Full wwPDB EM Validation Report ⓘ

Feb 4, 2025 – 03:16 pm GMT

PDB ID	:	9HNW
EMDB ID	:	EMD-52316
Title	:	USP1-UAF1 bound to Lys63-linked diubiquitin
Authors	:	Keijzer, N.; Sakoltchik, J.; Sixma, T.K.
Deposited on	:	2024-12-11
Resolution	:	3.04 Å(reported)

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

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

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

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

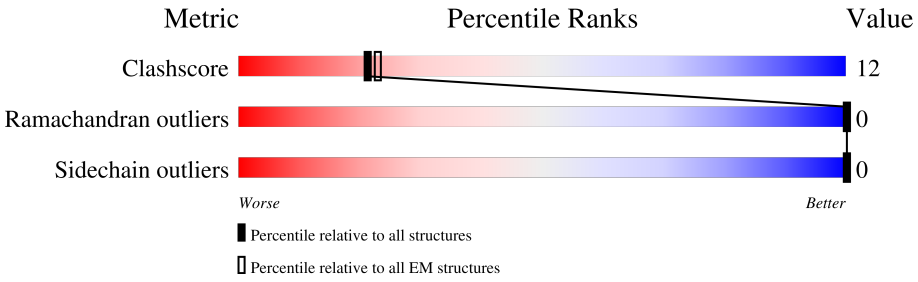
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 3.04 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	813	36% 14% 50%
2	B	712	61% 26% 13%
3	C	76	71% 26%
4	D	76	12% 80% 20%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 9349 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 Ubiquitin carboxyl-terminal hydrolase 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	406	3241	2054	530	640	17	0	0

There are 50 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	HIS	-	expression tag	UNP O94782
A	-1	HIS	-	expression tag	UNP O94782
A	0	HIS	-	expression tag	UNP O94782
A	1	HIS	-	expression tag	UNP O94782
A	2	HIS	-	expression tag	UNP O94782
A	3	HIS	-	expression tag	UNP O94782
A	4	ASP	-	expression tag	UNP O94782
A	5	TYR	-	expression tag	UNP O94782
A	6	ASP	-	expression tag	UNP O94782
A	7	ILE	-	expression tag	UNP O94782
A	8	PRO	-	expression tag	UNP O94782
A	9	THR	-	expression tag	UNP O94782
A	10	THR	-	expression tag	UNP O94782
A	11	GLU	-	expression tag	UNP O94782
A	12	ASN	-	expression tag	UNP O94782
A	13	LEU	-	expression tag	UNP O94782
A	14	TYR	-	expression tag	UNP O94782
A	15	PHE	-	expression tag	UNP O94782
A	16	GLN	-	expression tag	UNP O94782
A	17	GLY	-	expression tag	UNP O94782
A	18	ALA	-	expression tag	UNP O94782
A	19	MET	-	expression tag	UNP O94782
A	20	GLY	-	expression tag	UNP O94782
A	670	ALA	GLY	engineered mutation	UNP O94782
A	671	ALA	GLY	engineered mutation	UNP O94782
A	786	GLU	-	expression tag	UNP O94782
A	787	ARG	-	expression tag	UNP O94782
A	788	PRO	-	expression tag	UNP O94782

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Chain	Residue	Modelled	Actual	Comment	Reference
A	789	LEU	-	expression tag	UNP O94782
A	790	SER	-	expression tag	UNP O94782
A	791	ASN	-	expression tag	UNP O94782
A	792	LEU	-	expression tag	UNP O94782
A	793	GLU	-	expression tag	UNP O94782
A	794	PRO	-	expression tag	UNP O94782
A	795	ALA	-	expression tag	UNP O94782
A	796	VAL	-	expression tag	UNP O94782
A	797	SER	-	expression tag	UNP O94782
A	798	ARG	-	expression tag	UNP O94782
A	799	HIS	-	expression tag	UNP O94782
A	800	ALA	-	expression tag	UNP O94782
A	801	VAL	-	expression tag	UNP O94782
A	802	PRO	-	expression tag	UNP O94782
A	803	SER	-	expression tag	UNP O94782
A	804	LEU	-	expression tag	UNP O94782
A	805	SER	-	expression tag	UNP O94782
A	806	ARG	-	expression tag	UNP O94782
A	807	SER	-	expression tag	UNP O94782
A	808	THR	-	expression tag	UNP O94782
A	809	ARG	-	expression tag	UNP O94782
A	810	GLY	-	expression tag	UNP O94782

- Molecule 2 is a protein called WD repeat-containing protein 48.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	621	Total	C	N	O	S	0	0
			4904	3097	861	919	27		

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	TRP	-	expression tag	UNP Q8TAF3
B	-17	SER	-	expression tag	UNP Q8TAF3
B	-16	HIS	-	expression tag	UNP Q8TAF3
B	-15	PRO	-	expression tag	UNP Q8TAF3
B	-14	GLN	-	expression tag	UNP Q8TAF3
B	-13	PHE	-	expression tag	UNP Q8TAF3
B	-12	GLU	-	expression tag	UNP Q8TAF3
B	-11	LYS	-	expression tag	UNP Q8TAF3
B	-10	GLY	-	expression tag	UNP Q8TAF3
B	-9	ALA	-	expression tag	UNP Q8TAF3

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	LEU	-	expression tag	UNP Q8TAF3
B	-7	GLU	-	expression tag	UNP Q8TAF3
B	-6	VAL	-	expression tag	UNP Q8TAF3
B	-5	LEU	-	expression tag	UNP Q8TAF3
B	-4	PHE	-	expression tag	UNP Q8TAF3
B	-3	GLN	-	expression tag	UNP Q8TAF3
B	-2	GLY	-	expression tag	UNP Q8TAF3
B	-1	PRO	-	expression tag	UNP Q8TAF3
B	0	GLY	-	expression tag	UNP Q8TAF3
B	673	LEU	-	expression tag	UNP Q8TAF3
B	674	ARG	-	expression tag	UNP Q8TAF3
B	675	SER	-	expression tag	UNP Q8TAF3
B	676	PRO	-	expression tag	UNP Q8TAF3
B	677	ARG	-	expression tag	UNP Q8TAF3
B	678	ASN	-	expression tag	UNP Q8TAF3
B	679	SER	-	expression tag	UNP Q8TAF3
B	680	ARG	-	expression tag	UNP Q8TAF3
B	681	HIS	-	expression tag	UNP Q8TAF3
B	682	ALA	-	expression tag	UNP Q8TAF3
B	683	VAL	-	expression tag	UNP Q8TAF3
B	684	PRO	-	expression tag	UNP Q8TAF3
B	685	SER	-	expression tag	UNP Q8TAF3
B	686	LEU	-	expression tag	UNP Q8TAF3
B	687	SER	-	expression tag	UNP Q8TAF3
B	688	ARG	-	expression tag	UNP Q8TAF3
B	689	SER	-	expression tag	UNP Q8TAF3
B	690	THR	-	expression tag	UNP Q8TAF3
B	691	ARG	-	expression tag	UNP Q8TAF3
B	692	GLY	-	expression tag	UNP Q8TAF3
B	693	SER	-	expression tag	UNP Q8TAF3

- Molecule 3 is a protein called Polyubiquitin-B.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	76	Total	C	N	O	S	0	0
			603	380	105	117	1		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	76	ABU	-	linker	UNP P0CG47

- Molecule 4 is a protein called Polyubiquitin-B.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	76	Total	C	N	O	S	0	0
			600	376	105	118	1		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	63	DAB	LYS	engineered mutation	UNP P0CG47

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

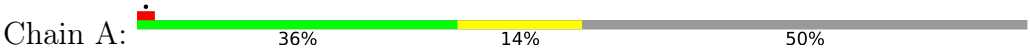
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	

