



wwPDB EM Validation Summary Report ⓘ

Mar 13, 2026 – 09:21 AM UTC

PDB ID : 7EKO / pdb_00007eko
EMDB ID : EMD-31171
Title : CrClpP-S1
Authors : Wang, N.; Wang, Y.F.; Cong, Y.; Liu, C.M.
Deposited on : 2021-04-06
Resolution : 3.30 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:

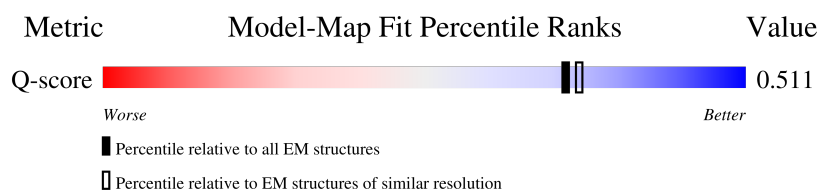
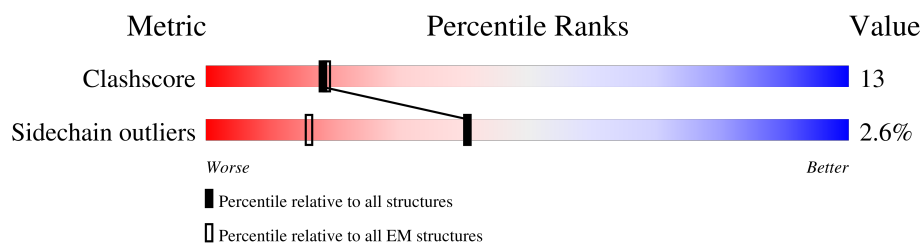
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

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

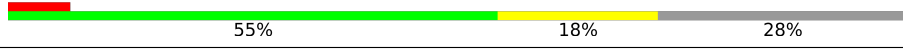
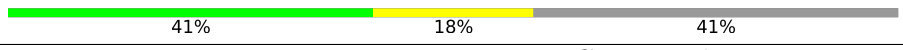
The reported resolution of this entry is 3.30 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



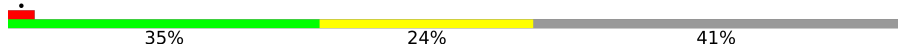
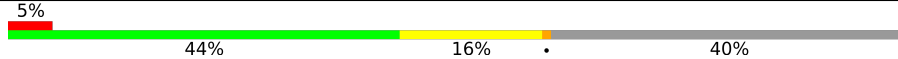
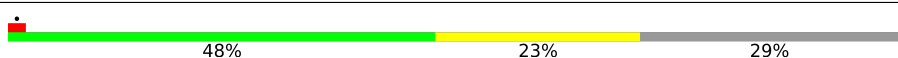
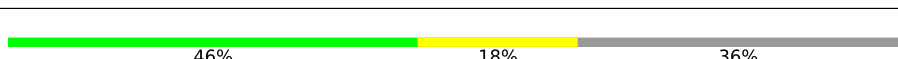
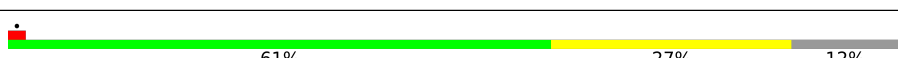
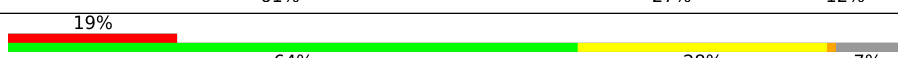
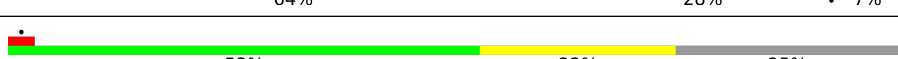
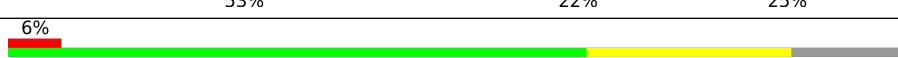
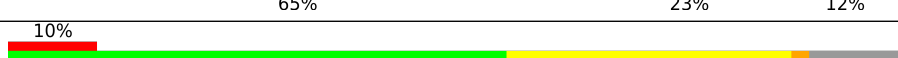
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	15087 (2.80 - 3.80)

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	A	238	
2	B	238	
2	D	238	
2	F	238	
3	C	296	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	E	296	
3	G	296	
4	H	208	
4	J	208	
4	M	208	
5	I	246	
6	K	251	
7	L	250	
8	N	383	
9	O	180	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 22470 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 ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	222	Total	C	N	O	S	0	0
			1728	1093	288	333	14		

- Molecule 2 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	193	Total	C	N	O	S	0	0
			1477	925	258	283	11		
2	D	193	Total	C	N	O	S	0	0
			1477	925	258	283	11		
2	F	172	Total	C	N	O	S	0	0
			1307	817	227	253	10		

- Molecule 3 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	174	Total	C	N	O	S	0	0
			1329	836	229	252	12		
3	E	174	Total	C	N	O	S	0	0
			1329	836	229	252	12		
3	G	179	Total	C	N	O	S	0	0
			1369	862	235	260	12		

- Molecule 4 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	H	148	Total	C	N	O	S	0	0
			1131	713	192	219	7		
4	J	165	Total	C	N	O	S	0	0
			1279	805	220	247	7		
4	M	133	Total	C	N	O	S	0	0
			1014	644	172	193	5		

- Molecule 5 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	217	Total	C	N	O	S	0	0
			1745	1123	300	315	7		

- Molecule 6 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	K	233	Total	C	N	O	S	0	0
			1841	1179	308	342	12		

- Molecule 7 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	L	187	Total	C	N	O	S	0	0
			1494	950	256	275	13		

- Molecule 8 is a protein called ATP-dependent Clp protease proteolytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	N	338	Total	C	N	O	S	0	0
			2691	1699	474	504	14		

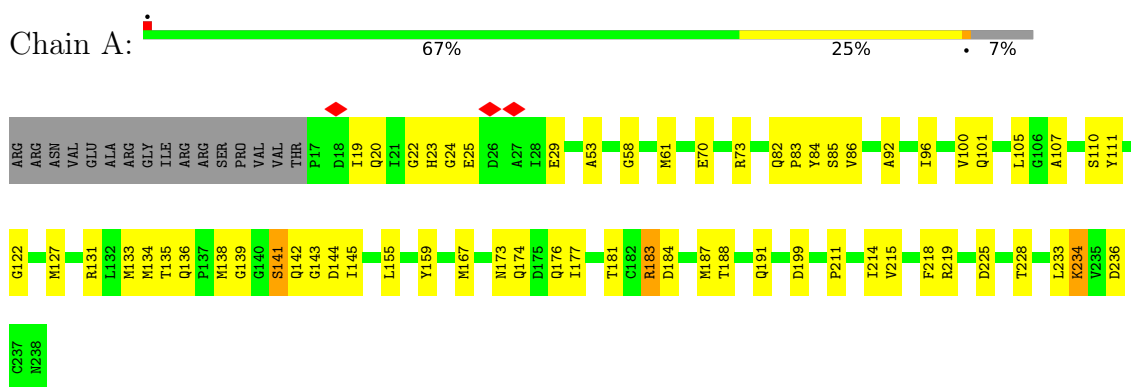
- Molecule 9 is a protein called ATP-dependent Clp protease ATP-binding subunit CLPT4, chloroplastic.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	O	162	Total	C	N	O	S	0	0
			1259	807	207	239	6		

