



wwPDB EM Validation Summary Report ⓘ

Aug 26, 2026 – 12:44 am BST

PDB ID : 7ZI4 / pdb_00007zi4
EMDB ID : EMD-14737
Title : Cryo-EM structure of the human INO80 complex bound to a WT nucleosome
Authors : Vance, N.R.; Ayala, R.; Willhoft, O.; Tvardovskiy, A.; McCormack, E.A.;
Bartke, T.; Zhang, X.; Wigley, D.B.
Deposited on : 2022-04-07
Resolution : 3.20 Å(reported)
Based on initial model : 6HTS

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 ⓘ 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:

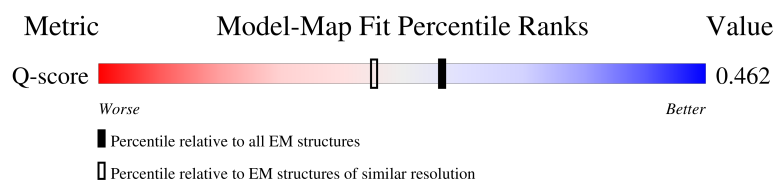
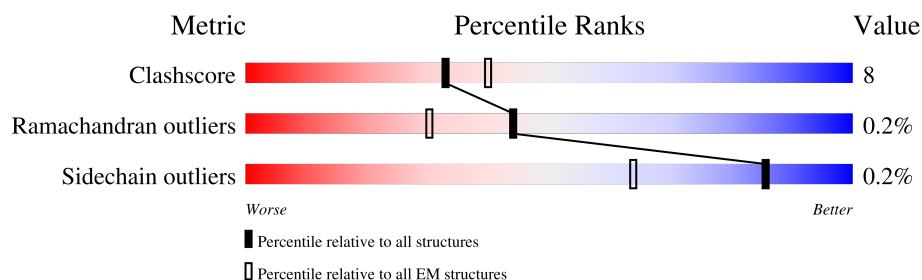
EMDB validation analysis : 0.0.1.dev133
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data 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

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 $\leq 5\%$. 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	456	 76% 20% 5%
1	C	456	 82% 16% .
1	E	456	 73% 24% .
2	B	463	 74% 18% 8%

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Mol	Chain	Length	Quality of chain
2	D	463	
2	F	463	
3	G	1556	
4	J	103	
4	N	103	
5	R	356	
6	H	607	
7	Q	192	
8	I	136	
8	M	136	
9	K	130	
9	O	130	
10	L	126	
10	P	126	
11	X	158	
12	Y	158	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
14	BEF	G	1602	-	-	X	-

2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 42294 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 RuvB-like 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	434	Total	C	N	O	S	0	0
			3323	2093	573	641	16		
1	C	447	Total	C	N	O	S	0	0
			3394	2136	585	657	16		
1	E	443	Total	C	N	O	S	0	0
			3402	2143	585	657	17		

- Molecule 2 is a protein called RuvB-like 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	426	Total	C	N	O	S	0	0
			3261	2045	568	633	15		
2	D	439	Total	C	N	O	S	0	0
			3356	2096	587	658	15		
2	F	434	Total	C	N	O	S	0	0
			3335	2083	586	650	16		

- Molecule 3 is a protein called Chromatin-remodeling ATPase INO80.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	682	Total	C	N	O	S	0	0
			4962	3201	896	843	22		

- Molecule 4 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	N	79	Total	C	N	O	S	0	0
			625	394	121	109	1		
4	J	82	Total	C	N	O	S	0	0
			646	408	126	111	1		

- Molecule 5 is a protein called INO80 complex subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	R	101	Total	C	N	O	S	0	0
			758	463	151	136	8		

- Molecule 6 is a protein called Actin-related protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	412	Total	C	N	O	S	0	0
			3109	1980	539	571	19		

- Molecule 7 is a protein called INO80 complex subunit C.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	Q	107	Total	C	N	O	S	0	0
			735	470	126	139			

- Molecule 8 is a protein called Histone H3.1.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	93	Total	C	N	O	S	0	0
			751	473	142	132	4		
8	M	99	Total	C	N	O	S	0	0
			809	511	155	139	4		

- Molecule 9 is a protein called Histone H2A type 1-B/E.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	K	106	Total	C	N	O	S	0	0
			819	517	160	142			
9	O	111	Total	C	N	O	S	0	0
			839	528	164	147			

- Molecule 10 is a protein called Histone H2B type 1-J.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	L	96	Total	C	N	O	S	0	0
			747	468	136	141	2		
10	P	93	Total	C	N	O	S	0	0
			727	456	132	137	2		

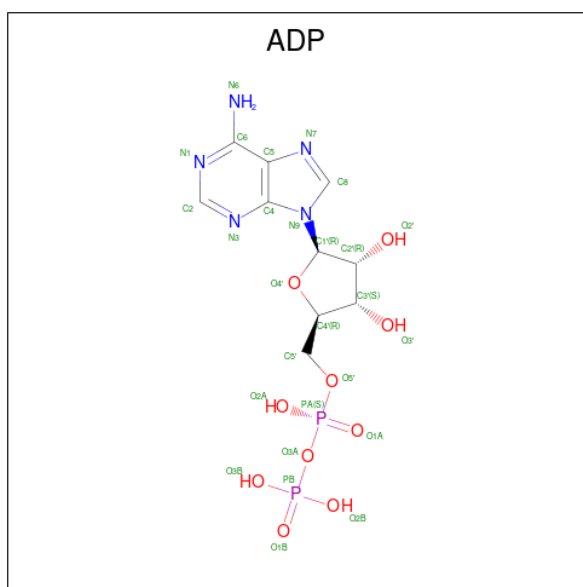
- Molecule 11 is a DNA chain called DNA (158-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
11	X	158	Total	C	N	O	P	0	0
			3223	1532	580	953	158		

- Molecule 12 is a DNA chain called DNA (158-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
12	Y	158	Total	C	N	O	P	0	0
			3252	1541	613	941	157		

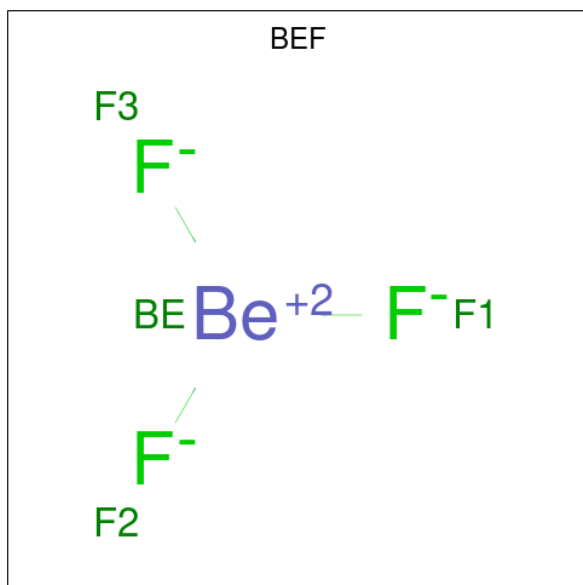
- Molecule 13 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



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Mol	Chain	Residues	Atoms					AltConf
13	H	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 14 is BERYLLIUM TRIFLUORIDE ION (CCD ID: BEF) (formula: BeF_3) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
14	G	1	Total	Be	F	0
			4	1	3	

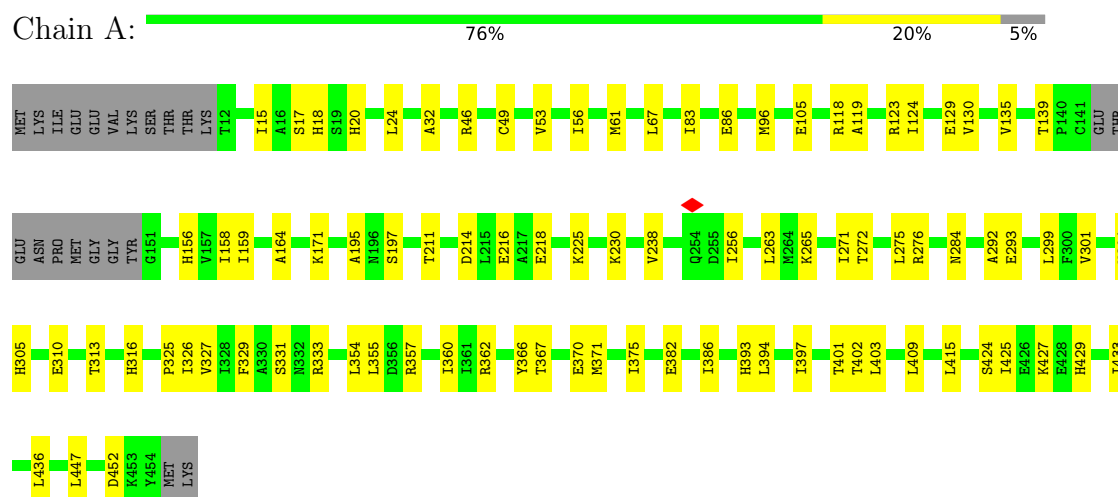
- Molecule 15 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
15	R	1	Total	Zn	0
			1	1	

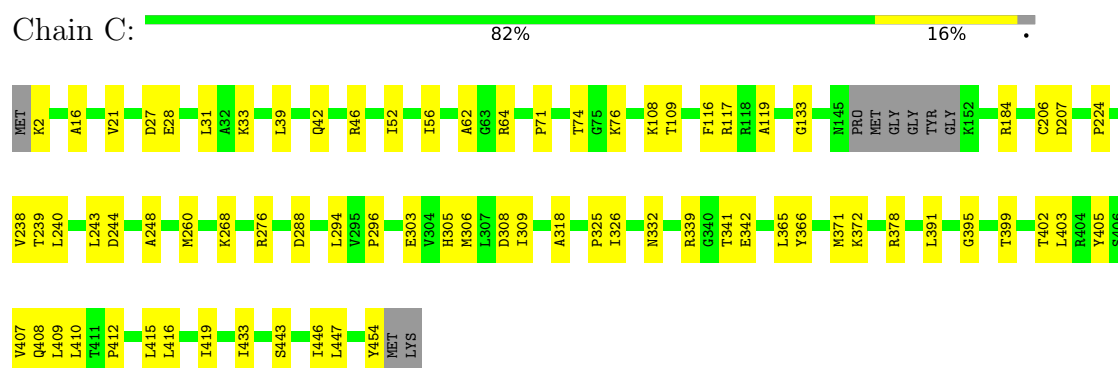
3 Residue-property plots [i](#)

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.

