



Full wwPDB EM Validation Report ⓘ

Mar 28, 2026 – 08:23 PM UTC

PDB ID : 8VYF / pdb_00008vyf
EMDB ID : EMD-43659
Title : SARS-CoV-2 S NTD (C.37 Lambda variant) plus S2L20 and S2X303 Fabs, local refinement
Authors : McCallum, M.; Veesler, D.; Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on : 2024-02-08
Resolution : 3.20 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

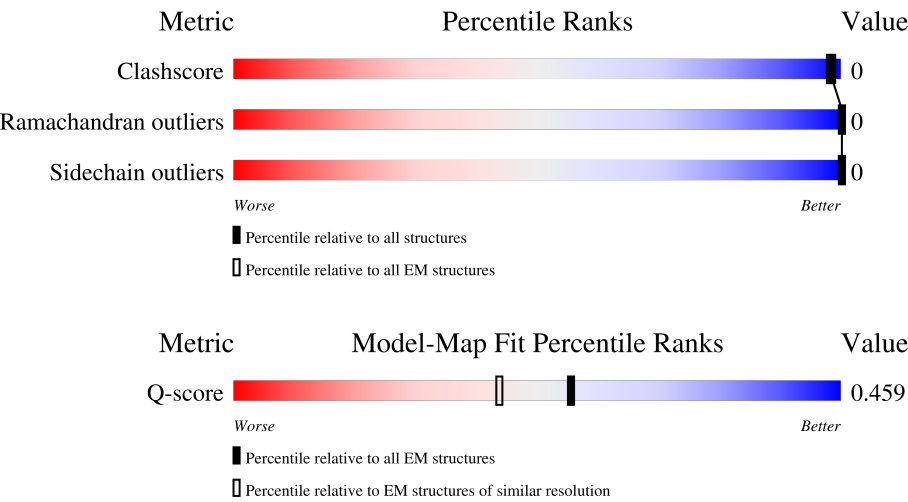
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.20 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	15020 (2.70 - 3.70)

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	1270	20% 79%
2	B	122	98%
3	C	107	7% 93% 5%
4	H	125	90% 90% 5% 5%

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Mol	Chain	Length	Quality of chain
5	L	105	98% 94% 6%
6	D	3	100% 33% 67%
7	E	2	50% 100%
7	F	2	50% 100%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 5132 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	265	Total	C	N	O	S	0	0
			2088	1358	340	383	7		

There are 91 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	75	VAL	GLY	variant	UNP P0DTC2
A	76	ILE	THR	variant	UNP P0DTC2
A	?	-	ARG	deletion	UNP P0DTC2
A	?	-	SER	deletion	UNP P0DTC2
A	?	-	TYR	deletion	UNP P0DTC2
A	?	-	LEU	deletion	UNP P0DTC2
A	?	-	THR	deletion	UNP P0DTC2
A	?	-	PRO	deletion	UNP P0DTC2
A	?	-	GLY	deletion	UNP P0DTC2
A	246	ASN	ASP	variant	UNP P0DTC2
A	376	CYS	SER	conflict	UNP P0DTC2
A	445	GLN	LEU	variant	UNP P0DTC2
A	483	SER	PHE	variant	UNP P0DTC2
A	607	GLY	ASP	variant	UNP P0DTC2
A	810	PRO	PHE	conflict	UNP P0DTC2
A	852	ASN	THR	variant	UNP P0DTC2
A	885	PRO	ALA	conflict	UNP P0DTC2
A	892	PRO	ALA	conflict	UNP P0DTC2
A	935	PRO	ALA	conflict	UNP P0DTC2
A	978	CYS	ASP	conflict	UNP P0DTC2
A	979	PRO	LYS	conflict	UNP P0DTC2
A	980	PRO	VAL	conflict	UNP P0DTC2
A	1202	GLY	-	expression tag	UNP P0DTC2
A	1203	SER	-	expression tag	UNP P0DTC2
A	1204	GLY	-	expression tag	UNP P0DTC2
A	1205	TYR	-	expression tag	UNP P0DTC2
A	1206	ILE	-	expression tag	UNP P0DTC2
A	1207	PRO	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1208	GLU	-	expression tag	UNP P0DTC2
A	1209	ALA	-	expression tag	UNP P0DTC2
A	1210	PRO	-	expression tag	UNP P0DTC2
A	1211	ARG	-	expression tag	UNP P0DTC2
A	1212	ASP	-	expression tag	UNP P0DTC2
A	1213	GLY	-	expression tag	UNP P0DTC2
A	1214	GLN	-	expression tag	UNP P0DTC2
A	1215	ALA	-	expression tag	UNP P0DTC2
A	1216	TYR	-	expression tag	UNP P0DTC2
A	1217	VAL	-	expression tag	UNP P0DTC2
A	1218	ARG	-	expression tag	UNP P0DTC2
A	1219	LYS	-	expression tag	UNP P0DTC2
A	1220	ASP	-	expression tag	UNP P0DTC2
A	1221	GLY	-	expression tag	UNP P0DTC2
A	1222	GLU	-	expression tag	UNP P0DTC2
A	1223	TRP	-	expression tag	UNP P0DTC2
A	1224	VAL	-	expression tag	UNP P0DTC2
A	1225	LEU	-	expression tag	UNP P0DTC2
A	1226	LEU	-	expression tag	UNP P0DTC2
A	1227	SER	-	expression tag	UNP P0DTC2
A	1228	THR	-	expression tag	UNP P0DTC2
A	1229	PHE	-	expression tag	UNP P0DTC2
A	1230	LEU	-	expression tag	UNP P0DTC2
A	1231	GLY	-	expression tag	UNP P0DTC2
A	1232	ARG	-	expression tag	UNP P0DTC2
A	1233	SER	-	expression tag	UNP P0DTC2
A	1234	LEU	-	expression tag	UNP P0DTC2
A	1235	GLU	-	expression tag	UNP P0DTC2
A	1236	VAL	-	expression tag	UNP P0DTC2
A	1237	LEU	-	expression tag	UNP P0DTC2
A	1238	PHE	-	expression tag	UNP P0DTC2
A	1239	GLN	-	expression tag	UNP P0DTC2
A	1240	GLY	-	expression tag	UNP P0DTC2
A	1241	PRO	-	expression tag	UNP P0DTC2
A	1242	GLY	-	expression tag	UNP P0DTC2
A	1243	SER	-	expression tag	UNP P0DTC2
A	1244	GLY	-	expression tag	UNP P0DTC2
A	1245	GLY	-	expression tag	UNP P0DTC2
A	1246	LEU	-	expression tag	UNP P0DTC2
A	1247	ASN	-	expression tag	UNP P0DTC2
A	1248	ASP	-	expression tag	UNP P0DTC2
A	1249	ILE	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1250	PHE	-	expression tag	UNP P0DTC2
A	1251	GLU	-	expression tag	UNP P0DTC2
A	1252	ALA	-	expression tag	UNP P0DTC2
A	1253	GLN	-	expression tag	UNP P0DTC2
A	1254	LYS	-	expression tag	UNP P0DTC2
A	1255	ILE	-	expression tag	UNP P0DTC2
A	1256	GLU	-	expression tag	UNP P0DTC2
A	1257	TRP	-	expression tag	UNP P0DTC2
A	1258	HIS	-	expression tag	UNP P0DTC2
A	1259	GLU	-	expression tag	UNP P0DTC2
A	1260	GLY	-	expression tag	UNP P0DTC2
A	1261	SER	-	expression tag	UNP P0DTC2
A	1262	GLY	-	expression tag	UNP P0DTC2
A	1263	HIS	-	expression tag	UNP P0DTC2
A	1264	HIS	-	expression tag	UNP P0DTC2
A	1265	HIS	-	expression tag	UNP P0DTC2
A	1266	HIS	-	expression tag	UNP P0DTC2
A	1267	HIS	-	expression tag	UNP P0DTC2
A	1268	HIS	-	expression tag	UNP P0DTC2
A	1269	HIS	-	expression tag	UNP P0DTC2
A	1270	HIS	-	expression tag	UNP P0DTC2

- Molecule 2 is a protein called S2L20 Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	121	Total	C	N	O	S	0	0
			936	593	162	177	4		

- Molecule 3 is a protein called S2L20 Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	105	Total	C	N	O	S	0	0
			785	496	129	156	4		

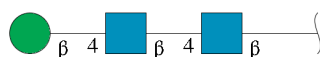
- Molecule 4 is a protein called S2X303 Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	H	119	Total	C	N	O	S	0	0
			628	386	121	119	2		

- Molecule 5 is a protein called S2X303 Light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	L	105	Total	C	N	O	S	0	0
			530	318	105	105	2		

- Molecule 6 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
6	D	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 7 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace
7	E	2	Total	C	N	O	0	0
			28	16	2	10		
7	F	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).

