Full wwPDB EM Validation Report

Apr 24, 2023 – 10:19 AM EDT

PDB ID	:	8GFT
EMDB ID	:	EMD-29984
Title	:	Hsp90 provides platform for CRaf dephosphorylation by PP5
Authors	:	Jaime-Garza, M.; Nowotny, C.A.; Coutandin, D.; Wang, F.; Tabios, M.; Agard, D.A.
Deposited on	:	2023-03-08
Resolution	:	3.80 Å(reported)
Based on initial models	:	5FWL, 1S95, 1WAO

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

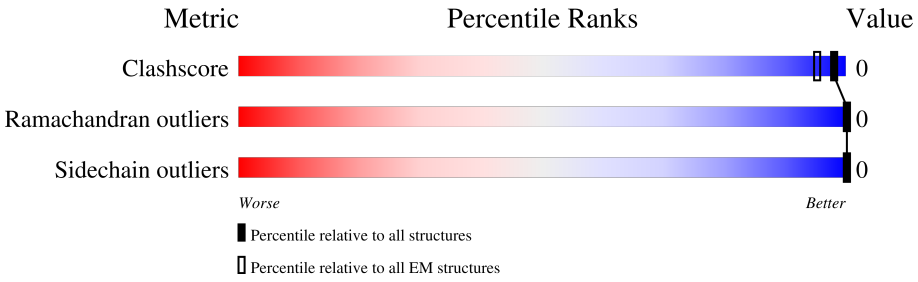
EMDB validation analysis	:	0.0.1.dev50
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.32.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.80 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 <=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	727	84% · 12%
1	B	727	84% · 13%
2	C	384	11% 63% · 33%
3	D	304	62% · 37%
4	E	503	33% 85% 5% · 9%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 35507 atoms, of which 17710 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 Heat shock protein HSP 90-beta.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	639	Total	C	H	N	O	S	0	0
			10411	3284	5230	871	1003	23		
1	B	633	Total	C	H	N	O	S	0	0
			10284	3249	5155	859	998	23		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP P08238
A	-1	PRO	-	expression tag	UNP P08238
A	0	GLY	-	expression tag	UNP P08238
B	-1	GLY	-	expression tag	UNP P08238
B	0	PRO	-	expression tag	UNP P08238
B	1	GLY	-	expression tag	UNP P08238

- Molecule 2 is a protein called Hsp90 co-chaperone Cdc37, N-terminally processed.

Mol	Chain	Residues	Atoms							AltConf	Trace
2	C	259	Total	C	H	N	O	P	S	0	0
			4307	1358	2125	383	425	1	15		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	379	LEU	-	expression tag	UNP Q16543
C	380	GLU	-	expression tag	UNP Q16543
C	381	VAL	-	expression tag	UNP Q16543
C	382	LEU	-	expression tag	UNP Q16543
C	383	PHE	-	expression tag	UNP Q16543
C	384	GLN	-	expression tag	UNP Q16543

- Molecule 3 is a protein called RAF proto-oncogene serine/threonine-protein kinase.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	D	191	Total	C	H	N	O	S	0	0
			3101	995	1553	262	278	13		

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	334	GLY	-	expression tag	UNP P04049
D	335	GLY	-	expression tag	UNP P04049
D	619	LEU	-	expression tag	UNP P04049
D	620	PRO	-	expression tag	UNP P04049
D	621	GLU	-	expression tag	UNP P04049
D	622	SER	-	expression tag	UNP P04049
D	623	GLY	-	expression tag	UNP P04049
D	624	TRP	-	expression tag	UNP P04049
D	625	SER	-	expression tag	UNP P04049
D	626	HIS	-	expression tag	UNP P04049
D	627	PRO	-	expression tag	UNP P04049
D	628	GLN	-	expression tag	UNP P04049
D	629	PHE	-	expression tag	UNP P04049
D	630	GLU	-	expression tag	UNP P04049
D	631	LYS	-	expression tag	UNP P04049
D	632	LEU	-	expression tag	UNP P04049
D	633	GLU	-	expression tag	UNP P04049
D	634	VAL	-	expression tag	UNP P04049
D	635	LEU	-	expression tag	UNP P04049
D	636	PHE	-	expression tag	UNP P04049
D	637	GLN	-	expression tag	UNP P04049

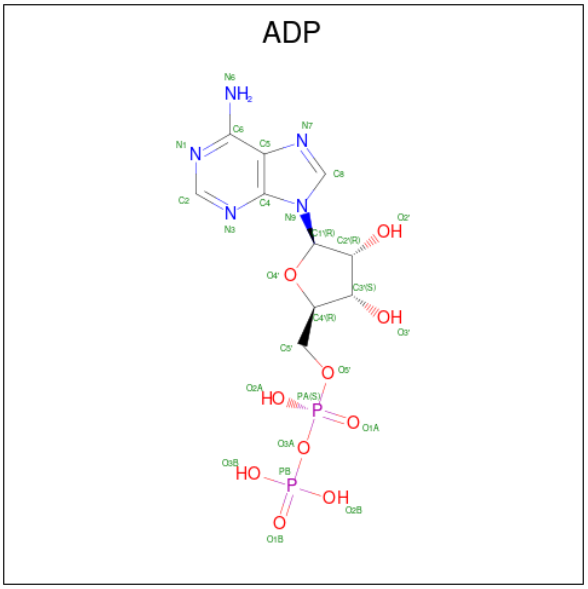
- Molecule 4 is a protein called Serine/threonine-protein phosphatase 5.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	E	459	Total	C	H	N	O	S	0	0
			7316	2347	3623	628	699	19		

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	-3	GLY	-	expression tag	UNP P53041
E	-2	PRO	-	expression tag	UNP P53041
E	-1	GLY	-	expression tag	UNP P53041
E	0	SER	-	expression tag	UNP P53041
E	304	ALA	HIS	engineered mutation	UNP P53041

- Molecule 5 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms						AltConf
5	A	1	Total	C	H	N	O	P	0
			39	10	12	5	10	2	

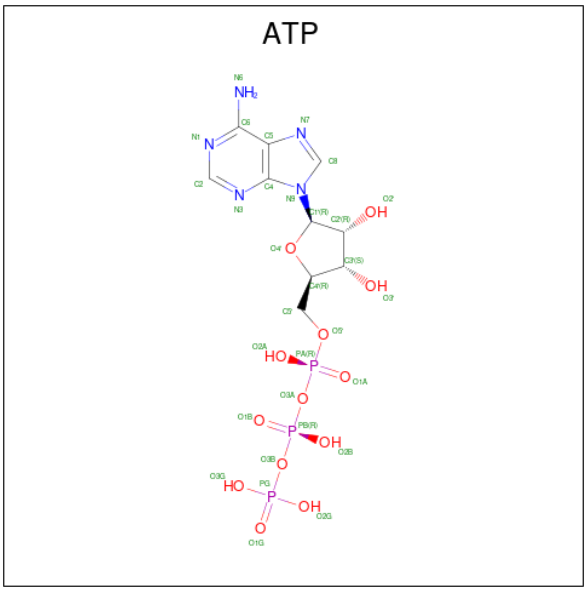
- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
6	A	1	Total	Mg	0
			1	1	
6	B	1	Total	Mg	0
			1	1	

- Molecule 7 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
7	A	1	Total	K	0
			1	1	
7	B	1	Total	K	0
			1	1	

- Molecule 8 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms						AltConf
8	B	1	Total	C	H	N	O	P	0
			43	10	12	5	13	3	

- Molecule 9 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

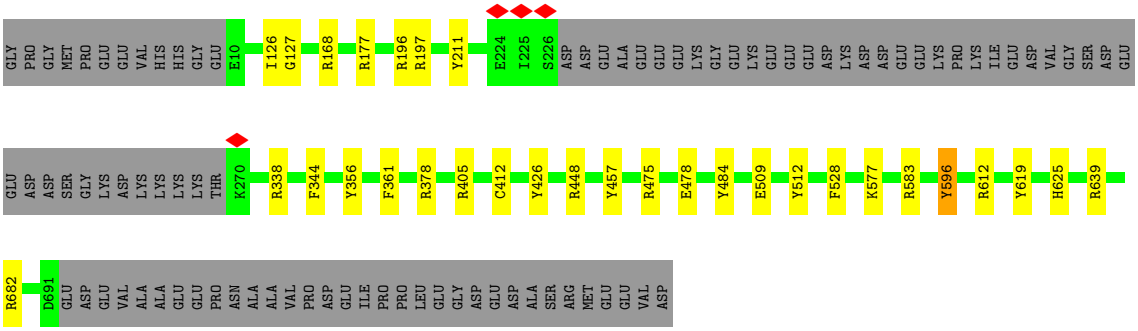
Mol	Chain	Residues	Atoms		AltConf
9	E	2	Total	Mn	0
			2	2	

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.

