



Full wwPDB EM Validation Report ⓘ

Mar 8, 2026 – 05:41 PM UTC

PDB ID : 8C1S / pdb_00008c1s
EMDB ID : EMD-16382
Title : Transmembrane domain of resting state homomeric GluA2 F231A mutant
AMPA receptor in complex with TARP gamma 2
Authors : Zhang, D.; Ivica, J.; Krieger, J.M.; Ho, H.; Yamashita, K.; Cais, O.; Greger,
I.
Deposited on : 2022-12-21
Resolution : 3.00 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:

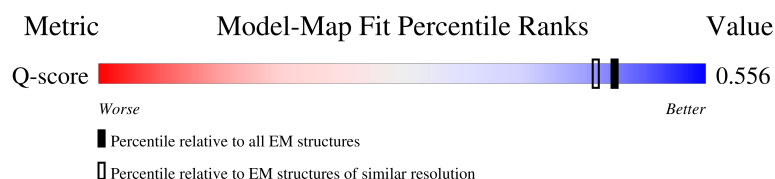
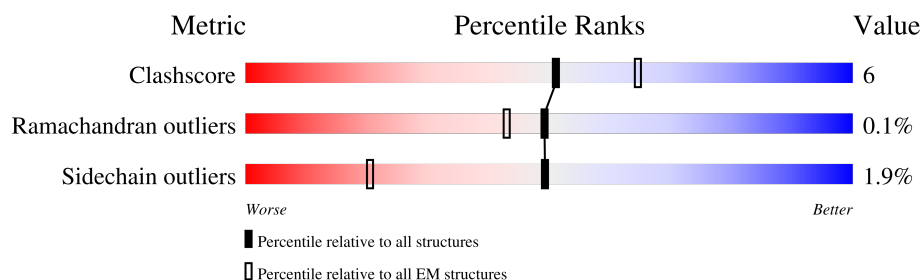
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data 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 3.00 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	14081 (2.50 - 3.50)

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	891	14% 83%
1	B	891	14% 83%
1	C	891	14% 83%
1	D	891	15% 83%

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Mol	Chain	Length	Quality of chain
2	E	322	9% 48% 7% 45%
2	F	322	10% 50% 5% 45%
2	G	322	9% 47% 7% 45%
2	H	322	9% 46% 8% 45%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 10668 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 Glutamate receptor 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	151	Total	C	N	O	S	2	0
			1195	805	184	199	7		
1	B	154	Total	C	N	O	S	2	0
			1204	811	185	201	7		
1	C	149	Total	C	N	O	S	2	0
			1169	787	180	195	7		
1	D	155	Total	C	N	O	S	2	0
			1217	819	187	204	7		

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	ASP	-	insertion	UNP P19491
A	-6	TYR	-	insertion	UNP P19491
A	-5	LYS	-	insertion	UNP P19491
A	-4	ASP	-	insertion	UNP P19491
A	-3	ASP	-	insertion	UNP P19491
A	-2	ASP	-	insertion	UNP P19491
A	-1	ASP	-	insertion	UNP P19491
A	0	LYS	-	insertion	UNP P19491
A	586	ARG	GLN	conflict	UNP P19491
A	743	ARG	GLY	conflict	UNP P19491
A	754	SER	ASN	conflict	UNP P19491
A	758	VAL	LEU	conflict	UNP P19491
B	-7	ASP	-	insertion	UNP P19491
B	-6	TYR	-	insertion	UNP P19491
B	-5	LYS	-	insertion	UNP P19491
B	-4	ASP	-	insertion	UNP P19491
B	-3	ASP	-	insertion	UNP P19491
B	-2	ASP	-	insertion	UNP P19491
B	-1	ASP	-	insertion	UNP P19491
B	0	LYS	-	insertion	UNP P19491
B	586	ARG	GLN	conflict	UNP P19491
B	743	ARG	GLY	conflict	UNP P19491

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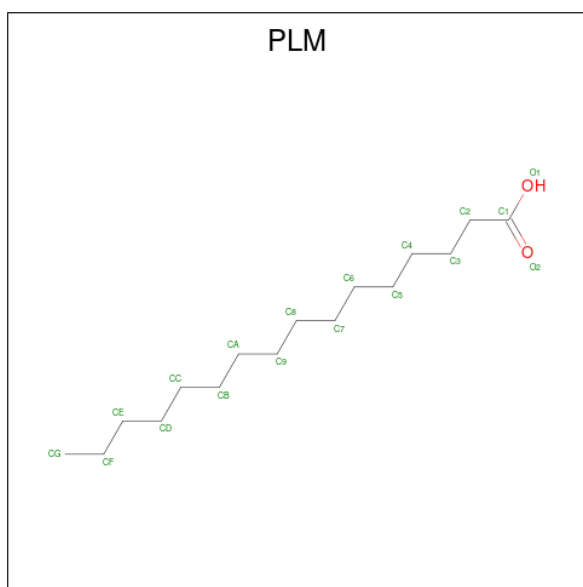
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Chain	Residue	Modelled	Actual	Comment	Reference
B	754	SER	ASN	conflict	UNP P19491
B	758	VAL	LEU	conflict	UNP P19491
C	-7	ASP	-	insertion	UNP P19491
C	-6	TYR	-	insertion	UNP P19491
C	-5	LYS	-	insertion	UNP P19491
C	-4	ASP	-	insertion	UNP P19491
C	-3	ASP	-	insertion	UNP P19491
C	-2	ASP	-	insertion	UNP P19491
C	-1	ASP	-	insertion	UNP P19491
C	0	LYS	-	insertion	UNP P19491
C	586	ARG	GLN	conflict	UNP P19491
C	743	ARG	GLY	conflict	UNP P19491
C	754	SER	ASN	conflict	UNP P19491
C	758	VAL	LEU	conflict	UNP P19491
D	-7	ASP	-	insertion	UNP P19491
D	-6	TYR	-	insertion	UNP P19491
D	-5	LYS	-	insertion	UNP P19491
D	-4	ASP	-	insertion	UNP P19491
D	-3	ASP	-	insertion	UNP P19491
D	-2	ASP	-	insertion	UNP P19491
D	-1	ASP	-	insertion	UNP P19491
D	0	LYS	-	insertion	UNP P19491
D	586	ARG	GLN	conflict	UNP P19491
D	743	ARG	GLY	conflict	UNP P19491
D	754	SER	ASN	conflict	UNP P19491
D	758	VAL	LEU	conflict	UNP P19491

- Molecule 2 is a protein called Voltage-dependent calcium channel gamma-2 subunit.

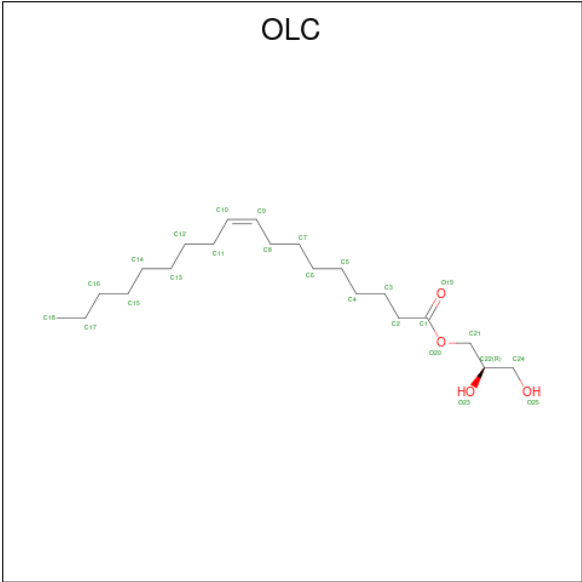
Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	177	Total	C	N	O	S	0	0
			1372	900	223	238	11		
2	F	178	Total	C	N	O	S	0	0
			1381	906	225	239	11		
2	G	177	Total	C	N	O	S	0	0
			1372	900	223	238	11		
2	H	177	Total	C	N	O	S	0	0
			1379	905	227	236	11		

- Molecule 3 is PALMITIC ACID (CCD ID: PLM) (formula: C₁₆H₃₂O₂).



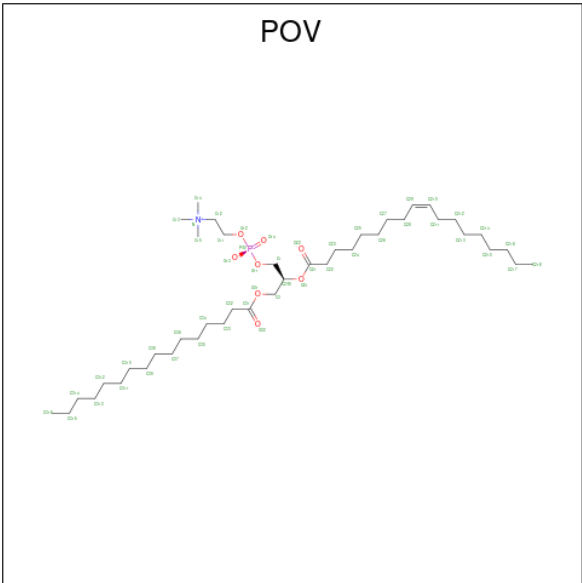
Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	C	O	0
			18	16	2	
3	B	1	Total	C	O	0
			18	16	2	
3	C	1	Total	C	O	0
			18	16	2	
3	D	1	Total	C	O	0
			18	16	2	
3	F	1	Total	C	O	0
			18	16	2	
3	G	1	Total	C	O	0
			18	16	2	

- Molecule 4 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (CCD ID: OLC) (formula: C₂₁H₄₀O₄).



Mol	Chain	Residues	Atoms			AltConf
4	A	1	Total	C	O	0
			25	21	4	
4	B	1	Total	C	O	0
			25	21	4	
4	C	1	Total	C	O	0
			25	21	4	
4	C	1	Total	C	O	0
			25	21	4	

- Molecule 5 is (2S)-3-(hexadecanoyloxy)-2-[(9Z)-octadec-9-enoyloxy]propyl 2-(trimethylamm onio)ethyl phosphate (CCD ID: POV) (formula: C₄₂H₈₂NO₈P).

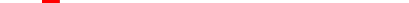


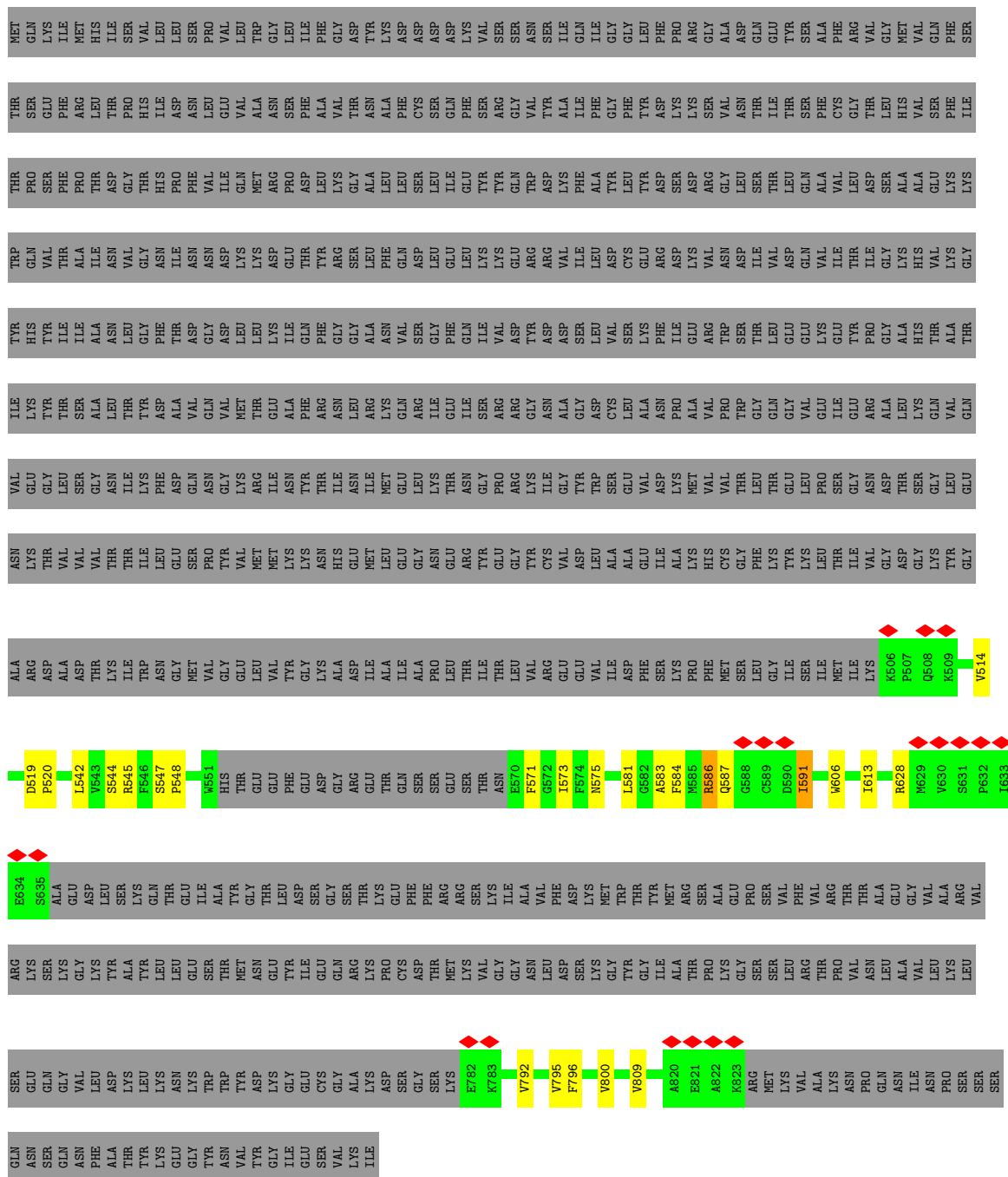
Mol	Chain	Residues	Atoms					AltConf
5	B	1	Total	C	N	O	P	0
			42	32	1	8	1	
5	D	1	Total	C	N	O	P	0
			40	30	1	8	1	
5	E	1	Total	C	N	O	P	0
			39	29	1	8	1	
5	G	1	Total	C	N	O	P	0
			42	32	1	8	1	