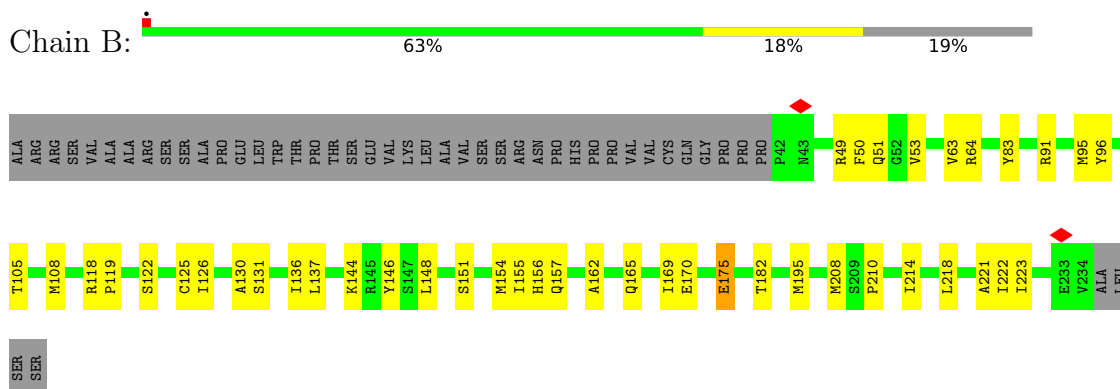
3 Residue-property plots

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.

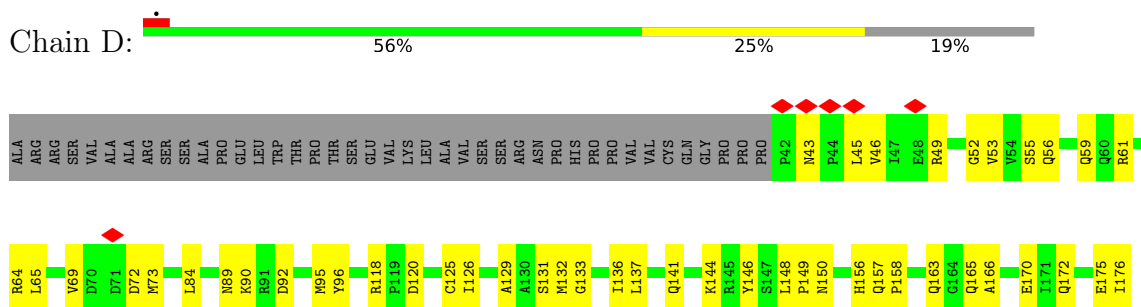
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



- Molecule 2: ATP-dependent Clp protease proteolytic subunit

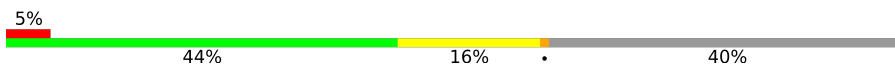


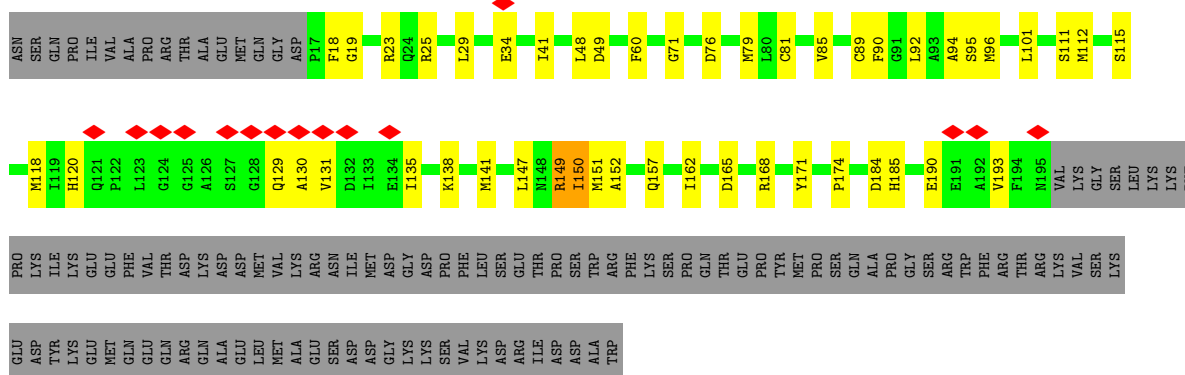
- Molecule 2: ATP-dependent Clp protease proteolytic subunit



ILE
ASP
ASP
ALA
TRP

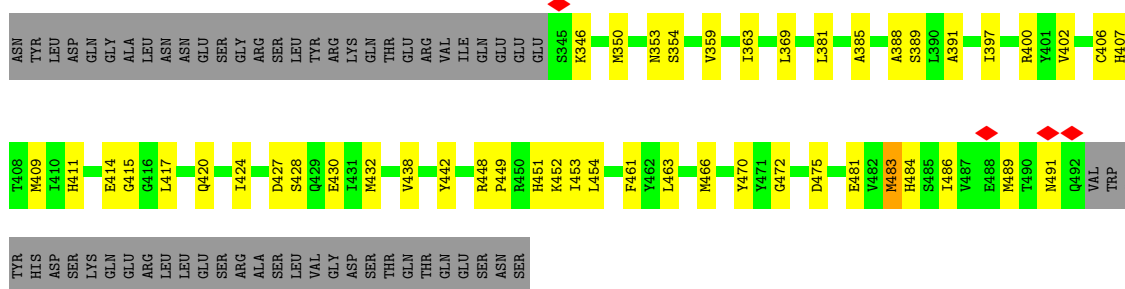
• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain G: 

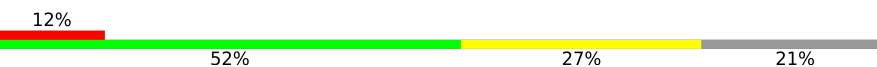


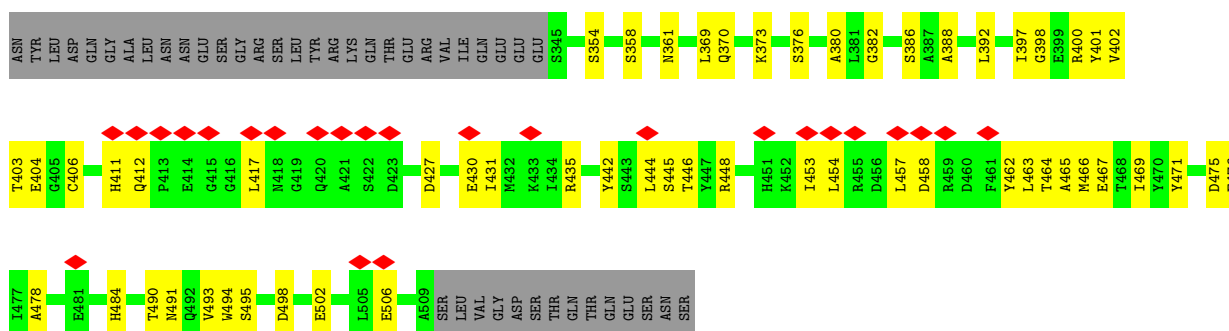
• Molecule 4: ATP-dependent Clp protease proteolytic subunit

