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

Full wwPDB EM Validation Report (i)

Jun 25, 2025 – 01:28 pm BST

PDB ID	:	7NSC / pdb_00007nsc
EMDB ID	:	EMD-12564
Title	:	Substrate receptor scaffolding module of human CTLH E3 ubiquitin ligase
Authors	:	Chrustowicz, J.; Sherpa, D.; Prabu, J.R.; Schulman, B.A.
Deposited on	:	2021-03-05
Resolution	:	3.30 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 (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:

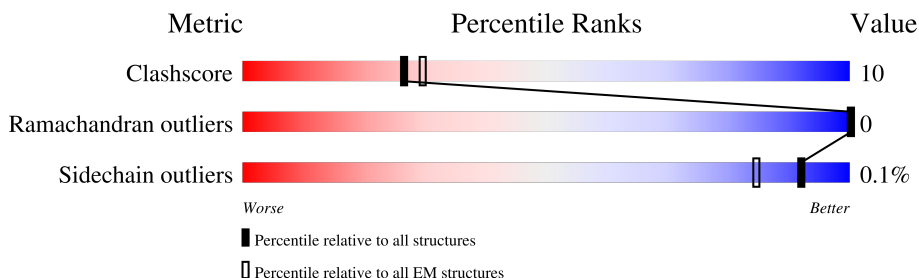|		
EMDB validation analysis	:	0.0.1.dev118
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1   Overall quality at a glance ⓘ

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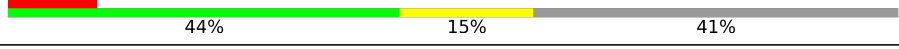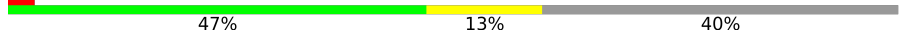*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.30 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		10
Ramachandran outliers		0
Sidechain outliers		0.1%

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

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	729	• 30% 8% 62%
2	E	659	9% 73% 20% 7%
3	H	266	10% 44% 15% 41%
4	D	300	• 47% 13% 40%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 9327 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 Ran-binding protein 9.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	276	Total 2065	C 1315	N 355	O 381	S 14	0	0

- Molecule 2 is a protein called Isoform 2 of Armadillo repeat-containing protein 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	615	Total 4631	C 2941	N 809	O 839	S 42	0	0

- Molecule 3 is a protein called Glucose-induced degradation protein 8 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	158	Total 1178	C 755	N 203	O 217	S 3	0	0

There are 38 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	229	SER	-	expression tag	UNP Q9NWU2
H	230	ASP	-	expression tag	UNP Q9NWU2
H	231	GLU	-	expression tag	UNP Q9NWU2
H	232	ASN	-	expression tag	UNP Q9NWU2
H	233	LEU	-	expression tag	UNP Q9NWU2
H	234	TYR	-	expression tag	UNP Q9NWU2
H	235	PHE	-	expression tag	UNP Q9NWU2
H	236	GLN	-	expression tag	UNP Q9NWU2
H	237	SER	-	expression tag	UNP Q9NWU2
H	238	GLY	-	expression tag	UNP Q9NWU2
H	239	TRP	-	expression tag	UNP Q9NWU2
H	240	SER	-	expression tag	UNP Q9NWU2
H	241	HIS	-	expression tag	UNP Q9NWU2
H	242	PRO	-	expression tag	UNP Q9NWU2
H	243	GLN	-	expression tag	UNP Q9NWU2

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Chain	Residue	Modelled	Actual	Comment	Reference
H	244	PHE	-	expression tag	UNP Q9NWU2
H	245	GLU	-	expression tag	UNP Q9NWU2
H	246	LYS	-	expression tag	UNP Q9NWU2
H	247	GLY	-	expression tag	UNP Q9NWU2
H	248	GLY	-	expression tag	UNP Q9NWU2
H	249	GLY	-	expression tag	UNP Q9NWU2
H	250	SER	-	expression tag	UNP Q9NWU2
H	251	GLY	-	expression tag	UNP Q9NWU2
H	252	GLY	-	expression tag	UNP Q9NWU2
H	253	GLY	-	expression tag	UNP Q9NWU2
H	254	SER	-	expression tag	UNP Q9NWU2
H	255	GLY	-	expression tag	UNP Q9NWU2
H	256	GLY	-	expression tag	UNP Q9NWU2
H	257	SER	-	expression tag	UNP Q9NWU2
H	258	ALA	-	expression tag	UNP Q9NWU2
H	259	TRP	-	expression tag	UNP Q9NWU2
H	260	SER	-	expression tag	UNP Q9NWU2
H	261	HIS	-	expression tag	UNP Q9NWU2
H	262	PRO	-	expression tag	UNP Q9NWU2
H	263	GLN	-	expression tag	UNP Q9NWU2
H	264	PHE	-	expression tag	UNP Q9NWU2
H	265	GLU	-	expression tag	UNP Q9NWU2
H	266	LYS	-	expression tag	UNP Q9NWU2

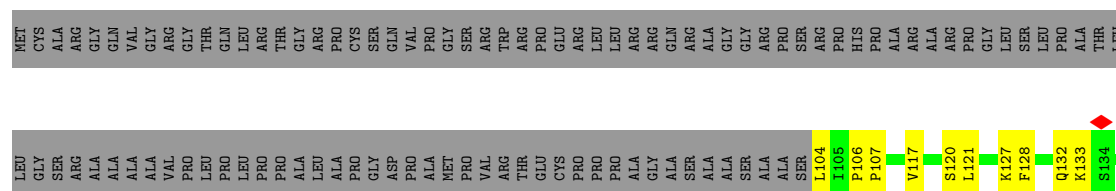- Molecule 4 is a protein called Glucose-induced degradation protein 4 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	181	1453	944	240	266	3	0	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: Ran-binding protein 9

Chain A:

• Molecule 2: Isoform 2 of Armadillo repeat-containing protein 8

Chain E:

MET GLU VAL THR ALA SER SER ARG HIS TYR VAL ASP ARG LEU PHE ASP PRO ASP P19 Q20 K21 V22 L23 Q24 G25 V26 I27 D28 M29 K30 N31 I34 G35 K38 N42 L43 I44 VAL LEU GLY ALA VAL PRO ARG LEU LEU TYR LEU LEU Q57 Q58 E59 T60 S61 S62 T63

K66 G74 M78 N83 V84 K85 L88 D89 C90 H91 I92 I93 L97 Q98 L101 S102 P103 D104 L105 K106 F107 R116 T117 T124 P125 E126 Y130 T131 D132 V135 I136 P137 H138 L139 I153 D165 H166 Q167 A175 V176 Q177 N178 I179 A180 H181 K189

Q193 F198 L201 L212 V213 N214 V215 L216 V217 D218 G219 E220 L221 L222 I225 K228 M229 R232 D233 K234 A252 R256 T257 D258 L267 P268 R272 R278 L279 E282 R283 V284 A287 D297 V298 H309 L310 L314 Y317 Y320 PRO

SER SER VAL ALA ILE THR ASP ILE LYS ARG L333 D334 E342 Q345 A346 A347 F348 K349 L350 L354 R362 N370 D373 R374 L379 S382 K385 R392 C393 L394 R399 S400 V401 R405 P416 V420 L421 Q422 D426 L429 V430 V431

M435 L436 C437 L440 F443 L462 P468 A469 L470 R471 V472 N480 M481 R495 S498 T499 F503 S509 D510 K516 N523 S526 T527 R528 P529 D532 K533 T537 H538 I542 V546 I549 L550 K559 D571 T581 N582 L586

M593 G594 H595 Q601 F606 C607 I608 L611 I612 W613 N614 Q620 E621 R622 L626 R627 D628 M629 G630 I631 V632 D633 I634 D643 C647 A650 Y657 LEU ALA

• Molecule 3: Glucose-induced degradation protein 8 homolog

Chain H:

10%

44%   15%   41%

MET SER TYR ALA GLU LYS PRO ASP GLU ILE THR LYS ASP GLU TRP MET GLU LYS LEU ASN ASN LEU HIS VAL GLN R26 A27 D28 I33 M34 N35 Y36 L37 V38 T39 F49 R50 M51 E52 S53 G54 I55 E56 P57 S58 V59 D60 L61 L64 D65 R71 E72 M73 I79 Q80

E81 A84 L85 I86 N87 P91 E92 L93 L94 D95 T96 L100 Q106 Q107 H108 L109 I110 R116 GLU THR GLU ALA ALA LEU GLU PHE ALA GLN THR GLN LEU ALA GLU GLN GLY GLU GLU GLU SER ARG GLU CYS LEU THR GLU MET GLU ARG THR LEU ALA LEU ALA ALA PHE ASP

