



## Full wwPDB EM Validation Report ⓘ

Jul 3, 2024 – 03:23 am BST

PDB ID : 7OGM  
EMDB ID : EMD-12884  
Title : A cooperative PNPase-Hfq-RNA carrier complex facilitates bacterial riboregulation. PNPase-3'ETS(leuZ)-Hfq  
Authors : Dendooven, T.; Sinha, D.; Roesoleva, A.; Cameron, T.A.; De Lay, N.; Luisi, B.F.; Bandyra, K.  
Deposited on : 2021-05-06  
Resolution : 3.70 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

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

EMDB validation analysis : 0.0.1.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) : 2.37.1

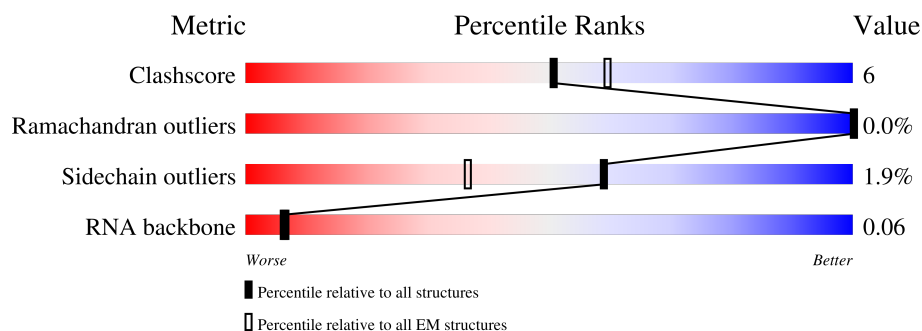
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.70 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
RNA backbone	4643	859

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  $\geq 3$ , 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  $\leq 5\%$ . 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	D	102	<div> <div>9%</div> <div>57%</div> <div>9%</div> <div>34%</div> </div>
1	E	102	<div> <div>5%</div> <div>56%</div> <div>•</div> <div>40%</div> </div>
1	F	102	<div> <div>9%</div> <div>56%</div> <div>•</div> <div>40%</div> </div>
1	I	102	<div> <div>23%</div> <div>59%</div> <div>•</div> <div>38%</div> </div>
1	J	102	<div> <div>22%</div> <div>57%</div> <div>5%</div> <div>38%</div> </div>
1	K	102	<div> <div>17%</div> <div>51%</div> <div>9%</div> <div>•</div> <div>39%</div> </div>
2	L	711	<div> <div>6%</div> <div>88%</div> <div>9%</div> <div>•</div> </div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	N	711	<div><div></div><div>10%</div><div>90%</div><div>7%</div><div></div></div>
2	O	711	<div><div></div><div>14%</div><div>92%</div><div>6%</div><div></div></div>
3	P	49	<div><div></div><div>8%</div><div>12%</div><div>55%</div><div>33%</div><div></div></div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 17683 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 RNA-binding protein Hfq.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	K	62	Total	C	N	O	0	0
			389	254	64	71		
1	J	63	Total	C	N	O	0	0
			404	266	65	73		
1	I	63	Total	C	N	O	0	0
			406	267	66	73		
1	D	67	Total	C	N	O	0	0
			438	289	69	80		
1	E	61	Total	C	N	O	0	0
			413	276	65	72		
1	F	61	Total	C	N	O	0	0
			390	257	63	70		

- Molecule 2 is a protein called Polyribonucleotide nucleotidyltransferase.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	L	693	Total	C	N	O	S	0	0
			4777	3021	847	890	19		
2	N	689	Total	C	N	O	S	0	0
			4841	3046	860	915	20		
2	O	695	Total	C	N	O	S	0	0
			4672	2931	845	878	18		

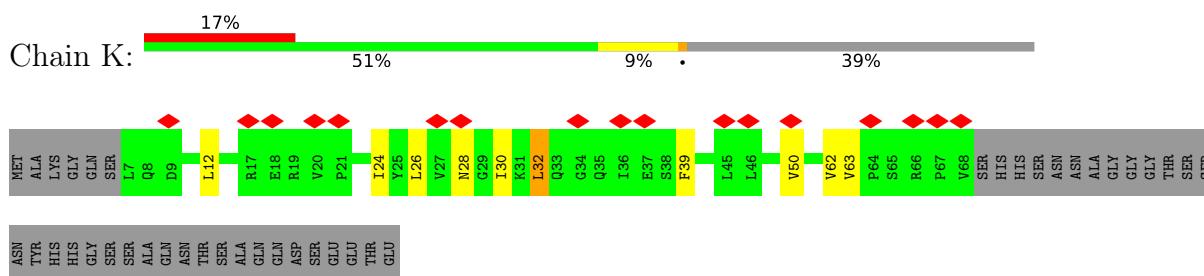
- Molecule 3 is a RNA chain called 3'ETS(LeuZ).

Mol	Chain	Residues	Atoms					AltConf	Trace
3	P	49	Total	C	N	O	P	0	0
			953	422	162	320	49		

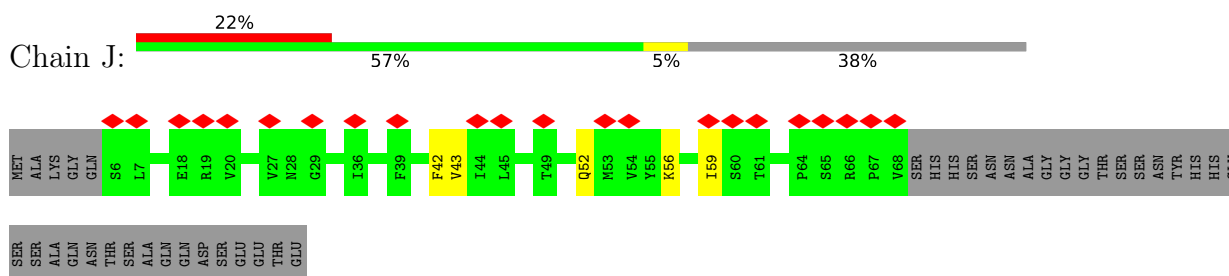
### 3 Residue-property plots [i](#)

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

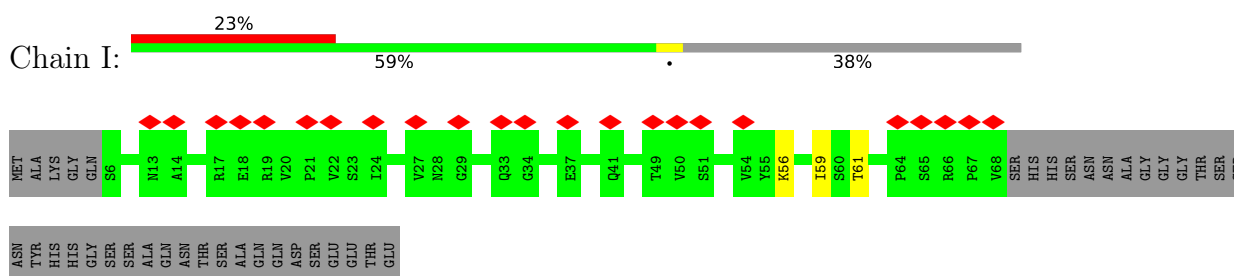
- Molecule 1: RNA-binding protein Hfq



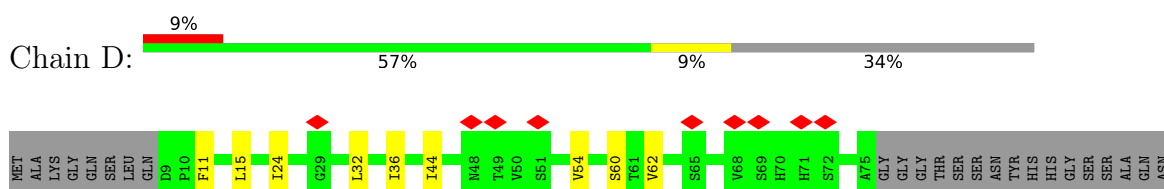
- Molecule 1: RNA-binding protein Hfq



- Molecule 1: RNA-binding protein Hfq



- Molecule 1: RNA-binding protein Hfq



THR  
SER  
ALA  
GLN  
GLN  
ASP  
SER  
GLU  
GLU  
THR  
GLU

• Molecule 1: RNA-binding protein Hfq



MET  
ALA  
LYS  
GLY  
GLN  
SER  
LEU  
Q8  
I30  
I36  
S51  
H57  
A58  
T61  
S65  
R66  
P67  
V68  
SER  
HIS  
HIS  
SER  
ASN  
ASN  
ALA  
HIS  
GLY  
GLY  
THR  
SER  
SER  
ASN  
TYR  
HIS  
HIS  
GLY  
SER  
SER  
ALA  
GLN  
ASN  
THR  
SER  
ALA  
GLN  
ASN  
ASP  
SER  
GLU  
GLU  
THR  
GLU

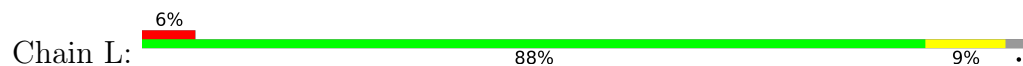
• Molecule 1: RNA-binding protein Hfq



MET  
ALA  
LYS  
GLY  
GLN  
SER  
LEU  
Q8  
L26  
V27  
N28  
Q35  
I36  
E37  
V54  
I59  
S60  
P64  
S65  
R66  
P67  
V68  
SER  
HIS  
HIS  
SER  
ASN  
ASN  
ALA  
HIS  
GLY  
GLY  
THR  
SER  
SER  
ASN  
TYR  
HIS  
HIS  
GLY  
SER  
SER  
ALA  
GLN  
ASN  
THR  
SER  
ALA  
GLN  
ASN  
ASP  
SER  
GLU  
GLU  
THR  
GLU

