wwPDB EM Validation Summary Report (i)

Aug 29, 2026 – 12:23 PM EDT

PDB ID	:	9MJO / pdb_00009mjo
EMDB ID	:	EMD-48318
Title	:	Cryo-EM structure of human NBCn2 bound to Carbonate
Authors	:	Yang, S.; Capper, M.J.; Zilberg, G.; Warren, A.L.; Wacker, D.
Deposited on	:	2024-12-16
Resolution	:	2.45 Å(reported)

This is a wwPDB EM Validation Summary 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 (i)) were used in the production of this report:

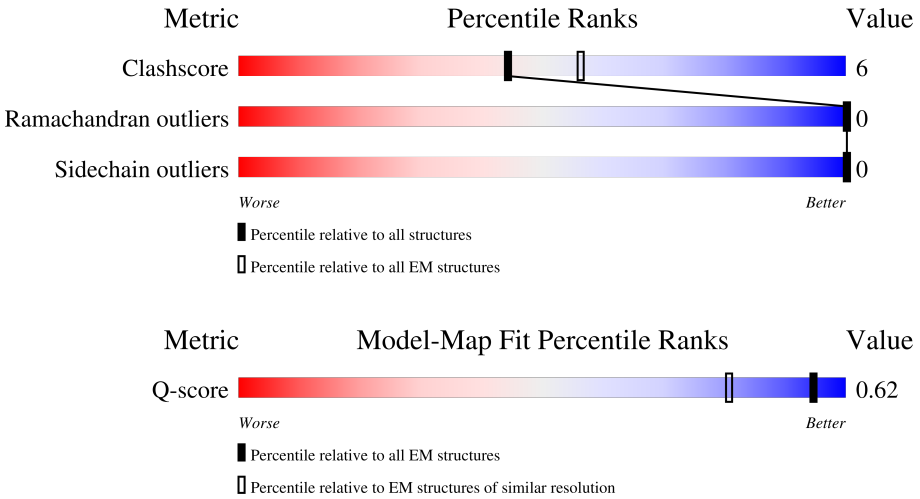
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

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 2.45 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	5931 (1.96 - 2.95)

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	981	45% 9% 45%
1	B	981	45% 10% 45%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 8638 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 Sodium-driven chloride bicarbonate exchanger.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	538	4198	2794	661	708	35	1	0
1	A	538	4198	2794	661	708	35	1	0

There are 182 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	159	MET	-	initiating methionine	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841
B	?	-	ARG	deletion	UNP Q6U841
B	?	-	ILE	deletion	UNP Q6U841
B	?	-	PRO	deletion	UNP Q6U841
B	?	-	ILE	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	ARG	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	PHE	deletion	UNP Q6U841
B	?	-	ALA	deletion	UNP Q6U841
B	?	-	ASP	deletion	UNP Q6U841
B	?	-	ILE	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	GLN	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	GLU	deletion	UNP Q6U841
B	?	-	PRO	deletion	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	MET	deletion	UNP Q6U841
B	?	-	ASP	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841

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Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	ALA	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	GLN	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	PRO	deletion	UNP Q6U841
B	?	-	GLN	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	ALA	deletion	UNP Q6U841
B	?	-	PRO	deletion	UNP Q6U841
B	?	-	ALA	deletion	UNP Q6U841
B	?	-	CYS	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	GLU	deletion	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841
B	?	-	ASP	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	ARG	deletion	UNP Q6U841
B	?	-	GLU	deletion	UNP Q6U841
B	?	-	ASN	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	THR	deletion	UNP Q6U841
B	?	-	VAL	deletion	UNP Q6U841
B	?	-	ASP	deletion	UNP Q6U841
B	?	-	PHE	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	LEU	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	GLN	deletion	UNP Q6U841
B	?	-	GLN	deletion	UNP Q6U841
B	?	-	LYS	deletion	UNP Q6U841
B	?	-	GLY	deletion	UNP Q6U841
B	?	-	HIS	deletion	UNP Q6U841
B	?	-	THR	deletion	UNP Q6U841
B	?	-	SER	deletion	UNP Q6U841

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Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	PRO	deletion	UNP Q6U841
B	?	-	CYS	deletion	UNP Q6U841
B	1119	GLY	-	expression tag	UNP Q6U841
B	1120	ARG	-	expression tag	UNP Q6U841
B	1121	PRO	-	expression tag	UNP Q6U841
B	1122	LEU	-	expression tag	UNP Q6U841
B	1123	GLU	-	expression tag	UNP Q6U841
B	1124	VAL	-	expression tag	UNP Q6U841
B	1125	LEU	-	expression tag	UNP Q6U841
B	1126	PHE	-	expression tag	UNP Q6U841
B	1127	GLN	-	expression tag	UNP Q6U841
B	1128	GLY	-	expression tag	UNP Q6U841
B	1129	PRO	-	expression tag	UNP Q6U841
B	1130	HIS	-	expression tag	UNP Q6U841
B	1131	HIS	-	expression tag	UNP Q6U841
B	1132	HIS	-	expression tag	UNP Q6U841
B	1133	HIS	-	expression tag	UNP Q6U841
B	1134	HIS	-	expression tag	UNP Q6U841
B	1135	HIS	-	expression tag	UNP Q6U841
B	1136	HIS	-	expression tag	UNP Q6U841
B	1137	HIS	-	expression tag	UNP Q6U841
B	1138	HIS	-	expression tag	UNP Q6U841
B	1139	HIS	-	expression tag	UNP Q6U841
A	159	MET	-	initiating methionine	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	ARG	deletion	UNP Q6U841
A	?	-	ILE	deletion	UNP Q6U841
A	?	-	PRO	deletion	UNP Q6U841
A	?	-	ILE	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	ARG	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	PHE	deletion	UNP Q6U841
A	?	-	ALA	deletion	UNP Q6U841
A	?	-	ASP	deletion	UNP Q6U841
A	?	-	ILE	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	GLN	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	GLU	deletion	UNP Q6U841

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	PRO	deletion	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	MET	deletion	UNP Q6U841
A	?	-	ASP	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	ALA	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841
A	?	-	GLN	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	PRO	deletion	UNP Q6U841
A	?	-	GLN	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	ALA	deletion	UNP Q6U841
A	?	-	PRO	deletion	UNP Q6U841
A	?	-	ALA	deletion	UNP Q6U841
A	?	-	CYS	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	GLU	deletion	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	ASP	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	ARG	deletion	UNP Q6U841
A	?	-	GLU	deletion	UNP Q6U841
A	?	-	ASN	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	THR	deletion	UNP Q6U841
A	?	-	VAL	deletion	UNP Q6U841
A	?	-	ASP	deletion	UNP Q6U841
A	?	-	PHE	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841
A	?	-	LEU	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841

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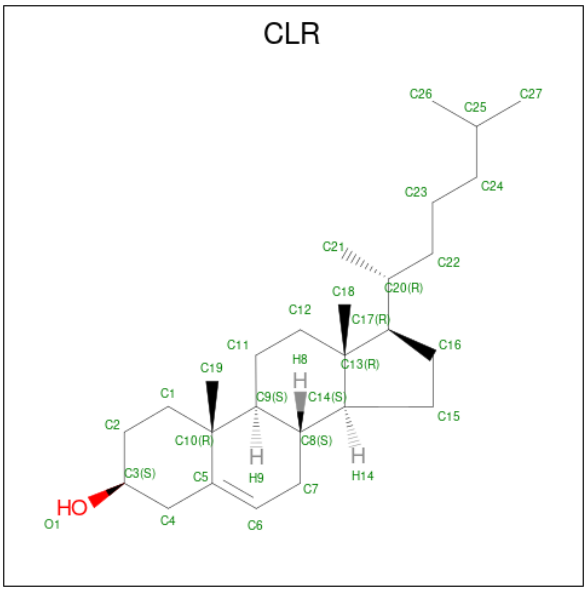
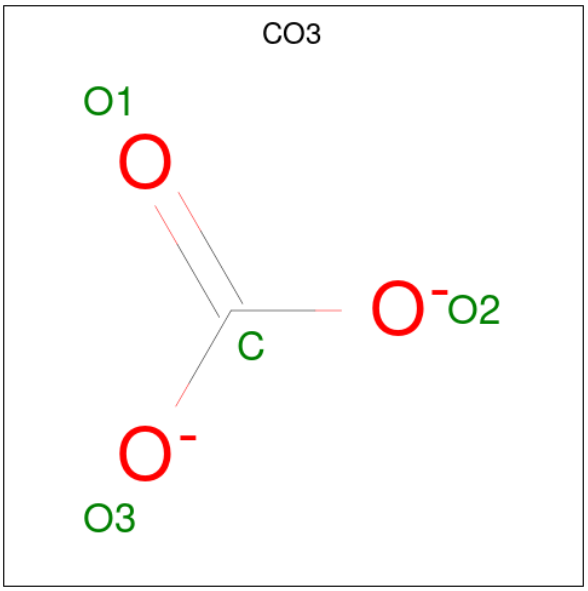
Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	GLN	deletion	UNP Q6U841
A	?	-	GLN	deletion	UNP Q6U841
A	?	-	LYS	deletion	UNP Q6U841
A	?	-	GLY	deletion	UNP Q6U841
A	?	-	HIS	deletion	UNP Q6U841
A	?	-	THR	deletion	UNP Q6U841
A	?	-	SER	deletion	UNP Q6U841
A	?	-	PRO	deletion	UNP Q6U841
A	?	-	CYS	deletion	UNP Q6U841
A	1119	GLY	-	expression tag	UNP Q6U841
A	1120	ARG	-	expression tag	UNP Q6U841
A	1121	PRO	-	expression tag	UNP Q6U841
A	1122	LEU	-	expression tag	UNP Q6U841
A	1123	GLU	-	expression tag	UNP Q6U841
A	1124	VAL	-	expression tag	UNP Q6U841
A	1125	LEU	-	expression tag	UNP Q6U841
A	1126	PHE	-	expression tag	UNP Q6U841
A	1127	GLN	-	expression tag	UNP Q6U841
A	1128	GLY	-	expression tag	UNP Q6U841
A	1129	PRO	-	expression tag	UNP Q6U841
A	1130	HIS	-	expression tag	UNP Q6U841
A	1131	HIS	-	expression tag	UNP Q6U841
A	1132	HIS	-	expression tag	UNP Q6U841
A	1133	HIS	-	expression tag	UNP Q6U841
A	1134	HIS	-	expression tag	UNP Q6U841
A	1135	HIS	-	expression tag	UNP Q6U841
A	1136	HIS	-	expression tag	UNP Q6U841
A	1137	HIS	-	expression tag	UNP Q6U841
A	1138	HIS	-	expression tag	UNP Q6U841
A	1139	HIS	-	expression tag	UNP Q6U841

- Molecule 2 is CHOLESTEROL (CCD ID: CLR) (formula: $C_{27}H_{46}O$).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
2	B	1	28	27	1	0
			Total	C	O	
2	B	1	28	27	1	0
			Total	C	O	
2	B	1	28	27	1	0
			Total	C	O	
2	B	1	28	27	1	0
			Total	C	O	
2	A	1	28	27	1	0
			Total	C	O	
2	A	1	28	27	1	0
			Total	C	O	
2	A	1	28	27	1	0
			Total	C	O	
2	A	1	28	27	1	0

- Molecule 3 is CARBONATE ION (CCD ID: CO3) (formula: CO_3).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
3	B	1	4	1	3	0
3	A	1	4	1	3	0

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		AltConf
			Total	Na	
4	B	2	2	2	0
4	A	2	2	2	0

- Molecule 5 is water.