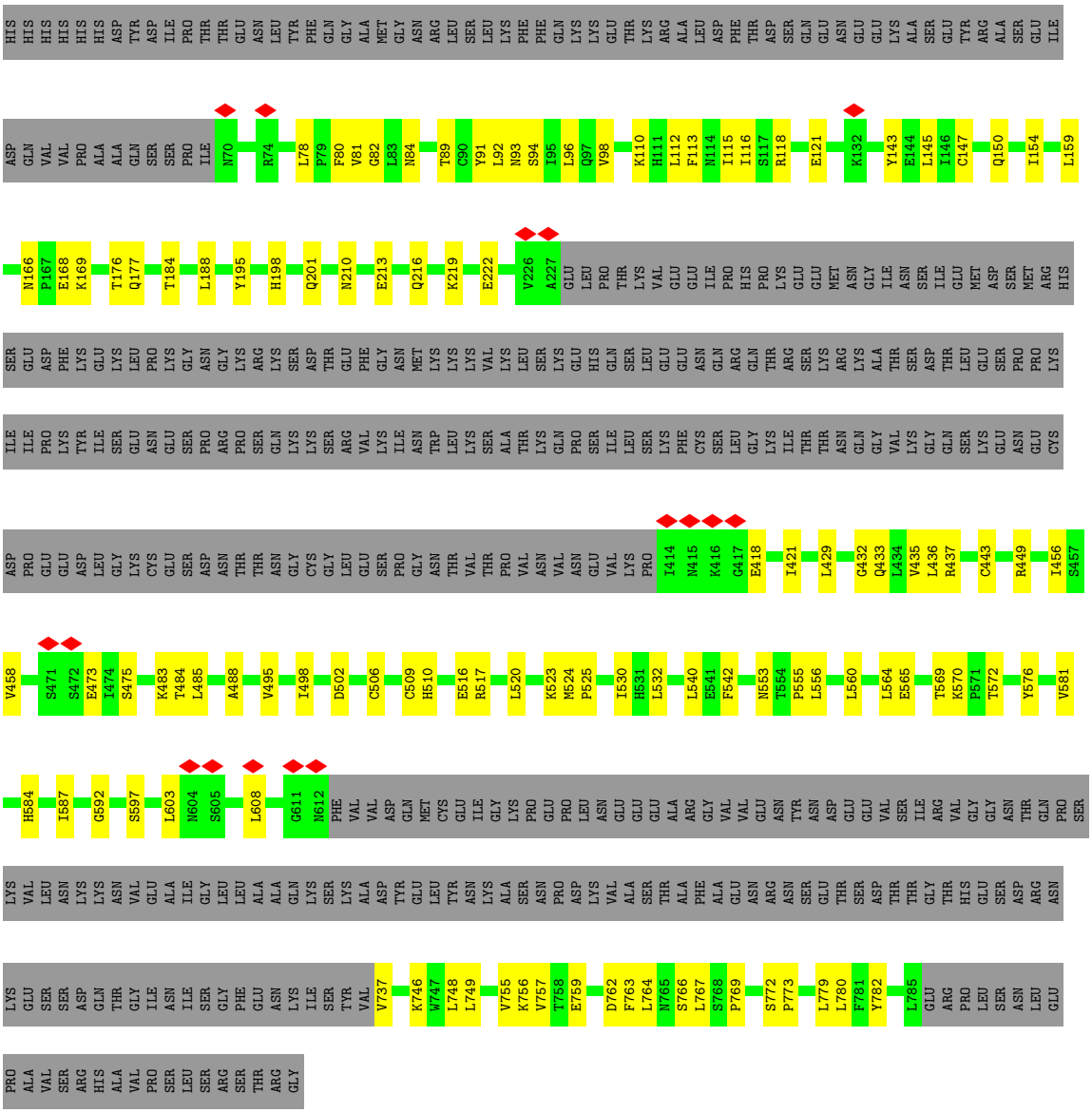
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Ubiquitin carboxyl-terminal hydrolase 1

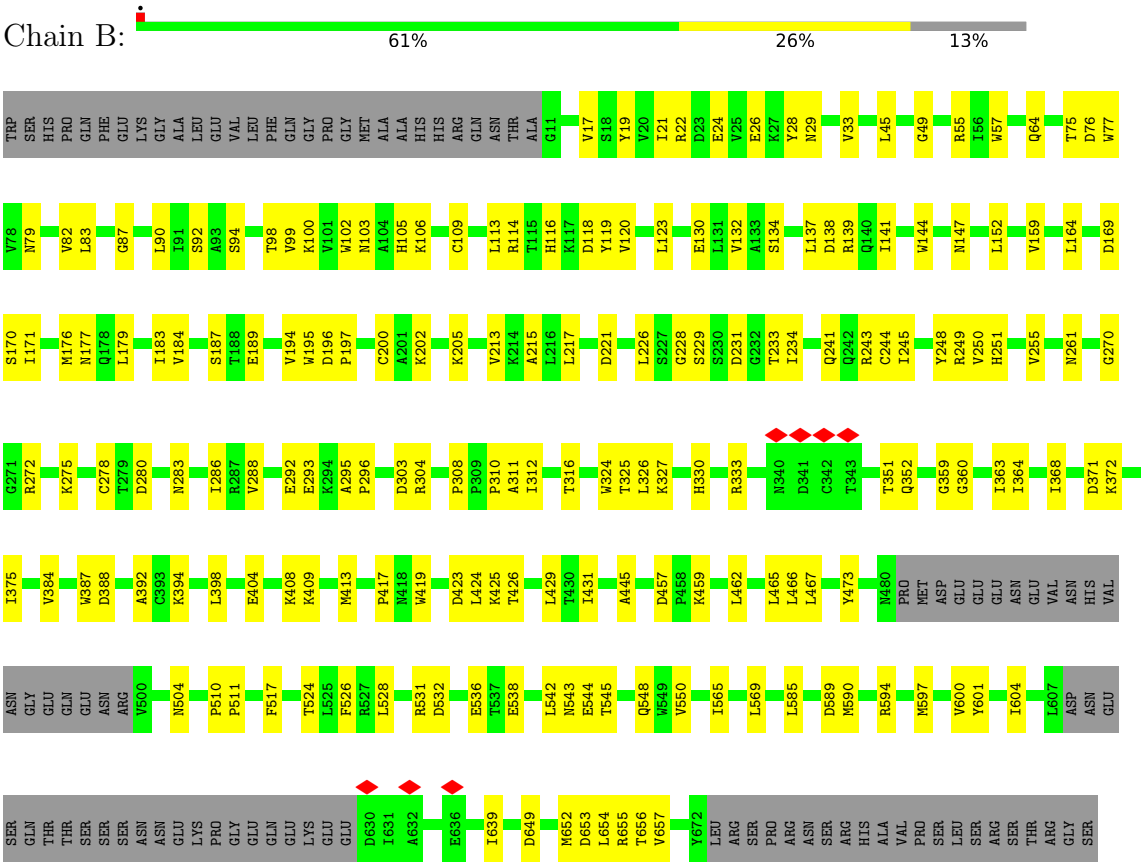
Chain A:





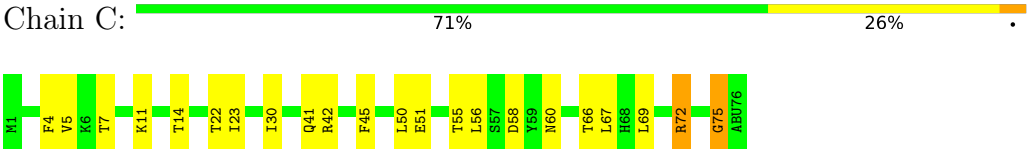
• Molecule 2: WD repeat-containing protein 48

Chain B:



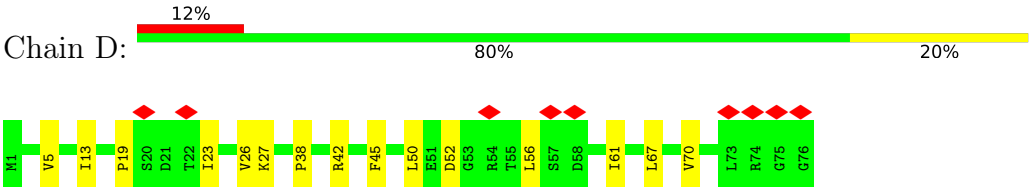
• Molecule 3: Polyubiquitin-B

Chain C:



• Molecule 4: Polyubiquitin-B

Chain D:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	299304	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50.0	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	10500	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.581	Depositor
Minimum map value	-0.343	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.010	Depositor
Recommended contour level	0.0192	Depositor
Map size (Å)	300.96002, 300.96002, 300.96002	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8360001, 0.8360001, 0.8360001	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: DAB, ABU, 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	A	0.29	0/3297	0.47	0/4450
2	B	0.28	0/5004	0.50	0/6787
3	C	0.29	0/603	0.53	0/811
4	D	0.23	0/598	0.47	0/802
All	All	0.28	0/9502	0.49	0/12850

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
3	C	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	C	72	ARG	Sidechain
3	C	75	GLY	Mainchain

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3241	0	3218	77	0
2	B	4904	0	4908	122	0
3	C	603	0	626	17	0
4	D	600	0	621	10	0
5	A	1	0	0	0	0
All	All	9349	0	9373	218	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 12.

