



wwPDB EM Validation Summary Report ⓘ

Nov 27, 2023 – 08:42 PM JST

PDB ID : 8W7M
EMDB ID : EMD-37343
Title : Yeast replisome in state V
Authors : Dang, S.; Zhai, Y.; Feng, J.; Yu, D.; Xu, Z.
Deposited on : 2023-08-30
Resolution : 4.12 Å (reported)
Based on initial model : 6SKL

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:

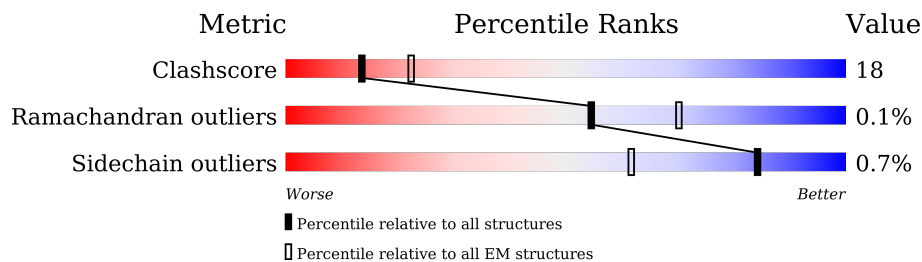
EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

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 4.12 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	2	868	
2	3	971	
3	4	933	
4	5	775	
5	6	1017	
6	7	845	
7	A	208	
8	B	213	

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Mol	Chain	Length	Quality of chain
9	C	194	
10	D	294	
11	E	650	
12	F	927	
12	G	927	
12	H	927	
13	I	71	
14	N	689	

2 Entry composition [i](#)

There are 18 unique types of molecules in this entry. The entry contains 51196 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 DNA replication licensing factor MCM2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	2	627	4955	3124	885	928	18	0	0

- Molecule 2 is a protein called DNA replication licensing factor MCM3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	3	619	4835	3046	860	916	13	0	0

- Molecule 3 is a protein called DNA replication licensing factor MCM4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	4	623	4947	3118	852	948	29	0	0

- Molecule 4 is a protein called Minichromosome maintenance protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	5	529	4176	2644	714	796	22	0	0

- Molecule 5 is a protein called DNA replication licensing factor MCM6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	6	613	4837	3051	839	923	24	0	0

- Molecule 6 is a protein called DNA replication licensing factor MCM7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	7	657	5124	3238	888	970	28	0	0

- Molecule 7 is a protein called DNA replication complex GINS protein PSF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	A	196	Total	C	N	O	S	0	0
			1602	1006	276	311	9		

- Molecule 8 is a protein called DNA replication complex GINS protein PSF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	B	193	Total	C	N	O	S	0	0
			1617	1039	286	287	5		

- Molecule 9 is a protein called DNA replication complex GINS protein PSF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	C	172	Total	C	N	O	S	0	0
			1387	904	223	253	7		

- Molecule 10 is a protein called DNA replication complex GINS protein SLD5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	D	243	Total	C	N	O	S	0	0
			2004	1276	327	389	12		

- Molecule 11 is a protein called Cell division control protein 45.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	E	568	Total	C	N	O	S	0	0
			4591	2930	774	873	14		

- Molecule 12 is a protein called DNA polymerase alpha-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	F	424	Total	C	N	O	S	0	0
			3404	2188	564	637	15		
12	G	422	Total	C	N	O	S	0	0
			3380	2172	557	636	15		
12	H	425	Total	C	N	O	S	0	0
			3411	2193	565	638	15		

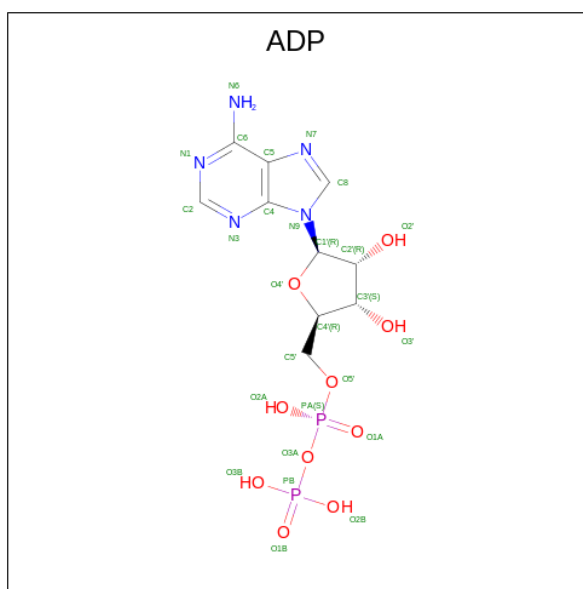
- Molecule 13 is a DNA chain called DNA (71-mer).

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			P
13	I	8	160	80	16	56	8	0	0

- Molecule 14 is a protein called DNA polymerase epsilon subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	N	83	641	410	111	119	1	0	0

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



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
15	2	1	27	10	5	10	2	0
15	3	1	27	10	5	10	2	0

- Molecule 16 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
16	2	1	1	1	0
16	3	1	1	1	0

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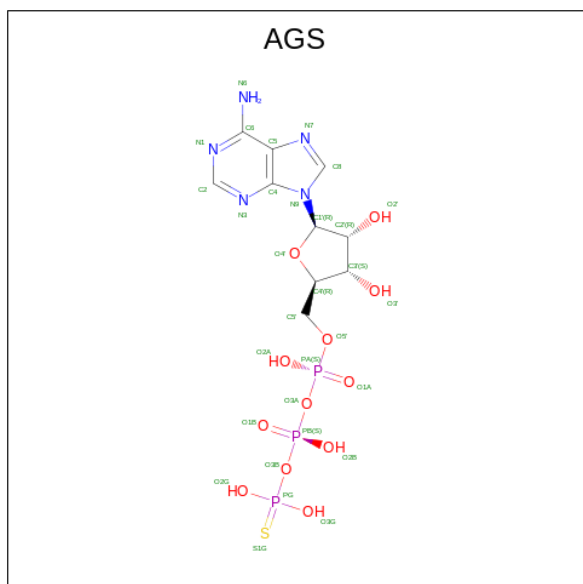
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Mol	Chain	Residues	Atoms		AltConf
16	4	1	Total	Mg	0
			1	1	
16	7	1	Total	Mg	0
			1	1	

- Molecule 17 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
17	2	1	Total	Zn	0
			1	1	
17	4	1	Total	Zn	0
			1	1	
17	5	1	Total	Zn	0
			1	1	
17	6	1	Total	Zn	0
			1	1	
17	7	1	Total	Zn	0
			1	1	

- Molecule 18 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (three-letter code: AGS) (formula: C₁₀H₁₆N₅O₁₂P₃S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf	
18	4	1	Total	C	N	O	P	S	0
			31	10	5	12	3	1	

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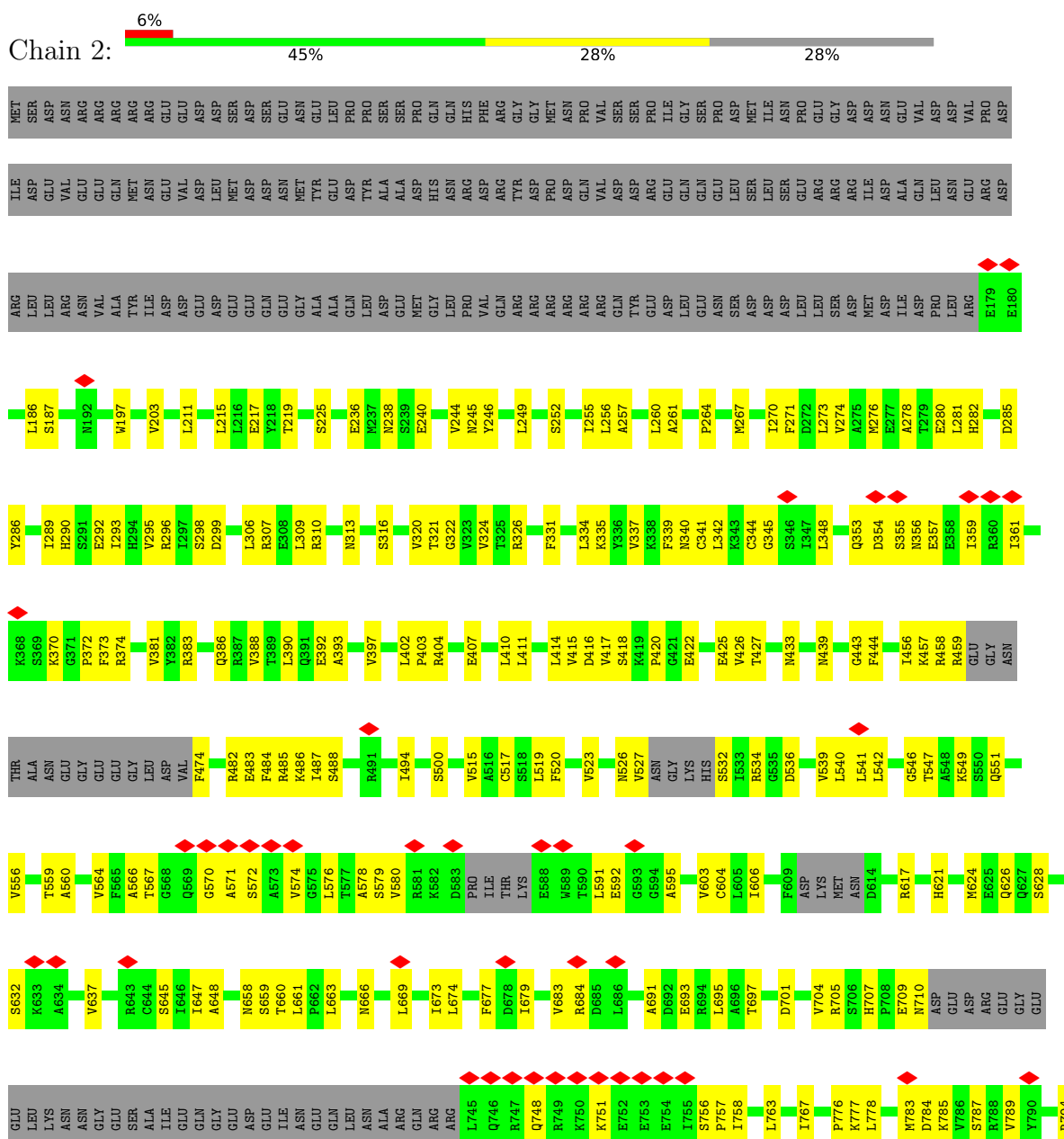
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Mol	Chain	Residues	Atoms					AltConf	
			Total	C	N	O	P		S
18	7	1	31	10	5	12	3	1	0

3 Residue-property plots

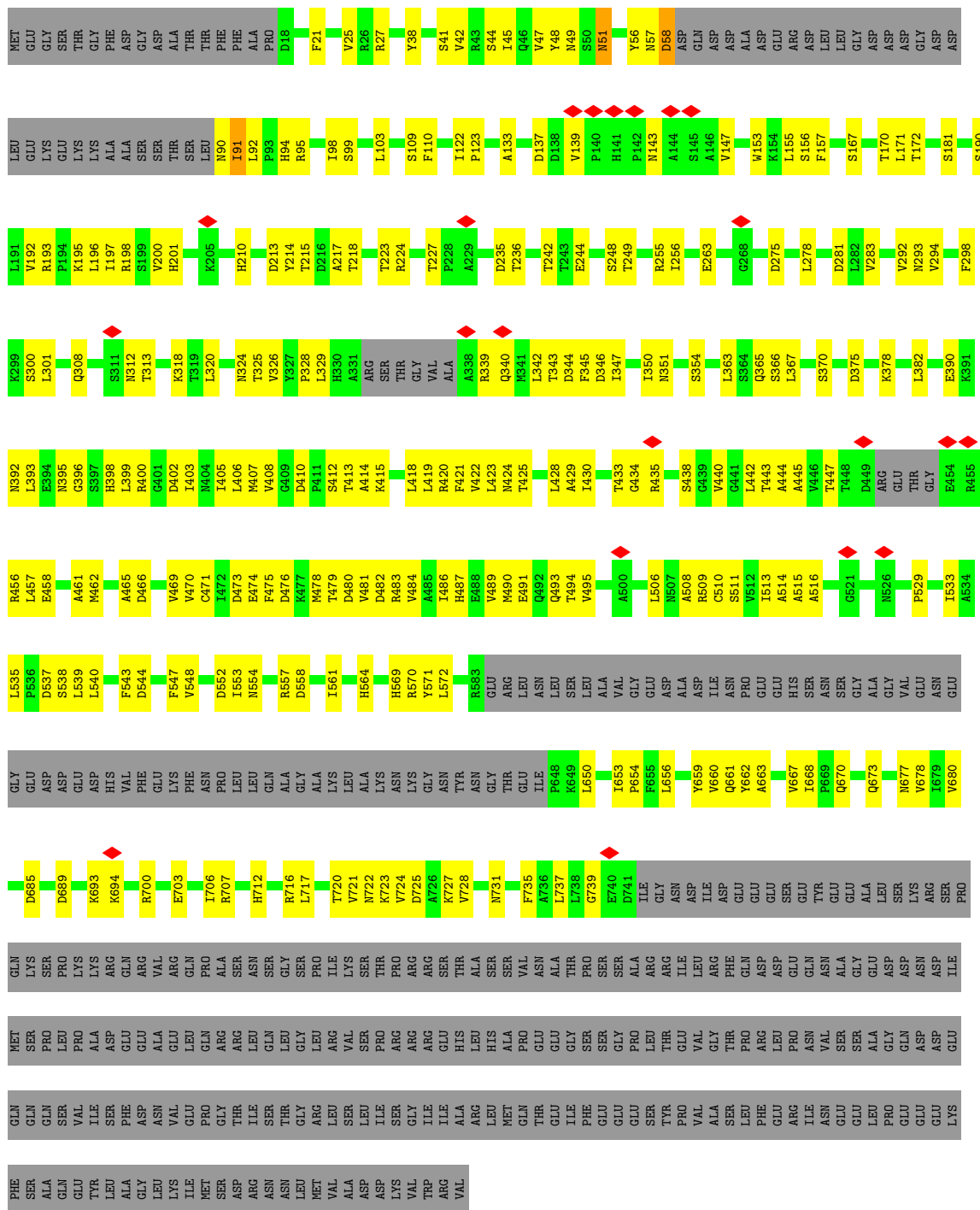
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: DNA replication licensing factor MCM2