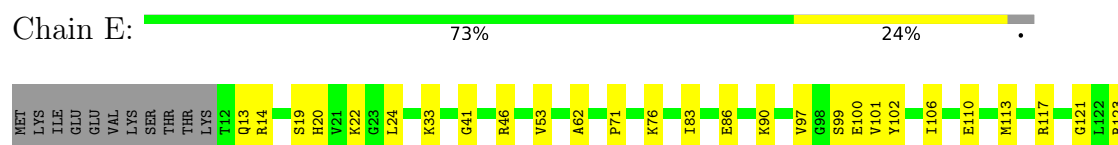
• Molecule 1: RuvB-like 1

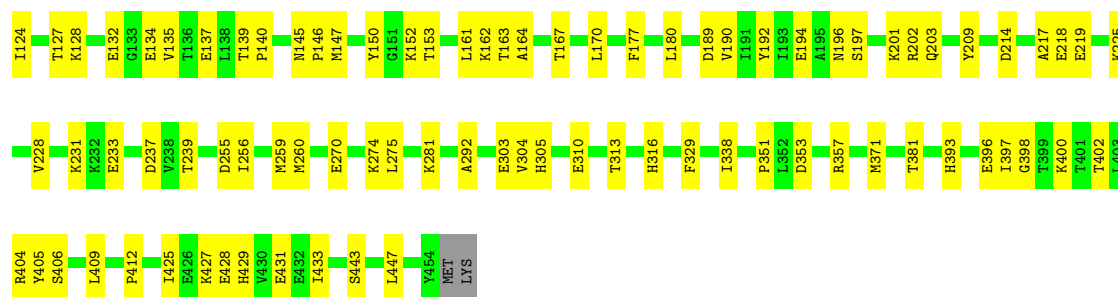


• Molecule 1: RuvB-like 1



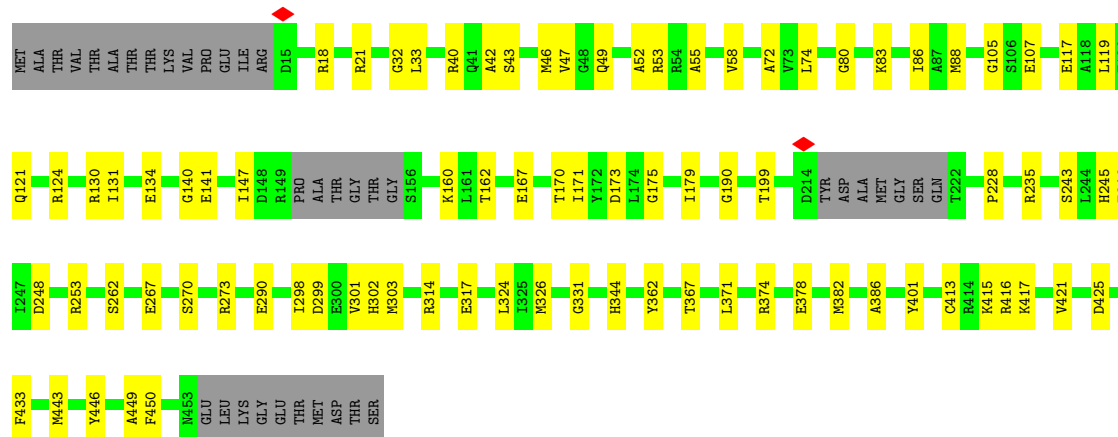
• Molecule 1: RuvB-like 1





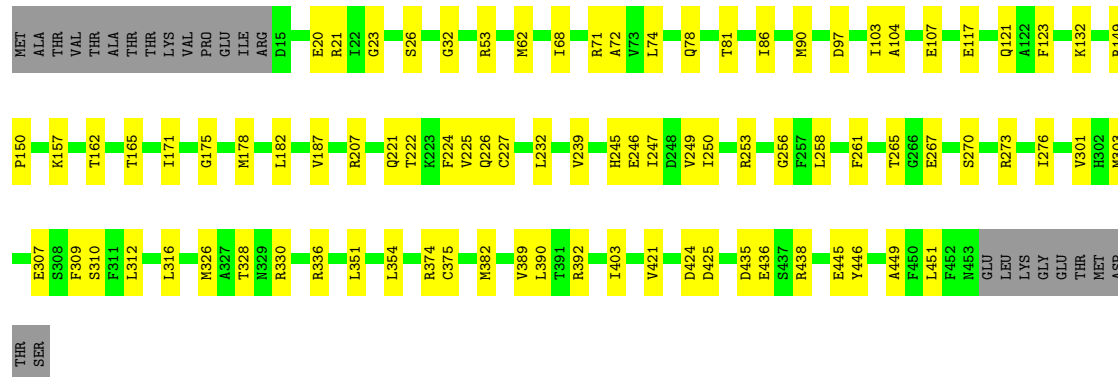
• Molecule 2: RuvB-like 2

Chain B: 74% 18% 8%



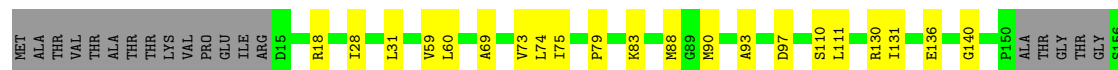
• Molecule 2: RuvB-like 2

Chain D: 76% 19% 5%

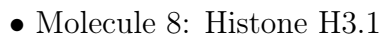
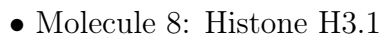


• Molecule 2: RuvB-like 2

Chain F: 76% 18% 6%









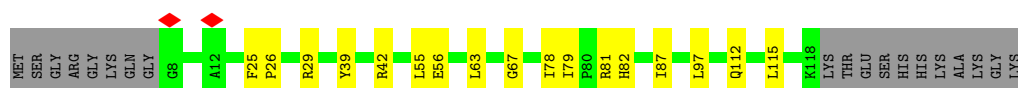
• Molecule 9: Histone H2A type 1-B/E

Chain K: 71% 11% 18%



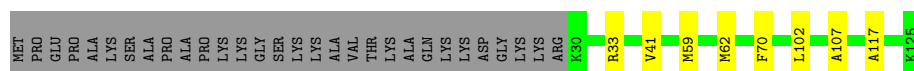
• Molecule 9: Histone H2A type 1-B/E

Chain O: 72% 13% 15%



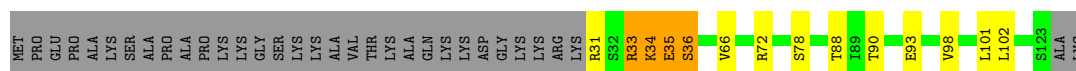
• Molecule 10: Histone H2B type 1-J

Chain L: 70% 6% 24%



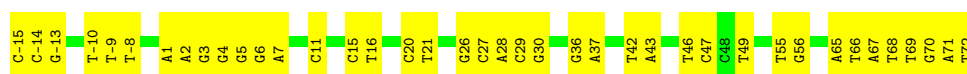
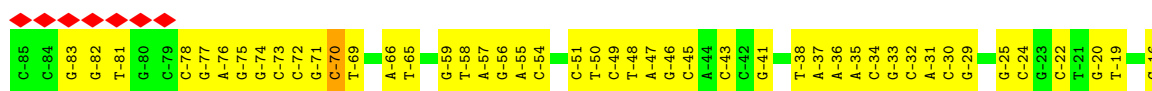
• Molecule 10: Histone H2B type 1-J

Chain P: 63% 8% 26%



• Molecule 11: DNA (158-MER)

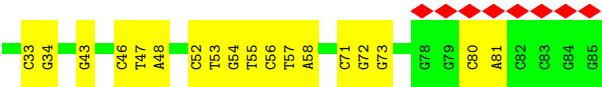
Chain X: 46% 54%



• Molecule 12: DNA (158-MER)

Chain Y: 5% 61% 39%





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	156300	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	88000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	51.824	Depositor
Minimum map value	-26.213	Depositor
Average map value	0.003	Depositor
Map value standard deviation	1.133	Depositor
Recommended contour level	4.5	Depositor
Map size (Å)	404.80002, 404.80002, 404.80002	wwPDB
Map dimensions	368, 368, 368	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.1, 1.1, 1.1	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, ZN, BEF

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	0.10	0/3366	0.31	0/4538
1	C	0.09	0/3437	0.26	0/4639
1	E	0.12	0/3448	0.28	0/4649
2	B	0.11	0/3297	0.31	0/4444
2	D	0.09	0/3395	0.27	0/4580
2	F	0.10	0/3373	0.28	0/4546
3	G	0.15	0/5085	0.43	0/6941
4	J	0.10	0/653	0.25	0/876
4	N	0.15	0/632	0.44	0/845
5	R	0.11	0/775	0.36	0/1049
6	H	0.10	0/3189	0.33	0/4343
7	Q	0.11	0/751	0.30	0/1028
8	I	0.11	0/760	0.28	0/1020
8	M	0.12	0/821	0.31	0/1102
9	K	0.11	0/829	0.28	0/1118
9	O	0.18	0/849	0.32	0/1147
10	L	0.10	0/758	0.29	0/1018
10	P	0.24	0/738	0.42	0/993
11	X	0.18	0/3610	0.39	1/5566 (0.0%)
12	Y	0.16	0/3653	0.33	0/5640
All	All	0.13	0/43419	0.33	1/60082 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	X	-70	DC	P-O3'-C3'	-5.44	112.03	120.20

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	3323	0	3410	63	0
1	C	3394	0	3430	55	0
1	E	3402	0	3486	82	0
2	B	3261	0	3296	64	0
2	D	3356	0	3383	61	0
2	F	3335	0	3371	60	0
3	G	4962	0	4421	97	0
4	J	646	0	680	11	0
4	N	625	0	658	18	0
5	R	758	0	741	15	0
6	H	3109	0	2888	60	0
7	Q	735	0	642	13	0
8	I	751	0	784	17	0
8	M	809	0	845	21	0
9	K	819	0	879	12	0
9	O	839	0	885	13	0
10	L	747	0	762	7	0
10	P	727	0	742	11	0
11	X	3223	0	1777	69	0
12	Y	3252	0	1773	51	0
13	A	27	0	12	3	0
13	B	27	0	12	3	0
13	C	27	0	12	1	0
13	D	27	0	12	0	0
13	E	27	0	12	2	0
13	F	27	0	12	1	0
13	G	27	0	12	5	0
13	H	27	0	12	0	0
14	G	4	0	0	2	0
15	R	1	0	0	0	0
All	All	42294	0	38949	683	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 8.

The worst 5 of 683 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)
11:X:-70:DC:H2''	11:X:-69:DT:H5'	1.41	0.98
3:G:549:LYS:HB2	13:G:1601:ADP:O1B	1.68	0.94
2:B:46:MET:HE2	2:B:53:ARG:HD3	1.57	0.85
1:E:146:PRO:HA	1:E:153:THR:HG23	1.59	0.83
11:X:-30:DC:O2	12:Y:30:DG:N2	2.10	0.81

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	430/456 (94%)	411 (96%)	18 (4%)	1 (0%)	43	73
1	C	443/456 (97%)	432 (98%)	11 (2%)	0	100	100
1	E	441/456 (97%)	424 (96%)	16 (4%)	1 (0%)	43	73
2	B	420/463 (91%)	404 (96%)	16 (4%)	0	100	100
2	D	437/463 (94%)	416 (95%)	21 (5%)	0	100	100
2	F	430/463 (93%)	413 (96%)	17 (4%)	0	100	100
3	G	674/1556 (43%)	613 (91%)	58 (9%)	3 (0%)	30	62
4	J	80/103 (78%)	79 (99%)	1 (1%)	0	100	100
4	N	77/103 (75%)	74 (96%)	3 (4%)	0	100	100
5	R	97/356 (27%)	91 (94%)	6 (6%)	0	100	100
6	H	406/607 (67%)	363 (89%)	40 (10%)	3 (1%)	18	52
7	Q	105/192 (55%)	99 (94%)	6 (6%)	0	100	100
8	I	91/136 (67%)	87 (96%)	4 (4%)	0	100	100
8	M	97/136 (71%)	92 (95%)	4 (4%)	1 (1%)	12	45
9	K	104/130 (80%)	102 (98%)	2 (2%)	0	100	100
9	O	109/130 (84%)	109 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	L	94/126 (75%)	93 (99%)	1 (1%)	0	100	100
10	P	91/126 (72%)	85 (93%)	5 (6%)	1 (1%)	11	43
All	All	4626/6458 (72%)	4387 (95%)	229 (5%)	10 (0%)	44	73

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	256	ILE
1	E	145	ASN
3	G	747	ILE
3	G	943	TYR
6	H	23	PRO

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	361/387 (93%)	361 (100%)	0	100	100
1	C	361/387 (93%)	361 (100%)	0	100	100
1	E	369/387 (95%)	369 (100%)	0	100	100
2	B	347/390 (89%)	347 (100%)	0	100	100
2	D	357/390 (92%)	357 (100%)	0	100	100
2	F	357/390 (92%)	356 (100%)	1 (0%)	86	88
3	G	423/1359 (31%)	420 (99%)	3 (1%)	76	83
4	J	65/79 (82%)	65 (100%)	0	100	100
4	N	63/79 (80%)	63 (100%)	0	100	100
5	R	80/288 (28%)	80 (100%)	0	100	100
6	H	304/520 (58%)	304 (100%)	0	100	100
7	Q	61/158 (39%)	61 (100%)	0	100	100
8	I	79/111 (71%)	79 (100%)	0	100	100
8	M	85/111 (77%)	85 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
9	K	84/100 (84%)	84 (100%)	0	100	100
9	O	83/100 (83%)	83 (100%)	0	100	100
10	L	80/105 (76%)	80 (100%)	0	100	100
10	P	79/105 (75%)	75 (95%)	4 (5%)	21	54
All	All	3638/5446 (67%)	3630 (100%)	8 (0%)	85	89

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
10	P	36	SER
10	P	35	GLU
10	P	33	ARG
3	G	1212	ARG
10	P	34	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
4	N	75	HIS
8	I	76	GLN
10	L	67	ASN
6	H	522	GLN
1	E	247	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 10 ligands modelled in this entry, 1 is monoatomic - leaving 9 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$
13	ADP	H	701	-	27,29,29	1.36	4 (14%)	42,45,45	1.98	11 (26%)
13	ADP	D	501	-	27,29,29	1.35	4 (14%)	42,45,45	1.97	11 (26%)
13	ADP	F	501	-	27,29,29	1.36	4 (14%)	42,45,45	1.96	10 (23%)
13	ADP	A	501	-	27,29,29	1.36	4 (14%)	42,45,45	1.94	11 (26%)
13	ADP	E	501	-	27,29,29	1.35	4 (14%)	42,45,45	1.96	11 (26%)
13	ADP	B	501	-	27,29,29	1.37	4 (14%)	42,45,45	2.01	10 (23%)
13	ADP	C	501	-	27,29,29	1.36	4 (14%)	42,45,45	1.96	11 (26%)
13	ADP	G	1601	14	27,29,29	1.36	4 (14%)	42,45,45	1.95	10 (23%)
14	BEF	G	1602	13	0,3,3	-	-	-	-	-

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
13	ADP	H	701	-	-	2/16/32/32	0/3/3/3
13	ADP	D	501	-	-	2/16/32/32	0/3/3/3
13	ADP	F	501	-	-	3/16/32/32	0/3/3/3
13	ADP	A	501	-	-	5/16/32/32	0/3/3/3
13	ADP	E	501	-	-	5/16/32/32	0/3/3/3
13	ADP	B	501	-	-	4/16/32/32	0/3/3/3
13	ADP	C	501	-	-	5/16/32/32	0/3/3/3
13	ADP	G	1601	14	-	1/16/32/32	0/3/3/3

The worst 5 of 32 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	H	701	ADP	C5-C4	4.54	1.47	1.39
13	B	501	ADP	C5-C4	4.54	1.47	1.39
13	C	501	ADP	C5-C4	4.52	1.47	1.39
13	F	501	ADP	C5-C4	4.52	1.47	1.39
13	A	501	ADP	C5-C4	4.49	1.47	1.39

The worst 5 of 85 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	B	501	ADP	C5-C4-N3	-6.55	118.21	126.75
13	G	1601	ADP	C5-C4-N3	-6.24	118.60	126.75
13	C	501	ADP	C5-C4-N3	-6.19	118.67	126.75
13	H	701	ADP	C5-C4-N3	-6.19	118.68	126.75
13	D	501	ADP	C5-C4-N3	-6.16	118.71	126.75

There are no chirality outliers.

