



Full wwPDB EM Validation Report ⓘ

Mar 29, 2026 – 09:42 AM UTC

PDB ID : 7WX3 / pdb_00007wx3
EMDB ID : EMD-32875
Title : GK domain of Drosophila P5CS filament with glutamate, ATP, and NADPH
Authors : Liu, J.L.; Zhong, J.; Guo, C.J.; Zhou, X.
Deposited on : 2022-02-14
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:

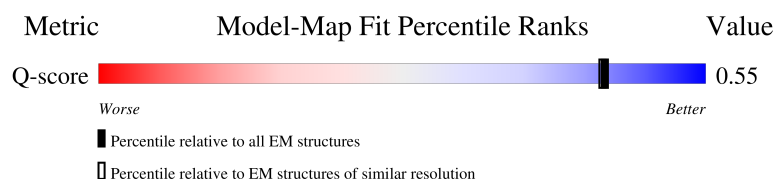
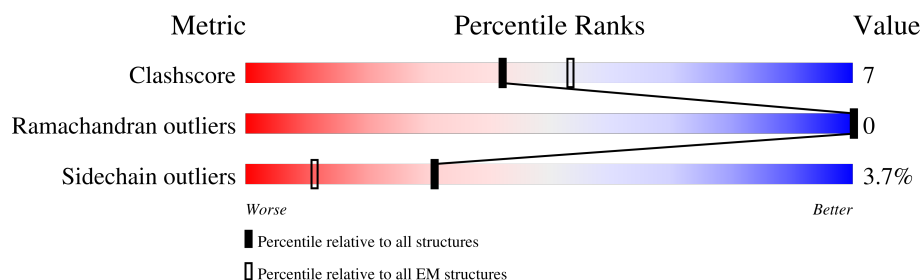
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

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

The reported resolution of this entry is 3.10 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.



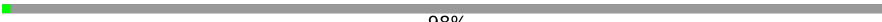
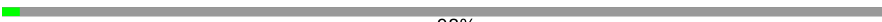
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14724 (2.60 - 3.60)

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	776	
1	B	776	
1	C	776	
1	D	776	

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Mol	Chain	Length	Quality of chain
1	E	776	 98%
1	F	776	 98%
1	G	776	 98%
1	H	776	 98%

2 Entry composition

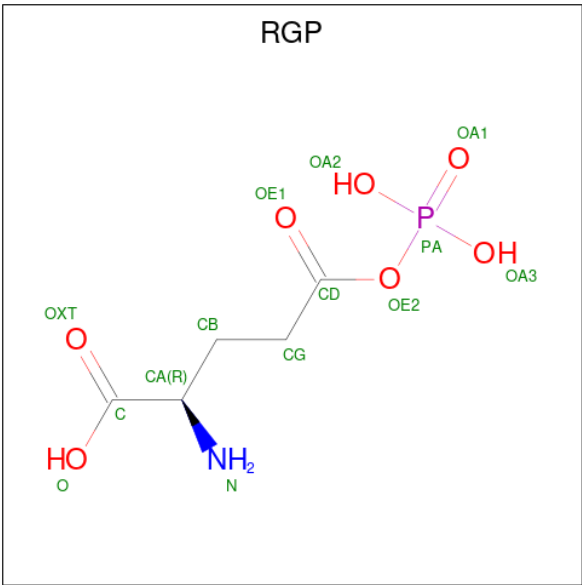
There are 4 unique types of molecules in this entry. The entry contains 8472 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Delta-1-pyrroline-5-carboxylate synthase.

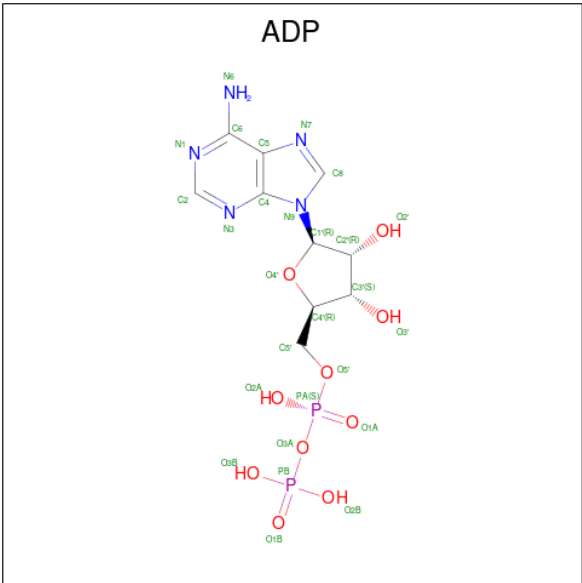
Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	252	Total	C	N	O	S	0	0
			1930	1222	327	366	15		
1	E	14	Total	C	N	O	S	0	0
			113	69	19	23	2		
1	B	258	Total	C	N	O	S	0	0
			1974	1246	334	379	15		
1	F	14	Total	C	N	O	S	0	0
			113	69	19	23	2		
1	C	258	Total	C	N	O	S	0	0
			1974	1246	334	379	15		
1	G	14	Total	C	N	O	S	0	0
			113	69	19	23	2		
1	D	258	Total	C	N	O	S	0	0
			1974	1246	334	379	15		
1	H	14	Total	C	N	O	S	0	0
			113	69	19	23	2		

- Molecule 2 is GAMMA-GLUTAMYL PHOSPHATE (CCD ID: RGP) (formula: $C_5H_{10}NO_7P$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	N	O	P	0
			14	5	1	7	1	
2	B	1	Total	C	N	O	P	0
			14	5	1	7	1	
2	C	1	Total	C	N	O	P	0
			14	5	1	7	1	
2	D	1	Total	C	N	O	P	0
			14	5	1	7	1	

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
3	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	B	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	C	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	D	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Mg	0
			1	1	
4	B	1	Total	Mg	0
			1	1	
4	C	1	Total	Mg	0
			1	1	
4	D	1	Total	Mg	0
			1	1	

98%



Frequency	Percentage
5%	5%
27%	27%
5%	5%
67%	67%



[illegible]

- Molecule 1: Delta-1-pyrroline-5-carboxylate synthase

Chain H: 98%

[illegible]

SER	LEU	ASP	GLU	ALA	ILE	ASN	HIS	ILE	HIS	THR	TYR	GLY	SER	SER	HIS	THR	ASP	VAL	ILE	THR	VAL	THR	LYS	TRP	GLU	ASN	ASP	ALA	ALA	GLN	ALA	ASP	ARG	GLN	PHE	LEU	ALA	GLY	SER	VAL	ASP	ALA	SER	ALA	CYS	VAL	PHE	HIS	ASN	ALA	SER	SER	ARG	ARG	PHE	ALA	ASP	GLY	PHE	ARG	GLY	LEU	GLY	ALA	GLU	VAL
GLY	ILE	SER	THR	ALA	ARG	ILE	HIS	ALA	ARG	GLY	PRO	VAL	GLY	VAL	GLU	GLY	LEU	LEU	THR	THR	LYS	TRP	ILE	LEU	GLU	GLY	GLN	ASP	HIS	ALA	ALA	ALA	ASP	PHE	VAL	ALA	GLU	GLY	GLY	GLY	ARG	THR	TRP	THR	ASN	LEU	HIS	SER	GLU	THR	LEU	PRO	LEU	ASP												

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1412498	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 ($e^-/\text{\AA}^2$)	72	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.331	Depositor
Minimum map value	-0.176	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.06	Depositor
Map size (Å)	317.99997, 317.99997, 317.99997	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	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: MG, ADP, RGP

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	0.43	0/1956	0.38	0/2640
1	B	0.43	0/2000	0.38	0/2700
1	C	0.43	0/2000	0.39	0/2700
1	D	0.42	0/2000	0.39	0/2700
1	E	0.32	0/112	0.38	0/148
1	F	0.32	0/112	0.38	0/148
1	G	0.32	0/112	0.38	0/148
1	H	0.32	0/112	0.38	0/148
All	All	0.42	0/8404	0.39	0/11332

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	1930	0	1971	29	0
1	B	1974	0	2006	30	0
1	C	1974	0	2006	26	0
1	D	1974	0	2006	31	0
1	E	113	0	117	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	113	0	117	1	0
1	G	113	0	117	2	0
1	H	113	0	117	1	0
2	A	14	0	6	1	0
2	B	14	0	6	0	0
2	C	14	0	6	0	0
2	D	14	0	6	1	0
3	A	27	0	12	1	0
3	B	27	0	12	1	0
3	C	27	0	12	1	0
3	D	27	0	12	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
All	All	8472	0	8529	114	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 7.

