WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB EM Validation Report (i)

Jun 24, 2025 – 01:32 PM JST

PDB ID	:	7E8F / pdb_00007e8f
EMDB ID	:	EMD-31017
Title	:	SARS-CoV-2 NTD in complex with N9 Fab
Authors	:	Du, S.; Xiao, J.; Zhang, Z.
Deposited on	:	2021-03-01
Resolution	:	3.18 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:
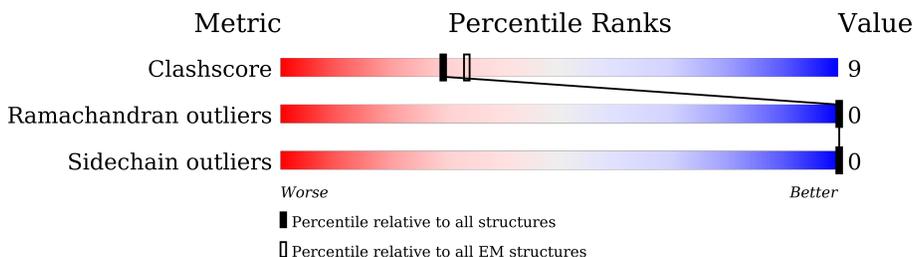
EMDB validation analysis	:	0.0.1.dev118
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (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 3.18 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		9
Ramachandran outliers		0
Sidechain outliers		0

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	291	9% / 63% / 26% / 11%
2	H	230	43% / 11% / 46%
3	L	212	· / 48% / · / 50%
4	C	230	44% / 10% / 46%
5	B	219	· / 39% / 11% / 49%
6	D	222	5% / 39% / 13% / 48%
7	E	214	7% / 42% / 7% / 50%
8	R	223	6% / 63% / 22% / 15%

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2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 8768 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 Spike protein S1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	258	Total 2079	C 1351	N 341	O 382	S 5	0	0

- Molecule 2 is a protein called N9 H.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	124	Total 938	C 588	N 159	O 186	S 5	0	0

- Molecule 3 is a protein called N9 L.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	L	105	Total 780	C 486	N 131	O 159	S 4	0	0

- Molecule 4 is a protein called 368-2 H.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	124	Total 944	C 593	N 165	O 182	S 4	0	0

- Molecule 5 is a protein called 368-2 L.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	B	112	Total 852	C 537	N 143	O 168	S 4	0	0

- Molecule 6 is a protein called 604 H.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	D	116	Total 874	C 550	N 148	O 171	S 5	0	0

- Molecule 7 is a protein called 604 L.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	E	106	Total 803	C 506	N 132	O 163	S 2	0	0

- Molecule 8 is a protein called Spike protein S1.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	R	189	Total 1498	C 958	N 249	O 283	S 8	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: Spike protein S1

Chain A:

9%

63%　　　26%　　11%

SER Q14 C15 V16 T19 T20 R21 T22 Q23 L24 P25 P26 A27 Y28 F32 T33 R34 Y37 L54 F58 T63 W64 I68 HIS VAL SER GLY THR ASN GLY THR LYS R78 F79 D80 P85 F92 E96 K97 S98 N99 I100 I101 R102 G103 W104 I105 F106 G107 T108

D111 S112 K113 L118 I119 A123 T124 N125 I128 K129 V130 C131 Q134 F135 D138 P139 G142 V143 N148 N149 K150 S151 W152 M153 E156 V159 N165 C166 Y170 V171 P174 F175 L176 MET ASP LEU GLY LYS GLN GLY ASN PHE K187 R190 E191

F192 V193 D198 G199 I210 N211 L212 V213 R214 P217 Q218 G219 L223 L229 P230 I231 G232 I233 N234 Q239 A243 D253 S254 S255 A264 Y269 L270 L276 V289 D290 CYS ALA LEU ASP PRO LEU SER GLU THR LYS CYS THR LEU

• Molecule 2: N9 H

Chain H:

43%　　　11%　　　46%

GLU V2 Q3 L4 G9 V12 L18 S25 M34 R38 Q39 A40 K43 E46 D62 I70 D73 K76 L79 M83 L86 R87 V88 E89 T98 S104 W107 M112 D113 V114 W115 S125 ALA SER THR LYS GLY PRO SER VAL

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

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

• Molecule 3: N9 L

Chain L:

48%　　　50%

SER Y2 Q16 T17 K26 W34 I47 E59 G76 T77 Q78 A79 M80 L106 SER GLN PRO LYS SER ALA ALA PRO SER VAL THR LEU PHE PRO PRO SER SER GLU GLU LEU GLN ALA ASN LYS ALA THR LEU VAL CYS LEU ILE SER ASP PHE TYR PRO GLY ALA VAL THR

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

VAL ALA PRO THR GLU CYS SER

• Molecule 4: 368-2 H

Chain C:

44%   10%   46%

GLU V2 R19 L20 S21 C22 A28 F29 R38 R43 E46 S52 S57 Y60 K65 G66 R67 R72 L79 M83 D90 T91 A97 R100 Y105 K112 D113 T122 S125 ALA SER THR LYS GLY PRO SER VAL PHE PRO LEU ALA

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

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

• Molecule 5: 368-2 L

Chain B:

39%   11%   49%

D1 I2 V3 M4 P12 V13 T14 P15 G16 E17 I21 R24 Q27 L30 H31 S32 N33 G34 Y35 L36 Y37 L42 R66 G73 T74 D75 F76 T77 L78 R82 V83 E84 A85 E86 D87 Y91 E110 I111 K112 ARG THR VAL ALA ALA PRO SER VAL PHE ILE

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

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

• Molecule 6: 604 H

Chain D:

5%   39%   13%   48%

E1 V2 S7 L11 I12 Q13 G16 C22 I27 S30 S31 N32 Y33 M34 T35 G42 W47 V50 I51 Y52 S53 Y59 A60 D61 K64 G65 R66 R71 D72 K73 L78 M82 S83 S84 L85 R86 A87 E88 D89 L99 Y102 V106

V113 T114 V115 S116 SER ALA SER THR LYS GLY PRO SER VAL PHE PRO LEU ALA PRO SER SER LYS SER THR SER GLY GLY THR ALA ALA LEU GLY CYS LEU VAL LYS ASP TYR PHE PRO GLU PRO VAL THR VAL SER TRP ASN SER GLY ALA LEU THR SER GLY VAL HIS THR PHE PRO ALA

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

• Molecule 7: 604 L

Chain E:

7%   42%   7%   50%

ASP I2 Q3 Q6 S7 P8 S9 F10 L11 S12 A13 S14 D17 R18 R24 S30 L33 A34 Q37 P40 G41 L47 V58 S76 P80 E81 D82 F83 Y86 Y87 C88 L91 Q100 I106 K107 ARG THR VAL ALA ALA PRO SER VAL PHE ILE

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

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

• Molecule 8: Spike protein S1

Chain R:

6%

63%　　　　　22%　　　　　15%

ARG VAL GLN PRO THR GLU SER ILE VAL ARG PHE PRO ASN ILE T333 N334 L335 C336 G339 E340 V341 F342 N343 F347 V350 W353 K356 R357 N360 C361 V362 N370 S371 A372 T376 F377 K378 C379 V382 S383 P384 T385 K386 D389 L390 C391 N394 V395

R403 E406 K417 Y421 L425 D428 G431 C432 V433 I434 S438 N439 D442 S443 N448 Y449 N450 Y451 L455 F456 R457 L461 Y473 N481 Q493 Q498 Y505 R509 V512 F515 E516 LEU LEU HIS ALA PRO A522 T523 V524 C525 G526

PRO LYS LYS SER THR ASN LEU VAL LYS ASN LYS CYS VAL ASN PHE

4   Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	304696	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 $(e^-/\text{Å}^2)$	63.27	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.195	Depositor
Minimum map value	-0.118	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.0359	Depositor
Map size (Å)	168.32, 168.32, 168.32	wwPDB
Map dimensions	160, 160, 160	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.052, 1.052, 1.052	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	0.22	0/2138	0.43	0/2913
2	H	0.20	0/959	0.35	0/1298
3	L	0.19	0/798	0.39	0/1087
4	C	0.20	0/965	0.37	0/1307
5	B	0.21	0/871	0.41	0/1183
6	D	0.20	0/891	0.34	0/1207
7	E	0.18	0/819	0.40	0/1112
8	R	0.22	0/1538	0.41	0/2090
All	All	0.21	0/8979	0.40	0/12197

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
5	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	B	31	HIS	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

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the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2079	0	2004	48	0
2	H	938	0	896	15	0
3	L	780	0	743	2	0
4	C	944	0	903	15	0
5	B	852	0	838	18	0
6	D	874	0	859	19	0
7	E	803	0	783	9	0
8	R	1498	0	1411	38	0
All	All	8768	0	8437	157	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 9.

