WORLDWIDE PDB

PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Nov 21, 2022 – 01:32 AM EST

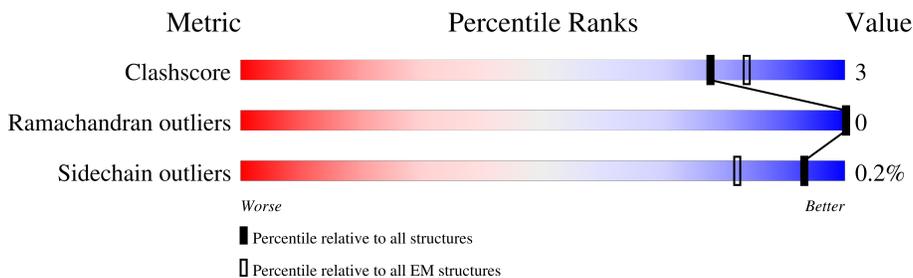|		
PDB ID	:	7UJ0
EMDB ID	:	EMD-26559
Title	:	ClpAP complex bound to ClpS N-terminal extension, class IIIb
Authors	:	Kim, S.; Fei, X.; Sauer, R.T.; Baker, T.A.
Deposited on	:	2022-03-29
Resolution	:	3.26 Å(reported)

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 3.26 Å.

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

Metric	Percentile Ranks	Value
Clashscore		3
Ramachandran outliers		0
Sidechain outliers		0.2%

Worse   *Better*

▌ Percentile relative to all structures

▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
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 <=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	758	33% / 70% 6% 24%
1	B	758	5% / 71% 6% 23%
1	C	758	• / 72% • 23%
1	D	758	• / 70% 6% 23%
1	E	758	11% / 68% 8% 23%
1	F	758	37% / 68% 8% 24%
2	S	106	• / 9% • 90%
3	H	201	• / 88% 7% 5%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	I	201	91% · 5%
3	J	201	90% 5% 5%
3	K	201	87% 8% 5%
3	L	201	93% · 5%
3	M	201	8% 90% · 5%
3	N	201	8% 86% 8% 5%
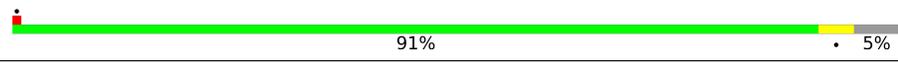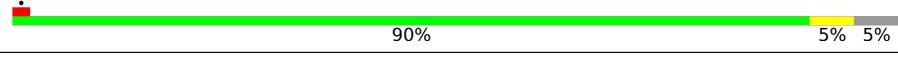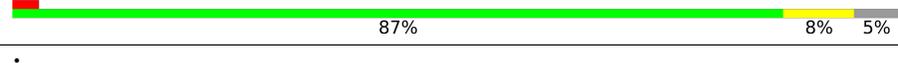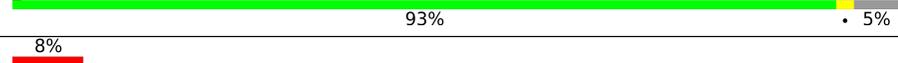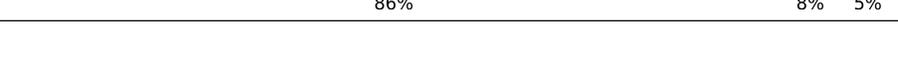
2   Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 76458 atoms, of which 38452 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 ATP-binding subunit ClpA.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	577	Total 9101	C 2835	H 4601	N 804	O 848	S 13	0	0
1	B	580	Total 9140	C 2847	H 4618	N 808	O 854	S 13	0	0
1	C	581	Total 9152	C 2851	H 4623	N 809	O 856	S 13	0	0
1	D	580	Total 9142	C 2848	H 4618	N 808	O 855	S 13	0	0
1	E	580	Total 9143	C 2848	H 4619	N 808	O 855	S 13	0	0
1	F	579	Total 9130	C 2844	H 4613	N 807	O 853	S 13	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	169	THR	MET	conflict	UNP A0A836NDF2
B	169	THR	MET	conflict	UNP A0A836NDF2
C	169	THR	MET	conflict	UNP A0A836NDF2
D	169	THR	MET	conflict	UNP A0A836NDF2
E	169	THR	MET	conflict	UNP A0A836NDF2
F	169	THR	MET	conflict	UNP A0A836NDF2