All (114) 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:D:116:GLU:OE1	1:H:124:ARG:NH2	2.29	0.66
1:C:116:GLU:OE1	1:G:124:ARG:NH2	2.29	0.65
1:B:116:GLU:OE1	1:F:124:ARG:NH2	2.30	0.65
1:A:116:GLU:OE1	1:E:124:ARG:NH2	2.30	0.65
1:C:59:LEU:HD11	1:C:327:ILE:HD11	1.79	0.65
1:A:59:LEU:HD11	1:A:327:ILE:HD11	1.79	0.64
1:D:59:LEU:HD11	1:D:327:ILE:HD11	1.79	0.64
1:B:59:LEU:HD11	1:B:327:ILE:HD11	1.80	0.64
1:B:277:ASP:OD2	1:B:277:ASP:N	2.32	0.63
1:C:256:ASP:HA	1:C:316:ASN:HB2	1.80	0.63
1:C:277:ASP:OD2	1:C:277:ASP:N	2.32	0.63
1:D:277:ASP:OD2	1:D:277:ASP:N	2.32	0.63
1:A:256:ASP:HA	1:A:316:ASN:HB2	1.81	0.62
1:D:256:ASP:HA	1:D:316:ASN:HB2	1.80	0.62
1:B:256:ASP:HA	1:B:316:ASN:HB2	1.80	0.62
1:A:154:MET:HE2	1:A:170:GLN:HB2	1.84	0.59
1:C:154:MET:HE2	1:C:170:GLN:HB2	1.84	0.58
1:D:154:MET:HE2	1:D:170:GLN:HB2	1.84	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:154:MET:HE2	1:B:170:GLN:HB2	1.84	0.57
1:D:275:THR:O	1:D:279:SER:OG	2.15	0.57
1:C:275:THR:O	1:C:279:SER:OG	2.23	0.56
1:B:313:VAL:HG22	1:B:335:PHE:HD1	1.73	0.54
1:D:313:VAL:HG22	1:D:335:PHE:HD1	1.73	0.54
1:C:313:VAL:HG22	1:C:335:PHE:HD1	1.73	0.53
1:A:313:VAL:HG22	1:A:335:PHE:HD1	1.73	0.53
1:D:232:ASP:N	1:D:232:ASP:OD1	2.39	0.53
1:C:109:GLY:HA3	1:C:145:ALA:O	2.09	0.52
1:B:232:ASP:N	1:B:232:ASP:OD1	2.40	0.52
1:A:109:GLY:HA3	1:A:145:ALA:O	2.09	0.52
1:D:109:GLY:HA3	1:D:145:ALA:O	2.09	0.52
1:B:109:GLY:HA3	1:B:145:ALA:O	2.09	0.52
1:C:232:ASP:N	1:C:232:ASP:OD1	2.40	0.51
1:A:232:ASP:OD1	1:A:232:ASP:N	2.39	0.50
3:D:802:ADP:H2'	3:D:802:ADP:N3	2.26	0.50
3:B:802:ADP:H2'	3:B:802:ADP:N3	2.26	0.50
1:C:123:MET:HE2	1:D:127:LEU:HD21	1.93	0.50
1:B:181:GLU:CD	1:B:181:GLU:H	2.20	0.50
1:C:127:LEU:HD21	1:D:123:MET:HE2	1.93	0.49
1:D:181:GLU:H	1:D:181:GLU:CD	2.20	0.49
1:A:123:MET:HE2	1:B:127:LEU:HD21	1.93	0.49
1:A:50:ARG:NH2	1:A:272:HIS:O	2.45	0.49
1:A:127:LEU:HD21	1:B:123:MET:HE2	1.93	0.49
1:A:181:GLU:H	1:A:181:GLU:CD	2.20	0.49
1:B:257:GLY:HA3	1:B:270:LEU:HD11	1.95	0.49
1:D:257:GLY:HA3	1:D:270:LEU:HD11	1.95	0.49
1:C:181:GLU:H	1:C:181:GLU:CD	2.21	0.49
1:B:197:LEU:HD13	1:C:113:LEU:HD22	1.95	0.49
3:C:802:ADP:H2'	3:C:802:ADP:N3	2.26	0.49
3:A:802:ADP:N3	3:A:802:ADP:H2'	2.26	0.49
1:C:59:LEU:HD22	1:C:248:LEU:HB3	1.96	0.48
1:A:113:LEU:HD22	1:D:197:LEU:HD13	1.96	0.48
1:A:197:LEU:HD13	1:D:113:LEU:HD22	1.95	0.48
1:A:59:LEU:HD22	1:A:248:LEU:HB3	1.96	0.48
1:B:113:LEU:HD22	1:C:197:LEU:HD13	1.96	0.48
1:C:257:GLY:HA3	1:C:270:LEU:HD11	1.95	0.48
1:D:59:LEU:HD22	1:D:248:LEU:HB3	1.95	0.48
1:D:315:CYS:HB3	1:D:326:ILE:HD11	1.96	0.48
1:A:257:GLY:HA3	1:A:270:LEU:HD11	1.96	0.47
1:B:59:LEU:HD22	1:B:248:LEU:HB3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:315:CYS:HB3	1:A:326:ILE:HD11	1.96	0.47
1:B:315:CYS:HB3	1:B:326:ILE:HD11	1.97	0.47
1:C:315:CYS:HB3	1:C:326:ILE:HD11	1.97	0.47
1:B:81:LEU:HD12	1:B:81:LEU:HA	1.71	0.46
1:B:120:SER:O	1:B:120:SER:OG	2.31	0.46
1:D:249:LEU:HD23	1:D:312:VAL:HG22	1.98	0.46
1:B:249:LEU:HD23	1:B:312:VAL:HG22	1.99	0.45
1:D:81:LEU:HA	1:D:81:LEU:HD12	1.71	0.45
1:A:120:SER:O	1:A:120:SER:OG	2.31	0.45
1:D:50:ARG:NH2	1:D:272:HIS:O	2.50	0.45
1:A:249:LEU:HD23	1:A:312:VAL:HG22	1.99	0.45
1:B:50:ARG:NH2	1:B:272:HIS:O	2.51	0.44
1:D:167:LYS:HE3	1:D:167:LYS:HB2	1.73	0.44
1:C:249:LEU:HD23	1:C:312:VAL:HG22	1.99	0.44
1:B:78:LEU:HD23	1:B:78:LEU:HA	1.79	0.44
1:B:167:LYS:HE3	1:B:167:LYS:HB2	1.73	0.44
1:A:213:MET:HE1	2:A:801:RGP:HB2	1.99	0.44
1:B:211:PRO:HA	1:B:212:PRO:HD3	1.90	0.44
1:B:191:LEU:HA	1:B:191:LEU:HD23	1.87	0.44
1:D:331:LYS:HE3	1:D:331:LYS:HB2	1.82	0.44
1:E:123:MET:HE3	1:E:123:MET:HB3	1.86	0.43
1:D:78:LEU:HD23	1:D:78:LEU:HA	1.79	0.43
1:D:211:PRO:HA	1:D:212:PRO:HD3	1.89	0.43
1:C:50:ARG:NH2	1:C:272:HIS:O	2.51	0.43
1:G:123:MET:HE3	1:G:123:MET:HB3	1.86	0.43
1:B:331:LYS:HE3	1:B:331:LYS:HB2	1.82	0.43
1:B:78:LEU:HD22	1:B:160:MET:HE1	2.01	0.43
1:C:123:MET:HE3	1:C:123:MET:HB3	1.74	0.43
1:A:123:MET:HE3	1:A:123:MET:HB3	1.74	0.43
1:D:78:LEU:HD22	1:D:160:MET:HE1	2.01	0.43
1:D:191:LEU:HD23	1:D:191:LEU:HA	1.87	0.42
1:A:78:LEU:HD22	1:A:160:MET:HE1	2.01	0.42
1:C:78:LEU:HD22	1:C:160:MET:HE1	2.01	0.42
1:A:167:LYS:HE3	1:A:167:LYS:HB2	1.73	0.42
1:C:254:ASP:OD2	1:C:254:ASP:N	2.51	0.42
1:A:254:ASP:OD2	1:A:254:ASP:N	2.51	0.42
1:D:53:LEU:HD22	1:D:248:LEU:HD13	2.01	0.42
1:B:53:LEU:HD22	1:B:248:LEU:HD13	2.02	0.42
1:D:254:ASP:OD2	1:D:254:ASP:N	2.51	0.41
1:A:53:LEU:HD22	1:A:248:LEU:HD13	2.01	0.41
1:B:254:ASP:OD2	1:B:254:ASP:N	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:337:THR:OG1	1:B:338:GLU:N	2.54	0.41
1:C:53:LEU:HD22	1:C:248:LEU:HD13	2.01	0.41
1:A:153:LEU:HD12	1:A:153:LEU:HA	1.94	0.41
1:A:337:THR:OG1	1:A:338:GLU:N	2.53	0.41
1:C:167:LYS:HE3	1:C:167:LYS:HB2	1.73	0.41
1:D:337:THR:OG1	1:D:338:GLU:N	2.54	0.41
1:C:81:LEU:HA	1:C:81:LEU:HD12	1.71	0.41
1:B:71:GLU:N	1:B:71:GLU:OE1	2.54	0.40
1:D:213:MET:HE1	2:D:801:RGP:HN1	1.87	0.40
1:A:81:LEU:HA	1:A:81:LEU:HD12	1.71	0.40
1:D:71:GLU:OE1	1:D:71:GLU:N	2.54	0.40
1:A:71:GLU:N	1:A:71:GLU:OE1	2.54	0.40
1:A:269:LYS:HB2	1:A:269:LYS:HE2	1.81	0.40
1:C:153:LEU:HD12	1:C:153:LEU:HA	1.95	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	244/776 (31%)	234 (96%)	10 (4%)	0	100	100
1	B	250/776 (32%)	239 (96%)	11 (4%)	0	100	100
1	C	250/776 (32%)	240 (96%)	10 (4%)	0	100	100
1	D	250/776 (32%)	241 (96%)	9 (4%)	0	100	100
1	E	12/776 (2%)	10 (83%)	2 (17%)	0	100	100
1	F	12/776 (2%)	10 (83%)	2 (17%)	0	100	100
1	G	12/776 (2%)	10 (83%)	2 (17%)	0	100	100
1	H	12/776 (2%)	10 (83%)	2 (17%)	0	100	100
All	All	1042/6208 (17%)	994 (95%)	48 (5%)	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	211/630 (34%)	205 (97%)	6 (3%)	38	66
1	B	217/630 (34%)	210 (97%)	7 (3%)	34	64
1	C	217/630 (34%)	209 (96%)	8 (4%)	30	61
1	D	217/630 (34%)	208 (96%)	9 (4%)	27	59
1	E	14/630 (2%)	13 (93%)	1 (7%)	13	41
1	F	14/630 (2%)	13 (93%)	1 (7%)	13	41
1	G	14/630 (2%)	13 (93%)	1 (7%)	13	41
1	H	14/630 (2%)	13 (93%)	1 (7%)	13	41
All	All	918/5040 (18%)	884 (96%)	34 (4%)	31	61

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	THR
1	A	126	THR
1	A	170	GLN
1	A	174	THR
1	A	256	ASP
1	A	310	VAL
1	E	126	THR
1	B	46	THR
1	B	126	THR
1	B	170	GLN
1	B	174	THR
1	B	256	ASP
1	B	277	ASP
1	B	310	VAL
1	F	126	THR
1	C	46	THR

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Mol	Chain	Res	Type
1	C	48	THR
1	C	126	THR
1	C	170	GLN
1	C	174	THR
1	C	256	ASP
1	C	277	ASP
1	C	310	VAL
1	G	126	THR
1	D	46	THR
1	D	48	THR
1	D	126	THR
1	D	170	GLN
1	D	174	THR
1	D	240	LEU
1	D	256	ASP
1	D	277	ASP
1	D	310	VAL
1	H	126	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	111	GLN
1	A	272	HIS
1	A	316	ASN
1	B	111	GLN
1	B	272	HIS
1	B	316	ASN
1	C	52	GLN
1	C	111	GLN
1	C	272	HIS
1	C	316	ASN
1	D	52	GLN
1	D	111	GLN
1	D	272	HIS
1	D	316	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
3	ADP	B	802	-	28,29,29	1.41	4 (14%)	43,45,45	1.96	10 (23%)
3	ADP	D	802	-	28,29,29	1.53	5 (17%)	43,45,45	2.01	10 (23%)
2	RGP	B	801	4	11,13,13	1.28	1 (9%)	13,18,18	1.16	1 (7%)
3	ADP	C	802	-	28,29,29	1.54	5 (17%)	43,45,45	2.02	10 (23%)
3	ADP	A	802	-	28,29,29	1.41	4 (14%)	43,45,45	1.96	10 (23%)
2	RGP	D	801	4	11,13,13	1.26	1 (9%)	13,18,18	1.18	1 (7%)
2	RGP	A	801	4	11,13,13	1.26	1 (9%)	13,18,18	1.16	1 (7%)
2	RGP	C	801	4	11,13,13	1.26	1 (9%)	13,18,18	1.17	1 (7%)

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	ADP	B	802	-	-	3/16/32/32	0/3/3/3
3	ADP	D	802	-	-	2/16/32/32	0/3/3/3
2	RGP	B	801	4	-	6/12/14/14	-
3	ADP	C	802	-	-	3/16/32/32	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ADP	A	802	-	-	3/16/32/32	0/3/3/3
2	RGP	D	801	4	-	6/12/14/14	-
2	RGP	A	801	4	-	6/12/14/14	-
2	RGP	C	801	4	-	6/12/14/14	-

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	802	ADP	C5-C4	4.76	1.47	1.39
3	A	802	ADP	C5-C4	4.73	1.47	1.39
3	B	802	ADP	C5-C4	4.72	1.47	1.39
3	D	802	ADP	C5-C4	4.71	1.47	1.39
3	C	802	ADP	PB-O1B	3.41	1.61	1.50
3	D	802	ADP	PB-O1B	3.41	1.61	1.50
2	C	801	RGP	PA-OE2	3.02	1.65	1.59
2	B	801	RGP	PA-OE2	3.02	1.65	1.59
2	D	801	RGP	PA-OE2	3.01	1.65	1.59
2	A	801	RGP	PA-OE2	3.00	1.65	1.59
3	D	802	ADP	C5-C6	2.66	1.48	1.41
3	B	802	ADP	C5-C6	2.63	1.48	1.41
3	C	802	ADP	C5-C6	2.61	1.48	1.41
3	A	802	ADP	C5-C6	2.61	1.48	1.41
3	D	802	ADP	C5-N7	-2.49	1.34	1.39
3	B	802	ADP	C5-N7	-2.48	1.34	1.39
3	C	802	ADP	C5-N7	-2.48	1.34	1.39
3	A	802	ADP	C5-N7	-2.43	1.34	1.39
3	D	802	ADP	C8-N7	2.09	1.35	1.31
3	C	802	ADP	C8-N7	2.09	1.35	1.31
3	A	802	ADP	C8-N7	2.08	1.35	1.31
3	B	802	ADP	C8-N7	2.03	1.35	1.31