SER PRO GLU E157 S158 P159 F160 G161 D162 L163 L164 H165 K171 V172 W173 S174 E175 V176 E184 N185 R186 E187 P190 K191 L192 L196 K197 L198 A202 L206 D207 Q208 K209 K210 M216 T217 D218 L219 S220 K221 G222 V223 ILE GLU GLU PRO LYS SER ASP GLU ASN LEU TYR

PHE GLN SER GLY TRP SER HIS PRO GLN PHE GLU LYS GLY GLY GLY SER GLY GLY GLY SER GLY GLY GLY SER ALA TRP SER HIS PRO GLN PHE GLU LYS

• Molecule 4: Glucose-induced degradation protein 4 homolog

Chain D:

47%   13%   40%

MET CYS ALA ARG GLY GLN ALA VAL GLY ARG GLY THR GLN LEU ARG THR GLY ARG PRO CYS SER GLN VAL PRO GLY SER ARG TRP ARG PRO GLU ARG LEU LEU ARG GLN ALA GLY GLY ARG PRO SER ARG ARG PRO HIS PRO ALA ARG ALA ARG PRO GLY LEU LEU SER LEU

LEU GLY SER ARG ALA ALA ALA VAL PRO LEU PRO PRO PRO ALA LEU ALA PRO GLY ASP PRO ALA MET PRO VAL ARG THR GLU CYS PRO PRO ALA GLY SER ALA SER ALA ALA SER L104 I105 P106 P107 V117 S120 L121 K127 F128 Q132 K133 S134

N137 V144 L145 L155 G163 LEU THR GLU GLU TYR P169 T170 E178 D194 Y209 Q210 Y211 S214 F215 D218 N227 V231 F232 M233 R234 W235 V241 I246 LYS ASP ILE SER GLY ALA SER PHE A255 Y259 I260 C261 F262 A266 A267 S268 I269 E270

G271 S278 GLU TRP TYR Q282 S283 L286 T287 H288 S293 A294 P295 I296 R300

4　Experimental information　ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	78264	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	60	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.125	Depositor
Minimum map value	-0.075	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.0245	Depositor
Map size (Å)	299.2, 299.2, 299.2	wwPDB
Map dimensions	352, 352, 352	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.85, 0.85, 0.85	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		Bond angles	
		RMSZ	$\#|Z|>5$	RMSZ	$\#|Z|>5$
1	A	0.30	2/2123 (0.1%)	0.41	0/2891
2	E	0.18	0/4697	0.39	1/6374 (0.0%)
3	H	0.18	0/1198	0.39	0/1633
4	D	0.21	0/1500	0.42	0/2035
All	All	0.22	2/9518 (0.0%)	0.40	1/12933 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	254	TYR	C-O	-5.31	1.18	1.24
1	A	727	TYR	N-CA	-5.30	1.39	1.46

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	181	HIS	N-CA-C	-6.58	106.20	114.56

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	2065	0	1917	50	0
2	E	4631	0	4667	93	0
3	H	1178	0	1092	29	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	1453	0	1336	28	0
All	All	9327	0	9012	179	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 10.