- Molecule 2 is a protein called ATP-dependent Clp protease adapter protein ClpS.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	S	11	Total 179	C 54	H 93	N 16	O 16	0	0

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

Mol	Chain	Residues	Atoms							AltConf	Trace
3	H	191	Total	C	H	N	O	S		0	0
			3002	943	1507	259	281	12			
3	I	191	Total	C	H	N	O	S		0	0
			3002	943	1507	259	281	12			
3	J	191	Total	C	H	N	O	S		0	0
			3002	943	1507	259	281	12			
3	K	191	Total	C	H	N	O	S		0	0
			3002	943	1507	259	281	12			
3	L	191	Total	C	H	N	O	S		0	0
			3002	943	1507	259	281	12			
3	M	190	Total	C	H	N	O	S		0	0
			2978	937	1494	255	280	12			
3	N	190	Total	C	H	N	O	S		0	0
			2978	937	1494	255	280	12			

There are 56 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	194	ARG	-	expression tag	UNP A0A0K4NM46
H	195	SER	-	expression tag	UNP A0A0K4NM46
H	196	HIS	-	expression tag	UNP A0A0K4NM46
H	197	HIS	-	expression tag	UNP A0A0K4NM46
H	198	HIS	-	expression tag	UNP A0A0K4NM46
H	199	HIS	-	expression tag	UNP A0A0K4NM46
H	200	HIS	-	expression tag	UNP A0A0K4NM46
H	201	HIS	-	expression tag	UNP A0A0K4NM46
I	194	ARG	-	expression tag	UNP A0A0K4NM46
I	195	SER	-	expression tag	UNP A0A0K4NM46
I	196	HIS	-	expression tag	UNP A0A0K4NM46
I	197	HIS	-	expression tag	UNP A0A0K4NM46
I	198	HIS	-	expression tag	UNP A0A0K4NM46
I	199	HIS	-	expression tag	UNP A0A0K4NM46
I	200	HIS	-	expression tag	UNP A0A0K4NM46
I	201	HIS	-	expression tag	UNP A0A0K4NM46
J	194	ARG	-	expression tag	UNP A0A0K4NM46
J	195	SER	-	expression tag	UNP A0A0K4NM46
J	196	HIS	-	expression tag	UNP A0A0K4NM46
J	197	HIS	-	expression tag	UNP A0A0K4NM46
J	198	HIS	-	expression tag	UNP A0A0K4NM46
J	199	HIS	-	expression tag	UNP A0A0K4NM46
J	200	HIS	-	expression tag	UNP A0A0K4NM46
J	201	HIS	-	expression tag	UNP A0A0K4NM46
K	194	ARG	-	expression tag	UNP A0A0K4NM46
K	195	SER	-	expression tag	UNP A0A0K4NM46

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
K	196	HIS	-	expression tag	UNP A0A0K4NM46
K	197	HIS	-	expression tag	UNP A0A0K4NM46
K	198	HIS	-	expression tag	UNP A0A0K4NM46
K	199	HIS	-	expression tag	UNP A0A0K4NM46
K	200	HIS	-	expression tag	UNP A0A0K4NM46
K	201	HIS	-	expression tag	UNP A0A0K4NM46
L	194	ARG	-	expression tag	UNP A0A0K4NM46
L	195	SER	-	expression tag	UNP A0A0K4NM46
L	196	HIS	-	expression tag	UNP A0A0K4NM46
L	197	HIS	-	expression tag	UNP A0A0K4NM46
L	198	HIS	-	expression tag	UNP A0A0K4NM46
L	199	HIS	-	expression tag	UNP A0A0K4NM46
L	200	HIS	-	expression tag	UNP A0A0K4NM46
L	201	HIS	-	expression tag	UNP A0A0K4NM46
M	194	ARG	-	expression tag	UNP A0A0K4NM46
M	195	SER	-	expression tag	UNP A0A0K4NM46
M	196	HIS	-	expression tag	UNP A0A0K4NM46
M	197	HIS	-	expression tag	UNP A0A0K4NM46
M	198	HIS	-	expression tag	UNP A0A0K4NM46
M	199	HIS	-	expression tag	UNP A0A0K4NM46
M	200	HIS	-	expression tag	UNP A0A0K4NM46
M	201	HIS	-	expression tag	UNP A0A0K4NM46
N	194	ARG	-	expression tag	UNP A0A0K4NM46
N	195	SER	-	expression tag	UNP A0A0K4NM46
N	196	HIS	-	expression tag	UNP A0A0K4NM46
N	197	HIS	-	expression tag	UNP A0A0K4NM46
N	198	HIS	-	expression tag	UNP A0A0K4NM46
N	199	HIS	-	expression tag	UNP A0A0K4NM46
N	200	HIS	-	expression tag	UNP A0A0K4NM46
N	201	HIS	-	expression tag	UNP A0A0K4NM46

