



wwPDB EM Validation Summary Report ⓘ

Mar 23, 2023 – 03:00 PM JST

PDB ID : 7YF0
EMDB ID : EMD-33780
Title : In situ structure of polymerase complex of mammalian reovirus in the core
Authors : Bao, K.Y.; Zhang, X.L.; Li, D.Y.; Zhu, P.
Deposited on : 2022-07-07
Resolution : 3.40 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ 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:

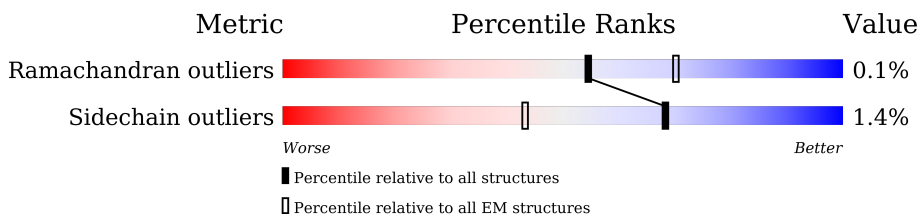
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.32.1

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 3.40 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	1	1275	10% 90%
1	2	1275	10% 90%
1	3	1275	10% 90%
1	4	1275	9% 91%
1	5	1275	10% 90%
1	A	1275	6% 84% 14%
1	B	1275	8% 82% 17%
1	C	1275	9% 82% 16%
1	D	1275	8% 81% 17%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	E	1275	
1	a	1275	
1	b	1275	
1	c	1275	
1	d	1275	
1	e	1275	
2	H	1289	
2	I	1289	
2	J	1289	
2	K	1289	
2	L	1289	
3	R	1267	
4	U	736	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 143441 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 helicase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	1	128	945	560	176	206	3	0	0
1	2	128	945	560	176	206	3	0	0
1	3	127	940	557	175	205	3	0	0
1	4	120	879	521	162	193	3	0	0
1	5	128	945	560	176	206	3	0	0
1	A	1096	8628	5504	1462	1611	51	0	0
1	B	1061	8360	5341	1415	1553	51	0	0
1	C	1066	8409	5374	1422	1562	51	0	0
1	D	1054	8327	5321	1408	1549	49	0	0
1	E	1061	8385	5356	1420	1560	49	0	0
1	a	1077	8496	5430	1443	1572	51	0	0
1	b	1074	8470	5413	1437	1569	51	0	0
1	c	1077	8499	5432	1443	1573	51	0	0
1	d	1084	8547	5458	1451	1587	51	0	0
1	e	1084	8547	5458	1451	1587	51	0	0

- Molecule 2 is a protein called Lambda-2 protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	1023	Total	C	N	O	S	0	0
			8069	5148	1374	1518	29		
2	I	1023	Total	C	N	O	S	0	0
			8069	5148	1374	1518	29		
2	J	1023	Total	C	N	O	S	0	0
			8069	5148	1374	1518	29		
2	K	1023	Total	C	N	O	S	0	0
			8069	5148	1374	1518	29		
2	L	1023	Total	C	N	O	S	0	0
			8069	5148	1374	1518	29		

- Molecule 3 is a protein called RNA-directed RNA polymerase.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	R	1065	Total	C	N	O	S	0	0
			8455	5405	1434	1556	60		

- Molecule 4 is a protein called Mu-2 protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	U	665	Total	C	N	O	S	0	0
			5312	3408	904	970	30		

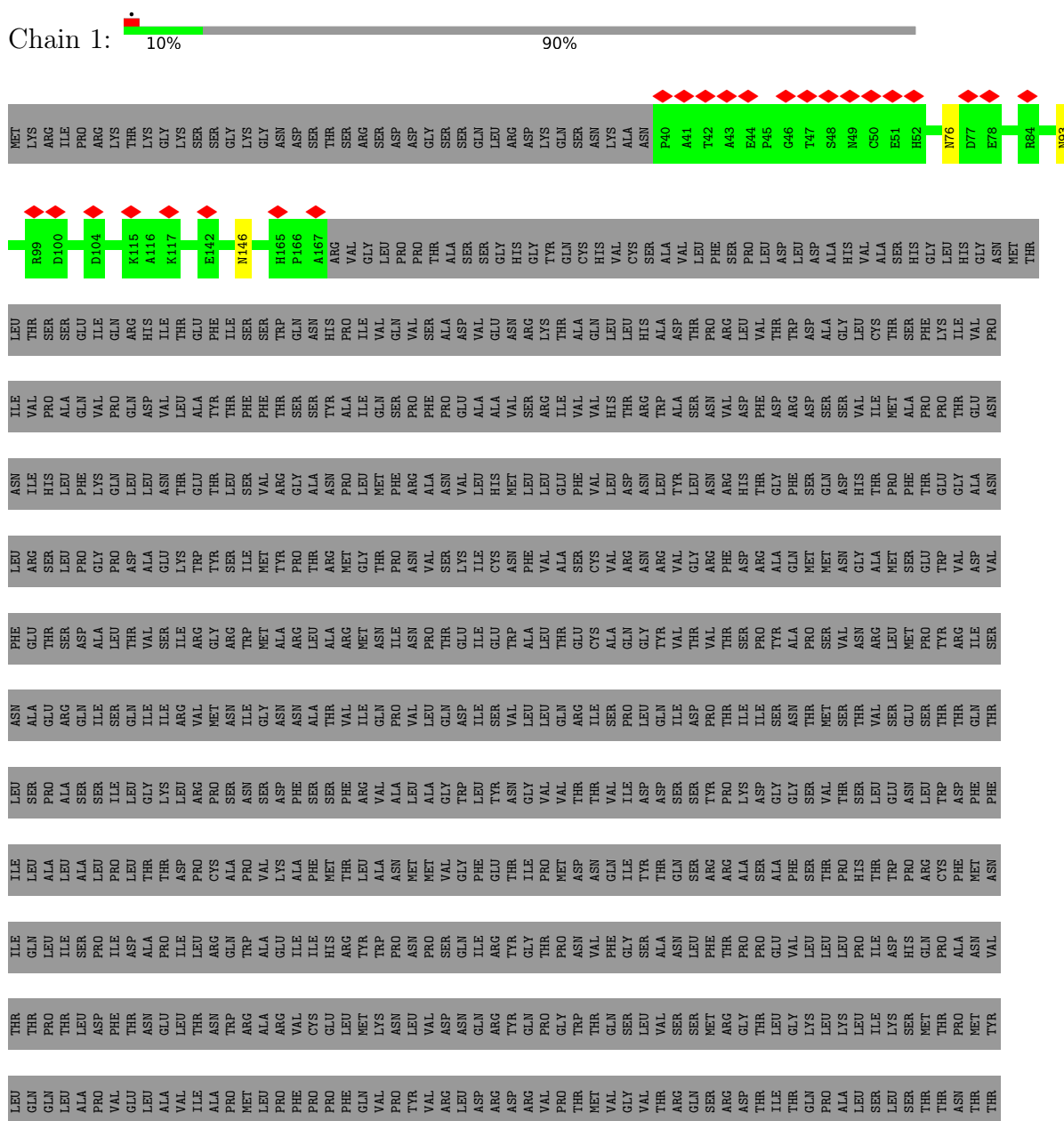
- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

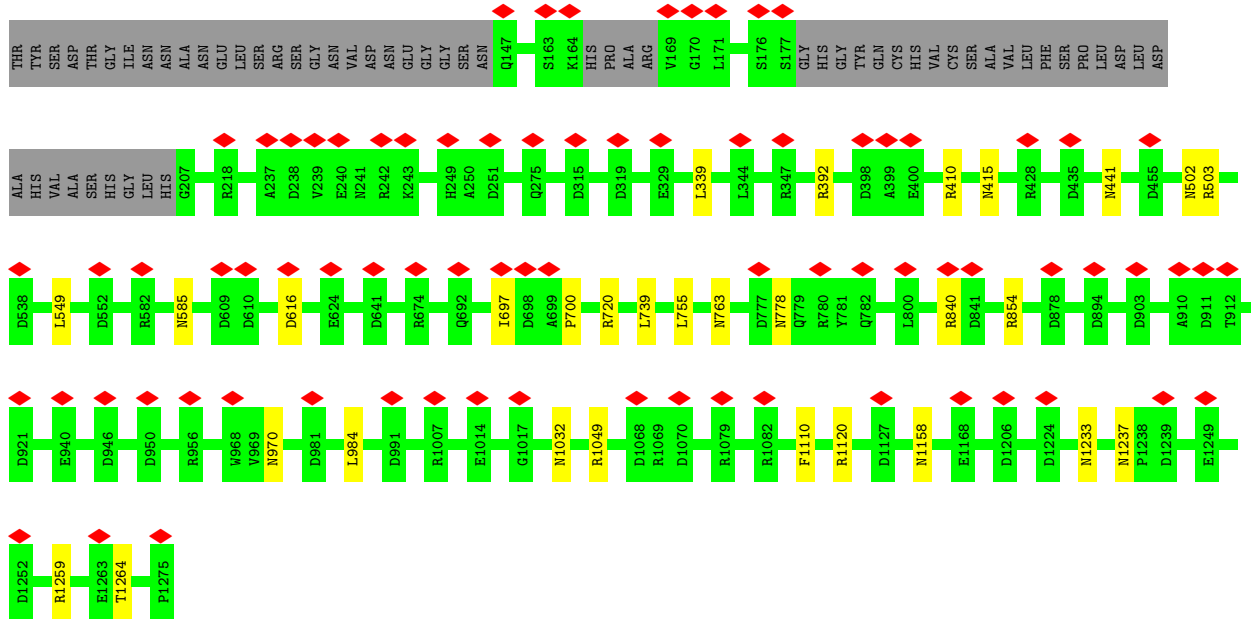
Mol	Chain	Residues	Atoms		AltConf
5	B	1	Total	Zn	0
			1	1	
5	C	1	Total	Zn	0
			1	1	
5	a	1	Total	Zn	0
			1	1	
5	b	1	Total	Zn	0
			1	1	
5	c	1	Total	Zn	0
			1	1	
5	d	1	Total	Zn	0
			1	1	
5	e	1	Total	Zn	0
			1	1	