All (218) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:115:ILE:HD12	1:A:118:ARG:HH21	1.58	0.69
1:A:502:ASP:HB2	3:C:14:THR:HG23	1.75	0.68
2:B:183:ILE:HG22	2:B:197:PRO:HD3	1.76	0.67
2:B:75:THR:HG21	2:B:524:THR:HG21	1.78	0.66
4:D:19:PRO:HA	4:D:56:LEU:HB2	1.78	0.66
2:B:459:LYS:HE2	2:B:590:MET:HB3	1.79	0.65
1:A:560:LEU:HD21	1:A:764:LEU:HD21	1.78	0.65
2:B:278:CYS:SG	2:B:333:ARG:NH2	2.71	0.63
1:A:145:LEU:HA	1:A:184:THR:HG21	1.81	0.62
1:A:166:ASN:O	1:A:169:LYS:NZ	2.31	0.62
3:C:41:GLN:HB2	3:C:69:LEU:HD11	1.82	0.62
1:A:570:LYS:HE3	1:A:570:LYS:HA	1.82	0.60
2:B:21:ILE:HG22	2:B:387:TRP:CZ3	2.36	0.60
2:B:536:GLU:OE2	2:B:536:GLU:N	2.34	0.60
2:B:241:GLN:HB2	2:B:243:ARG:HG2	1.84	0.60
3:C:45:PHE:HB3	3:C:50:LEU:HD21	1.84	0.59
2:B:21:ILE:CG2	2:B:387:TRP:CZ3	2.86	0.59
4:D:26:VAL:HG21	4:D:56:LEU:HD21	1.85	0.59
2:B:278:CYS:HB3	2:B:288:VAL:HG22	1.85	0.58
2:B:19:TYR:CE1	2:B:466:LEU:HD21	2.39	0.58
2:B:28:TYR:HB3	2:B:359:GLY:HA2	1.84	0.58
2:B:413:MET:SD	2:B:413:MET:N	2.74	0.58
2:B:465:LEU:O	2:B:504:ASN:ND2	2.36	0.58
2:B:29:ASN:OD1	2:B:55:ARG:NH1	2.36	0.58
2:B:600:VAL:HG13	2:B:604:ILE:HD12	1.84	0.57
4:D:23:ILE:HB	4:D:52:ASP:HA	1.87	0.57
1:A:443:CYS:O	2:B:272:ARG:NH1	2.37	0.57
2:B:21:ILE:HG21	2:B:387:TRP:CE3	2.38	0.57
2:B:33:VAL:HA	2:B:49:GLY:HA2	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:137:LEU:HD22	2:B:170:SER:HB3	1.87	0.57
1:A:483:LYS:HB2	1:A:556:LEU:HD22	1.87	0.56
2:B:404:GLU:O	2:B:408:LYS:HG2	2.06	0.56
1:A:517:ARG:NH2	3:C:66:THR:OG1	2.39	0.56
2:B:409:LYS:O	2:B:409:LYS:NZ	2.35	0.55
1:A:506:CYS:HB3	1:A:509:CYS:SG	2.46	0.55
2:B:589:ASP:HB3	2:B:655:ARG:HD3	1.86	0.55
1:A:540:LEU:HG	1:A:542:PHE:H	1.70	0.55
2:B:543:ASN:OD1	2:B:544:GLU:N	2.39	0.55
1:A:78:LEU:HD13	1:A:755:VAL:HG22	1.89	0.55
1:A:581:VAL:HG13	1:A:597:SER:HB3	1.88	0.55
2:B:141:ILE:HB	2:B:164:LEU:HB2	1.89	0.55
1:A:432:GLY:HA3	1:A:525:PRO:HD3	1.89	0.55
3:C:5:VAL:HG22	3:C:67:LEU:HB2	1.89	0.54
2:B:295:ALA:HB3	2:B:316:THR:HB	1.90	0.54
1:A:502:ASP:OD1	1:A:502:ASP:N	2.40	0.54
2:B:92:SER:OG	2:B:102:TRP:NE1	2.24	0.54
1:A:569:THR:OG1	1:A:570:LYS:N	2.41	0.54
2:B:116:HIS:NE2	2:B:134:SER:O	2.37	0.54
1:A:762:ASP:OD1	1:A:762:ASP:N	2.41	0.53
1:A:436:LEU:HB2	1:A:449:ARG:HB2	1.90	0.53
1:A:475:SER:OG	2:B:205:LYS:NZ	2.41	0.53
2:B:79:ASN:ND2	2:B:120:VAL:O	2.41	0.53
2:B:171:ILE:HA	2:B:187:SER:HB3	1.91	0.53
2:B:234:ILE:HB	2:B:248:TYR:HB2	1.91	0.53
1:A:746:LYS:HD2	1:A:759:GLU:HA	1.91	0.52
2:B:132:VAL:HG13	2:B:144:TRP:HB2	1.91	0.52
2:B:601:TYR:HB2	2:B:639:ILE:HG13	1.92	0.52
2:B:19:TYR:HE1	2:B:466:LEU:HD21	1.73	0.52
1:A:483:LYS:HB2	1:A:556:LEU:CD2	2.40	0.51
2:B:184:VAL:HG22	2:B:194:VAL:HG22	1.91	0.51
2:B:526:PHE:HB2	2:B:545:THR:HG21	1.92	0.51
1:A:555:PRO:HD2	1:A:769:PRO:HA	1.93	0.51
2:B:98:THR:HG22	2:B:114:ARG:HG2	1.91	0.51
2:B:325:THR:HG22	2:B:327:LYS:H	1.76	0.51
4:D:56:LEU:HA	4:D:61:ILE:HD12	1.93	0.51
1:A:565:GLU:OE1	1:A:572:THR:N	2.43	0.51
2:B:280:ASP:HB3	2:B:283:ASN:O	2.11	0.51
2:B:141:ILE:HG21	2:B:164:LEU:HD12	1.93	0.51
2:B:371:ASP:N	2:B:371:ASP:OD1	2.44	0.51
2:B:213:VAL:HA	2:B:229:SER:HA	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:272:ARG:HA	2:B:296:PRO:HB3	1.93	0.50
1:A:150:GLN:HE21	1:A:154:ILE:HG12	1.75	0.50
2:B:250:VAL:HG13	2:B:251:HIS:HD2	1.76	0.50
1:A:110:LYS:HA	1:A:150:GLN:OE1	2.11	0.50
2:B:177:ASN:HD21	2:B:179:LEU:HB2	1.77	0.50
1:A:84:ASN:HB2	1:A:177:GLN:HG3	1.93	0.50
2:B:102:TRP:HA	2:B:109:CYS:HA	1.94	0.50
1:A:110:LYS:HE3	1:A:608:LEU:HD22	1.94	0.49
2:B:152:LEU:HD21	2:B:159:VAL:HG23	1.93	0.49
1:A:603:LEU:HB3	1:A:737:VAL:HG13	1.95	0.49
1:A:116:ILE:HG23	1:A:143:TYR:CD2	2.48	0.49
2:B:569:LEU:HD12	2:B:585:LEU:HD12	1.95	0.49
2:B:118:ASP:HB2	2:B:138:ASP:HB3	1.94	0.49
2:B:241:GLN:OE1	2:B:243:ARG:NE	2.43	0.49
2:B:375:ILE:HD12	2:B:429:LEU:HD11	1.95	0.48
2:B:106:LYS:HD3	2:B:106:LYS:N	2.28	0.48
2:B:179:LEU:HD12	2:B:221:ASP:HA	1.94	0.48
2:B:649:ASP:HB3	2:B:652:MET:HB3	1.94	0.48
2:B:82:VAL:HG22	2:B:123:LEU:HD13	1.96	0.48
1:A:524:MET:HA	1:A:524:MET:HE2	1.95	0.48
1:A:532:LEU:HD21	1:A:780:LEU:HD12	1.96	0.48
2:B:139:ARG:HG2	2:B:169:ASP:C	2.34	0.48
2:B:24:GLU:H	2:B:24:GLU:CD	2.17	0.47
1:A:112:LEU:O	1:A:116:ILE:HG12	2.14	0.47
1:A:530:ILE:HD12	1:A:782:TYR:CE1	2.50	0.47
2:B:363:ILE:HG22	2:B:424:LEU:HD13	1.96	0.47
1:A:195:TYR:HB2	4:D:19:PRO:HG2	1.97	0.47
1:A:506:CYS:O	1:A:510:HIS:N	2.47	0.47
2:B:652:MET:SD	2:B:656:THR:HB	2.54	0.47
3:C:51:GLU:H	3:C:51:GLU:CD	2.18	0.47
1:A:495:VAL:HG13	1:A:516:GLU:HB3	1.96	0.47
2:B:215:ALA:HB3	2:B:228:GLY:HA3	1.97	0.47
1:A:749:LEU:HD23	1:A:756:LYS:HE2	1.96	0.46
2:B:261:ASN:HA	2:B:304:ARG:HH12	1.80	0.46
1:A:456:ILE:HG22	1:A:458:VAL:HG23	1.96	0.46
3:C:55:THR:OG1	3:C:56:LEU:N	2.48	0.46
1:A:91:TYR:HH	1:A:198:HIS:HD1	1.61	0.46
4:D:42:ARG:HB3	4:D:70:VAL:HB	1.98	0.46
1:A:159:LEU:HD23	1:A:176:THR:HG22	1.98	0.46
2:B:87:GLY:O	2:B:105:HIS:NE2	2.49	0.46
2:B:234:ILE:HD11	2:B:255:VAL:HG21	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:581:VAL:HG11	1:A:763:PHE:HZ	1.81	0.45
2:B:243:ARG:NH1	2:B:244:CYS:O	2.49	0.45
3:C:7:THR:OG1	3:C:11:LYS:O	2.28	0.45
2:B:351:THR:OG1	2:B:352:GLN:OE1	2.32	0.45
1:A:91:TYR:HD1	3:C:75:GLY:O	1.99	0.45
2:B:244:CYS:SG	2:B:245:ILE:N	2.90	0.45
3:C:60:ASN:O	3:C:60:ASN:ND2	2.49	0.45
2:B:17:VAL:HG22	2:B:517:PHE:HD1	1.82	0.45
1:A:118:ARG:O	1:A:121:GLU:HG3	2.16	0.45
2:B:99:VAL:HG23	2:B:113:LEU:HB2	1.98	0.45
3:C:22:THR:HA	3:C:55:THR:HA	1.99	0.45
2:B:64:GLN:O	2:B:64:GLN:NE2	2.49	0.45
1:A:91:TYR:CE2	1:A:198:HIS:HB2	2.51	0.44
1:A:553:ASN:ND2	1:A:773:PRO:O	2.50	0.44
2:B:565:ILE:HG21	2:B:654:LEU:HD12	1.99	0.44
1:A:213:GLU:O	1:A:216:GLN:HG3	2.17	0.44
2:B:45:LEU:HB3	2:B:57:TRP:HB2	2.00	0.44
2:B:251:HIS:HE1	2:B:270:GLY:HA2	1.82	0.44
4:D:27:LYS:HB3	4:D:38:PRO:HB3	1.99	0.44
2:B:467:LEU:HD13	2:B:550:VAL:HG13	2.00	0.44
1:A:94:SER:O	1:A:98:VAL:HG12	2.17	0.44
2:B:425:LYS:HG3	2:B:426:THR:HG23	2.00	0.44
1:A:188:LEU:HD21	1:A:210:ASN:OD1	2.17	0.44
1:A:435:VAL:HG11	1:A:437:ARG:HH21	1.83	0.44
2:B:29:ASN:O	2:B:360:GLY:N	2.44	0.44
2:B:653:ASP:O	2:B:657:VAL:HG23	2.17	0.44
1:A:80:PHE:HD2	1:A:748:LEU:HD21	1.83	0.43
3:C:58:ASP:OD1	3:C:58:ASP:N	2.51	0.43
1:A:576:TYR:HB3	1:A:782:TYR:HB3	1.99	0.43
2:B:77:TRP:O	2:B:94:SER:OG	2.29	0.43
1:A:418:GLU:HA	1:A:421:ILE:HD12	2.00	0.43
2:B:90:LEU:HB3	2:B:102:TRP:HB2	2.00	0.43
1:A:89:THR:OG1	1:A:93:ASN:OD1	2.32	0.43
2:B:19:TYR:CE1	2:B:431:ILE:HB	2.53	0.43
2:B:233:THR:HG22	2:B:249:ARG:HG2	2.00	0.43
1:A:188:LEU:HD21	1:A:210:ASN:CG	2.39	0.43
2:B:387:TRP:CZ3	2:B:394:LYS:HB2	2.53	0.43
1:A:116:ILE:HD12	1:A:143:TYR:CD2	2.52	0.43
1:A:498:ILE:HG22	1:A:502:ASP:O	2.19	0.43
1:A:766:SER:O	1:A:772:SER:OG	2.25	0.43
2:B:139:ARG:HB2	2:B:139:ARG:NH1	2.33	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:520:LEU:HB3	1:A:569:THR:HG22	2.00	0.43
1:A:587:ILE:HD12	1:A:587:ILE:HA	1.90	0.43
4:D:5:VAL:HB	4:D:13:ILE:HB	2.00	0.43
4:D:45:PHE:HB2	4:D:67:LEU:HD22	1.99	0.43
1:A:433:GLN:HB2	1:A:523:LYS:HB3	2.00	0.43
2:B:311:ALA:HA	2:B:326:LEU:HG	1.99	0.43
2:B:423:ASP:OD1	2:B:423:ASP:N	2.51	0.43
2:B:445:ALA:N	2:B:457:ASP:OD1	2.52	0.43
1:A:92:LEU:O	1:A:96:LEU:HG	2.18	0.42
2:B:176:MET:HG3	2:B:183:ILE:HB	2.01	0.42
2:B:548:GLN:H	2:B:548:GLN:CD	2.22	0.42
1:A:81:VAL:HG12	1:A:82:GLY:O	2.19	0.42
2:B:213:VAL:HG22	2:B:229:SER:HB2	2.02	0.42
1:A:166:ASN:HB2	1:A:168:GLU:OE2	2.20	0.42
1:A:78:LEU:HD21	1:A:757:VAL:HB	2.02	0.42
2:B:303:ASP:HB3	2:B:310:PRO:HD2	2.02	0.42
1:A:219:LYS:O	1:A:222:GLU:HG3	2.20	0.42
1:A:473:GLU:O	2:B:202:LYS:NZ	2.53	0.42
1:A:510:HIS:CE1	2:B:364:ILE:HG13	2.54	0.42
1:A:429:LEU:HD23	1:A:429:LEU:HA	1.88	0.42
2:B:528:LEU:HD12	2:B:532:ASP:HB2	2.01	0.42
1:A:484:THR:OG1	1:A:485:LEU:N	2.53	0.42
2:B:368:ILE:HD11	2:B:372:LYS:HA	2.01	0.42
1:A:115:ILE:HD12	1:A:118:ARG:NH2	2.30	0.41
2:B:293:GLU:OE2	2:B:324:TRP:NE1	2.43	0.41
2:B:100:LYS:HB3	2:B:109:CYS:SG	2.61	0.41
2:B:419:TRP:CH2	2:B:462:LEU:HB3	2.55	0.41
1:A:483:LYS:H	1:A:483:LYS:HG2	1.61	0.41
3:C:23:ILE:HD12	3:C:50:LEU:HD13	2.02	0.41
1:A:201:GLN:HB2	1:A:779:LEU:HD11	2.01	0.41
2:B:130:GLU:OE1	2:B:147:ASN:ND2	2.44	0.41
3:C:4:PHE:O	3:C:66:THR:HA	2.21	0.41
2:B:542:LEU:HD23	2:B:542:LEU:HA	1.79	0.41
3:C:42:ARG:HG2	3:C:72:ARG:NH2	2.35	0.41
4:D:23:ILE:HD12	4:D:50:LEU:HD13	2.03	0.41
1:A:524:MET:SD	1:A:564:LEU:HD12	2.60	0.41
2:B:24:GLU:OE1	2:B:24:GLU:N	2.43	0.41
2:B:164:LEU:HD13	2:B:195:TRP:CG	2.56	0.41
2:B:229:SER:OG	2:B:231:ASP:OD1	2.39	0.41
2:B:417:PRO:HD3	2:B:655:ARG:CZ	2.50	0.41
2:B:119:TYR:HB2	2:B:137:LEU:HD12	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:473:TYR:CD2	2:B:531:ARG:HA	2.56	0.41
2:B:22:ARG:HH21	2:B:26:GLU:HG2	1.86	0.41
2:B:103:ASN:CG	2:B:106:LYS:HG2	2.41	0.41
2:B:286:ILE:HD12	2:B:286:ILE:HA	1.98	0.41
2:B:538:GLU:CD	2:B:538:GLU:H	2.22	0.41
1:A:458:VAL:HG13	1:A:488:ALA:HB1	2.03	0.41
2:B:384:VAL:HG23	2:B:398:LEU:HB2	2.02	0.41
2:B:594:ARG:HA	2:B:597:MET:HG2	2.02	0.41
3:C:5:VAL:HG21	3:C:30:ILE:HD11	2.03	0.41
2:B:196:ASP:O	2:B:200:CYS:N	2.52	0.40
2:B:275:LYS:HG2	2:B:292:GLU:HG3	2.03	0.40
2:B:510:PRO:HA	2:B:511:PRO:HD3	1.92	0.40
2:B:83:LEU:HG	2:B:87:GLY:HA2	2.03	0.40
2:B:312:ILE:HG22	2:B:326:LEU:HD21	2.03	0.40
2:B:308:PRO:HG3	2:B:330:HIS:NE2	2.36	0.40
1:A:584:HIS:NE2	1:A:592:GLY:HA3	2.36	0.40
1:A:767:LEU:HD12	1:A:767:LEU:HA	1.82	0.40
2:B:76:ASP:OD1	2:B:77:TRP:N	2.41	0.40
2:B:82:VAL:O	2:B:90:LEU:HD12	2.21	0.40
2:B:169:ASP:HB2	2:B:189:GLU:HB2	2.04	0.40
2:B:467:LEU:HD23	2:B:467:LEU:HA	1.78	0.40
3:C:41:GLN:HB2	3:C:69:LEU:CD1	2.50	0.40
1:A:113:PHE:HE1	1:A:147:CYS:SG	2.43	0.40
2:B:217:LEU:HB2	2:B:226:LEU:HB2	2.03	0.40
2:B:388:ASP:O	2:B:392:ALA:N	2.52	0.40

