wwPDB EM Validation Summary Report (i)

Nov 28, 2023 – 03:39 pm GMT

PDB ID	:	8Q84
EMDB ID	:	EMD-18246
Title	:	Outer kinetochore Dam1 protomer dimer Ndc80-Nuf2 coiled-coil complex
Authors	:	Muir, K.W.; Barford, D.
Deposited on	:	2023-08-17
Resolution	:	3.15 Å(reported)
Based on initial model	:	.

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 (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 (i)) were used in the production of this report:

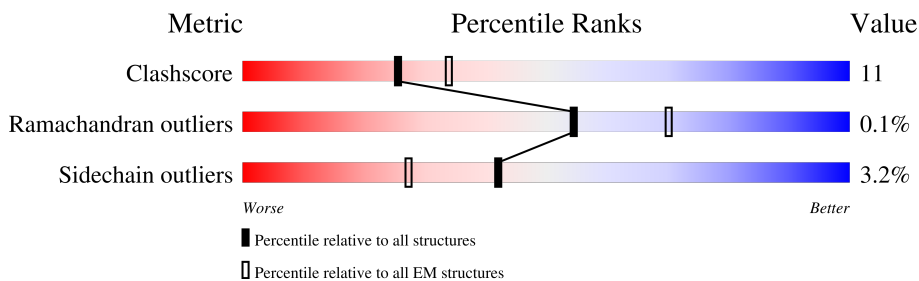|		
EMDB validation analysis	:	0.0.1.dev70
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)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

1   Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.15 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.
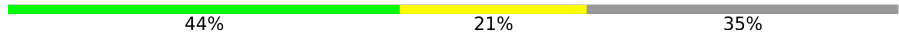
Metric	Percentile Ranks	Value
Clashscore		11
Ramachandran outliers		0.1%
Sidechain outliers		3.2%

Worse   *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures
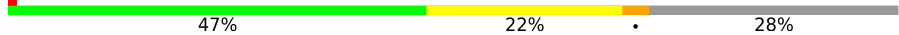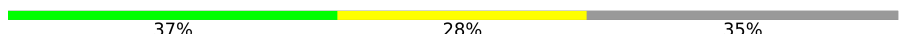
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	691	25% / 42% 57%
1	F	691	26% / 42% 57%
2	B	451	30% / 52% 47%
2	G	451	31% / 51% · 48%
3	I	343	20% 7% · 72%
3	U	343	19% 7% · 72%
3	e	343	· 97%
4	J	247	34% 13% 53%

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Mol	Chain	Length	Quality of chain
4	V	247	36% 11% 53%
5	K	133	60% 19% 20%
5	W	133	70% 9% 20%
6	L	94	44% 21% 35%
6	X	94	47% 22% 28%
7	M	72	56% 44%
7	Y	72	69% 31%
8	N	94	63% 33%
8	Z	94	72% 26%
9	O	295	59% 19% 20%
9	a	295	77% 21%
10	P	292	15% 7% 78%
10	b	292	23% 76%
11	Q	69	68% 23% 7%
11	c	69	93% 7%
12	R	165	37% 28% 35%
12	d	165	62% 35%

2 Entry composition ⓘ

There are 12 unique types of molecules in this entry. The entry contains 21802 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 Kinetochore protein NDC80.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	294	Total 1463	C 875	N 294	O 294		0	0
1	F	294	Total 1463	C 875	N 294	O 294		0	0

- Molecule 2 is a protein called Kinetochore protein NUF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	237	Total 1180	C 706	N 237	O 237		0	0
2	G	236	Total 1175	C 703	N 236	O 236		0	0

- Molecule 3 is a protein called DASH complex subunit DAM1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	95	Total 757	C 474	N 126	O 153	S 4	0	0
3	U	95	Total 757	C 474	N 126	O 153	S 4	0	0
3	e	11	Total 82	C 50	N 14	O 18		0	0

- Molecule 4 is a protein called DASH complex subunit DUO1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	J	117	Total 935	C 580	N 167	O 185	S 3	0	0
4	V	117	Total 935	C 580	N 167	O 185	S 3	0	0

- Molecule 5 is a protein called DASH complex subunit DAD2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	K	106	Total	C	N	O	S	0	0
			837	519	139	174	5		
5	W	106	Total	C	N	O	S	0	0
			837	519	139	174	5		

- Molecule 6 is a protein called DASH complex subunit DAD1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	L	61	Total	C	N	O	S	0	0
			485	304	79	101	1		
6	X	68	Total	C	N	O	S	0	0
			535	334	86	114	1		

- Molecule 7 is a protein called DASH complex subunit DAD4.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	M	72	Total	C	N	O	S	0	0
			571	351	106	111	3		
7	Y	72	Total	C	N	O	S	0	0
			571	351	106	111	3		

- Molecule 8 is a protein called DASH complex subunit DAD3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	N	92	Total	C	N	O	S	0	0
			744	461	130	152	1		
8	Z	94	Total	C	N	O	S	0	0
			761	471	132	156	2		

- Molecule 9 is a protein called DASH complex subunit SPC34.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	O	235	Total	C	N	O	S	0	0
			1929	1213	342	367	7		
9	a	234	Total	C	N	O	S	0	0
			1925	1211	341	366	7		

- Molecule 10 is a protein called DASH complex subunit ASK1.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	P	65	Total	C	N	O	S	0	0
			527	332	83	108	4		

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Mol	Chain	Residues	Atoms					AltConf	Trace
10	b	70	Total	C	N	O	S	0	0
			561	352	88	116	5		

- Molecule 11 is a protein called DASH complex subunit HSK3.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	Q	64	Total	C	N	O	S	0	0
			527	327	94	101	5		
11	c	64	Total	C	N	O	S	0	0
			527	327	94	101	5		

- Molecule 12 is a protein called DASH complex subunit SPC19.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	R	108	Total	C	N	O	S	0	0
			859	532	149	172	6		
12	d	108	Total	C	N	O	S	0	0
			859	532	149	172	6		

3 Residue-property plots ⓘ

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

• Molecule 1: Kinetochore protein NDC80

Chain A:

• Molecule 1: Kinetochore protein NDC80

Chain F:

• Molecule 2: Kinetochore protein NUF2

Chain B:

30%

52%

47%

E386 D392 K393 I396 F397 I398 Q399 E400 E401 S404 G405 N408 K409 L410 N411 D412 E413 I414 K415 Q416 L417 Q418 K419 D420 F421 E422 V423 E424 V425 K426 E427 I428 E429 I430 E431 Y432 S433 L434 L435 S436 G437 H438 I439 N440 K441 Y442 M443 N444 E445 M446 L447 GLU TYR MET GLN

• Molecule 2: Kinetochore protein NUF2

Chain G:

31%
51% • 48%

MET SER ARG ASN GLN ASP VAL PHE PRO ILE LEU ASP LEU GLN GLU LEU VAL ILE CYS LEU GLN SER CYS ASP PHE ALA LEU ALA THR GLN GLU ASN ILE SER ARG PRO THR SER ASP TYR MET VAL THR LEU TYR LYS GLN ILE ILE GLU ASN MET PHE MET GLY SER VAL GLU SER LEU

LEU ASN SER ASN GLN GLU GLU THR GLY ASP GLY HIS LEU GLU GLU GLU GLU ASN LYS GLU GLU ILE GLU LEU LYS LEU TYR LEU ASP THR LEU ASN VAL LEU VAL LEU ASN LYS ILE CYS PHE LYS PHE GLU ASP ASN ILE GLY VAL GLN ASP PHE ASN MET THR ASP LEU TYR LYS PRO GLU ALA GLN ARG THR GLN

ARG LEU LEU SER ALA VAL VAL ASN TYR ALA ARG PHE ARG GLU GLU MET PHE ASP CYS ASN SER PHE ILE LEU GLN LEU MET GLU LEU SER LEU LEU LEU GLY GLN LEU LEU ARG SER LYS PHE ASP ASP TYR ASN ILE LEU GLN GLN LEU LEU LYS GLN LEU TYR GLU ASP VAL ASP GLY ASP ASN ILE PRO

ASP GLU GLN GLU LEU GLN LYS LEU LEU GLU GLU GLN ASN LYS GLU GLU ILE GLU LEU LYS LYS LEU THR LYS ILE GLN GLU GLU ILE D212 Y213 N214 D215 Y216 K217 I218 S219 K220 Q221 S222 I223 F224 K225 D226 L227 E228 A229 L230 S231 F232 Q233 I234 V235 E236 L237 E238 S239 N240

R241 D242 K243 L244 I245 K246 I247 S248 N249 T250 D251 M252 E253 E254 L255 S256 E257 G258 I259 K260 E261 L262 N263 D264 L265 L266 I267 Q268 R269 K270 K271 T272 T273 D274 D275 L276 T277 A278 Q279 Q280 K281 N282 L283 Q284 D285 T286 V287 T288 T289 F290 E291 T292 S295 D299 R302 I303 I304

S305 S306 E307 V308 Q309 T316 E317 V335 I340 I396 F397 I398 Q399 E400 E401 L402 I403 S404 G405 K406 I407 N408 K409 L410 N411 D412 E413 I414 K415 Q416 L417 Q418 K419 D420 F421 E422 V423 E424 V425 K426 E427 I428 E429 I430 E431 Y432 S433 L434 L435 S436 G437 H438 I439 N440 K441 Y442

