



## Full wwPDB EM Validation Report ⓘ

Jul 21, 2021 – 01:53 pm BST

PDB ID : 7OJ8  
EMDB ID : EMD-12939  
Title : ABCG2 E1S turnover-2 state  
Authors : Ni, D.; Yu, Q.; Kowal, J.; Manolaridis, I.; Jackson, S.M.; Stahlberg, H.; Locher, K.P.  
Deposited on : 2021-05-14  
Resolution : 3.40 Å(reported)  
Based on initial model : 6HCO

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.0.dev84  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.22

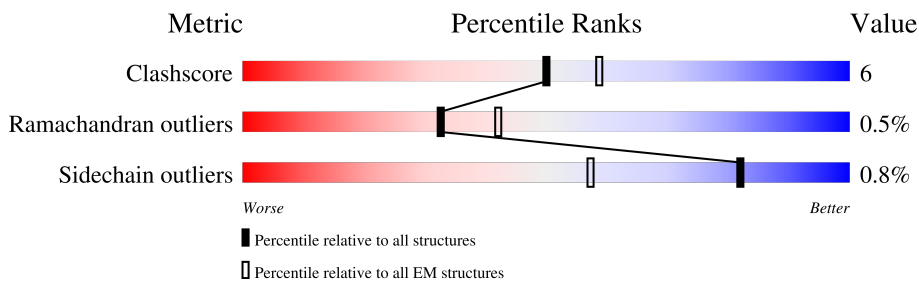
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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  $\geq 3$ , 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	665	
1	B	665	

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 9148 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.

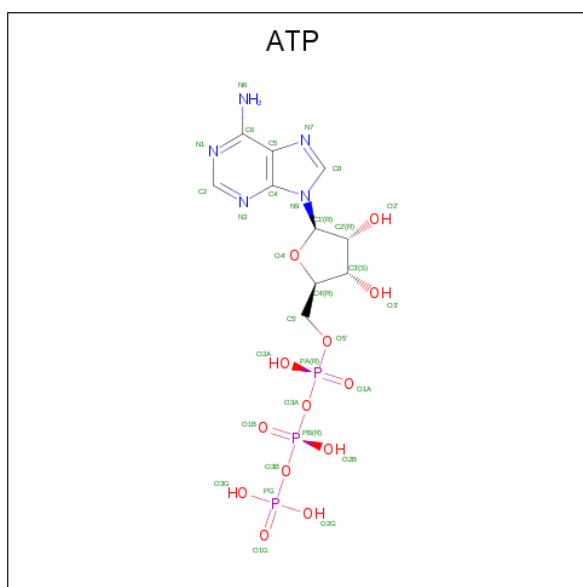
- Molecule 1 is a protein called Broad substrate specificity ATP-binding cassette transporter ABCG2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	575	Total	C	N	O	S	0	0
			4475	2906	737	803	29		
1	B	575	Total	C	N	O	S	0	0
			4475	2906	737	803	29		

There are 22 discrepancies between the modelled and reference sequences:

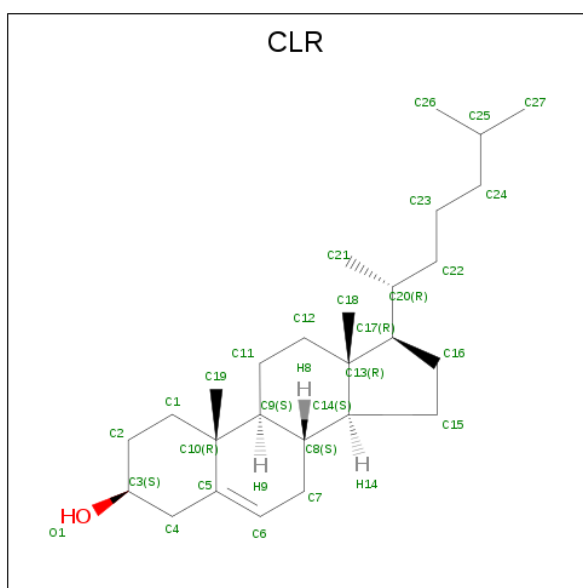
Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	initiating methionine	UNP Q9UNQ0
A	-8	ASP	-	expression tag	UNP Q9UNQ0
A	-7	TYR	-	expression tag	UNP Q9UNQ0
A	-6	LYS	-	expression tag	UNP Q9UNQ0
A	-5	ASP	-	expression tag	UNP Q9UNQ0
A	-4	ASP	-	expression tag	UNP Q9UNQ0
A	-3	ASP	-	expression tag	UNP Q9UNQ0
A	-2	ASP	-	expression tag	UNP Q9UNQ0
A	-1	LYS	-	expression tag	UNP Q9UNQ0
A	0	GLY	-	expression tag	UNP Q9UNQ0
A	1	SER	-	expression tag	UNP Q9UNQ0
B	-9	MET	-	initiating methionine	UNP Q9UNQ0
B	-8	ASP	-	expression tag	UNP Q9UNQ0
B	-7	TYR	-	expression tag	UNP Q9UNQ0
B	-6	LYS	-	expression tag	UNP Q9UNQ0
B	-5	ASP	-	expression tag	UNP Q9UNQ0
B	-4	ASP	-	expression tag	UNP Q9UNQ0
B	-3	ASP	-	expression tag	UNP Q9UNQ0
B	-2	ASP	-	expression tag	UNP Q9UNQ0
B	-1	LYS	-	expression tag	UNP Q9UNQ0
B	0	GLY	-	expression tag	UNP Q9UNQ0
B	1	SER	-	expression tag	UNP Q9UNQ0

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula:  $C_{10}H_{16}N_5O_{13}P_3$ ).



Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
2	B	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 3 is CHOLESTEROL (three-letter code: CLR) (formula:  $C_{27}H_{46}O$ ).



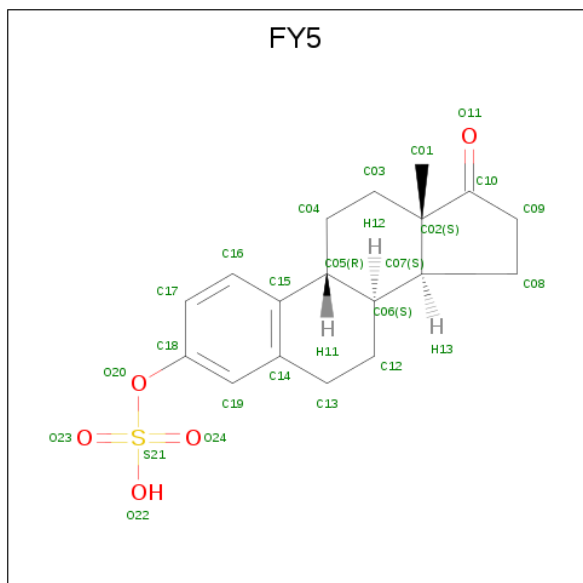
Mol	Chain	Residues	Atoms			AltConf
3	A	1	Total	C	O	0
			56	54	2	
3	A	1	Total	C	O	0
			56	54	2	

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Mol	Chain	Residues	Atoms			AltConf
3	B	1	Total	C	O	0
			56	54	2	
3	B	1	Total	C	O	0
			56	54	2	

- Molecule 4 is estrone 3-sulfate (three-letter code: FY5) (formula: C<sub>18</sub>H<sub>22</sub>O<sub>5</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
4	B	1	Total	C	O	S	0
			24	18	5	1	





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	221160	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	165000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	2.037	Depositor
Minimum map value	-1.007	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.057	Depositor
Recommended contour level	0.33	Depositor
Map size ( $\text{\AA}$ )	262.2, 262.2, 262.2	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.874, 0.874, 0.874	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: FY5, CLR, ATP

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	0/4569	0.50	1/6182 (0.0%)
1	B	0.43	0/4569	0.50	1/6182 (0.0%)
All	All	0.43	0/9138	0.50	2/12364 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	102	LEU	CA-CB-CG	6.03	129.18	115.30
1	A	102	LEU	CA-CB-CG	6.02	129.14	115.30