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	400/813 (49%)	385 (96%)	15 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	615/712 (86%)	598 (97%)	17 (3%)	0	100	100
3	C	74/76 (97%)	71 (96%)	3 (4%)	0	100	100
4	D	73/76 (96%)	70 (96%)	3 (4%)	0	100	100
All	All	1162/1677 (69%)	1124 (97%)	38 (3%)	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	372/738 (50%)	372 (100%)	0	100	100
2	B	546/626 (87%)	546 (100%)	0	100	100
3	C	68/68 (100%)	68 (100%)	0	100	100
4	D	67/67 (100%)	67 (100%)	0	100	100
All	All	1053/1499 (70%)	1053 (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 (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	150	GLN
1	A	197	GLN
1	A	205	GLN
3	C	49	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)

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	$\#\|Z\| > 2$
4	DAB	D	63	4,3	5,6,7	0.59	0	1,6,8	0.15	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
4	DAB	D	63	4,3	-	0/4/5/7	-

There are no bond length outliers.

There are no bond angle outliers.

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

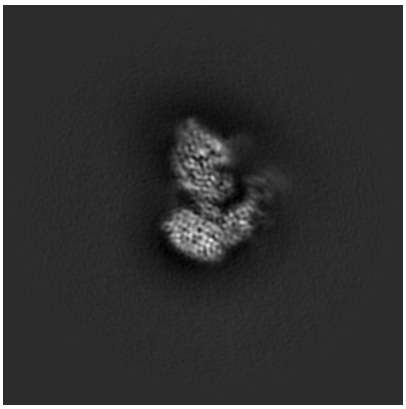
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-52316. These allow visual inspection of the internal detail of the map and identification of artifacts.