- Molecule 4 is PHOSPHOTHIOPHOSPHORIC ACID-ADENYLATE ESTER (three-letter code: AGS) (formula: $C_{10}H_{16}N_5O_{12}P_3S$) (labeled as "Ligand of Interest" by depositor).
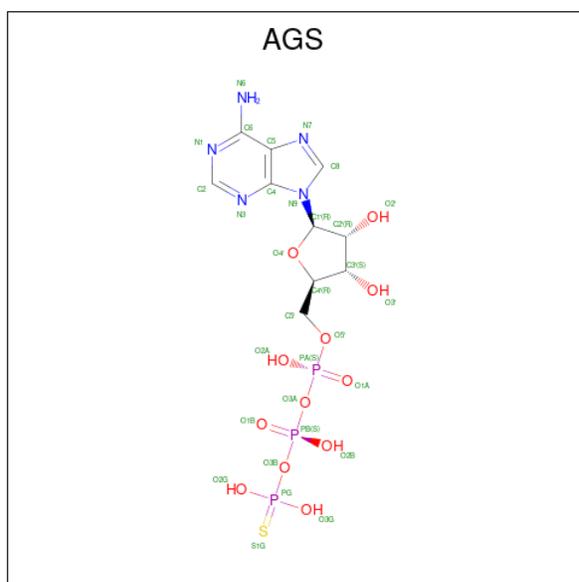
Mol	Chain	Residues	Atoms							AltConf
4	A	1	Total	C	H	N	O	P	S	0
			43	10	12	5	12	3	1	
4	B	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	
4	B	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	
4	C	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	
4	C	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	
4	D	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	
4	D	1	Total	C	H	N	O	P	S	0
			86	20	24	10	24	6	2	

- Molecule 5 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).

ADP

Mol	Chain	Residues	Atoms							AltConf
5	A	1	Total	C	H	N	O	P		0
			39	10	12	5	10	2		
5	E	1	Total	C	H	N	O	P		0
			78	20	24	10	20	4		
5	E	1	Total	C	H	N	O	P		0
			78	20	24	10	20	4		
5	F	1	Total	C	H	N	O	P		0
			78	20	24	10	20	4		
5	F	1	Total	C	H	N	O	P		0
			78	20	24	10	20	4		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
6	A	2	Total	Mg	0
			2	2	
6	B	2	Total	Mg	0
			2	2	
6	C	2	Total	Mg	0
			2	2	
6	D	2	Total	Mg	0
			2	2	
6	E	1	Total	Mg	0
			1	1	

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 ATP-binding subunit ClpA

• Molecule 1: ATP-dependent Clp protease ATP-binding subunit ClpA

Chain B:

5%

71% 6% 23%

MET LEU ASN GLN GLU LEU GLU LEU SER LEU ASN MET ALA PHE ALA ARG ALA ARG GLU HIS ARG HIS GLU PHE MET THR VAL GLU HIS LEU LEU LEU ALA LEU LEU SER ASN PRO SER ALA ARG GLU ALA LEU GLU ALA CYS SER VAL ASP LEU VAL ALA LEU ARG GLN GLU LEU GLU ALA

PHE ILE GLU GLN THR THR PRO VAL LEU PRO ALA SER GLU GLU GLU ARG ASP THR GLN PRO THR LEU SER PHE GLN ARG VAL LEU GLN ARG ALA VAL PHE HIS VAL GLN SER SER GLY ARG ASN GLU VAL THR GLY ALA ASN VAL LEU VAL ALA ILE PHE SER GLU GLN GLU SER GLN ALA

ALA TYR LEU LEU ARG LYS HIS GLU VAL SER ARG LEU ASP VAL VAL ASN PHE ILE SER HIS GLY THR ARG LYS ASP GLU PRO THR GLN SER SER ASP PRO GLY SER GLN PRO ASN SER GLU GLU GLN ALA GLY GLY GLU ARG THR **E170** **L179** **I185** **D186** **E194** **L195** **R205**