M443 N444 E445 M446 L447 GLU TYR MET GLN

• Molecule 3: DASH complex subunit DAM1

Chain I:

20% 7% • 72%

MET SER GLU ASP LYS ALA LYS LEU GLY THR THR ARG ALA SER ALA THR GLU TYR ARG LEU SER ILE GLY SER ALA PRO THR SER ARG ARG SER SER MET GLY GLU SER SER LEU MET LYS PHE ALA ASP GLN GLU GLY LEU THR SER SER VAL GLY GLU TYR ASN GLU N57 Q60 Q61

L62 L63 L64 P65 D78 T82 H88 E89 E96 S97 L98 L102 Y103 M106 P118 I121 I128 K129 Q130 L131 K132 S133 L134 L141 V142 M143 E144 L145 G151 ILE LYS ARG LYS ASP GLU GLY GLU ASN ASP LEU ALA LYS ALA SER GLN ASN LYS

GLN PHE ASN GLN PRO LEU PHE PRO SER SER GLN VAL THR LYS TYR ARG SER TYR ASP ASN ARG ASP LYS ARG LYS PRO SER LYS ILE LEU GLY ASN ASN LEU GLU VAL GLU ASN GLU GLU ASP TYR GLU GLU ASP THR SER SER GLU ALA SER PHE VAL LEU LEU PRO THR ASN ILE GLY MET

SER LYS SER SER GLN GLY HIS VAL THR LYS THR THR ARG LEU ASN ASN ASN THR ASN SER LYS LEU LEU ARG LYS ARG SER ILE LEU LEU HIS ILE ARG ASN SER ILE ALA SER GLY ALA ASP LEU PRO GLU ASP ILE GLU GLY ASP ASN ASP VAL VAL ASN LEU ASP GLY ASP HIS PRO THR ASN ILE GLY MET

SER LEU GLY SER GLY ALA ALA ARG VAL VAL ASN GLY VAL PRO VAL THR LYS ASN ASN ARG ASN SER MET PHE SER GLY ARG ALA ALA GLU LYS PRO THR GLU SER ARG HIS SER VAL ALA LYS LYS THR GLU LYS LYS ILE ILE THR ARG PRO PRO PHE ARG

• Molecule 3: DASH complex subunit DAM1

Chain U:

19% 7% • 72%

MET SER GLU ASP LYS ALA LYS LEU GLY THR THR ARG SER ALA THR GLU TYR ARG LEU SER ILE GLY SER ALA PRO THR SER ARG SER SER MET GLY GLU SER SER LEU MET LYS PHE ALA ASP GLN GLU GLY LEU THR SER SER VAL GLY GLU TYR ASN GLU N57 T58 I59 Q60

Q61 L62 L63 L64 P65 K66 I67 D72 I75 E96 W110 D120 I121 Q122 D123 D124 L125 I126 A127 I128 K129 Q130 L131 E135 K138 N139 N140 L141 V142 M143 E144 M148 G151 ILE LYS ARG LYS LYS ASP GLU GLN GLY GLU ASN ASP LEU ALA LYS ALA SER GLN

ASN LYS GLN PHE ASN GLN PRO LEU PHE PRO SER PRO SER GLN VAL ARG LYS TYR ARG SER TYR ASP ASN ARG ASP LYS ARG LYS SER PRO LYS LEU ILE GLY ASN ASN LEU GLN GLU VAL GLU GLU ASP TYR GLU ASP THR SER SER GLU ALA SER PHE VAL LEU ASN PRO THR ASN ILE

GLY MET SER LYS SER SER GLN GLY HIS VAL THR LYS THR ARG LEU ASN ASN THR ASN SER SER LEU ARG ARG LYS SER ILE LEU HIS THR ILE ARG ASN ILE ALA SER GLY ALA ASP LEU PRO ILE GLU ASN ASP VAL ASN LEU ASP LEU HIS PRO ASN ASN

ARG ILE SER GLY SER GLY ALA ARG VAL VAL ASN GLY PRO VAL THR LYS ASN ARG ASN SER MET PHE GLY ARG GLU ARG PRO THR GLU SER HIS SER VAL ALA LYS THR GLU LYS ILE ASN THR ARG PRO PHE ARG

• Molecule 3: DASH complex subunit DAM1

Chain e: • .... 97% ....

MET SER GLU ASP LYS ALA LYS LEU GLY THR ARG S13 S23 ALA PRO THR SER ARG SER MET GLY GLU SER SER SER LEU MET LYS PHE ALA ASP GLN GLU GLY LEU THR SER VAL GLY GLU TYR ASN GLU ASN THR ILE GLN LEU LEU LEU PRO LYS ILE ARG

GLU LEU SER SER ILE ILE THR LEU ASP SER ASN PHE THR ARG LEU ASN PHE ILE HIS GLU LEU LEU ALA ASP LEU ASN GLU SER LEU GLY SER LEU LEU TYR ILE MET SER ASN TRP CYS VAL GLU PHE SER GLN ALA PRO HIS ASP ILE GLN ASP LEU ILE ILE ALA ILE

LYS GLN LEU LYS SER LEU ASP GLU LYS ASN SER ILE GLY ASN LEU VAL MET GLU LEU SER ASN MET GLU GLY ILE LYS ARG LYS ASP GLU GLN GLY GLU ASP ASP THR SER GLU ALA PHE VAL LEU ASN PRO ASN ASN ARG ILE SER LEU GLY SER GLN PHE PRO SER SER VAL ARG LYS TYR ARG SER

TYR ASP ASN ARG ASP LYS ARG LYS SER PRO SER LYS ILE GLY ASN ASN LEU GLN GLU VAL GLU GLU ASP TYR GLU ASP THR SER SER GLU ALA PHE VAL LEU ASN PRO ASN ILE GLY MET SER LYS SER SER GLN GLY HIS VAL THR LYS THR ARG LEU ASN ASN

THR ASN SER SER LEU ARG ARG LYS SER ILE LEU HIS THR ILE ARG ASN ILE ALA SER GLY ALA ASP LEU PRO ILE GLU ASN ASP VAL ASN LEU ASP LEU HIS PRO ASN ASN ARG ILE SER GLY SER GLY ALA ARG VAL VAL ASN GLY PRO VAL THR LYS ASN

ARG ASN SER MET PHE SER GLY ARG ALA GLU ARG LYS PRO THR GLU SER HIS SER VAL ALA LYS THR GLU LYS ILE ASN THR ARG PRO PRO PHE ARG

• Molecule 4: DASH complex subunit DUO1

Chain J: ▬▬▬▬▬▬▬ 34% ▬▬▬▬ 13% ▬▬▬▬▬▬▬▬ 53%

MET SER GLU GLN SER GLN LEU ASP ASP SER THR ILE ASP LYS LEU ILE PRO GLN ILE PHE ASN GLU MET ARG SER ASN LEU ASN ASN THR THR ASN LYS PHE PRO LYS SER THR GLY GLY ALA SER ASP ASN ILE SER ALA ASN SER ASN SER ILE ARG SER PHE ASN SER ILE T60

T61 Q62 S63 L64 L65 K66 E67 S68 E69 S70 L71 I74 M77 I78 L85 L89 Y92 V96 V99 N104 M112 I113 H114 S115 Q116 I120 M124 Y129 N139 V142 N143 D146 I163 L166 R167 E176 LYS ASP ALA ALA PRO ALA

LYS PRO PRO ASN GLN GLY LEU ASN PRO ARG TYR GLY VAL GLN SER GLY ARG ARG PRO VAL PRO SER ALA GLY ILE LEU SER ASN ASN GLY ARG VAL ARG LYS THR HIS VAL PRO ALA SER LYS ARG PRO SER GLY ILE PRO ARG VAL THR ASN TRP THR LYS PRO THR ALA SER SER

ARG LYS MET PHE ARG

• Molecule 4: DASH complex subunit DUO1

Chain V: ▬▬▬▬▬▬▬ 36% ▬▬▬ 11% ▬▬▬▬▬▬▬▬ 53%

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

MET SER GLU GLN SER GLN LEU LEU ASP SER SER THR ILE ASP LYS LEU ILE PRO GLN ILE PHE ASN GLU MET ARG SER ASN LEU ASN ASN THR THR ASN LYS PHE PRO LYS SER THR GLY GLY ALA SER ASP ASN ILE SER ALA ASN ASN SER ILE ARG SER PHE ASN SER ILE T60

E67 S68 E69 S70 L71 I74 T75 I78 K79 T82 K86 P90 V91 Y92 V93 V96 D108 S109 W110 I111 N112 Q116 Q116 Q127 T128 Y129 I133 N134 D135 R136 N139 E140 N143 D148 E176 LYS ASP ALA ALA PRO ALA LYS PRO PRO ASN GLN

GLY LEU ASN PRO ARG TYR GLY VAL GLN SER GLY ARG PRO VAL PRO SER ALA GLY ILE SER ASN ASN GLY ARG VAL ARG LYS THR HIS VAL PRO ALA SER LYS ARG PRO SER GLY ILE PRO ARG VAL THR ASN ARG TRP THR LYS PRO THR ALA SER SER SER ARG LYS MET PHE ARG

