



wwPDB EM Validation Summary Report ⓘ

Mar 7, 2026 – 02:43 AM UTC

PDB ID : 8B9D / pdb_00008b9d
EMDB ID : EMD-15341
Title : Human replisome bound by Pol Alpha
Authors : Jones, M.L.; Yeeles, J.T.P.
Deposited on : 2022-10-05
Resolution : 3.40 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ 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:

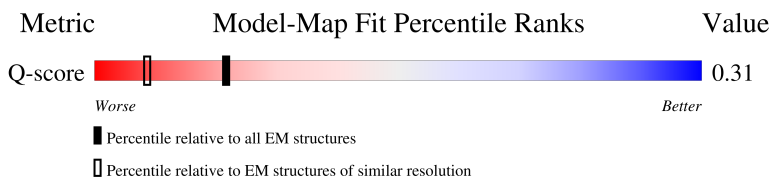
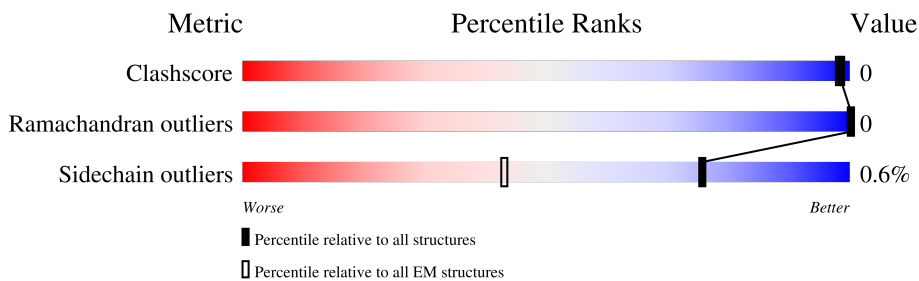
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data 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) : 2.49

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 3.40 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	14717 (2.90 - 3.90)

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	904	63% 36%
2	3	808	70% 30%
3	4	863	78% 22%
4	5	734	81% 19%

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Mol	Chain	Length	Quality of chain
5	6	821	74% 26%
6	7	719	79% 20%
7	A	598	19% 75% 25%
8	C	569	92% 6%
9	D	196	99%
10	E	185	95% 5%
11	F	216	86% 13%
12	G	261	77% 22%
13	K	1209	52% 47%
14	L	301	28% 71%
15	M	84	38% 62%
16	N	86	24% 76%
17	P	509	44% 53%
18	Q	1371	96%
19	O	462	27% 78% 21%
20	H	1160	7% 34% 66%
20	I	1160	34% 66%
20	J	1160	8% 34% 66%
21	B	1504	12% 88%

2 Entry composition [i](#)

There are 24 unique types of molecules in this entry. The entry contains 131961 atoms, of which 65802 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	H	N	O	S		
1	2	576	9110	2856	4570	815	846	23	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	3	569	8989	2798	4518	794	853	26	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	4	677	10859	3399	5470	948	1014	28	0	0

- Molecule 4 is a protein called DNA replication licensing factor MCM5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
4	5	597	9412	2928	4738	831	880	35	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
5	6	607	9706	3039	4870	859	912	26	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
6	7	576	9209	2874	4637	811	856	31	0	0

- Molecule 7 is a protein called DNA polymerase alpha subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
7	A	448	6958	2227	3465	572	679	15	0	0

- Molecule 8 is a protein called Cell division control protein 45 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
8	C	533	8621	2758	4285	741	806	31	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	135A	ASP	-	linker	UNP O75419
C	135B	TYR	-	linker	UNP O75419
C	135C	LYS	-	linker	UNP O75419
C	135D	ASP	-	linker	UNP O75419
C	135E	ASP	-	linker	UNP O75419
C	135F	ASP	-	linker	UNP O75419

- Molecule 9 is a protein called DNA replication complex GINS protein PSF1.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
9	D	195	3207	1013	1601	289	292	12	0	0

- Molecule 10 is a protein called DNA replication complex GINS protein PSF2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
10	E	176	2887	916	1456	242	264	9	0	0

- Molecule 11 is a protein called DNA replication complex GINS protein PSF3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
11	F	187	2953	945	1458	261	283	6	0	0

- Molecule 12 is a protein called DNA replication complex GINS protein SLD5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
12	G	203	3380	1065	1701	290	314	10	0	0

There are 38 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	-37	TRP	-	expression tag	UNP Q9BRT9
G	-36	SER	-	expression tag	UNP Q9BRT9
G	-35	HIS	-	expression tag	UNP Q9BRT9
G	-34	PRO	-	expression tag	UNP Q9BRT9
G	-33	GLN	-	expression tag	UNP Q9BRT9
G	-32	PHE	-	expression tag	UNP Q9BRT9
G	-31	GLU	-	expression tag	UNP Q9BRT9
G	-30	LYS	-	expression tag	UNP Q9BRT9
G	-29	GLY	-	expression tag	UNP Q9BRT9
G	-28	GLY	-	expression tag	UNP Q9BRT9
G	-27	GLY	-	expression tag	UNP Q9BRT9
G	-26	SER	-	expression tag	UNP Q9BRT9
G	-25	GLY	-	expression tag	UNP Q9BRT9
G	-24	GLY	-	expression tag	UNP Q9BRT9
G	-23	GLY	-	expression tag	UNP Q9BRT9
G	-22	SER	-	expression tag	UNP Q9BRT9
G	-21	GLY	-	expression tag	UNP Q9BRT9
G	-20	GLY	-	expression tag	UNP Q9BRT9
G	-19	SER	-	expression tag	UNP Q9BRT9
G	-18	ALA	-	expression tag	UNP Q9BRT9
G	-17	TRP	-	expression tag	UNP Q9BRT9
G	-16	SER	-	expression tag	UNP Q9BRT9
G	-15	HIS	-	expression tag	UNP Q9BRT9
G	-14	PRO	-	expression tag	UNP Q9BRT9
G	-13	GLN	-	expression tag	UNP Q9BRT9
G	-12	PHE	-	expression tag	UNP Q9BRT9
G	-11	GLU	-	expression tag	UNP Q9BRT9
G	-10	LYS	-	expression tag	UNP Q9BRT9
G	-9	SER	-	expression tag	UNP Q9BRT9
G	-8	GLY	-	expression tag	UNP Q9BRT9
G	-7	LEU	-	expression tag	UNP Q9BRT9
G	-6	GLU	-	expression tag	UNP Q9BRT9
G	-5	VAL	-	expression tag	UNP Q9BRT9
G	-4	LEU	-	expression tag	UNP Q9BRT9
G	-3	PHE	-	expression tag	UNP Q9BRT9
G	-2	GLN	-	expression tag	UNP Q9BRT9
G	-1	GLY	-	expression tag	UNP Q9BRT9

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Chain	Residue	Modelled	Actual	Comment	Reference
G	0	PRO	-	expression tag	UNP Q9BRT9

- Molecule 13 is a protein called Protein timeless homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
13	K	638	10470	3332	5241	931	940	26	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	0	GLY	-	expression tag	UNP Q9UNS1

- Molecule 14 is a protein called TIMELESS-interacting protein.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
14	L	87	1501	471	766	140	121	3	0	0

- Molecule 15 is a DNA chain called Leading strand DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
15	M	32	1032	320	370	106	204	32	0	0

- Molecule 16 is a DNA chain called DNA Molecule.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
16	N	21	656	202	237	71	125	21	0	0

- Molecule 17 is a protein called DNA primase large subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
17	P	241	4002	1279	2007	341	371	4	0	0

- Molecule 18 is a protein called Claspin.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
18	Q	59	1052	328	536	102	85	1	0	0

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	1340	LEU	-	expression tag	UNP Q9HAW4
Q	1341	GLU	-	expression tag	UNP Q9HAW4
Q	1342	VAL	-	expression tag	UNP Q9HAW4
Q	1343	LEU	-	expression tag	UNP Q9HAW4
Q	1344	PHE	-	expression tag	UNP Q9HAW4
Q	1345	GLN	-	expression tag	UNP Q9HAW4
Q	1346	GLY	-	expression tag	UNP Q9HAW4
Q	1347	PRO	-	expression tag	UNP Q9HAW4
Q	1348	ASP	-	expression tag	UNP Q9HAW4
Q	1349	TYR	-	expression tag	UNP Q9HAW4
Q	1350	LYS	-	expression tag	UNP Q9HAW4
Q	1351	ASP	-	expression tag	UNP Q9HAW4
Q	1352	ASP	-	expression tag	UNP Q9HAW4
Q	1353	ASP	-	expression tag	UNP Q9HAW4
Q	1354	ASP	-	expression tag	UNP Q9HAW4
Q	1355	LYS	-	expression tag	UNP Q9HAW4
Q	1356	ASP	-	expression tag	UNP Q9HAW4
Q	1357	TYR	-	expression tag	UNP Q9HAW4
Q	1358	LYS	-	expression tag	UNP Q9HAW4
Q	1359	ASP	-	expression tag	UNP Q9HAW4
Q	1360	ASP	-	expression tag	UNP Q9HAW4
Q	1361	ASP	-	expression tag	UNP Q9HAW4
Q	1362	ASP	-	expression tag	UNP Q9HAW4
Q	1363	LYS	-	expression tag	UNP Q9HAW4
Q	1364	ASP	-	expression tag	UNP Q9HAW4
Q	1365	TYR	-	expression tag	UNP Q9HAW4
Q	1366	LYS	-	expression tag	UNP Q9HAW4
Q	1367	ASP	-	expression tag	UNP Q9HAW4
Q	1368	ASP	-	expression tag	UNP Q9HAW4
Q	1369	ASP	-	expression tag	UNP Q9HAW4
Q	1370	ASP	-	expression tag	UNP Q9HAW4
Q	1371	LYS	-	expression tag	UNP Q9HAW4

- Molecule 19 is a protein called DNA primase small subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
19	O	364	6087	1966	3035	530	543	13	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	-41	MET	-	initiating methionine	UNP P49642
O	-40	ALA	-	expression tag	UNP P49642
O	-39	SER	-	expression tag	UNP P49642
O	-38	ALA	-	expression tag	UNP P49642
O	-37	TRP	-	expression tag	UNP P49642
O	-36	SER	-	expression tag	UNP P49642
O	-35	HIS	-	expression tag	UNP P49642
O	-34	PRO	-	expression tag	UNP P49642
O	-33	GLN	-	expression tag	UNP P49642
O	-32	PHE	-	expression tag	UNP P49642
O	-31	GLU	-	expression tag	UNP P49642
O	-30	LYS	-	expression tag	UNP P49642
O	-29	GLY	-	expression tag	UNP P49642
O	-28	GLY	-	expression tag	UNP P49642
O	-27	GLY	-	expression tag	UNP P49642
O	-26	SER	-	expression tag	UNP P49642
O	-25	GLY	-	expression tag	UNP P49642
O	-24	GLY	-	expression tag	UNP P49642
O	-23	GLY	-	expression tag	UNP P49642
O	-22	SER	-	expression tag	UNP P49642
O	-21	GLY	-	expression tag	UNP P49642
O	-20	GLY	-	expression tag	UNP P49642
O	-19	SER	-	expression tag	UNP P49642
O	-18	ALA	-	expression tag	UNP P49642
O	-17	TRP	-	expression tag	UNP P49642
O	-16	SER	-	expression tag	UNP P49642
O	-15	HIS	-	expression tag	UNP P49642
O	-14	PRO	-	expression tag	UNP P49642
O	-13	GLN	-	expression tag	UNP P49642
O	-12	PHE	-	expression tag	UNP P49642
O	-11	GLU	-	expression tag	UNP P49642
O	-10	LYS	-	expression tag	UNP P49642
O	-9	SER	-	expression tag	UNP P49642
O	-8	GLY	-	expression tag	UNP P49642
O	-7	LEU	-	expression tag	UNP P49642
O	-6	GLU	-	expression tag	UNP P49642
O	-5	VAL	-	expression tag	UNP P49642