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	4475	0	4565	50	0
1	B	4475	0	4565	57	0
2	A	31	0	12	1	0
2	B	31	0	12	3	0
3	A	56	0	92	3	0
3	B	56	0	92	1	0
4	B	24	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	9148	0	9338	111	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 (111) 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:440:SER:HB2	1:A:482:ARG:HH12	1.61	0.66
1:B:440:SER:HB2	1:B:482:ARG:HH12	1.60	0.64
1:A:82:THR:HA	1:A:86:LYS:HZ1	1.60	0.64
1:A:624:TRP:O	1:A:628:LYS:HB3	2.01	0.61
1:B:624:TRP:O	1:B:628:LYS:HB3	2.01	0.60
1:A:83:GLY:HA2	2:A:1501:ATP:O3A	2.02	0.59
1:A:494:TYR:OH	1:A:500:LYS:O	2.11	0.58
1:B:83:GLY:HA2	2:B:1501:ATP:O3A	2.04	0.57
1:B:85:GLY:HA2	2:B:1501:ATP:O2A	2.05	0.57
1:B:65:SER:O	1:B:66:ASN:HB2	2.06	0.56
3:A:1502:CLR:H242	3:A:1502:CLR:C17	2.37	0.55
1:A:65:SER:O	1:A:66:ASN:HB2	2.05	0.55
1:B:271:GLN:OE1	1:B:271:GLN:N	2.41	0.53
1:A:271:GLN:OE1	1:A:271:GLN:N	2.41	0.53
1:B:178:VAL:HG12	1:B:179:GLY:H	1.73	0.53
1:B:74:GLY:O	1:B:232:SER:HB2	2.10	0.52
1:A:178:VAL:HG12	1:A:179:GLY:H	1.73	0.52
1:A:413:TYR:HB3	1:A:416:LEU:HD21	1.92	0.52
1:B:459:TYR:CD2	1:B:653:LYS:HD2	2.44	0.52
1:A:459:TYR:CD2	1:A:653:LYS:HD2	2.44	0.52
1:A:74:GLY:O	1:A:232:SER:HB2	2.10	0.52
1:A:490:THR:HG21	1:A:510:MET:HA	1.92	0.52
1:B:490:THR:HG21	1:B:510:MET:HA	1.92	0.52
1:B:413:TYR:HB3	1:B:416:LEU:HD21	1.92	0.51
1:A:296:ASP:HB3	1:A:301:ASP:HB2	1.94	0.50
1:B:224:VAL:HG12	1:B:225:LEU:HD12	1.94	0.49
1:B:296:ASP:HB3	1:B:301:ASP:HB2	1.94	0.49
1:A:224:VAL:HG12	1:A:225:LEU:HD12	1.94	0.49
1:B:204:PRO:HB2	1:B:206:ILE:O	2.13	0.48
1:A:408:VAL:HG21	1:B:547:PHE:HE2	1.78	0.48
1:A:204:PRO:HB2	1:A:206:ILE:O	2.13	0.48
1:B:431:PHE:CZ	1:B:435:THR:HG21	2.49	0.48
1:A:641:LEU:HA	1:A:641:LEU:HD23	1.69	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:282:TYR:HB3	1:B:293:PHE:HZ	1.78	0.47
1:A:282:TYR:HB3	1:A:293:PHE:HZ	1.78	0.47
1:B:502:LYS:HD3	1:B:502:LYS:HA	1.62	0.47
1:A:293:PHE:O	1:A:297:ILE:HG13	2.15	0.47
1:A:44:TYR:OH	1:A:97:LYS:HB3	2.15	0.47
1:B:44:TYR:OH	1:B:97:LYS:HB3	2.15	0.47
3:A:1502:CLR:H242	3:A:1502:CLR:H17	1.96	0.47
1:A:89:LEU:HD22	1:A:259:LEU:HD11	1.97	0.47
3:A:1502:CLR:C24	3:A:1502:CLR:H213	2.45	0.47
1:B:293:PHE:O	1:B:297:ILE:HG13	2.14	0.46
1:B:89:LEU:HD22	1:B:259:LEU:HD11	1.97	0.46
1:A:413:TYR:HB2	1:A:497:LEU:HD22	1.97	0.46
1:B:413:TYR:HB2	1:B:497:LEU:HD22	1.97	0.46
1:A:405:LEU:HD23	1:A:405:LEU:HA	1.82	0.44
1:A:502:LYS:HD3	1:A:502:LYS:HA	1.62	0.44
1:B:79:LEU:HD13	1:B:242:ILE:HG23	1.99	0.44
1:A:632:ALA:O	1:A:636:MET:HG3	2.18	0.44
1:A:48:LEU:N	1:A:59:VAL:O	2.48	0.44
3:B:1503:CLR:H161	3:B:1503:CLR:H221	1.80	0.44
1:B:124:VAL:HG11	1:B:196:ILE:HG12	2.00	0.44
1:B:168:LEU:HD23	1:B:168:LEU:HA	1.81	0.44
1:B:632:ALA:O	1:B:636:MET:HG3	2.18	0.44
1:A:413:TYR:CE1	1:B:556:VAL:HB	2.53	0.43
4:B:1502:FY5:C01	4:B:1502:FY5:C05	2.95	0.43
1:A:192:LYS:HE3	1:A:192:LYS:HB3	1.90	0.43
1:A:79:LEU:HD13	1:A:242:ILE:HG23	2.00	0.43
1:B:40:HIS:HE1	1:B:350:HIS:NE2	2.17	0.43
1:A:40:HIS:HE1	1:A:350:HIS:NE2	2.17	0.43
1:A:124:VAL:HG11	1:A:196:ILE:HG12	2.00	0.43
1:A:633:LEU:HD23	1:A:633:LEU:HA	1.81	0.43
1:A:581:LEU:HD23	1:A:581:LEU:HA	1.79	0.43
1:B:48:LEU:N	1:B:59:VAL:O	2.49	0.43
1:B:445:VAL:HG11	1:B:541:MET:SD	2.59	0.43
1:B:581:LEU:HD23	1:B:581:LEU:HA	1.80	0.43
1:A:44:TYR:CE1	1:A:102:LEU:HD12	2.54	0.42
1:B:405:LEU:HD23	1:B:405:LEU:HA	1.82	0.42
1:B:388:LEU:HA	1:B:388:LEU:HD23	1.74	0.42
1:B:641:LEU:HD23	1:B:641:LEU:HA	1.69	0.42
1:B:134:LEU:O	1:B:178:VAL:HG23	2.20	0.42
1:A:473:LYS:HA	1:A:473:LYS:HD2	1.86	0.42
1:B:137:ARG:HG2	1:B:141:GLN:NE2	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:614:LEU:HD12	1:B:614:LEU:HA	1.87	0.42
1:A:445:VAL:HG11	1:A:541:MET:SD	2.59	0.42
1:B:44:TYR:CE1	1:B:102:LEU:HD12	2.54	0.42
1:B:118:LYS:HD3	1:B:460:ILE:O	2.20	0.42
1:B:533:VAL:HG12	1:B:535:SER:H	1.85	0.42
1:B:176:SER:OG	1:B:177:LYS:N	2.52	0.42
1:A:176:SER:OG	1:A:177:LYS:N	2.53	0.42
1:A:533:VAL:HG12	1:A:535:SER:H	1.85	0.42
1:A:137:ARG:HG2	1:A:141:GLN:NE2	2.35	0.41
1:A:209:LEU:O	1:A:240:PHE:HA	2.20	0.41
1:A:388:LEU:HA	1:A:388:LEU:HD23	1.74	0.41
1:B:179:GLY:HA2	1:B:185:GLY:HA3	2.02	0.41
1:A:118:LYS:HD3	1:A:460:ILE:O	2.20	0.41
1:A:565:LEU:HD23	1:A:565:LEU:HA	1.89	0.41
1:B:257:THR:OG1	1:B:267:HIS:ND1	2.52	0.41
1:A:590:ASN:HA	1:A:609:THR:HA	2.03	0.41
1:B:209:LEU:O	1:B:240:PHE:HA	2.20	0.41
1:B:409:ILE:HD11	1:B:432:PHE:CD2	2.56	0.41
1:B:479:LEU:HD12	1:B:479:LEU:HA	1.93	0.41
1:B:146:LEU:HD23	1:B:146:LEU:HA	1.85	0.41
1:B:633:LEU:HA	1:B:633:LEU:HD23	1.81	0.41
1:B:395:SER:OG	1:B:396:ILE:N	2.54	0.41
1:A:134:LEU:O	1:A:178:VAL:HG23	2.20	0.41
1:A:156:GLU:HB3	1:A:160:ARG:HH12	1.85	0.41
1:A:254:ASP:O	1:A:269:PRO:HA	2.21	0.41
1:B:85:GLY:CA	2:B:1501:ATP:O2A	2.68	0.41
1:B:459:TYR:HD2	1:B:653:LYS:HD2	1.85	0.40
1:B:590:ASN:HA	1:B:609:THR:HA	2.03	0.40
1:A:409:ILE:HD11	1:A:432:PHE:CD2	2.56	0.40
1:A:207:LEU:HD12	1:A:207:LEU:HA	1.90	0.40
1:B:192:LYS:HB3	1:B:192:LYS:HE3	1.90	0.40
1:B:376:GLN:O	1:B:380:VAL:HG23	2.21	0.40
1:B:494:TYR:OH	1:B:500:LYS:O	2.11	0.40
1:B:548:MET:HE3	1:B:574:PRO:HD3	2.03	0.40
4:B:1502:FY5:O24	4:B:1502:FY5:C17	2.70	0.40
1:A:648:LEU:HA	1:A:648:LEU:HD23	1.82	0.40
1:B:565:LEU:HD23	1:B:565:LEU:HA	1.89	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	567/665 (85%)	534 (94%)	30 (5%)	3 (0%)	29	61
1	B	567/665 (85%)	534 (94%)	30 (5%)	3 (0%)	29	61
All	All	1134/1330 (85%)	1068 (94%)	60 (5%)	6 (0%)	32	61

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	66	ASN
1	B	66	ASN
1	A	101	GLY
1	B	101	GLY
1	A	102	LEU
1	B	102	LEU

### 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	491/569 (86%)	487 (99%)	4 (1%)	81	91
1	B	491/569 (86%)	487 (99%)	4 (1%)	81	91
All	All	982/1138 (86%)	974 (99%)	8 (1%)	82	91

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	385	PHE
1	A	464	TYR
1	A	489	PHE
1	A	590	ASN
1	B	385	PHE
1	B	464	TYR
1	B	489	PHE
1	B	590	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	350	HIS
1	B	350	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

7 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
3	CLR	A	1503	-	31,31,31	1.09	1 (3%)	48,48,48	1.41	10 (20%)
3	CLR	B	1503	-	31,31,31	1.08	1 (3%)	48,48,48	1.48	10 (20%)
3	CLR	B	1504	-	31,31,31	1.09	1 (3%)	48,48,48	1.52	9 (18%)
2	ATP	B	1501	-	26,33,33	1.89	9 (34%)	31,52,52	2.31	12 (38%)
3	CLR	A	1502	-	31,31,31	1.08	1 (3%)	48,48,48	1.35	6 (12%)
2	ATP	A	1501	-	26,33,33	1.89	9 (34%)	31,52,52	2.32	12 (38%)
4	FY5	B	1502	-	27,27,27	4.25	11 (40%)	42,43,43	2.14	18 (42%)

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	CLR	A	1503	-	-	5/10/68/68	0/4/4/4
3	CLR	B	1503	-	-	7/10/68/68	0/4/4/4
3	CLR	B	1504	-	-	3/10/68/68	0/4/4/4
2	ATP	B	1501	-	-	0/18/38/38	0/3/3/3
3	CLR	A	1502	-	-	8/10/68/68	0/4/4/4
2	ATP	A	1501	-	-	0/18/38/38	0/3/3/3
4	FY5	B	1502	-	-	3/5/45/45	0/4/4/4