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		AltConf
6	A	1	Total	O	0
			1	1	
6	B	1	Total	O	0
			1	1	
6	C	2	Total	O	0
			2	2	
6	D	2	Total	O	0
			2	2	
6	F	1	Total	O	0
			1	1	
6	G	1	Total	O	0
			1	1	

- Molecule 1: Glutamate receptor 2

Chain B:  14% 83%



- Molecule 1: Glutamate receptor 2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	371741	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1400	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.045	Depositor
Minimum map value	-0.025	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	251.10399, 251.10399, 251.10399	wwPDB
Map dimensions	304, 304, 304	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.826, 0.826, 0.826	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PLM, POV, OLC

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	0.76	0/1230	0.86	1/1670 (0.1%)
1	B	0.79	1/1239 (0.1%)	0.85	2/1683 (0.1%)
1	C	0.79	0/1202	0.88	2/1631 (0.1%)
1	D	0.77	0/1252	0.83	0/1699
2	E	0.61	0/1403	0.74	0/1894
2	F	0.61	0/1412	0.73	0/1905
2	G	0.66	0/1403	0.78	1/1894 (0.1%)
2	H	0.62	0/1410	0.72	0/1901
All	All	0.70	1/10551 (0.0%)	0.80	6/14277 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	3
1	C	0	1
1	D	0	1
2	F	0	1
2	G	0	2
2	H	0	1
All	All	0	10

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	544	SER	CA-CB	-5.73	1.44	1.53

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	575	ASN	N-CA-C	-8.20	103.41	113.50
1	C	587	GLN	O-C-N	6.56	125.68	120.83
2	G	207	GLN	O-C-N	-6.20	115.55	122.12
1	A	548	PRO	N-CA-CB	-6.16	96.78	103.25
1	C	587	GLN	CB-CA-C	-6.13	103.02	115.27
1	B	548	PRO	N-CA-C	-5.71	107.00	114.03

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	586	ARG	Sidechain
1	B	545	ARG	Sidechain
1	B	586	ARG	Sidechain
1	B	628	ARG	Sidechain
1	C	586	ARG	Sidechain
1	D	594	ARG	Sidechain
2	F	204	ARG	Sidechain
2	G	131	ARG	Sidechain
2	G	204	ARG	Sidechain
2	H	209	ARG	Sidechain

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	1195	0	1183	20	0
1	B	1204	0	1192	17	0
1	C	1169	0	1164	18	0
1	D	1217	0	1209	16	0
2	E	1372	0	1363	19	0
2	F	1381	0	1376	14	0
2	G	1372	0	1363	16	0
2	H	1379	0	1383	19	0
3	A	18	0	31	0	0
3	B	18	0	31	1	0
3	C	18	0	31	0	0
3	D	18	0	31	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	18	0	31	0	0
3	G	18	0	31	0	0
4	A	25	0	40	0	0
4	B	25	0	40	0	0
4	C	50	0	80	0	0
5	B	42	0	56	1	0
5	D	40	0	52	1	0
5	E	39	0	50	3	0
5	G	42	0	56	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	2	0	0	0	0
6	D	2	0	0	0	0
6	F	1	0	0	0	0
6	G	1	0	0	0	0
All	All	10668	0	10793	118	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (118) 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)
2:G:135:ILE:HD11	2:G:200:MET:SD	2.24	0.76
2:H:33:TRP:CD1	2:H:179:SER:HG	2.08	0.71
1:A:586:ARG:HH11	1:B:586:ARG:HB2	1.58	0.68
2:F:30:THR:HG21	2:F:178:TRP:CH2	2.30	0.66
1:A:545:ARG:HD3	1:A:551:TRP:CZ2	2.31	0.66
2:E:67:CYS:HA	2:E:77:CYS:HB2	1.79	0.65
2:E:135:ILE:HD11	2:E:200:MET:HE3	1.80	0.64
2:F:33:TRP:CD1	2:F:179:SER:HG	2.17	0.63
1:B:542:LEU:HD13	2:G:198:VAL:HG21	1.80	0.62
1:C:606:TRP:CG	1:D:587:GLN:HG3	2.34	0.62
2:H:30:THR:HG21	2:H:178:TRP:HH2	1.64	0.62
1:A:792:VAL:O	1:A:795:VAL:HG12	1.99	0.61
2:F:30:THR:HG22	2:F:31:ASP:H	1.65	0.61
2:E:30:THR:HG21	2:E:178:TRP:CH2	2.36	0.61
2:E:104:SER:O	2:E:106:ILE:N	2.34	0.60
1:D:589:CYS:O	1:D:590:ASP:HB3	2.00	0.60
1:D:792:VAL:O	1:D:795:VAL:HG12	2.03	0.57
1:D:586:ARG:HD3	1:D:613:ILE:HD12	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:G:34:LEU:HD12	2:G:175:SER:O	2.03	0.57
2:F:6:ARG:HH21	2:F:204:ARG:HH12	1.50	0.57
1:A:606:TRP:CG	1:B:587:GLN:HG3	2.40	0.57
1:B:514:VAL:O	5:B:1003:POV:H15B	2.04	0.57
2:E:34:LEU:HD12	2:E:175:SER:O	2.04	0.57
1:C:606:TRP:CD1	1:D:587:GLN:HG3	2.40	0.56
1:B:792:VAL:O	1:B:795:VAL:HG12	2.05	0.56
2:G:30:THR:HG21	2:G:178:TRP:HH2	1.71	0.56
2:G:57:VAL:O	2:G:59:THR:HG23	2.05	0.56
2:E:31:ASP:OD2	2:E:65:ARG:NH2	2.38	0.55
2:E:67:CYS:HA	2:E:77:CYS:CB	2.37	0.55
2:H:30:THR:HG21	2:H:178:TRP:CH2	2.42	0.55
2:G:125:SER:HA	2:G:134:ILE:HD11	1.89	0.54
2:H:34:LEU:HD22	2:H:160:ASN:ND2	2.23	0.54
2:H:132:HIS:CE1	2:H:208:LEU:HD11	2.42	0.54
2:H:70:GLU:O	2:H:70:GLU:OE1	2.25	0.54
2:F:30:THR:HG22	2:F:31:ASP:N	2.22	0.54
1:D:545:ARG:O	2:E:202:ILE:HD11	2.08	0.53
2:G:72:ASN:OD1	2:G:73:PHE:N	2.43	0.52
2:E:55:GLU:N	2:E:55:GLU:OE1	2.42	0.52
1:C:619:ASN:CG	1:D:787:LEU:HD13	2.36	0.51
2:H:72:ASN:OD1	2:H:73:PHE:N	2.39	0.51
2:G:30:THR:HG21	2:G:178:TRP:CH2	2.47	0.50
1:A:514:VAL:H	5:E:1201:POV:H13	1.76	0.50
1:B:586:ARG:NH2	1:C:586:ARG:HB2	2.26	0.50
1:B:606:TRP:CG	1:C:587:GLN:HG3	2.46	0.50
2:F:132:HIS:CE1	2:F:204:ARG:HG2	2.47	0.49
1:B:606:TRP:CD1	1:C:587:GLN:HG3	2.47	0.49
1:C:792:VAL:O	1:C:795:VAL:HG12	2.13	0.49
2:G:72:ASN:OD1	2:G:73:PHE:CD2	2.66	0.49
2:G:104:SER:O	2:G:106:ILE:N	2.42	0.48
2:H:67:CYS:HA	2:H:77:CYS:HA	1.94	0.48
2:E:94:ALA:CB	5:E:1201:POV:H13B	2.43	0.48
1:A:542:LEU:O	1:A:546:PHE:HB3	2.13	0.48
2:E:12:LEU:HD22	2:E:196:LEU:HD11	1.95	0.48
1:C:542:LEU:O	1:C:546:PHE:HB3	2.13	0.48
2:E:31:ASP:O	2:E:61:SER:O	2.31	0.48
1:A:547:SER:O	1:A:548:PRO:C	2.55	0.47
2:H:205:HIS:O	2:H:209:ARG:HG3	2.14	0.47
1:A:583:ALA:O	1:A:609:THR:HG21	2.15	0.47
2:G:126:GLU:HA	2:G:126:GLU:OE2	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:125:SER:OG	2:H:135:ILE:HD11	2.15	0.47
2:G:203:ASP:O	2:G:204:ARG:C	2.55	0.47
1:C:540:LEU:O	1:C:544:SER:HB2	2.15	0.47
2:E:129:LYS:O	2:E:130:THR:OG1	2.23	0.46
5:E:1201:POV:O12	5:E:1201:POV:H13A	2.16	0.46
1:A:587:GLN:HG3	1:D:606:TRP:CG	2.50	0.46
2:E:30:THR:HG22	2:E:31:ASP:N	2.30	0.46
2:E:135:ILE:HD11	2:E:200:MET:CE	2.45	0.46
2:E:30:THR:HG22	2:E:31:ASP:H	1.79	0.46
1:C:520:PRO:O	1:C:619:ASN:ND2	2.48	0.46
1:C:623[B]:PHE:CD2	1:C:624:LEU:HD23	2.51	0.45
1:B:571:PHE:CZ	1:B:591:ILE:HG13	2.52	0.45
1:D:542:LEU:C	1:D:542:LEU:HD23	2.41	0.45
1:D:586:ARG:HD3	1:D:613:ILE:CD1	2.45	0.45
2:G:132:HIS:O	2:G:135:ILE:HG22	2.16	0.45
2:H:207:GLN:O	2:H:208:LEU:C	2.58	0.45
1:A:596:LEU:HD23	1:B:809:VAL:HG11	1.99	0.45
2:G:135:ILE:HD13	2:G:204:ARG:CZ	2.46	0.45
1:D:800:VAL:HB	2:H:151:ILE:HD11	1.99	0.45
1:C:628:ARG:NH1	1:C:785:SER:OG	2.50	0.44
1:B:583:ALA:O	1:C:587:GLN:NE2	2.50	0.44
1:C:586:ARG:HD3	1:C:609:THR:CG2	2.47	0.44
1:D:514:VAL:O	5:D:1002:POV:H13B	2.18	0.44
1:D:547:SER:OG	1:D:550:GLU:OE1	2.35	0.44
1:D:519:ASP:N	1:D:520:PRO:CD	2.82	0.43
1:C:519:ASP:N	1:C:520:PRO:CD	2.81	0.43
2:F:130:THR:O	2:F:130:THR:HG22	2.19	0.43
2:F:64:TRP:O	2:F:80:ILE:HD12	2.19	0.43
1:A:545:ARG:O	2:F:202:ILE:HD11	2.18	0.43
1:B:800:VAL:HG11	2:F:151:ILE:HD11	2.01	0.43
1:B:796:PHE:HB3	2:F:154:ILE:HD13	2.00	0.43
2:F:31:ASP:HA	2:F:62:GLY:HA3	2.01	0.42
2:F:147:LEU:O	2:F:150:ILE:HG22	2.19	0.42
2:E:13:THR:HG21	2:E:200:MET:HE1	2.01	0.42
1:A:596:LEU:HD23	1:B:809:VAL:CG1	2.50	0.42
2:H:204:ARG:HH11	2:H:204:ARG:HG2	1.84	0.42
1:B:584:PHE:O	1:B:613:ILE:HD11	2.20	0.42
2:E:70:GLU:O	2:E:70:GLU:CD	2.63	0.42
2:H:31:ASP:HA	2:H:62:GLY:HA3	2.02	0.42
1:B:519:ASP:N	1:B:520:PRO:CD	2.83	0.41
1:A:542:LEU:C	1:A:542:LEU:HD23	2.46	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:586:ARG:HD3	1:C:609:THR:HG22	2.02	0.41
2:H:69:LEU:HA	2:H:74:LYS:HG3	2.02	0.41
2:H:61:SER:HA	2:H:66:THR:HA	2.03	0.41
2:H:206:LYS:O	2:H:207:GLN:C	2.63	0.41
1:B:581:LEU:HD12	3:B:1001:PLM:HG2	2.02	0.41
2:G:202:ILE:O	2:G:206:LYS:HG3	2.20	0.41
1:A:531:PHE:HB3	2:F:150:ILE:HD12	2.02	0.41
1:A:545:ARG:HD3	1:A:551:TRP:CH2	2.56	0.41
1:A:519:ASP:N	1:A:520:PRO:CD	2.84	0.41
1:C:623[B]:PHE:HD2	1:C:624:LEU:HD23	1.86	0.41
1:C:604:VAL:HG11	1:D:802:GLY:HA3	2.02	0.41
1:D:800:VAL:HG11	2:H:151:ILE:HG12	2.03	0.40
2:G:41:LYS:HB3	2:G:76:LEU:HD23	2.03	0.40
1:A:546:PHE:O	1:A:546:PHE:CD2	2.73	0.40
1:A:800:VAL:HB	2:E:151:ILE:HD11	2.02	0.40
1:A:540:LEU:O	1:A:544:SER:HB2	2.20	0.40
2:H:34:LEU:O	2:H:60:HIS:O	2.39	0.40
1:A:586:ARG:NH2	1:A:610:LEU:HA	2.37	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	147/891 (16%)	137 (93%)	10 (7%)	0	100	100
1	B	150/891 (17%)	143 (95%)	7 (5%)	0	100	100
1	C	145/891 (16%)	136 (94%)	8 (6%)	1 (1%)	18	53
1	D	151/891 (17%)	140 (93%)	11 (7%)	0	100	100
2	E	169/322 (52%)	159 (94%)	10 (6%)	0	100	100
2	F	170/322 (53%)	160 (94%)	10 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	G	169/322 (52%)	163 (96%)	6 (4%)	0	100	100
2	H	169/322 (52%)	155 (92%)	14 (8%)	0	100	100
All	All	1270/4852 (26%)	1193 (94%)	76 (6%)	1 (0%)	49	80