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Chain	Residue	Modelled	Actual	Comment	Reference
O	-4	LEU	-	expression tag	UNP P49642
O	-3	PHE	-	expression tag	UNP P49642
O	-2	GLN	-	expression tag	UNP P49642
O	-1	GLY	-	expression tag	UNP P49642
O	0	PRO	-	expression tag	UNP P49642

- Molecule 20 is a protein called WD repeat and HMG-box DNA-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
20	H	399	6286	2007	3124	550	584	21	0	0
20	J	399	6286	2007	3124	550	584	21	0	0
20	I	399	6286	2007	3124	550	584	21	0	0

There are 93 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	-30	ASP	-	expression tag	UNP O75717
H	-29	TYR	-	expression tag	UNP O75717
H	-28	LYS	-	expression tag	UNP O75717
H	-27	ASP	-	expression tag	UNP O75717
H	-26	ASP	-	expression tag	UNP O75717
H	-25	ASP	-	expression tag	UNP O75717
H	-24	ASP	-	expression tag	UNP O75717
H	-23	LYS	-	expression tag	UNP O75717
H	-22	ASP	-	expression tag	UNP O75717
H	-21	TYR	-	expression tag	UNP O75717
H	-20	LYS	-	expression tag	UNP O75717
H	-19	ASP	-	expression tag	UNP O75717
H	-18	ASP	-	expression tag	UNP O75717
H	-17	ASP	-	expression tag	UNP O75717
H	-16	ASP	-	expression tag	UNP O75717
H	-15	LYS	-	expression tag	UNP O75717
H	-14	ASP	-	expression tag	UNP O75717
H	-13	TYR	-	expression tag	UNP O75717
H	-12	LYS	-	expression tag	UNP O75717
H	-11	ASP	-	expression tag	UNP O75717
H	-10	ASP	-	expression tag	UNP O75717
H	-9	ASP	-	expression tag	UNP O75717
H	-8	ASP	-	expression tag	UNP O75717

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Chain	Residue	Modelled	Actual	Comment	Reference
H	-7	LYS	-	expression tag	UNP O75717
H	-6	GLU	-	expression tag	UNP O75717
H	-5	ASN	-	expression tag	UNP O75717
H	-4	LEU	-	expression tag	UNP O75717
H	-3	TYR	-	expression tag	UNP O75717
H	-2	PHE	-	expression tag	UNP O75717
H	-1	GLN	-	expression tag	UNP O75717
H	0	GLY	-	expression tag	UNP O75717
J	-30	ASP	-	expression tag	UNP O75717
J	-29	TYR	-	expression tag	UNP O75717
J	-28	LYS	-	expression tag	UNP O75717
J	-27	ASP	-	expression tag	UNP O75717
J	-26	ASP	-	expression tag	UNP O75717
J	-25	ASP	-	expression tag	UNP O75717
J	-24	ASP	-	expression tag	UNP O75717
J	-23	LYS	-	expression tag	UNP O75717
J	-22	ASP	-	expression tag	UNP O75717
J	-21	TYR	-	expression tag	UNP O75717
J	-20	LYS	-	expression tag	UNP O75717
J	-19	ASP	-	expression tag	UNP O75717
J	-18	ASP	-	expression tag	UNP O75717
J	-17	ASP	-	expression tag	UNP O75717
J	-16	ASP	-	expression tag	UNP O75717
J	-15	LYS	-	expression tag	UNP O75717
J	-14	ASP	-	expression tag	UNP O75717
J	-13	TYR	-	expression tag	UNP O75717
J	-12	LYS	-	expression tag	UNP O75717
J	-11	ASP	-	expression tag	UNP O75717
J	-10	ASP	-	expression tag	UNP O75717
J	-9	ASP	-	expression tag	UNP O75717
J	-8	ASP	-	expression tag	UNP O75717
J	-7	LYS	-	expression tag	UNP O75717
J	-6	GLU	-	expression tag	UNP O75717
J	-5	ASN	-	expression tag	UNP O75717
J	-4	LEU	-	expression tag	UNP O75717
J	-3	TYR	-	expression tag	UNP O75717
J	-2	PHE	-	expression tag	UNP O75717
J	-1	GLN	-	expression tag	UNP O75717
J	0	GLY	-	expression tag	UNP O75717
I	-30	ASP	-	expression tag	UNP O75717
I	-29	TYR	-	expression tag	UNP O75717
I	-28	LYS	-	expression tag	UNP O75717

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Chain	Residue	Modelled	Actual	Comment	Reference
I	-27	ASP	-	expression tag	UNP O75717
I	-26	ASP	-	expression tag	UNP O75717
I	-25	ASP	-	expression tag	UNP O75717
I	-24	ASP	-	expression tag	UNP O75717
I	-23	LYS	-	expression tag	UNP O75717
I	-22	ASP	-	expression tag	UNP O75717
I	-21	TYR	-	expression tag	UNP O75717
I	-20	LYS	-	expression tag	UNP O75717
I	-19	ASP	-	expression tag	UNP O75717
I	-18	ASP	-	expression tag	UNP O75717
I	-17	ASP	-	expression tag	UNP O75717
I	-16	ASP	-	expression tag	UNP O75717
I	-15	LYS	-	expression tag	UNP O75717
I	-14	ASP	-	expression tag	UNP O75717
I	-13	TYR	-	expression tag	UNP O75717
I	-12	LYS	-	expression tag	UNP O75717
I	-11	ASP	-	expression tag	UNP O75717
I	-10	ASP	-	expression tag	UNP O75717
I	-9	ASP	-	expression tag	UNP O75717
I	-8	ASP	-	expression tag	UNP O75717
I	-7	LYS	-	expression tag	UNP O75717
I	-6	GLU	-	expression tag	UNP O75717
I	-5	ASN	-	expression tag	UNP O75717
I	-4	LEU	-	expression tag	UNP O75717
I	-3	TYR	-	expression tag	UNP O75717
I	-2	PHE	-	expression tag	UNP O75717
I	-1	GLN	-	expression tag	UNP O75717
I	0	GLY	-	expression tag	UNP O75717

- Molecule 21 is a protein called DNA polymerase alpha catalytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
21	B	178	2873	917	1430	243	268	15	0	0

There are 42 discrepancies between the modelled and reference sequences:

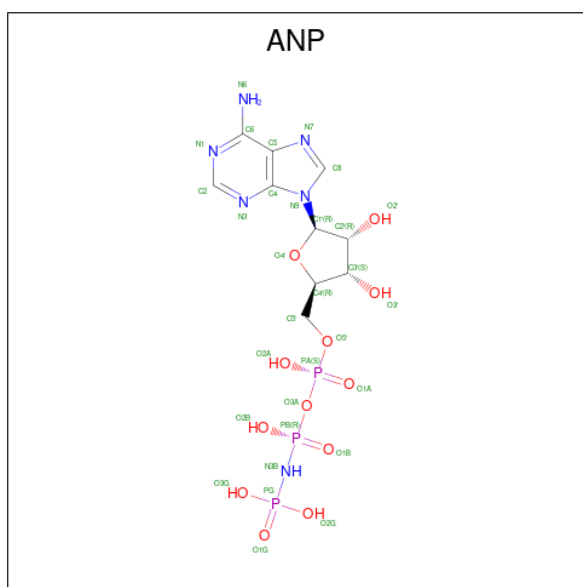
Chain	Residue	Modelled	Actual	Comment	Reference
B	-41	MET	-	initiating methionine	UNP P09884
B	-40	ALA	-	expression tag	UNP P09884
B	-39	SER	-	expression tag	UNP P09884
B	-38	ALA	-	expression tag	UNP P09884

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-37	TRP	-	expression tag	UNP P09884
B	-36	SER	-	expression tag	UNP P09884
B	-35	HIS	-	expression tag	UNP P09884
B	-34	PRO	-	expression tag	UNP P09884
B	-33	GLN	-	expression tag	UNP P09884
B	-32	PHE	-	expression tag	UNP P09884
B	-31	GLU	-	expression tag	UNP P09884
B	-30	LYS	-	expression tag	UNP P09884
B	-29	GLY	-	expression tag	UNP P09884
B	-28	GLY	-	expression tag	UNP P09884
B	-27	GLY	-	expression tag	UNP P09884
B	-26	SER	-	expression tag	UNP P09884
B	-25	GLY	-	expression tag	UNP P09884
B	-24	GLY	-	expression tag	UNP P09884
B	-23	GLY	-	expression tag	UNP P09884
B	-22	SER	-	expression tag	UNP P09884
B	-21	GLY	-	expression tag	UNP P09884
B	-20	GLY	-	expression tag	UNP P09884
B	-19	SER	-	expression tag	UNP P09884
B	-18	ALA	-	expression tag	UNP P09884
B	-17	TRP	-	expression tag	UNP P09884
B	-16	SER	-	expression tag	UNP P09884
B	-15	HIS	-	expression tag	UNP P09884
B	-14	PRO	-	expression tag	UNP P09884
B	-13	GLN	-	expression tag	UNP P09884
B	-12	PHE	-	expression tag	UNP P09884
B	-11	GLU	-	expression tag	UNP P09884
B	-10	LYS	-	expression tag	UNP P09884
B	-9	SER	-	expression tag	UNP P09884
B	-8	GLY	-	expression tag	UNP P09884
B	-7	LEU	-	expression tag	UNP P09884
B	-6	GLU	-	expression tag	UNP P09884
B	-5	VAL	-	expression tag	UNP P09884
B	-4	LEU	-	expression tag	UNP P09884
B	-3	PHE	-	expression tag	UNP P09884
B	-2	GLN	-	expression tag	UNP P09884
B	-1	GLY	-	expression tag	UNP P09884
B	0	PRO	-	expression tag	UNP P09884

- Molecule 22 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: C₁₀H₁₇N₆O₁₂P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf	
			Total	C	H	N	O		P
22	2	1	Total	C	H	N	O	P	0
			44	10	13	6	12	3	
22	3	1	Total	C	H	N	O	P	0
			44	10	13	6	12	3	
22	5	1	Total	C	H	N	O	P	0
			44	10	13	6	12	3	

- Molecule 23 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
23	2	1	Total	Mg	0
			1	1	
23	3	1	Total	Mg	0
			1	1	
23	5	1	Total	Mg	0
			1	1	

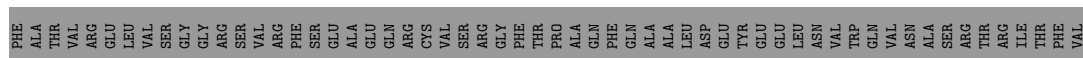
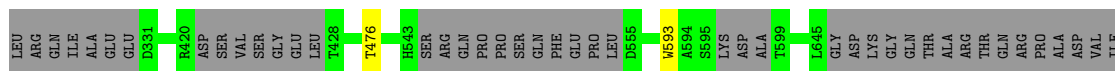
- Molecule 24 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
24	4	1	Total	Zn	0
			1	1	
24	5	1	Total	Zn	0
			1	1	