All (179) 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:350:GLN:NE2	1:A:727:TYR:OH	1.73	1.18
1:A:227:ASP:H	1:A:320:THR:HG21	1.34	0.92
2:E:527:THR:HG22	2:E:529:PRO:HD2	1.59	0.85
3:H:86:ILE:HG21	3:H:94:LEU:HD13	1.65	0.78
3:H:34:MET:HE2	3:H:49:PHE:HB3	1.65	0.77
3:H:36:TYR:HA	3:H:190:PRO:HB3	1.69	0.75
1:A:181:SER:HB2	1:A:186:ARG:HB3	1.68	0.74
1:A:344:GLU:OE1	2:E:232:ARG:NH1	2.21	0.73
1:A:726:ASP:HB3	1:A:727:TYR:CE1	2.24	0.73
1:A:376:TYR:HE2	3:H:33:ILE:HG13	1.55	0.71
2:E:392:ARG:HG2	2:E:431:VAL:HG11	1.73	0.71
2:E:362:ARG:NH1	2:E:399:ARG:O	2.24	0.71
2:E:462:LEU:HD22	2:E:470:LEU:HD21	1.73	0.70
1:A:726:ASP:C	1:A:727:TYR:CD1	2.70	0.70
2:E:345:GLN:HE22	2:E:385:LYS:HE2	1.56	0.70
3:H:171:LYS:NZ	3:H:175:GLU:OE2	2.24	0.70
2:E:595:HIS:O	2:E:601:GLN:NE2	2.23	0.69
1:A:350:GLN:CD	1:A:727:TYR:OH	2.37	0.68
2:E:88:LEU:HD22	2:E:124:THR:HG22	1.76	0.68
2:E:29:MET:HG3	2:E:43:LEU:HD21	1.76	0.67
1:A:726:ASP:C	1:A:727:TYR:HD1	2.01	0.67
2:E:627:ARG:NH2	2:E:657:TYR:OH	2.28	0.67
4:D:211:TYR:O	4:D:215:PHE:N	2.28	0.66
2:E:317:TYR:HD2	2:E:347:ALA:HB2	1.61	0.66
1:A:203:ARG:NH2	1:A:241:MET:SD	2.69	0.66
1:A:376:TYR:CE2	3:H:33:ILE:HG13	2.31	0.65
2:E:167:GLN:NE2	2:E:201:LEU:O	2.30	0.64
4:D:127:LYS:HG2	4:D:144:VAL:HG22	1.78	0.64
2:E:611:LEU:O	2:E:622:ARG:NH1	2.31	0.63
2:E:297:ASP:OD1	2:E:298:VAL:N	2.32	0.62
3:H:184:GLU:OE2	3:H:186:ARG:NH1	2.32	0.62
2:E:394:LEU:HD23	2:E:435:MET:HE1	1.79	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:310:LEU:HD23	2:E:354:LEU:HD11	1.82	0.61
1:A:711:MET:HB3	3:H:206:LEU:HD13	1.84	0.60
1:A:727:TYR:CD1	1:A:727:TYR:N	2.70	0.59
2:E:221:LEU:HD12	2:E:221:LEU:H	1.68	0.58
4:D:128:PHE:HB3	4:D:286:LEU:HB3	1.85	0.58
1:A:204:ALA:HB3	1:A:314:PRO:HD2	1.86	0.58
1:A:726:ASP:CB	1:A:727:TYR:CE1	2.87	0.57
2:E:78:MET:HB3	2:E:117:THR:HG21	1.86	0.56
2:E:139:LEU:HB3	2:E:153:ILE:HD12	1.88	0.56
2:E:571:ASP:OD2	4:D:293:SER:OG	2.24	0.56
1:A:385:THR:HG21	3:H:49:PHE:HD1	1.70	0.55
2:E:287:ALA:HB3	2:E:346:ALA:HB1	1.86	0.55
2:E:314:LEU:HD21	2:E:350:LEU:HD23	1.88	0.55
4:D:145:LEU:HD22	4:D:155:LEU:HD21	1.89	0.55
1:A:710:LEU:HD22	3:H:206:LEU:HD21	1.88	0.55
2:E:523:ASN:ND2	4:D:296:ILE:O	2.36	0.55
2:E:317:TYR:CD2	2:E:347:ALA:HB2	2.41	0.55
2:E:362:ARG:HH11	2:E:400:SER:HB2	1.72	0.54
3:H:100:LEU:HD21	3:H:176:VAL:HG23	1.88	0.54
1:A:298:GLY:HA2	1:A:336:PHE:HB2	1.90	0.54
2:E:215:VAL:HB	2:E:222:LEU:HG	1.90	0.53
1:A:216:TYR:HB2	1:A:338:ILE:HD12	1.91	0.53
2:E:379:LEU:HD22	2:E:416:PRO:HB2	1.90	0.53
2:E:586:LEU:HB3	2:E:629:MET:HE3	1.91	0.53
2:E:550:LEU:HD12	2:E:559:LYS:HG2	1.90	0.53
2:E:373:ASP:OD2	2:E:374:ARG:N	2.42	0.52
2:E:66:LYS:HB3	2:E:107:PHE:CE1	2.45	0.52
2:E:440:LEU:HD13	2:E:481:MET:HE2	1.91	0.52
3:H:79:ILE:HB	3:H:108:HIS:HB2	1.92	0.51
3:H:106:GLN:O	3:H:110:ILE:HG23	2.10	0.51
1:A:712:ALA:HB2	1:A:719:CYS:SG	2.51	0.51
1:A:726:ASP:HB3	1:A:727:TYR:CD1	2.45	0.51
1:A:222:VAL:HB	1:A:324:VAL:HG23	1.91	0.51
2:E:345:GLN:HE21	2:E:349:LYS:NZ	2.09	0.50
4:D:133:LYS:O	4:D:282:GLN:N	2.44	0.50
1:A:347:THR:HG21	2:E:233:ASP:HA	1.93	0.50
2:E:405:ARG:NH2	4:D:241:VAL:O	2.45	0.50
2:E:546:VAL:HA	2:E:549:ILE:HG22	1.94	0.50
1:A:271:TYR:CZ	1:A:304:ALA:HB2	2.47	0.50
4:D:120:SER:OG	4:D:121:LEU:N	2.44	0.50
1:A:160:GLU:OE2	1:A:167:ARG:NH2	2.45	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:163:LEU:O	3:H:164:LEU:HD22	2.12	0.50
1:A:257:ASP:OD1	1:A:258:ASP:N	2.45	0.50
2:E:526:SER:O	2:E:527:THR:OG1	2.23	0.49
2:E:24:GLN:HA	2:E:27:ILE:HG22	1.94	0.49
4:D:132:GLN:HG3	4:D:283:SER:O	2.12	0.49
1:A:210:ALA:HA	1:A:287:LEU:HD13	1.94	0.49
2:E:177:GLN:O	2:E:181:HIS:NE2	2.45	0.49
3:H:71:ARG:HB2	3:H:173:TRP:NE1	2.28	0.49
2:E:116:ARG:NH2	2:E:117:THR:OG1	2.37	0.48
1:A:376:TYR:HE1	1:A:380:HIS:CE1	2.32	0.48
2:E:399:ARG:NH2	4:D:300:ARG:O	2.47	0.48
1:A:291:THR:HG21	1:A:303:ILE:HD12	1.94	0.48
1:A:726:ASP:CB	1:A:727:TYR:CD1	2.96	0.48
2:E:22:VAL:O	2:E:26:VAL:HG23	2.13	0.48
4:D:231:VAL:HG13	4:D:262:PHE:HB3	1.95	0.48
3:H:218:ASP:OD1	3:H:218:ASP:N	2.46	0.48
2:E:550:LEU:O	2:E:559:LYS:NZ	2.46	0.48
2:E:593:MET:HE1	2:E:631:ILE:HD11	1.96	0.48
3:H:34:MET:HG3	3:H:55:ILE:HB	1.96	0.47
2:E:35:GLY:N	3:H:95:ASP:OD1	2.35	0.47
2:E:229:MET:HA	2:E:234:LYS:HE2	1.96	0.47
2:E:581:THR:HG22	2:E:582:ASN:H	1.79	0.47
2:E:627:ARG:HA	2:E:631:ILE:HG22	1.97	0.47
4:D:178:GLU:O	4:D:233:MET:HB2	2.14	0.47
3:H:73:MET:HE1	3:H:81:GLU:CB	2.44	0.47
2:E:225:ILE:HD12	2:E:228:LYS:HE3	1.97	0.47
4:D:233:MET:HE3	4:D:235:TRP:CZ2	2.50	0.47
2:E:175:ALA:O	2:E:179:ILE:HB	2.15	0.46
2:E:165:ASP:N	2:E:165:ASP:OD1	2.45	0.46
2:E:135:VAL:O	2:E:139:LEU:HG	2.16	0.46
2:E:267:LEU:HB3	2:E:268:PRO:HD3	1.98	0.46
1:A:343:ARG:O	1:A:347:THR:HG23	2.16	0.46
2:E:93:ILE:HD12	2:E:93:ILE:H	1.80	0.46
2:E:180:ALA:HB2	2:E:198:PHE:HZ	1.81	0.46
2:E:180:ALA:HB2	2:E:198:PHE:CZ	2.50	0.46
2:E:608:ILE:HD11	2:E:626:LEU:HD21	1.98	0.46
1:A:218:GLU:OE2	1:A:280:VAL:HG11	2.17	0.45
2:E:581:THR:HG22	2:E:582:ASN:N	2.31	0.45
4:D:269:ILE:HB	4:D:286:LEU:HB2	1.97	0.45
2:E:537:THR:HG23	2:E:538:HIS:ND1	2.30	0.45
2:E:97:LEU:HD23	2:E:97:LEU:HA	1.82	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:267:ALA:HB1	4:D:288:HIS:HB3	1.98	0.45
2:E:214:ASN:HA	2:E:221:LEU:HD23	1.98	0.45
2:E:83:ASN:OD1	2:E:84:VAL:N	2.50	0.45
2:E:278:ARG:HB3	2:E:282:GLU:OE2	2.17	0.45
4:D:259:TYR:O	4:D:271:GLY:HA2	2.17	0.45
2:E:437:CYS:O	2:E:480:ASN:ND2	2.46	0.44
2:E:612:ILE:O	2:E:612:ILE:HG13	2.18	0.44
2:E:633:ASP:OD1	2:E:634:ILE:N	2.49	0.44
2:E:136:ILE:HB	2:E:137:PRO:HD3	2.00	0.44
2:E:62:SER:OG	2:E:63:THR:N	2.50	0.44
1:A:218:GLU:OE1	1:A:334:PHE:HD1	2.01	0.44
1:A:293:PHE:HB2	1:A:302:GLY:O	2.17	0.44
1:A:338:ILE:O	1:A:342:MET:HG3	2.18	0.44
3:H:53:SER:OG	3:H:55:ILE:HG12	2.17	0.44
3:H:92:GLU:OE1	3:H:96:THR:OG1	2.35	0.43
1:A:217:PHE:CE2	1:A:314:PRO:HB3	2.52	0.43
4:D:210:GLN:OE1	4:D:210:GLN:N	2.34	0.43
2:E:232:ARG:HE	2:E:272:ARG:CZ	2.31	0.43
1:A:697:LEU:HD21	3:H:192:LEU:HD21	2.00	0.43
3:H:38:VAL:HG21	3:H:57:PRO:HB2	2.00	0.43
2:E:284:VAL:HG21	2:E:342:GLU:HB3	2.01	0.43
4:D:211:TYR:O	4:D:214:SER:N	2.52	0.43
2:E:34:ILE:HD13	3:H:87:ASN:OD1	2.19	0.43
4:D:145:LEU:HD13	4:D:155:LEU:HD11	1.99	0.43
1:A:249:LYS:HA	1:A:249:LYS:HD2	1.68	0.43
2:E:233:ASP:N	2:E:233:ASP:OD1	2.40	0.43
2:E:429:LEU:HD22	2:E:470:LEU:HD11	2.00	0.43
2:E:606:PHE:CD2	4:D:117:VAL:HG21	2.54	0.43
3:H:39:THR:OG1	3:H:187:GLU:O	2.28	0.43
2:E:526:SER:OG	4:D:295:PRO:HG3	2.19	0.42
4:D:194:ASP:N	4:D:194:ASP:OD1	2.51	0.42
4:D:106:PRO:HA	4:D:107:PRO:HD3	1.91	0.42
1:A:252:TYR:HB3	1:A:305:PHE:CE2	2.54	0.42
1:A:302:GLY:HA3	2:E:309:HIS:ND1	2.34	0.42
2:E:130:TYR:HD1	2:E:136:ILE:HD11	1.84	0.42
1:A:271:TYR:CE2	1:A:294:TYR:HD2	2.38	0.42
2:E:401:VAL:HG22	2:E:443:PHE:CE1	2.54	0.42
2:E:401:VAL:HG13	2:E:443:PHE:CD1	2.54	0.42
2:E:279:LEU:HB3	2:E:282:GLU:HG2	2.02	0.42
2:E:379:LEU:HD23	2:E:420:VAL:HG21	2.02	0.42
3:H:35:ASN:O	3:H:39:THR:HG22	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:87:ASN:HA	3:H:91:PRO:HA	2.02	0.42
1:A:199:ALA:HB3	1:A:243:ARG:HA	2.01	0.42
2:E:132:ASP:O	2:E:135:VAL:HG12	2.20	0.42
1:A:708:LEU:HA	1:A:711:MET:HG2	2.01	0.41
1:A:309:PRO:HG2	1:A:312:LEU:HD21	2.01	0.41
1:A:346:ARG:O	1:A:350:GLN:HG2	2.20	0.41
1:A:707:CYS:O	1:A:711:MET:HG2	2.20	0.41
1:A:302:GLY:HA3	2:E:309:HIS:CE1	2.56	0.41
2:E:468:PRO:O	2:E:472:VAL:HG13	2.20	0.41
4:D:169:PRO:HB2	4:D:170:THR:H	1.57	0.41
2:E:256:ARG:NH2	2:E:258:ASP:OD2	2.54	0.41
2:E:472:VAL:HG21	4:D:104:LEU:HD12	2.03	0.41
4:D:260:ILE:HD13	4:D:271:GLY:HA3	2.02	0.41
1:A:271:TYR:HE2	1:A:294:TYR:HD2	1.68	0.41
2:E:510:ASP:N	2:E:510:ASP:OD1	2.53	0.41
2:E:516:LYS:HD3	2:E:516:LYS:HA	1.77	0.41
2:E:189:LYS:O	2:E:193:GLN:HG2	2.21	0.40
1:A:345:TRP:O	1:A:349:ILE:HG12	2.22	0.40
2:E:542:ILE:H	2:E:542:ILE:HD12	1.87	0.40
2:E:31:ASN:OD1	3:H:84:ALA:HA	2.21	0.40
4:D:260:ILE:HG23	4:D:269:ILE:HG23	2.03	0.40
1:A:372:MET:SD	3:H:196:LEU:HD11	2.61	0.40
2:E:212:LEU:HA	2:E:215:VAL:HG23	2.03	0.40
2:E:216:LEU:O	2:E:216:LEU:HD23	2.21	0.40

