254:THR:O	2.18	0.43
1:A:50:GLU:HA	1:A:50:GLU:OE1	2.19	0.42
5:R:121:ILE:HD13	5:R:214:ILE:HD12	2.01	0.42
5:R:187:VAL:HG12	5:R:191:TYR:CE1	2.54	0.42
2:B:145:TYR:O	2:B:162:GLY:N	2.52	0.42
2:B:247:ASP:O	2:B:248:ALA:HB3	2.19	0.42
2:B:226:GLU:HG2	2:B:247:ASP:OD2	2.20	0.41
5:R:66:LEU:O	5:R:70:VAL:HG12	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:R:170:GLU:OE2	5:R:170:GLU:HA	2.19	0.41
1:A:310:ASP:OD1	1:A:311:TYR:N	2.53	0.41
2:B:217:MET:CE	3:G:21:MET:HE2	2.49	0.41
1:A:295:ASP:OD1	1:A:296:LEU:N	2.53	0.41
2:B:204:CYS:O	4:N:117:TYR:OH	2.32	0.41
5:R:90:VAL:O	5:R:94:VAL:HG23	2.20	0.41
1:A:251:SER:O	1:A:300:LYS:NZ	2.48	0.41
3:G:9:ILE:HG13	3:G:13:ARG:HE	1.86	0.41
2:B:210:LEU:O	2:B:219:ARG:N	2.52	0.41
4:N:64:VAL:HG13	4:N:68:PHE:CD2	2.55	0.41
2:B:163:ASP:O	2:B:164:THR:OG1	2.36	0.40
2:B:212:ASP:OD2	2:B:219:ARG:NH1	2.54	0.40
5:R:19:VAL:O	5:R:19:VAL:HG12	2.21	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	232/394 (59%)	231 (100%)	1 (0%)	0	100	100
2	B	336/345 (97%)	333 (99%)	3 (1%)	0	100	100
3	G	55/71 (78%)	54 (98%)	1 (2%)	0	100	100
4	N	126/139 (91%)	125 (99%)	1 (1%)	0	100	100
5	R	290/527 (55%)	286 (99%)	4 (1%)	0	100	100
All	All	1039/1476 (70%)	1029 (99%)	10 (1%)	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	213/349 (61%)	213 (100%)	0	100	100
2	B	281/287 (98%)	281 (100%)	0	100	100
3	G	46/58 (79%)	46 (100%)	0	100	100
4	N	106/116 (91%)	106 (100%)	0	100	100
5	R	261/458 (57%)	261 (100%)	0	100	100
All	All	907/1268 (72%)	907 (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 (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	19	GLN
1	A	213	GLN
1	A	218	ASN
1	A	278	ASN
1	A	292	ASN
2	B	91	HIS
2	B	156	GLN
4	N	31	ASN
5	R	158	GLN

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](#)

8 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
6	CLR	R	404	-	31,31,31	1.09	4 (12%)	48,48,48	1.17	6 (12%)
7	PLM	R	407	-	17,17,17	0.94	1 (5%)	17,17,17	0.74	2 (11%)
6	CLR	R	405	-	31,31,31	1.11	4 (12%)	48,48,48	1.20	8 (16%)
6	CLR	R	403	-	31,31,31	1.08	4 (12%)	48,48,48	1.13	6 (12%)
7	PLM	R	406	-	17,17,17	0.92	1 (5%)	17,17,17	0.74	2 (11%)
6	CLR	R	402	-	31,31,31	1.10	4 (12%)	48,48,48	1.17	5 (10%)
6	CLR	R	401	-	31,31,31	1.09	4 (12%)	48,48,48	1.14	6 (12%)
8	SRO	R	408	-	12,14,14	2.86	6 (50%)	12,19,19	1.78	1 (8%)

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	CLR	R	404	-	-	2/10/68/68	0/4/4/4
7	PLM	R	407	-	-	5/15/15/15	-
6	CLR	R	405	-	-	1/10/68/68	0/4/4/4
6	CLR	R	403	-	-	2/10/68/68	0/4/4/4
7	PLM	R	406	-	-	4/15/15/15	-
6	CLR	R	402	-	-	1/10/68/68	0/4/4/4
6	CLR	R	401	-	-	3/10/68/68	0/4/4/4
8	SRO	R	408	-	-	0/3/3/3	0/2/2/2

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	R	408	SRO	CZ2-CH2	7.62	1.52	1.36
8	R	408	SRO	CZ2-CE2	-3.51	1.35	1.41
6	R	401	CLR	C13-C17	-3.10	1.49	1.55
6	R	403	CLR	C13-C17	-3.08	1.49	1.55
6	R	405	CLR	C13-C17	-3.07	1.49	1.55
6	R	402	CLR	C13-C17	-3.02	1.49	1.55
6	R	404	CLR	C13-C17	-2.99	1.49	1.55
7	R	407	PLM	C2-C1	2.98	1.57	1.50
6	R	405	CLR	C11-C9	-2.95	1.48	1.53
7	R	406	PLM	C2-C1	2.91	1.57	1.50
6	R	402	CLR	C11-C9	-2.88	1.48	1.53
6	R	401	CLR	C11-C9	-2.87	1.49	1.53
6	R	404	CLR	C11-C9	-2.82	1.49	1.53
6	R	403	CLR	C11-C9	-2.80	1.49	1.53
8	R	408	SRO	CH2-CZ3	2.58	1.43	1.38
8	R	408	SRO	CE3-CD2	-2.57	1.37	1.42
8	R	408	SRO	CE3-CZ3	2.55	1.42	1.37
6	R	402	CLR	C16-C15	2.43	1.60	1.54
6	R	405	CLR	C16-C15	2.41	1.60	1.54
6	R	404	CLR	C16-C15	2.41	1.60	1.54
6	R	401	CLR	C16-C15	2.40	1.60	1.54
6	R	403	CLR	C16-C15	2.39	1.60	1.54
6	R	402	CLR	C12-C11	-2.32	1.48	1.53
6	R	404	CLR	C12-C11	-2.30	1.48	1.53
8	R	408	SRO	CD1-NE1	-2.30	1.31	1.36
6	R	403	CLR	C12-C11	-2.24	1.48	1.53
6	R	405	CLR	C12-C11	-2.23	1.48	1.53
6	R	401	CLR	C12-C11	-2.23	1.48	1.53

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	R	408	SRO	CZ2-CH2-CZ3	-5.01	114.39	120.15
6	R	405	CLR	C16-C15-C14	-2.90	99.39	105.13
6	R	401	CLR	C16-C15-C14	-2.83	99.53	105.13
6	R	403	CLR	C16-C15-C14	-2.77	99.65	105.13
6	R	402	CLR	C16-C15-C14	-2.76	99.67	105.13
6	R	404	CLR	C16-C15-C14	-2.75	99.69	105.13
6	R	404	CLR	C13-C17-C20	-2.68	115.28	119.49
6	R	402	CLR	C13-C17-C20	-2.60	115.42	119.49
6	R	405	CLR	C13-C17-C20	-2.49	115.59	119.49
6	R	402	CLR	C15-C14-C8	-2.40	115.14	119.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	R	403	CLR	C13-C17-C20	-2.34	115.82	119.49
6	R	401	CLR	C13-C17-C20	-2.30	115.88	119.49
6	R	404	CLR	C15-C14-C8	-2.30	115.29	119.08
6	R	403	CLR	C15-C14-C8	-2.29	115.32	119.08
6	R	404	CLR	C23-C22-C20	-2.27	108.52	115.03
6	R	405	CLR	C4-C5-C6	-2.25	117.37	120.61
6	R	405	CLR	C15-C14-C8	-2.23	115.41	119.08
6	R	402	CLR	C4-C5-C10	2.21	119.36	116.42
7	R	406	PLM	O1-C1-O2	2.21	128.80	123.30
7	R	407	PLM	O1-C1-O2	2.20	128.79	123.30
6	R	401	CLR	C15-C14-C8	-2.17	115.51	119.08
6	R	405	CLR	C7-C6-C5	-2.16	121.07	125.06
6	R	401	CLR	C4-C5-C10	2.16	119.29	116.42
6	R	405	CLR	C4-C5-C10	2.14	119.27	116.42
6	R	401	CLR	C4-C5-C6	-2.12	117.55	120.61
6	R	402	CLR	C7-C6-C5	-2.11	121.16	125.06
6	R	403	CLR	C4-C5-C10	2.11	119.22	116.42
6	R	403	CLR	C4-C5-C6	-2.09	117.60	120.61
6	R	405	CLR	C21-C20-C22	-2.07	107.12	110.36
6	R	404	CLR	C4-C5-C10	2.06	119.15	116.42
6	R	405	CLR	C14-C8-C9	-2.04	106.35	109.09
6	R	404	CLR	C4-C5-C6	-2.04	117.67	120.61
6	R	403	CLR	C23-C22-C20	-2.03	109.19	115.03
6	R	401	CLR	C14-C8-C9	-2.03	106.37	109.09
7	R	406	PLM	O2-C1-C2	-2.01	116.63	123.08
7	R	407	PLM	O2-C1-C2	-2.01	116.63	123.08

