Full wwPDB EM Validation Report

Nov 9, 2026 – 06:16 PM EST

PDB ID	:	13GG / pdb_000013gg
EMDB ID	:	EMD-77056
Title	:	High resolution cryo-EM structure of the Pseudomonas aeruginosa OprM Multidrug Efflux Pump
Authors	:	Ratliff, A.C.; Botos, I.; Putti, A.M.; Prashant, P.P.; Ramkumar, A.; Ghirlando, R.; Dekker, J.P.; Buchanan, S.K.
Deposited on	:	2026-05-05
Resolution	:	2.09 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 (i) 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 (1)) were used in the production of this report:

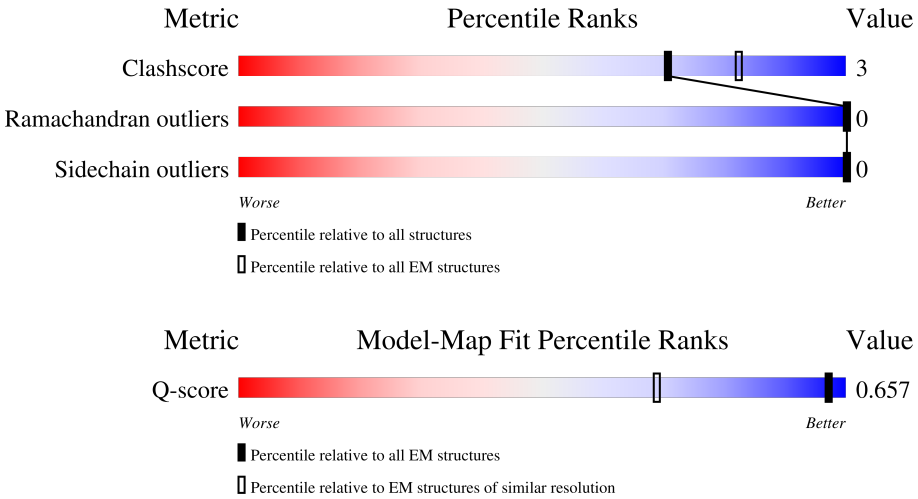
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.2
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data 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)	:	2.51

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 2.09 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	2022 (1.60 - 2.59)

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 <=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	500	85% 7% 9%
1	B	500	84% 8% 9%
1	C	500	84% 8% 9%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 11763 atoms, of which 690 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 Outer membrane protein OprM.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	456	Total	C	N	O	S	0	0
			3491	2184	622	682	3		
1	B	456	Total	C	N	O	S	0	0
			3491	2184	622	682	3		
1	C	456	Total	C	N	O	S	0	0
			3491	2184	622	682	3		

There are 45 discrepancies between the modelled and reference sequences:

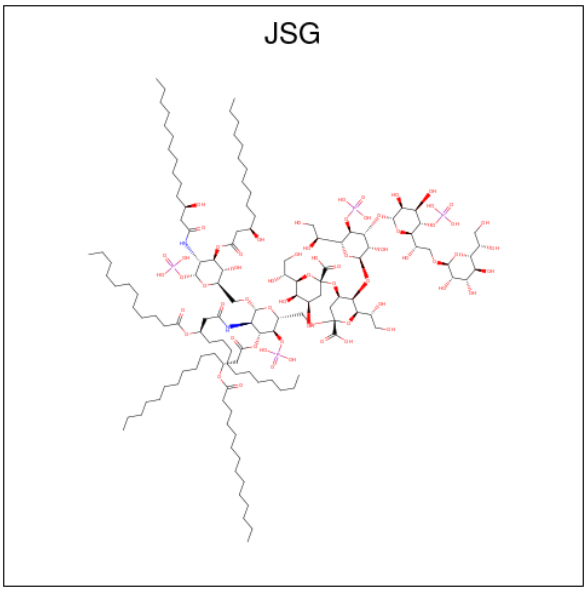
Chain	Residue	Modelled	Actual	Comment	Reference
A	486	GLU	-	expression tag	UNP Q51487
A	487	ASN	-	expression tag	UNP Q51487
A	488	LEU	-	expression tag	UNP Q51487
A	489	TYR	-	expression tag	UNP Q51487
A	490	PHE	-	expression tag	UNP Q51487
A	491	GLN	-	expression tag	UNP Q51487
A	492	GLY	-	expression tag	UNP Q51487
A	493	LEU	-	expression tag	UNP Q51487
A	494	GLU	-	expression tag	UNP Q51487
A	495	HIS	-	expression tag	UNP Q51487
A	496	HIS	-	expression tag	UNP Q51487
A	497	HIS	-	expression tag	UNP Q51487
A	498	HIS	-	expression tag	UNP Q51487
A	499	HIS	-	expression tag	UNP Q51487
A	500	HIS	-	expression tag	UNP Q51487
B	486	GLU	-	expression tag	UNP Q51487
B	487	ASN	-	expression tag	UNP Q51487
B	488	LEU	-	expression tag	UNP Q51487
B	489	TYR	-	expression tag	UNP Q51487
B	490	PHE	-	expression tag	UNP Q51487
B	491	GLN	-	expression tag	UNP Q51487
B	492	GLY	-	expression tag	UNP Q51487
B	493	LEU	-	expression tag	UNP Q51487
B	494	GLU	-	expression tag	UNP Q51487

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Chain	Residue	Modelled	Actual	Comment	Reference
B	495	HIS	-	expression tag	UNP Q51487
B	496	HIS	-	expression tag	UNP Q51487
B	497	HIS	-	expression tag	UNP Q51487
B	498	HIS	-	expression tag	UNP Q51487
B	499	HIS	-	expression tag	UNP Q51487
B	500	HIS	-	expression tag	UNP Q51487
C	486	GLU	-	expression tag	UNP Q51487
C	487	ASN	-	expression tag	UNP Q51487
C	488	LEU	-	expression tag	UNP Q51487
C	489	TYR	-	expression tag	UNP Q51487
C	490	PHE	-	expression tag	UNP Q51487
C	491	GLN	-	expression tag	UNP Q51487
C	492	GLY	-	expression tag	UNP Q51487
C	493	LEU	-	expression tag	UNP Q51487
C	494	GLU	-	expression tag	UNP Q51487
C	495	HIS	-	expression tag	UNP Q51487
C	496	HIS	-	expression tag	UNP Q51487
C	497	HIS	-	expression tag	UNP Q51487
C	498	HIS	-	expression tag	UNP Q51487
C	499	HIS	-	expression tag	UNP Q51487
C	500	HIS	-	expression tag	UNP Q51487

- Molecule 2 is (2 {R},4 {R},5 {R},6 {R})-6-[(1 {R})-1,2-bis(oxidanyl)ethyl]-2-[(2 {R},4 {R},5 {R},6 {R})-6-[(1 {R})-1,2-bis(oxidanyl)ethyl]-5-[(2 {S},3 {S},4 {R},5 {R},6 {R})-6-[(1 {S})-1,2-bis(oxidanyl)ethyl]-4-[(2 {R},3 {S},4 {R},5 {S},6 {R})-6-[(1 {S})-2-[(2 {S},3 {S},4 {S},5 {S},6 {R})-6-[(1 {S})-1,2-bis(oxidanyl)ethyl]-3,4,5-tris(oxidanyl)oxan-2-yl]oxy-1-oxidanyl-ethyl]-3,4-bis(oxidanyl)-5-phosphonooxy-oxan-2-yl]oxy-3-oxidanyl-5-phosphonooxy-oxan-2-yl]oxy-2-carboxy-2-[[(2 {R},3 {S},4 {R},5 {R},6 {R})-5-[[(3 {R})-3-dodecanoyloxytetradecanoyl]amino]-6-[[(2 {R},3 {S},4 {R},5 {R},6 {R})-3-oxidanyl-5-[[(3 {R})-3-oxidanyltetradecanoyl]amino]-4-[(3 {R})-3-oxidanyltetradecanoyl]oxy-6-phosphonooxy-oxan-2-yl]methoxy]-3-phosphonooxy-4-[(3 {R})-3-tetradecanoyloxytetradecanoyl]oxy-oxan-2-yl]methoxy]oxan-4-yl]oxy-4,5-bis(oxidanyl)oxane-2-carboxylic acid (CCD ID: JSG) (formula: $C_{131}H_{240}N_2O_{63}P_4$).



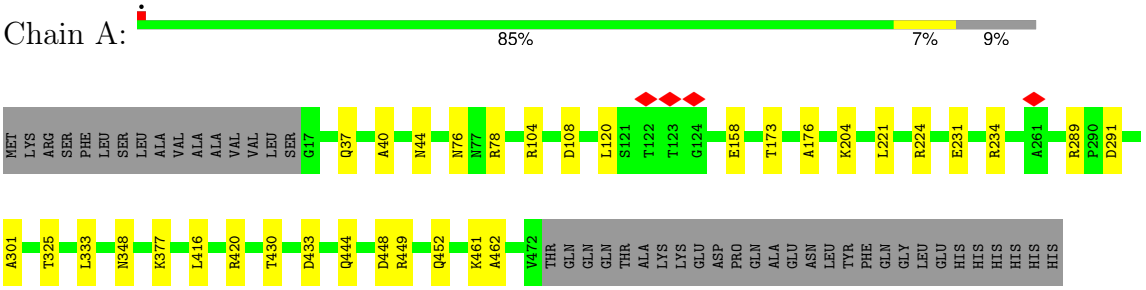
Mol	Chain	Residues	Atoms						AltConf
2	A	1	Total	C	H	N	O	P	0
			430	131	230	2	63	4	
2	A	1	Total	C	H	N	O	P	0
			430	131	230	2	63	4	
2	B	1	Total	C	H	N	O	P	0
			430	131	230	2	63	4	

3 Residue-property plots (i)

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.

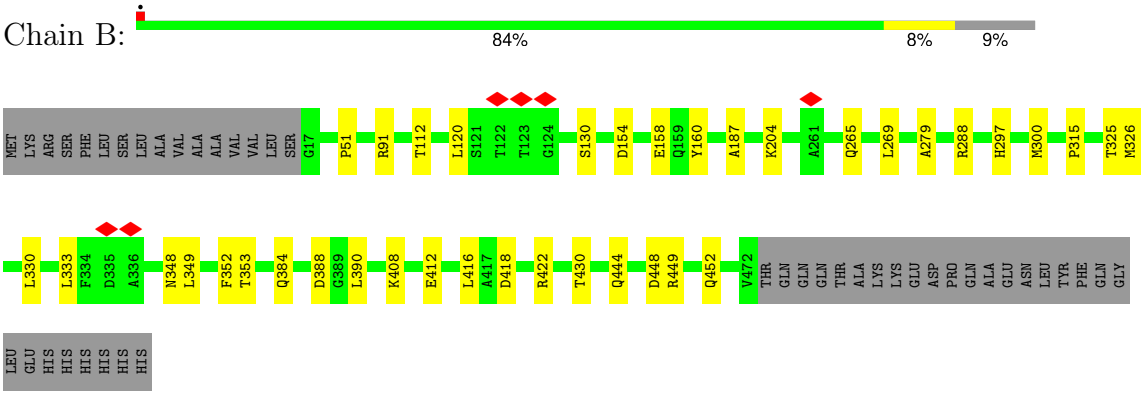
• Molecule 1: Outer membrane protein OprM

Chain A:



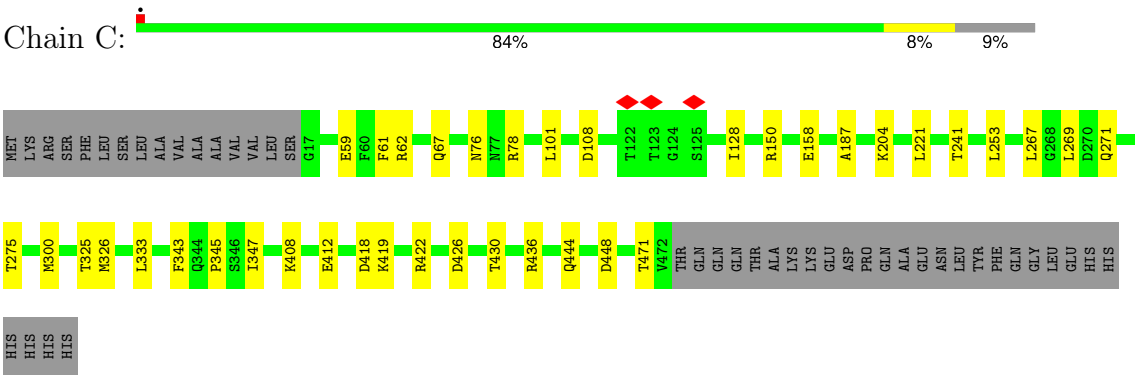
• Molecule 1: Outer membrane protein OprM

Chain B:



• Molecule 1: Outer membrane protein OprM

Chain C:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	577890	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 ($e^-/Å^2$)	50.7	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2800	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.100	Depositor
Minimum map value	-0.606	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.032	Depositor
Recommended contour level	0.115	Depositor
Map size (Å)	265.6, 265.6, 265.6	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.83000004, 0.83000004, 0.83000004	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: JSG

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	0.21	0/3547	0.30	0/4824
1	B	0.19	0/3547	0.29	0/4824
1	C	0.20	0/3547	0.29	0/4824
All	All	0.20	0/10641	0.29	0/14472

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

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	3491	0	3466	30	0
1	B	3491	0	3466	26	0
1	C	3491	0	3466	31	0
2	A	400	460	0	4	0
2	B	200	230	0	3	0
All	All	11073	690	10398	75	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 3.

