



wwPDB EM Validation Summary Report ⓘ

Mar 20, 2026 – 09:10 AM UTC

PDB ID : 7FER / pdb_00007fer
EMDB ID : EMD-31561
Title : Cryo-EM structure of BsClpP-ADEP1 complex at pH 4.2
Authors : Kim, L.; Lee, B.-G.; Kim, M.K.; Kwon, D.H.; Kim, H.; Brotz-Oesterhelt, H.; Roh, S.-H.; Song, H.K.
Deposited on : 2021-07-21
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:

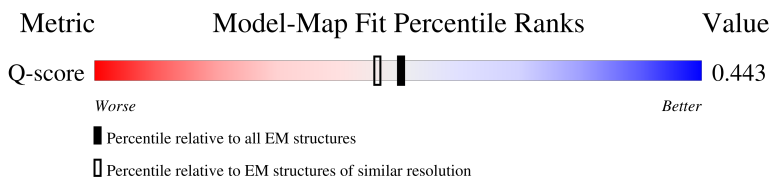
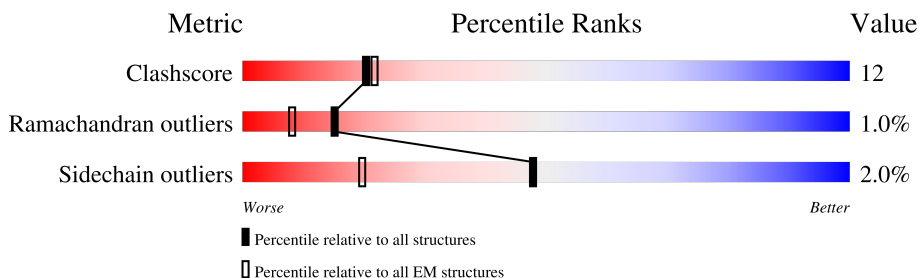
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
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 i

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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14717 (2.90 - 3.90)

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	202	<p>20% (red), 69% (green), 13% (yellow), 17% (grey)</p>
1	B	202	<p>24% (red), 68% (green), 13% (yellow), 17% (grey)</p>
1	C	202	<p>19% (red), 70% (green), 12% (yellow), 17% (grey)</p>
1	D	202	<p>17% (red), 70% (green), 13% (yellow), 17% (grey)</p>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	E	202	16% 70% 12% 17%
1	F	202	20% 68% 13% 17%
1	G	202	20% 68% 14% 17%
1	H	202	20% 69% 13% 17%
1	I	202	18% 69% 13% 17%
1	J	202	20% 70% 11% 17%
1	K	202	19% 64% 16% 17%
1	L	202	21% 69% 13% 17%
1	M	202	20% 66% 15% 17%
1	N	202	23% 65% 17% 17%
2	O	7	43% 14% 86%
2	P	7	29% 14% 86%
2	Q	7	29% 14% 71% 14%
2	R	7	29% 14% 86%
2	S	7	29% 14% 86%
2	T	7	43% 14% 86%
2	U	7	29% 14% 86%
2	V	7	57% 14% 71% 14%
2	W	7	57% 14% 86%
2	X	7	57% 14% 86%
2	Y	7	57% 14% 86%
2	Z	7	57% 14% 86%
2	a	7	57% 14% 71% 14%
2	b	7	57% 14% 86%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 36736 atoms, of which 18142 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
			Total	C	H	N	O	S		
1	A	168	2568	808	1293	213	247	7	0	0
1	B	168	2568	808	1293	213	247	7	0	0
1	C	168	2568	808	1293	213	247	7	0	0
1	D	168	2583	811	1304	214	247	7	0	0
1	E	168	2568	808	1293	213	247	7	0	0
1	F	168	2568	808	1293	213	247	7	0	0
1	G	168	2568	808	1293	213	247	7	0	0
1	H	168	2568	808	1293	213	247	7	0	0
1	I	168	2568	808	1293	213	247	7	0	0
1	J	168	2568	808	1293	213	247	7	0	0
1	K	168	2568	808	1293	213	247	7	0	0
1	L	168	2568	808	1293	213	247	7	0	0
1	M	168	2609	817	1322	216	247	7	0	0
1	N	168	2568	808	1293	213	247	7	0	0

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	197	HIS	-	expression tag	UNP P80244
A	198	HIS	-	expression tag	UNP P80244

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	199	HIS	-	expression tag	UNP P80244
A	200	HIS	-	expression tag	UNP P80244
A	201	HIS	-	expression tag	UNP P80244
A	202	HIS	-	expression tag	UNP P80244
B	197	HIS	-	expression tag	UNP P80244
B	198	HIS	-	expression tag	UNP P80244
B	199	HIS	-	expression tag	UNP P80244
B	200	HIS	-	expression tag	UNP P80244
B	201	HIS	-	expression tag	UNP P80244
B	202	HIS	-	expression tag	UNP P80244
C	197	HIS	-	expression tag	UNP P80244
C	198	HIS	-	expression tag	UNP P80244
C	199	HIS	-	expression tag	UNP P80244
C	200	HIS	-	expression tag	UNP P80244
C	201	HIS	-	expression tag	UNP P80244
C	202	HIS	-	expression tag	UNP P80244
D	197	HIS	-	expression tag	UNP P80244
D	198	HIS	-	expression tag	UNP P80244
D	199	HIS	-	expression tag	UNP P80244
D	200	HIS	-	expression tag	UNP P80244
D	201	HIS	-	expression tag	UNP P80244
D	202	HIS	-	expression tag	UNP P80244
E	197	HIS	-	expression tag	UNP P80244
E	198	HIS	-	expression tag	UNP P80244
E	199	HIS	-	expression tag	UNP P80244
E	200	HIS	-	expression tag	UNP P80244
E	201	HIS	-	expression tag	UNP P80244
E	202	HIS	-	expression tag	UNP P80244
F	197	HIS	-	expression tag	UNP P80244
F	198	HIS	-	expression tag	UNP P80244
F	199	HIS	-	expression tag	UNP P80244
F	200	HIS	-	expression tag	UNP P80244
F	201	HIS	-	expression tag	UNP P80244
F	202	HIS	-	expression tag	UNP P80244
G	197	HIS	-	expression tag	UNP P80244
G	198	HIS	-	expression tag	UNP P80244
G	199	HIS	-	expression tag	UNP P80244
G	200	HIS	-	expression tag	UNP P80244
G	201	HIS	-	expression tag	UNP P80244
G	202	HIS	-	expression tag	UNP P80244
H	197	HIS	-	expression tag	UNP P80244
H	198	HIS	-	expression tag	UNP P80244

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
H	199	HIS	-	expression tag	UNP P80244
H	200	HIS	-	expression tag	UNP P80244
H	201	HIS	-	expression tag	UNP P80244
H	202	HIS	-	expression tag	UNP P80244
I	197	HIS	-	expression tag	UNP P80244
I	198	HIS	-	expression tag	UNP P80244
I	199	HIS	-	expression tag	UNP P80244
I	200	HIS	-	expression tag	UNP P80244
I	201	HIS	-	expression tag	UNP P80244
I	202	HIS	-	expression tag	UNP P80244
J	197	HIS	-	expression tag	UNP P80244
J	198	HIS	-	expression tag	UNP P80244
J	199	HIS	-	expression tag	UNP P80244
J	200	HIS	-	expression tag	UNP P80244
J	201	HIS	-	expression tag	UNP P80244
J	202	HIS	-	expression tag	UNP P80244
K	197	HIS	-	expression tag	UNP P80244
K	198	HIS	-	expression tag	UNP P80244
K	199	HIS	-	expression tag	UNP P80244
K	200	HIS	-	expression tag	UNP P80244
K	201	HIS	-	expression tag	UNP P80244
K	202	HIS	-	expression tag	UNP P80244
L	197	HIS	-	expression tag	UNP P80244
L	198	HIS	-	expression tag	UNP P80244
L	199	HIS	-	expression tag	UNP P80244
L	200	HIS	-	expression tag	UNP P80244
L	201	HIS	-	expression tag	UNP P80244
L	202	HIS	-	expression tag	UNP P80244
M	197	HIS	-	expression tag	UNP P80244
M	198	HIS	-	expression tag	UNP P80244
M	199	HIS	-	expression tag	UNP P80244
M	200	HIS	-	expression tag	UNP P80244
M	201	HIS	-	expression tag	UNP P80244
M	202	HIS	-	expression tag	UNP P80244
N	197	HIS	-	expression tag	UNP P80244
N	198	HIS	-	expression tag	UNP P80244
N	199	HIS	-	expression tag	UNP P80244
N	200	HIS	-	expression tag	UNP P80244
N	201	HIS	-	expression tag	UNP P80244
N	202	HIS	-	expression tag	UNP P80244