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	802	ADP	C5-C4-N3	-6.78	117.39	126.72
3	A	802	ADP	C5-C4-N3	-6.77	117.40	126.72
3	B	802	ADP	C5-C4-N3	-6.76	117.41	126.72
3	D	802	ADP	C5-C4-N3	-6.73	117.45	126.72
3	C	802	ADP	N3-C4-N9	5.50	136.53	127.17
3	A	802	ADP	N3-C4-N9	5.48	136.49	127.17
3	D	802	ADP	N3-C4-N9	5.47	136.47	127.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	802	ADP	N3-C4-N9	5.46	136.45	127.17
3	C	802	ADP	C2-N3-C4	4.04	121.70	111.83
3	A	802	ADP	C2-N3-C4	4.02	121.65	111.83
3	B	802	ADP	C2-N3-C4	4.01	121.64	111.83
3	D	802	ADP	C2-N3-C4	4.01	121.62	111.83
3	B	802	ADP	C4-C5-N7	-3.27	106.84	110.58
3	D	802	ADP	O3B-PB-O2B	3.27	120.05	107.80
3	C	802	ADP	O3B-PB-O2B	3.26	120.02	107.80
3	A	802	ADP	C4-C5-N7	-3.25	106.87	110.58
3	C	802	ADP	C4-C5-N7	-3.25	106.87	110.58
3	C	802	ADP	N3-C2-N1	-3.23	123.69	128.58
3	D	802	ADP	N3-C2-N1	-3.20	123.74	128.58
3	A	802	ADP	N3-C2-N1	-3.19	123.75	128.58
3	D	802	ADP	C4-C5-N7	-3.19	106.93	110.58
3	B	802	ADP	N3-C2-N1	-3.17	123.78	128.58
3	A	802	ADP	C3'-C2'-C1'	2.64	106.45	101.46
3	C	802	ADP	C3'-C2'-C1'	2.61	106.41	101.46
3	B	802	ADP	C3'-C2'-C1'	2.61	106.40	101.46
3	D	802	ADP	C3'-C2'-C1'	2.60	106.37	101.46
3	C	802	ADP	C5-N7-C8	2.43	107.27	103.45
3	B	802	ADP	C5-N7-C8	2.42	107.26	103.45
3	D	802	ADP	C5-N7-C8	2.38	107.19	103.45
3	A	802	ADP	C5-N7-C8	2.38	107.19	103.45
3	A	802	ADP	O2B-PB-O1B	2.37	120.06	110.83
3	B	802	ADP	O2B-PB-O1B	2.36	120.04	110.83
3	C	802	ADP	C4-N9-C8	2.17	108.02	105.74
3	C	802	ADP	C1'-N9-C8	-2.17	122.28	127.09
3	D	802	ADP	C1'-N9-C8	-2.15	122.31	127.09
3	B	802	ADP	C1'-N9-C8	-2.14	122.34	127.09
3	A	802	ADP	C1'-N9-C8	-2.14	122.35	127.09
3	A	802	ADP	C4-N9-C8	2.13	107.98	105.74
3	D	802	ADP	C4-N9-C8	2.12	107.97	105.74
3	B	802	ADP	C4-N9-C8	2.08	107.92	105.74
2	B	801	RGP	OE2-CD-CG	2.04	120.81	111.87
2	A	801	RGP	OE2-CD-CG	2.03	120.78	111.87
2	C	801	RGP	OE2-CD-CG	2.03	120.76	111.87
2	D	801	RGP	OE2-CD-CG	2.02	120.75	111.87

There are no chirality outliers.

All (35) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	RGP	N-CA-CB-CG
3	A	802	ADP	C2'-C1'-N9-C4
3	B	802	ADP	C2'-C1'-N9-C4
3	C	802	ADP	C2'-C1'-N9-C4
3	D	802	ADP	C2'-C1'-N9-C4
2	B	801	RGP	O-C-CA-CB
2	C	801	RGP	O-C-CA-N
2	D	801	RGP	O-C-CA-N
2	A	801	RGP	O-C-CA-CB
2	A	801	RGP	O-C-CA-N
2	B	801	RGP	O-C-CA-N
3	A	802	ADP	C2'-C1'-N9-C8
3	B	802	ADP	C2'-C1'-N9-C8
3	C	802	ADP	C2'-C1'-N9-C8
3	D	802	ADP	C2'-C1'-N9-C8
2	B	801	RGP	OXT-C-CA-CB
2	A	801	RGP	OXT-C-CA-CB
2	A	801	RGP	OXT-C-CA-N
2	B	801	RGP	OXT-C-CA-N
2	A	801	RGP	C-CA-CB-CG
2	B	801	RGP	N-CA-CB-CG
2	C	801	RGP	N-CA-CB-CG
2	D	801	RGP	N-CA-CB-CG
2	C	801	RGP	OXT-C-CA-CB
2	D	801	RGP	OXT-C-CA-CB
3	A	802	ADP	C5'-O5'-PA-O1A
3	B	802	ADP	C5'-O5'-PA-O1A
2	C	801	RGP	O-C-CA-CB
2	D	801	RGP	O-C-CA-CB
2	B	801	RGP	C-CA-CB-CG
2	C	801	RGP	C-CA-CB-CG
2	D	801	RGP	C-CA-CB-CG
3	C	802	ADP	PA-O3A-PB-O1B
2	C	801	RGP	OXT-C-CA-N
2	D	801	RGP	OXT-C-CA-N

There are no ring outliers.

6 monomers are involved in 6 short contacts:

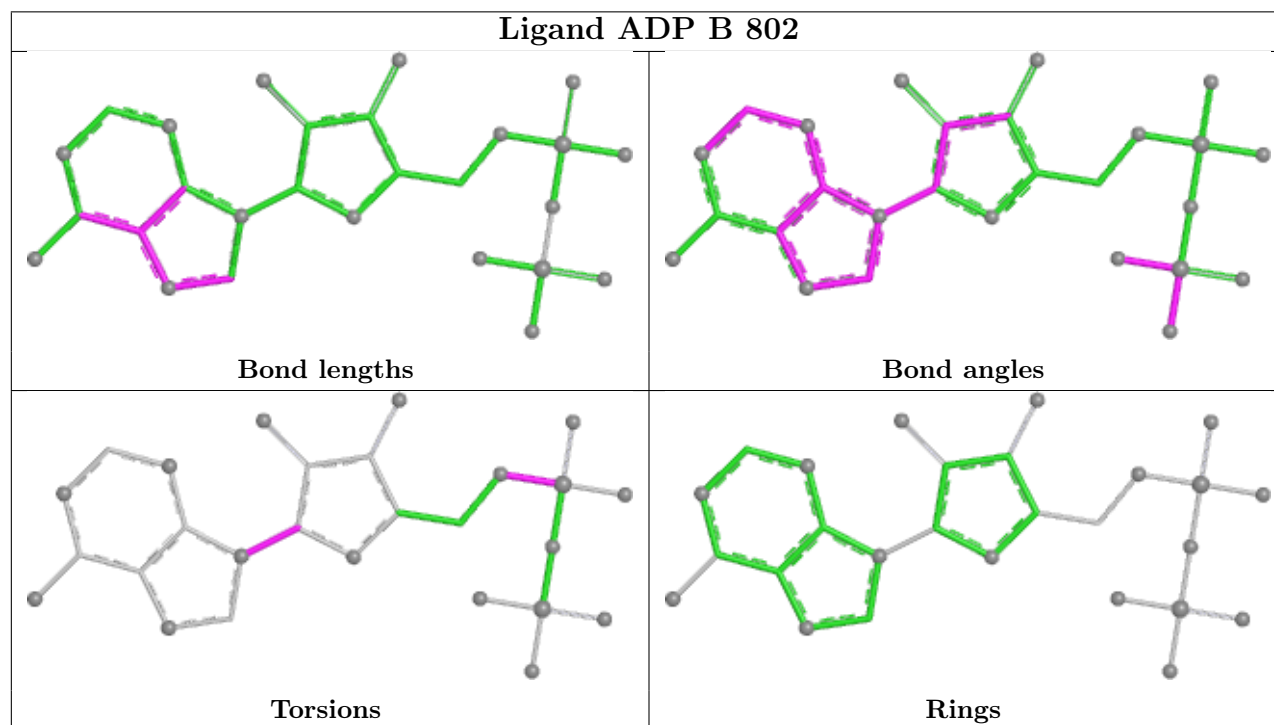
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	802	ADP	1	0
3	D	802	ADP	1	0
3	C	802	ADP	1	0