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	589	CYS

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	124/766 (16%)	122 (98%)	2 (2%)	55	79
1	B	125/766 (16%)	122 (98%)	3 (2%)	43	73
1	C	122/766 (16%)	119 (98%)	3 (2%)	42	72
1	D	127/766 (17%)	123 (97%)	4 (3%)	35	68
2	E	143/274 (52%)	142 (99%)	1 (1%)	76	86
2	F	144/274 (53%)	142 (99%)	2 (1%)	59	80
2	G	143/274 (52%)	140 (98%)	3 (2%)	47	75
2	H	144/274 (53%)	142 (99%)	2 (1%)	59	80
All	All	1072/4160 (26%)	1052 (98%)	20 (2%)	49	76

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	544	SER
1	A	548	PRO
1	B	547	SER
1	B	573	ILE
1	B	591	ILE
1	C	544	SER

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Mol	Chain	Res	Type
1	C	547	SER
1	C	586	ARG
1	D	586	ARG
1	D	591	ILE
1	D	592	SER
1	D	594	ARG
2	E	59	THR
2	F	204	ARG
2	F	208	LEU
2	G	134	ILE
2	G	204	ARG
2	G	205	HIS
2	H	204	ARG
2	H	206	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
2	E	9	GLN
2	E	205	HIS
2	G	132	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	OLC	C	1003	-	24,24,24	0.32	0	25,25,25	0.56	0
3	PLM	A	1001	-	17,17,17	0.60	0	17,17,17	0.63	0
4	OLC	A	1002	-	24,24,24	0.29	0	25,25,25	0.43	0
5	POV	E	1201	-	38,38,51	0.47	0	44,46,59	0.68	1 (2%)
3	PLM	D	1001	-	17,17,17	0.62	0	17,17,17	0.62	0
4	OLC	B	1002	-	24,24,24	0.41	0	25,25,25	0.57	0
3	PLM	G	1101	-	17,17,17	0.75	0	17,17,17	0.45	0
5	POV	D	1002	-	39,39,51	0.48	0	45,47,59	0.80	1 (2%)
3	PLM	C	1002	-	17,17,17	0.60	0	17,17,17	0.68	0
3	PLM	B	1001	-	17,17,17	0.60	0	17,17,17	0.68	0
4	OLC	C	1001	-	24,24,24	0.42	0	25,25,25	0.34	0
5	POV	B	1003	-	41,41,51	0.52	0	47,49,59	0.68	1 (2%)
5	POV	G	1102	-	41,41,51	0.37	0	47,49,59	0.85	1 (2%)
3	PLM	F	1301	-	17,17,17	0.62	0	17,17,17	0.63	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	OLC	C	1003	-	-	12/24/24/24	-
3	PLM	A	1001	-	-	9/15/15/15	-
4	OLC	A	1002	-	-	9/24/24/24	-
5	POV	E	1201	-	-	20/42/42/55	-
3	PLM	D	1001	-	-	7/15/15/15	-
4	OLC	B	1002	-	-	8/24/24/24	-
3	PLM	G	1101	-	-	7/15/15/15	-
5	POV	D	1002	-	-	14/43/43/55	-
3	PLM	C	1002	-	-	4/15/15/15	-
3	PLM	B	1001	-	-	10/15/15/15	-
4	OLC	C	1001	-	-	10/24/24/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	POV	B	1003	-	-	16/45/45/55	-
5	POV	G	1102	-	-	21/45/45/55	-
3	PLM	F	1301	-	-	4/15/15/15	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	1102	POV	O21-C21-C22	4.24	120.66	111.48
5	D	1002	POV	O21-C21-C22	4.18	120.52	111.48
5	B	1003	POV	O21-C21-C22	2.62	117.14	111.48
5	E	1201	POV	O31-C31-C32	2.02	117.99	111.83

There are no chirality outliers.

All (151) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1002	OLC	O20-C21-C22-C24
5	E	1201	POV	C1-O11-P-O14
5	E	1201	POV	C11-O12-P-O11
5	E	1201	POV	C11-O12-P-O13
5	E	1201	POV	O12-C11-C12-N
5	G	1102	POV	C1-O11-P-O12
5	G	1102	POV	C1-O11-P-O14
5	G	1102	POV	O12-C11-C12-N
5	G	1102	POV	C12-C11-O12-P
5	E	1201	POV	O32-C31-O31-C3
5	E	1201	POV	C32-C31-O31-C3
4	C	1003	OLC	C2-C1-O20-C21
4	A	1002	OLC	O20-C21-C22-O23
4	C	1003	OLC	O20-C21-C22-O23
4	C	1003	OLC	O19-C1-O20-C21
5	B	1003	POV	O22-C21-O21-C2
5	G	1102	POV	C32-C31-O31-C3
4	C	1003	OLC	O23-C22-C24-O25
5	D	1002	POV	C31-C32-C33-C34
4	C	1003	OLC	C1-C2-C3-C4
5	E	1201	POV	C31-C32-C33-C34
5	G	1102	POV	O32-C31-O31-C3
3	G	1101	PLM	C1-C2-C3-C4

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Mol	Chain	Res	Type	Atoms
5	B	1003	POV	C21-C22-C23-C24
5	B	1003	POV	C22-C21-O21-C2
5	D	1002	POV	C21-C22-C23-C24
5	G	1102	POV	C31-C32-C33-C34
5	B	1003	POV	C34-C35-C36-C37
4	B	1002	OLC	C2-C1-O20-C21
4	C	1003	OLC	C21-C22-C24-O25
4	B	1002	OLC	O19-C1-O20-C21
4	A	1002	OLC	C11-C12-C13-C14
5	B	1003	POV	C25-C26-C27-C28
5	G	1102	POV	C34-C35-C36-C37
4	A	1002	OLC	C3-C4-C5-C6
3	B	1001	PLM	C3-C4-C5-C6
5	G	1102	POV	C23-C24-C25-C26
3	A	1001	PLM	C3-C4-C5-C6
5	D	1002	POV	C22-C23-C24-C25
3	A	1001	PLM	CC-CD-CE-CF
4	C	1001	OLC	C11-C12-C13-C14
3	G	1101	PLM	CC-CD-CE-CF
3	A	1001	PLM	C5-C6-C7-C8
3	B	1001	PLM	C5-C6-C7-C8
5	E	1201	POV	C22-C21-O21-C2
3	D	1001	PLM	C1-C2-C3-C4
3	D	1001	PLM	CD-CE-CF-CG
4	C	1001	OLC	C1-C2-C3-C4
5	G	1102	POV	C11-C12-N-C13
5	G	1102	POV	C11-C12-N-C14
4	C	1003	OLC	C11-C12-C13-C14
3	B	1001	PLM	C8-C9-CA-CB
5	B	1003	POV	O21-C2-C3-O31
5	G	1102	POV	C2-C1-O11-P
5	E	1201	POV	O22-C21-O21-C2
5	B	1003	POV	C22-C23-C24-C25
4	C	1001	OLC	C12-C13-C14-C15
3	G	1101	PLM	C3-C4-C5-C6
3	C	1002	PLM	C2-C3-C4-C5
3	A	1001	PLM	C2-C3-C4-C5
4	C	1001	OLC	O20-C21-C22-C24
3	B	1001	PLM	C1-C2-C3-C4
4	C	1001	OLC	C2-C3-C4-C5
5	B	1003	POV	C26-C27-C28-C29
5	D	1002	POV	C210-C211-C212-C213

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Mol	Chain	Res	Type	Atoms
5	G	1102	POV	C11-C12-N-C15
4	C	1001	OLC	O20-C21-C22-O23
5	D	1002	POV	C3-C2-O21-C21
4	B	1002	OLC	C10-C11-C12-C13
4	C	1003	OLC	C6-C7-C8-C9
5	G	1102	POV	C37-C38-C39-C310
3	F	1301	PLM	C2-C3-C4-C5
3	D	1001	PLM	C9-CA-CB-CC
5	E	1201	POV	C211-C212-C213-C214
4	C	1003	OLC	O20-C21-C22-C24
4	C	1003	OLC	C15-C16-C17-C18
3	A	1001	PLM	CD-CE-CF-CG
5	E	1201	POV	C33-C34-C35-C36
5	G	1102	POV	C33-C34-C35-C36
5	B	1003	POV	C1-C2-C3-O31
5	E	1201	POV	C1-C2-C3-O31
5	B	1003	POV	C211-C212-C213-C214
4	C	1003	OLC	C9-C10-C11-C12
4	A	1002	OLC	C7-C8-C9-C10
4	A	1002	OLC	C1-C2-C3-C4
5	D	1002	POV	C23-C24-C25-C26
4	A	1002	OLC	C21-C22-C24-O25
5	D	1002	POV	C26-C27-C28-C29
5	E	1201	POV	O11-C1-C2-O21
3	B	1001	PLM	C2-C3-C4-C5
5	D	1002	POV	C33-C34-C35-C36
4	C	1001	OLC	C2-C1-O20-C21
3	D	1001	PLM	C2-C3-C4-C5
5	D	1002	POV	C22-C21-O21-C2
4	C	1003	OLC	C5-C6-C7-C8
4	B	1002	OLC	C13-C14-C15-C16
5	E	1201	POV	C23-C24-C25-C26
4	B	1002	OLC	C14-C15-C16-C17
3	B	1001	PLM	C7-C8-C9-CA
5	D	1002	POV	O22-C21-O21-C2
5	E	1201	POV	C27-C28-C29-C210
3	B	1001	PLM	CB-CC-CD-CE
5	E	1201	POV	C1-O11-P-O12
5	E	1201	POV	C1-O11-P-O13
5	G	1102	POV	C1-O11-P-O13
3	F	1301	PLM	C7-C8-C9-CA
5	D	1002	POV	C2-C1-O11-P

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Mol	Chain	Res	Type	Atoms
4	A	1002	OLC	C10-C11-C12-C13
5	E	1201	POV	O11-C1-C2-C3
4	A	1002	OLC	C15-C16-C17-C18
5	E	1201	POV	O21-C2-C3-O31
3	C	1002	PLM	C9-CA-CB-CC
3	G	1101	PLM	C2-C3-C4-C5
3	A	1001	PLM	CA-CB-CC-CD
4	C	1001	OLC	C7-C8-C9-C10
4	C	1001	OLC	O19-C1-O20-C21
3	D	1001	PLM	CB-CC-CD-CE
5	G	1102	POV	C29-C210-C211-C212
3	D	1001	PLM	C8-C9-CA-CB
5	G	1102	POV	C26-C27-C28-C29
3	F	1301	PLM	O2-C1-C2-C3
5	B	1003	POV	C32-C33-C34-C35
5	D	1002	POV	O21-C2-C3-O31
5	G	1102	POV	C25-C26-C27-C28
3	F	1301	PLM	O1-C1-C2-C3
3	C	1002	PLM	O2-C1-C2-C3
3	C	1002	PLM	O1-C1-C2-C3
5	B	1003	POV	C2-C1-O11-P
5	D	1002	POV	C34-C35-C36-C37
3	A	1001	PLM	CB-CC-CD-CE
3	B	1001	PLM	C9-CA-CB-CC
3	G	1101	PLM	O1-C1-C2-C3
3	B	1001	PLM	O2-C1-C2-C3
3	G	1101	PLM	O2-C1-C2-C3
3	D	1001	PLM	C5-C6-C7-C8
5	E	1201	POV	C22-C23-C24-C25
3	A	1001	PLM	O1-C1-C2-C3
5	B	1003	POV	C1-C2-O21-C21
3	A	1001	PLM	O2-C1-C2-C3
5	B	1003	POV	C29-C210-C211-C212
4	B	1002	OLC	C7-C8-C9-C10
4	C	1001	OLC	C9-C10-C11-C12
5	B	1003	POV	C27-C28-C29-C210
3	B	1001	PLM	O1-C1-C2-C3
5	G	1102	POV	O31-C31-C32-C33
5	B	1003	POV	C23-C24-C25-C26
4	B	1002	OLC	C15-C16-C17-C18
5	D	1002	POV	C32-C33-C34-C35
3	G	1101	PLM	CD-CE-CF-CG

