W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB EM Validation Summary Report ⓘ

May 6, 2024 – 04:18 AM JST

PDB ID	:	8W9D
EMDB ID	:	EMD-37365
Title	:	Cryo-EM structure of the Rpd3S-nucleosome complex from budding yeast in State 1
Authors	:	Wang, C.; Zhan, X.
Deposited on	:	2023-09-05
Resolution	:	3.90 Å(reported)

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

EMDB validation analysis	:	0.0.1.dev92
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 3.90 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.
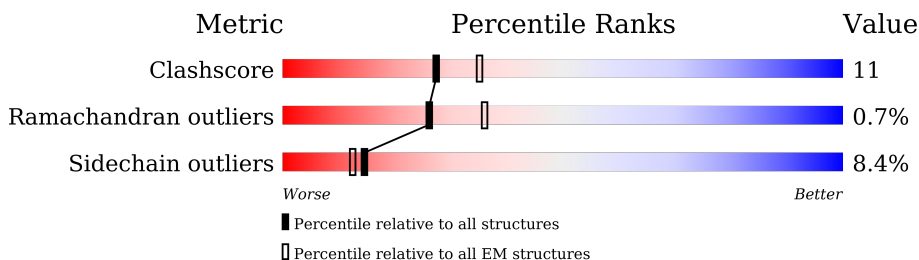
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	1536	
2	E	684	
2	F	684	
3	B	433	
4	C	401	
4	D	401	
4	G	401	
5	a	136	

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Mol	Chain	Length	Quality of chain
5	e	136	7% 74% · 24%
6	b	103	71% 9% 20%
6	f	103	71% 9% 20%
7	c	130	78% · 18%
7	g	130	80% ·· 17%
8	d	126	6% 69% 6% 25%
8	h	126	74% · 25%
9	i	147	99% ·
10	j	147	100%
11	H	5	100% 60% 40%

2 Entry composition (i)

There are 13 unique types of molecules in this entry. The entry contains 27990 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 Transcriptional regulatory protein SIN3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	606	Total	C	N	O	S	0	0
			5066	3253	860	938	15		

- Molecule 2 is a protein called Transcriptional regulatory protein RCO1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	353	Total	C	N	O	S	0	0
			2884	1837	493	536	18		
2	F	156	Total	C	N	O	S	0	0
			1282	822	211	239	10		

- Molecule 3 is a protein called Histone deacetylase RPD3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	B	385	Total	C	N	O	S	0	0
			3057	1948	513	571	25		

- Molecule 4 is a protein called Chromatin modification-related protein EAF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	183	Total	C	N	O	S	0	0
			1483	950	239	285	9		
4	D	185	Total	C	N	O	S	0	0
			1497	959	241	288	9		
4	G	69	Total	C	N	O	S	0	0
			570	371	98	97	4		

- Molecule 5 is a protein called Histone H3.1.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	a	97	Total	C	N	O	S	0	0
			801	505	155	137	4		

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

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	e	104	857	538	168	147	4	0	0

- Molecule 6 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	b	82	653	412	127	113	1	0	0
			Total	C	N	O	S		
6	f	82	653	412	127	113	1	0	0

- Molecule 7 is a protein called Histone H2A type 1-B/E.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
7	c	106	812	513	157	142	0	0
			Total	C	N	O		
7	g	108	828	522	162	144	0	0

- Molecule 8 is a protein called Histone H2B type 1-K.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	d	95	744	467	136	139	2	0	0
			Total	C	N	O	S		
8	h	95	744	467	136	139	2	0	0

- Molecule 9 is a DNA chain called 5-DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
9	i	147	3011	1440	546	879	146	0	0

- Molecule 10 is a DNA chain called 3-DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
10	j	147	3010	1440	543	881	146	0	0

- Molecule 11 is a protein called Unclear peptide.

Mol	Chain	Residues	Atoms				AltConf	Trace
11	H	5	Total 29	C 18	N 6	O 5	0	0

- Molecule 12 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
12	E	4	Total 4	Zn 4	0
12	B	1	Total 1	Zn 1	0
12	F	2	Total 2	Zn 2	0

- Molecule 13 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
13	B	2	Total 2	K 2	0

3　Residue-property plots　ⓘ

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

• Molecule 1: Transcriptional regulatory protein SIN3

Chain A:

20%

27%　　11%　　·　　61%

• Molecule 2: Transcriptional regulatory protein RCO1

Chain E:

29%

33% 13% 5% • 48%

K122 I123 K124 R125 E126 S127 L128 W129 N130 TYR ARG LYS ASN LEU GLY GLY GLN SER ASN ASN SER GLU MET THR LEU VAL PRO SER LYS ARG PHE THR GLN VAL PRO LYS ASN PHE GLN ASP LEU ASN ARG ASN D166 L167 K168 T169 F170 L171 T172 E173 N174 M175 T176 E177 E178 S179 N180 I181

R182 S183 T184 I185 G186 W187 N188 G189 ASP ILE ILE ASN ARG THR ARG ASP ARG GLU GLU PRO GLU SER ASP ARG ASP ASN LYS LYS LEU LEU SER ASN ILE ARG THR LYS ILE LEU LEU SER THR ASN ALA THR TYR ASP SER LYS SER LYS LEU PHE GLY GLN ASN SER ILE LYS SER THR ASN

ALA SER GLU LYS ILE PHE ASP LYS ASN SER THR I255 D256 F257 E258 N259 E260 D261 F262 A265 C266 N267 Q268 S269 G270 S271 F272 L273 C274 C275 D276 T277 K280 F284 D288 P289 P290 I291 D292 P293 N294 N295 L296 P297 G298 G299 D300 W301 H302 E305 C306 K307 F308

K309 I310 F311 I312 N313 N314 S315 M316 A317 T318 K321 I322 E323 S324 N325 F326 I327 K328 Q329 N330 N331 N332 V333 K334 I335 F336 A337 K338 L339 D344 S345 H346 N347 P348 K349 Q352 N355 Y356 I357 K358 P362 A363 V364 K365 T366 G367 S368 R369 G370 Q371 Y372 S373 D374 E375 N376

D377 K378 I379 P380 L381 T382 D383 R384 Q385 L386 F387 N388 T389 S390 Y391 G392 Q393 S394 I395 L398 D399 S400 Y401 N402 P403 I407 D408 S409 N410 S411 G412 K413 F414 L415 T423 W428 I437 W447 H448 V452 P453 R454 A455 L460 G461 S462 C466 S470 P471

K476 K477 T478 HIS HIS CYS GLN GLU ASP ASN VAL ASN Y489 K490 V491 V492 K493 K494 Q495 R496 L497 I498 N499 K500 K501 N502 Q503 L504 Y505 Y506 E507 P508 L509 Q510 K511 Q515 N516 N517 G518 N519 I522 I523 P524 THR THR SER HIS THR ASP TYR ASP PHE ASN GLN ASP PHE K538

I539 T540 D543 E544 Y549 D550 F551 F552 D553 K554 I555 Y556 K557 S558 K559 M560 V561 Q562 F563 R564 K565 L566 F567 Q568 F569 Q570 E571 S572 L573 I574 D575 K576 L577 V578 S579 N580 GLY SER GLN ASN GLY ASN SER GLU GLU ASN MET VAL LYS ASP ILE ALA SER LEU ILE TYR PHE GLN

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

GLU SER LYS PRO LYS GLU GLU LEU LEU LYS PHE LEU ASN ILE GLU GLU ASN PRO GLU GLN ASN GLN SER GLU

● Molecule 2: Transcriptional regulatory protein RCO1

20%

Chain F: 13%   9%   ·   77%

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

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

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

ILE ARG SER THR ILE GLY TRP ASN GLY ASP ILE ILE ASN ARG THR ARG ASP ARG ASP ASP ASN LYS LYS LEU LEU SER ASN ILE ARG THR LYS ILE LEU LEU SER THR ASN ALA THR TYR ASP SER LYS SER LYS LEU PHE GLY GLN ASN SER ILE LYS SER THR SER

ASN ALA SER GLU LYS ILE PHE ARG ASP LYS ASN ASN SER THR I255 D256 F257 E258 N259 E260 D261 F262 C263 S264 A265 C266 N267 Q268 S269 G270 S271 F272 L273 C274 C275 D276 T277 C278 P279 K280 S281 F282 H283 F284 L285 C286 L287 D288 P289 P290 I291 D292 P293 N294 N295 L296 P297 K298 G299 D300