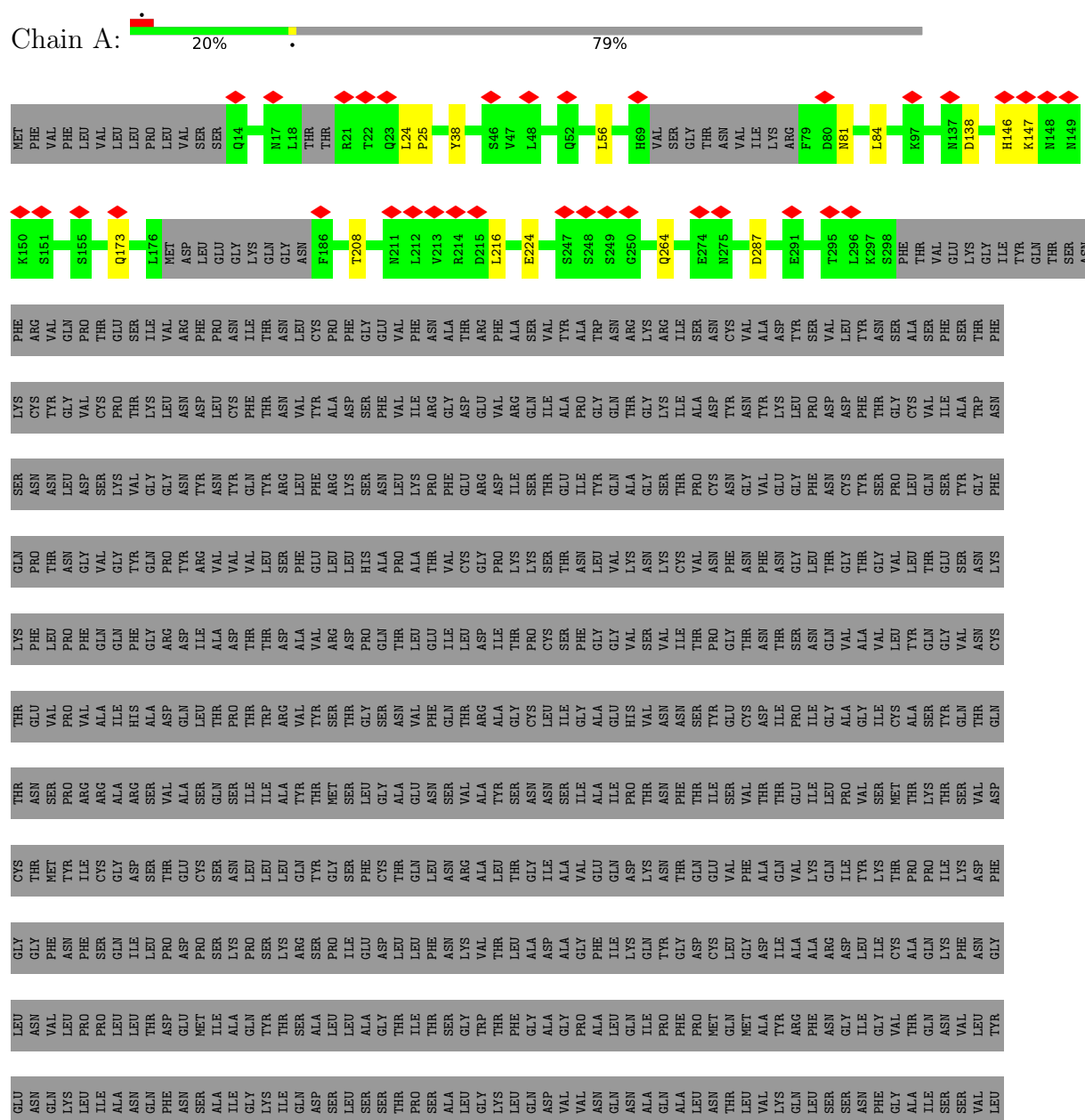


Mol	Chain	Residues	Atoms				AltConf
8	A	1	Total	C	N	O	0
			14	8	1	5	
8	A	1	Total	C	N	O	0
			14	8	1	5	
8	A	1	Total	C	N	O	0
			14	8	1	5	
8	A	1	Total	C	N	O	0
			14	8	1	5	
8	A	1	Total	C	N	O	0
			14	8	1	5	

3 Residue-property plots

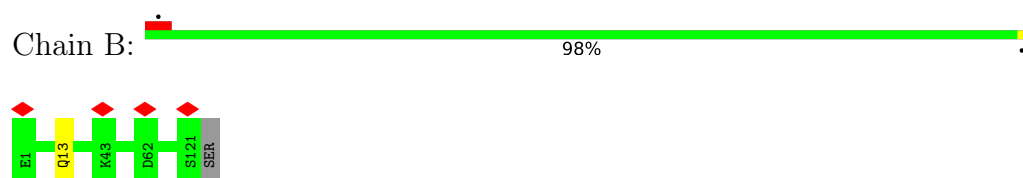
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Spike glycoprotein

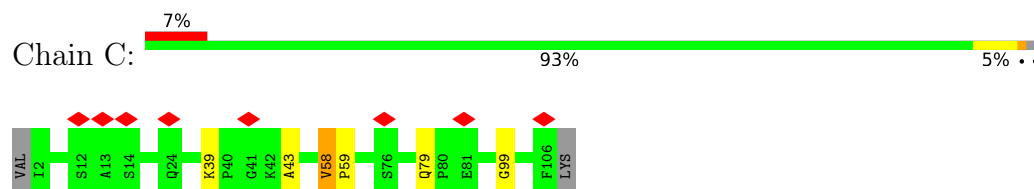




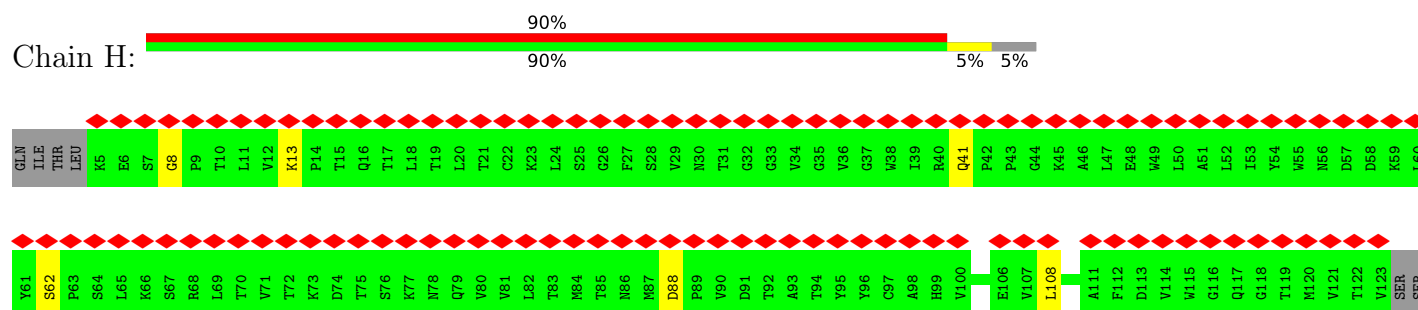
- Molecule 2: S2L20 Heavy Chain



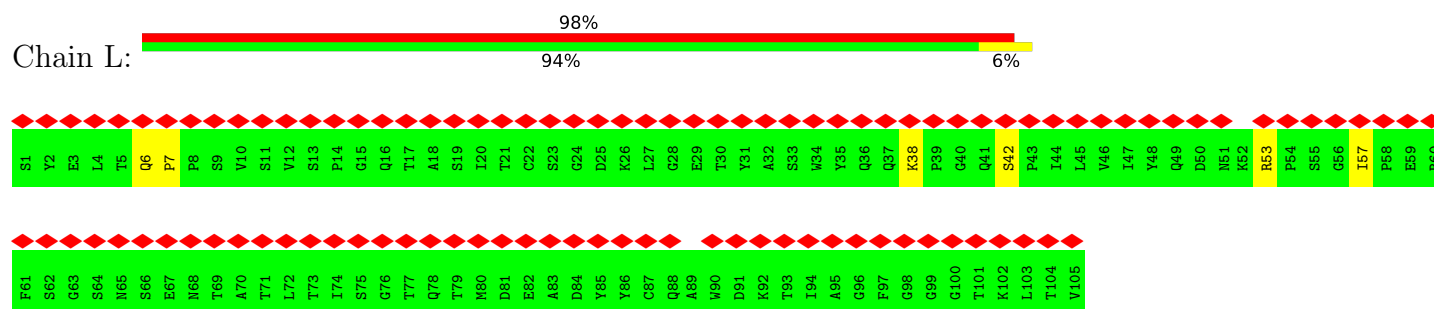
- Molecule 3: S2L20 Light Chain



- Molecule 4: S2X303 Heavy Chain



- Molecule 5: S2X303 Light Chain



- Molecule 6: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 7: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 7: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	95557	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	63	Depositor
Minimum defocus (nm)	2000	Depositor
Maximum defocus (nm)	30000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	5.786	Depositor
Minimum map value	-3.939	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.078	Depositor
Recommended contour level	0.9	Depositor
Map size ($\text{\AA}$)	431.616, 431.616, 431.616	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.843, 0.843, 0.843	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: NAG, BMA

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	0.54	0/2147	0.95	26/2930 (0.9%)
2	B	0.54	0/959	0.81	2/1298 (0.2%)
3	C	0.51	0/804	0.92	10/1096 (0.9%)
4	H	0.42	0/639	1.16	12/892 (1.3%)
5	L	0.45	0/536	1.20	12/747 (1.6%)
All	All	0.51	0/5085	0.98	62/6963 (0.9%)

There are no bond length outliers.