• Molecule 2: DNA replication licensing factor MCM3



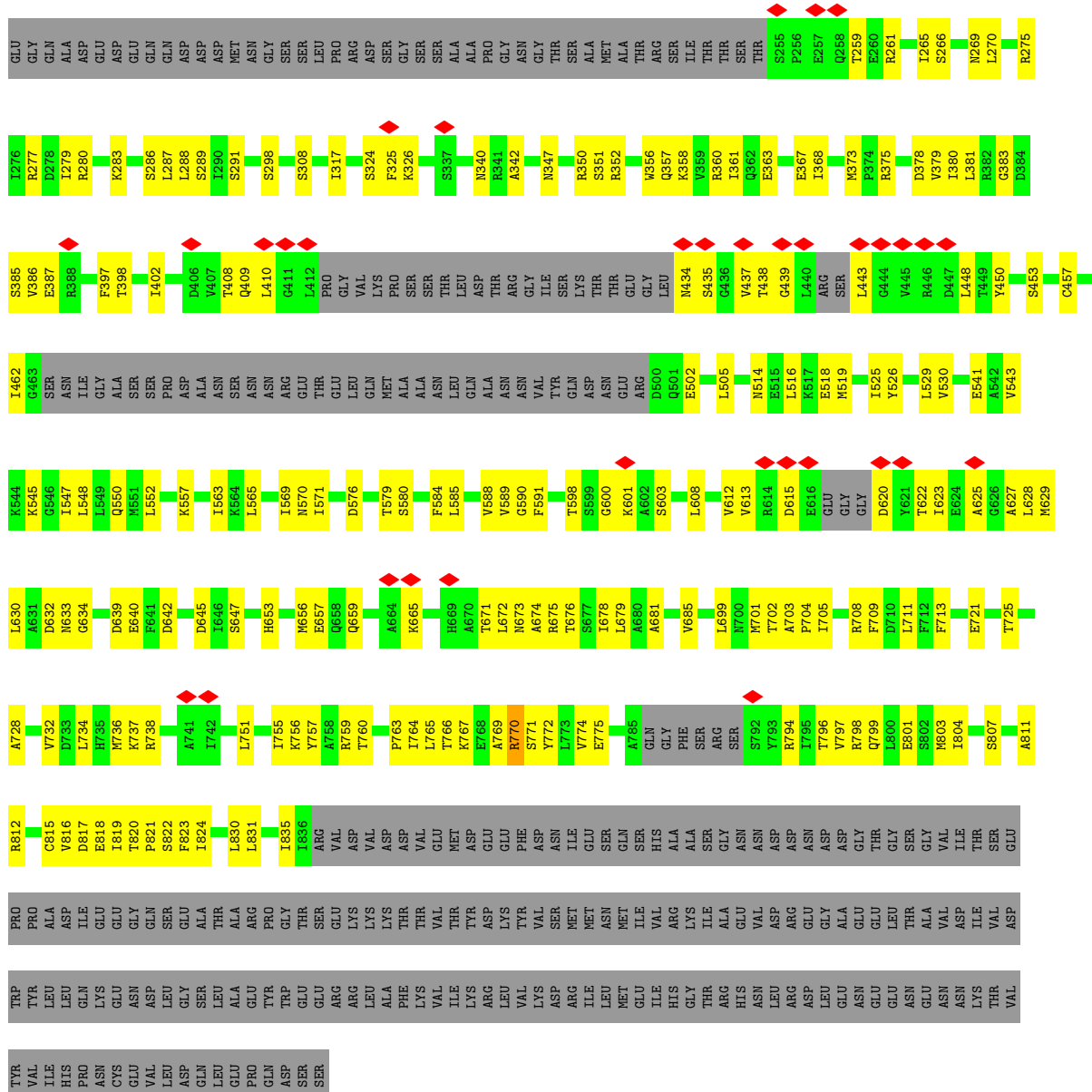
• Molecule 3: DNA replication licensing factor MCM4



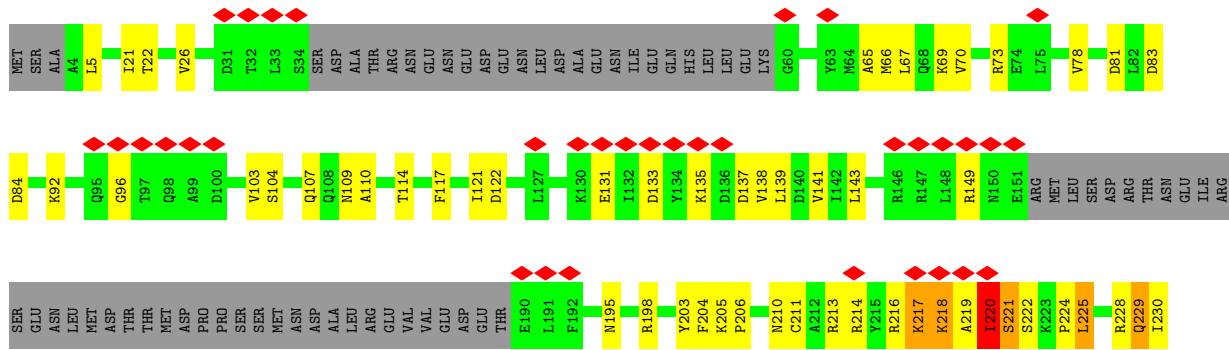
MET	SER	GLN	GLN	SER	SER	SER	THR	LYS	GLU	ASP	ASN	ASN	SER	SER	PRO	VAL	VAL	PRO	ALA	GLN	GLN	PRO	PRO	GLN	LEU	SER	SER	PRO	ALA	ALA	LEU	ALA	GLY	GLN	GLY	ASP	GLY	GLN	GLY	ASP	ARG	TYR	ILE	TYR	GLY	ARG	ASN	ASN	GLN	GLN	LEU	SER	GLN	GLY	GLY
ASN	ILE	ARG	ALA	ALA	ILE	GLY	SER	PRO	LEU	PHE	PRO	SER	SER	SER	GLN	ARG	GLN	ASN	ASP	ASP	ASP	PHE	GLN	SER	GLY	GLN	ARG	ILE	ALA	ALA	ALA	GLY	ARG	SER	ARG	TYR	HIS	TYR	ALA	ASP	LEU	ARG	ARG	ASN	ASN	GLN	ARG	ALA	ALA	GLU	PRO	THR	THR	SER	SER
SER	SER	LEU	GLY	ARG	ASN	GLY	GLN	ASN	ARG	VAL	HIS	MET	ARG	ARG	ARG	ASN	ASN	ASP	ASP	ILE	ILE	HIS	THR	SER	LEU	LEU	ASP	PHE	ASP	THR	THR	VAL	VAL	ASN	THR	THR	SER	SER	ALA	ALA	PRO	PRO	PRO	PRO	ALA	ALA	ALA	GLU	PRO	THR	THR	GLY	GLY		
T183	H184	I187	Q188	E189	C190	T191	T192	M193	F194	R195	M196	M199	S200	R206	R212	E213	E214	F215	T216	M217	M218	T219	T220	D221	E222	E223	L224	T225	Y226	I227	L230	M231	E232	M233	L236	G237	L243	D244	A245	L249	Q253	E255	E256	L257	Y258	H259	Q260	L261	L262						
M263	F264	P265	V268	M272	D273	Q274	D278	K280	V281	S282	L283	L284	V285	D286	M287	M288	L289	D290	Y291	D292	L293	D294	E295	L296	E297	T298	K299	F300	Y301	K302	V303	R304	P305	V306	M307	V308	M314	M318	P319	M320	D321	K324	L325	L328	L331	V332	T336	D341							
M342	K343	A345	K348	C349	M350	V351	C352	D353	M356	A357	V358	E359	I360	D361	V364	I365	Q366	E367	R370	C371	E372	R373	I374	D375	C376	N377	S381	M382	S383	L384	I385	C389	A392	Q395	V396	I397	K398	L399	Q400	E401	T402	P403	D404	P405	V406	P407	D408	C409	Y420						
V424	R428	A429	G430	D431	V435	R445	A446	R449	Q450	R451	V452	L453	K454	S455	L456	L457	V463	V464	H465	V466	V469	SER	ASP	LYS	ARG	LEU	ASP	VAL	THR	THR	SER	THR	ILE	GLU	GLN	GLU	LEU	MET	GLN	ASN	LYS	VAL	ASP	HIS	ASN	ASN	GLU	VAL	GLU	VAL	ARG	Q500			
I501	V512	L521	L522	S525	I526	S529	I530	E531	L532	L533	V536	K537	K538	I540	L541	L542	G543	L544	G547	T548	T553	K554	G555	G560	D561	I562	N563	I564	L565	L566	C567	G568	D569	P570	S571	T572	S573	K574	I577	L578	Q579	Y580	V581	R587	S592	G593	K594								
G595	S596	S597	L601	I605	T606	R607	ASP	VAL	ASP	THR	LYS	L614	V615	L616	E617	A620	L621	L622	L623	S624	D625	G626	G627	V628	C629	C630	I631	F634	M637	S638	D639	S640	T641	R642	S643	V644	L645	H646	E647	E650	I656	A657	K658	A659	G660	I661	I662	R668	S669	S670					
I671	L672	A673	S674	I678	G679	M683	L686	P687	V688	T689	E690	M691	I692	P696	R697	L698	D703	L704	V705	Y706	L709	D710	E714	K715	M716	E719	A721	K722	H723	L724	T725	N726	L729	P733	GLU	HIS	ILE	SER	GLN	ASP	D740	V741	L742	F746	L747	Y750									
K755	P760	T763	E764	K767	T768	V771	V775	G776	M777	R778	K779	M780	GLY	ASP	LEU	LEU	LYS	ASP	GLN	ALA	SER	ASP	GLU	LEU	ILE	S800	M801	I802	R803	L813	K814	V817	E818	L819	E820	D821	R830	D835	K841	T842	V850	Q851	T852												
GLY	LYS	SER	VAL	ILE	GLN	ARG	LYS	LEU	GLY	VAL	VAL	ASP	ARG	ARG	SER	VAL	ARG	GLU	ILE	ASN	ASN	VAL	LEU	LEU	LYS	ASP	SER	ASP	GLN	ALA	SER	ASP	GLN	ASP	VAL	HIS	ILE	SER	ASP	GLN	ASP	D740	V741	L742	F746	L747	Y750								
GLU	ASP	LYS	VAL	ILE	VAL	VAL	GLY	GLY	VAL	VAL	ARG	ARG	SER	VAL	ARG	VAL	ARG	GLU	ILE	ASN	ASN	ARG	VAL	LEU	LEU	LYS	SER	ASP	GLN	ALA	SER	ASP	GLN	ASP	VAL	HIS	ILE	SER	ASP	GLN	ASP	D740	V741	L742	F746	L747	Y750								