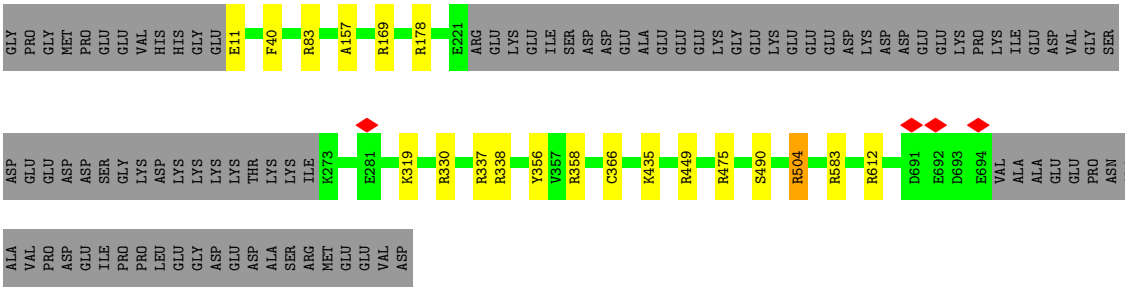
• Molecule 1: Heat shock protein HSP 90-beta

Chain A:



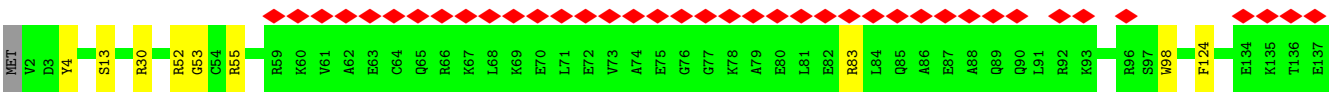
• Molecule 1: Heat shock protein HSP 90-beta

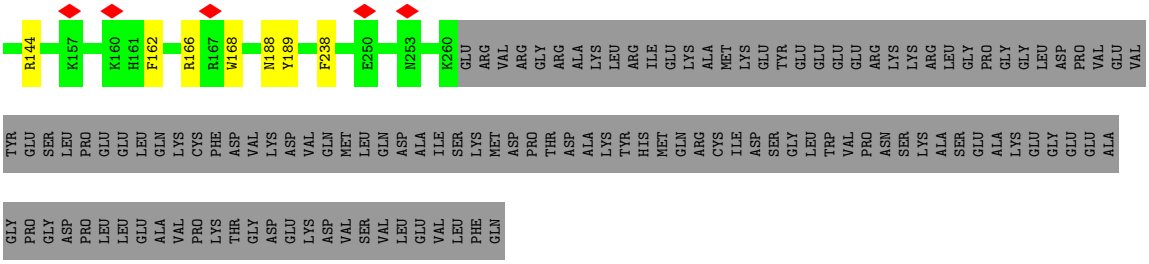
Chain B:



• Molecule 2: Hsp90 co-chaperone Cdc37, N-terminally processed

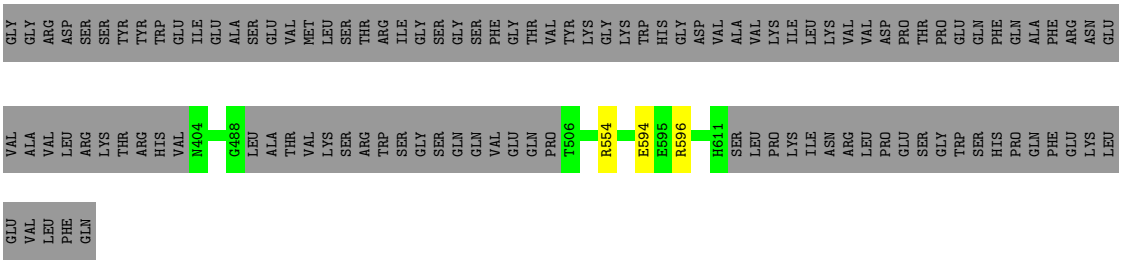
Chain C:





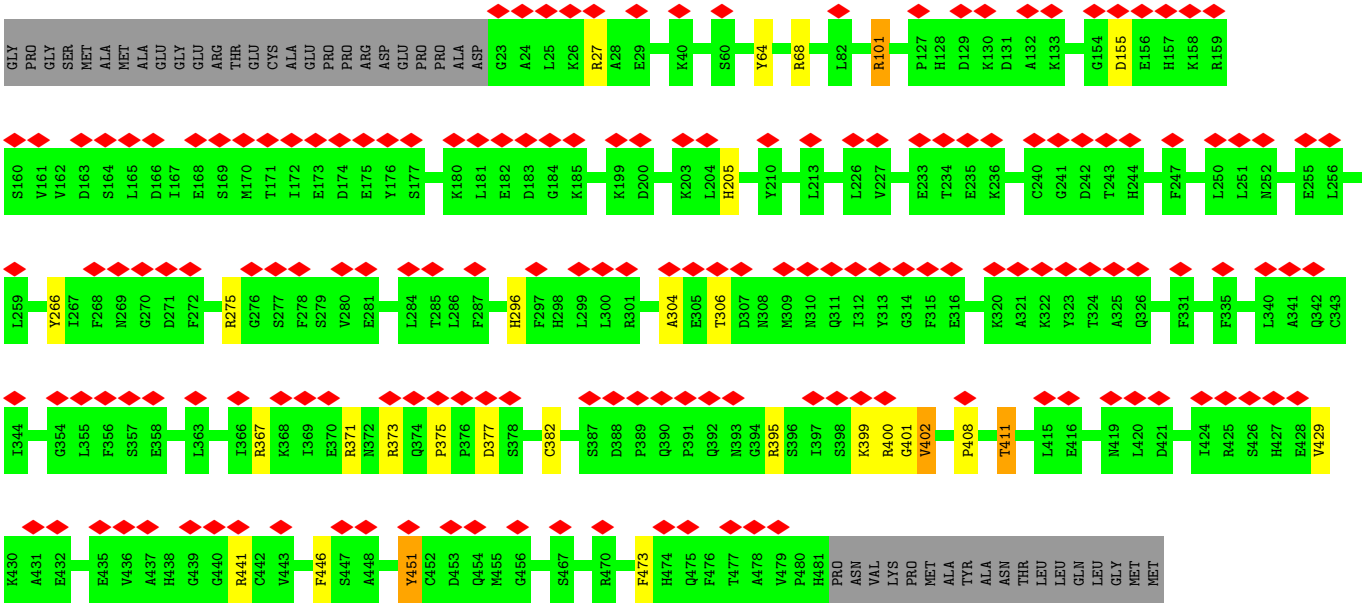
• Molecule 3: RAF proto-oncogene serine/threonine-protein kinase

Chain D:



• Molecule 4: Serine/threonine-protein phosphatase 5

Chain E:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	545237	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 ($e^-/Å^2$)	69.00	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.032	Depositor
Minimum map value	-0.005	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.00576	Depositor
Map size (Å)	267.19998, 267.19998, 267.19998	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8349999, 0.8349999, 0.8349999	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: ATP, ADP, MG, SEP, K, MN

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	0.95	9/5265 (0.2%)	1.04	23/7073 (0.3%)
1	B	0.93	6/5213 (0.1%)	1.03	17/7007 (0.2%)
2	C	0.91	3/2209 (0.1%)	1.01	10/2955 (0.3%)
3	D	0.87	1/1582 (0.1%)	0.97	2/2132 (0.1%)
4	E	0.89	7/3774 (0.2%)	1.17	17/5088 (0.3%)
All	All	0.92	26/18043 (0.1%)	1.06	69/24255 (0.3%)

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
1	A	0	4
1	B	0	2
4	E	0	3
All	All	0	9

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	490	SER	CB-OG	-24.57	1.10	1.42
1	B	612	ARG	CZ-NH2	-11.48	1.18	1.33
1	A	127	GLY	N-CA	-8.88	1.32	1.46
1	A	596	TYR	CD1-CE1	-8.22	1.27	1.39
4	E	402	VAL	CB-CG1	-8.01	1.36	1.52
4	E	101	ARG	CZ-NH2	-7.41	1.23	1.33
1	B	583	ARG	CZ-NH2	-7.03	1.24	1.33
2	C	124	PHE	CB-CG	-7.02	1.39	1.51
1	A	361	PHE	CB-CG	-6.56	1.40	1.51
1	A	457	TYR	CB-CG	-6.55	1.41	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	528	PHE	CB-CG	-6.43	1.40	1.51
4	E	473	PHE	CB-CG	-6.33	1.40	1.51
1	B	612	ARG	CZ-NH1	-6.03	1.25	1.33
4	E	266	TYR	CZ-OH	-5.97	1.27	1.37
4	E	205	HIS	CE1-NE2	-5.63	1.19	1.32
4	E	205	HIS	CG-CD2	-5.43	1.26	1.35
1	A	211	TYR	CB-CG	-5.37	1.43	1.51
1	A	478	GLU	CD-OE2	-5.36	1.19	1.25
2	C	162	PHE	CE1-CZ	-5.33	1.27	1.37
1	B	11	GLU	CB-CG	5.26	1.62	1.52
3	D	594	GLU	CD-OE1	-5.22	1.20	1.25
4	E	296	HIS	CB-CG	-5.21	1.40	1.50
1	B	356	TYR	CB-CG	-5.15	1.44	1.51
1	A	356	TYR	CB-CG	-5.10	1.44	1.51
2	C	189	TYR	N-CA	-5.08	1.36	1.46
1	A	509	GLU	CD-OE2	-5.06	1.20	1.25