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	R	403	CLR	C17-C20-C22-C23
6	R	403	CLR	C21-C20-C22-C23
6	R	401	CLR	C17-C20-C22-C23
6	R	401	CLR	C21-C20-C22-C23
6	R	402	CLR	C20-C22-C23-C24
6	R	405	CLR	C22-C23-C24-C25
6	R	401	CLR	C20-C22-C23-C24
7	R	407	PLM	CC-CD-CE-CF
7	R	407	PLM	CB-CC-CD-CE
7	R	406	PLM	C8-C9-CA-CB
7	R	406	PLM	C5-C6-C7-C8

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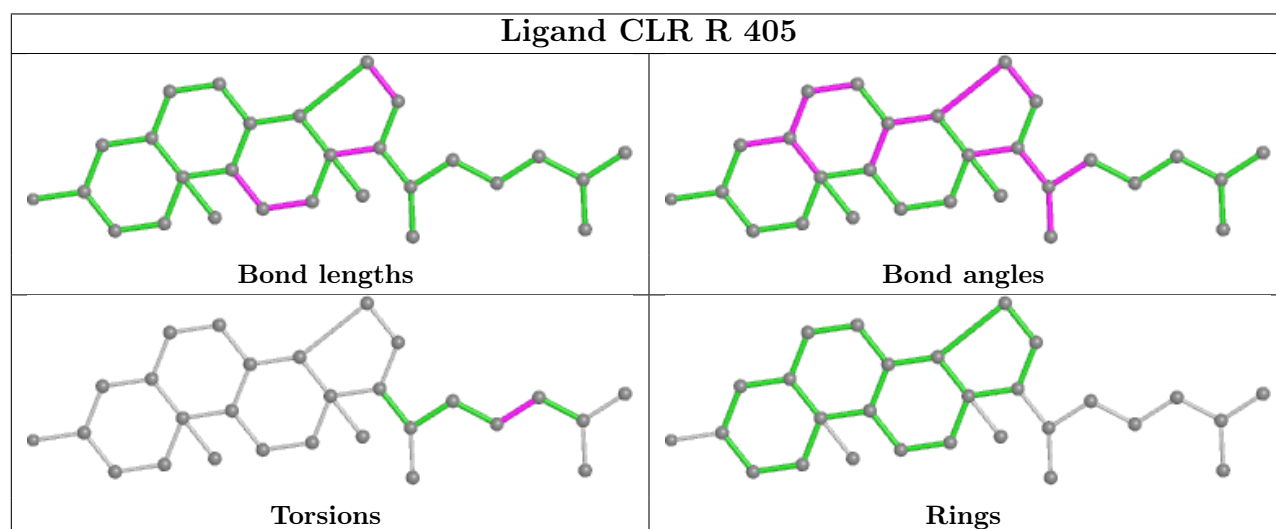
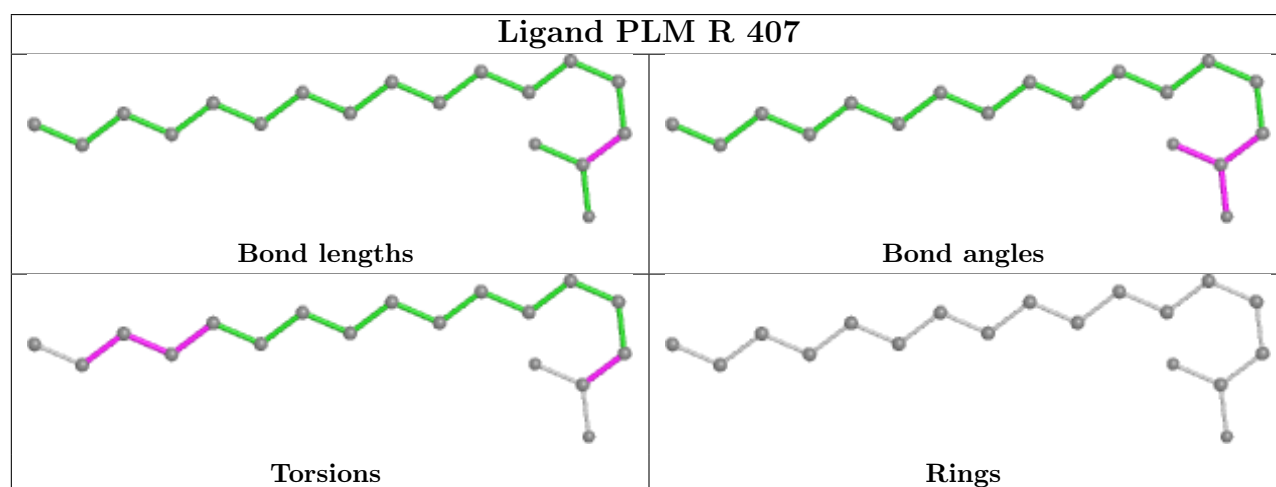
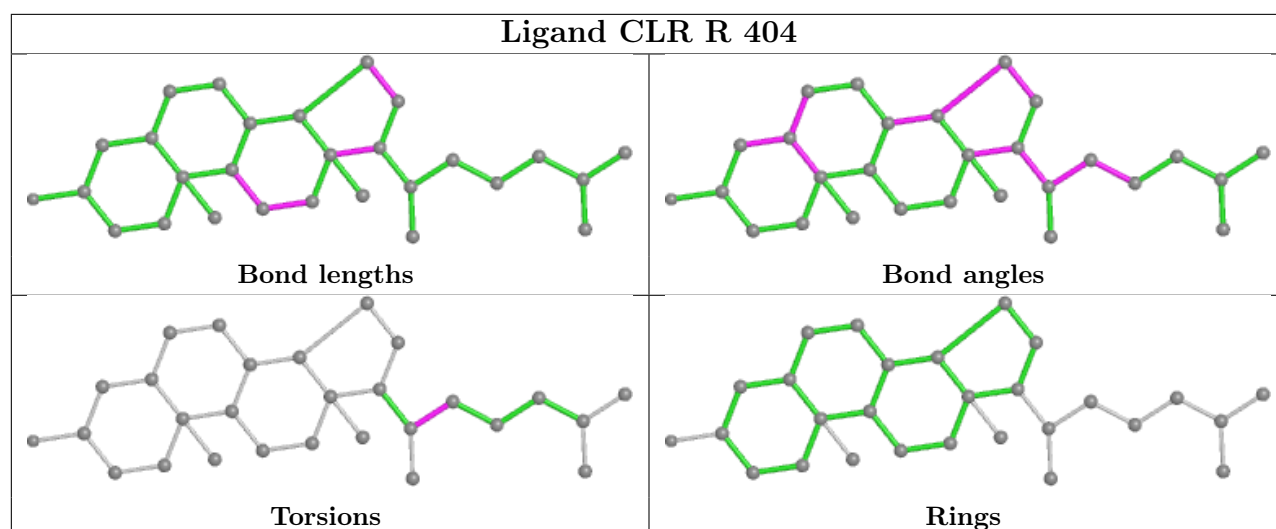
Mol	Chain	Res	Type	Atoms
6	R	404	CLR	C21-C20-C22-C23
7	R	407	PLM	CD-CE-CF-CG
7	R	407	PLM	O2-C1-C2-C3
7	R	406	PLM	O2-C1-C2-C3
7	R	407	PLM	O1-C1-C2-C3
6	R	404	CLR	C17-C20-C22-C23
7	R	406	PLM	O1-C1-C2-C3