Chain H: 



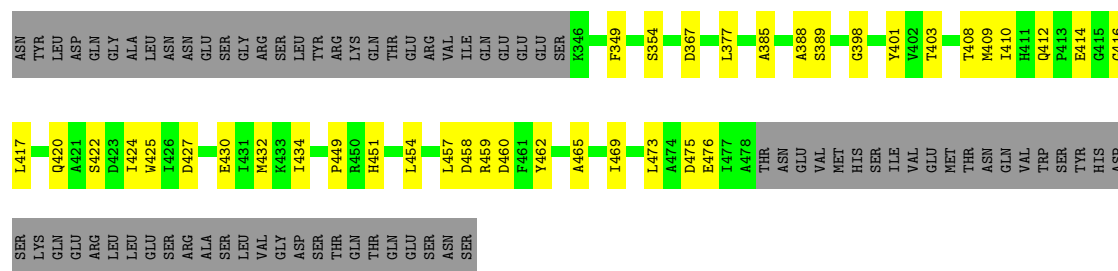
• Molecule 4: ATP-dependent Clp protease proteolytic subunit

Chain J: 

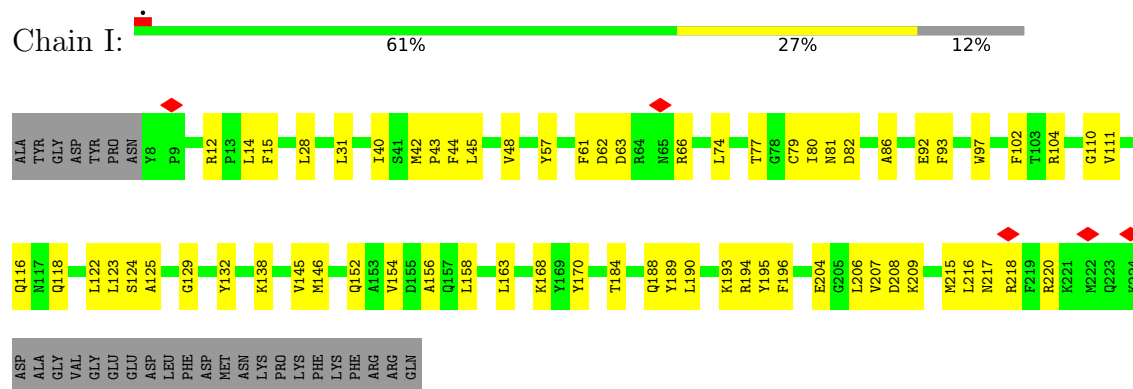


• Molecule 4: ATP-dependent Clp protease proteolytic subunit

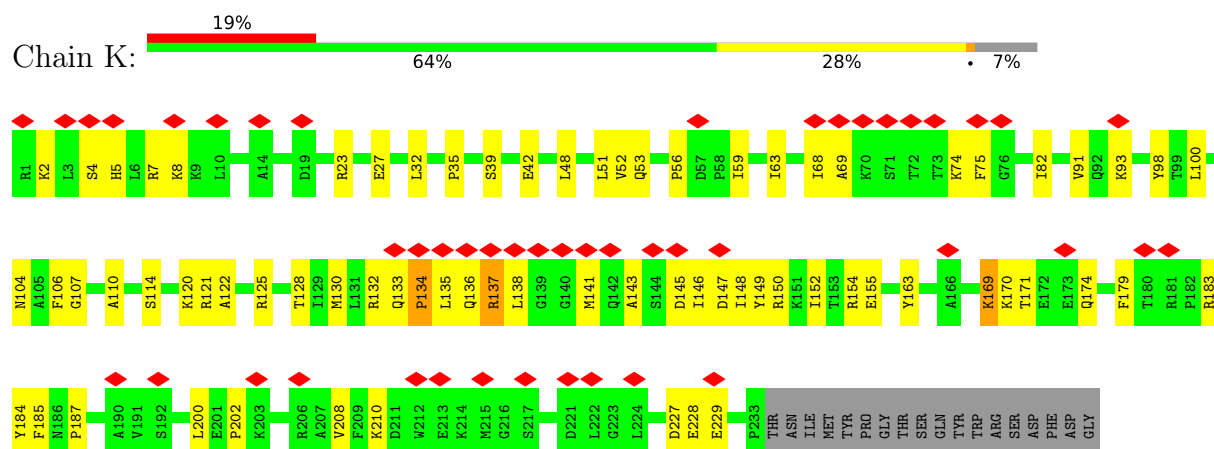
Chain M: 



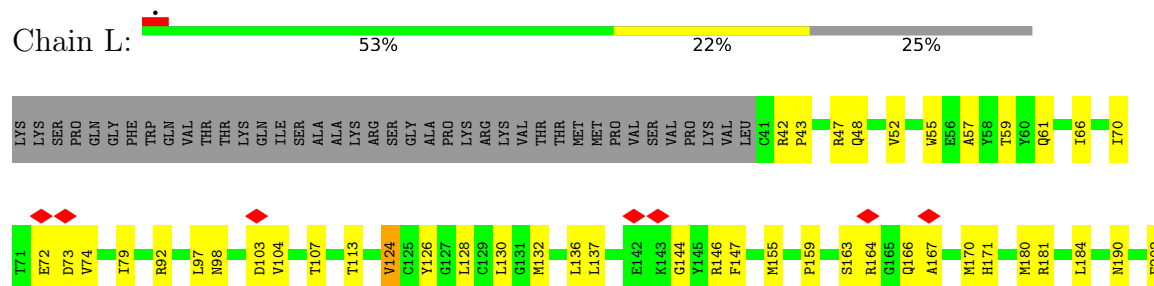
• Molecule 5: ATP-dependent Clp protease proteolytic subunit

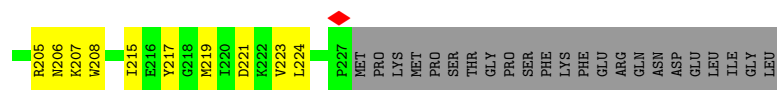


• Molecule 6: ATP-dependent Clp protease proteolytic subunit

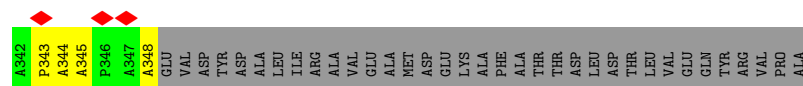
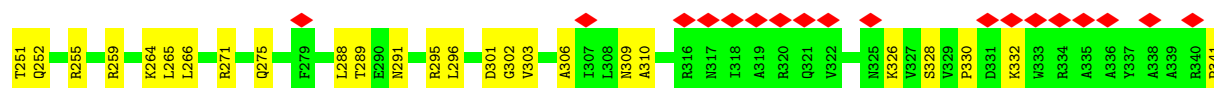
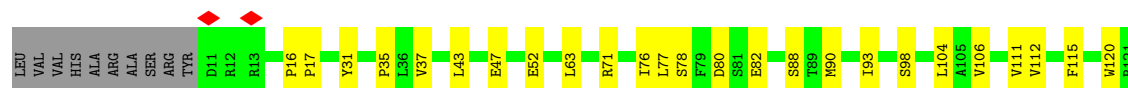