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	6	GLN	CA-C-N	9.18	126.36	119.66
5	L	6	GLN	C-N-CA	9.18	126.36	119.66
4	H	41	GLN	CA-C-N	8.77	126.06	119.66
4	H	41	GLN	C-N-CA	8.77	126.06	119.66
1	A	24	LEU	CA-C-N	7.86	125.40	119.66
1	A	24	LEU	C-N-CA	7.86	125.40	119.66
1	A	25	PRO	CA-C-N	7.41	127.34	119.85
1	A	25	PRO	C-N-CA	7.41	127.34	119.85
1	A	138	ASP	CA-C-N	7.29	127.21	119.85
1	A	138	ASP	C-N-CA	7.29	127.21	119.85
4	H	8	GLY	CA-C-N	7.13	127.11	119.76
4	H	8	GLY	C-N-CA	7.13	127.11	119.76
3	C	99	GLY	CA-C-N	7.09	127.40	119.32
3	C	99	GLY	C-N-CA	7.09	127.40	119.32
1	A	81	ASN	CA-C-N	6.77	126.69	119.85
1	A	81	ASN	C-N-CA	6.77	126.69	119.85
4	H	62	SER	CA-C-N	6.72	126.98	119.32
4	H	62	SER	C-N-CA	6.72	126.98	119.32
5	L	57	ILE	CA-C-N	6.64	126.67	119.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	57	ILE	C-N-CA	6.64	126.67	119.90
1	A	173	GLN	CA-C-N	6.57	126.60	119.90
1	A	173	GLN	C-N-CA	6.57	126.60	119.90
3	C	43	ALA	CA-C-N	6.53	126.48	119.76
3	C	43	ALA	C-N-CA	6.53	126.48	119.76
5	L	53	ARG	CA-C-N	6.50	126.48	119.78
5	L	53	ARG	C-N-CA	6.50	126.48	119.78
1	A	287	ASP	CA-C-N	6.46	126.97	119.47
1	A	287	ASP	C-N-CA	6.46	126.97	119.47
1	A	38	TYR	CA-C-N	6.43	126.05	119.56
1	A	38	TYR	C-N-CA	6.43	126.05	119.56
5	L	42	SER	CA-C-N	6.42	126.18	119.76
5	L	42	SER	C-N-CA	6.42	126.18	119.76
4	H	13	LYS	CA-C-N	6.41	126.36	119.76
4	H	13	LYS	C-N-CA	6.41	126.36	119.76
3	C	58	VAL	CA-C-N	6.39	126.42	119.90
3	C	58	VAL	C-N-CA	6.39	126.42	119.90
1	A	208	THR	CA-C-N	6.35	126.27	119.85
1	A	208	THR	C-N-CA	6.35	126.27	119.85
4	H	108	LEU	CA-C-N	6.29	126.25	120.03
4	H	108	LEU	C-N-CA	6.29	126.25	120.03
3	C	79	GLN	CA-C-N	6.27	125.96	119.56
3	C	79	GLN	C-N-CA	6.27	125.96	119.56
5	L	7	PRO	CA-C-N	6.20	125.76	119.19
5	L	7	PRO	C-N-CA	6.20	125.76	119.19
1	A	224	GLU	CA-C-N	6.15	126.17	119.90
1	A	224	GLU	C-N-CA	6.15	126.17	119.90
1	A	216	LEU	CA-C-N	6.12	126.03	119.85
1	A	216	LEU	C-N-CA	6.12	126.03	119.85
1	A	84	LEU	CA-C-N	6.06	125.97	119.85
1	A	84	LEU	C-N-CA	6.06	125.97	119.85
2	B	13	GLN	CA-C-N	5.90	126.25	119.93
2	B	13	GLN	C-N-CA	5.90	126.25	119.93
1	A	56	LEU	CA-C-N	5.80	125.73	119.76
1	A	56	LEU	C-N-CA	5.80	125.73	119.76
4	H	88	ASP	CA-C-N	5.61	125.98	119.47
4	H	88	ASP	C-N-CA	5.61	125.98	119.47
1	A	264	GLN	CA-C-N	5.16	126.29	119.84
1	A	264	GLN	C-N-CA	5.16	126.29	119.84
5	L	38	LYS	CA-C-N	5.12	125.41	119.93
5	L	38	LYS	C-N-CA	5.12	125.41	119.93
3	C	39	LYS	CA-C-N	5.02	125.30	119.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	39	LYS	C-N-CA	5.02	125.30	119.93

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2088	0	1958	1	0
2	B	936	0	885	0	0
3	C	785	0	724	1	0
4	H	628	0	333	0	0
5	L	530	0	280	0	0
6	D	39	0	34	0	0
7	E	28	0	25	0	0
7	F	28	0	25	0	0
8	A	70	0	65	0	0
All	All	5132	0	4329	2	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 0.

All (2) 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:146:HIS:ND1	1:A:147:LYS:N	2.52	0.56
3:C:58:VAL:HA	3:C:59:PRO:HD3	1.92	0.41

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	257/1270 (20%)	247 (96%)	10 (4%)	0	100	100
2	B	119/122 (98%)	118 (99%)	1 (1%)	0	100	100
3	C	103/107 (96%)	99 (96%)	4 (4%)	0	100	100
4	H	117/125 (94%)	113 (97%)	4 (3%)	0	100	100
5	L	103/105 (98%)	100 (97%)	3 (3%)	0	100	100
All	All	699/1729 (40%)	677 (97%)	22 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	224/1106 (20%)	224 (100%)	0	100	100
2	B	95/99 (96%)	95 (100%)	0	100	100
3	C	83/94 (88%)	83 (100%)	0	100	100
4	H	13/110 (12%)	13 (100%)	0	100	100
5	L	9/88 (10%)	9 (100%)	0	100	100
All	All	424/1497 (28%)	424 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	115	GLN
1	A	245	HIS
2	B	39	GLN
3	C	38	GLN
3	C	93	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

7 monosaccharides 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	$\# Z > 2$
6	NAG	D	1	6,1	14,14,15	1.29	1 (7%)	17,19,21	1.07	2 (11%)
6	NAG	D	2	6	14,14,15	1.11	1 (7%)	17,19,21	0.97	1 (5%)
6	BMA	D	3	6	11,11,12	1.06	0	15,15,17	0.65	0
7	NAG	E	1	1,7	14,14,15	1.23	1 (7%)	17,19,21	1.03	1 (5%)
7	NAG	E	2	7	14,14,15	1.14	1 (7%)	17,19,21	1.02	1 (5%)
7	NAG	F	1	1,7	14,14,15	1.27	1 (7%)	17,19,21	1.05	1 (5%)
7	NAG	F	2	7	14,14,15	1.17	1 (7%)	17,19,21	0.97	1 (5%)

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
6	NAG	D	1	6,1	-	2/6/23/26	0/1/1/1
6	NAG	D	2	6	-	0/6/23/26	0/1/1/1
6	BMA	D	3	6	-	2/2/19/22	0/1/1/1
7	NAG	E	1	1,7	-	0/6/23/26	0/1/1/1
7	NAG	E	2	7	-	0/6/23/26	0/1/1/1
7	NAG	F	1	1,7	-	0/6/23/26	0/1/1/1
7	NAG	F	2	7	-	0/6/23/26	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	1	NAG	C1-C2	3.75	1.57	1.52
7	F	1	NAG	C1-C2	3.68	1.57	1.52
7	E	1	NAG	C1-C2	3.58	1.57	1.52
7	F	2	NAG	C1-C2	3.37	1.56	1.52
7	E	2	NAG	C1-C2	3.13	1.56	1.52
6	D	2	NAG	C1-C2	2.90	1.56	1.52

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	1	NAG	C8-C7-N2	2.79	120.74	116.12
7	F	1	NAG	C8-C7-N2	2.56	120.36	116.12
7	E	1	NAG	C8-C7-N2	2.55	120.35	116.12
6	D	2	NAG	C8-C7-N2	2.48	120.24	116.12
7	E	2	NAG	C8-C7-N2	2.46	120.19	116.12
7	F	2	NAG	C8-C7-N2	2.39	120.08	116.12
6	D	1	NAG	C4-C3-C2	-2.06	108.01	111.02

There are no chirality outliers.

All (4) torsion outliers are listed below:

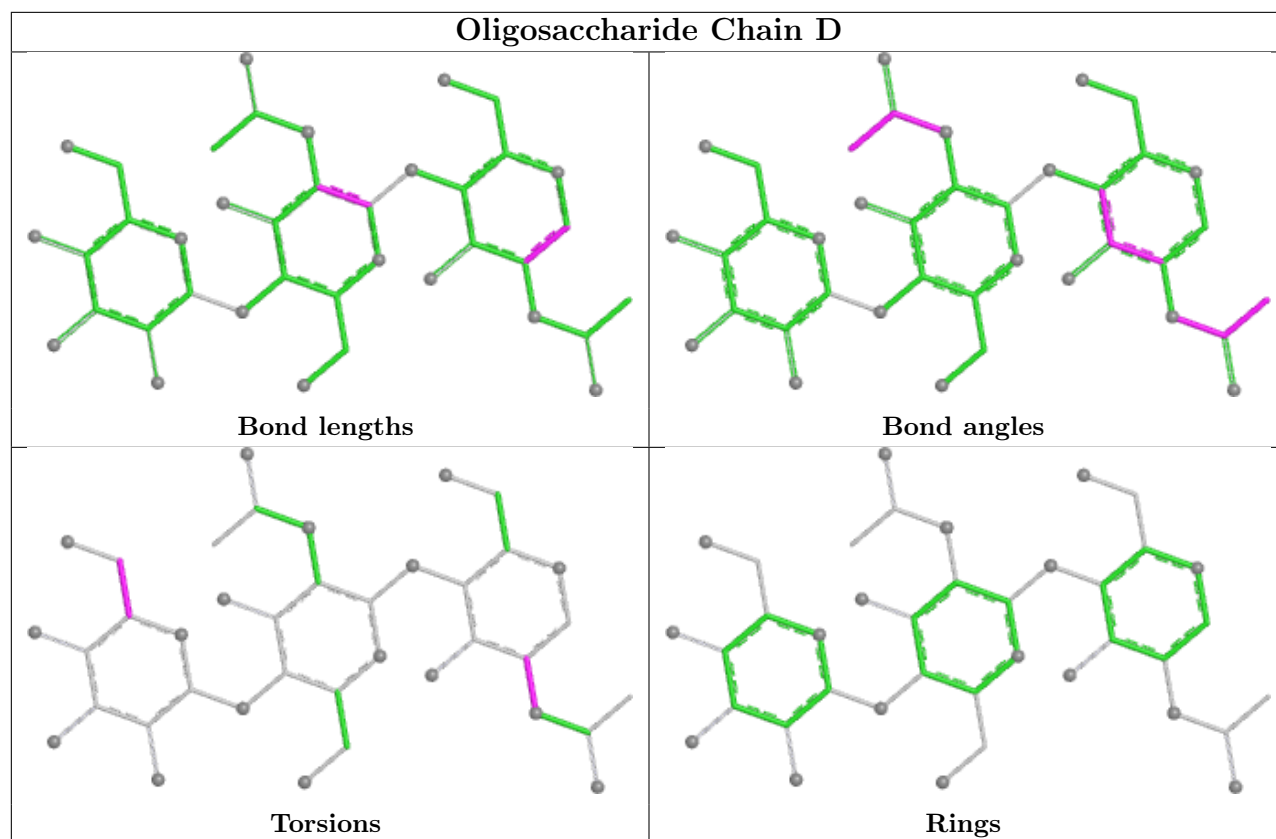
Mol	Chain	Res	Type	Atoms
6	D	3	BMA	O5-C5-C6-O6
6	D	3	BMA	C4-C5-C6-O6
6	D	1	NAG	C1-C2-N2-C7
6	D	1	NAG	C3-C2-N2-C7