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1502	FY5	C02-C10	-14.17	1.33	1.52
4	B	1502	FY5	C04-C05	9.80	1.67	1.53
4	B	1502	FY5	C08-C07	-6.86	1.40	1.54
4	B	1502	FY5	C02-C07	5.67	1.65	1.54
4	B	1502	FY5	C13-C14	5.44	1.60	1.51
4	B	1502	FY5	O20-S21	4.33	1.64	1.58
4	B	1502	FY5	C05-C06	-4.14	1.49	1.54
4	B	1502	FY5	C08-C09	3.76	1.61	1.53
2	A	1501	ATP	O4'-C1'	3.64	1.46	1.41
2	B	1501	ATP	C5-N7	3.54	1.52	1.39
2	B	1501	ATP	O4'-C1'	3.50	1.46	1.41
2	A	1501	ATP	C5-N7	3.50	1.52	1.39
2	A	1501	ATP	C6-N6	3.19	1.45	1.34
2	B	1501	ATP	C6-N6	3.15	1.45	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1501	ATP	C2'-C1'	-3.11	1.49	1.53
2	A	1501	ATP	C2'-C1'	-3.04	1.49	1.53
3	B	1504	CLR	C16-C17	2.89	1.60	1.54
3	A	1502	CLR	C16-C17	2.87	1.60	1.54
3	A	1503	CLR	C16-C17	2.86	1.60	1.54
3	B	1503	CLR	C16-C17	2.83	1.60	1.54
4	B	1502	FY5	C09-C10	2.78	1.55	1.51
2	B	1501	ATP	PG-O3G	-2.35	1.45	1.54
2	A	1501	ATP	PG-O3G	-2.32	1.45	1.54
2	A	1501	ATP	PG-O2G	-2.31	1.45	1.54
2	B	1501	ATP	PG-O2G	-2.30	1.46	1.54
4	B	1502	FY5	C12-C13	2.21	1.57	1.52
2	A	1501	ATP	C2'-C3'	-2.09	1.47	1.53
2	B	1501	ATP	C2'-C3'	-2.07	1.47	1.53
2	B	1501	ATP	PA-O2A	-2.05	1.45	1.55
2	A	1501	ATP	PA-O2A	-2.04	1.45	1.55
2	A	1501	ATP	C5-C4	2.02	1.46	1.40
4	B	1502	FY5	C06-C07	2.01	1.57	1.53
2	B	1501	ATP	C5-C4	2.01	1.46	1.40

All (77) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1501	ATP	C4-C5-N7	-4.94	104.25	109.40
2	A	1501	ATP	C4-C5-N7	-4.92	104.27	109.40
2	B	1501	ATP	PB-O3B-PG	-4.73	116.58	132.83
2	A	1501	ATP	PB-O3B-PG	-4.73	116.60	132.83
4	B	1502	FY5	C08-C07-C06	4.56	126.59	119.08
2	A	1501	ATP	C1'-N9-C4	-4.46	118.80	126.64
2	B	1501	ATP	C1'-N9-C4	-4.45	118.83	126.64
4	B	1502	FY5	C01-C02-C10	4.31	113.11	105.18
2	B	1501	ATP	PA-O3A-PB	-4.25	118.25	132.83
2	A	1501	ATP	PA-O3A-PB	-4.24	118.28	132.83
2	A	1501	ATP	C3'-C2'-C1'	3.97	106.95	100.98
2	B	1501	ATP	C3'-C2'-C1'	3.97	106.95	100.98
4	B	1502	FY5	C14-C15-C05	-3.85	116.62	121.05
4	B	1502	FY5	C01-C02-C07	-3.67	107.57	112.98
4	B	1502	FY5	C12-C06-C05	3.61	112.80	109.28
2	A	1501	ATP	N3-C2-N1	-3.60	123.04	128.68
2	B	1501	ATP	N3-C2-N1	-3.55	123.13	128.68
4	B	1502	FY5	C09-C10-C02	-3.20	105.44	108.59
4	B	1502	FY5	C08-C07-C02	-3.19	101.22	104.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1502	FY5	O22-S21-O23	-3.12	97.66	108.49
3	B	1503	CLR	C22-C20-C17	-3.08	103.91	110.28
3	A	1502	CLR	C22-C20-C17	-2.99	104.10	110.28
4	B	1502	FY5	C04-C05-C15	-2.95	109.28	113.84
2	A	1501	ATP	O3G-PG-O3B	2.94	114.49	104.64
2	B	1501	ATP	O3G-PG-O3B	2.93	114.47	104.64
3	B	1504	CLR	C22-C20-C17	-2.88	104.33	110.28
2	A	1501	ATP	O2G-PG-O3B	2.84	114.18	104.64
2	B	1501	ATP	O2G-PG-O3B	2.83	114.13	104.64
3	B	1504	CLR	C12-C13-C14	-2.77	102.97	107.27
4	B	1502	FY5	O22-S21-O20	2.71	112.36	105.83
3	B	1504	CLR	C15-C14-C13	2.69	107.08	103.84
3	B	1504	CLR	C13-C17-C20	-2.69	115.28	119.49
3	B	1503	CLR	C13-C17-C20	-2.64	115.35	119.49
3	B	1503	CLR	C11-C12-C13	-2.62	108.29	112.78
4	B	1502	FY5	C15-C05-C06	2.55	114.69	111.58
2	B	1501	ATP	O2A-PA-O1A	-2.55	99.62	112.24
2	A	1501	ATP	C2'-C3'-C4'	2.55	107.60	102.64
2	A	1501	ATP	O2A-PA-O1A	-2.55	99.65	112.24
2	B	1501	ATP	C2'-C3'-C4'	2.53	107.56	102.64
3	A	1503	CLR	C22-C20-C17	-2.48	105.16	110.28
4	B	1502	FY5	C16-C15-C14	2.41	121.69	118.74
3	B	1503	CLR	C15-C14-C13	2.39	106.73	103.84
3	B	1504	CLR	C11-C12-C13	-2.39	108.69	112.78
3	B	1504	CLR	C24-C23-C22	-2.38	102.31	113.24
4	B	1502	FY5	C03-C02-C10	-2.36	113.12	116.67
3	A	1502	CLR	C7-C8-C14	-2.36	107.48	110.91
3	A	1503	CLR	C12-C13-C14	-2.36	103.62	107.27
3	A	1502	CLR	C18-C13-C12	2.34	114.28	110.59
3	B	1504	CLR	C19-C10-C9	-2.34	108.89	111.68
3	A	1503	CLR	C19-C10-C9	-2.32	108.92	111.68
4	B	1502	FY5	O20-S21-O24	2.30	114.42	107.71
3	A	1503	CLR	C24-C23-C22	-2.23	102.99	113.24
3	B	1504	CLR	C16-C17-C20	-2.21	108.72	112.15
3	B	1503	CLR	C12-C13-C14	-2.17	103.91	107.27
3	B	1503	CLR	C18-C13-C12	2.16	114.00	110.59
3	A	1503	CLR	C2-C3-C4	-2.14	107.38	110.31
4	B	1502	FY5	C12-C06-C07	-2.13	108.44	112.08
3	B	1503	CLR	C3-C4-C5	2.13	115.63	112.03
3	B	1503	CLR	C10-C9-C8	-2.11	109.56	112.73
3	B	1503	CLR	C16-C17-C20	-2.11	108.87	112.15
2	B	1501	ATP	O2B-PB-O1B	-2.10	101.84	112.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1501	ATP	O2B-PB-O1B	-2.10	101.87	112.24
3	B	1504	CLR	C18-C13-C12	2.09	113.89	110.59
3	B	1503	CLR	C24-C23-C22	-2.09	103.63	113.24
3	A	1503	CLR	C18-C13-C12	2.08	113.88	110.59
2	A	1501	ATP	C5'-C4'-C3'	-2.08	107.39	115.18
3	A	1503	CLR	C15-C14-C13	2.08	106.34	103.84
2	B	1501	ATP	C5'-C4'-C3'	-2.08	107.40	115.18
3	A	1502	CLR	C16-C17-C20	-2.07	108.94	112.15
3	A	1502	CLR	C10-C5-C6	2.07	126.07	122.90
3	A	1503	CLR	C7-C8-C14	-2.06	107.92	110.91
3	A	1502	CLR	C19-C10-C9	-2.06	109.22	111.68
4	B	1502	FY5	C05-C06-C07	2.03	111.66	108.73
4	B	1502	FY5	C13-C12-C06	2.03	113.98	110.59
3	A	1503	CLR	C13-C17-C20	-2.03	116.31	119.49
3	A	1503	CLR	C11-C12-C13	-2.02	109.32	112.78
4	B	1502	FY5	C07-C02-C10	2.01	102.89	100.59

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	1502	FY5	C18-O20-S21-O22
3	A	1502	CLR	C16-C17-C20-C21
3	A	1502	CLR	C13-C17-C20-C21
3	B	1503	CLR	C13-C17-C20-C21
3	A	1502	CLR	C13-C17-C20-C22
3	B	1503	CLR	C13-C17-C20-C22
3	B	1503	CLR	C16-C17-C20-C21
3	A	1502	CLR	C21-C20-C22-C23
3	B	1503	CLR	C21-C20-C22-C23
3	A	1502	CLR	C17-C20-C22-C23
3	B	1504	CLR	C21-C20-C22-C23
3	A	1502	CLR	C16-C17-C20-C22
3	A	1503	CLR	C21-C20-C22-C23
3	A	1502	CLR	C22-C23-C24-C25
3	B	1503	CLR	C16-C17-C20-C22
3	B	1504	CLR	C23-C24-C25-C27
3	B	1503	CLR	C23-C24-C25-C27
3	A	1503	CLR	C23-C24-C25-C27
4	B	1502	FY5	C17-C18-O20-S21
4	B	1502	FY5	C19-C18-O20-S21
3	B	1504	CLR	C23-C24-C25-C26