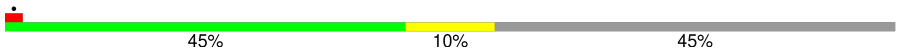
Mol	Chain	Residues	Atoms		AltConf
			Total	O	
5	B	3	3	3	0
5	A	3	3	3	0

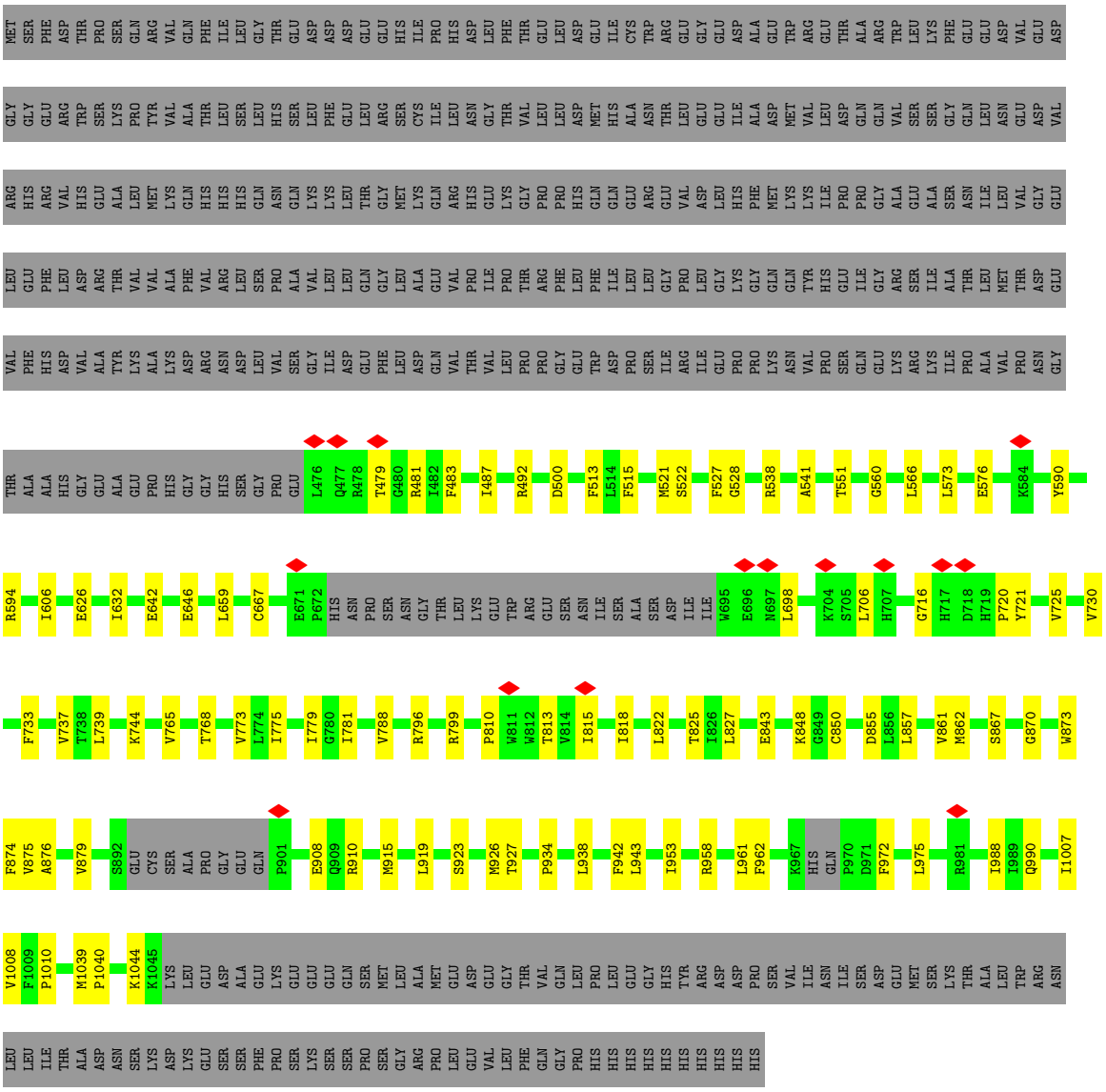
3 Residue-property plots (i)

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: Sodium-driven chloride bicarbonate exchanger

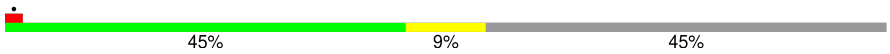
Chain B:





- Molecule 1: Sodium-driven chloride bicarbonate exchanger

Chain A:


45%
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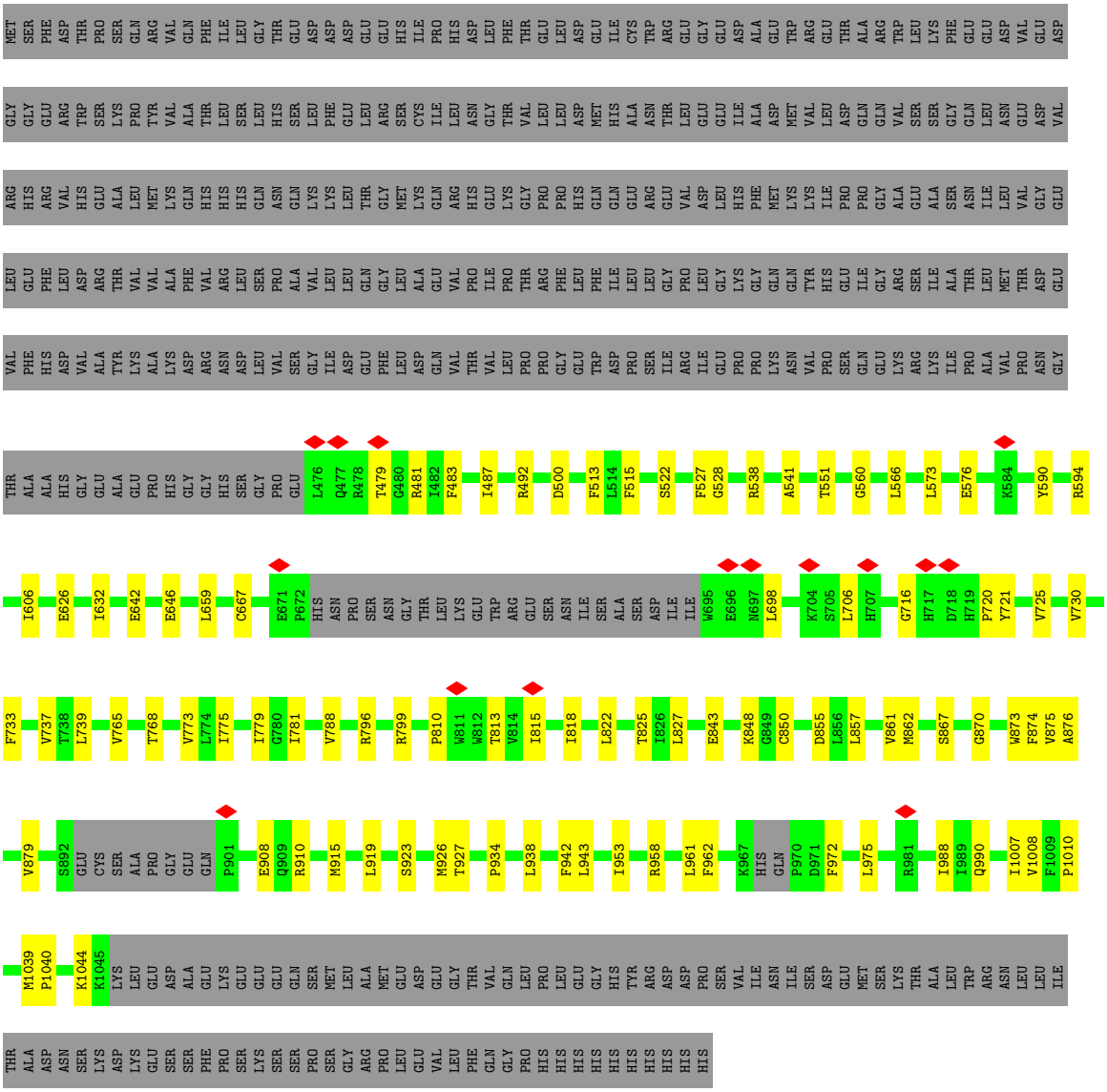