All (69) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	E	402	VAL	CA-CB-CG1	18.11	138.06	110.90
2	C	55	ARG	NE-CZ-NH2	-11.24	114.68	120.30
1	A	583	ARG	NE-CZ-NH1	11.01	125.81	120.30
1	A	596	TYR	CB-CG-CD2	9.52	126.71	121.00
1	A	197	ARG	NE-CZ-NH1	9.41	125.01	120.30
1	B	366	CYS	CA-CB-SG	-9.22	97.41	114.00
4	E	371	ARG	NE-CZ-NH1	8.47	124.53	120.30
1	B	330	ARG	NE-CZ-NH2	-8.20	116.20	120.30
1	A	126	ILE	C-N-CA	8.16	139.45	122.30
1	B	358	ARG	NE-CZ-NH1	7.76	124.18	120.30
4	E	400	ARG	NE-CZ-NH1	7.69	124.15	120.30
1	A	448	ARG	NE-CZ-NH1	7.33	123.97	120.30
1	A	612	ARG	NE-CZ-NH1	7.08	123.84	120.30
1	A	168	ARG	NE-CZ-NH1	6.83	123.72	120.30
1	B	319	LYS	C-N-CA	6.77	138.63	121.70
1	B	178	ARG	NE-CZ-NH1	6.61	123.61	120.30
1	B	157	ALA	C-N-CA	6.60	138.19	121.70
1	A	412	CYS	CA-CB-SG	-6.56	102.19	114.00
1	A	196	ARG	NE-CZ-NH1	6.53	123.57	120.30
1	B	583	ARG	NE-CZ-NH2	6.51	123.55	120.30
2	C	188	ASN	C-N-CA	6.44	137.79	121.70
1	A	338	ARG	NE-CZ-NH1	6.35	123.47	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	83	ARG	NE-CZ-NH1	6.31	123.45	120.30
4	E	275	ARG	NE-CZ-NH1	6.29	123.44	120.30
1	B	435	LYS	C-N-CA	6.11	136.98	121.70
1	A	512	TYR	CB-CG-CD2	-6.06	117.36	121.00
4	E	395	ARG	NE-CZ-NH1	6.05	123.32	120.30
2	C	4	TYR	CB-CG-CD2	-6.01	117.39	121.00
3	D	596	ARG	NE-CZ-NH2	-5.95	117.32	120.30
1	B	83	ARG	NE-CZ-NH1	5.92	123.26	120.30
2	C	166	ARG	NE-CZ-NH1	5.87	123.24	120.30
1	B	338	ARG	NE-CZ-NH1	5.81	123.21	120.30
1	A	583	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	A	378	ARG	NE-CZ-NH1	5.68	123.14	120.30
4	E	155	ASP	CB-CG-OD2	5.65	123.38	118.30
4	E	306	THR	CA-CB-CG2	5.61	120.26	112.40
4	E	68	ARG	NE-CZ-NH1	5.60	123.10	120.30
1	B	319	LYS	O-C-N	-5.58	113.77	122.70
1	B	337	ARG	NE-CZ-NH1	5.58	123.09	120.30
1	B	449	ARG	NE-CZ-NH1	5.58	123.09	120.30
2	C	52	ARG	NE-CZ-NH1	5.49	123.04	120.30
1	B	435	LYS	O-C-N	-5.48	113.93	122.70
4	E	64	TYR	CB-CG-CD2	-5.45	117.73	121.00
1	B	612	ARG	CD-NE-CZ	5.44	131.21	123.60
1	B	504	ARG	NE-CZ-NH1	5.44	123.02	120.30
1	A	596	TYR	CA-CB-CG	5.42	123.70	113.40
3	D	554	ARG	NE-CZ-NH1	5.42	123.01	120.30
4	E	441	ARG	NE-CZ-NH1	5.41	123.01	120.30
1	A	177	ARG	NE-CZ-NH1	5.38	122.99	120.30
1	A	596	TYR	CD1-CE1-CZ	5.38	124.64	119.80
4	E	27	ARG	NE-CZ-NH1	5.36	122.98	120.30
1	A	426	TYR	CB-CG-CD1	-5.33	117.80	121.00
2	C	55	ARG	NE-CZ-NH1	5.33	122.96	120.30
2	C	83	ARG	NE-CZ-NH2	-5.32	117.64	120.30
1	B	169	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	405	ARG	NE-CZ-NH1	5.27	122.94	120.30
2	C	144	ARG	NE-CZ-NH1	5.25	122.92	120.30
2	C	30	ARG	NE-CZ-NH1	5.23	122.91	120.30
1	A	682	ARG	NE-CZ-NH1	5.17	122.89	120.30
1	A	405	ARG	NE-CZ-NH2	-5.17	117.71	120.30
4	E	411	THR	CA-CB-CG2	5.16	119.62	112.40
4	E	451	TYR	CA-CB-CG	5.16	123.20	113.40
4	E	304	ALA	C-N-CA	5.14	134.55	121.70
1	A	127	GLY	C-N-CA	5.14	134.54	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	475	ARG	NE-CZ-NH2	-5.13	117.73	120.30
4	E	373	ARG	NE-CZ-NH1	5.09	122.85	120.30
1	A	639	ARG	NE-CZ-NH1	5.02	122.81	120.30
4	E	367	ARG	NE-CZ-NH1	5.01	122.80	120.30
4	E	402	VAL	CB-CA-C	-5.00	101.89	111.40

There are no chirality outliers.

All (9) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	344	PHE	Mainchain
1	A	484	TYR	Sidechain
1	A	596	TYR	Sidechain
1	A	619	TYR	Sidechain
1	B	475	ARG	Sidechain
1	B	504	ARG	Sidechain
4	E	101	ARG	Sidechain
4	E	446	PHE	Sidechain
4	E	451	TYR	Sidechain

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5181	5230	5226	1	0
1	B	5129	5155	5150	1	0
2	C	2182	2125	2122	2	0
3	D	1548	1553	1551	0	0
4	E	3693	3623	3621	7	0
5	A	27	12	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
8	B	31	12	12	0	0
9	E	2	0	0	0	0
All	All	17797	17710	17694	11	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 0.

All (11) 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)
4:E:382:CYS:HB3	4:E:401:GLY:O	1.98	0.62
4:E:399:LYS:O	4:E:402:VAL:HB	2.01	0.60
4:E:382:CYS:CB	4:E:401:GLY:O	2.57	0.52
4:E:429:VAL:O	4:E:429:VAL:HG23	2.13	0.48
4:E:408:PRO:O	4:E:411:THR:HG22	2.14	0.47
2:C:168:TRP:CZ3	2:C:238:PHE:CD2	3.05	0.44
2:C:53:GLY:HA3	2:C:98:TRP:CH2	2.54	0.43
4:E:375:PRO:HB2	4:E:382:CYS:SG	2.59	0.43
1:A:577:LYS:HE2	1:A:625:HIS:CE1	2.54	0.43
4:E:377:ASP:HA	4:E:401:GLY:C	2.40	0.42
1:B:40:PHE:CD2	1:B:40:PHE:C	2.92	0.41

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	635/727 (87%)	632 (100%)	3 (0%)	0	100	100
1	B	629/727 (86%)	622 (99%)	7 (1%)	0	100	100
2	C	256/384 (67%)	249 (97%)	7 (3%)	0	100	100
3	D	187/304 (62%)	181 (97%)	6 (3%)	0	100	100
4	E	457/503 (91%)	446 (98%)	11 (2%)	0	100	100
All	All	2164/2645 (82%)	2130 (98%)	34 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	578/653 (88%)	578 (100%)	0	100	100
1	B	572/653 (88%)	572 (100%)	0	100	100
2	C	238/346 (69%)	238 (100%)	0	100	100
3	D	172/271 (64%)	172 (100%)	0	100	100
4	E	397/431 (92%)	397 (100%)	0	100	100
All	All	1957/2354 (83%)	1957 (100%)	0	100	100

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
4	E	463	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)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	SEP	C	13	2	8,9,10	1.04	0	8,12,14	1.37	1 (12%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SEP	C	13	2	-	0/5/8/10	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	13	SEP	P-OG-CB	2.40	124.91	118.30

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 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	$\#\|Z\| > 2$
5	ADP	A	801	6	24,29,29	1.06	2 (8%)	29,45,45	1.44	5 (17%)
8	ATP	B	802	6	26,33,33	1.13	1 (3%)	31,52,52	1.53	4 (12%)

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
5	ADP	A	801	6	-	0/12/32/32	0/3/3/3
8	ATP	B	802	6	-	3/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	802	ATP	C5-C4	-2.31	1.34	1.40
5	A	801	ADP	O4'-C1'	2.30	1.44	1.41
5	A	801	ADP	C5-C4	-2.19	1.35	1.40

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	B	802	ATP	C4-C5-N7	4.48	114.06	109.40
5	A	801	ADP	C4-C5-N7	4.28	113.86	109.40
8	B	802	ATP	PA-O3A-PB	-3.34	121.37	132.83
5	A	801	ADP	PA-O3A-PB	-2.99	122.56	132.83
8	B	802	ATP	PB-O3B-PG	-2.86	123.03	132.83
8	B	802	ATP	N6-C6-N1	-2.25	113.91	118.57
5	A	801	ADP	N6-C6-N1	-2.23	113.95	118.57
5	A	801	ADP	C2-N1-C6	-2.14	115.10	118.75
5	A	801	ADP	O2B-PB-O3A	2.03	111.45	104.64

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	B	802	ATP	PB-O3B-PG-O3G
8	B	802	ATP	PB-O3B-PG-O1G
8	B	802	ATP	PB-O3A-PA-O5'