5 of 27 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
13	A	501	ADP	C5'-O5'-PA-O1A
13	B	501	ADP	C5'-O5'-PA-O3A
13	B	501	ADP	O4'-C4'-C5'-O5'
13	B	501	ADP	C3'-C4'-C5'-O5'
13	C	501	ADP	C5'-O5'-PA-O1A

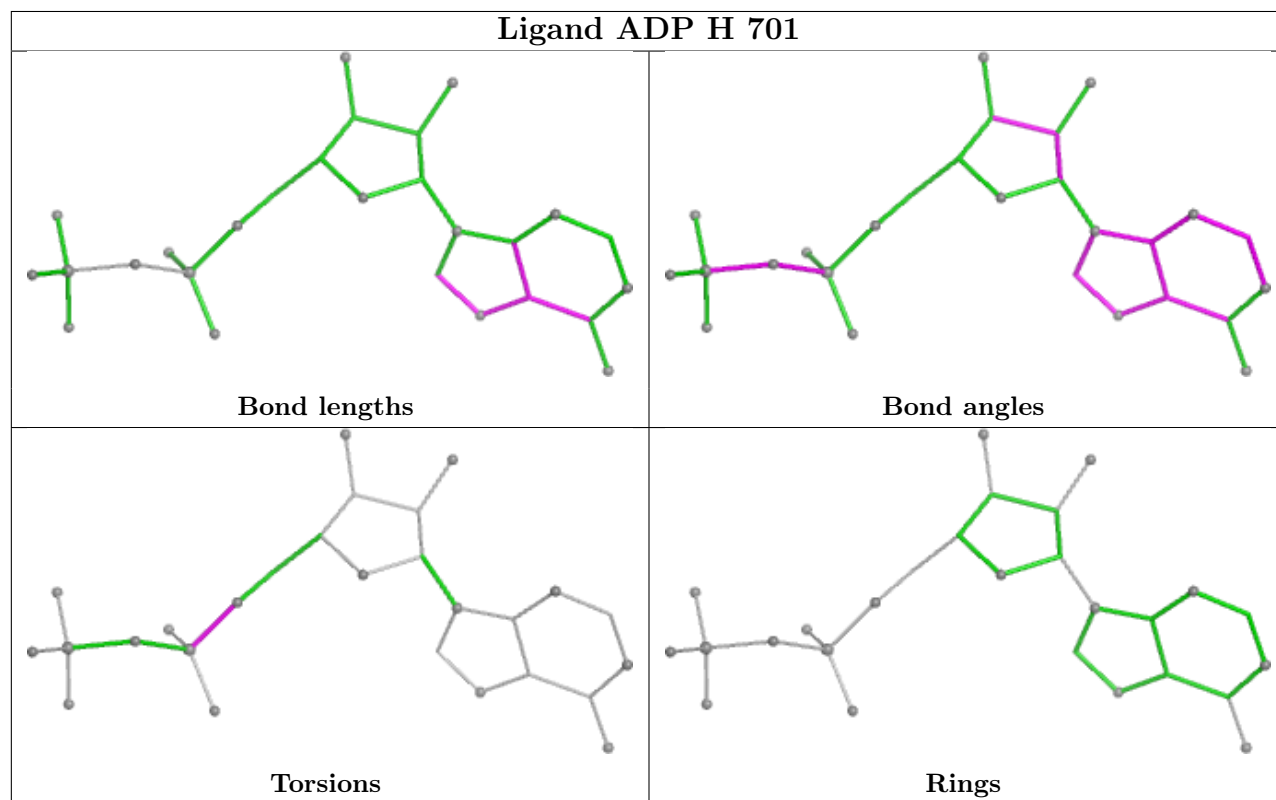
There are no ring outliers.

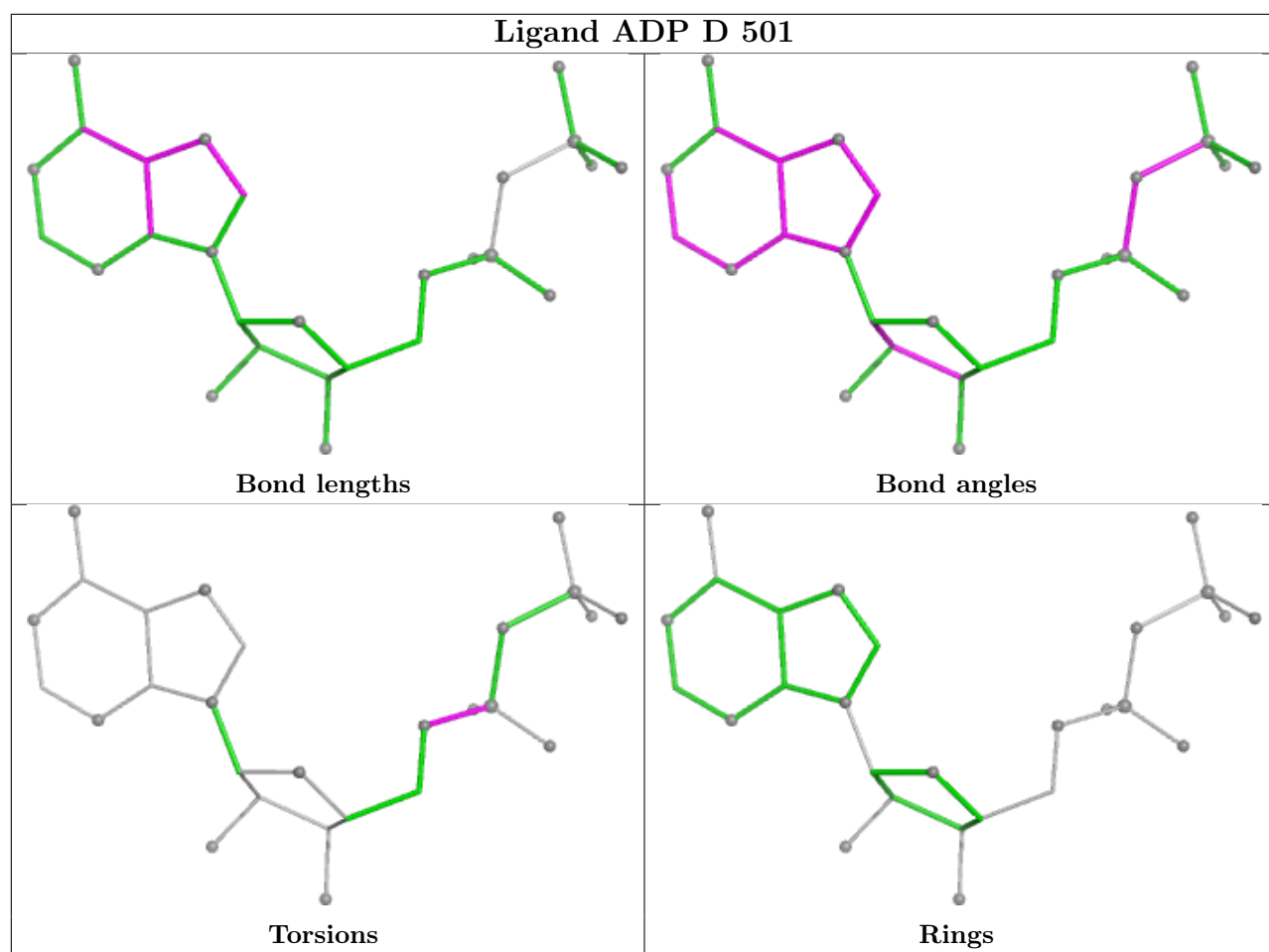
7 monomers are involved in 17 short contacts:

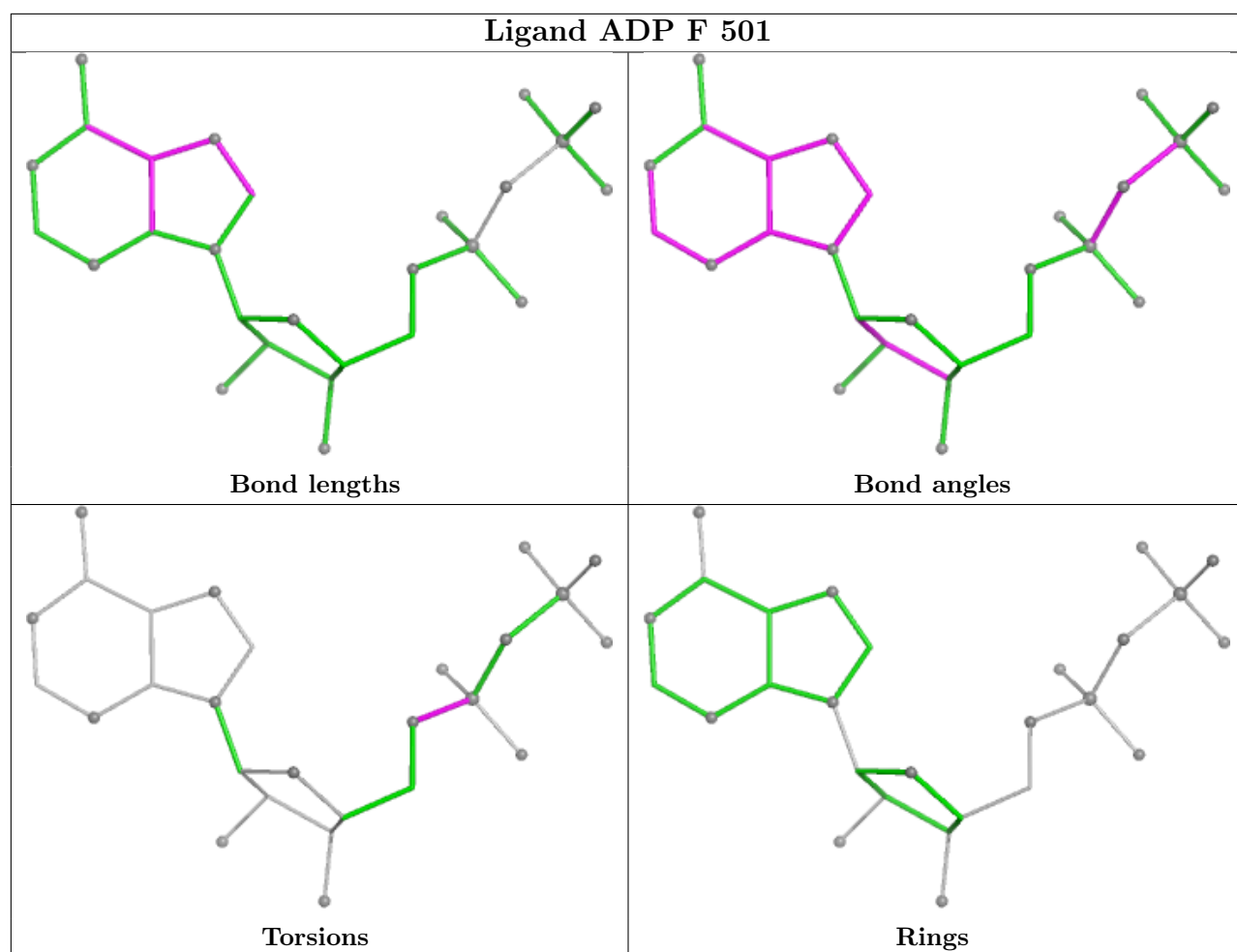
Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	F	501	ADP	1	0
13	A	501	ADP	3	0
13	E	501	ADP	2	0
13	B	501	ADP	3	0
13	C	501	ADP	1	0
13	G	1601	ADP	5	0
14	G	1602	BEF	2	0