All (75) 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:289:ARG:HH12	1:A:462:ALA:HA	1.28	0.98
1:A:289:ARG:NH1	1:A:462:ALA:O	2.25	0.69
1:A:289:ARG:NH1	1:A:462:ALA:HA	2.05	0.68
1:B:325:THR:OG1	1:B:333:LEU:O	2.11	0.66
1:C:444:GLN:NE2	1:C:448:ASP:OD1	2.29	0.66
1:B:444:GLN:NE2	1:B:448:ASP:OD1	2.27	0.66
1:A:289:ARG:HH12	1:A:462:ALA:CA	2.08	0.65
1:A:348:ASN:ND2	1:C:108:ASP:OD1	2.29	0.64
1:C:325:THR:OG1	1:C:333:LEU:O	2.12	0.62
1:A:325:THR:OG1	1:A:333:LEU:O	2.13	0.62
1:C:426:ASP:OD2	1:C:430:THR:HB	1.99	0.61
1:B:158:GLU:OE1	1:B:300:MET:HE3	2.00	0.61
1:A:231:GLU:OE2	1:A:234:ARG:NH1	2.34	0.61
2:A:601:JSG:CHB	1:B:352:PHE:HB2	2.32	0.60
1:A:444:GLN:NE2	1:A:448:ASP:OD1	2.33	0.56
1:A:377:LYS:NZ	1:C:253:LEU:HD11	2.21	0.56
1:A:416:LEU:O	1:A:420:ARG:HG3	2.07	0.54
1:A:158:GLU:HB3	1:A:301:ALA:HB2	1.91	0.53
2:A:601:JSG:CBK	1:C:128:ILE:HD12	2.39	0.53
1:B:187:ALA:HA	1:B:269:LEU:HD11	1.91	0.52
1:B:384:GLN:NE2	1:B:388:ASP:OD2	2.42	0.52
1:A:204:LYS:HB2	1:A:204:LYS:NZ	2.24	0.52
2:B:601:JSG:CDZ	1:C:345:PRO:HG2	2.39	0.52
1:A:104:ARG:HG3	1:B:353:THR:HG22	1.92	0.51
2:B:601:JSG:CEB	1:C:347:ILE:HG22	2.40	0.50
1:C:267:LEU:HB3	1:C:271:GLN:OE1	2.11	0.50
1:A:176:ALA:CB	1:A:461:LYS:HD3	2.42	0.50
1:B:297:HIS:HA	1:B:300:MET:HE2	1.94	0.50
1:A:120:LEU:HD13	1:B:326:MET:HE2	1.94	0.50
1:A:449:ARG:NH1	1:A:452:GLN:OE1	2.41	0.50
1:C:158:GLU:OE1	1:C:300:MET:HE3	2.12	0.49
1:B:204:LYS:HB2	1:B:204:LYS:NZ	2.25	0.49
1:B:449:ARG:NH1	1:B:452:GLN:OE1	2.43	0.48
1:B:91:ARG:NH1	1:B:160:TYR:OH	2.47	0.48
1:A:289:ARG:NH1	1:A:462:ALA:C	2.72	0.47
1:C:61:PHE:O	1:C:67:GLN:NE2	2.34	0.47
1:A:108:ASP:OD1	1:B:348:ASN:ND2	2.33	0.46
1:C:204:LYS:NZ	1:C:204:LYS:HB2	2.29	0.46
2:B:601:JSG:CFA	1:C:343:PHE:HB2	2.46	0.46
2:A:601:JSG:CEB	1:C:333:LEU:HD11	2.45	0.46
1:A:176:ALA:HB3	1:A:461:LYS:HD3	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:51:PRO:HG2	1:B:288:ARG:CZ	2.47	0.45
1:C:59:GLU:HG3	1:C:471:THR:OG1	2.17	0.45
1:C:62:ARG:HG2	1:C:62:ARG:HH11	1.82	0.45
1:C:187:ALA:HA	1:C:269:LEU:HD11	1.97	0.45
1:A:377:LYS:NZ	1:C:253:LEU:CD1	2.80	0.45
1:B:265:GLN:HA	1:B:265:GLN:OE1	2.17	0.45
1:B:288:ARG:HG2	1:B:288:ARG:HH11	1.82	0.45
1:A:37:GLN:HE22	1:A:44:ASN:H	1.65	0.44
1:A:433:ASP:OD1	1:C:436:ARG:NH1	2.39	0.44
1:B:330:LEU:HD12	1:B:330:LEU:HA	1.86	0.43
1:B:408:LYS:O	1:B:412:GLU:HG3	2.19	0.43
1:A:289:ARG:HG2	1:A:291:ASP:OD1	2.17	0.43
1:C:419:LYS:HB2	1:C:419:LYS:NZ	2.34	0.43
1:A:76:ASN:O	1:A:78:ARG:NH1	2.45	0.42
2:A:601:JSG:OBL	1:C:128:ILE:HD12	2.19	0.42
1:C:101:LEU:HD21	1:C:150:ARG:HG3	2.00	0.42
1:B:154:ASP:O	1:B:158:GLU:HG2	2.20	0.42
1:B:279:ALA:HB2	1:B:390:LEU:HD21	2.01	0.42
1:B:418:ASP:O	1:B:422:ARG:HG2	2.20	0.42
1:A:221:LEU:HD21	1:B:430:THR:HG21	2.02	0.41
1:B:120:LEU:HD13	1:C:326:MET:HE2	2.01	0.41
1:C:62:ARG:HG2	1:C:62:ARG:NH1	2.36	0.41
1:C:62:ARG:HD2	1:C:275:THR:HG22	2.02	0.41
1:A:430:THR:HG21	1:C:221:LEU:HD21	2.03	0.41
1:C:267:LEU:HD22	1:C:271:GLN:OE1	2.21	0.41
1:C:408:LYS:O	1:C:412:GLU:HG3	2.20	0.41
1:A:40:ALA:HB2	1:C:241:THR:HG22	2.03	0.40
1:A:224:ARG:HG3	1:B:416:LEU:HD12	2.04	0.40
1:A:289:ARG:NH1	1:A:462:ALA:CA	2.76	0.40
1:B:112:THR:O	1:B:130:SER:HA	2.20	0.40
1:C:418:ASP:O	1:C:422:ARG:HG2	2.22	0.40
1:A:173:THR:HA	1:A:461:LYS:HD2	2.04	0.40
1:B:315:PRO:HG3	1:B:349:LEU:HD13	2.02	0.40
1:C:76:ASN:O	1:C:78:ARG:NH1	2.50	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	454/500 (91%)	452 (100%)	2 (0%)	0	100	100
1	B	454/500 (91%)	451 (99%)	3 (1%)	0	100	100
1	C	454/500 (91%)	452 (100%)	2 (0%)	0	100	100
All	All	1362/1500 (91%)	1355 (100%)	7 (0%)	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	358/396 (90%)	358 (100%)	0	100	100
1	B	358/396 (90%)	358 (100%)	0	100	100
1	C	358/396 (90%)	358 (100%)	0	100	100
All	All	1074/1188 (90%)	1074 (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 (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	165	GLN
1	B	76	ASN
1	B	93	GLN

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Mol	Chain	Res	Type
1	B	165	GLN
1	B	303	ASN
1	B	371	ASN
1	B	415	GLN
1	B	442	GLN
1	C	76	ASN
1	C	93	GLN
1	C	165	GLN
1	C	344	GLN
1	C	348	ASN
1	C	442	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)

3 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	$\#\|Z\| > 2$
2	JSG	B	601	-	204,206,206	0.70	2 (0%)	264,278,278	1.35	29 (10%)
2	JSG	A	601	-	204,206,206	0.69	2 (0%)	264,278,278	1.33	28 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	JSG	A	602	-	204,206,206	0.71	4 (1%)	264,278,278	1.34	30 (11%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	JSG	B	601	-	-	64/195/333/333	1/7/7/7
2	JSG	A	601	-	-	43/195/333/333	0/7/7/7
2	JSG	A	602	-	-	52/195/333/333	1/7/7/7

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	JSG	CCS-CCR	2.61	1.57	1.52
2	A	602	JSG	CAL-CAN	2.49	1.57	1.53
2	B	601	JSG	CAL-CAN	2.46	1.56	1.53
2	B	601	JSG	CCS-CCR	2.40	1.57	1.52
2	A	601	JSG	ODA-CDB	2.28	1.44	1.40
2	A	602	JSG	C3-C4	2.26	1.56	1.52
2	A	602	JSG	CCS-CCR	2.23	1.56	1.52
2	A	602	JSG	OAU-CAL	2.10	1.47	1.41