W301 H302 C303 N304 E305 C306 K307 F308 K309 I310 F311 I312 N313 N314 S315 M316 A317 T318 L319 K320 K321 I322 E323 S324 N325 F326 I327 K328 N331 N332 V333 K334 I335 F336 A337 K338 L339 L340 F341 N342 I343 D344 S345 H346 N347 P348 K349 Q350 F351 Q352 L353 P354 N355 Y356 I357 K358 E359 T360 F361

P362 A363 V364 K365 T366 G367 S368 R369 G370 Q371 Y372 S373 D374 E375 ASN ASP LYS ILE PRO LEU THR ASP ARG GLN LEU PHE ASN THR SER TYR GLY GLN SER ILE THR LYS LEU ASP SER SER ASN PRO ASP THR HIS ILE ASP SER ASN ASN GLY LYS PHE LEU ILE CYS TYR LYS CYS ASN

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

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

ILE D543 E544 N545 S546 I547 K548 Y549 D550 F551 F552 D553 K554 I555 Y556 K557 S558 K559 M560 V561 Q562 K563 R564 K565 L566 F567 Q568 F569 Q570 E571 S572 L573 I574 D575 K576 L577 VAL SER ASN GLY SER GLN ASN GLY ASN SER GLU ASN MET VAL LYS ASP ILE ALA SER LEU ILE TYR PHE

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

ILE GLU SER LYS PRO LYS GLU GLU LEU LEU LYS PHE LEU ASN ILE GLU ASN PRO GLU ASN GLN SER GLU

• Molecule 3: Histone deacetylase RPD3

Chain B: 11%   67%   17%   5%   •   11%

MET V2 Y3 E4 A5 T6 P7 F8 D9 P10 I11 T12 V13 K14 P15 S16 D17 K18 R19 D28 N31 Y32 A33 Y34 G35 A36 G37 H38 P39 M40 K41 P42 H43 R44 M53 M61 R65 A66 K67 P68 A69 T70 K71 Q72 E73 Q76 T79 D80 E81 D84 F85 L86

T90 P91 D92 N93 L94 E95 M96 R99 K103 F104 N105 V106 G107 D108 D109 C110 P111 V112 F113 D114 G125 G126 S127 M128 E129 G130 A131 A132 R133 L134 N135 R136 G137 K138 C139 G148 L149 H150 K153 K154 S155 S158 G159 D165 I166 I171 Y176 D184

D191 E195 S207 E213 R239 D240 D244 K257 L269 D279 R280 C283 S287 A292 V295 S300 P304 G311 G312 Y313 T314 M315 R316 N317 V318 L328 L334 D335 K336 Y340 R356 P357 S358 N359 N362 V363 N364 E367 Y368

L369 D370 F377 E381 Y385 A386 PRO SER VAL GLN LEU ASN HIS THR PRO ARG ASP ALA GLU ASP LEU GLY ASP SER VAL GLU GLU ALA LYS ASP THR LYS GLY GLY SER GLN TYR ALA ARG ASP LEU HIS VAL GLU HIS ASP ASN GLU PHE TYR

• Molecule 4: Chromatin modification-related protein EAF3

Chain C: 12%   35%   9%   •   54%

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

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

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

HIS PRO GLY SER LEU ARG SER SER ASP GLN ASN GLY ASN ASP ASP ARG ARG SER SER LEU SER PRO ASN MET LEU HIS HIS ILE ALA GLY TYR PRO THR K219 I220 S221 L222 Q223 L228 D234 D235 T240 K241 D242 C246 R247 D251 V252 E255

M259 E264 V265 S266 Q267 E268 L269 E270 S271 P272 G273 S274 Q275 S276 S279 E280 Y281 L285 K286 L287 L293 L297 R300 L301 E302 K312 S313 S314 K315 D316 Q317 K318 P319 L320 V321 P322 I323 R324 G327 S336 V337 L341 I342 S343 S344 T345 T346 M347 D348

L349 C352 I356 D361 D371 E372 Y373 D376 K377 D378 R381 S382 D383 D384 A385 L399 G400 M401

• Molecule 4: Chromatin modification-related protein EAF3

Chain D:

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

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

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

HIS PRO GLY SER LEU ARG SER SER ASP GLN ASN GLY ASN ASP ASP ARG ARG SER SER LEU SER PRO ASN MET LEU HIS HIS ILE ALA GLY TYR PRO T217 P218 K219 I220 S221 L222 Q223 I224 P225 I226 K227 L228 K229 S230 V231 L232 V233 D234 D235 W236 E237 Y238 V239 T240

K241 D242 K243 K244 I245 C246 R247 L248 P249 A250 D251 V252 T253 V254 E255 M256 V257 L258 N259 K260 Y261 E262 H263 E264 V265 S266 Q267 E268 L269 E270 S271 P272 G273 S274 Q275 S276 Q277 L278 S279 E280 Y281 C282 A283 G284 L285 K286 L287 D290 K291 C292 L293 G294 N295 M296 L297 L298 Y299 R300 L301

E302 R303 L304 Q305 Y306 D307 E308 L309 L310 K311 K312 S313 S314 K315 D316 Q317 K318 P319 L320 V321 P322 I323 R324 I325 Y326 G327 A328 I329 H330 L331 L332 R333 L334 I335 S336 V337 L338 P339 E340 L341 I342 S343 S344 T345 T346 M347 D348 L349 Q350 S351 L354 L355 I356 K357 Q358 T359 E360 D361 F362

L363 V364 W365 L366 L367 M368 H369 V370 D371 E372 Y373 F374 N375 D376 K377 D378 P379 N380 R381 S382 D383 D384 A385 L386 Y387 V388 N389 T390 S391 S392 Q393 Y394 E395 G396 V397 A398 L399 G400 M401

• Molecule 4: Chromatin modification-related protein EAF3

Chain G:

MET VAL ASP LEU GLU GLN E7 F8 A9 L10 G11 G12 R13 C14 L15 A16 F17 H18 G19 P20 L21 M22 Y23 E24 A25 K26 I27 L28 K29 I30 W31 D32 P33 SER SER LYS MET TYR THR SER ILE PRO ASN ASP LYS PRO GLY GLY SER SER GLN ALA THR LYS GLU LYS PRO GLN LYS

LEU GLY GLU ASP GLU SER ILE PRO GLU GLU ILE ILE ASN G74 K75 C76 F77 F78 I79 H80 Y81 GLN GLY TRP LYS SER SER TRP D89 E90 W91 V92 G93 Y94 D95 R96 I97 R98 A99 Y100 N101 E102 E103 N104 I105 A106 M107 K108 K109 R110 L111 A112 N113 E114 A115 K116 E117 A118 K119 K120

S121 L122 LEU GLU GLN GLN GLN LYS LYS LYS LEU SER THR SER LEU GLY GLY PRO SER ASN GLY LYS LYS LEU ARG GLY LYS ASP SER ARG ASN ALA ILE SER LYS SER THR THR SER GLN PHE LEU THR LYS SER SER VAL SER GLY ARG SER GLY SER ALA ASN SER LEU

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

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

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

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

● Molecule 5: Histone H3.1

Chain a:

MET ALA ARG THR LYS GLN THR ALA ARG LYS SER THR GLY GLY LYS ALA PRO ARG LYS GLN LEU ALA THR LYS ALA ALA ARG LYS SER ALA PRO ALA THR GLY GLY VAL LYS LYS **P38 H39** **D81** **S86** **D123** **R134** ALA

● Molecule 5: Histone H3.1

Chain e:

MET **A1 R2 T3 K4 Q5** THR ALA ARG LYS SER THR GLY GLY LYS ALA PRO ARG LYS GLN LEU ALA THR LYS ALA ALA ARG LYS SER ALA PRO ALA THR GLY GLY VAL LYS **K37 P38 H39** **R63** **R134 A135**

● Molecule 6: Histone H4

Chain b:

MET SER GLY ARG GLY LYS GLY GLY LYS GLY LEU GLY LYS GLY GLY ALA LYS ARG HIS ARG LYS **V21 L22 R23 D24 N25** **I50 Y51 E52 E53** **T54** **E74** **K79** **R92** **G102**

● Molecule 6: Histone H4

Chain f:

MET SER GLY ARG GLY LYS GLY GLY LYS GLY LEU GLY LYS GLY GLY ALA LYS ARG HIS ARG LYS **V21 L22 R23 D24** **I50 Y51 E52 E53** **T54** **E74** **K79** **R92** **G102**

● Molecule 7: Histone H2A type 1-B/E

Chain c:

MET SER GLY ARG GLY LYS GLN GLY GLY LYS ALA ARG ALA **K13 A14** **S19** **K36** **D90** **L115 L116 P117 K118** LYS THR GLU SER HIS HIS LYS ALA LYS GLY LYS