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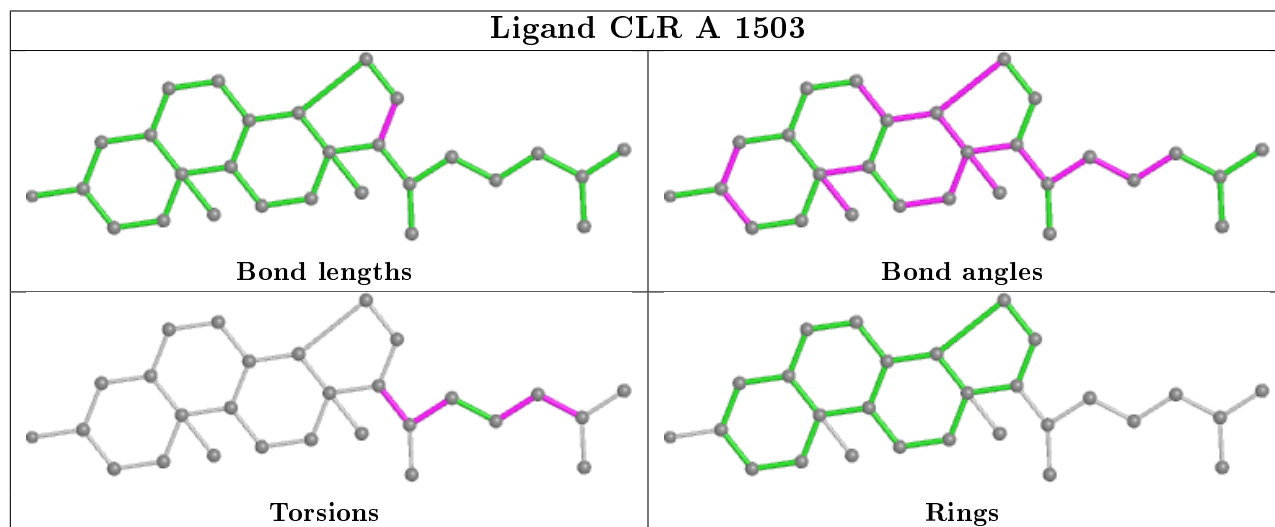
Mol	Chain	Res	Type	Atoms
3	B	1503	CLR	C17-C20-C22-C23
3	A	1503	CLR	C22-C23-C24-C25
3	A	1503	CLR	C23-C24-C25-C26
3	A	1502	CLR	C23-C24-C25-C26
3	A	1503	CLR	C16-C17-C20-C22

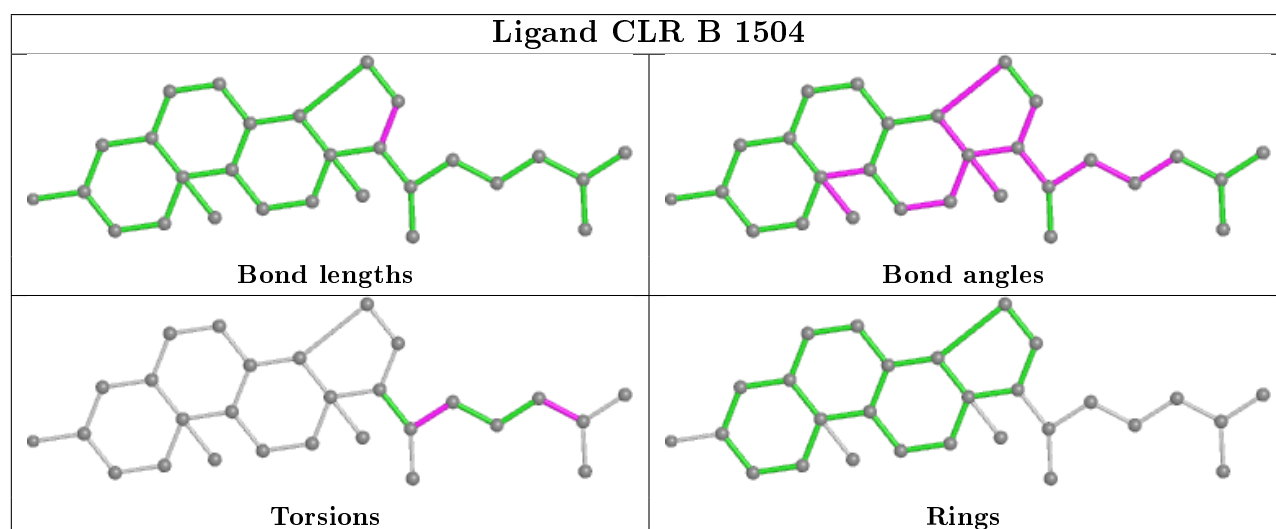
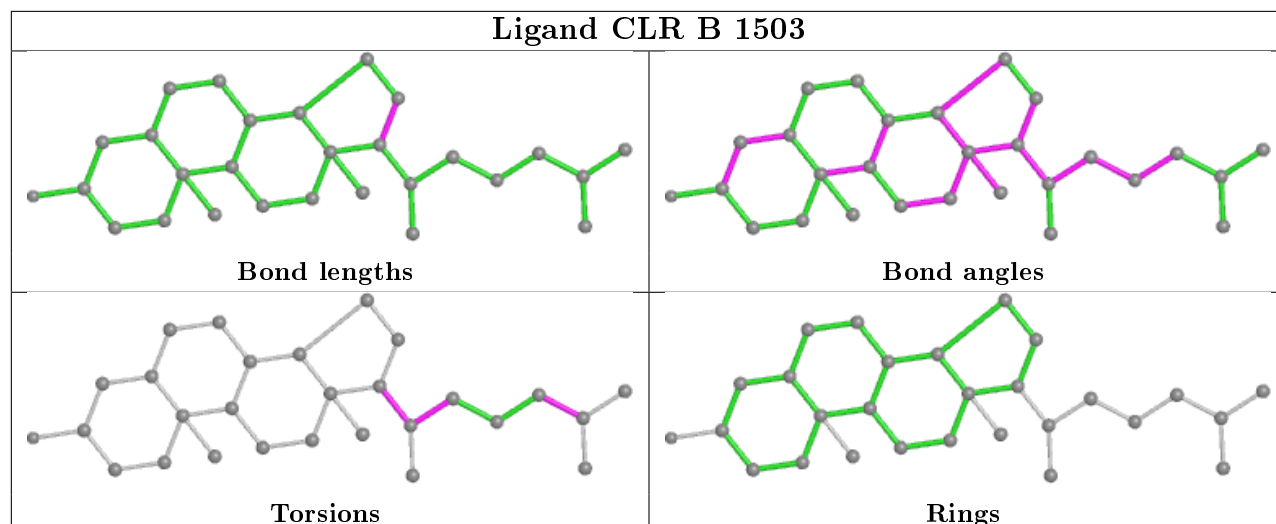
There are no ring outliers.

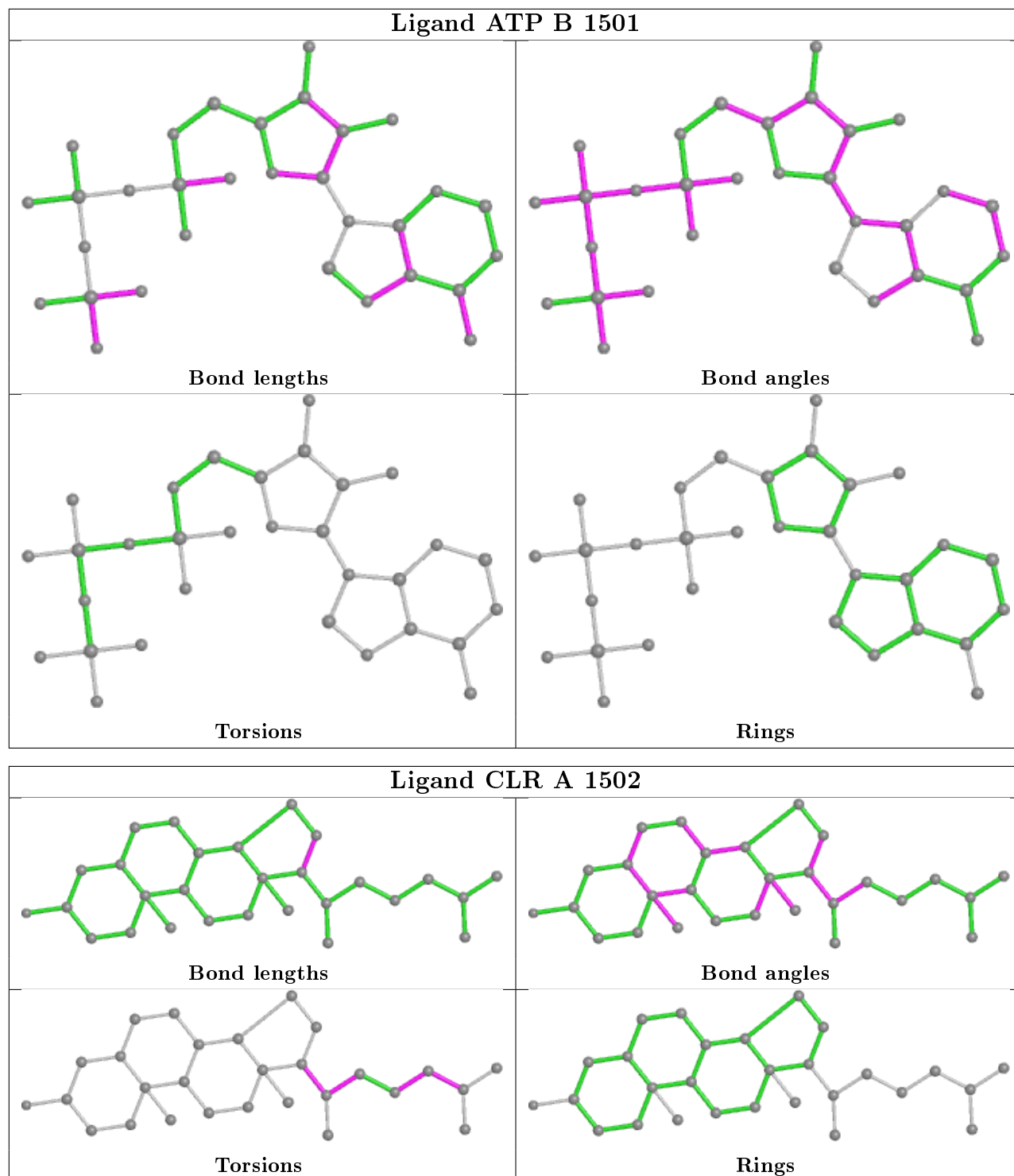
5 monomers are involved in 10 short contacts:

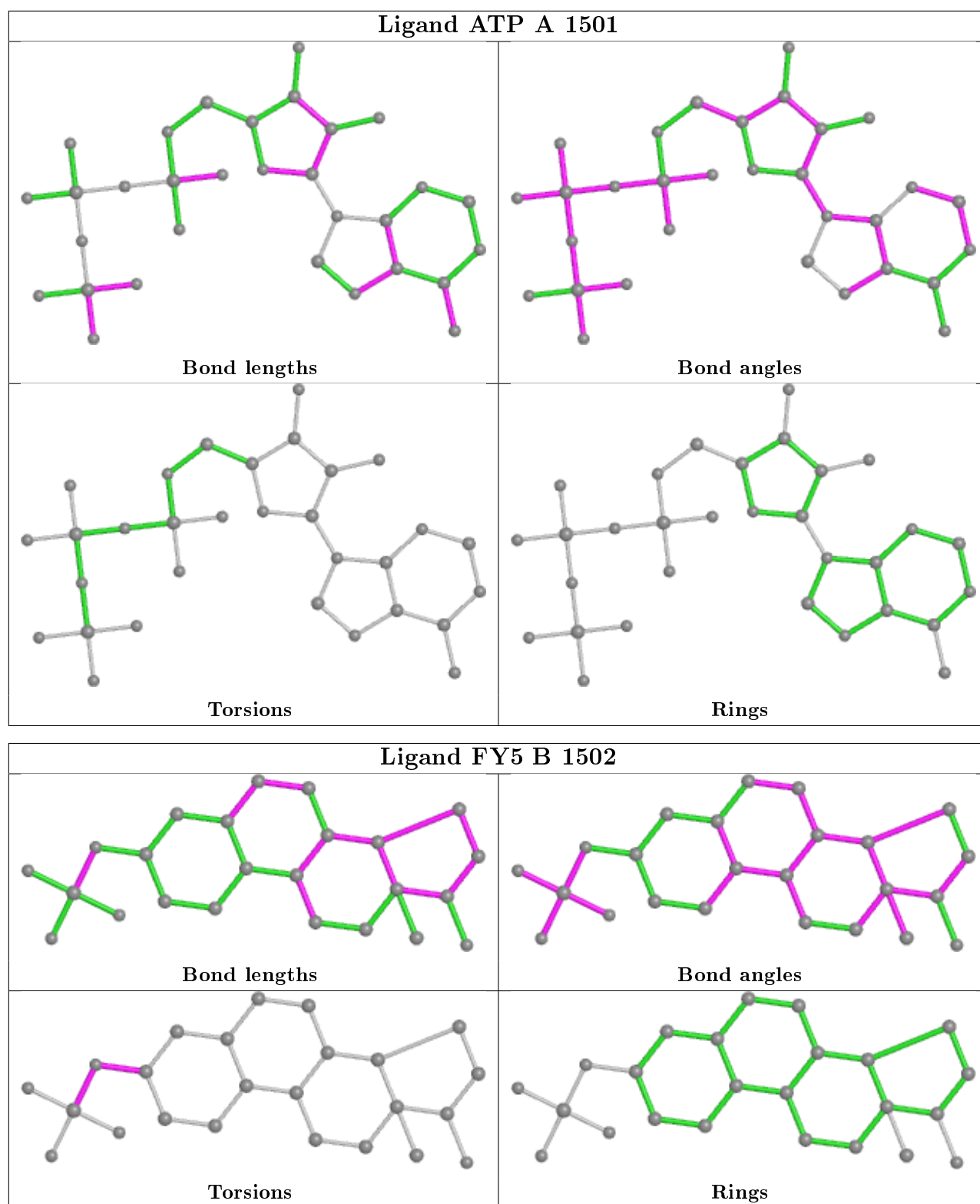
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1503	CLR	1	0
2	B	1501	ATP	3	0
3	A	1502	CLR	3	0
2	A	1501	ATP	1	0
4	B	1502	FY5	2	0

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

There are no chain breaks in this entry.

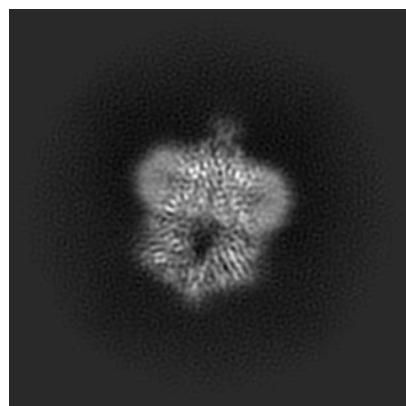
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12939. These allow visual inspection of the internal detail of the map and identification of artifacts.

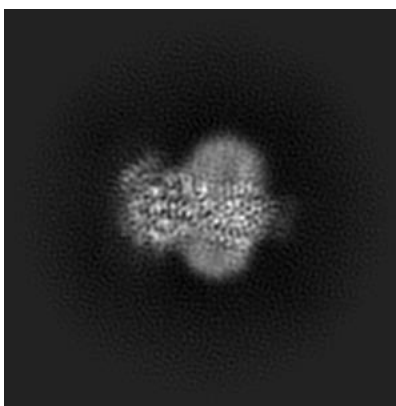
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