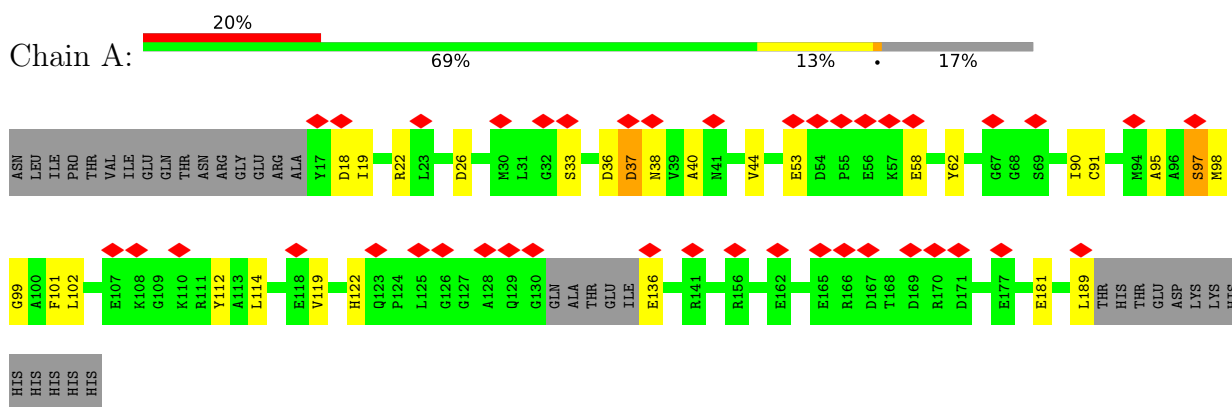
- Molecule 2 is a protein called ADEP1.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	O	7	Total	C	N	O	0	0
			52	38	6	8		
2	P	7	Total	C	N	O	0	0
			52	38	6	8		
2	Q	7	Total	C	N	O	0	0
			52	38	6	8		
2	R	7	Total	C	N	O	0	0
			52	38	6	8		
2	S	7	Total	C	N	O	0	0
			52	38	6	8		
2	T	7	Total	C	N	O	0	0
			52	38	6	8		
2	U	7	Total	C	N	O	0	0
			52	38	6	8		
2	V	7	Total	C	N	O	0	0
			52	38	6	8		
2	W	7	Total	C	N	O	0	0
			52	38	6	8		
2	X	7	Total	C	N	O	0	0
			52	38	6	8		
2	Y	7	Total	C	N	O	0	0
			52	38	6	8		
2	Z	7	Total	C	N	O	0	0
			52	38	6	8		
2	a	7	Total	C	N	O	0	0
			52	38	6	8		
2	b	7	Total	C	N	O	0	0
			52	38	6	8		

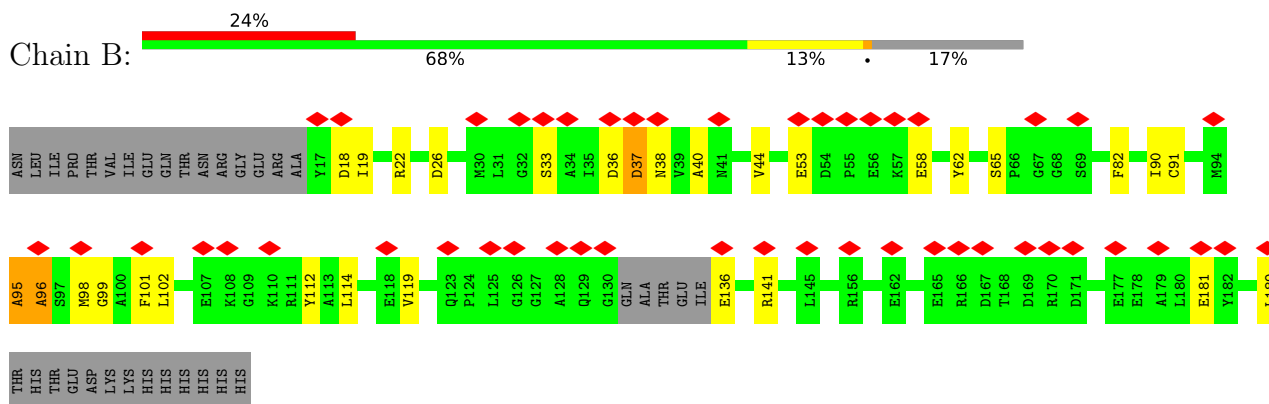
3 Residue-property plots [i](#)

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.

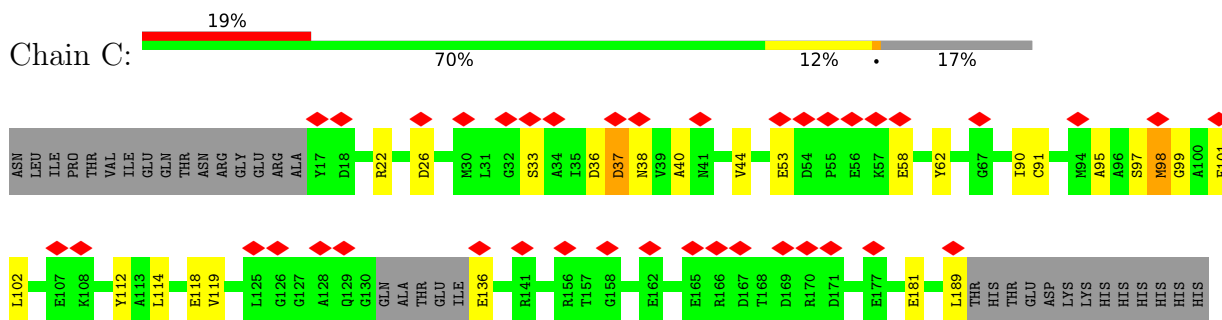
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



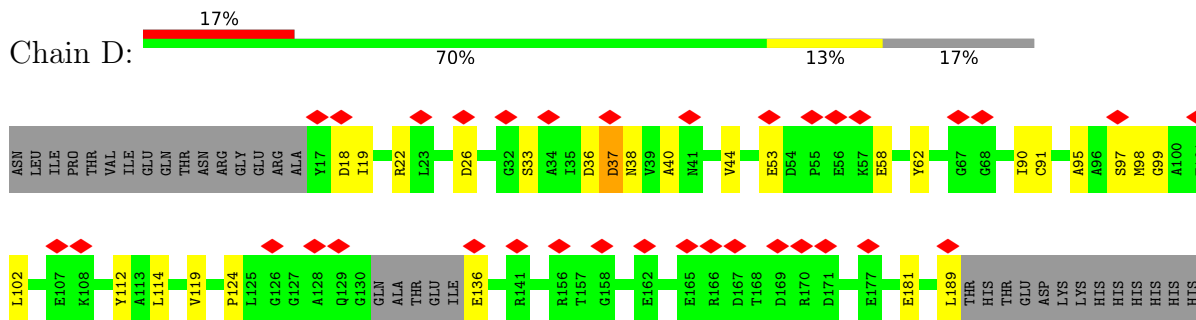
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



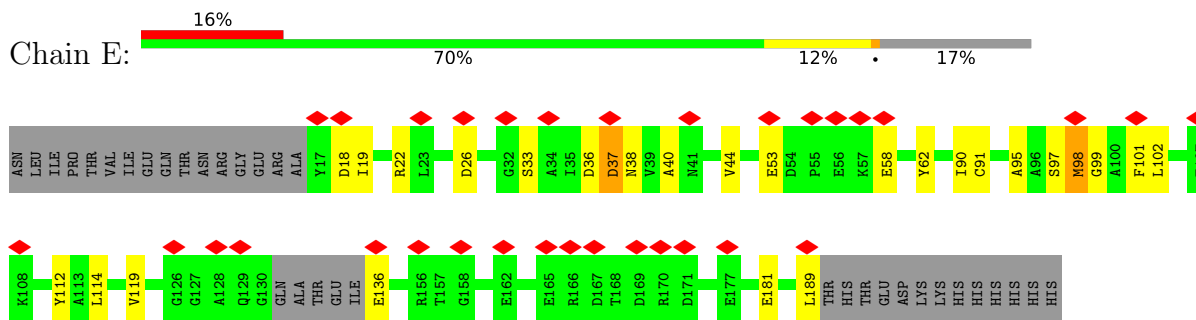
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



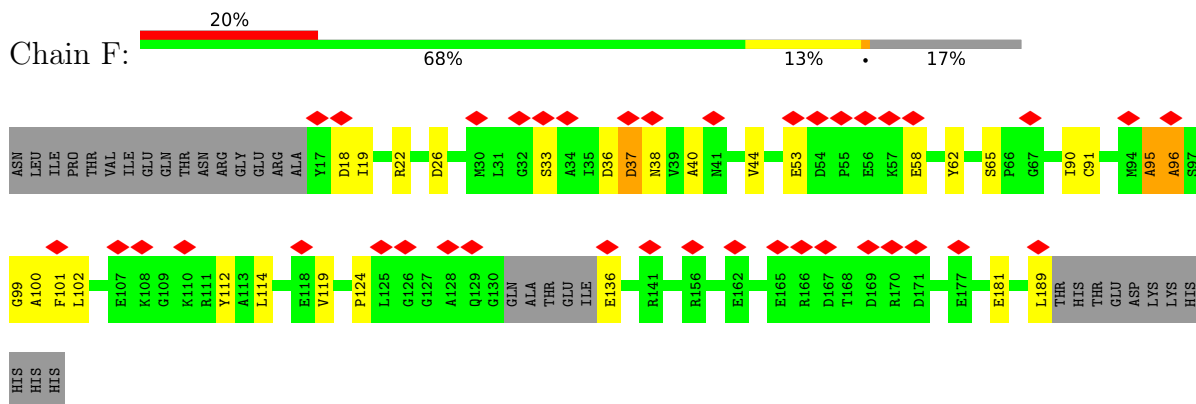
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



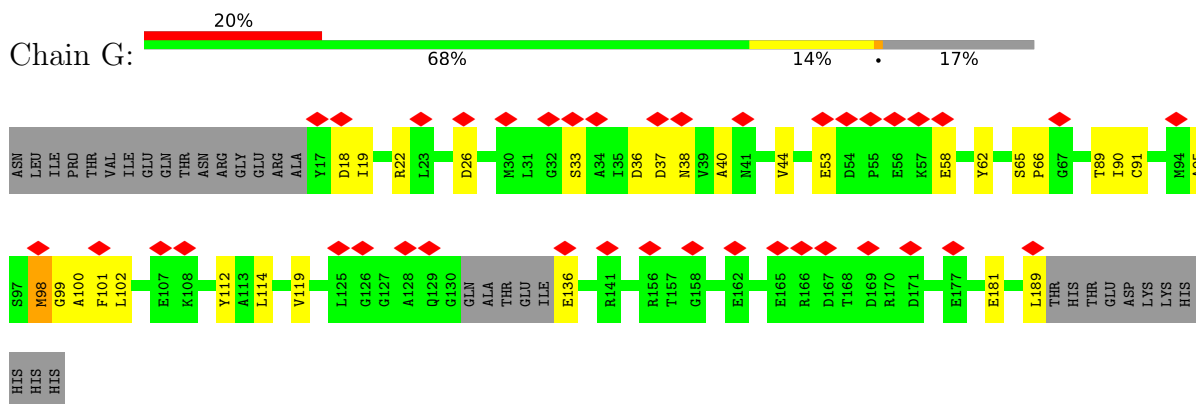
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