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	270/729 (37%)	256 (95%)	14 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	E	609/659 (92%)	565 (93%)	44 (7%)	0	100	100
3	H	154/266 (58%)	129 (84%)	25 (16%)	0	100	100
4	D	173/300 (58%)	156 (90%)	17 (10%)	0	100	100
All	All	1206/1954 (62%)	1106 (92%)	100 (8%)	0	100	100

There are no Ramachandran outliers to report.

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	206/595 (35%)	205 (100%)	1 (0%)	86	91
2	E	495/588 (84%)	495 (100%)	0	100	100
3	H	111/235 (47%)	111 (100%)	0	100	100
4	D	150/249 (60%)	150 (100%)	0	100	100
All	All	962/1667 (58%)	961 (100%)	1 (0%)	92	96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	727	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	184	ASN
1	A	240	ASN
1	A	319	GLN
1	A	328	ASN
1	A	331	GLN
1	A	350	GLN
2	E	167	GLN

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Mol	Chain	Res	Type
2	E	181	HIS
2	E	345	GLN
4	D	131	HIS

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 oligosaccharides 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-12564. 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 ⓘ
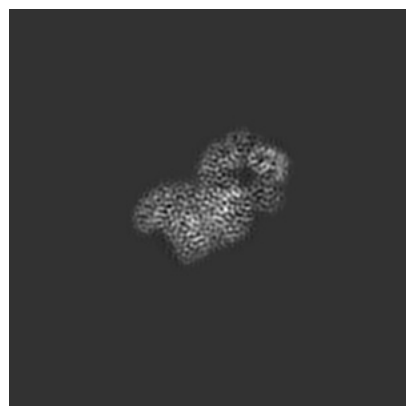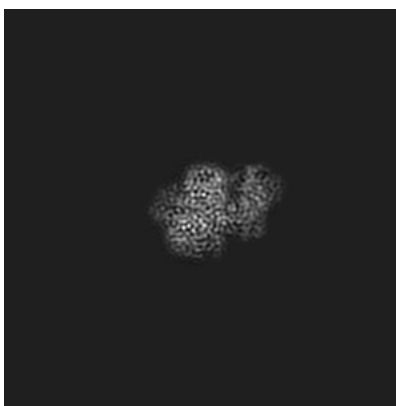
6.1.1 Primary map

| X | Y | Z |

6.1.2 Raw map

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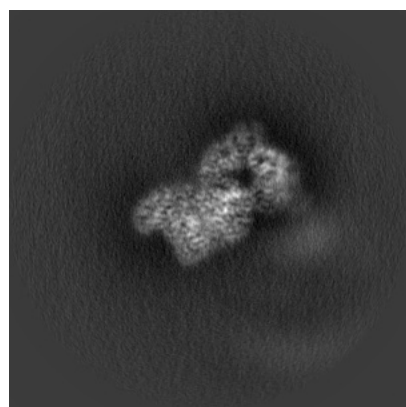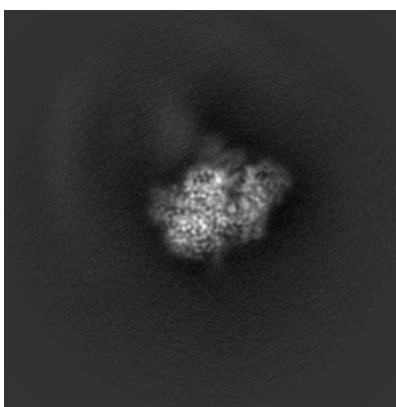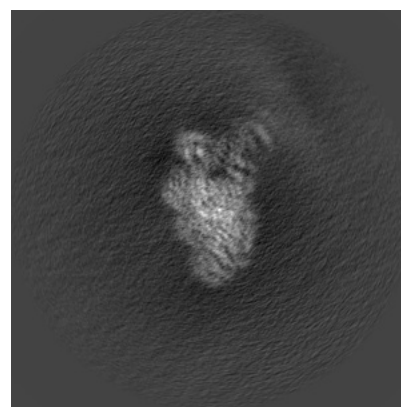
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
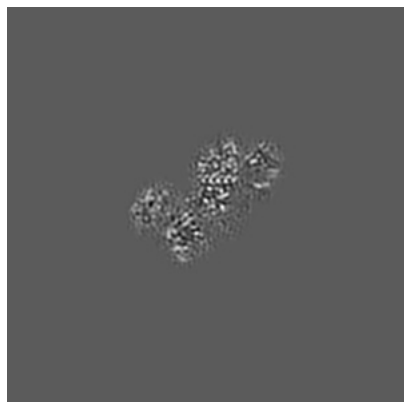
6.2.1 Primary map
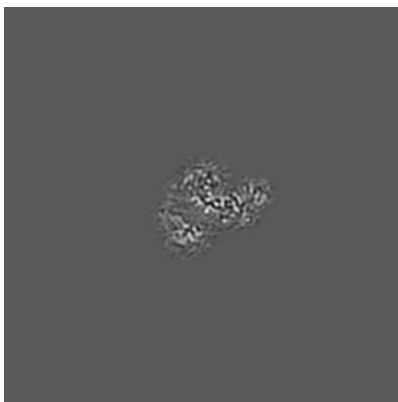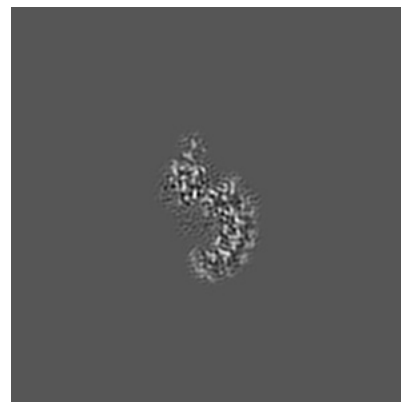
| X Index: 176 | Y Index: 176 | Z Index: 176 |

6.2.2 Raw map
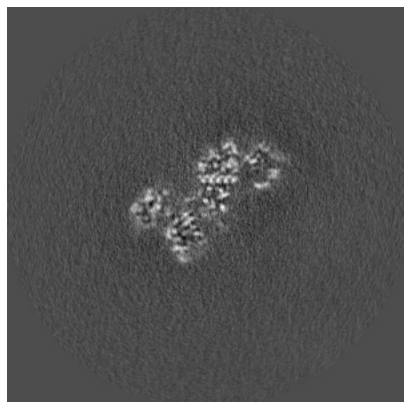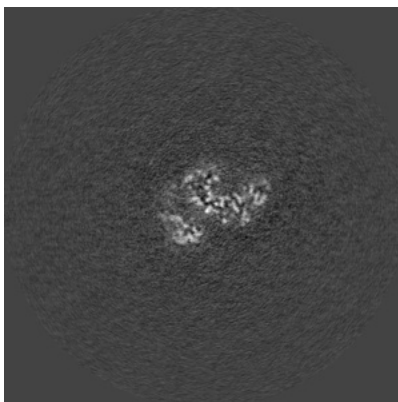
| X Index: 176 | Y Index: 176 | Z Index: 176 |
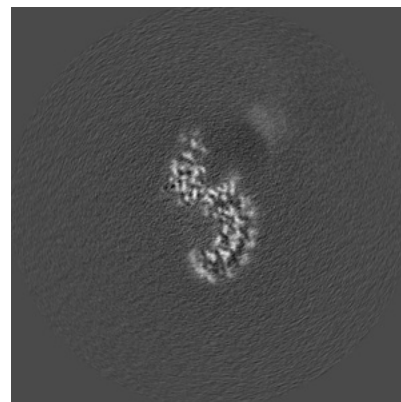
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices ⓘ