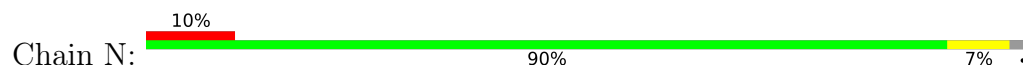
GLU

• Molecule 2: Polyribonucleotide nucleotidyltransferase

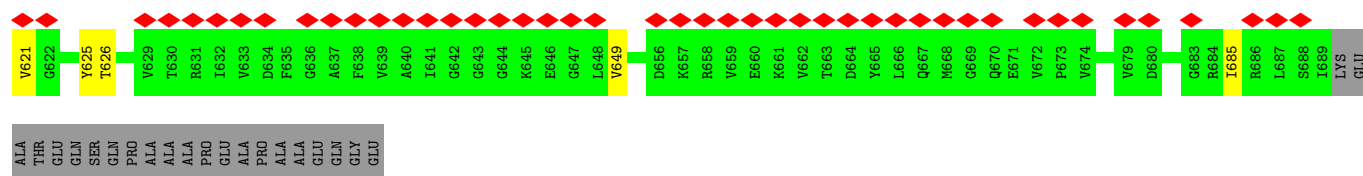


M1  
L2  
I5  
V6  
F9  
Q10  
Y11  
V16  
M22  
Q26  
V33  
V33  
L102  
F103  
P104  
F107  
E110  
G133  
I143  
P144  
P148  
I157  
N164  
Q167  
D168  
K174  
L216  
N220  
A226  
W231  
N239  
L242  
V246  
L254  
V270  
I273  
L282  
A283  
E284  
D285  
E286  
T287  
L288  
L293  
I296  
D317  
G318  
R319  
R325  
G326  
L327  
D328  
V329  
R330  
L334  
P335  
R336  
T344  
R345  
G346  
Q349  
A350  
L351  
H379  
G394  
S395  
I431  
I481  
R499  
V536  
E550  
R554  
K559  
I560  
N561  
V568  
I569  
G570  
K571  
G572  
V575  
I576  
T585  
I589  
E590  
D591  
D592  
G593  
T594  
V595  
A617  
E618  
I619  
E620  
V621  
G622  
R623  
T630  
R631  
I632  
V633  
D634  
V639  
G642  
G643  
G644  
A655  
D656  
K657  
R658  
V659  
T663  
L666  
Q667  
M668  
G669  
Q670  
E671  
V672  
P673  
L677  
E678  
V679  
D680  
R681  
A692  
T693  
GLU  
GLN  
SER  
GLN  
GLN  
PRO  
ALA  
ALA  
ALA  
PRO  
GLU  
GLU  
GLY  
GLY  
GLU

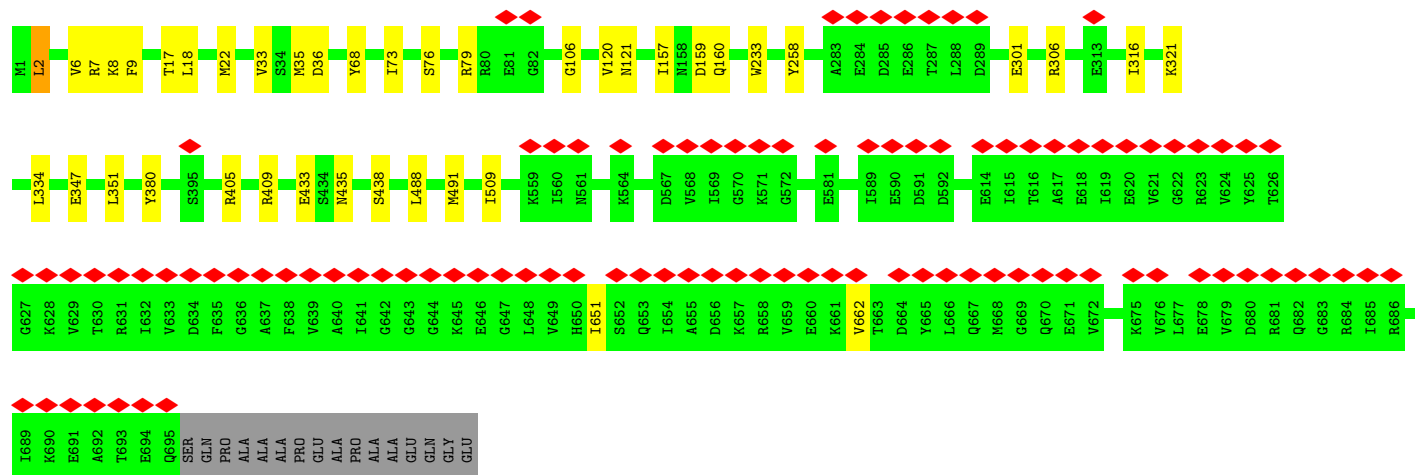
• Molecule 2: Polyribonucleotide nucleotidyltransferase



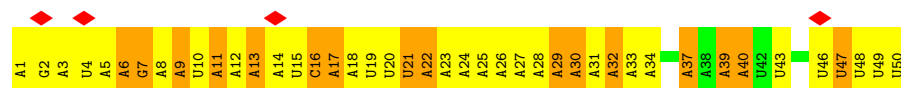
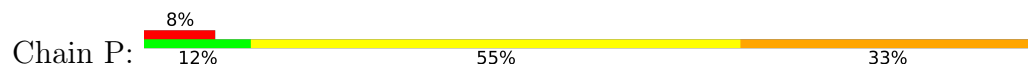
M1  
L2  
N3  
P4  
R7  
K8  
F9  
V16  
M22  
M23  
V40  
D55  
F56  
F78  
R79  
R80  
V118  
S119  
V120  
A130  
N218  
E221  
K228  
P229  
R230  
V238  
A241  
L254  
L282  
A283  
E284  
D285  
E286  
T287  
L288  
D289  
L293  
E301  
E313  
P314  
R315  
I316  
D317  
G318  
R319  
E320  
M323  
D328  
V329  
R330  
T344  
Q349  
D361  
A362  
Q363  
R372  
V387  
V428  
E433  
G467  
L478  
I481  
E485  
L488  
I555  
D563  
K571  
G584  
E588  
I589  
E590  
D591  
D592  
G593  
K596  
I615  
T616  
A617  
E618  
I619  
E620



• Molecule 2: Polyribonucleotide nucleotidyltransferase



• Molecule 3: 3'ETS(LeuZ)



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	133607	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 ( $e^-/\text{\AA}^2$ )	53.6	Depositor
Minimum defocus (nm)	-1	Depositor
Maximum defocus (nm)	-2.6	Depositor
Magnification	130000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	3.176	Depositor
Minimum map value	-1.698	Depositor
Average map value	0.006	Depositor
Map value standard deviation	0.065	Depositor
Recommended contour level	0.41	Depositor
Map size (Å)	319.50003, 319.50003, 319.50003	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.065, 1.065, 1.065	Depositor



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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	D	0.81	0/446	0.86	0/619
1	E	0.84	0/422	0.90	0/585
1	F	0.81	0/396	0.85	0/552
1	I	0.82	0/412	0.85	0/573
1	J	0.82	0/411	0.83	0/572
1	K	0.84	0/393	0.83	0/547
2	L	0.74	0/4844	0.85	0/6629
2	N	0.72	0/4913	0.83	0/6704
2	O	0.76	0/4739	0.85	0/6487
3	P	0.33	0/1063	0.81	1/1651 (0.1%)
All	All	0.74	0/18039	0.84	1/24919 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	P	1	A	OP1-P-OP2	-7.65	108.12	119.60

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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	D	438	0	394	12	0
1	E	413	0	379	5	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	390	0	355	5	0
1	I	406	0	375	2	0
1	J	404	0	360	3	0
1	K	389	0	355	8	0
2	L	4777	0	4567	67	0
2	N	4841	0	4617	59	0
2	O	4672	0	4268	47	0
3	P	953	0	484	20	0
All	All	17683	0	16154	199	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 6.

All (199) 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:N:555:ILE:HG21	2:N:596:LYS:CE	1.58	1.31
2:N:555:ILE:HG21	2:N:596:LYS:HE2	1.26	1.14
2:N:555:ILE:CG2	2:N:596:LYS:CE	2.25	1.14
2:L:569:ILE:HA	2:L:576:ILE:CD1	1.82	1.09
2:N:555:ILE:CG2	2:N:596:LYS:HE3	1.81	1.08
2:L:325:ARG:HD2	2:L:346:GLY:HA3	1.38	1.05
2:N:555:ILE:CG2	2:N:596:LYS:HE2	1.88	0.99
2:N:555:ILE:HG21	2:N:596:LYS:HE3	1.39	0.99
2:N:316:ILE:HD12	2:N:485:GLU:HG3	1.50	0.92
2:O:2:LEU:H	2:O:2:LEU:HD13	1.33	0.92
2:O:2:LEU:H	2:O:2:LEU:CD1	1.83	0.90
2:L:5:ILE:O	2:L:6:VAL:HG23	1.72	0.90
2:L:569:ILE:HA	2:L:576:ILE:CG1	2.04	0.87
2:L:569:ILE:HA	2:L:576:ILE:HG13	1.58	0.85
2:N:625:TYR:CE2	2:N:626:THR:O	2.31	0.84
1:D:24:ILE:HD11	1:D:32:LEU:HD12	1.58	0.83
2:L:2:LEU:HD11	2:L:22:MET:O	1.79	0.83
2:L:5:ILE:HD13	2:L:226:ALA:HB2	1.63	0.80
2:L:569:ILE:HA	2:L:576:ILE:HD12	1.62	0.80
2:L:568:VAL:O	2:L:576:ILE:HG13	1.82	0.78
2:L:5:ILE:O	2:L:6:VAL:CG2	2.32	0.78
2:N:555:ILE:HG22	2:N:596:LYS:HE3	1.67	0.77
1:D:24:ILE:HG22	1:D:62:VAL:HG22	1.65	0.77
2:N:9:PHE:CD1	2:N:218:ASN:ND2	2.49	0.76
2:L:5:ILE:CD1	2:L:226:ALA:HB2	2.17	0.74