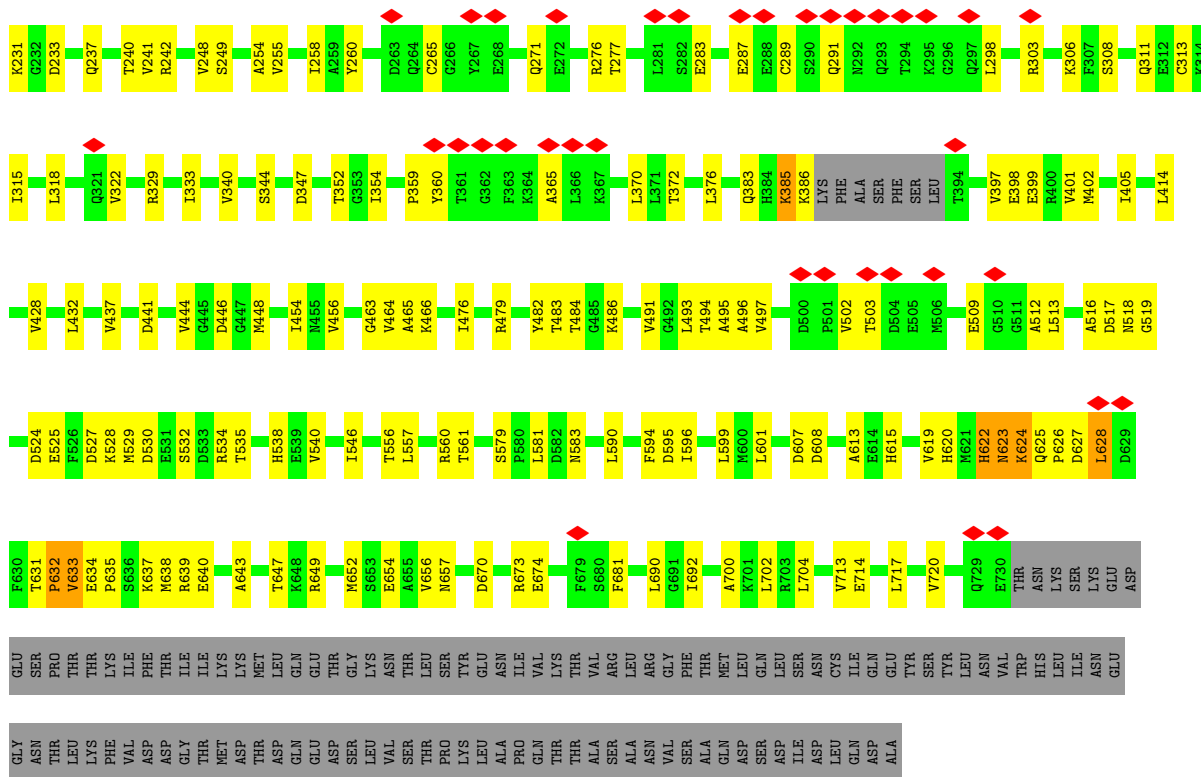
● Molecule 4: Minichromosome maintenance protein 5



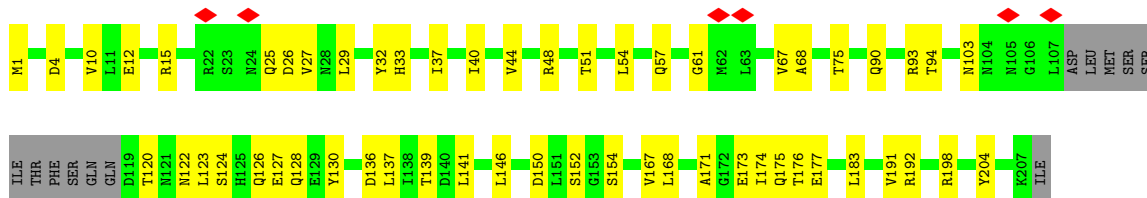


● Molecule 6: DNA replication licensing factor MCM7

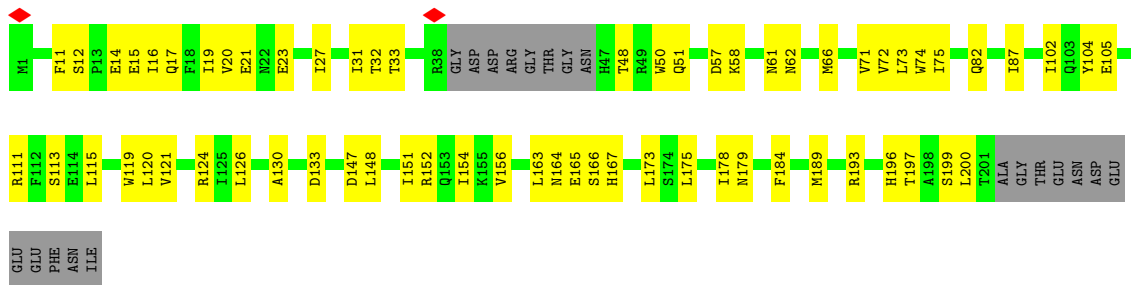




• Molecule 7: DNA replication complex GINS protein PSF1

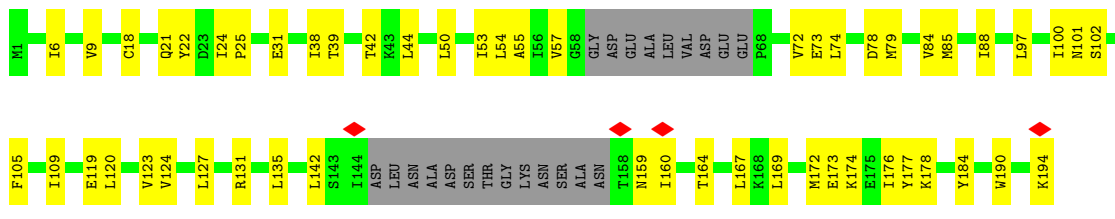


• Molecule 8: DNA replication complex GINS protein PSF2

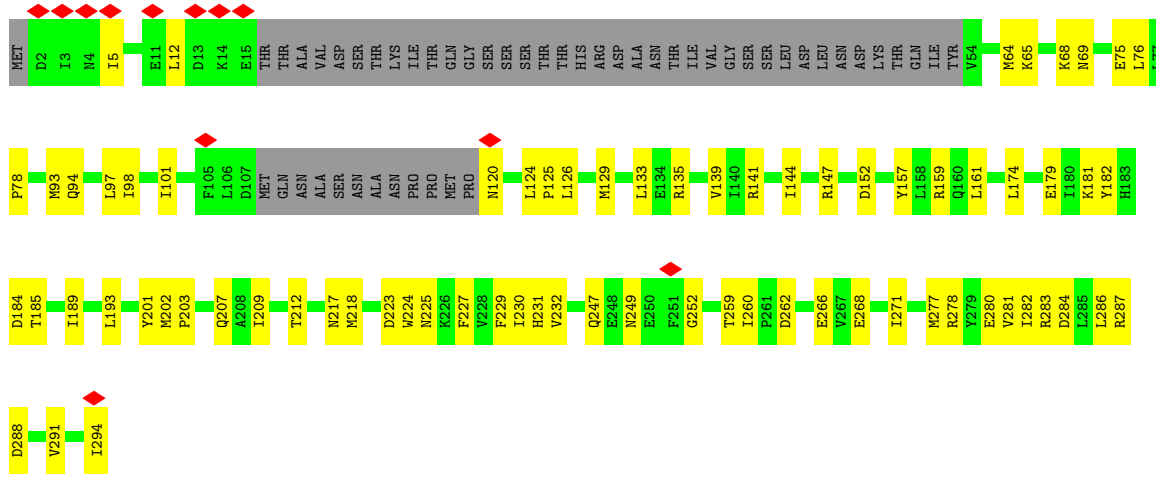


• Molecule 9: DNA replication complex GINS protein PSF3

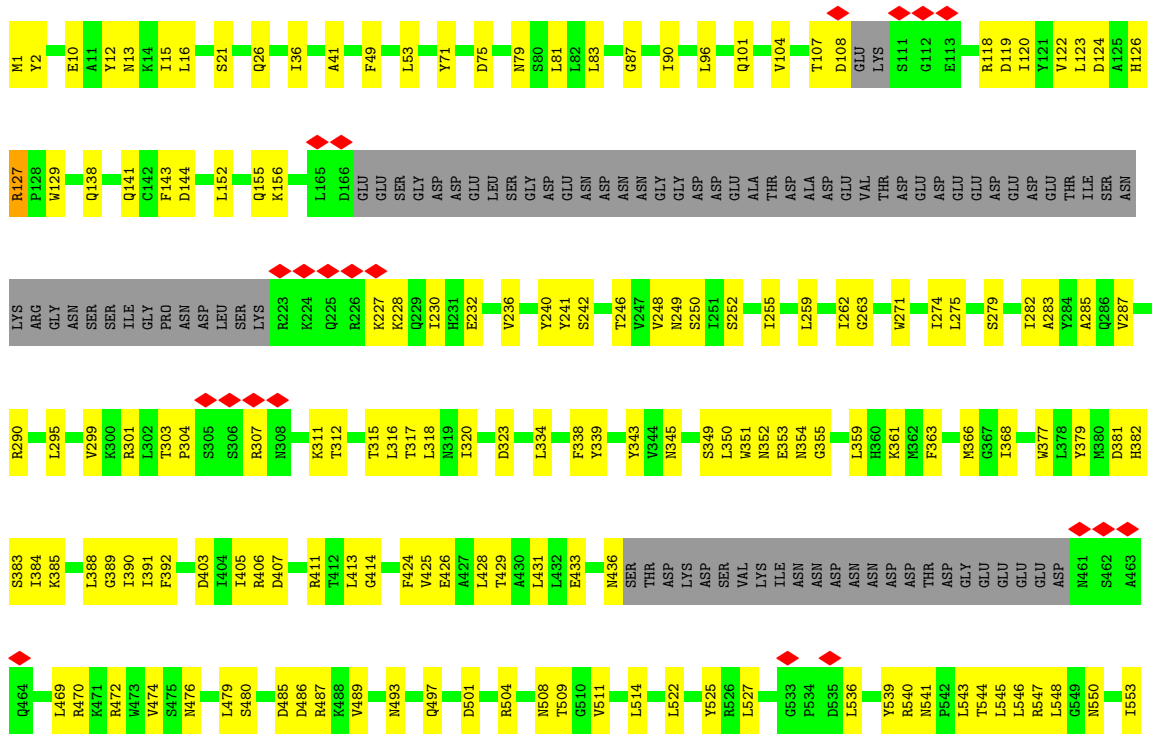




• Molecule 10: DNA replication complex GINS protein SLD5



• Molecule 11: Cell division control protein 45



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	28871	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 ($e^-/\text{\AA}^2$)	53	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.261	Depositor
Minimum map value	-0.265	Depositor
Average map value	0.009	Depositor
Map value standard deviation	0.056	Depositor
Recommended contour level	0.45	Depositor
Map size (Å)	466.39996, 466.39996, 466.39996	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality

5.1 Standard geometry

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

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	2	0.25	0/5036	0.51	0/6796
2	3	0.27	0/4920	0.49	0/6675
3	4	0.25	0/5020	0.49	0/6785
4	5	0.26	0/4227	0.48	0/5701
5	6	0.26	0/4913	0.49	0/6631
6	7	0.30	0/5204	0.49	0/7039
7	A	0.26	0/1622	0.45	0/2183
8	B	0.27	0/1650	0.47	0/2231
9	C	0.26	0/1420	0.40	0/1918
10	D	0.26	0/2040	0.46	0/2755
11	E	0.28	0/4677	0.47	0/6335
12	F	0.27	0/3489	0.46	0/4724
12	G	0.26	0/3465	0.46	0/4696
12	H	0.26	0/3496	0.47	0/4735
13	I	0.46	0/175	1.28	0/268
14	N	0.31	0/654	0.47	0/883
All	All	0.27	0/52008	0.48	0/70355

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

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	2	4955	0	5000	178	0
2	3	4835	0	4881	195	0
3	4	4947	0	5020	193	0
4	5	4176	0	4261	162	0
5	6	4837	0	4830	181	0
6	7	5124	0	5175	162	0
7	A	1602	0	1604	49	0
8	B	1617	0	1674	56	0
9	C	1387	0	1405	39	0
10	D	2004	0	2001	60	0
11	E	4591	0	4567	150	0
12	F	3404	0	3352	114	0
12	G	3380	0	3310	147	0
12	H	3411	0	3355	104	0
13	I	160	0	97	2	0
14	N	641	0	622	146	0
15	2	27	0	12	8	0
15	3	27	0	12	6	0
16	2	1	0	0	0	0
16	3	1	0	0	0	0
16	4	1	0	0	0	0
16	7	1	0	0	0	0
17	2	1	0	0	0	0
17	4	1	0	0	0	0
17	5	1	0	0	0	0
17	6	1	0	0	0	0
17	7	1	0	0	0	0
18	4	31	0	12	5	0
18	7	31	0	12	7	0
All	All	51196	0	51202	1834	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 18.