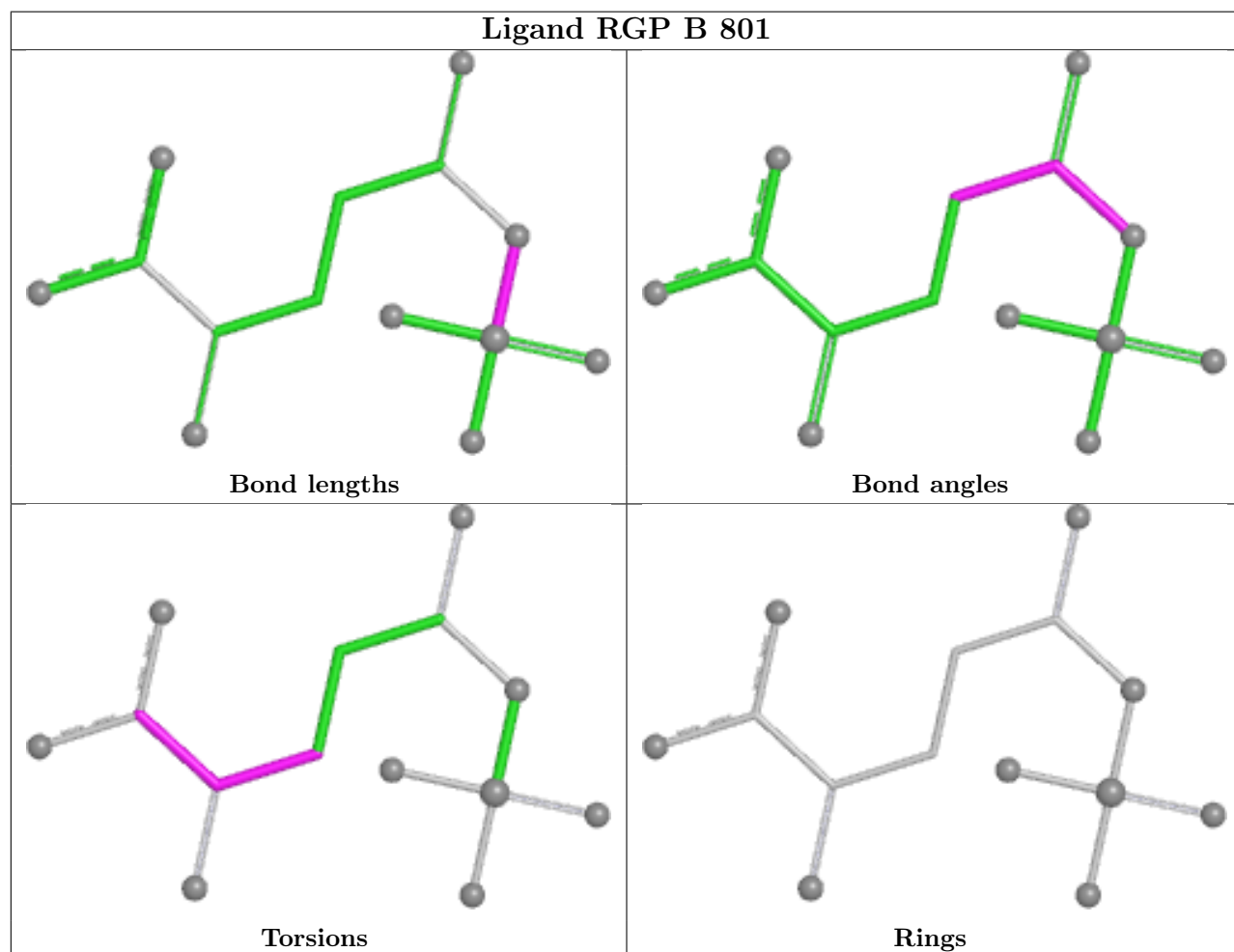
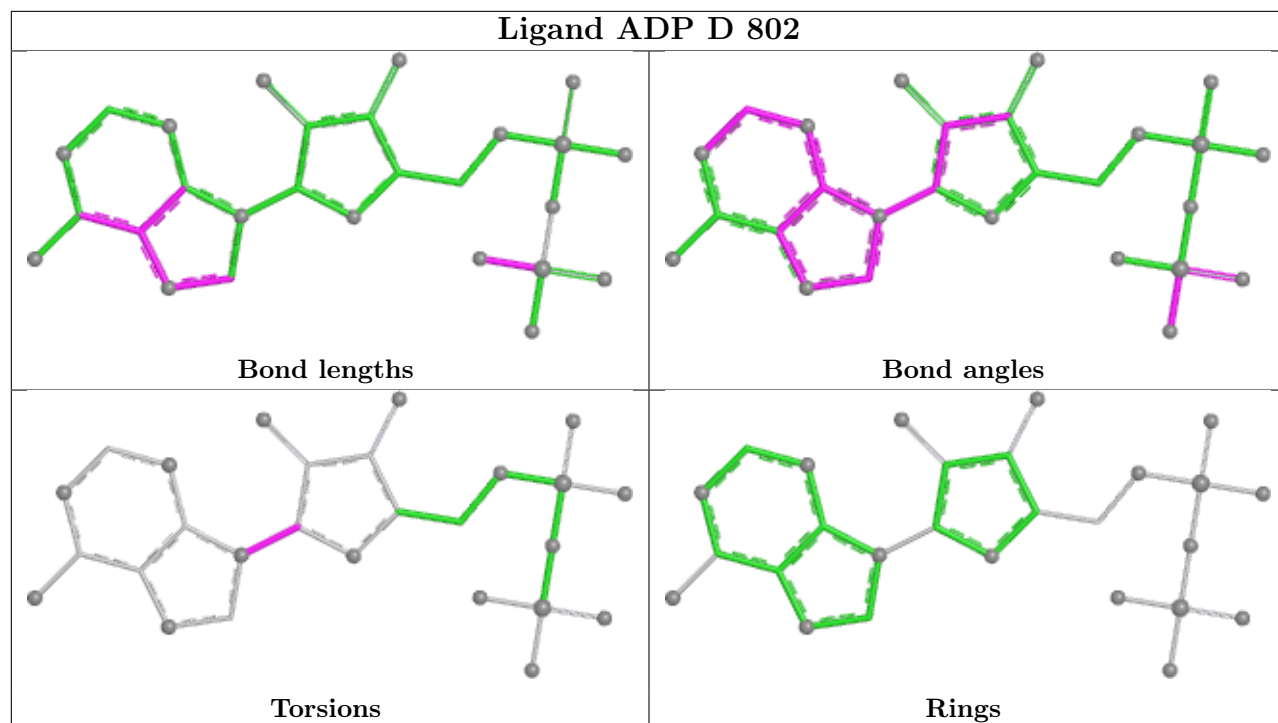
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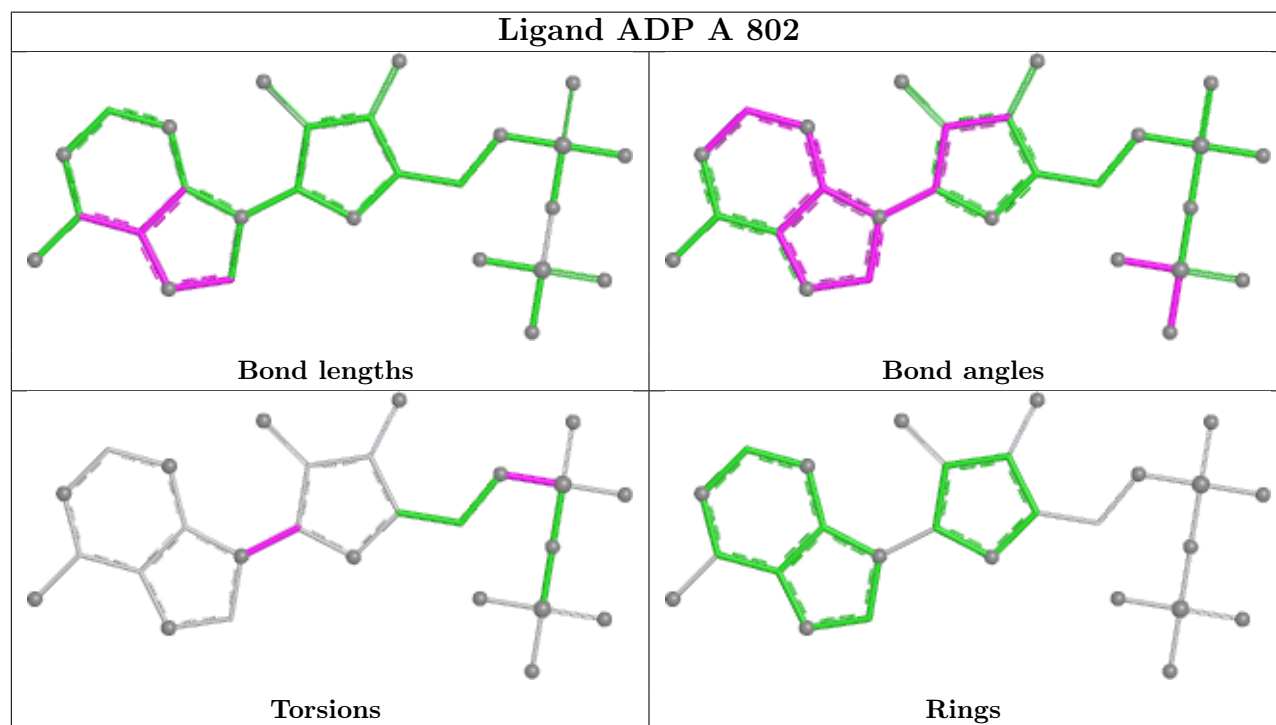
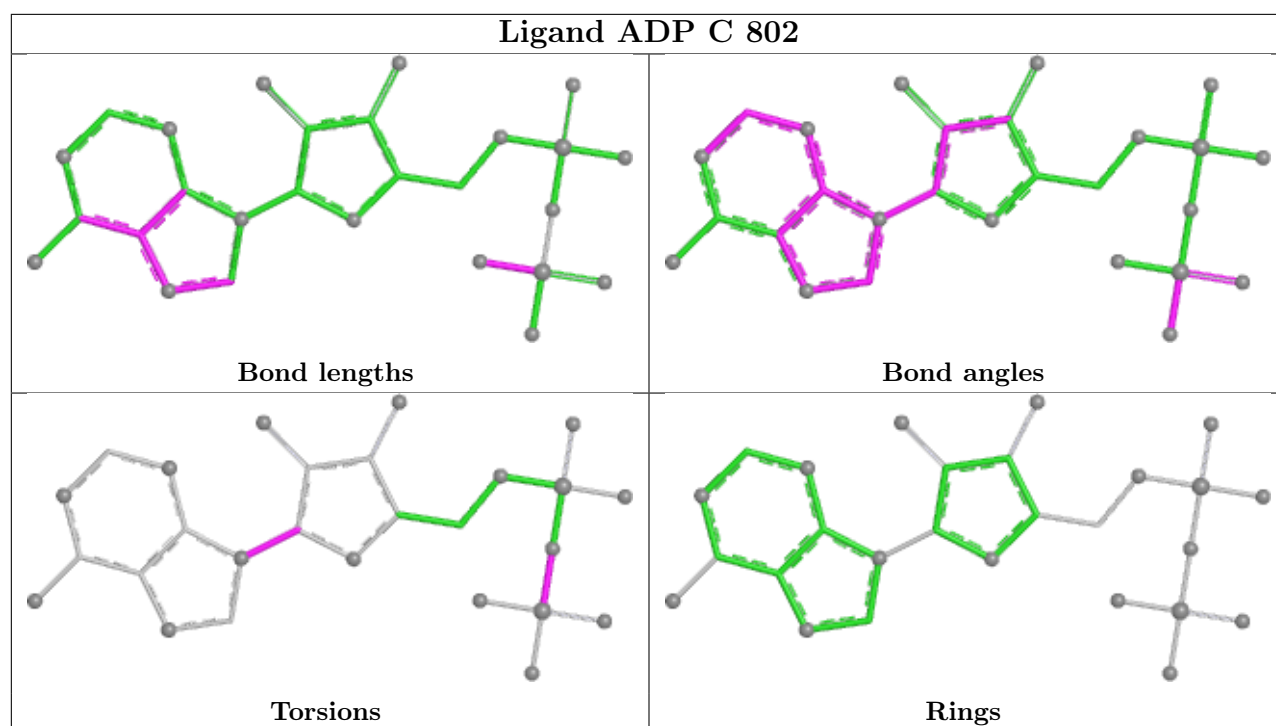
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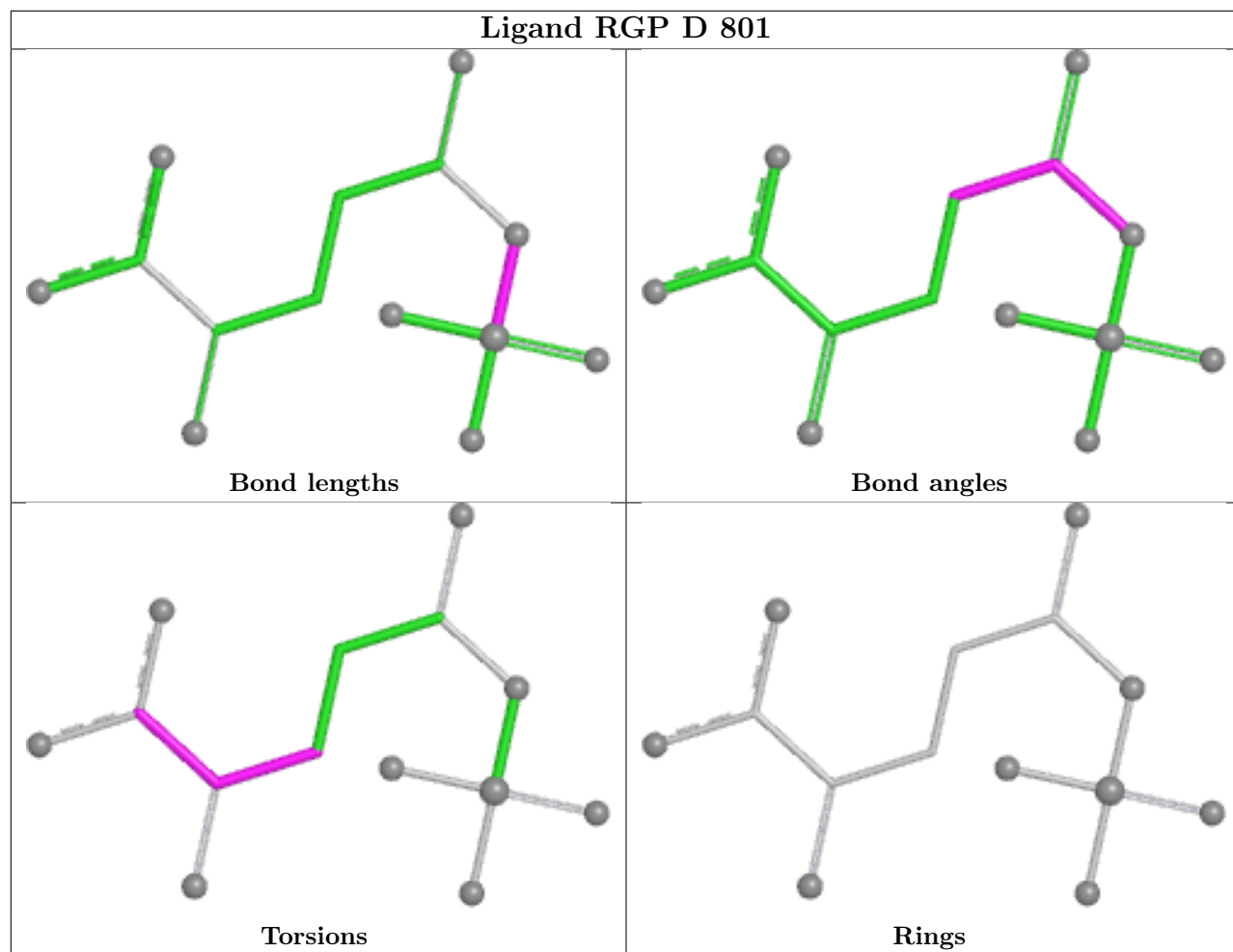
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	802	ADP	1	0
2	D	801	RGP	1	0
2	A	801	RGP	1	0