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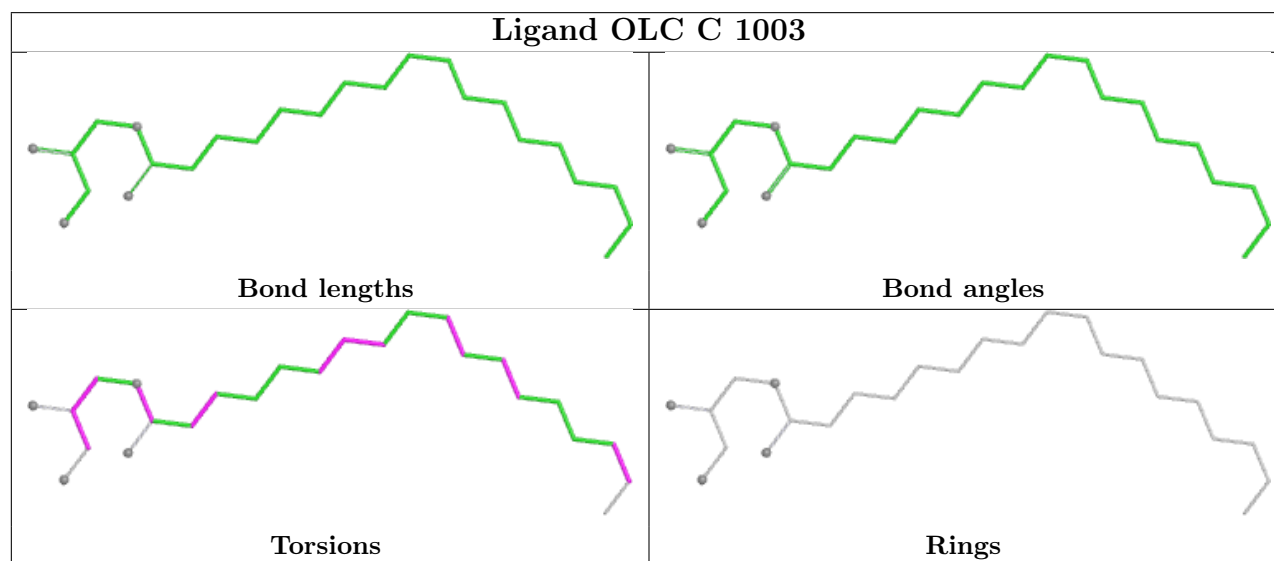
Mol	Chain	Res	Type	Atoms
4	B	1002	OLC	C11-C12-C13-C14
5	G	1102	POV	O32-C31-C32-C33

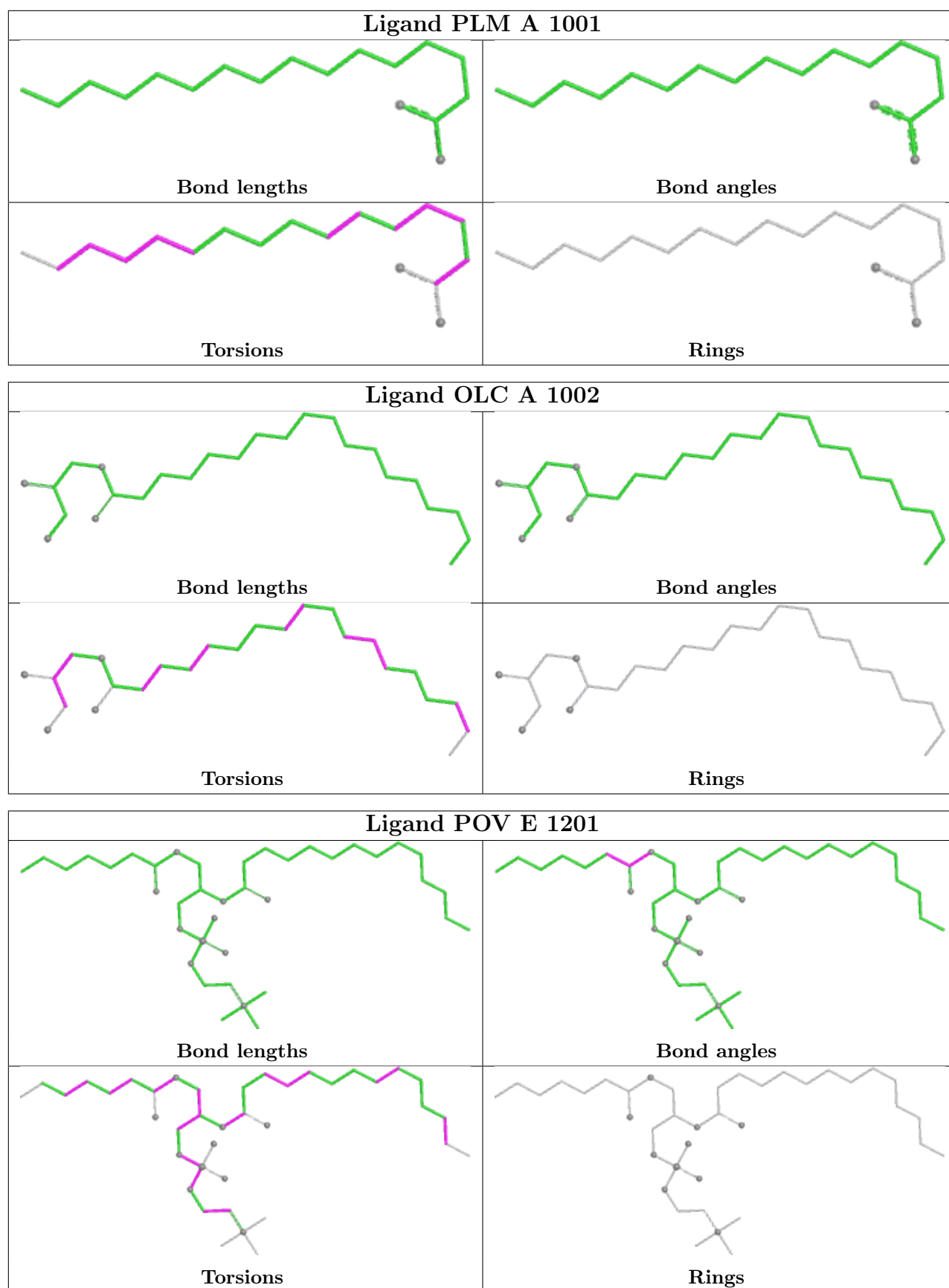
There are no ring outliers.

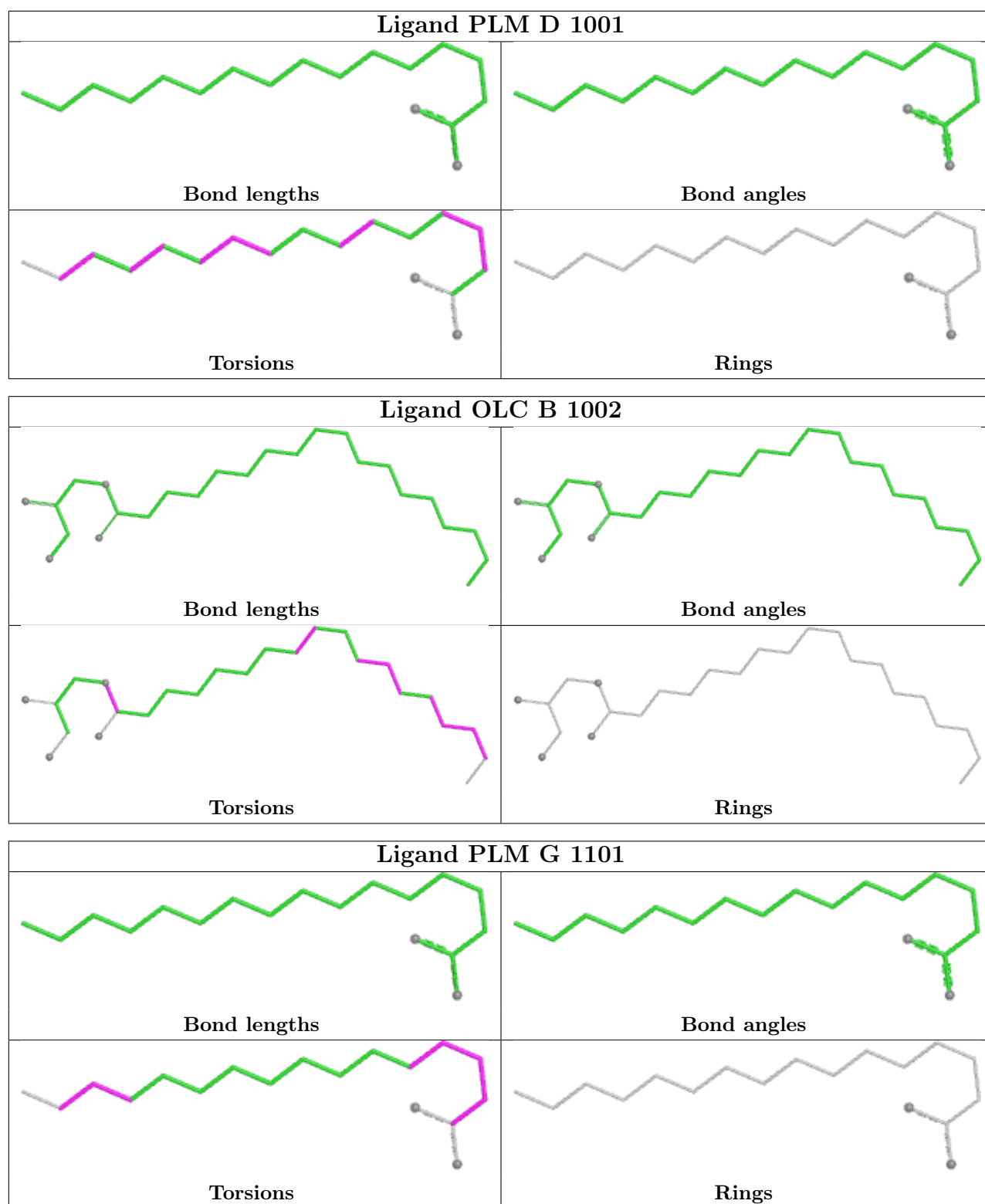
4 monomers are involved in 6 short contacts:

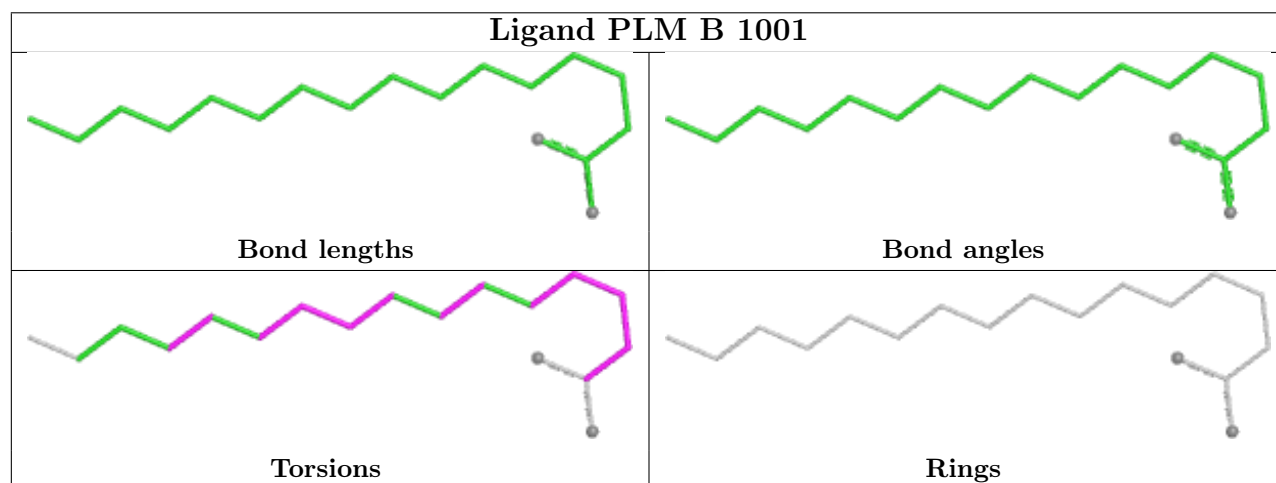
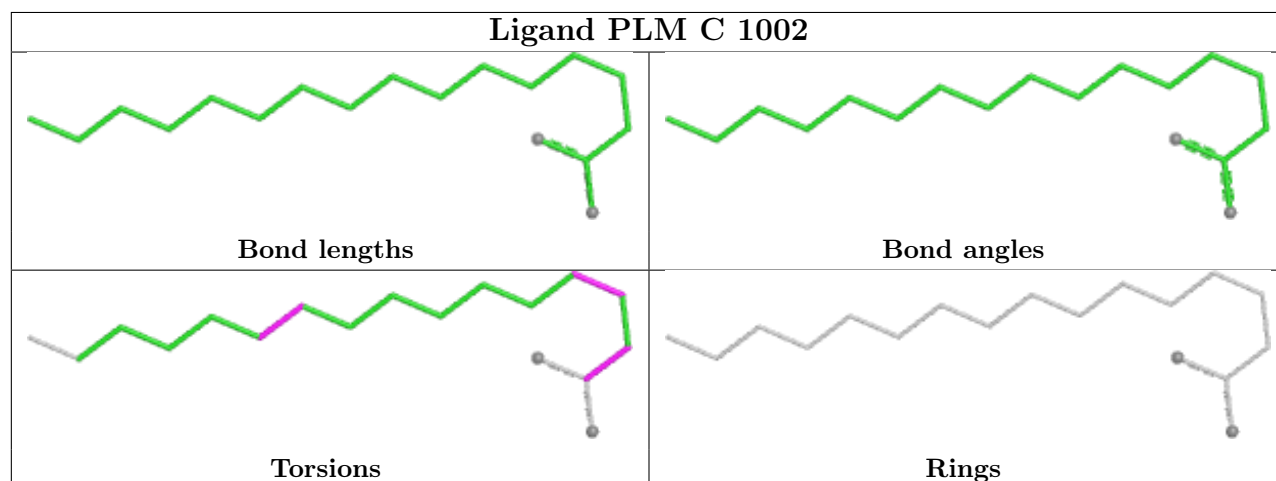
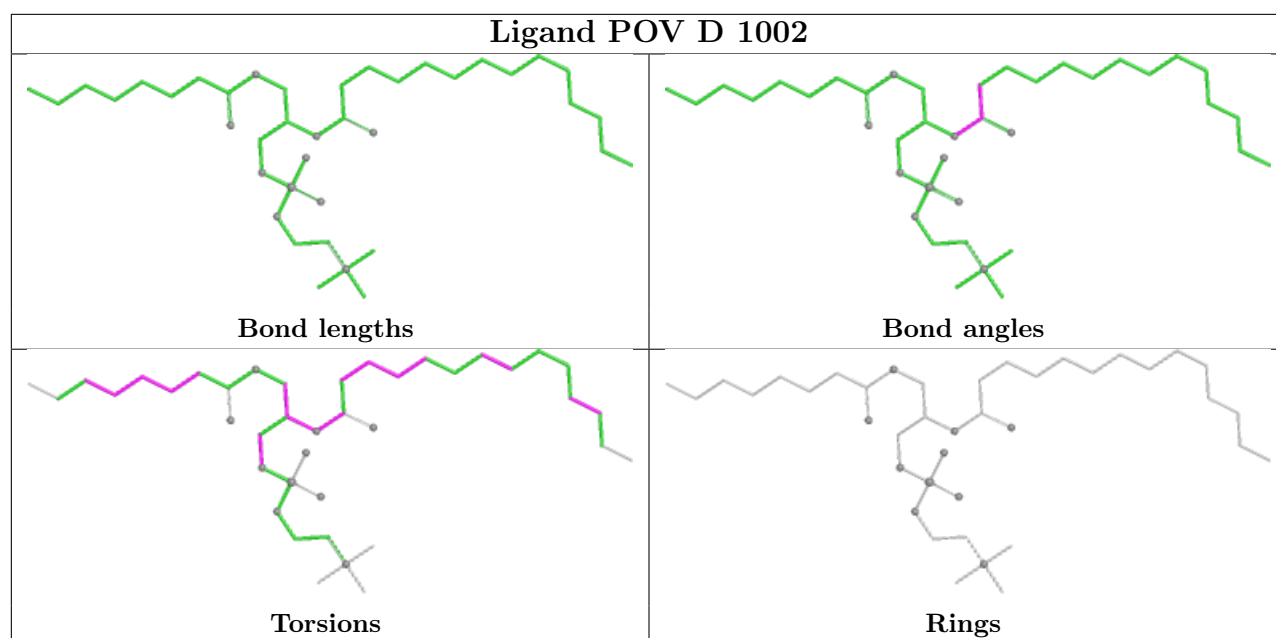
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	1201	POV	3	0
5	D	1002	POV	1	0
3	B	1001	PLM	1	0
5	B	1003	POV	1	0

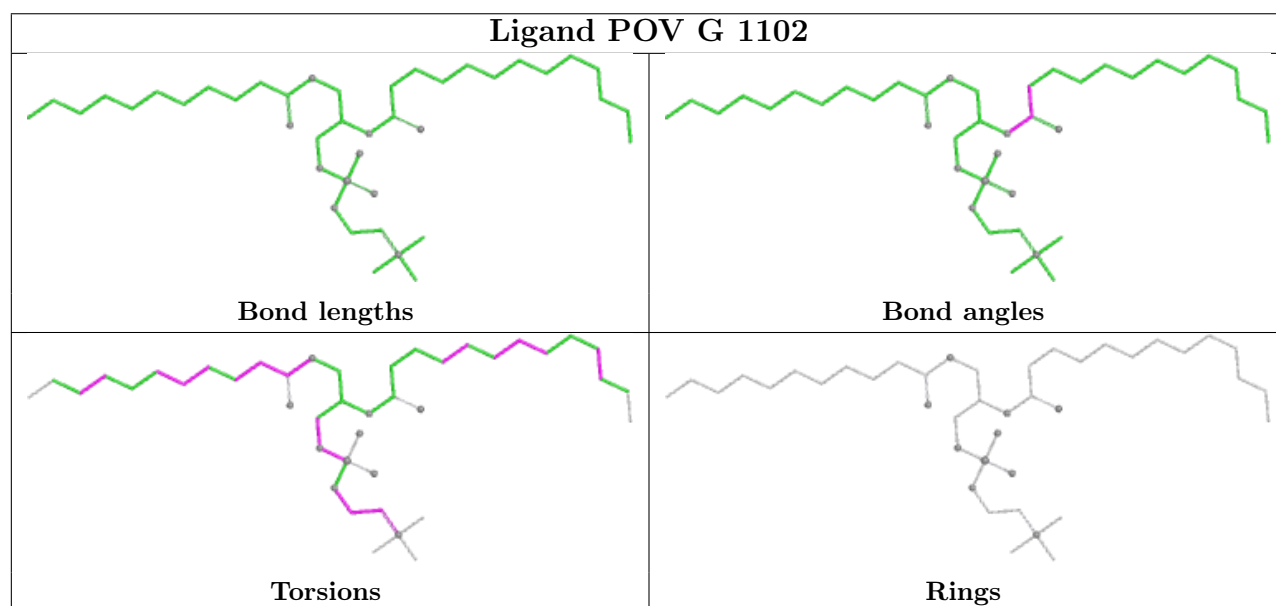
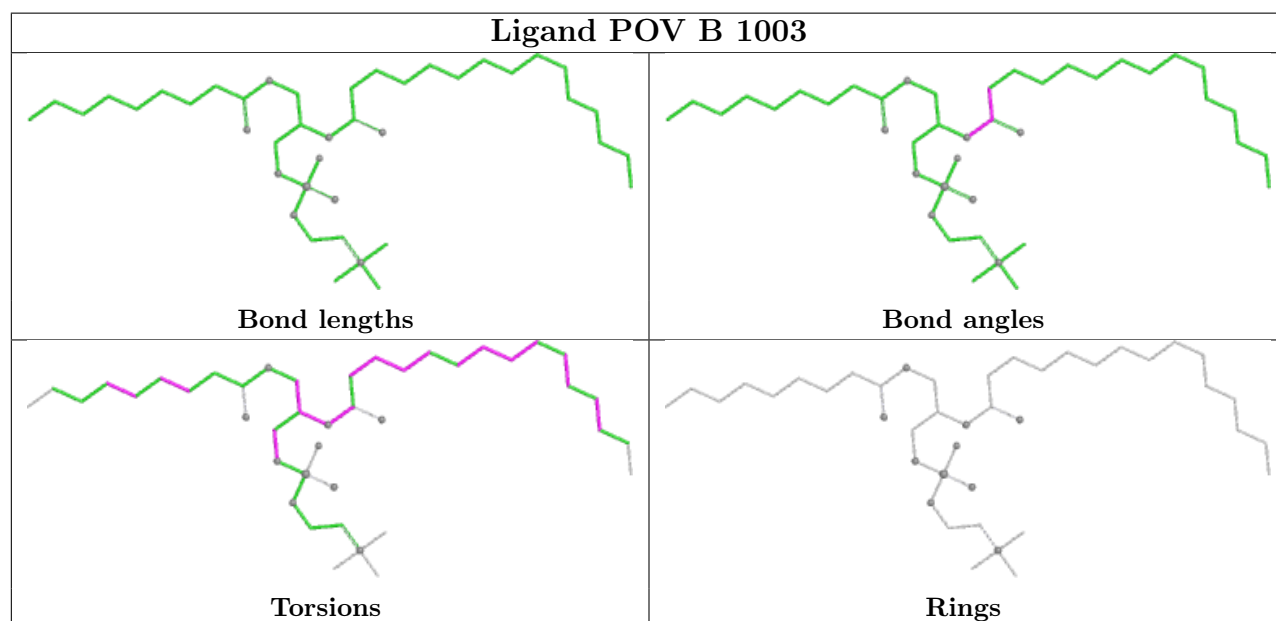
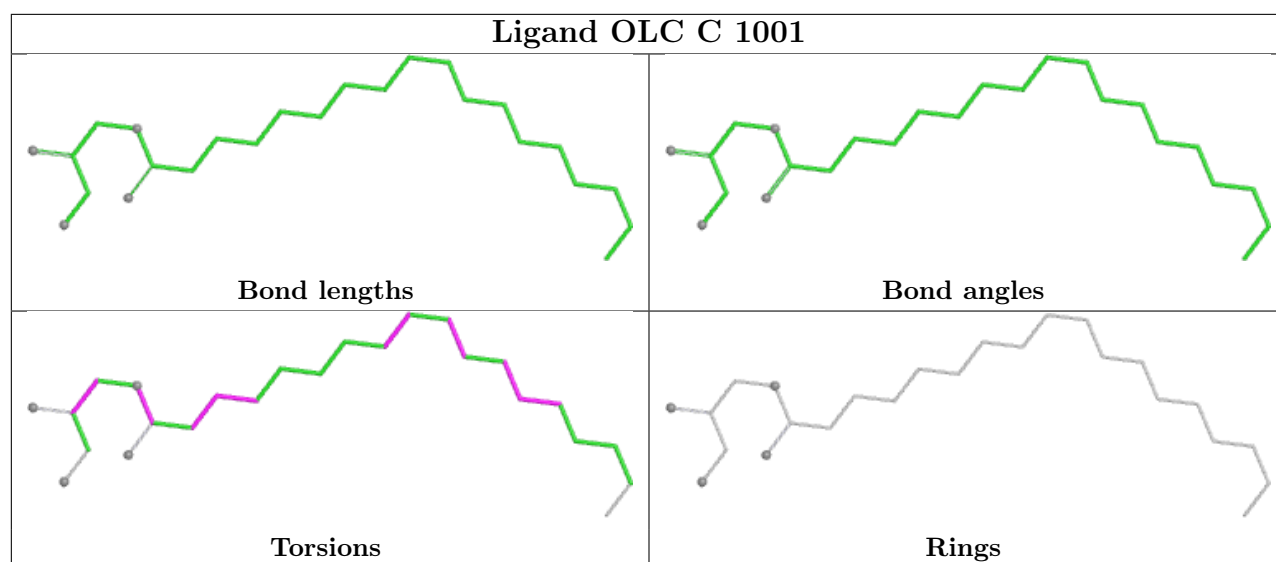
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

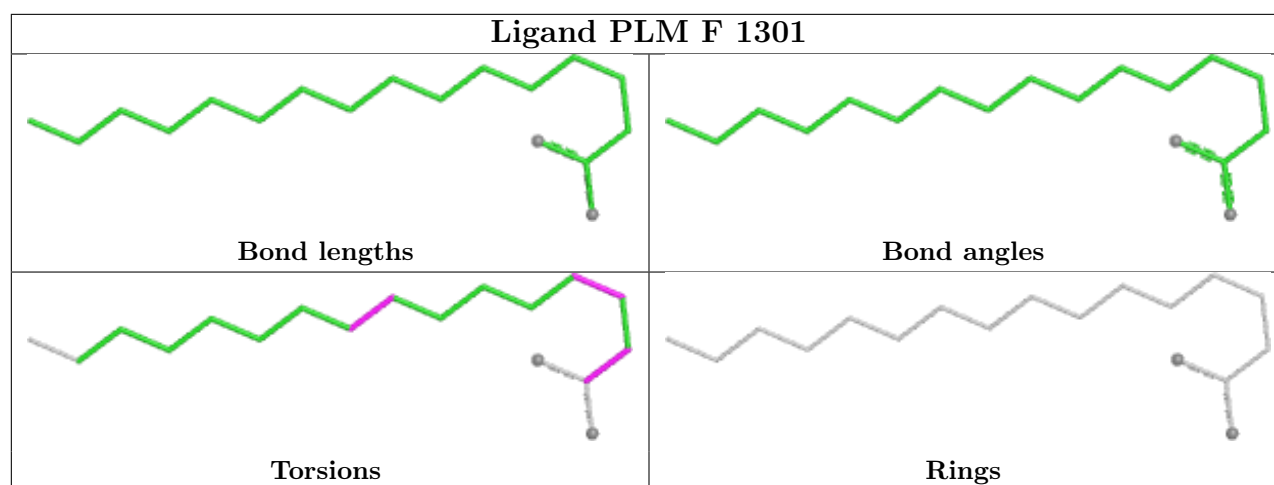












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

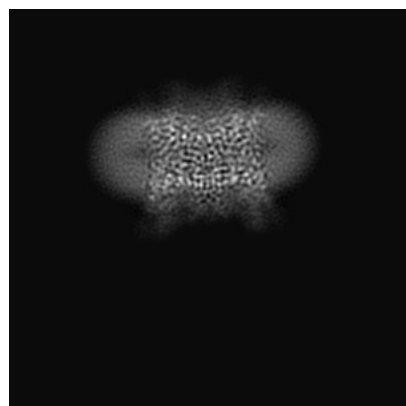
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-16382. These allow visual inspection of the internal detail of the map and identification of artifacts.