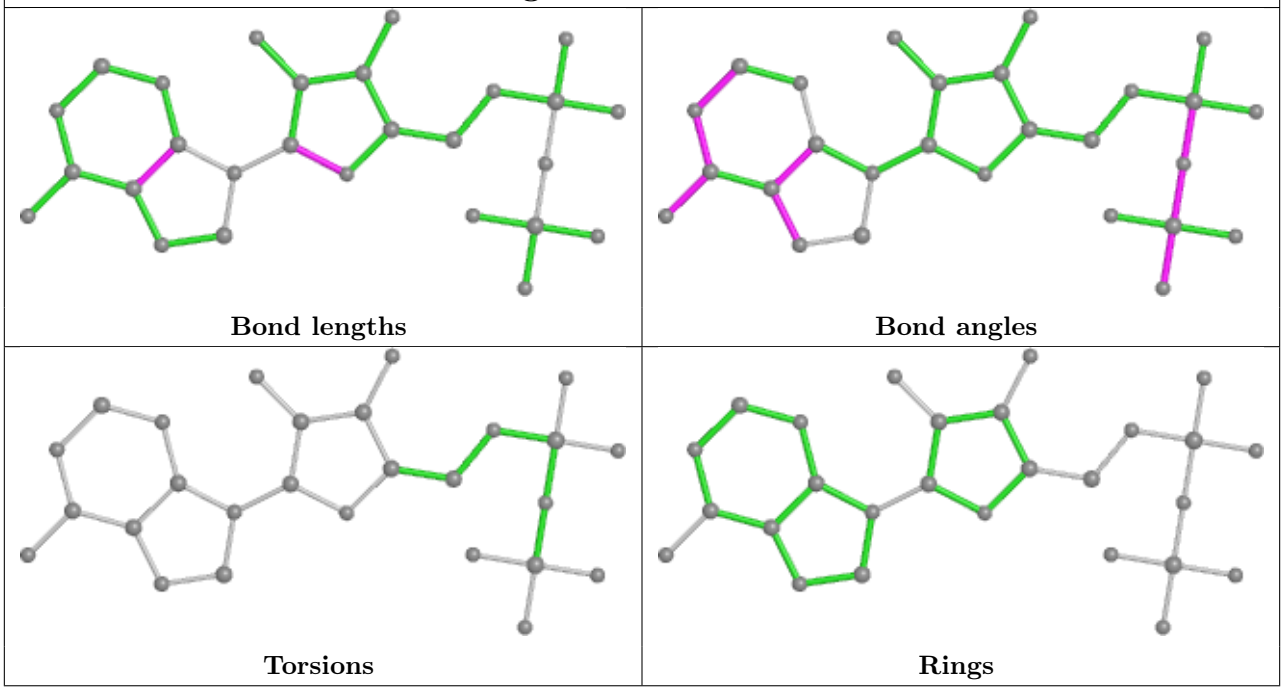
There are no ring outliers.

No monomer is involved in short contacts.

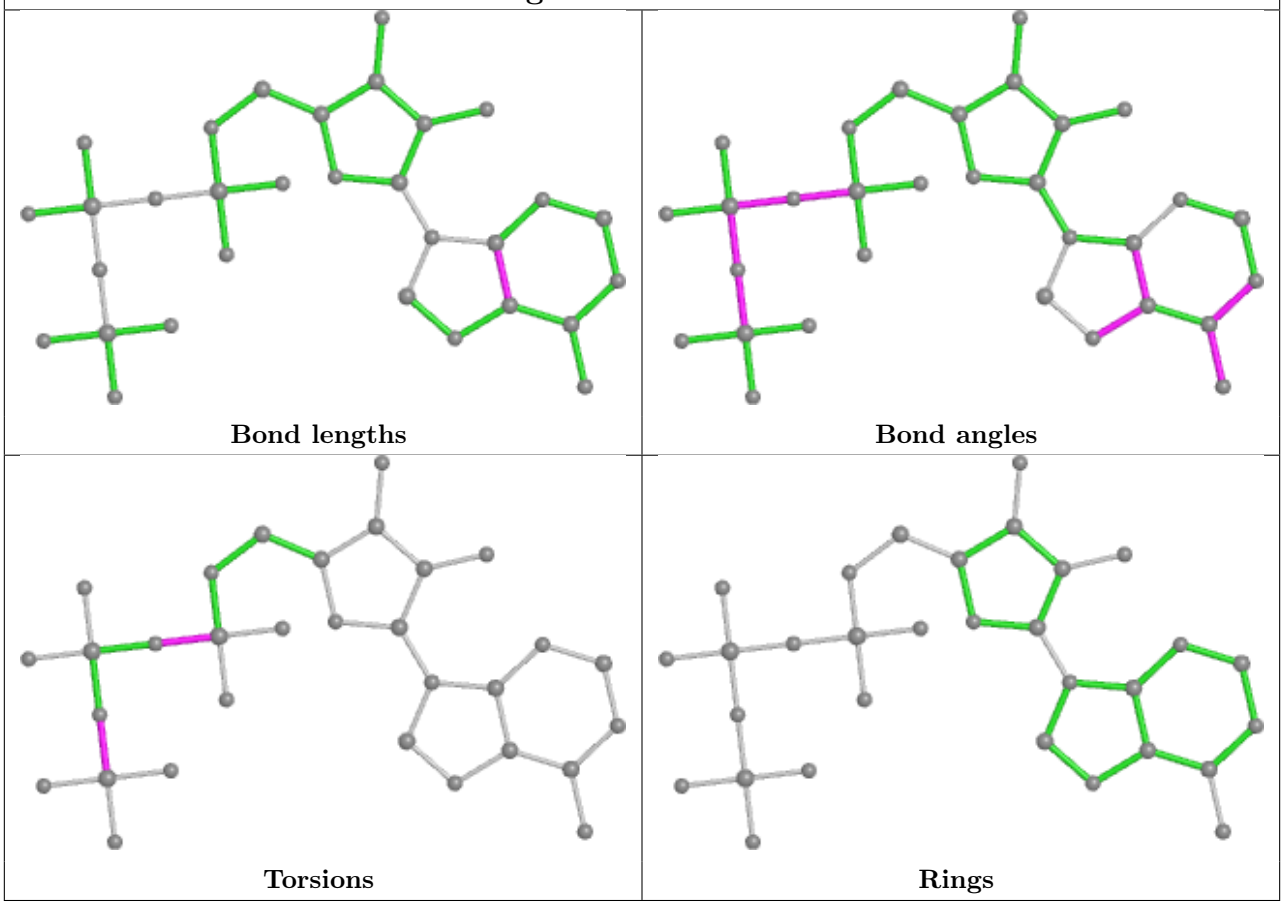
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

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

Ligand ADP A 801



Ligand ATP B 802



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.

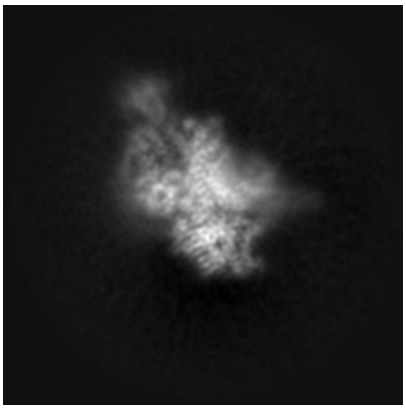
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-29984. These allow visual inspection of the internal detail of the map and identification of artifacts.

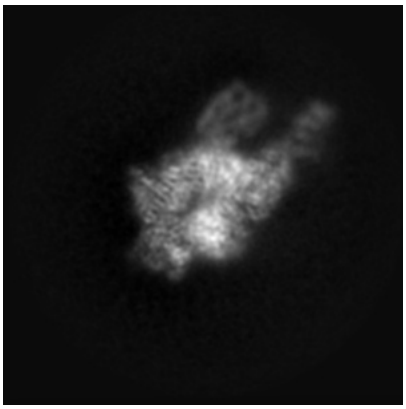
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