MET SER PHE ASP THR PRO SER GLN ARG VAL GLN PHE ILE LEU GLY THR GLU ASP ASP ASP GLU GLU HIS ILE PRO HIS ASP LEU PHE THR GLU LEU ASP GLU ILE CYS TRP ARG GLU GLY GLU ASP ALA GLU TRP ARG GLU THR ALA ARG TRP LEU LYS PHE GLU GLU ASP VAL GLU ASP
GLY GLY GLU ARG TRP SER LYS PRO TYR VAL ALA THR LEU SER LEU HIS SER LEU PHE GLU LEU ARG SER CYS ILE LEU ASN GLY THR VAL LEU LEU ASP MET HIS ALA ASN THR LEU GLU GLU ILE ALA ASP MET VAL LEU ASP GLN GLN VAL SER SER GLY GLN LEU ASN GLU ASP VAL
ARG HIS ARG VAL HIS GLU ALA LEU MET LYS LYS GLN HIS HIS HIS GLN ASN GLN LYS LYS LEU THR GLY MET LYS GLN ARG HIS GLU LYS GLY PRO PRO HIS GLN GLN GLU ARG GLU VAL ASP LEU HIS PHE MET LYS LYS ILE PRO PRO GLY ALA GLU ALA SER ASN ILE LEU VAL GLY GLU
LEU GLU PHE LEU ASP ARG THR VAL VAL ALA PHE VAL ARG LEU SER PRO ALA VAL LEU LEU GLN GLY LEU ALA GLU VAL PRO ILE PRO THR ARG PHE LEU PHE ILE LEU LEU GLY PRO LEU GLY LYS GLY GLN GLN TYR HIS GLU ILE GLY ARG SER ILE ALA THR LEU MET THR ASP GLU
VAL PHE HIS ASP VAL ALA TYR LYS ALA LYS ASP ARG ASN ASP LEU VAL SER GLY ILE ASP GLU PHE LEU ASP GLN VAL THR VAL LEU PRO PRO GLY GLU TRP ASP PRO SER ILE ARG ILE GLU PRO PRO LYS ASN VAL PRO SER GLN GLU LYS ARG LYS ILE PRO ALA VAL PRO ASN GLY
THR ALA ALA HIS GLY GLU ALA GLU PRO HIS GLY GLY HIS SER GLY PRO GLU L476 Q477 R478 T479 G480 R481 I482 F483 I487 R492 D500 F513 L514 F515 S522 F527 G528 R538 A541 T551 G560 L566 L573 E576 K584 Y590 R594
I606 E626 I632 E642 E646 L659 C667 E671 P672 HIS ASN PRO SER ASN GLY THR LEU LYS GLU TRP ARG GLU SER ASN ILE SER ALA SER ASP ILE ILE ILE W695 E696 N697 L698 K704 S705 L706 H707 G716 H717 D718 H719 P720 Y721 V725 V730
F733 V737 T738 L739 V765 T768 V773 L774 I775 I779 G780 I781 V788 R796 R799 P810 W811 W812 T813 V814 I815 I818 L822 T825 I826 L827 E843 K848 G849 C850 D855 L856 L857 V861 M862 S867 G870 W873 F874 V875 A876
V879 S892 GLU CYS SER ALA PRO GLY GLU GLN P901 E908 Q909 R910 M915 L919 S923 M926 T927 P934 L938 F942 L943 I953 R958 L961 F962 K967 HIS GLN P970 D971 F972 L975 R981 I988 I989 Q990 I1007 V1008 F1009 P1010
M1039 P1040 K1044 K1045 LYS LEU GLU ASP ALA GLU LYS GLU GLU GLN SER MET LEU ALA MET GLU ASP GLU GLY THR VAL GLN LEU PRO LEU GLU GLY HIS TYR ARG ASP ASP PRO SER VAL ILE ASN ILE SER ASP GLU MET SER LYS THR ALA LEU TRP ARG ASN LEU LEU ILE
THR ALA ASP ASN SER LYS ASP LYS GLU SER SER PHE PRO SER LYS SER SER PRO SER GLY ARG PRO LEU GLU GLU VAL LEU PHE GLN GLY PRO HIS HIS HIS HIS HIS HIS HIS HIS HIS HIS HIS HIS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	291402	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 ($e^-/Å^2$)	50.0	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.646	Depositor
Minimum map value	-0.546	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.011	Depositor
Recommended contour level	0.086	Depositor
Map size (Å)	330.0, 330.0, 330.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.825, 0.825, 0.825	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: NA, CO3, CLR

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	0.23	0/4309	0.38	0/5855
1	B	0.23	0/4309	0.38	0/5855
All	All	0.23	0/8618	0.38	0/11710

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4198	0	4293	57	0
1	B	4198	0	4293	58	0
2	A	112	0	184	6	0
2	B	112	0	184	6	0
3	A	4	0	0	0	0
3	B	4	0	0	0	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
5	A	3	0	0	0	0
5	B	3	0	0	0	0
All	All	8638	0	8954	113	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.

The worst 5 of 113 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:500:ASP:HB3	1:A:910:ARG:HG2	1.65	0.79
1:B:500:ASP:HB3	1:B:910:ARG:HG2	1.65	0.76
1:B:522:SER:HB3	1:B:942:PHE:HZ	1.54	0.72
1:A:522:SER:HB3	1:A:942:PHE:HZ	1.54	0.71
1:B:843:GLU:HG3	1:B:1040:PRO:HB3	1.74	0.69

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	531/981 (54%)	520 (98%)	11 (2%)	0	100	100
1	B	531/981 (54%)	520 (98%)	11 (2%)	0	100	100
All	All	1062/1962 (54%)	1040 (98%)	22 (2%)	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	456/865 (53%)	456 (100%)	0	100	100
1	B	456/865 (53%)	456 (100%)	0	100	100
All	All	912/1730 (53%)	912 (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. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	656	HIS
1	A	664	GLN
1	A	984	HIS
1	B	664	GLN
1	B	656	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 14 ligands modelled in this entry, 4 are monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	CO3	B	1205	4	3,3,3	0.81	0	2,3,3	0.12	0
3	CO3	A	1205	4	3,3,3	0.80	0	2,3,3	0.11	0
2	CLR	A	1202	-	31,31,31	0.30	0	48,48,48	0.43	0
2	CLR	A	1204	-	31,31,31	0.28	0	48,48,48	0.39	0
2	CLR	B	1202	-	31,31,31	0.31	0	48,48,48	0.43	0
2	CLR	A	1203	-	31,31,31	0.28	0	48,48,48	0.39	0
2	CLR	A	1201	-	31,31,31	0.30	0	48,48,48	0.38	0
2	CLR	B	1203	-	31,31,31	0.29	0	48,48,48	0.39	0
2	CLR	B	1201	-	31,31,31	0.29	0	48,48,48	0.38	0
2	CLR	B	1204	-	31,31,31	0.27	0	48,48,48	0.39	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CLR	A	1202	-	-	0/10/68/68	0/4/4/4
2	CLR	A	1204	-	-	4/10/68/68	0/4/4/4
2	CLR	B	1202	-	-	0/10/68/68	0/4/4/4
2	CLR	A	1203	-	-	1/10/68/68	0/4/4/4
2	CLR	A	1201	-	-	1/10/68/68	0/4/4/4
2	CLR	B	1203	-	-	1/10/68/68	0/4/4/4
2	CLR	B	1201	-	-	1/10/68/68	0/4/4/4
2	CLR	B	1204	-	-	4/10/68/68	0/4/4/4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1204	CLR	C13-C17-C20-C21
2	A	1204	CLR	C13-C17-C20-C21
2	B	1204	CLR	C13-C17-C20-C22
2	A	1204	CLR	C13-C17-C20-C22
2	B	1204	CLR	C16-C17-C20-C21

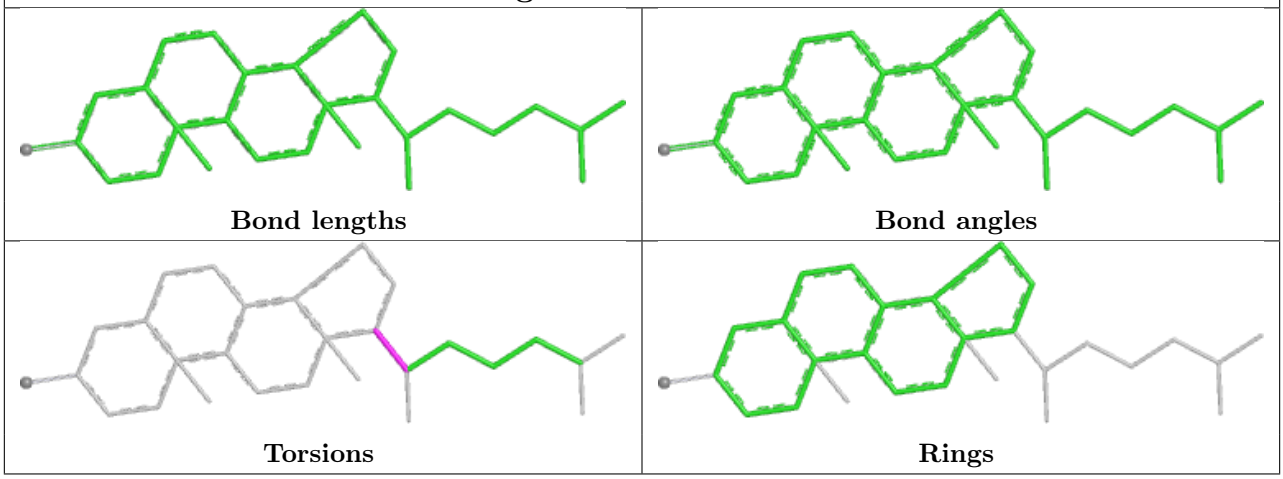
There are no ring outliers.