6.3.1 Primary map
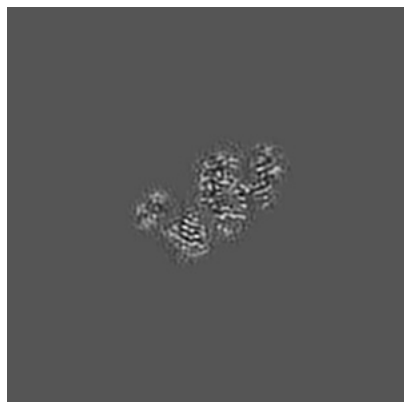
| X Index: 169 | Y Index: 191 | Z Index: 176 |

6.3.2 Raw map
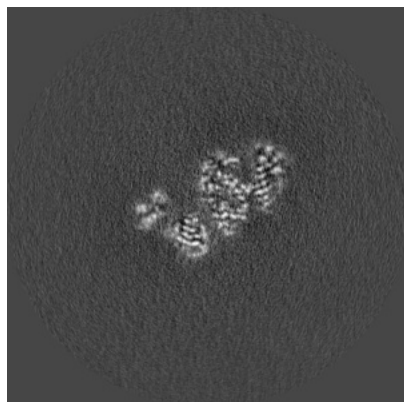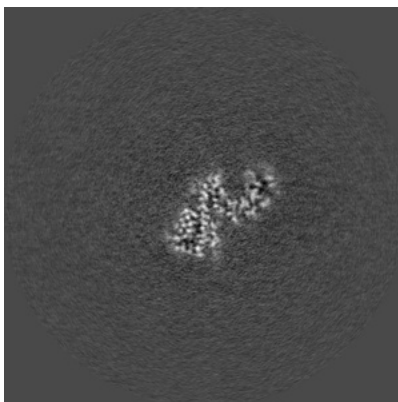
| X Index: 168 | Y Index: 190 | Z Index: 176 |
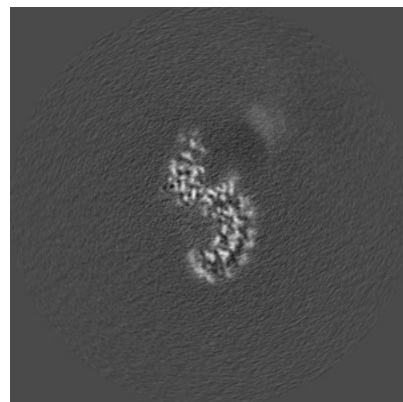
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map
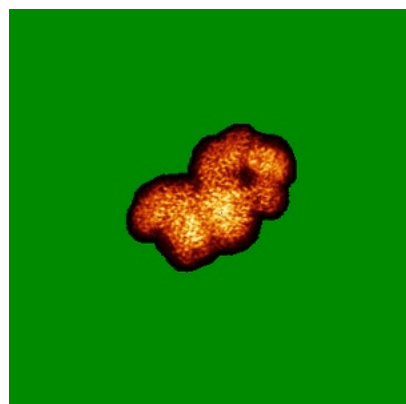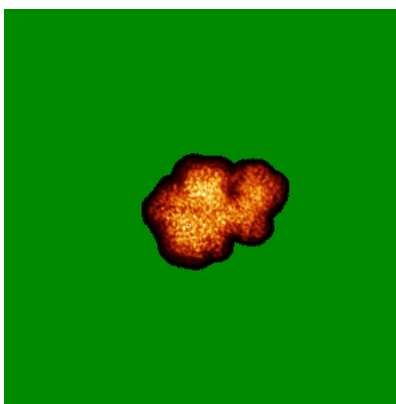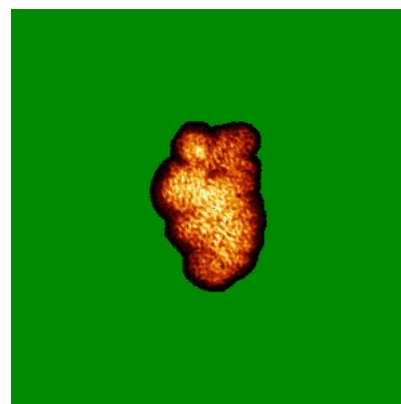
X	Y	Z

6.4.2 Raw map

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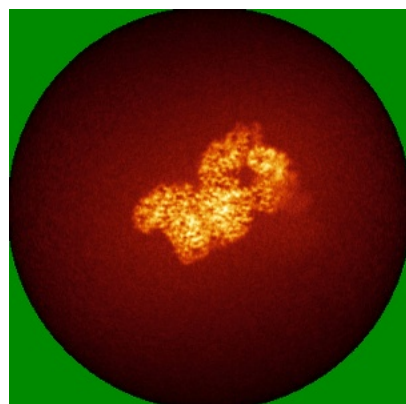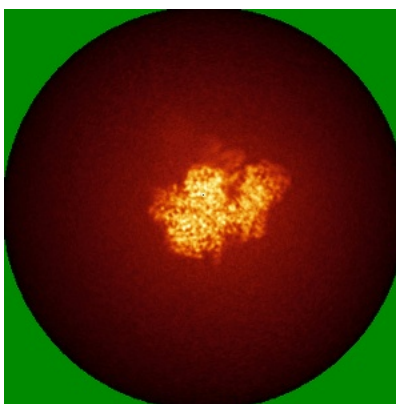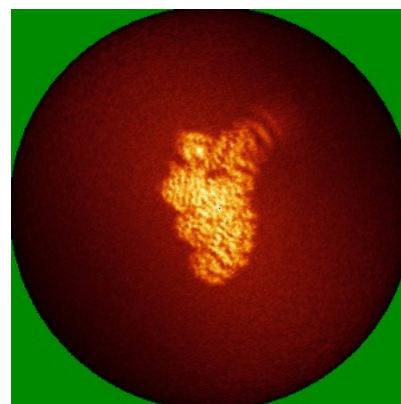
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5　Orthogonal surface views ⓘ

6.5.1　Primary map

X　　　　　　　　　　Y　　　　　　　　　　Z
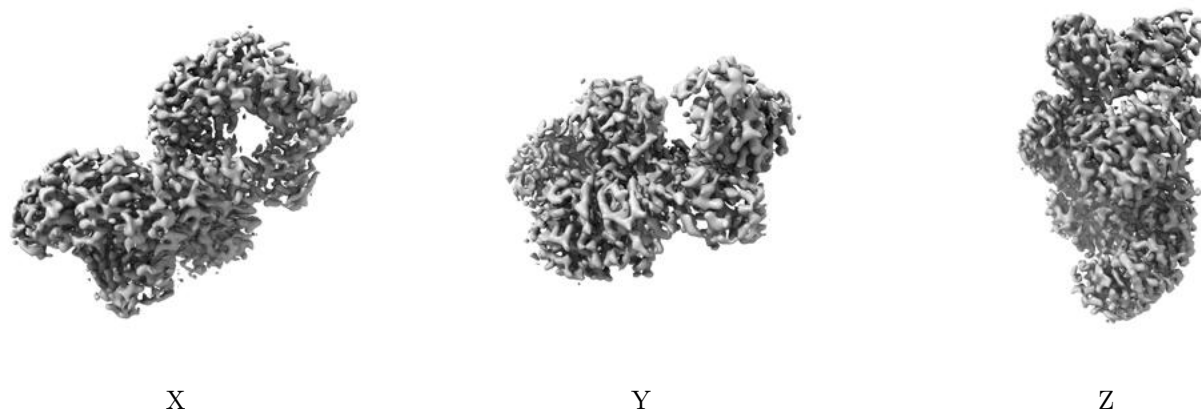
The images above show the 3D surface view of the map at the recommended contour level 0.0245. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2　Raw map

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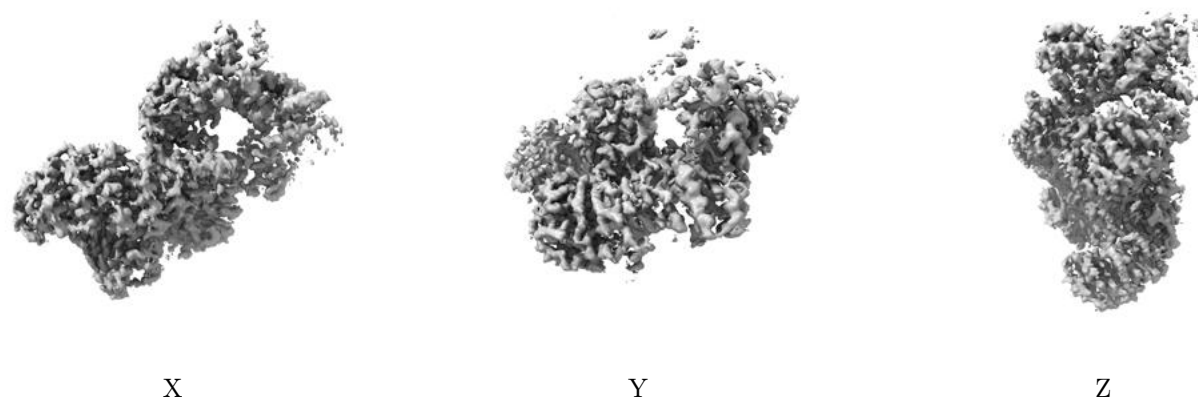
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