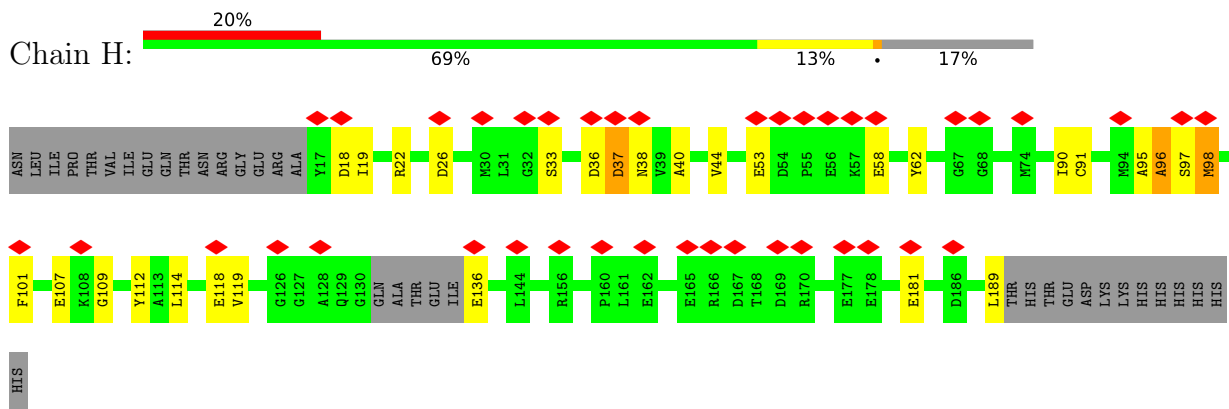
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



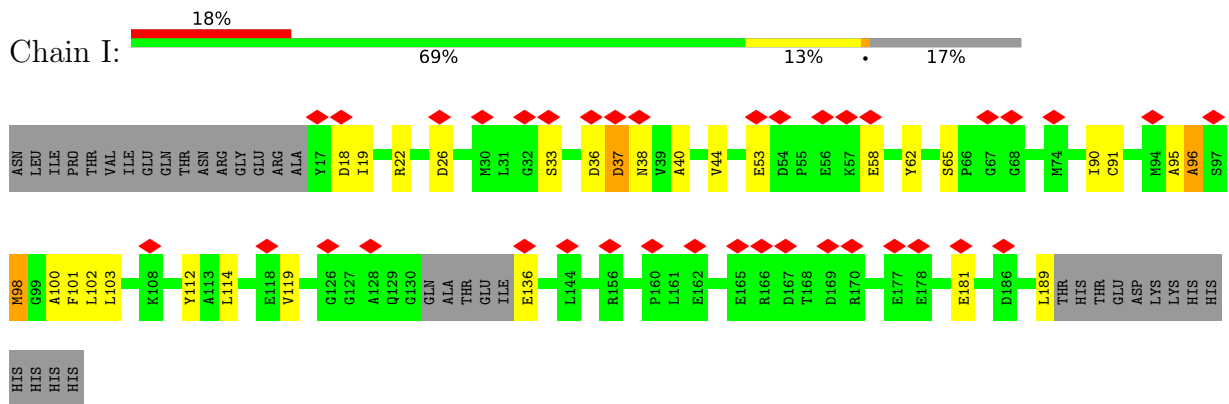
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



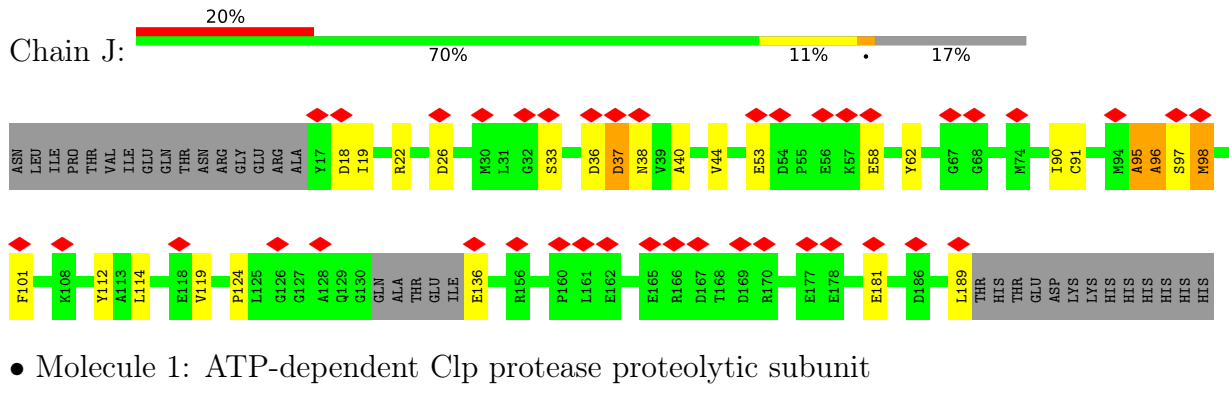
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



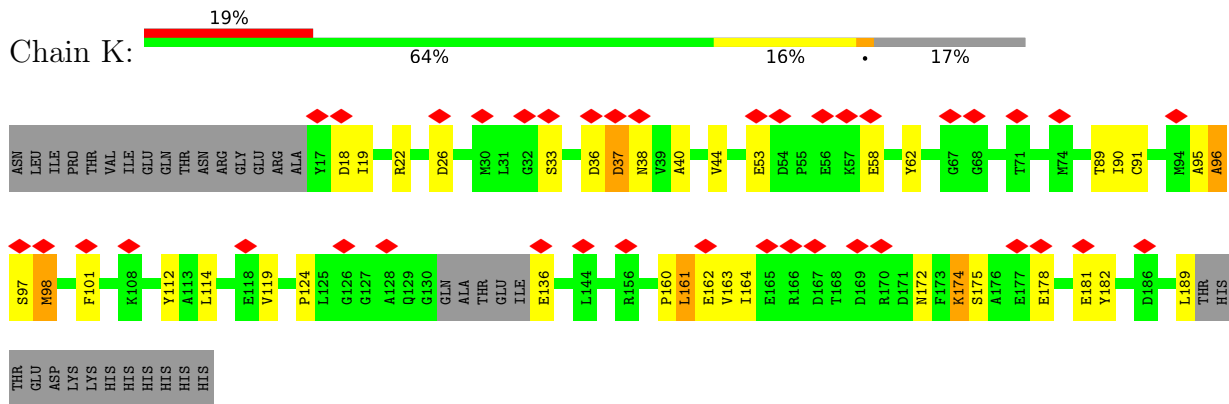
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



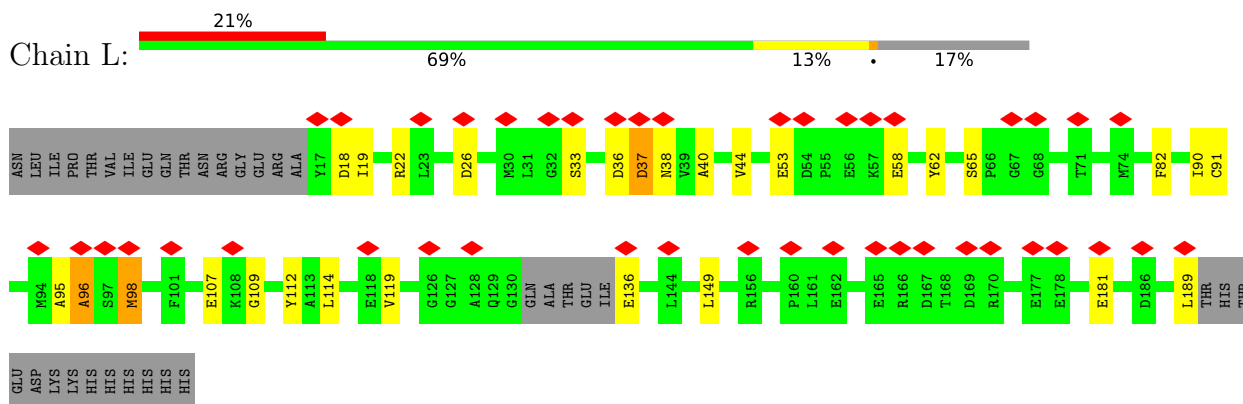
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