● Molecule 7: Histone H2A type 1-B/E

Chain g:

MET SER GLY ARG GLY LYS GLN GLY GLY LYS ALA R11 A12 K13 A14 K15 E64 K118 LYS THR GLU SER HIS HIS LYS ALA LYS GLY LYS

• Molecule 8: Histone H2B type 1-K

Chain d:

6%

69%   6%   25%

MET PRO GLU PRO ALA LYS SER ALA PRO ALA PRO LYS LYS GLY SER LYS LYS ALA VAL THR LYS ALA GLN LYS LYS ASP GLY LYS LYS ARG K30 R31 S32 R33 D51 E71 S78 K85 R86 S87 E105 S123 A124 LYS

• Molecule 8: Histone H2B type 1-K

Chain h:

74%   25%

MET PRO GLU PRO ALA LYS SER ALA PRO ALA PRO LYS LYS GLY SER LYS LYS ALA VAL THR LYS ALA GLN LYS LYS ASP GLY LYS LYS ARG K30 R31 S32 R33 A124 LYS

• Molecule 9: 5-DNA

Chain i:

99%

A-73 C-49 T69 A72 T73

• Molecule 10: 3-DNA

Chain j:

100%

A-73 T-72 T73

• Molecule 11: Unclear peptide

Chain H:

100%

60%   40%

X17 X18 K19 X20 X21

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	422198	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/Å^2)$	50	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	2300	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.078	Depositor
Minimum map value	-0.034	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.015	Depositor
Map size (Å)	304.36002, 304.36002, 304.36002	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.087, 1.087, 1.087	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: K, 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	0.46	7/5180 (0.1%)	0.54	5/6984 (0.1%)
2	E	0.68	4/2952 (0.1%)	0.97	18/3978 (0.5%)
2	F	0.27	0/1313	0.47	0/1763
3	B	1.07	37/3137 (1.2%)	0.86	19/4246 (0.4%)
4	C	0.30	0/1509	0.48	0/2039
4	D	0.26	0/1524	0.49	0/2061
4	G	0.70	0/583	0.97	3/777 (0.4%)
5	a	0.41	0/813	0.43	0/1090
5	e	0.46	0/868	0.55	0/1160
6	b	0.45	0/660	0.50	0/883
6	f	0.46	0/660	0.64	0/883
7	c	0.46	0/822	0.53	0/1109
7	g	0.40	0/838	0.53	1/1130 (0.1%)
8	d	0.41	0/755	0.49	0/1014
8	h	0.41	0/755	0.51	0/1014
9	i	0.79	0/3378	1.00	1/5212 (0.0%)
10	j	0.80	0/3376	1.00	0/5209
11	H	1.17	0/8	1.69	0/8
All	All	0.65	48/29131 (0.2%)	0.76	47/40560 (0.1%)

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
2	E	0	4
3	B	0	6
All	All	0	10

The worst 5 of 48 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	380	PRO	N-CA	13.10	1.69	1.47
1	A	920	GLU	C-O	-11.75	1.01	1.23
3	B	42	PRO	C-O	-10.80	1.01	1.23
3	B	127	SER	CA-CB	-10.55	1.37	1.52
3	B	130	GLY	C-O	-10.10	1.07	1.23

The worst 5 of 47 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	384	ARG	CB-CA-C	15.81	142.01	110.40
2	E	379	ILE	O-C-N	-9.56	102.94	121.10
3	B	129	GLU	CB-CA-C	-8.73	92.93	110.40
3	B	133	ARG	CG-CD-NE	-8.46	94.05	111.80
3	B	280	ARG	CB-CG-CD	-8.25	90.15	111.60

There are no chirality outliers.

5 of 10 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	B	33	ALA	Mainchain
2	E	379	ILE	Mainchain
2	E	428	TRP	Peptide
2	E	470	SER	Peptide
2	E	492	TRP	Peptide

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	5066	0	5024	119	0
2	E	2884	0	2833	119	0
2	F	1282	0	1245	48	0
3	B	3057	0	2934	56	0
4	C	1483	0	1510	23	0
4	D	1497	0	1524	50	0
4	G	570	0	563	0	0
5	a	801	0	839	0	0
5	e	857	0	904	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	b	653	0	696	0	0
6	f	653	0	696	0	0
7	c	812	0	867	0	0
7	g	828	0	885	0	0
8	d	744	0	768	0	0
8	h	744	0	769	0	0
9	i	3011	0	1662	0	0
10	j	3010	0	1663	0	0
11	H	29	0	19	4	0
12	B	1	0	0	0	0
12	E	4	0	0	0	0
12	F	2	0	0	0	0
13	B	2	0	0	1	0
All	All	27990	0	25401	364	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 364 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:380:PRO:N	2:E:380:PRO:CA	1.69	1.31
2:E:178:GLU:OE1	3:B:65:ARG:NH1	1.67	1.26
2:E:184:THR:OG1	3:B:73:GLU:OE1	1.68	1.08
2:E:167:LEU:HD21	3:B:340:TYR:CE1	2.03	0.93
1:A:912:TRP:HH2	2:E:113:LEU:HD13	1.36	0.88

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	598/1536 (39%)	568 (95%)	27 (4%)	3 (0%)	29	67
2	E	343/684 (50%)	293 (85%)	41 (12%)	9 (3%)	5	35
2	F	152/684 (22%)	146 (96%)	6 (4%)	0	100	100
3	B	383/433 (88%)	365 (95%)	16 (4%)	2 (0%)	29	67
4	C	181/401 (45%)	168 (93%)	12 (7%)	1 (1%)	25	63
4	D	183/401 (46%)	172 (94%)	11 (6%)	0	100	100
4	G	63/401 (16%)	62 (98%)	1 (2%)	0	100	100
5	a	95/136 (70%)	94 (99%)	1 (1%)	0	100	100
5	e	100/136 (74%)	96 (96%)	4 (4%)	0	100	100
6	b	80/103 (78%)	77 (96%)	1 (1%)	2 (2%)	5	36
6	f	80/103 (78%)	77 (96%)	2 (2%)	1 (1%)	12	48
7	c	104/130 (80%)	101 (97%)	3 (3%)	0	100	100
7	g	106/130 (82%)	104 (98%)	2 (2%)	0	100	100
8	d	93/126 (74%)	91 (98%)	2 (2%)	0	100	100
8	h	93/126 (74%)	92 (99%)	1 (1%)	0	100	100
11	H	1/5 (20%)	1 (100%)	0	0	100	100
All	All	2655/5535 (48%)	2507 (94%)	130 (5%)	18 (1%)	26	60

5 of 18 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	E	171	LEU
2	E	174	ASN
2	E	470	SER
4	C	241	LYS
6	b	25	ASN

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	
1	A	560/1391 (40%)	508 (91%)	52 (9%)	9	34
2	E	332/653 (51%)	288 (87%)	44 (13%)	4	22
2	F	148/653 (23%)	132 (89%)	16 (11%)	6	29
3	B	326/367 (89%)	304 (93%)	22 (7%)	16	46
4	C	172/359 (48%)	158 (92%)	14 (8%)	11	40
4	D	174/359 (48%)	159 (91%)	15 (9%)	10	38
4	G	56/359 (16%)	56 (100%)	0	100	100
5	a	85/111 (77%)	83 (98%)	2 (2%)	49	69
5	e	90/111 (81%)	87 (97%)	3 (3%)	38	63
6	b	67/79 (85%)	60 (90%)	7 (10%)	7	29
6	f	67/79 (85%)	59 (88%)	8 (12%)	5	25
7	c	83/100 (83%)	79 (95%)	4 (5%)	25	54
7	g	84/100 (84%)	80 (95%)	4 (5%)	25	54
8	d	81/105 (77%)	73 (90%)	8 (10%)	8	31
8	h	81/105 (77%)	79 (98%)	2 (2%)	47	69
11	H	1/1 (100%)	0	1 (100%)	0	0
All	All	2407/4932 (49%)	2205 (92%)	202 (8%)	14	39

5 of 202 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	B	316	ARG
4	D	377	LYS
8	h	30	LYS
4	C	246	CYS
4	C	371	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 41 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	294	ASN
5	e	39	HIS
2	F	568	GLN
7	c	38	ASN
5	e	125	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 ⓘ

Of 9 ligands modelled in this entry, 9 are 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 ⓘ