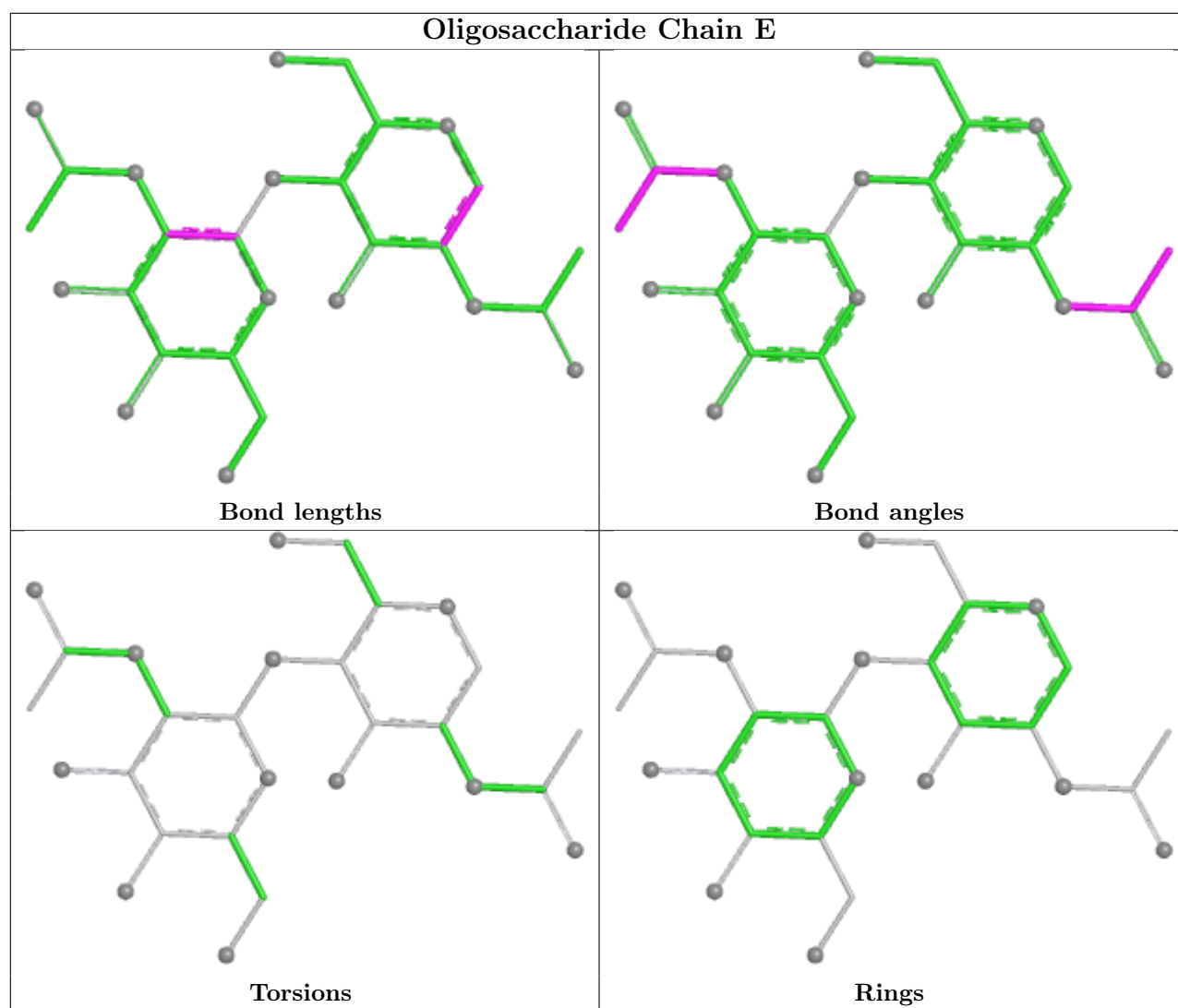
There are no ring outliers.

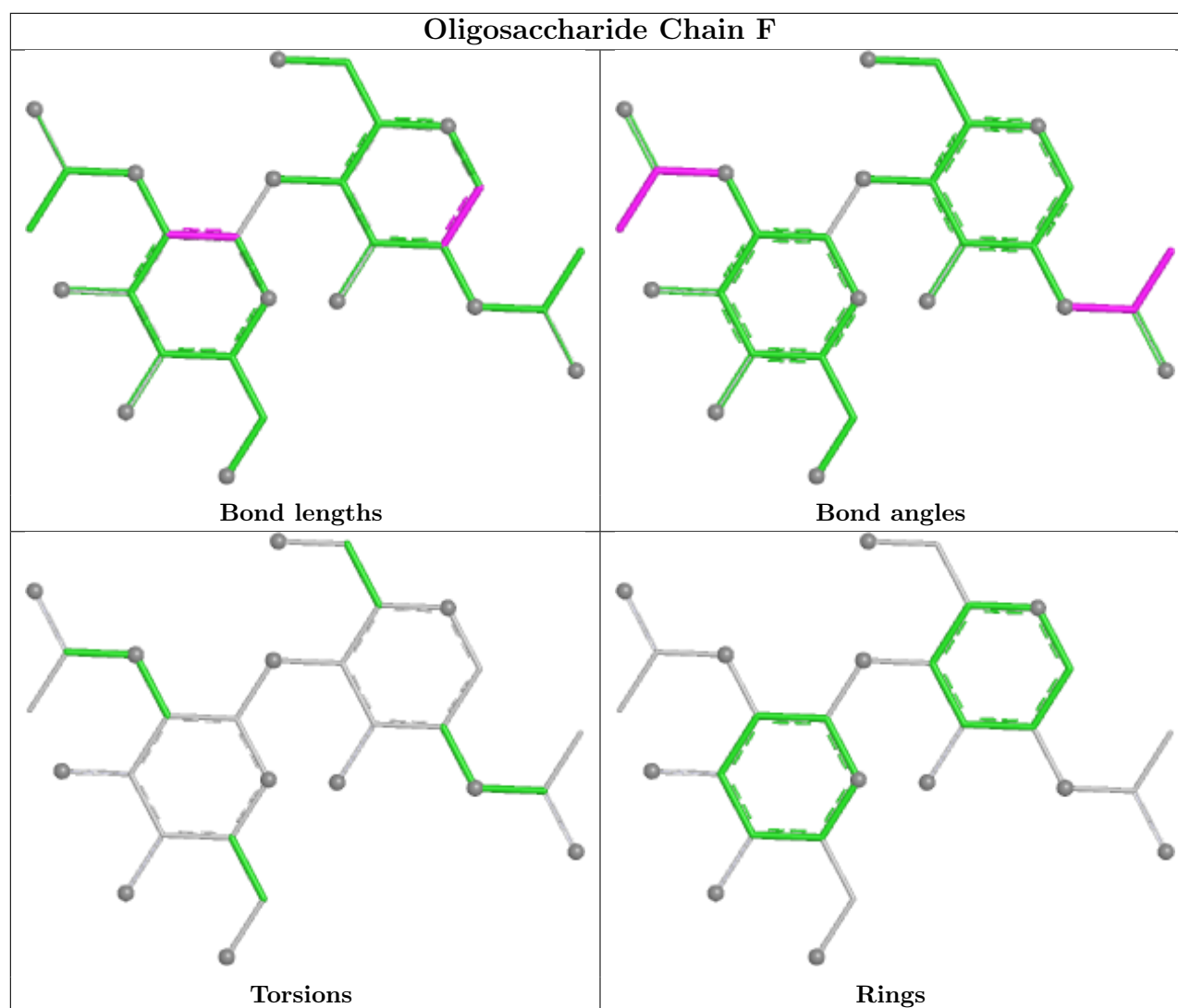
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.







5.6 Ligand geometry [i](#)

5 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	$\# Z > 2$
8	NAG	A	1303	1	14,14,15	1.23	1 (7%)	17,19,21	1.11	1 (5%)
8	NAG	A	1304	1	14,14,15	1.35	1 (7%)	17,19,21	1.08	1 (5%)
8	NAG	A	1302	1	14,14,15	1.24	1 (7%)	17,19,21	1.03	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	NAG	A	1301	1	14,14,15	1.22	1 (7%)	17,19,21	1.04	1 (5%)
8	NAG	A	1305	1	14,14,15	1.21	1 (7%)	17,19,21	1.07	1 (5%)

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
8	NAG	A	1303	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1304	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1302	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1301	1	-	0/6/23/26	0/1/1/1
8	NAG	A	1305	1	-	0/6/23/26	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	A	1304	NAG	C1-C2	4.13	1.58	1.52
8	A	1302	NAG	C1-C2	3.71	1.57	1.52
8	A	1303	NAG	C1-C2	3.61	1.57	1.52
8	A	1305	NAG	C1-C2	3.57	1.57	1.52
8	A	1301	NAG	C1-C2	3.50	1.57	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	1303	NAG	C8-C7-N2	2.75	120.67	116.12
8	A	1305	NAG	C8-C7-N2	2.62	120.47	116.12
8	A	1304	NAG	C8-C7-N2	2.62	120.46	116.12
8	A	1302	NAG	C8-C7-N2	2.55	120.35	116.12
8	A	1301	NAG	C8-C7-N2	2.42	120.13	116.12

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

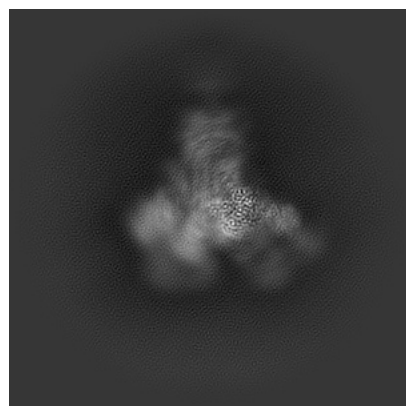
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-43659. These allow visual inspection of the internal detail of the map and identification of artifacts.