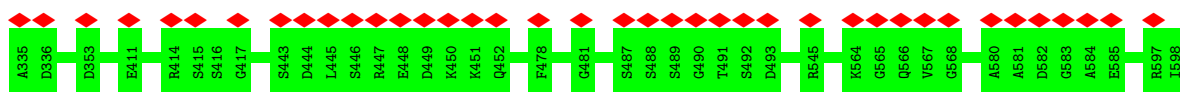
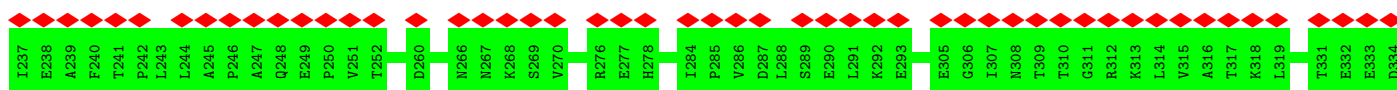
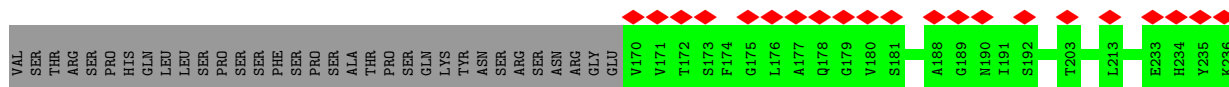
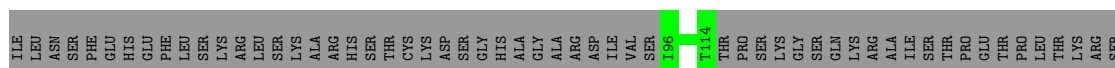
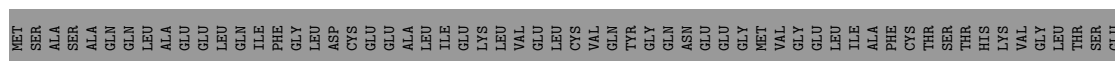
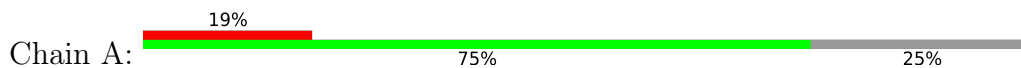
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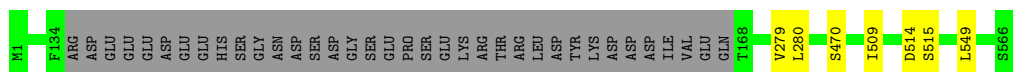
Mol	Chain	Residues	Atoms		AltConf
24	6	1	Total 1	Zn 1	0
24	7	1	Total 1	Zn 1	0



• Molecule 7: DNA polymerase alpha subunit B



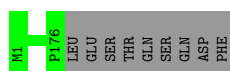
• Molecule 8: Cell division control protein 45 homolog



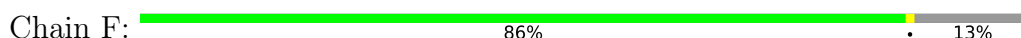
• Molecule 9: DNA replication complex GINS protein PSF1

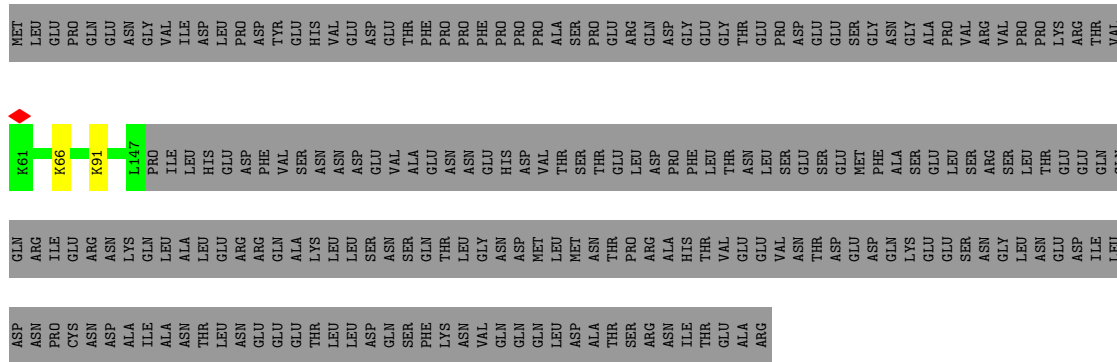


• Molecule 10: DNA replication complex GINS protein PSF2

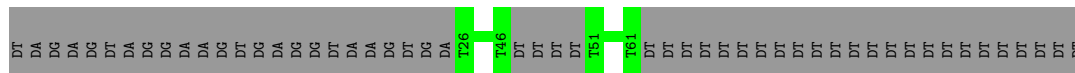


• Molecule 11: DNA replication complex GINS protein PSF3

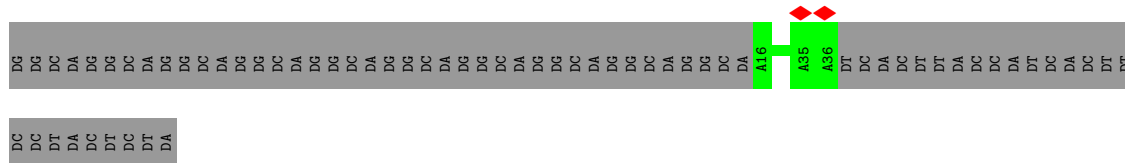




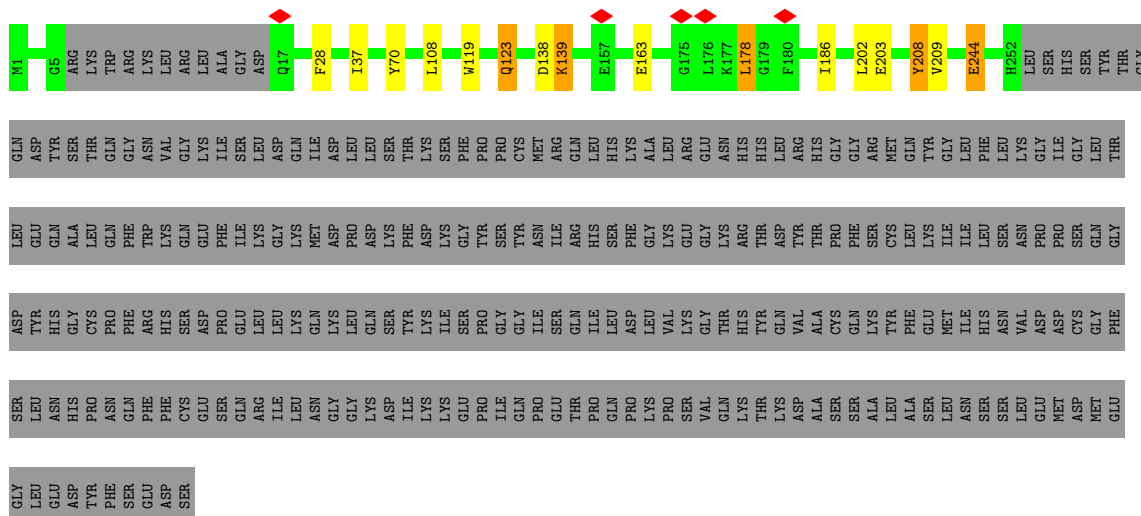
• Molecule 15: Leading strand DNA



• Molecule 16: DNA Molecule



• Molecule 17: DNA primase large subunit



• Molecule 18: Claspin

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	174696	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 ($e^-/\text{\AA}^2$)	37.8	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	4.092	Depositor
Minimum map value	-2.479	Depositor
Average map value	0.007	Depositor
Map value standard deviation	0.072	Depositor
Recommended contour level	0.137	Depositor
Map size (Å)	395.616, 395.616, 395.616	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.2363, 1.2363, 1.2363	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: MG, ANP, ZN

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	0.46	0/4622	0.60	0/6244
2	3	0.45	0/4536	0.60	0/6116
3	4	0.46	0/5477	0.61	1/7397 (0.0%)
4	5	0.48	0/4744	0.62	0/6382
5	6	0.45	0/4911	0.62	0/6621
6	7	0.42	0/4639	0.60	2/6255 (0.0%)
7	A	0.34	0/3569	0.52	0/4850
8	C	0.42	0/4428	0.60	2/5978 (0.0%)
9	D	0.43	0/1638	0.61	0/2202
10	E	0.46	0/1462	0.61	0/1981
11	F	0.41	0/1527	0.63	1/2062 (0.0%)
12	G	0.48	1/1711 (0.1%)	0.61	0/2305
13	K	0.45	0/5331	0.57	0/7181
14	L	0.45	0/750	0.61	0/999
15	M	0.36	0/738	0.66	0/1138
16	N	0.39	0/467	0.60	0/715
17	P	0.42	0/2034	0.70	1/2736 (0.0%)
18	Q	0.38	0/522	0.49	0/686
19	O	0.35	0/3132	0.55	0/4226
20	H	0.34	0/3238	0.60	0/4387
20	I	0.34	0/3238	0.60	1/4387 (0.0%)
20	J	0.35	0/3238	0.58	0/4387
21	B	0.32	0/1475	0.49	0/1987
All	All	0.42	1/67427 (0.0%)	0.60	8/91222 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
6	7	0	1
17	P	0	1
20	J	0	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
12	G	40	ALA	C-N	5.69	1.38	1.33

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	279	VAL	CA-C-N	8.10	136.28	121.70
8	C	279	VAL	C-N-CA	8.10	136.28	121.70
17	P	208	TYR	CA-CB-CG	-6.00	103.10	113.90
6	7	90	GLU	CA-C-N	5.80	131.92	122.81
6	7	90	GLU	C-N-CA	5.80	131.92	122.81

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	7	90	GLU	Mainchain
20	J	530	PRO	Peptide
17	P	208	TYR	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	2	4540	4570	4570	4	0
2	3	4471	4518	4518	2	0
3	4	5389	5470	5470	2	0
4	5	4674	4738	4738	2	0
5	6	4836	4870	4870	0	0
6	7	4572	4637	4637	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	3493	3465	3465	0	0
8	C	4336	4285	4283	2	0
9	D	1606	1601	1601	0	0
10	E	1431	1456	1456	0	0
11	F	1495	1458	1458	0	0
12	G	1679	1701	1700	0	0
13	K	5229	5241	5241	1	0
14	L	735	766	766	0	0
15	M	662	370	372	0	0
16	N	419	237	238	0	0
17	P	1995	2007	2007	5	0
18	Q	516	536	536	0	0
19	O	3052	3035	3035	0	0
20	H	3162	3124	3124	1	0
20	I	3162	3124	3124	3	0
20	J	3162	3124	3124	1	0
21	B	1443	1430	1430	1	0
22	2	31	13	13	0	0
22	3	31	13	13	2	0
22	5	31	13	13	0	0
23	2	1	0	0	0	0
23	3	1	0	0	0	0
23	5	1	0	0	0	0
24	4	1	0	0	0	0
24	5	1	0	0	0	0
24	6	1	0	0	0	0
24	7	1	0	0	0	0
All	All	66159	65802	65802	23	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.