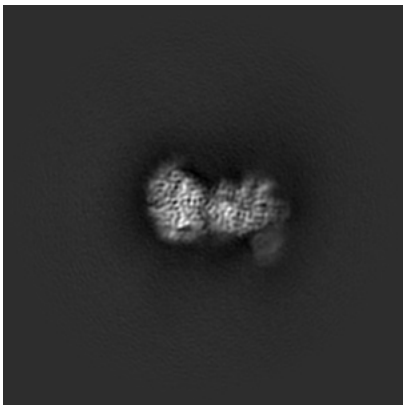
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

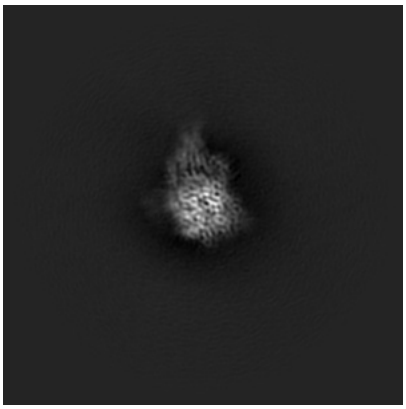
6.1.1 Primary map



X

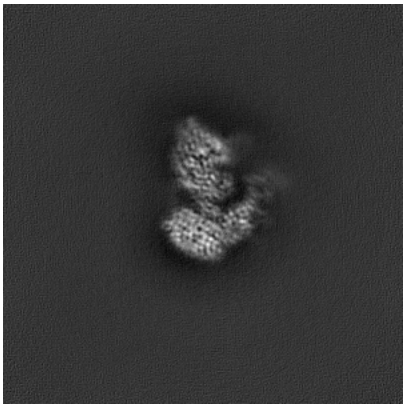


Y

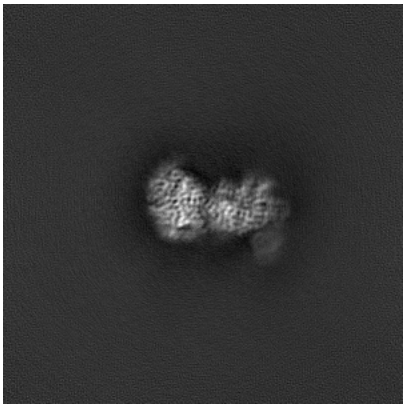


Z

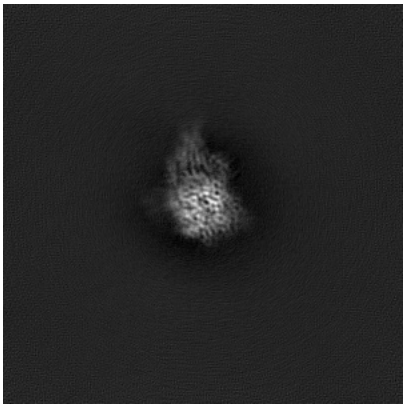
6.1.2 Raw map



X



Y

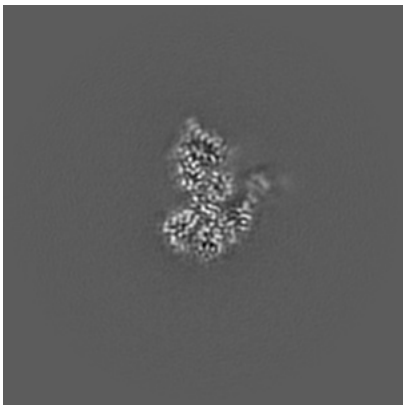


Z

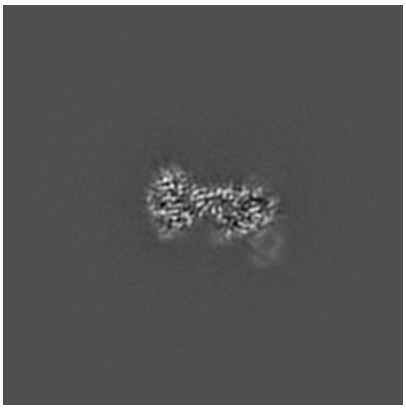
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

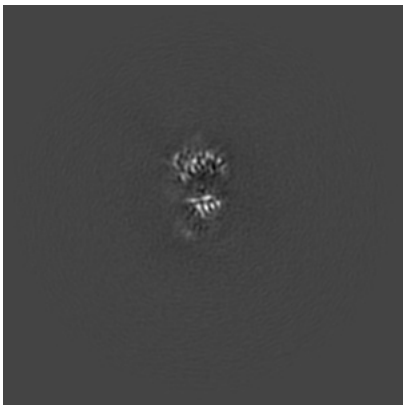
6.2.1 Primary map



X Index: 180

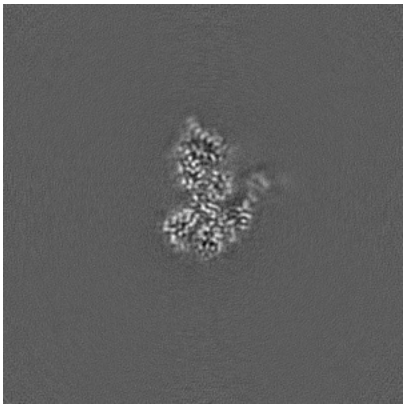


Y Index: 180

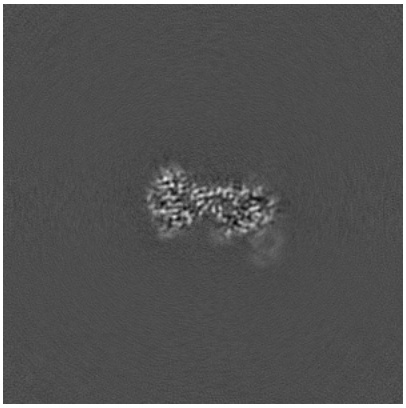


Z Index: 180

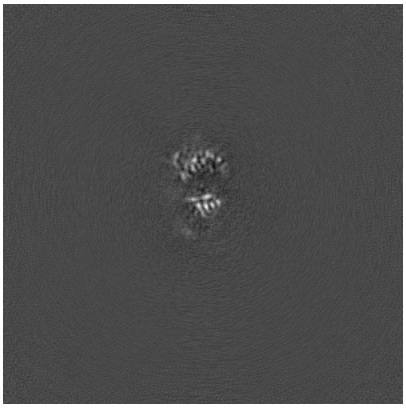
6.2.2 Raw map



X Index: 180



Y Index: 180

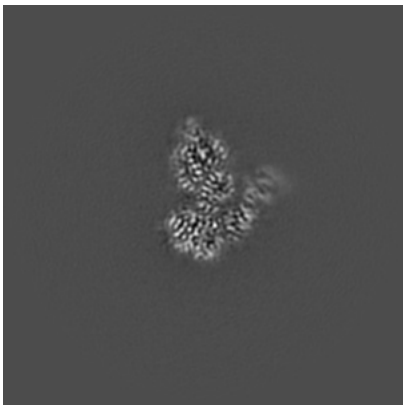


Z Index: 180

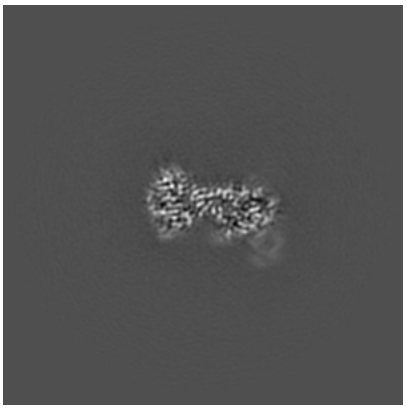
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

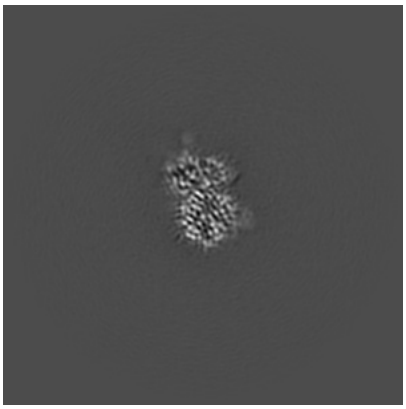
6.3.1 Primary map



X Index: 175

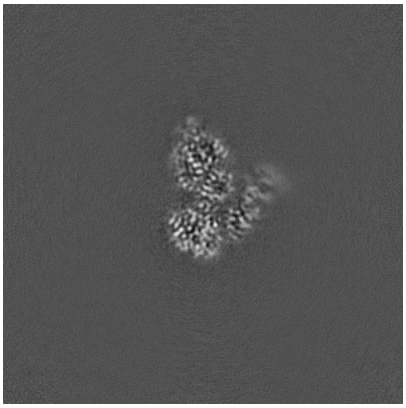


Y Index: 180

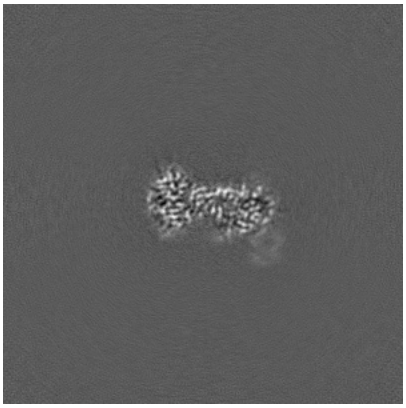


Z Index: 161

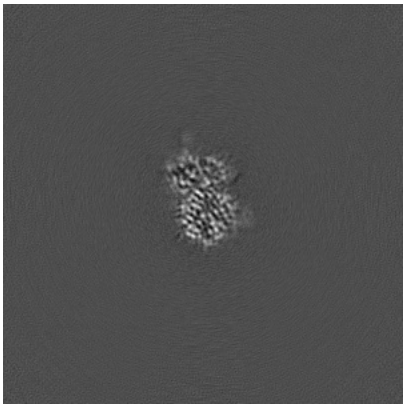
6.3.2 Raw map



X Index: 174



Y Index: 181

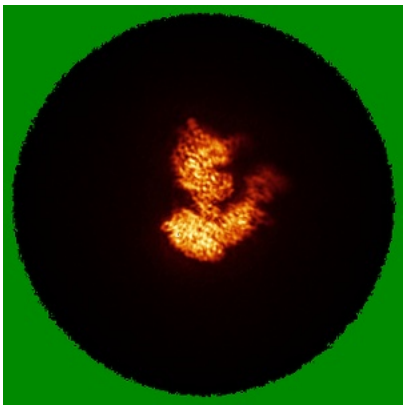


Z Index: 161

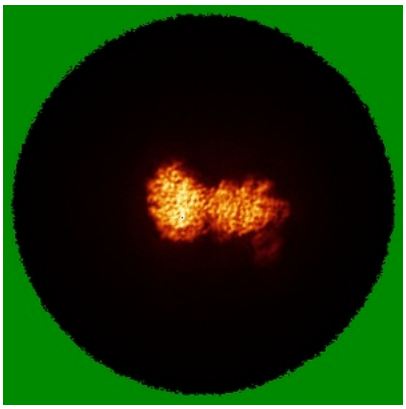
The images above show the largest variance slices of the map in three orthogonal directions.

