



Full wwPDB EM Validation Report ⓘ

Oct 28, 2024 – 12:31 PM EDT

PDB ID : 8UPM
EMDB ID : EMD-42452
Title : Pfr state of Stigmatella aurantiaca bacteriophytochrome 2
Authors : Malla, T.N.; Schmidt, M.; Stojkovic, E.A.
Deposited on : 2023-10-23
Resolution : 3.75 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.dev113
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

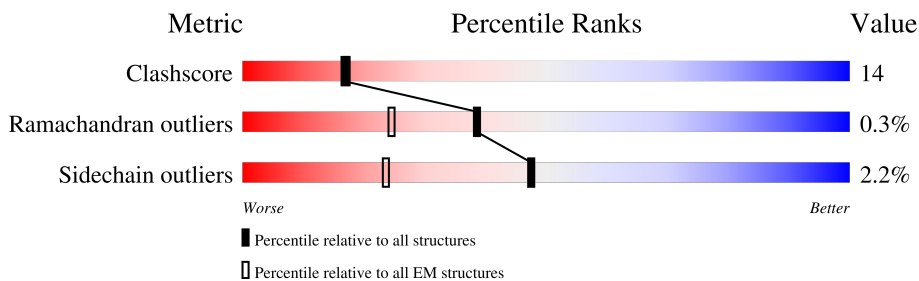
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.75 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	747	
1	B	747	

2 Entry composition [i](#)

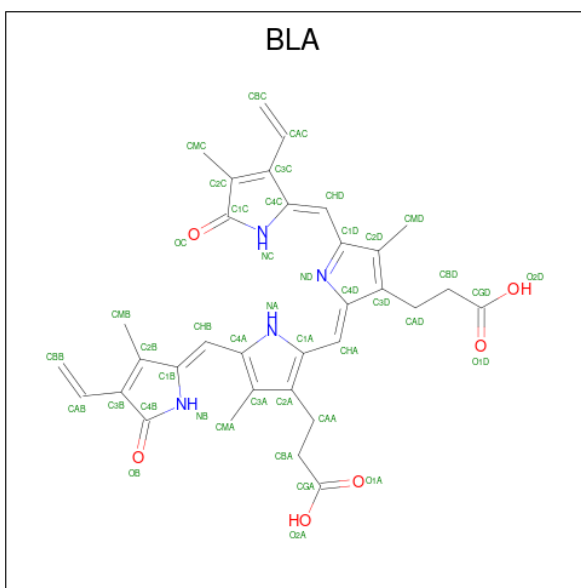
There are 2 unique types of molecules in this entry. The entry contains 7760 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Bacteriophytochrome (Light-regulated signal transduction histidine kinase).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	503	Total 3837	C 2423	N 702	O 703	S 9	1	0
1	B	503	Total 3837	C 2423	N 702	O 703	S 9	1	0

- Molecule 2 is BILIVERDINE IX ALPHA (three-letter code: BLA) (formula: C₃₃H₃₄N₄O₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
2	A	1	Total 43	C 33	N 4	O 6	0
2	B	1	Total 43	C 33	N 4	O 6	0

ARG	LEU	VAL	PRO	GLY	VAL	GLY	W463	L337	P243	E112
LEU	LEU	LEU	GLY	PHE	LEU	PHE	E464	A388	L244	M117
VAL	ALA	THR	ALA	VAL	THR	VAL	E465	K339	H245	E118
PRO	THR	PRO	THR	MET	LEU	MET	T466	L347	L246	L128
HIS	LEU	ARG	PRO	GLU	THR	ASP	V467	L347	E247	A135
GLY	PRO	SER	PRO	ASP	SER	TYR	R468	T351	Y248	K136
ALA	THR	ARG	THR	TYR	THR	TYR	D478	L249	L249	R139
ALA	ARG	ARG	THR	HIS	HIS	HIS	L479	R250	R250	E140
LEU	PHE	GLN	PHE	GLY	GLY	GLY	L480	N251	R250	L141
TRP	ALA	ALA	GLN	ALA	ALA	ALA	A480	M252	M252	L142
TRP	LEU	TRP	ARG	LEU	LEU	LEU	E483	G253	G253	Q143
VAL	GLY	TYR	GLY	GLY	PRO	PRO	D371	V254	V254	L152
ASP	ALA	LYS	ALA	GLY	LYS	LYS	E372	S257	S257	F155
SER	SER	SER	SER	GLU	GLU	GLU	R486	L262	L262	R162
ALA	ALA	THR	THR	GLY	GLY	GLY	L489	L262	L262	G169
ALA	ALA	THR	THR	GLY	GLY	GLY	L490	L263	L263	E170
LYS	VAL	ARG	VAL	ARG	ARG	ARG	G491	L269	L269	M180
GLN	PHE	ARG	THR	HIS	HIS	HIS	V492	W269	W269	M186
GLY	TYR	TYR	PRO	MET	MET	MET	V493	G270	G270	H187
ALA	VAL	ARG	VAL	GLU	GLU	GLU	L494	L271	L271	F188
THR	ALA	LYS	VAL	LEU	LEU	LEU	R495	L272	L272	
PHE	ASP	ASP	THR	LEU	LEU	LEU	Q496	H276	H276	
THR	PHE	GLY	THR	TRP	TRP	TRP	L500	Q386	Q386	
LEU	ILE	ILE	VAL	LEU	LEU	LEU	E501	L277	L277	
GLY	GLY	GLY	ARG	ALA	ALA	ALA	R502	A278	A278	
ILE	ILE	ILE	CYS	GLN	GLN	GLN	L503	Y284	Y284	
ARG	ALA	ALA	ASP	ARG	ARG	ARG	S504	L401	L401	
ARG	ALA	ALA	GLY	SER	SER	SER	E505	R404	R404	
GLY	PRO	PRO	ILE	GLY	GLY	GLY	A506	V407	V407	
PRO	PRO	PRO	ARG	ASP	ASP	ASP	L507	L299	L299	
GLY	PHE	PHE	ILE	MET	MET	MET	S508	Q300	Q300	
	GLU	GLU	ALA	LEU	LEU	LEU	M511	L301	L301	
	ALA	ALA	ALA	ASP	ASP	ASP	ALA	S302	S302	
	ILE	ILE	VAL	GLY	GLY	GLY	GLU	E303	E303	
	PHE	PHE	TRP	LEU	LEU	LEU	LEU	E304	E304	
	MET	MET	ALA	PHE	PHE	PHE	LEU	E305	E305	
	PHE	PHE	ASN	TYR	TYR	TYR	ASP	R306	R306	
	LEU	LEU	LEU	SER	SER	SER	ALA	E309	E309	
	ARG	ARG	VAL	ARG	ARG	ARG	ALA	N211	N211	
	LEU	LEU	VAL	ALA	ALA	ALA	GLY	A212	A212	
	ASN	ASN	ASN	GLY	GLY	GLY	HIS	R213	R213	
	ALA	ALA	ALA	THR	THR	THR	HIS	P221	P221	
	ALA	ALA	ALA	VAL	VAL	VAL	VAL	R229	R229	
	LYS	LYS	LYS	VAL	VAL	VAL	ALA	D232	D232	
	TYR	TYR	TYR	ASP	ASP	ASP	ALA	L233	L233	
	GLY	GLY	GLY	ASP	ASP	ASP	LEU	S234	S234	
	ALA	ALA	ALA	GLY	GLY	GLY	LYS	G235	G235	
	GLY	GLY	GLY	GLY	GLY	GLY	GLY	L316	L316	
	GLY	GLY	GLY	GLY	GLY	GLY	LEU	L319	L319	
	THR	THR	THR	GLU	GLU	GLU	PRO	P322	P322	
	ARG	ARG	ARG	VAL	VAL	VAL	ALA	L327	L327	
	GLY	GLY	GLY	TRP	TRP	TRP	LEU	E334	E334	
	VAL	VAL	VAL	ASN	ASN	ASN	LEU	E335	E335	
	VAL	VAL	VAL	MET	MET	MET	ARG	A462	A462	
	GLY	GLY	GLY	GLN	GLN	GLN	P456	R457	R457	
	LEU	LEU	LEU	GLU	GLU	GLU	ILE	F460	F460	
	ALA	ALA	ALA	VAL	VAL	VAL	GLN	Q461	Q461	
	ALA	ALA	ALA	VAL	VAL	VAL	GLN	E341	E341	
	ILE	ILE	ILE	PHE	PHE	PHE	TYR	A336	A336	
	ALA	ALA	ALA	HIS	HIS	HIS	ALA			
	ARG	ARG	ARG	GLY	GLY	GLY	ALA			

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	155342	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	59.31	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.328	Depositor
Minimum map value	-0.157	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.032	Depositor
Map size (\AA)	337.6, 337.6, 337.6	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.84400004, 0.84400004, 0.84400004	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: BLA

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	0.25	0/3920	0.56	0/5339
1	B	0.25	0/3920	0.61	1/5339 (0.0%)
All	All	0.25	0/7840	0.59	1/10678 (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

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	20	LEU	CA-CB-CG	7.93	133.54	115.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	220	VAL	Peptide

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	3837	0	3880	105	0
1	B	3837	0	3880	121	0
2	A	43	0	31	4	0
2	B	43	0	31	3	0
All	All	7760	0	7822	213	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 14.