E215 **V218** **A222** **G226** **L227** **E238** **A241** **D242** **C243** **E264** **E275** **Q276** **I287** **H288** **T289** **I290** **A296** **S297** **G298** **G299** **G300** **V301** **G314** **R317** **E326** **K333** **D334** **R335** **R339** **R340** **K343** **I344** **D345** **D391** **D396** **P413** **V414** **S415** **K416** **R417** **K418**

D447 **L452** **G453** **D454** **T471** **K486** **P487** **V488** **T505** **E523** **T529** **G539** **Y540** **V541** **G542** **F543** **L562** **E565** **I566** **E567** **M581** **D588** **N589** **N590** **G591** **R592** **R597** **N606** **V609** **T612** **E613** **R614** **N624** **I635** **N642** **R706** **E719** **S724**

G728 **D736** **K737** **E738** **K739** **N740** **A749** GLN LYS HIS LYS ALA GLU ALA ALA HIS

• Molecule 1: ATP-dependent Clp protease ATP-binding subunit ClpA

Chain C:

72% 23%

MET LEU ASN GLU LEU GLU LEU SER LEU ASN MET ALA PHE ALA ARG ALA ARG GLU HIS ARG HIS GLU PHE MET THR VAL GLU HIS LEU LEU LEU ALA LEU LEU SER ASN PRO SER ALA ARG GLU ALA LEU GLU ALA CYS SER VAL ASP LEU VAL ALA LEU ARG GLN GLU LEU GLU ALA

PHE ILE GLU GLN THR THR PRO VAL LEU PRO ALA SER GLU GLU GLU ARG ASP THR GLN PRO THR LEU SER PHE GLN ARG VAL LEU GLN ARG ALA VAL PHE HIS VAL GLN SER SER GLY ARG ASN GLU VAL THR GLY ALA ASN VAL LEU VAL ALA ILE PHE SER GLU GLN GLU SER GLN ALA

ALA TYR LEU LEU ARG LYS HIS GLU VAL SER ARG LEU ASP VAL VAL ASN PHE ILE SER HIS GLY THR ARG LYS ASP GLU PRO THR GLN SER SER ASP PRO GLY SER GLN PRO ASN SER GLU GLU GLN ALA GLY GLY GLU ARG **T169** **E194** **S216** **E238** **I245** **K258**

L271 **D277** **T278** **I281** **S297** **G298** **G299** **Q300** **L310** **F327** **E332** **E352** **K387** **D396** **E404** **P413** **V414** **S415** **K416** **R417** **K418** **D447** **V460** **I467** **D520** **E523** **E526** **E567** **D588** **N589** **R592** **R597** **L644** **Q672** **V678**

E685 **R702** **E719** **L725** **G728** **G729** **Q730** **E738** **A749** GLN LYS HIS LYS ALA GLU ALA ALA HIS

• Molecule 1: ATP-dependent Clp protease ATP-binding subunit ClpA

Chain D:

70% 6% 23%

MET LEU ASN GLN GLU LEU GLU LEU SER LEU ASN MET ALA PHE ALA ARG ALA ARG GLU HIS ARG HIS GLU PHE MET THR VAL GLU HIS LEU LEU LEU ALA LEU LEU SER ASN PRO SER ALA ARG GLU ALA LEU GLU ALA CYS SER VAL ASP LEU VAL ALA LEU ARG GLN GLU LEU GLU ALA

PHE ILE GLU GLN THR THR PRO VAL LEU PRO ALA SER GLU GLU GLU ASP ARG THR GLN PRO THR LEU SER PHE GLN ARG VAL LEU GLN ARG ALA ALA VAL PHE HIS VAL GLN SER SER GLY ARG ASN GLU VAL THR GLY ALA ASN VAL LEU VAL ALA ILE PHE SER GLU GLN GLU SER GLN ALA

ALA TYR LEU LEU ARG LYS GLU VAL SER ARG LEU ASP VAL VAL ASN PHE ILE SER HIS GLY THR ARG LYS ASP GLU PRO THR GLN SER SER ASP PRO GLY SER GLN PRO ASN SER GLU GLU GLN ALA GLY GLU GLU ARG **T169** **E170** **R191** **R197** **K207** **E215** **V218**