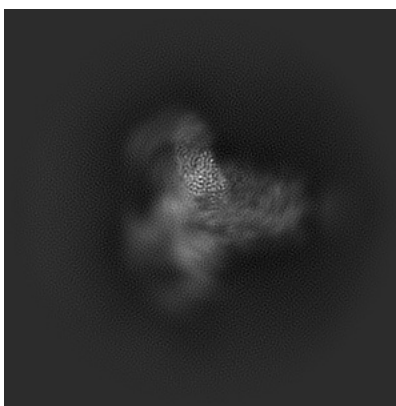
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

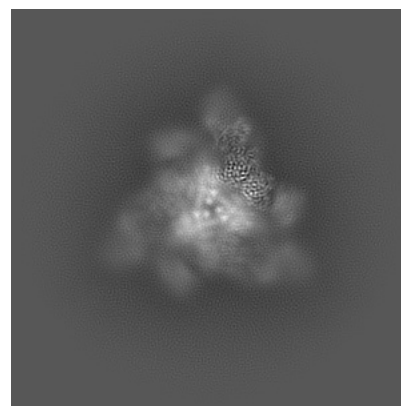
6.1.1 Primary map



X

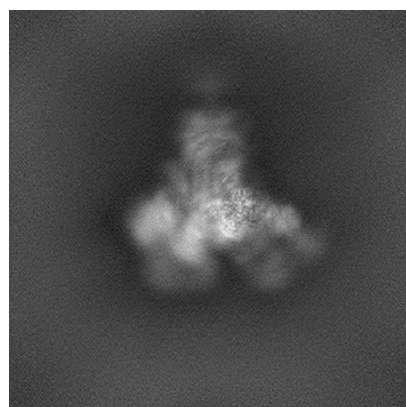


Y

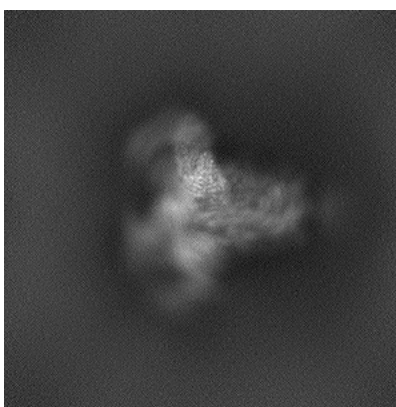


Z

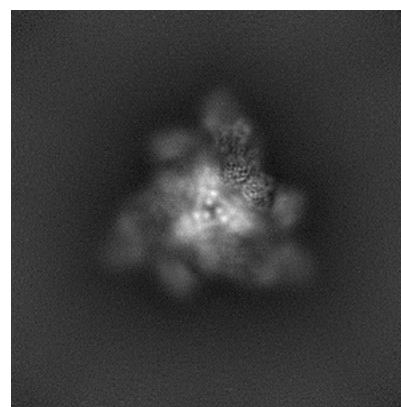
6.1.2 Raw map



X



Y

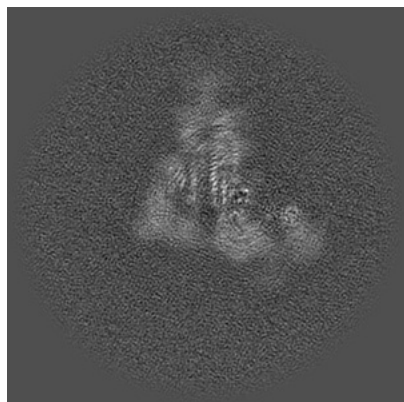


Z

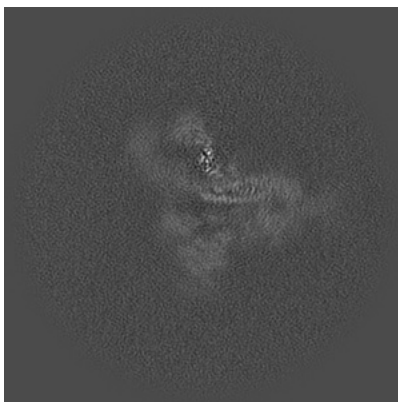
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

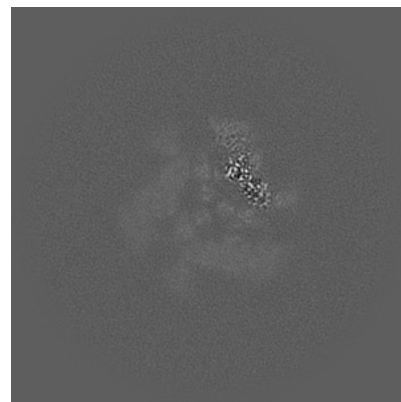
6.2.1 Primary map



X Index: 256

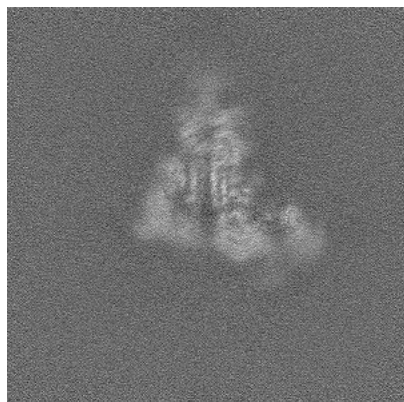


Y Index: 256



Z Index: 256

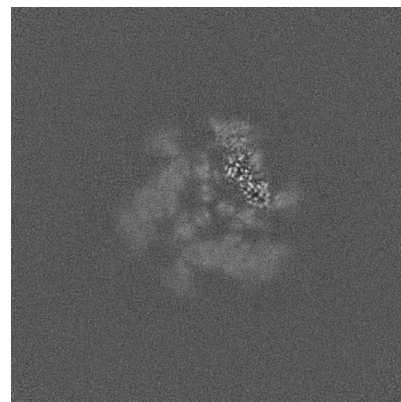
6.2.2 Raw map



X Index: 256



Y Index: 256

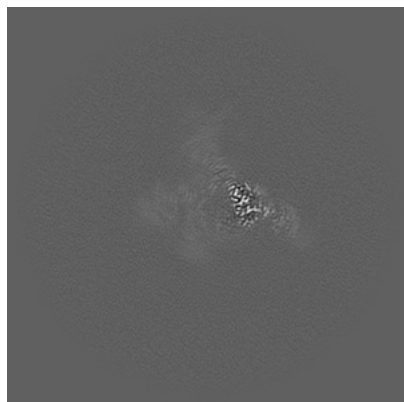


Z Index: 256

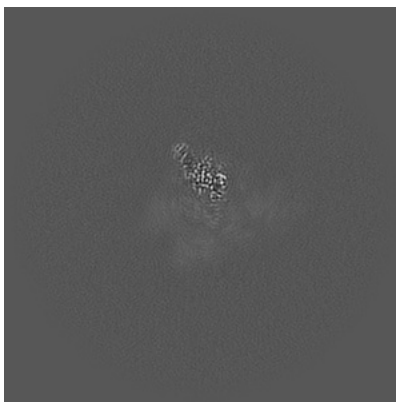
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

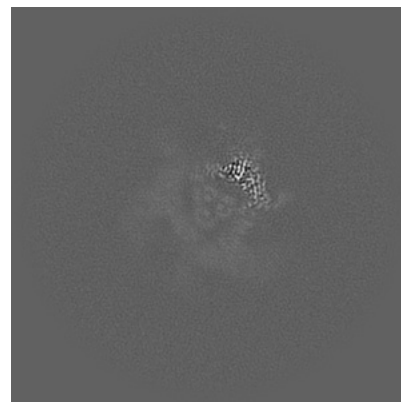
6.3.1 Primary map



X Index: 291

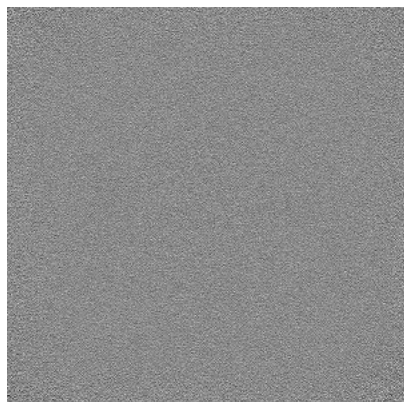


Y Index: 295

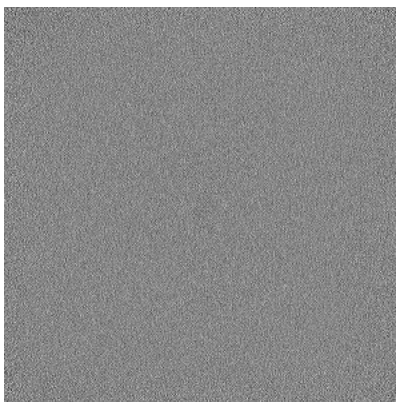


Z Index: 264

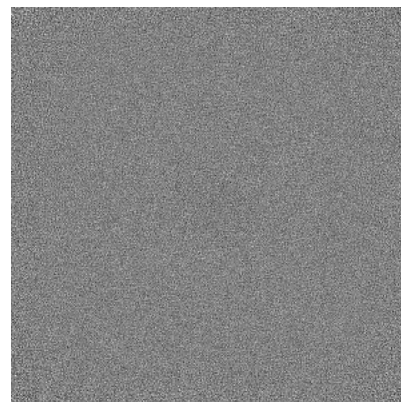
6.3.2 Raw map



X Index: 0



Y Index: 0

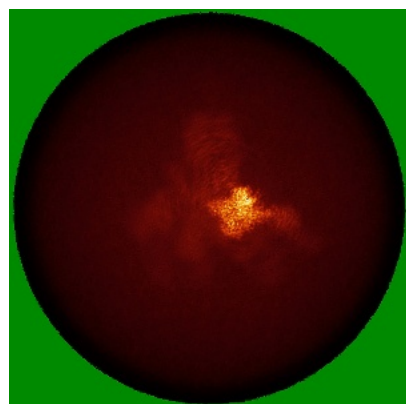


Z Index: 0

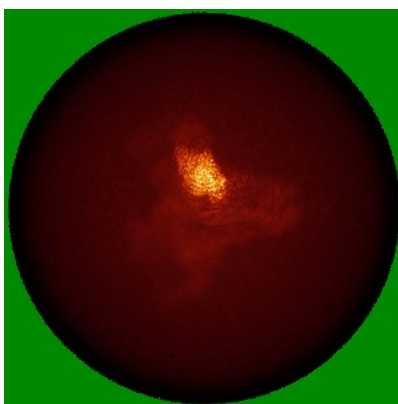
The images above show the largest variance slices of the map in three orthogonal directions.