3 Residue-property plots [i](#)

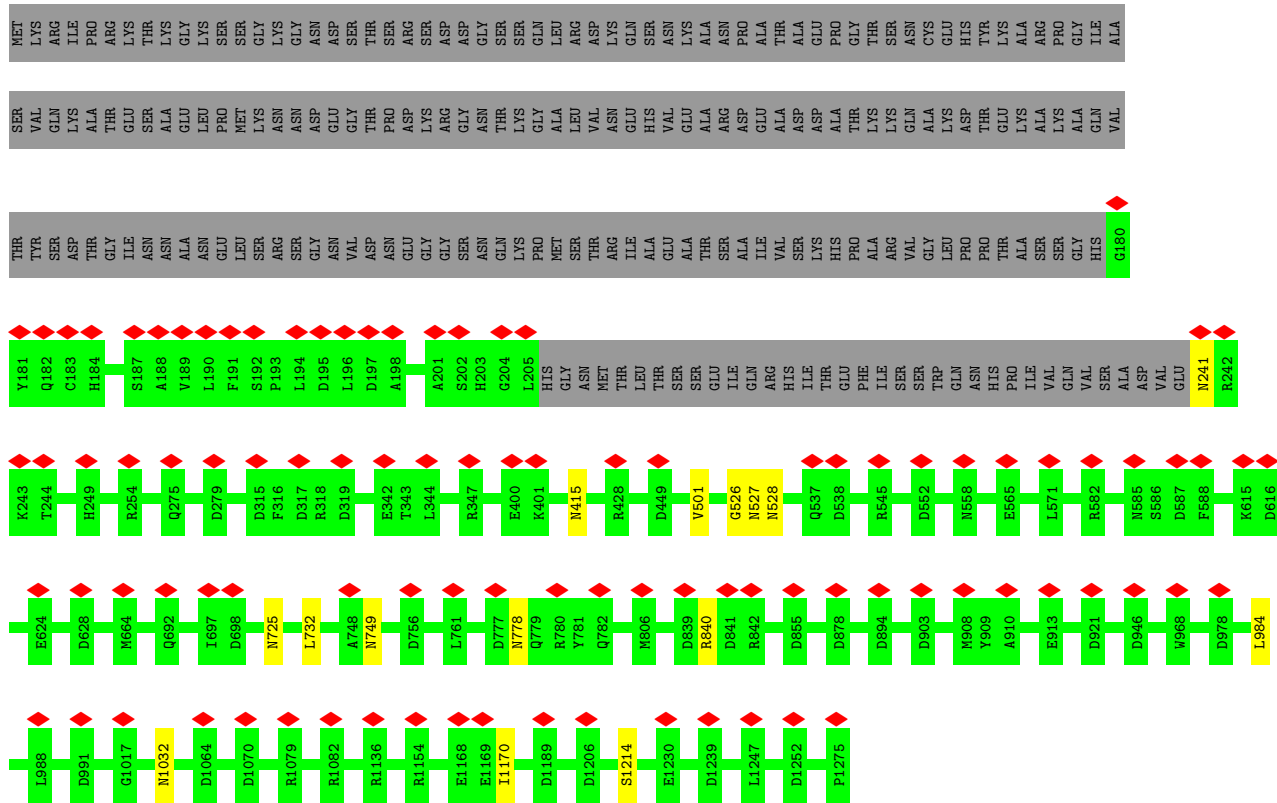
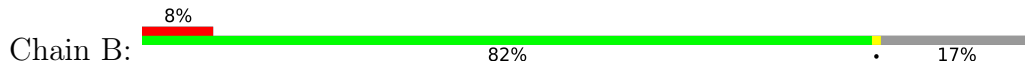
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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 helicase

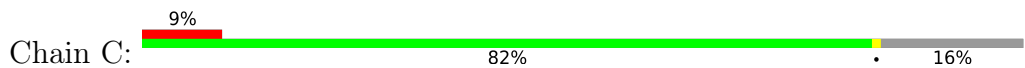


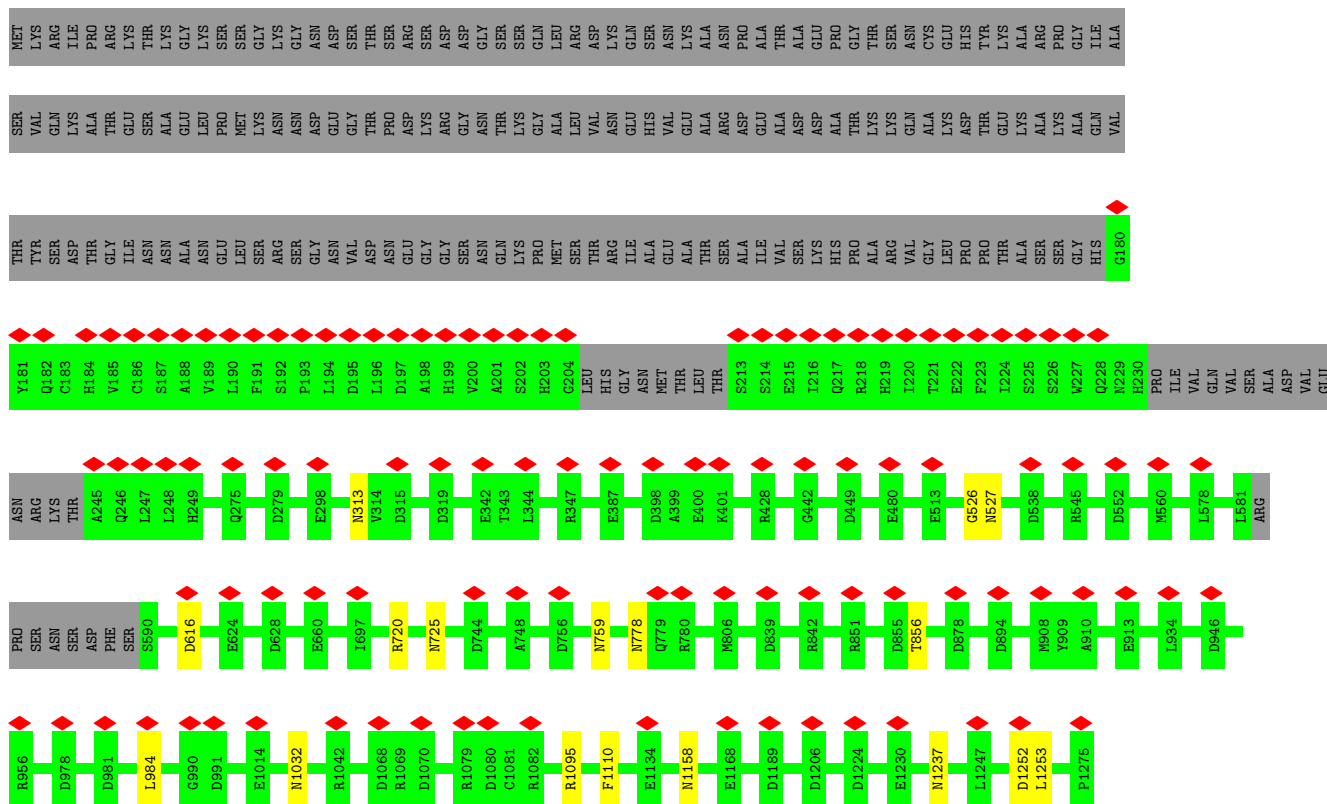


● Molecule 1: RNA helicase

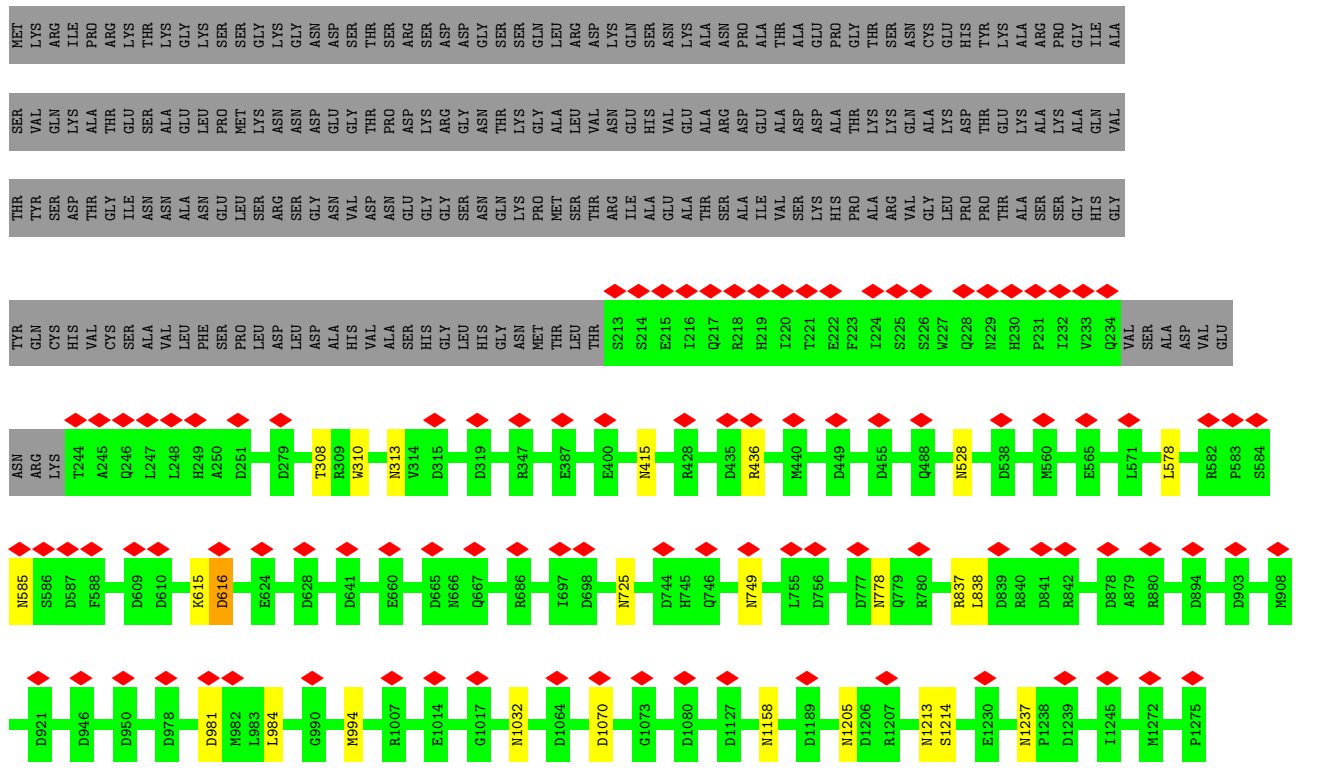
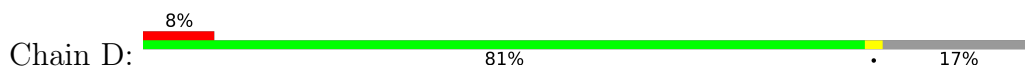