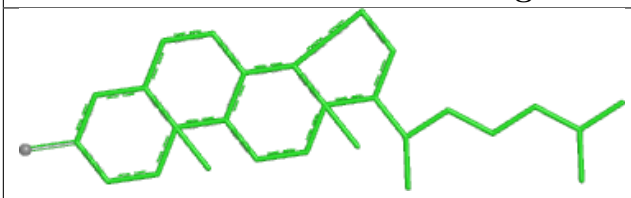
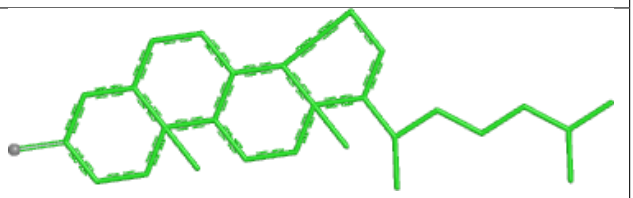
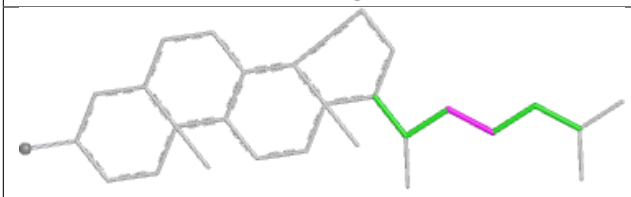
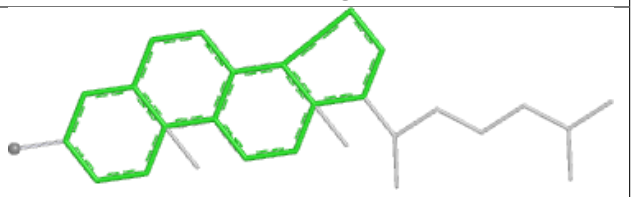
8 monomers are involved in 12 short contacts:

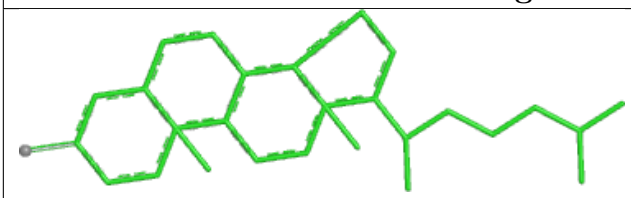
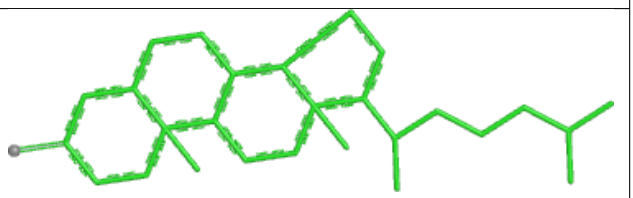
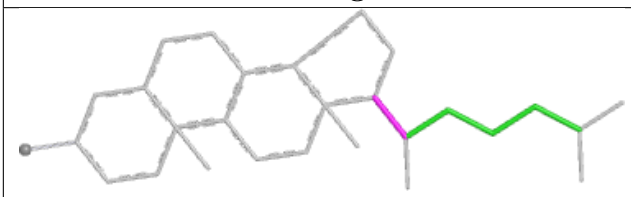
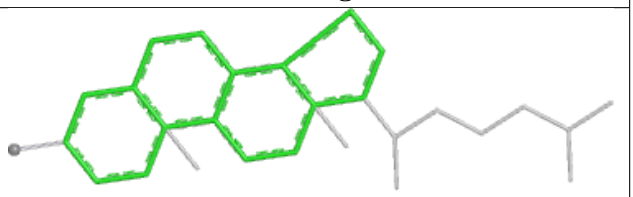
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1202	CLR	1	0
2	A	1204	CLR	1	0
2	B	1202	CLR	1	0
2	A	1203	CLR	2	0
2	A	1201	CLR	2	0
2	B	1203	CLR	2	0
2	B	1201	CLR	2	0
2	B	1204	CLR	1	0

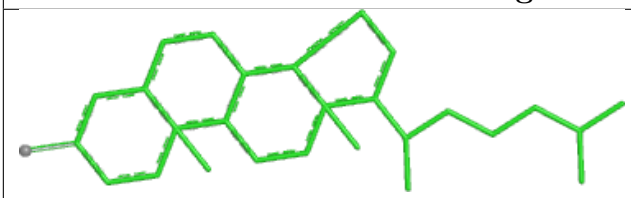
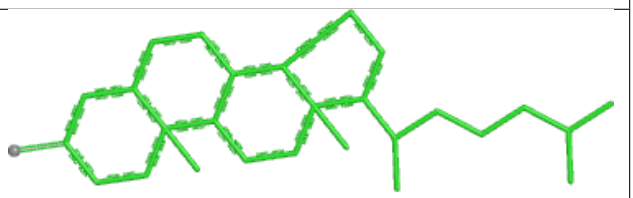
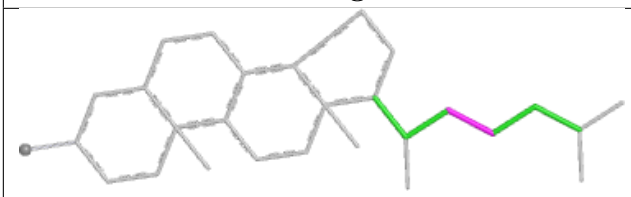
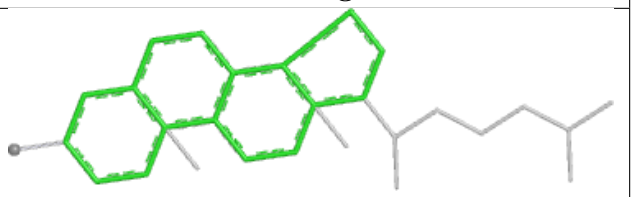
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 CLR A 1204



Ligand CLR A 1203	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLR A 1201	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLR B 1203	
 Bond lengths	 Bond angles
 Torsions	 Rings

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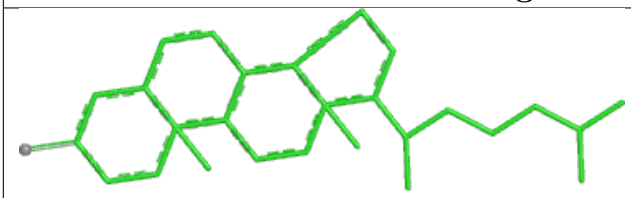
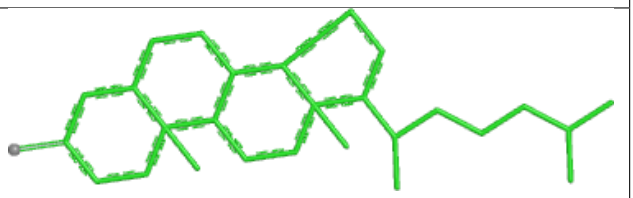
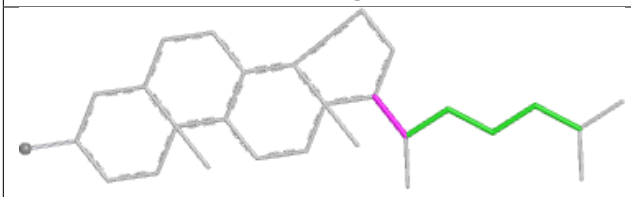
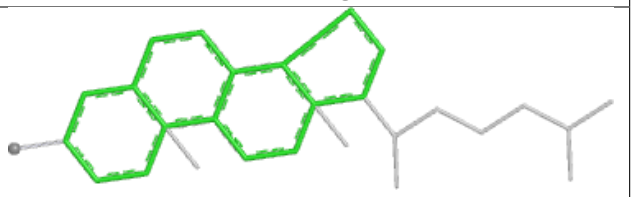
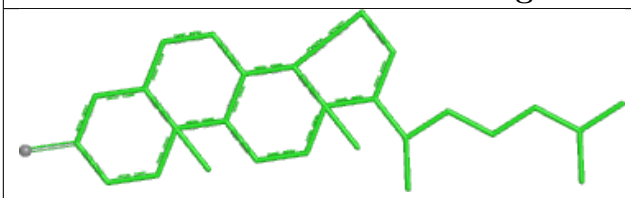
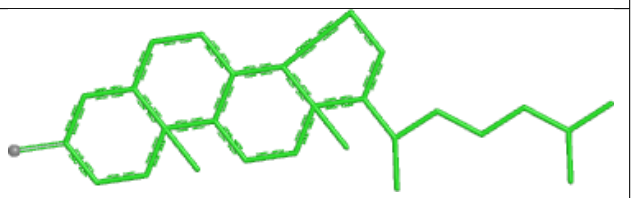
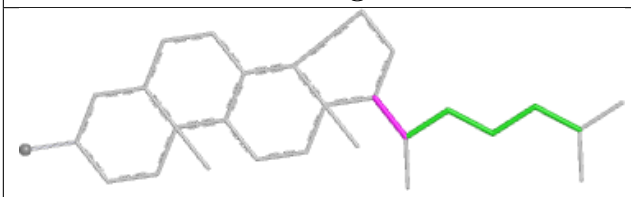
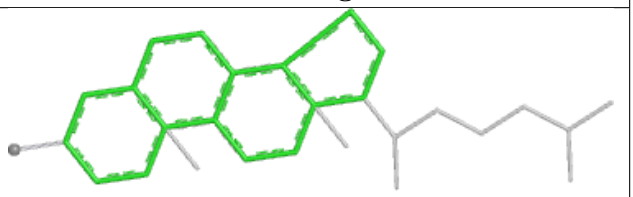
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLR B 1204	
 Bond lengths	 Bond angles
 Torsions	 Rings

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.

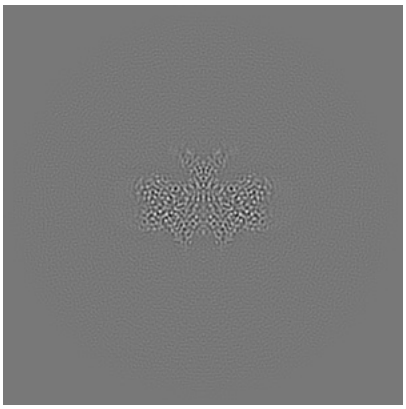
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-48318. These allow visual inspection of the internal detail of the map and identification of artifacts.