• Molecule 7: ATP-dependent Clp protease proteolytic subunit

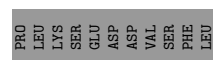
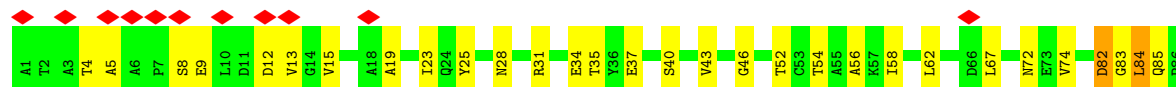




- Molecule 8: ATP-dependent Clp protease proteolytic subunit



- Molecule 9: ATP-dependent Clp protease ATP-binding subunit CLPT4, chloroplastic



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	131245	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 ($e^-/\text{\AA}^2$)	38	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.258	Depositor
Minimum map value	-0.142	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.026	Depositor
Map size (Å)	284.688, 284.688, 284.688	wwPDB
Map dimensions	216, 216, 216	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.318, 1.318, 1.318	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	0.45	0/1758	0.57	0/2376
2	B	0.46	0/1500	0.54	0/2028
2	D	0.39	0/1500	0.52	0/2028
2	F	0.35	0/1326	0.57	0/1792
3	C	0.44	0/1350	0.53	0/1814
3	E	0.33	0/1350	0.54	0/1814
3	G	0.53	0/1391	0.76	0/1870
4	H	0.45	0/1149	0.59	1/1553 (0.1%)
4	J	0.36	0/1301	0.57	0/1758
4	M	0.44	0/1031	0.61	0/1393
5	I	0.45	0/1790	0.63	0/2428
6	K	0.49	0/1881	0.74	1/2542 (0.0%)
7	L	0.43	0/1529	0.64	0/2072
8	N	0.40	0/2746	0.54	2/3718 (0.1%)
9	O	0.58	0/1285	0.76	1/1743 (0.1%)
All	All	0.44	0/22887	0.61	5/30929 (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	A	0	1
6	K	0	1
All	All	0	2

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	N	170	GLY	CA-C-N	6.28	138.81	120.97

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	N	170	GLY	C-N-CA	6.28	138.81	120.97
9	O	84	LEU	N-CA-C	-6.01	105.87	112.72
4	H	483	MET	CB-CG-SD	-5.64	95.79	112.70
6	K	56	PRO	N-CA-C	-5.38	109.09	114.68

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	110	SER	Mainchain
6	K	134	PRO	Peptide

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1728	0	1718	51	0
2	B	1477	0	1477	42	0
2	D	1477	0	1477	52	0
2	F	1307	0	1301	30	0
3	C	1329	0	1330	40	0
3	E	1329	0	1330	59	0
3	G	1369	0	1365	35	0
4	H	1131	0	1123	44	0
4	J	1279	0	1263	58	0
4	M	1014	0	1013	32	0
5	I	1745	0	1731	59	0
6	K	1841	0	1867	61	0
7	L	1494	0	1481	47	0
8	N	2691	0	2709	63	0
9	O	1259	0	1246	36	0
All	All	22470	0	22431	592	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 13.

The worst 5 of 592 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:SER:OG	5:I:156:ALA:CB	2.13	0.96
1:A:141:SER:OG	5:I:156:ALA:HB2	1.67	0.93
1:A:183:ARG:HH22	2:B:165:GLN:NE2	1.71	0.87
1:A:183:ARG:NH2	2:B:165:GLN:HE21	1.74	0.85
2:D:46:VAL:HA	2:D:49:ARG:HD2	1.59	0.84

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

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	A	186/200 (93%)	182 (98%)	4 (2%)	45	66
2	B	126/199 (63%)	125 (99%)	1 (1%)	73	79
2	D	129/199 (65%)	129 (100%)	0	100	100
2	F	141/199 (71%)	138 (98%)	3 (2%)	47	67
3	C	140/250 (56%)	140 (100%)	0	100	100
3	E	140/250 (56%)	140 (100%)	0	100	100
3	G	137/250 (55%)	130 (95%)	7 (5%)	21	50
4	M	35/175 (20%)	34 (97%)	1 (3%)	37	62
6	K	112/213 (53%)	105 (94%)	7 (6%)	16	44
7	L	155/217 (71%)	150 (97%)	5 (3%)	34	60
8	N	283/327 (86%)	280 (99%)	3 (1%)	65	76
9	O	130/146 (89%)	116 (89%)	14 (11%)	6	23
All	All	1714/2625 (65%)	1669 (97%)	45 (3%)	41	64

5 of 45 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
8	N	130	MET
9	O	52	THR
8	N	131	ILE
9	O	35	THR
9	O	58	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
3	G	129	GLN
7	L	166	GLN
8	N	229	GLN
7	L	171	HIS
2	B	230	GLN

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 oligosaccharides 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

There are no chain breaks in this entry.

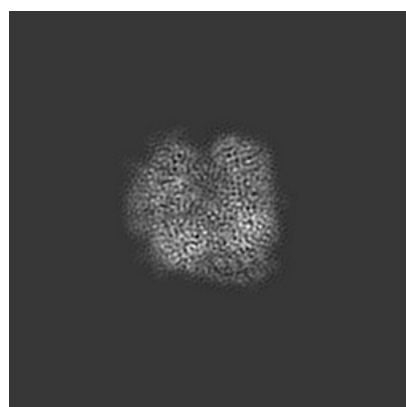
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31171. These allow visual inspection of the internal detail of the map and identification of artifacts.