- Molecule 5: DASH complex subunit DAD2

Chain K: 60% 19% • 20%

M1 I4 I8 A9 I10 K11 R12 K13 E14 L15 Q16 S17 L18 I21 L24 Q31 L32 T33 E34 D57 S58 S67 L68 G69 L70 L71 Q72 Y73 K87 LYS LYS GLU SER GLU GLN SER ASN GLU THR ILE LEU GLU ALA GLN GLU ASN ASP LYS ASN ASP GLU ASP

ASN ASP GLU ASP E115 D116 P119 M124 V125 E133

- Molecule 5: DASH complex subunit DAD2

Chain W: 70% 9% • 20%

M1 D2 S3 I4 D5 K13 Q16 D26 I30 L71 Q72 E79 K87 LYS LYS GLU SER GLU GLN SER ASN GLU THR GLY LEU GLU ALA GLN GLU ASN ASP LYS ASN ASP GLU ASP E115 R126 I127 R128 N132 E133

- Molecule 6: DASH complex subunit DAD1

Chain L: 44% 21% 35%

MET MET ALA SER THR SER ASN ASP GLU GLU LYS LEU ILE SER T15 T16 D17 K18 Y19 R24 N25 I26 V27 L28 Q29 E30 E33 S48 S52 I53 A54 V55 G56 R57 S63 W66 K67 D71 G72 L73 E74 S75 LEU SER ASP GLU ALA PRO ILE ASP GLU GLN PRO

THR LEU SER GLN SER LYS THR LYS

- Molecule 6: DASH complex subunit DAD1

Chain X: 47% 22% • 28%

MET MET ALA SER THR SER ASN ASP GLU GLU LYS LEU I13 T16 D17 K18 Y19 F20 I21 E22 Q23 R24 V27 L28 I31 M35 L42 L45 S48 L49 S52 Q60 L65 D71 G72 L73 E74 S75 L76 S77 A80 PRO ILE ASP GLU GLN PRO THR

LEU SER GLN SER LYS THR LYS

- Molecule 7: DASH complex subunit DAD4

Chain M: 56% 44%

M1 E2 H5 Q9 I12 L13 S14 R15 I16 I17 G18 K21 R22 L23 N24 E25 I29 L30 N31 Q32 E33 N39 R40 N41 K42 N43 L44 E45 I46 I50 N53 Y54 S57 V58 Q59 E63 N67 K68 K69 L72

• Molecule 7: DASH complex subunit DAD4

Chain Y: 69%   31%

M1 E2 N3 P4 H5 E6 Q9 I12 L13 S14 R15 I16 I17 G18 K21 R22 L23 N24 E25 E33 I37 E45 I46 I50 S57 L62 L72

• Molecule 8: DASH complex subunit DAD3

Chain N: 63%   33%

MET GLU H3 K15 Y16 K17 Q18 L19 S20 L21 D22 L23 K24 A25 L26 D27 E28 T29 I30 K31 E32 L33 N34 Y35 H42 S49 P50 D51 E52 I53 L54 Q55 E56 M57 R58 V62 L66 V67 L70 L71 K72 G73 S77 Q81 R82 K83 Q84 E85 K94

• Molecule 8: DASH complex subunit DAD3

Chain Z: 72%   26%

M1 E2 H3 V12 L13 D14 K15 Y16 K17 Q18 L19 S20 L21 D22 L23 K24 K31 Y35 H38 T47 V48 S49 P50 D51 E52 I53 L54 Q55 E56 L70 S74 S77 L78 I79 K83 K94

• Molecule 9: DASH complex subunit SPC34

Chain O: 59%   19%   20%

MET G2 E3 S4 I12 F24 N32 Q36 N40 K41 A42 S43 I44 K53 A60 F64 N67 Q71 R75 R76 D77 F83 R89 M93 R97 R98 K105 P111 K118 N125 LYS ARG ARG ARG THR ALA THR THR SER GLY

GLY LEU ASN GLY PHE ILE PHE ASP THR ASP LEU ILE GLY SER SER VAL ILE SER N155 K169 D170 D171 P172 Q173 I174 Q175 R176 L177 L178 Y179 A180 G184 S185 V186 E203 L209 M214 T218 E225 Q228 D229 Y230 D231 Q232 L233 Y234 H235 S241 L244 R245

F246 I247 K248 K249 E250 V251 L252 Q254 R257 M261 S262 H265 PRO SER SER SER HIS ASP VAL ALA LYS ILE ILE ARG LYS GLU LYS ASP GLU ILE ALA ASN LEU GLN GLU

• Molecule 9: DASH complex subunit SPC34

Chain a: 77%   21%

MET GLY E3 N13 Y61 R98 N125 LYS ARG ARG ARG THR ALA THR THR SER GLY GLY LEU ASN GLY PHE ILE PHE ASP THR ASP LEU ILE GLY SER SER VAL ILE SER N155 F161 M188 H235 F246 H265 PRO SER SER SER HIS ASP VAL ALA LYS

ILE ILE ARG LYS GLU LYS ASP GLU ILE ARG LEU GLU MET GLU ILE ALA ASN LEU GLN GLU

• Molecule 10: DASH complex subunit ASK1

Chain P: 15%   7%   78%

MET ASP SER ALA S5 K6 E11 K12 L13 D14 Q15 E16 I17 T18 V19 N20 I24 S29 K34 D38 P41 T45 E51 M54 E58 W59 L60 F64 L69 VAL ASN LEU GLN ALA ASN ALA ALA ALA PRO VAL GLY ASN ALA PRO VAL LYS SER LEU

VAL SER ASN ASN VAL GLY ILE PHE PRO THR SER ALA GLU GLU ALA SER ARG GLN SER GLN THR ASP ASN GLY PRO ASN GLU ALA ASP SER ALA VAL HIS VAL ASN ARG VAL HIS SER MET PHE ASN ASN ASP SER ILE ASP ASP PHE HIS THR ALA ASN ILE THR SER THR GLY GLN

ILE LEU LYS PRO ASP SER SER ASP GLU ASP THR GLY SER GLU ALA VAL PRO SER ARG GLU THR ASP LEU THR GLY GLY HIS GLY ALA ASP GLU ASP GLU THR SER THR ILE ARG GLN SER ARG LYS ILE SER LEU LEU GLN GLN TYR GLY

SER SER SER MET VAL PRO SER PRO ILE VAL PRO ASN LYS MET ARG LYS GLN LEU ALA HIS GLU GLU HIS ILE ASN ASN ASP GLY ASP ASP GLU ASN SER ASN ILE GLU SER THR PRO LEU LYS GLN GLY HIS HIS PRO LYS GLY ALA ASP ASP ASN ASN GLU

GLY PRO ASP GLU GLU GLU SER THR LYS GLU VAL PRO LYS PRO GLY THR ILE ILE ILE HIS PHE SER THR ASN ARG

• Molecule 10: DASH complex subunit ASK1

Chain b: 23% •   76%

M1 D2 K6 E66 V70 ASN LEU GLN ALA ASN ALA ALA PRO VAL GLY ASN ALA PRO VAL LYS SER LEU VAL SER ASN ASN VAL GLY ILE PHE PRO THR SER ALA GLU GLU ALA SER ARG GLN SER GLN THR ASP ASN GLY PRO ASN GLU ALA ASP SER ALA VAL HIS VAL

ASN ARG ASP VAL HIS SER MET PHE ASN ASN ASP SER ILE ASP ASP PHE HIS THR ALA ASN ILE THR SER THR GLY GLN ILE LEU THR SER THR GLY ILE LEU LEU LYS PRO ASP SER SER ASP GLU ASP THR GLY SER GLU ALA VAL PRO SER ARG GLU THR ASP LEU THR GLY GLY HIS GLY ALA ASP

ASP GLU GLN ASP GLU THR ILE GLN ARG GLN SER ARG LYS ILE SER LEU LEU LEU GLN GLN TYR GLY SER SER SER MET VAL PRO SER PRO ILE VAL PRO ASN LYS MET ARG LYS GLN LEU ALA HIS GLU HIS ILE ASN ASN ASP GLY ASP ASP GLU ASN SER ASN ASP ASP GLU

ASN SER ASN ASN ILE GLU SER THR PRO LEU LYS GLN GLY HIS HIS PRO LYS GLY GLN ALA ASP ASP ASN ASN GLU GLY PRO ASP GLU GLU GLU SER THR LYS GLU VAL PRO LYS PRO GLY THR ILE ILE ILE HIS PHE SER THR ASN ARG

• Molecule 11: DASH complex subunit HSK3

Chain Q: 68%   23% • 7%

M1 N4 K5 Q6 R7 Q8 Q11 E15 L16 R17 E18 L23 Q24 E25 T26 I32 Q36 S51 I58 M61 M64 LEU GLY LYS THR GLN

• Molecule 11: DASH complex subunit HSK3

Chain c: 93%   7%

M1 M64 LEU GLY LYS THR GLN

• Molecule 12: DASH complex subunit SPC19

Chain R: 37%   28%   35%

M1 T2 D3 Q7 A11 L12 T15 V16 K20 E31 P32 N35 T39 M40 R48 L49 V50 P51 V55 E56 R57 S58 K59 L60 E67 V70 R71 G74 D75 K76 L77 R78 K79 S80 M81 G82 R83 M84 Q85 R86 E87 L88 D89 T90 L91 Q92 Q93 T94