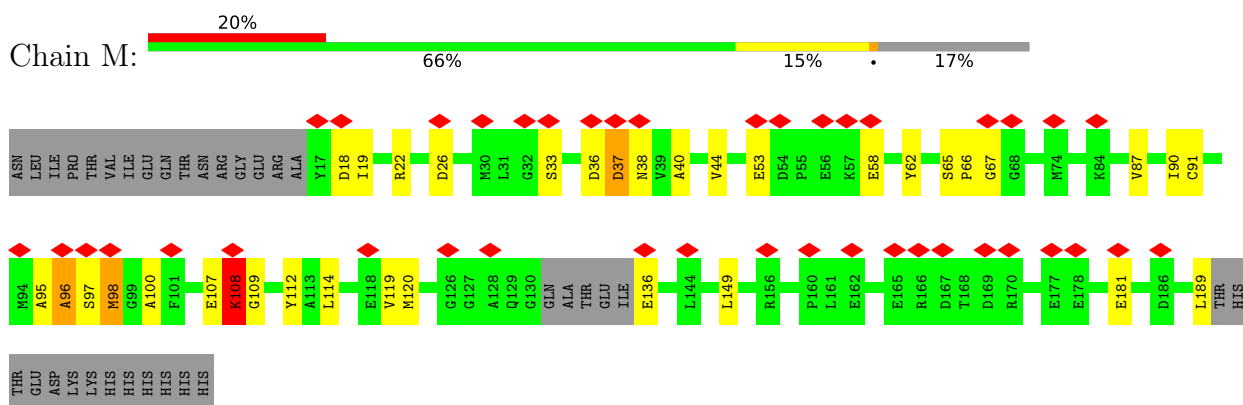
• Molecule 1: ATP-dependent Clp protease proteolytic subunit



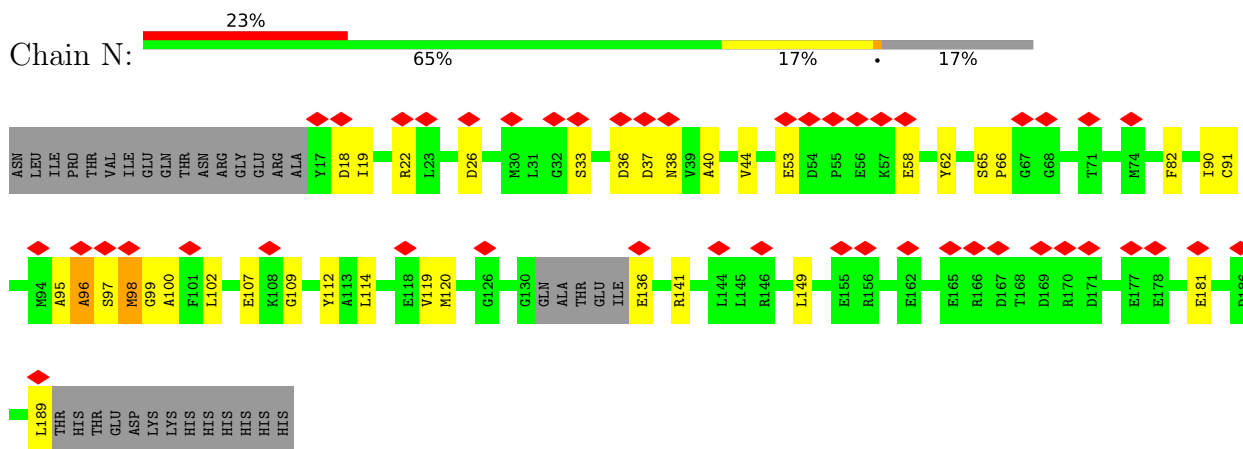
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



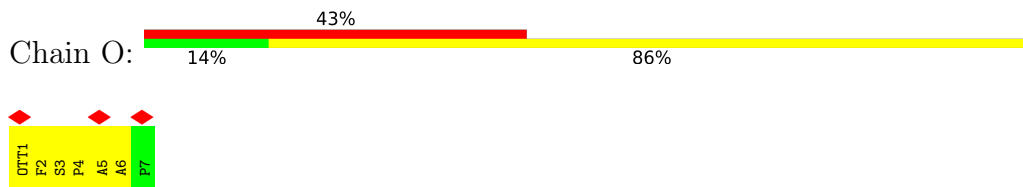
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



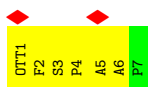
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



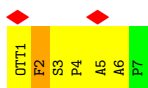
- Molecule 2: ADEP1



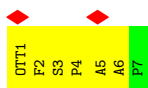
- Molecule 2: ADEP1



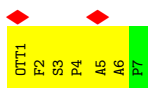
• Molecule 2: ADEP1



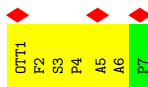
• Molecule 2: ADEP1



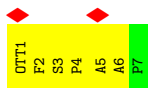
• Molecule 2: ADEP1



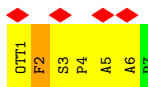
• Molecule 2: ADEP1



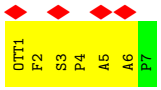
• Molecule 2: ADEP1



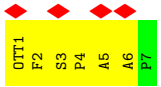
• Molecule 2: ADEP1



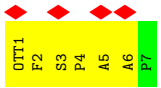
● Molecule 2: ADEP1



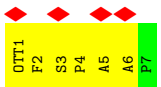
● Molecule 2: ADEP1



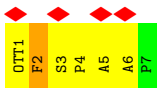
● Molecule 2: ADEP1



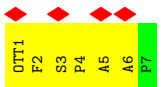
● Molecule 2: ADEP1



● Molecule 2: ADEP1



● Molecule 2: ADEP1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	114990	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 ($e^-/\text{\AA}^2$)	30.0	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	1.766	Depositor
Minimum map value	-0.969	Depositor
Average map value	0.022	Depositor
Map value standard deviation	0.132	Depositor
Recommended contour level	0.6	Depositor
Map size (Å)	172.0, 172.0, 172.0	wwPDB
Map dimensions	200, 200, 200	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86, 0.86, 0.86	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: MAA, MP8, OTT

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	0.42	0/1290	0.58	0/1740
1	B	0.42	0/1290	0.62	1/1740 (0.1%)
1	C	0.41	0/1290	0.58	0/1740
1	D	0.41	0/1294	0.58	0/1744
1	E	0.41	0/1290	0.58	0/1740
1	F	0.42	0/1290	0.63	1/1740 (0.1%)
1	G	0.41	0/1290	0.61	0/1740
1	H	0.42	0/1290	0.58	0/1740
1	I	0.43	0/1290	0.63	0/1740
1	J	0.41	0/1290	0.55	0/1740
1	K	0.49	0/1290	0.68	0/1740
1	L	0.42	0/1290	0.61	0/1740
1	M	0.46	0/1302	0.66	0/1752
1	N	0.43	0/1290	0.59	0/1740
2	O	3.23	5/29 (17.2%)	2.00	0/37
2	P	3.24	5/29 (17.2%)	2.00	0/37
2	Q	3.24	5/29 (17.2%)	2.00	0/37
2	R	3.23	5/29 (17.2%)	2.00	0/37
2	S	3.23	5/29 (17.2%)	2.00	0/37
2	T	3.23	5/29 (17.2%)	2.00	0/37
2	U	3.24	5/29 (17.2%)	2.00	0/37
2	V	3.23	5/29 (17.2%)	2.00	0/37
2	W	3.24	5/29 (17.2%)	2.00	0/37
2	X	3.24	5/29 (17.2%)	2.00	0/37
2	Y	3.24	5/29 (17.2%)	2.00	0/37
2	Z	3.24	5/29 (17.2%)	2.00	0/37
2	a	3.24	5/29 (17.2%)	2.00	0/37
2	b	3.24	5/29 (17.2%)	2.00	0/37
All	All	0.64	70/18482 (0.4%)	0.67	2/24894 (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	J	0	1

The worst 5 of 70 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	Y	3	SER	C-N	7.01	1.45	1.34
2	W	3	SER	C-N	6.98	1.45	1.34
2	U	3	SER	C-N	6.97	1.45	1.34
2	P	3	SER	C-N	6.96	1.45	1.34
2	Z	3	SER	C-N	6.96	1.45	1.34

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	95	ALA	O-C-N	5.51	130.19	123.14
1	B	95	ALA	O-C-N	5.35	129.99	123.14

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	J	95	ALA	Mainchain

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	A	1275	1293	1293	31	0
1	B	1275	1293	1293	34	0
1	C	1275	1293	1293	28	0
1	D	1279	1304	1304	27	0
1	E	1275	1293	1293	28	0
1	F	1275	1293	1293	35	0
1	G	1275	1293	1293	34	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	H	1275	1293	1293	30	0
1	I	1275	1293	1293	31	0
1	J	1275	1293	1293	28	0
1	K	1275	1293	1293	39	0
1	L	1275	1293	1293	33	0
1	M	1287	1322	1326	41	0
1	N	1275	1293	1293	40	0
2	O	52	0	49	13	0
2	P	52	0	49	12	0
2	Q	52	0	49	13	0
2	R	52	0	49	12	0
2	S	52	0	49	12	0
2	T	52	0	49	12	0
2	U	52	0	49	12	0
2	V	52	0	49	14	0
2	W	52	0	49	12	0
2	X	52	0	49	12	0
2	Y	52	0	49	12	0
2	Z	52	0	49	13	0
2	a	52	0	49	13	0
2	b	52	0	49	12	0
All	All	18594	18142	18832	457	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 12.