● Molecule 1: RNA helicase

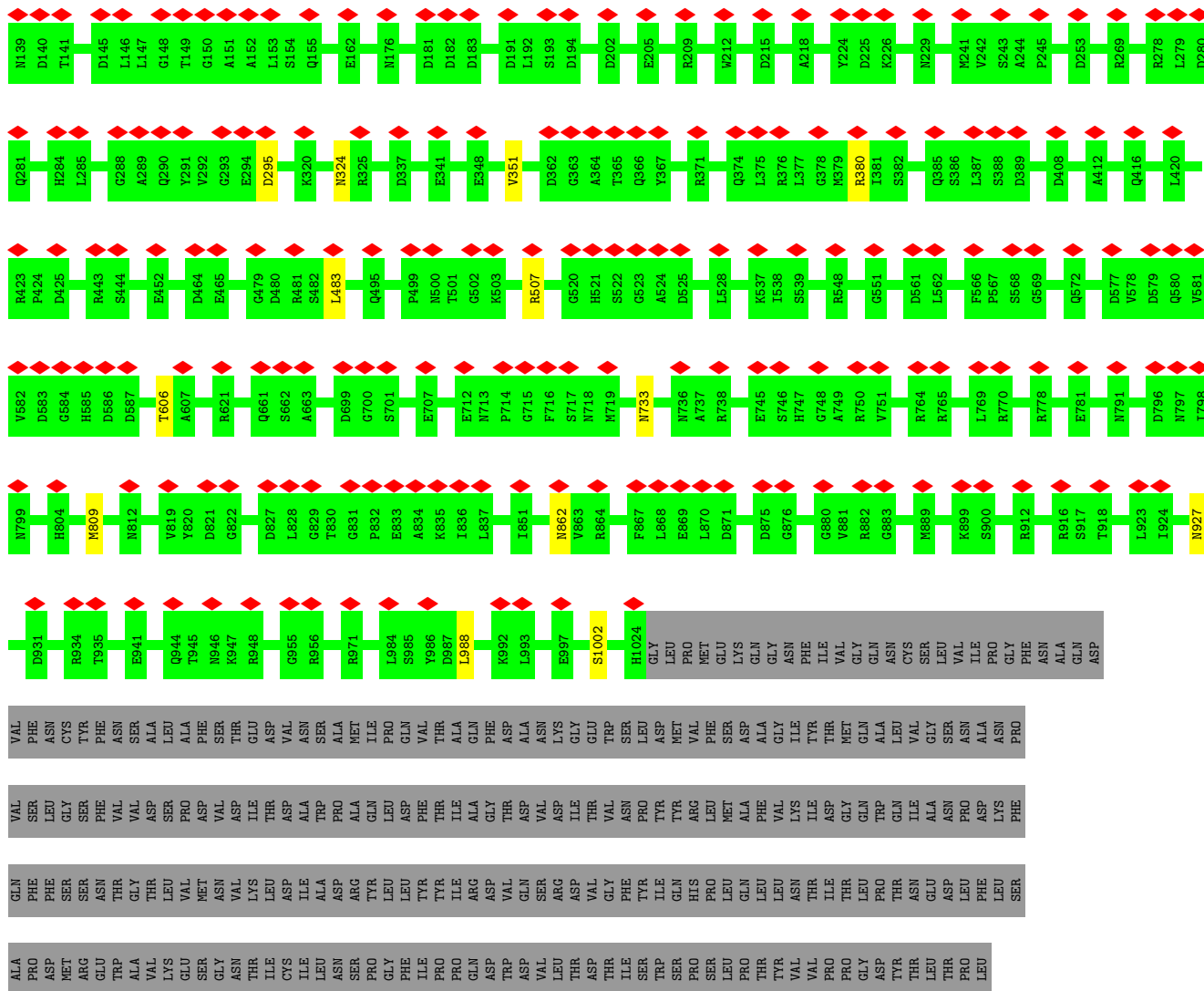




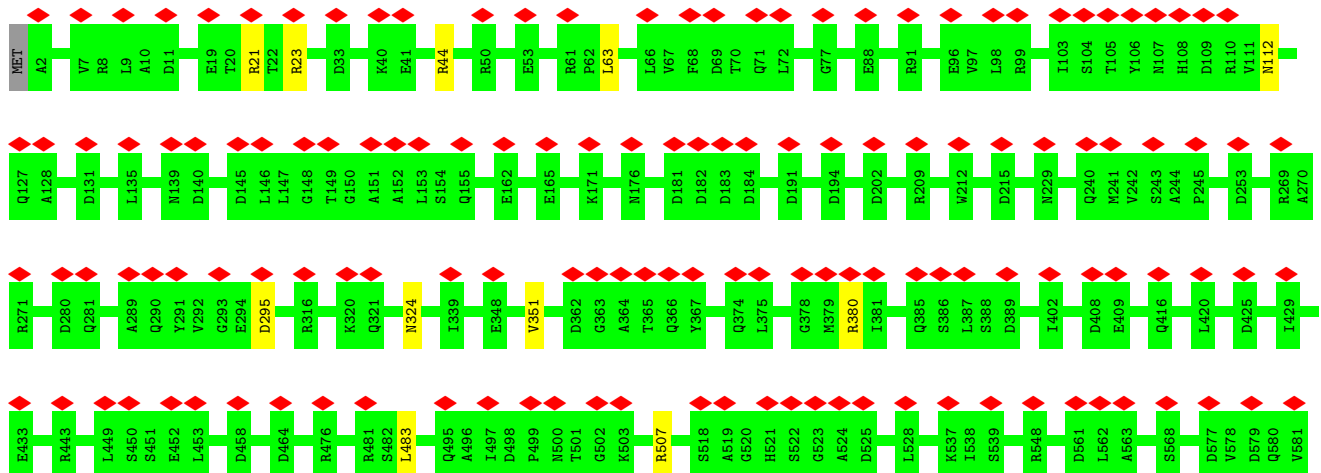
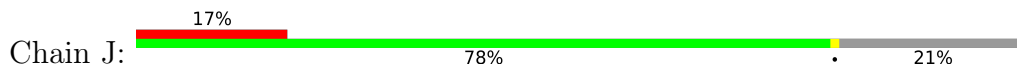
• Molecule 1: RNA helicase

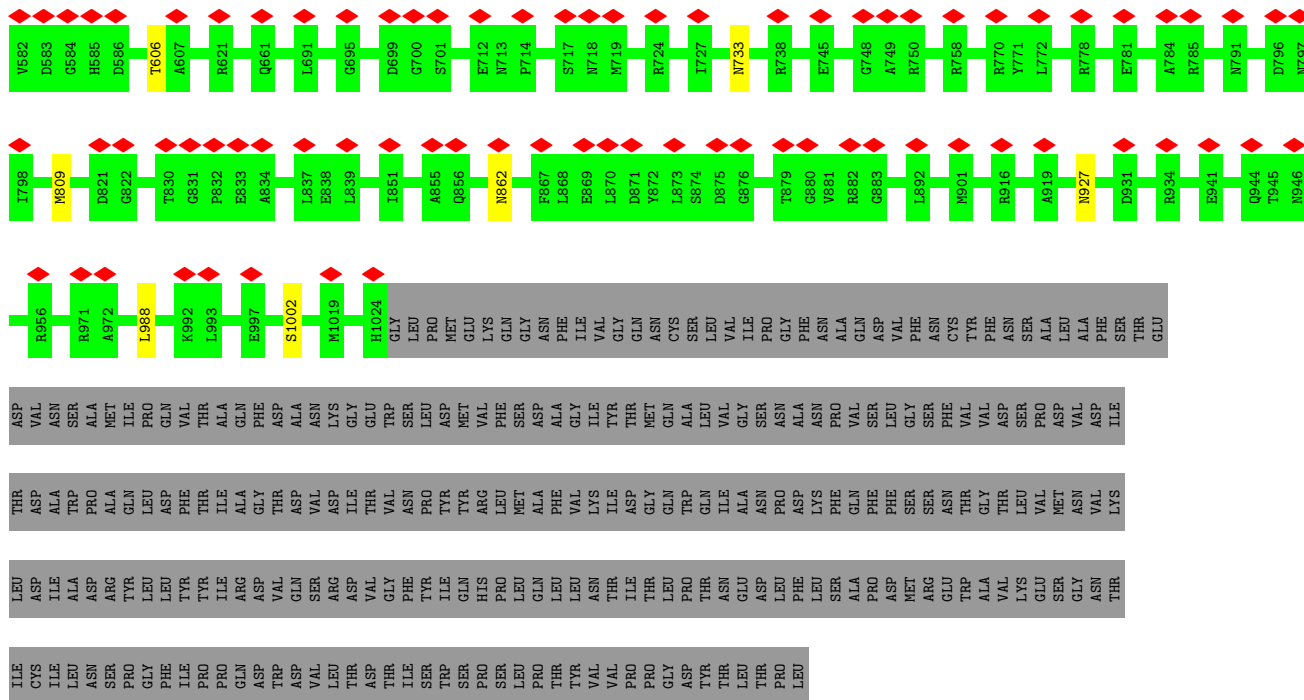


• Molecule 1: RNA helicase

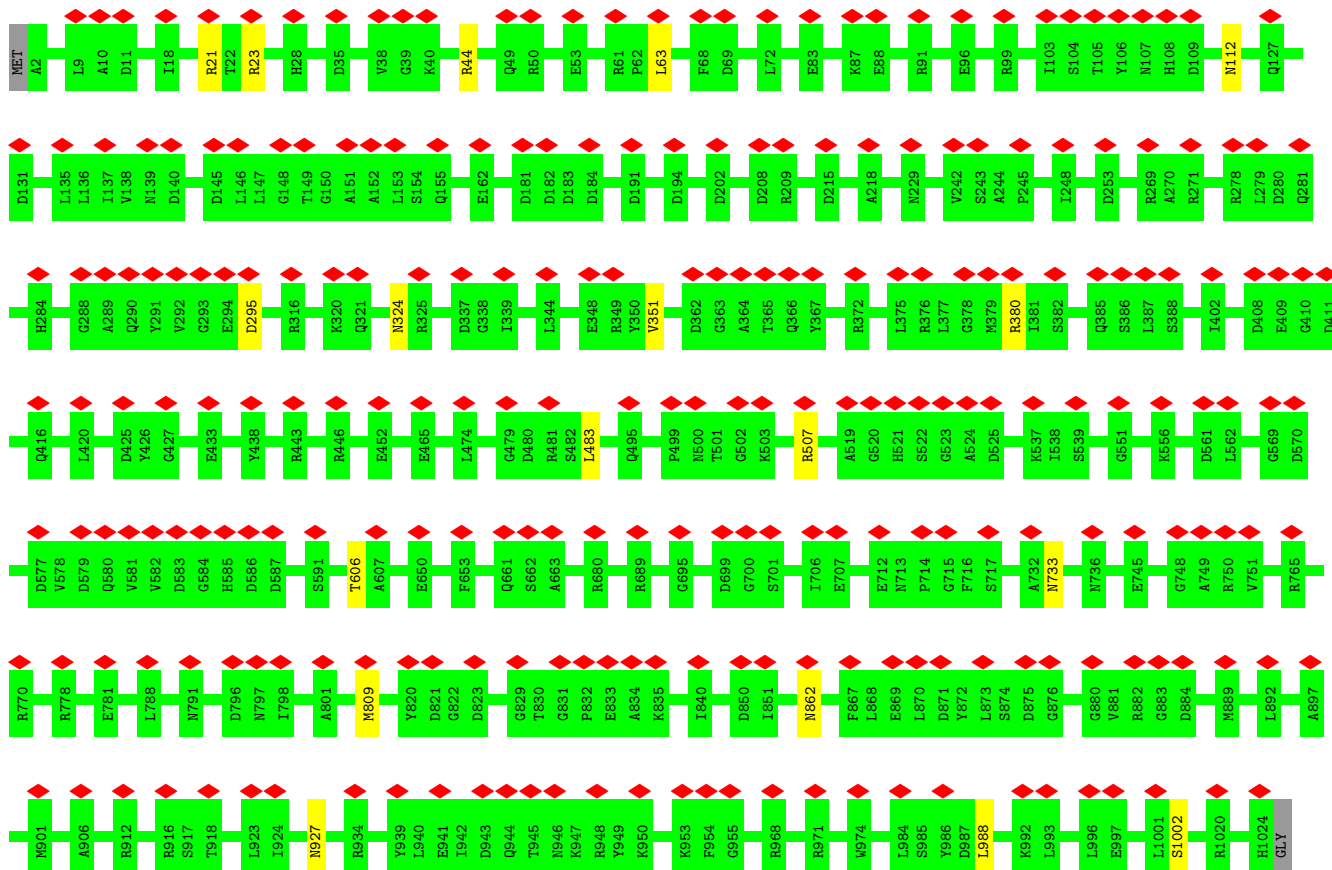
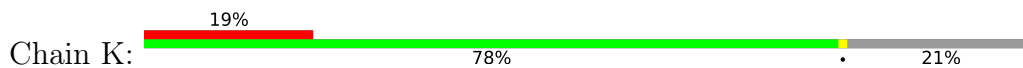