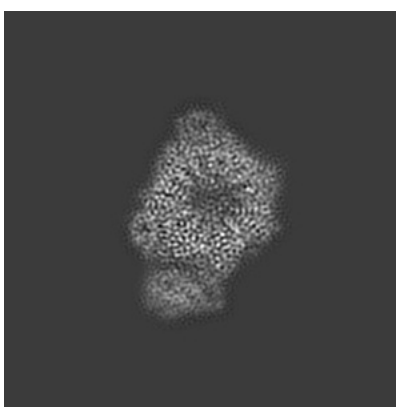
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

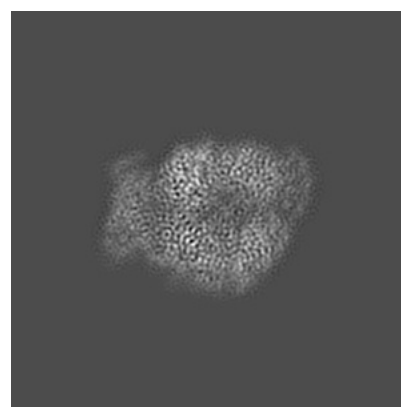
6.1.1 Primary map



X



Y

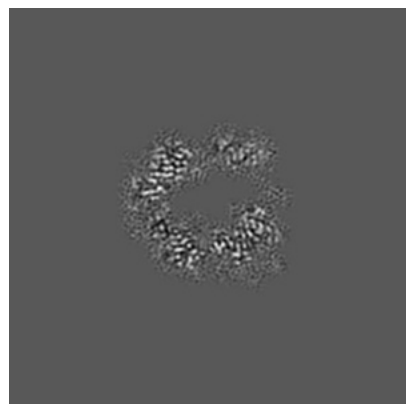


Z

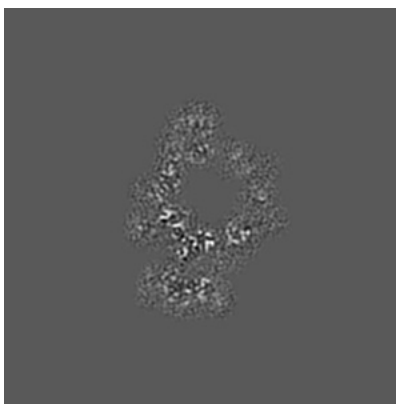
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 108



Y Index: 108

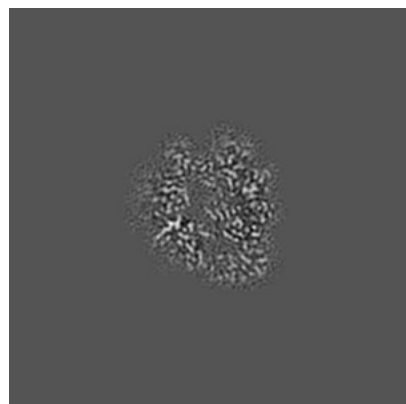


Z Index: 108

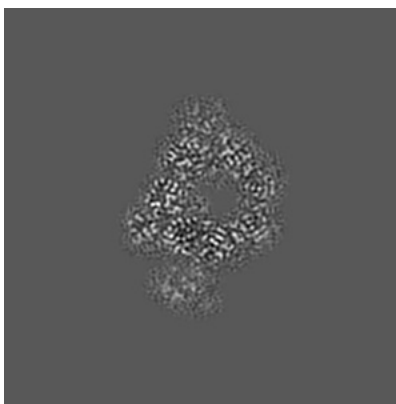
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

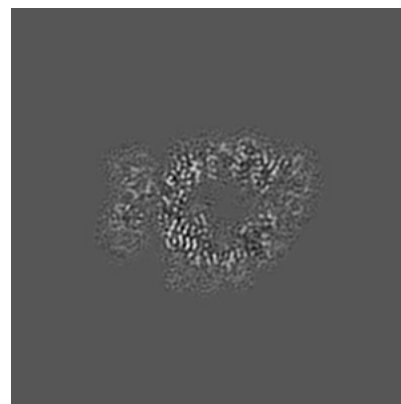
6.3.1 Primary map



X Index: 95



Y Index: 126

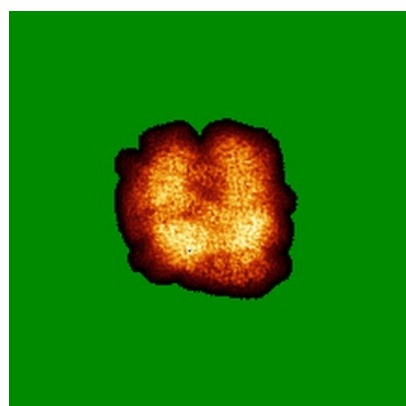


Z Index: 99

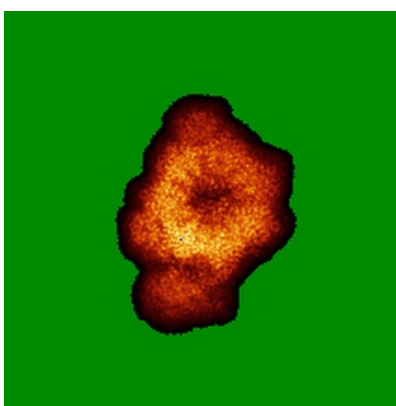
The images above show the largest variance slices of the map in three orthogonal directions.

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

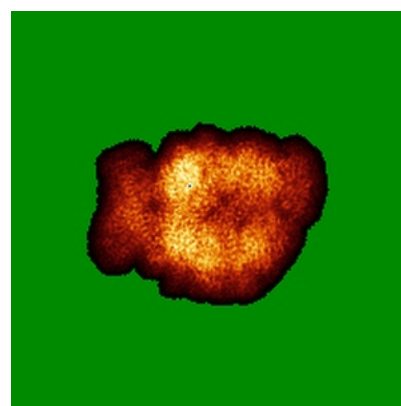
6.4.1 Primary map



X



Y

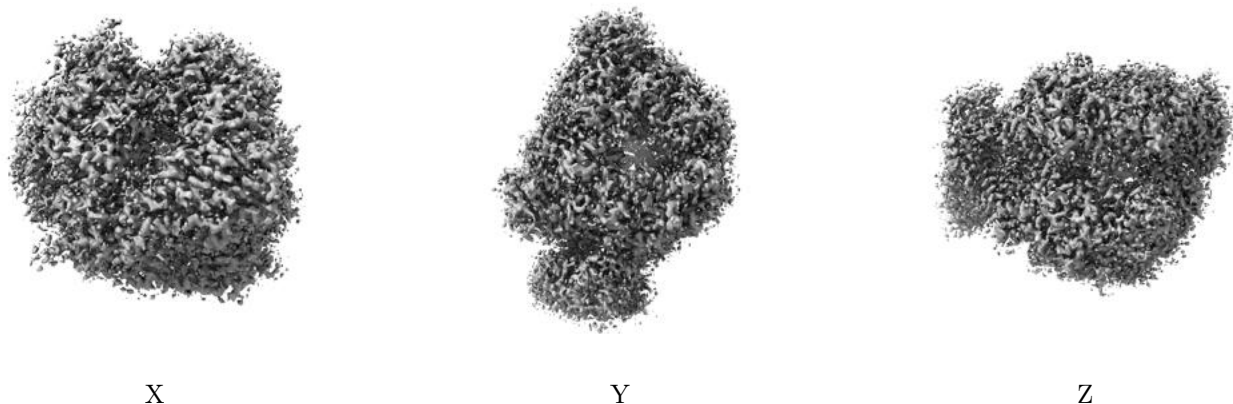


Z

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 0.026. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