The worst 5 of 457 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:E:26:ASP:OD2	2:S:1:OTT:H8B	1.16	1.34
1:I:26:ASP:OD2	2:W:1:OTT:H8B	1.16	1.34
1:F:26:ASP:OD2	2:T:1:OTT:H8B	1.16	1.33
1:J:26:ASP:OD2	2:X:1:OTT:H8B	1.16	1.32
1:H:26:ASP:OD2	2:V:1:OTT:H8B	1.16	1.31

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	164/202 (81%)	149 (91%)	14 (8%)	1 (1%)	21	50
1	B	164/202 (81%)	148 (90%)	15 (9%)	1 (1%)	21	50
1	C	164/202 (81%)	148 (90%)	14 (8%)	2 (1%)	10	35
1	D	164/202 (81%)	148 (90%)	15 (9%)	1 (1%)	21	50
1	E	164/202 (81%)	147 (90%)	15 (9%)	2 (1%)	10	35
1	F	164/202 (81%)	148 (90%)	14 (8%)	2 (1%)	10	35
1	G	164/202 (81%)	148 (90%)	14 (8%)	2 (1%)	10	35
1	H	164/202 (81%)	149 (91%)	14 (8%)	1 (1%)	21	50
1	I	164/202 (81%)	149 (91%)	14 (8%)	1 (1%)	21	50
1	J	164/202 (81%)	148 (90%)	14 (8%)	2 (1%)	10	35
1	K	164/202 (81%)	147 (90%)	14 (8%)	3 (2%)	6	26
1	L	164/202 (81%)	149 (91%)	14 (8%)	1 (1%)	21	50
1	M	164/202 (81%)	147 (90%)	14 (8%)	3 (2%)	6	26
1	N	164/202 (81%)	148 (90%)	14 (8%)	2 (1%)	10	35
2	O	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	P	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	Q	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	R	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	S	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	T	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	U	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	V	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	W	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	X	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	Y	3/7 (43%)	2 (67%)	1 (33%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	Z	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	a	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
2	b	3/7 (43%)	2 (67%)	1 (33%)	0	100	100
All	All	2338/2926 (80%)	2101 (90%)	213 (9%)	24 (1%)	15	40

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	96	ALA
1	C	98	MET
1	E	98	MET
1	F	96	ALA
1	G	96	ALA

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	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	B	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	C	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	D	135/168 (80%)	133 (98%)	2 (2%)	57	69
1	E	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	F	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	G	134/168 (80%)	132 (98%)	2 (2%)	57	69
1	H	134/168 (80%)	130 (97%)	4 (3%)	36	59
1	I	134/168 (80%)	131 (98%)	3 (2%)	45	63
1	J	134/168 (80%)	131 (98%)	3 (2%)	45	63
1	K	134/168 (80%)	129 (96%)	5 (4%)	30	55
1	L	134/168 (80%)	131 (98%)	3 (2%)	45	63
1	M	137/168 (82%)	133 (97%)	4 (3%)	37	60

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	N	134/168 (80%)	131 (98%)	3 (2%)	45	63
2	O	3/3 (100%)	3 (100%)	0	100	100
2	P	3/3 (100%)	3 (100%)	0	100	100
2	Q	3/3 (100%)	3 (100%)	0	100	100
2	R	3/3 (100%)	3 (100%)	0	100	100
2	S	3/3 (100%)	3 (100%)	0	100	100
2	T	3/3 (100%)	3 (100%)	0	100	100
2	U	3/3 (100%)	3 (100%)	0	100	100
2	V	3/3 (100%)	3 (100%)	0	100	100
2	W	3/3 (100%)	3 (100%)	0	100	100
2	X	3/3 (100%)	3 (100%)	0	100	100
2	Y	3/3 (100%)	3 (100%)	0	100	100
2	Z	3/3 (100%)	3 (100%)	0	100	100
2	a	3/3 (100%)	3 (100%)	0	100	100
2	b	3/3 (100%)	3 (100%)	0	100	100
All	All	1922/2394 (80%)	1883 (98%)	39 (2%)	48	65

5 of 39 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	174	LYS
1	M	108	LYS
1	L	33	SER
1	M	33	SER
1	N	37	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

28 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	MAA	Q	5	2	4,5,6	3.25	3 (75%)	2,5,7	1.01	0
2	MAA	X	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.00	0
2	MP8	O	7	2	6,8,9	1.02	0	3,10,12	1.23	0
2	MAA	T	5	2	4,5,6	3.27	3 (75%)	2,5,7	1.01	0
2	MP8	T	7	2	6,8,9	1.02	0	3,10,12	1.23	0
2	MAA	R	5	2	4,5,6	3.25	3 (75%)	2,5,7	1.01	0
2	MP8	Y	7	2	6,8,9	1.02	0	3,10,12	1.24	0
2	MAA	V	5	2	4,5,6	3.23	3 (75%)	2,5,7	1.00	0
2	MP8	b	7	2	6,8,9	1.01	0	3,10,12	1.24	0
2	MP8	a	7	2	6,8,9	1.01	0	3,10,12	1.23	0
2	MAA	W	5	2	4,5,6	3.25	3 (75%)	2,5,7	1.01	0
2	MAA	Z	5	2	4,5,6	3.25	3 (75%)	2,5,7	1.00	0
2	MP8	S	7	2	6,8,9	1.02	0	3,10,12	1.23	0
2	MP8	R	7	2	6,8,9	1.01	0	3,10,12	1.23	0
2	MAA	P	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.02	0
2	MAA	S	5	2	4,5,6	3.25	3 (75%)	2,5,7	1.01	0
2	MAA	a	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.00	0
2	MP8	U	7	2	6,8,9	1.02	0	3,10,12	1.25	0
2	MAA	U	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.02	0
2	MP8	X	7	2	6,8,9	1.01	0	3,10,12	1.21	0
2	MAA	O	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.01	0
2	MAA	Y	5	2	4,5,6	3.27	3 (75%)	2,5,7	1.02	0
2	MP8	W	7	2	6,8,9	1.03	0	3,10,12	1.24	0
2	MP8	Z	7	2	6,8,9	1.03	0	3,10,12	1.24	0
2	MAA	b	5	2	4,5,6	3.26	3 (75%)	2,5,7	1.01	0
2	MP8	V	7	2	6,8,9	1.02	0	3,10,12	1.22	0
2	MP8	P	7	2	6,8,9	1.01	0	3,10,12	1.25	0
2	MP8	Q	7	2	6,8,9	1.02	0	3,10,12	1.24	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	MAA	Q	5	2	-	0/2/4/6	-
2	MAA	X	5	2	-	0/2/4/6	-
2	MP8	O	7	2	-	0/0/11/13	0/1/1/1
2	MAA	T	5	2	-	0/2/4/6	-
2	MP8	T	7	2	-	0/0/11/13	0/1/1/1
2	MAA	R	5	2	-	0/2/4/6	-
2	MP8	Y	7	2	-	0/0/11/13	0/1/1/1
2	MAA	V	5	2	-	0/2/4/6	-
2	MP8	b	7	2	-	0/0/11/13	0/1/1/1
2	MP8	a	7	2	-	0/0/11/13	0/1/1/1
2	MAA	W	5	2	-	0/2/4/6	-
2	MAA	Z	5	2	-	0/2/4/6	-
2	MP8	S	7	2	-	0/0/11/13	0/1/1/1
2	MP8	R	7	2	-	0/0/11/13	0/1/1/1
2	MAA	P	5	2	-	0/2/4/6	-
2	MAA	S	5	2	-	0/2/4/6	-
2	MAA	a	5	2	-	0/2/4/6	-
2	MP8	U	7	2	-	0/0/11/13	0/1/1/1
2	MAA	U	5	2	-	0/2/4/6	-
2	MP8	X	7	2	-	0/0/11/13	0/1/1/1
2	MAA	O	5	2	-	0/2/4/6	-
2	MAA	Y	5	2	-	0/2/4/6	-
2	MP8	W	7	2	-	0/0/11/13	0/1/1/1
2	MP8	Z	7	2	-	0/0/11/13	0/1/1/1
2	MAA	b	5	2	-	0/2/4/6	-
2	MP8	V	7	2	-	0/0/11/13	0/1/1/1
2	MP8	P	7	2	-	0/0/11/13	0/1/1/1
2	MP8	Q	7	2	-	0/0/11/13	0/1/1/1

The worst 5 of 42 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	Y	5	MAA	CA-N	5.14	1.56	1.47
2	X	5	MAA	CA-N	5.13	1.56	1.47
2	P	5	MAA	CA-N	5.12	1.56	1.47
2	a	5	MAA	CA-N	5.12	1.56	1.47
2	T	5	MAA	CA-N	5.10	1.56	1.47

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.

5.5 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 [i](#)

There are no chain breaks in this entry.

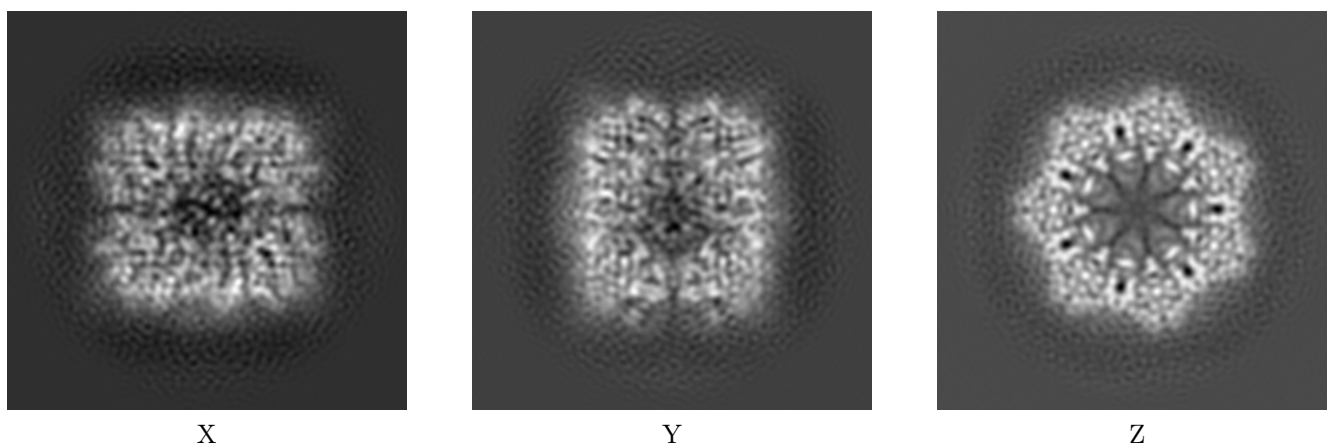
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31561. 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](#)