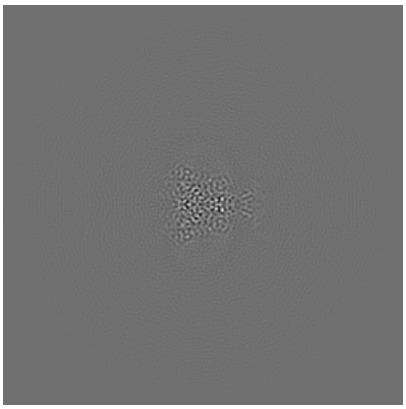
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

6.1.1 Primary map



X



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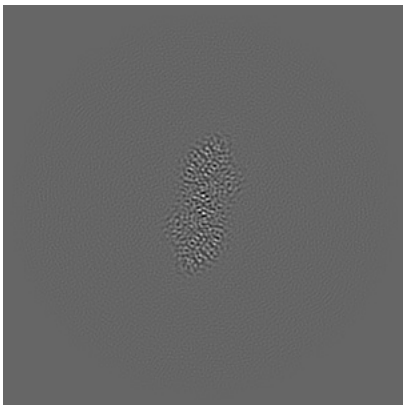
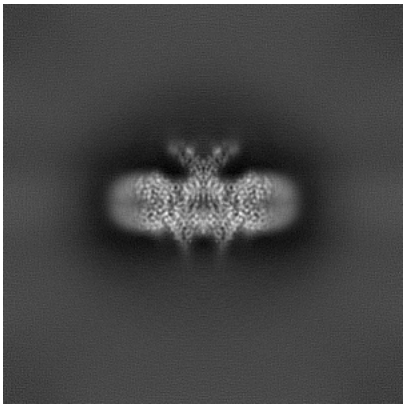


Z

6.1.2 Raw map



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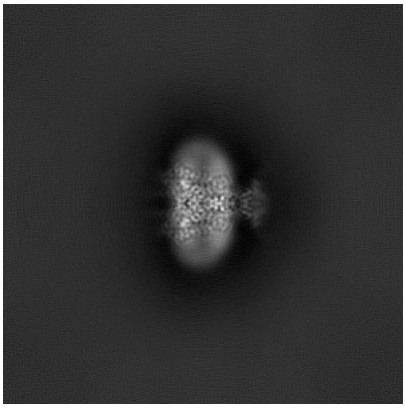

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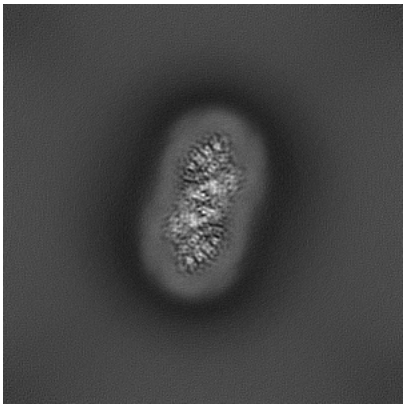
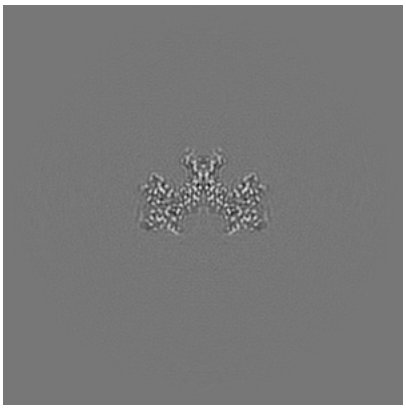


Z

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

6.2 Central slices (i)

6.2.1 Primary map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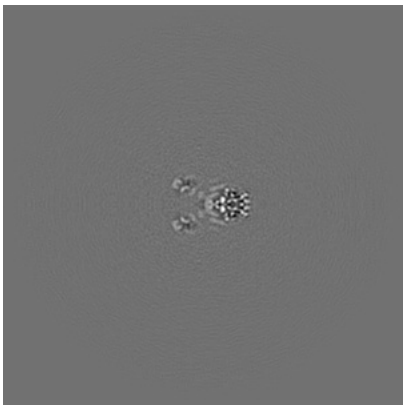
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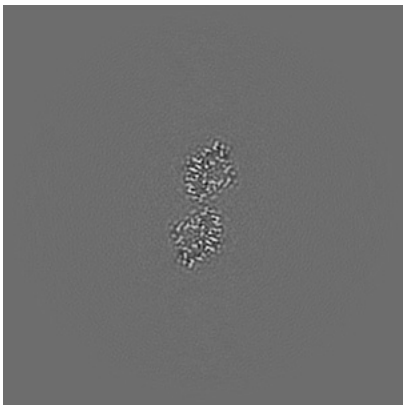
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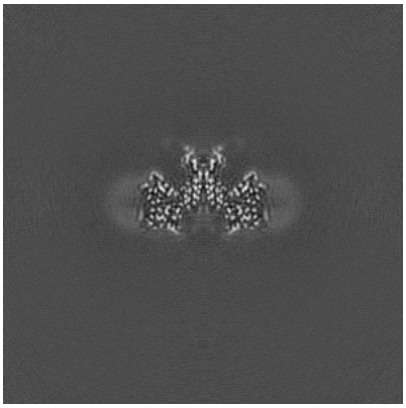
6.2.2 Raw map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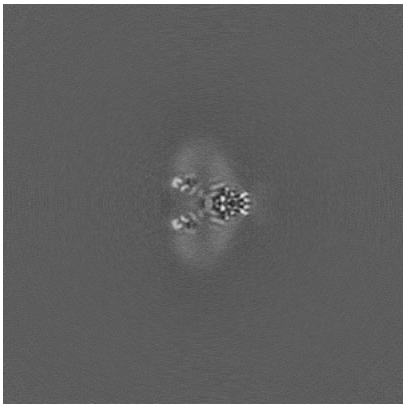
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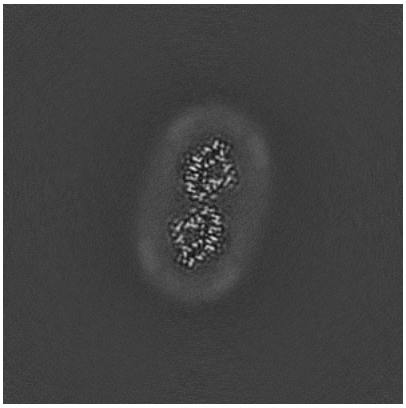
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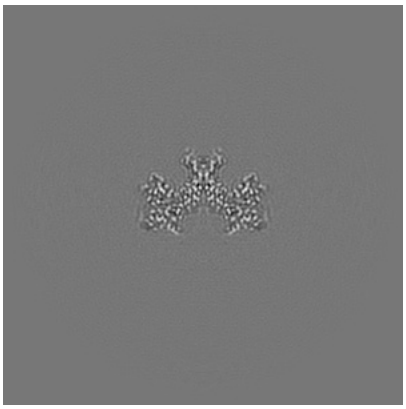
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

6.3.1 Primary map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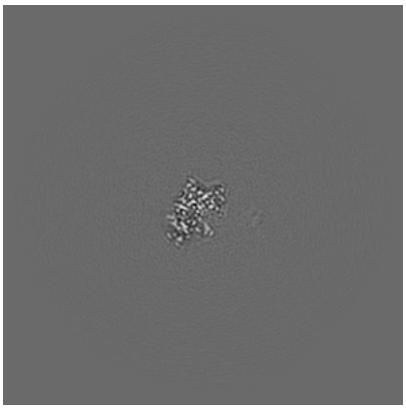
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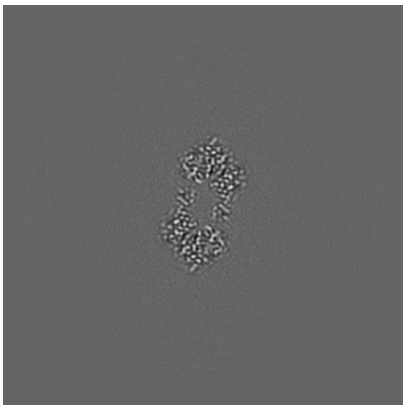
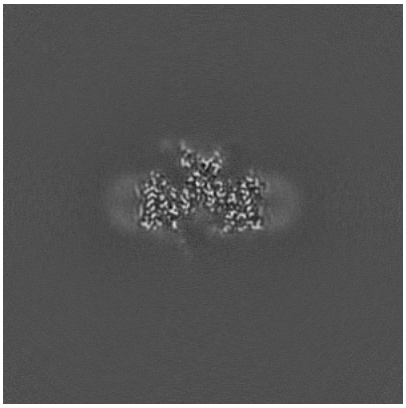
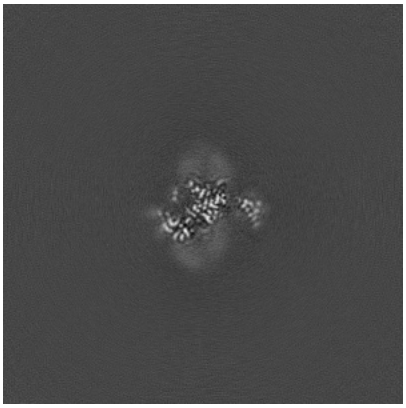
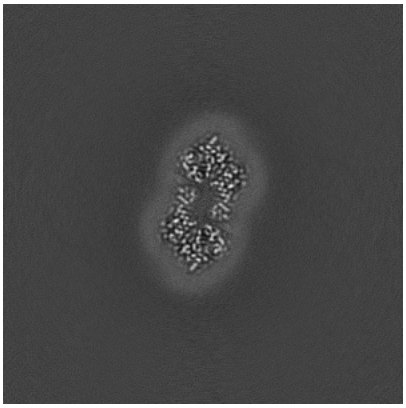

Z Index: 182

6.3.2 Raw map


X Index: 197

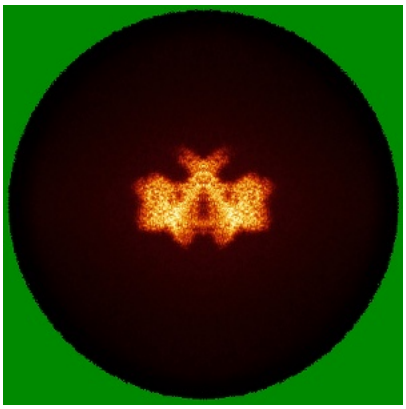

Y Index: 183

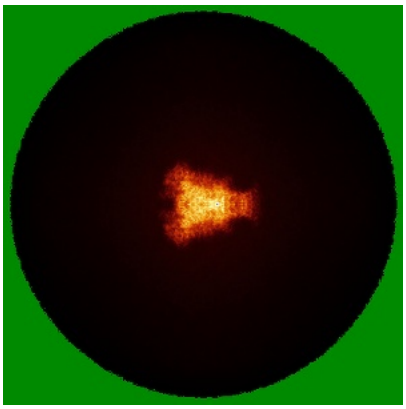

Z Index: 182

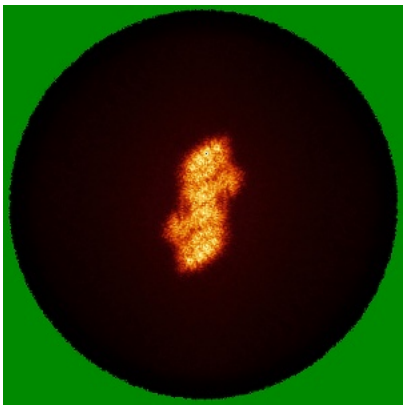
The images above show the largest variance slices of the map in three orthogonal directions.