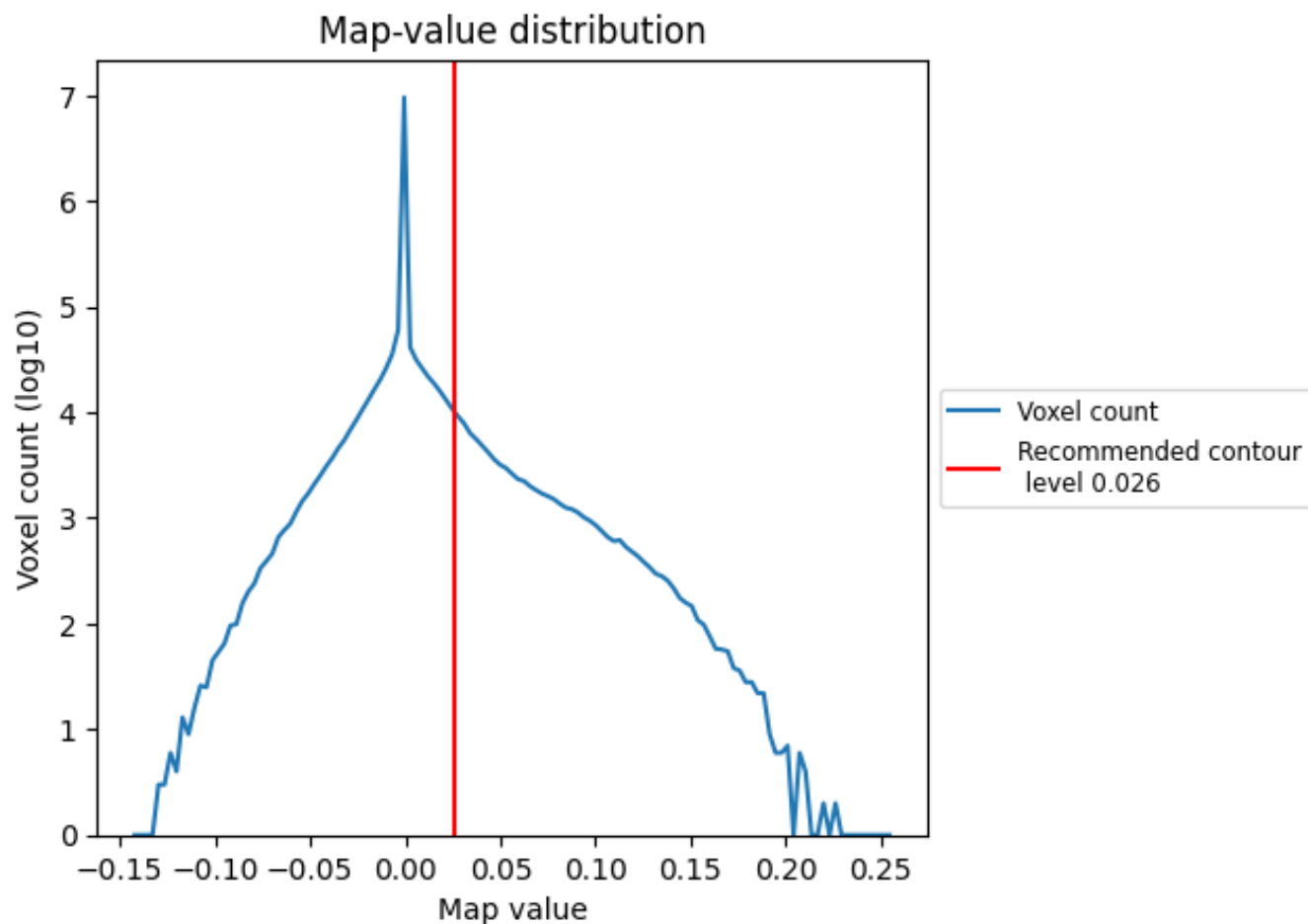
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

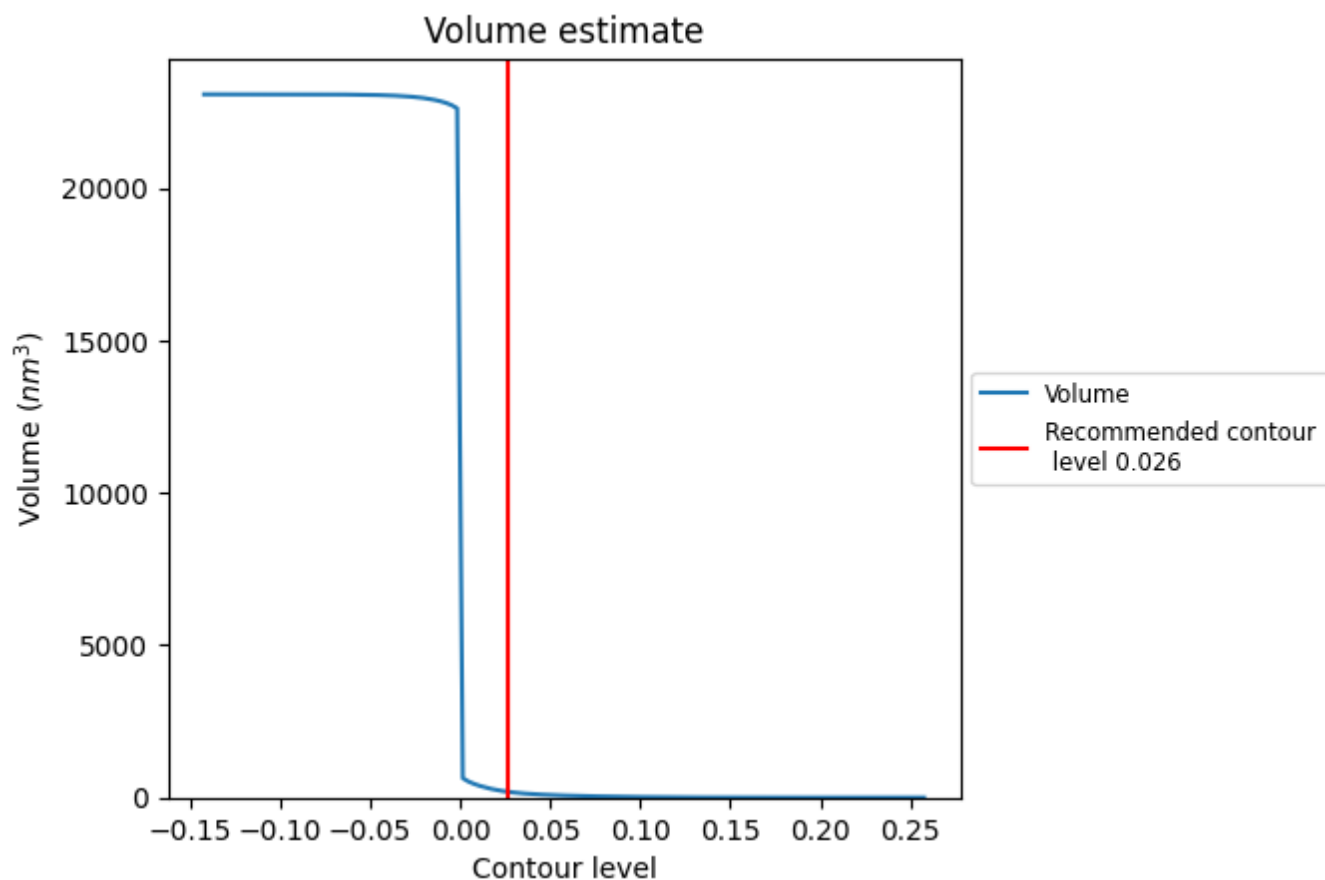
This section contains the results of statistical analysis of the map.