All (87) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	JSG	OAM-CAL-CAN	4.95	117.36	108.40
2	A	601	JSG	O3-CFK-CFL	4.91	120.22	111.43
2	B	601	JSG	O3-CFK-CFL	4.90	120.22	111.43
2	A	601	JSG	CCT-CCS-CCR	-4.86	106.26	114.41
2	B	601	JSG	OAQ-CEE-CEF	4.70	119.86	111.43
2	A	601	JSG	OFJ-CGB-CGC	4.62	121.47	111.48
2	A	602	JSG	OFJ-CGB-CGC	4.38	120.97	111.48
2	A	601	JSG	OBH-CBA-CBB	4.19	116.98	111.35
2	A	601	JSG	OAQ-CEE-CEF	4.18	118.92	111.43
2	B	601	JSG	C8-C7-N2	4.14	121.91	116.25
2	A	602	JSG	OAQ-CEE-CEF	4.14	118.85	111.43
2	A	601	JSG	OFZ-CGN-CGP	4.10	120.34	111.48
2	A	602	JSG	OFZ-CGN-CGP	4.04	120.23	111.48
2	B	601	JSG	OCX-CCR-CCS	4.03	117.33	108.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	602	JSG	OCX-CCR-CCS	3.98	117.23	108.76
2	B	601	JSG	OCX-CCR-CCQ	3.94	117.08	108.73
2	A	602	JSG	C1-O5-C5	3.85	121.24	113.72
2	A	602	JSG	OAU-CAL-CAN	3.76	117.70	110.59
2	B	601	JSG	OFJ-CGB-CGC	3.73	119.56	111.48
2	A	602	JSG	OAM-CAL-CAN	3.71	115.12	108.40
2	A	602	JSG	CCO-OCY-CCS	3.70	119.00	113.07
2	A	601	JSG	C1-C2-N2	-3.65	104.80	110.92
2	B	601	JSG	OFZ-CGN-CGP	3.60	119.26	111.48
2	A	602	JSG	CCT-CCS-CCR	-3.56	108.43	114.41
2	A	602	JSG	OCX-CCR-CCQ	3.54	116.23	108.73
2	A	602	JSG	C3-C4-C5	3.44	117.61	110.58
2	A	602	JSG	CCB-OCL-CCF	3.31	118.37	113.07
2	A	602	JSG	OAU-CAL-OAM	3.28	115.66	111.36
2	B	601	JSG	C3-C2-N2	-3.27	105.69	110.91
2	B	601	JSG	O7-C7-N2	-3.21	117.52	122.95
2	B	601	JSG	OAU-CAL-OAM	3.19	115.54	111.36
2	A	602	JSG	O4-C4-C5	3.15	115.44	108.76
2	A	601	JSG	CBB-CBA-CAX	-3.12	104.34	111.39
2	B	601	JSG	CGG-CGF-CGE	3.09	130.00	114.37
2	A	601	JSG	CBG-CBE-CBC	-3.07	104.28	110.58
2	B	601	JSG	OAU-CAT-CAV	3.06	112.76	106.69
2	A	602	JSG	O3-CFK-CFL	3.05	116.89	111.43
2	A	602	JSG	CAL-OAU-CAT	3.02	119.61	113.72
2	A	601	JSG	OCX-CCR-CCQ	3.01	115.11	108.73
2	B	601	JSG	OBW-CBV-CBT	2.93	112.60	108.50
2	A	602	JSG	C8-C7-N2	2.88	120.18	116.25
2	A	602	JSG	C6-C5-C4	-2.84	106.49	113.35
2	A	601	JSG	CCQ-CCR-CCS	2.79	118.00	111.72
2	A	602	JSG	OCY-CCS-CCT	2.78	112.00	106.60
2	A	602	JSG	C3-O3-CFK	2.73	122.03	117.59
2	A	601	JSG	CCO-OCJ-CCD	-2.73	111.52	117.98
2	B	601	JSG	CCB-OCL-CCF	2.72	117.43	113.07
2	A	602	JSG	O4-C4-C3	2.72	114.54	108.76
2	A	602	JSG	O5-C5-C4	2.66	115.22	109.72
2	A	601	JSG	OCY-CCS-CCR	2.65	113.77	108.23
2	A	601	JSG	OCX-CCR-CCS	2.64	114.37	108.76
2	A	601	JSG	O5-C1-C2	-2.62	105.65	110.59
2	B	601	JSG	CAL-OAU-CAT	2.61	118.83	113.72
2	B	601	JSG	CDP-CDO-NAO	2.56	119.75	116.25
2	B	601	JSG	C3-O3-CFK	2.55	121.74	117.59
2	A	602	JSG	CBK-CBI-CBG	-2.55	106.99	112.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	JSG	OFY-CFK-CFL	-2.51	118.82	124.65
2	B	601	JSG	OAU-CAL-CAN	2.49	115.29	110.59
2	A	601	JSG	CCH-CCG-CCF	-2.46	107.16	112.05
2	A	602	JSG	CAP-OAQ-CEE	2.46	121.58	117.59
2	A	602	JSG	OES-CEE-CEF	-2.45	118.96	124.65
2	B	601	JSG	CCT-CCS-CCR	-2.41	110.36	114.41
2	A	602	JSG	CCG-CCF-CCE	-2.41	110.36	114.41
2	B	601	JSG	CDB-ODL-CDF	2.39	116.91	113.07
2	A	601	JSG	CBR-CBT-CBV	-2.39	105.68	110.51
2	B	601	JSG	CAV-CAT-CAR	-2.36	107.12	112.07
2	A	601	JSG	C4-C3-C2	2.34	114.91	110.55
2	A	602	JSG	OBH-CBA-CBB	-2.33	108.21	111.35
2	A	602	JSG	O6-CBA-CBB	2.32	113.02	107.23
2	A	601	JSG	OFJ-CGB-OGA	-2.30	118.33	123.70
2	A	601	JSG	O3-CFK-OFY	-2.23	118.49	123.70
2	B	601	JSG	OBF-CBE-CBG	2.20	113.02	107.42
2	A	602	JSG	CDB-ODL-CDF	2.20	116.59	113.07
2	A	601	JSG	CBA-OBH-CBG	2.19	119.50	114.36
2	B	601	JSG	CBI-CBG-CBE	-2.18	110.75	114.41
2	B	601	JSG	CCG-CCF-CCE	-2.16	110.78	114.41
2	A	602	JSG	OBF-CBE-CBG	2.15	112.88	107.42
2	A	601	JSG	CCF-CCE-CCD	-2.13	105.76	110.43
2	A	601	JSG	CBB-CBC-CBE	-2.10	106.95	110.87
2	A	601	JSG	CCO-OCY-CCS	2.08	116.41	113.07
2	B	601	JSG	OAQ-CEE-OES	-2.06	118.88	123.70
2	A	601	JSG	OES-CEE-CEF	-2.04	119.92	124.65
2	B	601	JSG	CAL-CAN-CAP	2.03	113.60	109.92
2	A	601	JSG	CBI-CBG-CBE	-2.03	111.01	114.41
2	B	601	JSG	CCH-CCG-CCF	-2.02	108.03	112.05
2	A	601	JSG	CDP-CDO-NAO	2.01	118.99	116.25
2	A	601	JSG	OFZ-CGN-OGO	-2.00	119.03	123.70

There are no chirality outliers.

All (159) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	JSG	C2-C1-O1-CAV
2	A	601	JSG	CAX-CBA-O6-C6
2	A	601	JSG	CBB-CBA-O6-C6
2	A	601	JSG	OBH-CBA-O6-C6
2	A	601	JSG	OBN-CBM-CBP-OBD
2	A	601	JSG	CCQ-CCR-OCX-PHK

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Mol	Chain	Res	Type	Atoms
2	A	601	JSG	CCR-CCS-CCT-CCU
2	A	601	JSG	CCR-CCS-CCT-OCZ
2	A	601	JSG	OCY-CCS-CCT-CCU
2	A	601	JSG	OCY-CCS-CCT-OCZ
2	A	601	JSG	CDO-CDP-CDQ-CDR
2	A	601	JSG	CDO-CDP-CDQ-OED
2	A	601	JSG	OFY-CFK-O3-C3
2	A	601	JSG	CGC-CGB-OFJ-CEW
2	A	601	JSG	OGA-CGB-OFJ-CEW
2	A	601	JSG	CGP-CGN-OFZ-CFM
2	A	602	JSG	C7-C8-CEW-OFJ
2	A	602	JSG	OAU-CAL-OAM-PHG
2	A	602	JSG	OAY-CAX-CBA-O6
2	A	602	JSG	CCQ-CCR-OCX-PHK
2	A	602	JSG	CDE-CDF-CDG-CDH
2	A	602	JSG	CDE-CDF-CDG-ODM
2	A	602	JSG	ODL-CDF-CDG-CDH
2	A	602	JSG	ODL-CDF-CDG-ODM
2	A	602	JSG	CDP-CDQ-CDR-CDS
2	A	602	JSG	CEE-CEF-CEG-CEH
2	A	602	JSG	CEE-CEF-CEG-OET
2	A	602	JSG	CFL-CFM-CFN-CFO
2	A	602	JSG	OFZ-CFM-CFN-CFO
2	A	602	JSG	OGA-CGB-OFJ-CEW
2	A	602	JSG	CGP-CGN-OFZ-CFM
2	A	602	JSG	OGO-CGN-OFZ-CFM
2	B	601	JSG	C2-C1-O1-CAV
2	B	601	JSG	CAN-CAP-OAQ-CEE
2	B	601	JSG	OAY-CAX-CBA-O6
2	B	601	JSG	OBN-CBM-CBP-OBD
2	B	601	JSG	CBT-CBV-CBX-CBZ
2	B	601	JSG	CBT-CBV-CBX-OBY
2	B	601	JSG	OBW-CBV-CBX-CBZ
2	B	601	JSG	OBW-CBV-CBX-OBY
2	B	601	JSG	CDO-CDP-CDQ-CDR
2	B	601	JSG	CDO-CDP-CDQ-OED
2	B	601	JSG	OES-CEE-OAQ-CAP
2	B	601	JSG	CGP-CGN-OFZ-CFM
2	B	601	JSG	OGO-CGN-OFZ-CFM
2	A	602	JSG	OCL-CCB-OBF-CBE
2	B	601	JSG	OCL-CCB-OBF-CBE
2	A	602	JSG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
2	A	601	JSG	OGO-CGN-OFZ-CFM
2	B	601	JSG	OFY-CFK-O3-C3
2	A	601	JSG	CFL-CFK-O3-C3
2	A	602	JSG	CGC-CGB-OFJ-CEW
2	B	601	JSG	CEF-CEE-OAQ-CAP
2	B	601	JSG	CFL-CFK-O3-C3
2	A	601	JSG	OCL-CCB-OBF-CBE
2	B	601	JSG	C8-C7-N2-C2
2	B	601	JSG	O7-C7-N2-C2
2	B	601	JSG	O5-C1-O1-CAV
2	B	601	JSG	C2-C3-O3-CFK
2	B	601	JSG	CGD-CGE-CGF-CGG
2	A	601	JSG	CDC-CDB-ODA-CCU
2	A	602	JSG	C4-C5-C6-O6
2	A	602	JSG	OED-CDQ-CDR-CDS
2	A	601	JSG	ODM-CDG-CDH-ODN
2	A	602	JSG	OCM-CCG-CCH-OCN
2	B	601	JSG	O5-C5-C6-O6
2	A	601	JSG	CDF-CDG-CDH-ODN
2	A	602	JSG	CCF-CCG-CCH-OCN
2	A	601	JSG	ODL-CDB-ODA-CCU
2	B	601	JSG	CGC-CGB-OFJ-CEW
2	A	601	JSG	C5-C6-O6-CBA
2	A	601	JSG	CEZ-CFA-CFB-CFC
2	B	601	JSG	CFQ-CFR-CFS-CFT
2	A	602	JSG	CGT-CGU-CGV-CGW
2	A	601	JSG	CFO-CFP-CFQ-CFR
2	B	601	JSG	CFN-CFO-CFP-CFQ
2	B	601	JSG	C4-C5-C6-O6
2	B	601	JSG	CDT-CDU-CDV-CDW
2	B	601	JSG	CEN-CEO-CEP-CEQ
2	A	601	JSG	CEF-CEE-OAQ-CAP
2	B	601	JSG	OGA-CGB-OFJ-CEW
2	A	602	JSG	CGP-CGQ-CGR-CGS
2	B	601	JSG	CDR-CDS-CDT-CDU
2	B	601	JSG	OCZ-CCT-CCU-ODA
2	B	601	JSG	OBJ-CBI-CBK-OBL
2	A	601	JSG	OES-CEE-OAQ-CAP
2	B	601	JSG	CGB-CGC-CGD-CGE
2	B	601	JSG	CAT-CAV-O1-C1
2	B	601	JSG	OFJ-CEW-CEX-CEY
2	A	601	JSG	CEN-CEO-CEP-CEQ