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-37365. 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 ⓘ
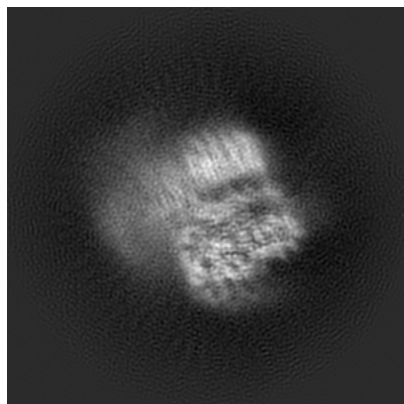
6.1.1 Primary map

X
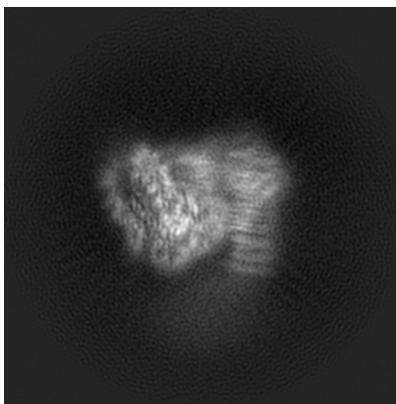
Y
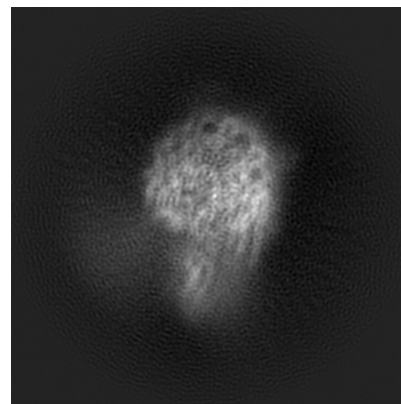
Z

6.1.2 Raw map

X

Y

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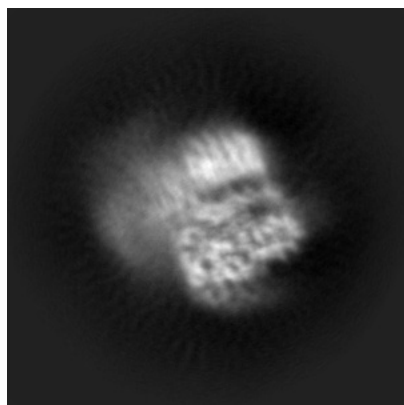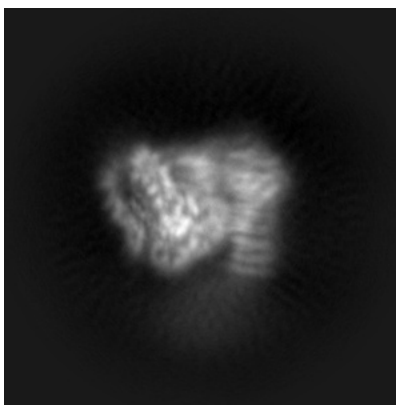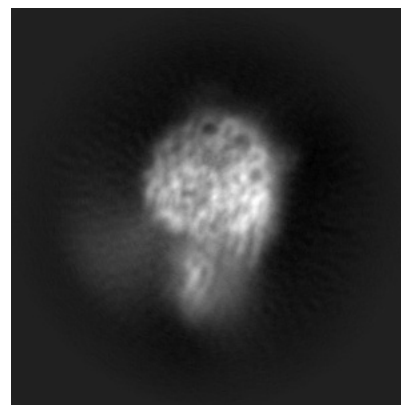
The images above show the map projected in three orthogonal directions.

6.2   Central slices   ⓘ
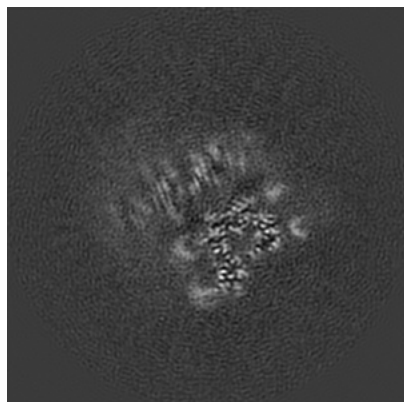
6.2.1   Primary map
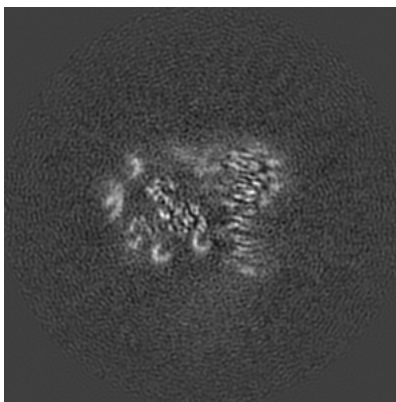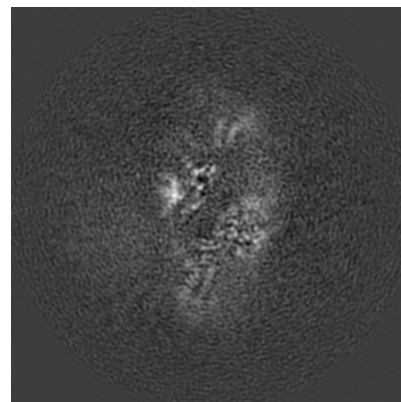
| X Index: 140 | Y Index: 140 | Z Index: 140 |

6.2.2   Raw map
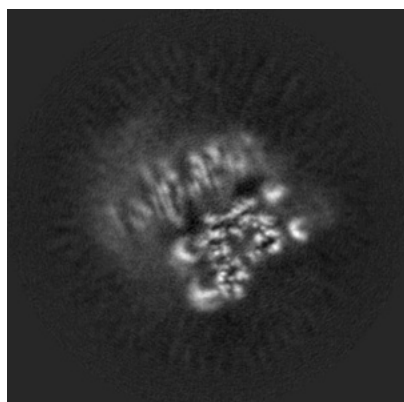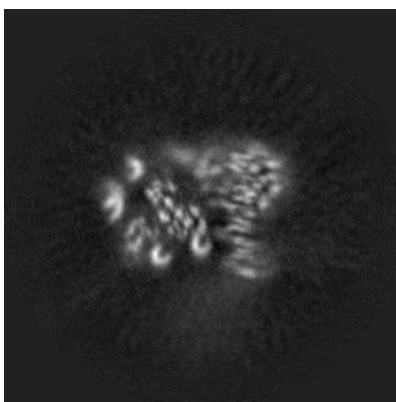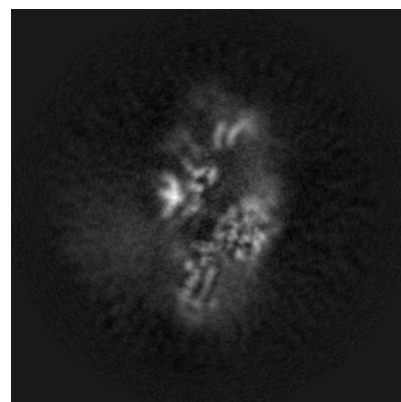
| X Index: 140 | Y Index: 140 | Z Index: 140 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
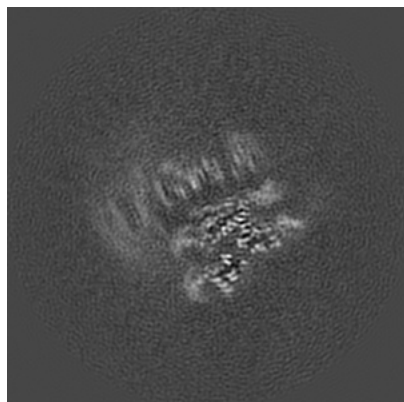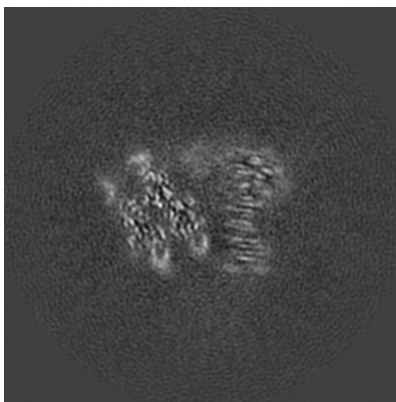
X Index: 130	Y Index: 147	Z Index: 113
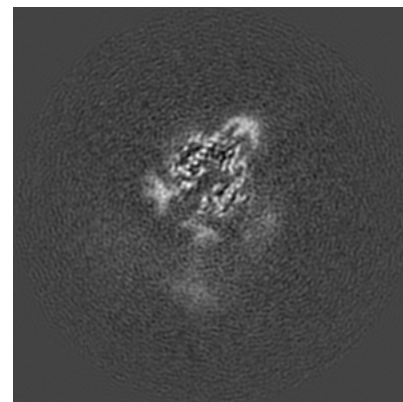
6.3.2 Raw map
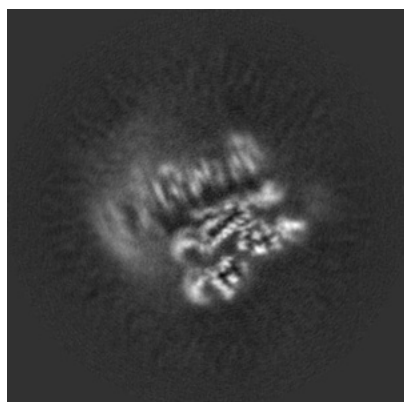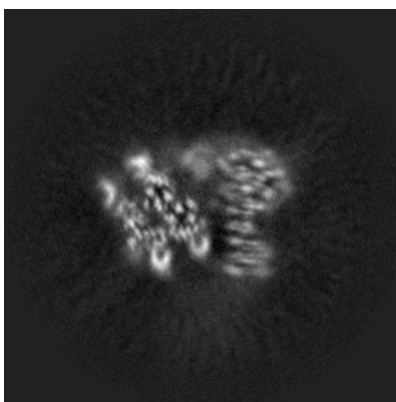
X Index: 131	Y Index: 146	Z Index: 113
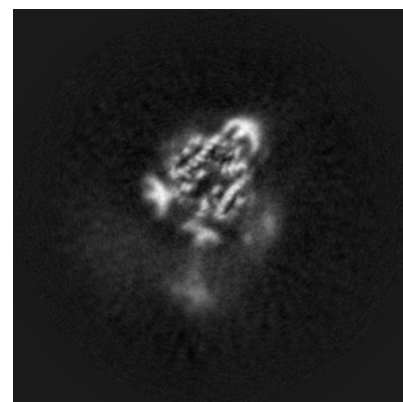
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map
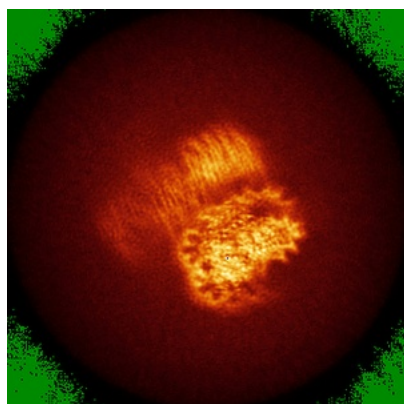
X
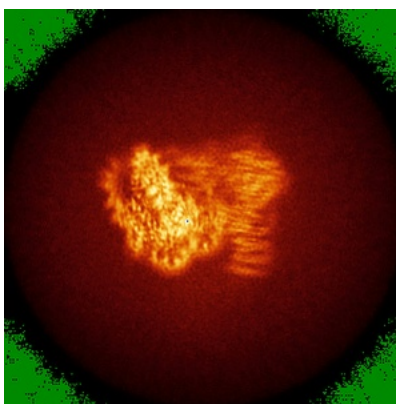
Y
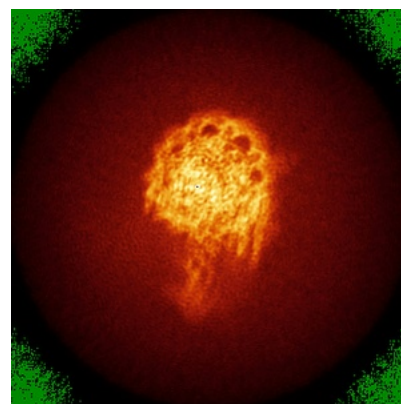
Z