The worst 5 of 23 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)
2:3:348:SER:H	22:3:1000:ANP:HNB1	1.43	0.66
20:H:715:TYR:HH	20:H:730:TRP:CD1	2.16	0.64
20:I:715:TYR:HH	20:I:730:TRP:CG	2.22	0.57
20:J:715:TYR:HH	20:J:730:TRP:CD1	2.22	0.56
6:7:24:ASP:OD1	6:7:30:GLN:N	2.38	0.55

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	568/904 (63%)	553 (97%)	15 (3%)	0	100	100
2	3	559/808 (69%)	541 (97%)	18 (3%)	0	100	100
3	4	667/863 (77%)	652 (98%)	15 (2%)	0	100	100
4	5	587/734 (80%)	571 (97%)	16 (3%)	0	100	100
5	6	597/821 (73%)	581 (97%)	16 (3%)	0	100	100
6	7	562/719 (78%)	549 (98%)	13 (2%)	0	100	100
7	A	444/598 (74%)	436 (98%)	8 (2%)	0	100	100
8	C	529/569 (93%)	516 (98%)	13 (2%)	0	100	100
9	D	193/196 (98%)	191 (99%)	2 (1%)	0	100	100
10	E	174/185 (94%)	171 (98%)	3 (2%)	0	100	100
11	F	183/216 (85%)	179 (98%)	4 (2%)	0	100	100
12	G	201/261 (77%)	198 (98%)	3 (2%)	0	100	100
13	K	632/1209 (52%)	625 (99%)	7 (1%)	0	100	100
14	L	85/301 (28%)	82 (96%)	3 (4%)	0	100	100
17	P	237/509 (47%)	226 (95%)	11 (5%)	0	100	100
18	Q	51/1371 (4%)	51 (100%)	0	0	100	100
19	O	360/462 (78%)	350 (97%)	10 (3%)	0	100	100
20	H	397/1160 (34%)	390 (98%)	7 (2%)	0	100	100
20	I	397/1160 (34%)	388 (98%)	9 (2%)	0	100	100
20	J	397/1160 (34%)	393 (99%)	4 (1%)	0	100	100
21	B	174/1504 (12%)	170 (98%)	4 (2%)	0	100	100
All	All	7994/15710 (51%)	7813 (98%)	181 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	2	499/781 (64%)	496 (99%)	3 (1%)	78	80
2	3	489/707 (69%)	486 (99%)	3 (1%)	78	80
3	4	598/753 (79%)	597 (100%)	1 (0%)	87	85
4	5	509/625 (81%)	506 (99%)	3 (1%)	78	80
5	6	538/724 (74%)	537 (100%)	1 (0%)	87	85
6	7	498/619 (80%)	494 (99%)	4 (1%)	73	77
7	A	396/527 (75%)	396 (100%)	0	100	100
8	C	486/520 (94%)	484 (100%)	2 (0%)	84	83
9	D	173/174 (99%)	173 (100%)	0	100	100
10	E	160/169 (95%)	160 (100%)	0	100	100
11	F	163/186 (88%)	162 (99%)	1 (1%)	78	80
12	G	188/232 (81%)	188 (100%)	0	100	100
13	K	562/1055 (53%)	557 (99%)	5 (1%)	70	76
14	L	78/274 (28%)	76 (97%)	2 (3%)	40	61
17	P	220/459 (48%)	210 (96%)	10 (4%)	24	51
18	Q	54/1230 (4%)	54 (100%)	0	100	100
19	O	339/422 (80%)	337 (99%)	2 (1%)	78	80
20	H	345/1017 (34%)	345 (100%)	0	100	100
20	I	345/1017 (34%)	343 (99%)	2 (1%)	78	80
20	J	345/1017 (34%)	344 (100%)	1 (0%)	86	84
21	B	164/1328 (12%)	161 (98%)	3 (2%)	51	67
All	All	7149/13836 (52%)	7106 (99%)	43 (1%)	76	80

5 of 43 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
17	P	108	LEU
19	O	247	VAL
17	P	123	GLN
17	P	202	LEU
21	B	1352	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 46 such sidechains are listed below:

Mol	Chain	Res	Type
13	K	451	ASN
19	O	203	HIS
13	K	522	ASN
17	P	164	GLN
19	O	315	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 7 are monoatomic - leaving 3 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
22	ANP	5	1001	23	33,33,33	1.01	4 (12%)	45,52,52	0.68	1 (2%)
22	ANP	3	1000	23	33,33,33	0.95	4 (12%)	45,52,52	0.74	1 (2%)
22	ANP	2	1000	23	33,33,33	0.99	3 (9%)	45,52,52	0.59	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
22	ANP	5	1001	23	-	2/18/38/38	0/3/3/3
22	ANP	3	1000	23	-	5/18/38/38	0/3/3/3
22	ANP	2	1000	23	-	2/18/38/38	0/3/3/3

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
22	5	1001	ANP	PB-O3A	-3.56	1.54	1.59
22	2	1000	ANP	PB-O3A	-3.51	1.54	1.59
22	3	1000	ANP	PB-O3A	-3.23	1.55	1.59
22	5	1001	ANP	PG-O1G	2.46	1.49	1.46
22	2	1000	ANP	PB-O1B	2.36	1.49	1.46

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
22	3	1000	ANP	O1G-PG-N3B	-3.03	107.31	111.77
22	5	1001	ANP	O3A-PB-N3B	-2.04	100.94	106.59

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

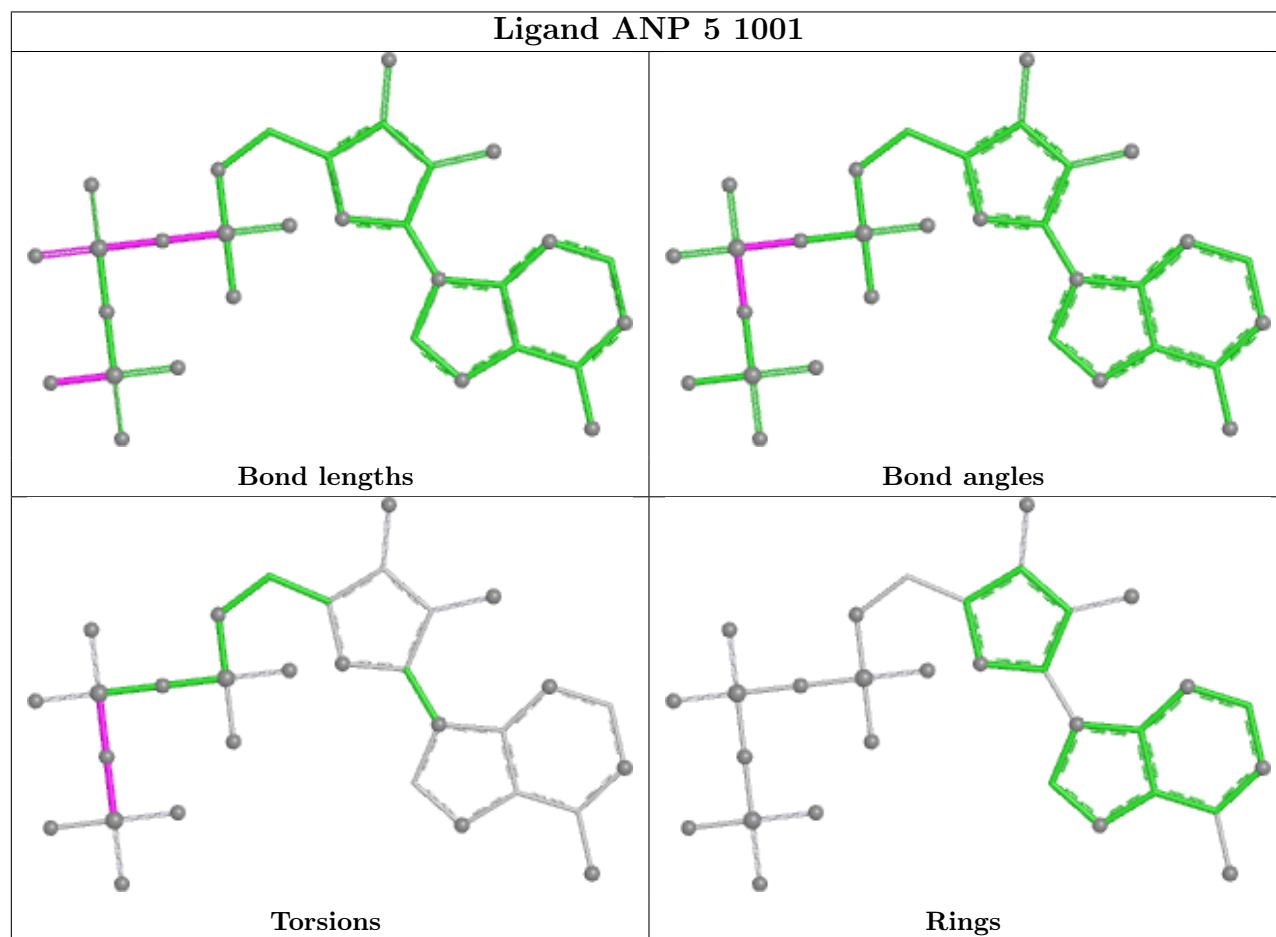
Mol	Chain	Res	Type	Atoms
22	2	1000	ANP	PB-N3B-PG-O1G
22	2	1000	ANP	PG-N3B-PB-O1B
22	3	1000	ANP	PB-N3B-PG-O1G
22	3	1000	ANP	PA-O3A-PB-O1B
22	3	1000	ANP	PA-O3A-PB-O2B

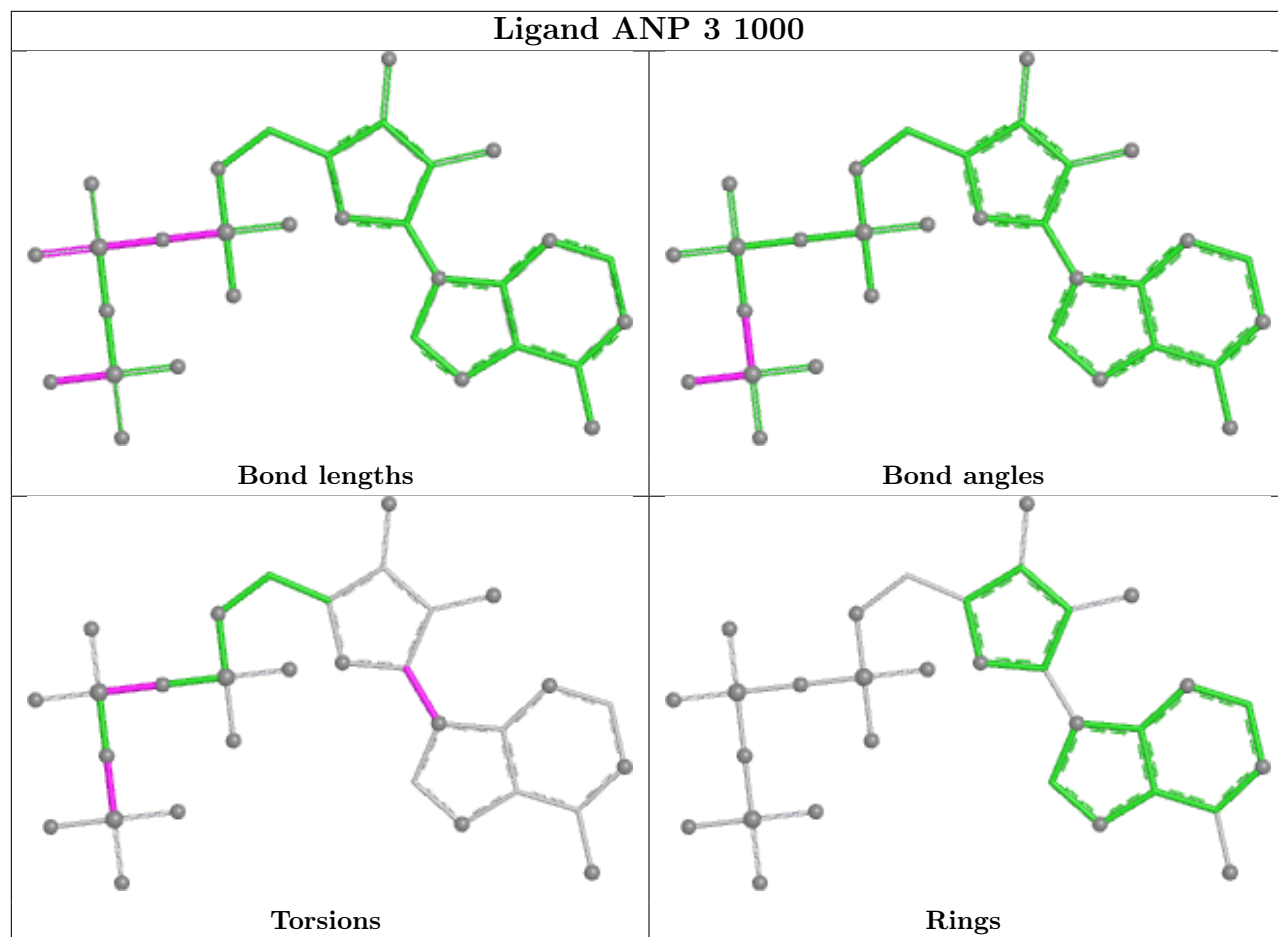
There are no ring outliers.