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

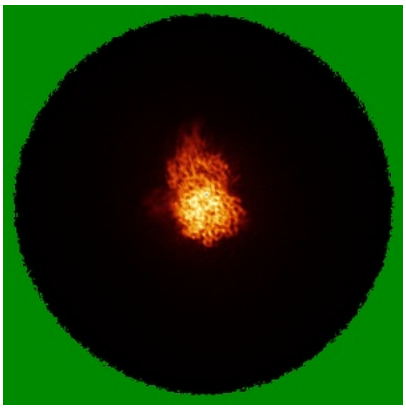
6.4.1 Primary map



X

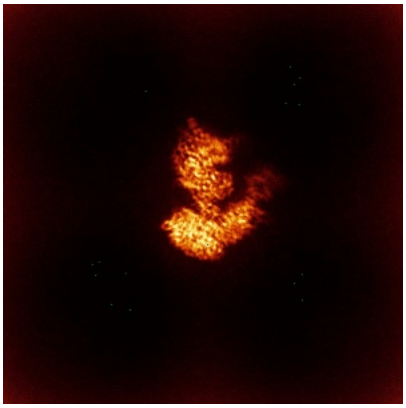


Y

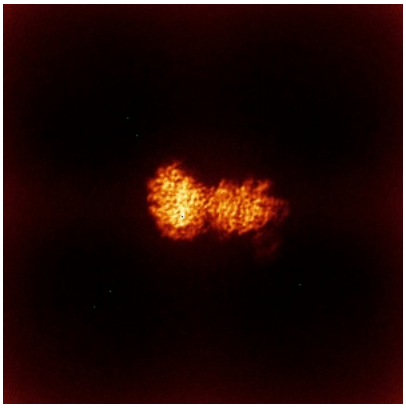


Z

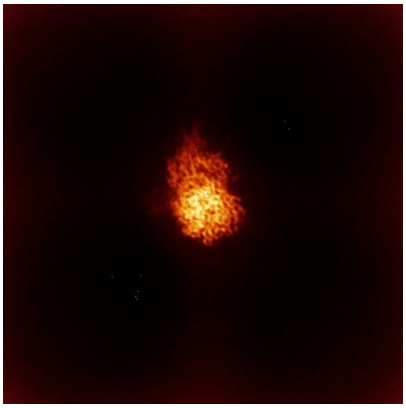
6.4.2 Raw map



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 0.0192. 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.

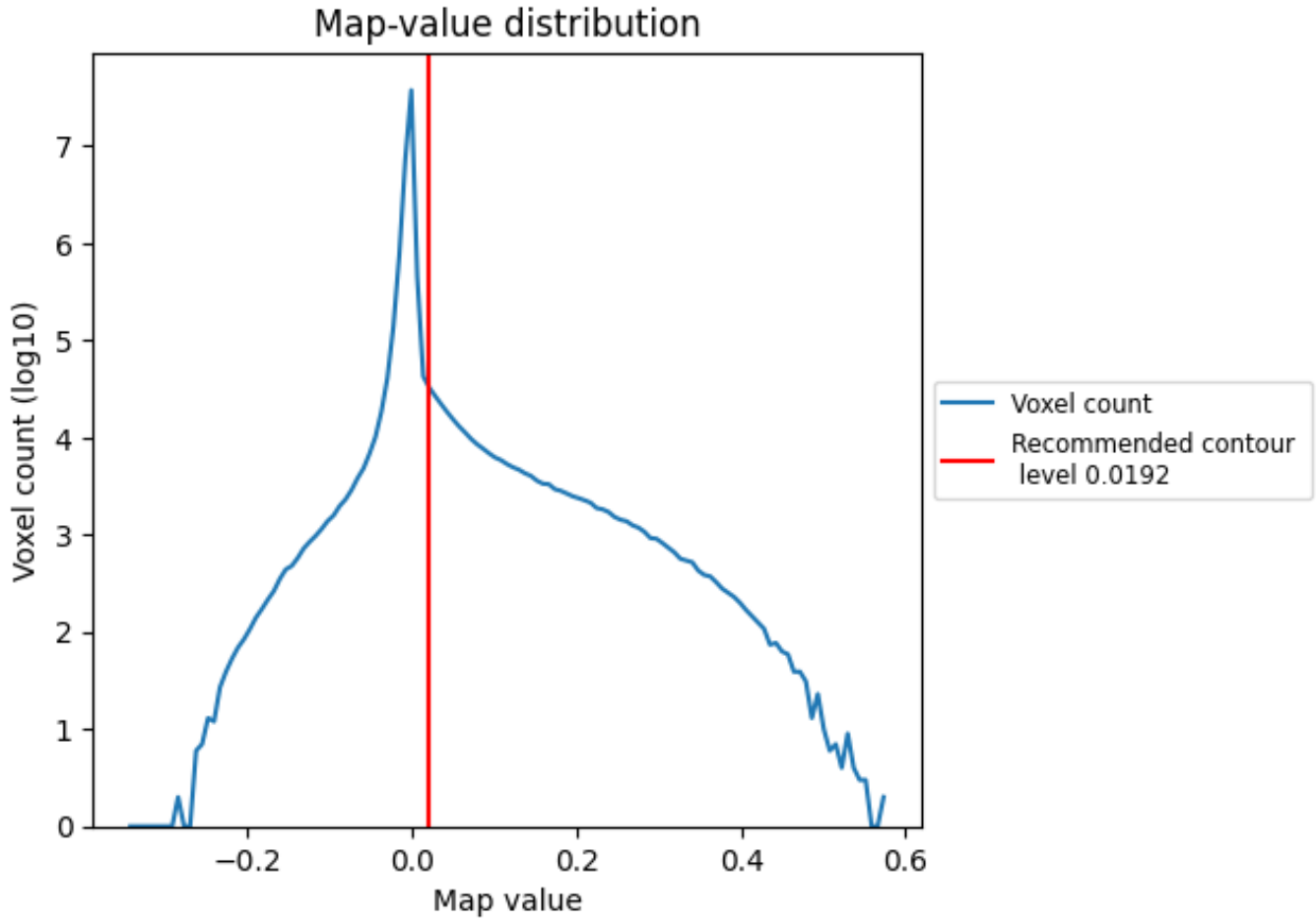
6.6 Mask visualisation (i)

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

7 Map analysis

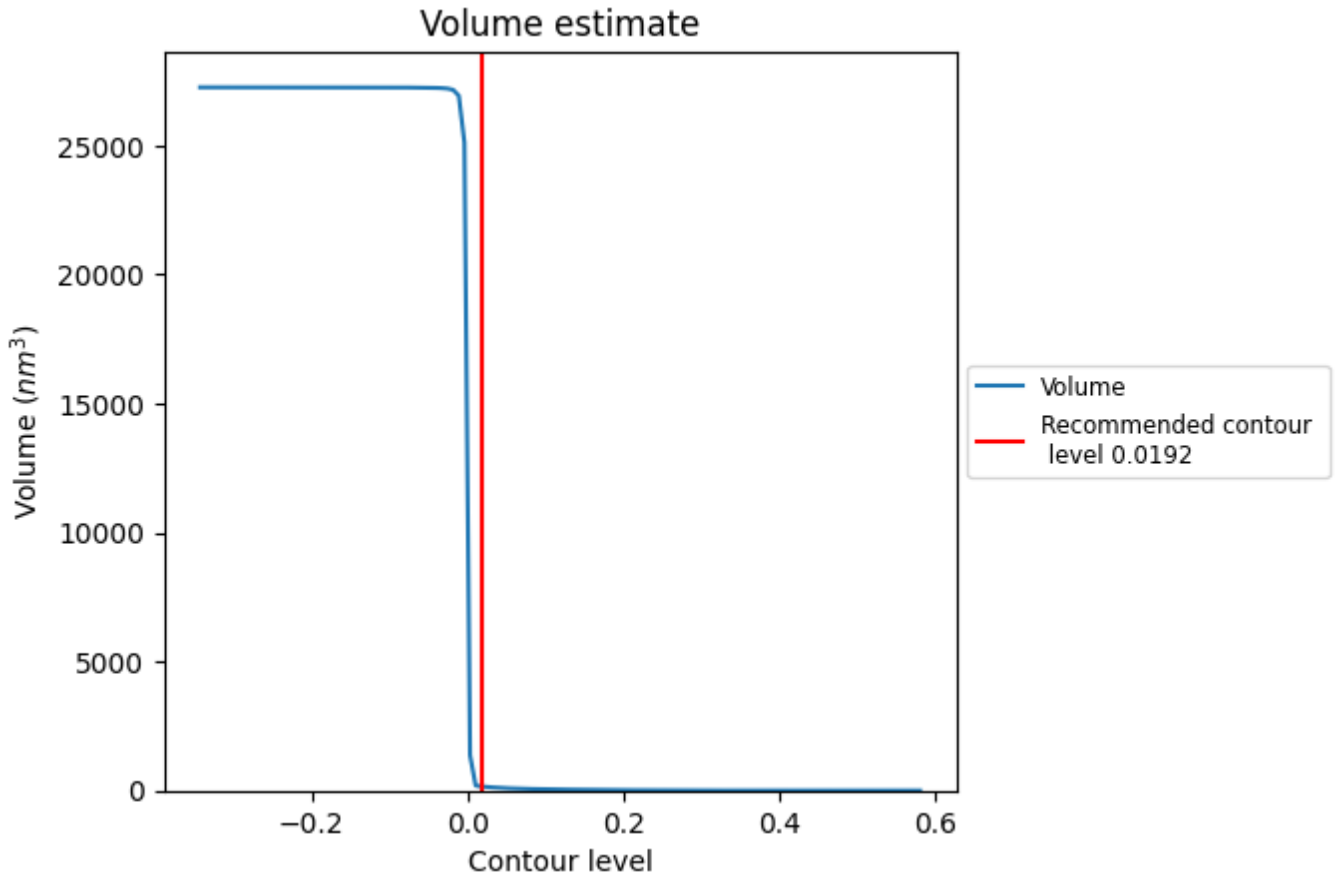
This section contains the results of statistical analysis of the map.