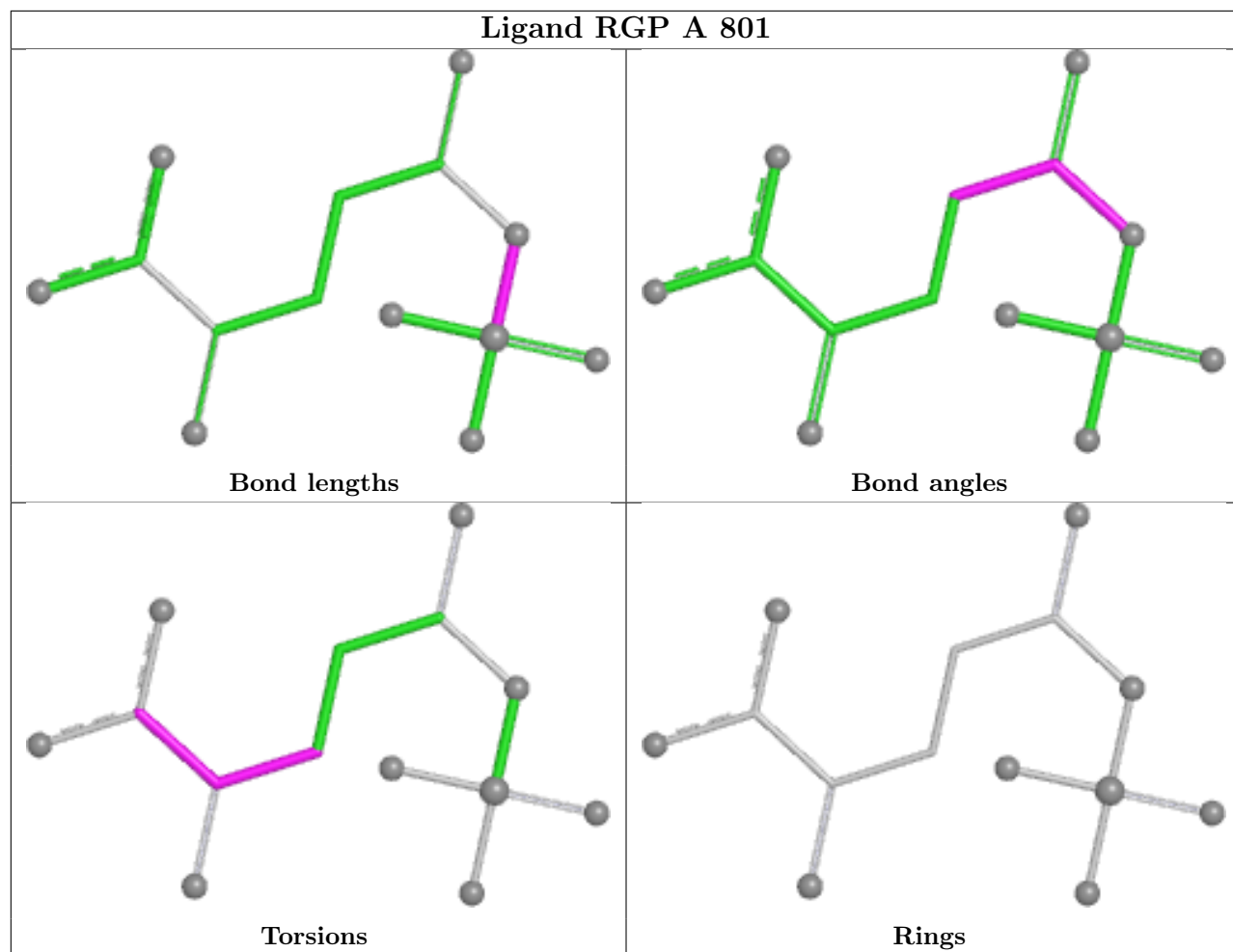
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

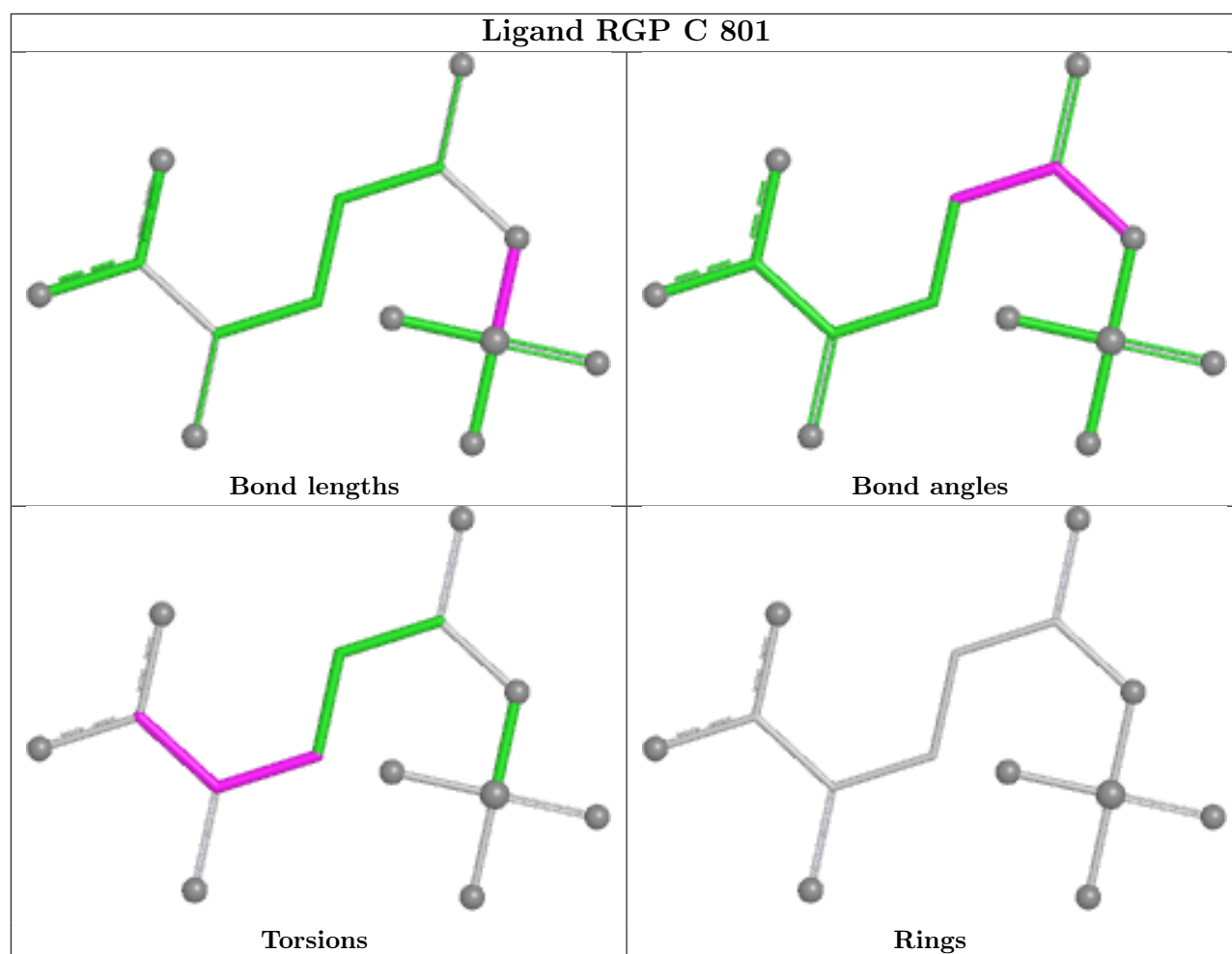












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

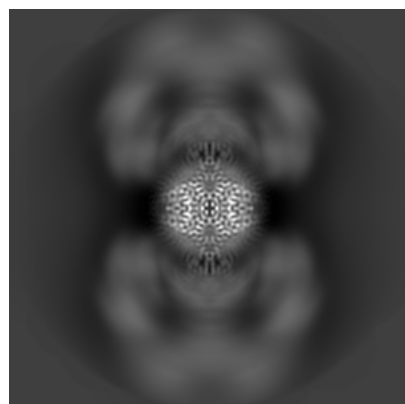
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-32875. These allow visual inspection of the internal detail of the map and identification of artifacts.

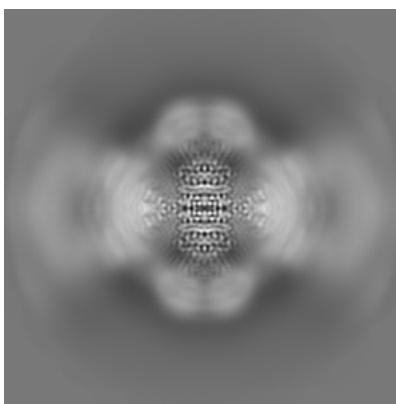
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

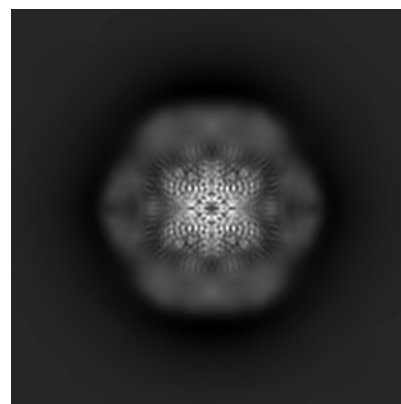
6.1.1 Primary map



X

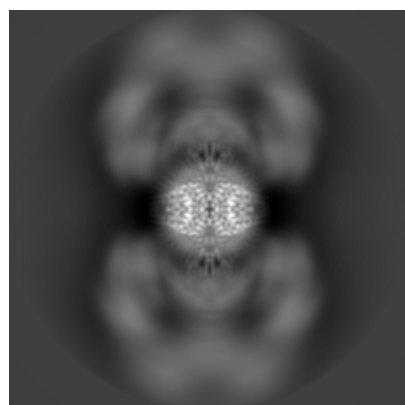


Y

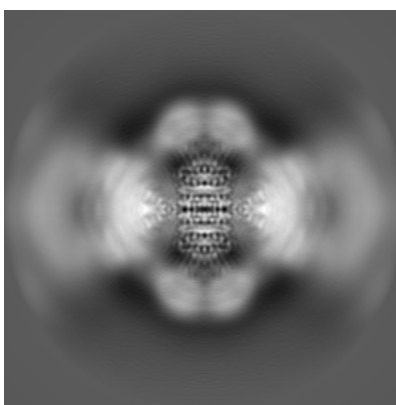


Z

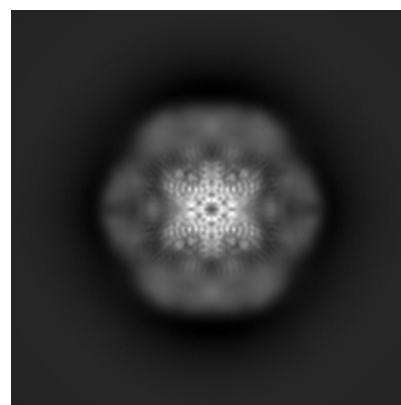
6.1.2 Raw map



X



Y

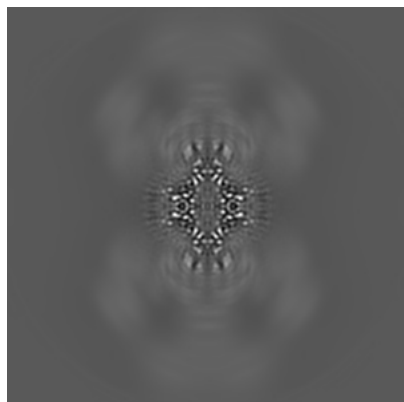


Z

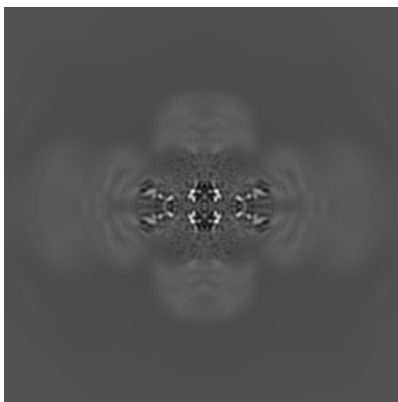
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

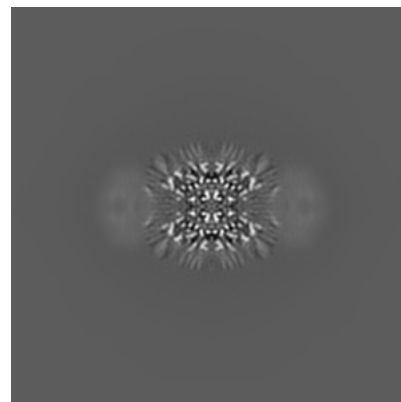
6.2.1 Primary map



X Index: 150

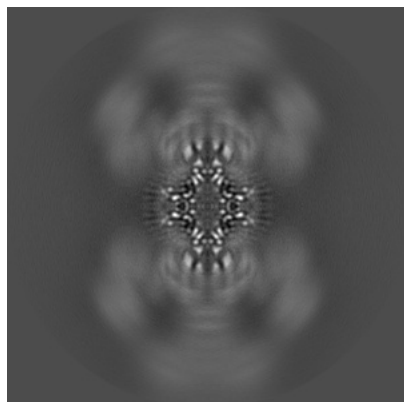


Y Index: 150

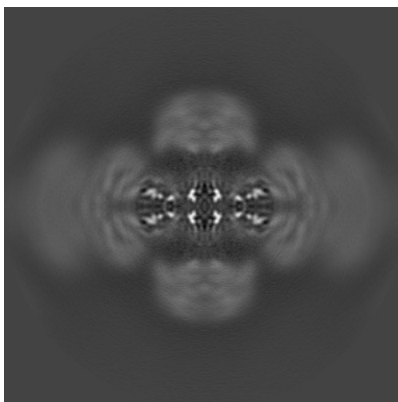


Z Index: 150

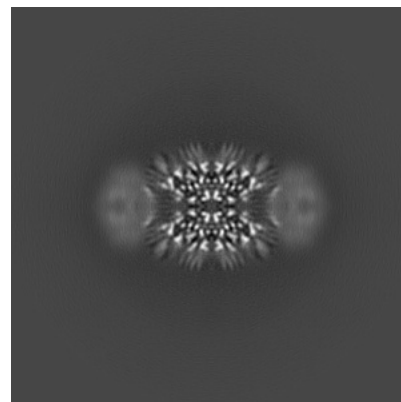
6.2.2 Raw map



X Index: 150



Y Index: 150

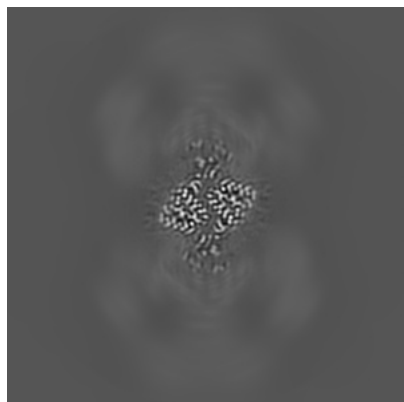


Z Index: 150

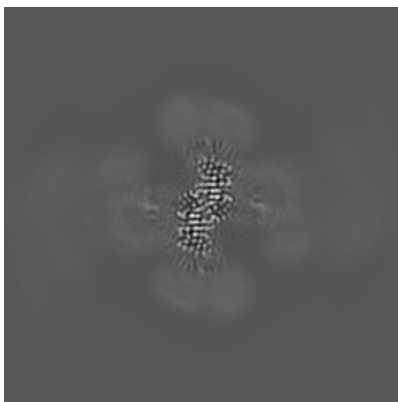
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