Y95 E96 L97 N98 D99 L100 R101 K104 N105 M108 ASP ASP ASP ASP ALA LEU ASN SER PRO ASP MET GLY GLN GLU TYR GLU GLY ARG ASP ALA ASP ASP VAL VAL MET MET ALA SER SER THR ASN GLU GLU LEU GLU GLU LEU LYS LEU LYS GLU LYS LYS GLN LEU GLU

ASN LYS LEU GLU ILE LEU LYS GLN LYS

• Molecule 12: DASH complex subunit SPC19

Chain d: 62%   ·   35%

M1 R57 M81 Q85 Y95 N98 M108 ASP ASP ASP ASP ALA LEU ASN SER PRO ASP MET GLY GLN GLU TYR GLU GLY ARG ASP ALA ASP ASP VAL VAL MET MET ALA SER SER THR ASN GLU GLU LEU GLU GLU LEU LYS LYS LEU LYS GLU LYS LYS LYS GLN LEU LEU

GLU ASN LYS LEU GLU ILE LEU LYS GLN LYS

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	248732	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.815	Depositor
Minimum map value	-0.855	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.040	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	423.99997, 423.99997, 423.99997	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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 RMSZ	Bond lengths #$|Z|$ >5	Bond angles RMSZ	Bond angles #$|Z|$ >5
1	A	0.22	0/1462	0.34	0/2041
1	F	0.22	0/1462	0.35	0/2041
2	B	0.21	0/1179	0.35	0/1646
2	G	0.21	0/1174	0.36	0/1639
3	I	0.25	0/766	0.57	2/1034 (0.2%)
3	U	0.29	0/766	0.70	3/1034 (0.3%)
3	e	0.27	0/82	0.61	0/109
4	J	0.25	0/945	0.51	0/1275
4	V	0.26	0/945	0.52	1/1275 (0.1%)
5	K	0.27	0/844	0.58	0/1135
5	W	0.27	0/844	0.50	0/1135
6	L	0.26	0/490	0.49	0/662
6	X	0.30	0/540	0.61	1/730 (0.1%)
7	M	0.28	0/577	0.51	0/779
7	Y	0.26	0/577	0.48	0/779
8	N	0.33	0/751	0.59	0/1007
8	Z	0.29	0/768	0.62	0/1029
9	O	0.26	0/1962	0.53	0/2638
9	a	0.26	0/1958	0.51	0/2633
10	P	0.28	0/535	0.49	0/722
10	b	0.27	0/569	0.54	0/768
11	Q	0.27	0/534	0.53	0/716
11	c	0.26	0/534	0.46	0/716
12	R	0.27	0/864	0.62	0/1161
12	d	0.26	0/864	0.61	0/1161
All	All	0.26	0/21992	0.51	7/29865 (0.0%)

There are no bond length outliers.

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	I	143	MET	CA-CB-CG	6.21	123.86	113.30
3	U	120	ASP	CB-CG-OD2	6.00	123.70	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	U	143	MET	CA-CB-CG	5.96	123.42	113.30
3	U	123	ASP	CB-CG-OD1	5.45	123.21	118.30
4	V	108	ASP	CB-CG-OD1	5.33	123.10	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1463	0	607	0	0
1	F	1463	0	607	0	0
2	B	1180	0	483	1	0
2	G	1175	0	481	2	0
3	I	757	0	753	19	0
3	U	757	0	753	21	0
3	e	82	0	79	0	0
4	J	935	0	952	31	0
4	V	935	0	952	24	0
5	K	837	0	837	29	0
5	W	837	0	837	9	0
6	L	485	0	475	15	0
6	X	535	0	522	19	0
7	M	571	0	578	25	0
7	Y	571	0	578	14	0
8	N	744	0	754	38	0
8	Z	761	0	772	26	0
9	O	1929	0	1929	60	0
9	a	1925	0	1926	0	0
10	P	527	0	513	22	0
10	b	561	0	548	0	0
11	Q	527	0	520	13	0
11	c	527	0	520	0	0
12	R	859	0	897	51	0
12	d	859	0	897	0	0
All	All	21802	0	18770	337	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 11.

The worst 5 of 337 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)
8:N:18:GLN:HA	8:N:21:LEU:HD12	1.65	0.77
9:O:176:ARG:HB3	9:O:186:VAL:HG21	1.67	0.76
7:M:17:ILE:HG13	11:Q:11:GLN:HE22	1.49	0.76
4:V:68:SER:O	8:Z:15:LYS:NZ	2.19	0.76
4:J:104:ASN:ND2	8:N:56:GLU:OE2	2.20	0.75

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	292/691 (42%)	291 (100%)	0	1 (0%)	41	73
1	F	292/691 (42%)	290 (99%)	1 (0%)	1 (0%)	41	73
2	B	235/451 (52%)	229 (97%)	6 (3%)	0	100	100
2	G	234/451 (52%)	228 (97%)	6 (3%)	0	100	100
3	I	93/343 (27%)	91 (98%)	2 (2%)	0	100	100
3	U	93/343 (27%)	92 (99%)	1 (1%)	0	100	100
3	e	9/343 (3%)	8 (89%)	1 (11%)	0	100	100
4	J	115/247 (47%)	113 (98%)	2 (2%)	0	100	100
4	V	115/247 (47%)	113 (98%)	2 (2%)	0	100	100
5	K	102/133 (77%)	100 (98%)	2 (2%)	0	100	100
5	W	102/133 (77%)	98 (96%)	4 (4%)	0	100	100
6	L	59/94 (63%)	59 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	X	66/94 (70%)	63 (96%)	3 (4%)	0	100	100
7	M	70/72 (97%)	67 (96%)	3 (4%)	0	100	100
7	Y	70/72 (97%)	67 (96%)	3 (4%)	0	100	100
8	N	90/94 (96%)	79 (88%)	11 (12%)	0	100	100
8	Z	92/94 (98%)	85 (92%)	7 (8%)	0	100	100
9	O	231/295 (78%)	228 (99%)	3 (1%)	0	100	100
9	a	230/295 (78%)	222 (96%)	8 (4%)	0	100	100
10	P	63/292 (22%)	62 (98%)	1 (2%)	0	100	100
10	b	68/292 (23%)	67 (98%)	1 (2%)	0	100	100
11	Q	62/69 (90%)	60 (97%)	2 (3%)	0	100	100
11	c	62/69 (90%)	62 (100%)	0	0	100	100
12	R	106/165 (64%)	105 (99%)	1 (1%)	0	100	100
12	d	106/165 (64%)	105 (99%)	1 (1%)	0	100	100
All	All	3057/6235 (49%)	2984 (98%)	71 (2%)	2 (0%)	54	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	411	ILE
1	F	411	ILE

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	I	89/309 (29%)	85 (96%)	4 (4%)	27	61
3	U	89/309 (29%)	86 (97%)	3 (3%)	37	68
3	e	9/309 (3%)	9 (100%)	0	100	100
4	J	109/222 (49%)	108 (99%)	1 (1%)	78	91
4	V	109/222 (49%)	108 (99%)	1 (1%)	78	91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
5	K	95/120 (79%)	92 (97%)	3 (3%)	39	70
5	W	95/120 (79%)	93 (98%)	2 (2%)	53	78
6	L	56/87 (64%)	55 (98%)	1 (2%)	59	81
6	X	62/87 (71%)	58 (94%)	4 (6%)	17	48
7	M	66/66 (100%)	63 (96%)	3 (4%)	27	61
7	Y	66/66 (100%)	65 (98%)	1 (2%)	65	84
8	N	87/89 (98%)	84 (97%)	3 (3%)	37	68
8	Z	89/89 (100%)	85 (96%)	4 (4%)	27	61
9	O	217/269 (81%)	210 (97%)	7 (3%)	39	70
9	a	217/269 (81%)	210 (97%)	7 (3%)	39	70
10	P	62/259 (24%)	59 (95%)	3 (5%)	25	59
10	b	66/259 (26%)	63 (96%)	3 (4%)	27	61
11	Q	58/62 (94%)	55 (95%)	3 (5%)	23	55
11	c	58/62 (94%)	58 (100%)	0	100	100
12	R	101/153 (66%)	100 (99%)	1 (1%)	76	89
12	d	101/153 (66%)	95 (94%)	6 (6%)	19	51
All	All	1901/3581 (53%)	1841 (97%)	60 (3%)	42	70