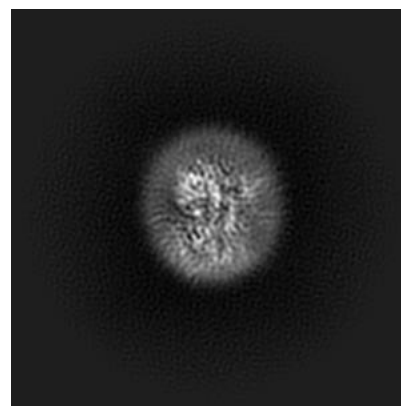
#### 6.1.1 Primary map



X

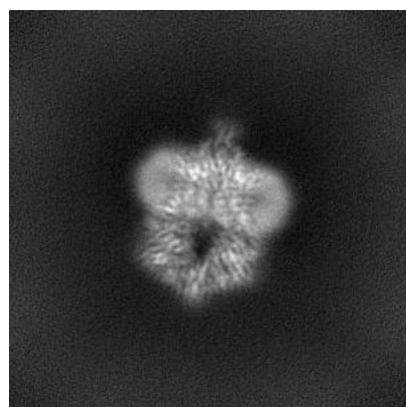


Y

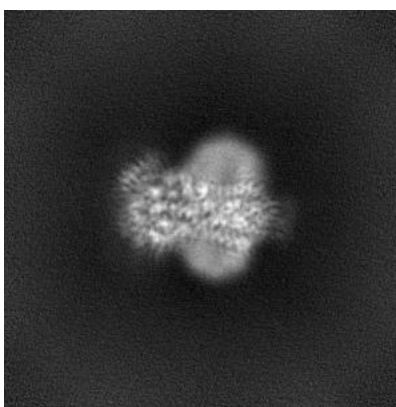


Z

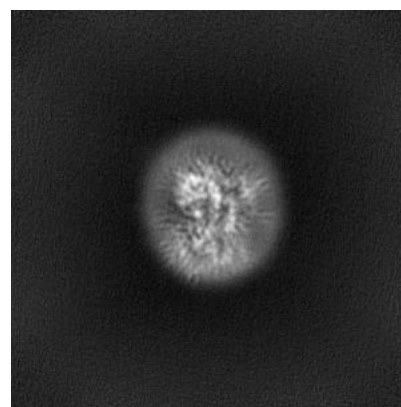
#### 6.1.2 Raw map



X



Y



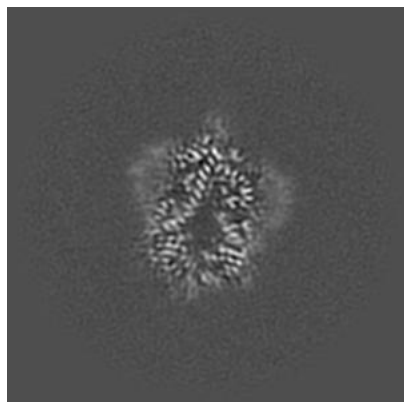
Z

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

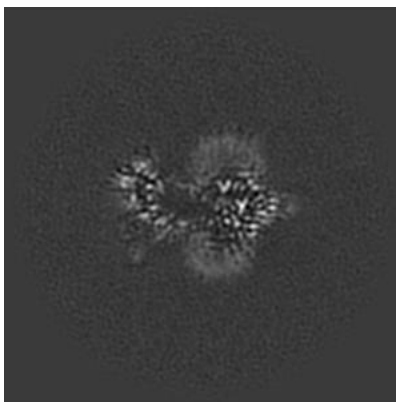


## 6.2 Central slices [i](#)

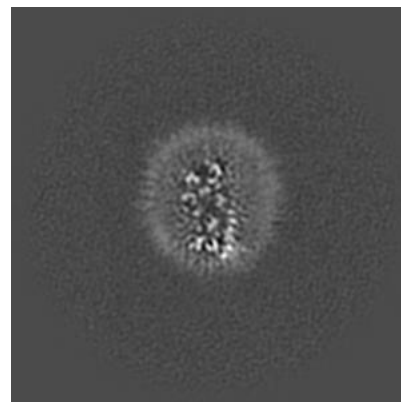
### 6.2.1 Primary map



X Index: 150

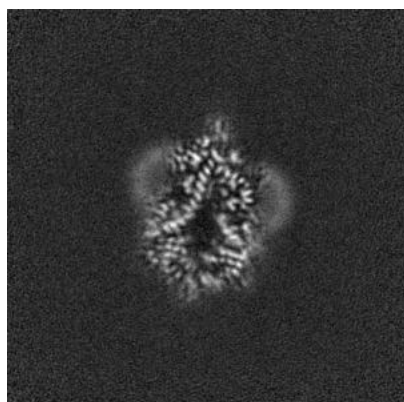


Y Index: 150

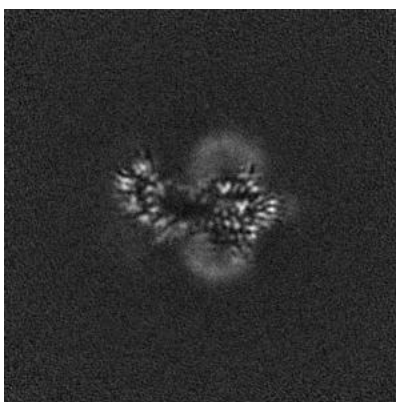


Z Index: 150

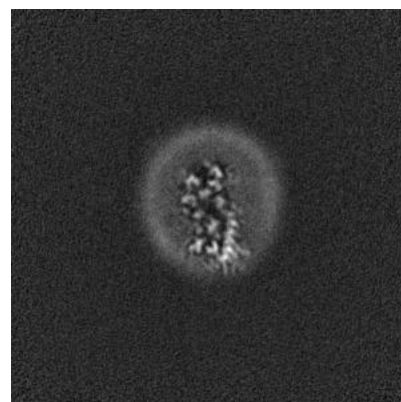
### 6.2.2 Raw map



X Index: 150



Y Index: 150

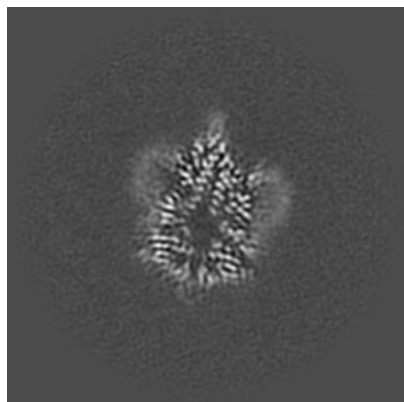


Z Index: 150

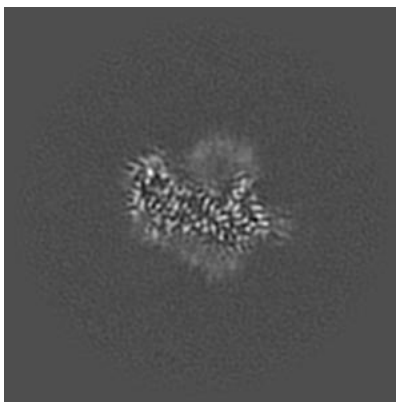
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

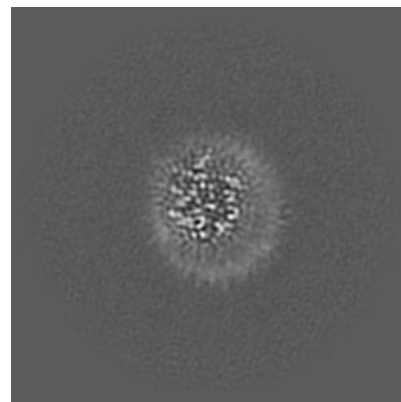
### 6.3.1 Primary map



X Index: 153

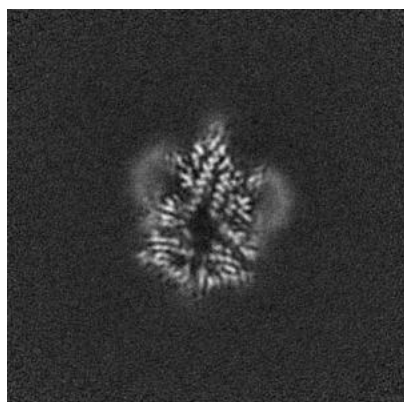


Y Index: 170

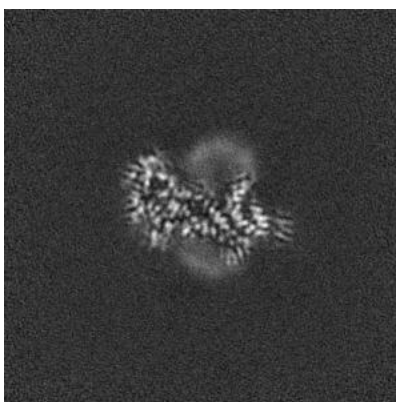


Z Index: 178

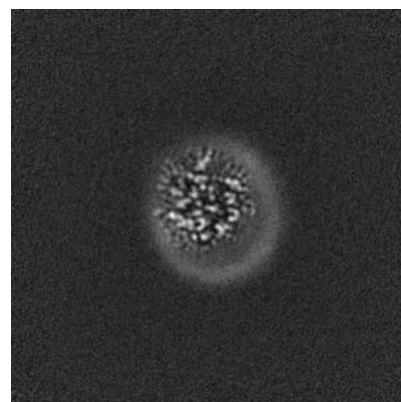
### 6.3.2 Raw map



X Index: 153



Y Index: 171

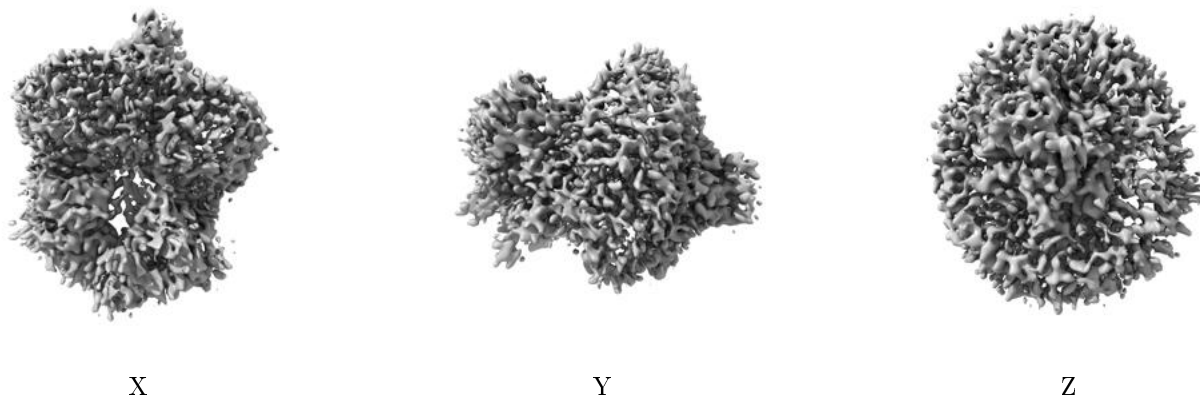


Z Index: 178

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

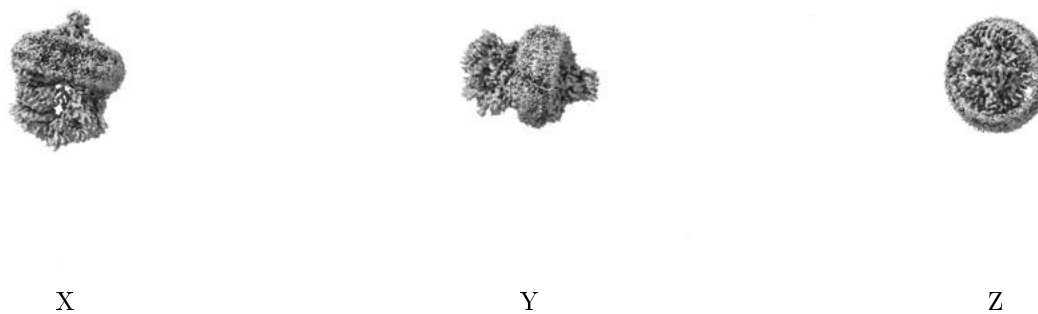
## 6.4 Orthogonal surface views [i](#)

### 6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.33. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 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.

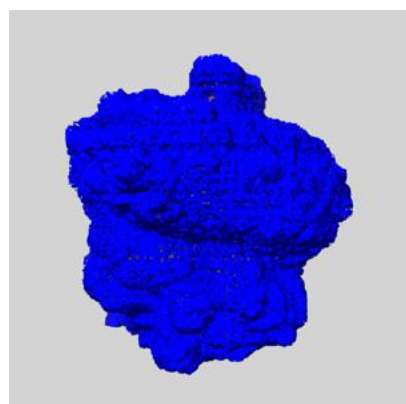
## 6.5 Mask visualisation [i](#)

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

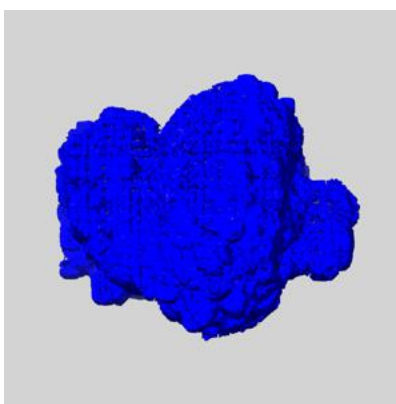
A mask typically either:

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

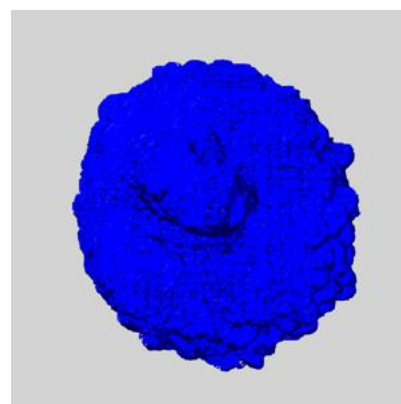
### 6.5.1 emd\_12939\_msk\_1.map [i](#)