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

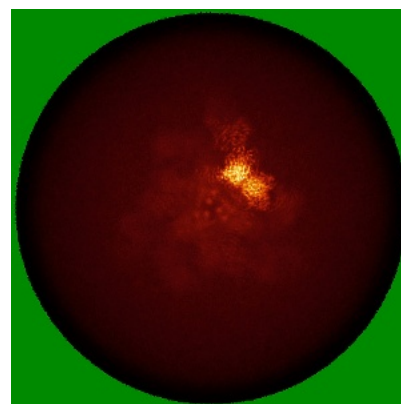
6.4.1 Primary map



X

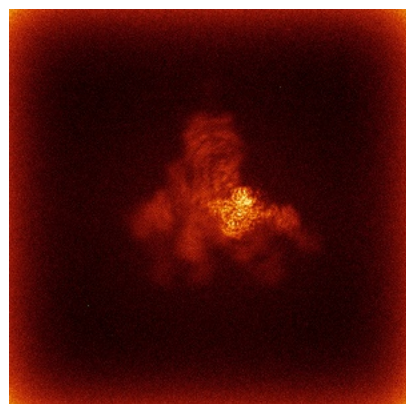


Y

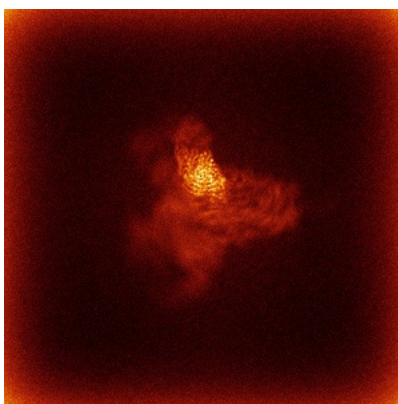


Z

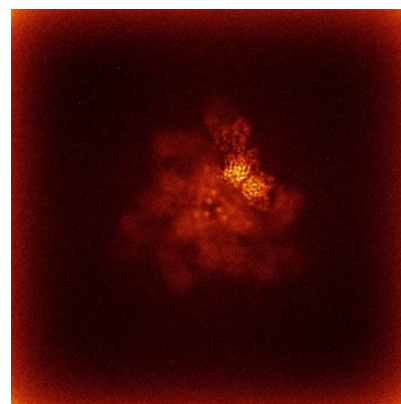
6.4.2 Raw map



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.

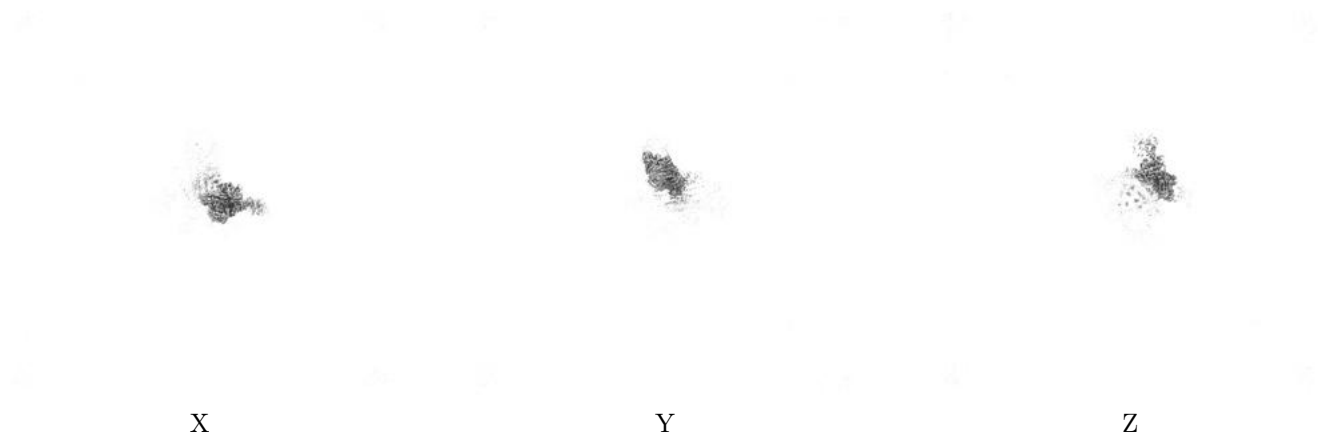
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.9. 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.

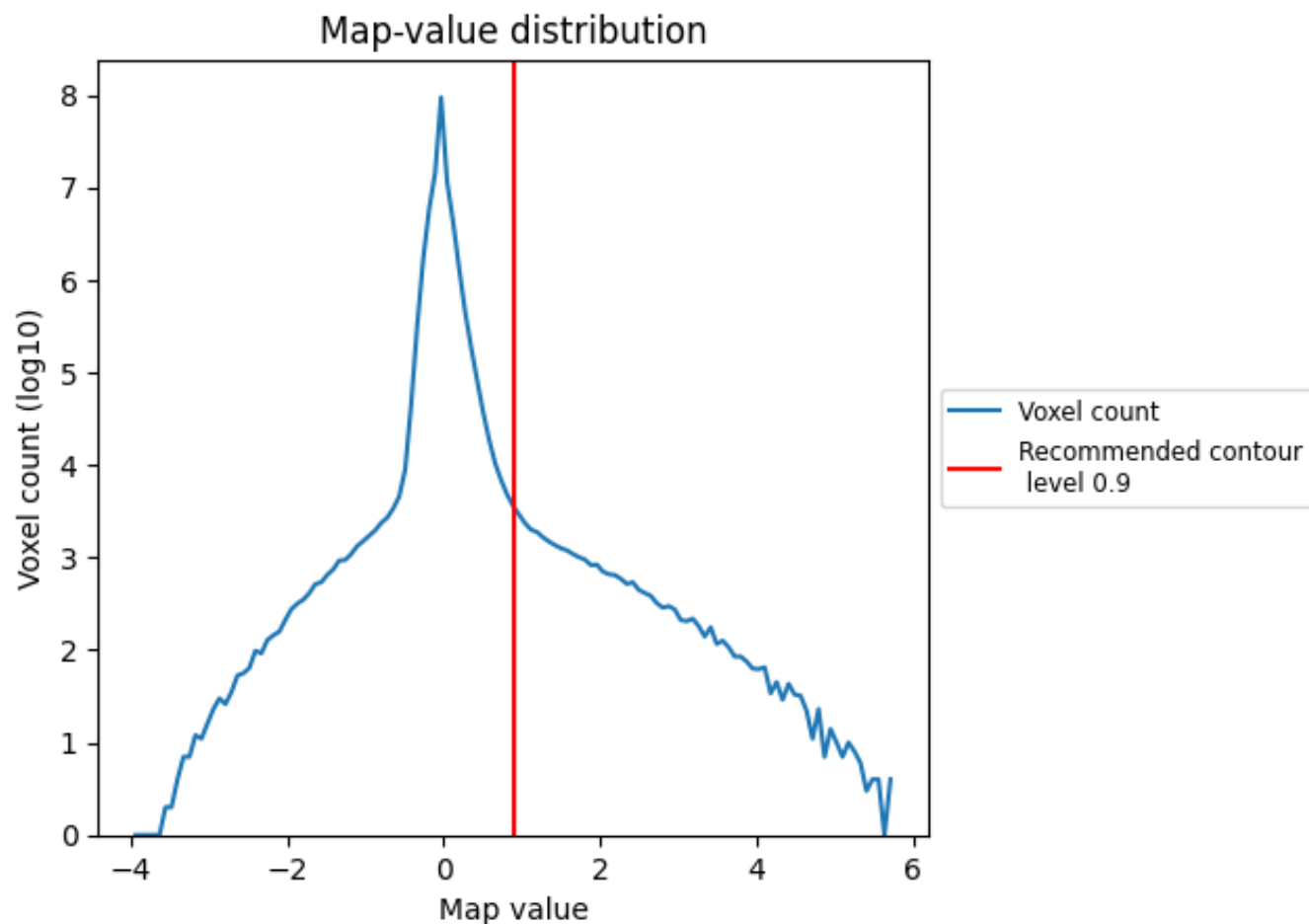
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