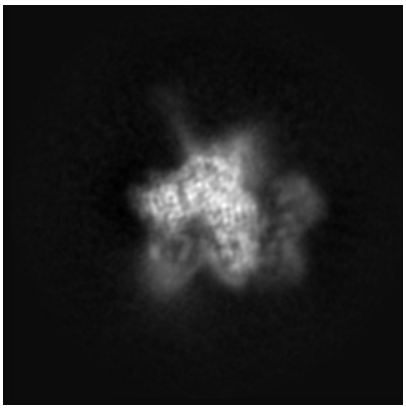
6.1.1 Primary map



X

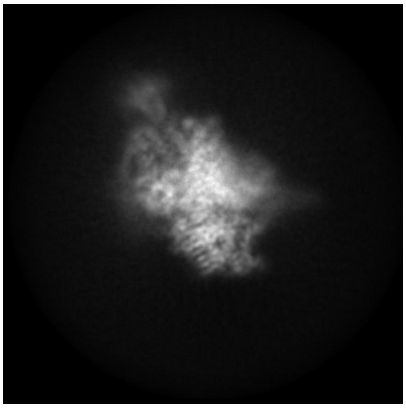


Y

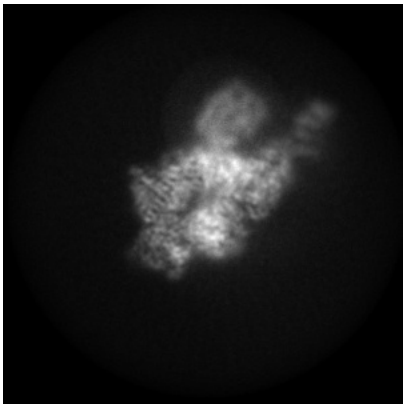


Z

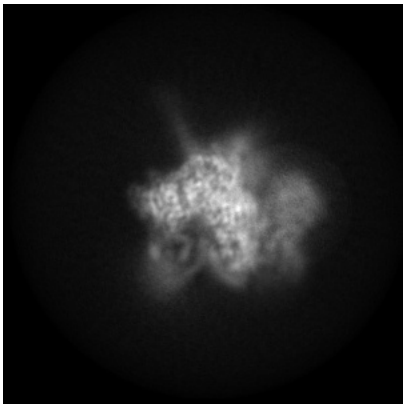
6.1.2 Raw map



X



Y

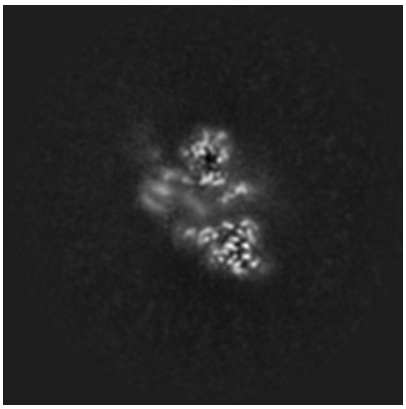


Z

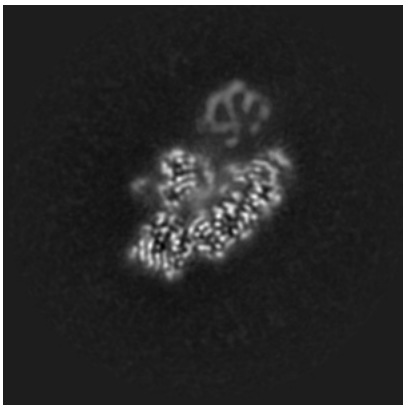
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

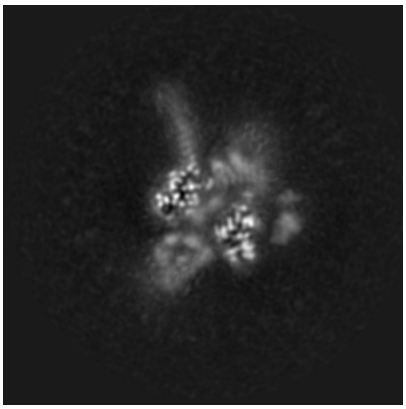
6.2.1 Primary map



X Index: 160

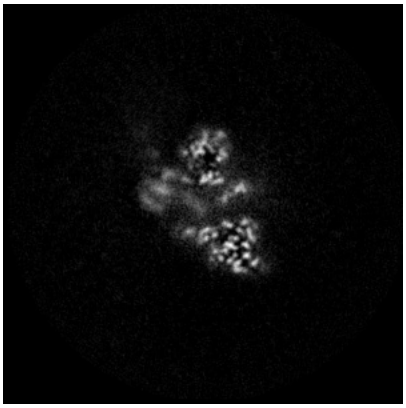


Y Index: 160

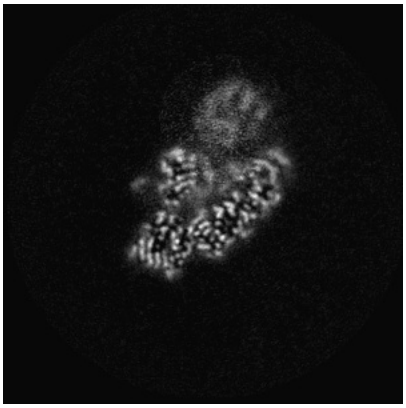


Z Index: 160

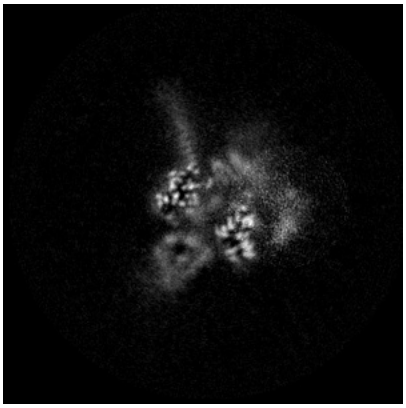
6.2.2 Raw map



X Index: 160



Y Index: 160

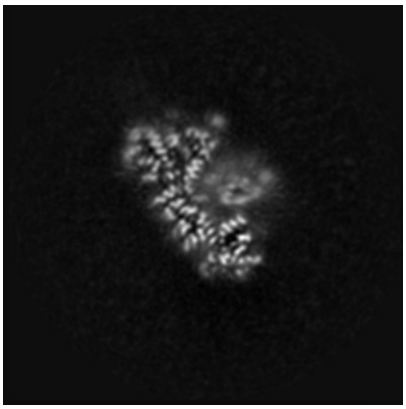


Z Index: 160

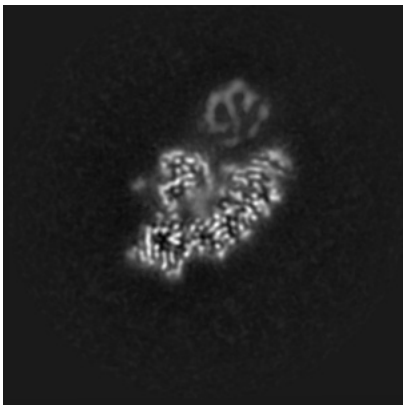
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

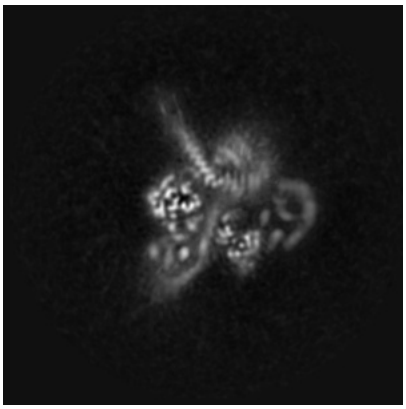
6.3.1 Primary map



X Index: 177

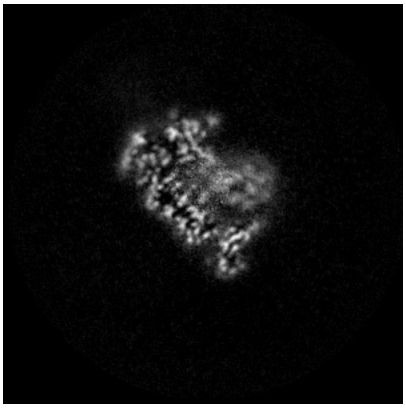


Y Index: 158

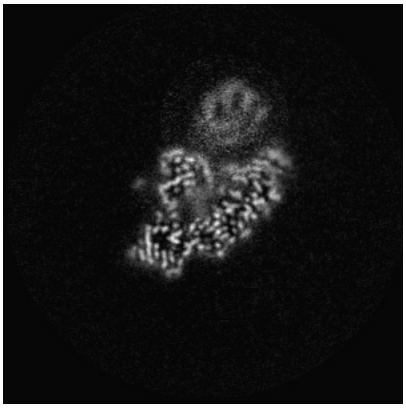


Z Index: 171

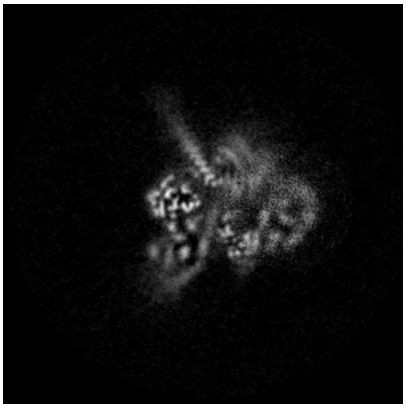
6.3.2 Raw map



X Index: 183



Y Index: 158

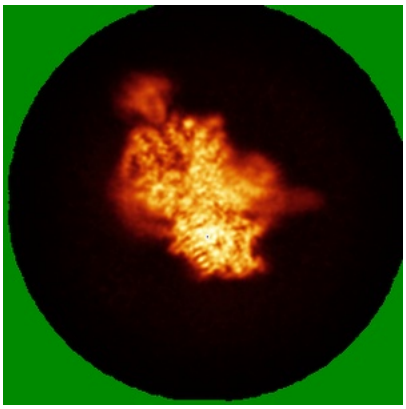


Z Index: 171

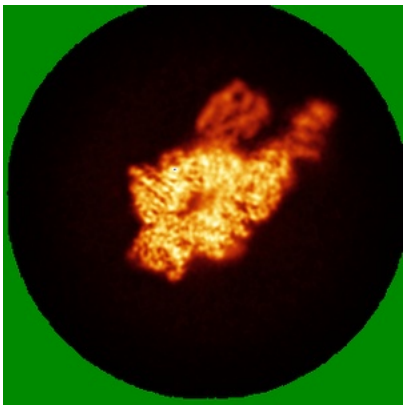
The images above show the largest variance slices of the map in three orthogonal directions.