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.

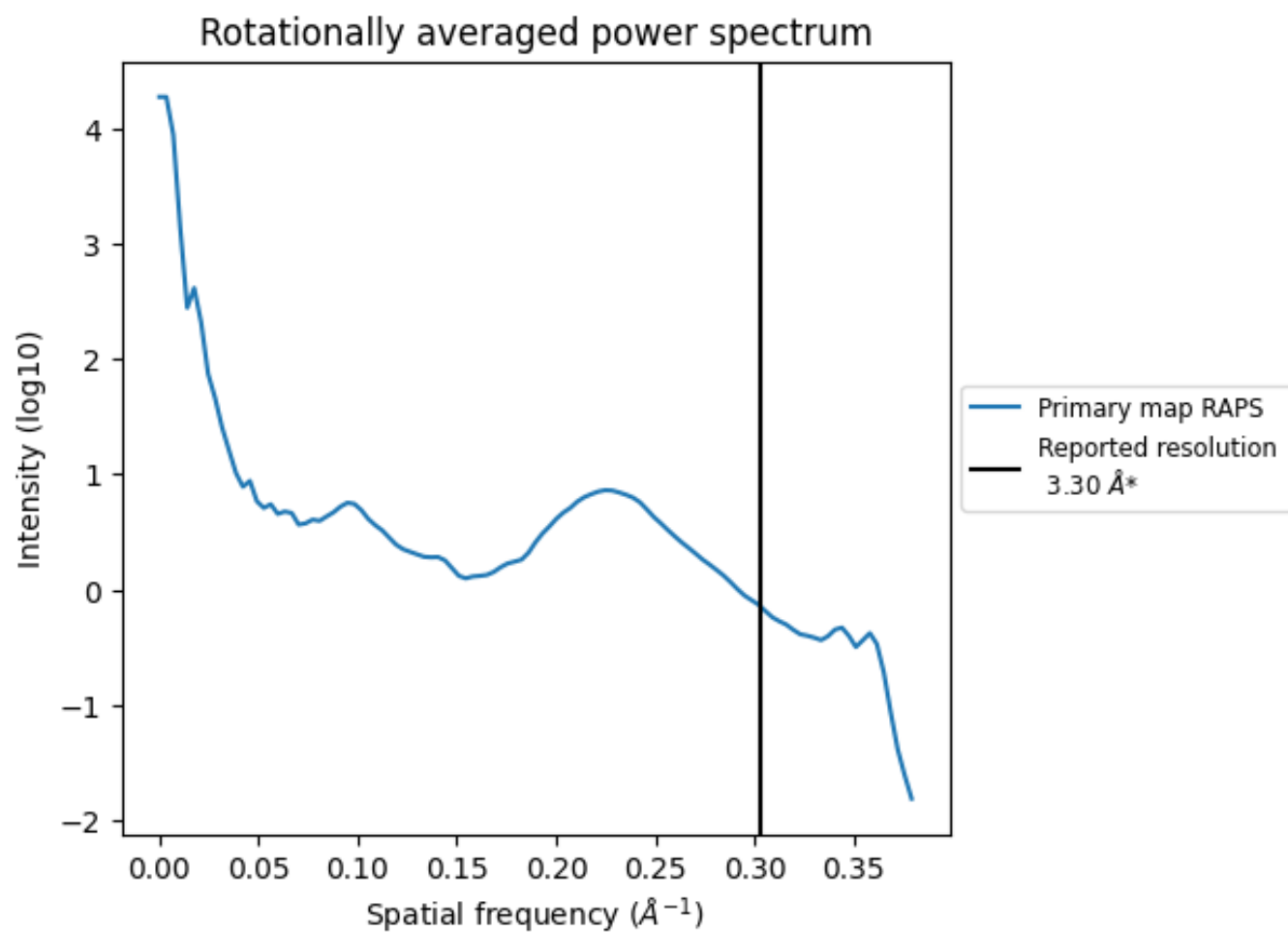
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 193 nm³; this corresponds to an approximate mass of 175 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 0.303 Å⁻¹

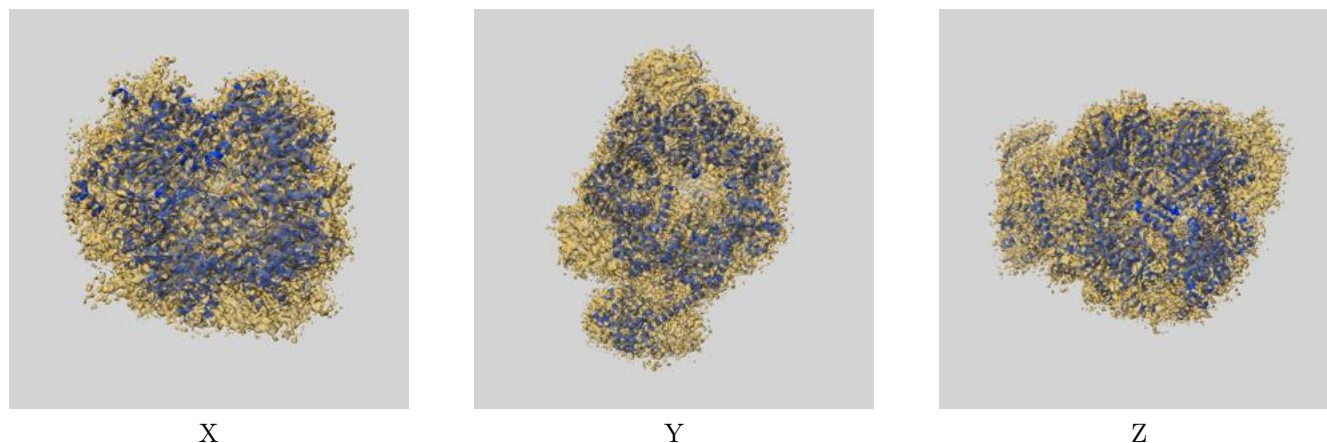
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

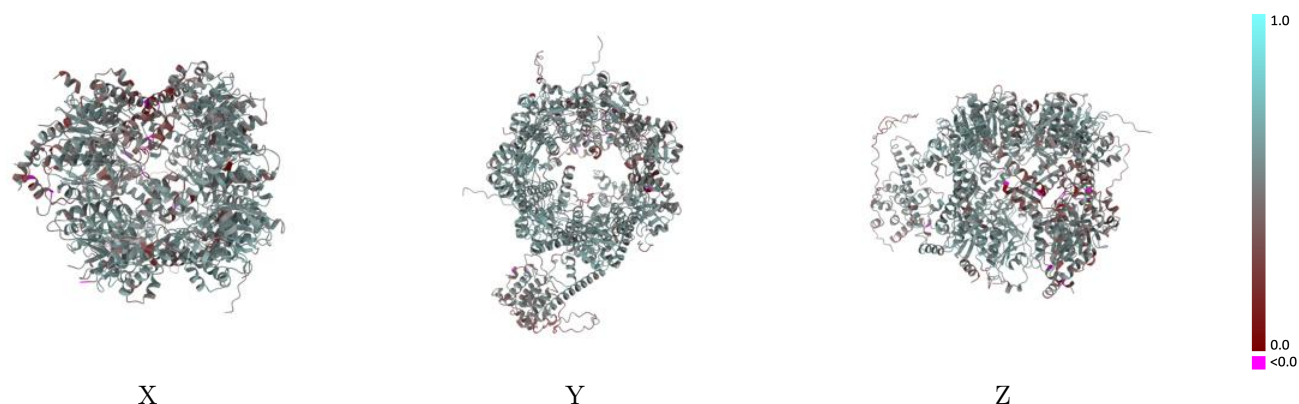
This section contains information regarding the fit between EMDB map EMD-31171 and PDB model 7EKO. Per-residue inclusion information can be found in [section 3](#) on [page 6](#).