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
12	R	48	ARG
12	d	81	MET
6	X	19	TYR
12	d	57	ARG
12	d	108	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
3	I	60	GLN
5	K	31	GLN
11	Q	11	GLN
9	a	254	GLN
10	b	22	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-18246. 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 ⓘ
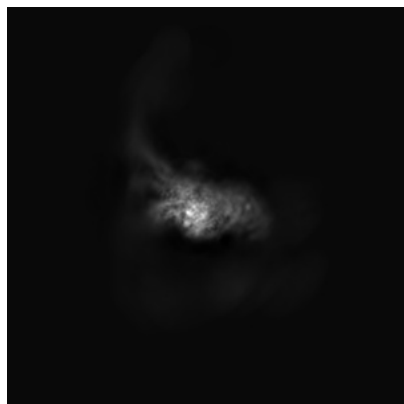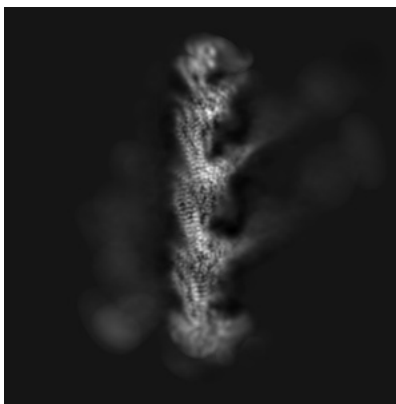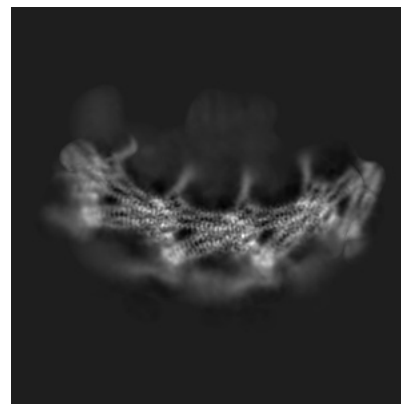
6.1.1   Primary map

X   Y   Z

6.1.2   Raw map

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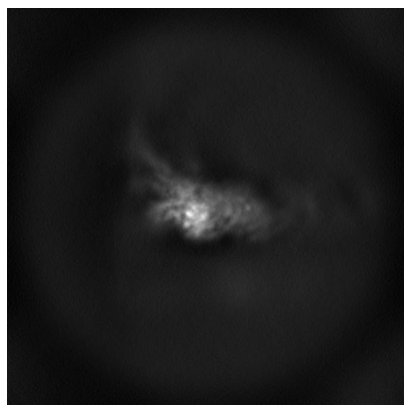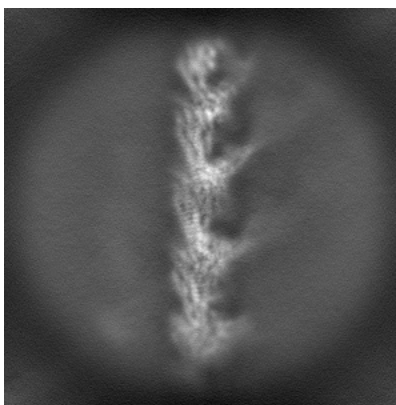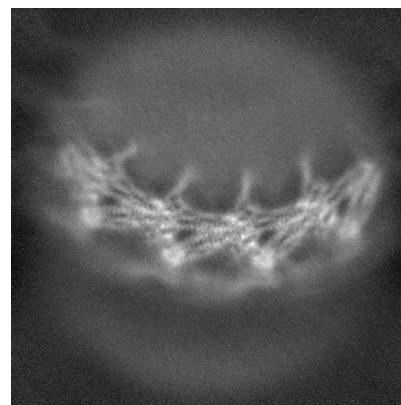
The images above show the map projected in three orthogonal directions.

6.2   Central slices ⓘ
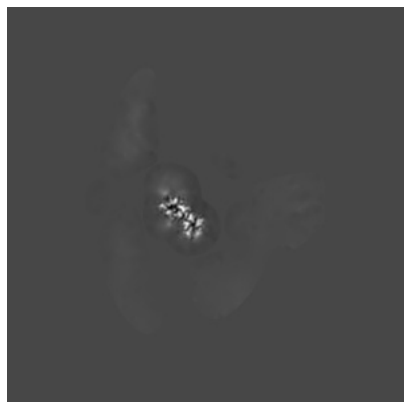
6.2.1   Primary map
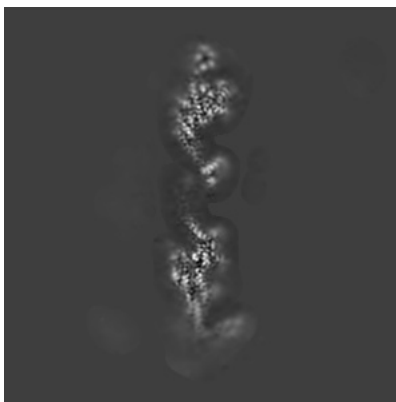
| X Index: 200 | Y Index: 200 | Z Index: 200 |

6.2.2   Raw map
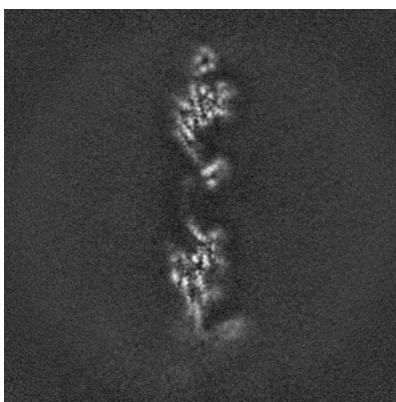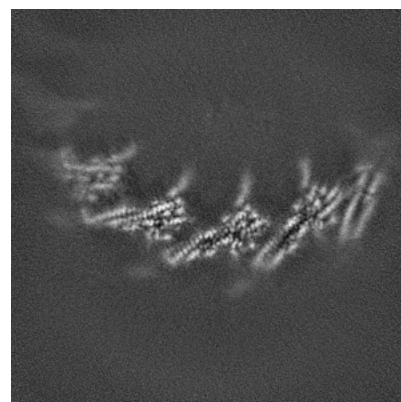
| X Index: 200 | Y Index: 200 | Z Index: 200 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
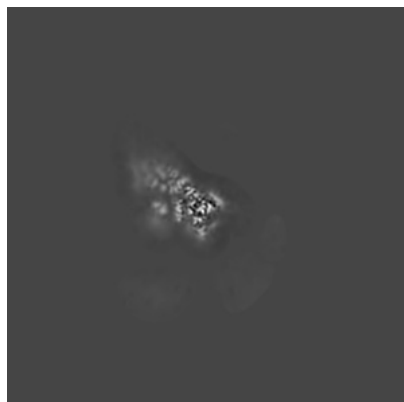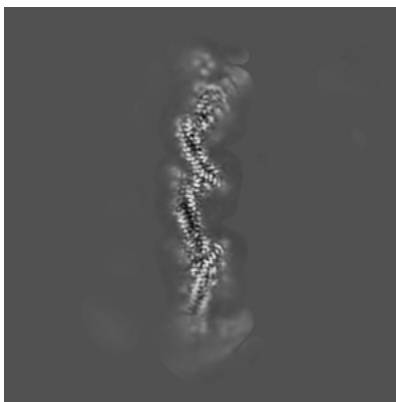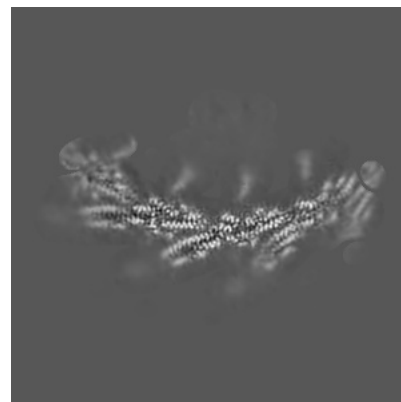
| X Index: 157 | Y Index: 186 | Z Index: 194 |

6.3.2 Raw map
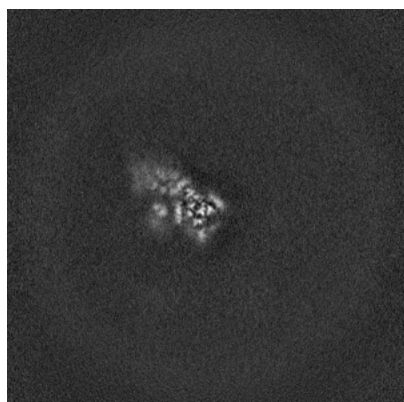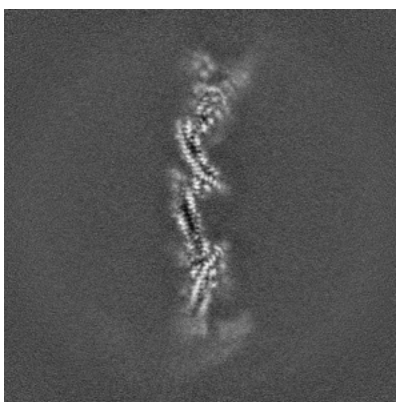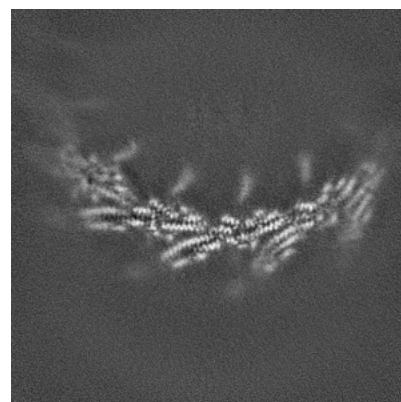
| X Index: 157 | Y Index: 186 | Z Index: 194 |