• Molecule 2: Lambda-2 protein

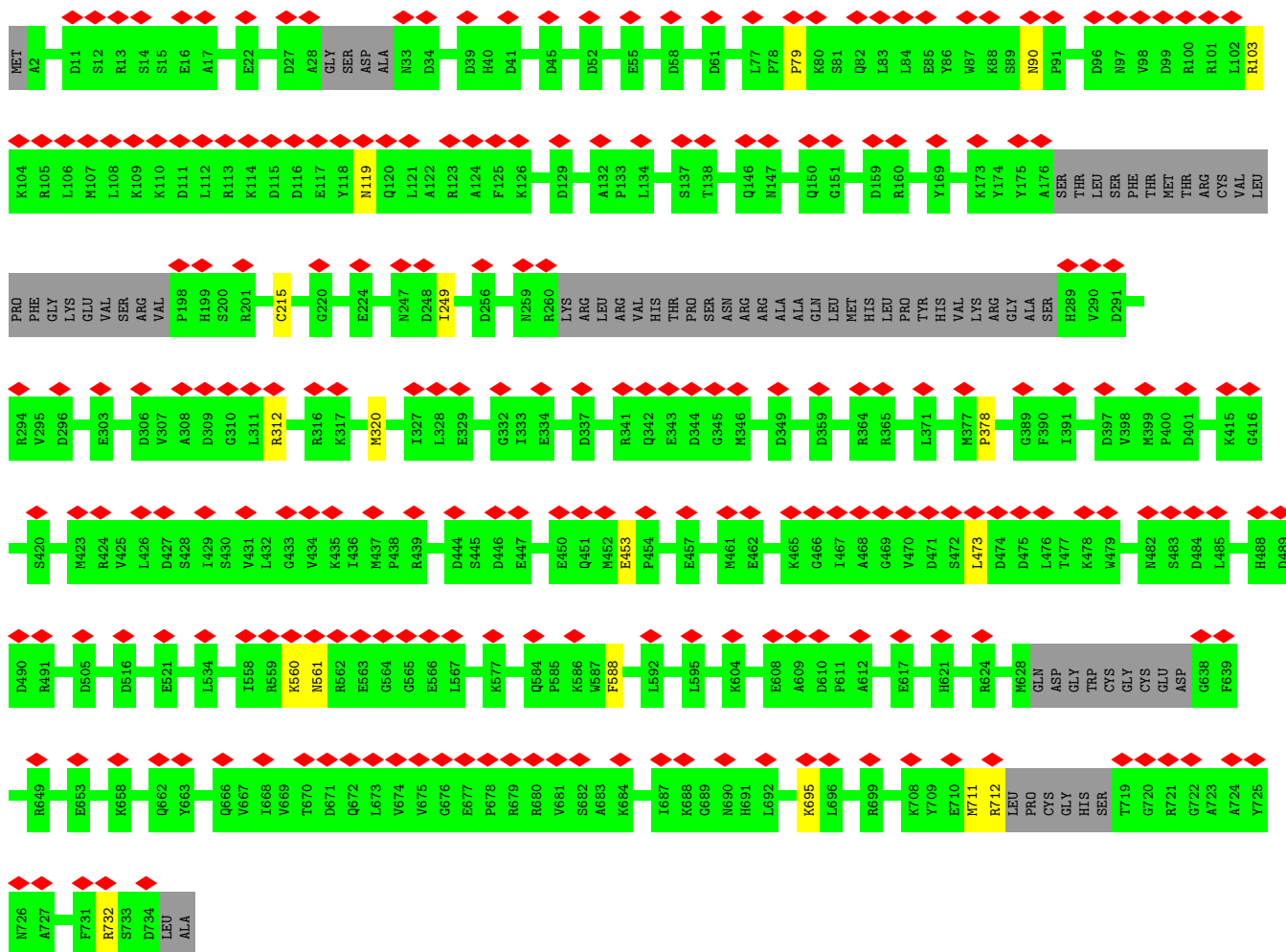
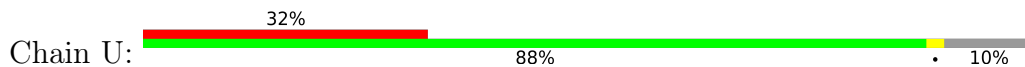




• Molecule 2: Lambda-2 protein



• Molecule 4: Mu-2 protein



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	62584	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 ($e^-/\text{\AA}^2$)	30	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.764	Depositor
Minimum map value	-0.940	Depositor
Average map value	0.021	Depositor
Map value standard deviation	0.128	Depositor
Recommended contour level	0.5	Depositor
Map size (Å)	435.2, 435.2, 435.2	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.36, 1.36, 1.36	Depositor

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section:
ZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	1	0.34	0/956	0.54	0/1290
1	2	0.34	0/956	0.56	0/1290
1	3	0.33	0/951	0.53	0/1283
1	4	0.32	0/888	0.54	0/1196
1	5	0.33	0/956	0.58	0/1290
1	A	0.38	0/8856	0.61	7/12127 (0.1%)
1	B	0.37	0/8586	0.60	2/11761 (0.0%)
1	C	0.37	0/8636	0.61	3/11827 (0.0%)
1	D	0.38	0/8553	0.61	7/11717 (0.1%)
1	E	0.38	0/8612	0.60	3/11798 (0.0%)
1	a	0.36	0/8727	0.59	2/11954 (0.0%)
1	b	0.37	0/8701	0.60	4/11919 (0.0%)
1	c	0.37	0/8730	0.61	5/11959 (0.0%)
1	d	0.37	0/8779	0.61	4/12027 (0.0%)
1	e	0.38	0/8779	0.60	2/12027 (0.0%)
2	H	0.31	0/8271	0.58	4/11279 (0.0%)
2	I	0.31	0/8271	0.58	4/11279 (0.0%)
2	J	0.31	0/8271	0.58	4/11279 (0.0%)
2	K	0.31	0/8271	0.58	4/11279 (0.0%)
2	L	0.31	0/8271	0.58	4/11279 (0.0%)
3	R	0.36	0/8672	0.61	6/11770 (0.1%)
4	U	0.34	0/5428	0.62	2/7364 (0.0%)
All	All	0.35	0/147121	0.60	67/200994 (0.0%)

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
1	5	0	2

Continued on next page...

Continued from previous page...

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	2
1	C	0	2
1	D	0	2
1	E	0	2
1	a	0	2
1	b	0	2
1	c	0	1
1	d	0	3
1	e	0	3
2	H	0	2
2	I	0	2
2	J	0	2
2	K	0	2
2	L	0	2
4	U	0	3
All	All	0	37

There are no bond length outliers.

The worst 5 of 67 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1170	ILE	C-N-CA	10.07	146.88	121.70
3	R	203	ASP	CB-CG-OD1	9.26	126.63	118.30
1	D	1070	ASP	CB-CG-OD1	9.15	126.53	118.30
1	C	616	ASP	CB-CG-OD1	8.25	125.72	118.30
1	A	739	LEU	CA-CB-CG	7.70	133.01	115.30

There are no chirality outliers.

5 of 37 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	5	54	LYS	Peptide
1	5	55	ALA	Peptide
1	A	1110	PHE	Peptide
1	A	697	ILE	Peptide
1	A	700	PRO	Peptide

5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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	1	126/1275 (10%)	114 (90%)	12 (10%)	0	100	100
1	2	126/1275 (10%)	116 (92%)	10 (8%)	0	100	100
1	3	125/1275 (10%)	115 (92%)	10 (8%)	0	100	100
1	4	116/1275 (9%)	108 (93%)	8 (7%)	0	100	100
1	5	126/1275 (10%)	110 (87%)	14 (11%)	2 (2%)	9	34
1	A	1090/1275 (86%)	1024 (94%)	65 (6%)	1 (0%)	51	82
1	B	1057/1275 (83%)	989 (94%)	65 (6%)	3 (0%)	41	72
1	C	1058/1275 (83%)	986 (93%)	70 (7%)	2 (0%)	47	78
1	D	1050/1275 (82%)	986 (94%)	61 (6%)	3 (0%)	41	72
1	E	1059/1275 (83%)	992 (94%)	67 (6%)	0	100	100
1	a	1071/1275 (84%)	999 (93%)	72 (7%)	0	100	100
1	b	1068/1275 (84%)	991 (93%)	76 (7%)	1 (0%)	51	82
1	c	1071/1275 (84%)	987 (92%)	83 (8%)	1 (0%)	51	82
1	d	1080/1275 (85%)	1000 (93%)	79 (7%)	1 (0%)	51	82
1	e	1080/1275 (85%)	997 (92%)	81 (8%)	2 (0%)	47	78
2	H	1021/1289 (79%)	949 (93%)	72 (7%)	0	100	100
2	I	1021/1289 (79%)	949 (93%)	72 (7%)	0	100	100
2	J	1021/1289 (79%)	949 (93%)	72 (7%)	0	100	100
2	K	1021/1289 (79%)	949 (93%)	72 (7%)	0	100	100
2	L	1021/1289 (79%)	948 (93%)	73 (7%)	0	100	100
3	R	1049/1267 (83%)	988 (94%)	61 (6%)	0	100	100
4	U	653/736 (89%)	599 (92%)	51 (8%)	3 (0%)	29	61
All	All	18110/27573 (66%)	16845 (93%)	1246 (7%)	19 (0%)	54	82