6.4.2 Raw map

X

Y

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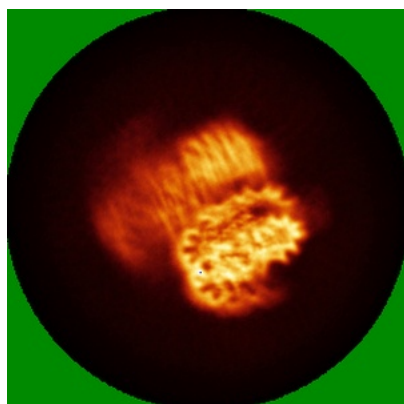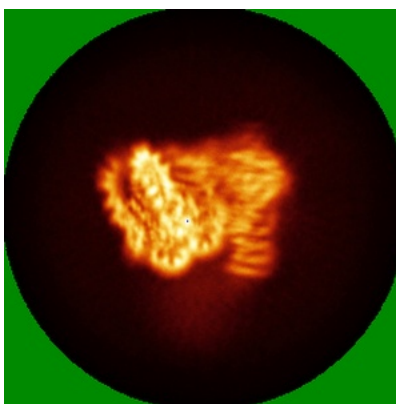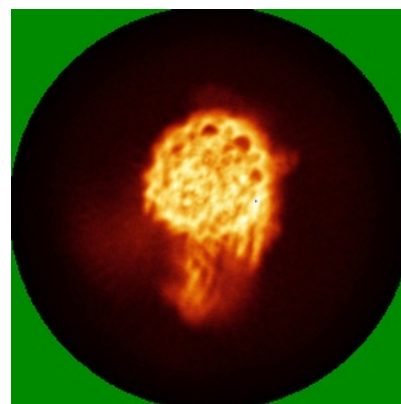
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

| X | Y | Z |
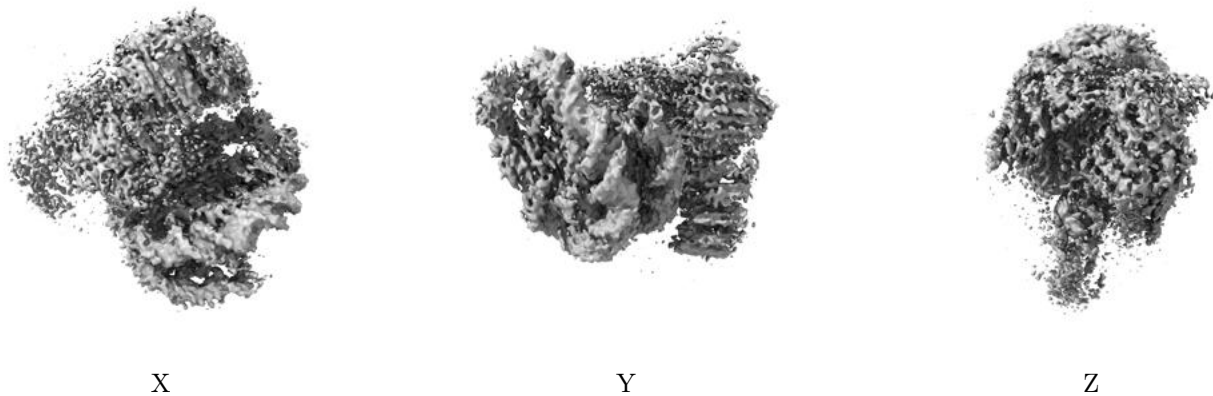
The images above show the 3D surface view of the map at the recommended contour level 0.015. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

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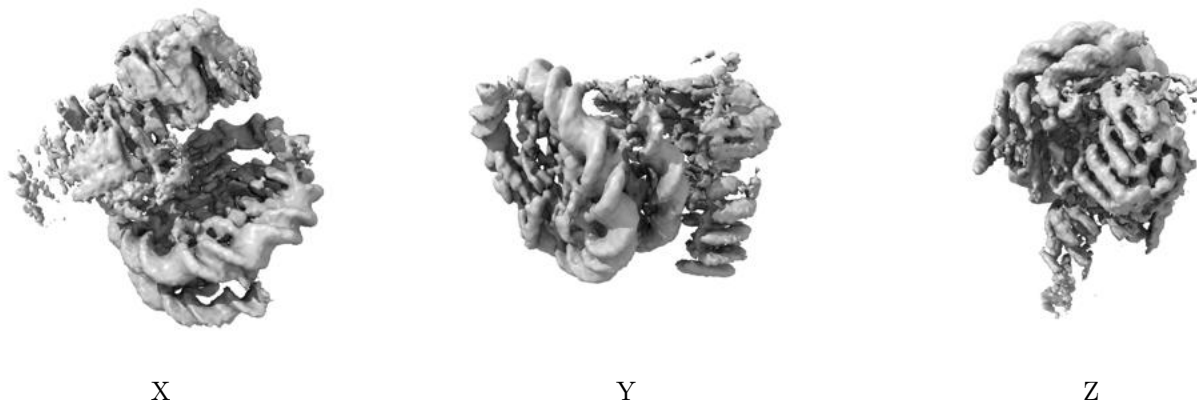
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