All (157) 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:R:379:CYS:HA	8:R:432:CYS:HB3	1.48	0.94
8:R:391:CYS:HA	8:R:525:CYS:HB3	1.58	0.85
5:B:2:ILE:HG12	5:B:27:GLN:HG3	1.60	0.82
7:E:83:PHE:HB3	7:E:106:ILE:HG12	1.62	0.81
1:A:131:CYS:HA	1:A:166:CYS:HB3	1.62	0.81
6:D:82:MET:HB3	6:D:85:LEU:HD21	1.60	0.80
5:B:24:ARG:NH1	5:B:75:ASP:OD1	2.22	0.71
8:R:357:ARG:HD2	8:R:394:ASN:HD21	1.56	0.70
5:B:31:HIS:HA	5:B:34:GLY:H	1.55	0.70
8:R:340:GLU:OE1	8:R:356:LYS:NZ	2.26	0.69
6:D:30:SER:HB2	6:D:73:LYS:HE3	1.75	0.68
1:A:213:VAL:HG23	1:A:214:ARG:HG2	1.77	0.67
1:A:96:GLU:HG3	1:A:100:ILE:HG22	1.77	0.66
4:C:91:THR:HG23	4:C:122:THR:HA	1.78	0.65
1:A:14:GLN:N	1:A:14:GLN:OE1	2.30	0.64
5:B:36:LEU:HD11	5:B:73:GLY:H	1.63	0.64
5:B:66:ARG:NH1	5:B:87:ASP:OD1	2.30	0.64
8:R:357:ARG:HG2	8:R:357:ARG:HH11	1.62	0.64
1:A:111:ASP:OD1	1:A:134:GLN:NE2	2.32	0.63
4:C:29:PHE:O	4:C:72:ARG:NH2	2.31	0.63
6:D:1:GLU:HG3	6:D:2:VAL:HG23	1.80	0.63
7:E:30:SER:OG	8:R:498:GLN:OE1	2.17	0.61
8:R:379:CYS:HA	8:R:432:CYS:CB	2.25	0.61
8:R:433:VAL:HG12	8:R:512:VAL:HG13	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:D:82:MET:HE1	6:D:113:VAL:HG21	1.84	0.60
4:C:52:SER:O	4:C:72:ARG:NH1	2.35	0.60
4:C:67:ARG:NH2	4:C:90:ASP:OD2	2.29	0.60
1:A:148:ASN:OD1	1:A:149:ASN:N	2.34	0.60
7:E:33:LEU:HD11	7:E:88:CYS:HB2	1.84	0.60
2:H:73:ASP:OD2	2:H:76:LYS:NZ	2.36	0.59
1:A:64:TRP:HE1	1:A:264:ALA:HB1	1.67	0.57
7:E:34:ALA:HB2	7:E:91:LEU:HD11	1.85	0.57
5:B:31:HIS:O	5:B:31:HIS:ND1	2.37	0.57
2:H:87:ARG:NE	2:H:89:GLU:OE2	2.36	0.57
4:C:105:TYR:CD2	5:B:33:ASN:HB3	2.40	0.56
2:H:3:GLN:H	2:H:25:SER:HB3	1.70	0.56
4:C:100:ARG:HA	4:C:113:ASP:HB2	1.88	0.56
1:A:16:VAL:HG21	1:A:254:SER:O	2.05	0.56
1:A:128:ILE:HD12	1:A:170:TYR:HD2	1.71	0.56
8:R:442:ASP:O	8:R:448:ASN:ND2	2.33	0.56
2:H:34:MET:HE1	2:H:98:THR:HG22	1.87	0.56
4:C:52:SER:HB3	4:C:57:SER:HB2	1.88	0.56
4:C:19:ARG:HH11	4:C:19:ARG:HG3	1.71	0.56
1:A:276:LEU:HB3	1:A:289:VAL:HG22	1.87	0.55
8:R:439:ASN:O	8:R:443:SER:OG	2.22	0.55
6:D:11:LEU:HD11	6:D:116:SER:HB2	1.89	0.55
6:D:59:TYR:HB2	6:D:64:LYS:HG2	1.88	0.55
8:R:403:ARG:HG2	8:R:505:TYR:HA	1.88	0.55
1:A:130:VAL:HG21	1:A:231:ILE:HD12	1.88	0.54
5:B:12:PRO:HA	5:B:110:GLU:HG2	1.89	0.54
8:R:391:CYS:CA	8:R:525:CYS:HB3	2.34	0.54
1:A:118:LEU:HD12	1:A:135:PHE:HE1	1.72	0.54
7:E:37:GLN:HB2	7:E:47:LEU:HD11	1.90	0.53
1:A:187:LYS:N	1:A:210:ILE:O	2.42	0.53
6:D:71:ARG:HH21	6:D:73:LYS:HZ1	1.57	0.52
1:A:19:THR:OG1	1:A:138:ASP:OD1	2.24	0.51
8:R:395:VAL:HG22	8:R:515:PHE:HD1	1.75	0.51
4:C:22:CYS:HB3	4:C:79:LEU:HB3	1.92	0.51
8:R:347:PHE:CE2	8:R:509:ARG:HB3	2.46	0.51
5:B:42:LEU:HD13	5:B:91:TYR:CZ	2.46	0.50
2:H:12:VAL:HG11	2:H:86:LEU:HD13	1.93	0.50
8:R:341:VAL:HG23	8:R:342:PHE:CD1	2.46	0.50
8:R:455:LEU:HD22	8:R:493:GLN:HG3	1.93	0.50
3:L:34:TRP:HB2	3:L:47:ILE:HB	1.94	0.50
1:A:193:VAL:HG13	1:A:270:LEU:HD11	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:37:TYR:OH	1:A:54:LEU:O	2.20	0.49
1:A:32:PHE:CD2	1:A:218:GLN:HG2	2.48	0.48
2:H:9:GLY:HA2	2:H:18:LEU:HD21	1.95	0.48
8:R:395:VAL:HG23	8:R:524:VAL:HG21	1.95	0.48
1:A:28:TYR:CE1	1:A:63:THR:HG22	2.48	0.48
1:A:34:ARG:HD2	1:A:191:GLU:OE1	2.14	0.47
7:E:47:LEU:HA	7:E:58:VAL:HG21	1.95	0.47
1:A:96:GLU:CD	1:A:190:ARG:HH11	2.23	0.47
6:D:66:ARG:NH1	6:D:89:ASP:OD1	2.41	0.47
8:R:376:THR:HG23	8:R:378:LYS:HG3	1.97	0.47
1:A:143:VAL:HG21	1:A:243:ALA:HB1	1.98	0.46
1:A:92:PHE:HB3	1:A:192:PHE:HB2	1.97	0.46
5:B:32:SER:HB3	5:B:37:TYR:CE1	2.51	0.46
6:D:61:ASP:HA	6:D:64:LYS:HE2	1.97	0.46
1:A:128:ILE:HD12	1:A:170:TYR:CD2	2.49	0.46
1:A:130:VAL:HG21	1:A:231:ILE:HG23	1.98	0.46
4:C:19:ARG:HG3	4:C:19:ARG:NH1	2.31	0.46
1:A:124:THR:C	1:A:174:PRO:HD3	2.41	0.46
5:B:16:GLY:N	5:B:83:VAL:O	2.32	0.46
4:C:20:LEU:HD13	4:C:83:MET:HE3	1.98	0.46
4:C:60:TYR:HB2	4:C:65:LYS:HD2	1.97	0.46
8:R:347:PHE:HE2	8:R:509:ARG:HB3	1.81	0.45
2:H:4:LEU:HD11	2:H:98:THR:HG23	1.97	0.45
6:D:31:SER:O	8:R:473:TYR:OH	2.29	0.45
1:A:33:THR:HG23	1:A:58:PHE:CZ	2.52	0.45
6:D:52:TYR:O	6:D:71:ARG:NH1	2.49	0.45
8:R:417:LYS:HD3	8:R:455:LEU:HD12	1.99	0.45
1:A:139:PRO:HB2	1:A:159:VAL:HG13	1.99	0.45
4:C:38:ARG:NE	4:C:46:GLU:OE1	2.50	0.45
5:B:36:LEU:HD12	5:B:76:PHE:HZ	1.82	0.45
5:B:21:ILE:HD12	5:B:78:LEU:HD23	1.98	0.45
1:A:253:ASP:C	1:A:255:SER:H	2.25	0.44
7:E:8:PRO:HG3	7:E:11:LEU:HD13	2.00	0.44
1:A:92:PHE:O	1:A:192:PHE:N	2.50	0.44
2:H:112:MET:O	2:H:115:TRP:NE1	2.46	0.44
6:D:47:TRP:HZ2	6:D:50:VAL:HG12	1.83	0.44
6:D:27:ILE:CD1	6:D:106:VAL:HG21	2.48	0.44
7:E:6:GLN:O	7:E:100:GLN:NE2	2.48	0.44
1:A:85:PRO:O	1:A:269:TYR:HE1	2.00	0.44
1:A:103:GLY:HA3	1:A:119:ILE:O	2.17	0.44
8:R:382:VAL:HG12	8:R:383:SER:H	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:R:350:VAL:O	8:R:353:TRP:HD1	2.01	0.43
1:A:104:TRP:HB2	1:A:106:PHE:CE1	2.52	0.43
8:R:431:GLY:HA2	8:R:515:PHE:CD2	2.52	0.43
5:B:15:PRO:HA	5:B:83:VAL:HG12	2.00	0.43
2:H:38:ARG:NE	2:H:46:GLU:OE1	2.47	0.43
1:A:213:VAL:HG23	1:A:214:ARG:N	2.34	0.43
6:D:66:ARG:O	6:D:83:SER:OG	2.32	0.43
8:R:347:PHE:CE2	8:R:509:ARG:HD3	2.52	0.43
6:D:22:CYS:HB3	6:D:78:LEU:HB3	2.00	0.43
2:H:40:ALA:HB3	2:H:43:LYS:HB2	2.00	0.43
8:R:425:LEU:HD23	8:R:425:LEU:HA	1.84	0.43
8:R:442:ASP:HB3	8:R:451:TYR:HE2	1.83	0.43
6:D:33:TYR:OH	8:R:455:LEU:O	2.35	0.42
5:B:14:THR:HG23	5:B:15:PRO:HD2	2.02	0.42
1:A:102:ARG:NH1	1:A:153:MET:SD	2.91	0.42
1:A:105:ILE:HD11	1:A:239:GLN:HB3	2.01	0.42
6:D:53:SER:OG	8:R:457:ARG:O	2.25	0.42
8:R:403:ARG:HB2	8:R:406:GLU:OE1	2.19	0.42
1:A:123:ALA:HB2	1:A:153:MET:HE1	2.02	0.42
1:A:176:LEU:HD21	1:A:192:PHE:CE1	2.55	0.42
5:B:33:ASN:ND2	8:R:481:ASN:O	2.52	0.42
8:R:339:GLY:O	8:R:343:ASN:HB2	2.20	0.42
8:R:421:TYR:HA	8:R:461:LEU:HD13	2.02	0.42
2:H:104:SER:HA	2:H:107:TRP:CD2	2.55	0.42
2:H:83:MET:CE	2:H:86:LEU:HD21	2.50	0.42
1:A:108:THR:OG1	1:A:234:ASN:O	2.38	0.41
4:C:97:ALA:HB1	4:C:112:LYS:HB3	2.01	0.41
1:A:231:ILE:HG22	1:A:233:ILE:HG23	2.01	0.41
2:H:113:ASP:OD2	2:H:114:VAL:HG23	2.19	0.41
8:R:438:SER:CB	8:R:509:ARG:HG3	2.51	0.41
1:A:212:LEU:HD22	1:A:217:PRO:HA	2.02	0.41
1:A:199:GLY:HA2	1:A:232:GLY:HA2	2.02	0.41
1:A:213:VAL:HG23	1:A:214:ARG:H	1.86	0.41
2:H:83:MET:HE2	2:H:86:LEU:HD21	2.01	0.41
6:D:99:LEU:HB2	6:D:102:TYR:HB2	2.02	0.41
1:A:193:VAL:HG23	1:A:223:LEU:HD22	2.03	0.41
4:C:28:ALA:HA	8:R:449:TYR:HB3	2.02	0.41
5:B:30:LEU:HD12	5:B:31:HIS:N	2.36	0.41
2:H:70:ILE:HD11	2:H:79:LEU:HD11	2.02	0.41
1:A:142:GLY:HA3	1:A:156:GLU:HG2	2.02	0.40
1:A:176:LEU:HB3	1:A:190:ARG:NH1	2.36	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:131:CYS:CA	1:A:166:CYS:HB3	2.35	0.40
5:B:4:MET:HE3	5:B:4:MET:HB3	1.97	0.40
6:D:35:THR:HG22	6:D:50:VAL:HG23	2.04	0.40
8:R:382:VAL:HG12	8:R:383:SER:N	2.36	0.40
7:E:82:ASP:OD1	7:E:86:TYR:OH	2.38	0.40
1:A:229:LEU:HB2	1:A:231:ILE:HG12	2.02	0.40
3:L:59:GLU:OE1	3:L:59:GLU:N	2.54	0.40
1:A:125:ASN:OD1	1:A:171:VAL:HG13	2.21	0.40
8:R:362:VAL:HG23	8:R:525:CYS:O	2.22	0.40
8:R:377:PHE:CE1	8:R:434:ILE:HG12	2.56	0.40