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

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

6.4.1 Primary map
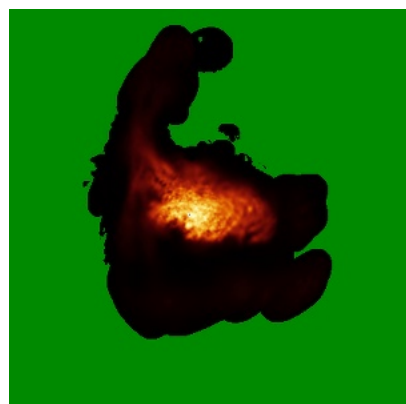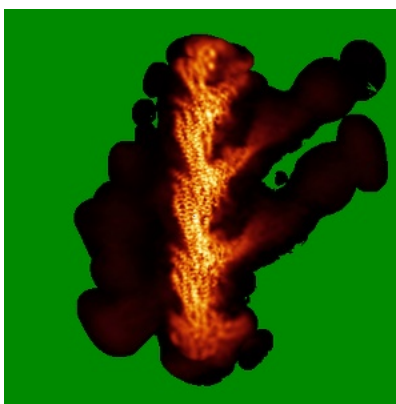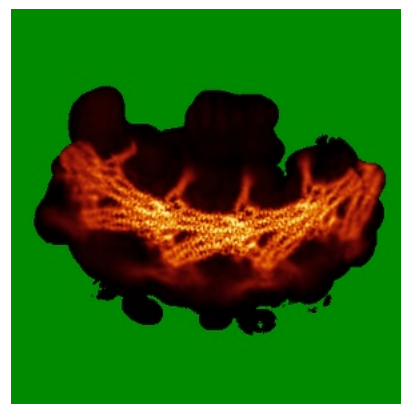
| X | Y | Z |

6.4.2 Raw map

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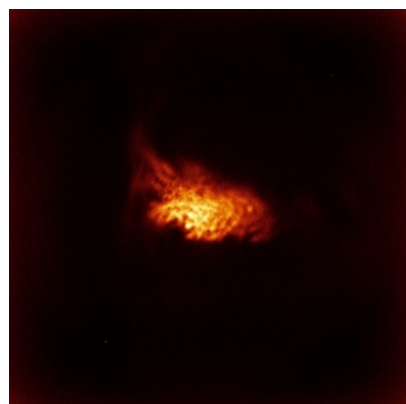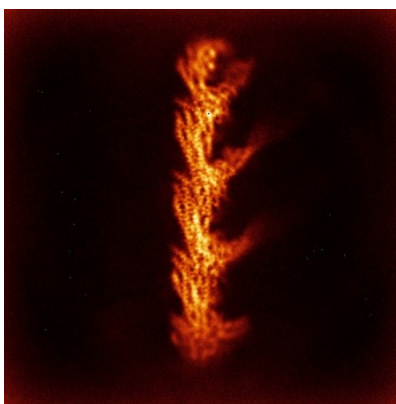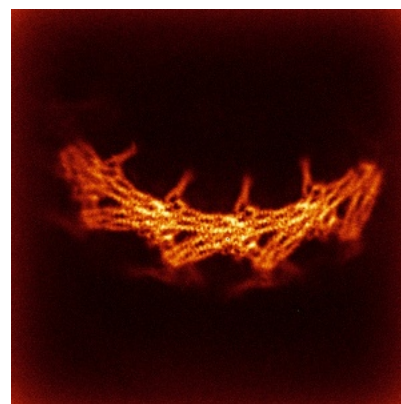
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

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 0.1. 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
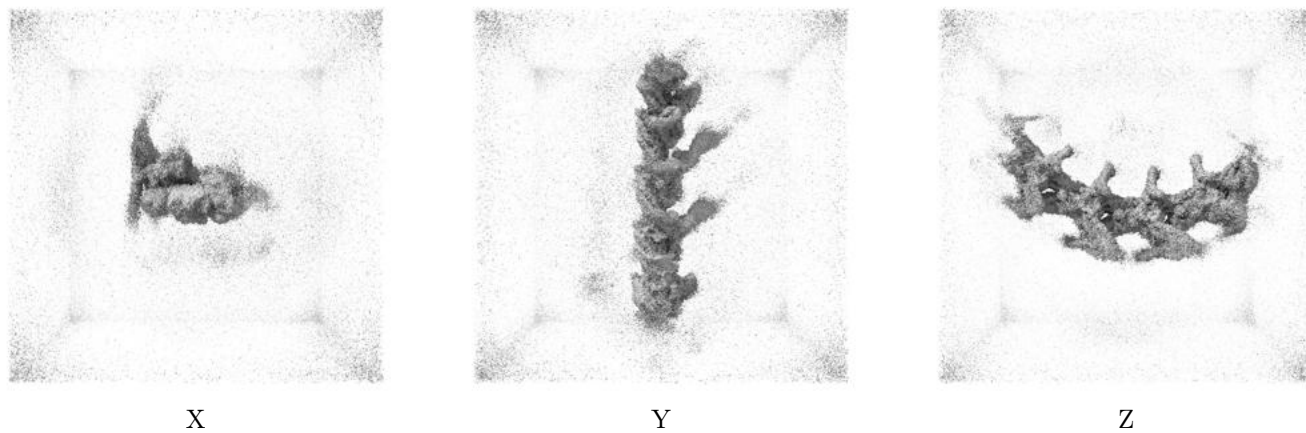
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