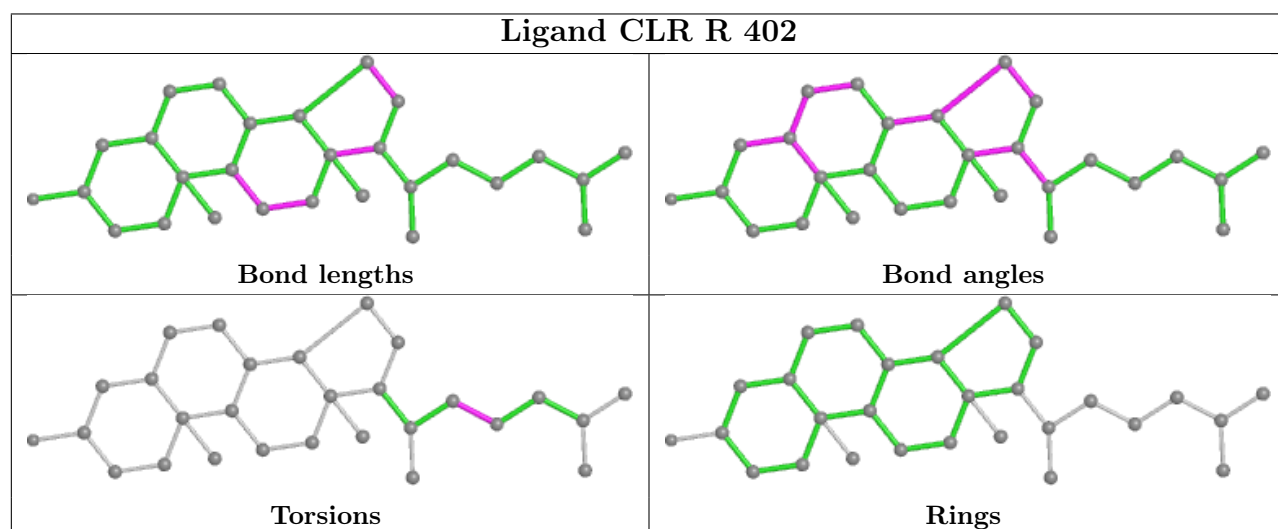
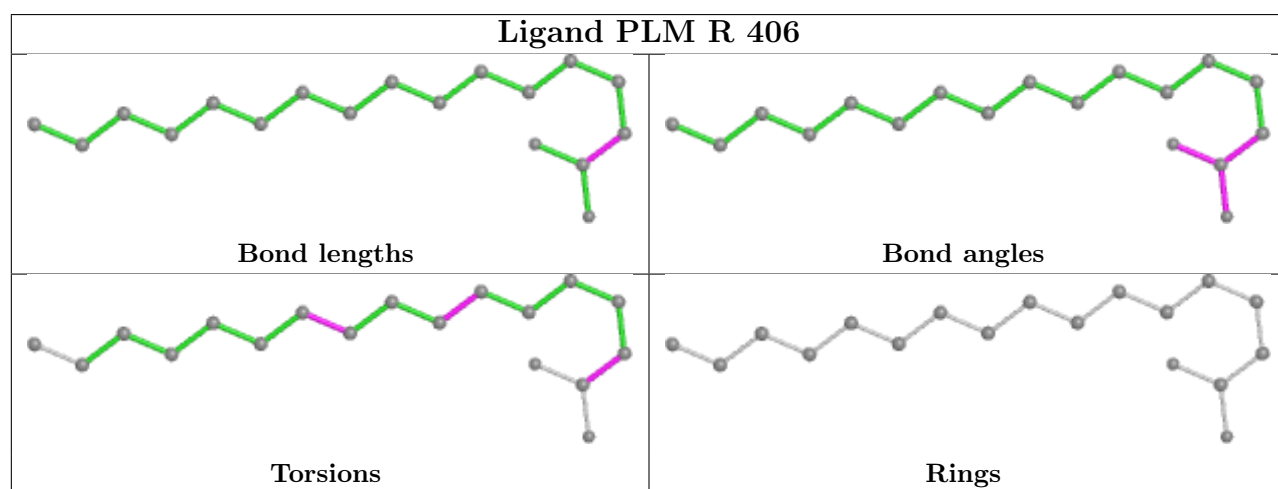
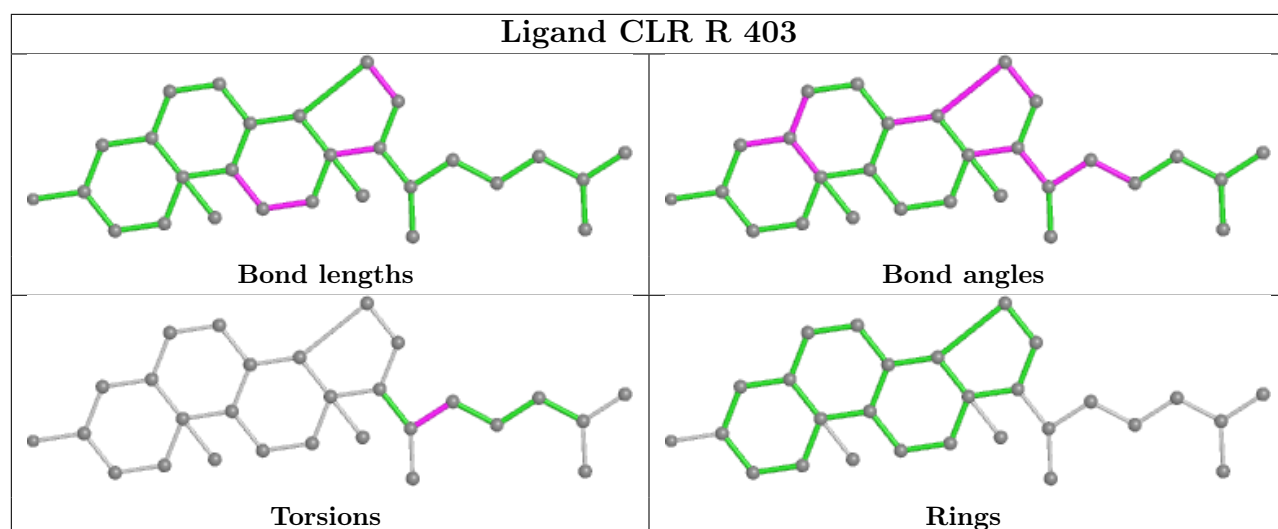
There are no ring outliers.

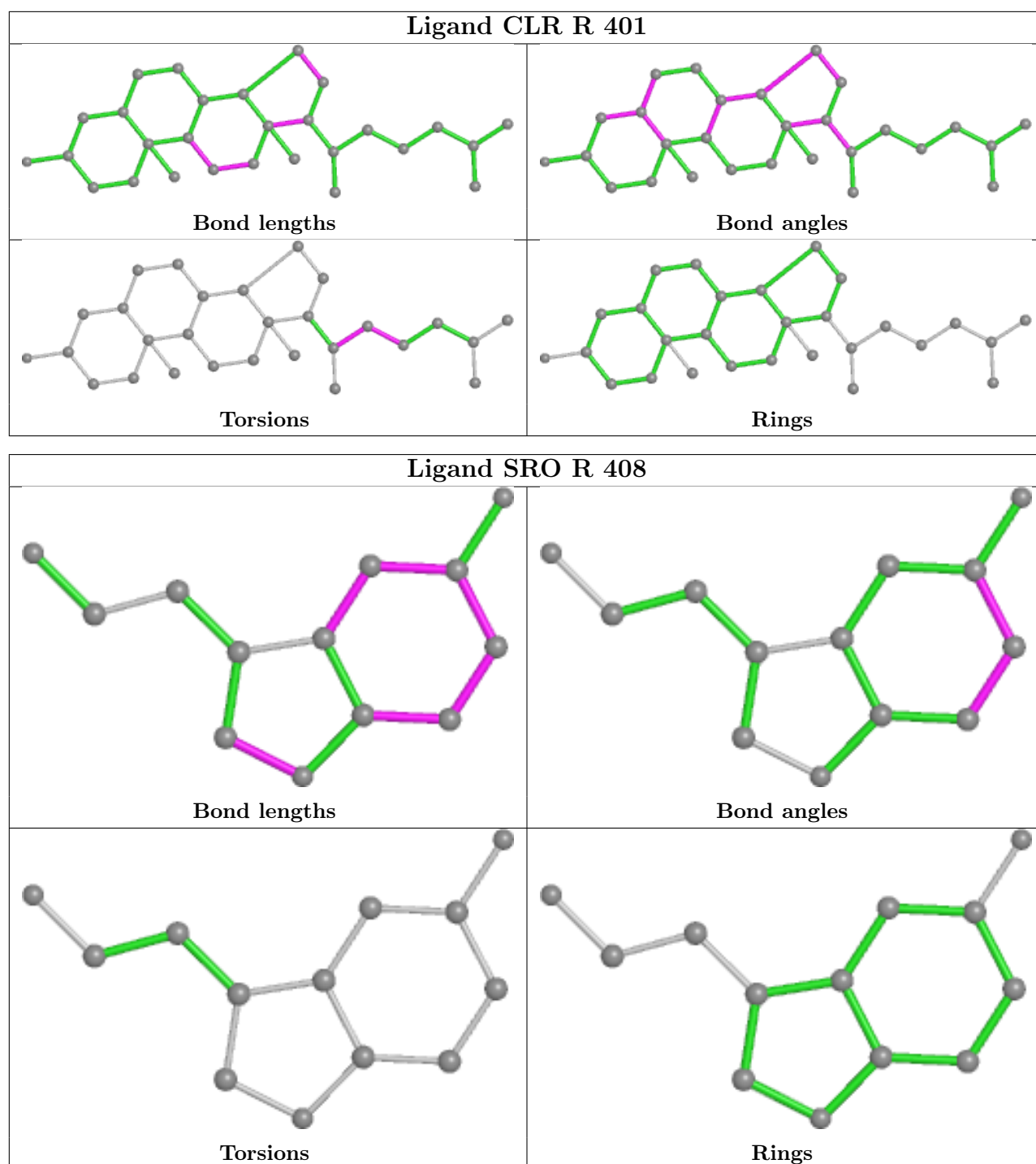
5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	R	404	CLR	1	0
6	R	405	CLR	1	0
6	R	403	CLR	1	0
6	R	402	CLR	1	0
6	R	401	CLR	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.