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Mol	Chain	Res	Type	Atoms
2	B	601	JSG	CGT-CGU-CGV-CGW
2	A	601	JSG	CDV-CDW-CDX-CDY
2	A	602	JSG	CGE-CGF-CGG-CGH
2	A	602	JSG	CFN-CFO-CFP-CFQ
2	A	602	JSG	CDR-CDS-CDT-CDU
2	B	601	JSG	CCS-CCT-CCU-ODA
2	A	602	JSG	C7-C8-CEW-CEX
2	A	602	JSG	C5-C6-O6-CBA
2	B	601	JSG	C8-CEW-CEX-CEY
2	A	602	JSG	CGR-CGS-CGT-CGU
2	A	601	JSG	CFQ-CFR-CFS-CFT
2	B	601	JSG	CEY-CEZ-CFA-CFB
2	B	601	JSG	OCM-CCG-CCH-OCN
2	A	602	JSG	CFO-CFP-CFQ-CFR
2	B	601	JSG	C4-C3-O3-CFK
2	B	601	JSG	CEH-CEI-CEJ-CEK
2	A	601	JSG	C4-C5-C6-O6
2	B	601	JSG	CAR-CAP-OAQ-CEE
2	A	601	JSG	CFL-CFM-CFN-CFO
2	A	602	JSG	CEN-CEO-CEP-CEQ
2	B	601	JSG	CCF-CCG-CCH-OCN
2	A	602	JSG	CGV-CGW-CGX-CGY
2	B	601	JSG	CCR-OCX-PHK-OHL
2	B	601	JSG	CAP-CAN-NAO-CDO
2	A	602	JSG	CEM-CEN-CEO-CEP
2	A	602	JSG	CGF-CGG-CGH-CGI
2	B	601	JSG	CEX-CEY-CEZ-CFA
2	A	601	JSG	O5-C5-C6-O6
2	A	601	JSG	CDS-CDT-CDU-CDV
2	A	601	JSG	CDR-CDS-CDT-CDU
2	A	602	JSG	CGW-CGX-CGY-CGZ
2	A	601	JSG	CCS-CCR-OCX-PHK
2	A	602	JSG	CCS-CCR-OCX-PHK
2	B	601	JSG	CFT-CFU-CFV-CFW
2	B	601	JSG	CGE-CGF-CGG-CGH
2	A	602	JSG	CGG-CGH-CGI-CGJ
2	B	601	JSG	CFO-CFP-CFQ-CFR
2	B	601	JSG	CBG-CBI-CBK-OBL
2	B	601	JSG	CFU-CFV-CFW-CFX
2	A	602	JSG	CGX-CGY-CGZ-CHA
2	A	602	JSG	CEO-CEP-CEQ-CER
2	B	601	JSG	OFY-CFK-CFL-CFM

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Mol	Chain	Res	Type	Atoms
2	A	602	JSG	OBY-CBX-CBZ-OCA
2	B	601	JSG	CDW-CDX-CDY-CDZ
2	A	602	JSG	CGQ-CGR-CGS-CGT
2	A	602	JSG	CAL-CAN-NAO-CDO
2	B	601	JSG	CEE-CEF-CEG-CEH
2	A	601	JSG	CEW-CEX-CEY-CEZ
2	A	601	JSG	CBC-CBE-OBF-CCB
2	A	601	JSG	O5-C1-O1-CAV
2	A	602	JSG	CCS-CCT-CCU-ODA
2	B	601	JSG	O3-CFK-CFL-CFM
2	A	602	JSG	CEX-CEY-CEZ-CFA
2	B	601	JSG	CFR-CFS-CFT-CFU
2	B	601	JSG	CFA-CFB-CFC-CFD
2	A	601	JSG	C4-O4-PHC-OHD
2	A	602	JSG	OAZ-CAX-CBA-CBB
2	B	601	JSG	OBO-CBM-CBP-CBQ
2	B	601	JSG	C4-O4-PHC-OHD
2	B	601	JSG	OFJ-CGB-CGC-CGD
2	A	602	JSG	CFK-CFL-CFM-CFN
2	A	602	JSG	OCZ-CCT-CCU-ODA
2	A	602	JSG	CGC-CGD-CGE-CGF
2	A	601	JSG	CEX-CEY-CEZ-CFA
2	A	602	JSG	CEW-CEX-CEY-CEZ
2	A	601	JSG	CDW-CDX-CDY-CDZ
2	B	601	JSG	CCT-CCU-ODA-CDB
2	A	602	JSG	CEK-CEL-CEM-CEN
2	B	601	JSG	OGA-CGB-CGC-CGD

All (2) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	602	JSG	CCO-CCP-CCQ-CCR-CCS-OCY
2	B	601	JSG	CDB-CDC-CDD-CDE-CDF-ODL

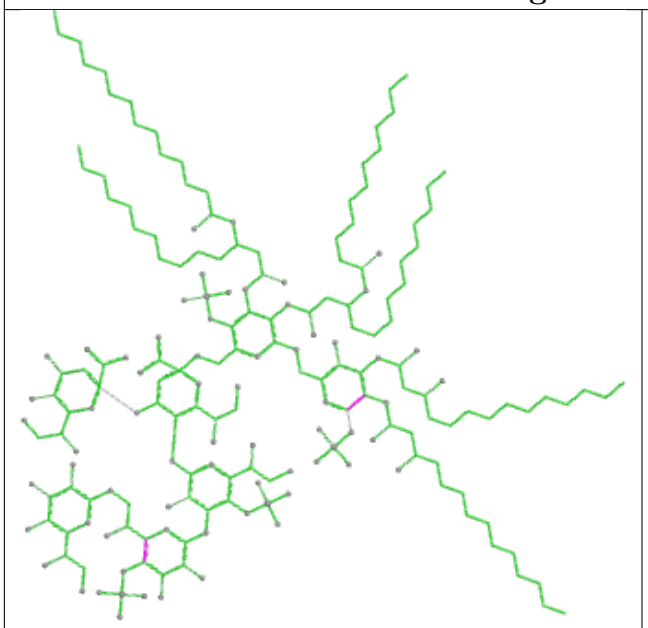
2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	601	JSG	3	0
2	A	601	JSG	4	0

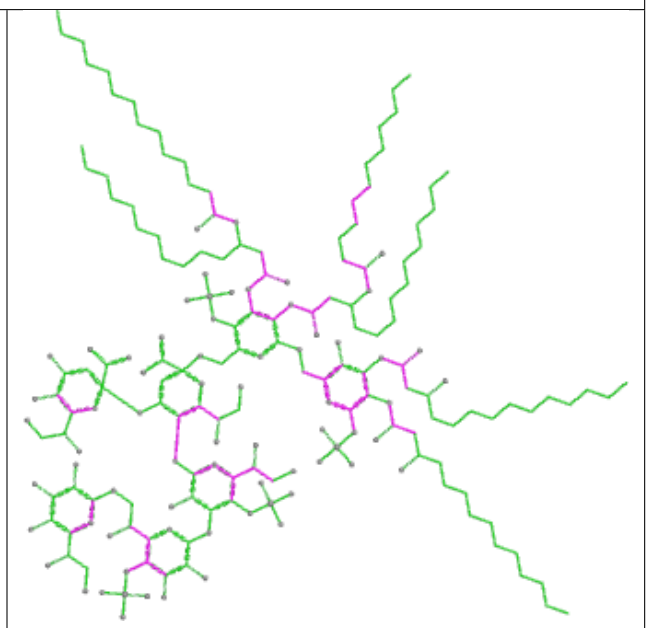
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 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.