All (213) 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:13:CYS:SG	1:A:14:ASP:N	2.62	0.72
1:A:355:LEU:HD23	1:A:362:LEU:HD21	1.73	0.71
1:A:136:LYS:HZ3	1:B:306:ARG:HD2	1.55	0.70
1:B:251:ASN:ND2	1:B:453:ARG:O	2.25	0.69
1:A:385:PHE:O	1:A:415:ARG:NH2	2.26	0.69
1:A:380:LEU:HD22	1:A:423:LEU:HD11	1.75	0.68
1:A:153:THR:HG23	1:A:155:PHE:H	1.58	0.67
1:B:136:LYS:HA	1:B:136:LYS:HE2	1.77	0.66
1:A:42:VAL:HG22	1:A:221:PRO:HG2	1.77	0.66
1:B:366:ARG:HD2	1:B:407:VAL:HG11	1.77	0.66
1:A:160:VAL:HG22	1:A:272:ILE:HG12	1.77	0.66
1:B:370:MET:HE3	1:B:370:MET:H	1.60	0.65
1:B:128:LEU:HD21	1:B:152:LEU:HD12	1.76	0.65
1:A:484:GLY:O	1:A:488:ALA:N	2.22	0.64
1:B:140:GLU:OE2	1:B:140:GLU:N	2.24	0.64
1:B:88:LEU:HD12	1:B:93:TYR:HD1	1.62	0.64
1:A:137:GLY:O	1:A:141:LEU:N	2.28	0.64
1:A:157:ARG:HH11	1:A:176:LYS:HZ1	1.46	0.64
1:B:276:HIS:ND1	1:B:278:ALA:O	2.31	0.63
1:B:490:ILE:HD12	1:B:493:VAL:HB	1.81	0.63
1:B:94:ARG:HD3	1:B:284:TYR:CZ	2.34	0.62
1:A:299:LEU:HB3	1:B:300:GLN:HE22	1.64	0.62
1:B:162:ARG:HH21	1:B:170:GLU:HG3	1.65	0.61
1:A:371:ASP:OD2	1:A:371:ASP:N	2.33	0.61
1:A:136:LYS:NZ	1:B:306:ARG:HD2	2.16	0.61
1:B:71:LEU:HD11	1:B:86:VAL:HG11	1.81	0.61
1:B:70:GLU:O	1:B:74:GLN:NE2	2.34	0.60
1:A:211:ASN:OD1	1:A:213:ARG:N	2.35	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:209:ILE:HB	1:B:257:SER:H	1.66	0.60
1:B:31:LEU:HB2	1:B:40:LEU:HD11	1.84	0.60
1:A:81:ARG:HH12	1:B:118:GLU:HA	1.67	0.60
1:A:489:LEU:O	1:A:492:VAL:HG12	2.01	0.59
1:B:500:LEU:HD13	1:B:503:LEU:HD21	1.83	0.59
1:A:475:LYS:HA	1:A:475:LYS:HE3	1.84	0.59
1:B:312:GLU:OE2	1:B:316:ARG:NH2	2.35	0.59
1:B:200:LEU:HD23	1:B:239:ARG:HH22	1.67	0.59
1:A:195:VAL:HG22	1:A:198:ARG:HH21	1.68	0.59
1:B:452:ALA:HB3	1:B:453:ARG:HH11	1.68	0.58
1:B:162:ARG:O	1:B:170:GLU:N	2.30	0.58
1:A:349:GLY:O	1:A:428:ARG:NH1	2.37	0.58
1:B:416:LEU:N	1:B:422:ARG:O	2.36	0.58
1:A:71:LEU:HD23	1:A:86:VAL:HG11	1.86	0.58
1:A:161:TYR:HD2	1:A:271:LEU:HB2	1.69	0.58
1:A:176:LYS:NZ	1:A:181:ASP:O	2.35	0.57
1:B:94:ARG:NH2	1:B:112:GLU:H	2.02	0.57
1:B:465:GLU:HA	1:B:468:ARG:HG2	1.85	0.57
1:A:39:ARG:HD2	1:A:60:GLY:HA2	1.87	0.57
1:B:309:GLU:N	1:B:309:GLU:OE1	2.37	0.56
1:A:174:GLU:OE2	1:A:176:LYS:NZ	2.37	0.56
1:A:455:HIS:HD2	2:A:801:BLA:HBB1	1.70	0.56
1:A:455:HIS:CD2	2:A:801:BLA:HBB1	2.40	0.56
1:B:30:LEU:HD11	1:B:105:VAL:HB	1.87	0.56
1:B:213:ARG:HH22	1:B:250:ARG:HB2	1.70	0.56
1:B:53:ARG:HG3	1:B:58:LEU:HD11	1.87	0.56
1:A:162:ARG:NH2	1:A:170:GLU:OE2	2.39	0.56
1:B:455:HIS:HD2	2:B:801:BLA:HBB2	1.71	0.56
1:B:67:LEU:HD13	1:B:71:LEU:HB2	1.87	0.55
1:A:180:MET:SD	1:A:180:MET:N	2.79	0.55
1:A:33:PHE:HZ	1:A:67:LEU:HD11	1.72	0.55
1:A:430:GLU:OE2	1:A:469:GLU:N	2.38	0.55
1:B:11:SER:OG	1:B:15:ARG:NH2	2.39	0.55
1:A:429:PRO:HG2	1:A:434:THR:HB	1.87	0.55
1:B:187:HIS:HB2	1:B:460:PHE:HD1	1.71	0.55
1:A:251:ASN:HB3	1:A:454:LEU:HD13	1.89	0.55
1:B:262:LEU:HD11	1:B:272:ILE:HG13	1.88	0.55
1:A:412:LEU:HD21	1:A:482:ALA:HB2	1.88	0.54
1:A:306:ARG:NH2	1:B:304:GLU:OE2	2.40	0.54
1:A:94:ARG:HB2	1:A:109:GLU:HB3	1.90	0.54
1:B:233:LEU:HB3	1:B:236:SER:HB3	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:213:ARG:HH12	1:B:250:ARG:HE	1.57	0.53
1:A:459:SER:OG	1:A:460:PHE:N	2.42	0.53
1:A:193:ILE:HD11	2:A:801:BLA:HMA3	1.90	0.53
1:A:428:ARG:NH2	1:A:478:ASP:OD2	2.41	0.53
1:A:369:SER:OG	1:A:371:ASP:OD2	2.20	0.53
1:A:323:LEU:HD11	1:A:344:VAL:HB	1.91	0.53
1:A:276:HIS:CE1	1:A:280:LEU:HD21	2.44	0.52
1:A:341:GLY:O	1:A:345:LEU:HB3	2.09	0.52
1:B:94:ARG:HG3	1:B:109:GLU:HB3	1.91	0.52
1:A:461:GLN:O	1:A:464:GLU:HG2	2.10	0.52
1:B:387:THR:OG1	1:B:486:ARG:NH2	2.43	0.52
1:A:438:ALA:HA	1:A:442:ARG:HH22	1.74	0.52
1:B:20:LEU:HD21	1:B:229:ARG:HB2	1.92	0.52
1:A:78:LEU:HD13	1:A:84:LEU:HG	1.92	0.52
1:B:428:ARG:NH2	1:B:478:ASP:OD2	2.43	0.52
1:A:128:LEU:HD13	1:A:293:LEU:HD22	1.91	0.51
1:B:70:GLU:HG2	1:B:71:LEU:HD22	1.92	0.51
1:A:406:ASP:OD1	1:A:433:ARG:NH1	2.43	0.51
1:B:303:SER:HA	1:B:306:ARG:HH21	1.76	0.51
1:A:84:LEU:C	1:A:94:ARG:HH12	2.15	0.50
1:A:186:MET:HG3	1:A:455:HIS:HE2	1.77	0.50
1:A:192:ASP:HA	2:A:801:BLA:HMC3	1.93	0.50
1:A:499:GLU:HG2	1:B:503:LEU:HD23	1.94	0.50
1:B:252:MET:HG3	1:B:254:VAL:HG12	1.94	0.50
1:A:509:ARG:NH2	1:B:506:ALA:O	2.45	0.49
1:B:135:ALA:HB1	1:B:141:LEU:HD12	1.94	0.49
1:B:207:ARG:NH1	2:B:801:BLA:O1D	2.45	0.49
1:A:372:GLU:OE2	1:A:404:ARG:NH1	2.46	0.49
1:B:34:ARG:NH1	1:B:102:GLY:O	2.45	0.49
1:A:135:ALA:HA	1:A:140:GLU:OE2	2.11	0.49
1:A:328:GLY:O	1:B:495:ARG:NH1	2.46	0.49
1:B:162:ARG:HB3	1:B:170:GLU:HB2	1.94	0.49
1:A:431:ALA:O	1:A:432:VAL:HB	2.13	0.49
1:B:67:LEU:HD12	1:B:68:PRO:O	2.13	0.49
1:B:463:TRP:O	1:B:467:VAL:HG22	2.12	0.48
1:A:502:ARG:HE	1:A:505:GLU:HG2	1.79	0.48
1:B:315[A]:HIS:CE1	1:B:316:ARG:HE	2.31	0.48
1:B:327:LEU:HD12	1:B:493:VAL:HG12	1.95	0.48
1:A:14:ASP:OD1	1:A:15:ARG:N	2.46	0.48
1:A:199:ALA:O	1:A:203:ARG:HG3	2.14	0.48
1:B:505:GLU:HA	1:B:508:SER:HB2	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:211:ASN:OD1	1:B:213:ARG:N	2.47	0.48
1:A:490:ILE:HG13	1:A:494:LEU:HD12	1.95	0.48
1:B:32:ALA:HB3	1:B:41:GLU:HB3	1.94	0.48
1:B:88:LEU:HD12	1:B:93:TYR:CD1	2.45	0.48
1:A:246:LEU:O	1:A:250:ARG:HG3	2.14	0.47
1:B:94:ARG:HH21	1:B:112:GLU:H	1.62	0.47
1:B:455:HIS:HB2	1:B:456:PRO:HD3	1.96	0.47
1:A:369:SER:O	1:A:373:VAL:HG12	2.15	0.47
1:B:207:ARG:NH2	1:B:241:VAL:HG12	2.30	0.47
1:A:324:ALA:HB3	1:B:489:LEU:HA	1.97	0.47
1:B:161:TYR:O	1:B:270:GLY:HA2	2.15	0.47
1:A:416:LEU:HB2	1:A:422:ARG:HB2	1.97	0.47
1:B:462:ALA:O	1:B:466:THR:OG1	2.21	0.47
1:B:97:LEU:HD13	1:B:105:VAL:O	2.15	0.46
1:A:489:LEU:O	1:A:491:GLY:N	2.48	0.46
1:B:245:HIS:CE1	1:B:249:LEU:HD11	2.50	0.46
1:B:453:ARG:HD3	1:B:453:ARG:N	2.31	0.46
1:A:248:TYR:CE1	1:A:454:LEU:HA	2.49	0.46
1:A:502:ARG:HB2	1:B:503:LEU:HD22	1.96	0.46
1:B:398:TYR:HE2	1:B:401:LEU:HG	1.79	0.46
1:B:162:ARG:NH2	1:B:170:GLU:HG3	2.29	0.46
1:A:24:ILE:O	1:A:217:VAL:N	2.45	0.46
1:A:78:LEU:HG	1:A:97:LEU:HD23	1.98	0.46
1:A:426:TRP:HH2	1:A:485:PHE:HB3	1.79	0.46
1:B:201:TYR:OH	2:B:801:BLA:O2D	2.33	0.46
1:A:487:SER:HA	1:A:490:ILE:HB	1.97	0.46
1:B:431:ALA:O	1:B:432:VAL:HB	2.16	0.46
1:A:159:MET:HE2	1:A:161:TYR:HE1	1.80	0.46
1:B:276:HIS:HD1	1:B:278:ALA:H	1.63	0.46
1:B:502:ARG:NH2	1:B:505:GLU:OE1	2.49	0.46
1:B:376:LEU:HD12	1:B:377:ALA:N	2.31	0.46
1:B:239:ARG:HD2	1:B:240:SER:O	2.16	0.45
1:B:379:TRP:O	1:B:382:PRO:HD2	2.16	0.45
1:B:492:VAL:O	1:B:496:GLN:HG2	2.16	0.45
1:A:57:ALA:O	1:A:61:LYS:HE2	2.16	0.45
1:B:42:VAL:HG12	1:B:221:PRO:HD2	1.97	0.45
1:B:478:ASP:OD1	1:B:479:LEU:N	2.49	0.45
1:B:19:HIS:CD2	1:B:232:ASP:HB2	2.51	0.45
1:B:28:GLY:HA3	1:B:238:LEU:HD11	1.98	0.45
1:A:224:VAL:HG12	1:A:227:LEU:H	1.82	0.45
1:B:290:CYS:O	1:B:294:THR:HG23	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:85:ARG:NH1	1:A:116:ASP:OD2	2.48	0.45
1:A:316:ARG:HD2	1:A:347:LEU:O	2.17	0.45
1:B:37:ASP:HB2	1:B:39:ARG:NH1	2.32	0.45
1:B:454:LEU:HG	1:B:456:PRO:HD2	1.99	0.44
1:A:292:VAL:O	1:A:296:LEU:HD23	2.18	0.44
1:B:380:LEU:HD13	1:B:385:PHE:HZ	1.82	0.44
1:B:407:VAL:HA	1:B:429:PRO:HA	1.98	0.44
1:A:207:ARG:HB3	1:A:259:SER:OG	2.17	0.44
1:A:356:LEU:HB2	1:A:423:LEU:H	1.81	0.44
1:A:213:ARG:NH1	1:A:255:GLU:OE2	2.50	0.44
1:B:315[A]:HIS:HE1	1:B:316:ARG:HH21	1.64	0.44
1:B:319:LEU:O	1:B:322:PRO:HD2	2.17	0.44
1:B:269:TRP:CE3	1:B:301:LEU:HD21	2.53	0.43
1:B:387:THR:O	1:B:414:VAL:HG23	2.18	0.43
1:B:450:GLY:HA3	1:B:453:ARG:CZ	2.48	0.43
1:A:78:LEU:HD21	1:A:95:ALA:HB1	2.00	0.43
1:A:213:ARG:NH2	1:A:250:ARG:HG2	2.33	0.43
1:B:207:ARG:NH2	1:B:239:ARG:HE	2.17	0.43
1:B:500:LEU:O	1:B:503:LEU:HG	2.18	0.43
1:B:335:GLU:C	1:B:339:LYS:HZ2	2.22	0.43
1:B:243:PRO:HA	1:B:246:LEU:HG	2.00	0.43
1:A:81:ARG:HG2	1:A:83:ALA:H	1.82	0.43
1:A:255:GLU:OE1	1:A:279:PRO:HD3	2.19	0.43
1:A:430:GLU:HG2	1:A:432:VAL:HG12	2.01	0.43
1:B:202:THR:HG23	1:B:263:LEU:HD21	1.99	0.43
1:B:480:ALA:O	1:B:483:GLU:HG3	2.19	0.43
1:A:117:MET:SD	1:A:118:GLU:N	2.92	0.42
1:A:388:SER:HB2	1:A:414:VAL:HG12	2.01	0.42
1:B:180:MET:SD	1:B:180:MET:N	2.93	0.42
1:B:186:MET:SD	1:B:187:HIS:N	2.92	0.42
1:B:19:HIS:NE2	1:B:234:SER:HB3	2.34	0.42
1:B:187:HIS:HB2	1:B:460:PHE:CD1	2.53	0.42
1:B:334:GLU:O	1:B:337:LEU:HG	2.20	0.42
1:B:37:ASP:N	1:B:37:ASP:OD1	2.52	0.42
1:B:372:GLU:OE2	1:B:404:ARG:NH2	2.53	0.42
1:B:155:PHE:HA	1:B:276:HIS:HD2	1.84	0.42
1:B:440:ASN:OD1	1:B:440:ASN:N	2.52	0.42
1:A:426:TRP:HZ3	1:A:482:ALA:HA	1.84	0.42
1:A:376:LEU:HD23	1:A:376:LEU:HA	1.80	0.41
1:A:144:THR:O	1:A:148:THR:HG23	2.20	0.41
1:B:207:ARG:CZ	1:B:239:ARG:HH21	2.34	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:128:LEU:HD21	1:A:152:LEU:HD13	2.03	0.41
1:B:139:ARG:NH1	1:B:143:GLN:HB2	2.35	0.41
1:B:351:THR:HG22	1:B:429:PRO:HD3	2.01	0.41
1:A:32:ALA:C	1:A:33:PHE:HD2	2.24	0.41
1:A:99:GLU:HG3	1:A:104:THR:HG22	2.02	0.41
1:A:174:GLU:CD	1:A:183:PHE:H	2.23	0.41
1:A:333:LEU:O	1:A:337:LEU:HG	2.21	0.41
1:B:14:ASP:OD1	1:B:15:ARG:HG3	2.21	0.41
1:B:169:GLY:HA3	1:B:188:PHE:CZ	2.56	0.41
1:A:269:TRP:CD2	1:A:301:LEU:HD11	2.56	0.41
1:A:503:LEU:HD22	1:B:503:LEU:HB3	2.03	0.41
1:A:311:ALA:HA	1:B:310:ALA:HB1	2.03	0.40
1:A:316:ARG:HD3	1:A:316:ARG:HA	1.85	0.40
1:A:356:LEU:HD11	1:A:361:PRO:HG3	2.03	0.40
1:B:247:GLU:OE2	1:B:453:ARG:HG3	2.21	0.40
1:A:300:GLN:NE2	1:B:299:LEU:HB3	2.36	0.40
1:A:371:ASP:O	1:A:374:GLU:HG3	2.21	0.40
1:A:139:ARG:HH12	1:A:143:GLN:HB2	1.87	0.40
1:B:347:LEU:HD23	1:B:347:LEU:HA	1.86	0.40
1:A:409:ALA:H	1:A:427:PHE:HE1	1.70	0.40
1:B:18:ILE:HD13	1:B:18:ILE:HA	1.93	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	502/747 (67%)	480 (96%)	19 (4%)	3 (1%)	22	55
1	B	502/747 (67%)	468 (93%)	34 (7%)	0	100	100
All	All	1004/1494 (67%)	948 (94%)	53 (5%)	3 (0%)	38	68