A mask typically either:

- Encompasses the whole structure

- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

6.6.1 emd_12564_msk_1.map (i)

X   Y   Z
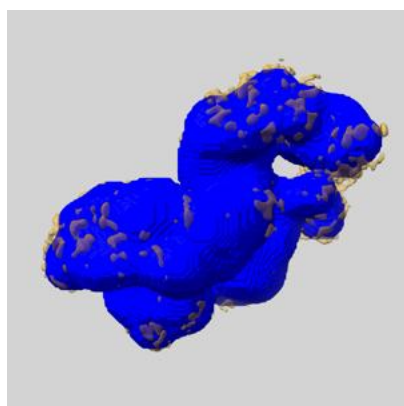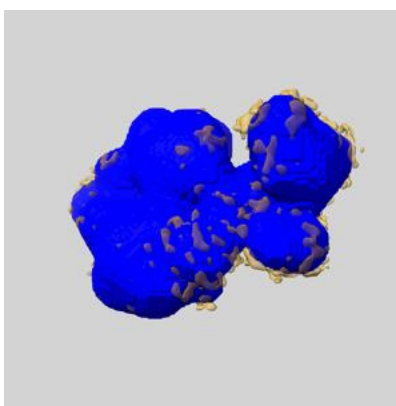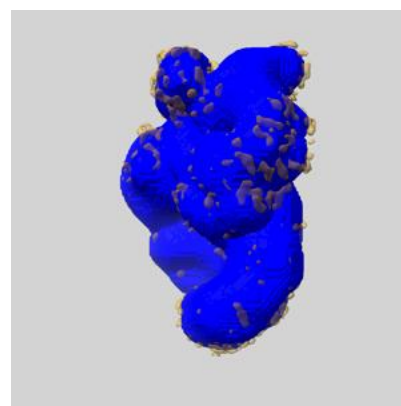
7 Map analysis ⓘ

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

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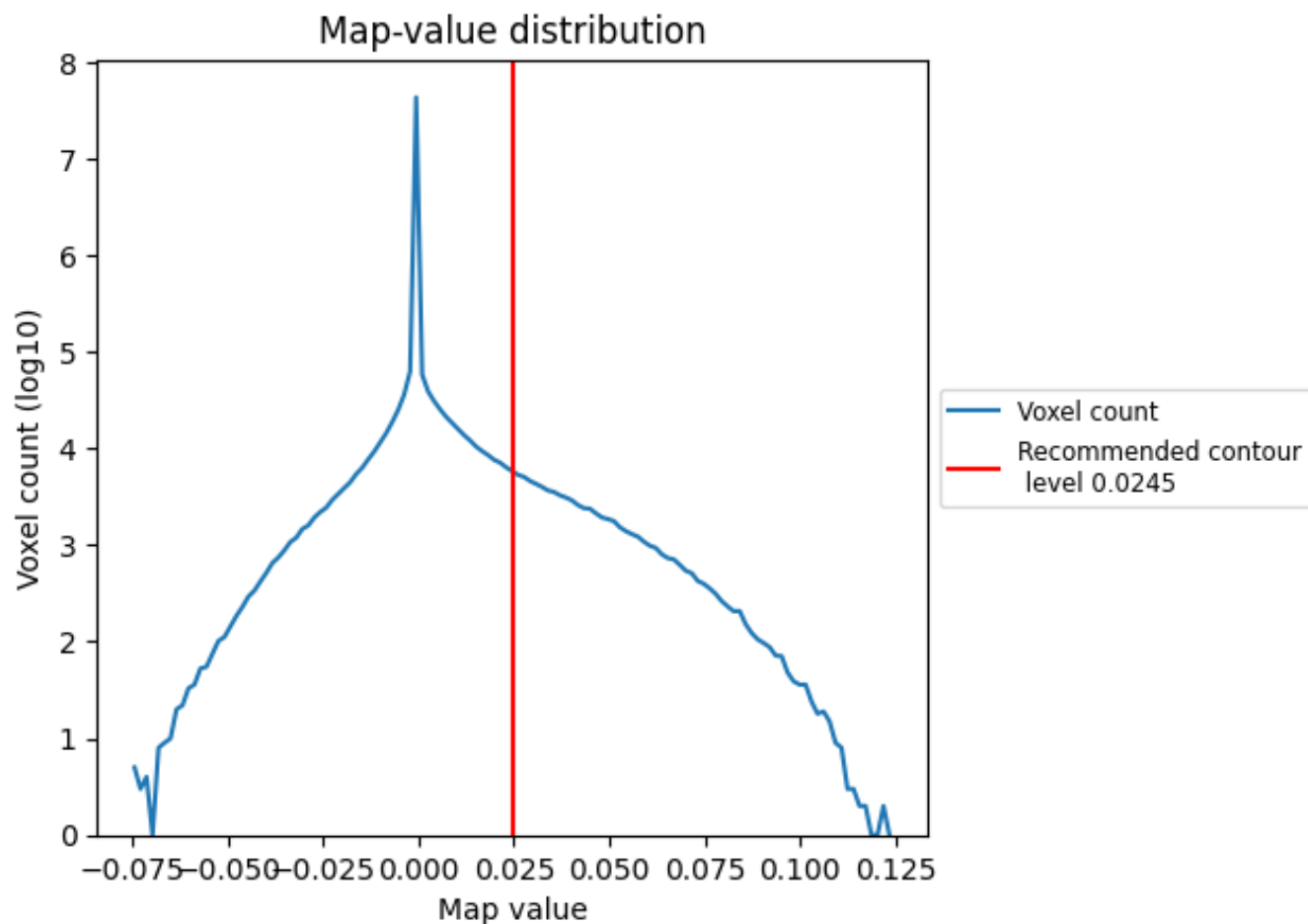
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
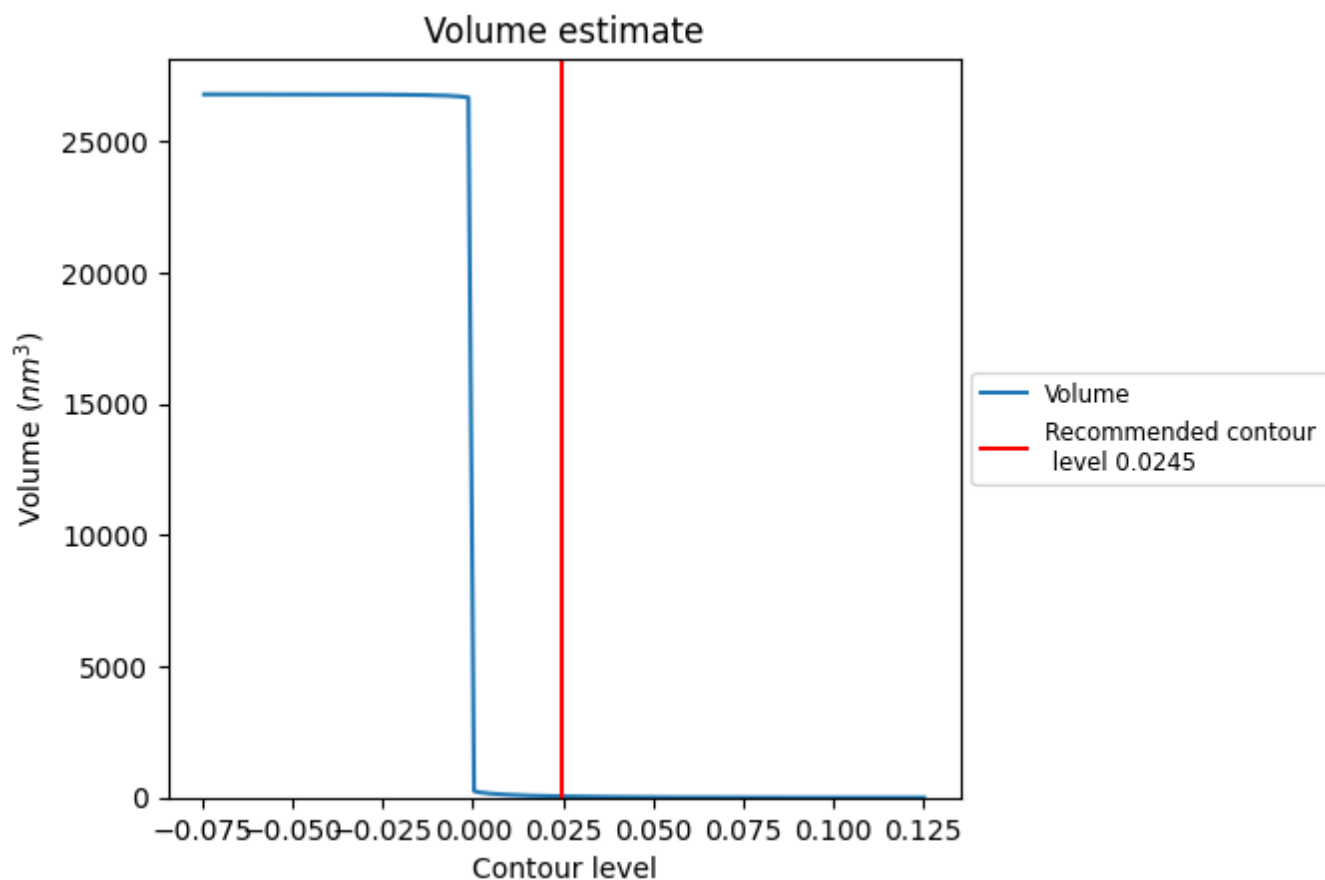
The volume at the recommended contour level is 47 nm^3; this corresponds to an approximate mass of 43 kDa.