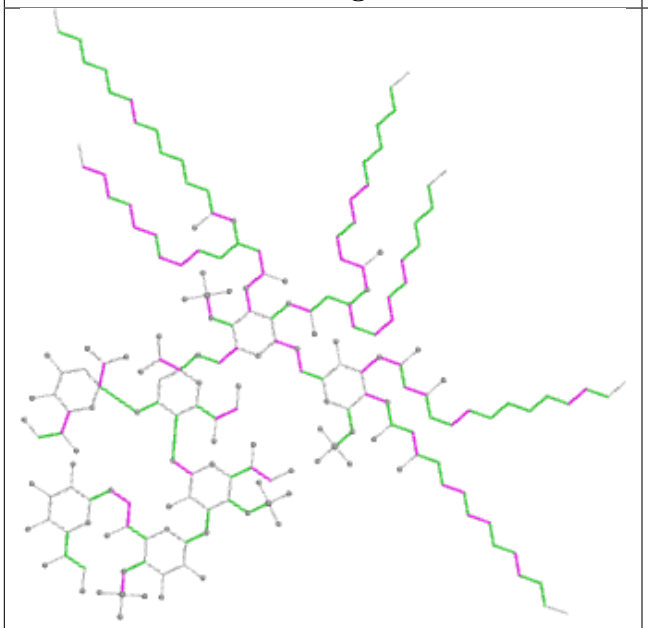
Ligand JSG B 601



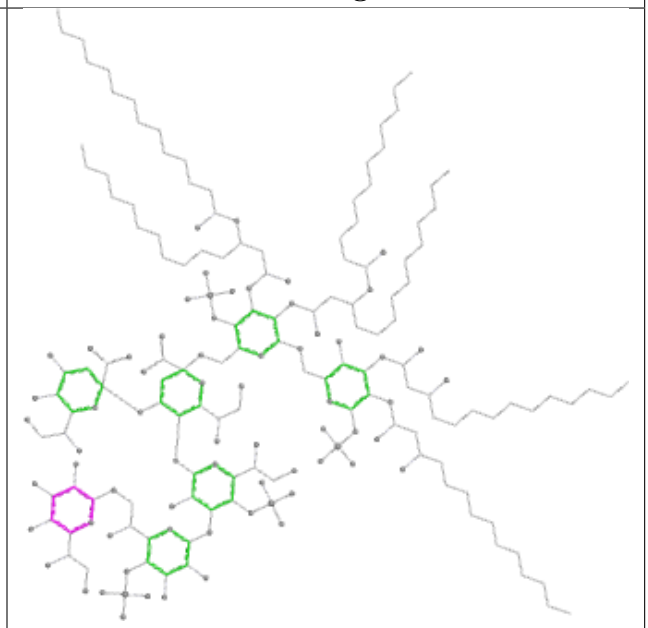
Bond lengths



Bond angles

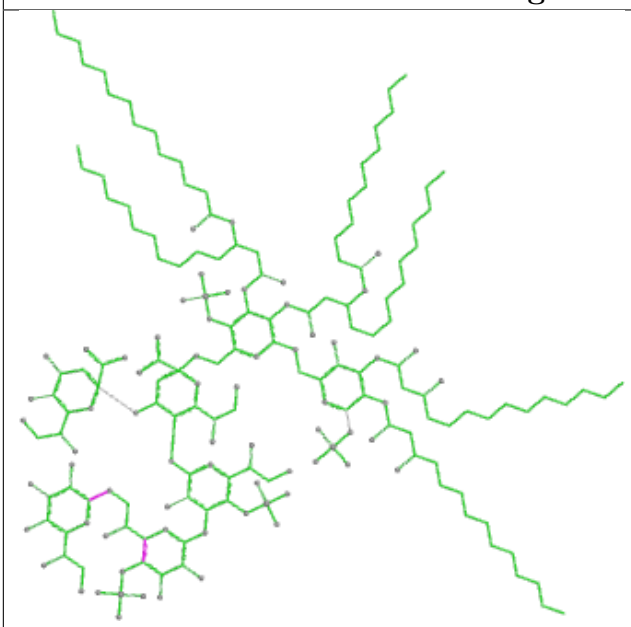


Torsions

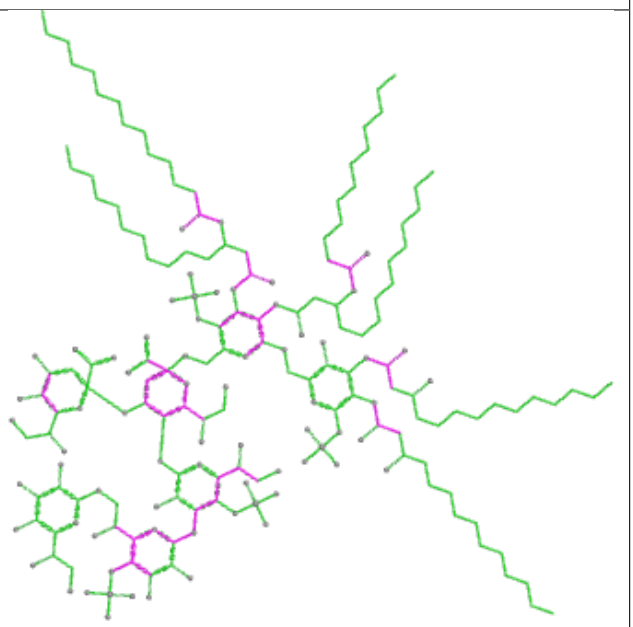


Rings

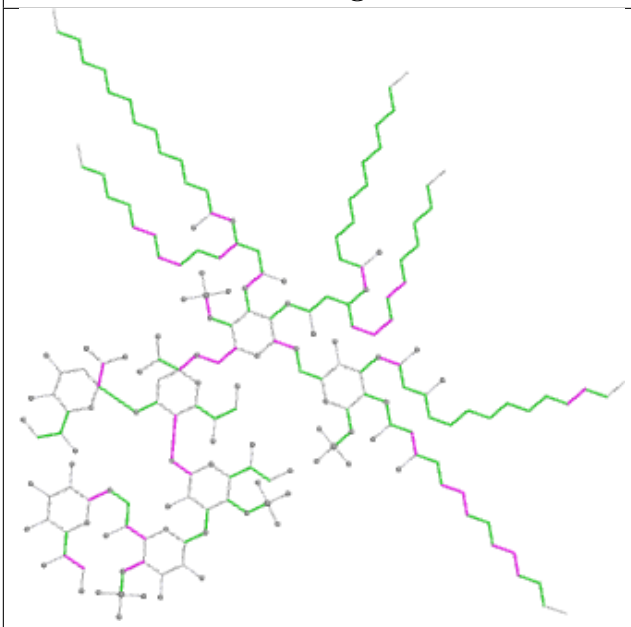
Ligand JSG A 601



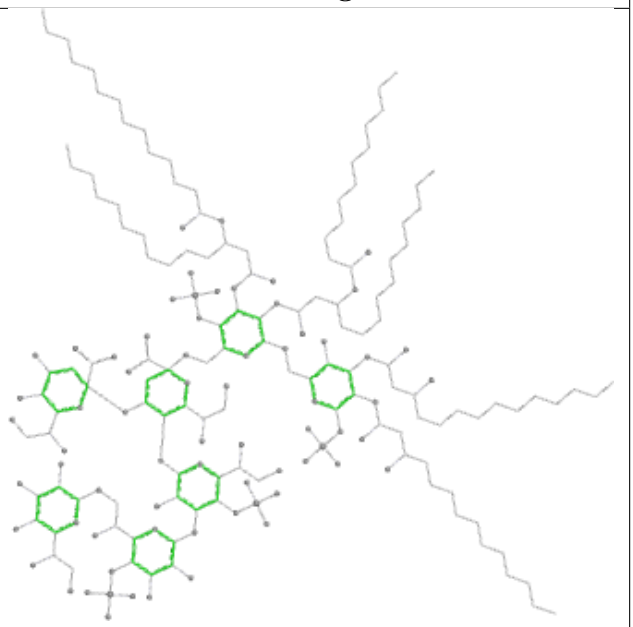
Bond lengths



Bond angles

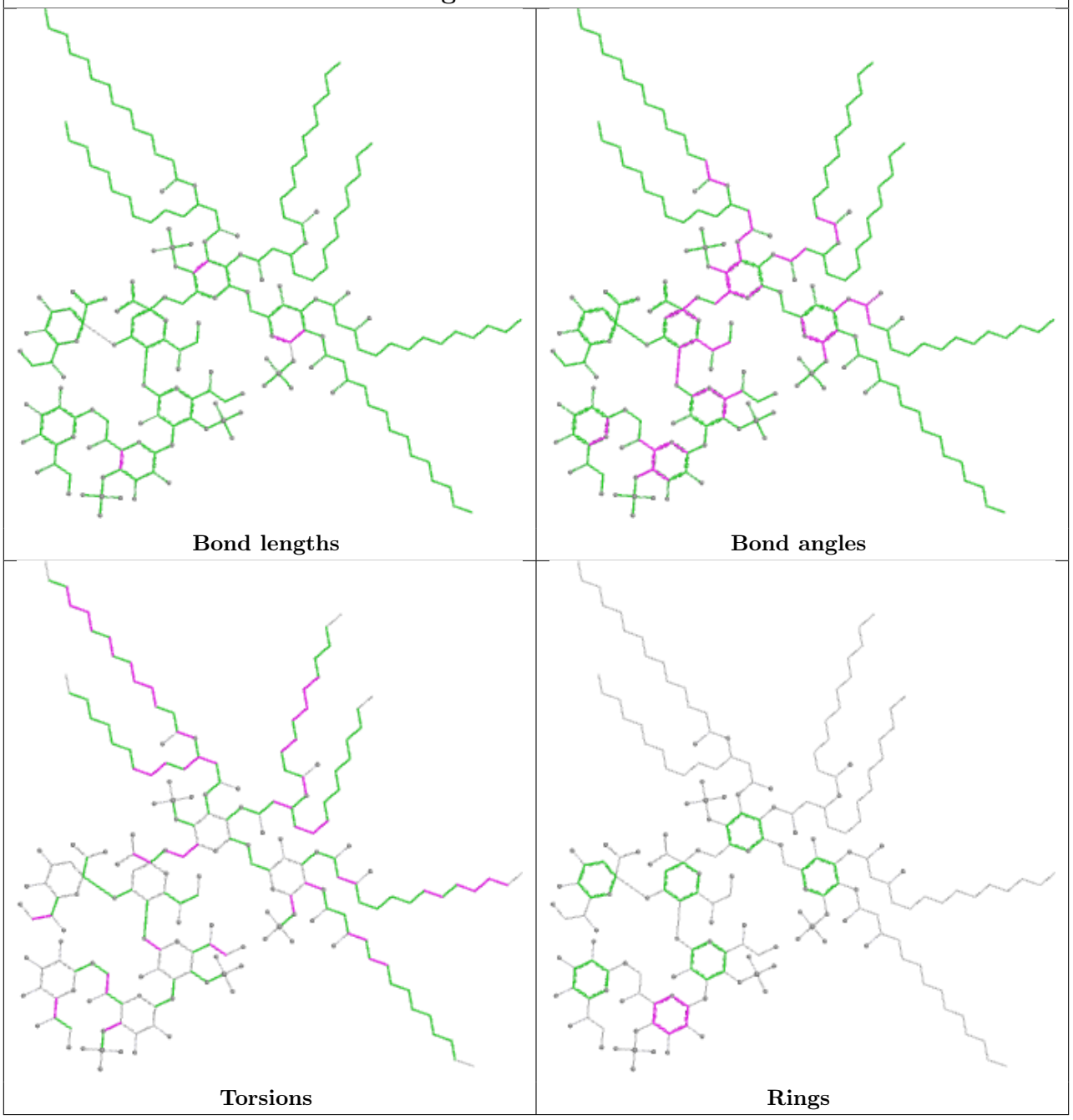


Torsions



Rings

Ligand JSG A 602



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.

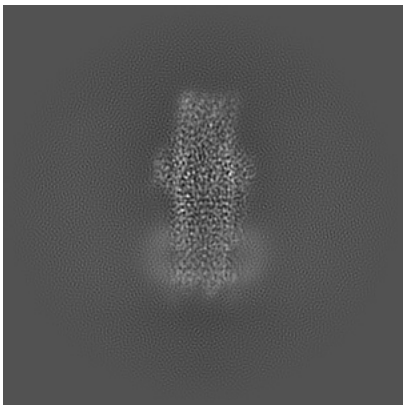
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-77056. These allow visual inspection of the internal detail of the map and identification of artifacts.

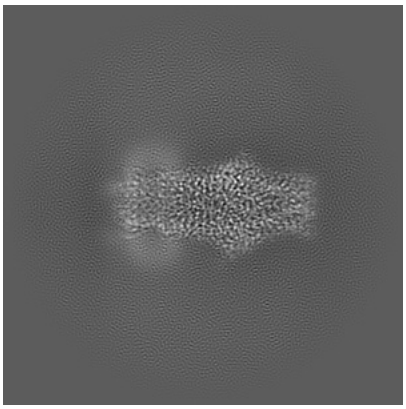
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

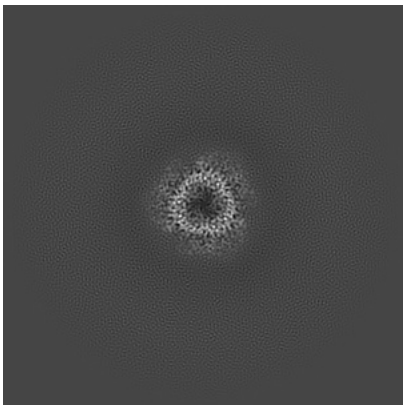
6.1.1 Primary map



X

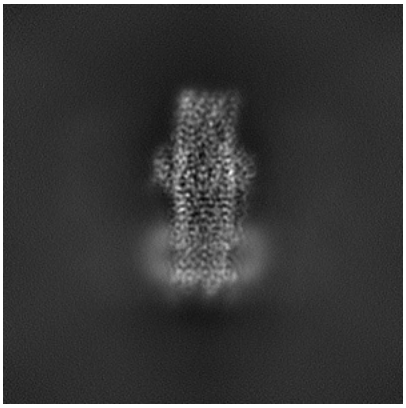


Y

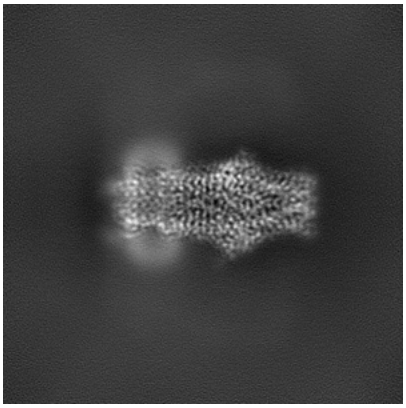


Z

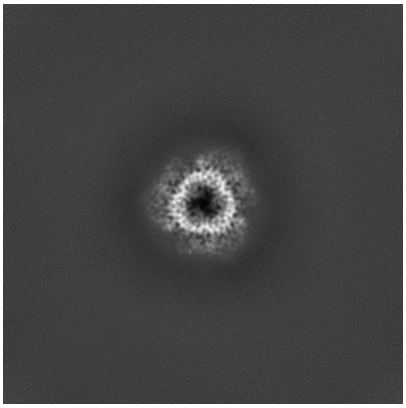
6.1.2 Raw map



X



Y

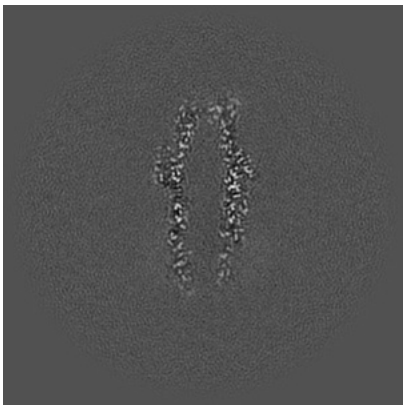


Z

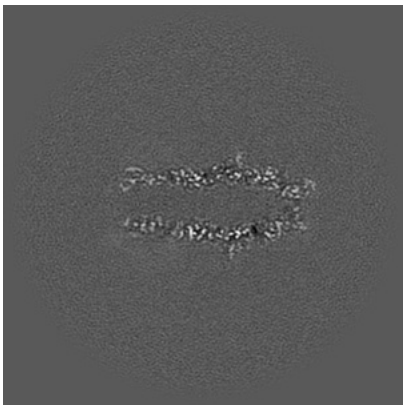
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