There are no symmetry-related clashes.

5.3　Torsion angles (i)

5.3.1　Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	252/291 (87%)	208 (82%)	44 (18%)	0	100	100
2	H	122/230 (53%)	119 (98%)	3 (2%)	0	100	100
3	L	103/212 (49%)	99 (96%)	4 (4%)	0	100	100
4	C	122/230 (53%)	112 (92%)	10 (8%)	0	100	100
5	B	110/219 (50%)	102 (93%)	8 (7%)	0	100	100
6	D	114/222 (51%)	113 (99%)	1 (1%)	0	100	100
7	E	104/214 (49%)	98 (94%)	6 (6%)	0	100	100
8	R	185/223 (83%)	177 (96%)	8 (4%)	0	100	100
All	All	1112/1841 (60%)	1028 (92%)	84 (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	230/261 (88%)	230 (100%)	0	100	100
2	H	102/194 (53%)	102 (100%)	0	100	100
3	L	85/178 (48%)	85 (100%)	0	100	100
4	C	96/188 (51%)	96 (100%)	0	100	100
5	B	96/192 (50%)	96 (100%)	0	100	100
6	D	94/186 (50%)	94 (100%)	0	100	100
7	E	90/187 (48%)	90 (100%)	0	100	100
8	R	163/196 (83%)	163 (100%)	0	100	100
All	All	956/1582 (60%)	956 (100%)	0	100	100