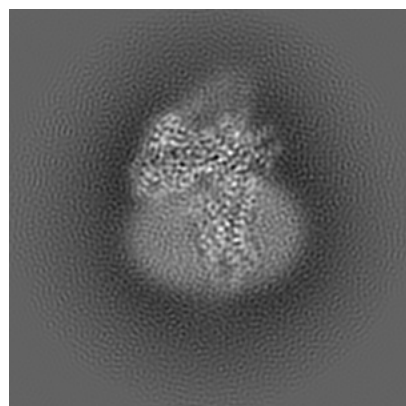
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-33442. These allow visual inspection of the internal detail of the map and identification of artifacts.

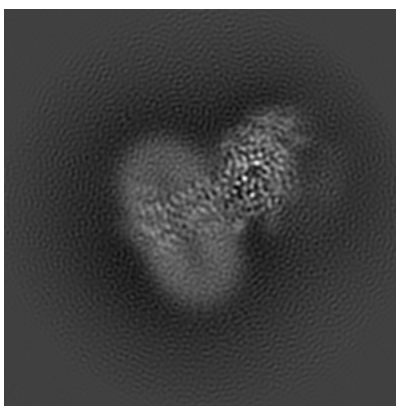
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

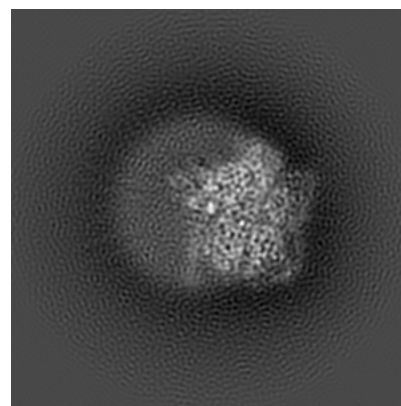
6.1.1 Primary map



X

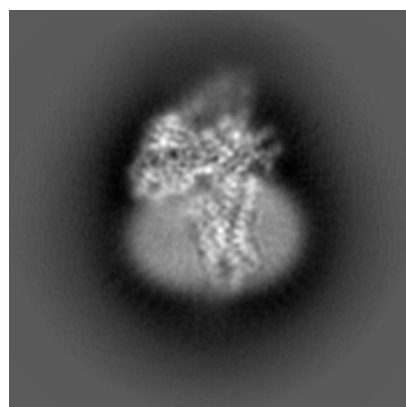


Y

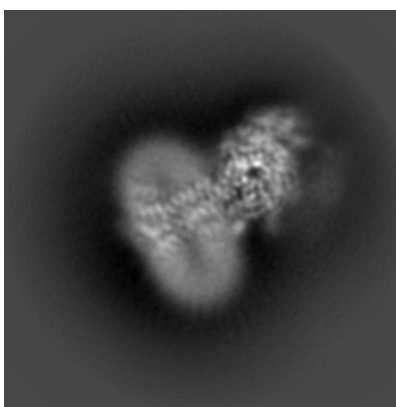


Z

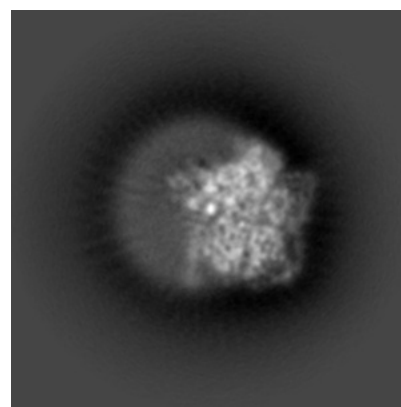
6.1.2 Raw map



X



Y

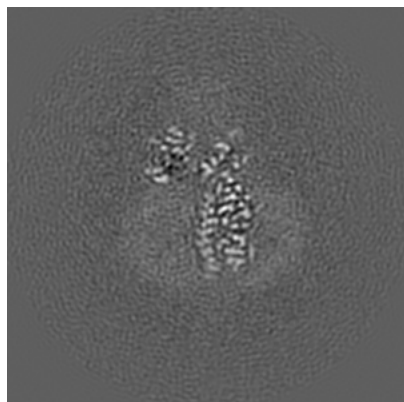


Z

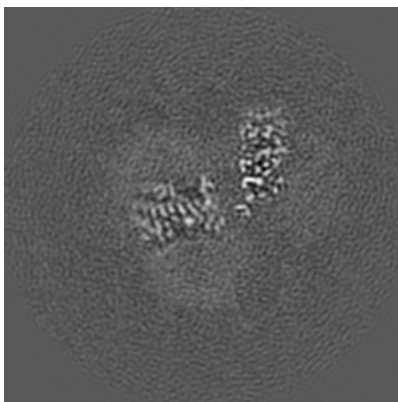
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

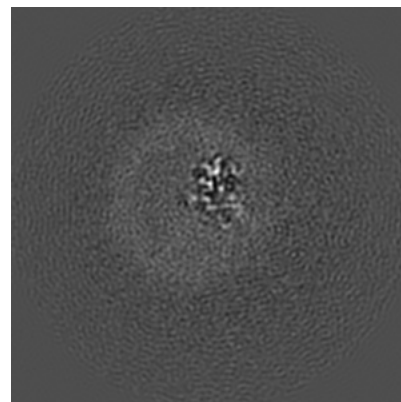
6.2.1 Primary map



X Index: 100

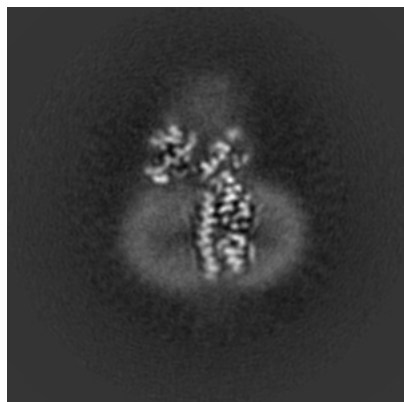


Y Index: 100

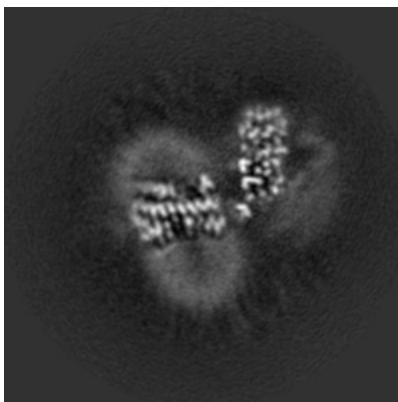


Z Index: 100

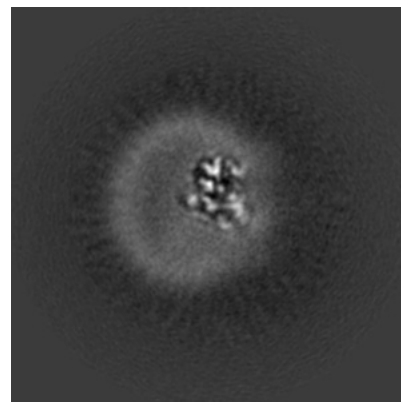
6.2.2 Raw map



X Index: 100



Y Index: 100

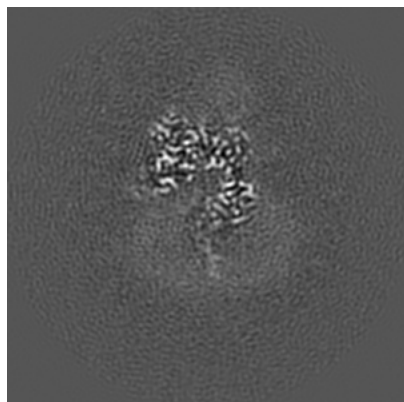


Z Index: 100

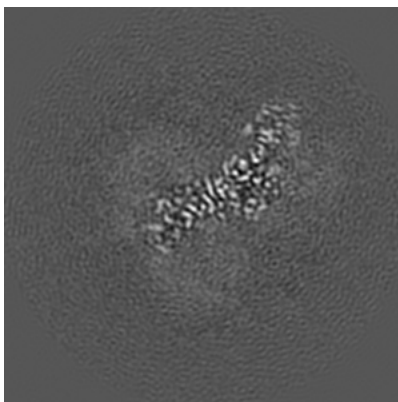
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