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

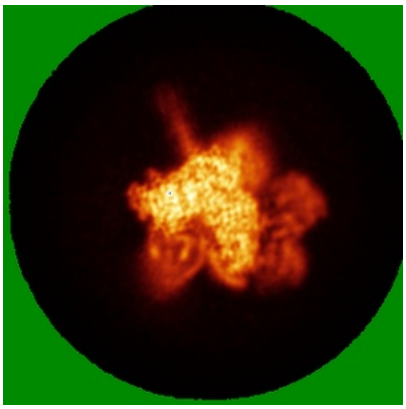
6.4.1 Primary map



X

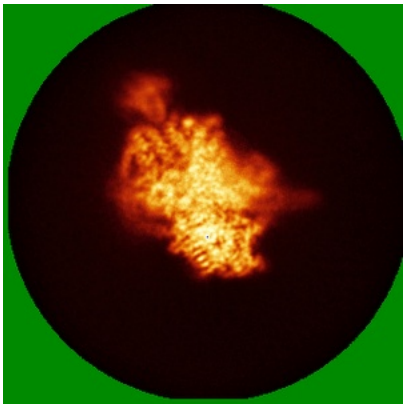


Y



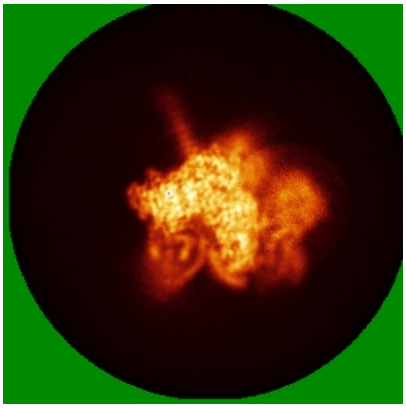
Z

6.4.2 Raw map



X

Y

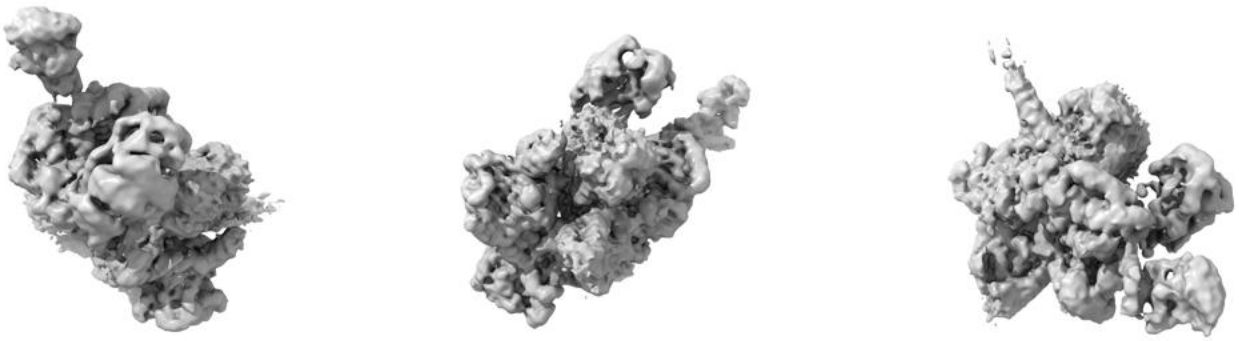


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.00576. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

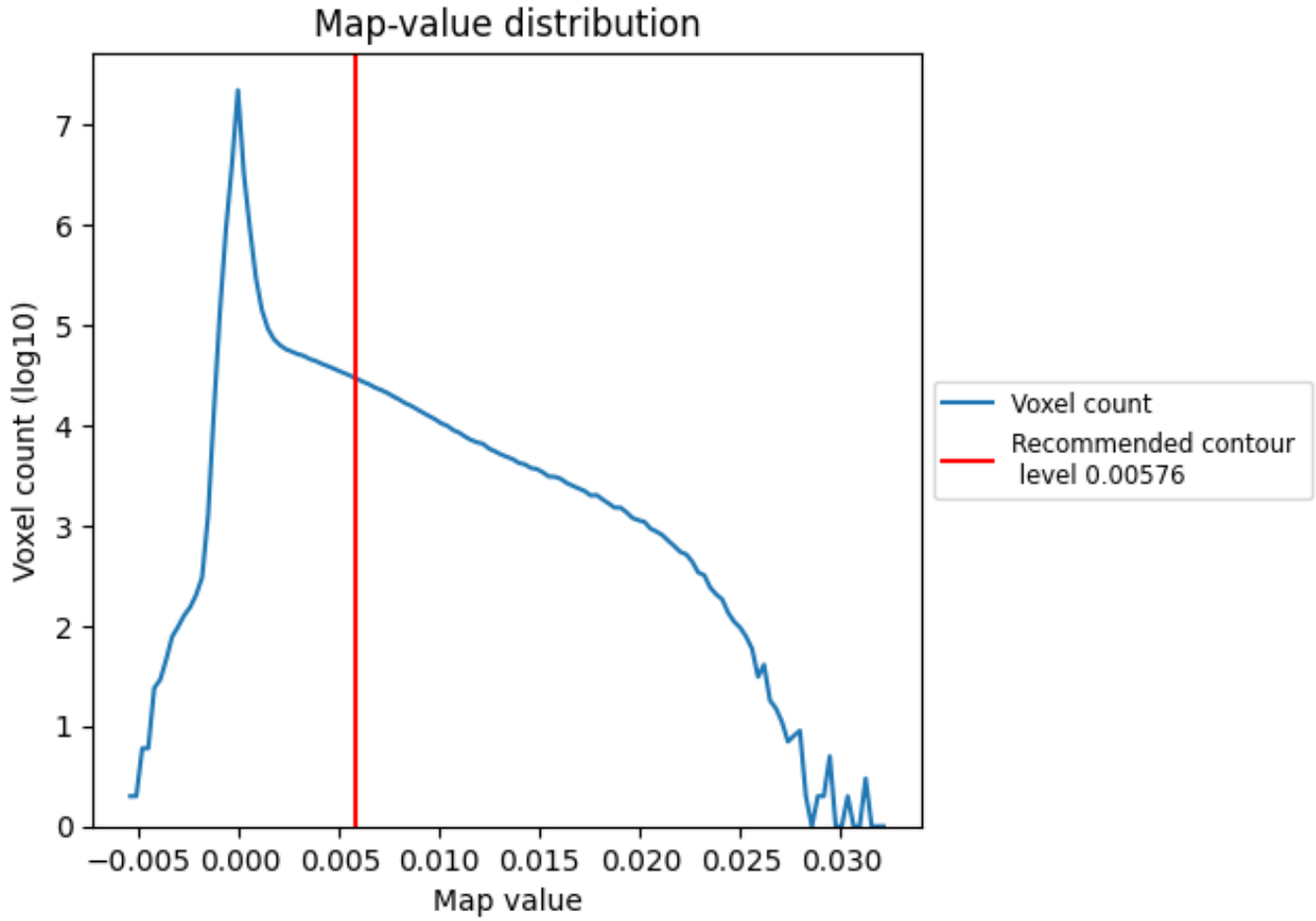
6.6 Mask visualisation (i)

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

7 Map analysis

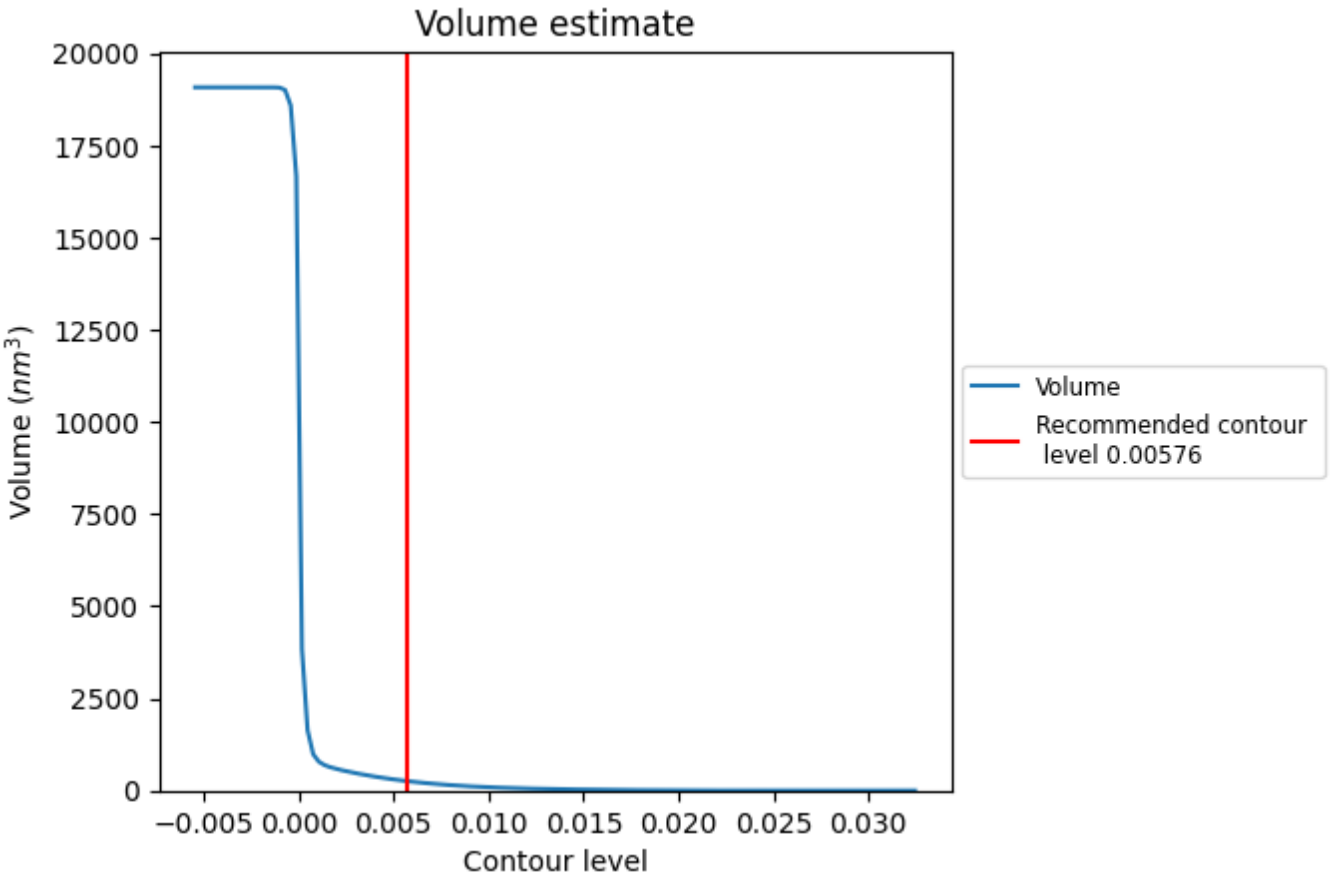
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