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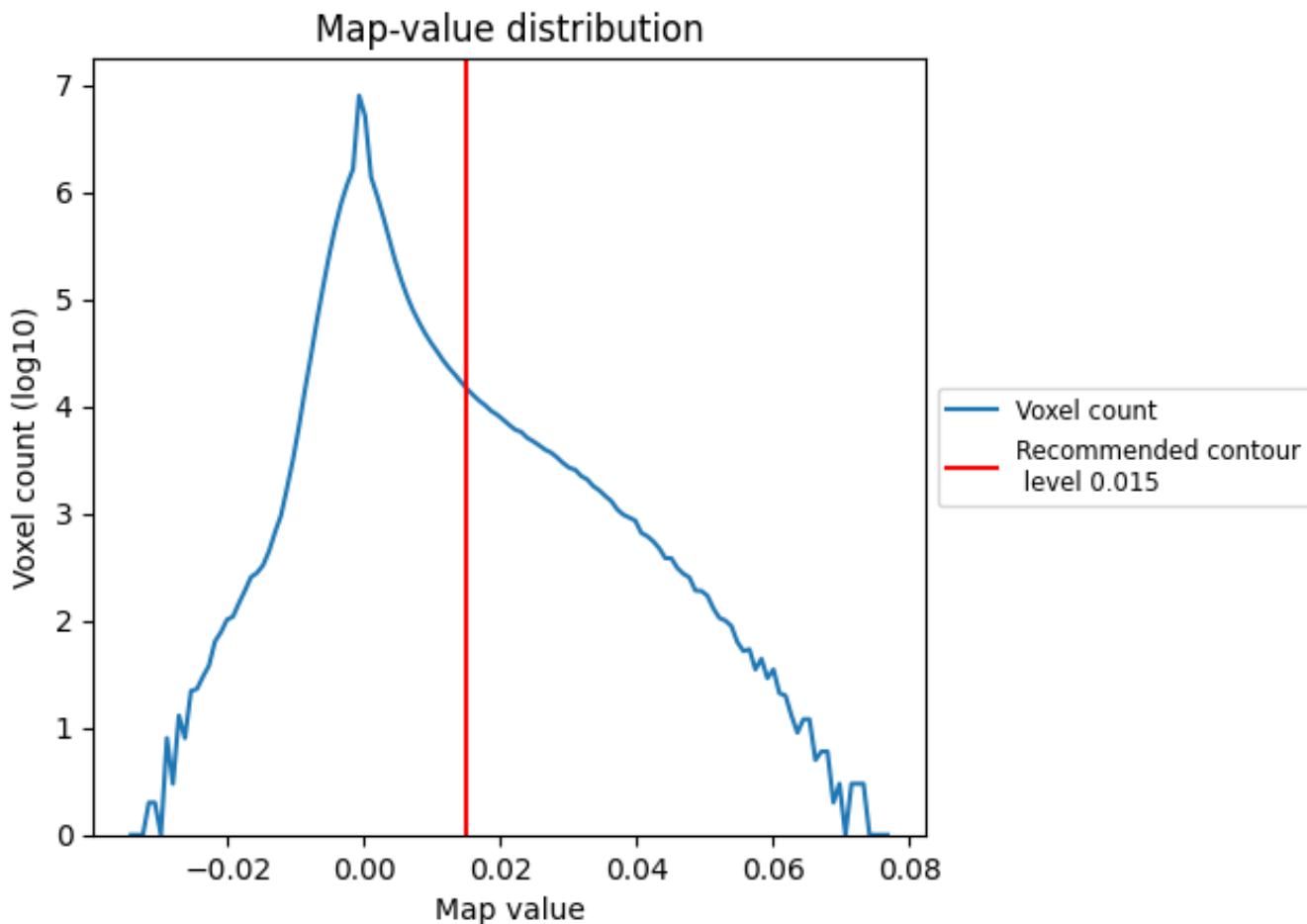
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2   Volume estimate ⓘ
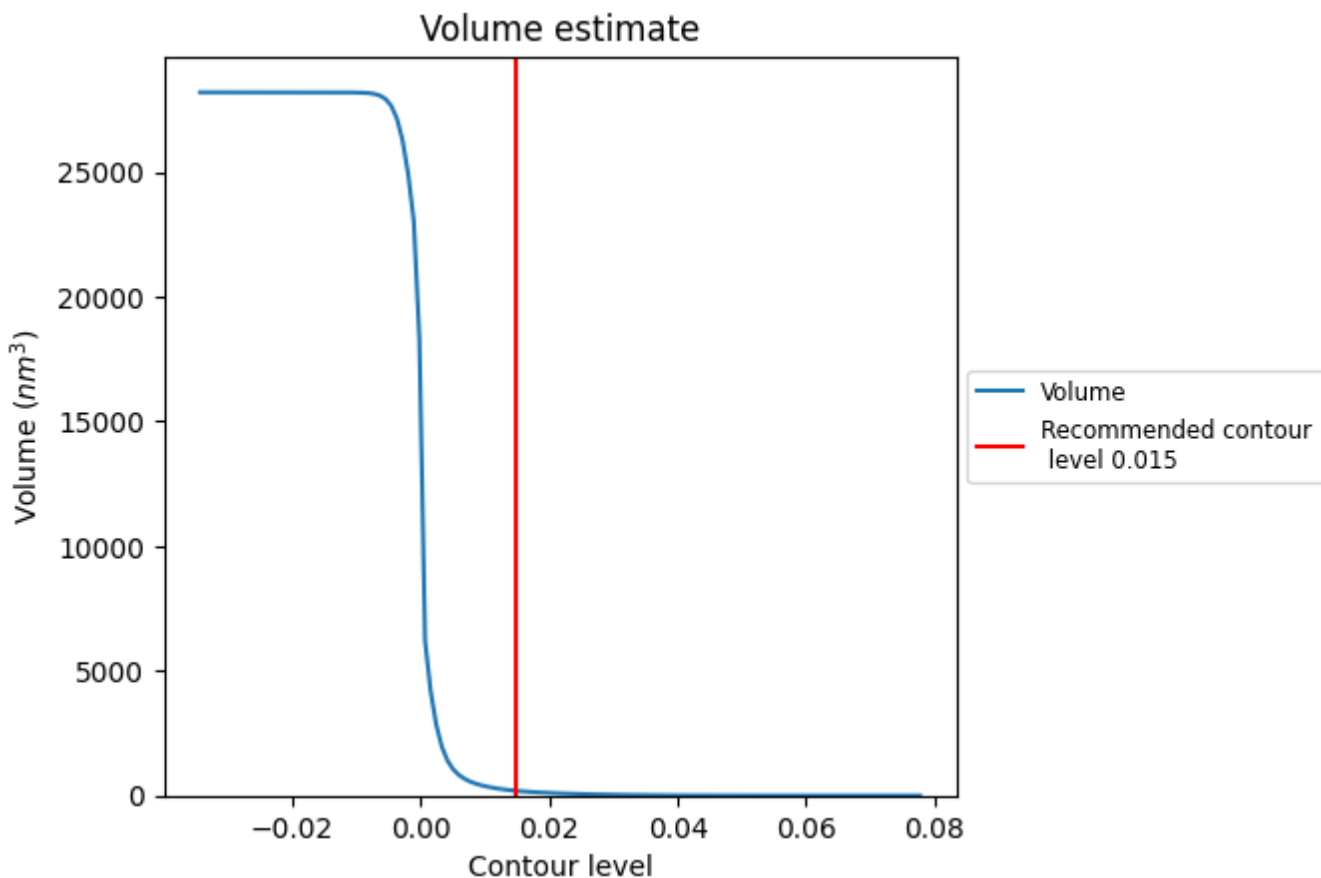
The volume at the recommended contour level is 189 nm^3; this corresponds to an approximate mass of 171 kDa.