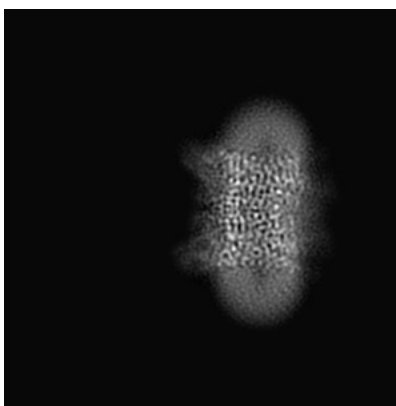
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

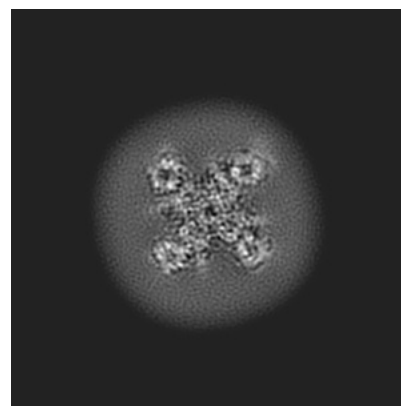
6.1.1 Primary map



X

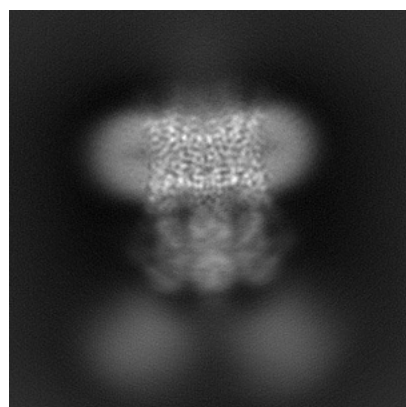


Y

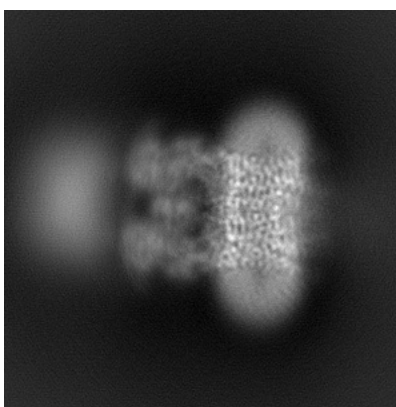


Z

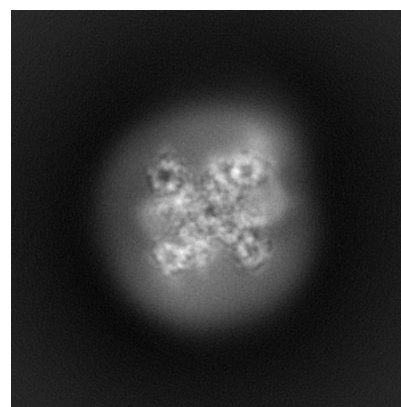
6.1.2 Raw map



X



Y

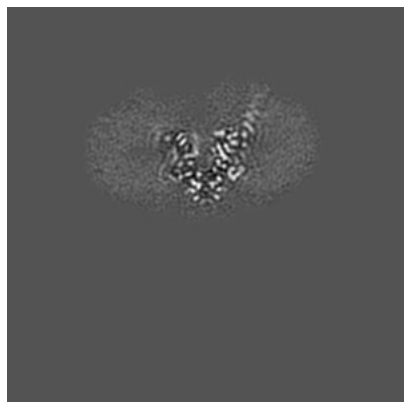


Z

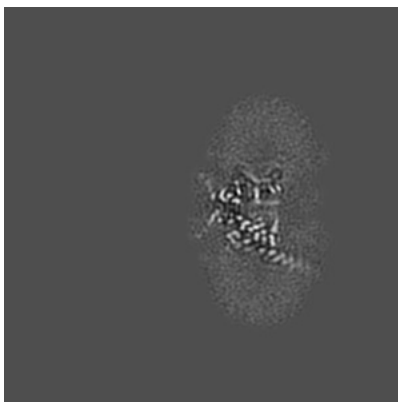
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

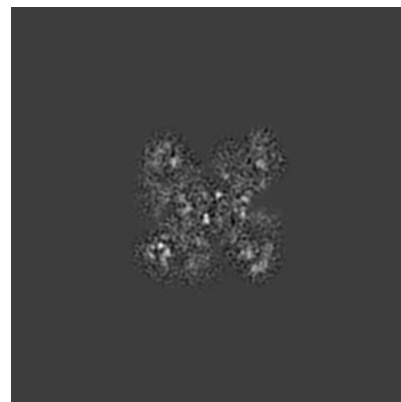
6.2.1 Primary map



X Index: 152

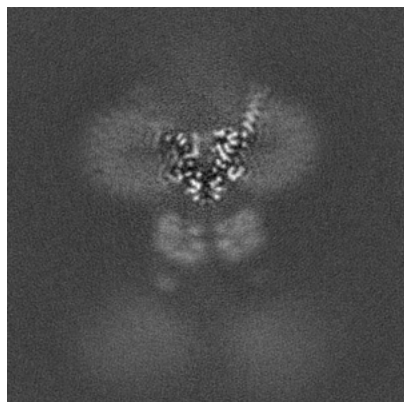


Y Index: 152

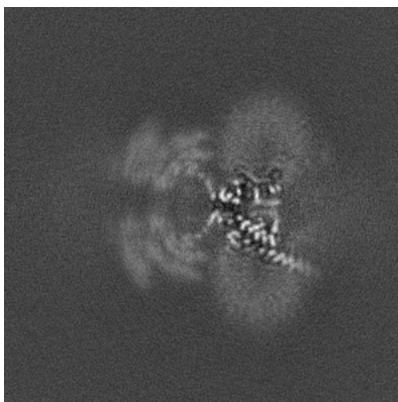


Z Index: 152

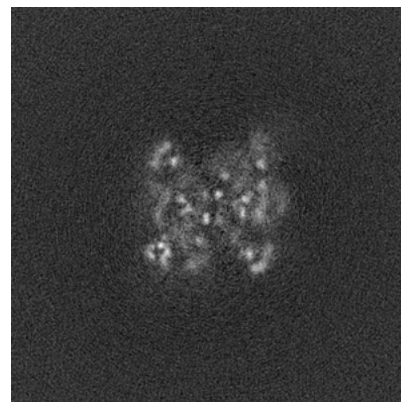
6.2.2 Raw map



X Index: 152



Y Index: 152

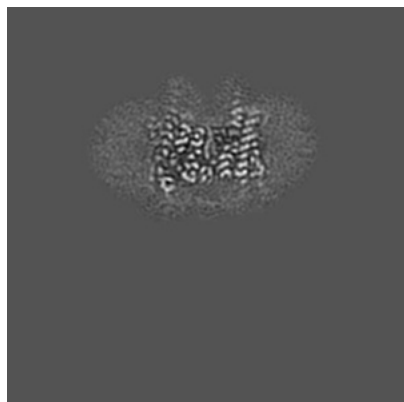


Z Index: 152

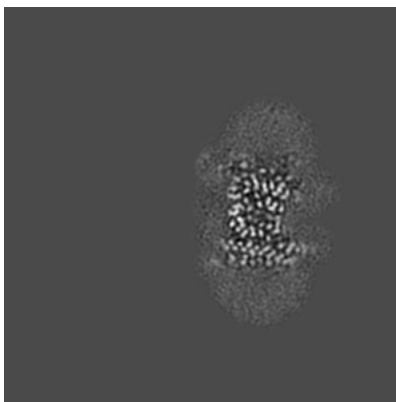
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

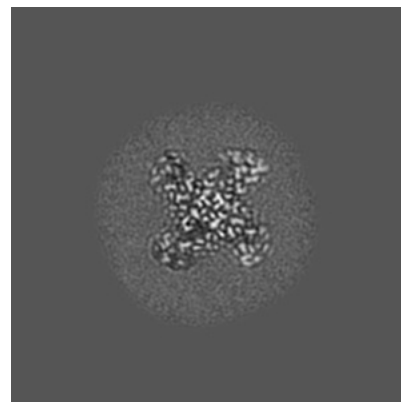
6.3.1 Primary map



X Index: 172

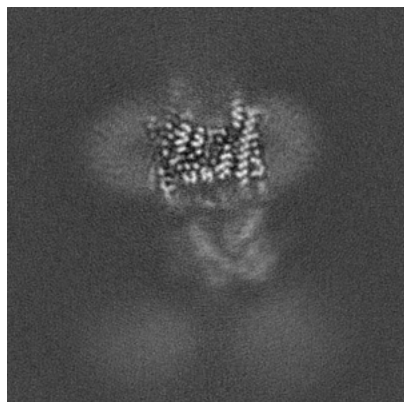


Y Index: 169

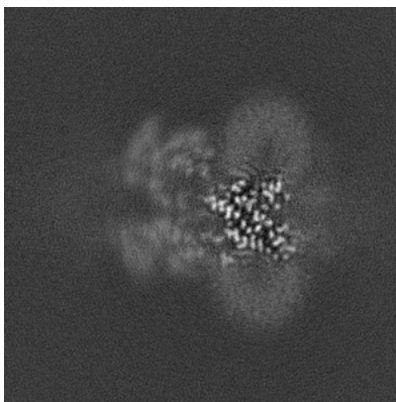


Z Index: 177

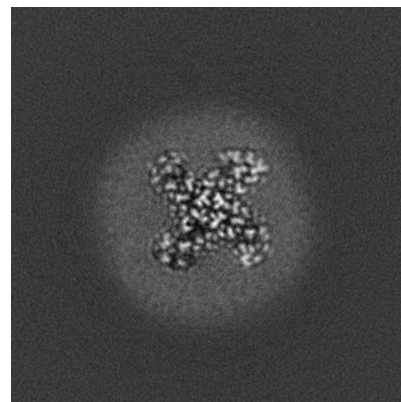
6.3.2 Raw map



X Index: 171



Y Index: 159

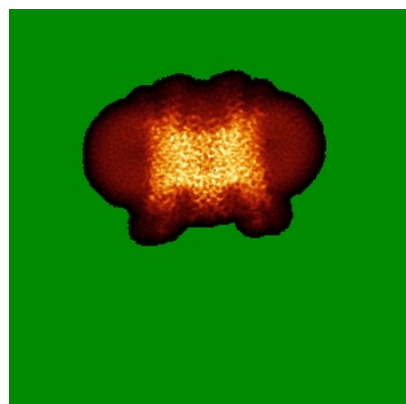


Z Index: 177

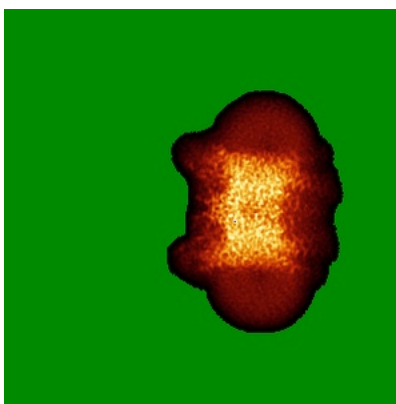
The images above show the largest variance slices of the map in three orthogonal directions.

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

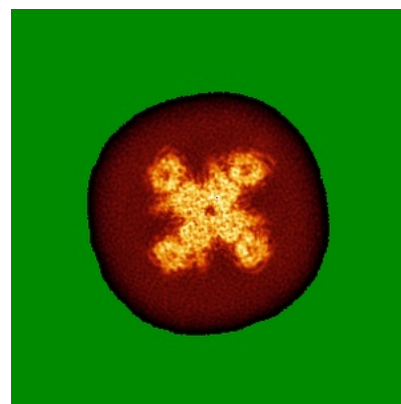
6.4.1 Primary map



X

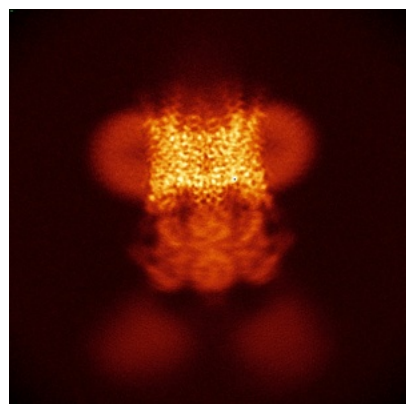


Y

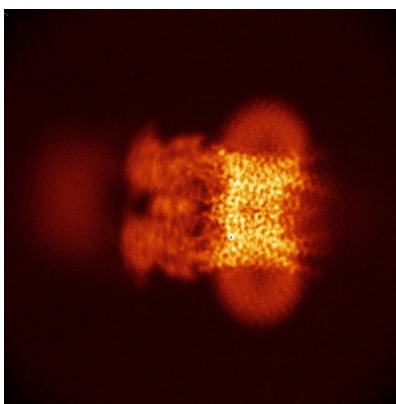


Z

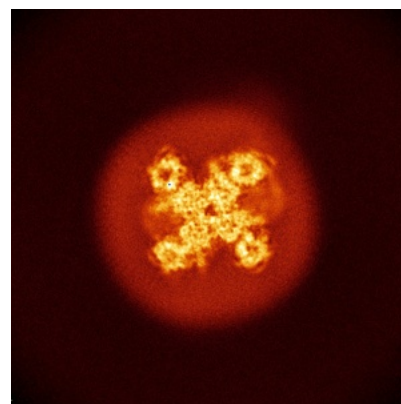
6.4.2 Raw map



X



Y

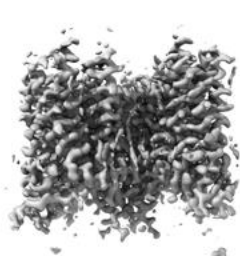


Z

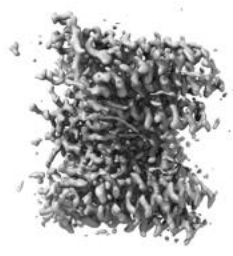
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



X



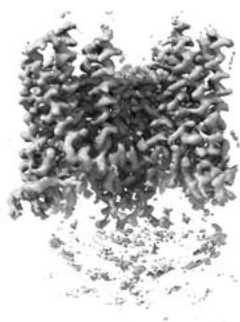
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.01. 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



X



Y



Z

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.