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:N:589:ILE:HG21	2:N:596:LYS:HD3	1.68	0.73
3:P:11:A:OP2	3:P:11:A:H4'	1.87	0.73
2:O:2:LEU:CD1	2:O:2:LEU:N	2.49	0.73
2:O:2:LEU:HD23	2:O:22:MET:HG3	1.70	0.72
2:L:589:ILE:HG22	2:L:595:VAL:HG22	1.72	0.71
2:L:568:VAL:O	2:L:576:ILE:CG1	2.39	0.71
1:D:24:ILE:HD11	1:D:32:LEU:HB2	1.73	0.70
2:N:2:LEU:HD13	2:N:22:MET:HB2	1.74	0.70
3:P:7:G:H5'	3:P:7:G:N3	2.05	0.70
2:N:330:ARG:CZ	2:O:2:LEU:HD21	2.21	0.70
2:N:7:ARG:CZ	2:N:221:GLU:HG2	2.22	0.69
2:N:55:ASP:OD1	2:N:56:PHE:N	2.27	0.68
2:N:330:ARG:NE	2:O:2:LEU:HD11	2.09	0.67
2:O:258:TYR:OH	2:O:301:GLU:HG3	1.94	0.67
1:K:26:LEU:HB2	1:K:30:ILE:HB	1.77	0.67
2:O:159:ASP:O	2:O:160:GLN:NE2	2.28	0.67
1:K:50:VAL:HG11	1:F:64:PRO:O	1.93	0.67
2:O:334:LEU:HD11	2:O:351:LEU:HD11	1.77	0.65
1:D:24:ILE:HD11	1:D:32:LEU:CD1	2.27	0.65
2:N:330:ARG:NH1	2:O:2:LEU:HD21	2.12	0.65
3:P:40:A:H8	3:P:40:A:O5'	1.81	0.64
2:N:330:ARG:CZ	2:O:2:LEU:HD11	2.27	0.64
2:L:570:GLY:HA3	2:L:575:VAL:HG13	1.80	0.63
2:L:344:THR:HB	2:L:349:GLN:HG2	1.80	0.62
2:O:2:LEU:HD13	2:O:2:LEU:O	2.00	0.62
2:O:347:GLU:OE2	2:O:435:ASN:ND2	2.33	0.62
2:L:148:PRO:HG2	2:L:216:ILE:HG23	1.80	0.62
2:L:242:LEU:HD22	2:L:296:ILE:HD13	1.83	0.61
2:L:550:GLU:HA	2:L:554:ARG:HH21	1.66	0.61
2:L:559:LYS:HA	2:L:594:THR:CG2	2.31	0.60
2:N:9:PHE:CD2	2:N:16:VAL:HB	2.36	0.60
2:L:351:LEU:HD23	2:L:351:LEU:O	2.00	0.60
2:L:2:LEU:HD21	2:L:22:MET:HG3	1.84	0.60
2:L:327:LEU:HD22	2:L:536:VAL:HG21	1.83	0.60
1:D:24:ILE:CD1	1:D:32:LEU:HD12	2.29	0.59
1:E:57:HIS:HB3	3:P:47:U:H1'	1.84	0.59
2:O:2:LEU:HD23	2:O:22:MET:CG	2.32	0.59
2:L:569:ILE:CA	2:L:576:ILE:CD1	2.70	0.59
2:L:317:ASP:OD1	2:L:318:GLY:N	2.37	0.58
2:L:569:ILE:CA	2:L:576:ILE:HG13	2.33	0.56
2:O:651:ILE:HA	2:O:662:VAL:HA	1.87	0.56

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:O:334:LEU:CD1	2:O:351:LEU:HD11	2.35	0.56
2:O:405:ARG:HG3	2:O:409:ARG:NH1	2.22	0.55
3:P:7:G:OP1	3:P:7:G:N2	2.37	0.55
3:P:17:A:N3	3:P:17:A:H2'	2.22	0.55
1:I:61:THR:HG22	1:D:54:VAL:HG22	1.89	0.55
2:L:569:ILE:HG12	2:L:576:ILE:CD1	2.37	0.55
2:L:569:ILE:CG1	2:L:589:ILE:HD11	2.37	0.55
2:N:330:ARG:NH2	2:O:2:LEU:CD1	2.69	0.55
2:O:306:ARG:HA	2:O:488:LEU:HD21	1.89	0.55
2:N:363:GLN:HB2	2:O:79:ARG:HG3	1.89	0.55
2:L:5:ILE:C	2:L:6:VAL:HG23	2.27	0.54
1:D:24:ILE:CD1	1:D:32:LEU:HB2	2.37	0.54
2:L:9:PHE:CE1	2:L:16:VAL:HB	2.43	0.54
1:I:56:LYS:HA	1:I:59:ILE:HD12	1.89	0.54
2:L:569:ILE:HG23	2:L:576:ILE:HD12	1.90	0.54
2:O:157:ILE:HD12	2:O:157:ILE:O	2.08	0.54
2:N:2:LEU:C	2:N:2:LEU:HD12	2.28	0.54
1:F:26:LEU:HD22	1:F:26:LEU:N	2.23	0.54
2:N:589:ILE:CG2	2:N:596:LYS:HD3	2.38	0.53
2:O:2:LEU:C	2:O:2:LEU:HD22	2.29	0.53
2:N:7:ARG:NE	2:N:221:GLU:HG2	2.24	0.53
2:L:104:PRO:HG2	2:L:107:PHE:HB2	1.89	0.53
3:P:7:G:N3	3:P:7:G:H2'	2.23	0.53
2:N:320:GLU:HB3	2:N:323:MET:HB2	1.91	0.52
2:O:380:TYR:OH	2:O:438:SER:OG	2.27	0.52
2:N:387:VAL:O	2:N:387:VAL:HG12	2.08	0.52
2:N:330:ARG:NH2	2:O:2:LEU:HD11	2.25	0.52
2:N:625:TYR:CD2	2:N:626:THR:O	2.63	0.52
2:L:254:LEU:HD12	2:L:273:ILE:HD11	1.92	0.51
2:O:258:TYR:OH	2:O:301:GLU:CG	2.58	0.51
1:K:24:ILE:HD13	1:K:62:VAL:HG13	1.92	0.51
2:N:344:THR:HG22	2:N:349:GLN:HG3	1.92	0.51
1:K:50:VAL:HG12	1:F:64:PRO:HD2	1.91	0.51
2:N:254:LEU:HD21	2:N:301:GLU:HG3	1.91	0.51
2:L:559:LYS:HA	2:L:594:THR:HG22	1.92	0.51
2:L:569:ILE:HA	2:L:576:ILE:HD11	1.81	0.51
2:N:9:PHE:CE2	2:N:16:VAL:HG11	2.45	0.51
1:K:50:VAL:CG1	1:F:64:PRO:HG2	2.41	0.50
2:N:649:VAL:HG22	2:N:685:ILE:HB	1.92	0.50
2:L:589:ILE:HD12	2:L:589:ILE:O	2.11	0.50
3:P:6:A:H4'	3:P:6:A:OP1	2.12	0.50

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:5:ILE:HG22	2:L:6:VAL:N	2.27	0.49
3:P:9:A:H5''	3:P:9:A:H8	1.76	0.49
2:L:1:MET:HG3	2:L:2:LEU:N	2.28	0.49
2:L:143:ILE:HG23	2:L:144:PRO:HD2	1.95	0.49
2:O:6:VAL:HG11	2:O:8:LYS:HE3	1.96	0.48
2:N:467:GLY:HA3	2:N:481:ILE:CD1	2.43	0.48
2:O:2:LEU:CD2	2:O:22:MET:SD	3.01	0.48
3:P:13:A:H2'	3:P:13:A:N3	2.29	0.48
2:L:242:LEU:HD22	2:L:296:ILE:CD1	2.43	0.48
1:J:42:PHE:HB3	3:P:49:U:H2'	1.96	0.47
1:K:12:LEU:HD21	1:K:39:PHE:CB	2.44	0.47
2:L:319:ARG:CZ	2:L:325:ARG:HG3	2.44	0.47
1:D:24:ILE:HG22	1:D:62:VAL:CG2	2.39	0.47
2:N:9:PHE:CE1	2:N:218:ASN:CB	2.97	0.47
2:O:2:LEU:HD21	2:O:22:MET:SD	2.54	0.47
2:O:258:TYR:OH	2:O:301:GLU:OE2	2.33	0.47
3:P:21:U:H1'	3:P:22:A:H5'	1.96	0.47
2:L:143:ILE:CD1	2:L:231:TRP:CH2	2.98	0.46
2:N:555:ILE:HG23	2:N:596:LYS:HE2	1.85	0.46
3:P:39:A:H3'	3:P:40:A:C8	2.50	0.46
1:K:24:ILE:HB	1:K:32:LEU:HG	1.97	0.46
2:L:351:LEU:CD1	2:N:23:MET:HE1	2.45	0.46
2:O:6:VAL:HG13	2:O:17:THR:HG23	1.98	0.46
3:P:39:A:O5'	3:P:39:A:C8	2.68	0.46
2:L:246:VAL:HG21	2:L:293:LEU:HD11	1.97	0.46
2:N:315:ARG:NH2	2:N:319:ARG:HH22	2.14	0.46
2:N:625:TYR:CG	2:N:626:THR:N	2.85	0.45
3:P:16:C:O2	3:P:16:C:O4'	2.31	0.45
2:L:431:ILE:HD12	2:L:431:ILE:N	2.32	0.45
2:N:313:GLU:N	2:N:314:PRO:HD2	2.31	0.45
2:N:478:LEU:HD23	2:N:478:LEU:H	1.81	0.45
2:L:589:ILE:HG22	2:L:595:VAL:CG2	2.45	0.45
1:E:61:THR:HB	1:F:54:VAL:HG12	1.99	0.45
2:N:478:LEU:HD23	2:N:478:LEU:N	2.31	0.45
2:L:336:ARG:HG2	2:N:120:VAL:O	2.17	0.44
2:N:328:ASP:OD2	2:O:2:LEU:HD11	2.16	0.44
2:L:589:ILE:HG22	2:L:595:VAL:HG13	1.99	0.44
2:N:2:LEU:HD13	2:N:22:MET:CB	2.43	0.44
2:N:485:GLU:HG2	2:N:488:LEU:HD12	1.98	0.44
2:O:405:ARG:HG3	2:O:409:ARG:CZ	2.47	0.44
2:L:569:ILE:HG12	2:L:589:ILE:HD11	1.98	0.44