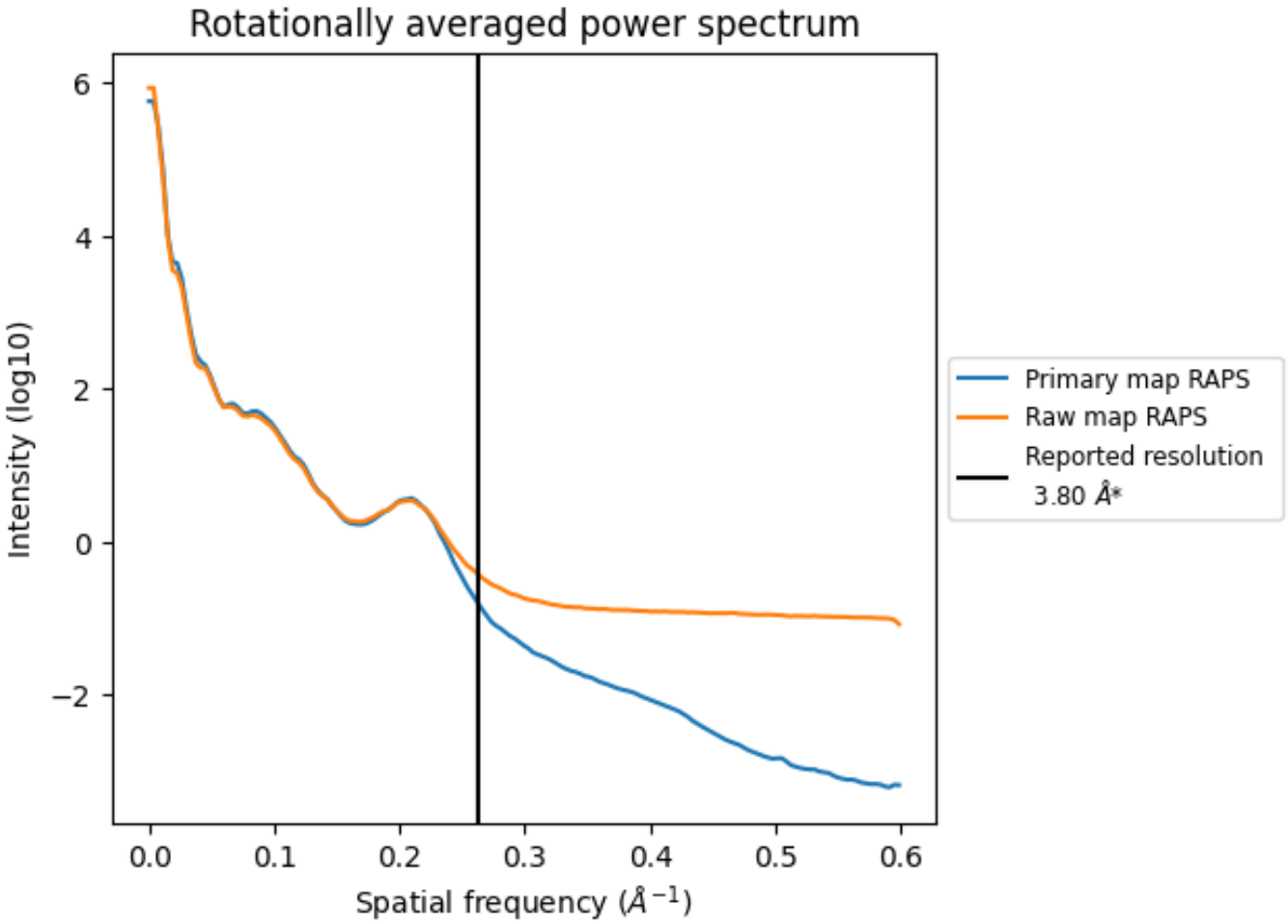
7.2 Volume estimate



The volume at the recommended contour level is 254 nm^3; this corresponds to an approximate mass of 230 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)

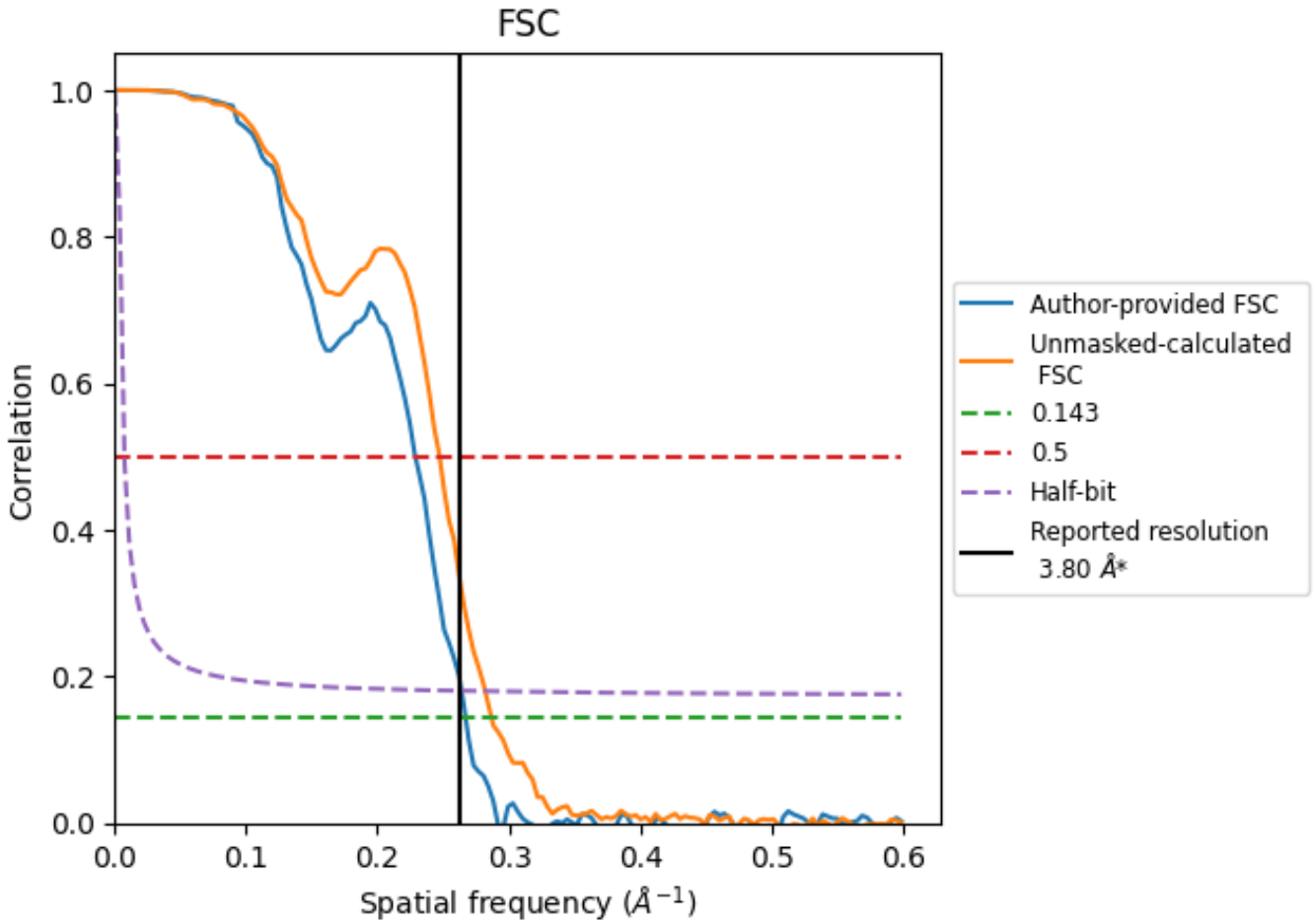


*Reported resolution corresponds to spatial frequency of 0.263 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.263 Å^{-1}