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)
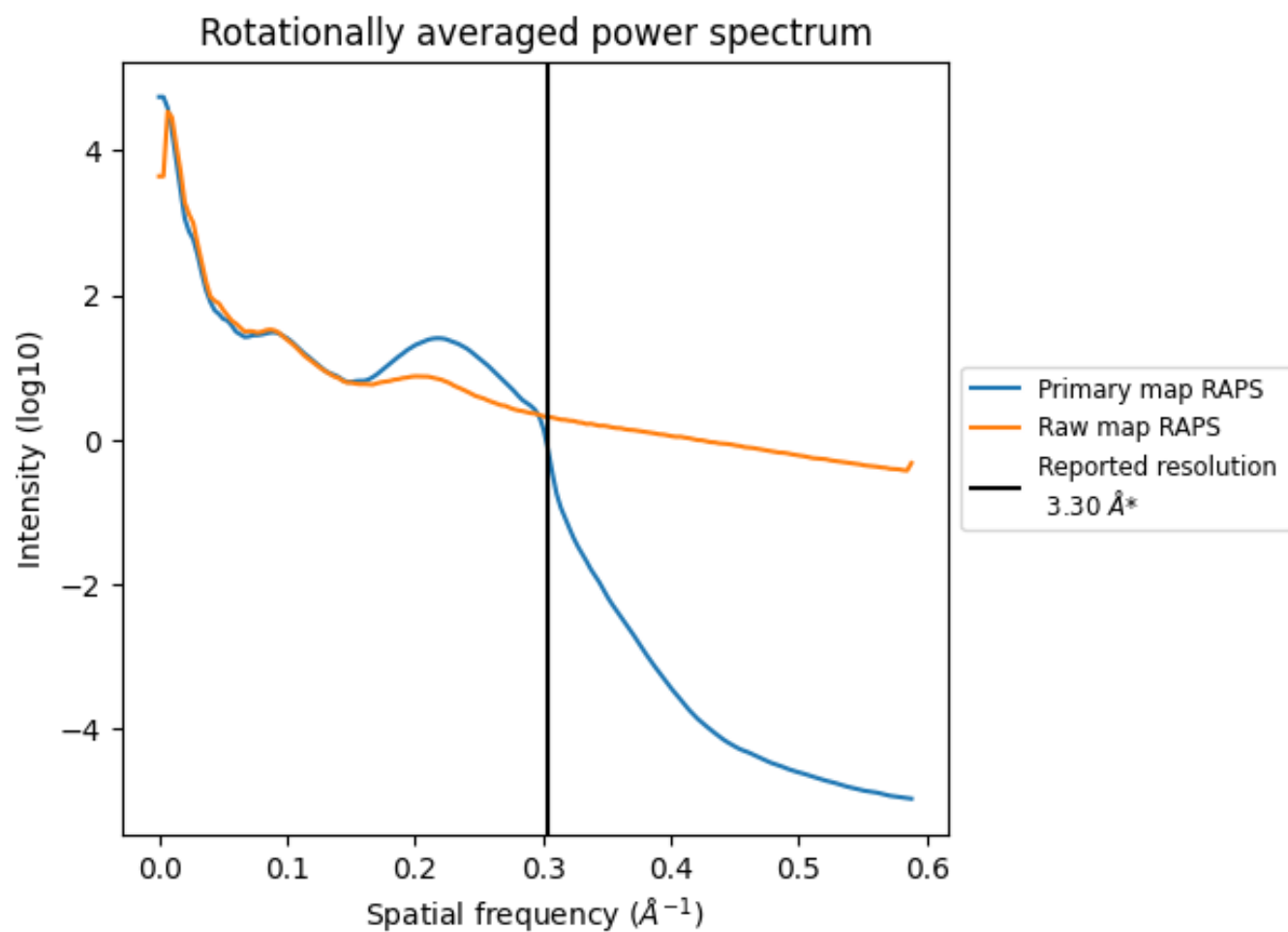
*Reported resolution corresponds to spatial frequency of 0.303 Å^{-1}

8 Fourier-Shell correlation (i)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC (i)
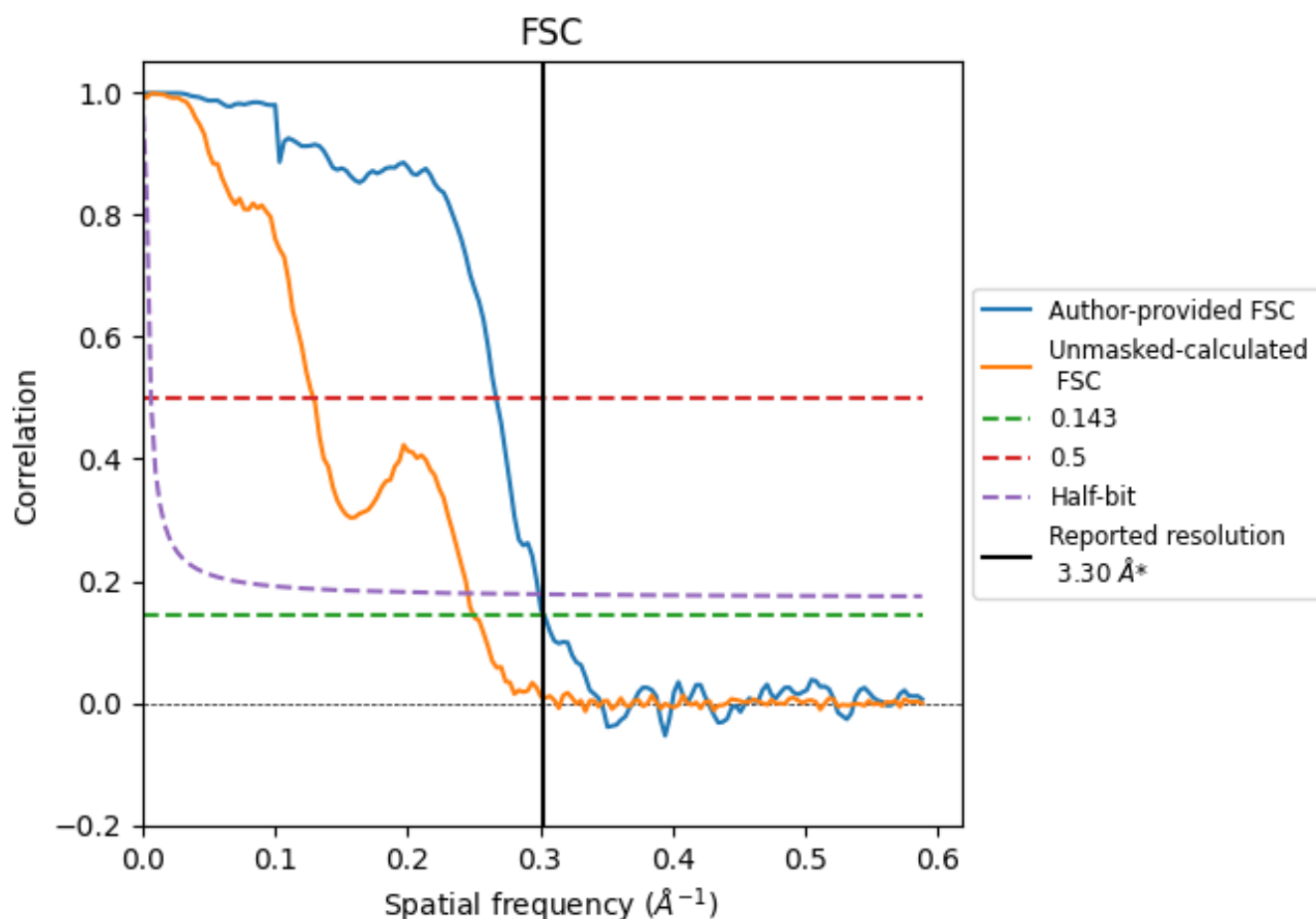
*Reported resolution corresponds to spatial frequency of 0.303 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.30	3.75	3.34
Unmasked-calculated*	4.00	7.74	4.07