The worst 5 of 1834 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)
6:7:622:HIS:HB2	6:7:624:LYS:NZ	1.58	1.17
6:7:622:HIS:CB	6:7:624:LYS:NZ	2.08	1.17
14:N:25:LEU:HD13	14:N:63:LEU:HD12	1.42	1.01
11:E:589:PRO:HD2	11:E:592:LEU:HD12	1.44	1.00
6:7:622:HIS:CB	6:7:624:LYS:HZ3	1.73	0.99

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	2	613/868 (71%)	581 (95%)	32 (5%)	0	100	100
2	3	609/971 (63%)	579 (95%)	30 (5%)	0	100	100
3	4	613/933 (66%)	583 (95%)	30 (5%)	0	100	100
4	5	503/775 (65%)	484 (96%)	19 (4%)	0	100	100
5	6	599/1017 (59%)	567 (95%)	32 (5%)	0	100	100
6	7	649/845 (77%)	626 (96%)	21 (3%)	2 (0%)	41	76
7	A	192/208 (92%)	191 (100%)	1 (0%)	0	100	100
8	B	189/213 (89%)	180 (95%)	9 (5%)	0	100	100
9	C	166/194 (86%)	161 (97%)	5 (3%)	0	100	100
10	D	237/294 (81%)	228 (96%)	9 (4%)	0	100	100
11	E	560/650 (86%)	529 (94%)	28 (5%)	3 (0%)	29	67
12	F	418/927 (45%)	407 (97%)	11 (3%)	0	100	100
12	G	416/927 (45%)	398 (96%)	18 (4%)	0	100	100
12	H	419/927 (45%)	399 (95%)	19 (4%)	1 (0%)	47	80
14	N	81/689 (12%)	71 (88%)	10 (12%)	0	100	100
All	All	6264/10438 (60%)	5984 (96%)	274 (4%)	6 (0%)	54	85

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	7	220	ILE
11	E	127	ARG
11	E	597	THR
12	H	749	TYR
11	E	596	HIS

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	2	544/770 (71%)	543 (100%)	1 (0%)	93	96
2	3	534/835 (64%)	528 (99%)	6 (1%)	73	84
3	4	561/848 (66%)	561 (100%)	0	100	100
4	5	478/688 (70%)	475 (99%)	3 (1%)	86	92
5	6	531/886 (60%)	530 (100%)	1 (0%)	93	96
6	7	566/753 (75%)	551 (97%)	15 (3%)	44	65
7	A	181/193 (94%)	181 (100%)	0	100	100
8	B	183/198 (92%)	183 (100%)	0	100	100
9	C	155/173 (90%)	155 (100%)	0	100	100
10	D	234/279 (84%)	234 (100%)	0	100	100
11	E	509/586 (87%)	503 (99%)	6 (1%)	71	83
12	F	375/825 (46%)	374 (100%)	1 (0%)	92	95
12	G	372/825 (45%)	371 (100%)	1 (0%)	92	95
12	H	375/825 (46%)	374 (100%)	1 (0%)	92	95
14	N	63/629 (10%)	60 (95%)	3 (5%)	25	52
All	All	5661/9313 (61%)	5623 (99%)	38 (1%)	84	90

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
11	E	592	LEU
14	N	77	LEU
11	E	595	ILE
12	F	649	ARG
14	N	93	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
10	D	186	HIS
11	E	354	ASN
12	H	852	ASN
11	E	269	ASN
11	E	497	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 9 are monoatomic - leaving 4 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
18	AGS	4	1001	16	26,33,33	0.71	1 (3%)	26,52,52	1.13	2 (7%)
15	ADP	3	1001	16	24,29,29	0.95	1 (4%)	29,45,45	1.47	4 (13%)
18	AGS	7	902	16	26,33,33	0.72	1 (3%)	26,52,52	1.08	2 (7%)
15	ADP	2	901	16	24,29,29	0.97	1 (4%)	29,45,45	1.48	4 (13%)

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
18	AGS	4	1001	16	-	8/17/38/38	0/3/3/3
15	ADP	3	1001	16	-	3/12/32/32	0/3/3/3
18	AGS	7	902	16	-	6/17/38/38	0/3/3/3
15	ADP	2	901	16	-	3/12/32/32	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	2	901	ADP	C5-C4	2.45	1.47	1.40
15	3	1001	ADP	C5-C4	2.41	1.47	1.40
18	7	902	AGS	PG-S1G	2.13	1.95	1.90
18	4	1001	AGS	PG-S1G	2.13	1.95	1.90

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	4	1001	AGS	PA-O3A-PB	-4.34	117.94	132.83
18	7	902	AGS	PA-O3A-PB	-4.07	118.86	132.83
15	2	901	ADP	PA-O3A-PB	-3.67	120.24	132.83
15	3	1001	ADP	PA-O3A-PB	-3.55	120.63	132.83
15	2	901	ADP	N3-C2-N1	-3.22	123.64	128.68

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

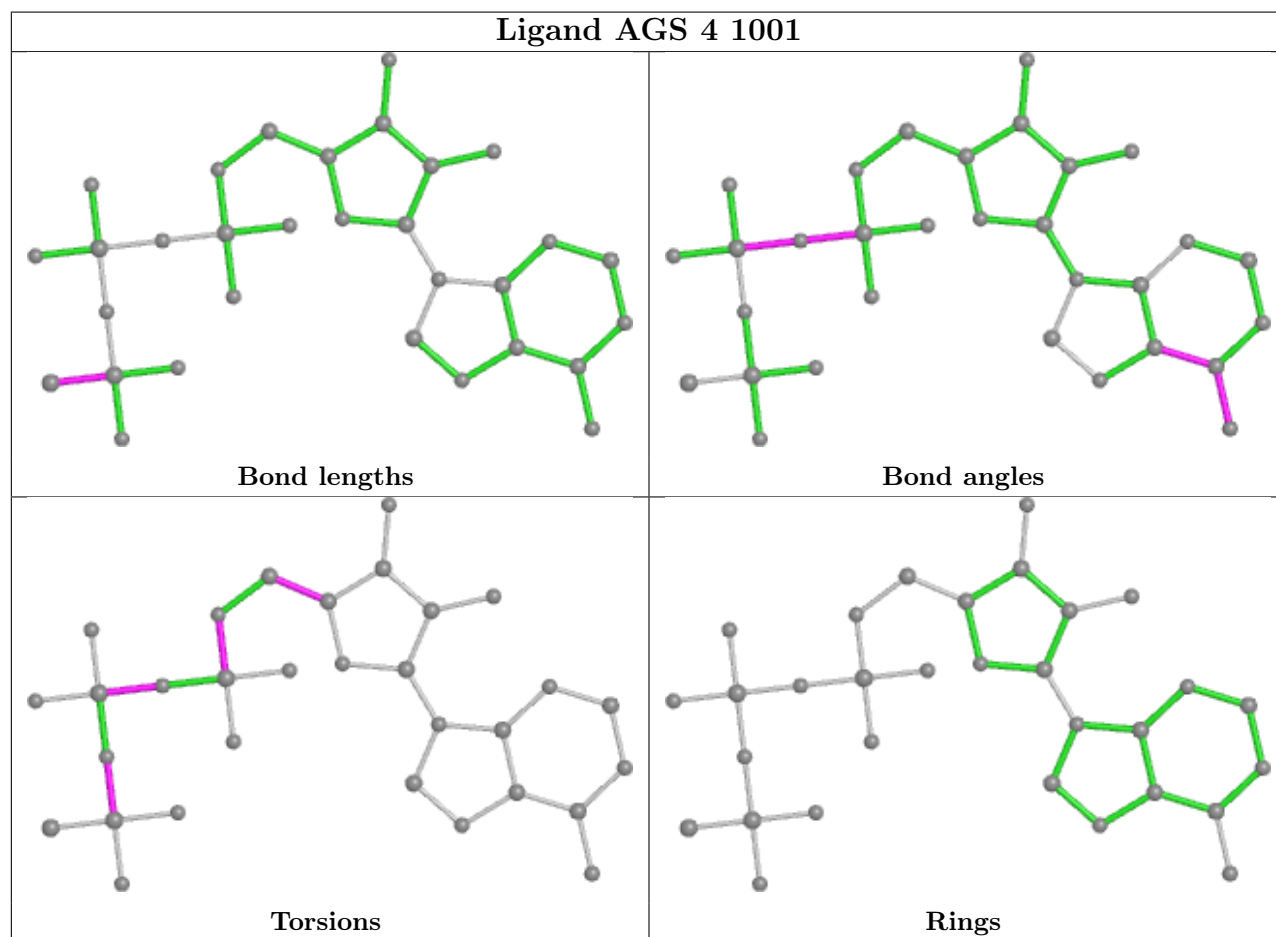
Mol	Chain	Res	Type	Atoms
15	2	901	ADP	C5'-O5'-PA-O1A
15	2	901	ADP	C5'-O5'-PA-O2A
15	3	1001	ADP	C5'-O5'-PA-O1A
15	3	1001	ADP	C5'-O5'-PA-O2A
18	4	1001	AGS	PB-O3B-PG-O3G

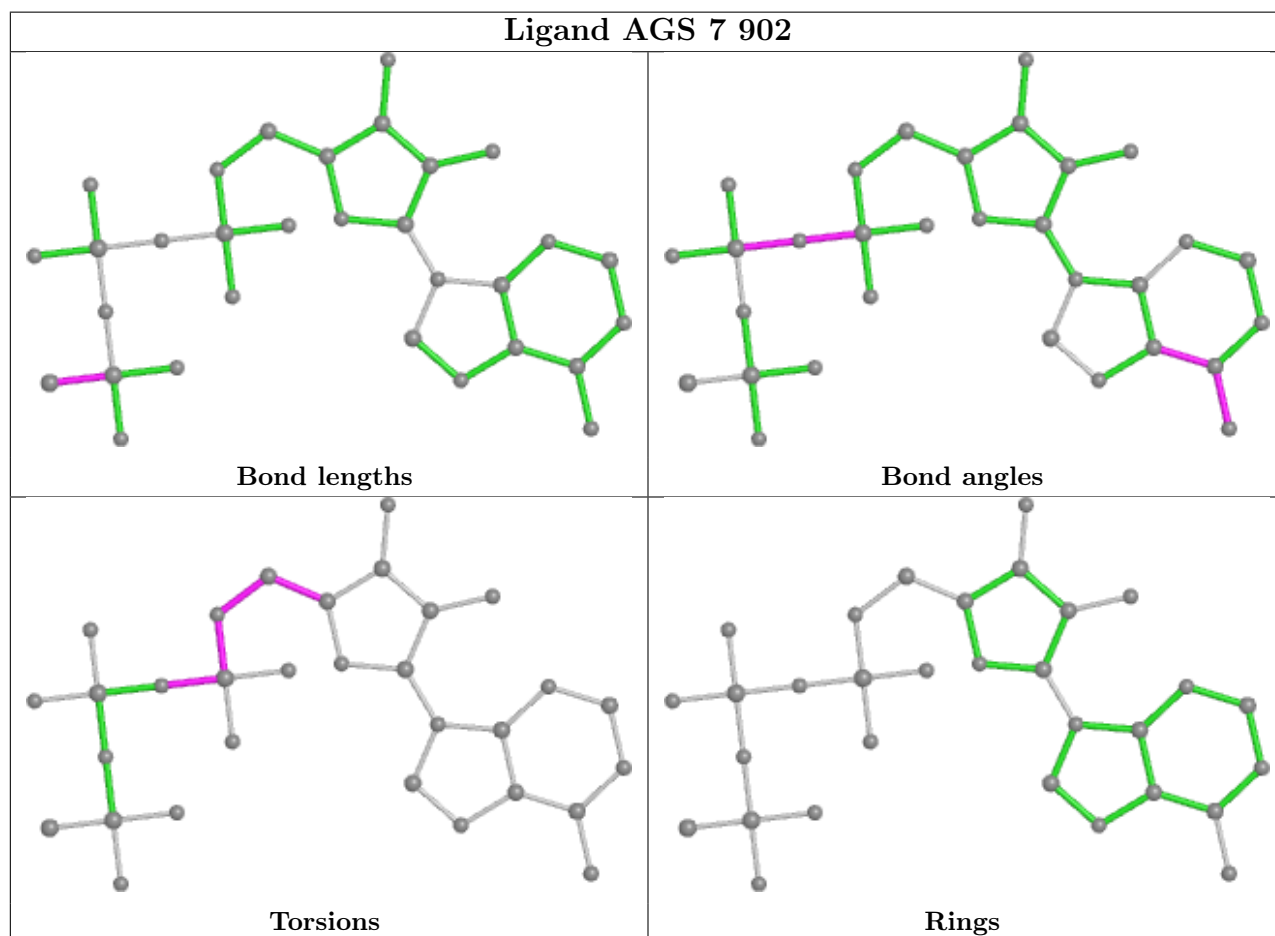
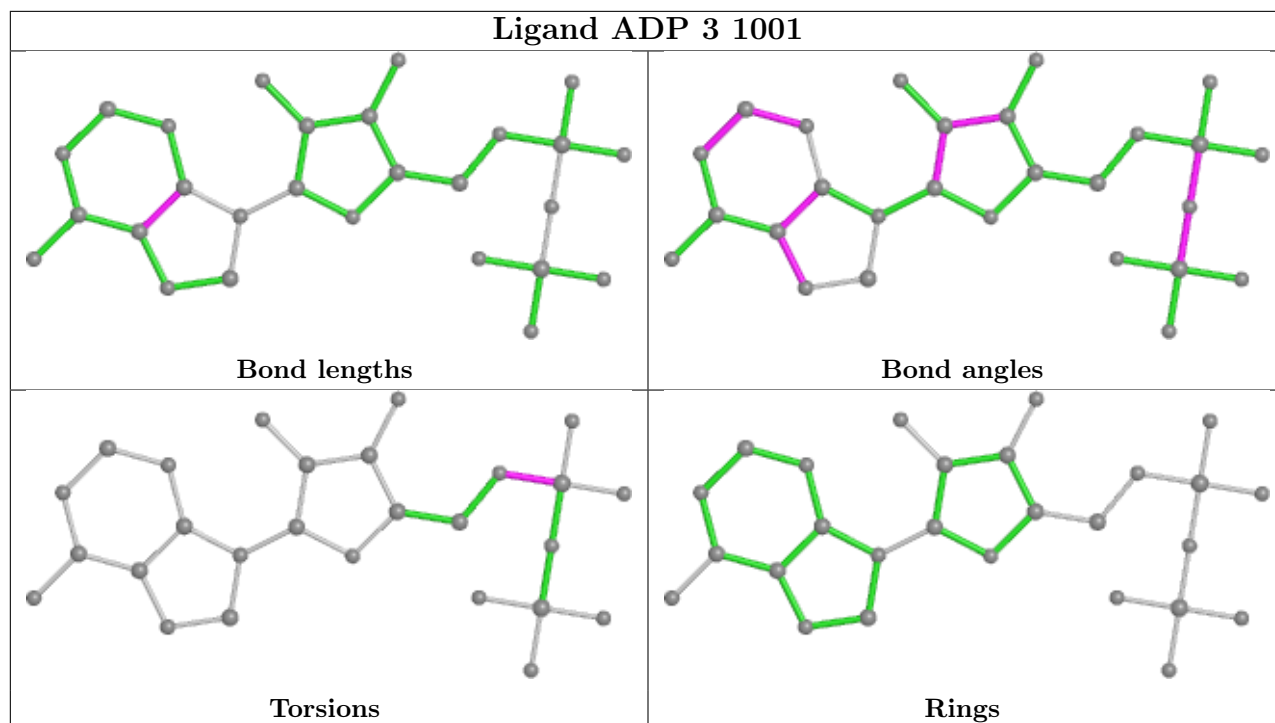
There are no ring outliers.