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	1214	SER
1	D	310	TRP
1	D	1214	SER
1	c	310	TRP
1	e	310	TRP

5.3.2 Protein sidechains [i](#)

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	1	101/1113 (9%)	98 (97%)	3 (3%)	41	68
1	2	101/1113 (9%)	97 (96%)	4 (4%)	31	60
1	3	101/1113 (9%)	99 (98%)	2 (2%)	55	77
1	4	94/1113 (8%)	90 (96%)	4 (4%)	29	59
1	5	101/1113 (9%)	98 (97%)	3 (3%)	41	68
1	A	969/1113 (87%)	949 (98%)	20 (2%)	53	76
1	B	936/1113 (84%)	928 (99%)	8 (1%)	78	90
1	C	941/1113 (84%)	931 (99%)	10 (1%)	73	86
1	D	934/1113 (84%)	920 (98%)	14 (2%)	65	82
1	E	940/1113 (84%)	929 (99%)	11 (1%)	71	85
1	a	951/1113 (85%)	940 (99%)	11 (1%)	71	85
1	b	948/1113 (85%)	937 (99%)	11 (1%)	71	85
1	c	952/1113 (86%)	938 (98%)	14 (2%)	65	82
1	d	958/1113 (86%)	948 (99%)	10 (1%)	76	88
1	e	958/1113 (86%)	941 (98%)	17 (2%)	59	79
2	H	884/1118 (79%)	872 (99%)	12 (1%)	67	83
2	I	884/1118 (79%)	872 (99%)	12 (1%)	67	83
2	J	884/1118 (79%)	872 (99%)	12 (1%)	67	83
2	K	884/1118 (79%)	872 (99%)	12 (1%)	67	83
2	L	884/1118 (79%)	872 (99%)	12 (1%)	67	83

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	R	921/1084 (85%)	906 (98%)	15 (2%)	62	81
4	U	590/650 (91%)	580 (98%)	10 (2%)	60	80
All	All	15916/24019 (66%)	15689 (99%)	227 (1%)	68	83

5 of 227 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	K	21	ARG
1	e	763	ASN
3	R	423	ARG
1	e	686	ARG
1	c	1154	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 235 such sidechains are listed below:

Mol	Chain	Res	Type
2	J	240	GLN
1	e	524	ASN
3	R	580	GLN
1	e	357	ASN
1	c	1075	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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](#)

Of 7 ligands modelled in this entry, 7 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

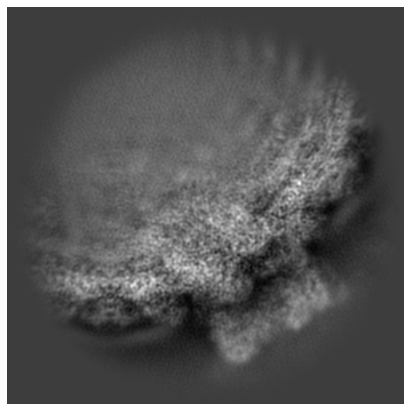
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-33780. These allow visual inspection of the internal detail of the map and identification of artifacts.

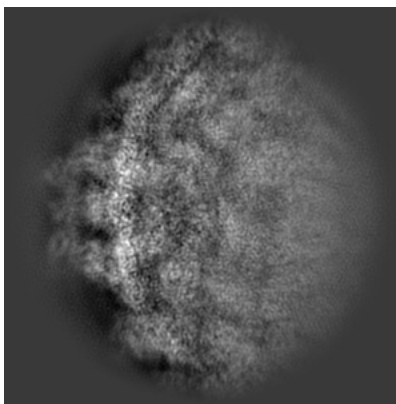
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

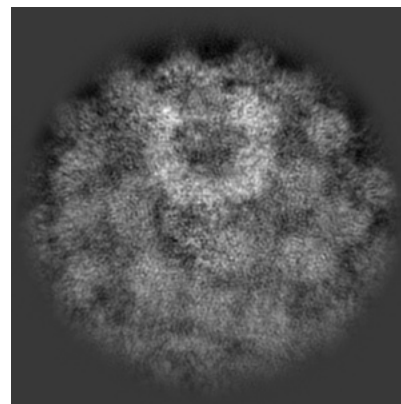
6.1.1 Primary map



X

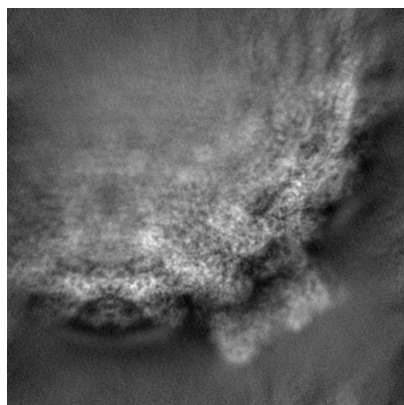


Y

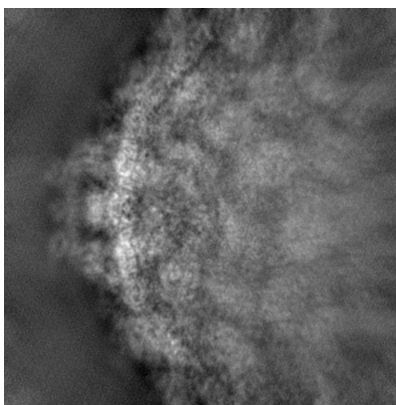


Z

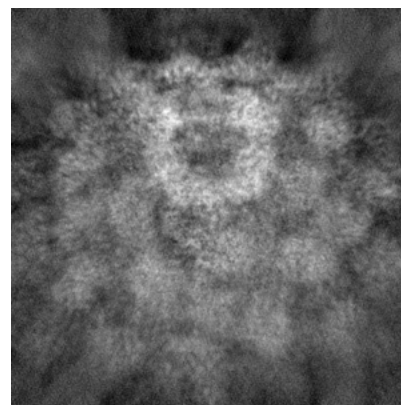
6.1.2 Raw map



X



Y

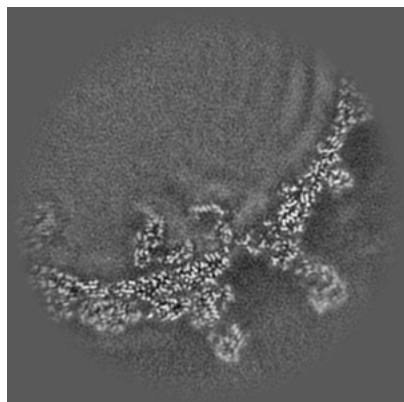


Z

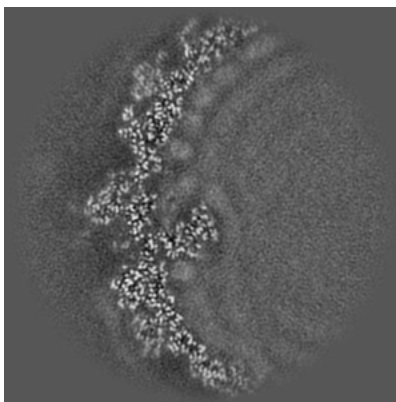
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

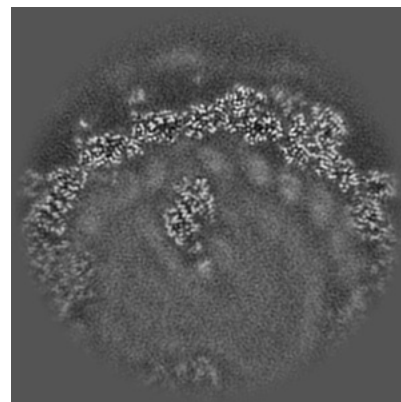
6.2.1 Primary map



X Index: 160

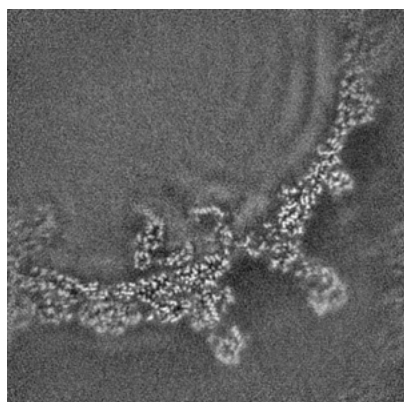


Y Index: 160

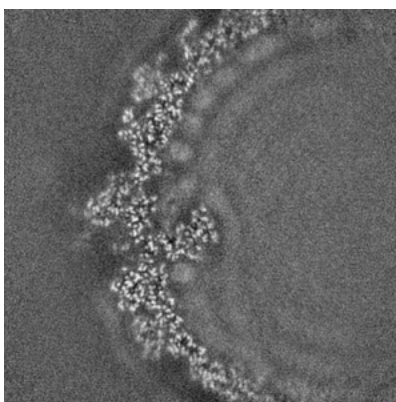


Z Index: 160

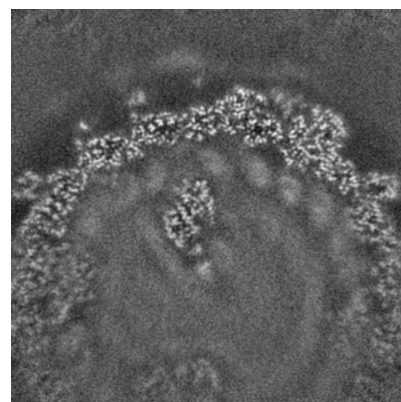
6.2.2 Raw map



X Index: 160



Y Index: 160

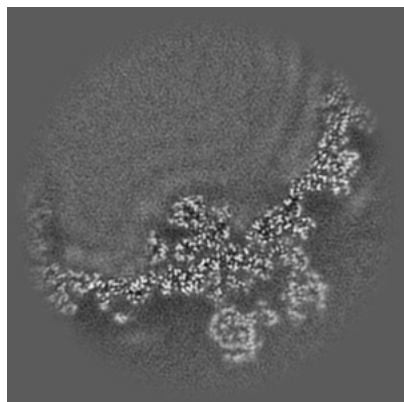


Z Index: 160

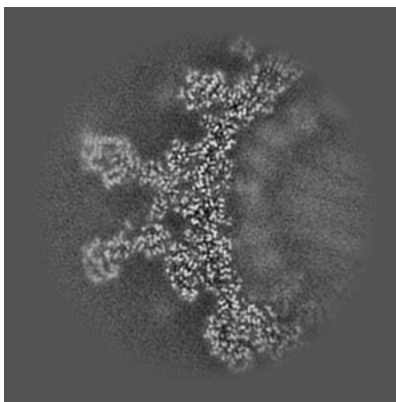
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