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	13	CYS
1	A	432	VAL
1	A	457	ARG

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	390/574 (68%)	383 (98%)	7 (2%)	54	72
1	B	390/574 (68%)	379 (97%)	11 (3%)	38	60
All	All	780/1148 (68%)	762 (98%)	18 (2%)	47	65

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	30	LEU
1	A	180	MET
1	A	265	ASP
1	A	284	TYR
1	A	314	SER
1	A	366	ARG
1	A	486	ARG
1	B	38	ARG
1	B	93	TYR
1	B	117	MET
1	B	136	LYS
1	B	180	MET
1	B	313	ASP
1	B	315[A]	HIS
1	B	315[B]	HIS
1	B	370	MET
1	B	453	ARG
1	B	457	ARG

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

sidechains are listed below:

Mol	Chain	Res	Type
1	B	25	GLN
1	B	74	GLN
1	B	300	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](#)

2 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	BLA	B	801	1	42,46,46	3.83	21 (50%)	54,67,67	2.19	12 (22%)
2	BLA	A	801	1	42,46,46	3.82	21 (50%)	54,67,67	2.05	10 (18%)

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	BLA	B	801	1	-	19/26/74/74	0/4/4/4
2	BLA	A	801	1	-	14/26/74/74	0/4/4/4

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	BLA	C4C-NC	9.53	1.54	1.37
2	A	801	BLA	C4C-NC	9.50	1.54	1.37
2	B	801	BLA	C1B-NB	9.48	1.54	1.37
2	A	801	BLA	C1B-NB	9.43	1.53	1.37
2	B	801	BLA	C3C-C2C	7.84	1.53	1.37
2	A	801	BLA	C3C-C2C	7.71	1.52	1.37
2	A	801	BLA	C1C-NC	6.98	1.54	1.38
2	B	801	BLA	C1C-NC	6.91	1.54	1.38
2	A	801	BLA	C4B-NB	6.79	1.53	1.38
2	B	801	BLA	C4B-NB	6.76	1.53	1.38
2	A	801	BLA	C4D-ND	6.06	1.51	1.38
2	B	801	BLA	C4D-ND	5.97	1.51	1.38
2	A	801	BLA	CAC-C3C	-5.83	1.31	1.47
2	B	801	BLA	CAC-C3C	-5.80	1.31	1.47
2	A	801	BLA	C1D-ND	5.41	1.48	1.36
2	B	801	BLA	C1D-ND	5.35	1.48	1.36
2	B	801	BLA	CHD-C1D	5.22	1.52	1.40
2	A	801	BLA	CHD-C1D	5.22	1.52	1.40
2	B	801	BLA	C4D-C3D	5.08	1.53	1.45
2	B	801	BLA	C3D-C2D	5.01	1.47	1.36
2	A	801	BLA	C3D-C2D	4.93	1.47	1.36
2	A	801	BLA	C4D-C3D	4.87	1.53	1.45
2	B	801	BLA	CBC-CAC	4.05	1.49	1.30
2	A	801	BLA	CBC-CAC	4.05	1.49	1.30
2	A	801	BLA	CHA-C4D	-3.04	1.32	1.35
2	B	801	BLA	C1B-C2B	3.01	1.50	1.45
2	A	801	BLA	C4A-CHB	2.99	1.53	1.41
2	B	801	BLA	C1A-CHA	2.97	1.53	1.41
2	B	801	BLA	C4A-CHB	2.96	1.53	1.41
2	A	801	BLA	C1A-CHA	2.90	1.53	1.41
2	B	801	BLA	CHA-C4D	-2.85	1.32	1.35
2	A	801	BLA	C1B-C2B	2.84	1.50	1.45
2	B	801	BLA	C3B-C2B	2.68	1.42	1.37
2	A	801	BLA	C3B-C2B	2.61	1.42	1.37
2	A	801	BLA	CHD-C4C	-2.56	1.31	1.37
2	A	801	BLA	OC-C1C	-2.51	1.18	1.23
2	B	801	BLA	OC-C1C	-2.51	1.18	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	BLA	CHD-C4C	-2.48	1.31	1.37
2	A	801	BLA	OB-C4B	-2.45	1.18	1.23
2	B	801	BLA	OB-C4B	-2.44	1.18	1.23
2	A	801	BLA	CAB-C3B	2.07	1.52	1.47
2	B	801	BLA	CAB-C3B	2.06	1.52	1.47