X



Y

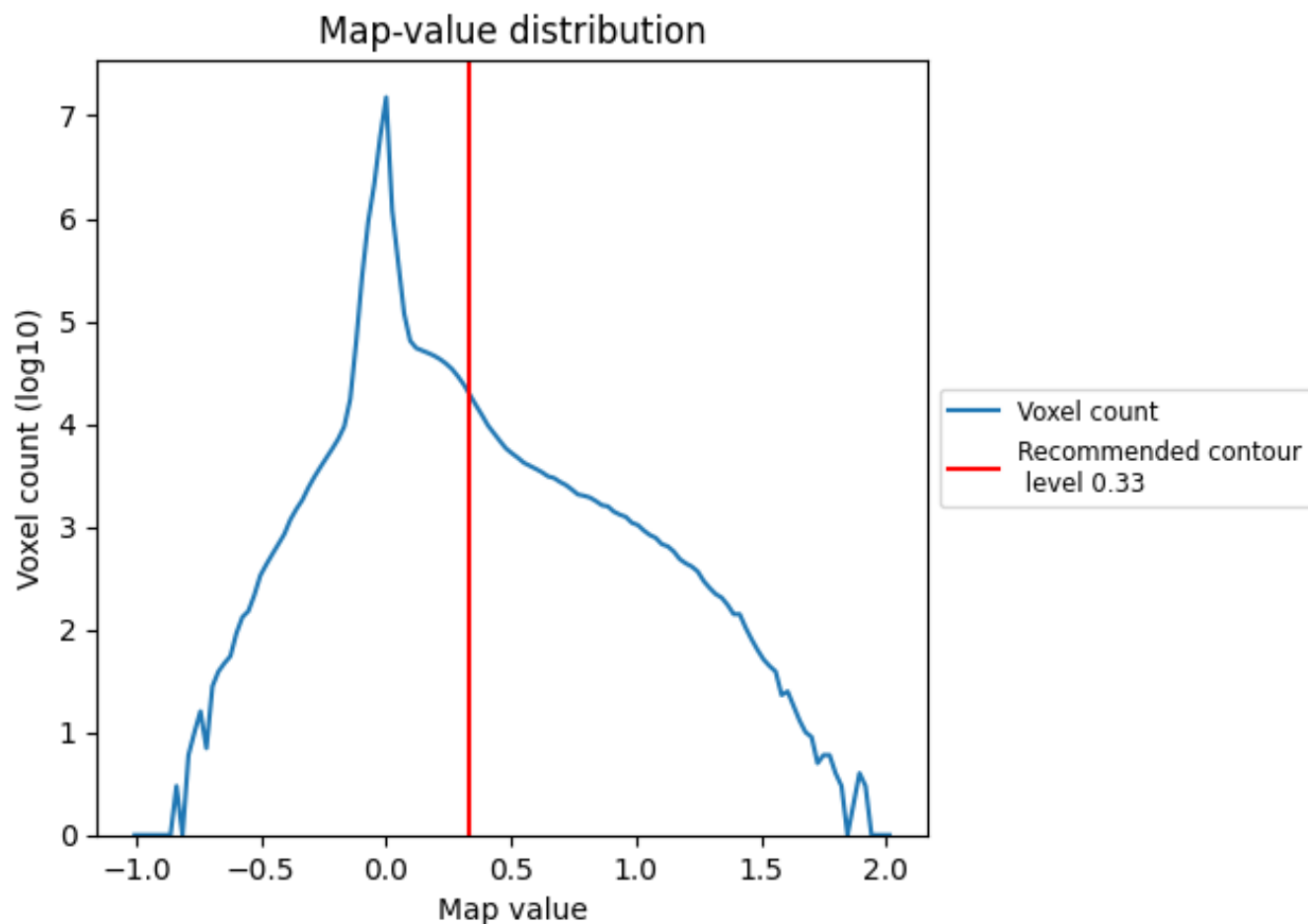


Z

## 7 Map analysis [i](#)

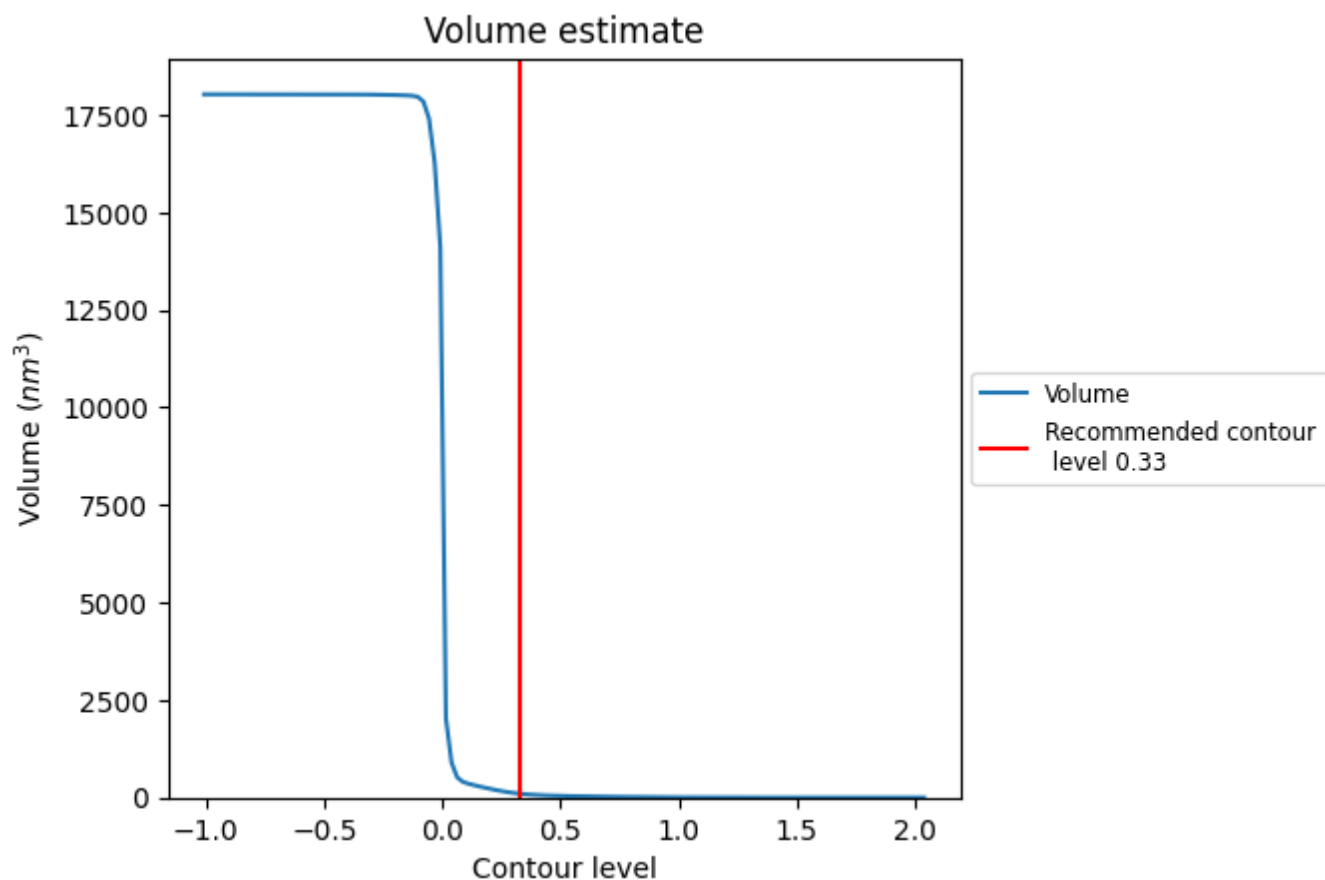
This section contains the results of statistical analysis of the map.

### 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.

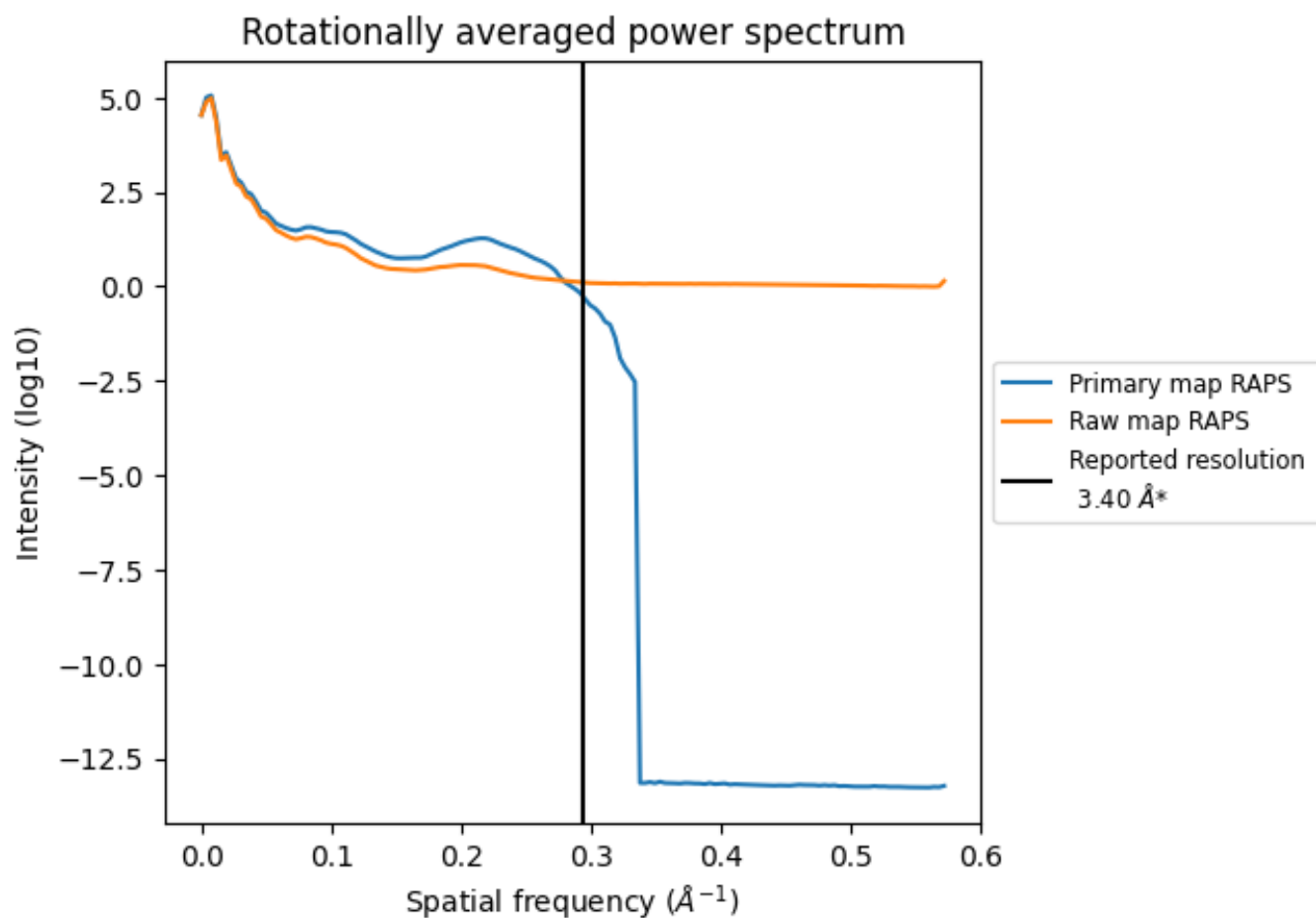
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 97 nm<sup>3</sup>; this corresponds to an approximate mass of 88 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