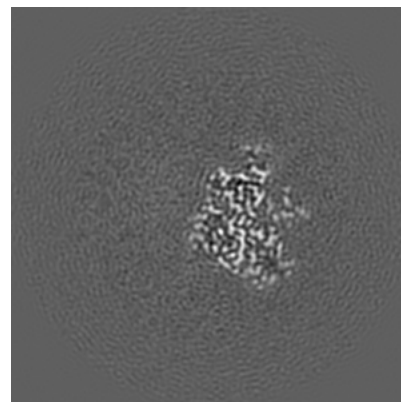
6.3.1 Primary map



X Index: 110

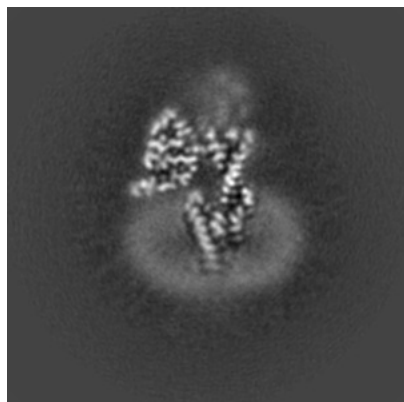


Y Index: 109

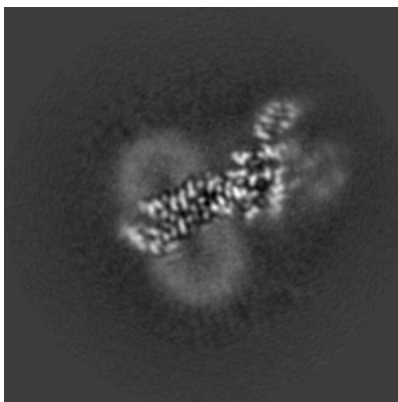


Z Index: 120

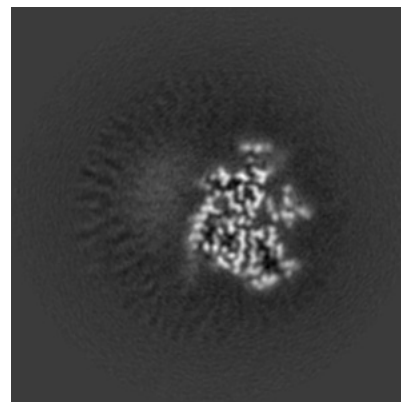
6.3.2 Raw map



X Index: 107



Y Index: 113

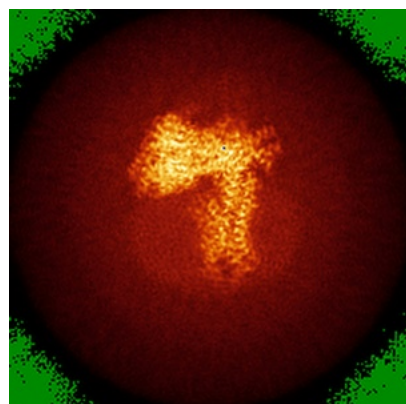


Z Index: 120

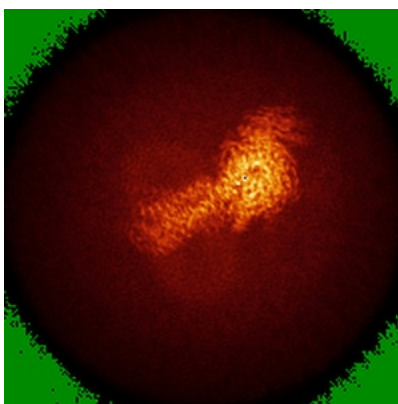
The images above show the largest variance slices of the map in three orthogonal directions.

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

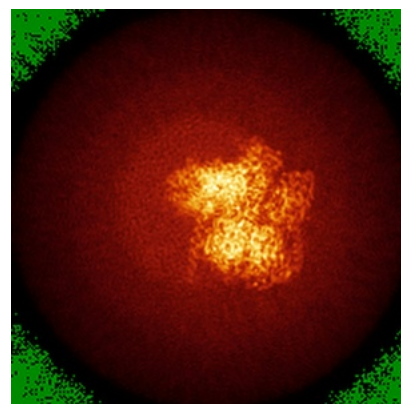
6.4.1 Primary map



X

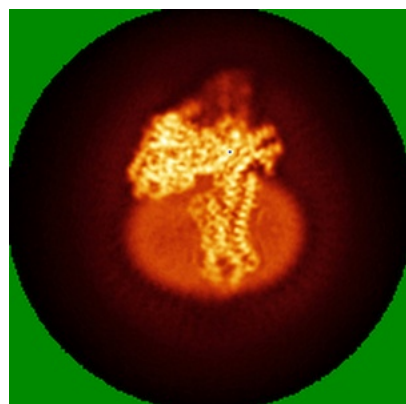


Y

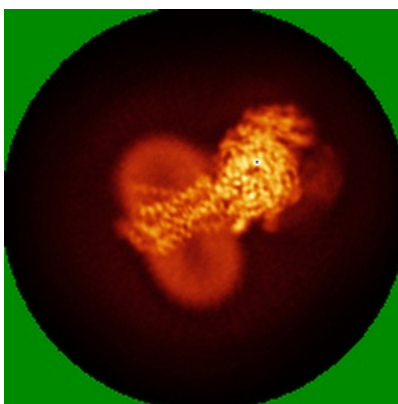


Z

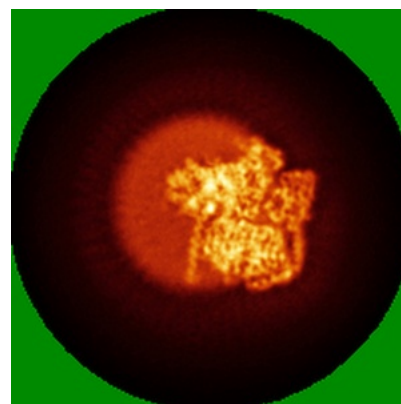
6.4.2 Raw map



X



Y

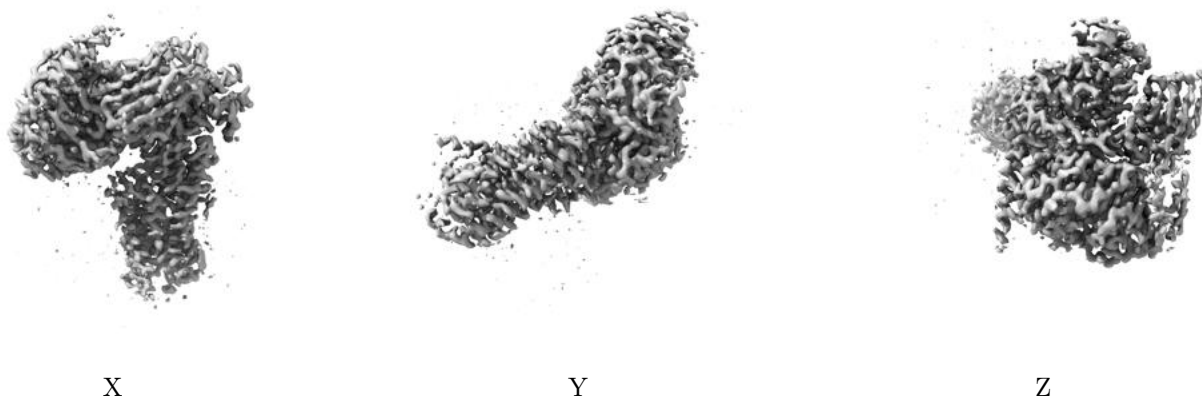


Z

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.