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

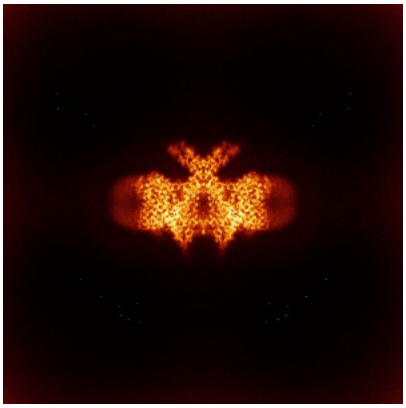
6.4.1 Primary map

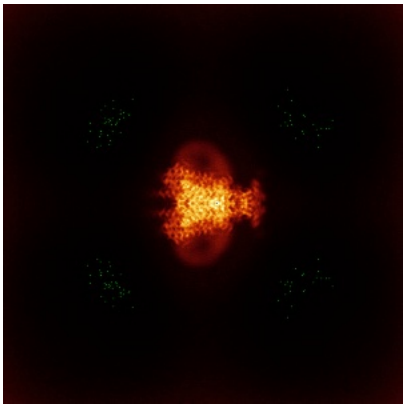

X

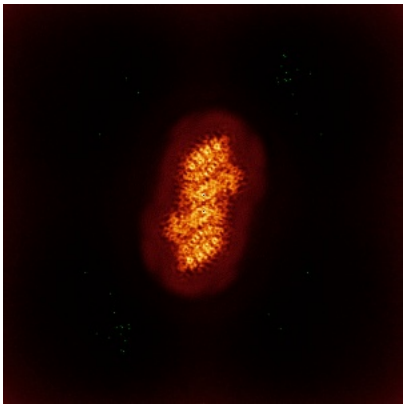

Y


Z

6.4.2 Raw map


X

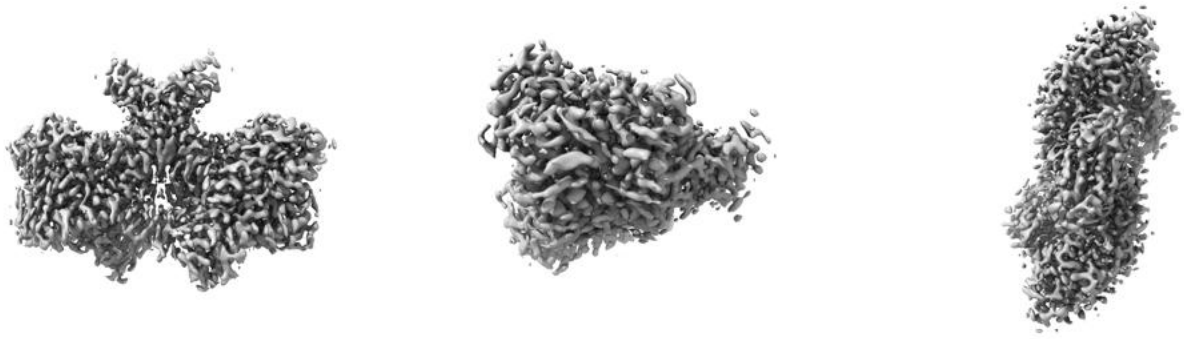

Y


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)

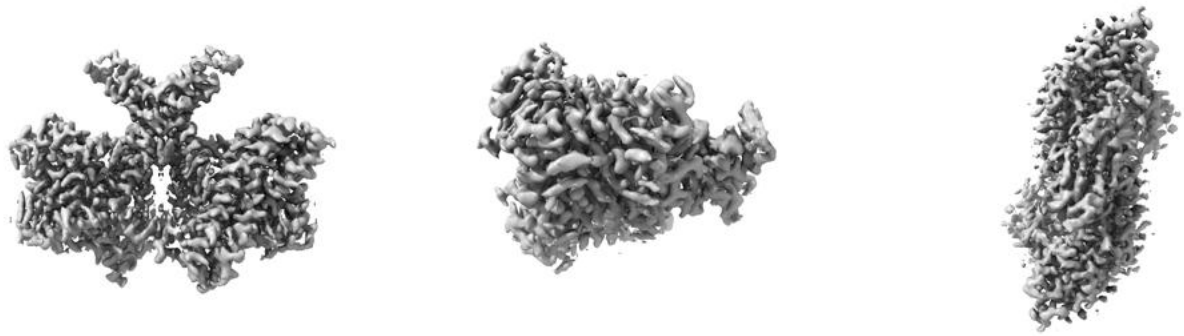
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.086. 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.

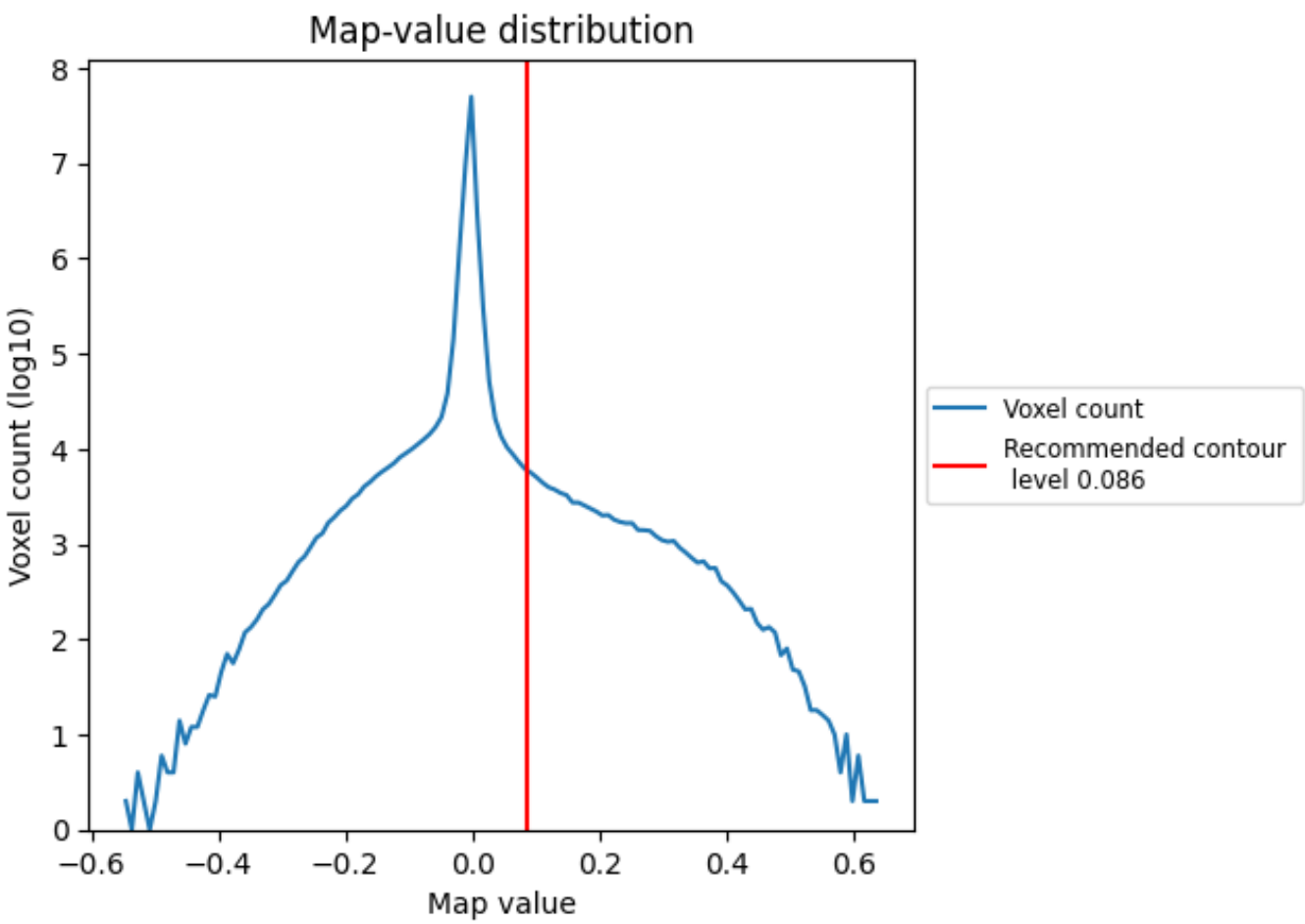
6.6 Mask visualisation (i)