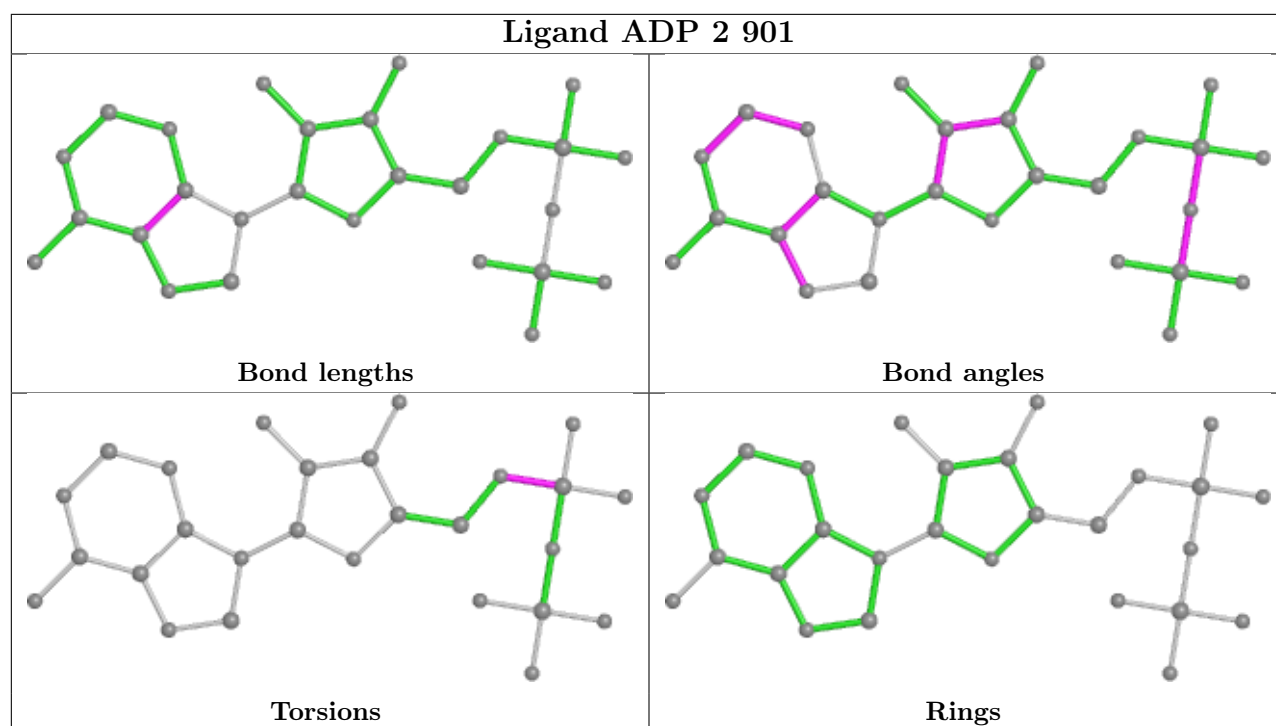
4 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
18	4	1001	AGS	5	0
15	3	1001	ADP	6	0
18	7	902	AGS	7	0
15	2	901	ADP	8	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.

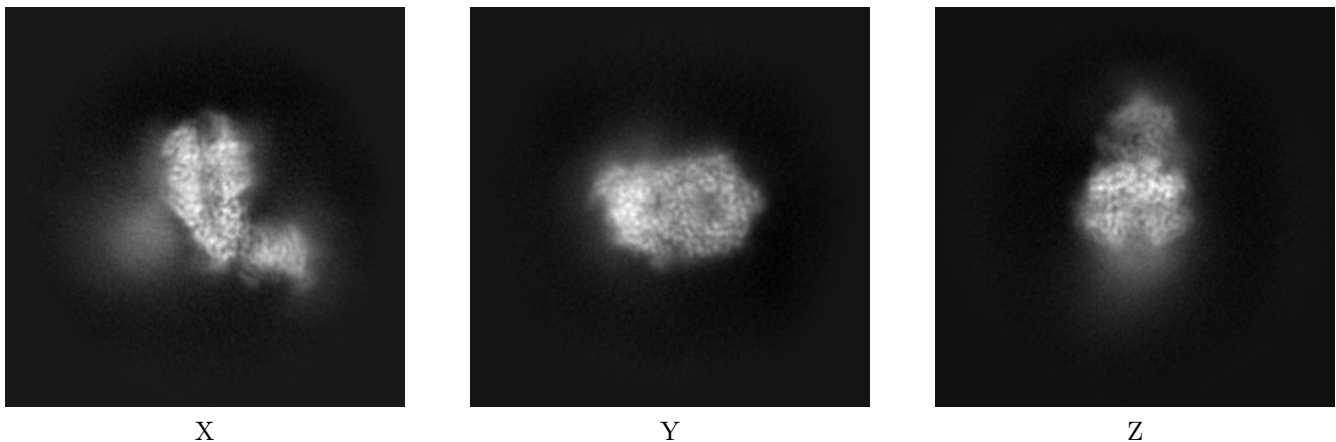
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-37343. These allow visual inspection of the internal detail of the map and identification of artifacts.

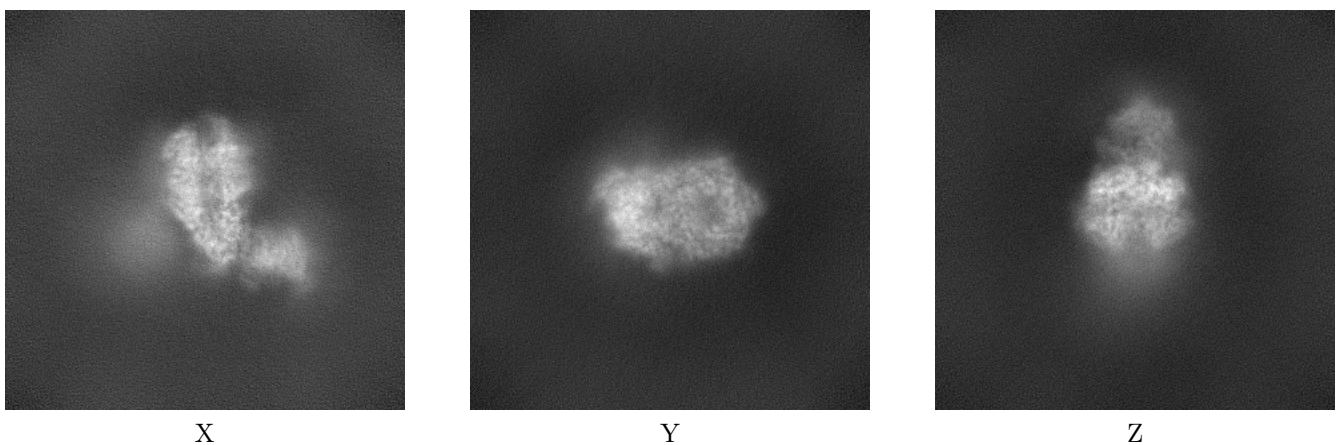
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

6.1.1 Primary map



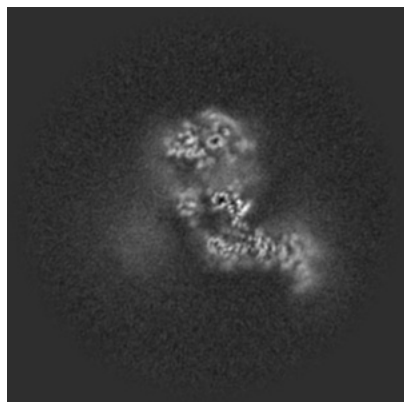
6.1.2 Raw map



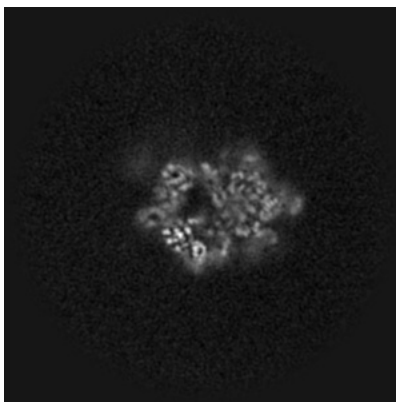
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

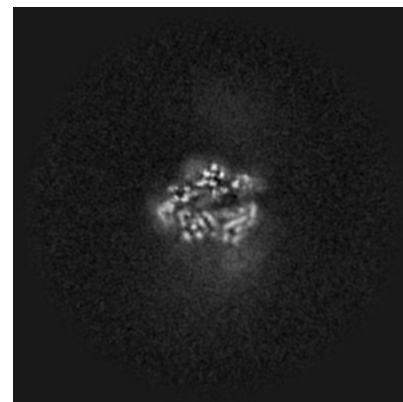
6.2.1 Primary map



X Index: 220

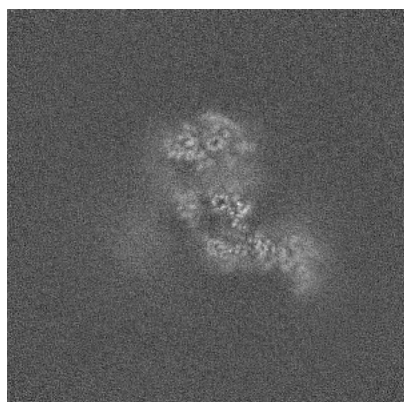


Y Index: 220

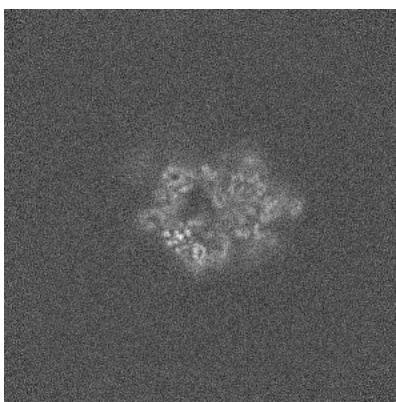


Z Index: 220

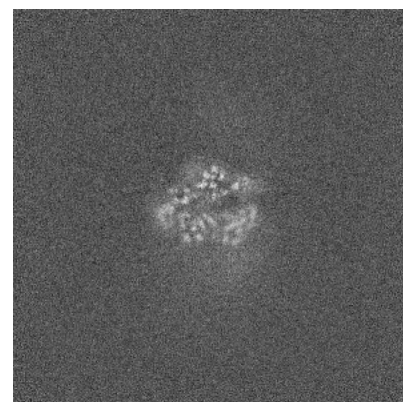
6.2.2 Raw map



X Index: 220



Y Index: 220

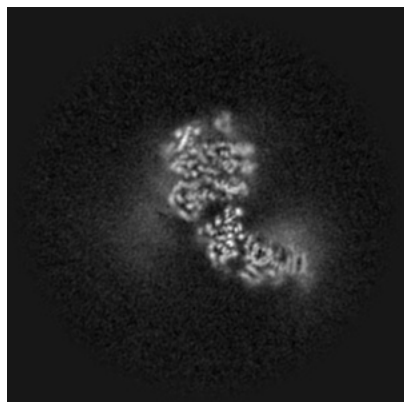


Z Index: 220

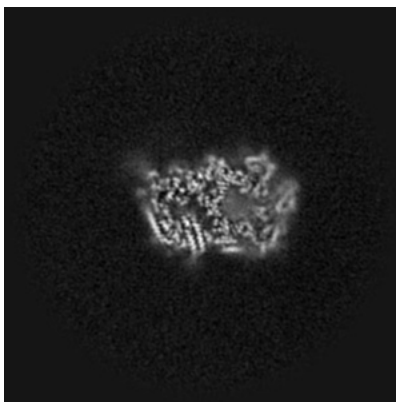
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