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	BLA	CMC-C2C-C3C	-7.92	109.26	128.43
2	B	801	BLA	CMC-C2C-C3C	-7.81	109.52	128.43
2	B	801	BLA	C1A-CHA-C4D	-6.91	119.47	128.73
2	A	801	BLA	C1A-CHA-C4D	-6.36	120.22	128.73
2	B	801	BLA	CMC-C2C-C1C	-6.03	108.60	121.21
2	A	801	BLA	CMC-C2C-C1C	-5.60	109.50	121.21
2	B	801	BLA	C4C-CHD-C1D	-3.88	118.52	128.06
2	B	801	BLA	C3D-C4D-ND	-3.23	105.47	110.04
2	A	801	BLA	C3D-C4D-ND	-3.03	105.75	110.04
2	A	801	BLA	C4C-CHD-C1D	-2.88	120.97	128.06
2	A	801	BLA	C1B-NB-C4B	-2.55	107.53	110.66
2	B	801	BLA	C4B-C3B-C2B	2.50	111.13	107.92
2	B	801	BLA	CMB-C2B-C3B	-2.41	122.59	128.43
2	A	801	BLA	C4B-C3B-C2B	2.38	110.98	107.92
2	B	801	BLA	CMB-C2B-C1B	2.33	126.99	124.16
2	B	801	BLA	C4D-C3D-C2D	2.32	109.24	106.73
2	A	801	BLA	C4D-C3D-C2D	2.31	109.22	106.73
2	B	801	BLA	C1B-NB-C4B	-2.26	107.88	110.66
2	A	801	BLA	C3B-C2B-C1B	2.25	110.43	107.92
2	B	801	BLA	C3B-C2B-C1B	2.25	110.42	107.92
2	A	801	BLA	CMB-C2B-C3B	-2.16	123.19	128.43
2	B	801	BLA	CHB-C1B-C2B	2.07	131.10	126.99

There are no chirality outliers.

All (33) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	801	BLA	NA-C1A-CHA-C4D
2	A	801	BLA	C2A-C1A-CHA-C4D
2	A	801	BLA	NB-C1B-CHB-C4A
2	A	801	BLA	C2B-C1B-CHB-C4A
2	A	801	BLA	ND-C1D-CHD-C4C
2	B	801	BLA	NA-C1A-CHA-C4D

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Mol	Chain	Res	Type	Atoms
2	B	801	BLA	C2A-C1A-CHA-C4D
2	B	801	BLA	NA-C4A-CHB-C1B
2	B	801	BLA	C3A-C4A-CHB-C1B
2	B	801	BLA	C2A-CAA-CBA-CGA
2	B	801	BLA	NB-C1B-CHB-C4A
2	B	801	BLA	C2B-C1B-CHB-C4A
2	B	801	BLA	C2B-C3B-CAB-CBB
2	B	801	BLA	C4B-C3B-CAB-CBB
2	B	801	BLA	C2C-C3C-CAC-CBC
2	B	801	BLA	C4C-C3C-CAC-CBC
2	B	801	BLA	ND-C1D-CHD-C4C
2	A	801	BLA	C2D-C1D-CHD-C4C
2	B	801	BLA	C2D-C1D-CHD-C4C
2	B	801	BLA	C3D-CAD-CBD-CGD
2	A	801	BLA	C3D-CAD-CBD-CGD
2	B	801	BLA	ND-C4D-CHA-C1A
2	A	801	BLA	C4B-C3B-CAB-CBB
2	A	801	BLA	C2B-C3B-CAB-CBB
2	B	801	BLA	CAA-CBA-CGA-O1A
2	A	801	BLA	CAA-CBA-CGA-O1A
2	B	801	BLA	CAA-CBA-CGA-O2A
2	A	801	BLA	CAA-CBA-CGA-O2A
2	B	801	BLA	CAD-CBD-CGD-O1D
2	B	801	BLA	CAD-CBD-CGD-O2D
2	A	801	BLA	CAD-CBD-CGD-O2D
2	A	801	BLA	CAD-CBD-CGD-O1D
2	A	801	BLA	C2A-CAA-CBA-CGA

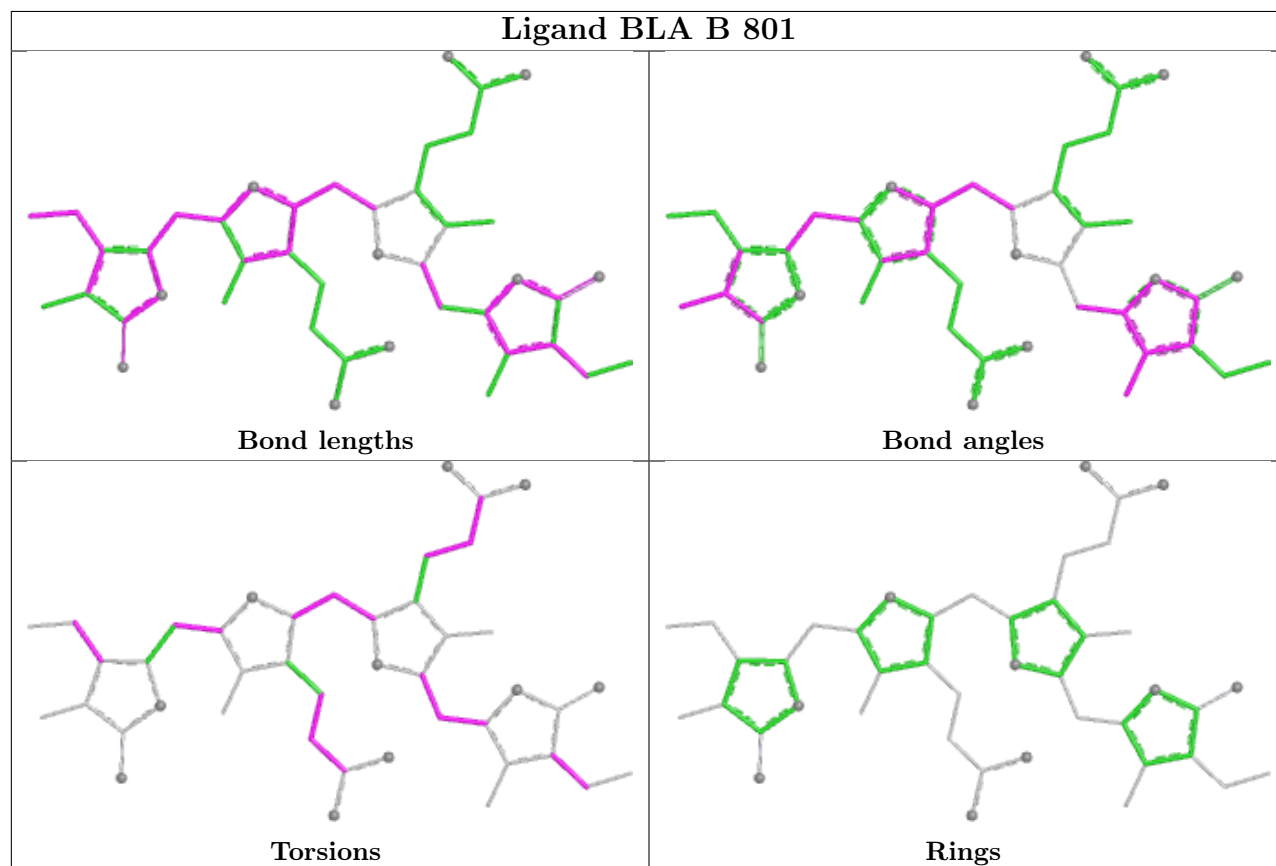
There are no ring outliers.

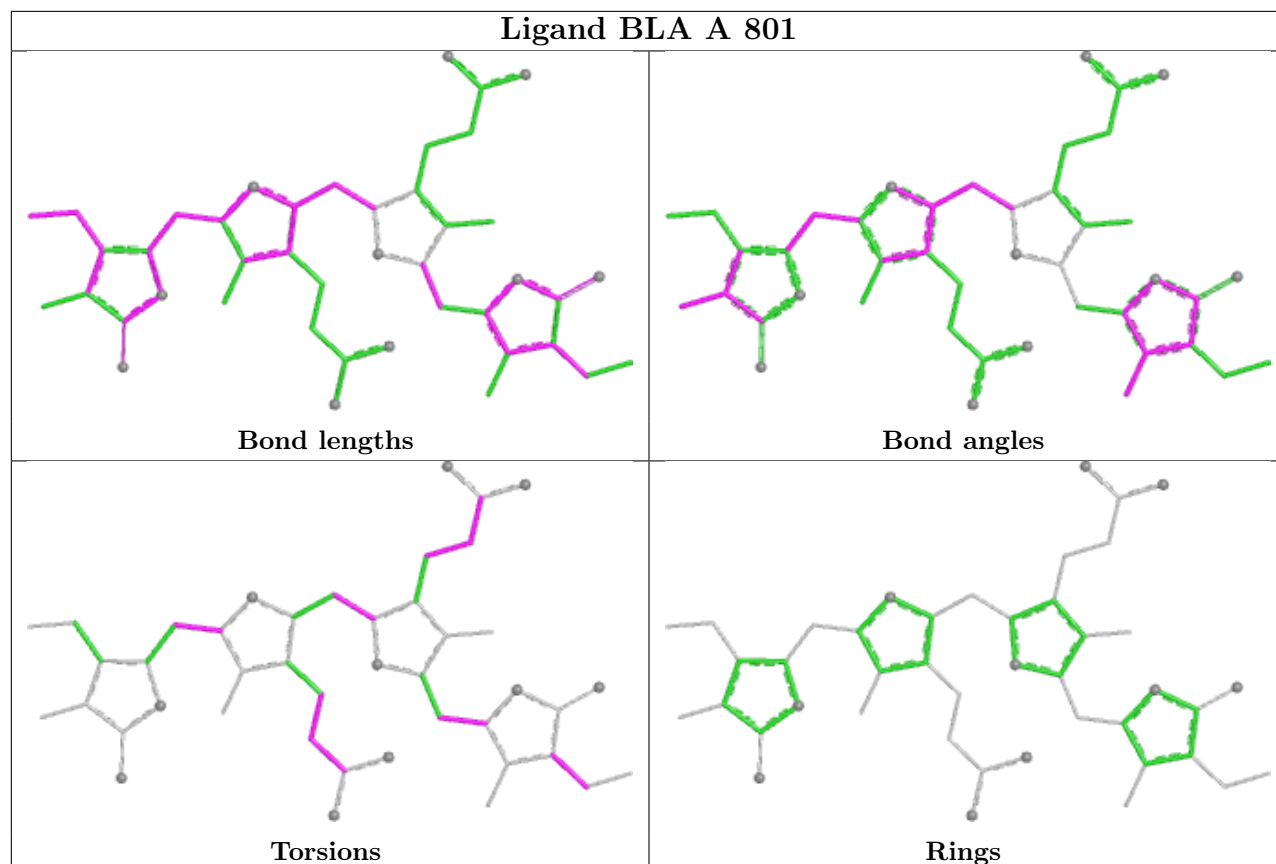
2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	801	BLA	3	0
2	A	801	BLA	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 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.