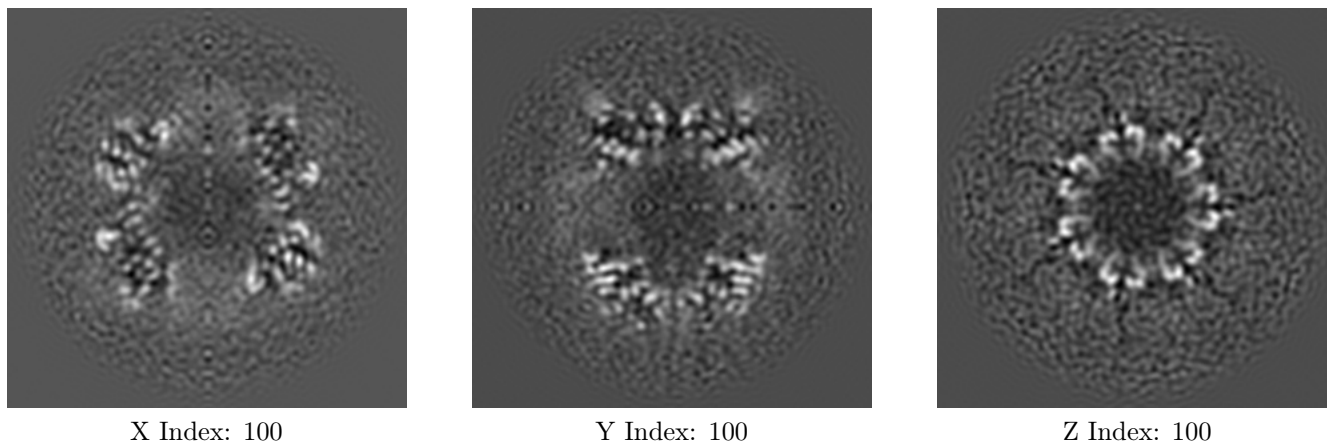
6.1.1 Primary map



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

6.2 Central slices [i](#)

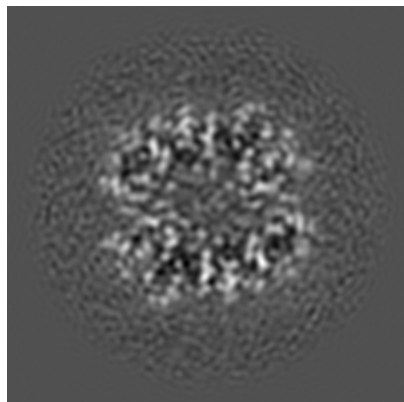
6.2.1 Primary map



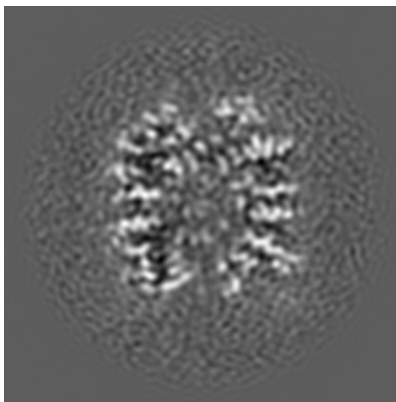
The images above show central slices of the map in three orthogonal directions.

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

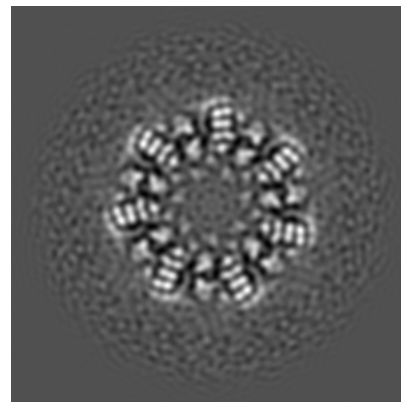
6.3.1 Primary map



X Index: 70



Y Index: 129

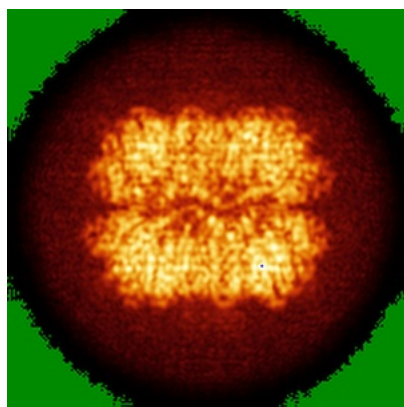


Z Index: 70

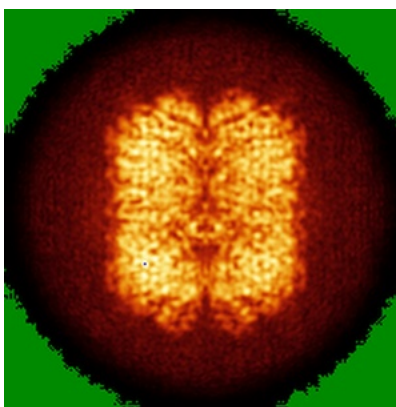
The images above show the largest variance slices of the map in three orthogonal directions.

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

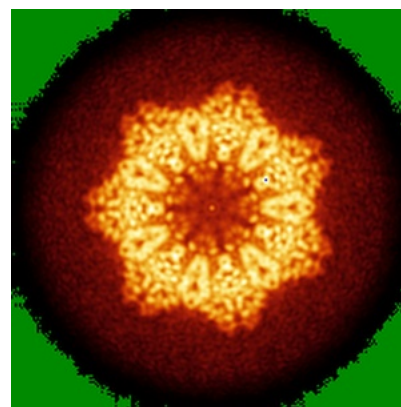
6.4.1 Primary map



X



Y

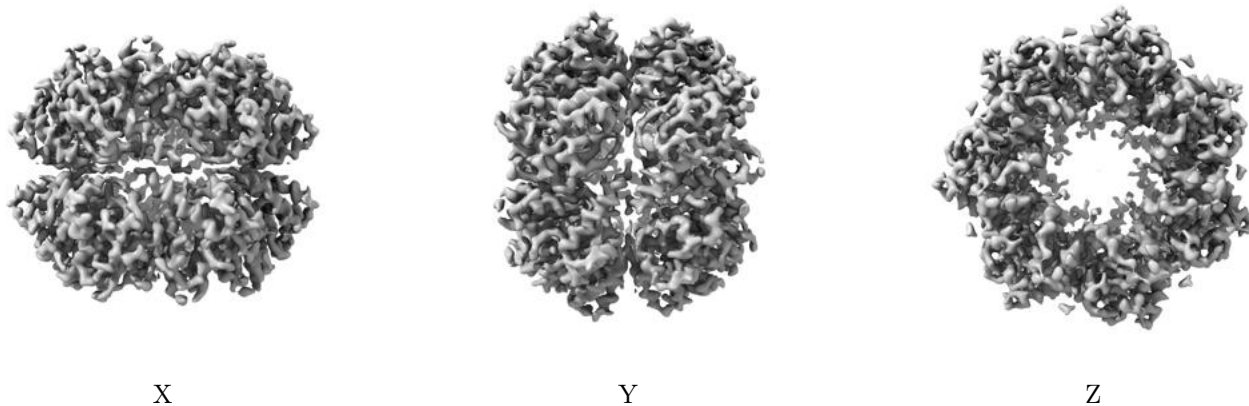


Z

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

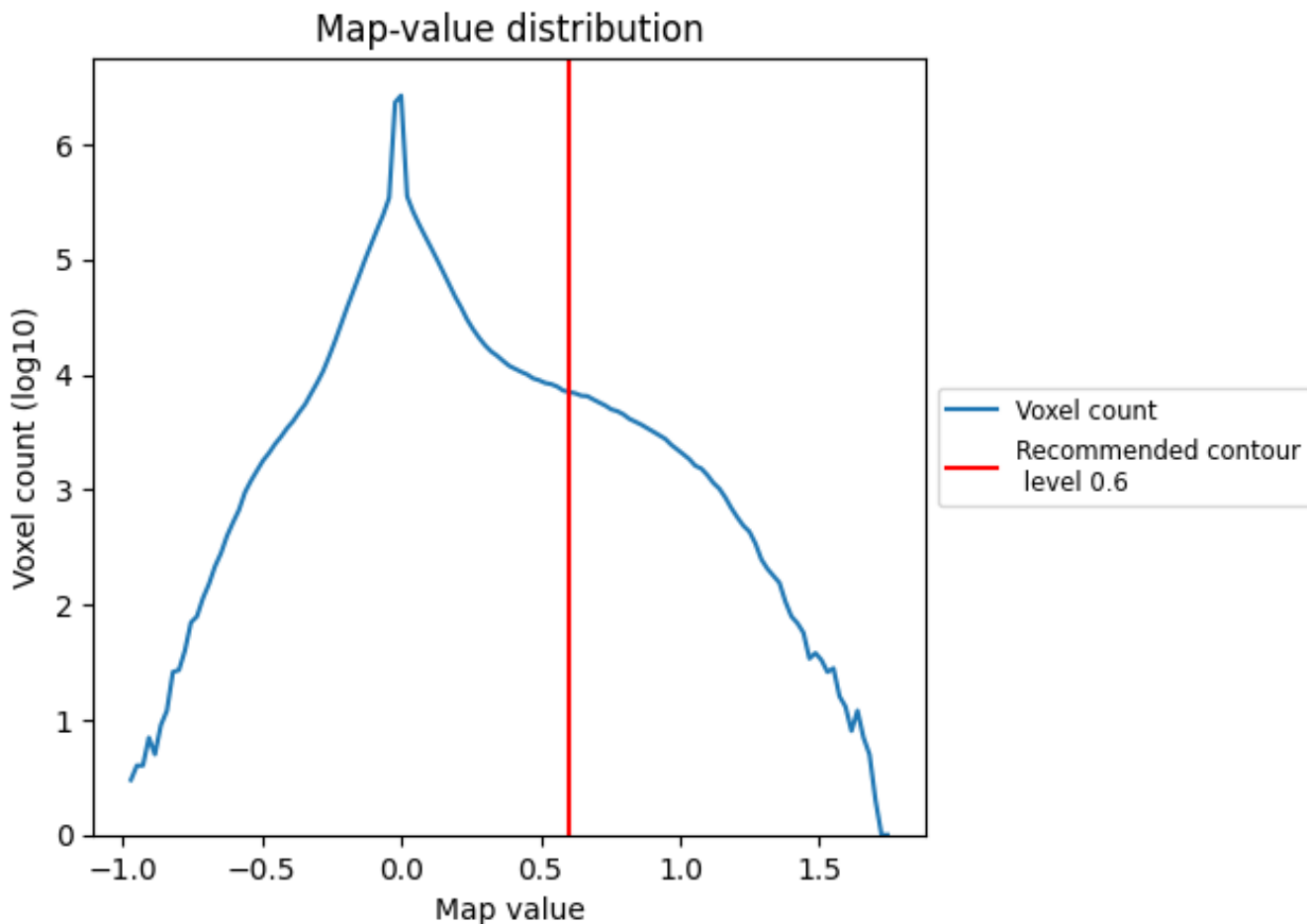
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