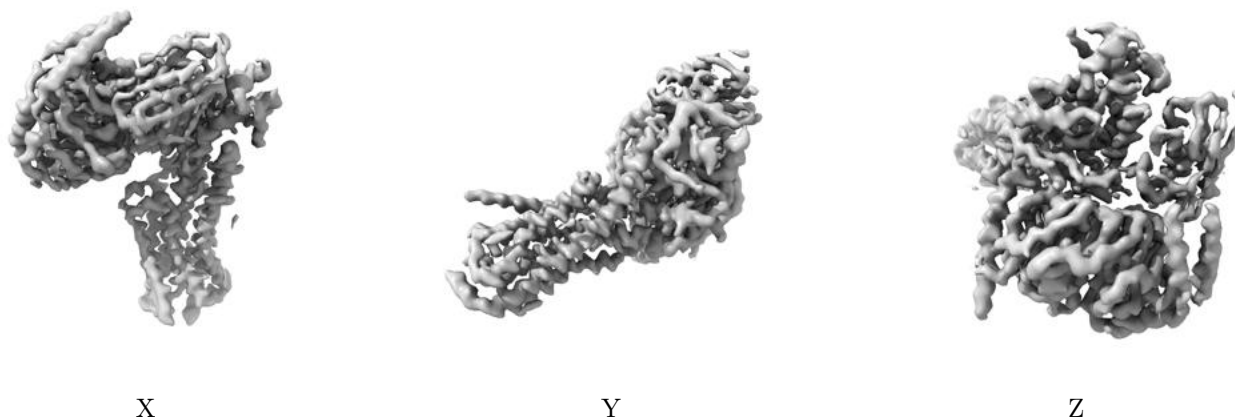
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.04. 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.

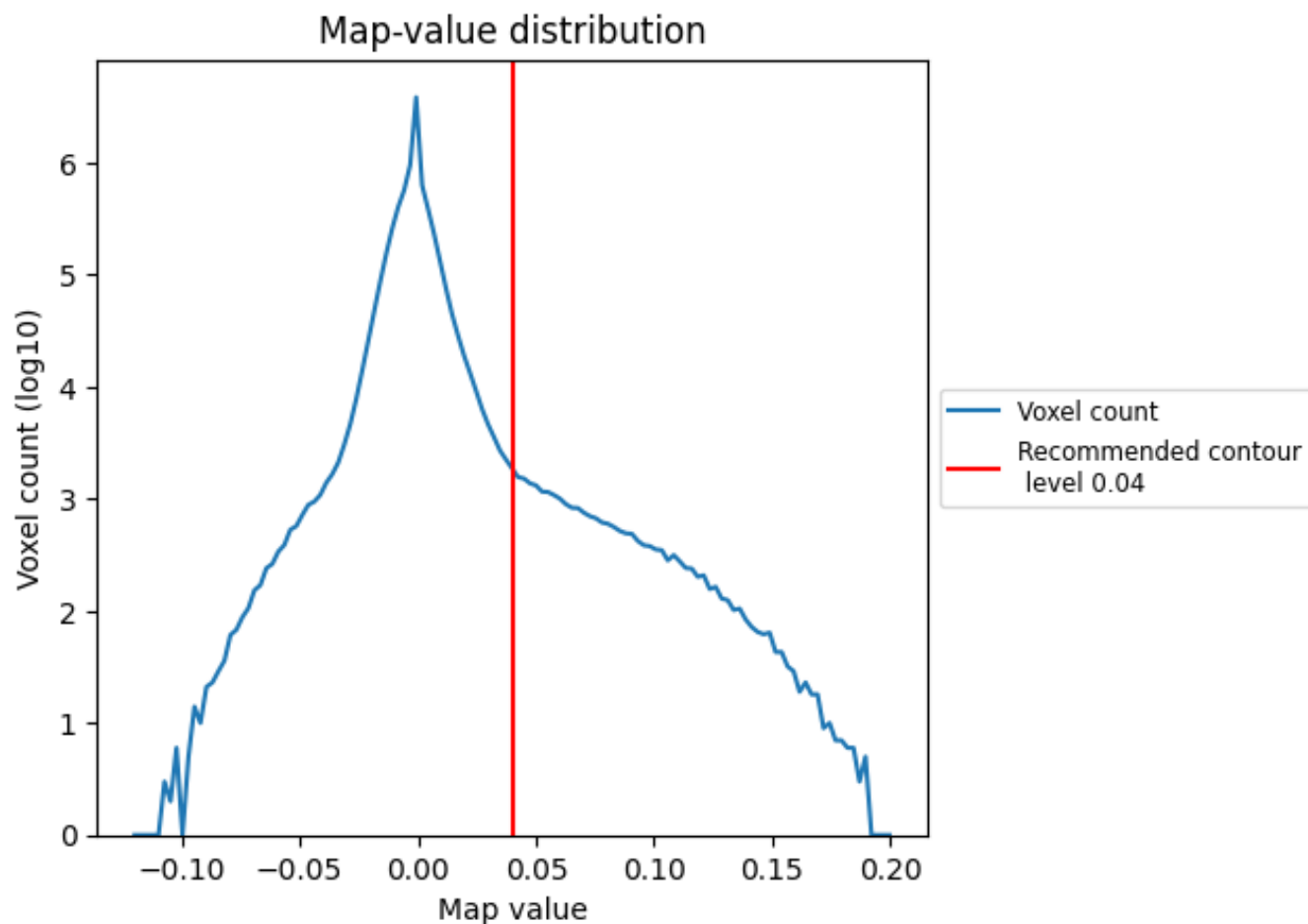
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

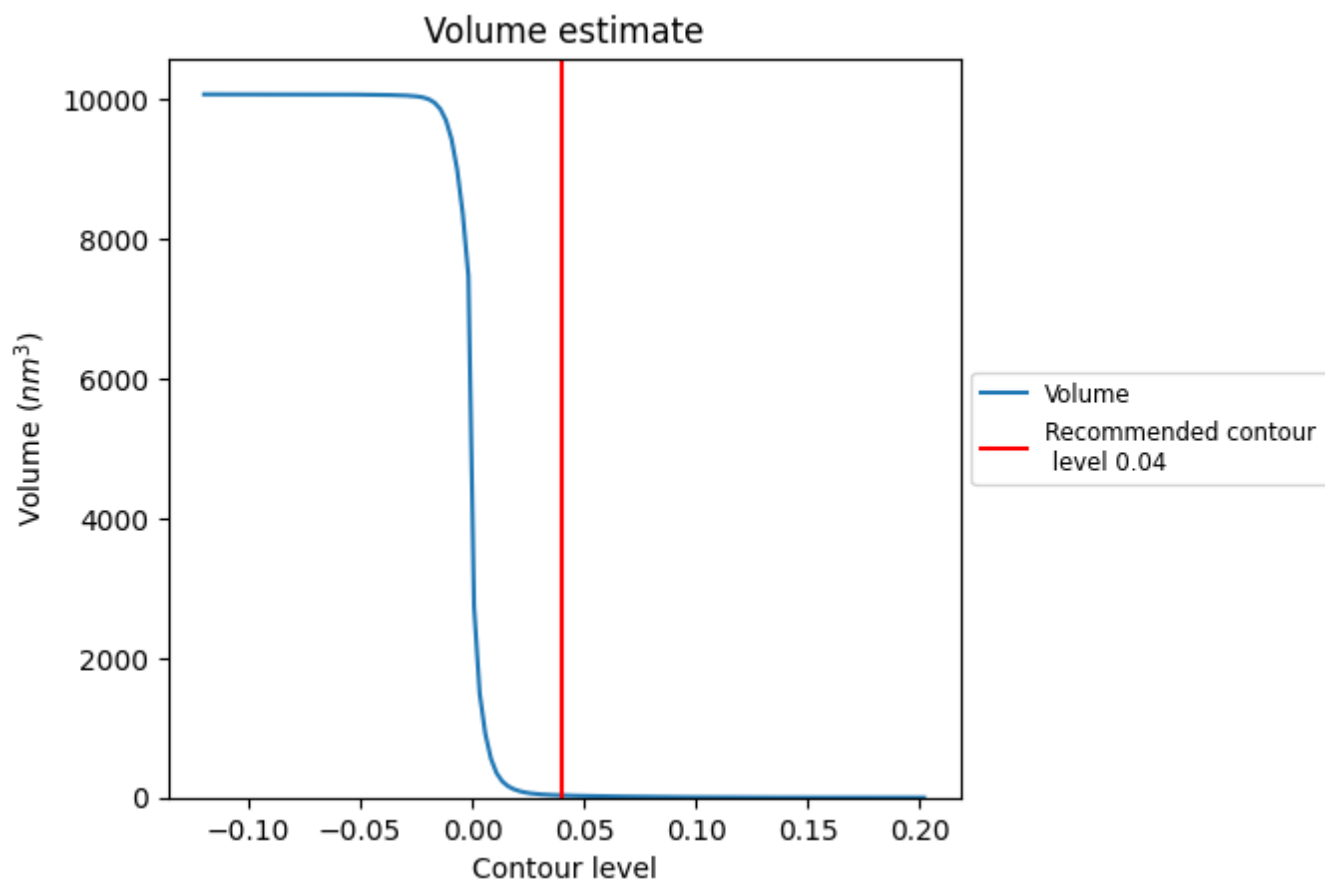
This section contains the results of statistical analysis of the map.

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.