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

7 Map analysis (i)

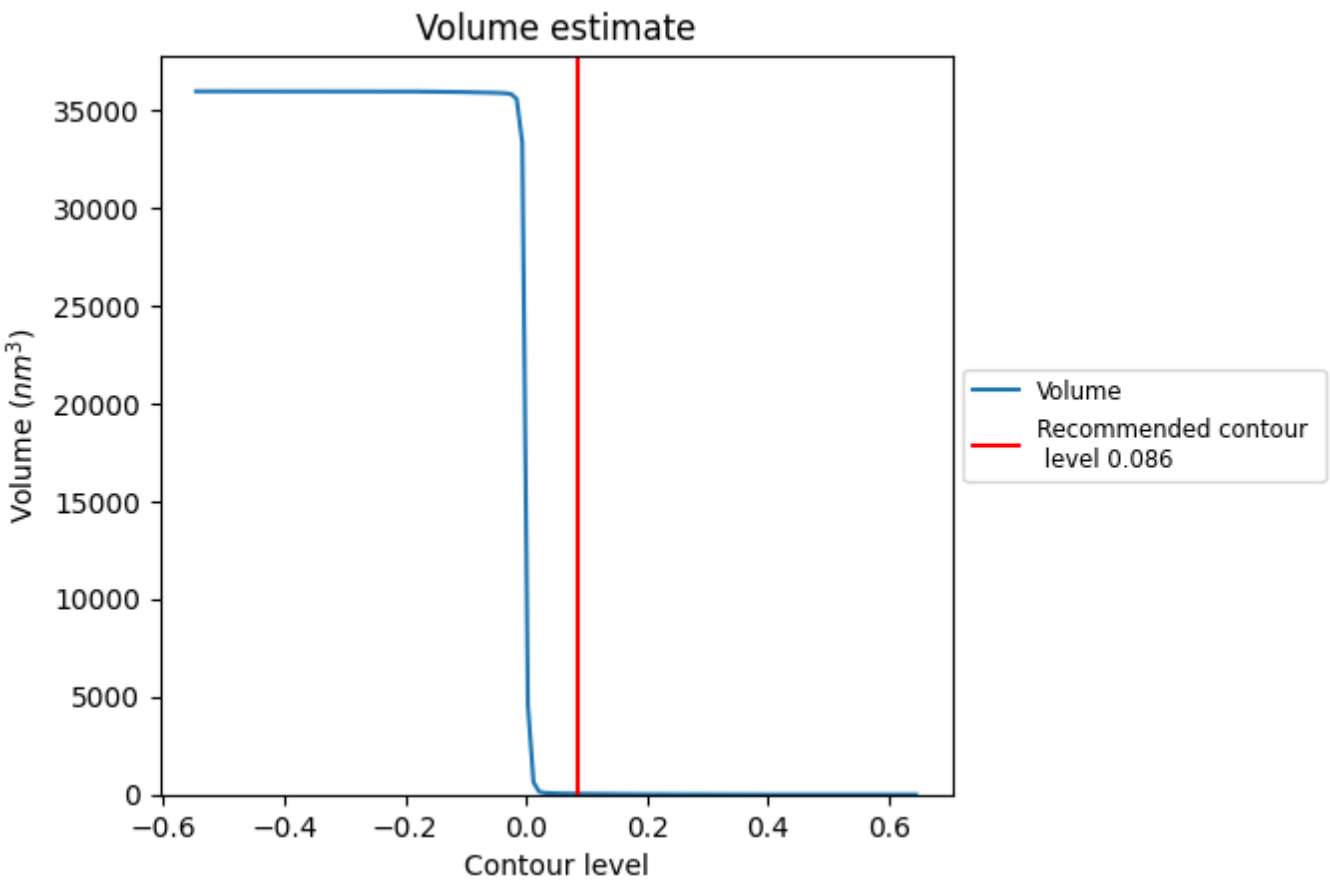
This section contains the results of statistical analysis of the map.

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.

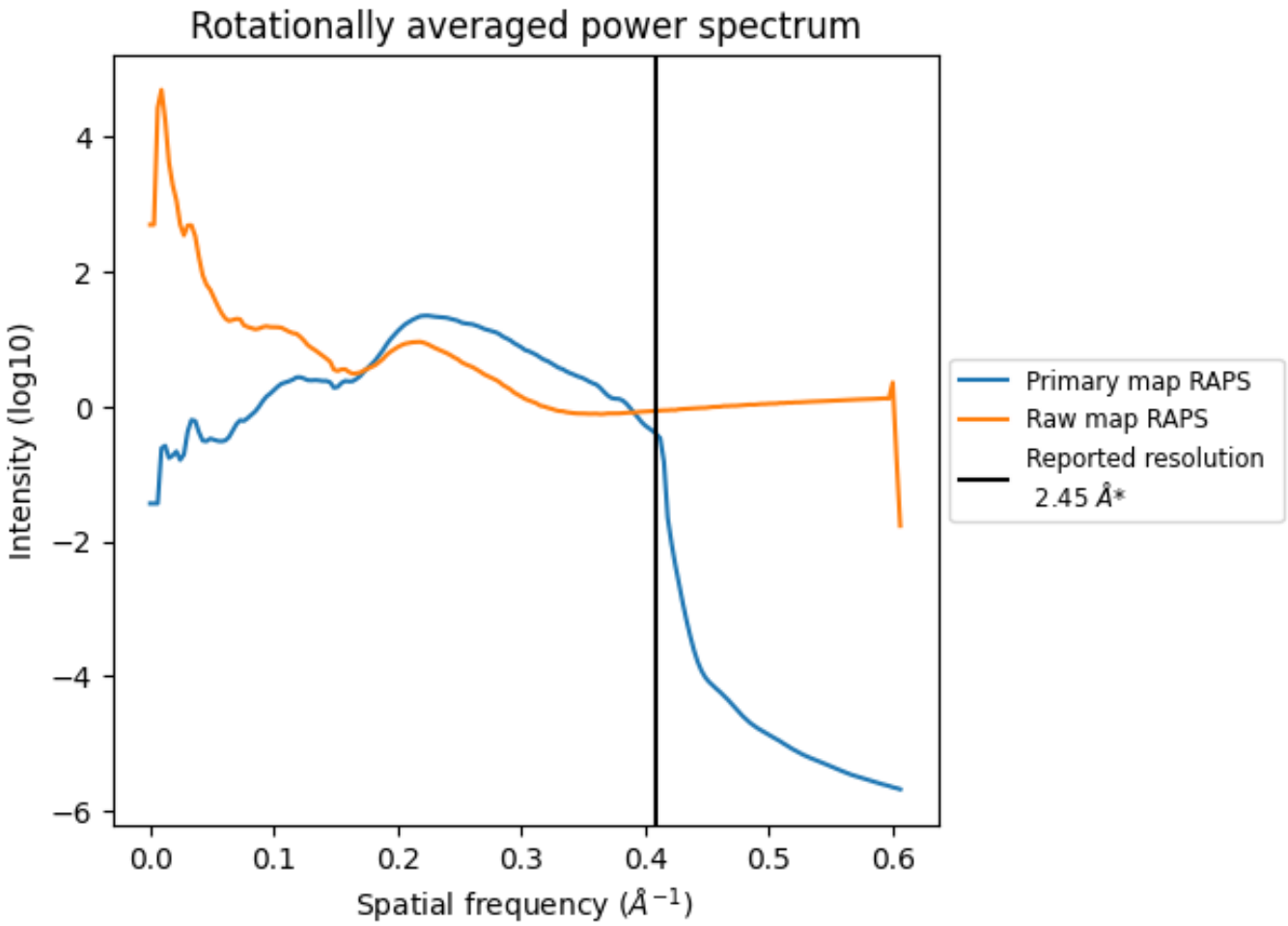
7.2 Volume estimate (i)



The volume at the recommended contour level is 41 nm^3; this corresponds to an approximate mass of 37 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)

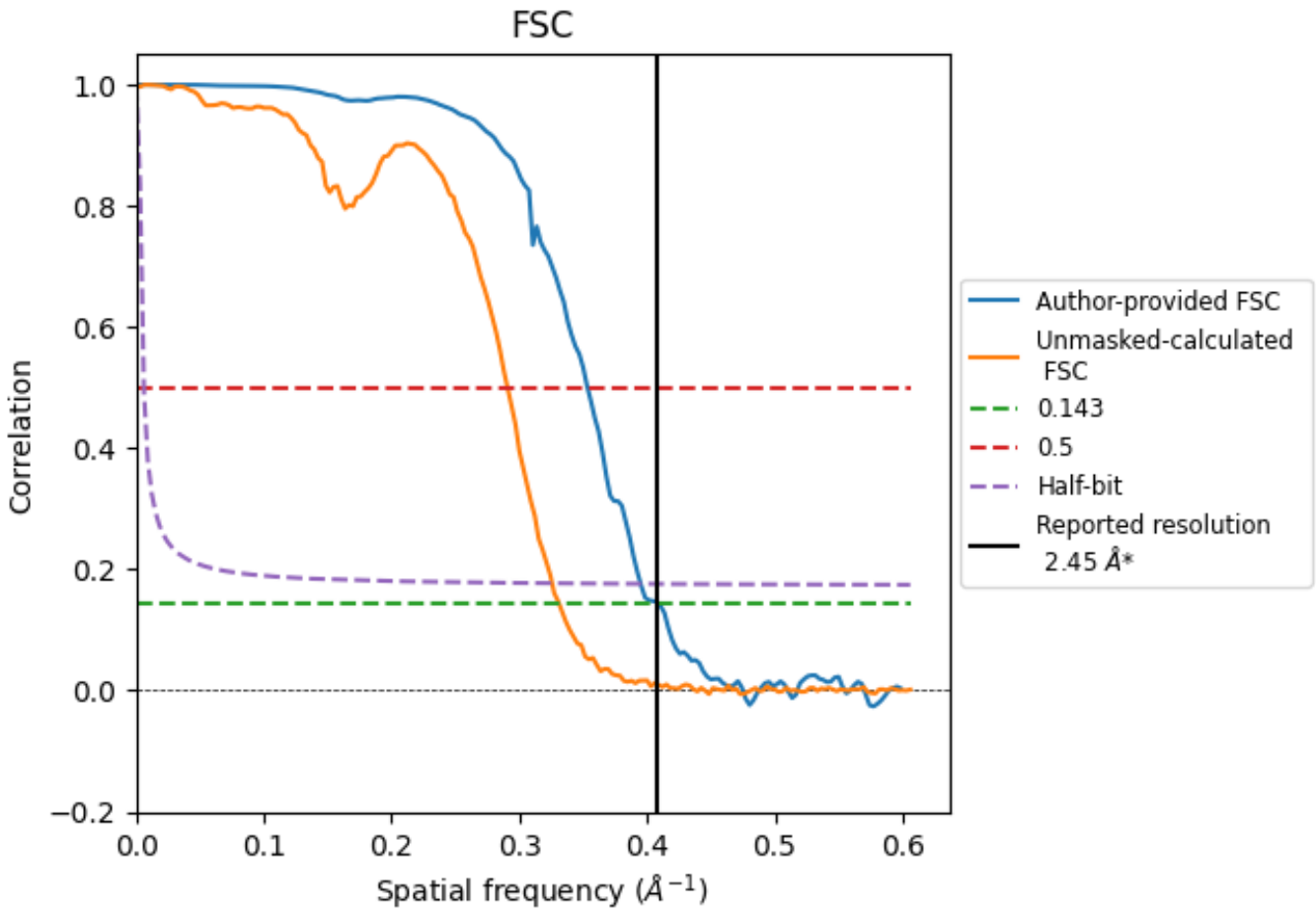


*Reported resolution corresponds to spatial frequency of 0.408 Å^{-1}

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 0.408 Å^{-1}

8.2 Resolution estimates (i)

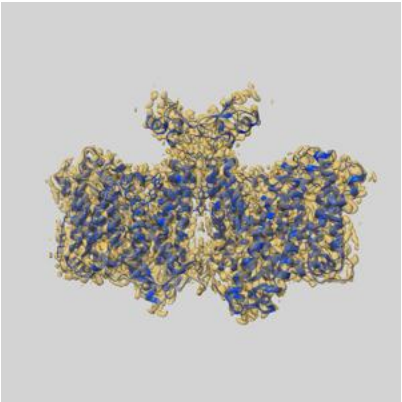
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.45	-	-
Author-provided FSC curve	2.44	2.83	2.53
Unmasked-calculated*	3.02	3.44	3.07