*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 4.00 differs from the reported value 3.3 by more than 10 %
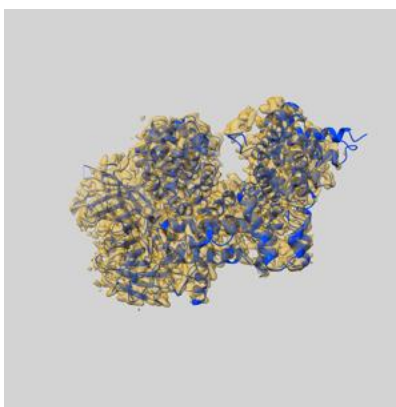
9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-12564 and PDB model 7NSC. Per-residue inclusion information can be found in section 3 on page 5.
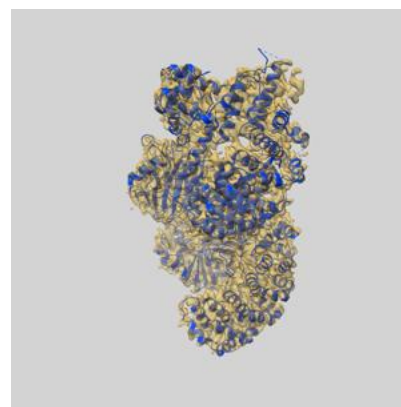
9.1 Map-model overlay ⓘ
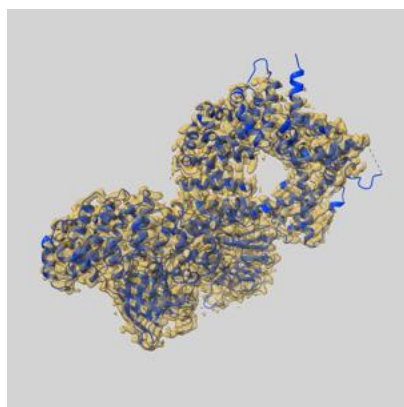

X   Y   Z

The images above show the 3D surface view of the map at the recommended contour level 0.0245 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 ⓘ

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 ⓘ
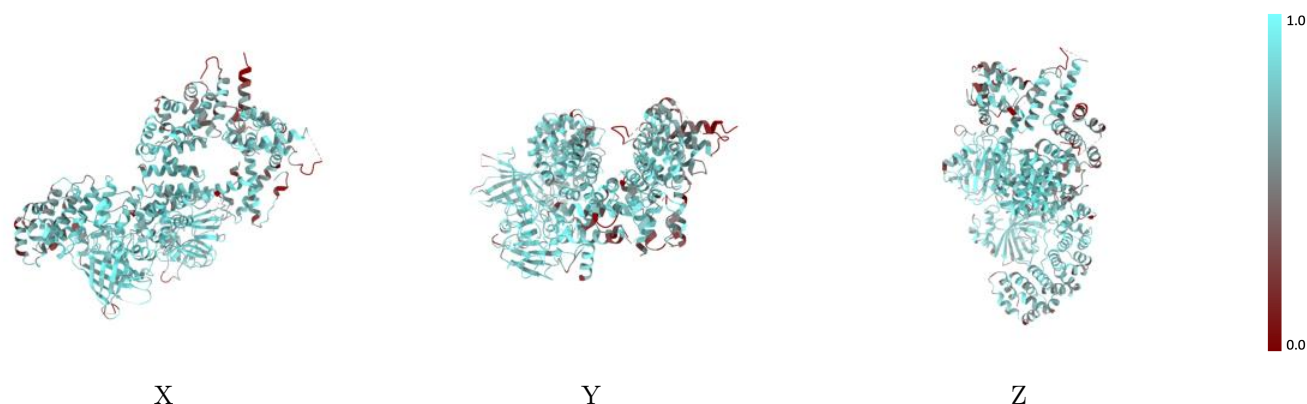
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0245).

9.4　Atom inclusion ⓘ
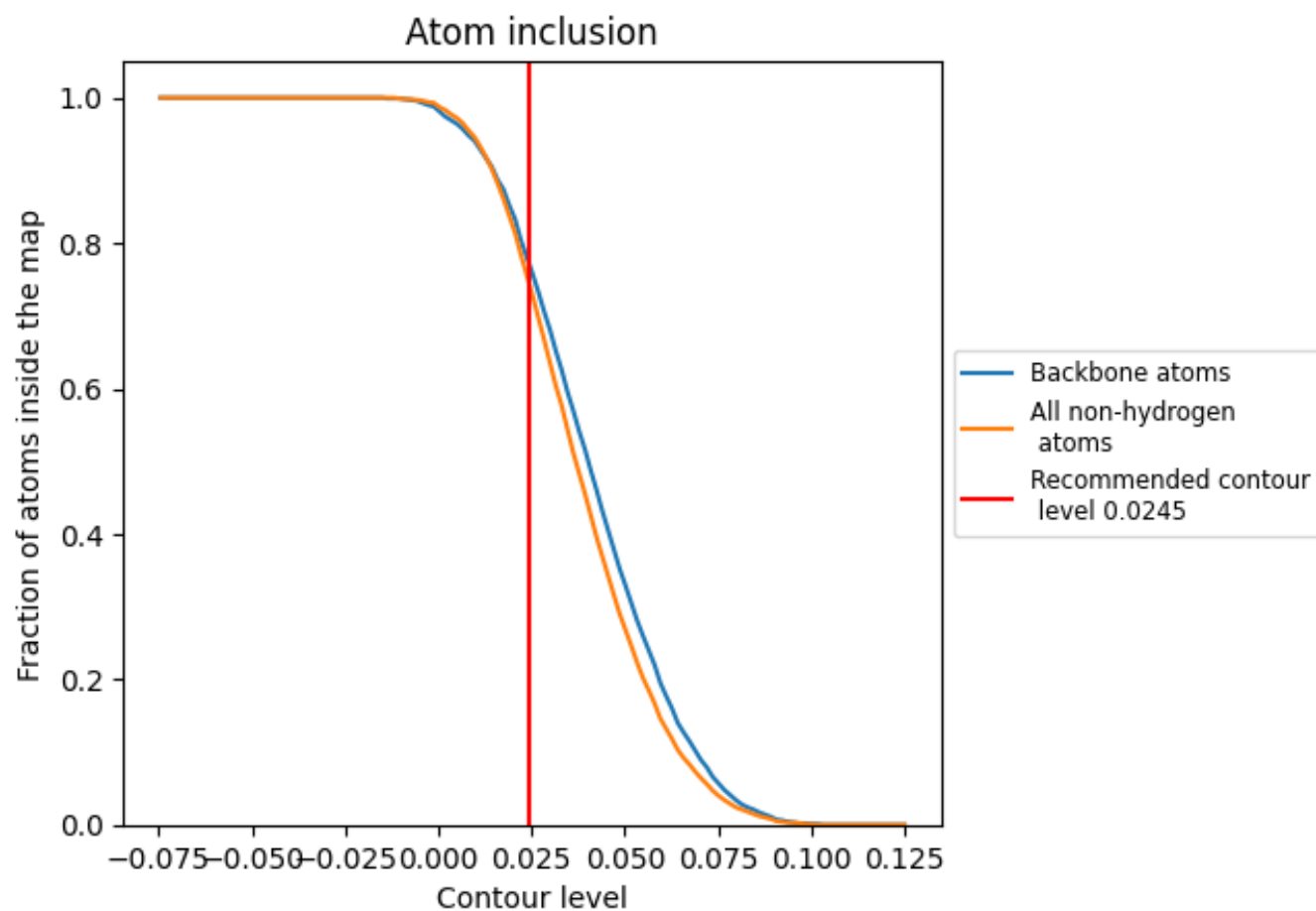
At the recommended contour level, 77% of all backbone atoms, 74% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.0245) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7420	0.5150
A	0.7660	0.5330
D	0.8150	0.5430
E	0.7250	0.5080
H	0.6780	0.4760

1.0

0.0

<0.0