8.2 Resolution estimates (i)

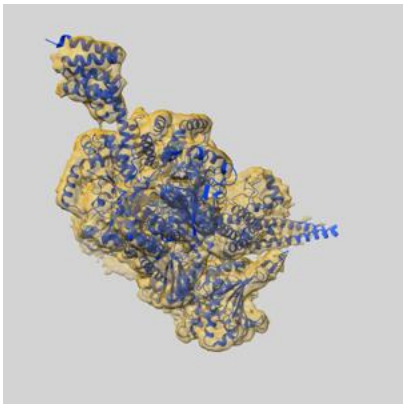
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.80	-	-
Author-provided FSC curve	3.74	4.37	3.79
Unmasked-calculated*	3.49	4.04	3.55

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

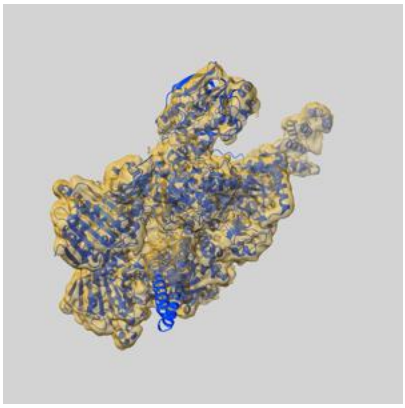
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-29984 and PDB model 8GFT. Per-residue inclusion information can be found in section 3 on page 7.

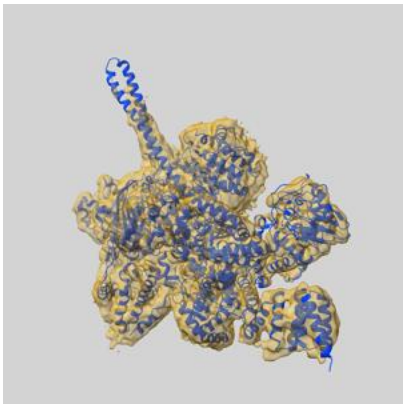
9.1 Map-model overlay



X



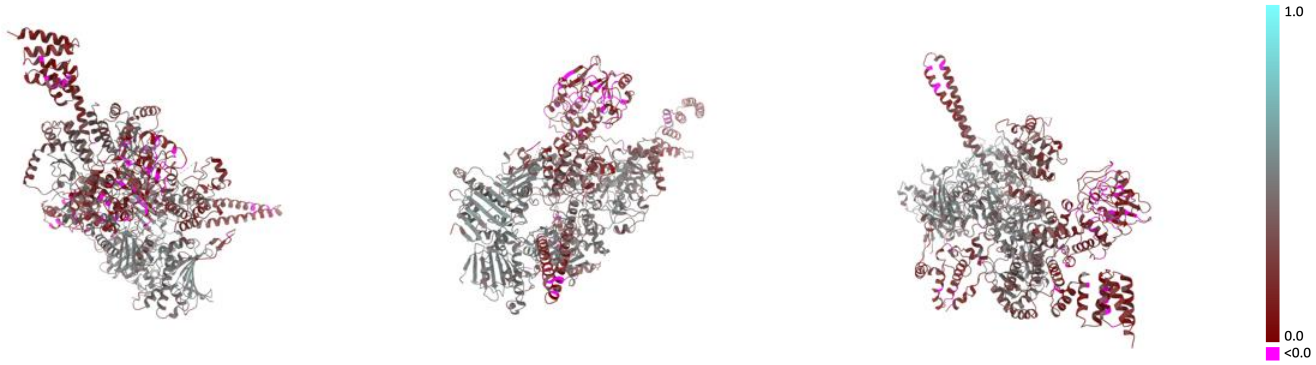
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.00576 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.

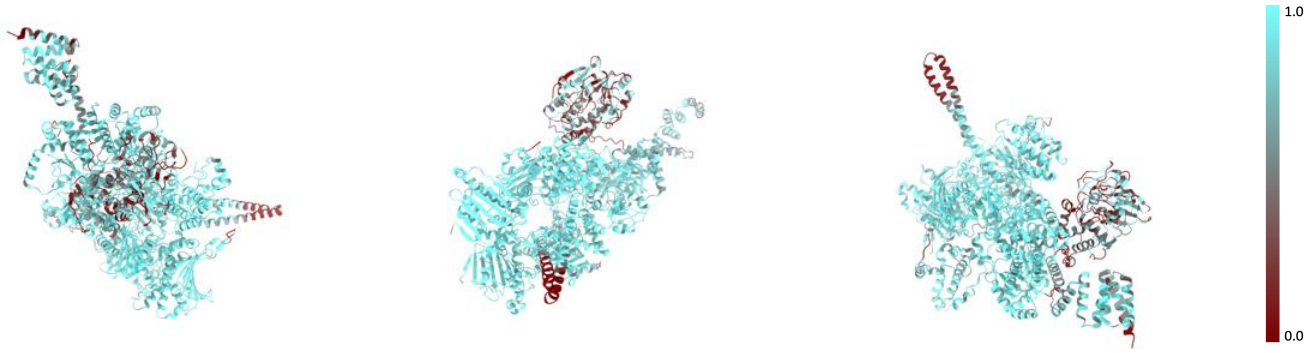
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

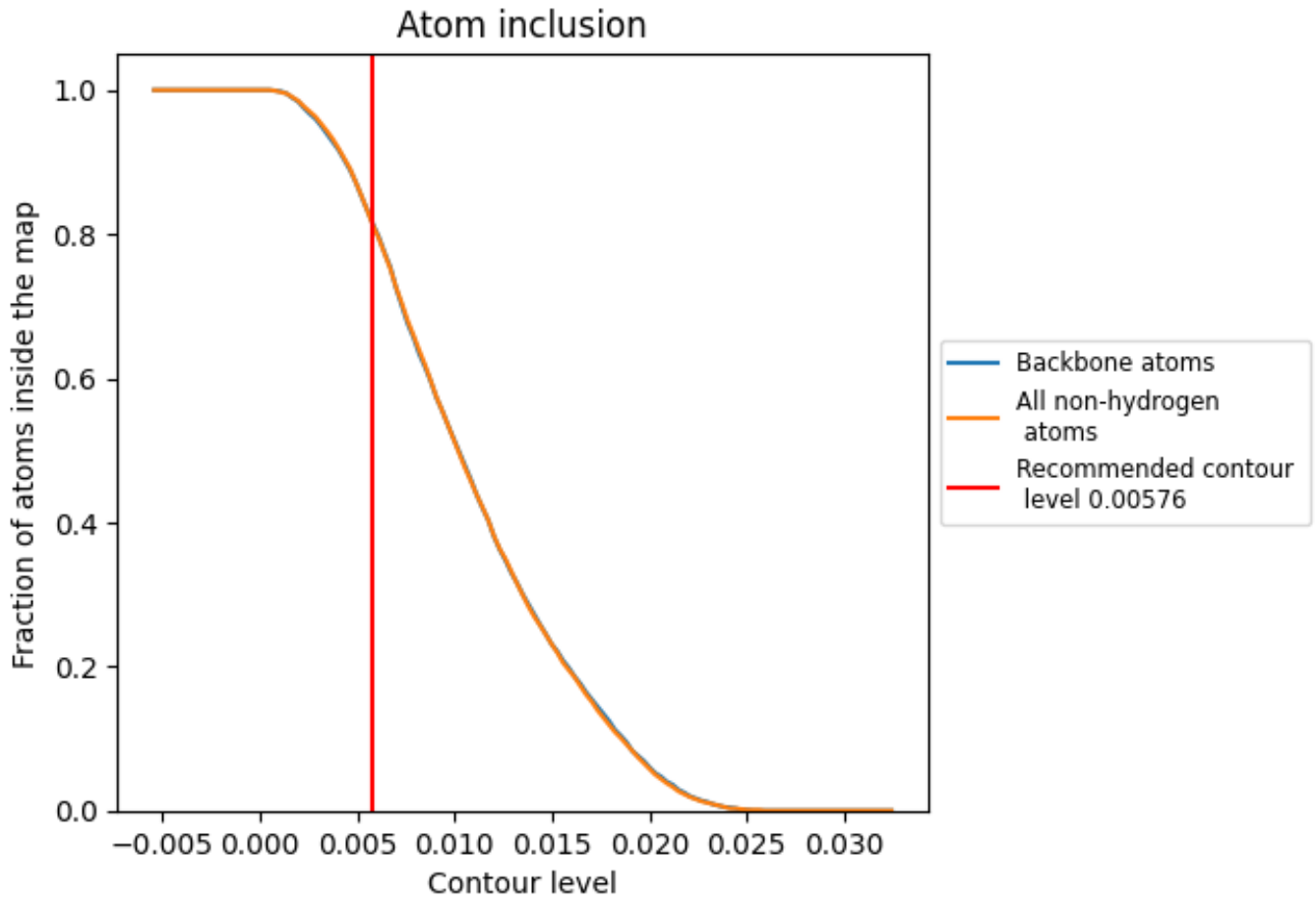
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.00576).

9.4 Atom inclusion (i)



At the recommended contour level, 82% of all backbone atoms, 82% 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 (0.00576) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8150	0.3330
A	0.9350	0.4280
B	0.9320	0.4350
C	0.7330	0.2300
D	0.9570	0.2810
E	0.5080	0.1410