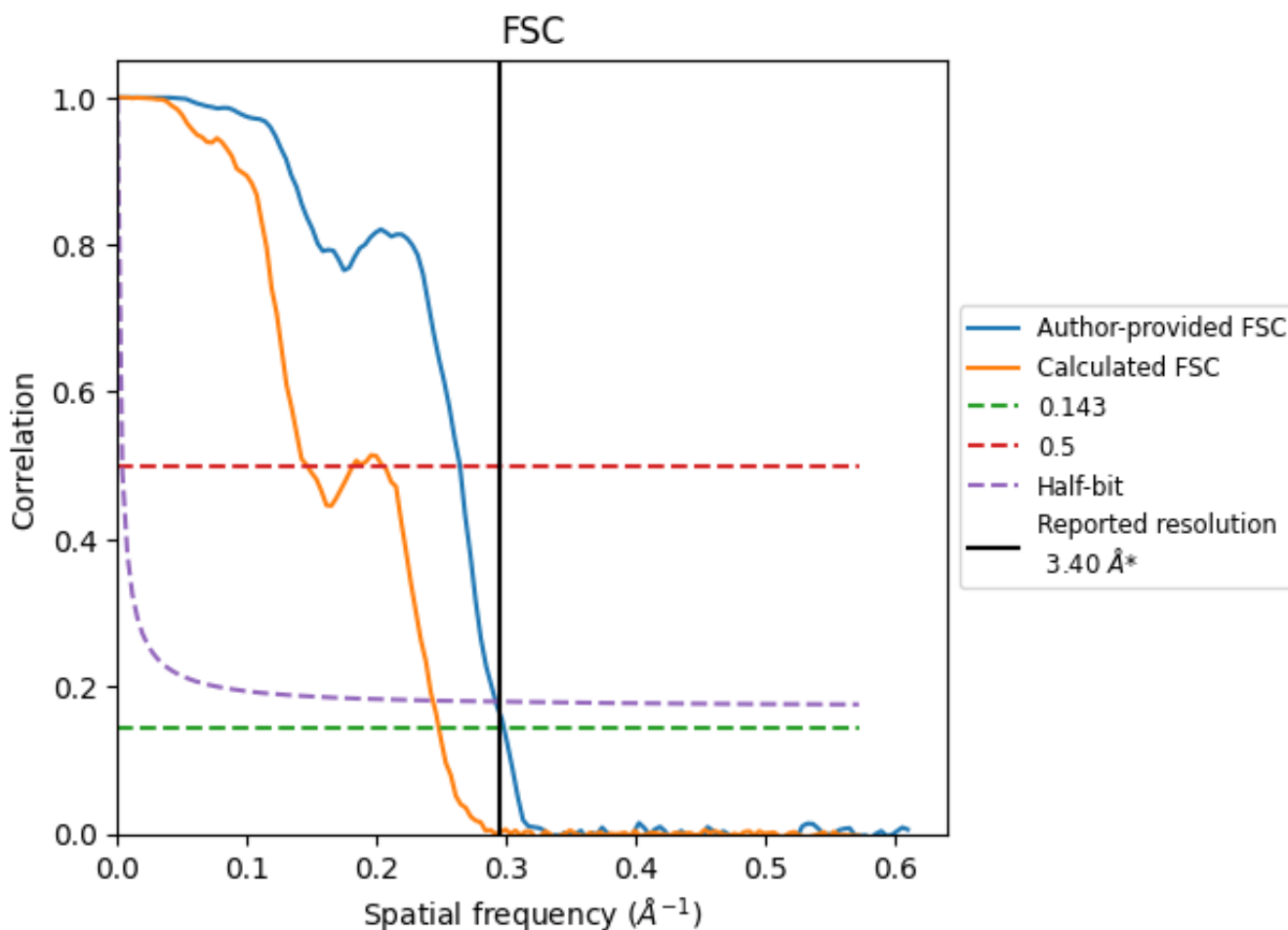


\*Reported resolution corresponds to spatial frequency of 0.294 Å<sup>-1</sup>

## 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 0.294 Å<sup>-1</sup>



## 8.2 Resolution estimates [i](#)

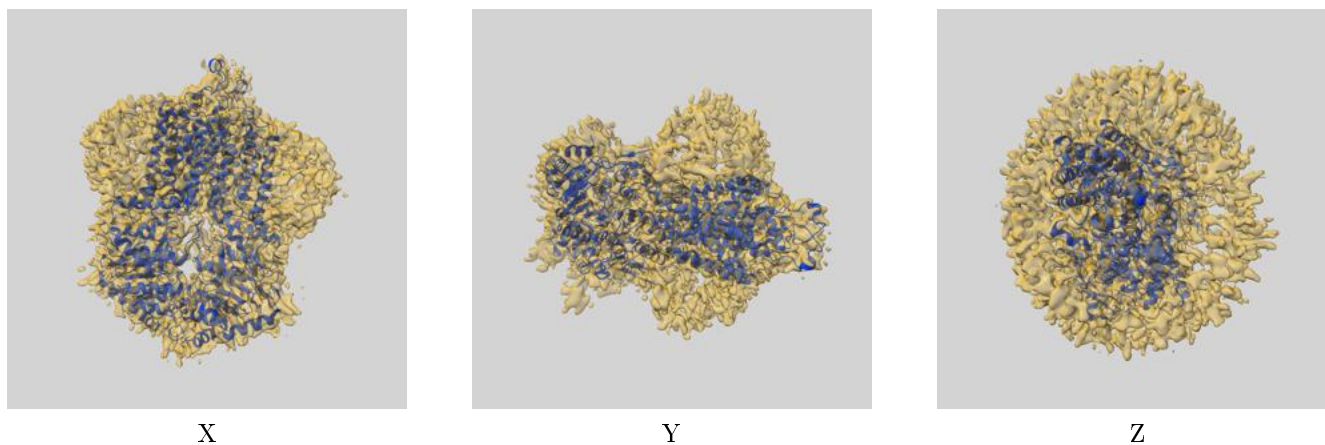
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.35	3.78	3.43
Calculated*	4.03	6.84	4.11

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.03 differs from the reported value 3.4 by more than 10 %

## 9 Map-model fit [i](#)

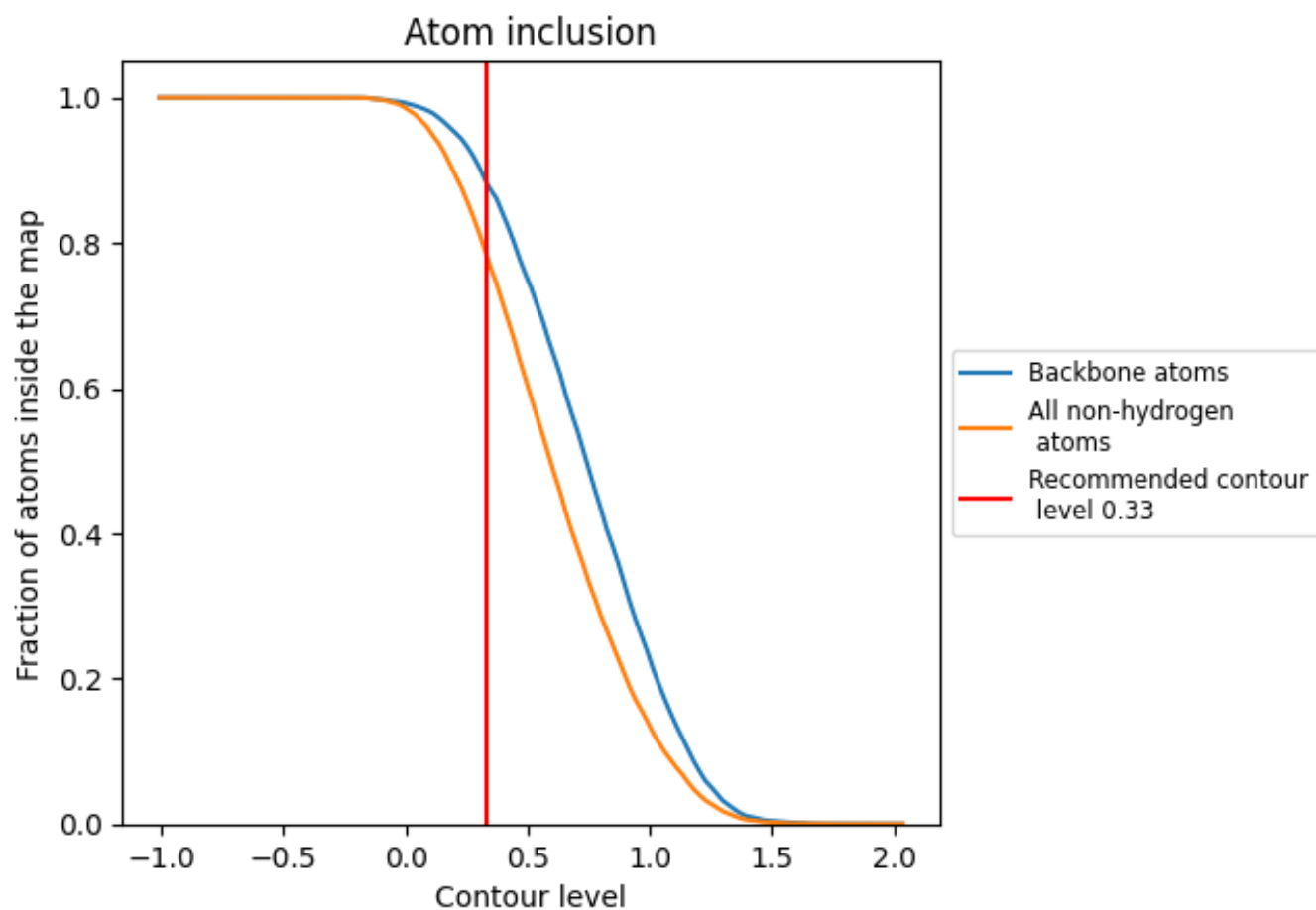
This section contains information regarding the fit between EMDB map EMD-12939 and PDB model 7OJ8. Per-residue inclusion information can be found in section 3 on page 6.

### 9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.33 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 Atom inclusion [i](#)



At the recommended contour level, 88% of all backbone atoms, 79% of all non-hydrogen atoms, are inside the map.