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	GLN
1	A	30	ASN
2	H	39	GLN
2	H	99	ASN
3	L	37	GLN
3	L	41	GLN
4	C	82	GLN
4	C	84	ASN
7	E	3	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 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-31017. 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 ⓘ
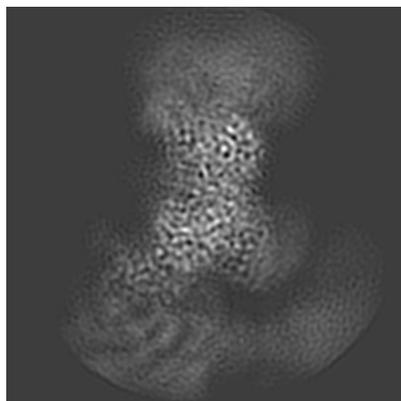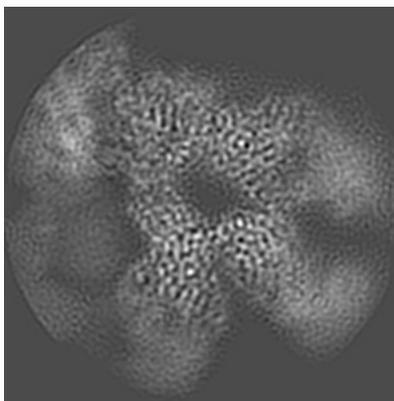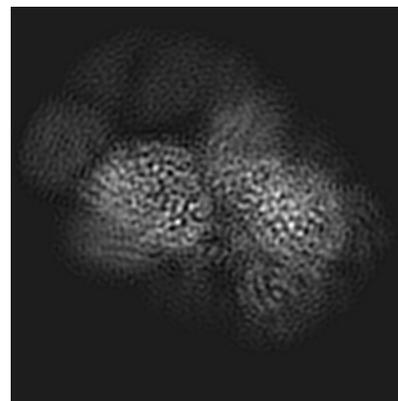
6.1.1   Primary map

X   Y   Z

6.1.2   Raw map

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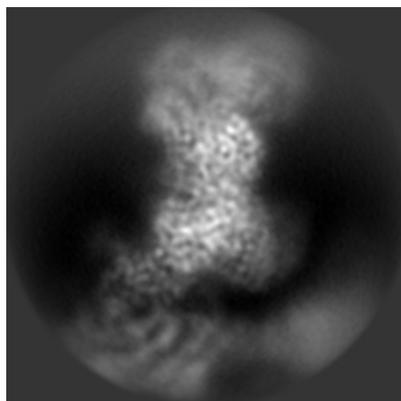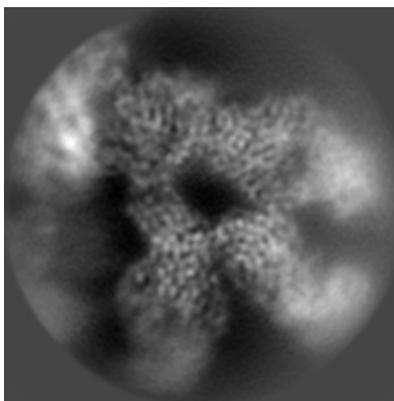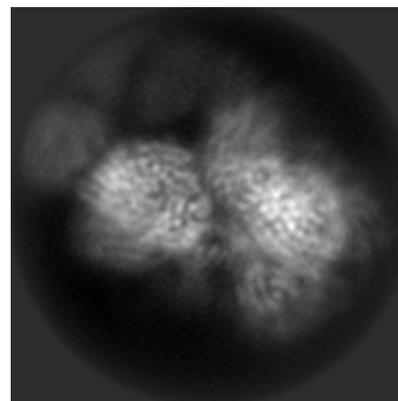
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
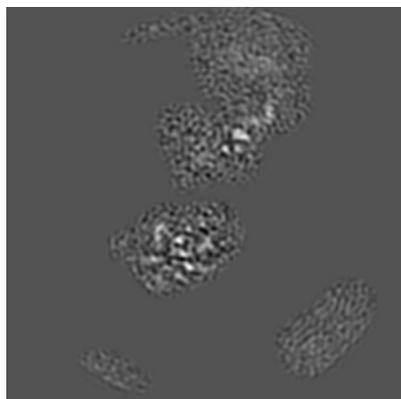
6.2.1 Primary map
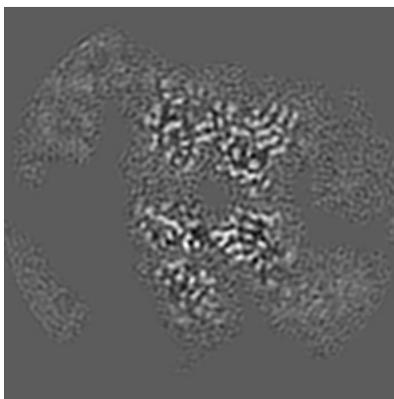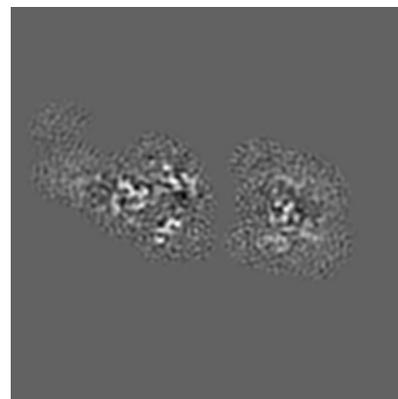
| X Index: 80 | Y Index: 80 | Z Index: 80 |

6.2.2 Raw map
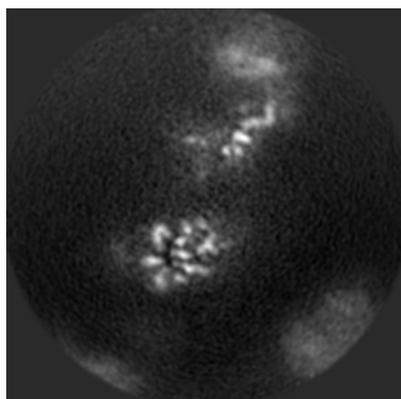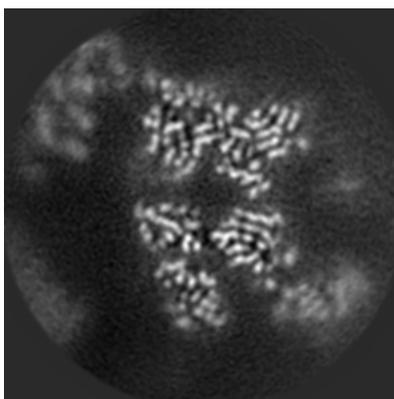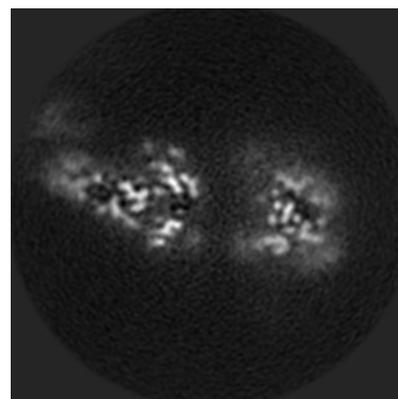
| X Index: 80 | Y Index: 80 | Z Index: 80 |

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

6.3   Largest variance slices   ⓘ
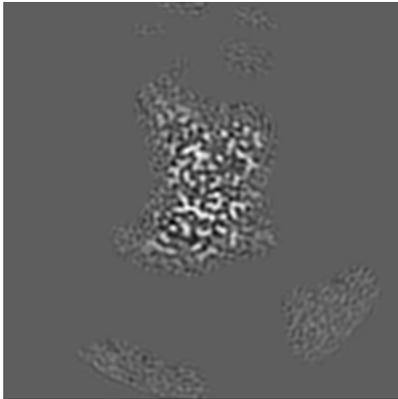
6.3.1   Primary map
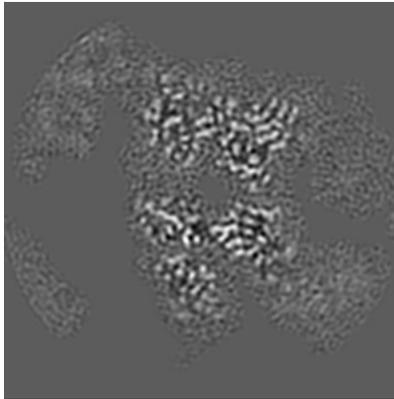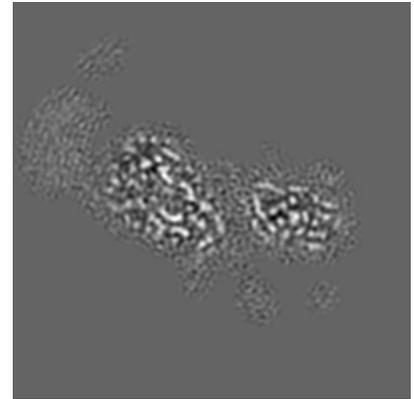
X Index: 67   Y Index: 80   Z Index: 69