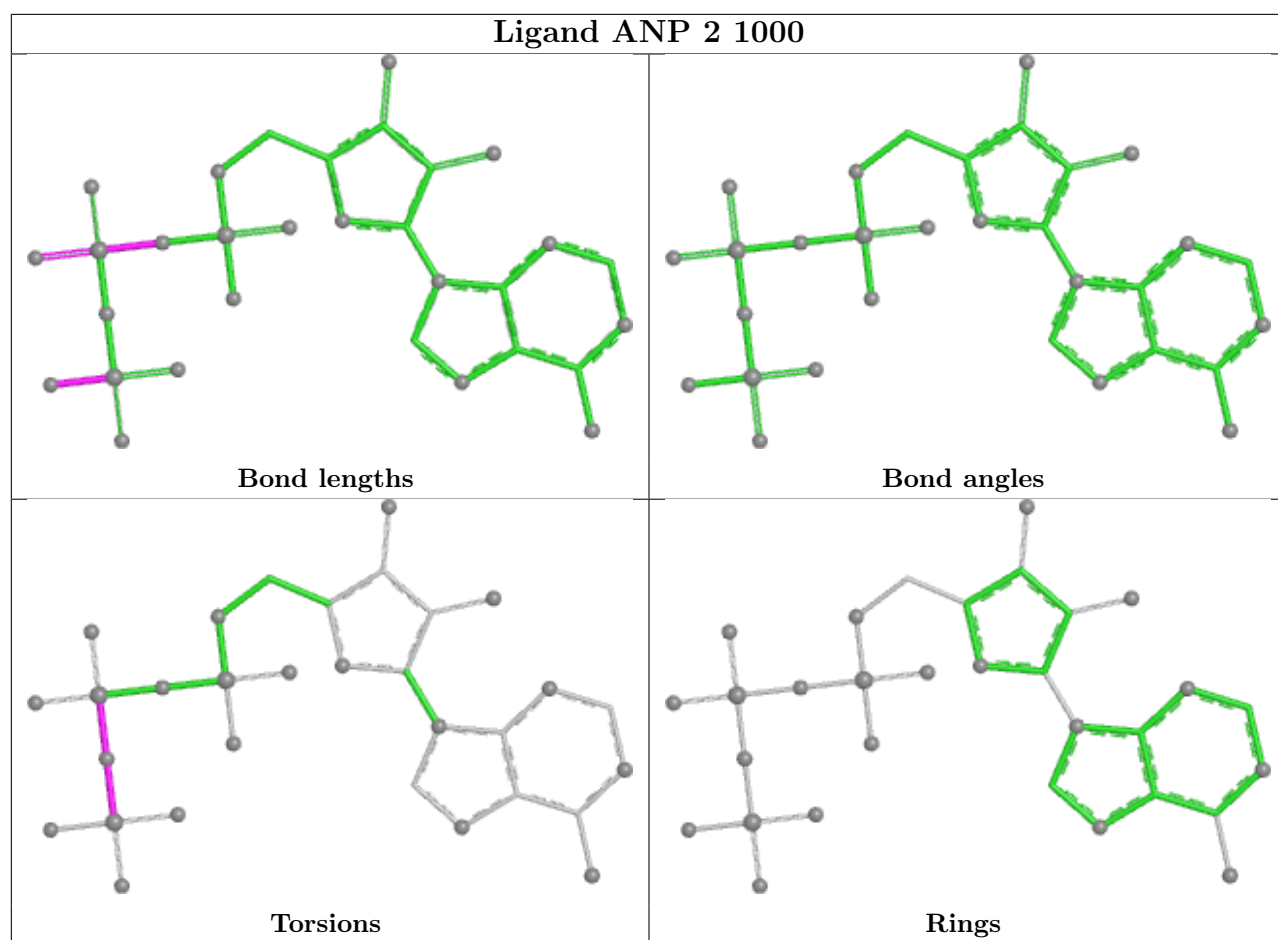
1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
22	3	1000	ANP	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.

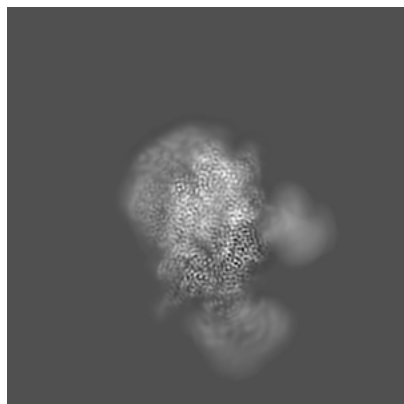
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-15341. These allow visual inspection of the internal detail of the map and identification of artifacts.

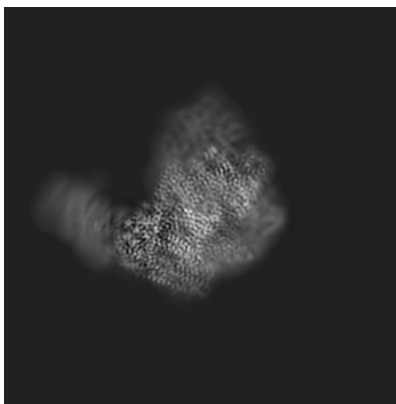
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

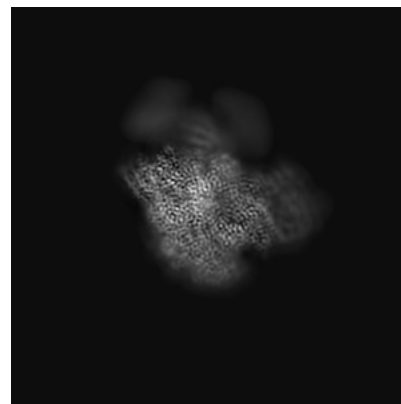
6.1.1 Primary map



X

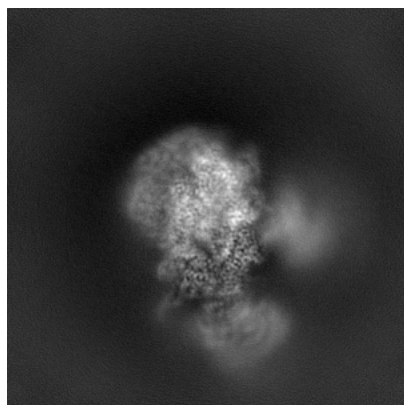


Y

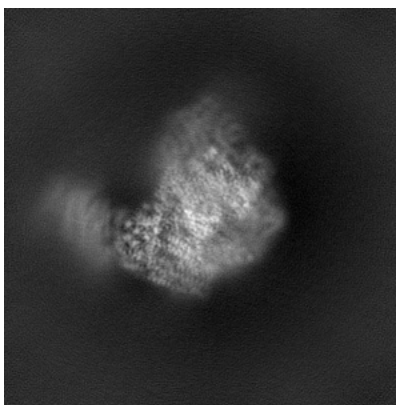


Z

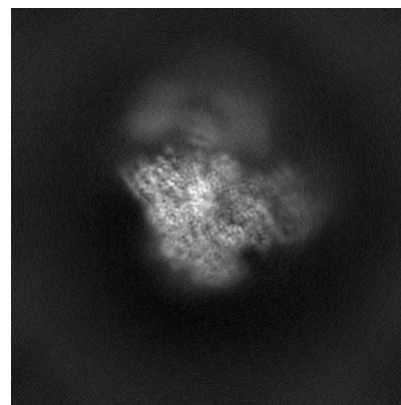
6.1.2 Raw map



X



Y

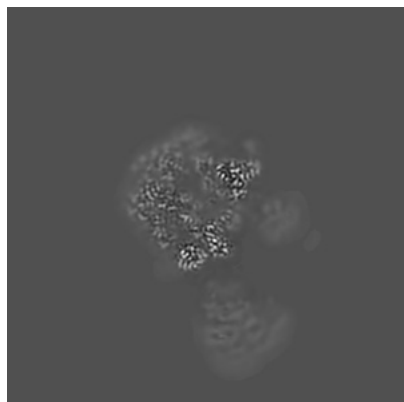


Z

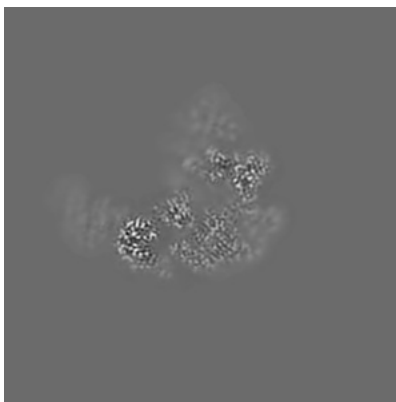
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

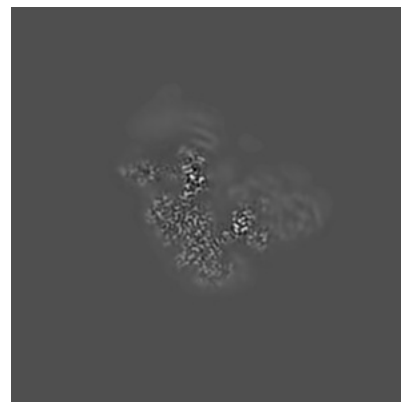
6.2.1 Primary map



X Index: 160

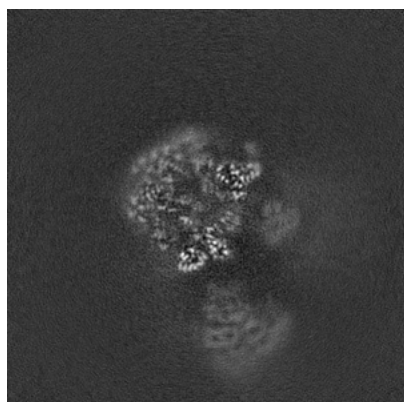


Y Index: 160

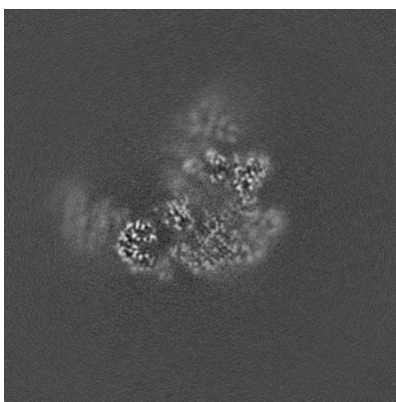


Z Index: 160

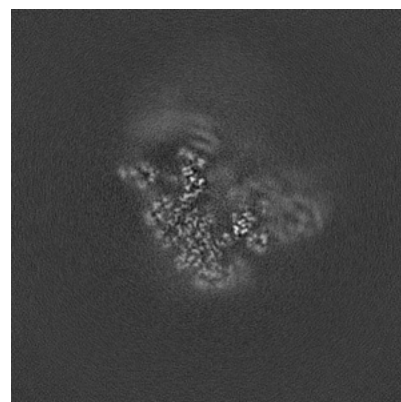
6.2.2 Raw map



X Index: 160



Y Index: 160

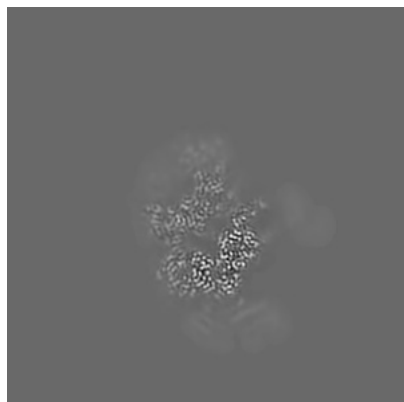


Z Index: 160

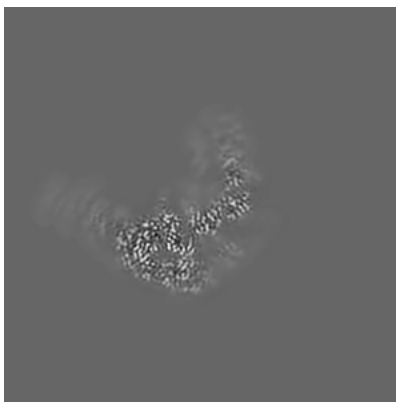
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