E238 **D242** **A255** **R266** **L271** **S297** **L310** **Y324** **S328** **D345** **E352** **I358** **K362** **V382** **K387** **D391** **L394** **A398** **I399** **D400** **K416** **R417** **K418** **K419** **T420** **V441** **R446** **G482** **H485** **Q500** **K501** **T502** **E526** **T529**

R532 **G542** **F543** **D544** **L562** **D582** **T587** **R597** **R610** **L653** **S654** **T655** **H659** **A701** **R706** **N711** **E719** **L725** **G728** **G729** **Q730** **D736** **K739** **N740** **Y744** **G745** **F746** **Q747** **S748** ALA GLN LYS HIS LYS ALA GLU ALA ALA HIS

• Molecule 1: ATP-dependent Clp protease ATP-binding subunit ClpA

Chain E: 11%   68%   8%   23%

MET LEU ASN GLN GLU LEU GLU LEU SER LEU ASN MET ALA PHE ALA ARG ALA ARG GLU HIS ARG HIS GLU PHE MET THR VAL GLU HIS LEU LEU LEU ALA LEU LEU SER ASN PRO SER ALA ARG GLU ALA LEU GLU ALA CYS SER VAL ASP LEU VAL ALA LEU ARG GLN GLU LEU GLU ALA

PHE ILE GLU GLN THR THR PRO VAL LEU PRO ALA SER GLU GLU GLU ASP THR GLN PRO THR LEU SER PHE GLN ARG VAL LEU GLN ARG ALA ALA VAL PHE HIS VAL GLN SER SER GLY ARG ASN GLU VAL THR GLY ALA ASN VAL LEU VAL ALA ILE PHE SER GLU GLN GLU SER GLN ALA

ALA TYR LEU LEU ARG LYS GLU VAL SER ARG LEU ASP VAL VAL ASN PHE ILE SER HIS GLY THR ARG LYS ASP GLU PRO THR GLN SER SER ASP PRO GLY SER GLN PRO ASN SER GLU GLU GLN ALA GLY GLU GLU ARG **T169** **E170** **N171** **D186** **E194** **R204** **V213**

A222 **G226** **E238** **E286** **A293** **G294** **A295** **T323** **Y324** **Q325** **E326** **R339** **E352** **V355** **N359** **G360** **L361** **K376** **I389** **D396** **K397** **R408** **M412** **P413** **V414** **S415** **K416** **R417** **K418** **S428** **E438** **K439** **Q443** **D447** **N451** **M458** **Q463** **P496**

K501 **T502** **V506** **L516** **E526** **R527** **H528** **T529** **A536** **P537** **G538** **G539** **Y540** **V541** **G542** **F543** **D544** **Q545** **G546** **V553** **H558** **A559** **V560** **D564** **E565** **V580** **G584** **D588** **N589** **N590** **G591** **D595** **F596** **R597** **V600** **N642** **D651** **F665** **Q672** **L673** **D674** **Q675** **K676**

G677 **V678** **S679** **L680** **E681** **V682** **S683** **Q684** **E685** **A686** **R687** **N688** **W689** **L690** **A691** **E692** **K693** **D696** **G700** **A701** **R702** **P703** **M704** **A705** **R706** **V707** **I708** **Q709** **D710** **K713** **K714** **P715** **L716** **A717** **N718** **E719** **L720** **L721** **F722** **G723** **S724** **L725** **V726** **D727** **G728** **G729** **Q730** **V731** **T732** **V733** **A734** **L735** **D736** **K737** **E738** **K739** **N740**

E741 **L742** **T743** **Y744** **G745** **F746** **Q747** **S748** ALA GLN LYS HIS LYS ALA GLU ALA ALA HIS

• Molecule 1: ATP-dependent Clp protease ATP-binding subunit ClpA

Chain F: 37%   68%   8%   24%

MET LEU ASN GLN GLU LEU GLU LEU SER LEU ASN MET ALA PHE ALA ARG ALA ALA ARG GLU HIS ARG HIS GLU PHE MET THR VAL GLU HIS LEU LEU LEU ALA LEU LEU SER ASN PRO SER ALA ARG GLU ALA LEU GLU ALA CYS SER VAL ASP LEU VAL ALA LEU ARG GLN GLU LEU GLU ALA

PHE ILE GLU GLN THR THR PRO VAL LEU PRO ALA SER GLU GLU GLU ASP THR GLN PRO THR LEU SER PHE GLN ARG VAL LEU GLN ARG ALA ALA VAL PHE HIS VAL GLN SER SER GLY ARG ASN GLU VAL THR GLY ALA ASN VAL LEU VAL ALA ILE PHE SER GLU GLN GLU SER GLN ALA