6.3.2   Raw map
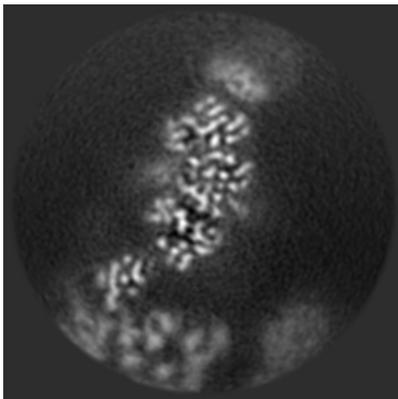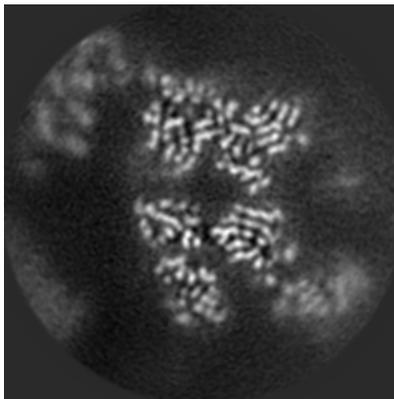
X Index: 107   Y Index: 80   Z Index: 70
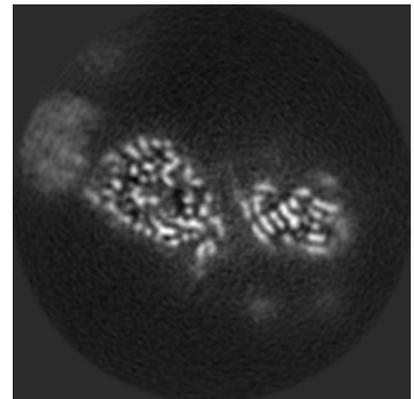
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map
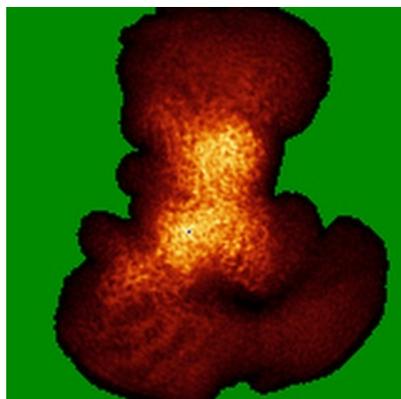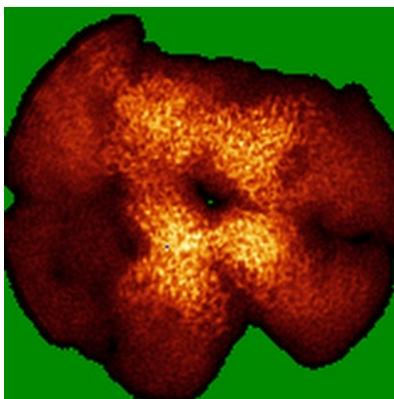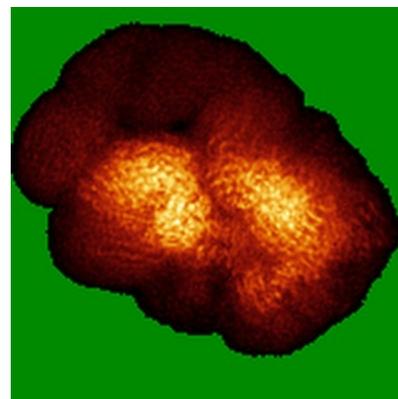
X   Y   Z

6.4.2 Raw map

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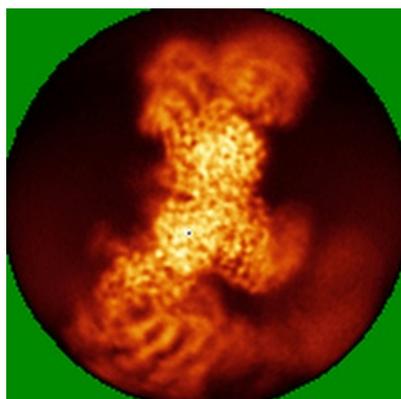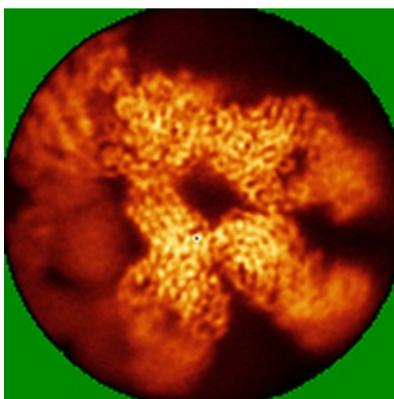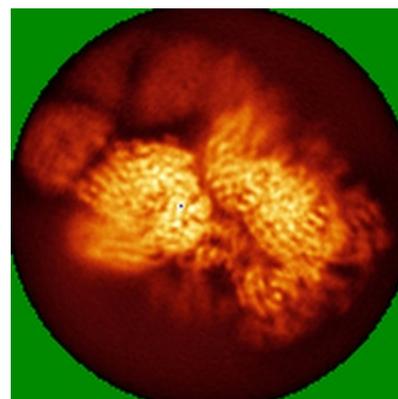
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5   Orthogonal surface views ⓘ

6.5.1   Primary map

X   Y   Z
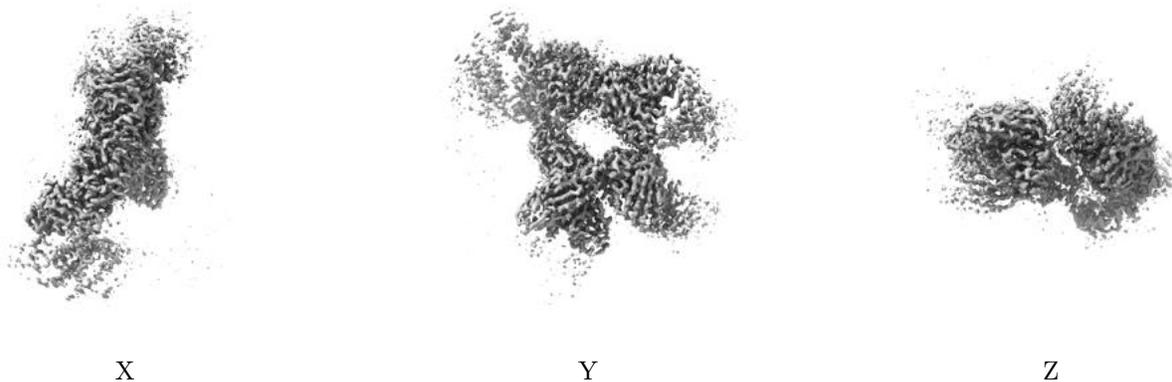
The images above show the 3D surface view of the map at the recommended contour level 0.0359. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2   Raw map