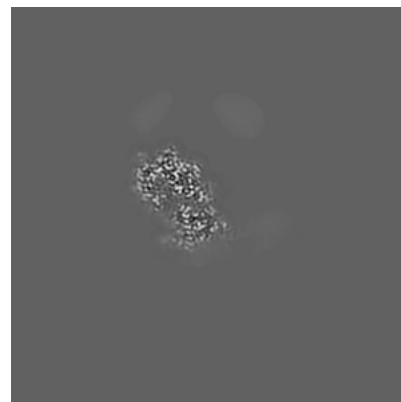
6.3.1 Primary map



X Index: 135

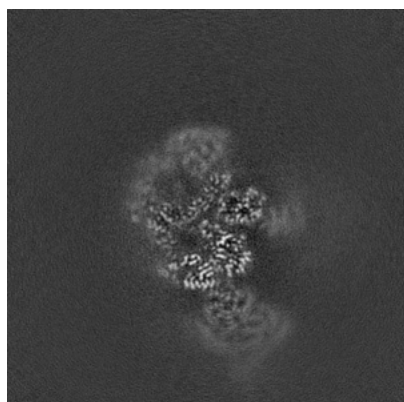


Y Index: 180

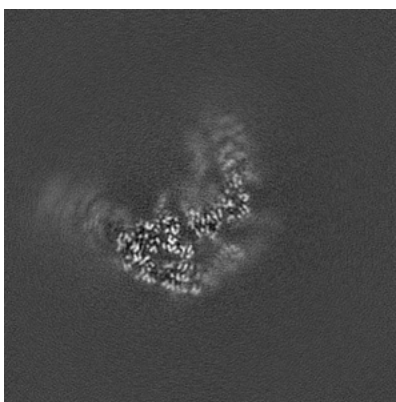


Z Index: 120

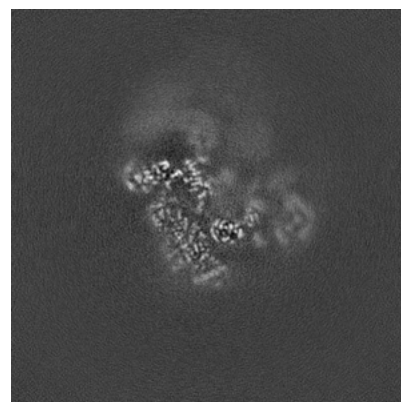
6.3.2 Raw map



X Index: 147



Y Index: 179

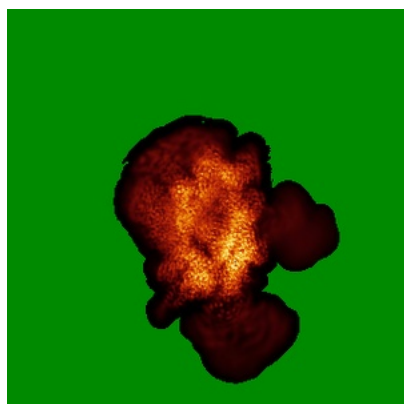


Z Index: 151

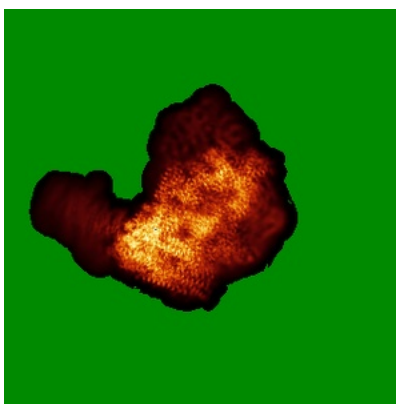
The images above show the largest variance slices of the map in three orthogonal directions.

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

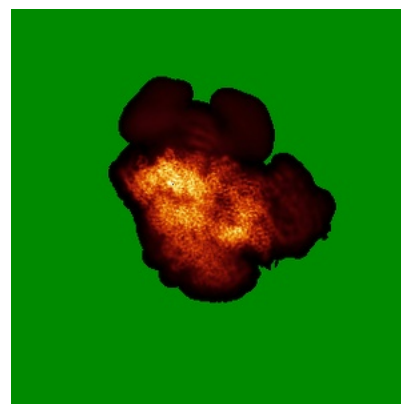
6.4.1 Primary map



X

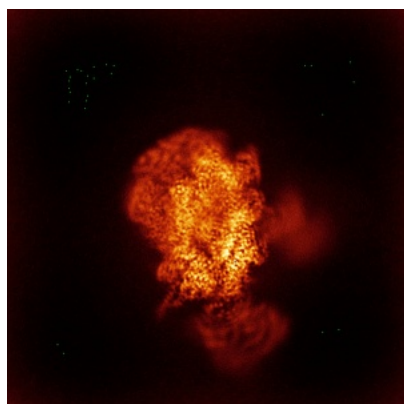


Y

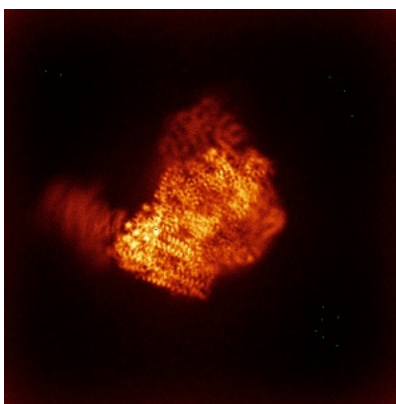


Z

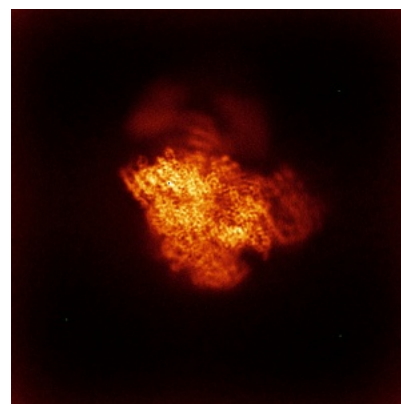
6.4.2 Raw map



X



Y

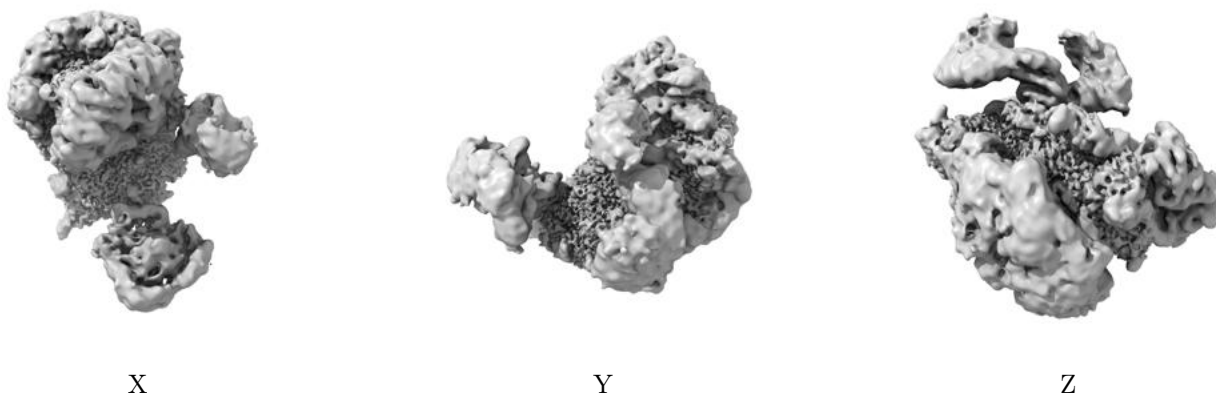


Z

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.

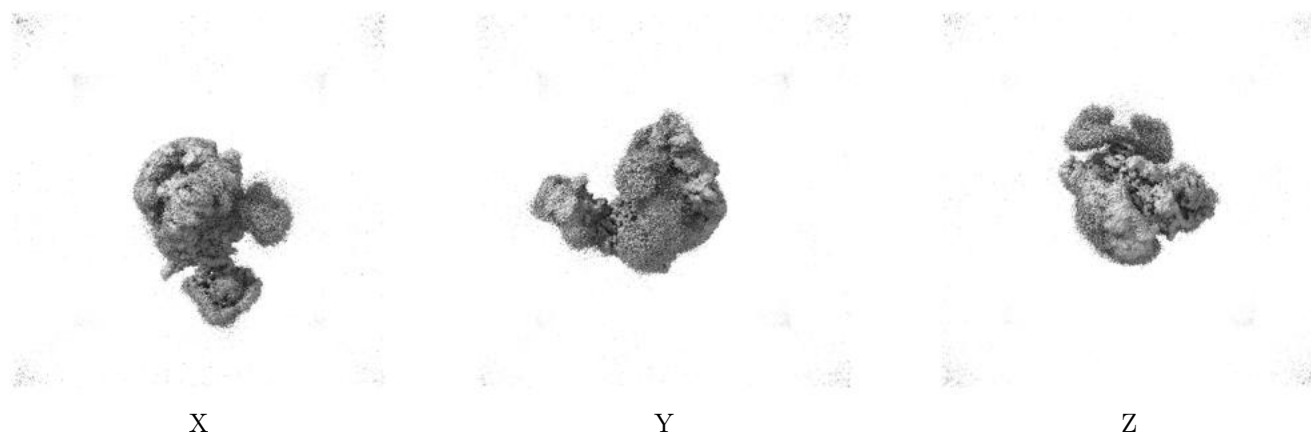
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.137. 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.