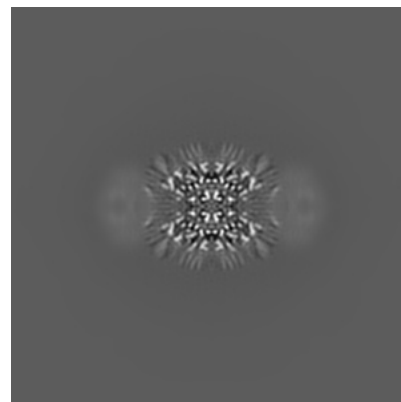
6.3.1 Primary map



X Index: 154

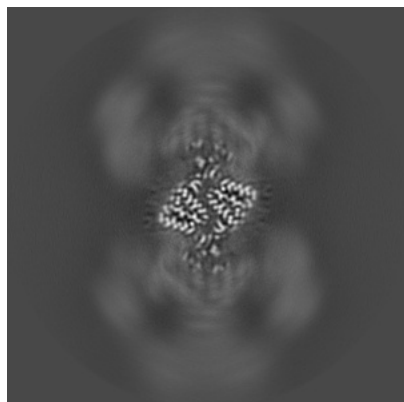


Y Index: 165

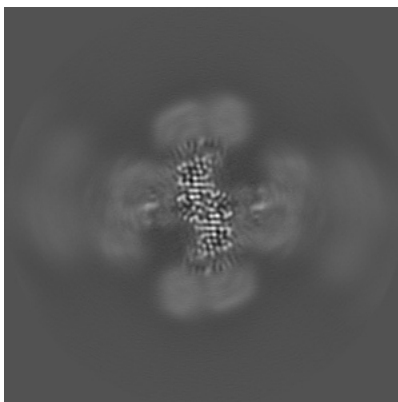


Z Index: 150

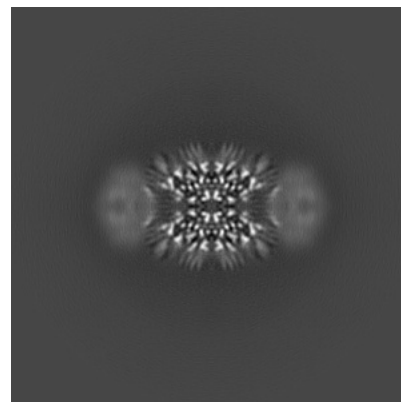
6.3.2 Raw map



X Index: 154



Y Index: 135

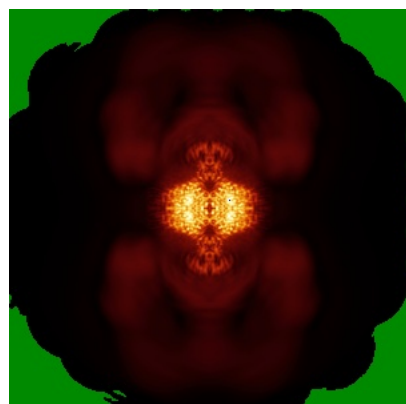


Z Index: 150

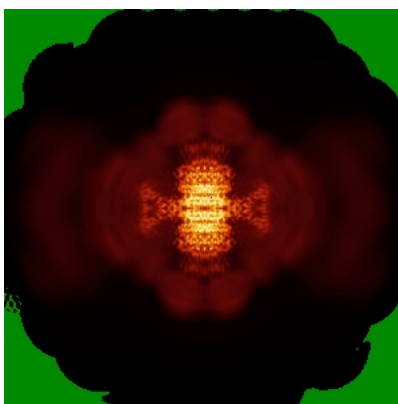
The images above show the largest variance slices of the map in three orthogonal directions.

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

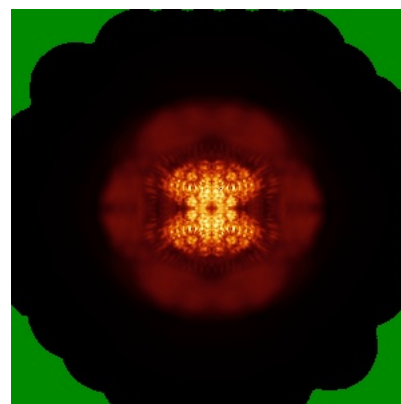
6.4.1 Primary map



X

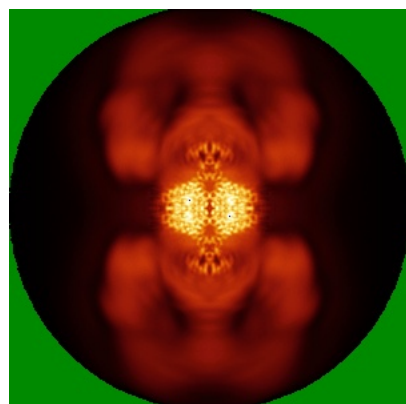


Y

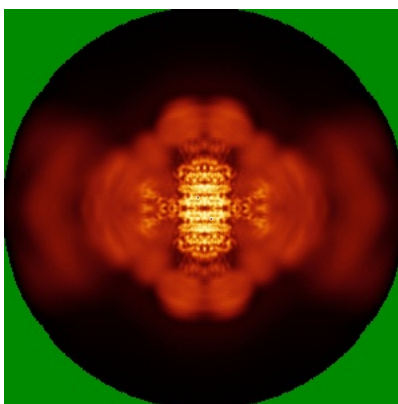


Z

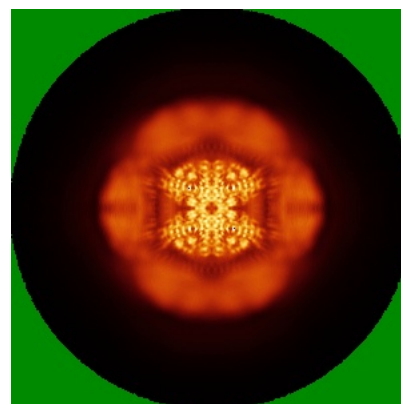
6.4.2 Raw map



X



Y

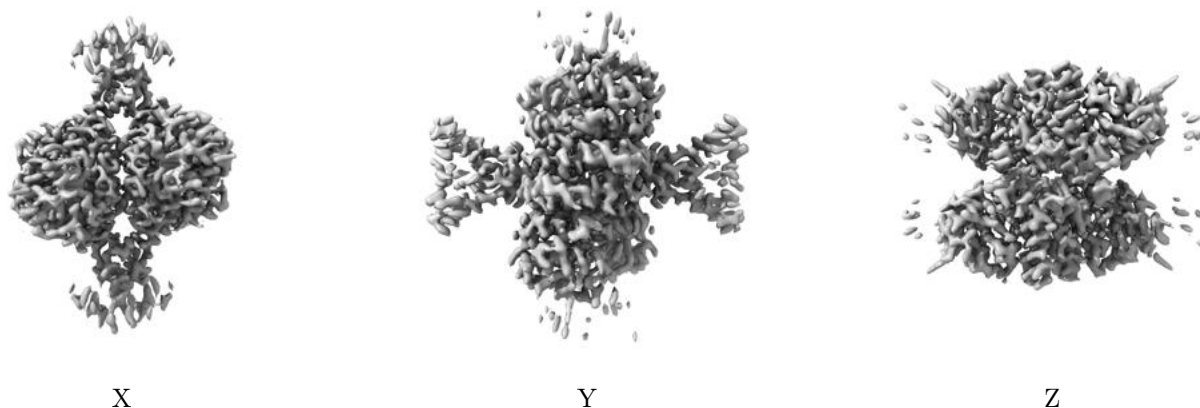


Z

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.

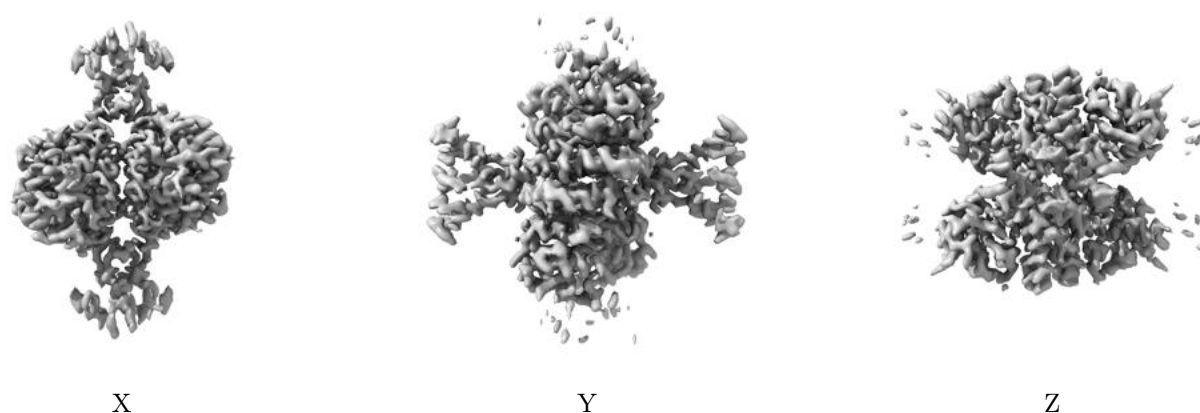
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.06. 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.

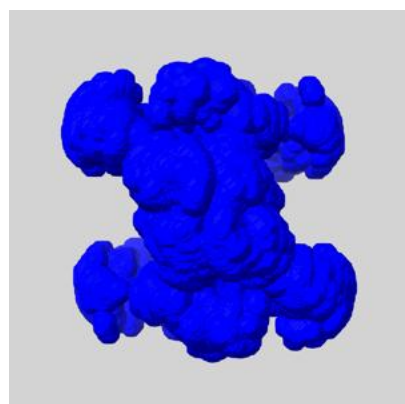
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

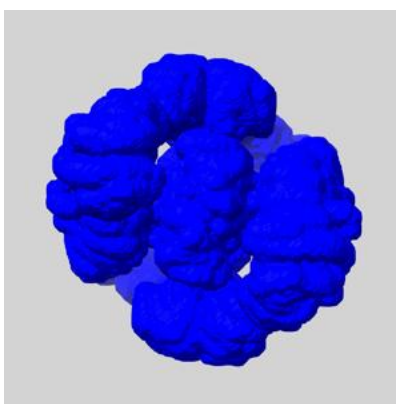
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

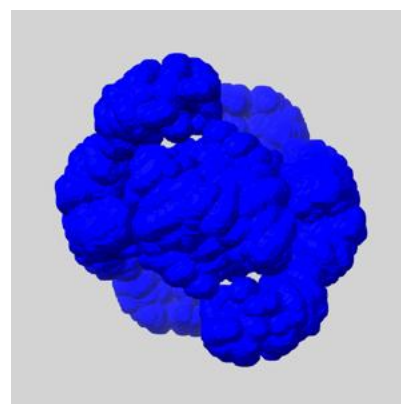
6.6.1 emd_32875_msk_1.map [i](#)