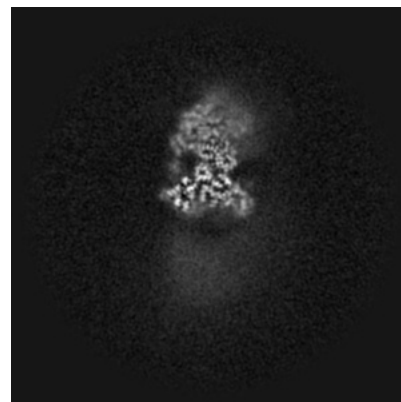
6.3.1 Primary map



X Index: 240

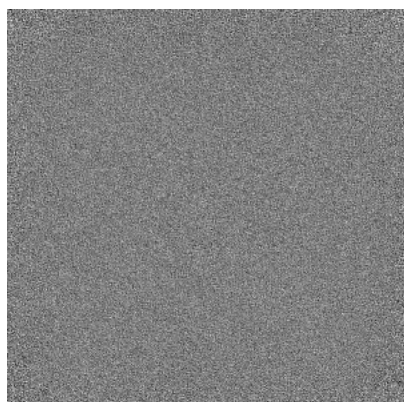


Y Index: 241

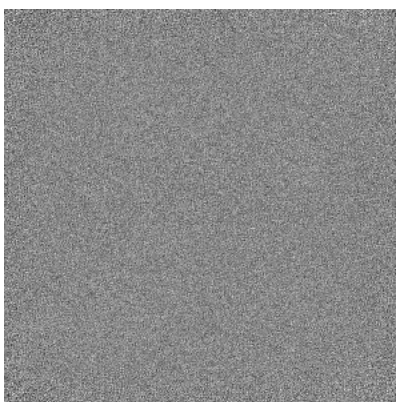


Z Index: 178

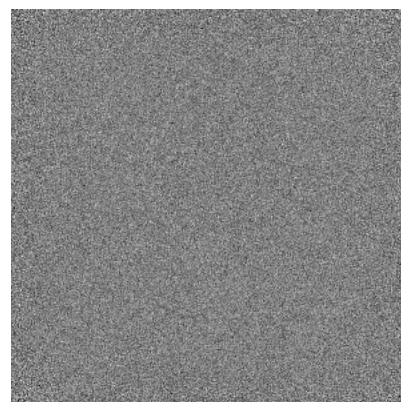
6.3.2 Raw map



X Index: 0



Y Index: 0

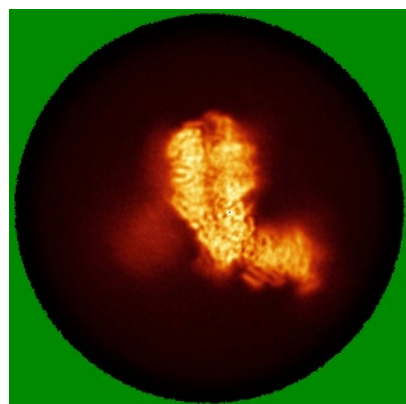


Z Index: 0

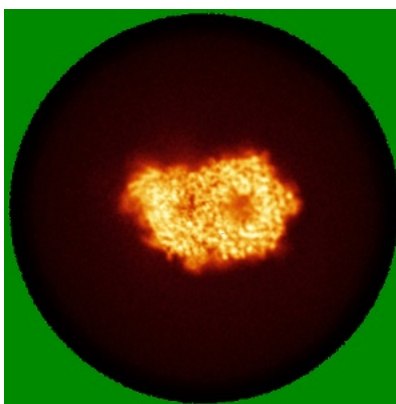
The images above show the largest variance slices of the map in three orthogonal directions.

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

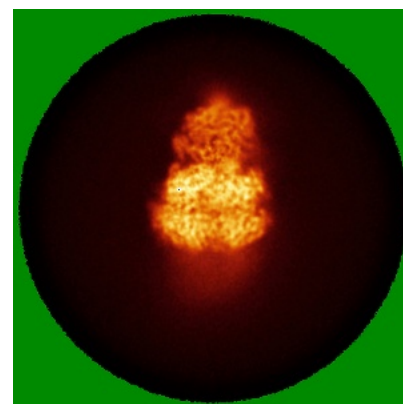
6.4.1 Primary map



X

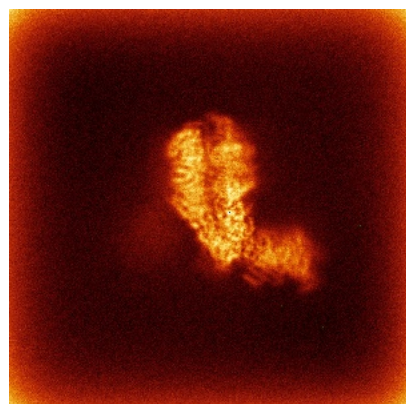


Y

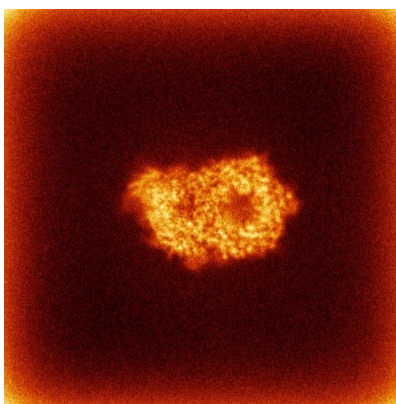


Z

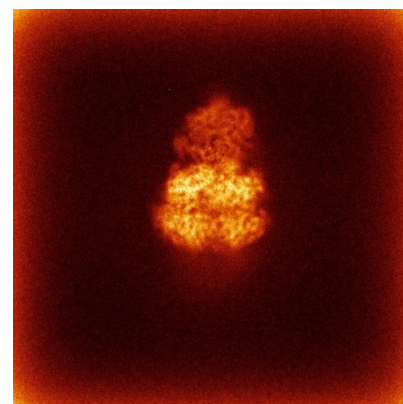
6.4.2 Raw map



X



Y

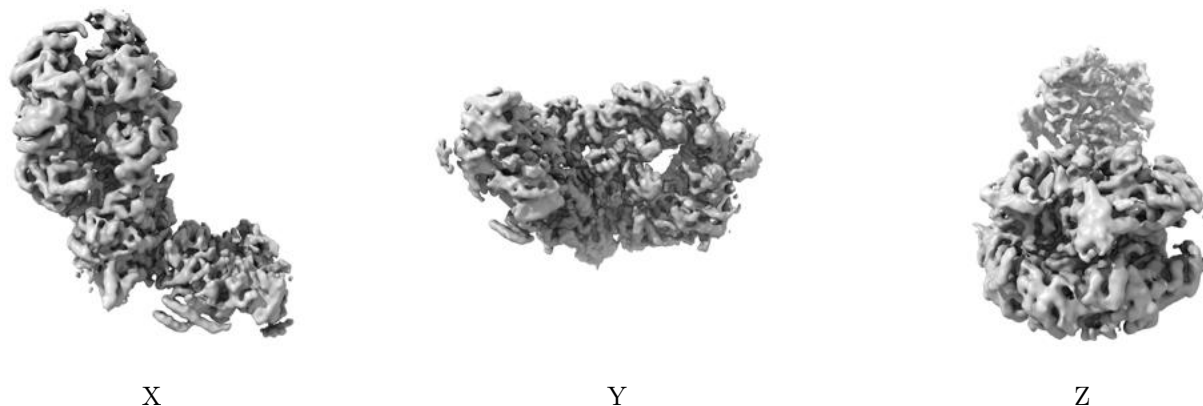


Z

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.

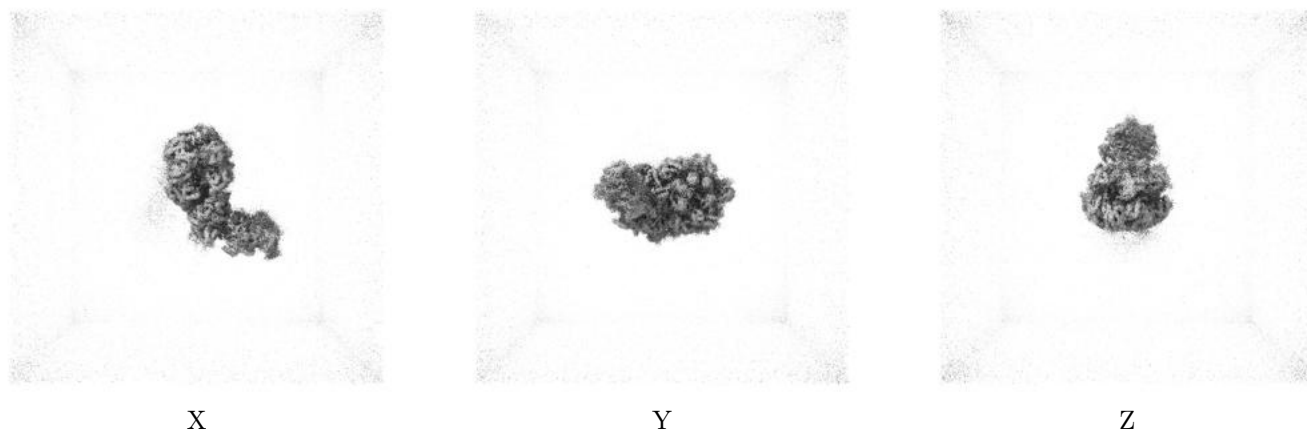
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.45. 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.