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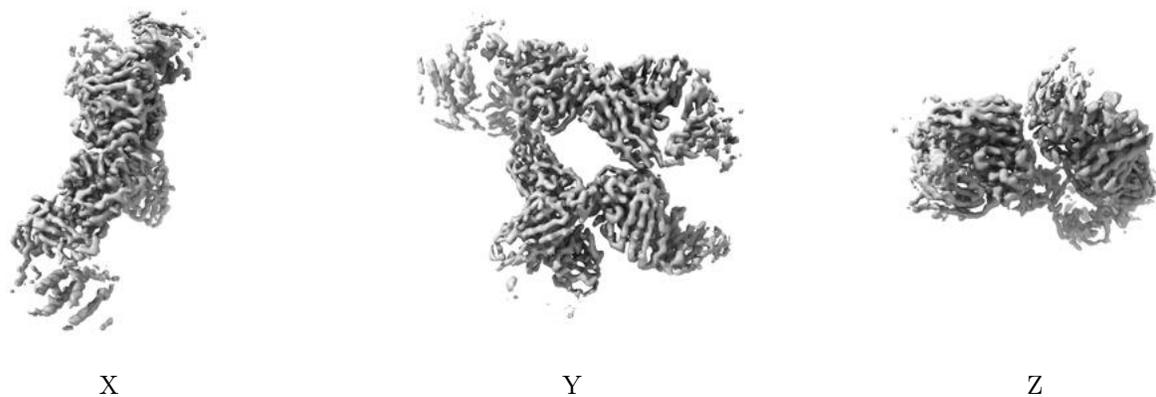
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation ⓘ

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_31017_msk_1.map ⓘ

X   Y   Z
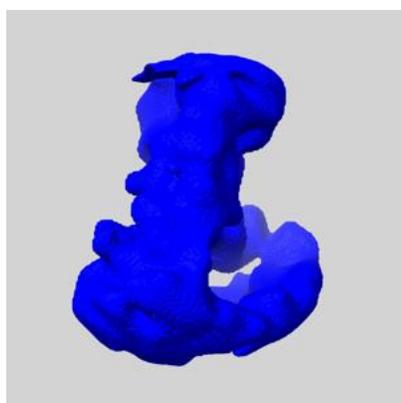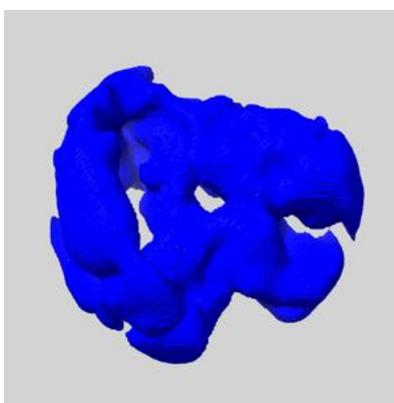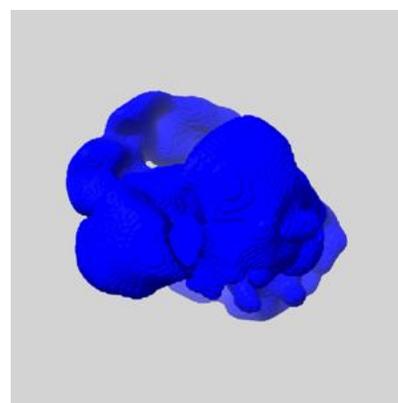
7 Map analysis ⓘ

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 ⓘ
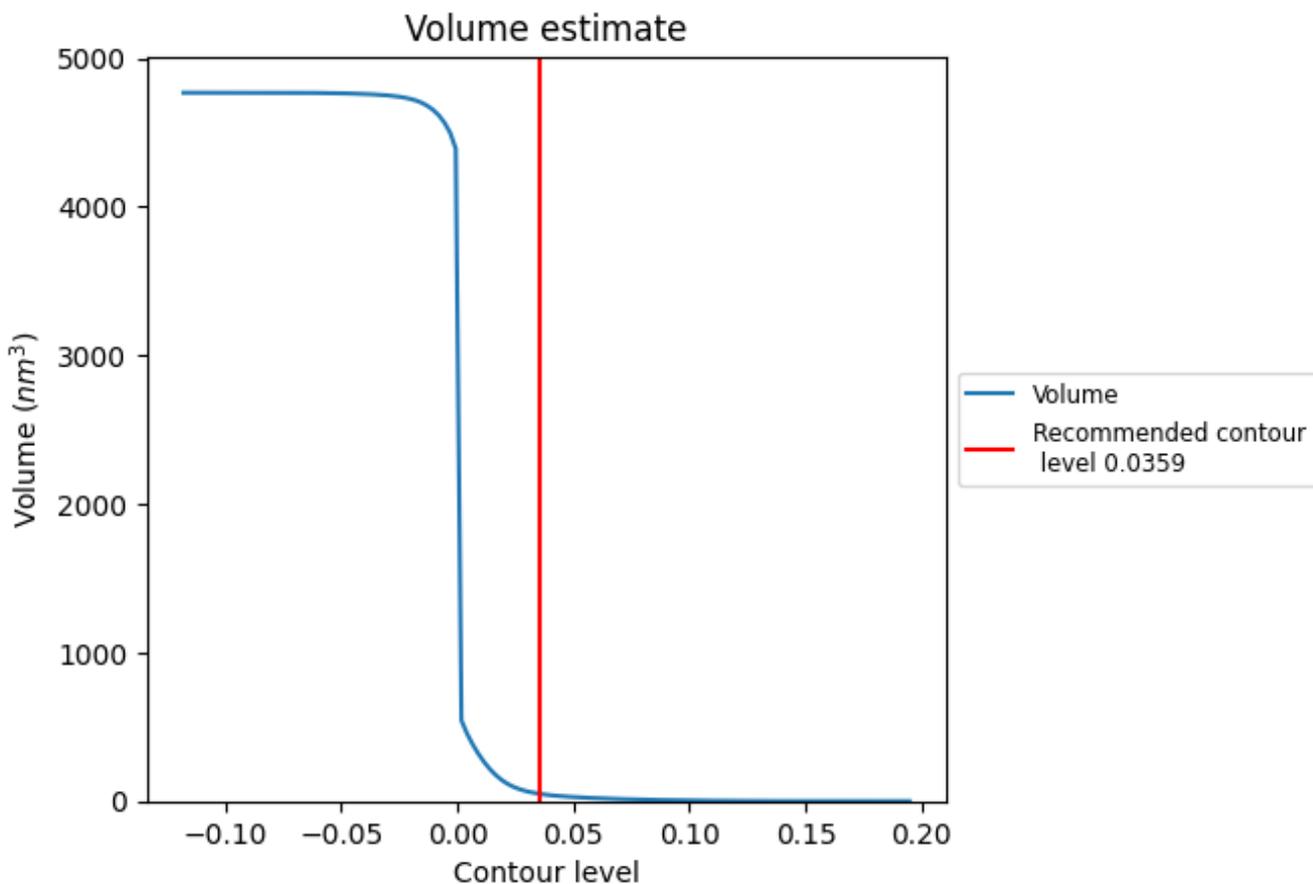
The volume at the recommended contour level is 48 nm^3; this corresponds to an approximate mass of 44 kDa.