X



Y

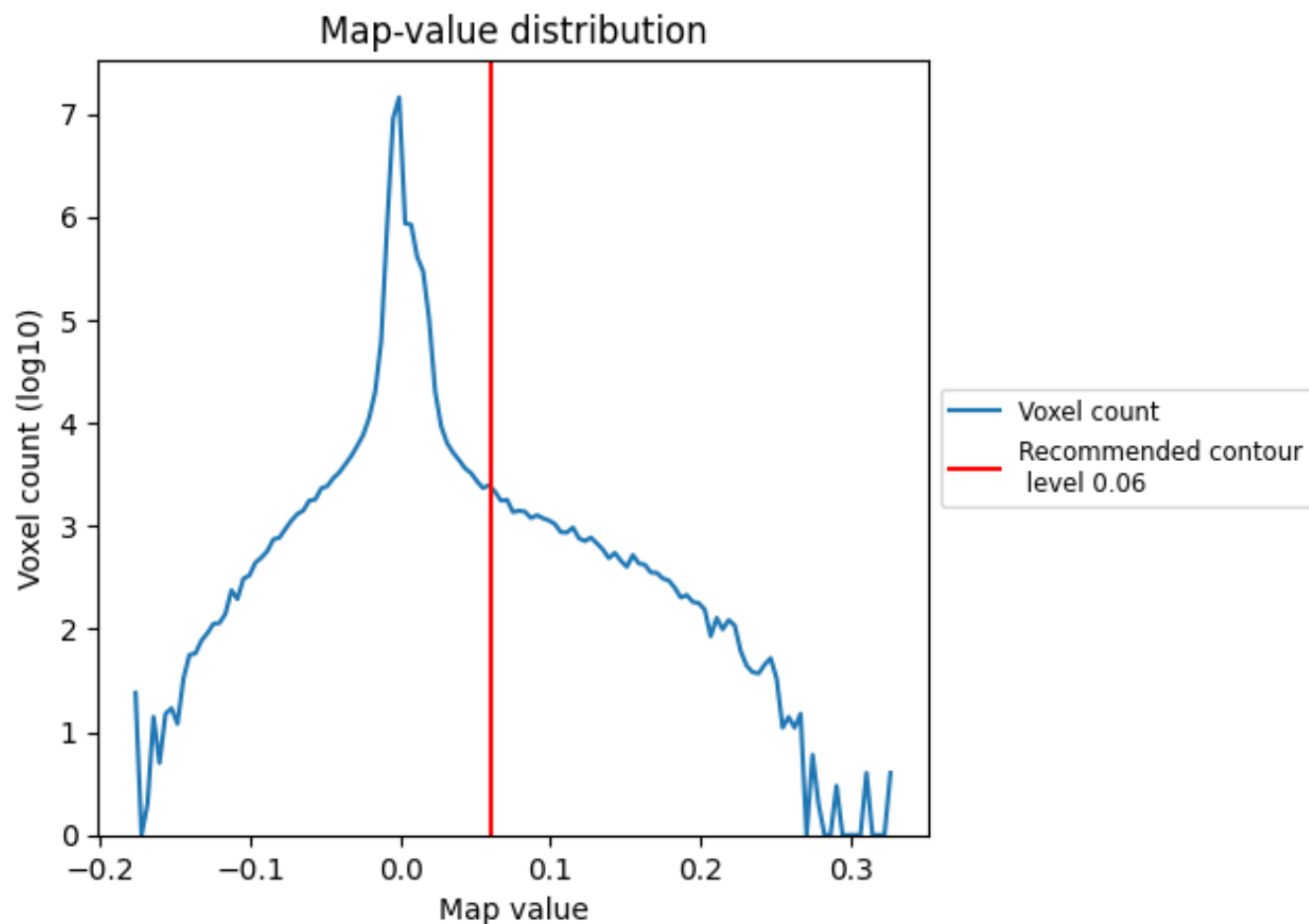


Z

7 Map analysis [i](#)

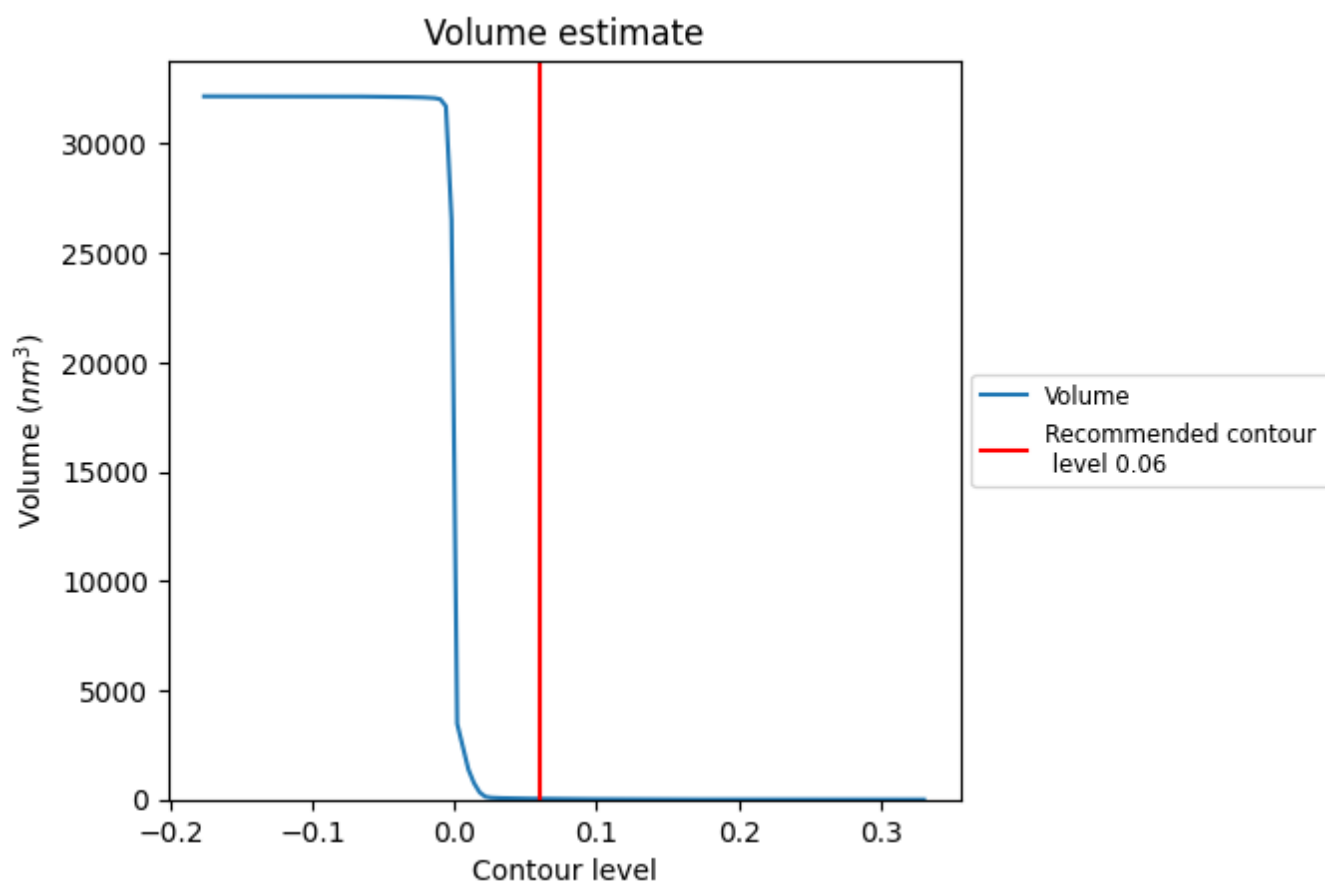
This section contains the results of statistical analysis of the map.

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.

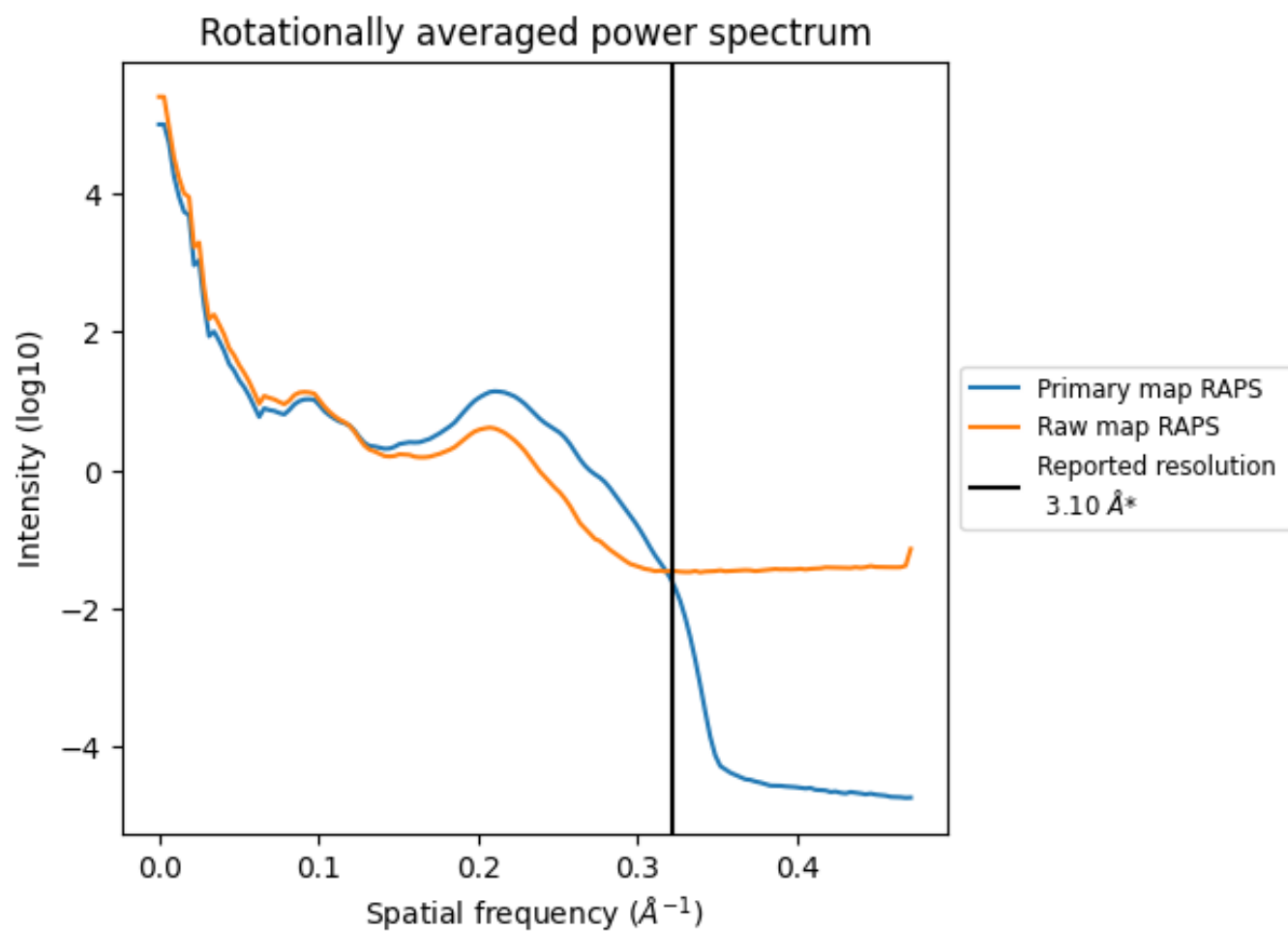
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 36 nm^3 ; this corresponds to an approximate mass of 33 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 ⓘ