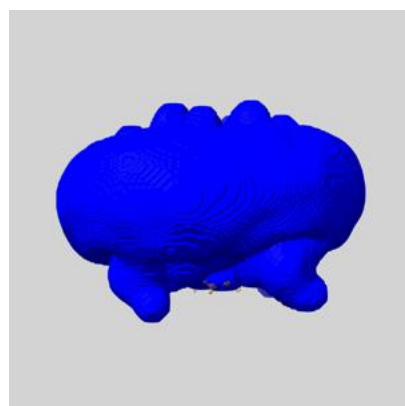
6.6 Mask visualisation [i](#)

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

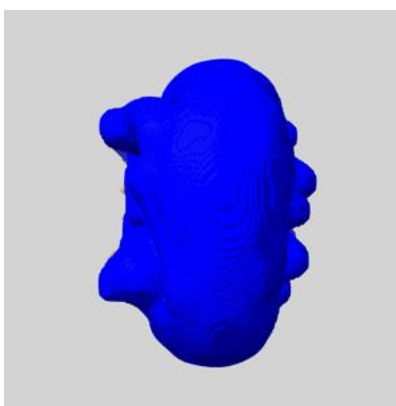
A mask typically either:

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

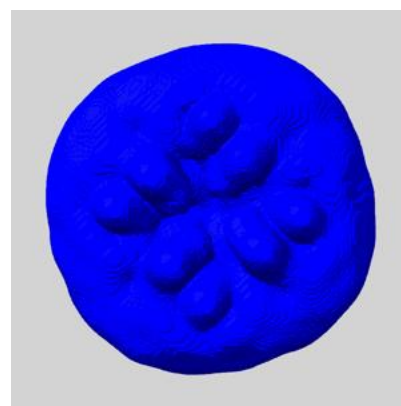
6.6.1 emd_16382_msk_1.map [i](#)



X



Y

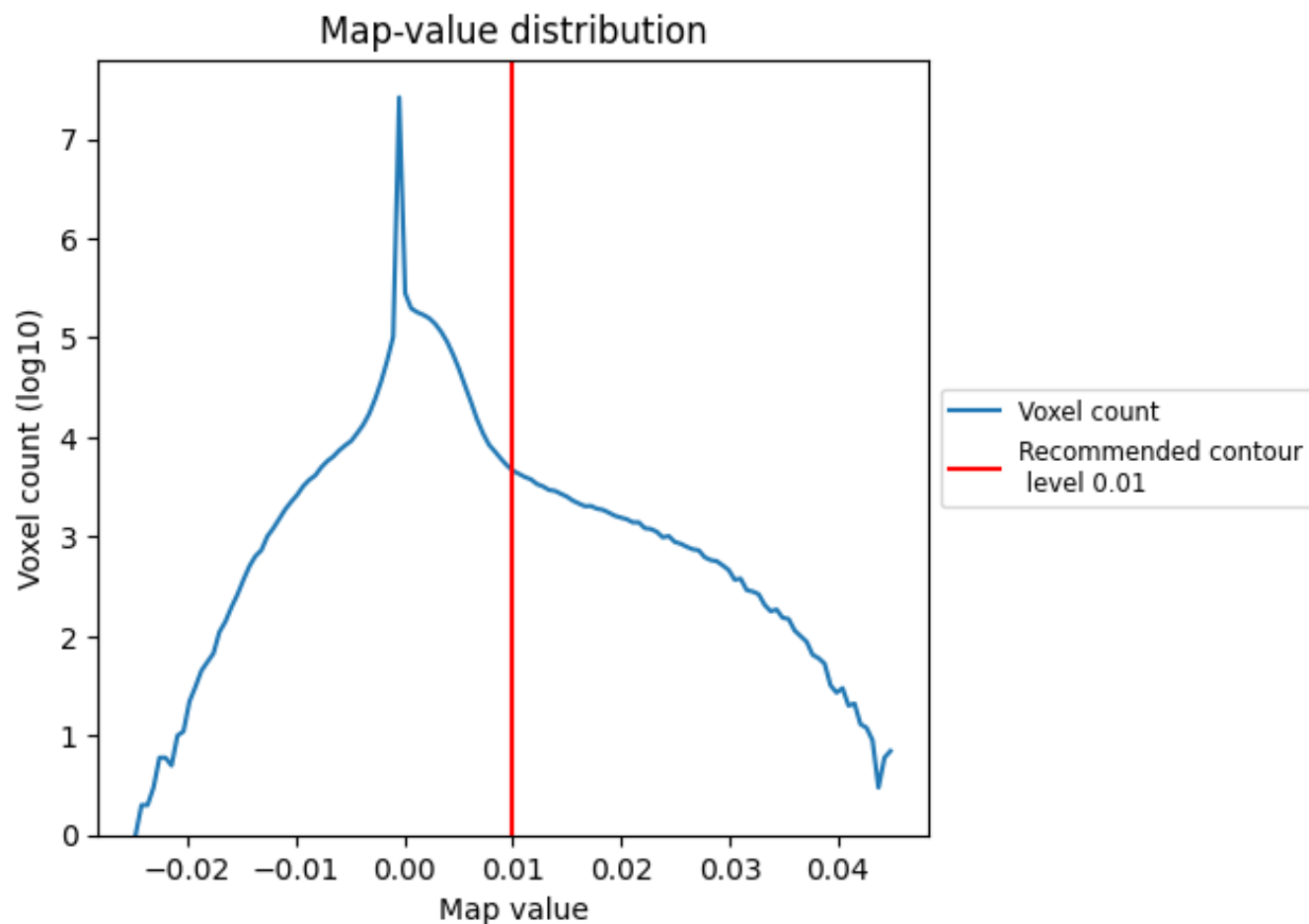


Z

7 Map analysis [i](#)

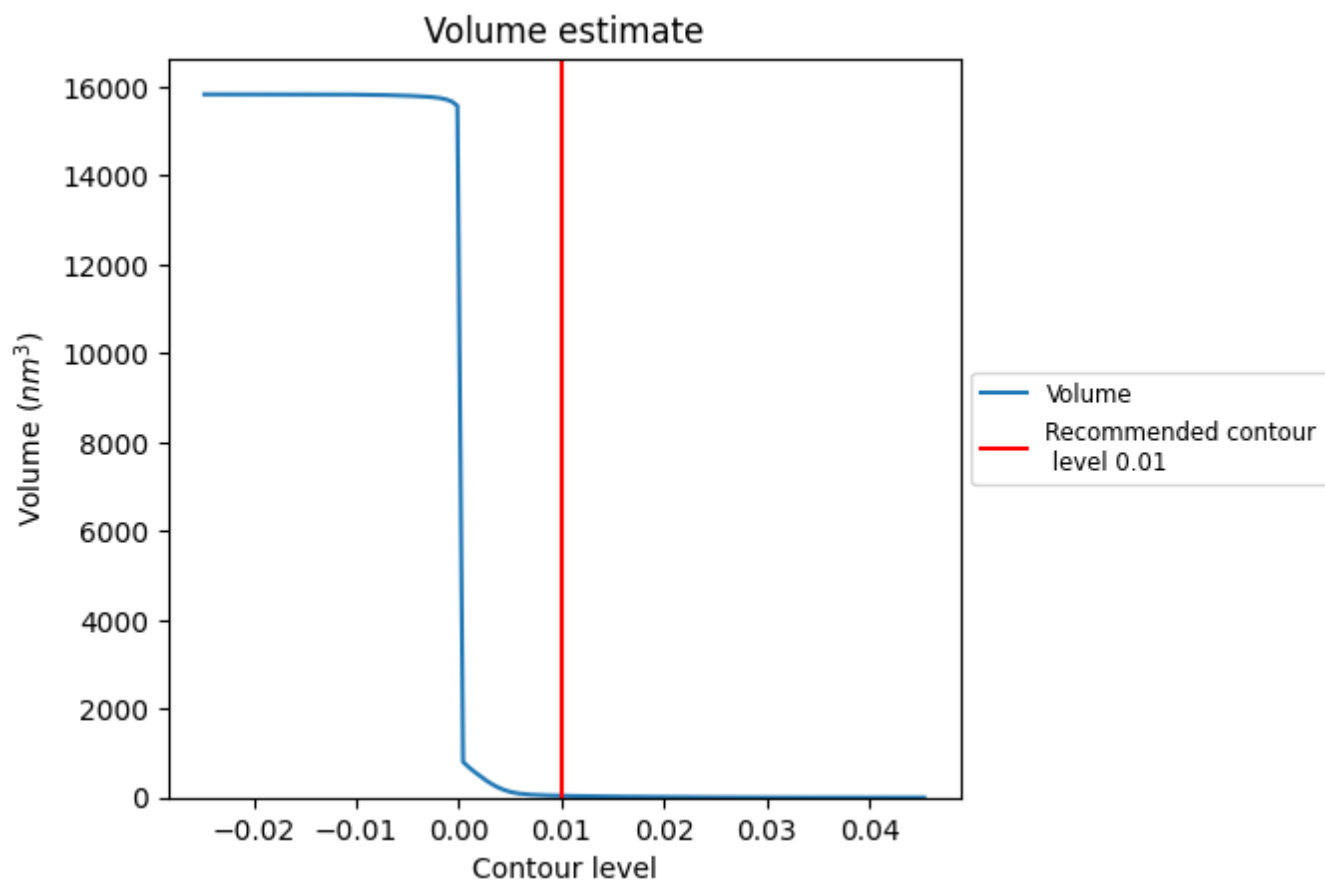
This section contains the results of statistical analysis of the map.

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.

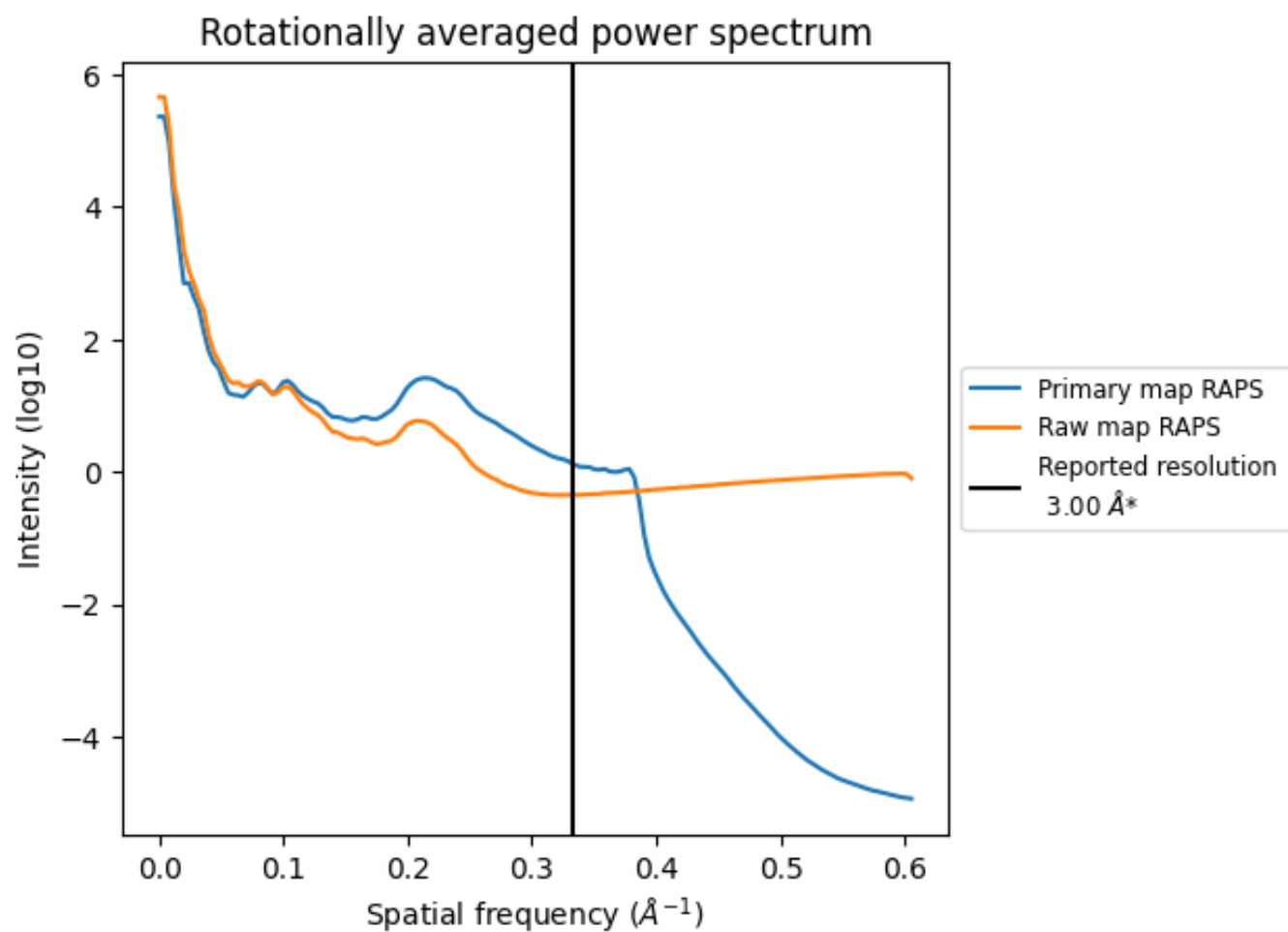
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 40 nm³; this corresponds to an approximate mass of 36 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