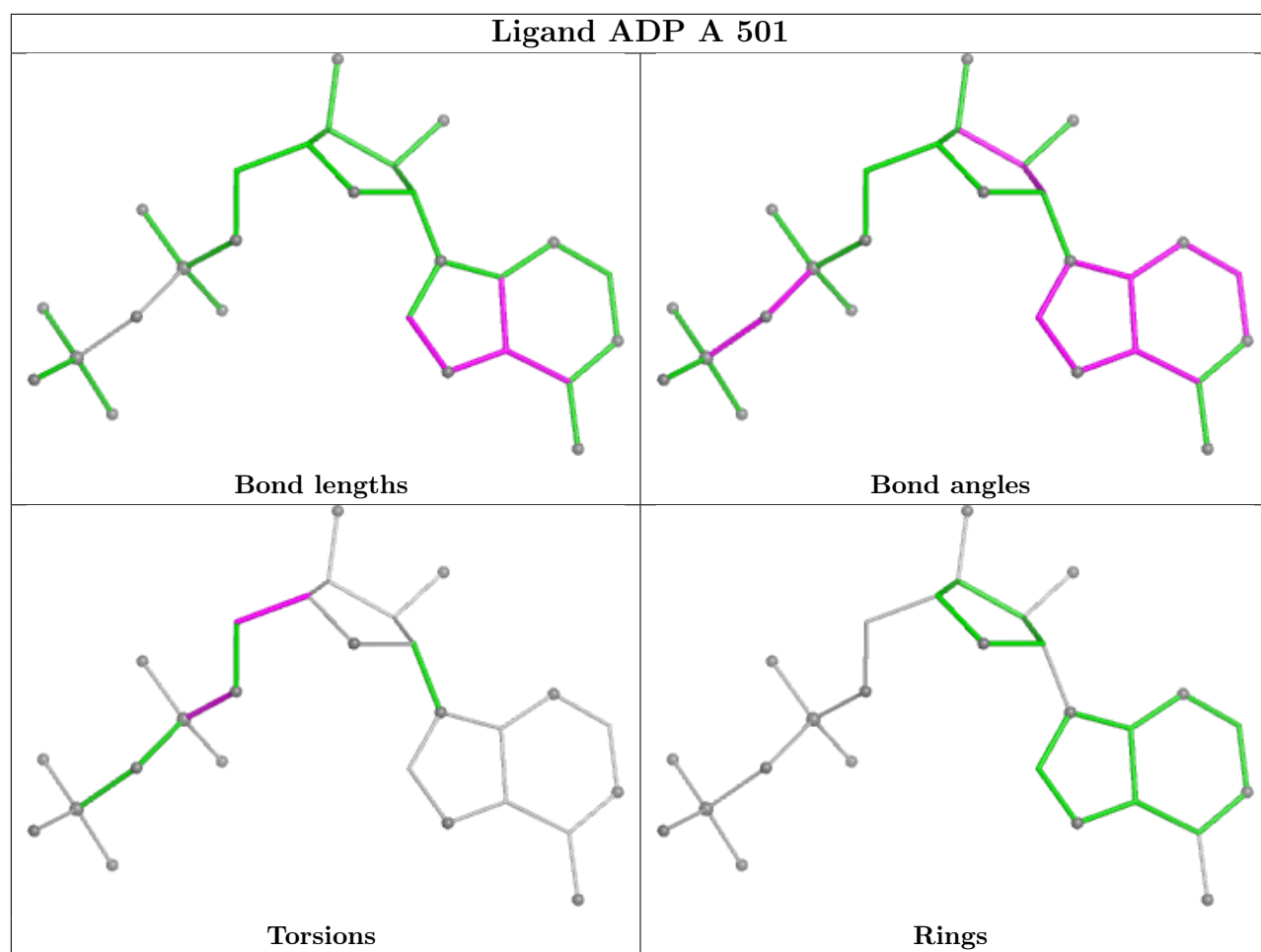
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

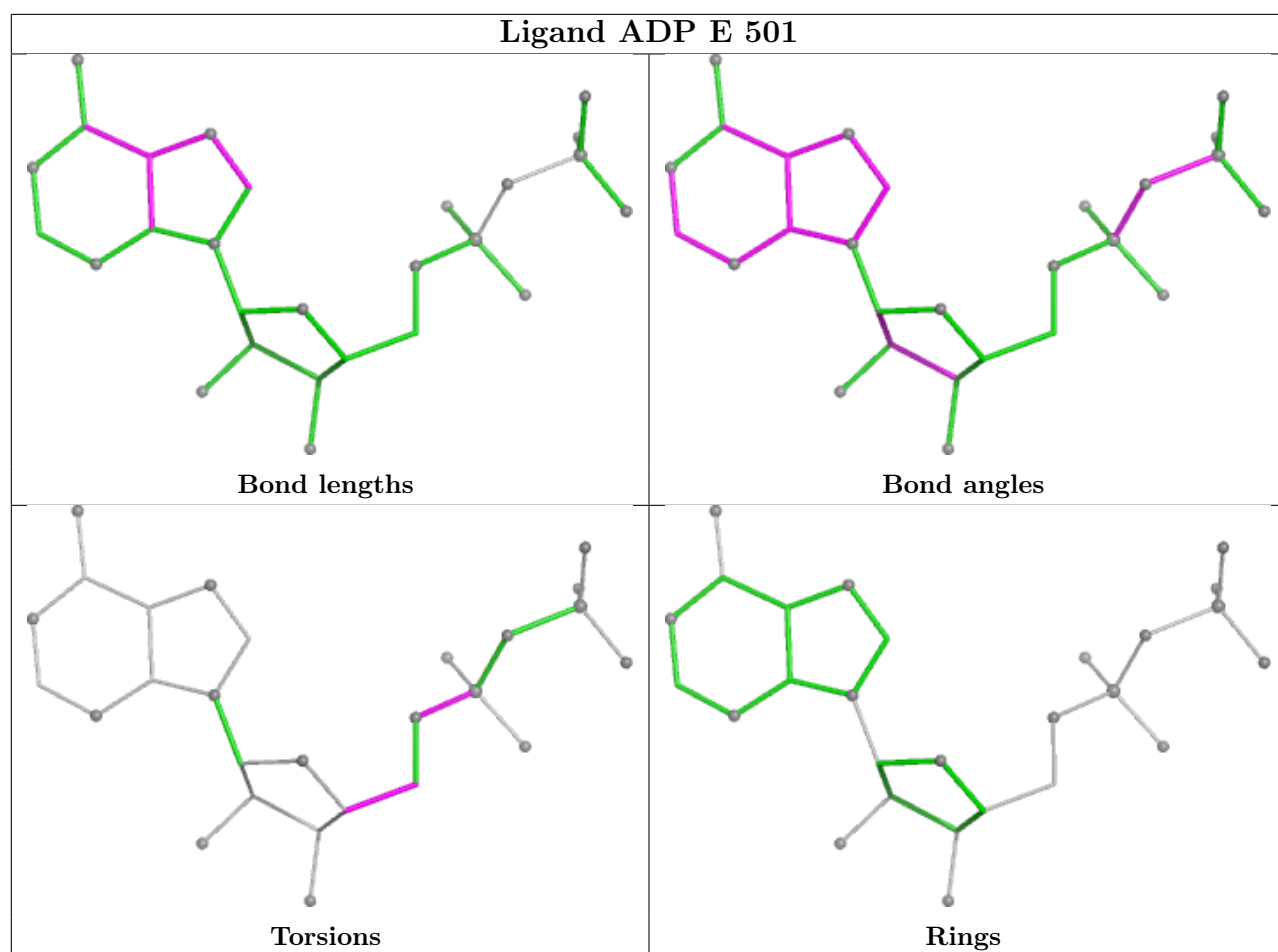
Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