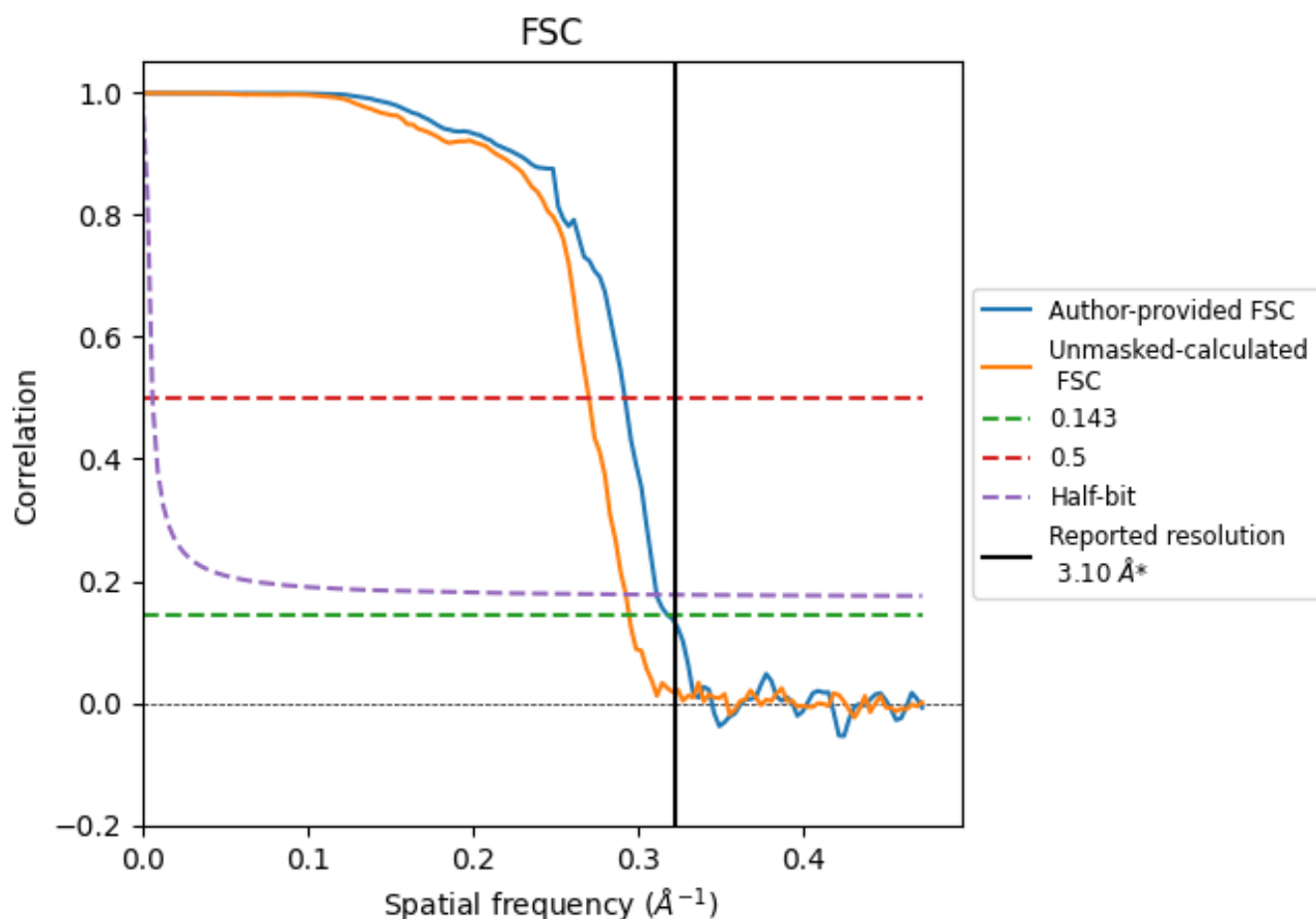


*Reported resolution corresponds to spatial frequency of $0.323 \text{ \AA}^{-1}$

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.323 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

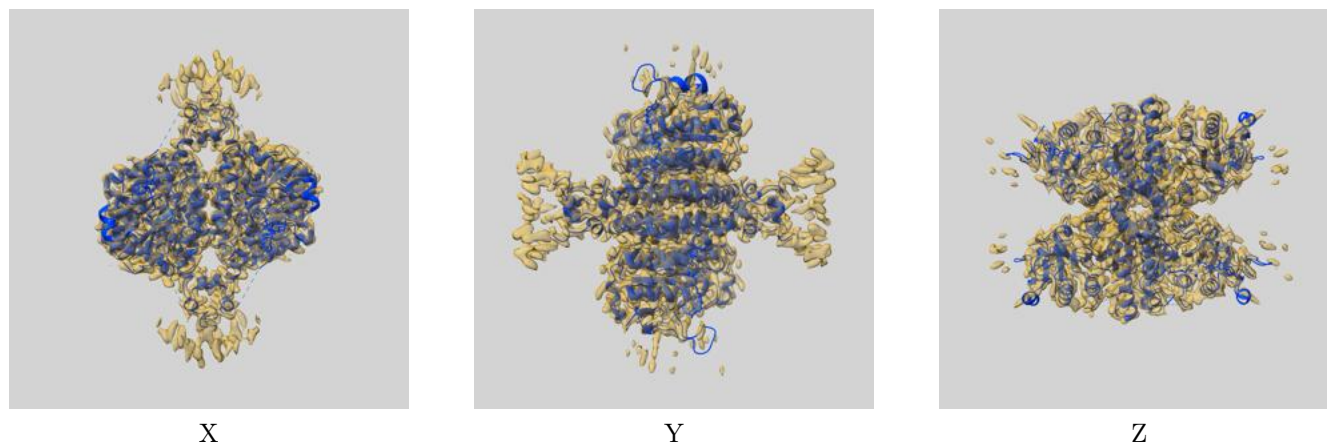
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.14	3.43	3.21
Unmasked-calculated*	3.40	3.70	3.42

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

9 Map-model fit [i](#)

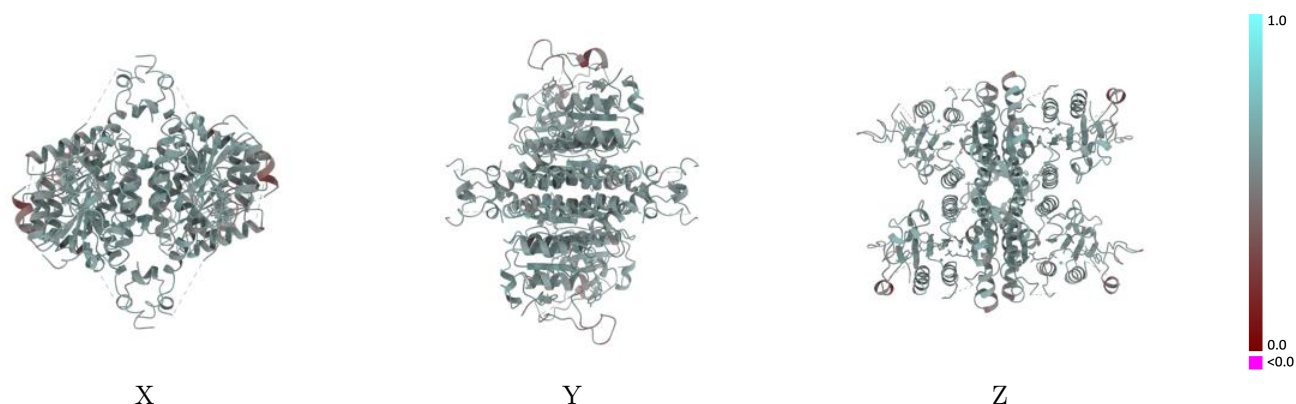
This section contains information regarding the fit between EMDB map EMD-32875 and PDB model 7WX3. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

9.1 Map-model overlay [i](#)



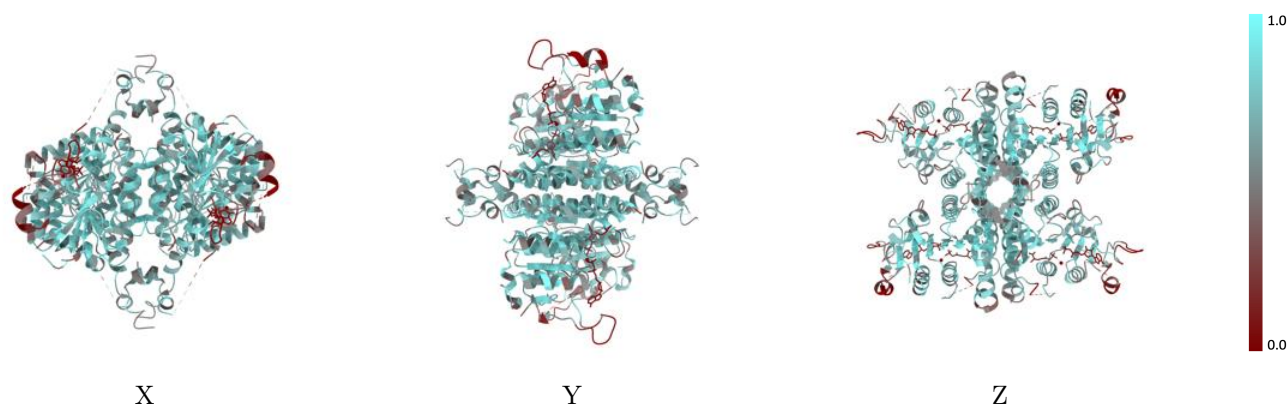
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



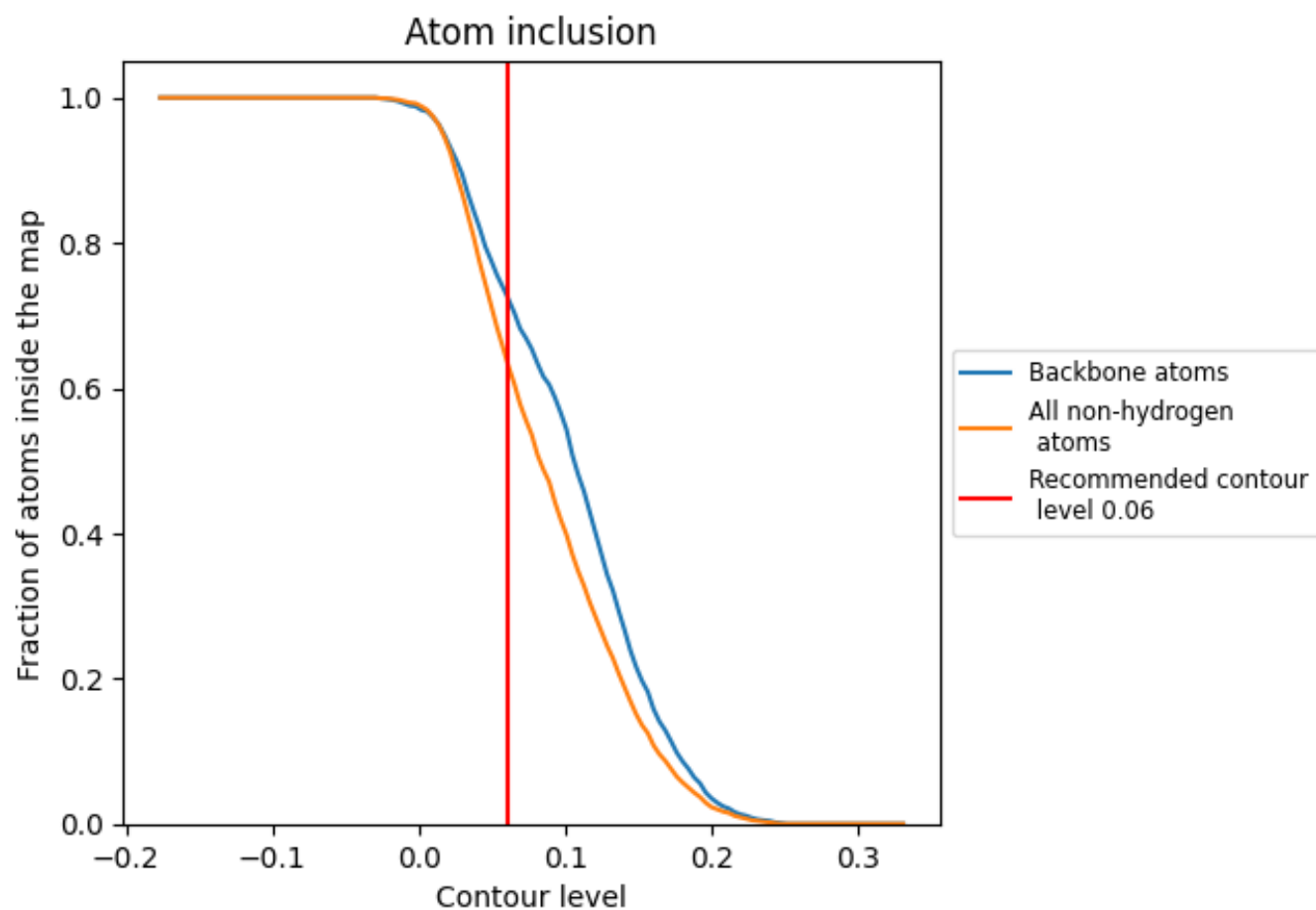
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.06).

9.4 Atom inclusion [i](#)



At the recommended contour level, 73% of all backbone atoms, 64% 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 (0.06) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6380	0.5500
A	0.6520	0.5510
B	0.6390	0.5490
C	0.6390	0.5480
D	0.6400	0.5490
E	0.5490	0.5510
F	0.5490	0.5590
G	0.5590	0.5490
H	0.5590	0.5550

1.0

0.0

<0.0