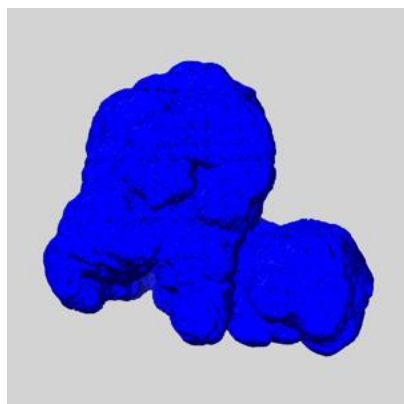
6.6 Mask visualisation [i](#)

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

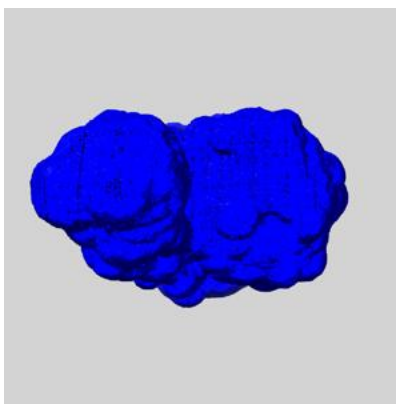
A mask typically either:

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

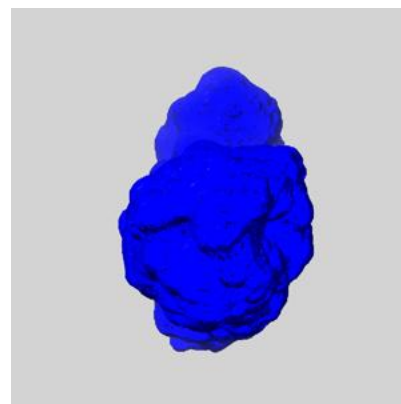
6.6.1 emd_37343_msk_1.map [i](#)



X



Y

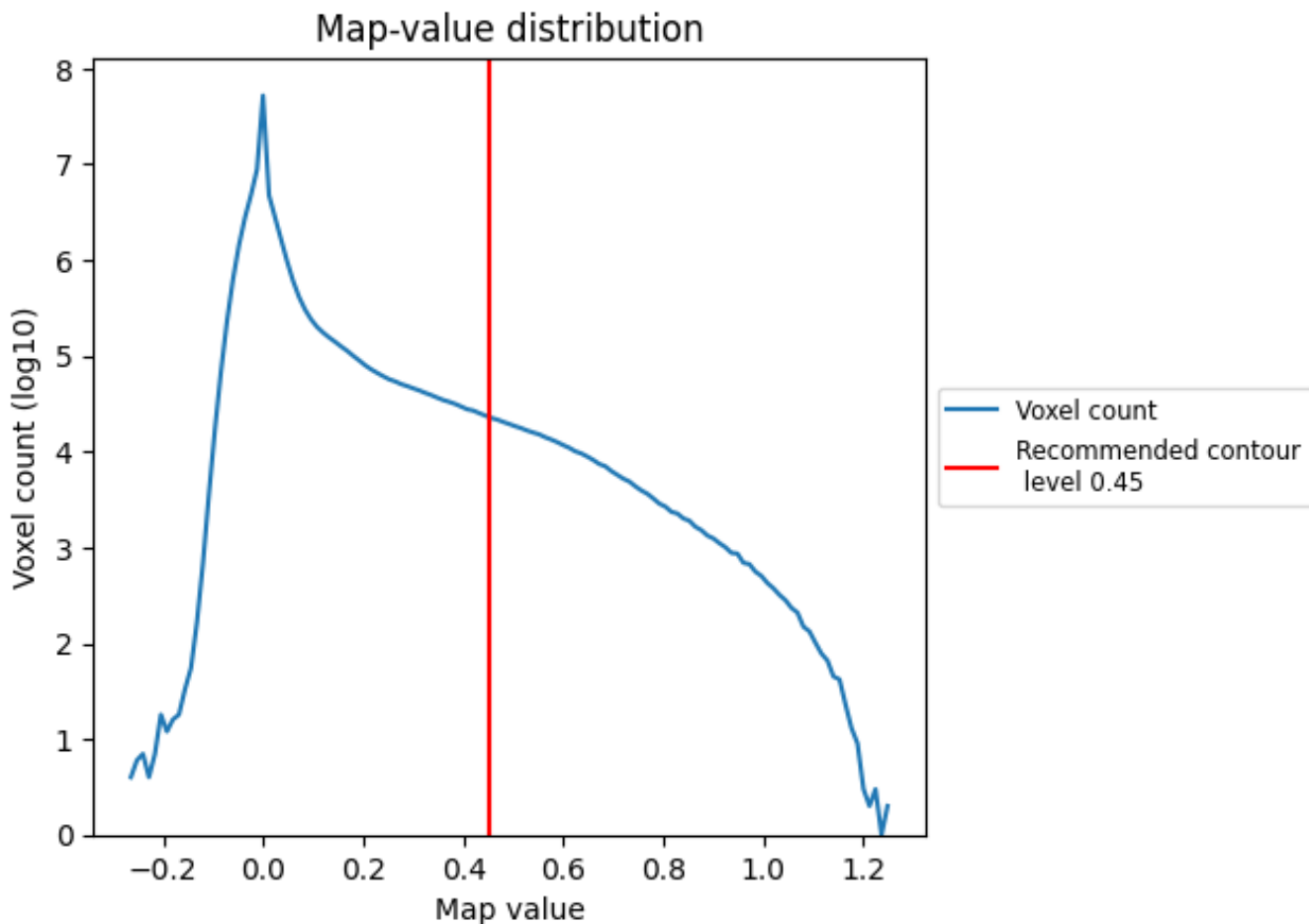


Z

7 Map analysis [i](#)

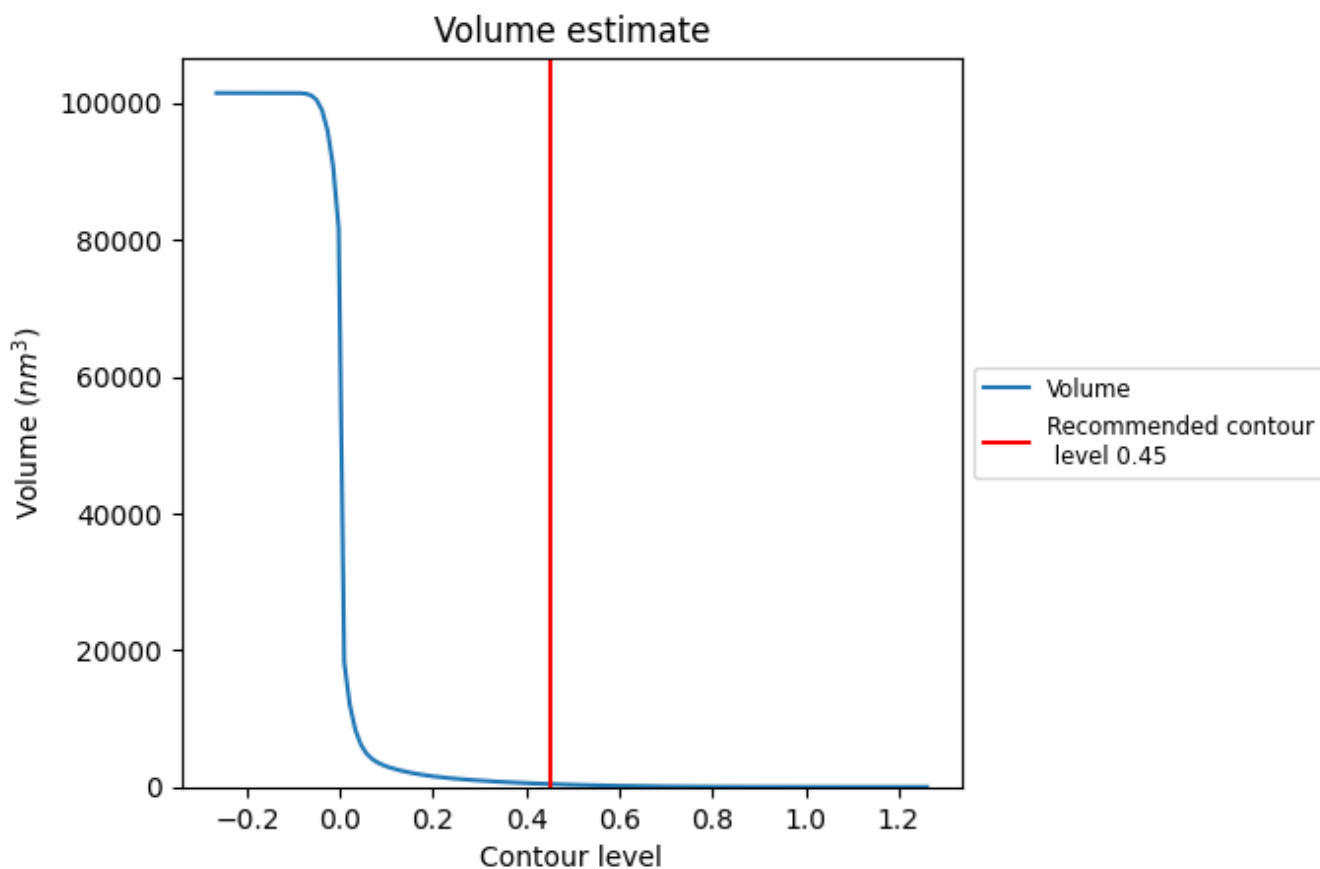
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

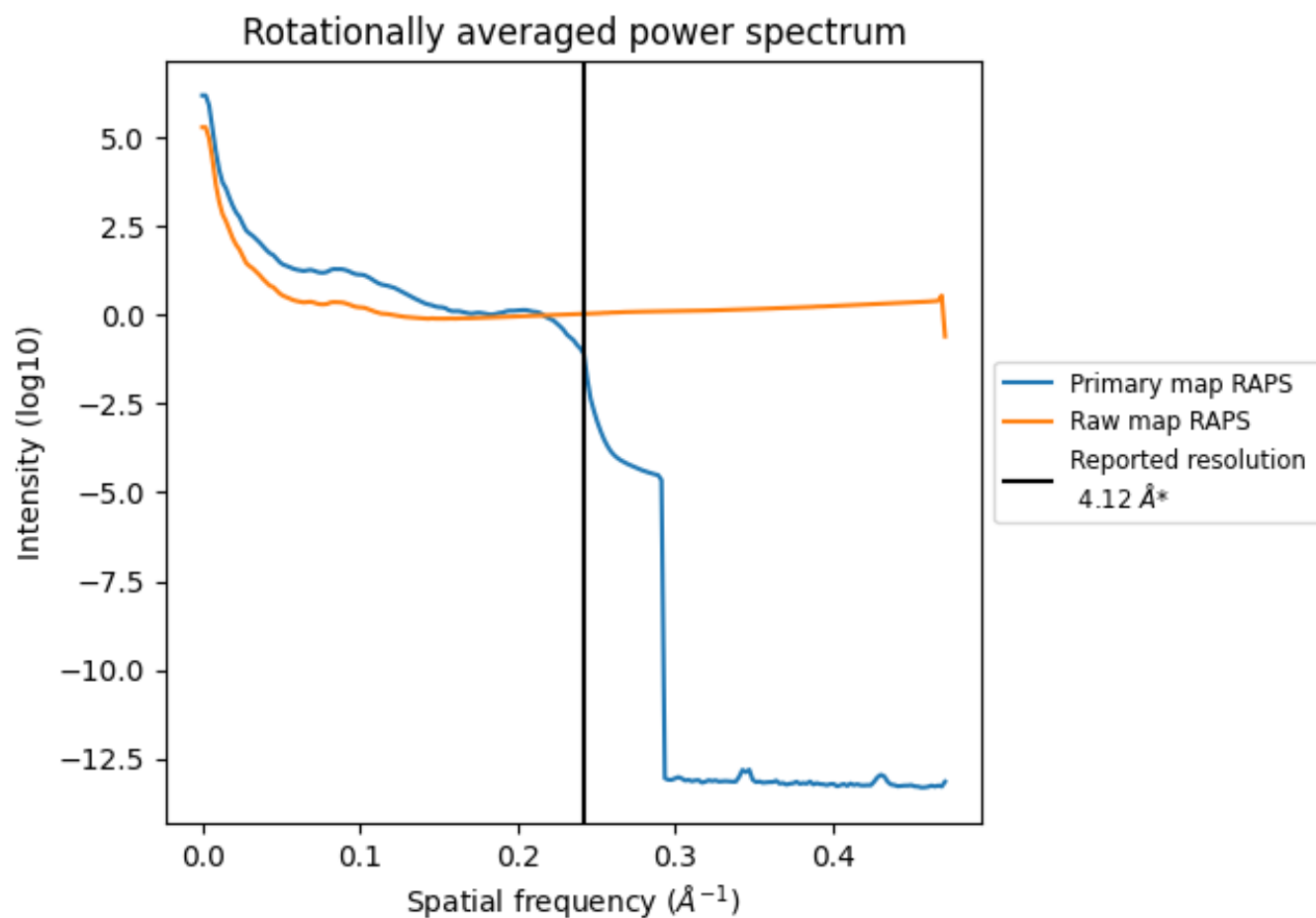
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 427 nm³; this corresponds to an approximate mass of 386 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](#)