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 ⓘ
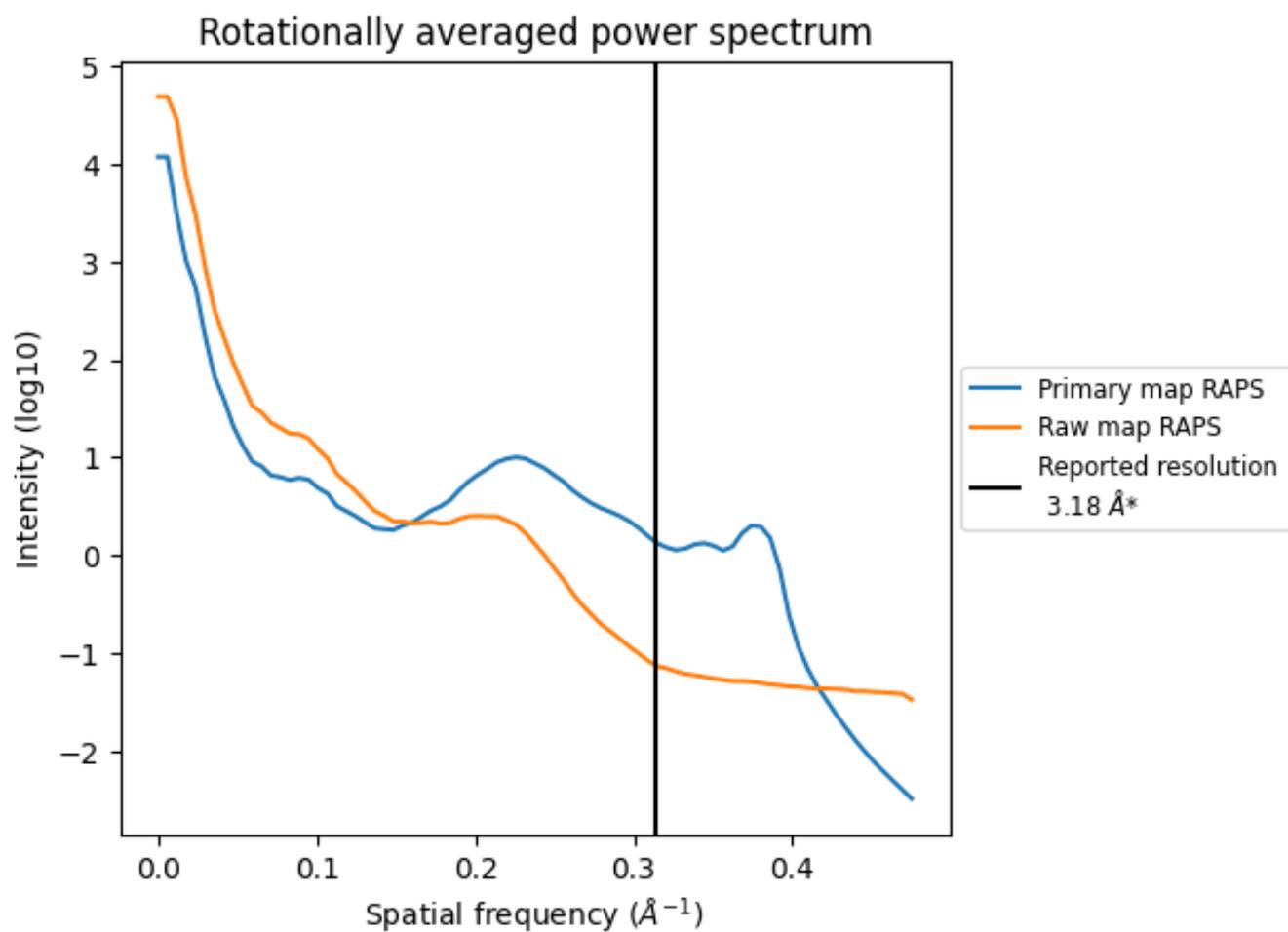
*Reported resolution corresponds to spatial frequency of 0.314 Å^{-1}

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 ⓘ
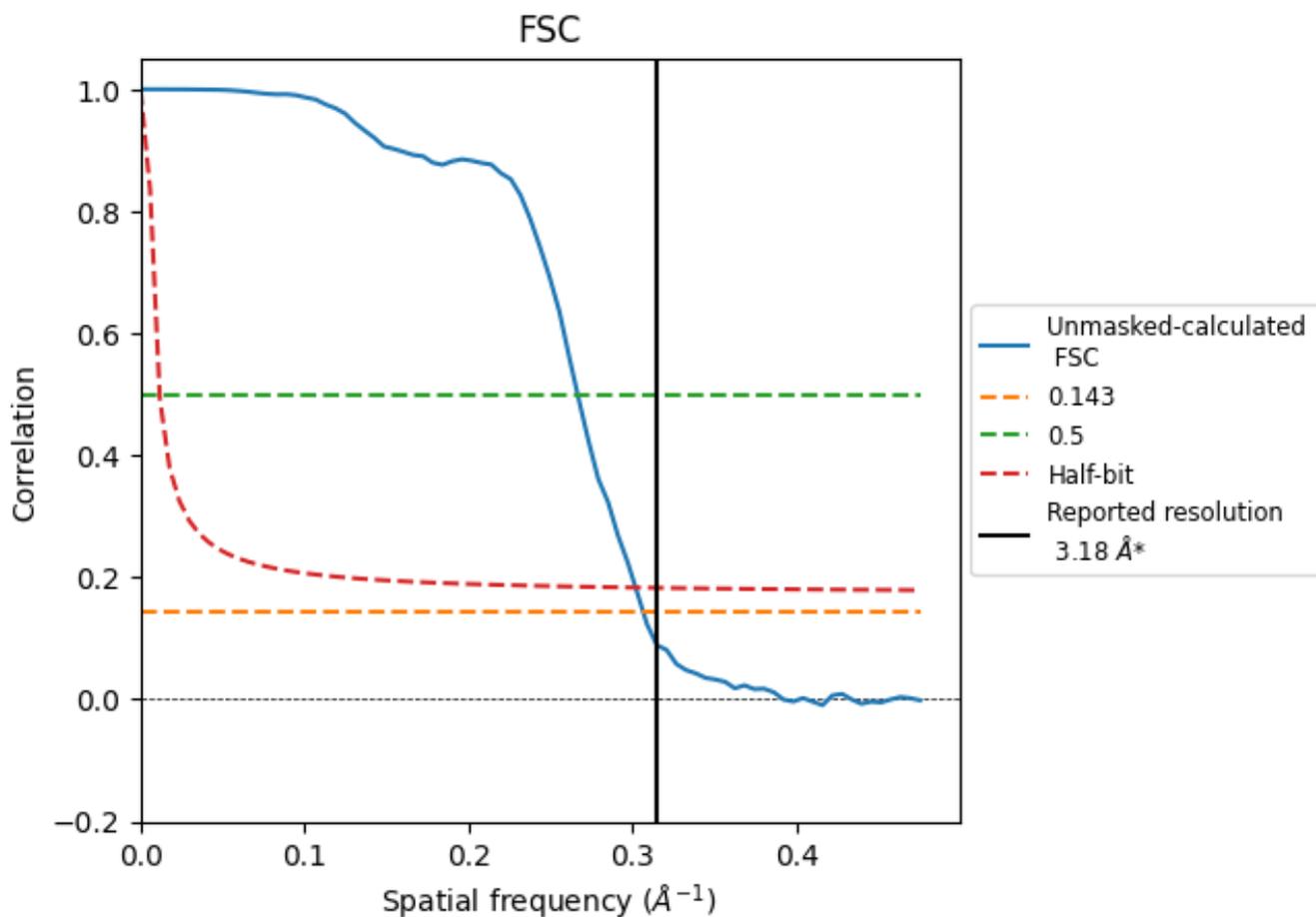
*Reported resolution corresponds to spatial frequency of 0.314 Å^{-1}

8.2 Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.18	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.26	3.75	3.31

*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-31017 and PDB model 7E8F. Per-residue inclusion information can be found in section 3 on page 5.