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 ⓘ
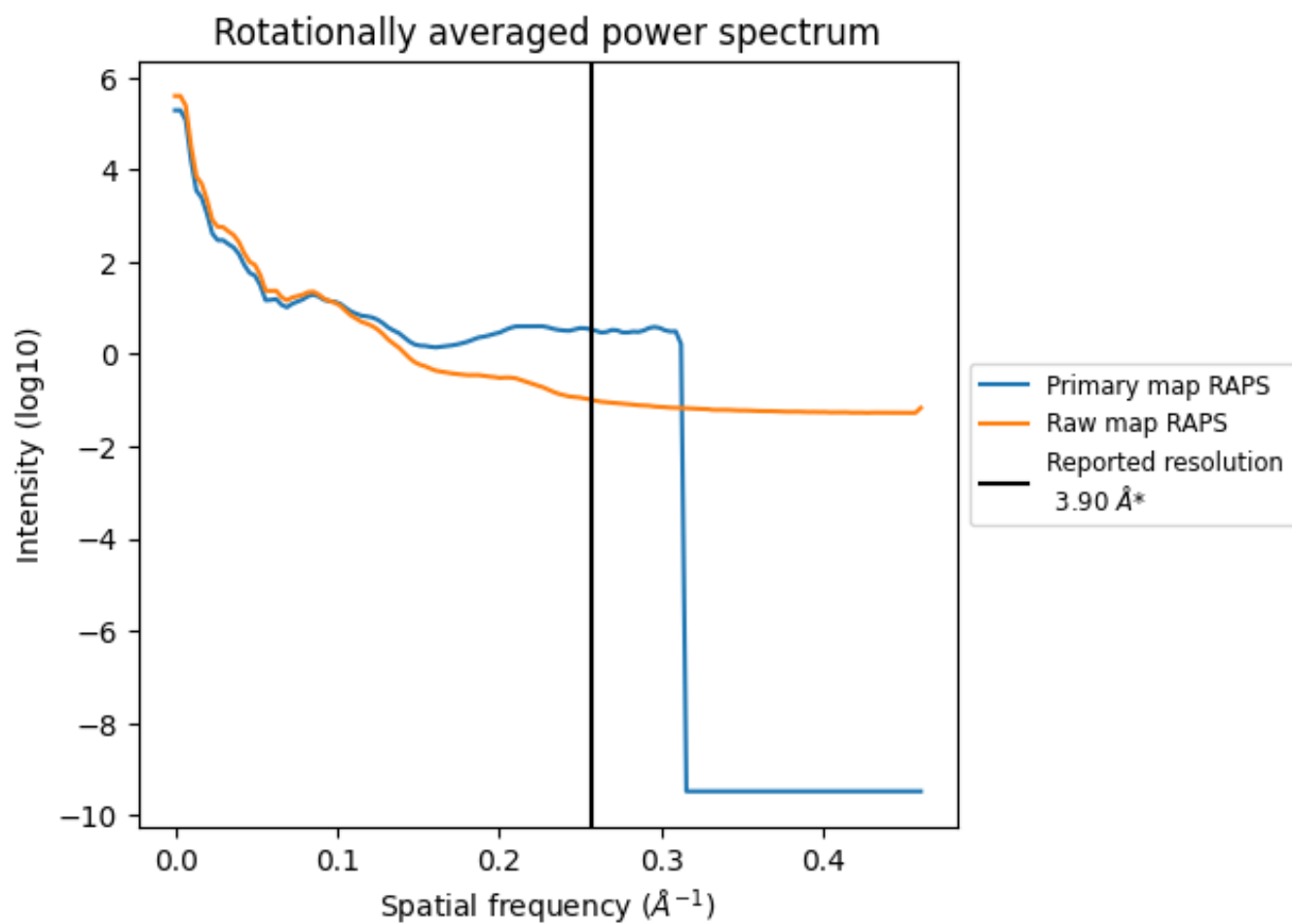
*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

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 ⓘ
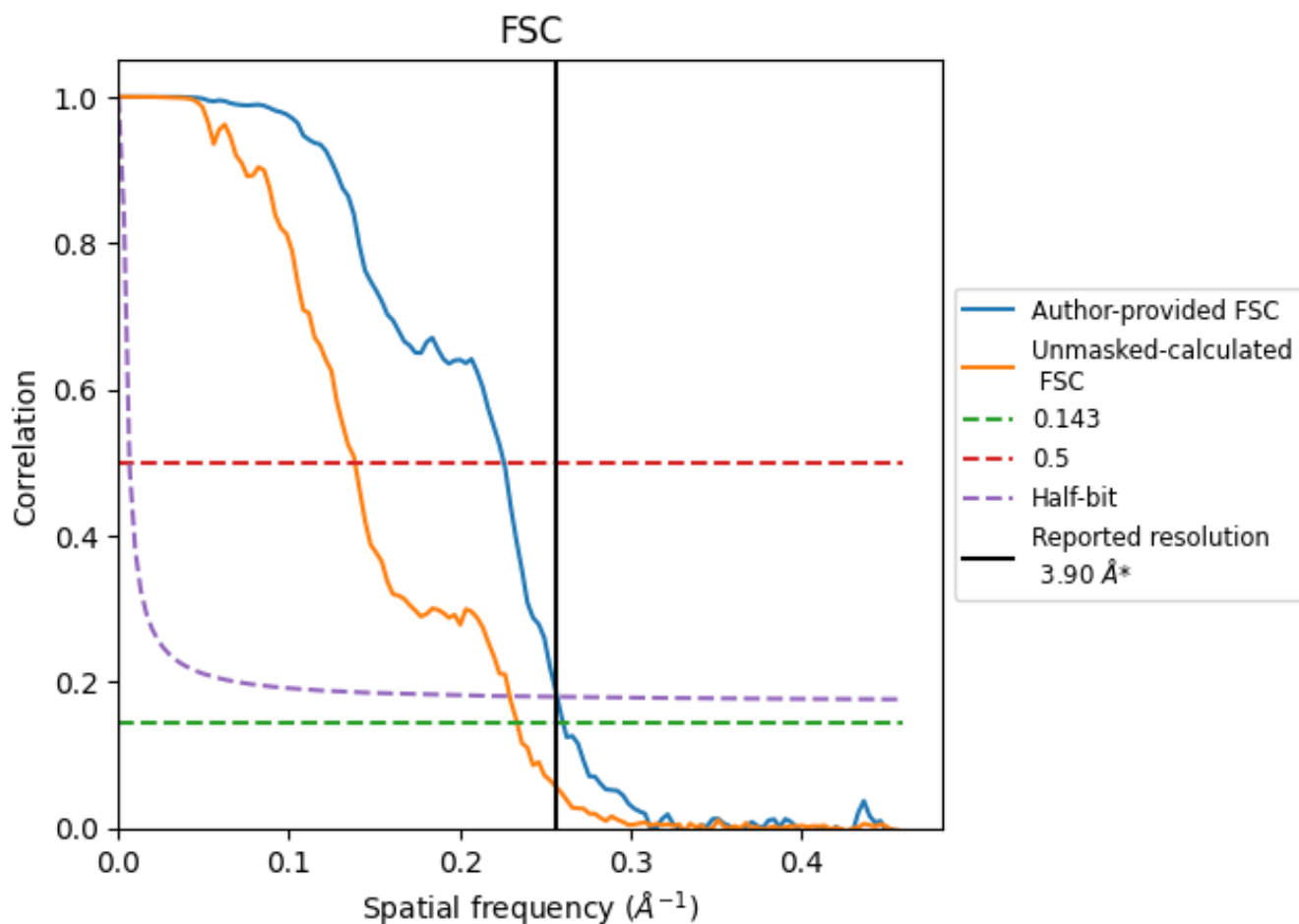
*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

8.2   Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.84	4.42	3.89
Unmasked-calculated*	4.28	7.22	4.36

*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-37365 and PDB model 8W9D. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay ⓘ

| X | Y | Z |
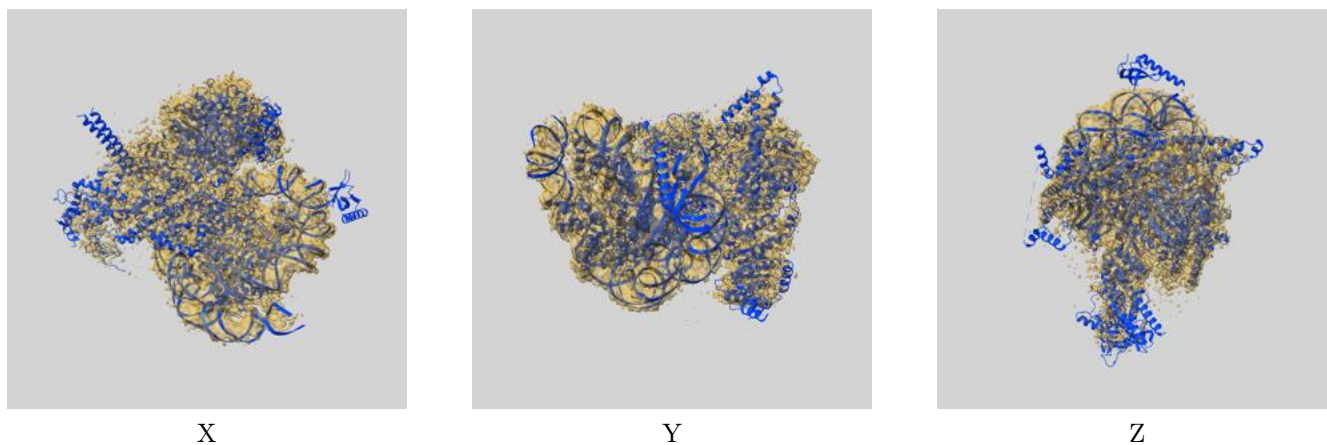
The images above show the 3D surface view of the map at the recommended contour level 0.015 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model ⓘ