ALA TYR LEU LEU ARG LYS HIS GLU VAL SER ARG LEU ASP VAL VAL ASN PHE ILE SER HIS GLY THR ARG LYS ASP GLU PRO THR GLN SER SER ASP PRO GLY SER GLN PRO ASN SER GLU GLU GLN ALA GLY GLY GLU GLU ARG THR **E170 N171** Q178 L188 E194 R205

K220 T221 A222 I223 E238 C243 I250 L253 L254 A255 G256 K258 Y259 F263 E264 K265 Q276 D277 H288 G292 A293 G294 A295 A296 S297 G298 G299 Q300 V301 D302 R317 T322 T323 Y324 Q325 N329 I330 K333 D334 R335 D345 A367 D370 V371

R372 A375 N390 D396 D400 E404 R410 L411 M412 P413 V414 S415 K416 R417 T420 A424 R432 R435 I436 P437 E438 K439 S440 V441 S442 Q443 S444 D445 R446 D447 T448 L449 K450 N451 L452 G453 D454 R455 L456 K457 M458 L459 V460 F461 G462 Q463 D464 I467

T471 E472 K475 M476 A477 R478 A479 G480 L481 G482 H483 E484 H485 K486 P487 V488 G489 S490 F491 L492 F493 A494 G495 P496 T497 G498 V499 G500 K501 V504 Q507 K510 A511 L512 G513 I514 E515 L516 L517 R518 F519 D520 M521 S522 E523 Y524 M525 E526 R527 H528 T529 V530 S531 R532 L533 I534

G535 A536 P537 P538 G539 Y540 V541 G542 F543 D544 Q545 G546 G647 L548 L549 T550 D551 A552 V553 I554 K555 H556 P557 H558 A559 L562 L563 D564 E565 I566 E567 K568 A569 H570 P571 D572 V573 F574 N575 I576 Q579 V580 M581 D582 N583 G584 T585 L586 T587 D588 N589 N590 G591 R592 K593 A594 D595 F596

R597 L601 L669 T604 T605 N606 A607 G608 V609 R610 E611 T612 E613 R614 K615 H621 Q622 D623 N624 S625 T626 D627 A628 M629 E630 K633 K634 I635 F636 T637 P638 E639 F640 R641 N642 R643 L644 D645 N646 I647 I648 W649 F650 D651 H652 L653 D656 V657 I658 H659 Q660 V661 V662 D663 K664 F665

I666 V667 E668 L669 Q670 V671 Q672 L673 D674 Q675 K676 G677 V678 S679 L680 E681 V682 S683 Q684 R687 N688 W689 L690 A691 E692 K693 G694 Y695 D696 R697 A698 M699 G700 A701 R702 P703 M704 A705 R706 N711 L712 K713 K714 P715 L716 A717 N718 E719 L720 L721 F722 G723 S724 L725 V726 D727 G728 G729

Q730 V731 T732 V733 A734 L735 D736 K737 E738 K739 N740 E741 L742 T743 Y744 G745 F746 Q747 S748 ALA GLN LYS HIS LYS ALA GLU ALA ALA HIS

• Molecule 2: ATP-dependent Clp protease adapter protein ClpS

Chain S:

MET GLY LYS THR ASN ASP TRP LEU ASP PHE ASP ASP GLN LEU ALA GLU E16 R19 L22 S26 MET TYR LYS VAL ILE LEU VAL VAL ASN ASP ASP TYR THR PRO MET GLU PHE VAL ILE ASP LEU GLN LYS PHE SER TYR ASP GLU ARG ALA THR GLN LEU MET LEU ALA

VAL HIS TYR GLN GLY LYS ALA ILE CYS GLY VAL PHE THR ALA GLU VAL ALA GLU THR LYS VAL ALA MET VAL ASN LYS TYR ALA ARG GLU GLU HIS PRO LEU LEU CYS THR LEU GLU LYS ALA

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain H:

ALA L2 R12 R15 D37 A72 S75 T89 L103 N116 S117 R118 V119 M120 I121 H122 D134 E141 R148 E151 E162 Q163 I164 E165 R166 D167 T168 E169 R192 ASN ARG SER HIS HIS HIS HIS HIS HIS

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain I:

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain J:

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain K:

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain L:

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain M:

• Molecule 3: ATP-dependent Clp protease proteolytic subunit

Chain N:

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	38006	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 $(e^-/Å^2)$	34	Depositor
Minimum defocus (nm)	-500	Depositor
Maximum defocus (nm)	-2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	16.875	Depositor
Minimum map value	-6.958	Depositor
Average map value	0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	1.4	Depositor
Map size (Å)	150.51, 147.9, 186.18001	wwPDB
Map dimensions	214, 170, 173	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86999995, 0.86999995, 0.87000006	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, AGS, MG

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	0.27	0/4566	0.53	0/6162
1	B	0.28	0/4588	0.53	0/6192
1	C	0.30	0/4595	0.52	0/6202
1	D	0.30	0/4590	0.54	1/6195 (0.0%)
1	E	0.28	0/4590	0.54	0/6195
1	F	0.27	0/4583	0.54	0/6185
2	S	0.28	0/87	0.64	0/116
3	H	0.29	0/1519	0.50	0/2047
3	I	0.30	0/1519	0.52	0/2047
3	J	0.31	0/1519	0.55	0/2047
3	K	0.31	0/1519	0.52	0/2047
3	L	0.30	0/1519	0.52	0/2047
3	M	0.29	0/1508	0.51	0/2033
3	N	0.29	0/1508	0.49	0/2033
All	All	0.29	0/38210	0.53	1/51548 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	391	ASP	CB-CG-OD1	6.90	124.51	118.30

There are no chirality outliers.

There are no planarity outliers.

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	4500	4601	4601	28	0
1	B	4522	4618	4617	28	0
1	C	4529	4623	4623	27	0
1	D	4524	4618	4618	33	0
1	E	4524	4619	4619	41	0
1	F	4517	4613	4613	42	0
2	S	86	93	92	1	0
3	H	1495	1507	1507	8	0
3	I	1495	1507	1507	5	0
3	J	1495	1507	1507	6	0
3	K	1495	1507	1507	9	0
3	L	1495	1507	1507	2	0
3	M	1484	1494	1494	6	0
3	N	1484	1494	1494	10	0
4	A	31	12	12	0	0
4	B	62	24	24	1	0
4	C	62	24	24	1	0
4	D	62	24	24	2	0
5	A	27	12	12	0	0
5	E	54	24	24	1	0
5	F	54	24	24	1	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
6	C	2	0	0	0	0
6	D	2	0	0	0	0
6	E	1	0	0	0	0
All	All	38006	38452	38450	222	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 3.

The worst 5 of 222 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)
3:K:141:GLU:OE2	3:L:118:ARG:NH2	2.14	0.80
1:F:733:VAL:HG12	1:F:742:LEU:HD12	1.70	0.72
1:B:706:ARG:NH2	1:C:644:LEU:O	2.23	0.72
1:B:614:ARG:NH2	1:B:624:ASN:OD1	2.25	0.69
1:D:324:TYR:OH	1:D:345:ASP:OD1	2.10	0.68

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	575/758 (76%)	572 (100%)	3 (0%)	0	100	100
1	B	578/758 (76%)	576 (100%)	2 (0%)	0	100	100
1	C	579/758 (76%)	570 (98%)	9 (2%)	0	100	100
1	D	578/758 (76%)	576 (100%)	2 (0%)	0	100	100
1	E	578/758 (76%)	576 (100%)	2 (0%)	0	100	100
1	F	577/758 (76%)	573 (99%)	4 (1%)	0	100	100
2	S	9/106 (8%)	9 (100%)	0	0	100	100
3	H	189/201 (94%)	189 (100%)	0	0	100	100
3	I	189/201 (94%)	188 (100%)	1 (0%)	0	100	100
3	J	189/201 (94%)	189 (100%)	0	0	100	100
3	K	189/201 (94%)	189 (100%)	0	0	100	100
3	L	189/201 (94%)	189 (100%)	0	0	100	100
3	M	188/201 (94%)	188 (100%)	0	0	100	100
3	N	188/201 (94%)	187 (100%)	1 (0%)	0	100	100
All	All	4795/6061 (79%)	4771 (100%)	24 (0%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	484/639 (76%)	483 (100%)	1 (0%)	93	96
1	B	486/639 (76%)	486 (100%)	0	100	100
1	C	487/639 (76%)	487 (100%)	0	100	100
1	D	487/639 (76%)	486 (100%)	1 (0%)	93	96
1	E	487/639 (76%)	485 (100%)	2 (0%)	91	94
1	F	486/639 (76%)	486 (100%)	0	100	100
2	S	10/93 (11%)	10 (100%)	0	100	100
3	H	162/171 (95%)	161 (99%)	1 (1%)	86	91
3	I	162/171 (95%)	162 (100%)	0	100	100
3	J	162/171 (95%)	162 (100%)	0	100	100
3	K	162/171 (95%)	161 (99%)	1 (1%)	86	91
3	L	162/171 (95%)	161 (99%)	1 (1%)	86	91
3	M	161/171 (94%)	161 (100%)	0	100	100
3	N	161/171 (94%)	161 (100%)	0	100	100
All	All	4059/5124 (79%)	4052 (100%)	7 (0%)	93	96