9.1 Map-model overlay ⓘ
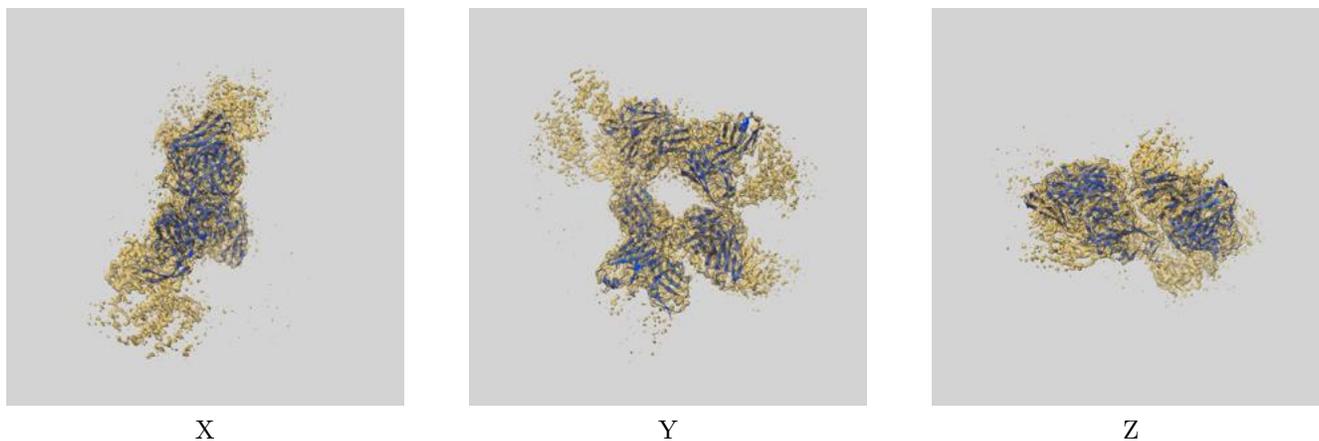
X   Y   Z

The images above show the 3D surface view of the map at the recommended contour level 0.0359 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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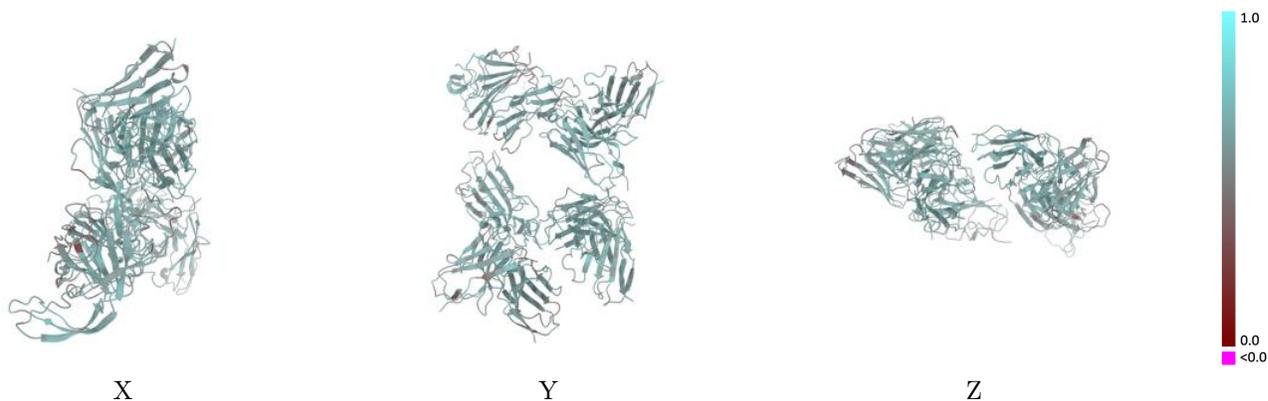
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

9.3   Atom inclusion mapped to coordinate model (i)
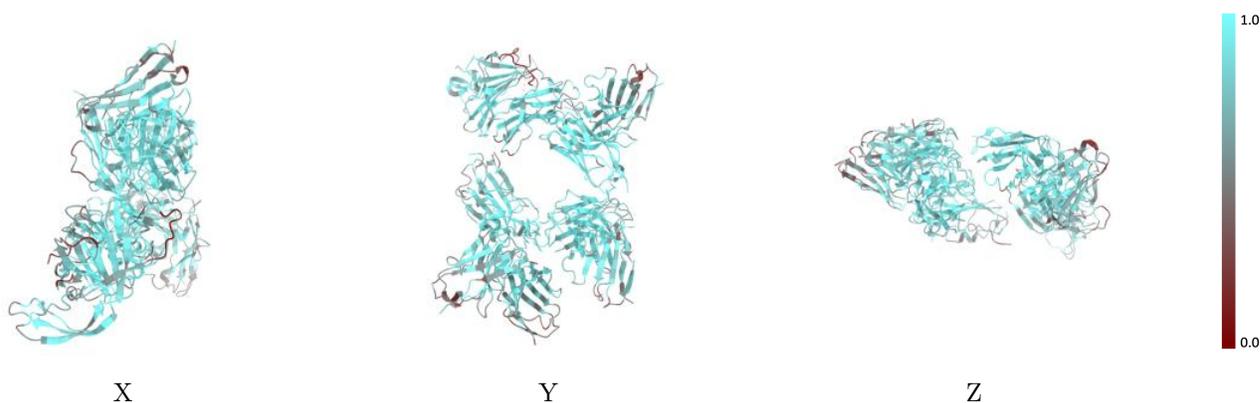
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0359).

9.4   Atom inclusion ⓘ
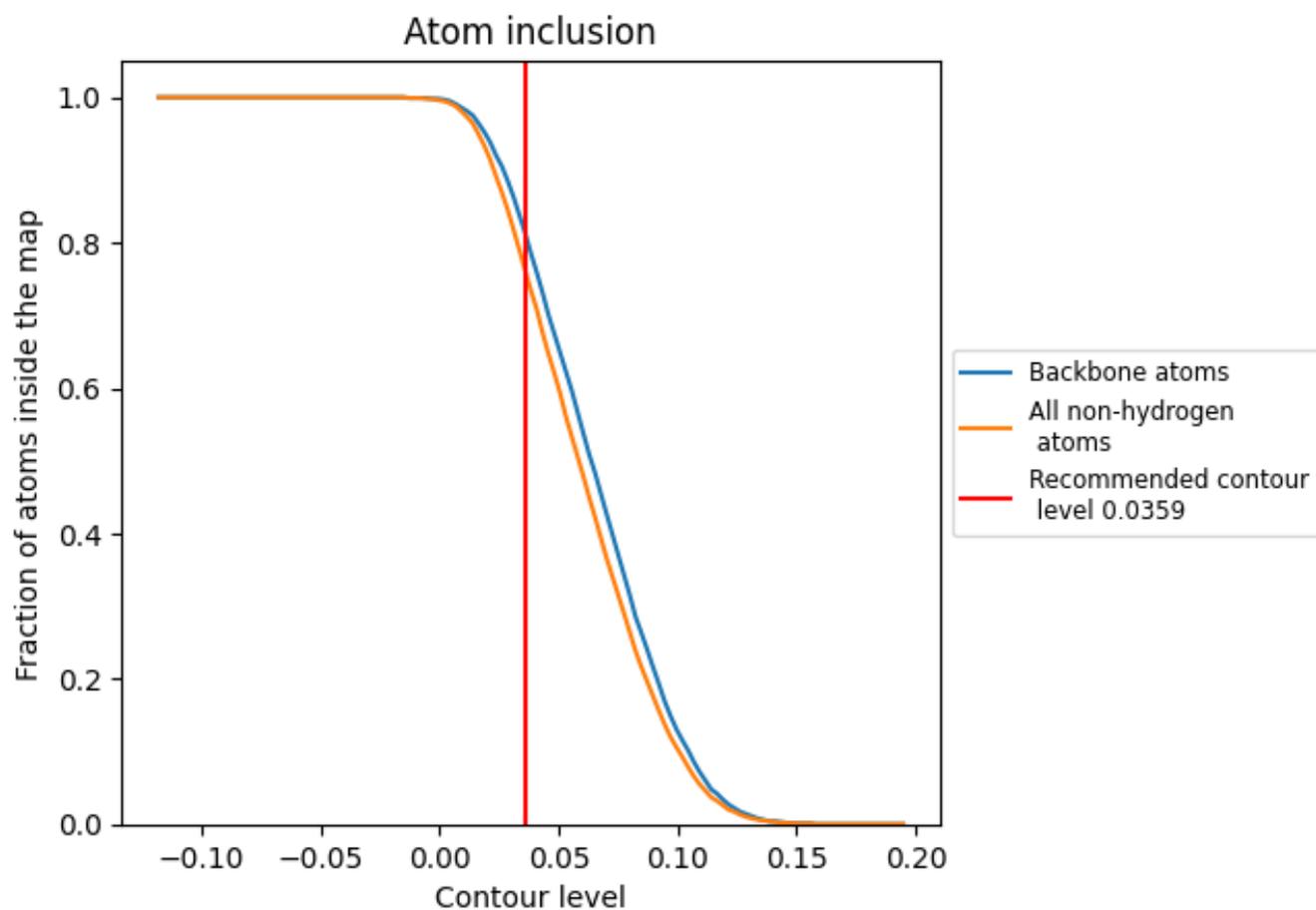
At the recommended contour level, 81% of all backbone atoms, 76% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.0359) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7640	0.5920
A	0.7310	0.5750
B	0.7620	0.5940
C	0.8480	0.6160
D	0.7180	0.5850
E	0.6860	0.5680
H	0.8640	0.6290
L	0.7220	0.5840
R	0.7860	0.5980

1.0

0.0
<0.0