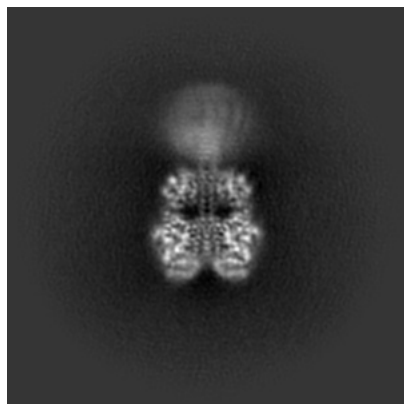
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42452. These allow visual inspection of the internal detail of the map and identification of artifacts.

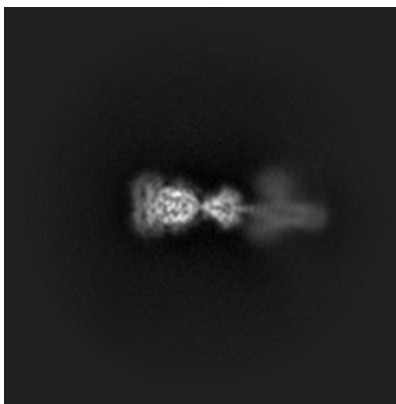
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

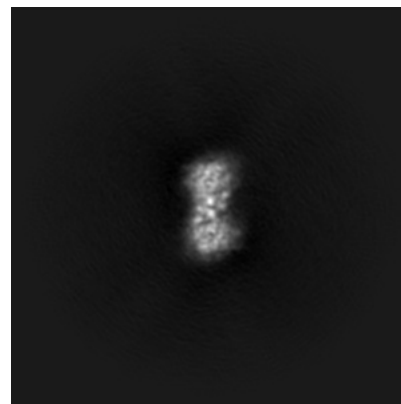
6.1.1 Primary map



X

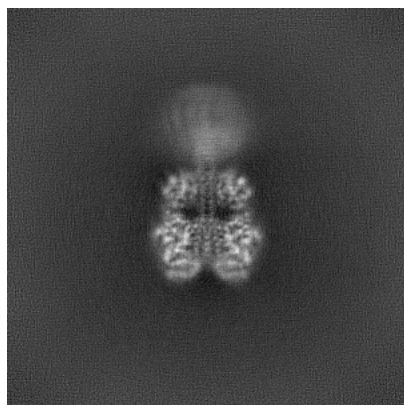


Y

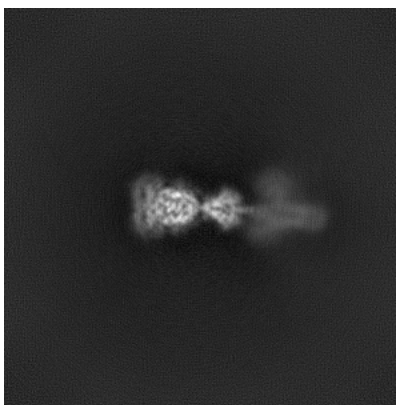


Z

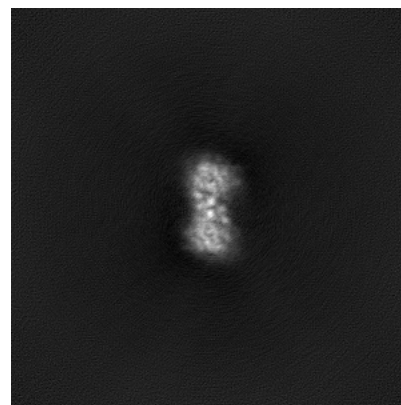
6.1.2 Raw map



X



Y

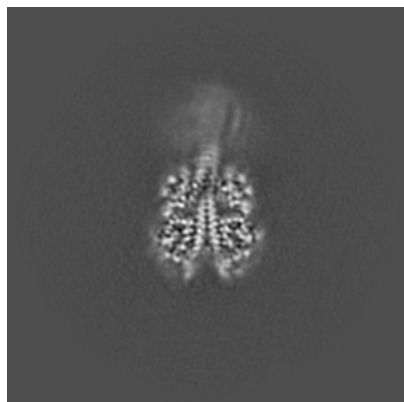


Z

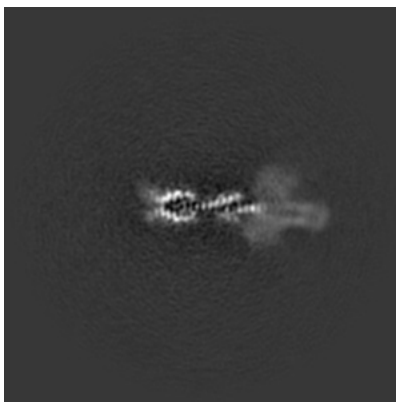
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

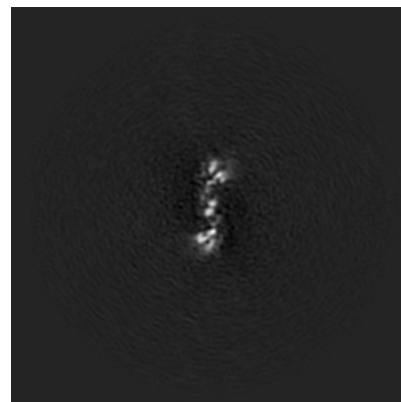
6.2.1 Primary map



X Index: 200

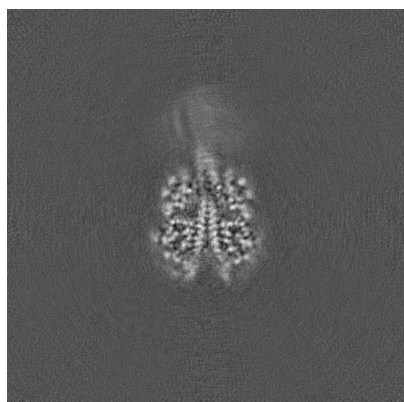


Y Index: 200

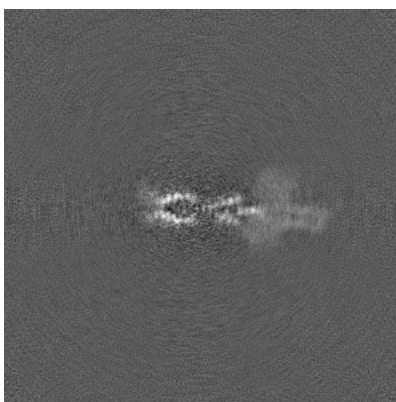


Z Index: 200

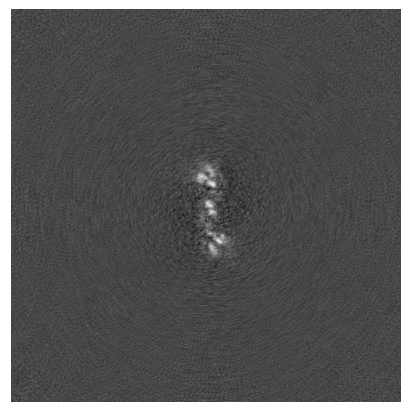
6.2.2 Raw map



X Index: 200



Y Index: 200

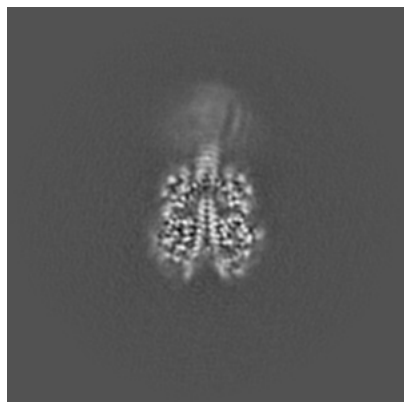


Z Index: 200

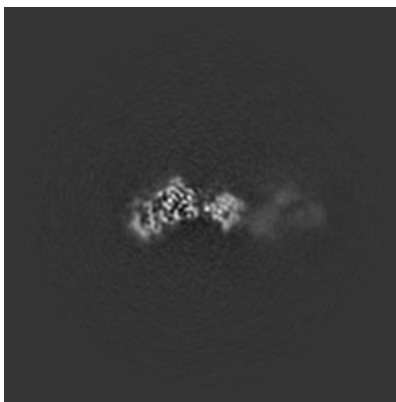
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