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:N:428:VAL:HG11	2:O:68:TYR:CD2	2.52	0.44
3:P:37:A:OP2	3:P:37:A:C8	2.71	0.44
2:L:157:ILE:H	2:L:157:ILE:HG13	1.69	0.44
2:N:317:ASP:OD2	2:N:319:ARG:NE	2.44	0.44
1:J:56:LYS:HA	1:J:59:ILE:HD12	2.00	0.44
2:L:287:THR:HG22	2:L:293:LEU:HD22	2.00	0.44
2:L:569:ILE:CA	2:L:576:ILE:HD11	2.44	0.43
2:L:569:ILE:CG1	2:L:576:ILE:HD11	2.48	0.43
2:O:2:LEU:N	2:O:2:LEU:HD12	2.33	0.43
2:L:102:LEU:HD12	2:L:102:LEU:HA	1.80	0.43
2:N:40:VAL:HG21	2:N:130:ALA:HA	2.00	0.43
3:P:32:A:H8	3:P:33:A:H2'	1.83	0.43
2:L:569:ILE:HG12	2:L:576:ILE:HD11	2.00	0.43
2:N:330:ARG:HE	2:O:2:LEU:HD11	1.84	0.43
2:L:327:LEU:CD2	2:L:536:VAL:HG11	2.48	0.43
2:L:630:THR:H	2:L:669:GLY:H	1.66	0.43
2:N:330:ARG:NH2	2:O:2:LEU:HD13	2.34	0.43
2:N:228:LYS:O	2:N:230:ARG:NH2	2.51	0.43
1:D:11:PHE:CZ	1:D:15:LEU:HD11	2.54	0.43
2:O:106:GLY:O	2:O:233:TRP:HZ2	2.01	0.43
1:D:36:ILE:HG22	1:D:44:ILE:HG21	2.00	0.42
2:L:334:LEU:HD21	2:N:118:VAL:HB	2.01	0.42
2:L:254:LEU:HD11	2:L:270:VAL:HG13	2.00	0.42
2:L:242:LEU:HD21	2:L:293:LEU:CD1	2.50	0.42
1:K:63:VAL:HG12	1:J:52:GLN:HA	2.02	0.41
2:L:143:ILE:HD11	2:L:231:TRP:CH2	2.55	0.41
2:O:35:MET:O	2:O:36:ASP:C	2.56	0.41
2:O:509:ILE:N	2:O:509:ILE:HD12	2.35	0.41
2:L:33:VAL:HG21	2:L:133:GLY:HA2	2.01	0.41
2:O:2:LEU:O	2:O:2:LEU:HD22	2.20	0.41
3:P:39:A:H2'	3:P:39:A:N3	2.34	0.41
2:L:11:TYR:CE2	2:L:164:ASN:ND2	2.86	0.41
2:L:379:HIS:ND1	2:N:80:ARG:HD3	2.36	0.41
2:N:330:ARG:CZ	2:O:2:LEU:CD2	2.94	0.41
2:O:2:LEU:H	2:O:2:LEU:HD12	1.75	0.41
1:E:30:ILE:HD12	1:E:30:ILE:HA	1.99	0.41
2:L:329:VAL:HG12	2:L:330:ARG:N	2.36	0.41
2:N:328:ASP:OD2	2:O:2:LEU:CD1	2.68	0.41
3:P:17:A:N3	3:P:17:A:C2'	2.84	0.41
1:D:60:SER:HA	1:E:58:ALA:HB2	2.03	0.41
2:L:589:ILE:CG2	2:L:595:VAL:HG22	2.46	0.41

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:N:361:ASP:CB	2:O:73:ILE:HD11	2.51	0.41
2:N:372:ARG:HE	2:N:372:ARG:HB3	1.48	0.41
2:N:9:PHE:CE1	2:N:218:ASN:HB3	2.56	0.40
3:P:29:A:O2'	3:P:30:A:O3'	2.38	0.40
2:L:26:GLN:HE21	2:O:433:GLU:HB2	1.86	0.40
2:N:349:GLN:HB3	2:N:433:GLU:HG2	2.02	0.40
2:O:491:MET:HG3	2:O:509:ILE:HG13	2.02	0.40
2:L:568:VAL:O	2:L:576:ILE:HG12	2.17	0.40
1:D:60:SER:HA	1:E:58:ALA:CB	2.52	0.40
2:O:9:PHE:HE1	2:O:18:LEU:HD23	1.85	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	D	65/102 (64%)	62 (95%)	3 (5%)	0	100	100
1	E	59/102 (58%)	58 (98%)	1 (2%)	0	100	100
1	F	59/102 (58%)	57 (97%)	2 (3%)	0	100	100
1	I	61/102 (60%)	59 (97%)	2 (3%)	0	100	100
1	J	61/102 (60%)	60 (98%)	1 (2%)	0	100	100
1	K	60/102 (59%)	60 (100%)	0	0	100	100
2	L	691/711 (97%)	657 (95%)	34 (5%)	0	100	100
2	N	687/711 (97%)	666 (97%)	20 (3%)	1 (0%)	51	83
2	O	693/711 (98%)	668 (96%)	25 (4%)	0	100	100
All	All	2436/2745 (89%)	2347 (96%)	88 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	N	4	PRO

### 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	D	39/89 (44%)	39 (100%)	0	100	100
1	E	38/89 (43%)	38 (100%)	0	100	100
1	F	34/89 (38%)	33 (97%)	1 (3%)	42	66
1	I	37/89 (42%)	37 (100%)	0	100	100
1	J	35/89 (39%)	34 (97%)	1 (3%)	42	66
1	K	34/89 (38%)	32 (94%)	2 (6%)	19	51
2	L	438/575 (76%)	426 (97%)	12 (3%)	44	68
2	N	454/575 (79%)	450 (99%)	4 (1%)	78	88
2	O	397/575 (69%)	389 (98%)	8 (2%)	55	74
All	All	1506/2259 (67%)	1478 (98%)	28 (2%)	59	76

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	28	ASN
1	K	32	LEU
1	J	43	VAL
1	F	27	VAL
2	L	110	GLU
2	L	157	ILE
2	L	167	GLN
2	L	168	ASP
2	L	174	LYS
2	L	220	ASN
2	L	287	THR
2	L	344	THR
2	L	481	ILE
2	L	499	ARG

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
2	L	585	THR
2	L	633	VAL
2	N	363	GLN
2	N	372	ARG
2	N	478	LEU
2	N	621	VAL
2	O	2	LEU
2	O	7	ARG
2	O	33	VAL
2	O	76	SER
2	O	120	VAL
2	O	121	ASN
2	O	316	ILE
2	O	321	LYS

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

Mol	Chain	Res	Type
1	K	28	ASN
2	L	26	GLN
2	L	146	ASN
2	L	218	ASN
2	L	532	HIS
2	N	109	ASN
2	N	291	ASN
2	O	10	GLN
2	O	26	GLN
2	O	64	GLN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	P	47/49 (95%)	39 (82%)	5 (10%)

All (39) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	P	3	A
3	P	4	U
3	P	5	A

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
3	P	6	A
3	P	7	G
3	P	8	A
3	P	9	A
3	P	10	U
3	P	11	A
3	P	12	A
3	P	13	A
3	P	14	A
3	P	15	U
3	P	16	C
3	P	17	A
3	P	18	A
3	P	19	U
3	P	20	U
3	P	21	U
3	P	22	A
3	P	23	A
3	P	24	A
3	P	25	A
3	P	26	A
3	P	27	A
3	P	28	A
3	P	29	A
3	P	30	A
3	P	31	A
3	P	32	A
3	P	34	A
3	P	37	A
3	P	39	A
3	P	40	A
3	P	43	U
3	P	46	U
3	P	47	U
3	P	48	U
3	P	50	U

All (5) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	P	2	G
3	P	9	A

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
3	P	10	U
3	P	29	A
3	P	31	A

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
3	P	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	P	40:A	O3'	42:U	P	9.61

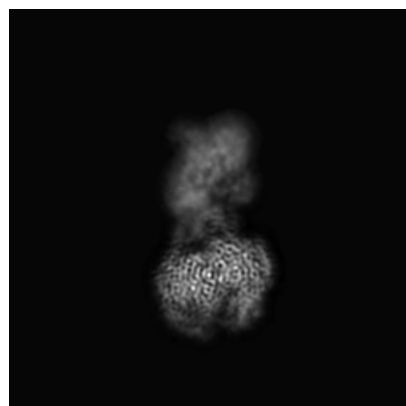
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12884. These allow visual inspection of the internal detail of the map and identification of artifacts.

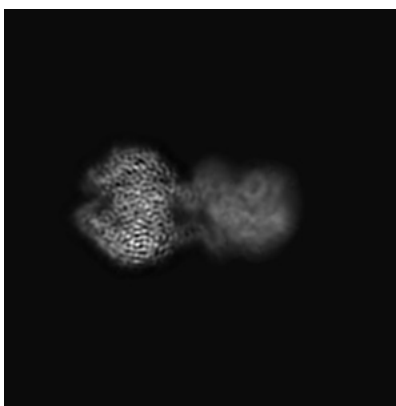
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

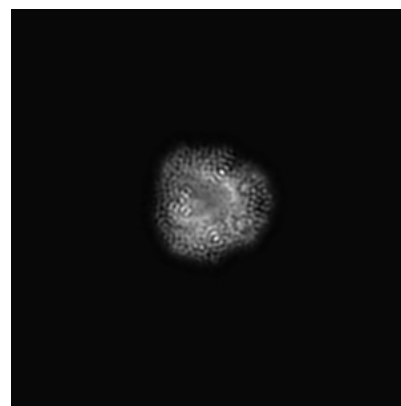
#### 6.1.1 Primary map



X

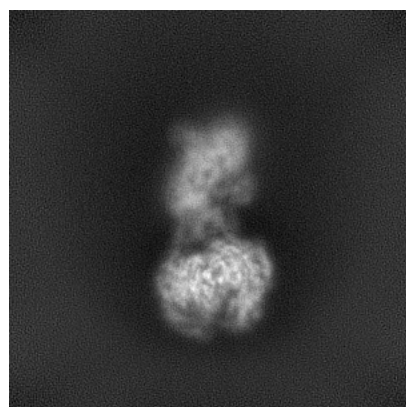


Y

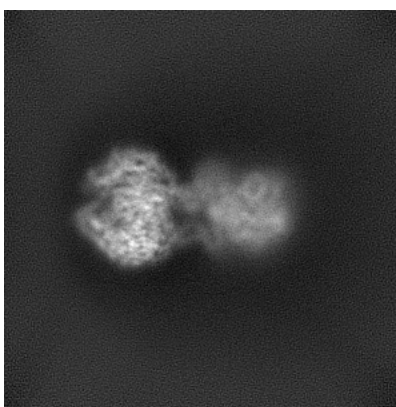


Z

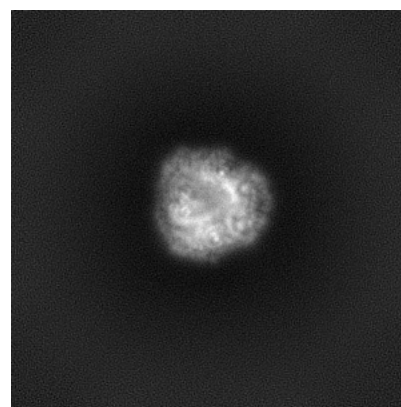
#### 6.1.2 Raw map



X



Y

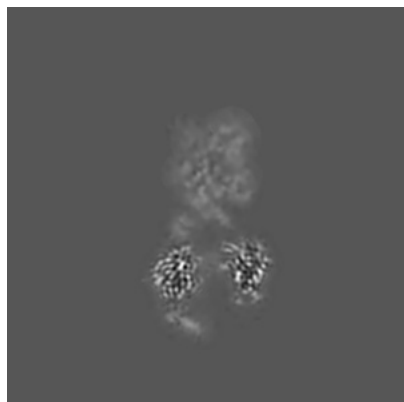


Z

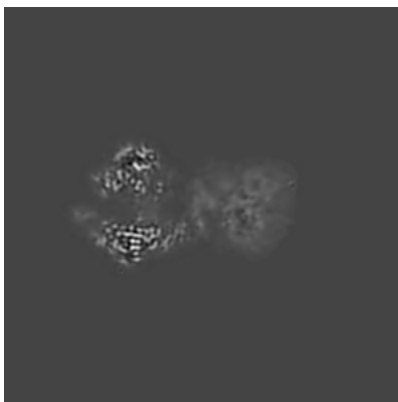
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