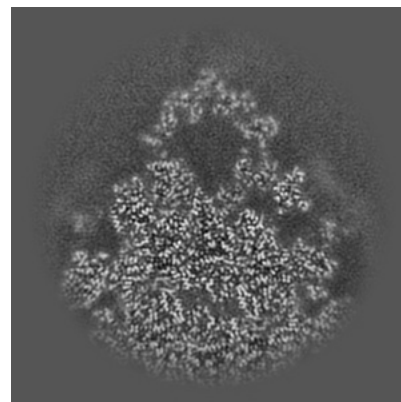
6.3.1 Primary map



X Index: 131

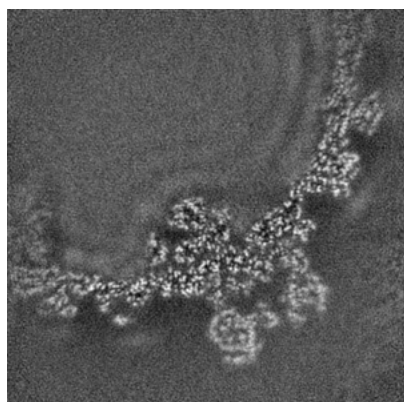


Y Index: 228

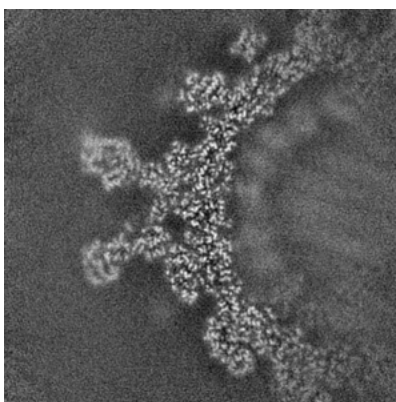


Z Index: 99

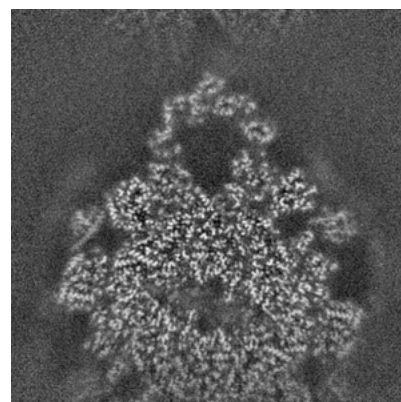
6.3.2 Raw map



X Index: 131



Y Index: 228

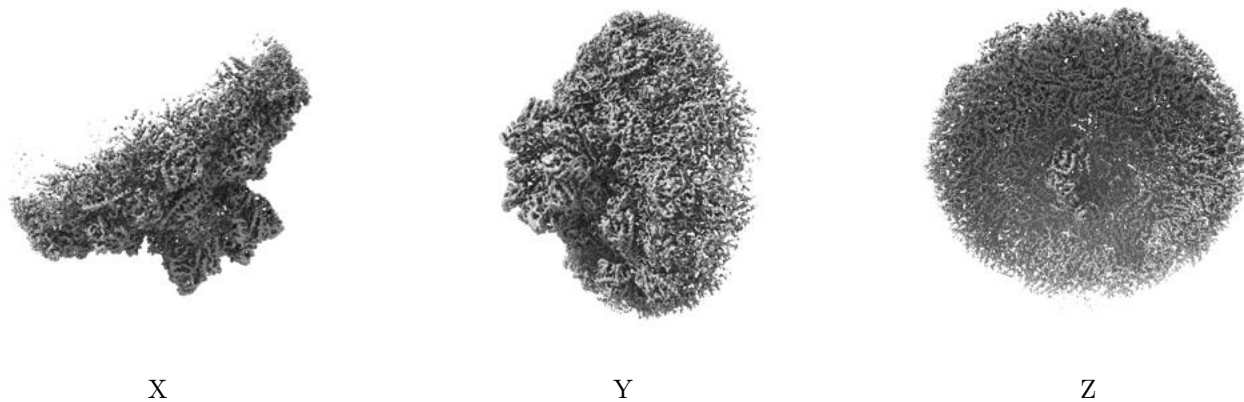


Z Index: 102

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

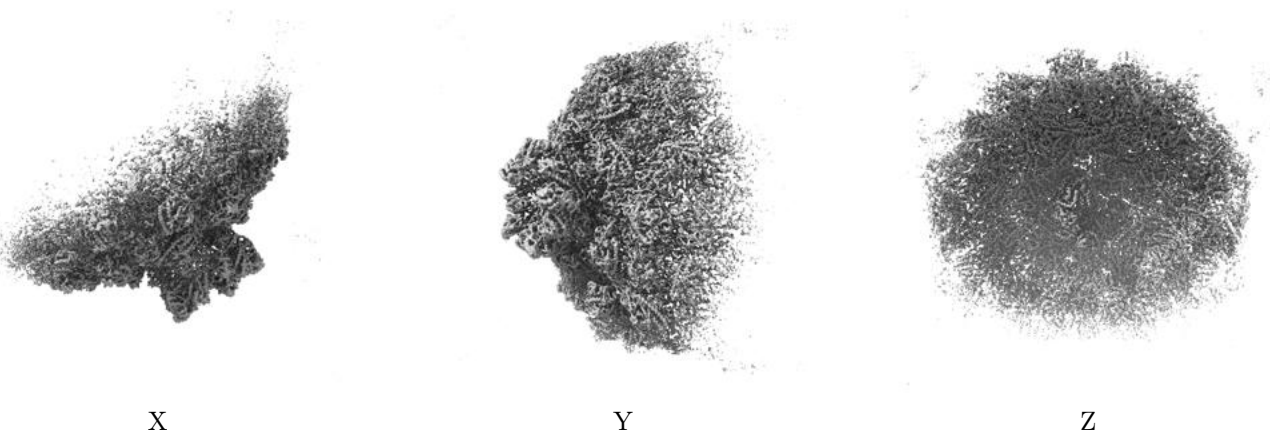
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

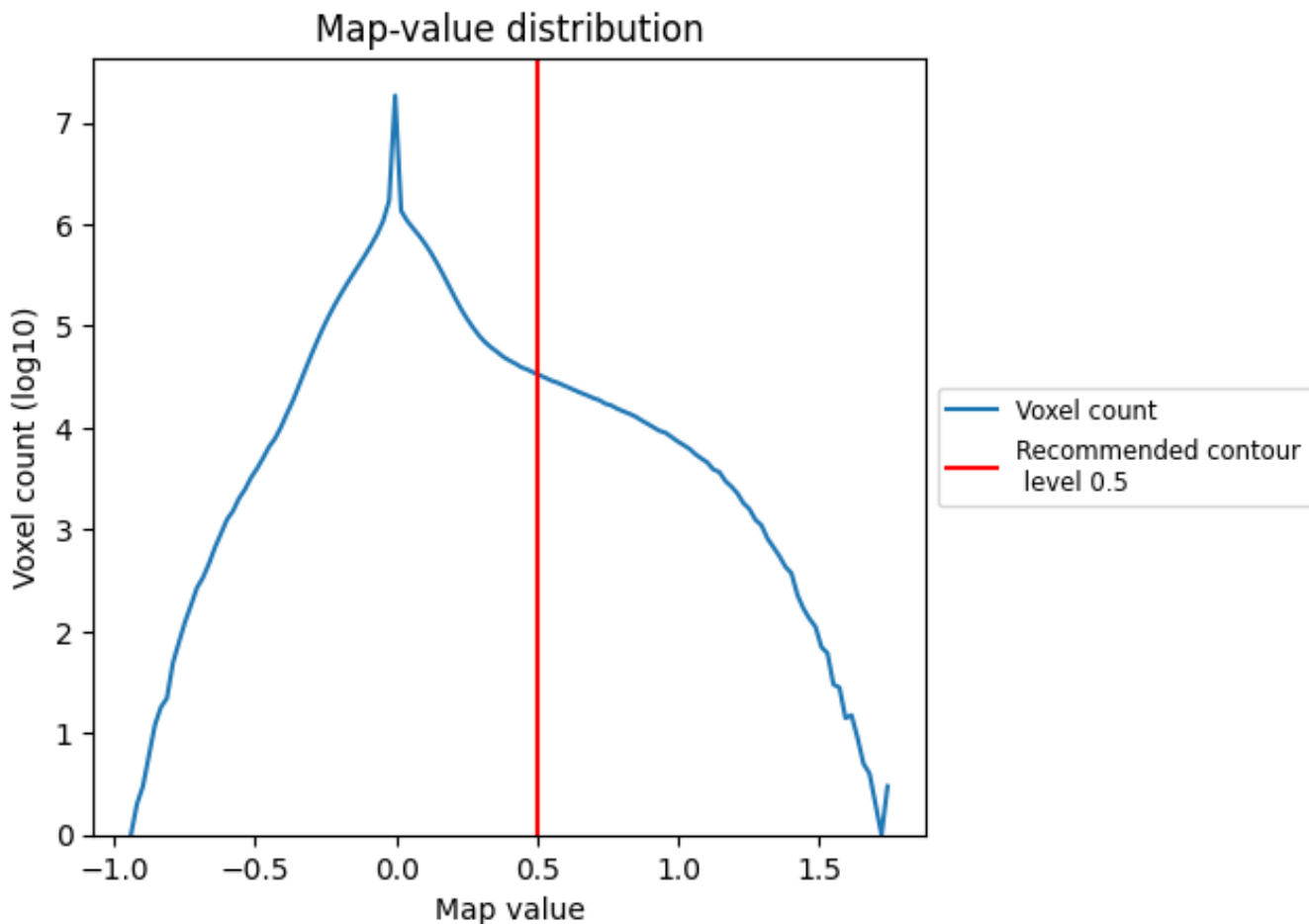
6.5 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