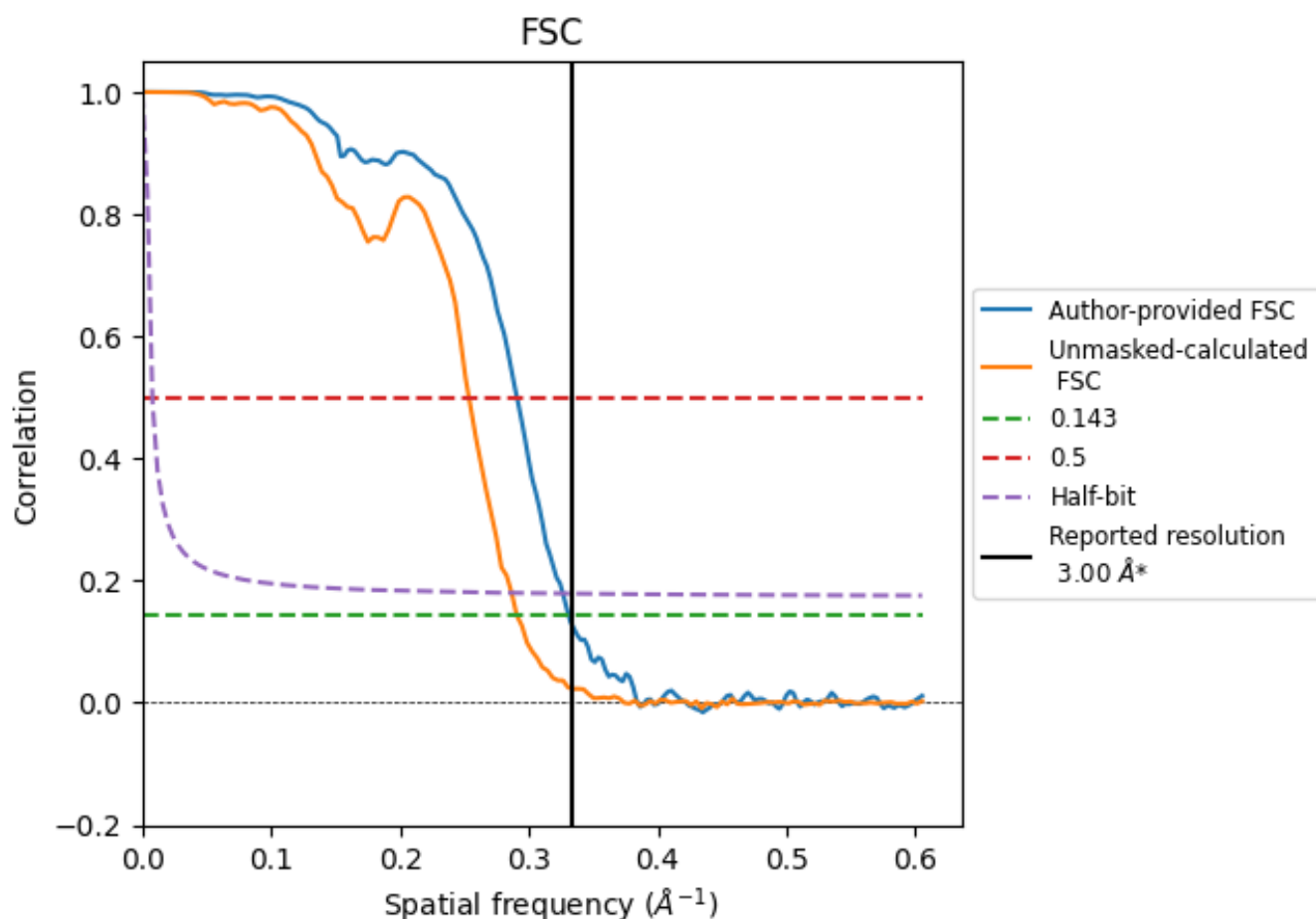


*Reported resolution corresponds to spatial frequency of 0.333 Å⁻¹

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 0.333 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

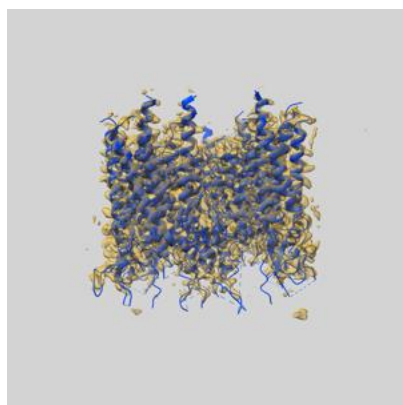
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	3.02	3.44	3.06
Unmasked-calculated*	3.44	3.94	3.49

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.44 differs from the reported value 3.0 by more than 10 %

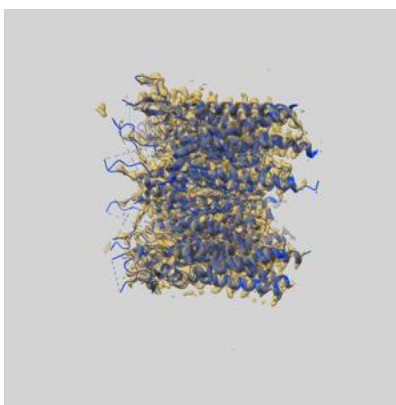
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-16382 and PDB model 8C1S. Per-residue inclusion information can be found in section [3](#) on page [9](#).

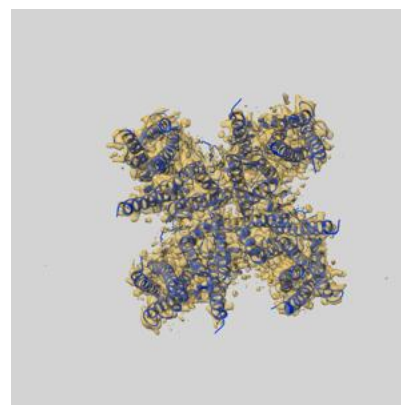
9.1 Map-model overlay [i](#)



X



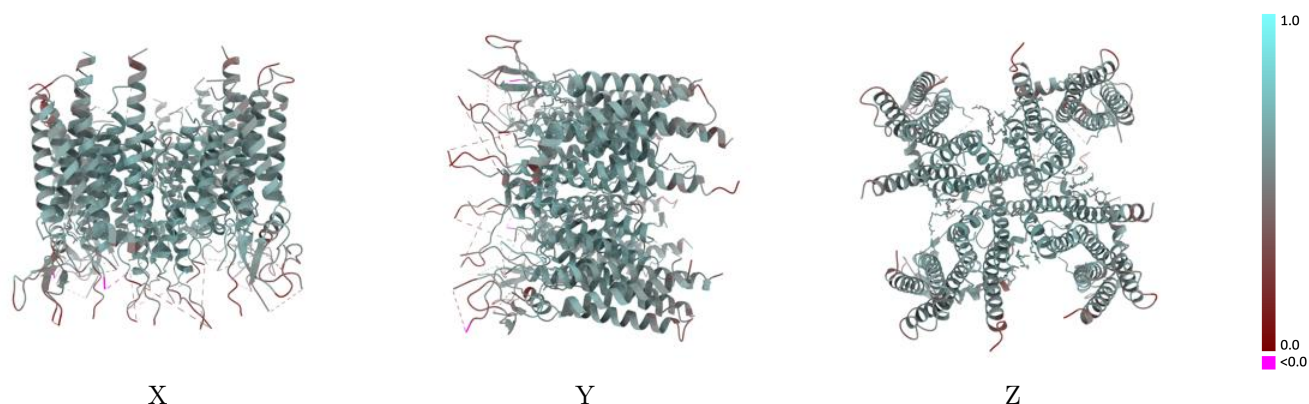
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.01 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](#)

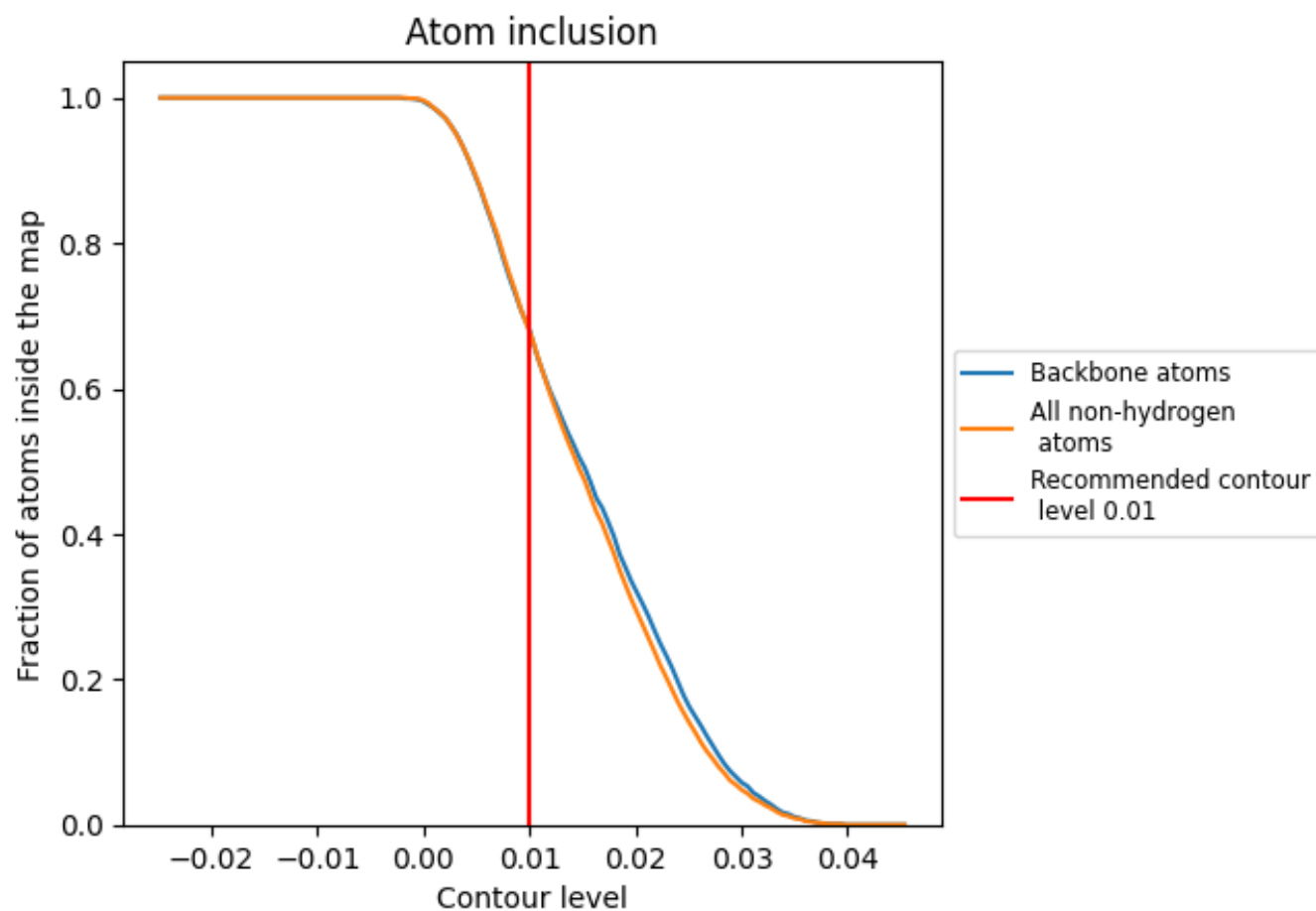


The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

This section was not generated.

9.4 Atom inclusion [i](#)



At the recommended contour level, 68% 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 (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6790	0.5560
A	0.7540	0.5810
B	0.7430	0.5890
C	0.7610	0.5860
D	0.7390	0.5880
E	0.6380	0.5300
F	0.6190	0.5260
G	0.6230	0.5380
H	0.6350	0.5270

1.0

0.0

<0.0