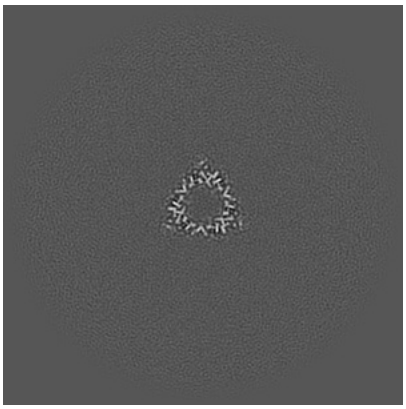
6.2.1 Primary map



X Index: 160

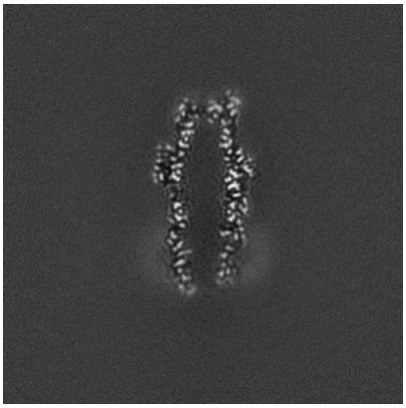


Y Index: 160

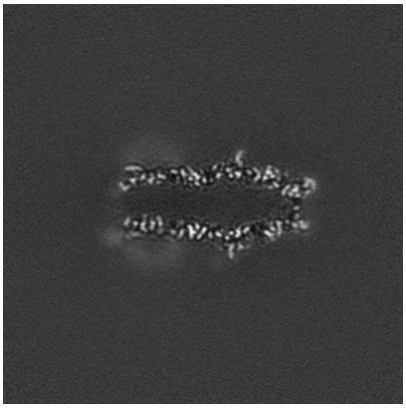


Z Index: 160

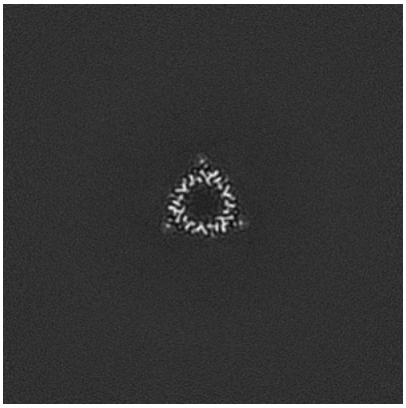
6.2.2 Raw map



X Index: 160



Y Index: 160

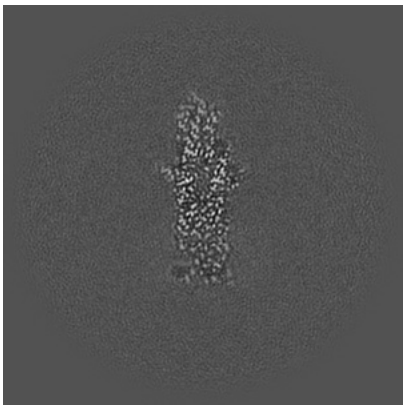


Z Index: 160

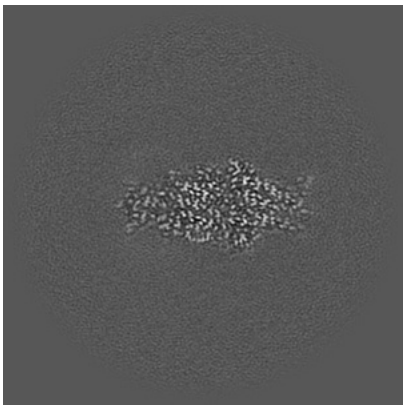
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

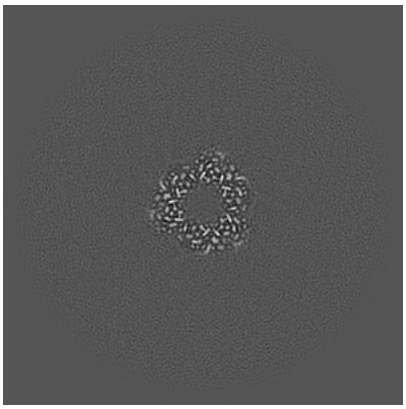
6.3.1 Primary map



X Index: 142

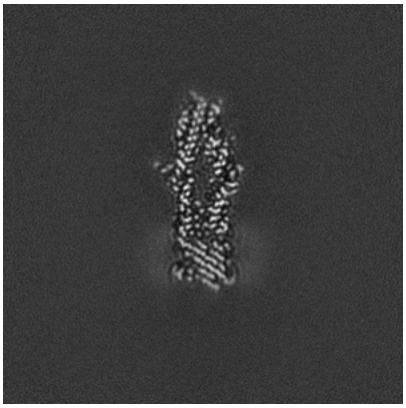


Y Index: 142

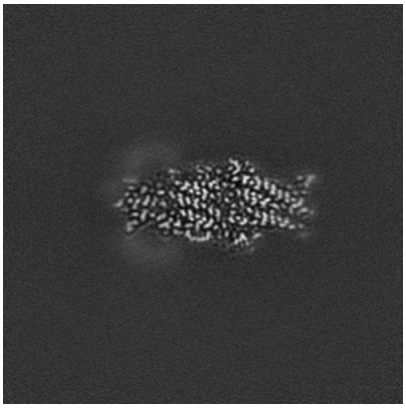


Z Index: 184

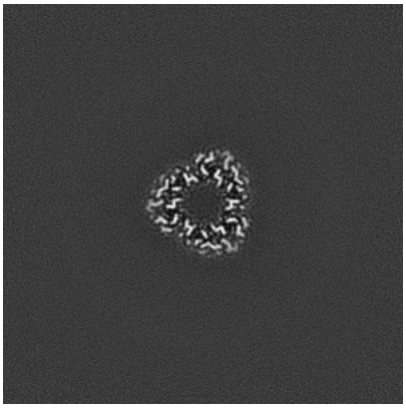
6.3.2 Raw map



X Index: 144



Y Index: 142

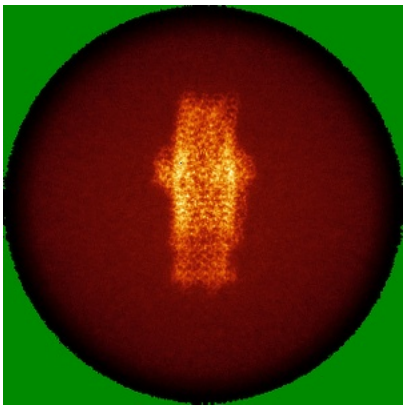


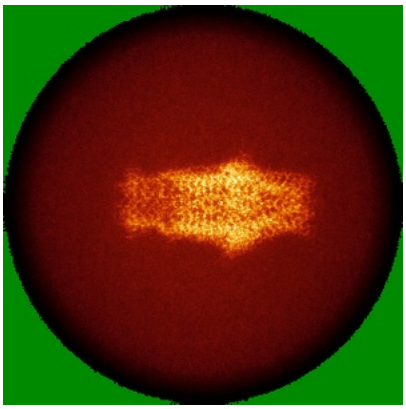
Z Index: 182

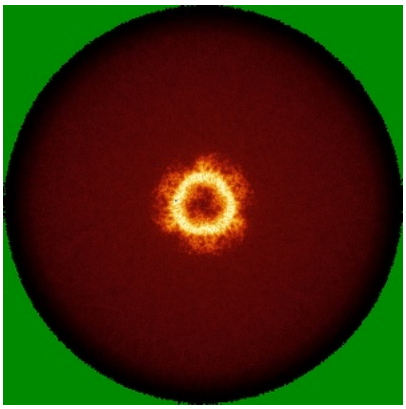
The images above show the largest variance slices of the map in three orthogonal directions.

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

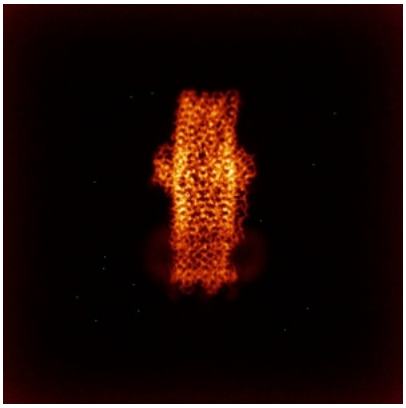
6.4.1 Primary map

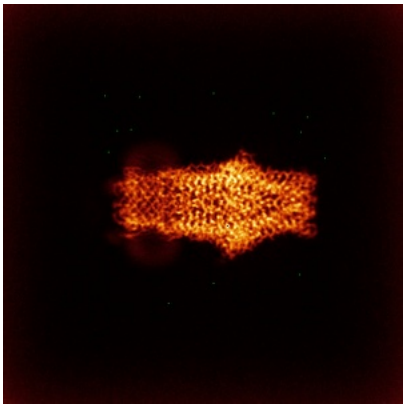

X

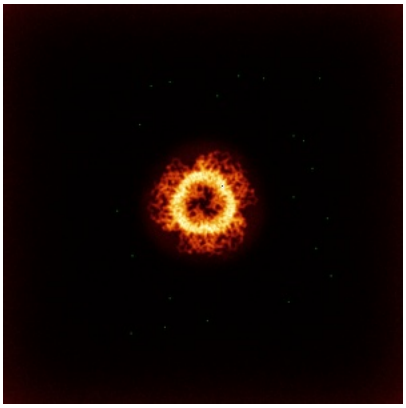

Y


Z

6.4.2 Raw map


X

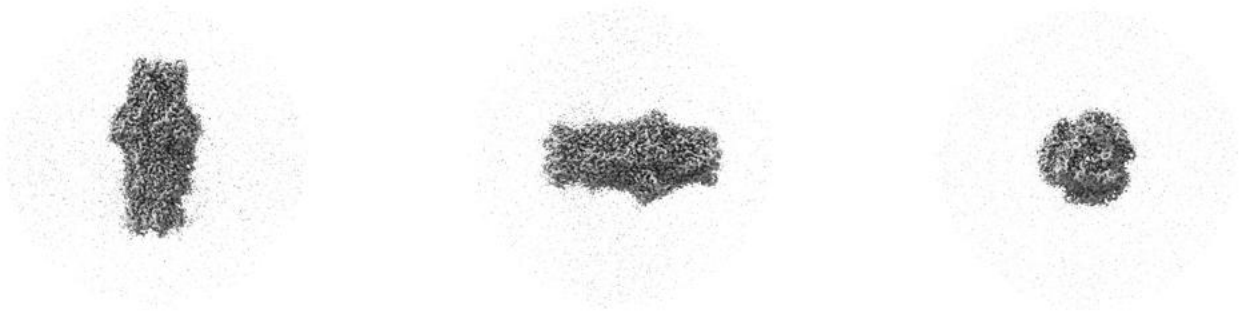

Y


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 0.115. 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.