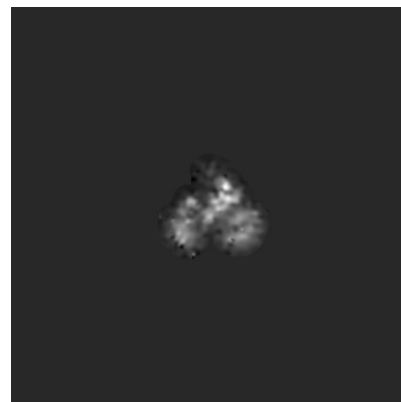
### 6.2.1 Primary map



X Index: 150

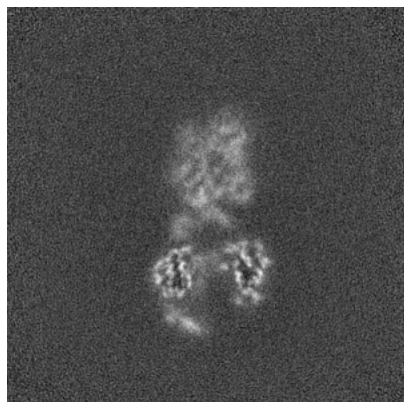


Y Index: 150

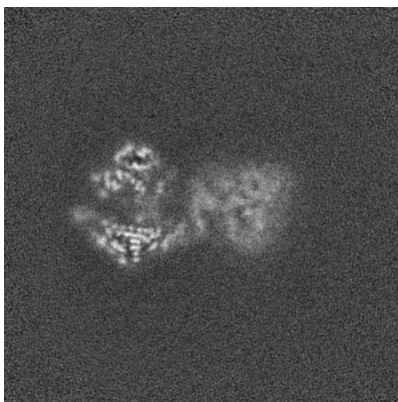


Z Index: 150

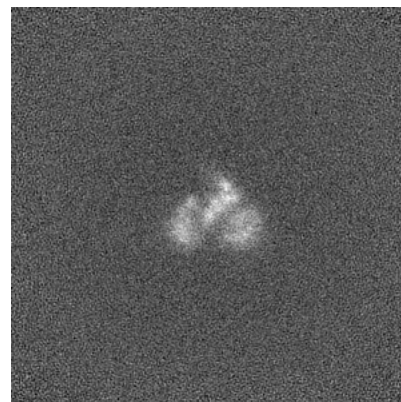
### 6.2.2 Raw map



X Index: 150



Y Index: 150

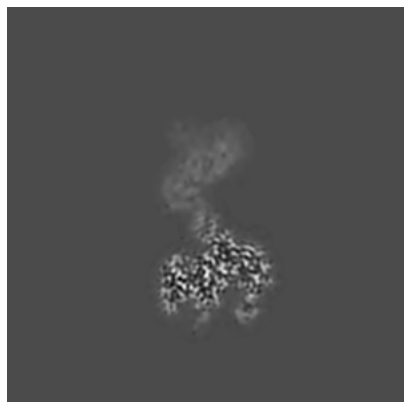


Z Index: 150

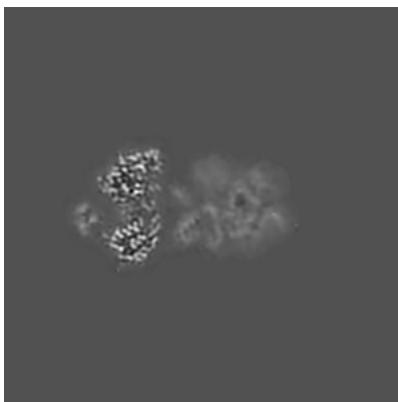
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

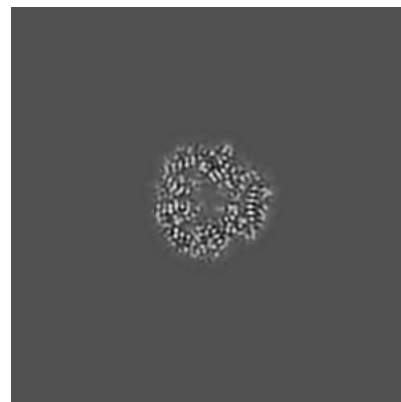
### 6.3.1 Primary map



X Index: 128

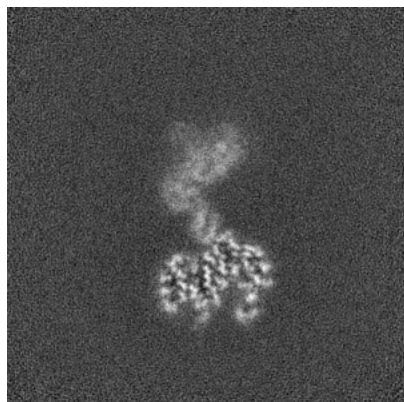


Y Index: 141

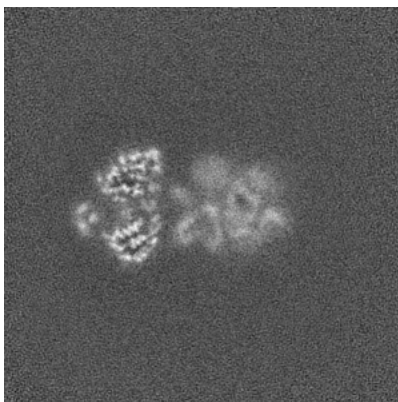


Z Index: 100

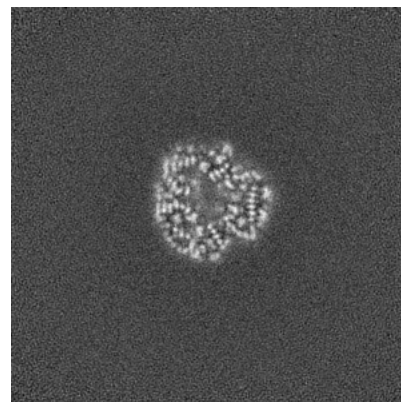
### 6.3.2 Raw map



X Index: 128



Y Index: 141

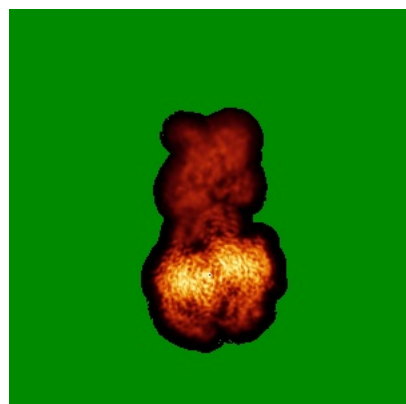


Z Index: 99

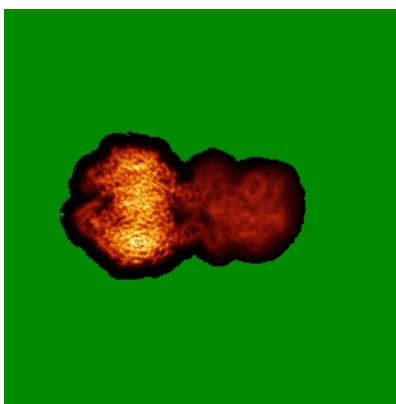
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