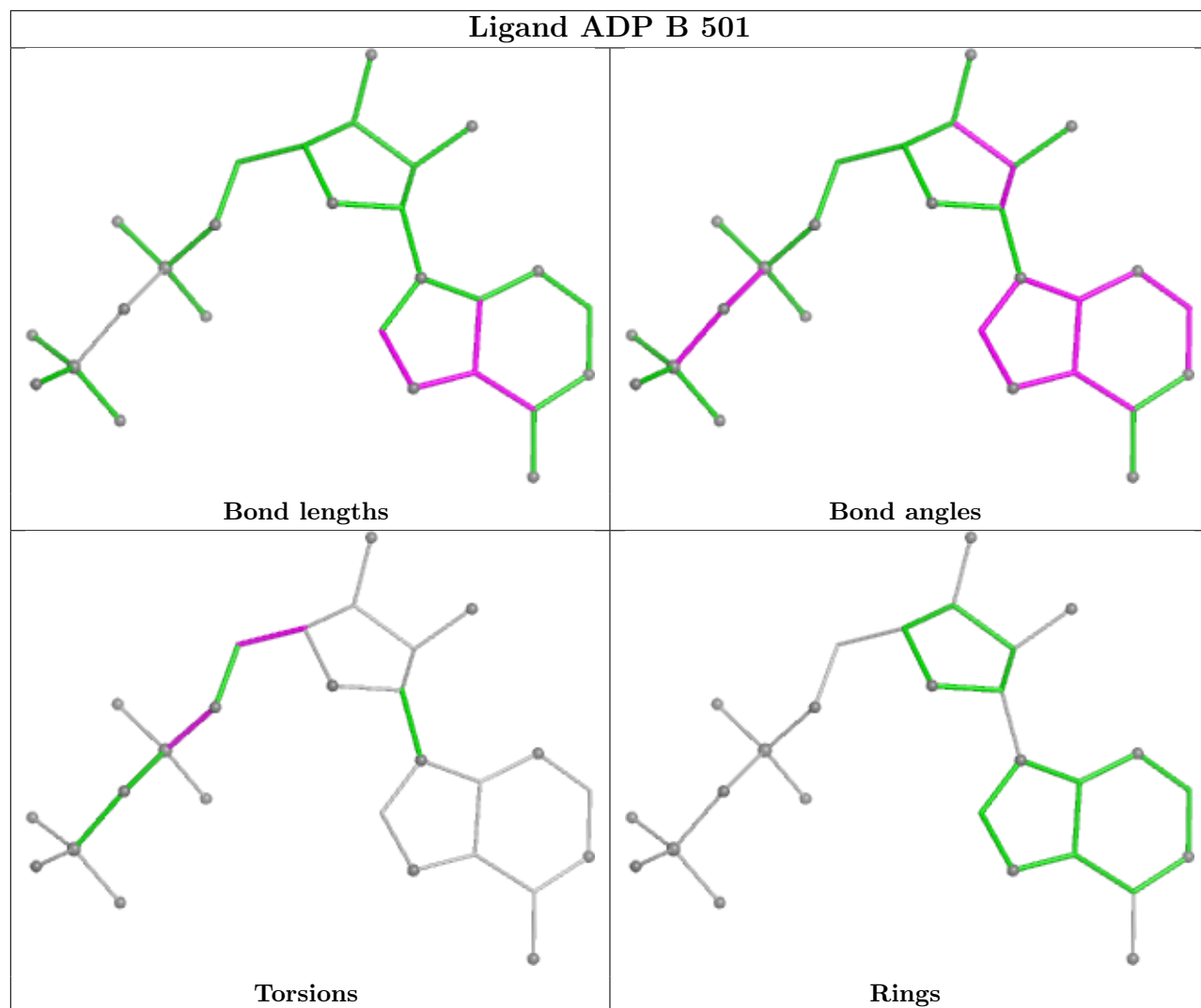


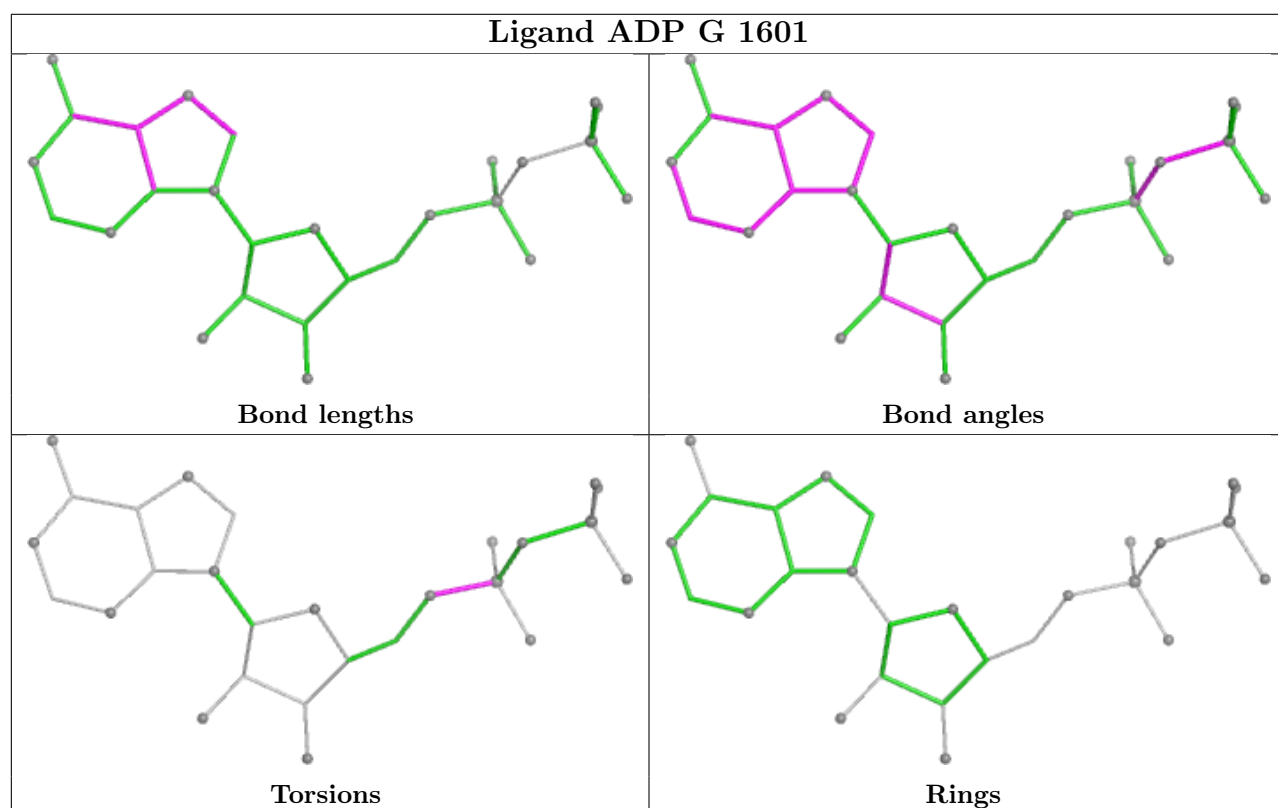
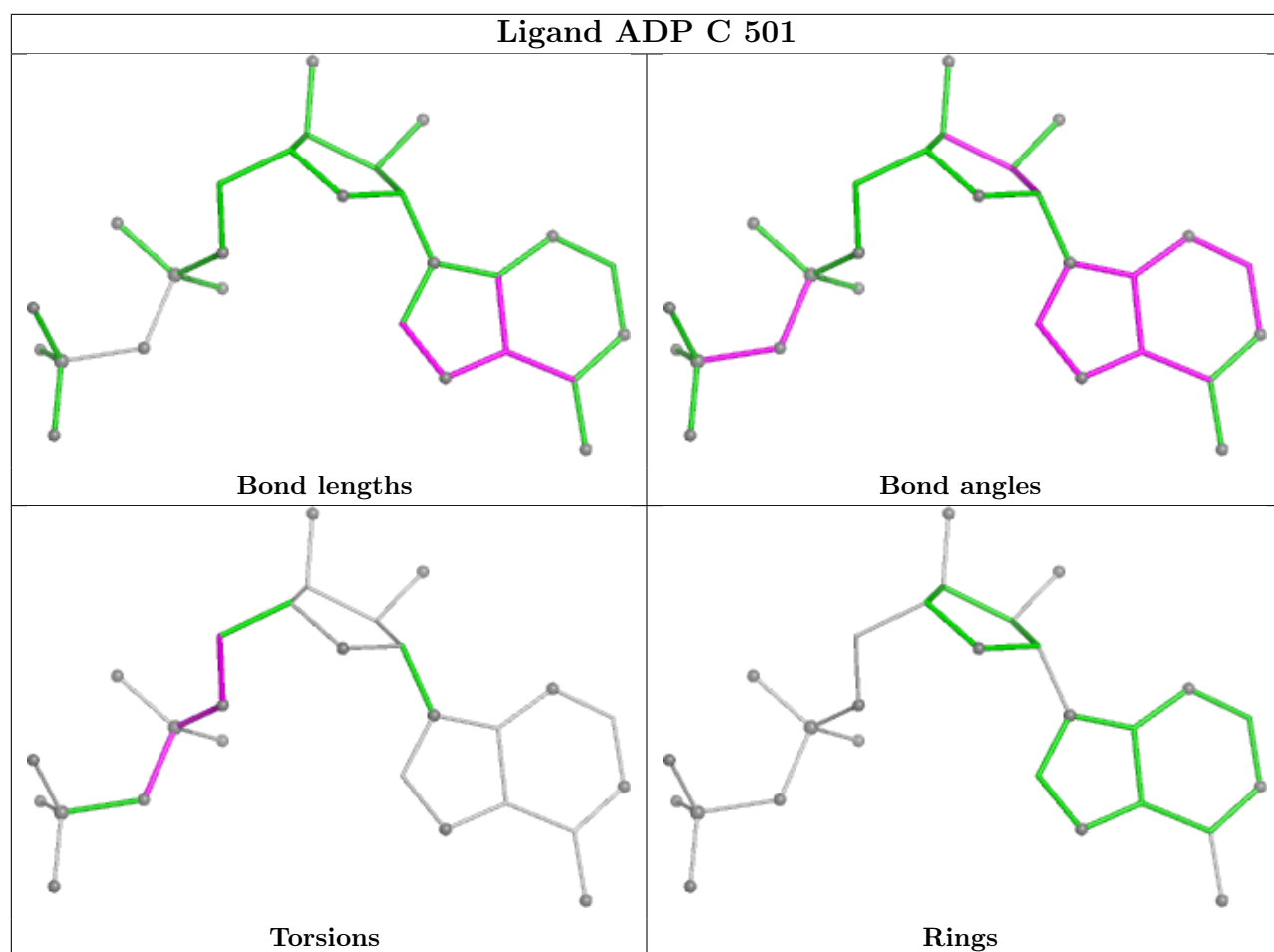


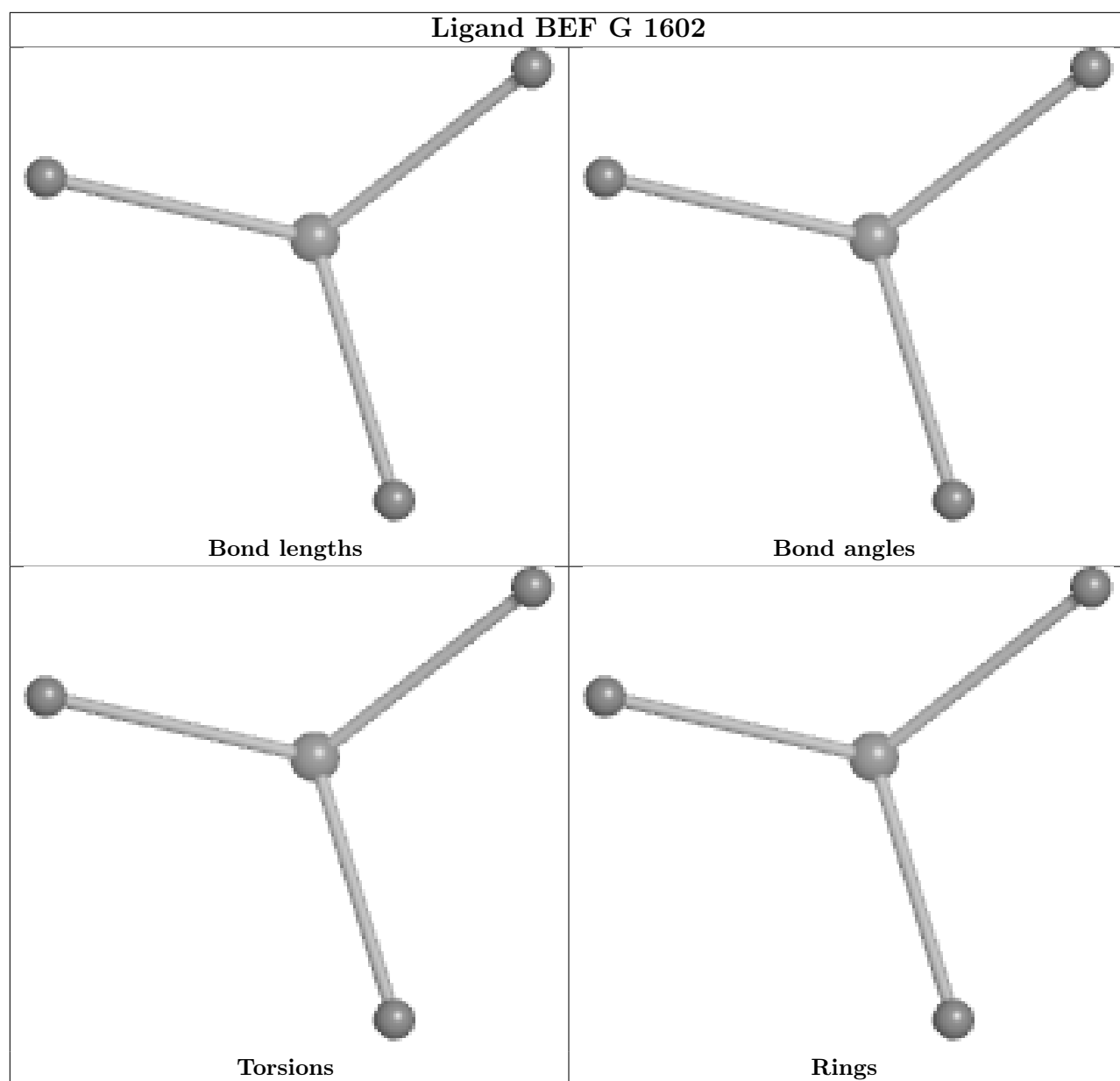












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

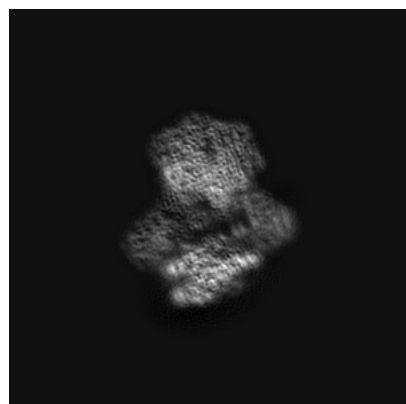
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-14737. These allow visual inspection of the internal detail of the map and identification of artifacts.

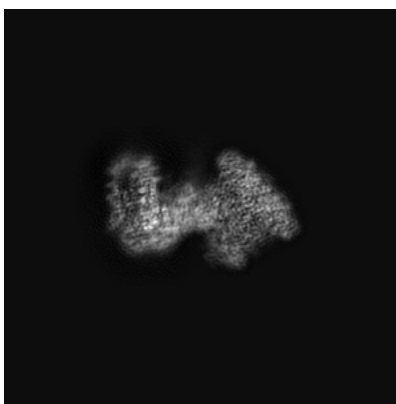
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

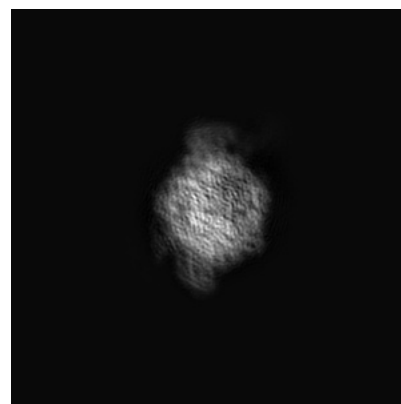
6.1.1 Primary map



X

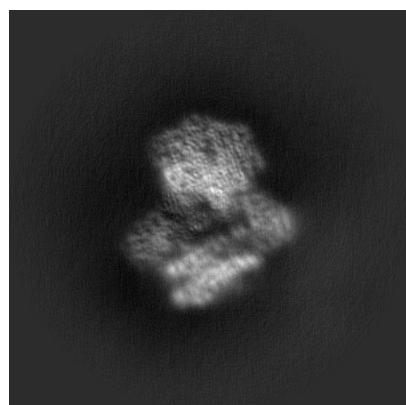


Y

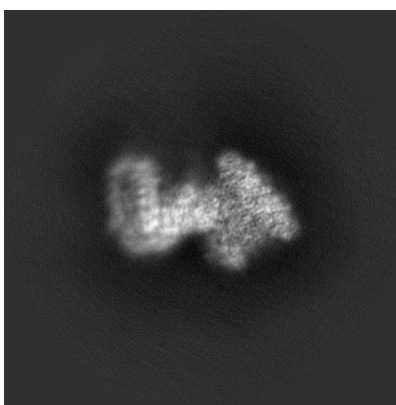


Z

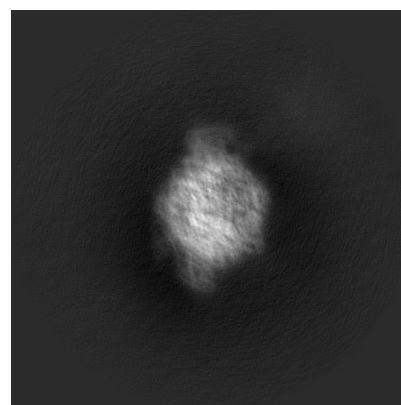
6.1.2 Raw map



X



Y

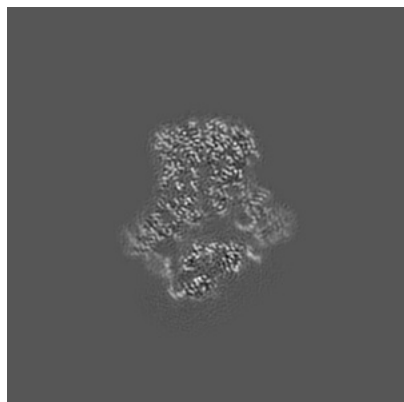


Z

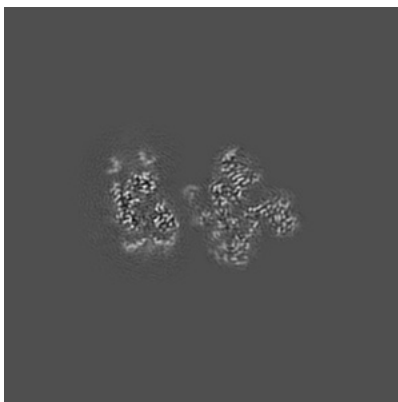
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