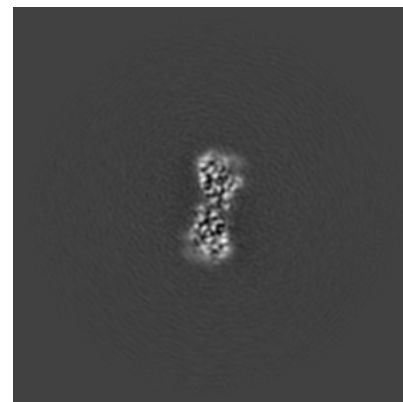
6.3.1 Primary map



X Index: 199

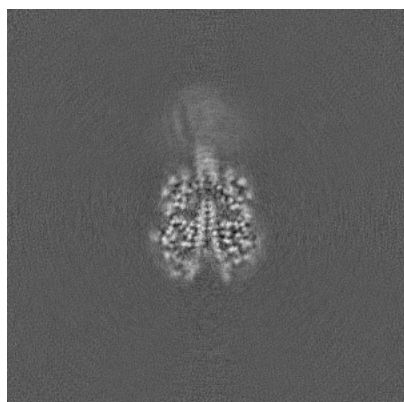


Y Index: 223

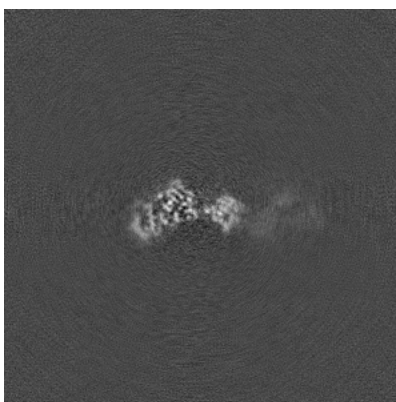


Z Index: 175

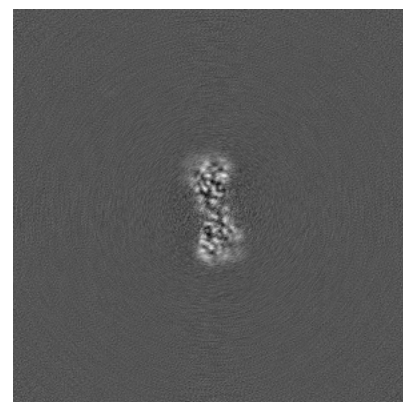
6.3.2 Raw map



X Index: 199



Y Index: 176

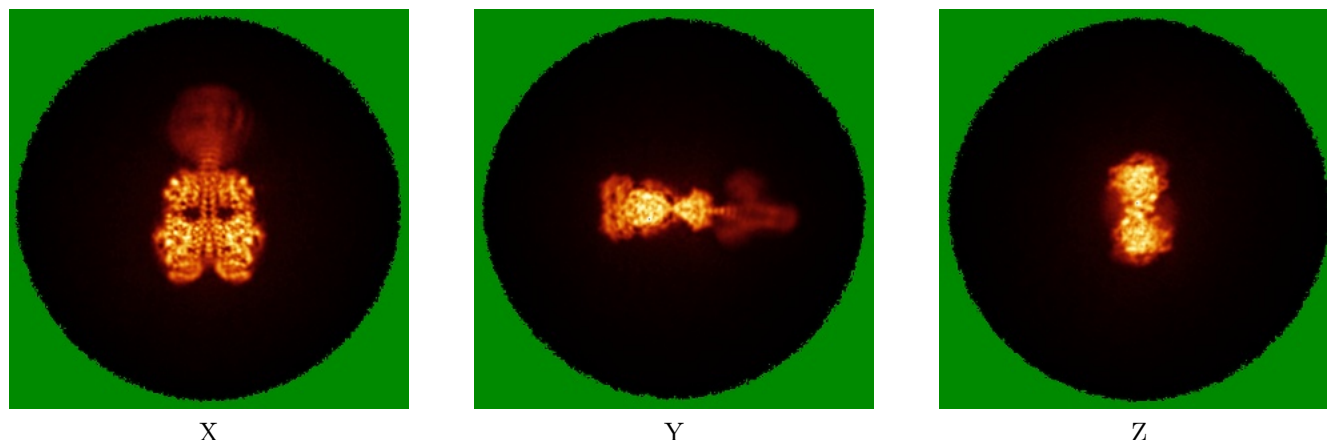


Z Index: 176

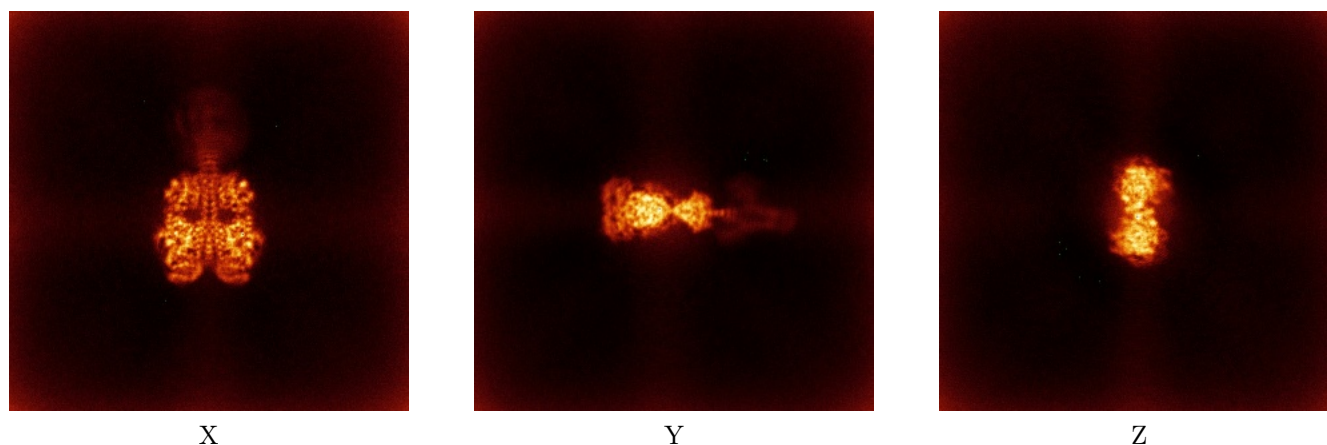
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



6.4.2 Raw map



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

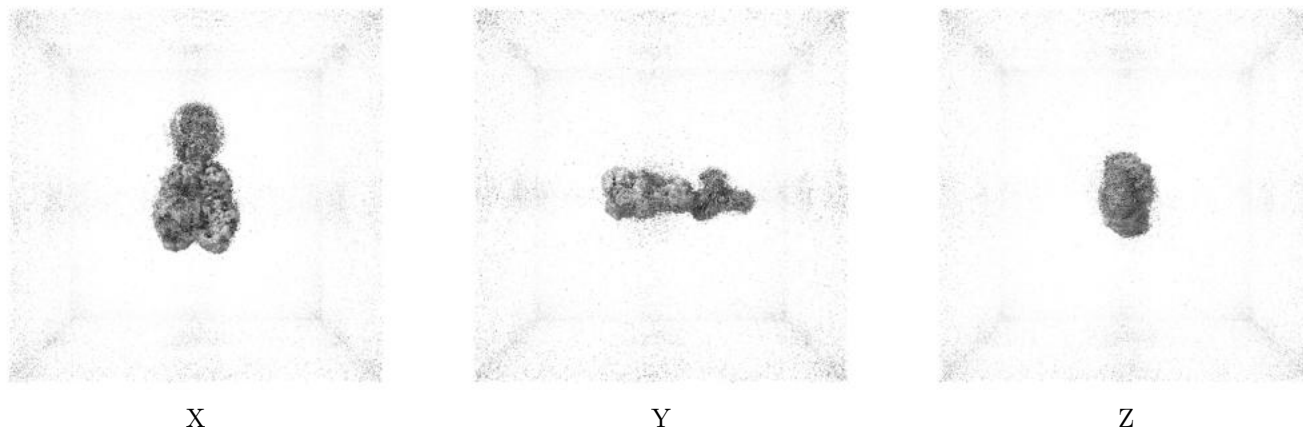
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.032. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

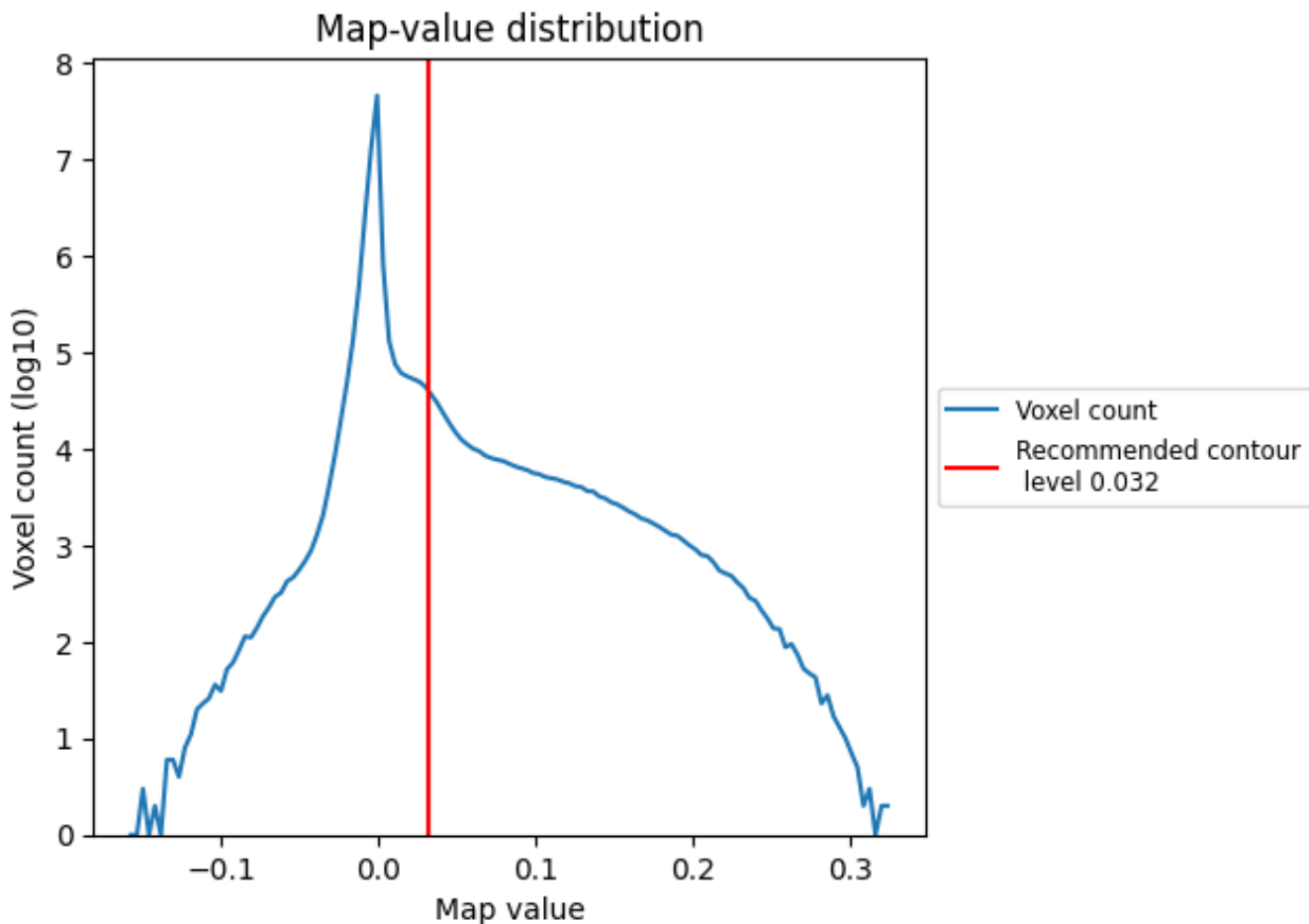
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