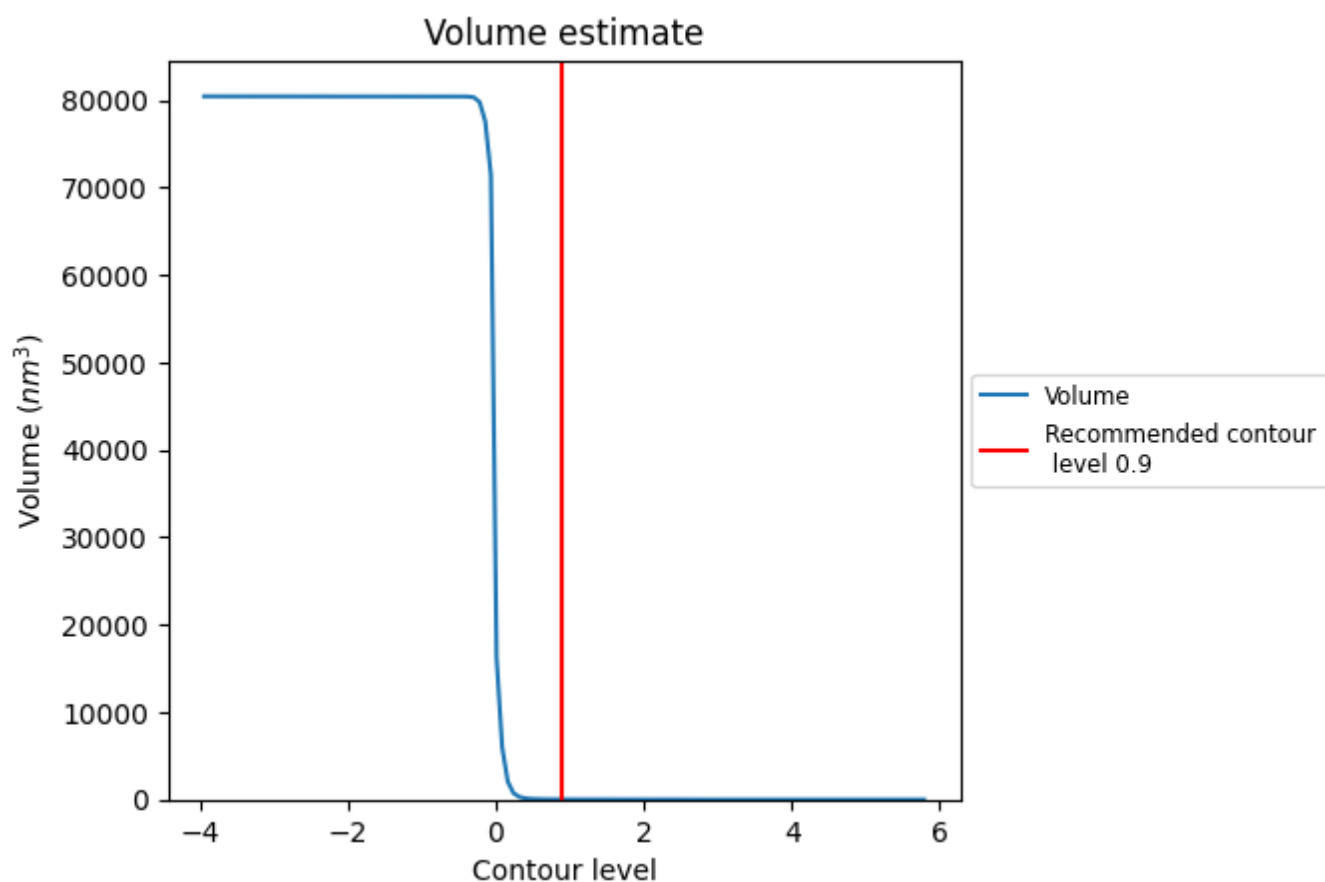
This section contains the results of statistical analysis of the map.

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.

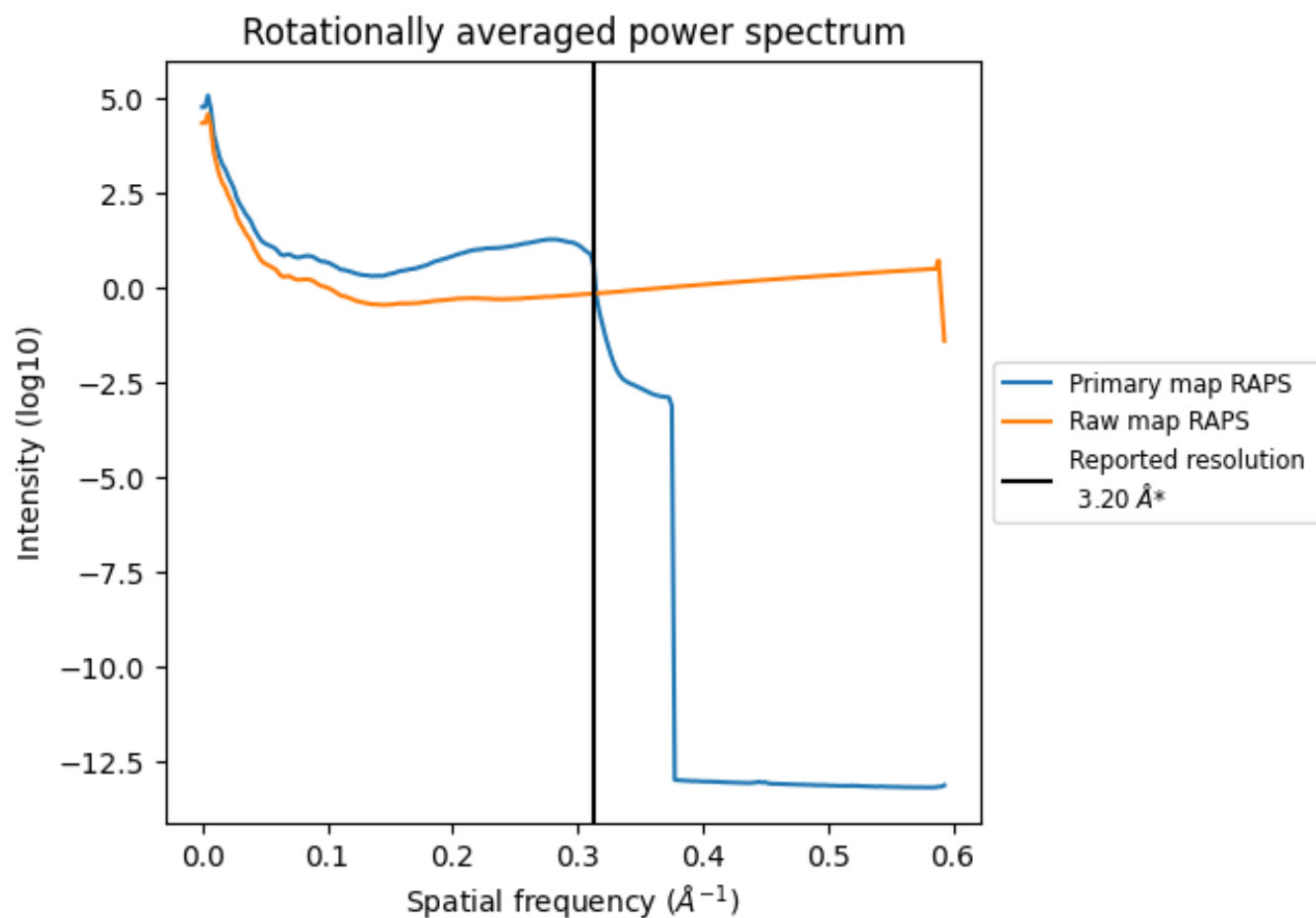
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 19 nm³; this corresponds to an approximate mass of 17 kDa.

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

7.3 Rotationally averaged power spectrum ⓘ

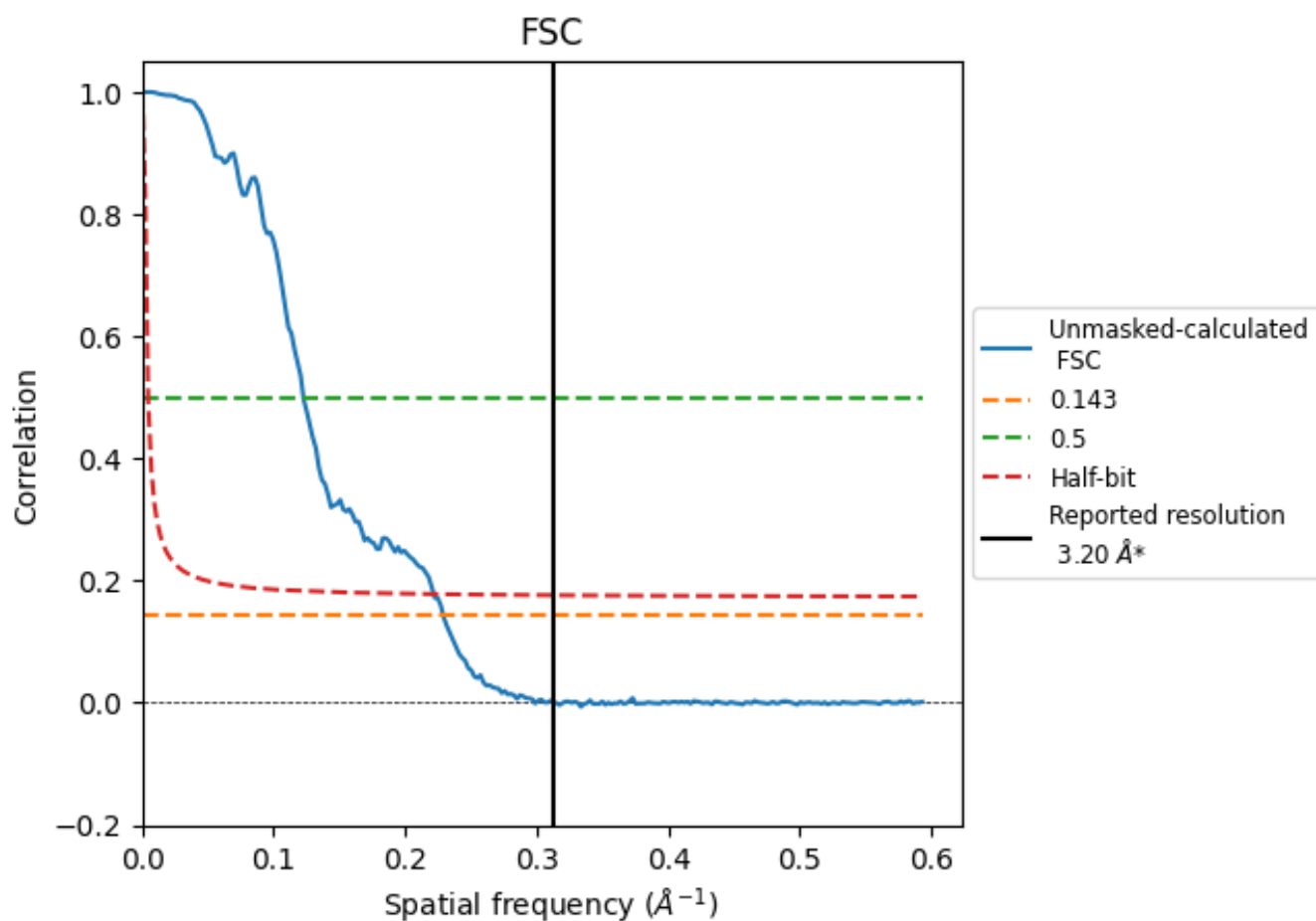


*Reported resolution corresponds to spatial frequency of 0.312 Å⁻¹

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 $0.312 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