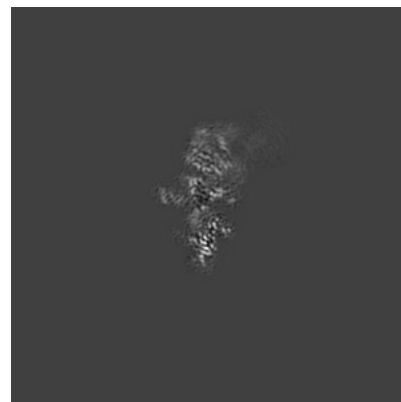
6.2.1 Primary map



X Index: 184

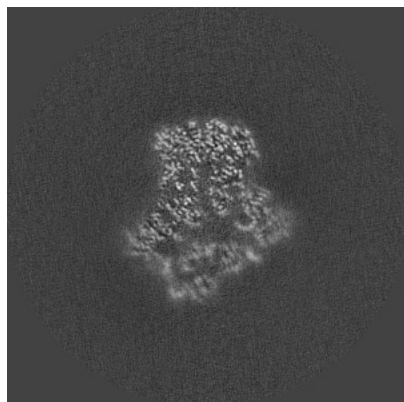


Y Index: 184

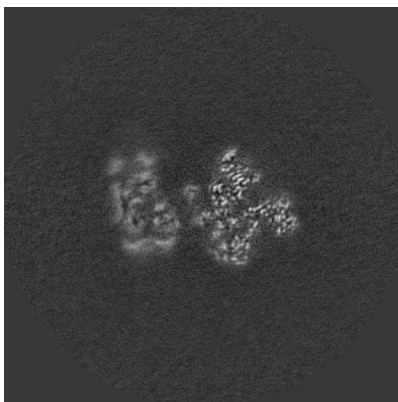


Z Index: 184

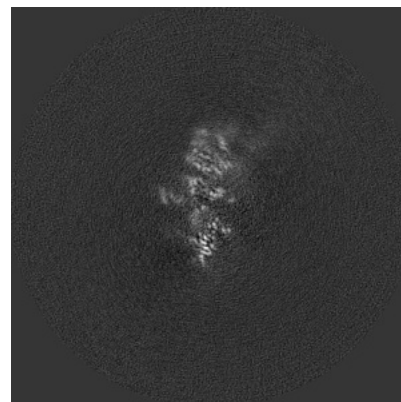
6.2.2 Raw map



X Index: 184



Y Index: 184

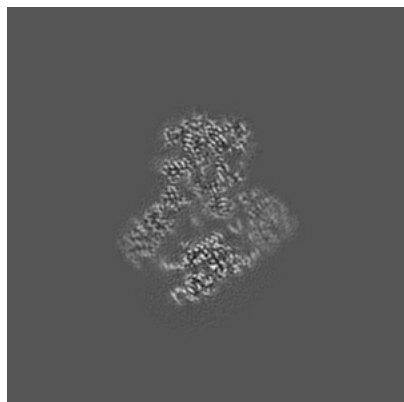


Z Index: 184

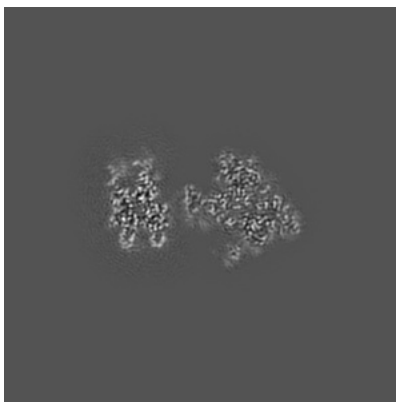
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

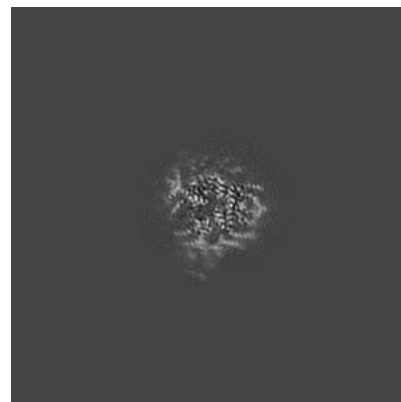
6.3.1 Primary map



X Index: 175

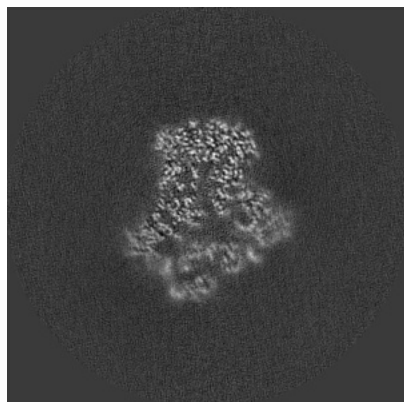


Y Index: 172

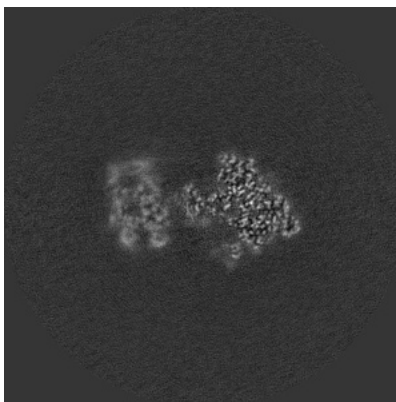


Z Index: 128

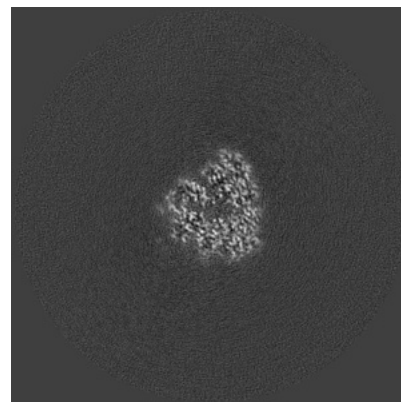
6.3.2 Raw map



X Index: 183



Y Index: 170

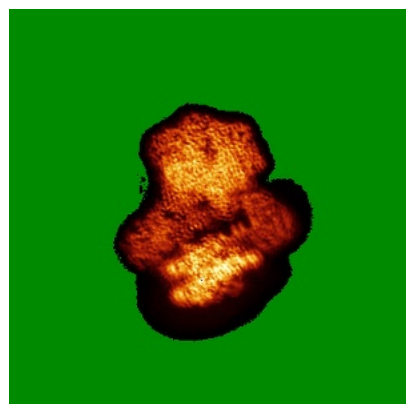


Z Index: 224

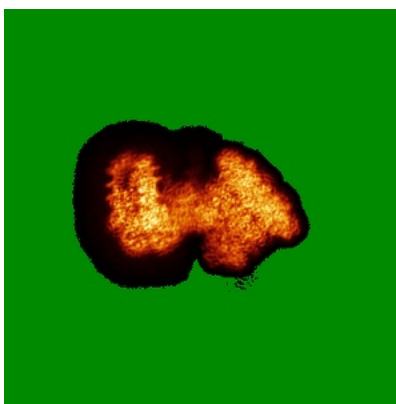
The images above show the largest variance slices of the map in three orthogonal directions.

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

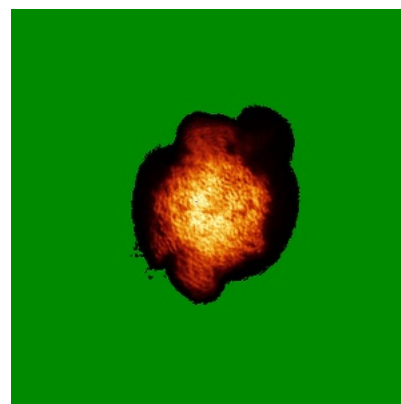
6.4.1 Primary map



X

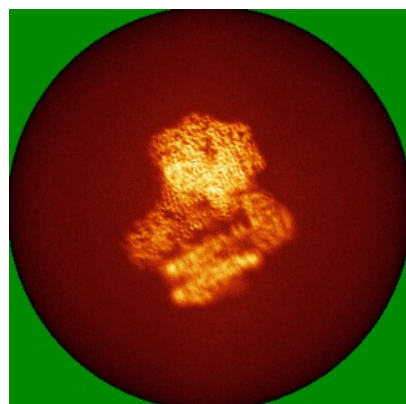


Y

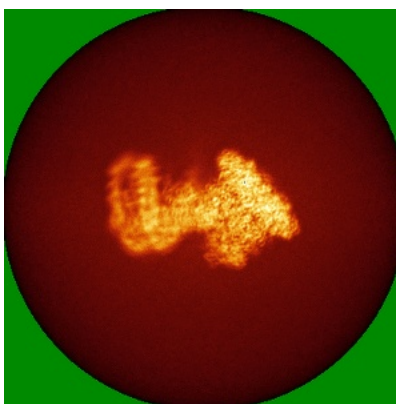


Z

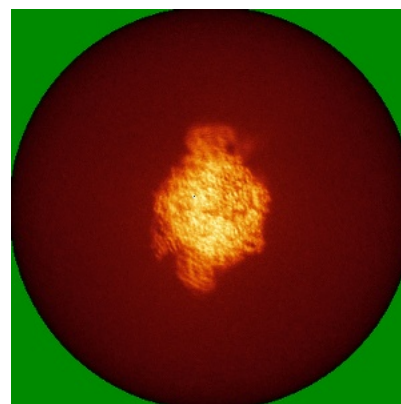
6.4.2 Raw map



X



Y

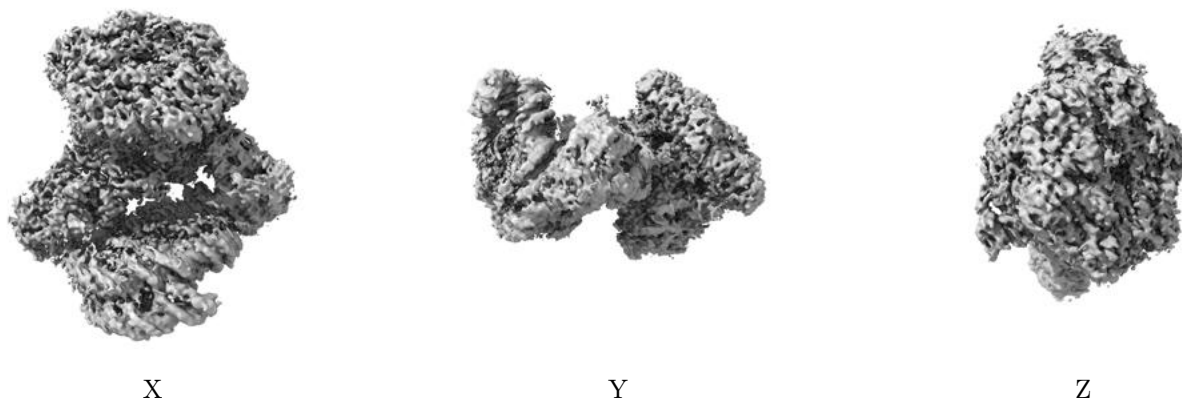


Z

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.

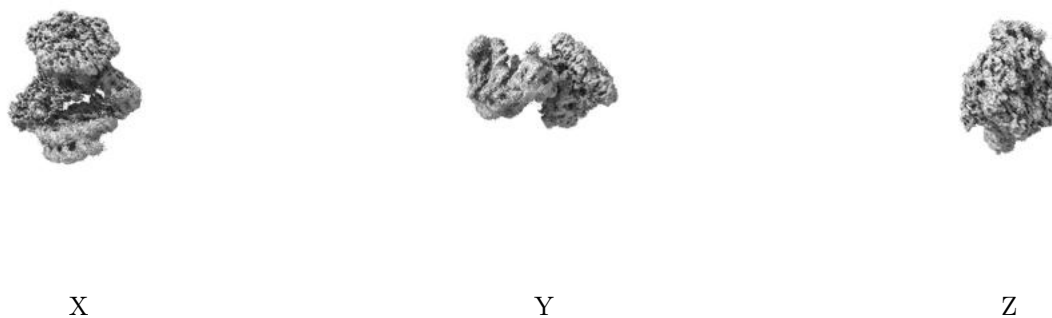
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 4.5. 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.