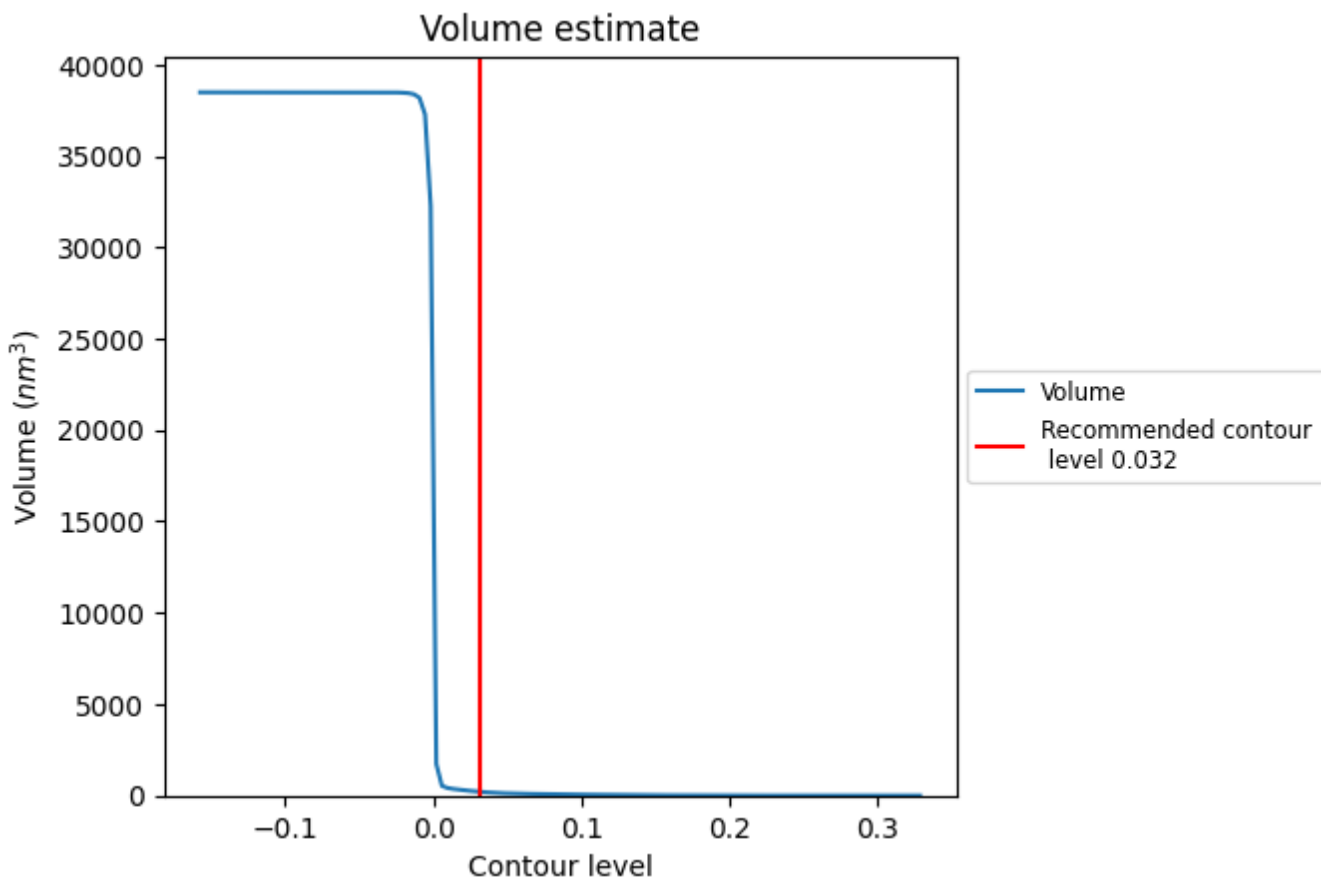
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

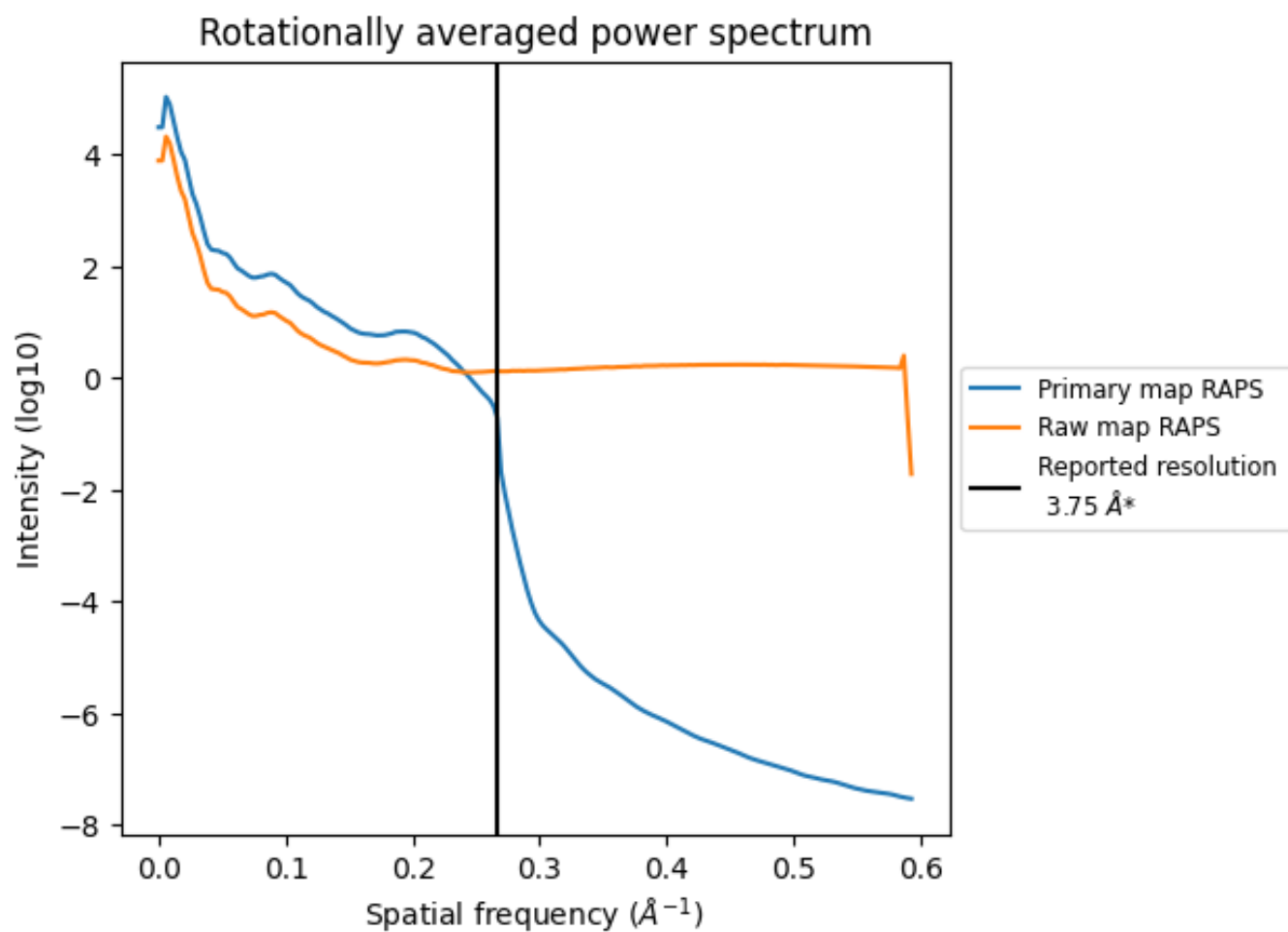
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 201 nm³; this corresponds to an approximate mass of 182 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