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.02 differs from the reported value 2.45 by more than 10 %

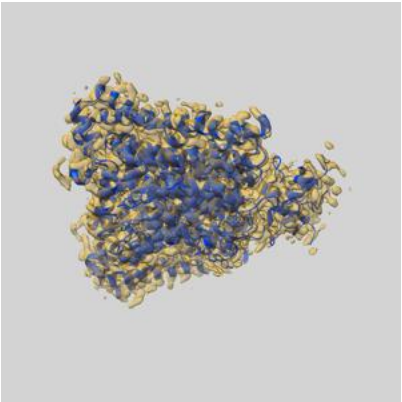
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-48318 and PDB model 9MJO. Per-residue inclusion information can be found in section 3 on page 10.

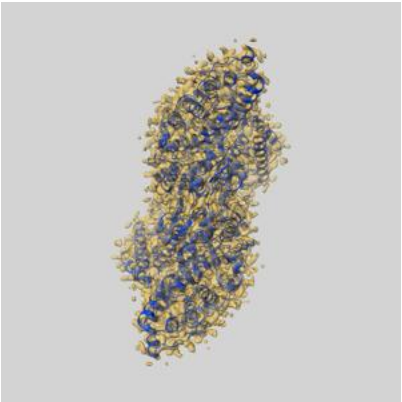
9.1 Map-model overlay (i)



X



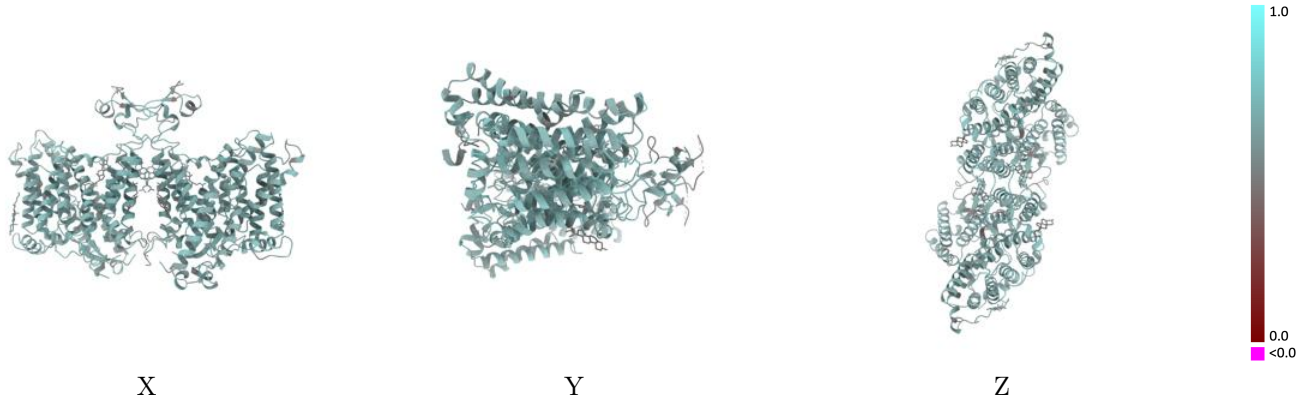
Y



Z

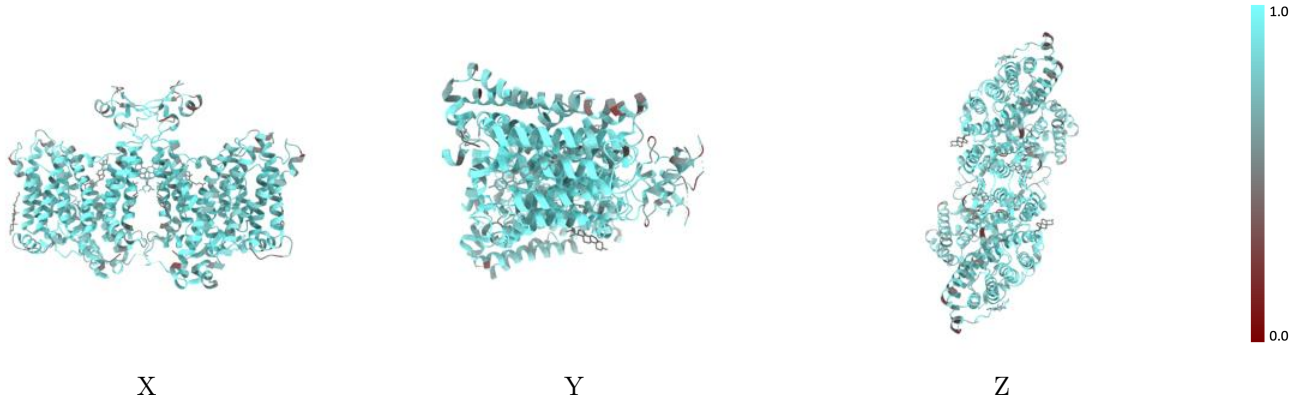
The images above show the 3D surface view of the map at the recommended contour level 0.086 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model (i)



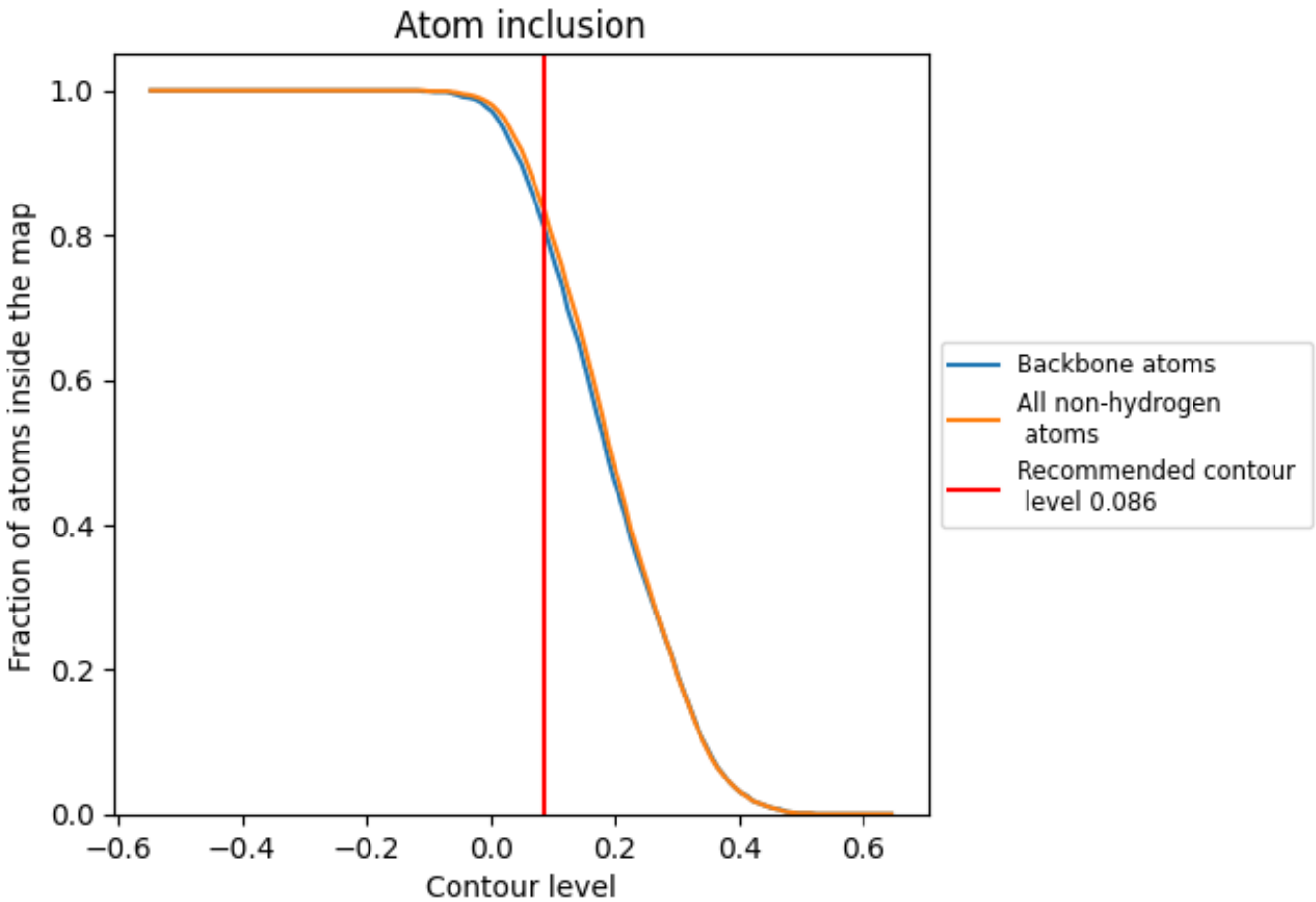
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.086).

9.4 Atom inclusion (i)



At the recommended contour level, 81% of all backbone atoms, 84% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.086) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8370	0.6200
A	0.8390	0.6210
B	0.8390	0.6200