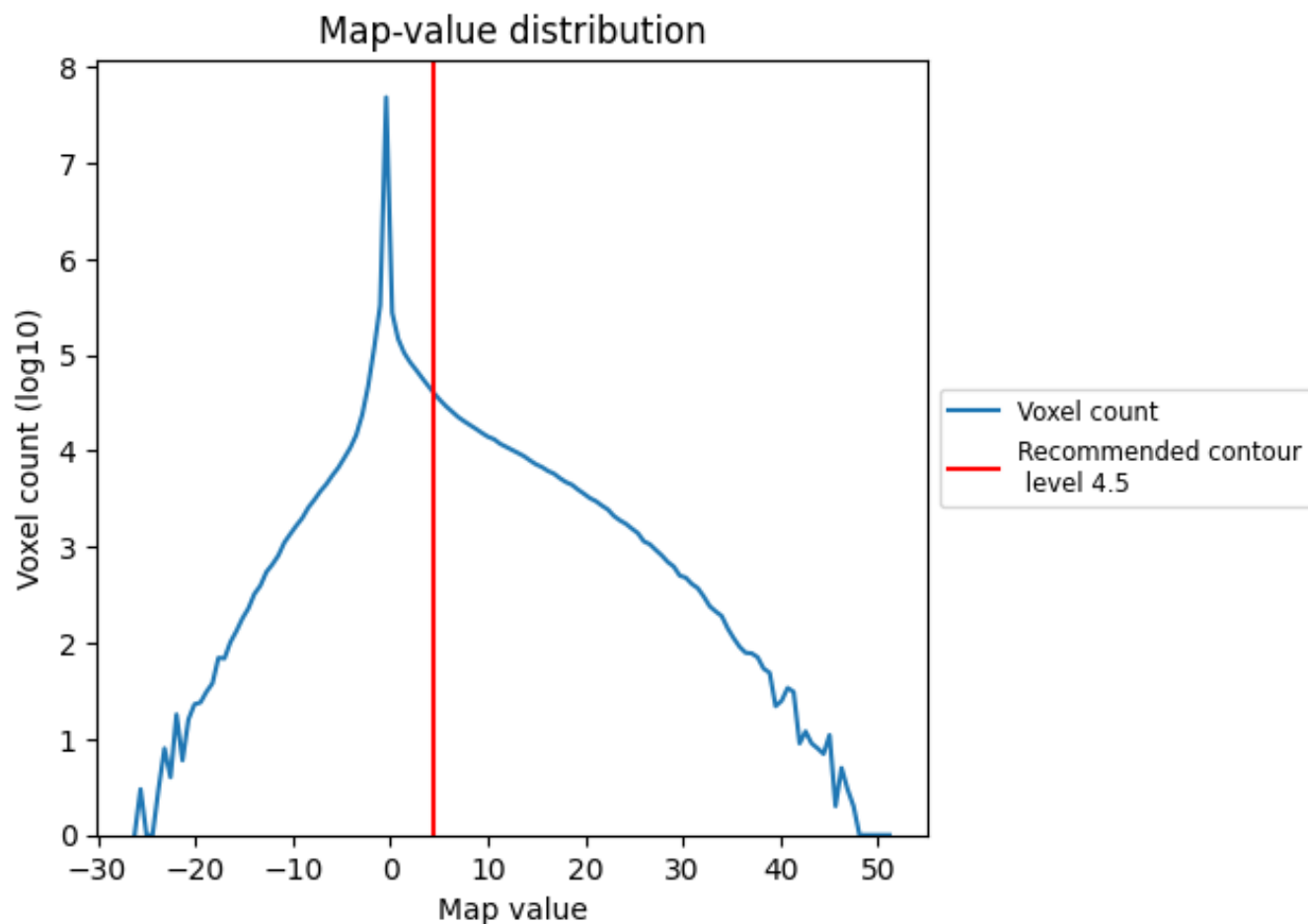
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

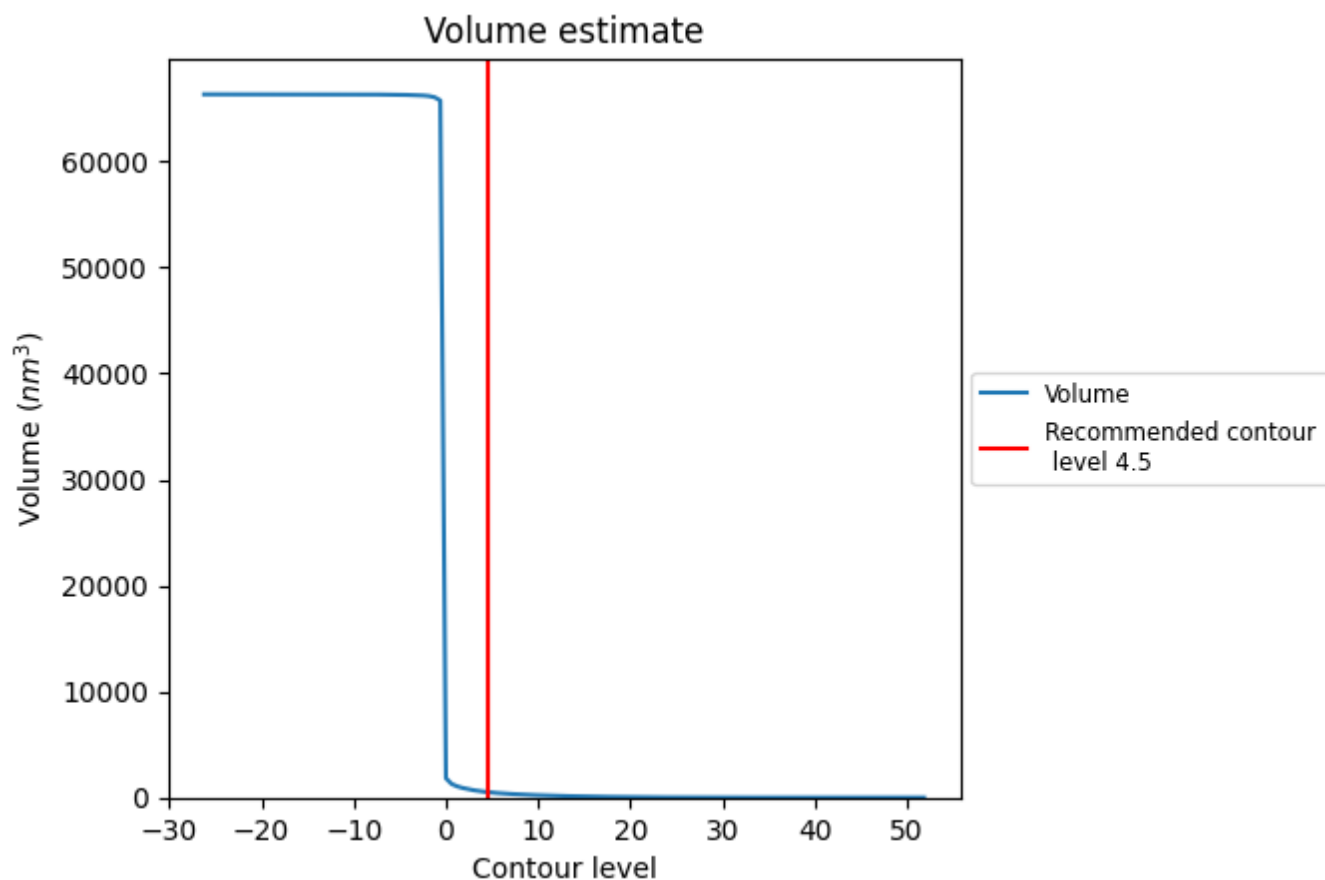
This section contains the results of statistical analysis of the map.

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.

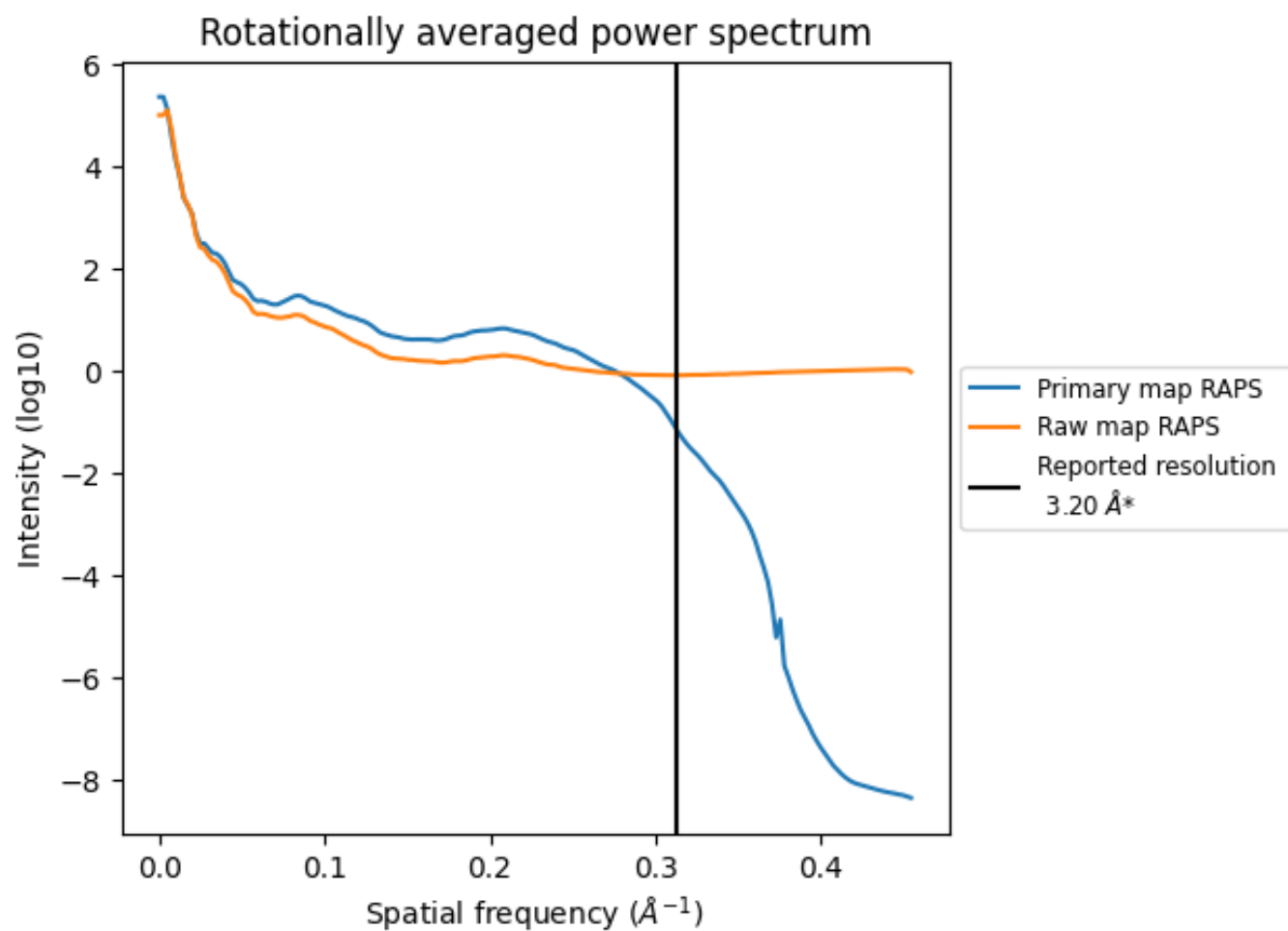
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 515 nm^3 ; this corresponds to an approximate mass of 465 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 ⓘ