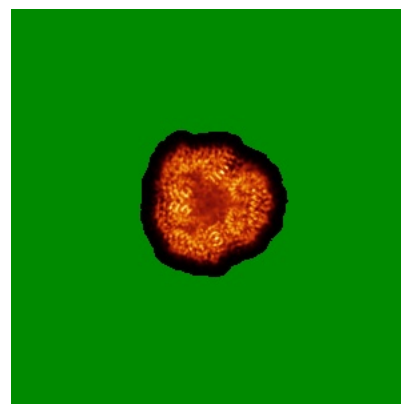
### 6.4.1 Primary map



X

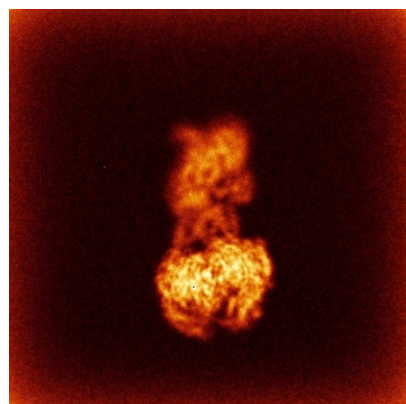


Y

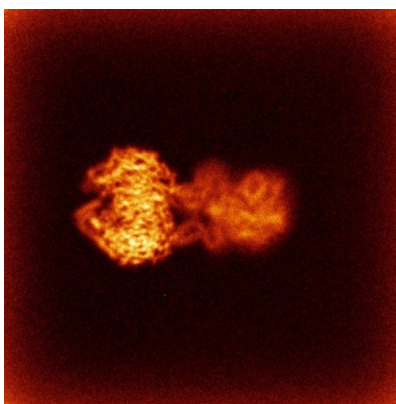


Z

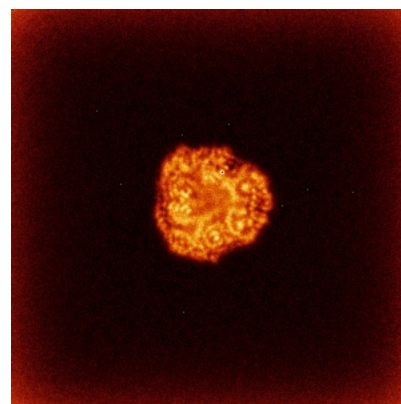
### 6.4.2 Raw map



X



Y



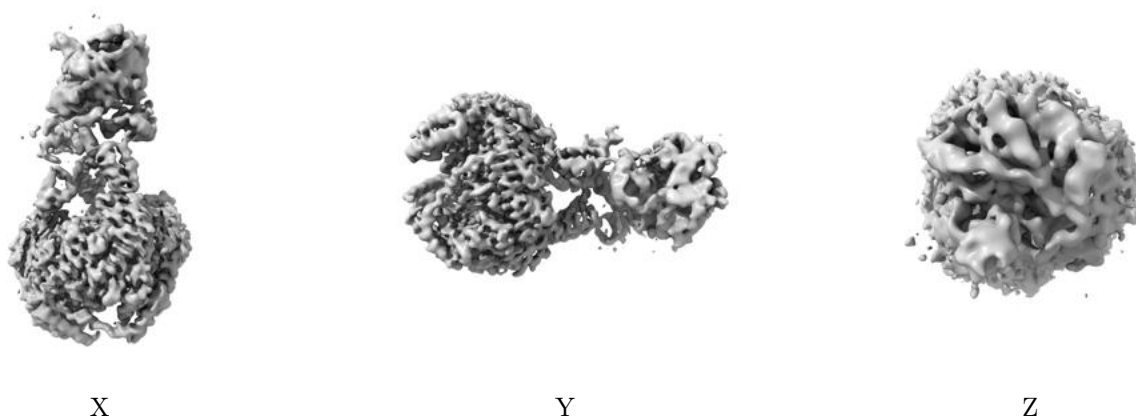
Z

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



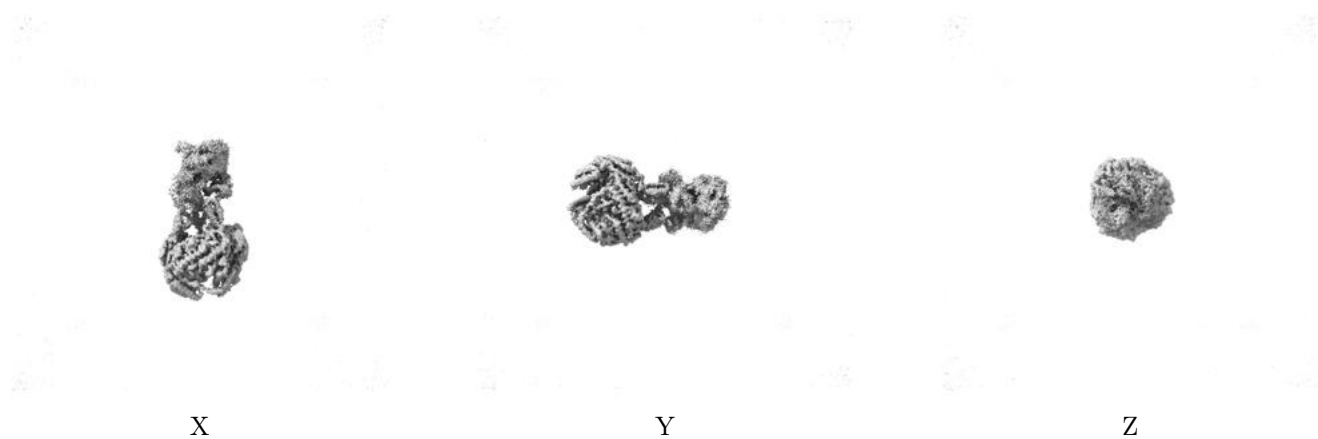
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.41. 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



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.



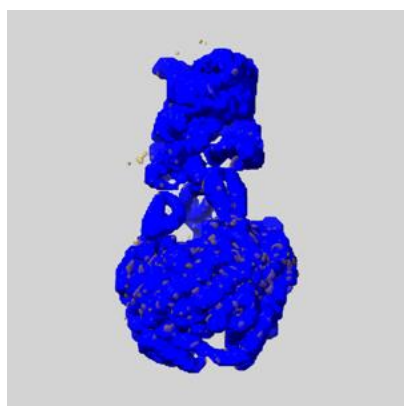
## 6.6 Mask visualisation [i](#)

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

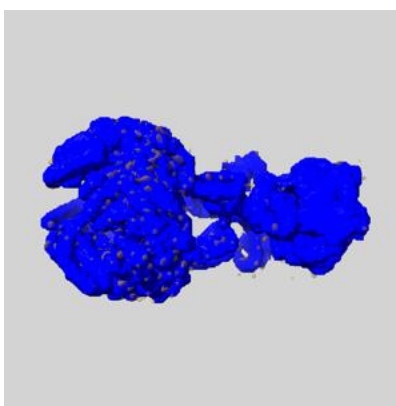
A mask typically either:

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

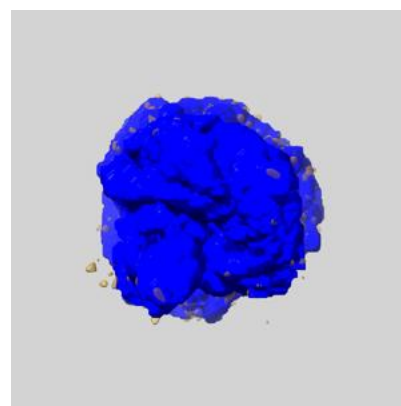
### 6.6.1 emd\_12884\_msk\_1.map [i](#)