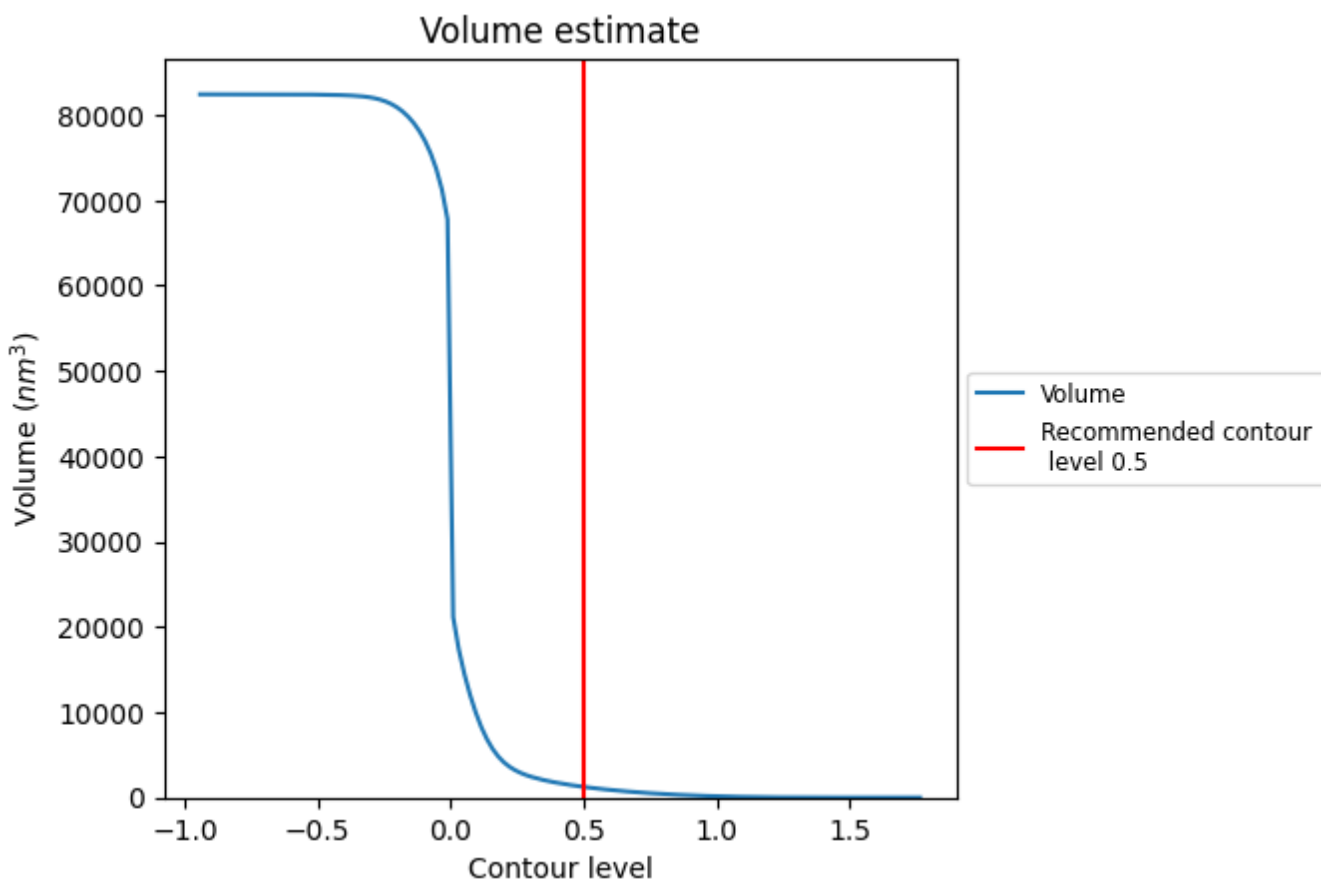
This section contains the results of statistical analysis of the map.

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.

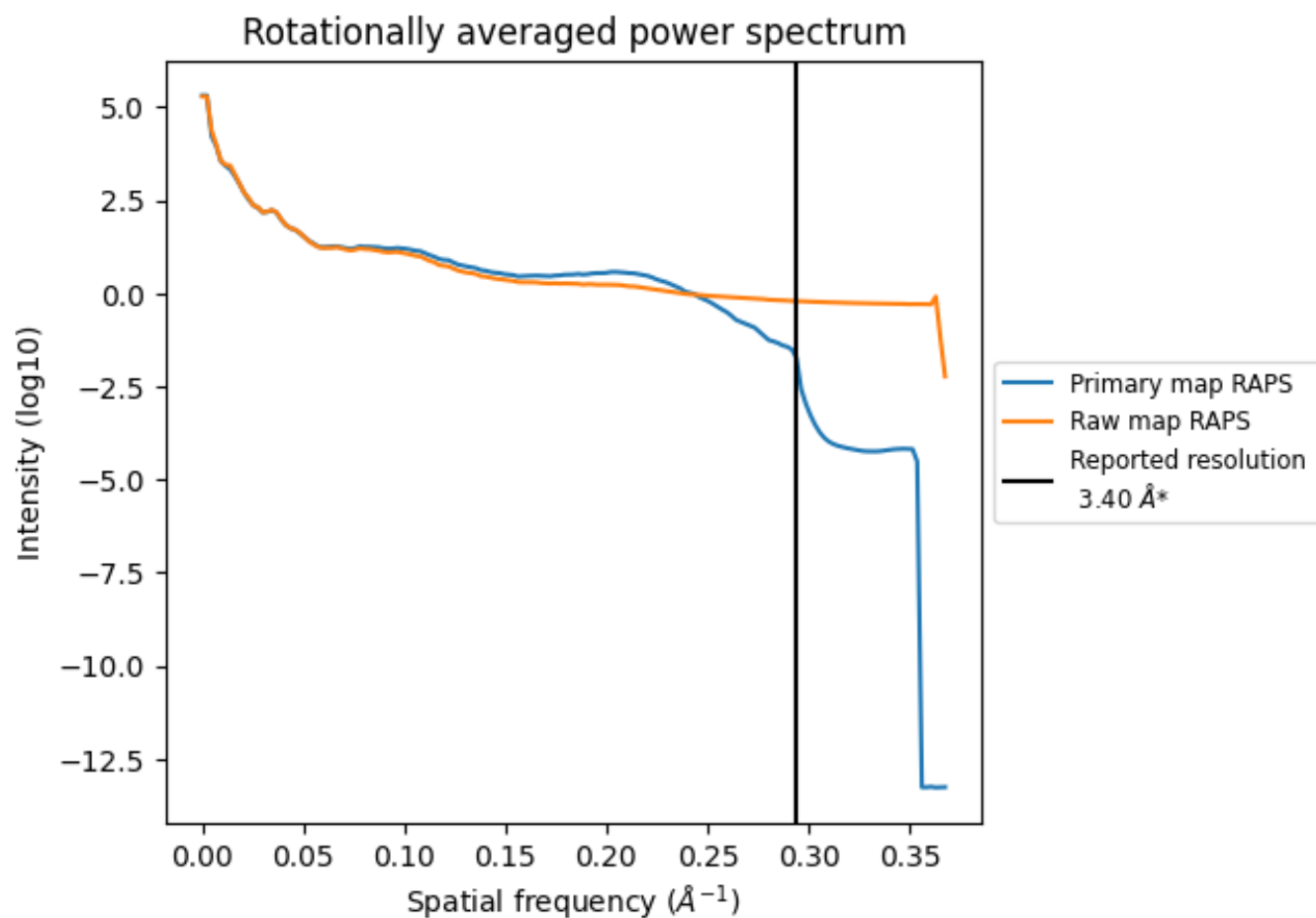
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1254 nm³; this corresponds to an approximate mass of 1133 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](#)