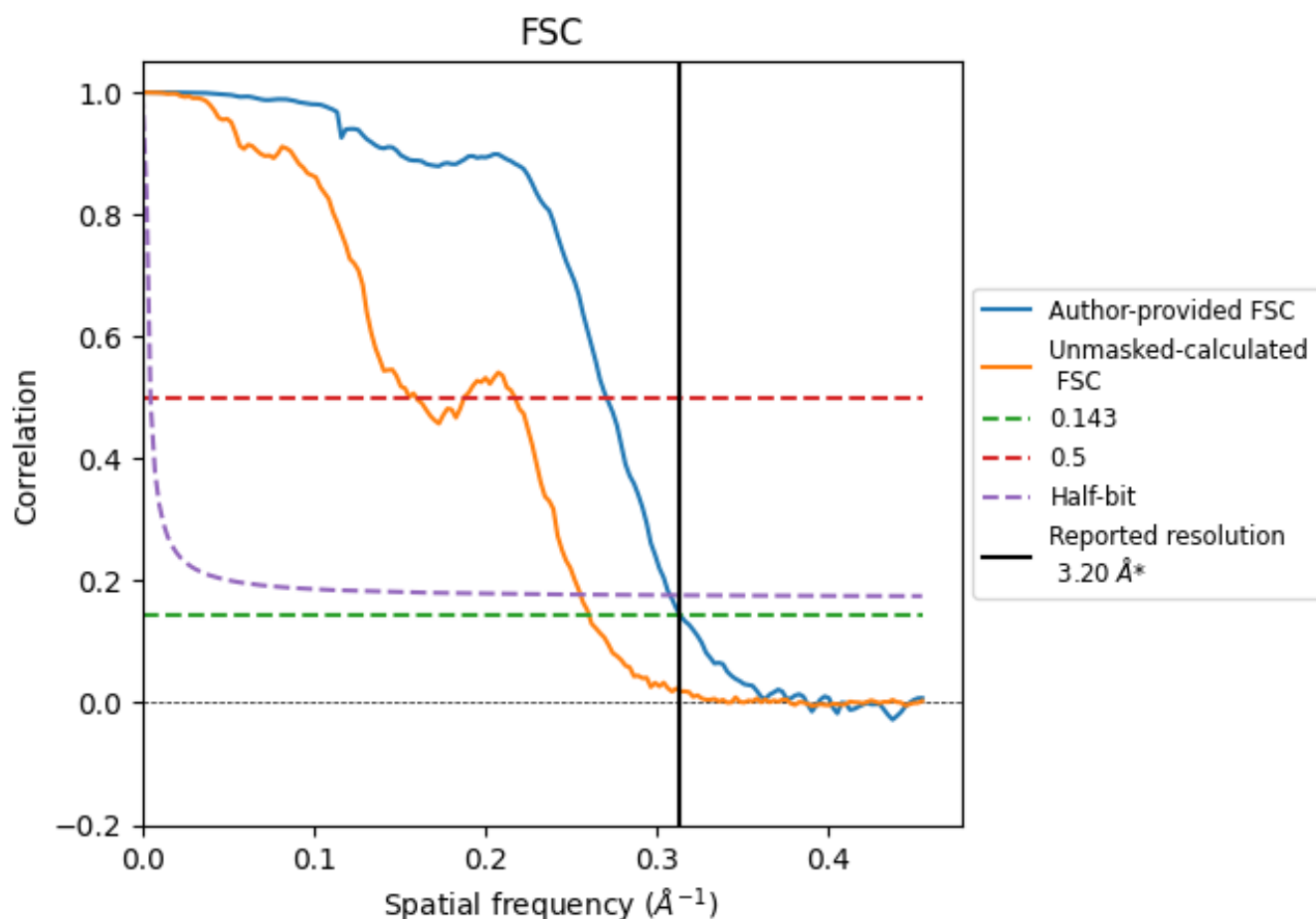


*Reported resolution corresponds to spatial frequency of $0.312 \text{ \AA}^{-1}$

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 Å⁻¹

8.2 Resolution estimates [i](#)

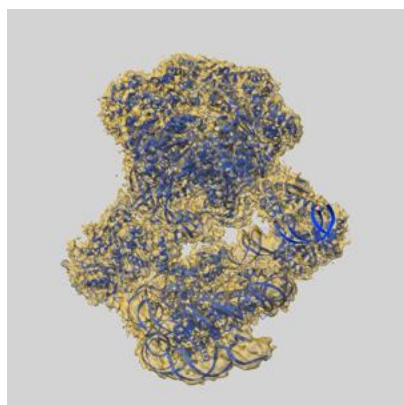
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	3.19	3.70	3.25
Unmasked-calculated*	3.84	6.26	3.92

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

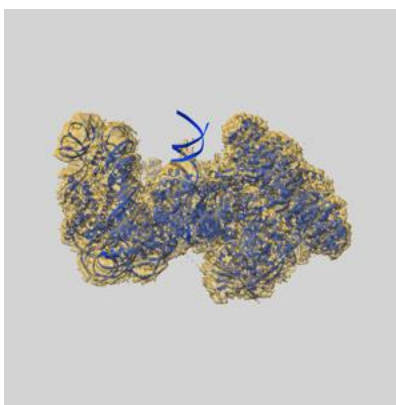
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-14737 and PDB model 7ZI4. Per-residue inclusion information can be found in section [3](#) on page [8](#).

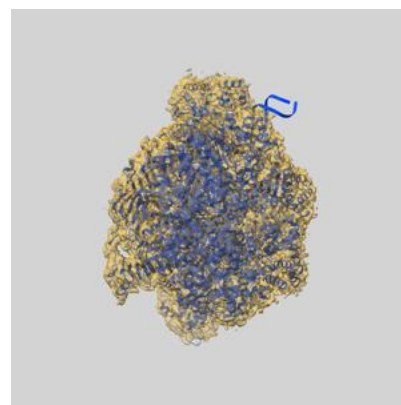
9.1 Map-model overlay [i](#)



X



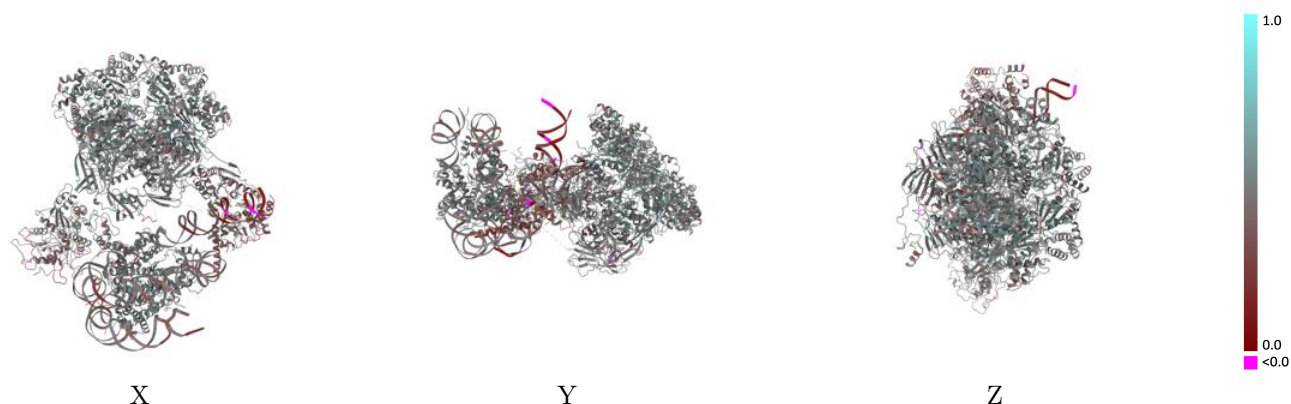
Y



Z

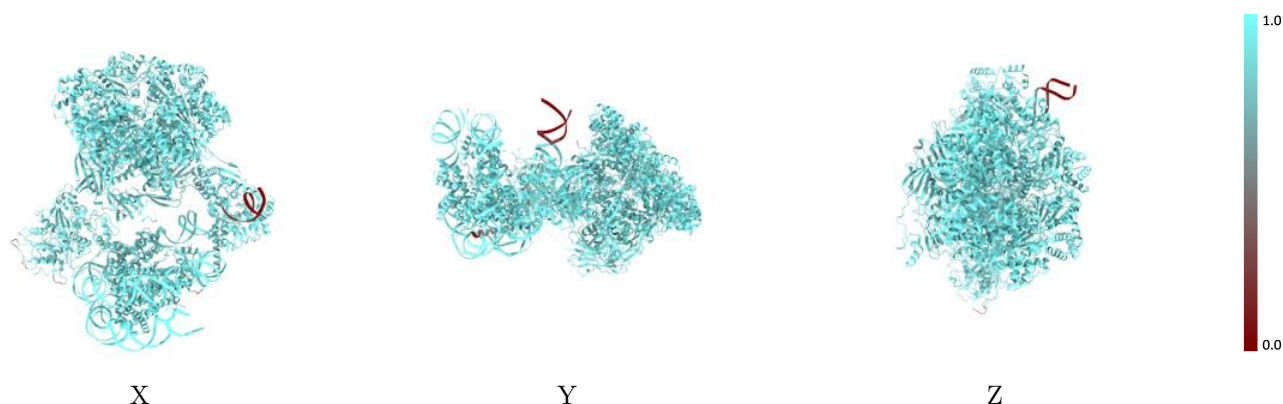
The images above show the 3D surface view of the map at the recommended contour level 4.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



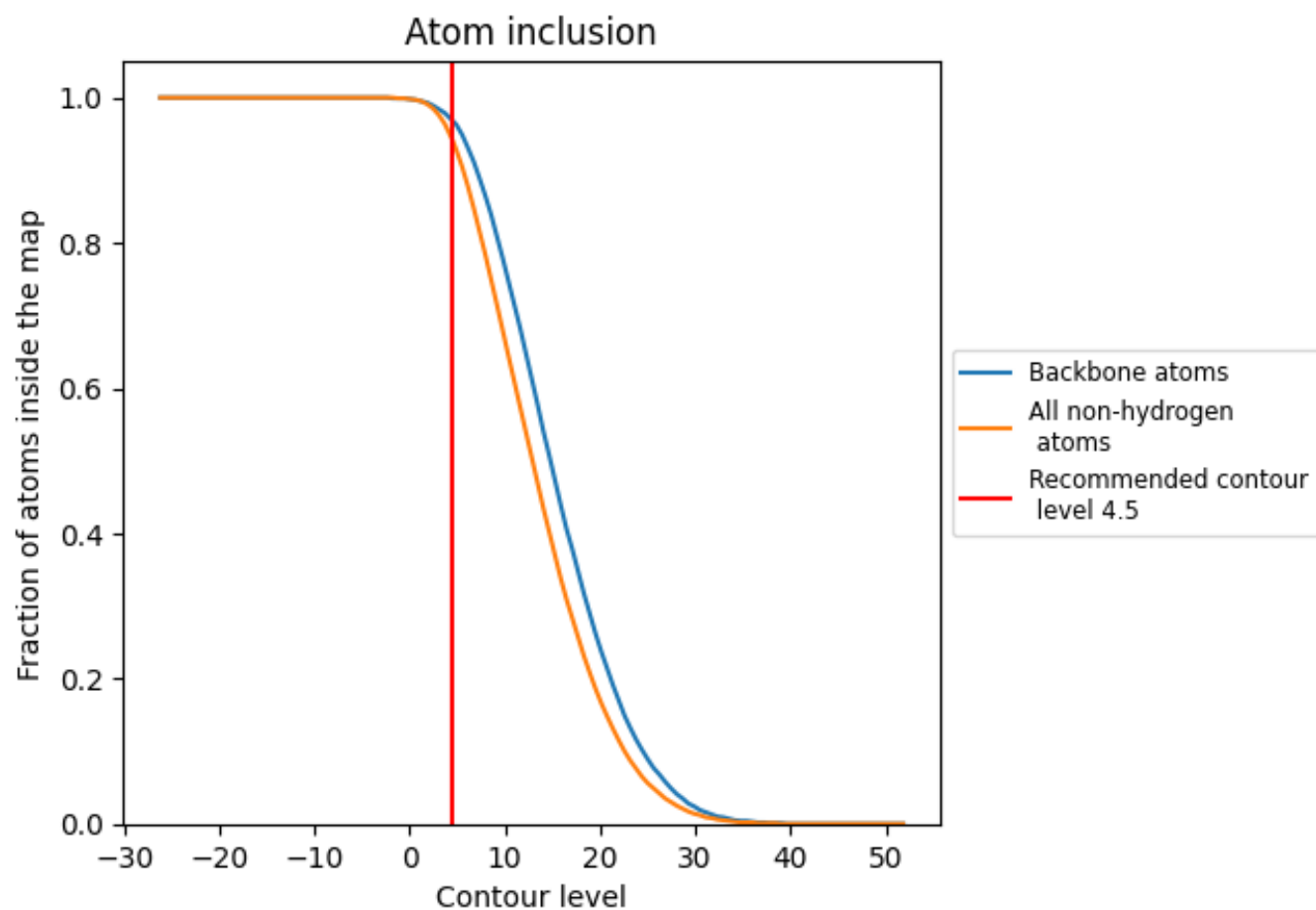
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (4.5).

9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 94% 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 (4.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9410	 0.4620
A	 0.9480	 0.5010
B	 0.9410	 0.4930
C	 0.9480	 0.5000
D	 0.9450	 0.4890
E	 0.9520	 0.4960
F	 0.9400	 0.4990
G	 0.9450	 0.4310
H	 0.9050	 0.4200
I	 0.9610	 0.4990
J	 0.9500	 0.4950
K	 0.9600	 0.5020
L	 0.9640	 0.4860
M	 0.9440	 0.4840
N	 0.9730	 0.4990
O	 0.9400	 0.4840
P	 0.9610	 0.4910
Q	 0.9290	 0.4410
R	 0.8350	 0.3790
X	 0.9420	 0.3850
Y	 0.9340	 0.3860