X



Y

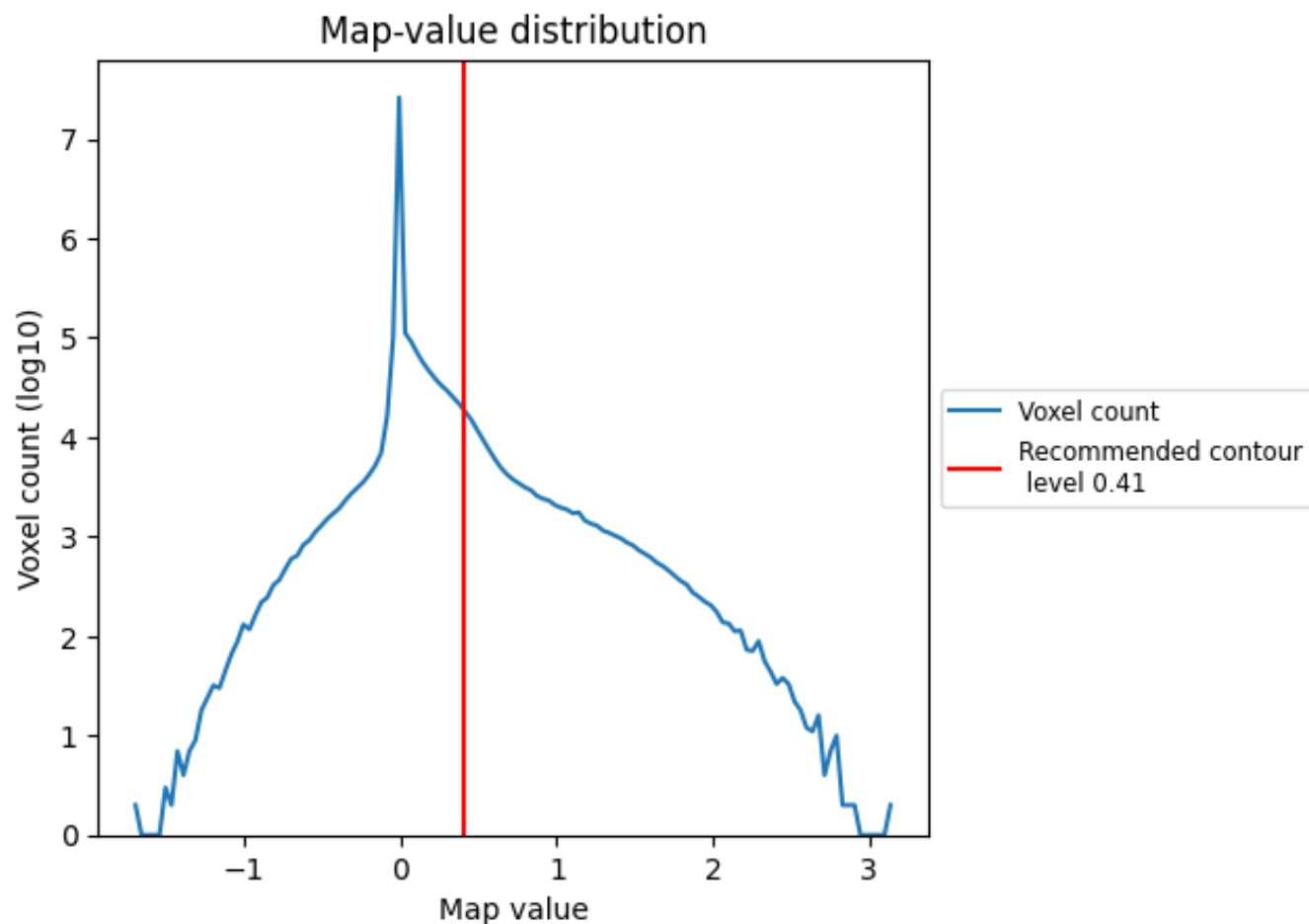


Z

## 7 Map analysis [i](#)

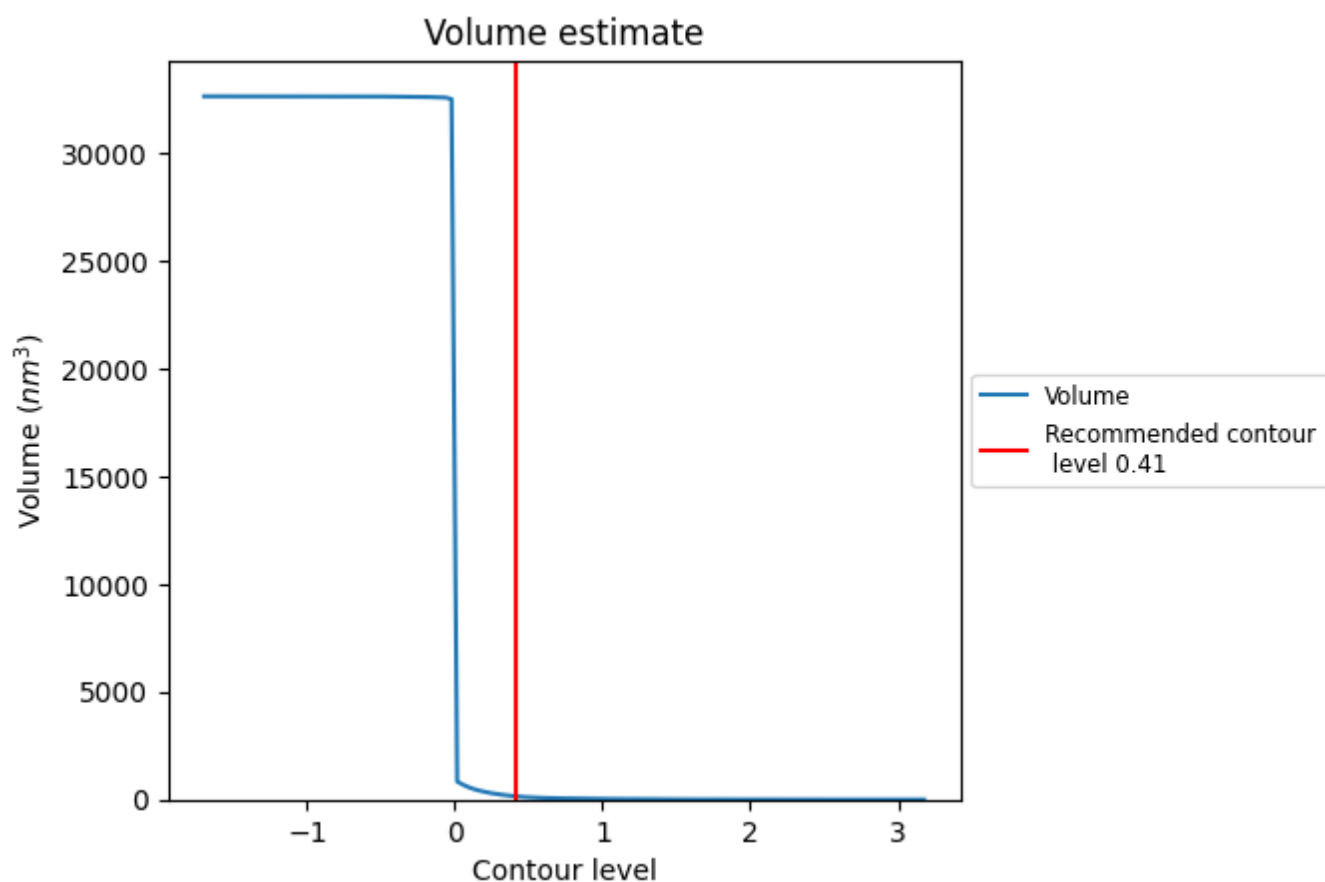
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

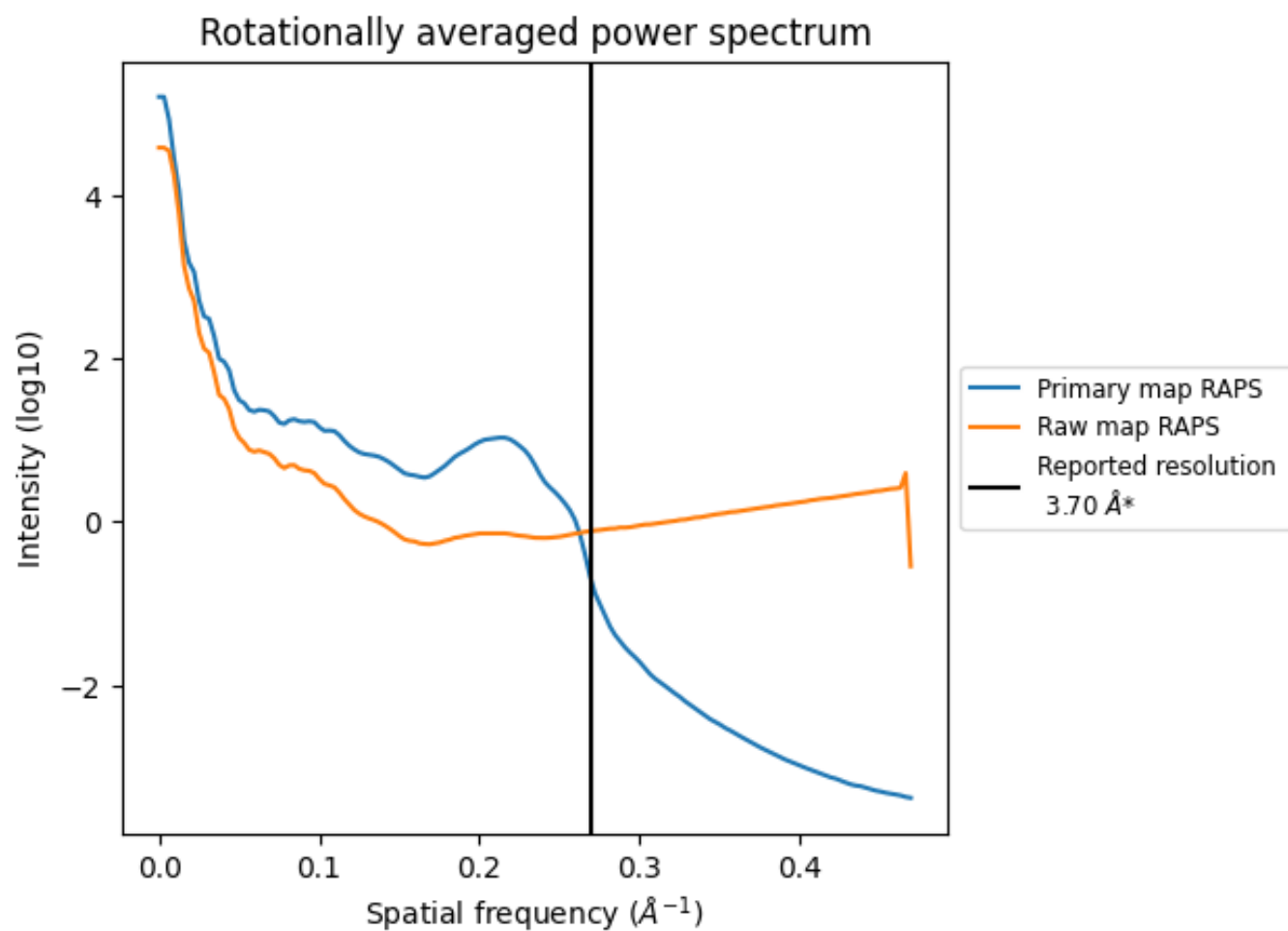
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 152 nm<sup>3</sup>; this corresponds to an approximate mass of 138 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 ⓘ

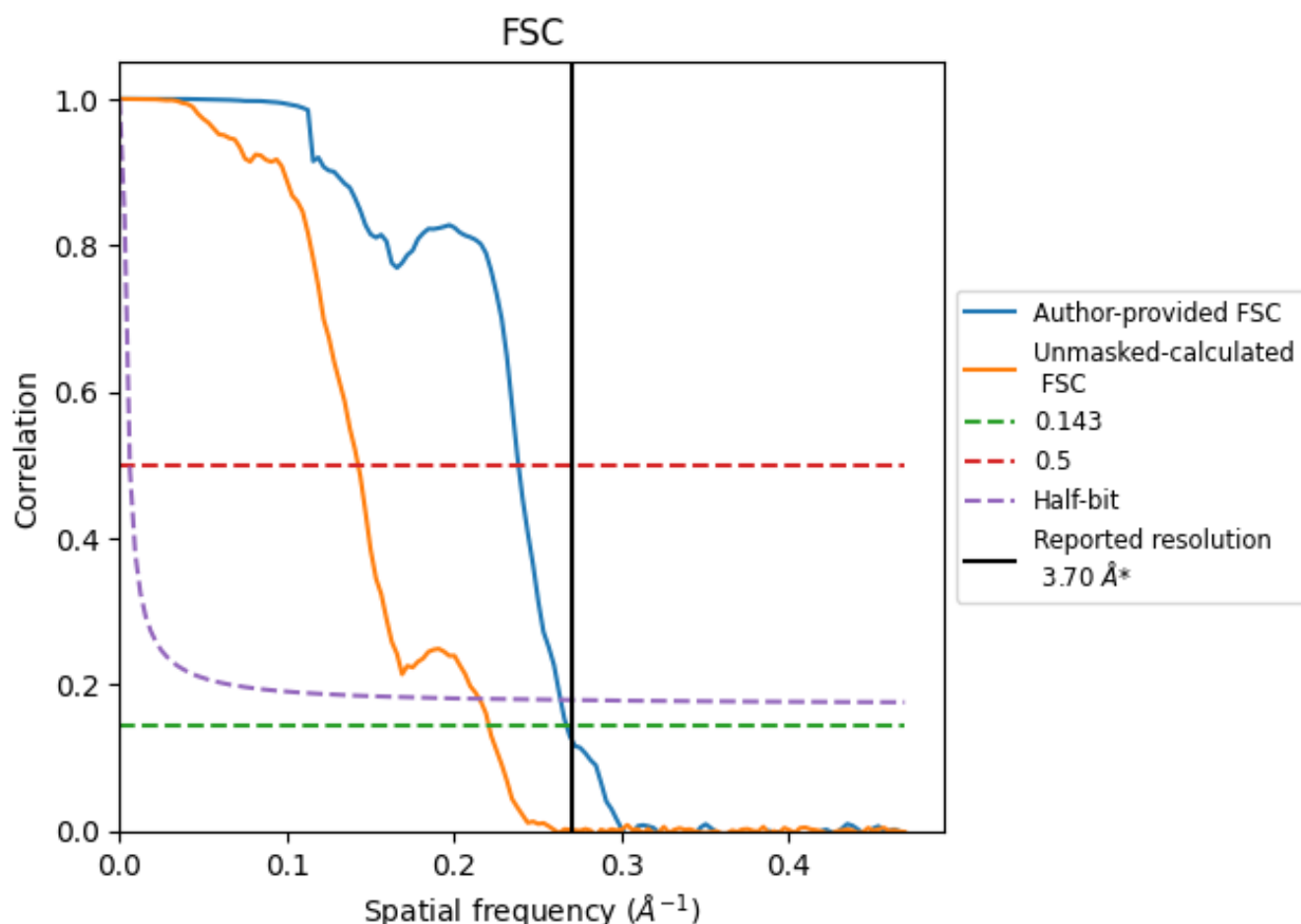


\*Reported resolution corresponds to spatial frequency of 0.270  $\text{\AA}^{-1}$