9.1 Map-model overlay [i](#)



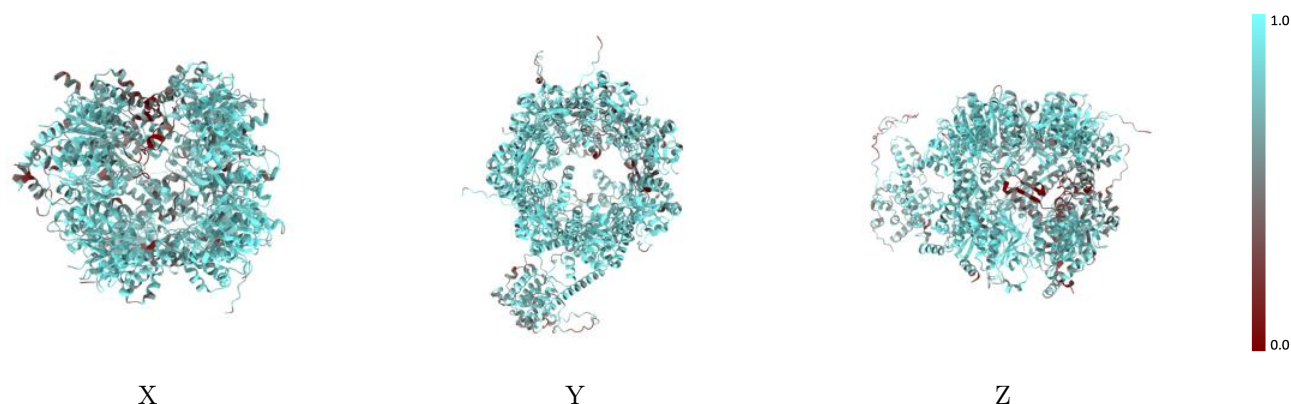
The images above show the 3D surface view of the map at the recommended contour level 0.026 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



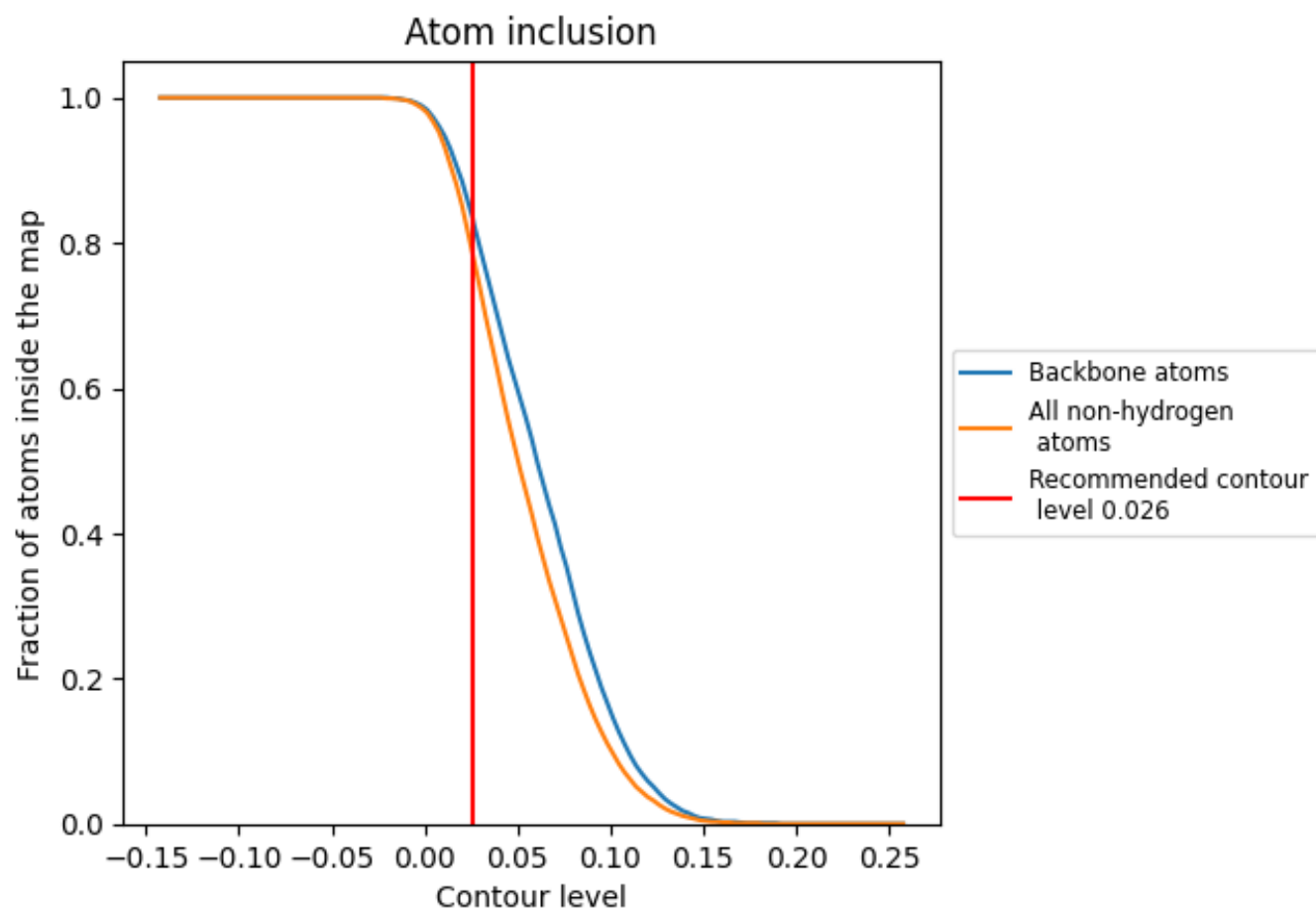
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.026).

9.4 Atom inclusion [i](#)



At the recommended contour level, 83% of all backbone atoms, 78% 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 (0.026) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7840	0.5110
A	0.8320	0.5430
B	0.8730	0.5600
C	0.8700	0.5580
D	0.8220	0.5350
E	0.8030	0.5170
F	0.7390	0.4780
G	0.7680	0.4990
H	0.8400	0.5490
I	0.8300	0.5270
J	0.6620	0.4490
K	0.6290	0.4270
L	0.8080	0.5280
M	0.8280	0.5370
N	0.7930	0.5190
O	0.6710	0.4470

1.0

0.0

<0.0