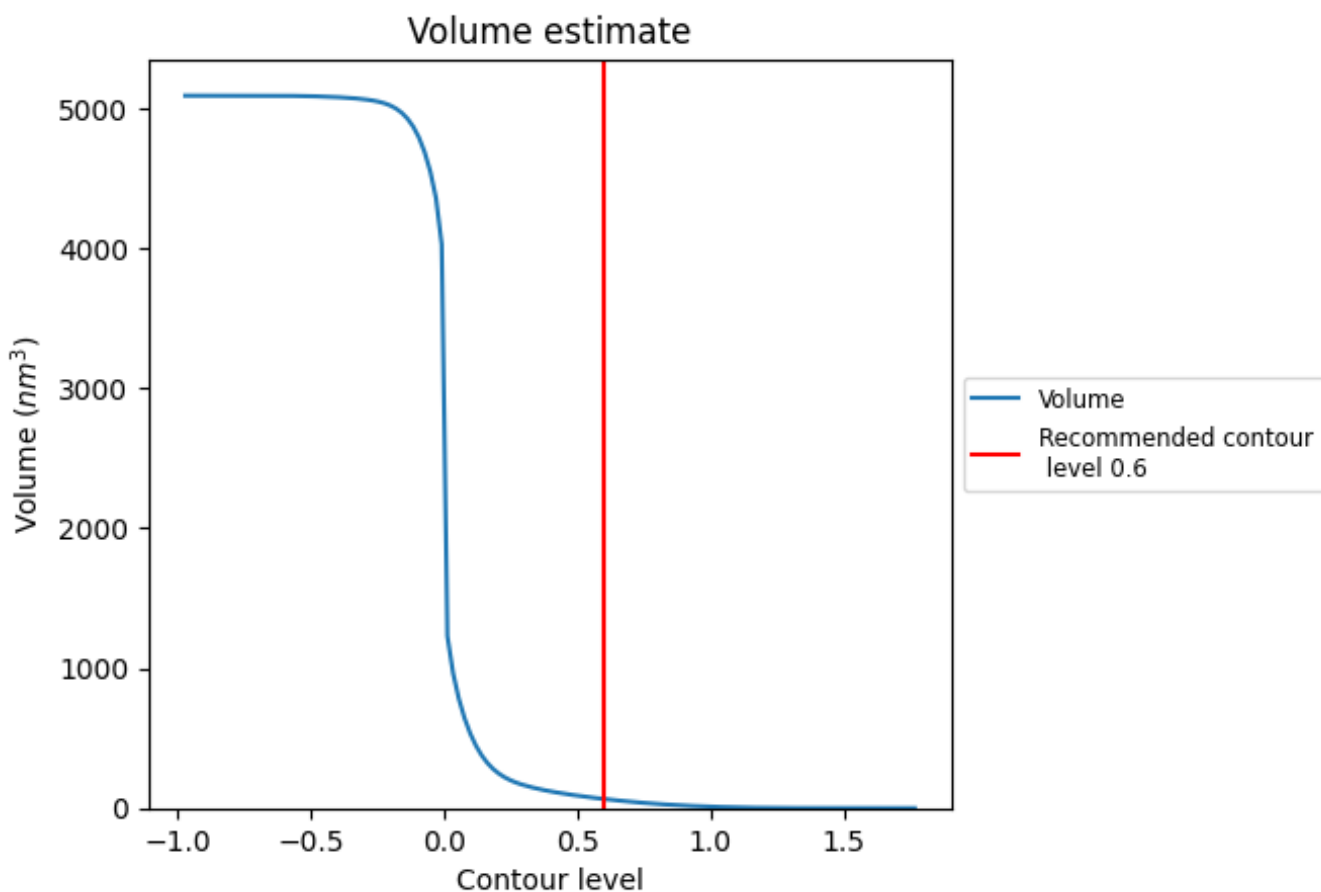
This section contains the results of statistical analysis of the map.

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.

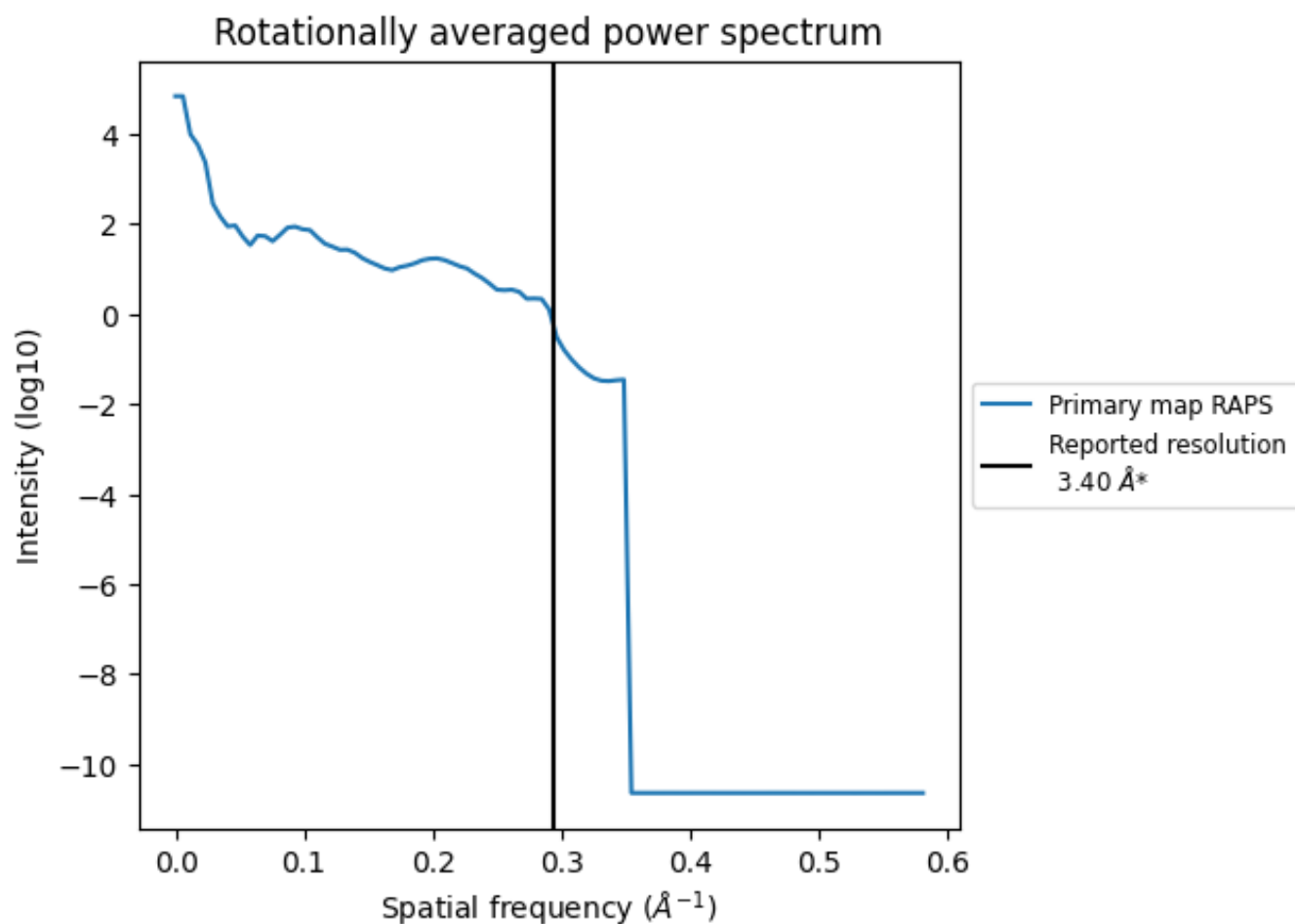
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 66 nm³; this corresponds to an approximate mass of 59 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 Å⁻¹