## 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 0.270 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

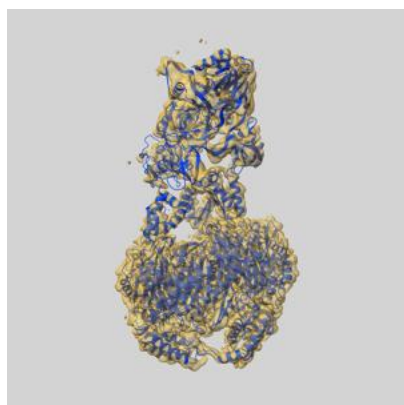
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.70	-	-
Author-provided FSC curve	3.74	4.19	3.79
Unmasked-calculated*	4.53	7.01	4.65

\*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 4.53 differs from the reported value 3.7 by more than 10 %

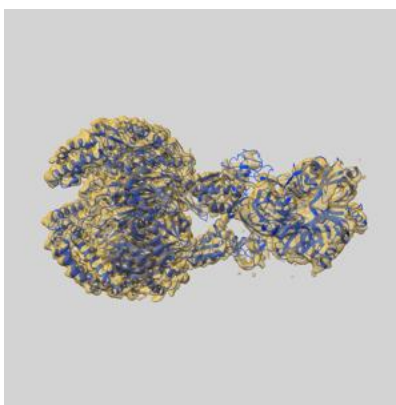
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-12884 and PDB model 7OGM. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

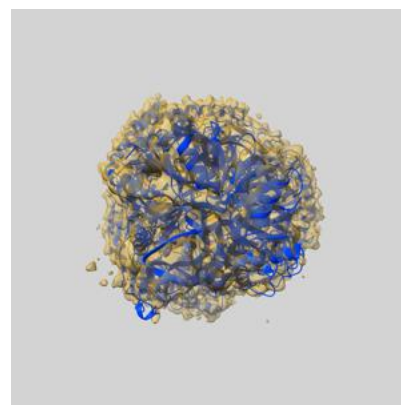
### 9.1 Map-model overlay [i](#)



X



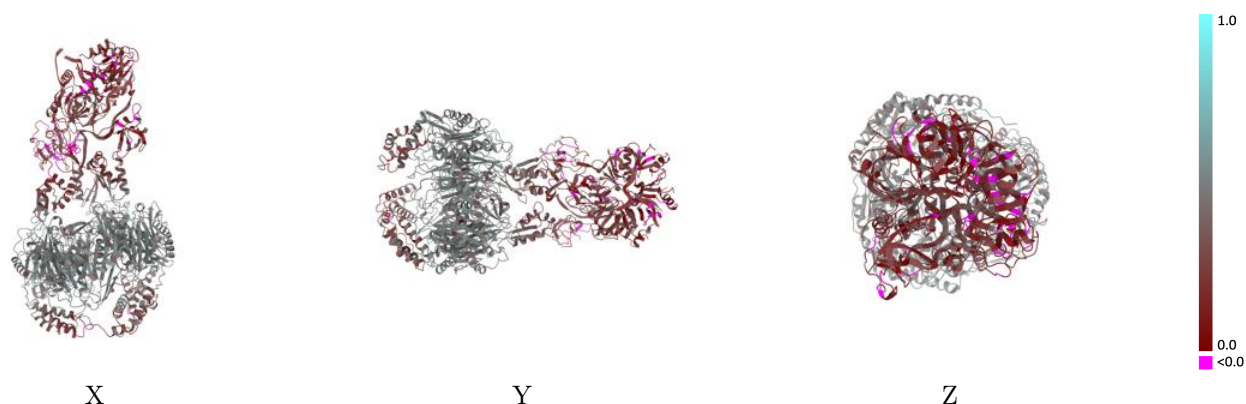
Y



Z

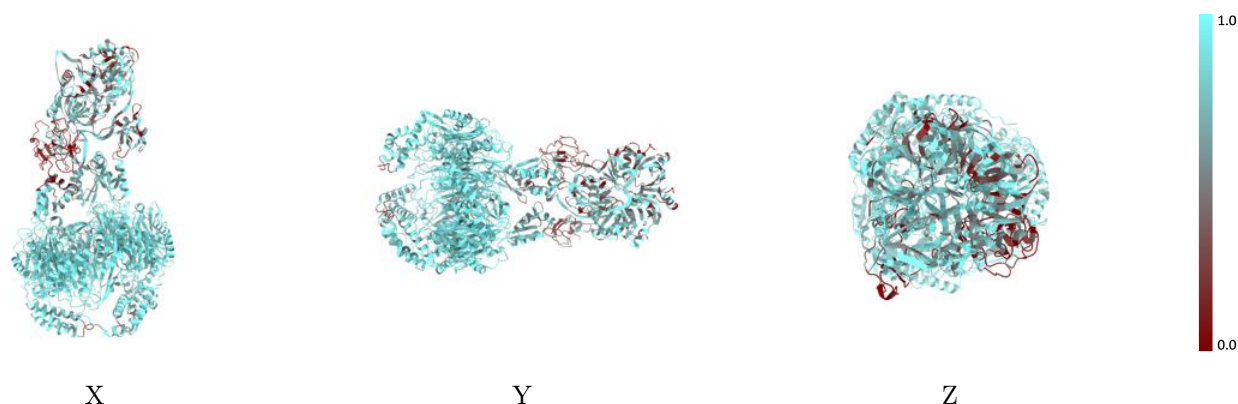
The images above show the 3D surface view of the map at the recommended contour level 0.41 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to 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.

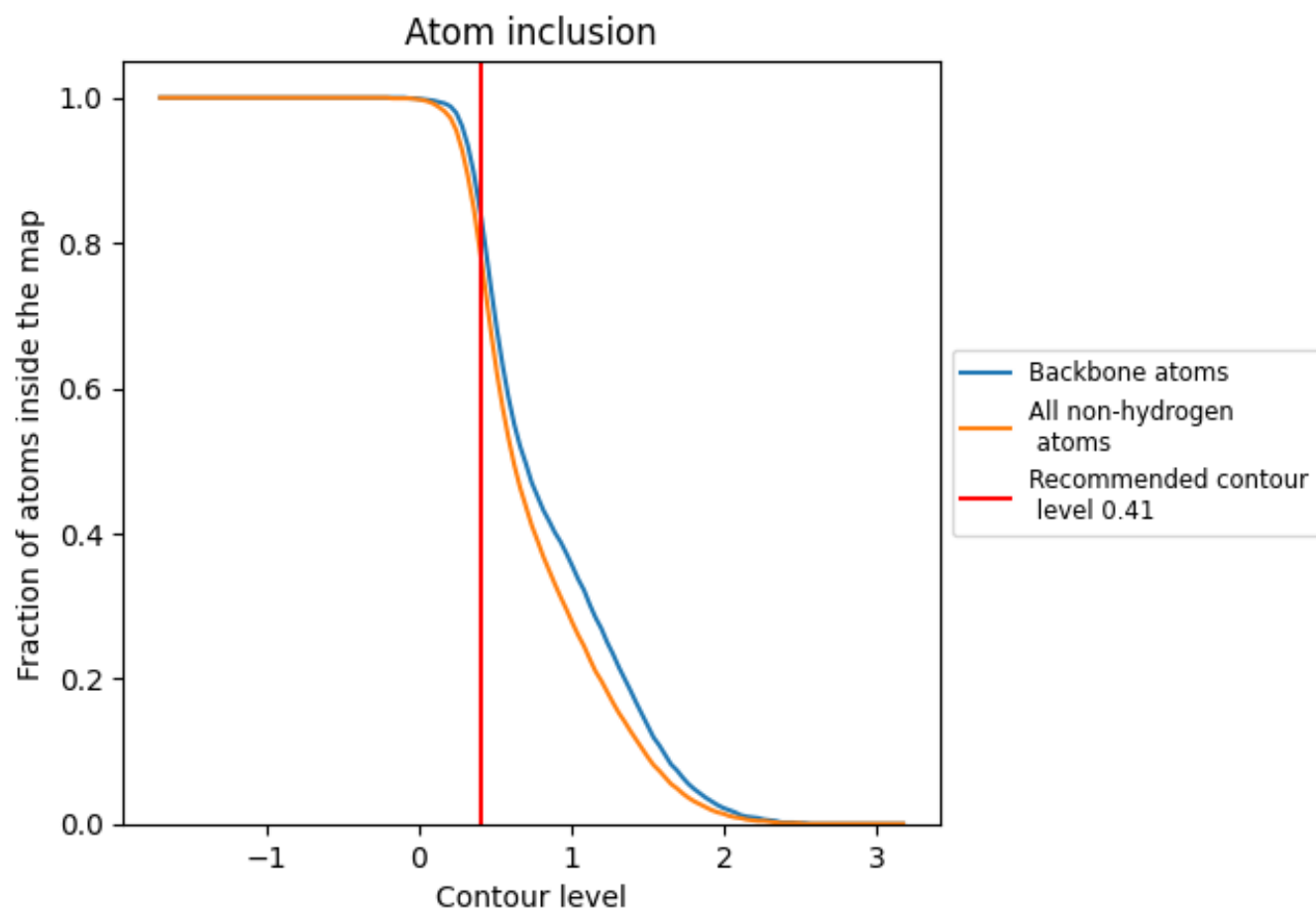
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.41).

























## 9.4 Atom inclusion [i](#)



At the recommended contour level, 83% of all backbone atoms, 77% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.41) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7740	 0.3840
D	 0.6420	 0.2450
E	 0.7030	 0.2840
F	 0.6700	 0.2220
I	 0.5210	 0.1750
J	 0.5470	 0.1710
K	 0.5680	 0.1420
L	 0.8300	 0.4310
N	 0.8010	 0.4210
O	 0.7840	 0.4210
P	 0.7250	 0.2290