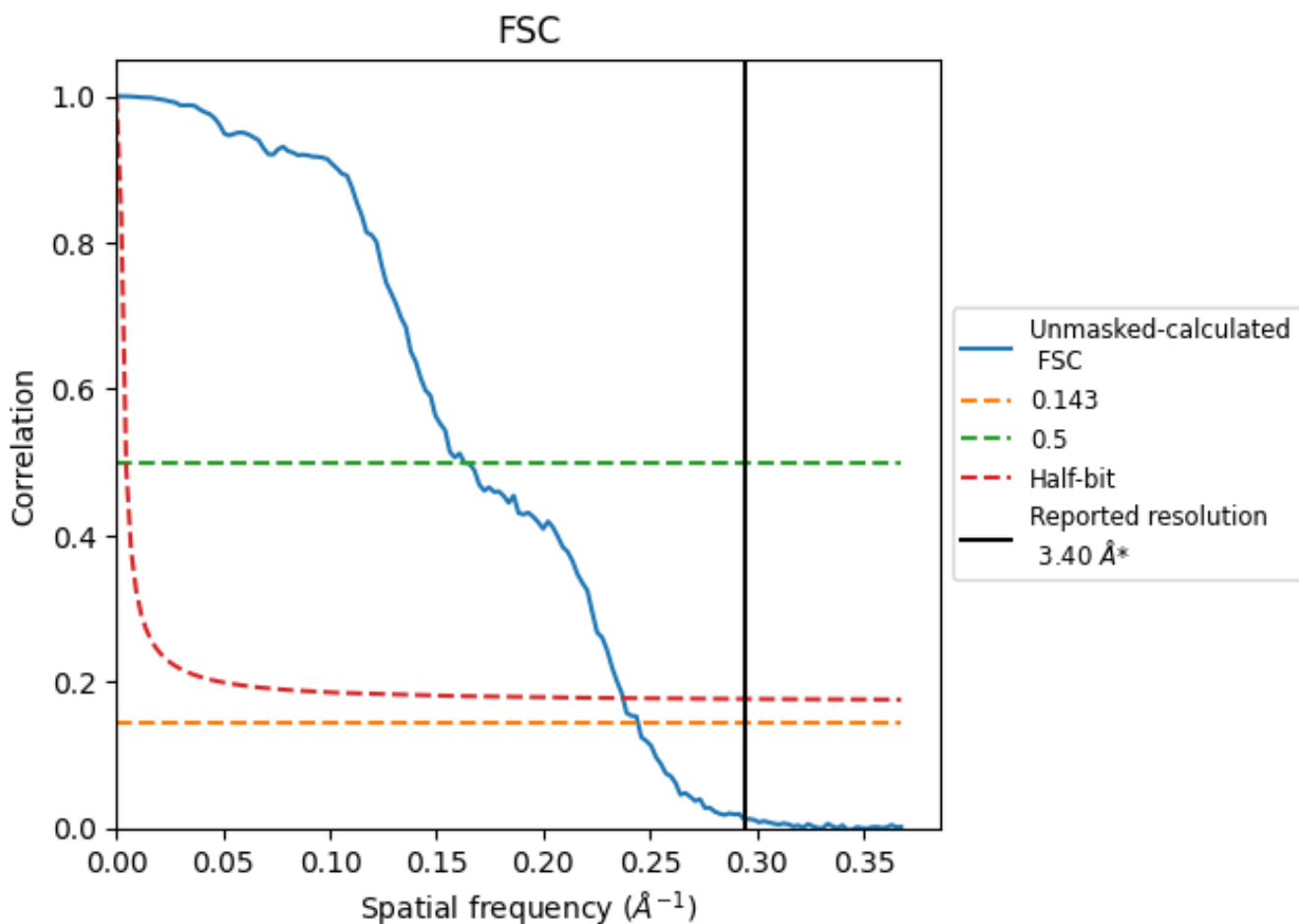


*Reported resolution corresponds to spatial frequency of 0.294 \AA^{-1}

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 0.294 Å⁻¹

8.2 Resolution estimates [i](#)

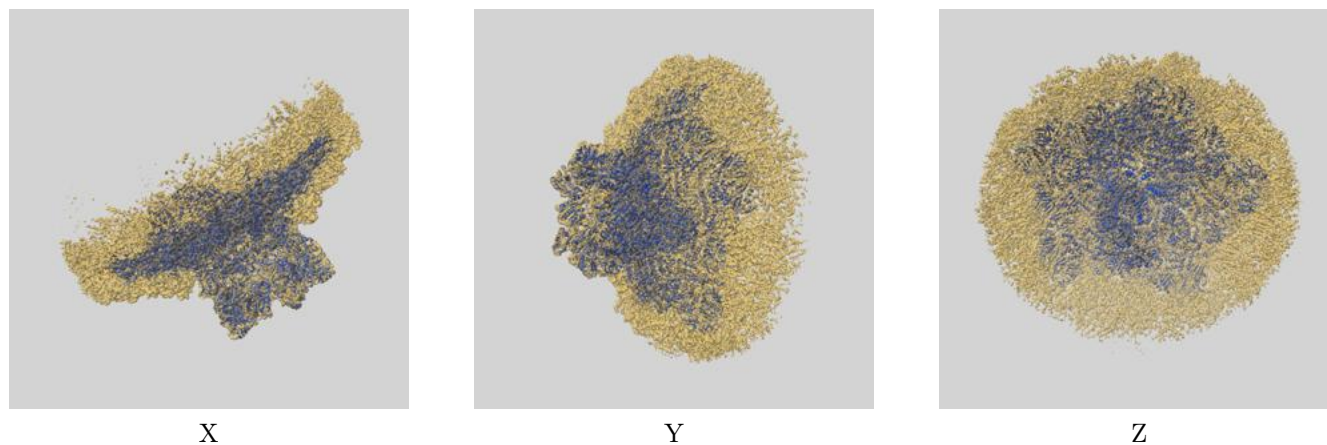
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.09	6.14	4.21

*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 4.09 differs from the reported value 3.4 by more than 10 %

9 Map-model fit [i](#)

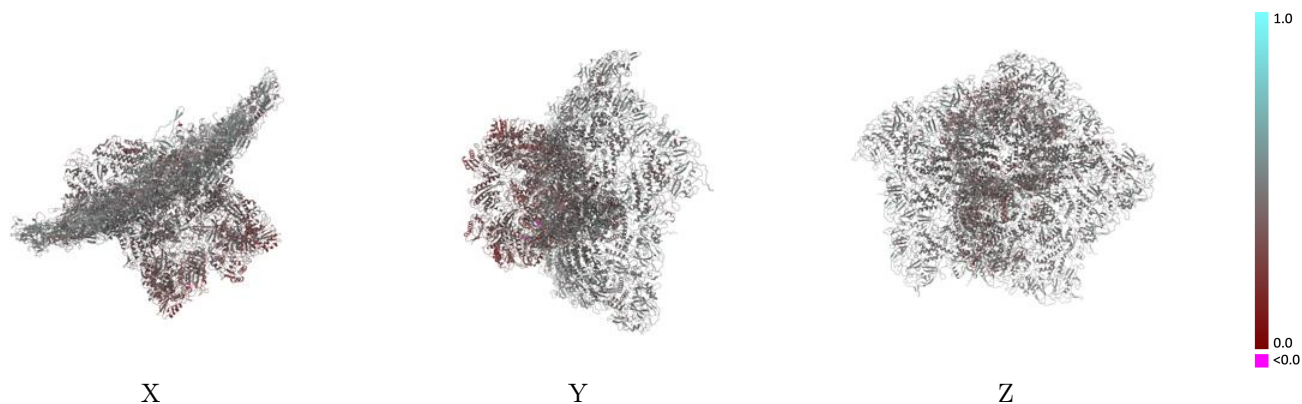
This section contains information regarding the fit between EMDB map EMD-33780 and PDB model 7YF0. Per-residue inclusion information can be found in section [3](#) on page [6](#).

9.1 Map-model overlay [i](#)



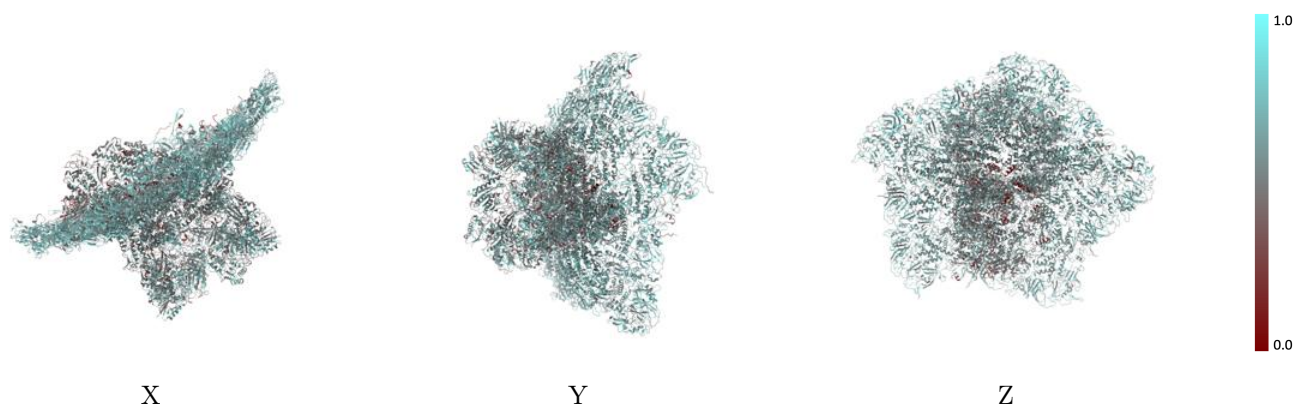
The images above show the 3D surface view of the map at the recommended contour level 0.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



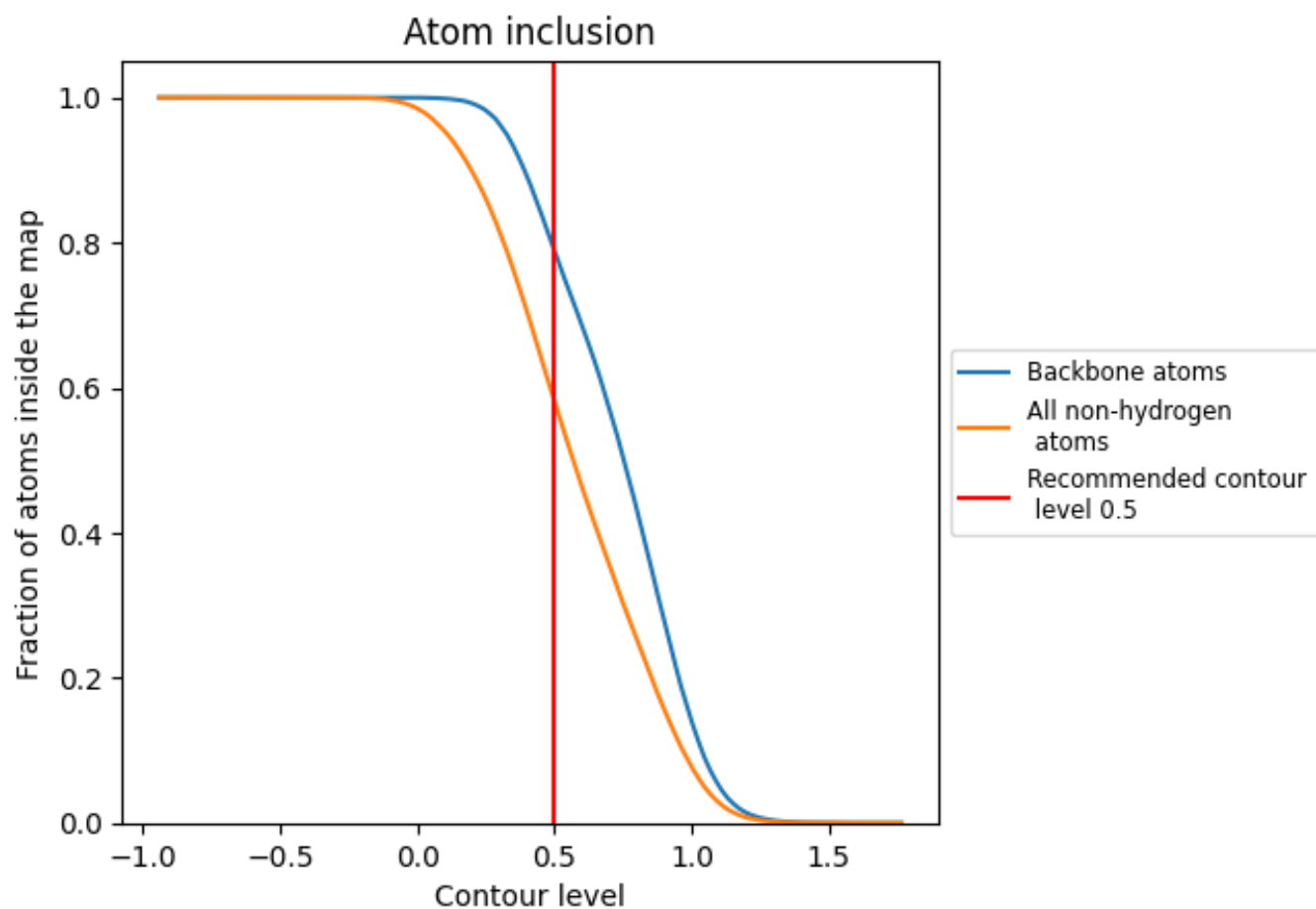
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.5).















































9.4 Atom inclusion [i](#)



At the recommended contour level, 79% of all backbone atoms, 58% 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 (0.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5805	 0.4410
1	 0.5198	 0.4560
2	 0.5488	 0.4610
3	 0.5431	 0.4490
4	 0.4568	 0.4460
5	 0.5177	 0.4540
A	 0.6138	 0.4700
B	 0.6136	 0.4710
C	 0.6021	 0.4660
D	 0.6078	 0.4670
E	 0.6138	 0.4700
H	 0.5475	 0.3860
I	 0.5355	 0.3880
J	 0.5367	 0.3870
K	 0.5316	 0.3900
L	 0.5331	 0.3870
R	 0.5177	 0.4350
U	 0.4488	 0.4250
a	 0.6256	 0.4680
b	 0.6286	 0.4650
c	 0.6262	 0.4670
d	 0.6347	 0.4690
e	 0.6260	 0.4670