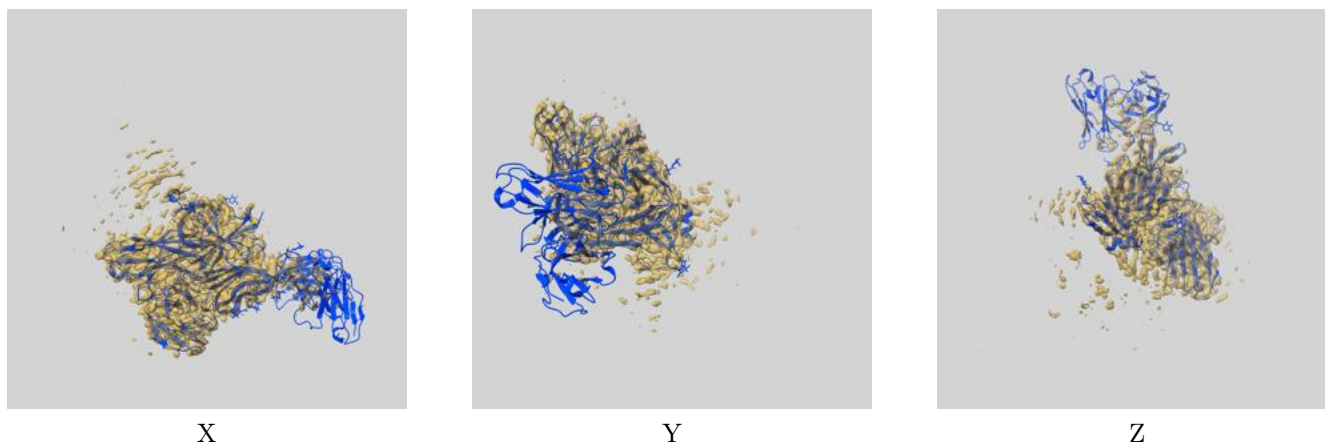
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.37	8.16	4.51

*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 4.37 differs from the reported value 3.2 by more than 10 %

9 Map-model fit [i](#)

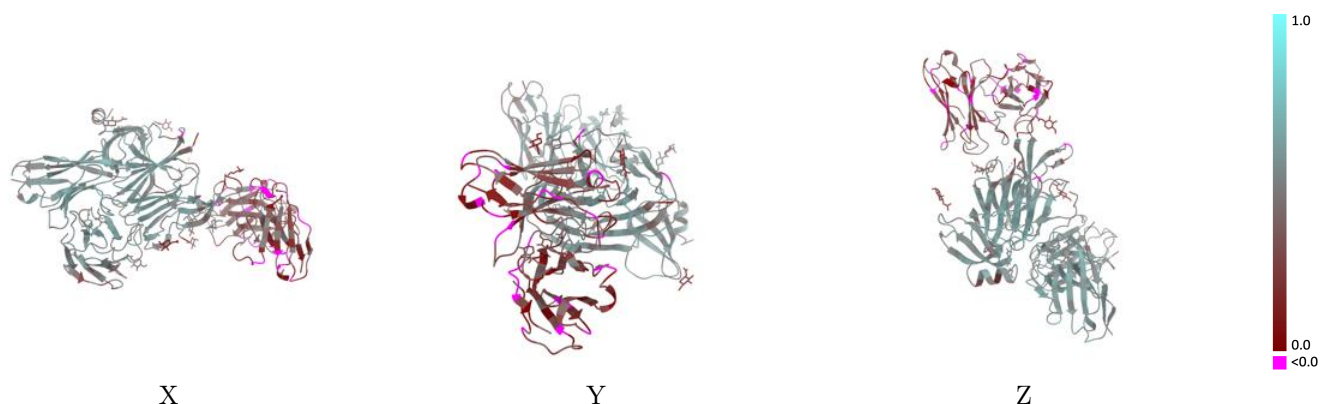
This section contains information regarding the fit between EMDB map EMD-43659 and PDB model 8VYF. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



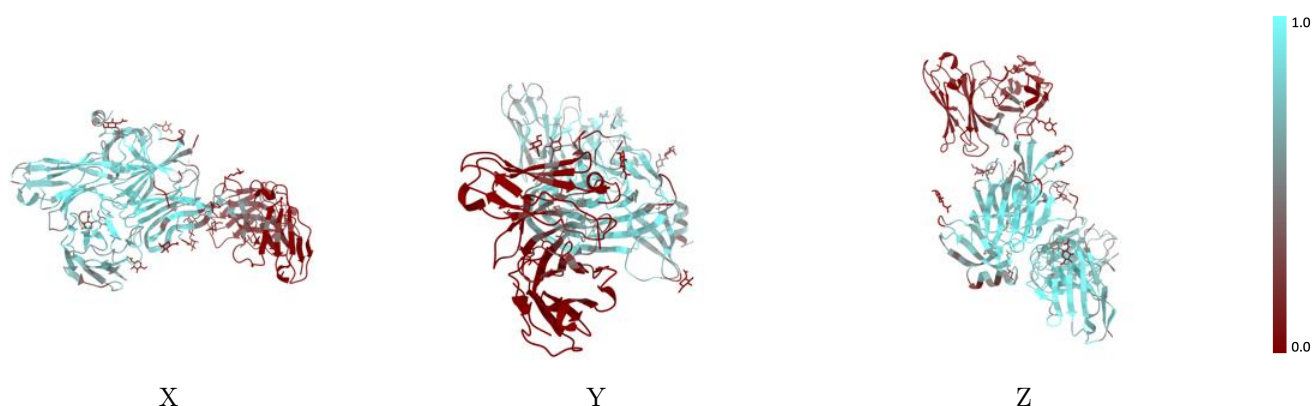
The images above show the 3D surface view of the map at the recommended contour level 0.9 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



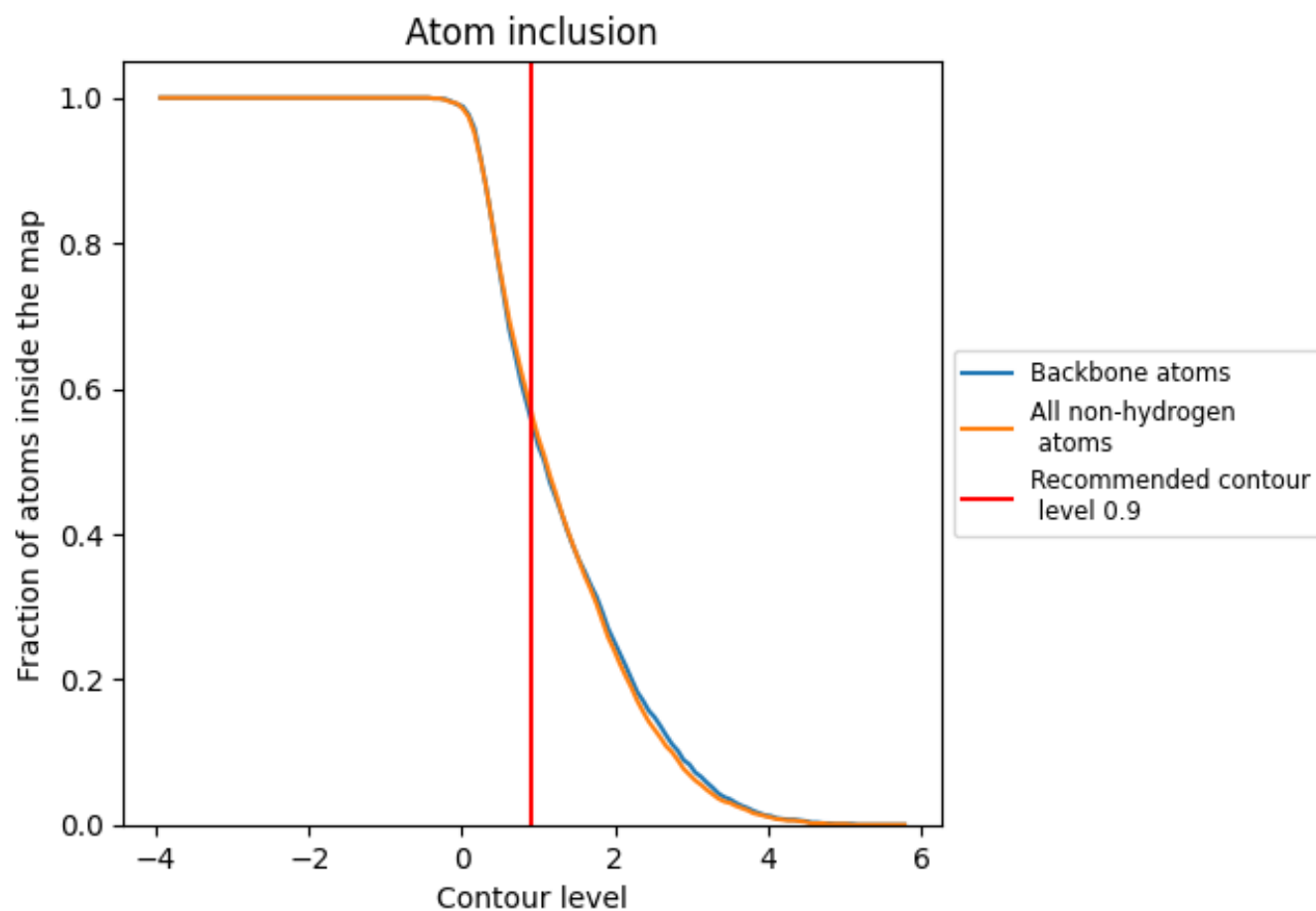
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.9).

9.4 Atom inclusion [i](#)



At the recommended contour level, 56% of all backbone atoms, 57% 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 (0.9) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5720	0.4590
A	0.6970	0.5190
B	0.8080	0.5630
C	0.7080	0.5200
D	0.1790	0.3320
E	0.2500	0.4540
F	0.2500	0.4350
H	0.1090	0.2400
L	0.0770	0.2120

1.0

0.0

<0.0