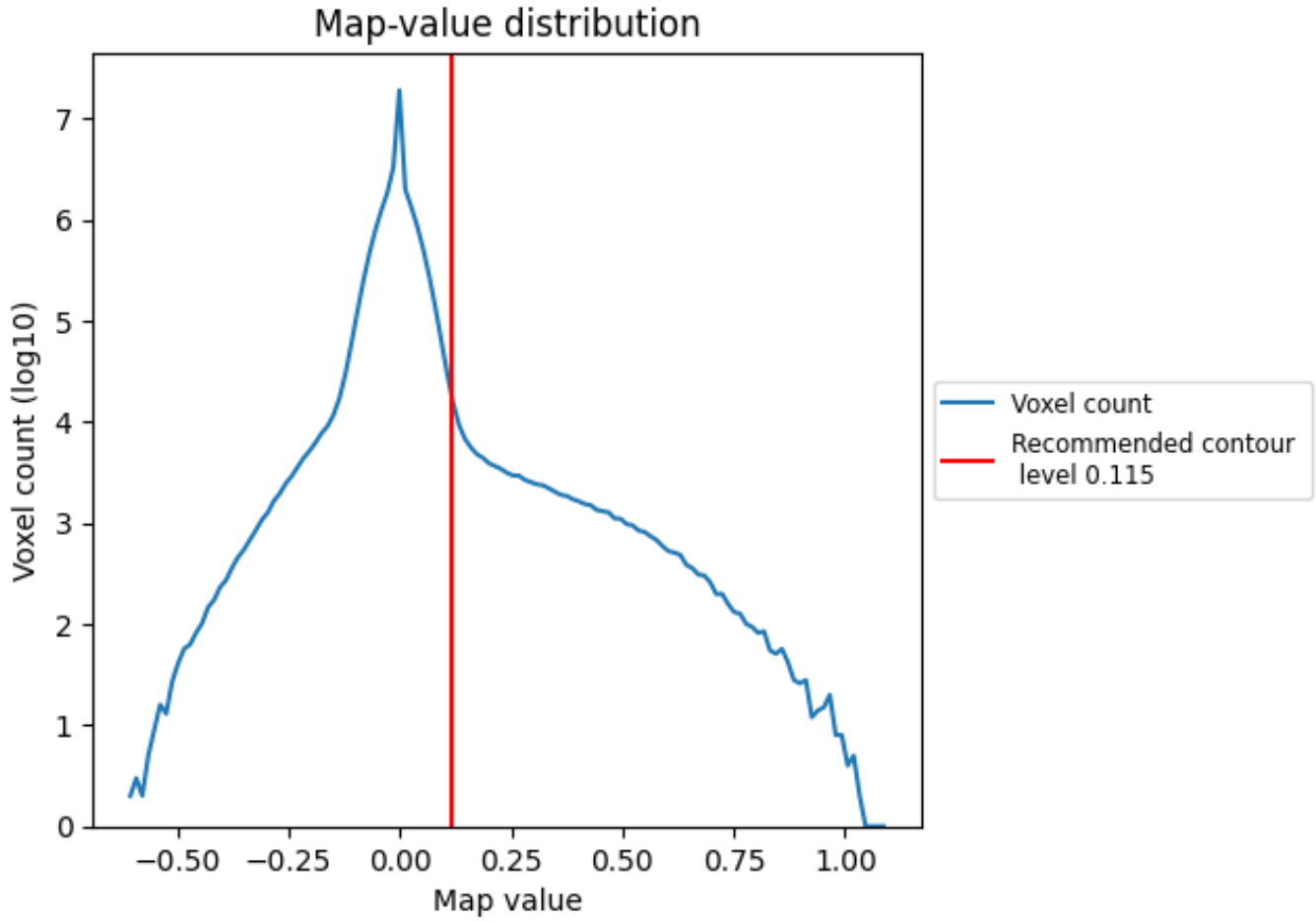
6.6 Mask visualisation (i)

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

7 Map analysis

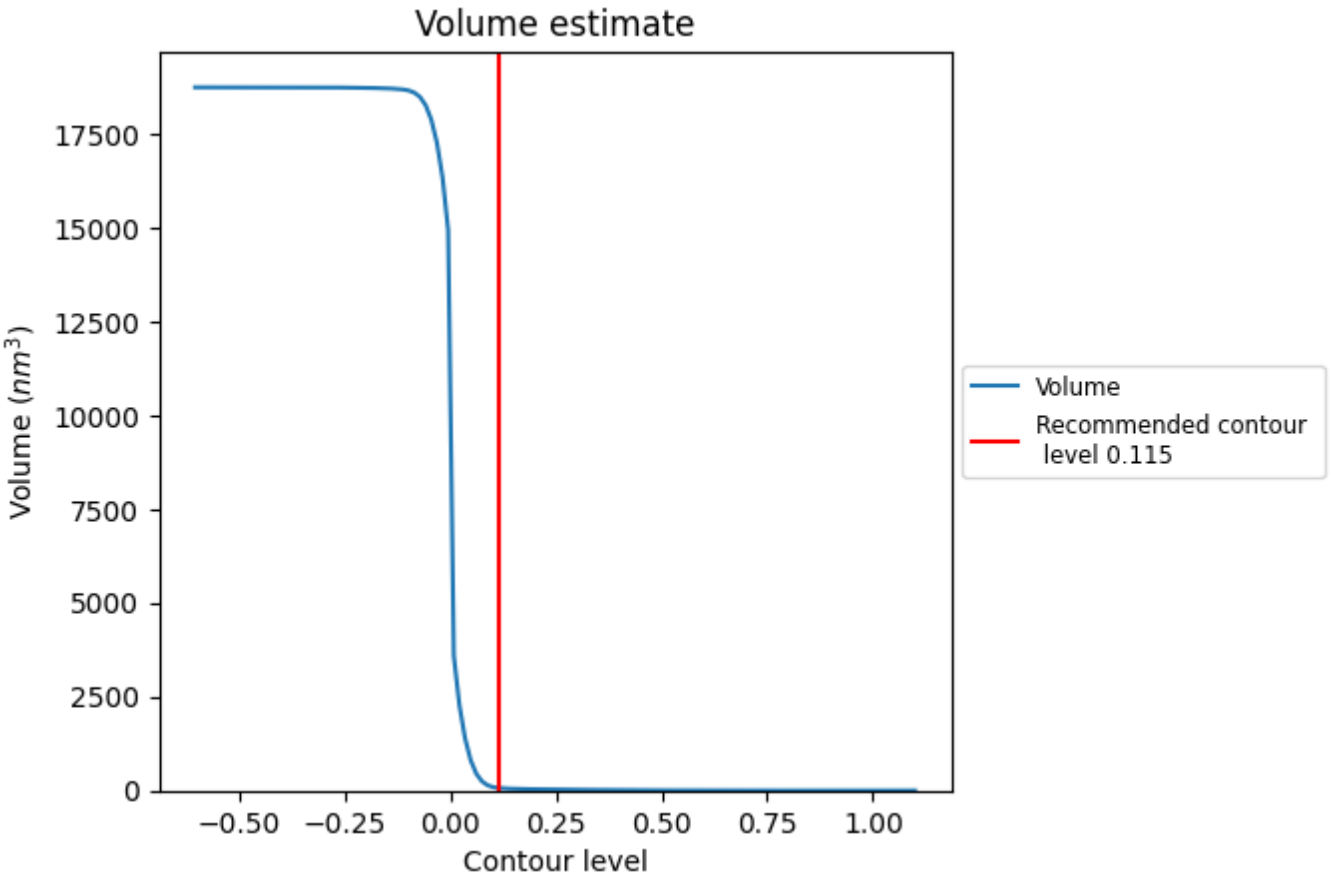
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

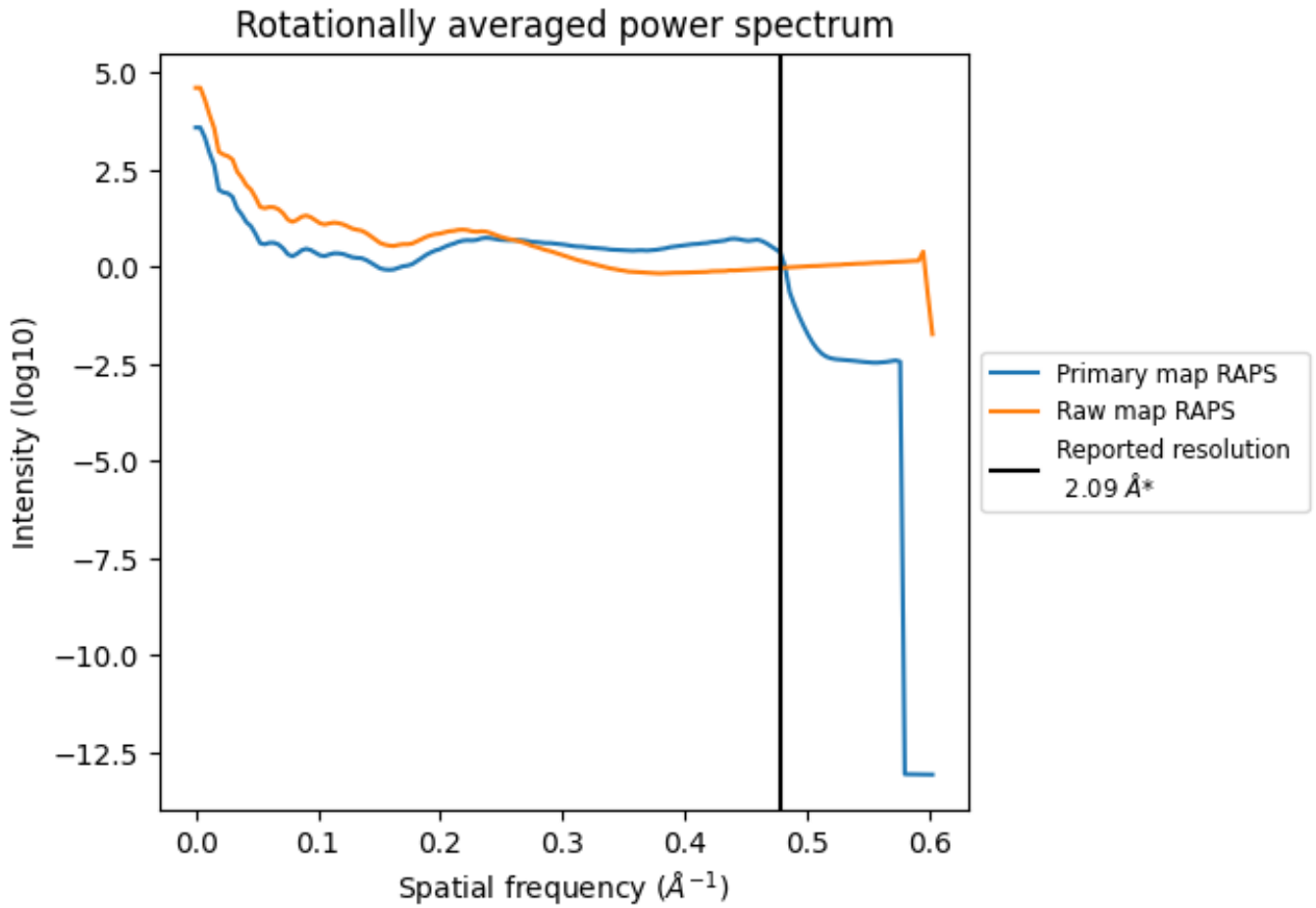
7.2 Volume estimate



The volume at the recommended contour level is 66 nm^3; this corresponds to an approximate mass of 60 kDa.