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.

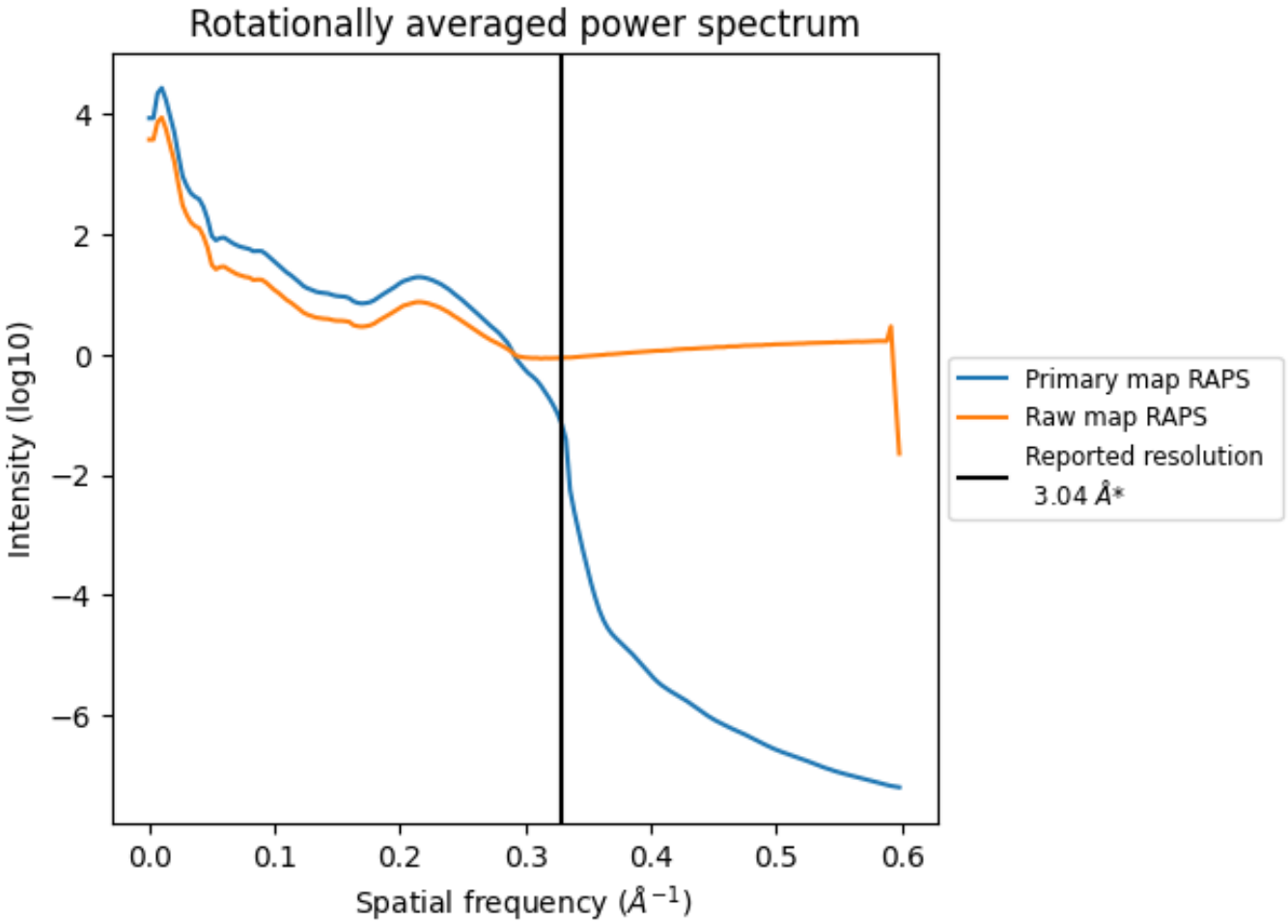
7.2 Volume estimate (i)



The volume at the recommended contour level is 155 nm^3; this corresponds to an approximate mass of 140 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)

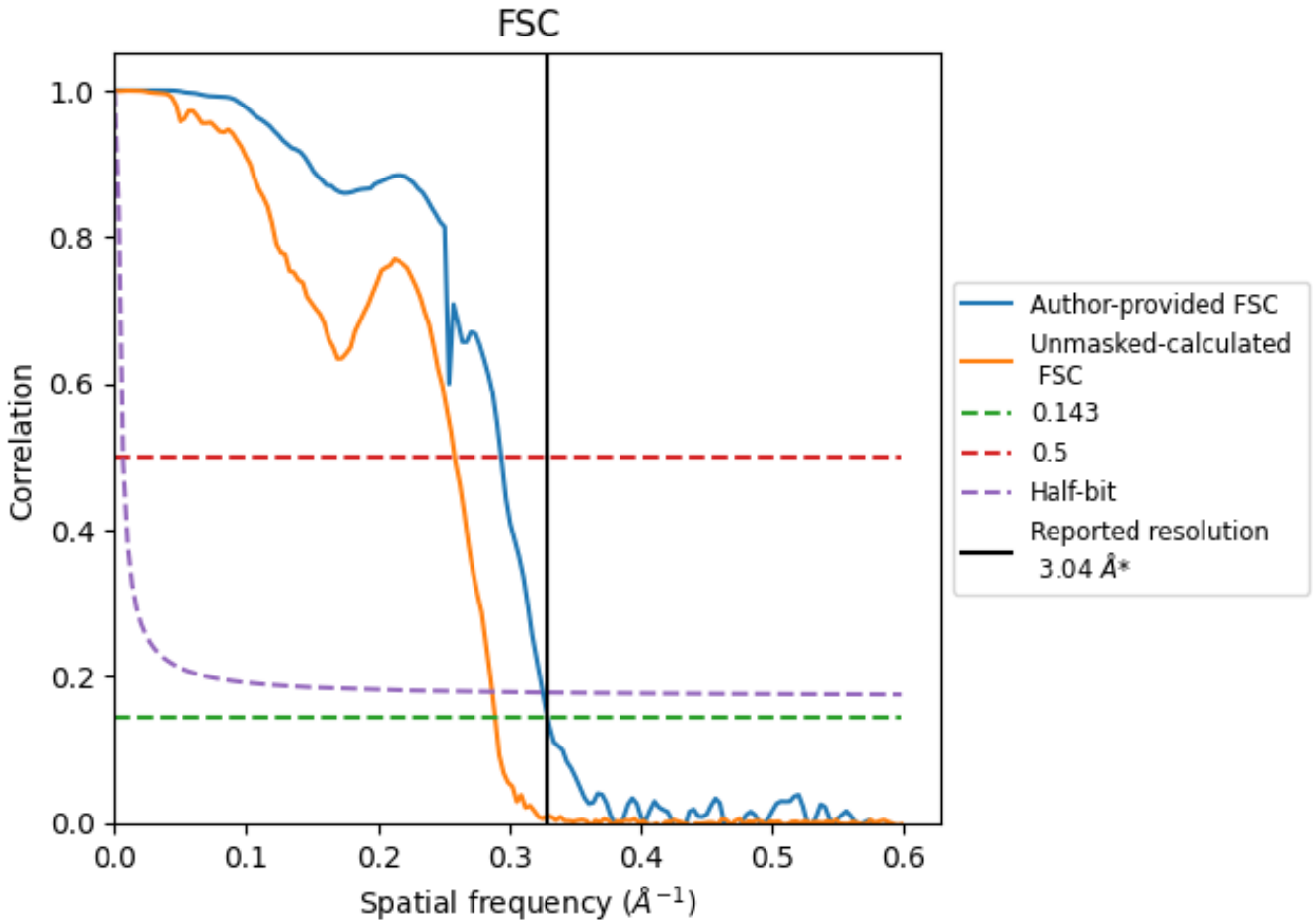


*Reported resolution corresponds to spatial frequency of 0.329 Å^{-1}

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 0.329 Å^{-1}

8.2 Resolution estimates (i)

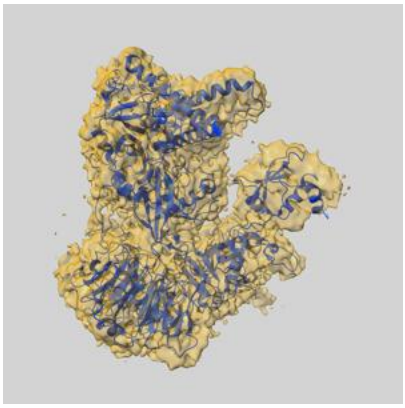
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.04	-	-
Author-provided FSC curve	3.04	3.40	3.07
Unmasked-calculated*	3.46	3.87	3.48