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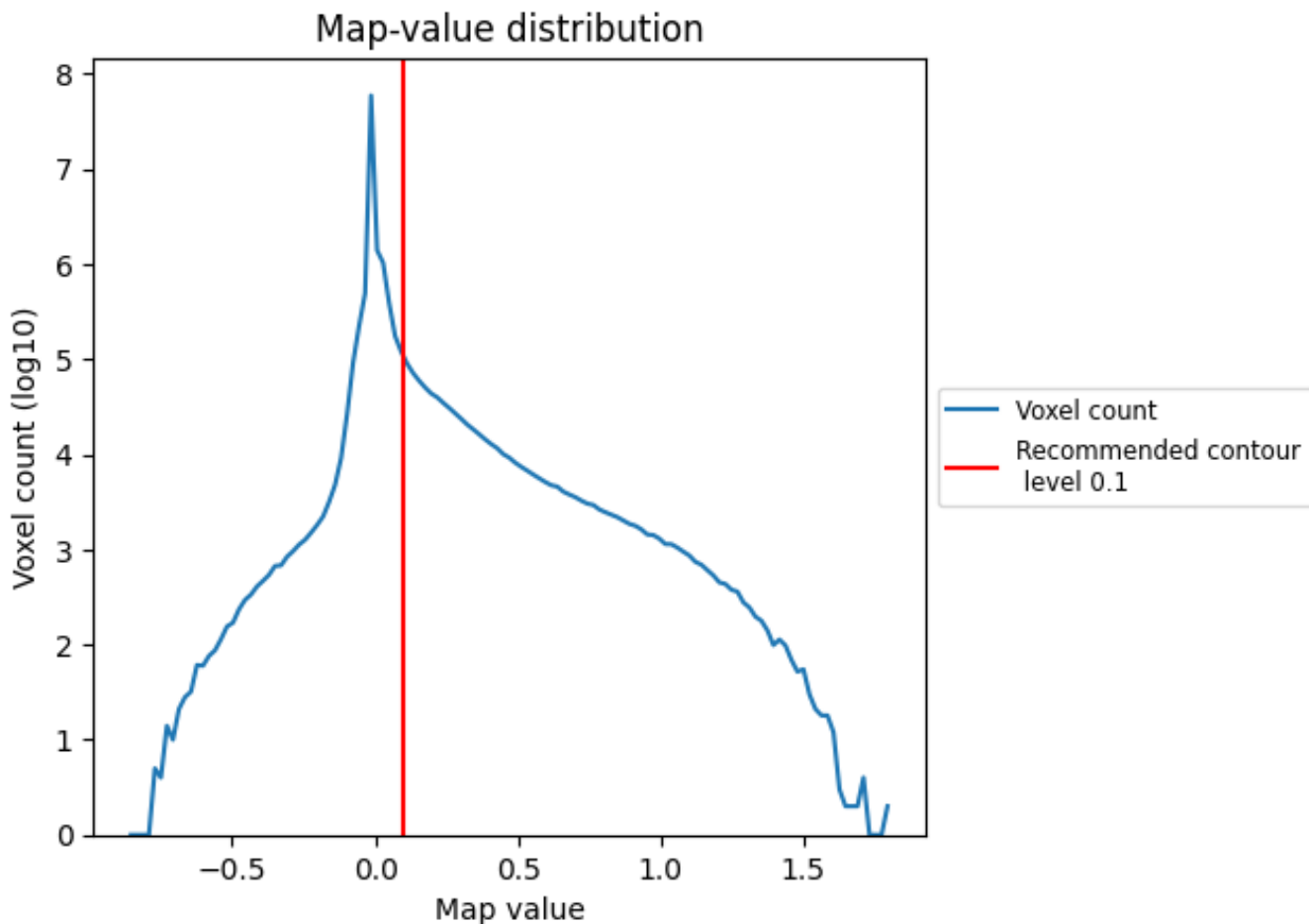
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2　Volume estimate ⓘ
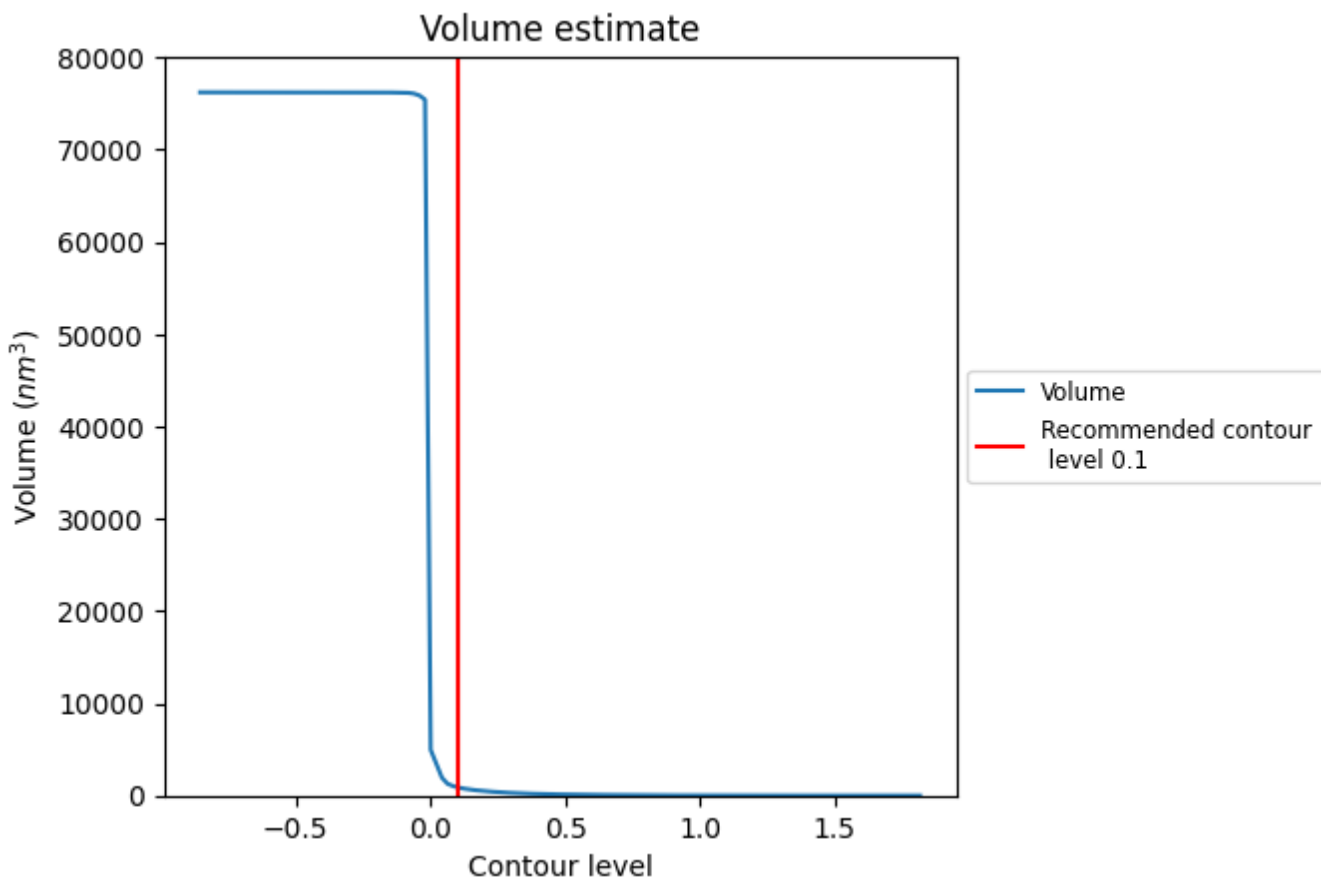
The volume at the recommended contour level is 901 nm^3; this corresponds to an approximate mass of 814 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ
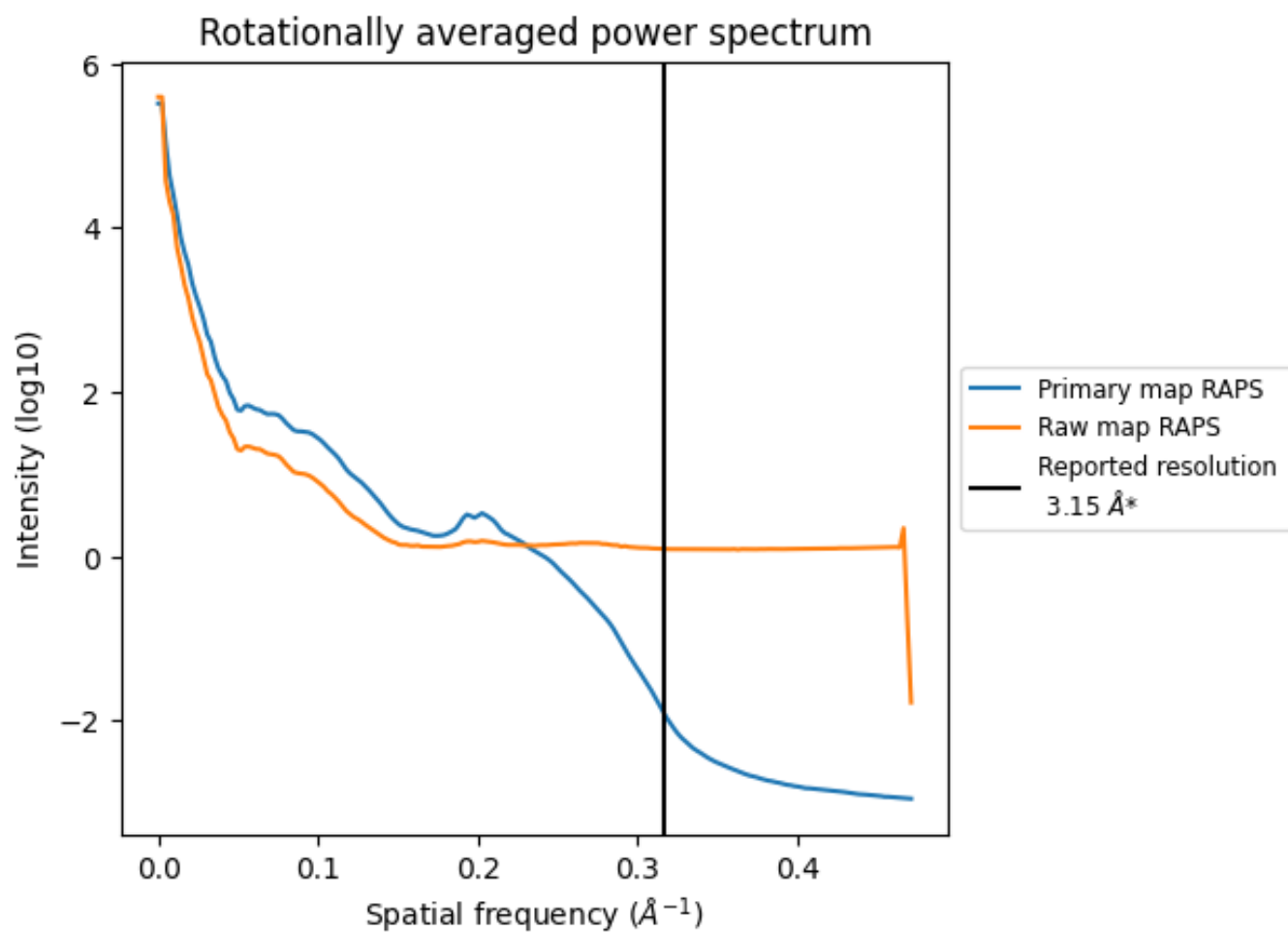
*Reported resolution corresponds to spatial frequency of 0.317 Å^{-1}