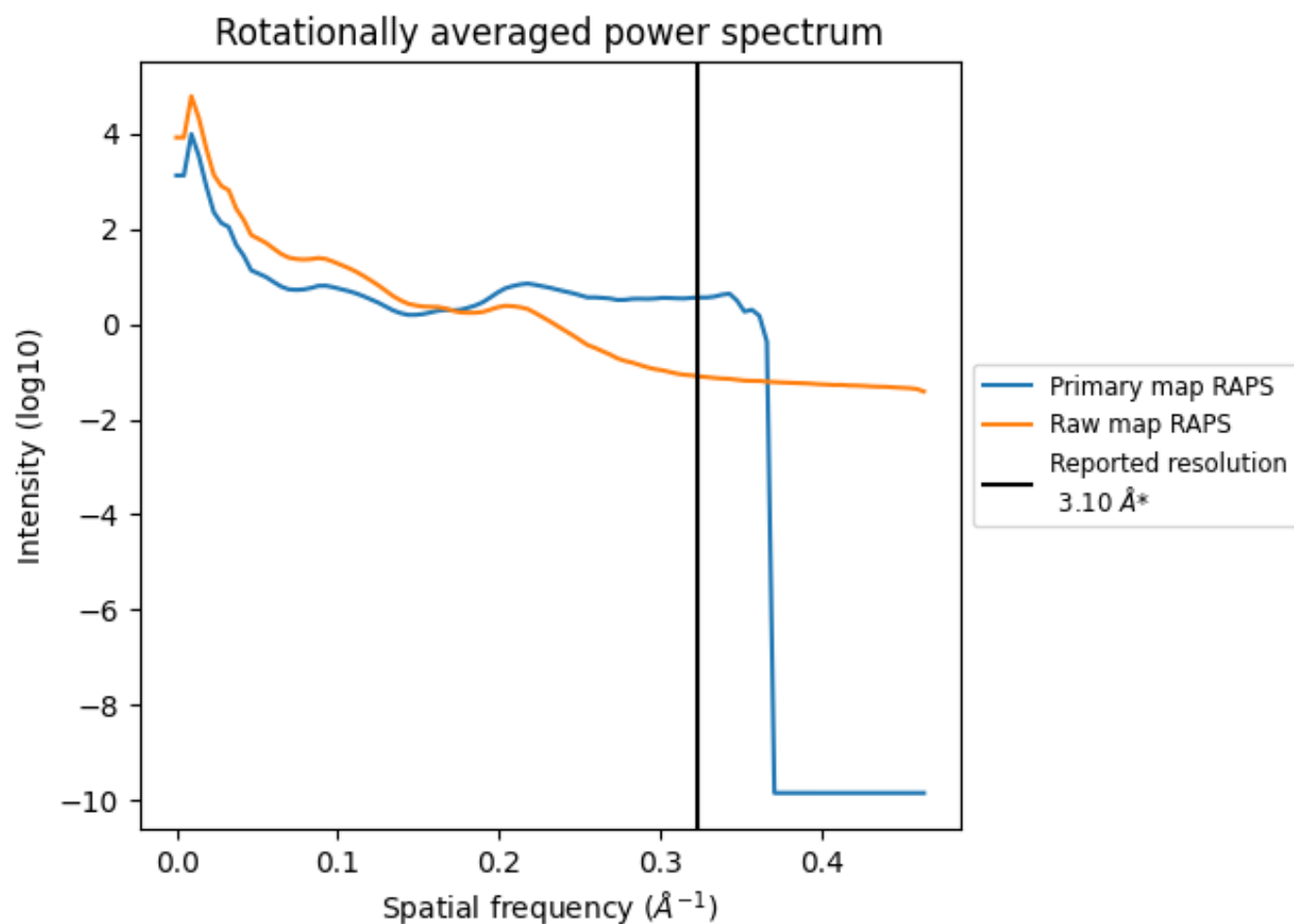
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 32 nm³; this corresponds to an approximate mass of 29 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 ⓘ

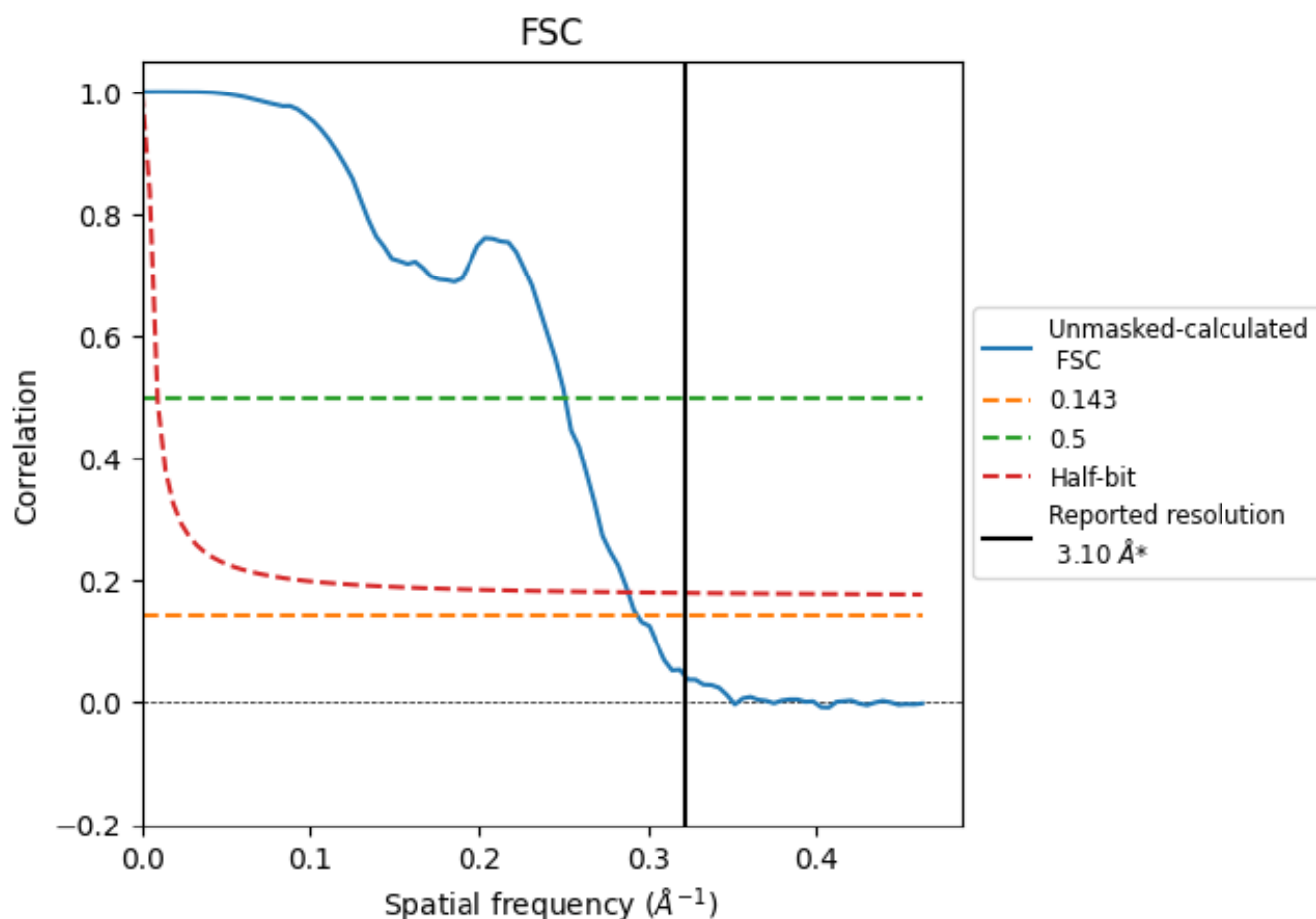


*Reported resolution corresponds to spatial frequency of 0.323 Å⁻¹

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 $0.323 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

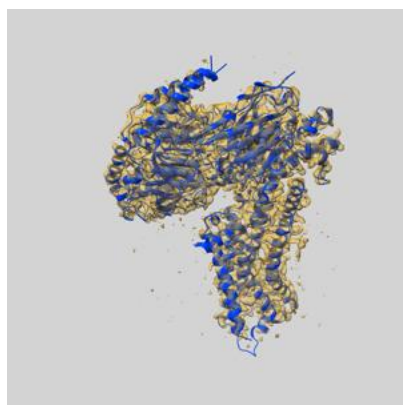
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.40	3.98	3.47

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

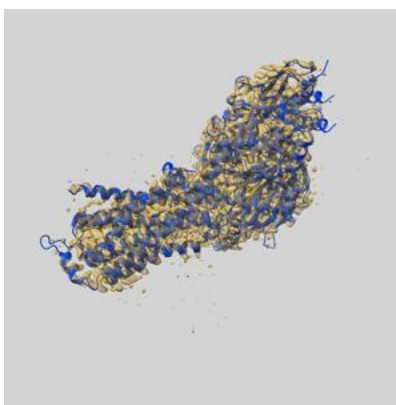
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-33442 and PDB model 7XT8. Per-residue inclusion information can be found in section [3](#) on page [8](#).