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

7.3 Rotationally averaged power spectrum (i)

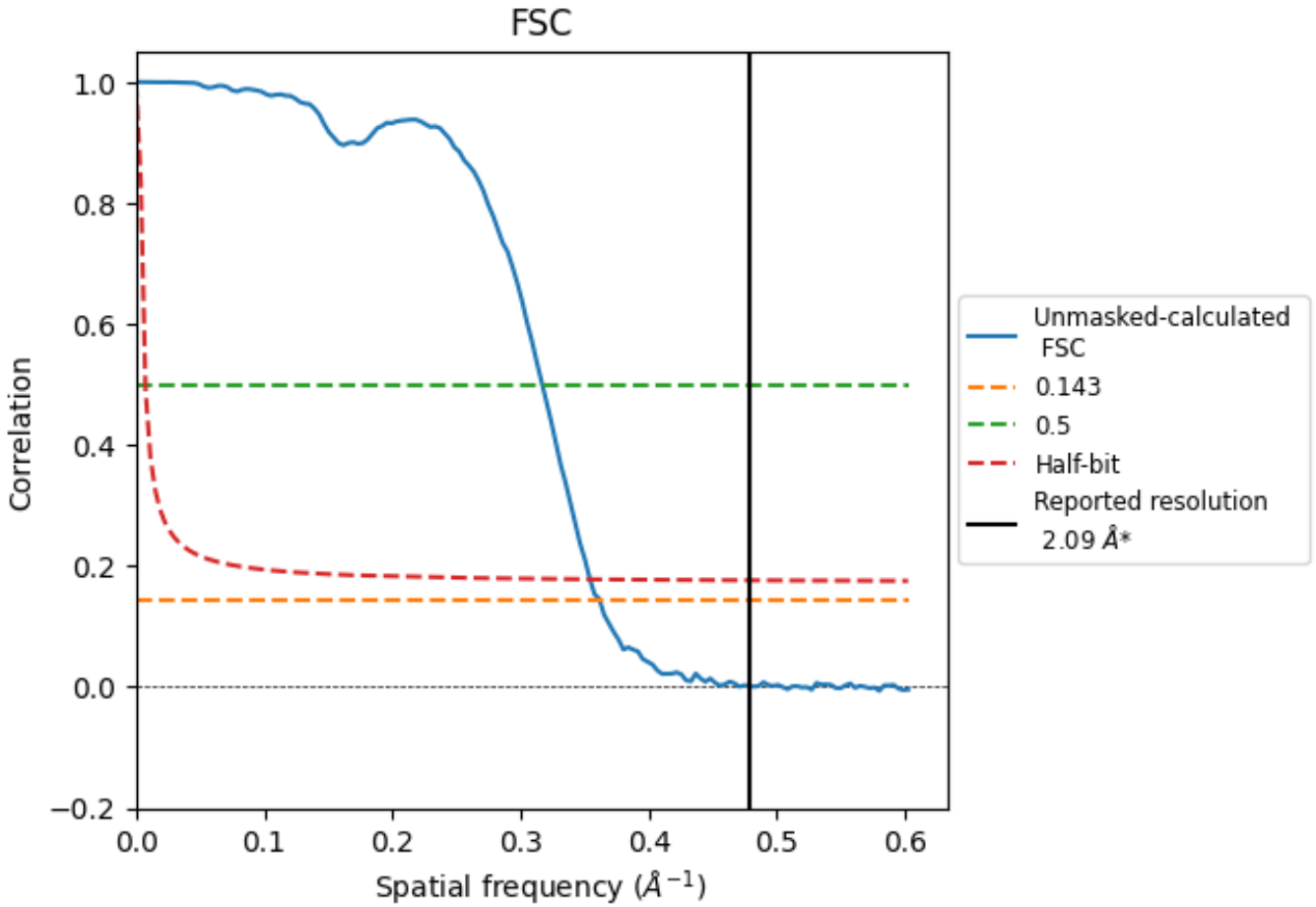


*Reported resolution corresponds to spatial frequency of 0.478 $Å^{-1}$

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.478 Å^{-1}

8.2 Resolution estimates (i)

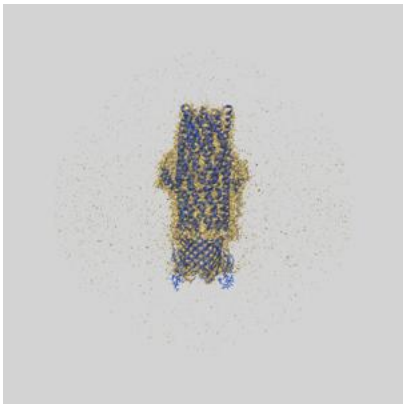
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.09	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.76	3.15	2.82

*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 2.76 differs from the reported value 2.09 by more than 10 %

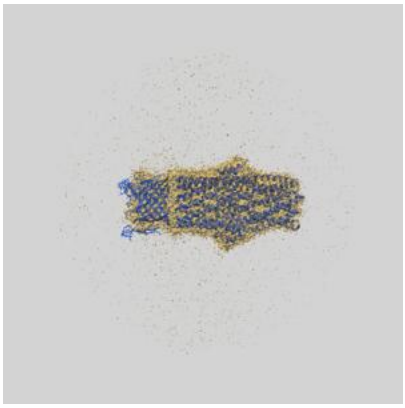
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-77056 and PDB model 13GG. Per-residue inclusion information can be found in section 3 on page 6.

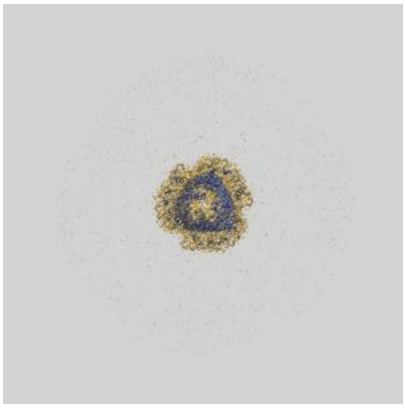
9.1 Map-model overlay



X



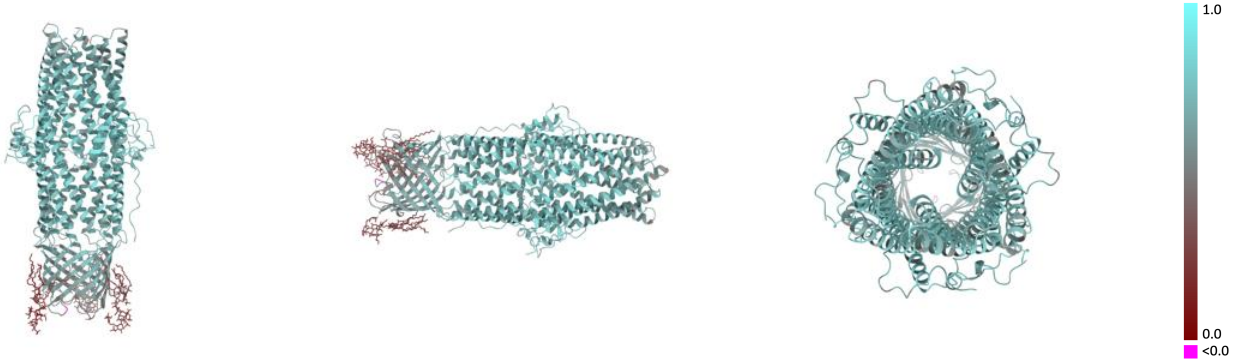
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.115 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.

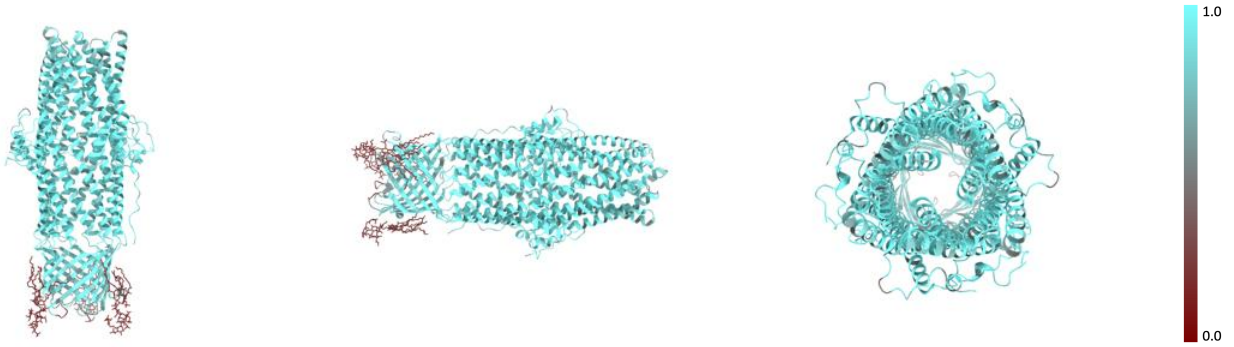
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according 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.

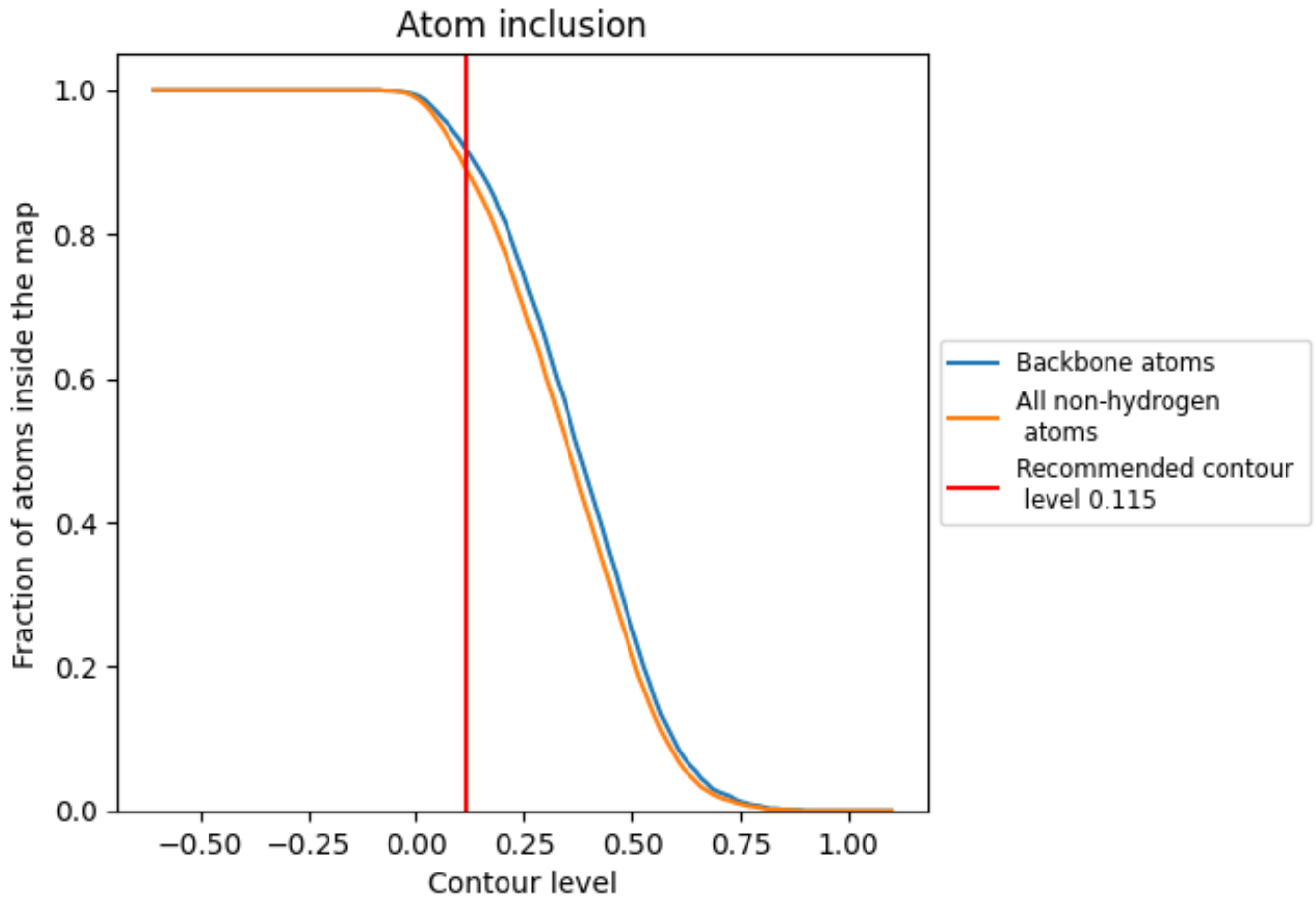
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.115).

9.4 Atom inclusion (i)



At the recommended contour level, 92% of all backbone atoms, 89% 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 (0.115) and Q-score for the entire model and for each chain.



Chain	Atom inclusion	Q-score
All	0.8910	0.6570
A	0.8490	0.6330
B	0.8890	0.6600
C	0.9230	0.6810