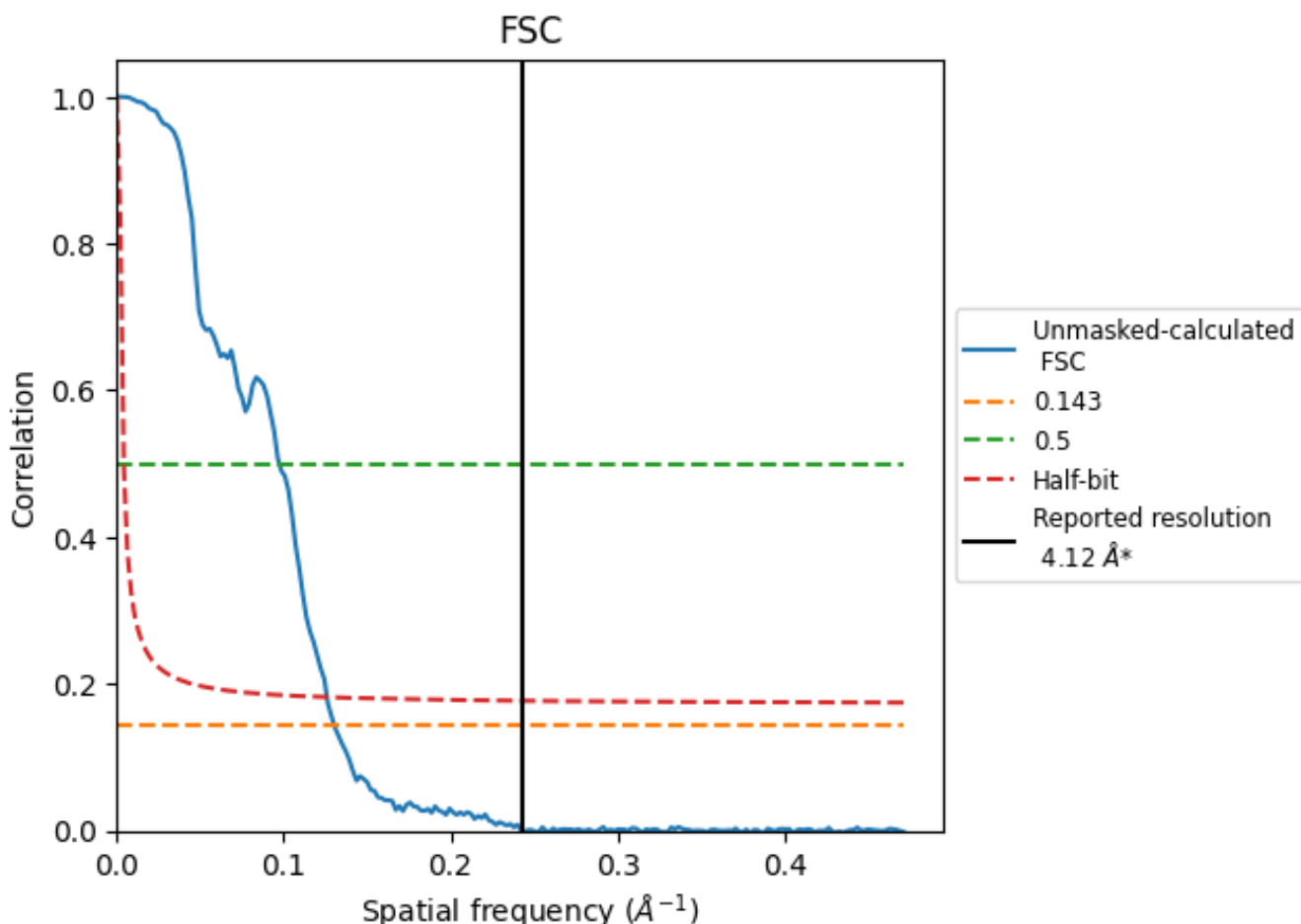


*Reported resolution corresponds to spatial frequency of 0.243 Å⁻¹

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 0.243 \AA^{-1}

8.2 Resolution estimates [i](#)

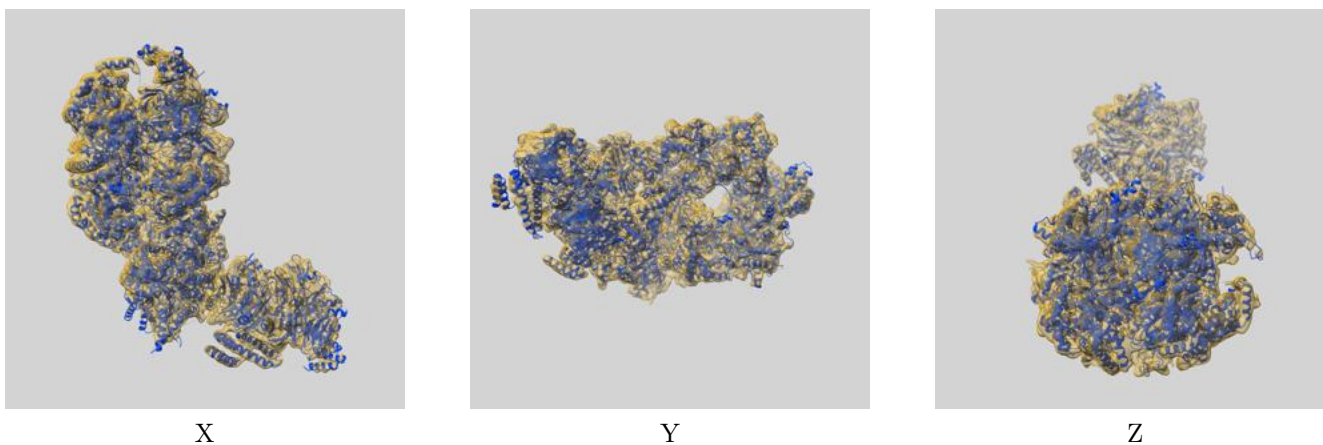
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.12	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.67	10.27	7.94

*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 7.67 differs from the reported value 4.12 by more than 10 %

9 Map-model fit [i](#)

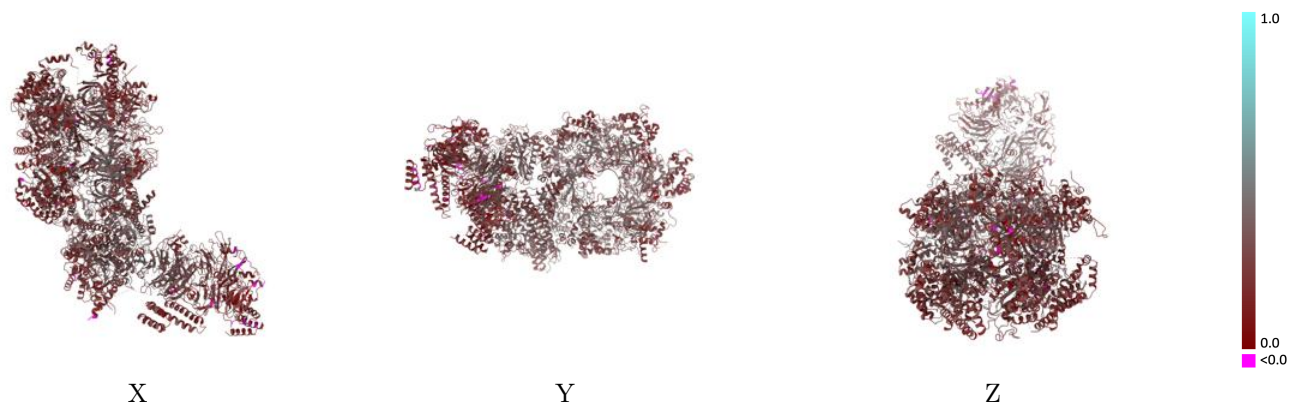
This section contains information regarding the fit between EMDB map EMD-37343 and PDB model 8W7M. Per-residue inclusion information can be found in section [3](#) on page [9](#).

9.1 Map-model overlay [i](#)



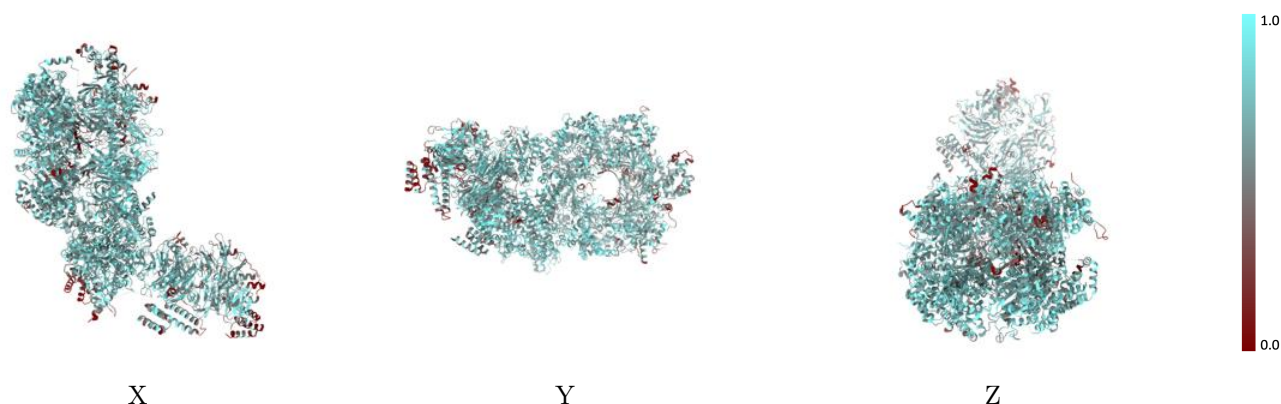
The images above show the 3D surface view of the map at the recommended contour level 0.45 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



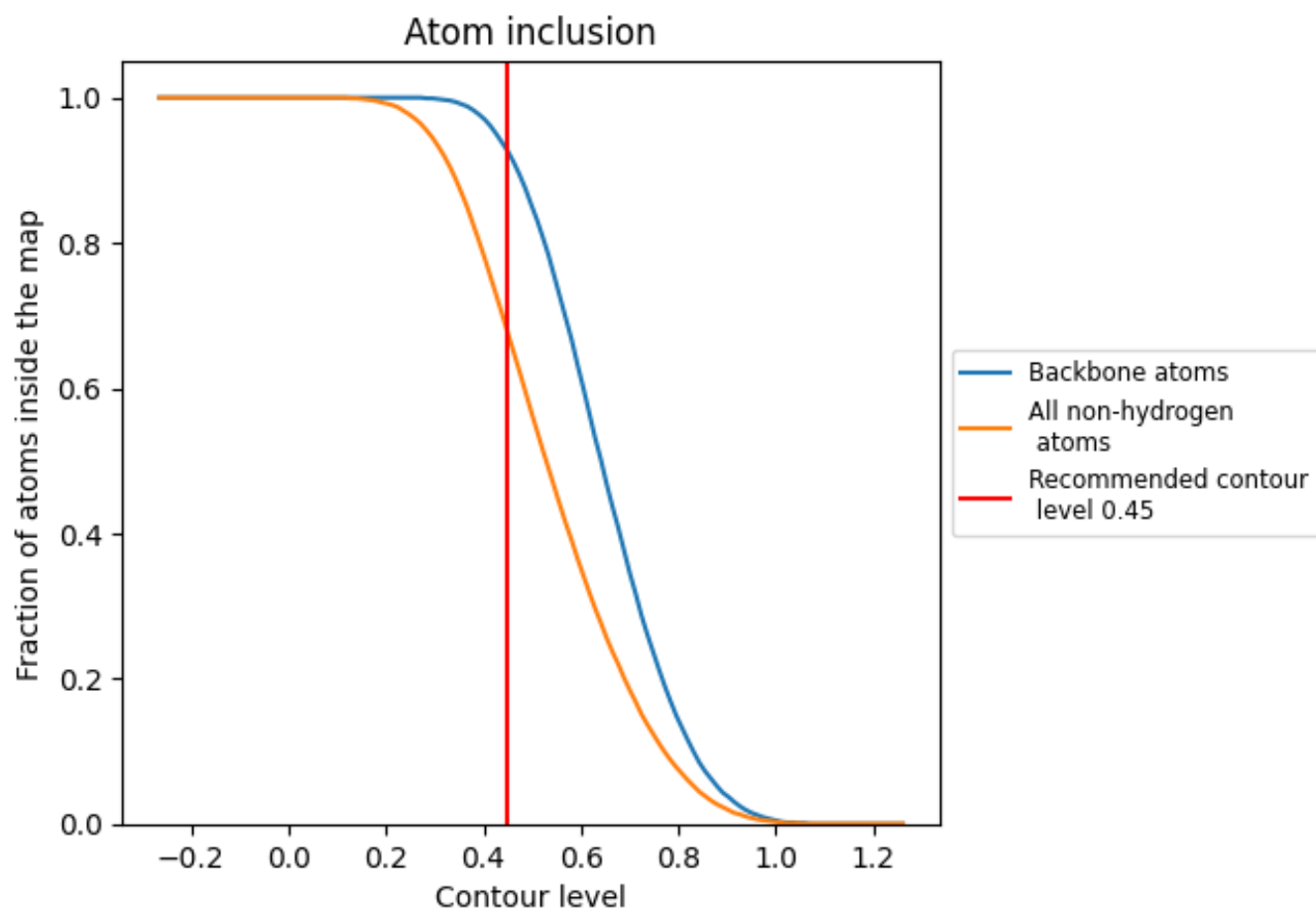
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.45).



































9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 68% 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 (0.45) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6760	 0.2670
2	 0.6790	 0.2610
3	 0.7350	 0.2910
4	 0.6630	 0.2440
5	 0.7140	 0.2920
6	 0.6790	 0.2490
7	 0.6590	 0.2580
A	 0.7130	 0.2750
B	 0.7520	 0.3310
C	 0.7550	 0.2980
D	 0.7450	 0.3110
E	 0.7050	 0.2900
F	 0.6880	 0.2980
G	 0.5560	 0.2050
H	 0.6160	 0.2210
I	 0.4560	 0.2750
N	 0.2230	 0.2120