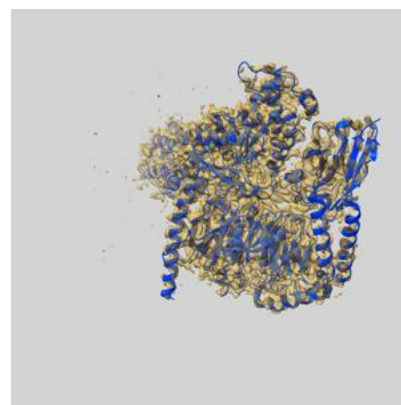
9.1 Map-model overlay [i](#)



X



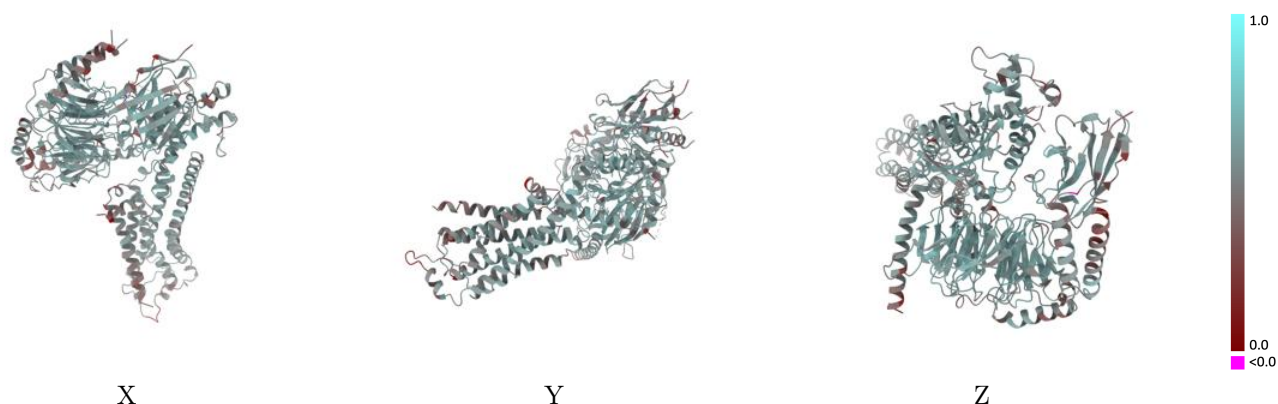
Y



Z

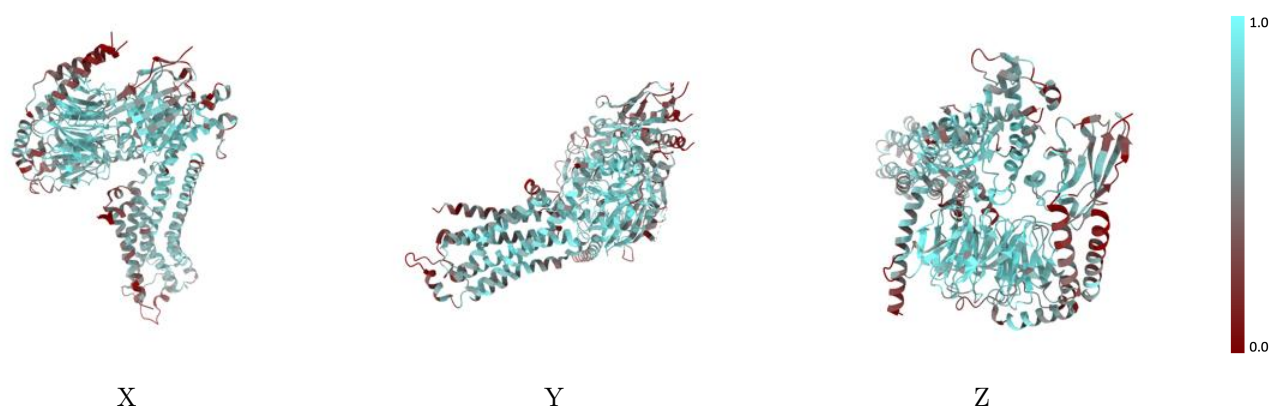
The images above show the 3D surface view of the map at the recommended contour level 0.04 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



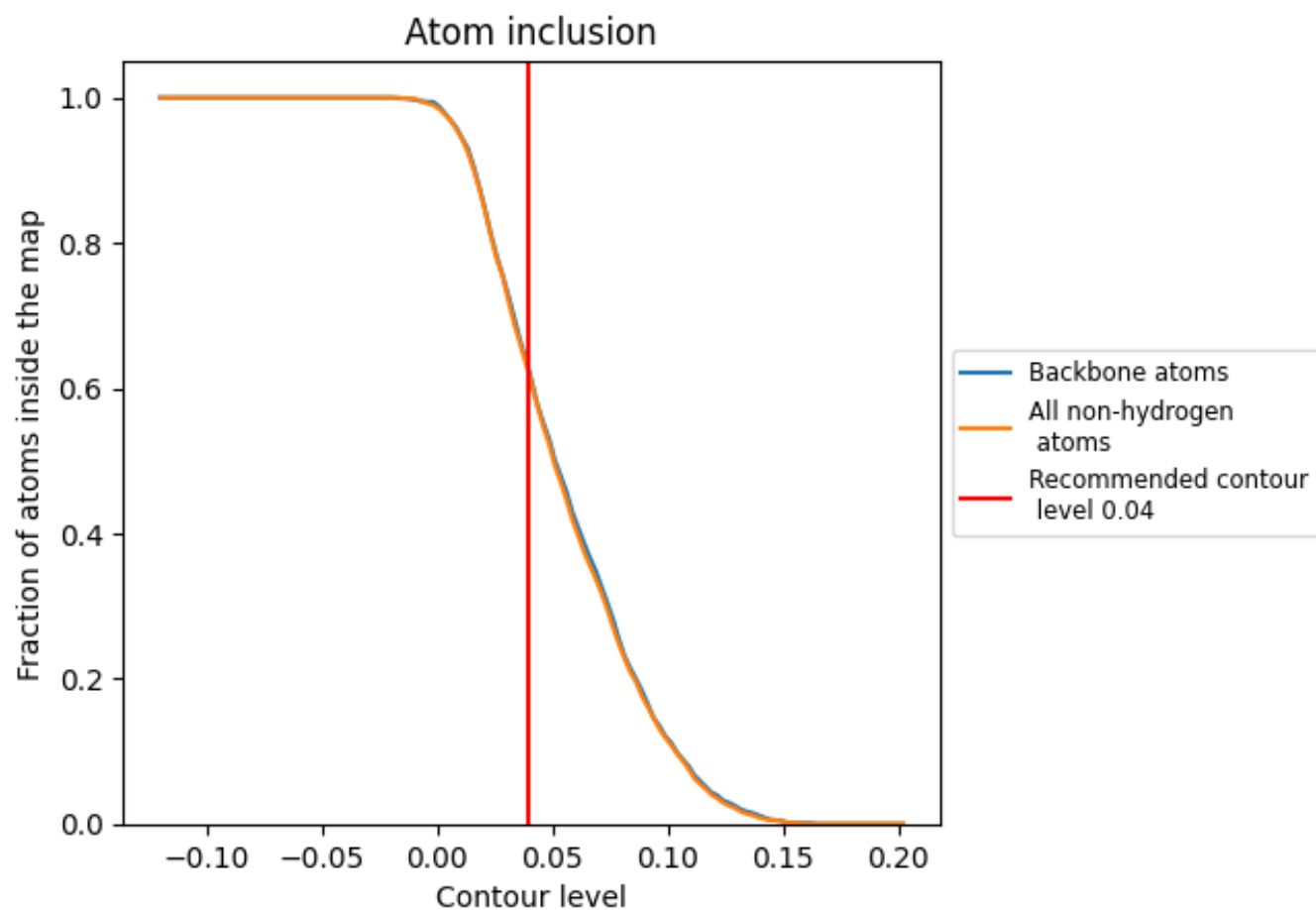
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.04).

9.4 Atom inclusion [i](#)



At the recommended contour level, 62% of all backbone atoms, 62% 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 (0.04) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6200	0.5330
A	0.6780	0.5460
B	0.7090	0.5630
G	0.4360	0.4920
N	0.6040	0.5420
R	0.5540	0.4960