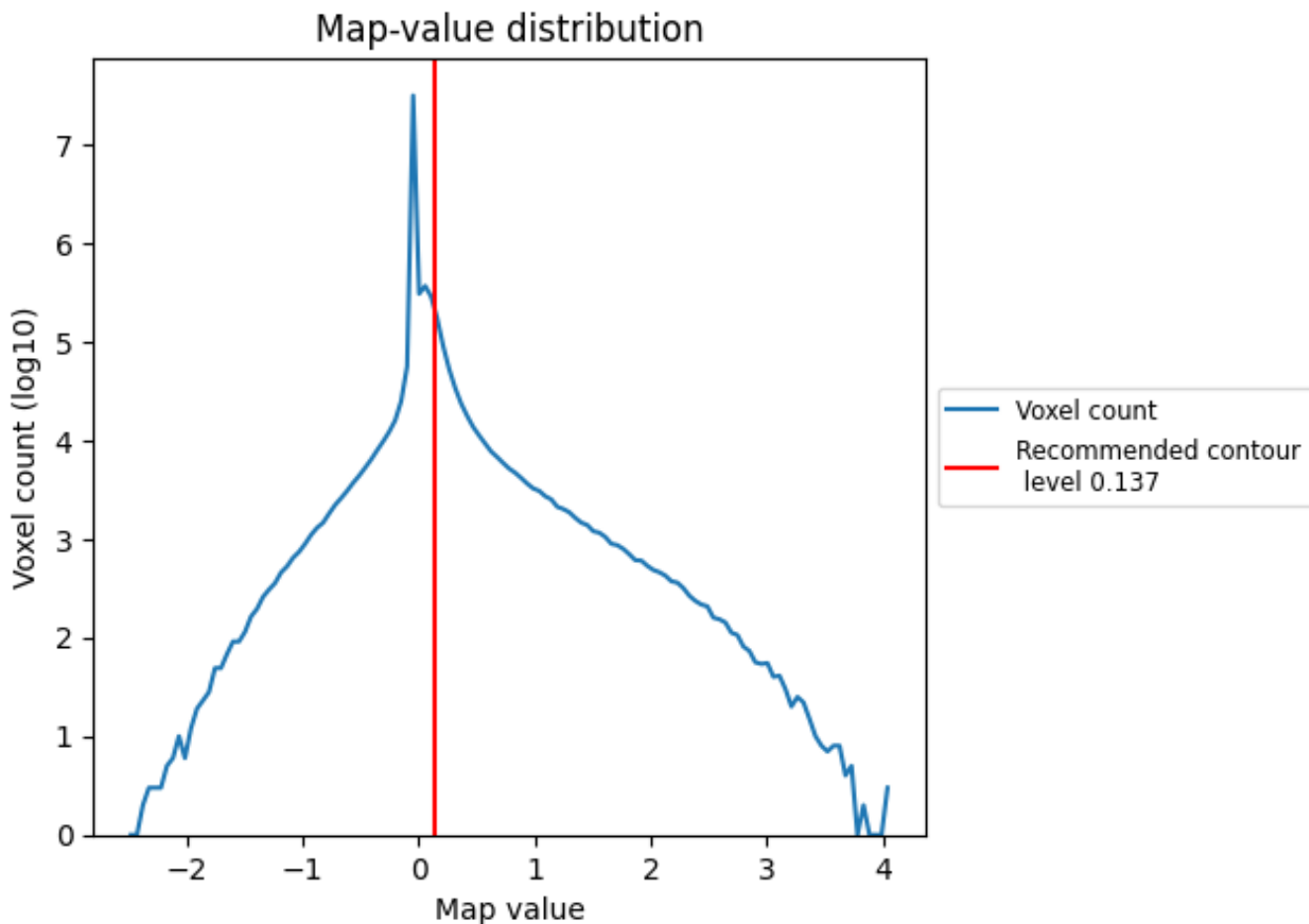
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

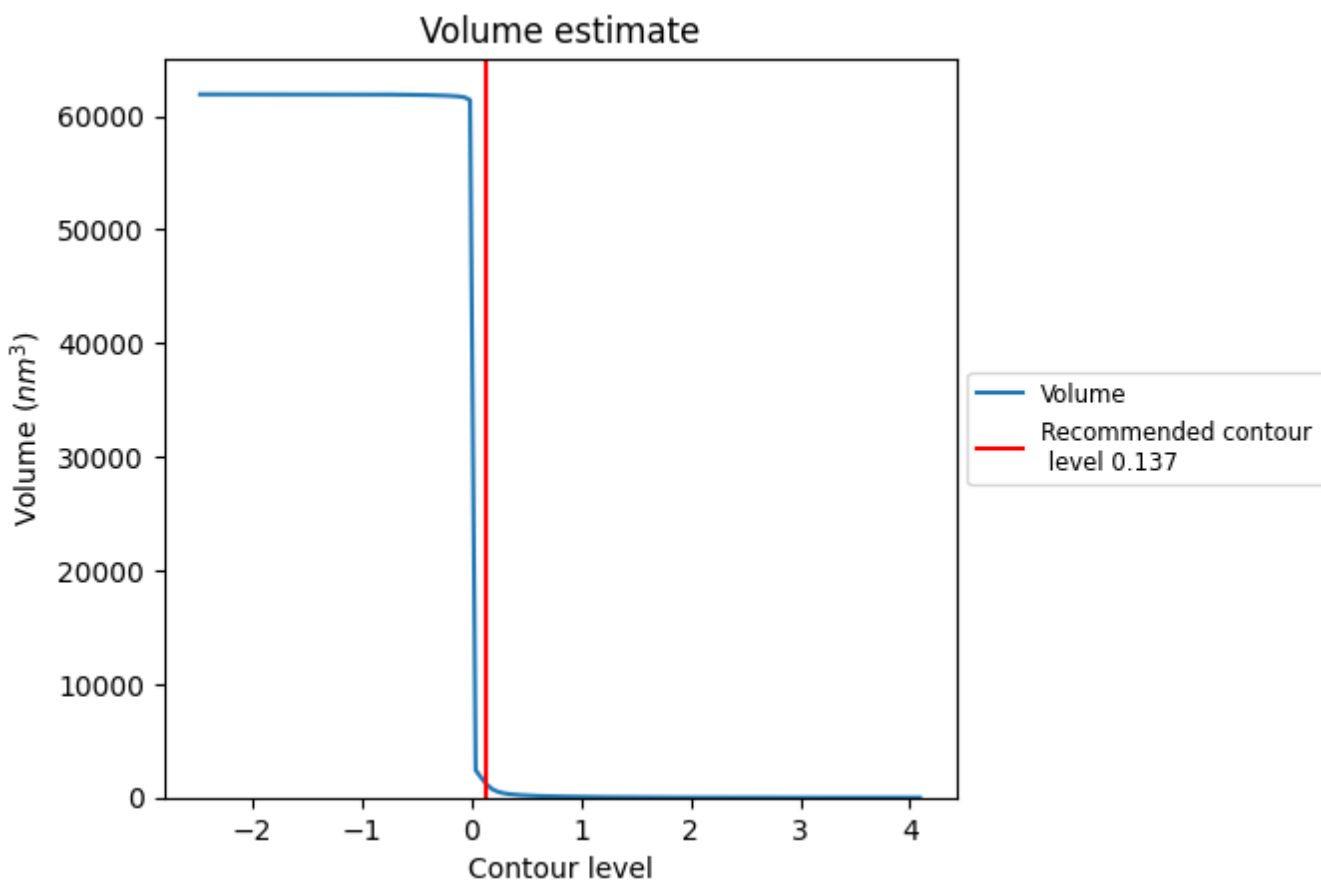
This section contains the results of statistical analysis of the map.

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.

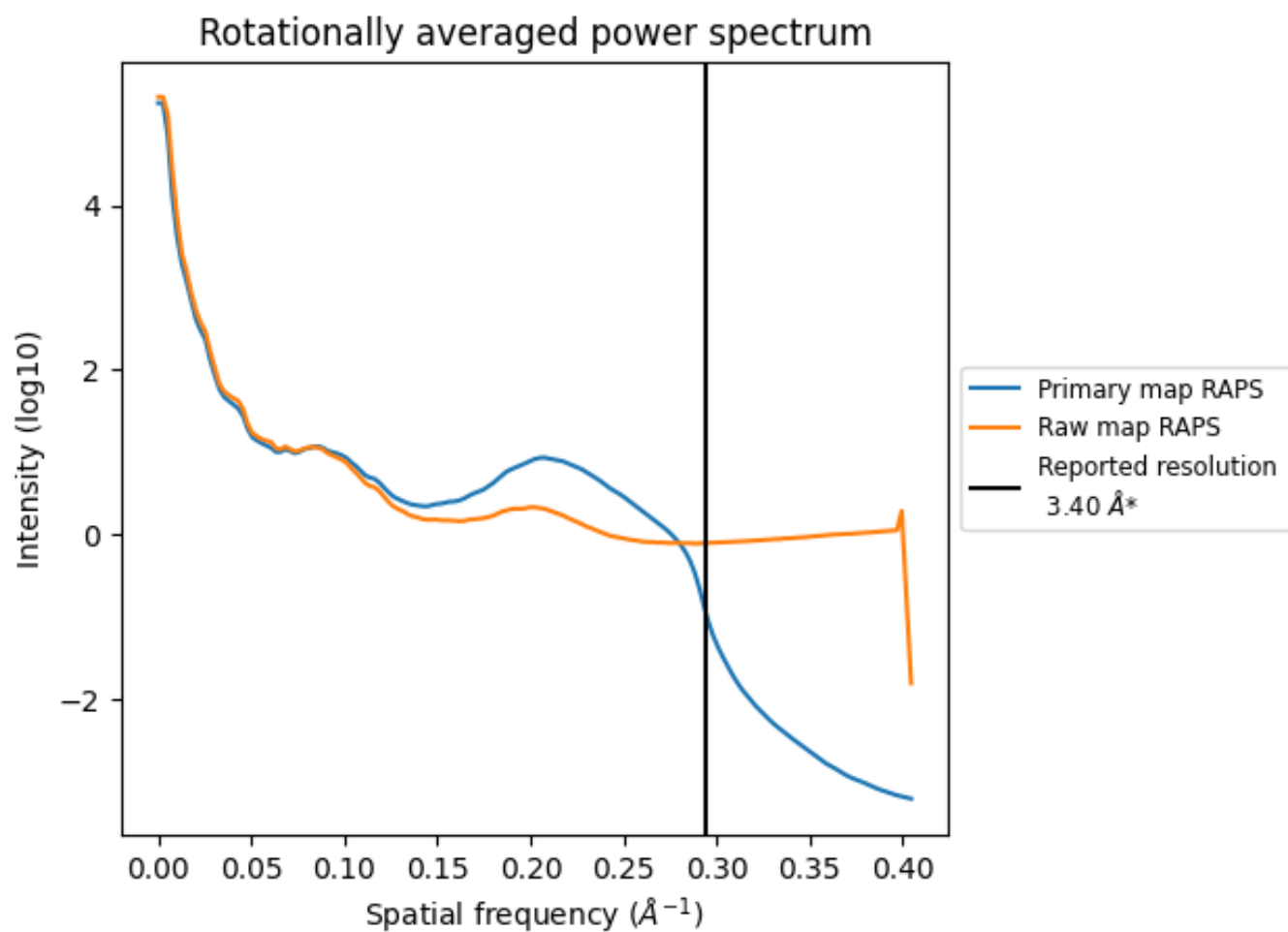
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1147 nm³; this corresponds to an approximate mass of 1036 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](#)