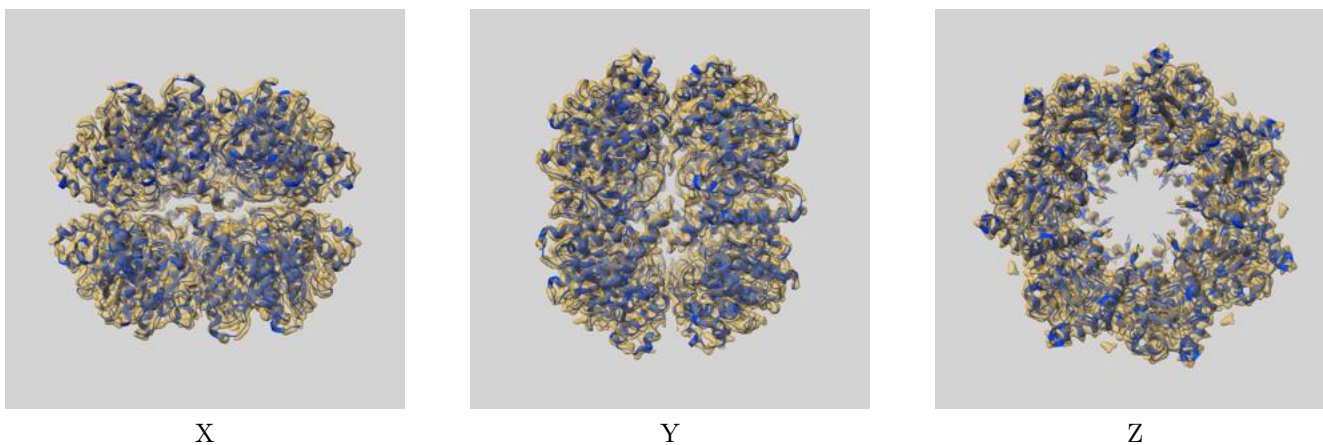
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

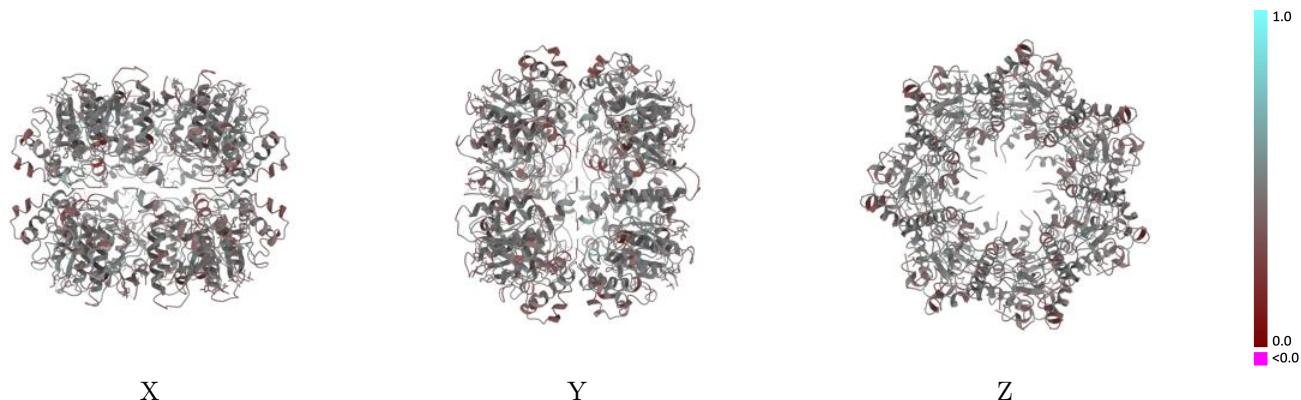
This section contains information regarding the fit between EMDB map EMD-31561 and PDB model 7FER. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



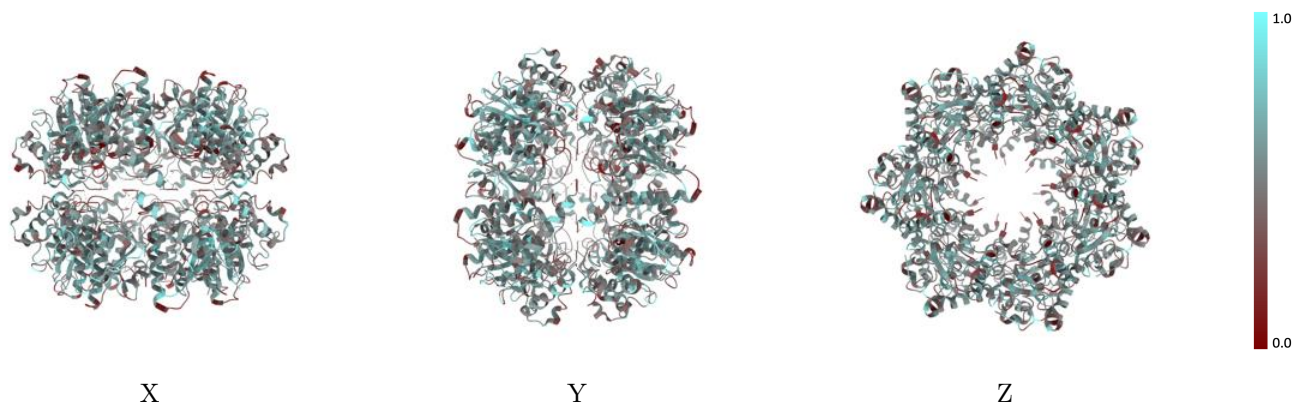
The images above show the 3D surface view of the map at the recommended contour level 0.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



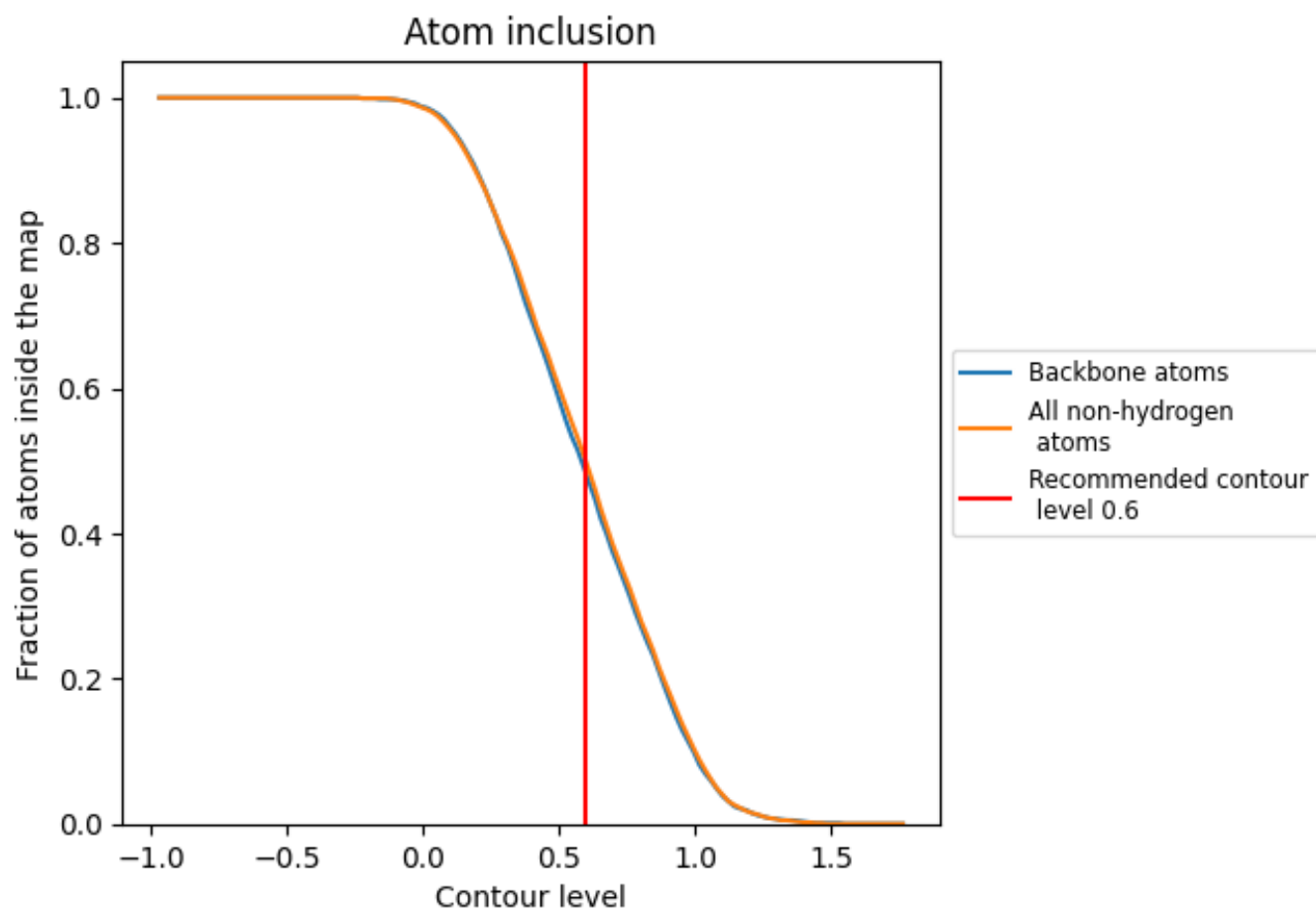
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.6).



























































9.4 Atom inclusion [i](#)



At the recommended contour level, 48% of all backbone atoms, 50% 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 (0.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.4990	 0.4430
A	 0.5180	 0.4370
B	 0.5200	 0.4290
C	 0.5200	 0.4430
D	 0.5210	 0.4420
E	 0.5290	 0.4430
F	 0.5150	 0.4380
G	 0.5170	 0.4420
H	 0.5170	 0.4510
I	 0.5250	 0.4510
J	 0.5180	 0.4500
K	 0.5220	 0.4530
L	 0.5070	 0.4450
M	 0.5090	 0.4510
N	 0.5100	 0.4400
O	 0.4230	 0.3900
P	 0.4420	 0.3810
Q	 0.4420	 0.4060
R	 0.4420	 0.4220
S	 0.4420	 0.4230
T	 0.4420	 0.3930
U	 0.4420	 0.4060
V	 0.3650	 0.4260
W	 0.3650	 0.4470
X	 0.3650	 0.4240
Y	 0.3650	 0.4300
Z	 0.3650	 0.4200
a	 0.3650	 0.4280
b	 0.4040	 0.4320