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.46 differs from the reported value 3.04 by more than 10 %

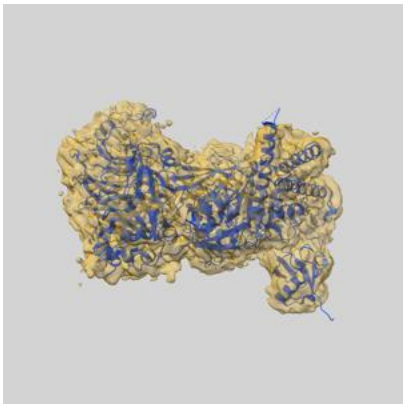
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-52316 and PDB model 9HNW. Per-residue inclusion information can be found in section 3 on page 7.

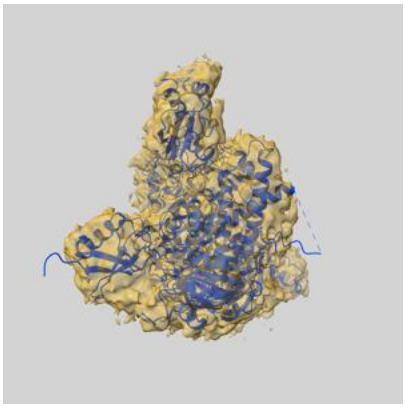
9.1 Map-model overlay



X



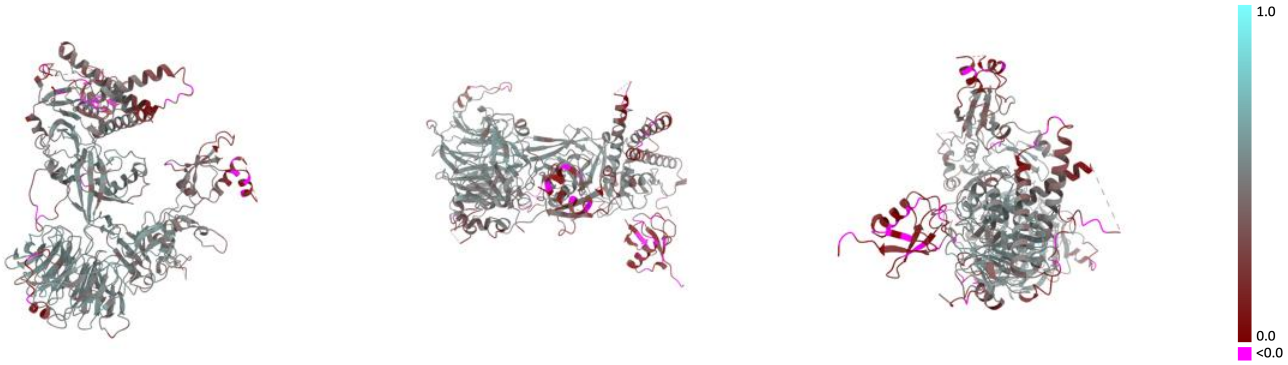
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0192 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.

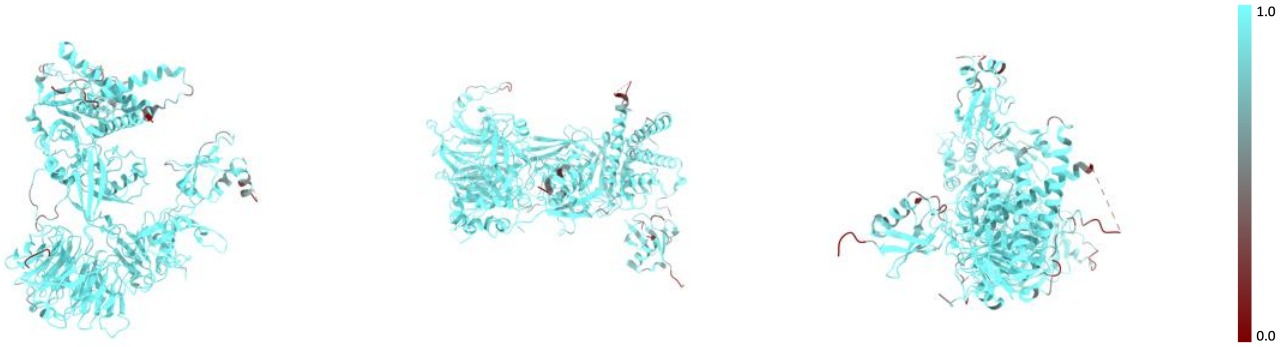
9.2 Q-score mapped to coordinate model (i)



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.

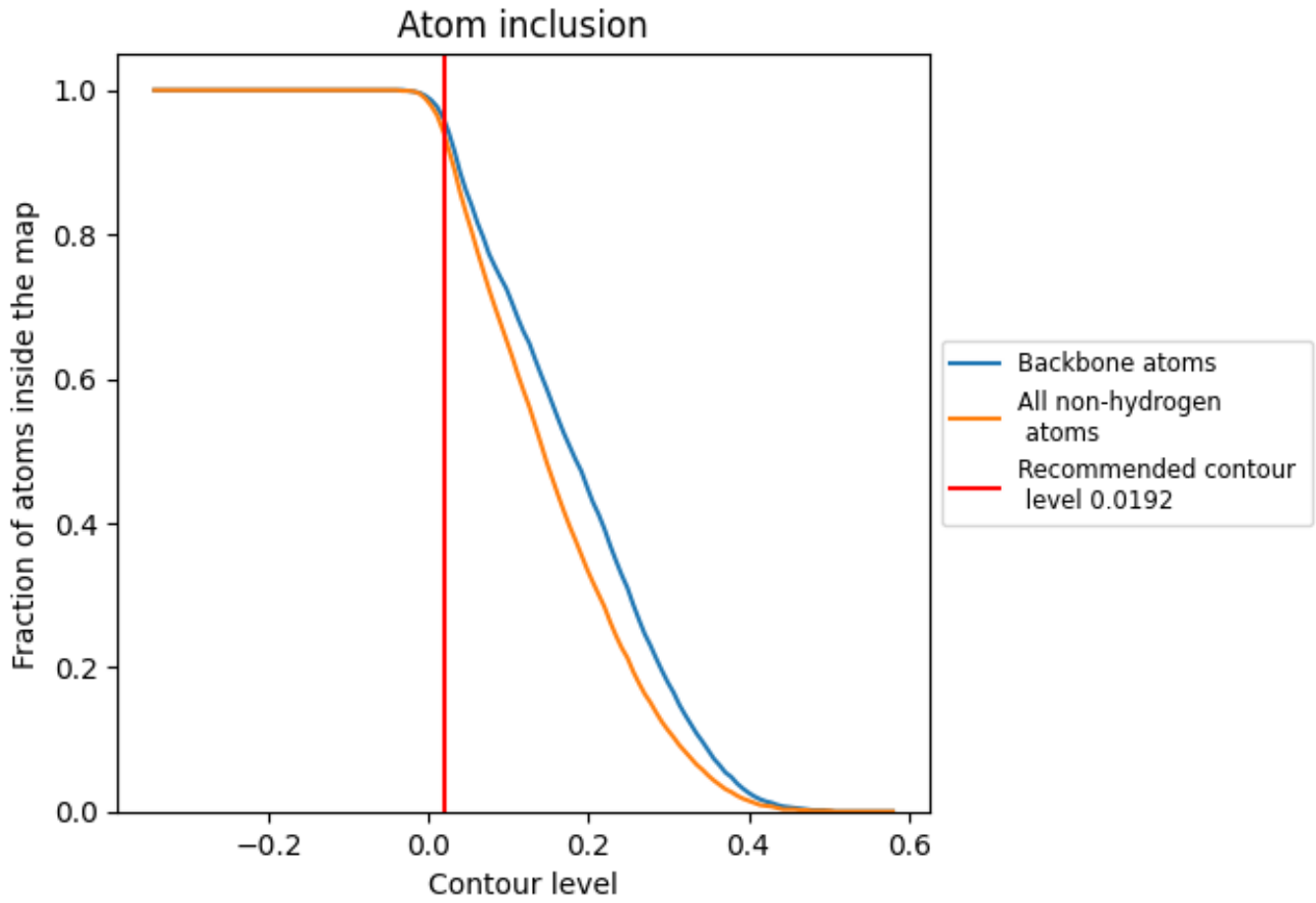
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.0192).

9.4 Atom inclusion (i)



At the recommended contour level, 96% of all backbone atoms, 94% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.0192) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9400	0.4220
A	0.9270	0.4150
B	0.9620	0.4550
C	0.9950	0.5120
D	0.7830	0.0980