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 ⓘ
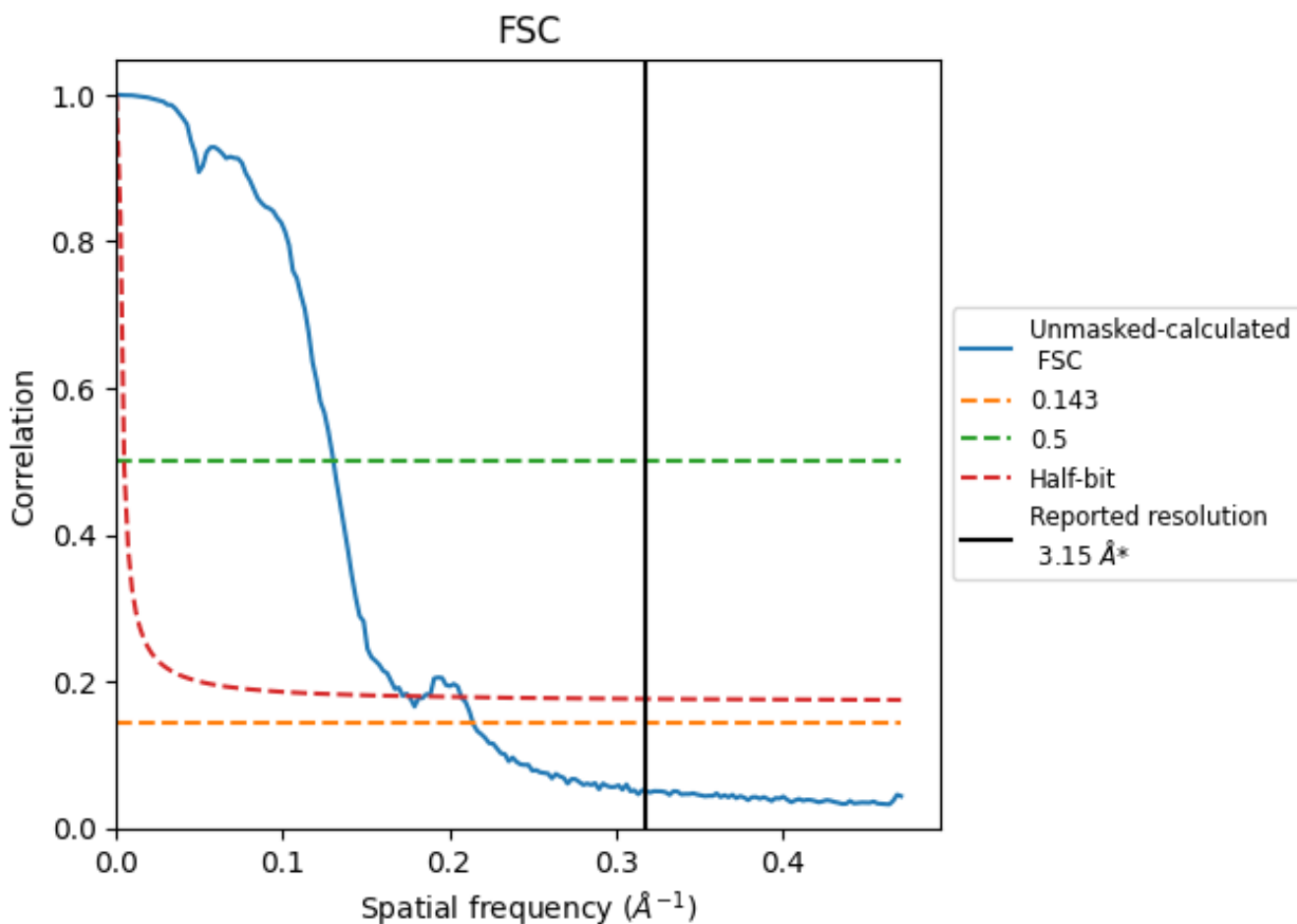
*Reported resolution corresponds to spatial frequency of 0.317 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.15	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.67	7.66	5.69

*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 4.67 differs from the reported value 3.15 by more than 10 %

9　Map-model fit　ⓘ

This section contains information regarding the fit between EMDB map EMD-18246 and PDB model 8Q84. Per-residue inclusion information can be found in section 3 on page 7.

9.1　Map-model overlay　ⓘ

| X | Y | Z |
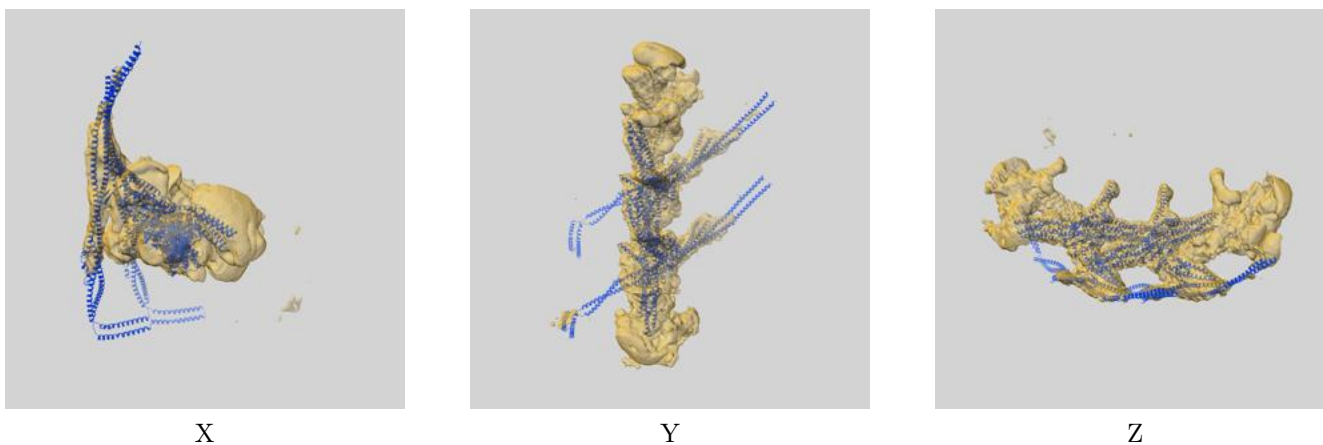
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model ⓘ

This section was not generated.

9.3   Atom inclusion mapped to coordinate model ⓘ

This section was not generated.

9.4   Atom inclusion ⓘ
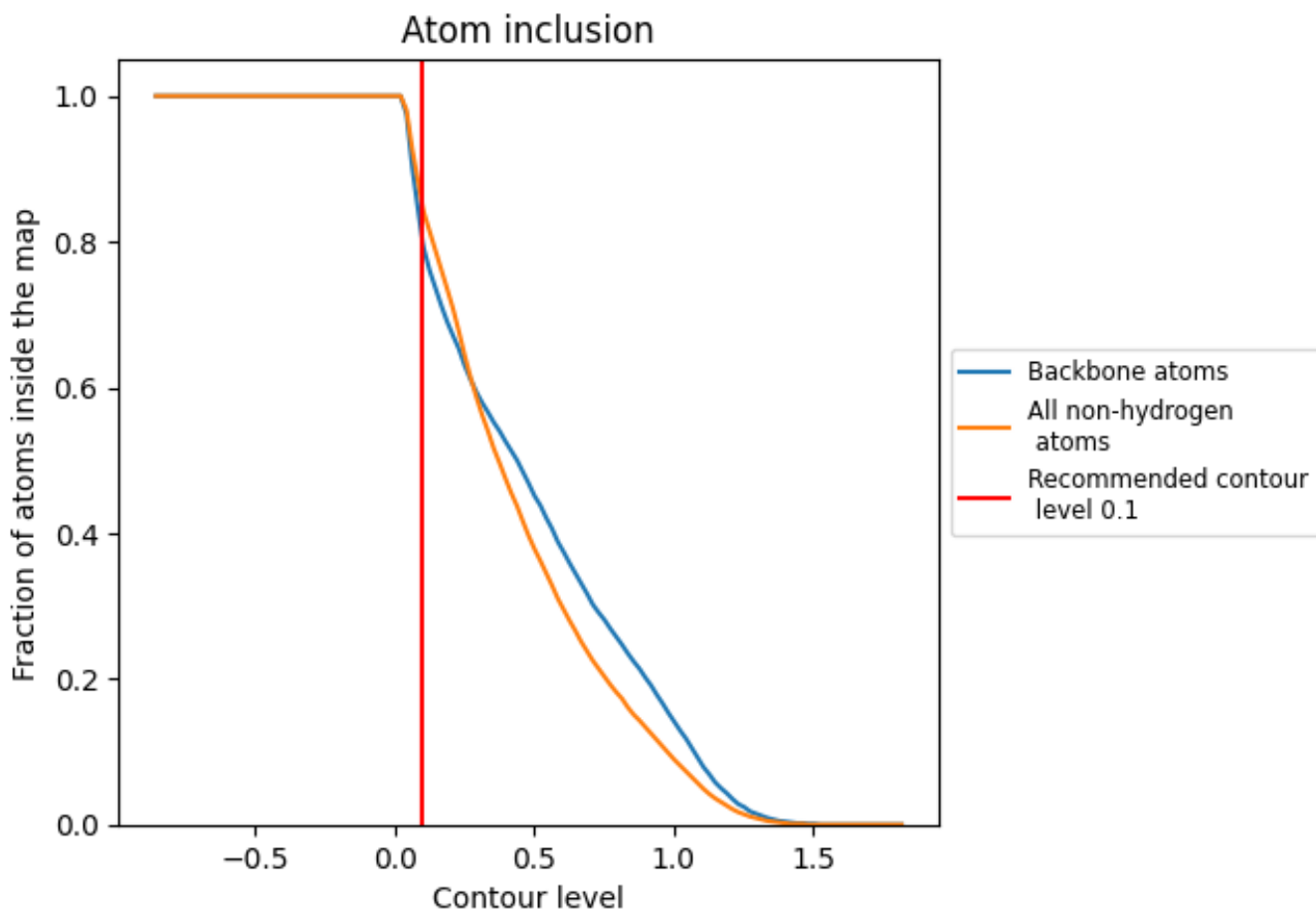
At the recommended contour level, 80% of all backbone atoms, 85% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion
All	0.8480
A	0.4160
B	0.4420
F	0.3840
G	0.4140
I	0.9910
J	0.9980
K	0.9890
L	0.9960
M	0.9970
N	0.9760
O	0.9790
P	1.0000
Q	1.0000
R	0.9940
U	0.9960
V	0.9950
W	0.9950
X	0.9740
Y	1.0000
Z	0.9800
a	0.9880
b	0.9890
c	0.9960
d	0.9940
e	1.0000

1.0

0.0
<0.0