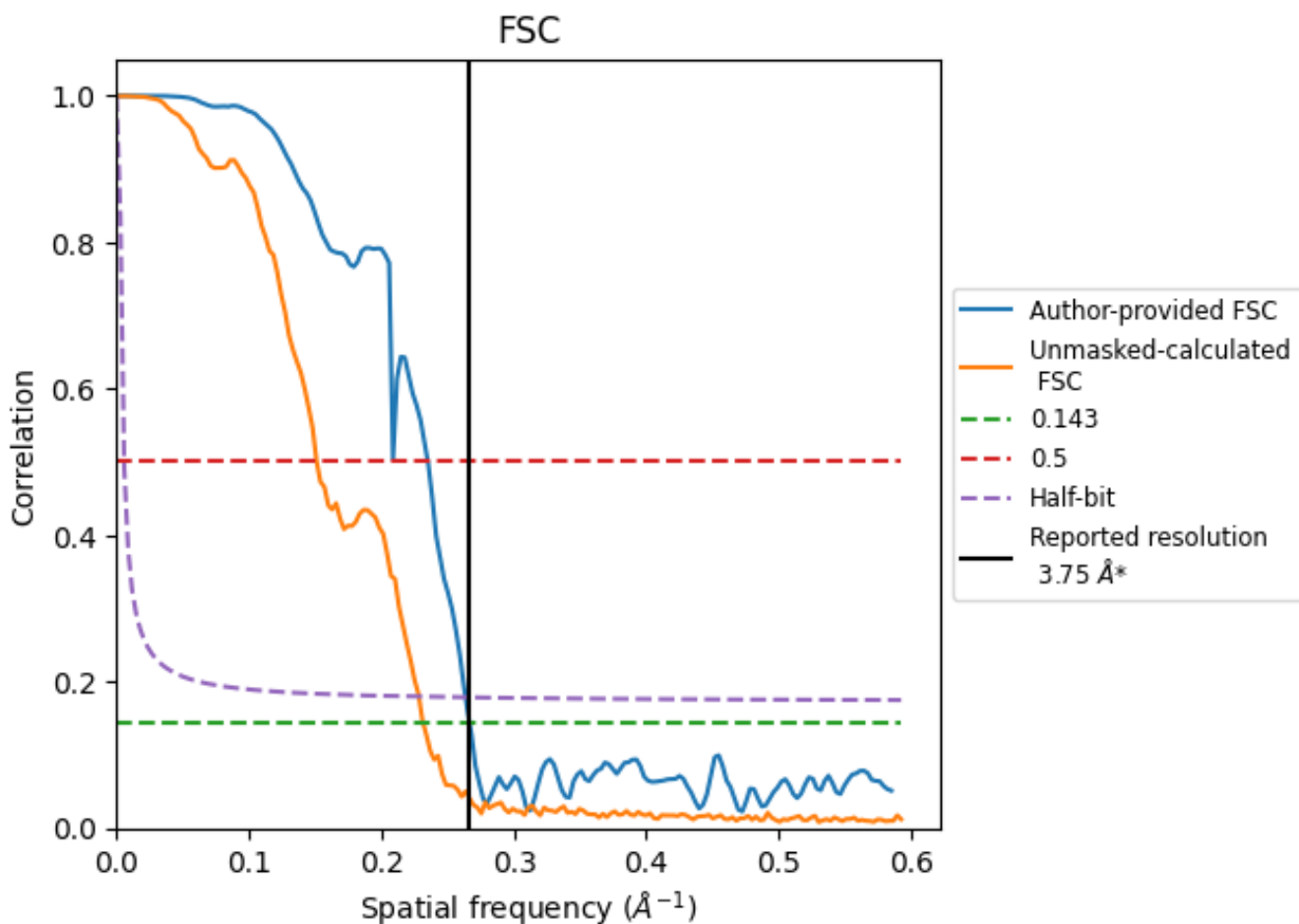


*Reported resolution corresponds to spatial frequency of 0.267 Å⁻¹

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 0.267\AA^{-1}

8.2 Resolution estimates [i](#)

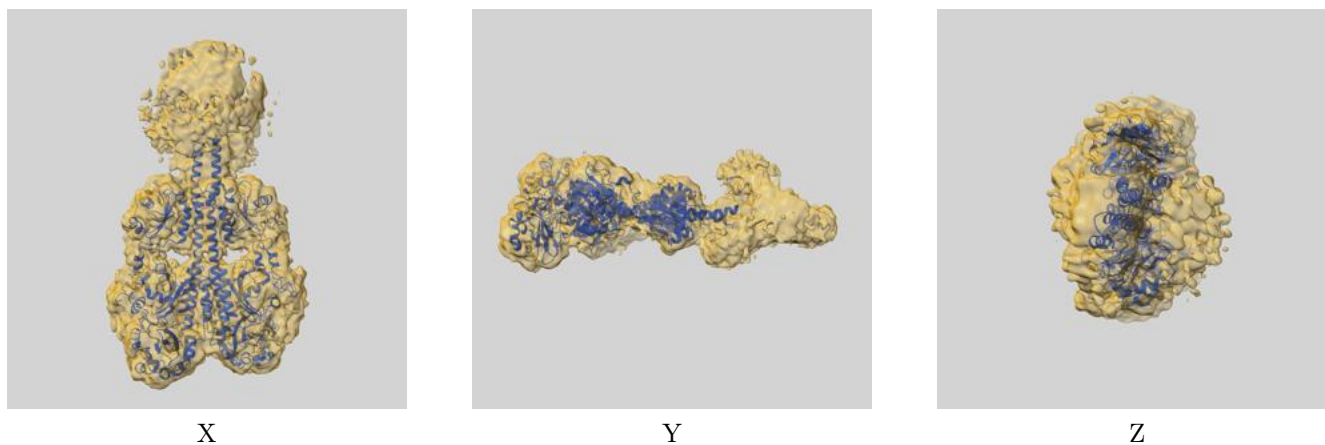
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.75	-	-
Author-provided FSC curve	3.75	4.25	3.79
Unmasked-calculated*	4.32	6.62	4.38

*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 4.32 differs from the reported value 3.75 by more than 10 %

9 Map-model fit [i](#)

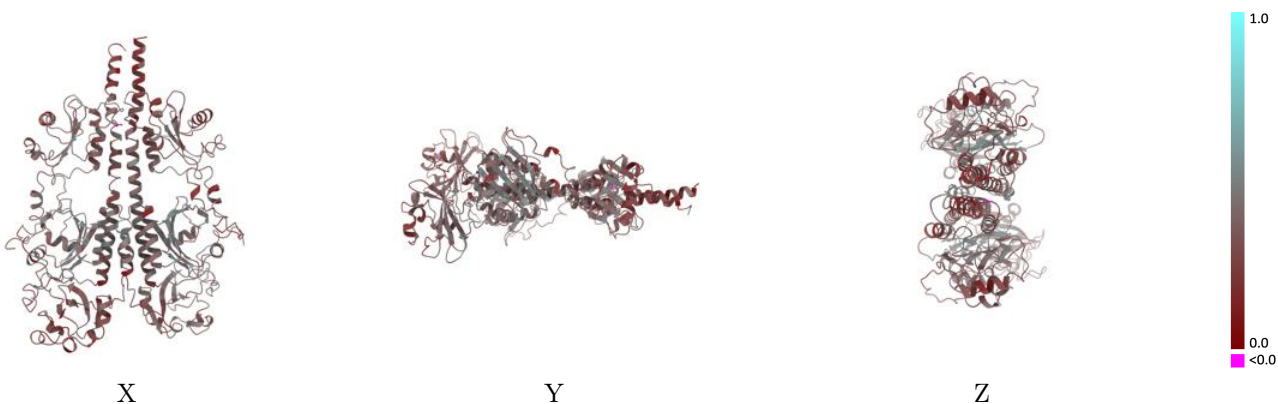
This section contains information regarding the fit between EMDB map EMD-42452 and PDB model 8UPM. Per-residue inclusion information can be found in section [3](#) on page [4](#).

9.1 Map-model overlay [i](#)



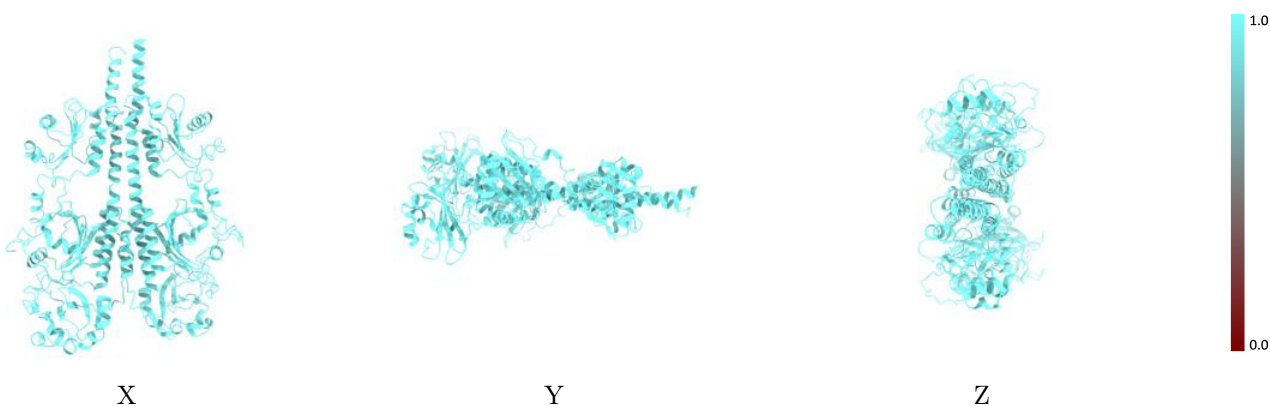
The images above show the 3D surface view of the map at the recommended contour level 0.032 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



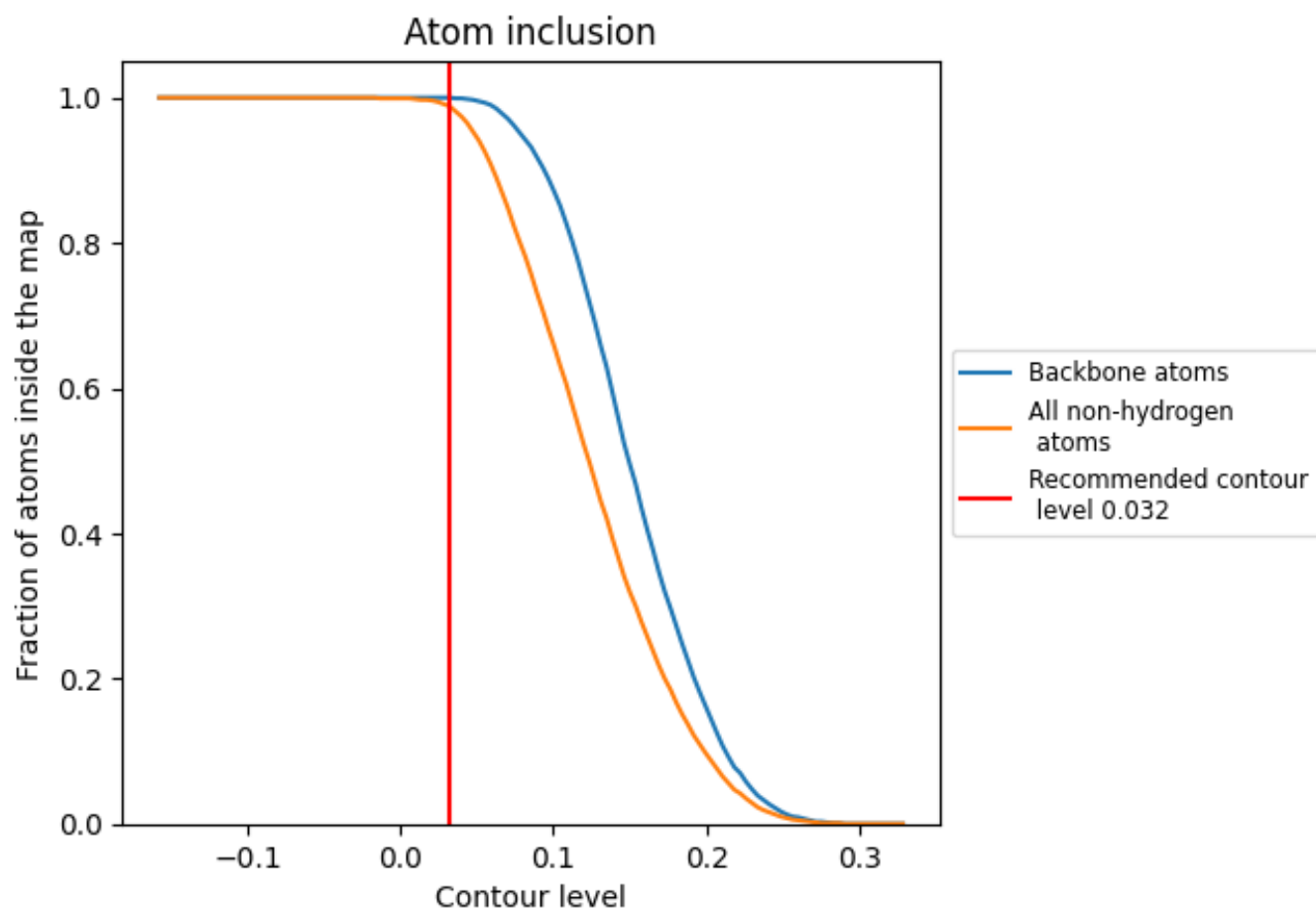
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.032).






9.4 Atom inclusion [i](#)



At the recommended contour level, 100% of all backbone atoms, 99% 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 (0.032) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9880	 0.3550
A	 0.9900	 0.3580
B	 0.9860	 0.3520