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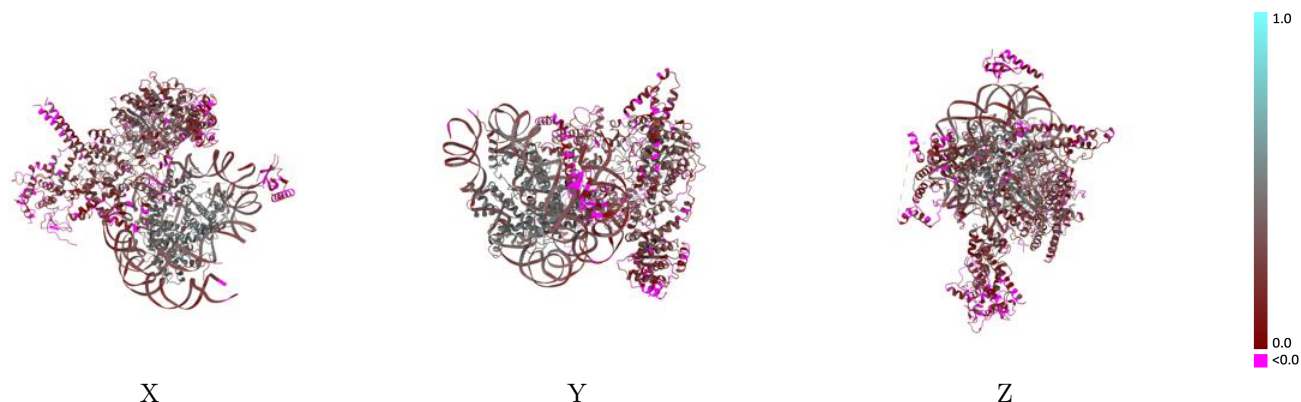
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

X   Y   Z
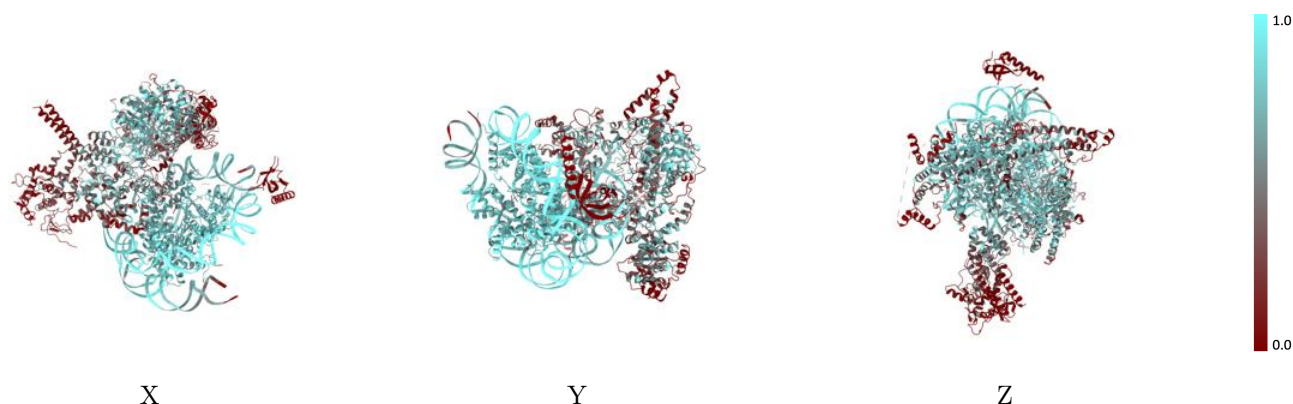
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.015).

9.4   Atom inclusion ⓘ
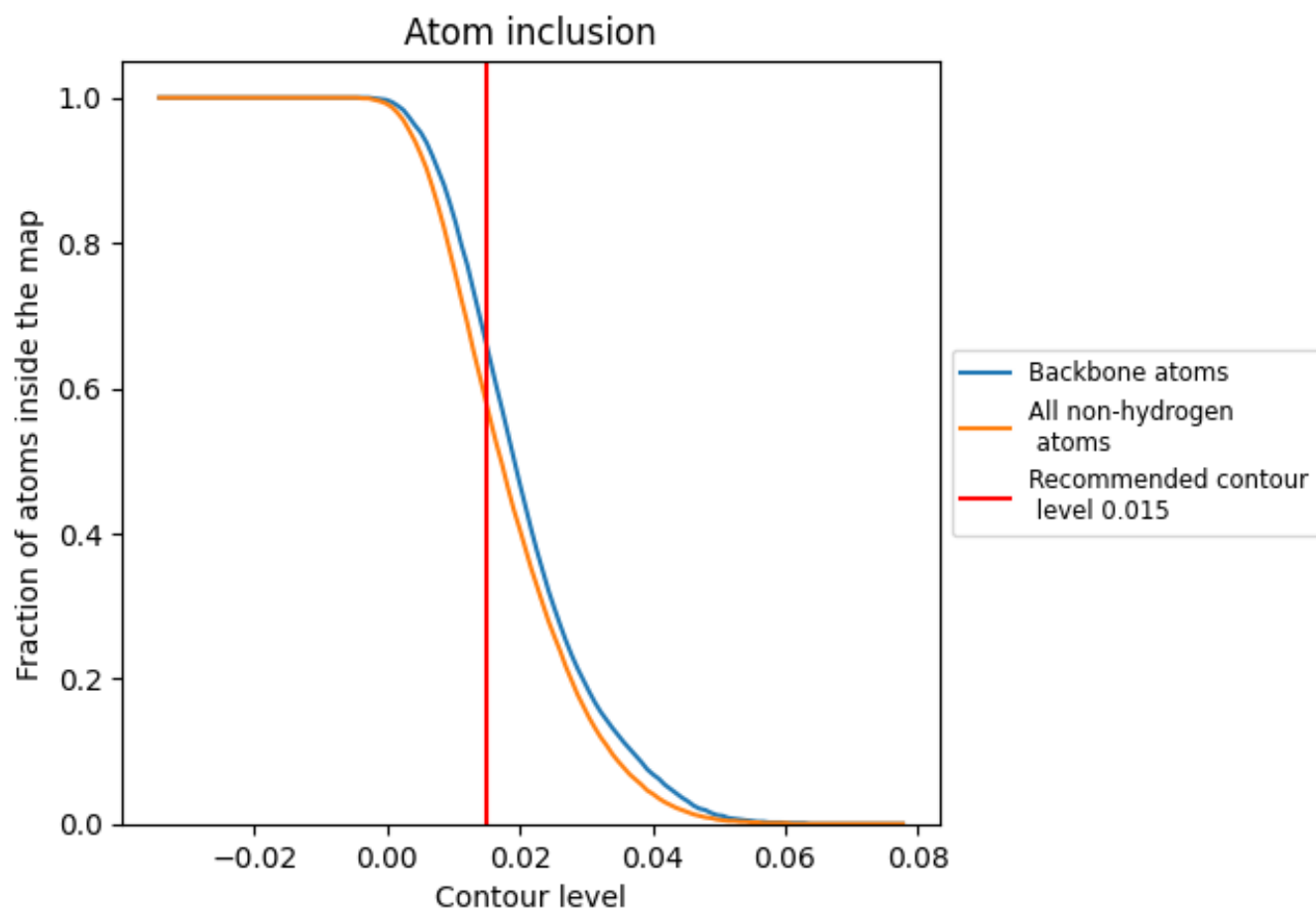
At the recommended contour level, 66% of all backbone atoms, 58% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.015) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5780	0.2630
A	0.3950	0.1890
B	0.6660	0.2830
C	0.5420	0.2350
D	0.1440	0.1220
E	0.3520	0.1680
F	0.1270	0.0710
G	0.0000	-0.0020
H	0.1380	0.1700
a	0.8130	0.4420
b	0.8260	0.4720
c	0.7540	0.4290
d	0.7310	0.4020
e	0.7920	0.4370
f	0.8690	0.4680
g	0.8090	0.4530
h	0.8180	0.4470
i	0.8300	0.2880
j	0.8530	0.2860

1.0

0.0
<0.0