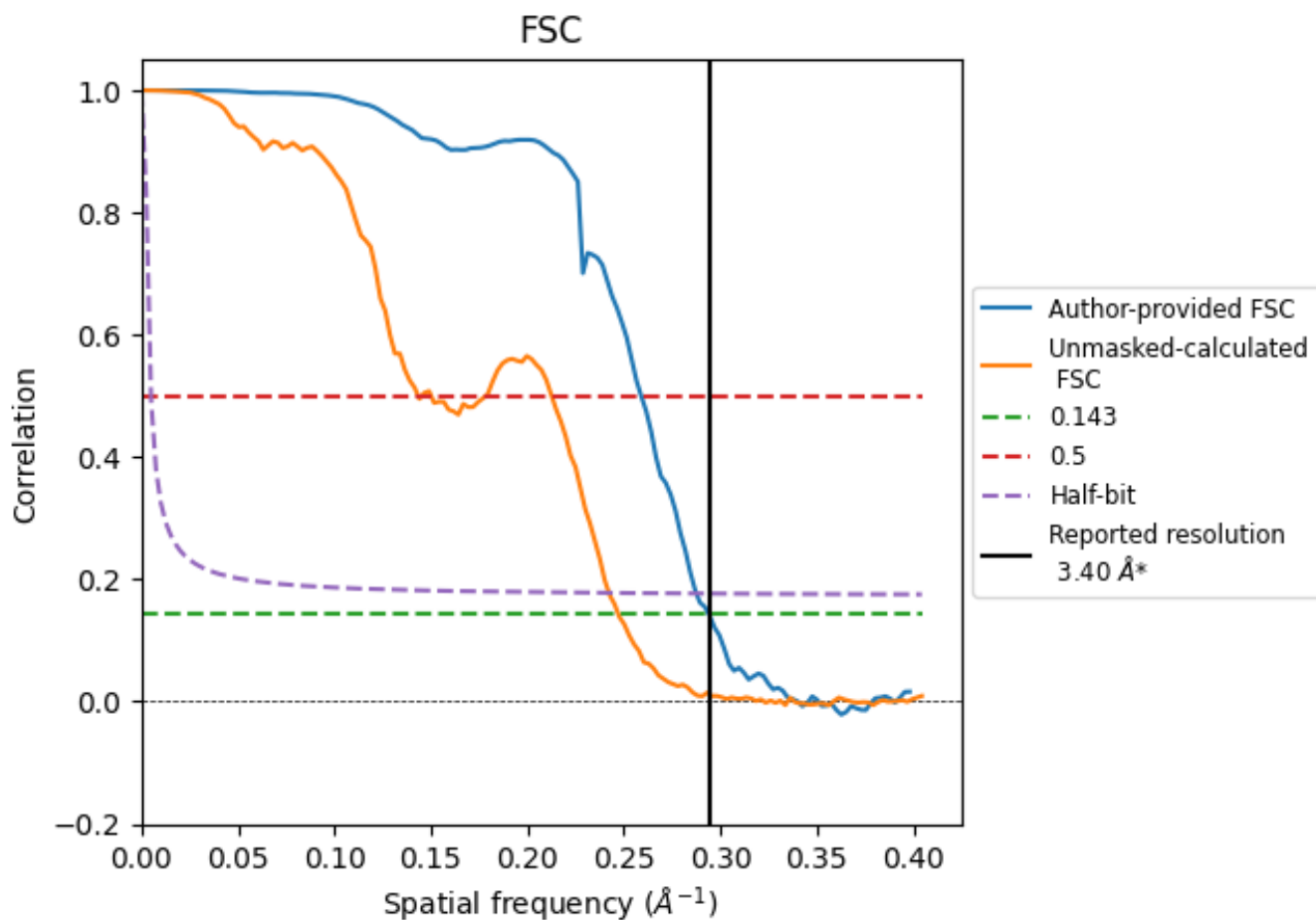


*Reported resolution corresponds to spatial frequency of 0.294 Å⁻¹

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 0.294 Å⁻¹

8.2 Resolution estimates [i](#)

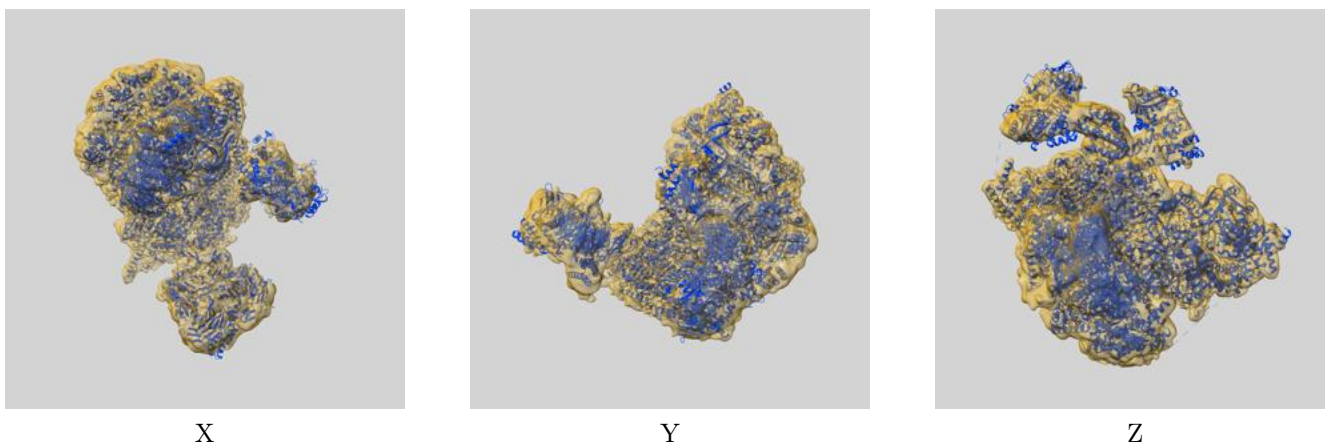
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.40	3.86	3.48
Unmasked-calculated*	4.05	6.97	4.13

*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 4.05 differs from the reported value 3.4 by more than 10 %

9 Map-model fit [i](#)

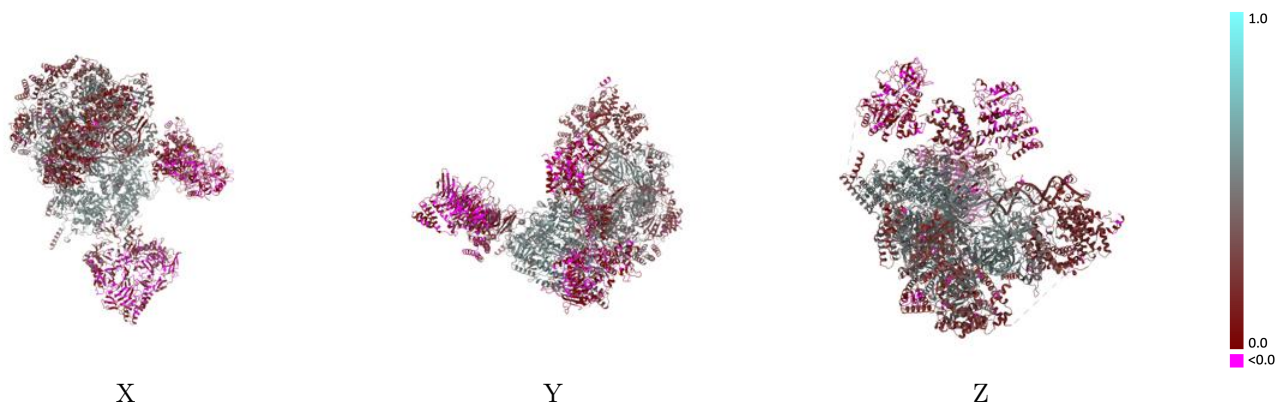
This section contains information regarding the fit between EMDB map EMD-15341 and PDB model 8B9D. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.137 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 [\(i\)](#)

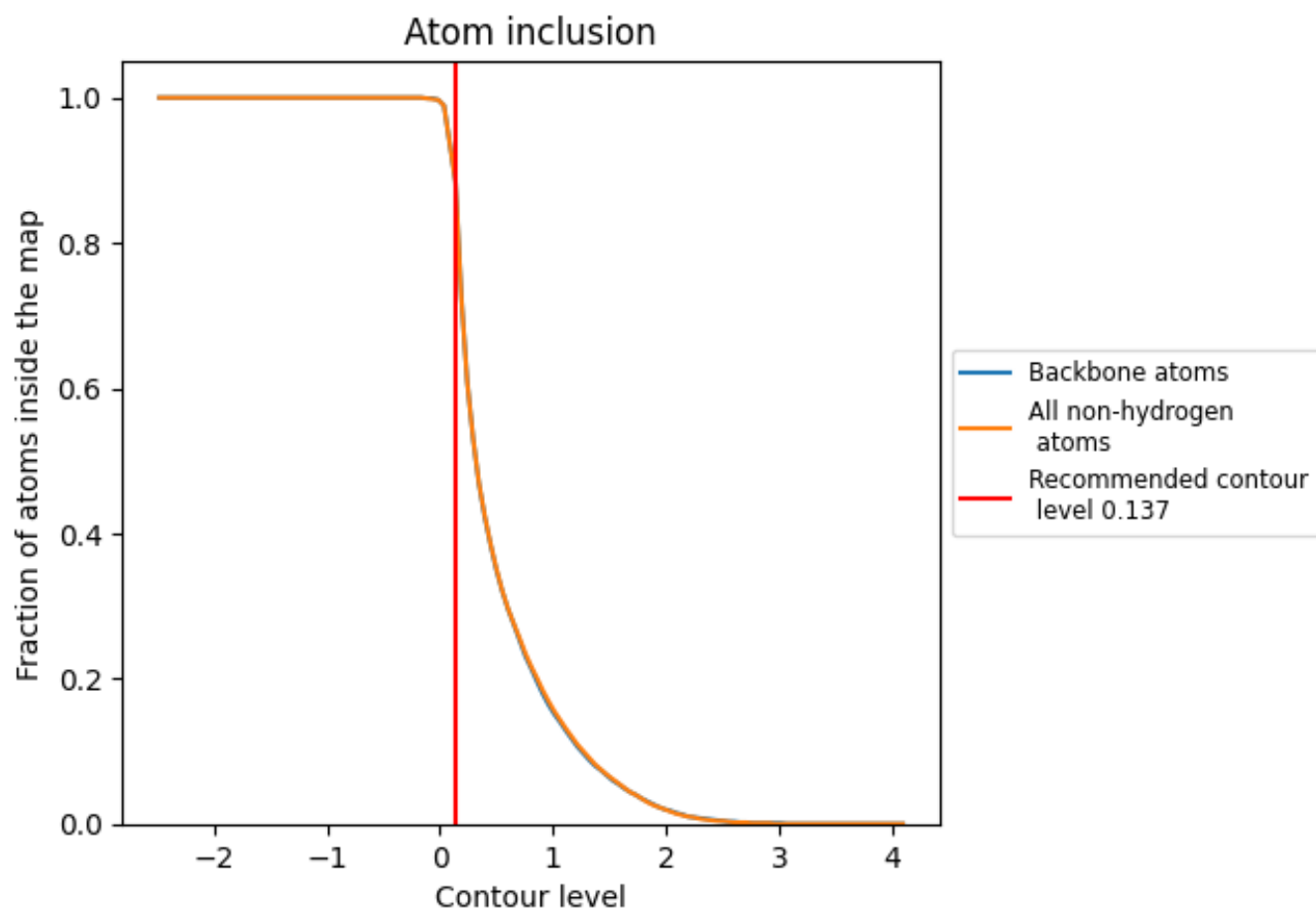


The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

This section was not generated.

















































9.4 Atom inclusion [i](#)



At the recommended contour level, 88% of all backbone atoms, 88% 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 (0.137) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8850	 0.3100
2	 0.9650	 0.4870
3	 0.9760	 0.4410
4	 0.9650	 0.3500
5	 0.9620	 0.4750
6	 0.9710	 0.4110
7	 0.9770	 0.3510
A	 0.7150	 0.0570
B	 0.6210	 0.0700
C	 0.9740	 0.4900
D	 0.9760	 0.4960
E	 0.9790	 0.5540
F	 0.9800	 0.5320
G	 0.9650	 0.5230
H	 0.7340	 0.0550
I	 0.8150	 0.1640
J	 0.6930	 0.0500
K	 0.8830	 0.2060
L	 0.8870	 0.2180
M	 0.9030	 0.3040
N	 0.8880	 0.2380
O	 0.6130	 0.0530
P	 0.9140	 0.1520
Q	 0.5410	 0.1250