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	418	LYS
3	H	192	ARG
3	L	192	ARG
3	K	192	ARG
1	E	376	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	740	ASN
1	F	711	ASN
3	N	191	HIS
3	H	41	ASN
1	D	730	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 21 ligands modelled in this entry, 9 are monoatomic - leaving 12 for Mogul analysis.

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	$\#|Z| > 2$
4	AGS	B	801	6	26,33,33	0.81	1 (3%)	26,52,52	0.85	1 (3%)
4	AGS	D	801	6	26,33,33	0.84	1 (3%)	26,52,52	0.96	1 (3%)
5	ADP	E	801	6	24,29,29	0.69	0	29,45,45	0.79	1 (3%)
5	ADP	F	802	-	24,29,29	0.65	0	29,45,45	0.76	1 (3%)
5	ADP	E	802	-	24,29,29	0.68	0	29,45,45	0.74	1 (3%)
4	AGS	A	801	6	26,33,33	0.82	1 (3%)	26,52,52	0.93	2 (7%)
4	AGS	C	801	6	26,33,33	0.81	0	26,52,52	0.87	1 (3%)
4	AGS	D	802	6	26,33,33	0.83	1 (3%)	26,52,52	0.88	1 (3%)
5	ADP	F	801	-	24,29,29	0.67	0	29,45,45	0.83	1 (3%)
4	AGS	B	802	6	26,33,33	0.83	1 (3%)	26,52,52	0.91	1 (3%)
5	ADP	A	802	-	24,29,29	0.67	0	29,45,45	0.85	2 (6%)
4	AGS	C	802	6	26,33,33	0.82	1 (3%)	26,52,52	0.81	1 (3%)

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
4	AGS	B	801	6	-	1/17/38/38	0/3/3/3
4	AGS	D	801	6	-	3/17/38/38	0/3/3/3
5	ADP	E	801	6	-	2/12/32/32	0/3/3/3
5	ADP	F	802	-	-	4/12/32/32	0/3/3/3
5	ADP	E	802	-	-	0/12/32/32	0/3/3/3
4	AGS	A	801	6	-	5/17/38/38	0/3/3/3
4	AGS	C	801	6	-	3/17/38/38	0/3/3/3
4	AGS	D	802	6	-	4/17/38/38	0/3/3/3
5	ADP	F	801	-	-	0/12/32/32	0/3/3/3
4	AGS	B	802	6	-	1/17/38/38	0/3/3/3
5	ADP	A	802	-	-	1/12/32/32	0/3/3/3
4	AGS	C	802	6	-	2/17/38/38	0/3/3/3

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	801	AGS	PG-S1G	2.13	1.95	1.90
4	D	801	AGS	PG-S1G	2.13	1.95	1.90
4	D	802	AGS	PG-S1G	2.12	1.95	1.90
4	B	801	AGS	PG-S1G	2.10	1.95	1.90
4	B	802	AGS	PG-S1G	2.04	1.95	1.90

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	801	AGS	O4'-C1'-C2'	-2.38	103.45	106.93
5	F	802	ADP	C5-C6-N6	2.31	123.86	120.35
5	A	802	ADP	C5-C6-N6	2.26	123.78	120.35
4	C	801	AGS	C5-C6-N6	2.22	123.73	120.35
4	B	801	AGS	C5-C6-N6	2.22	123.72	120.35

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	801	AGS	C5'-O5'-PA-O2A
4	A	801	AGS	C5'-O5'-PA-O3A
4	A	801	AGS	C4'-C5'-O5'-PA
4	C	801	AGS	C5'-O5'-PA-O3A
4	C	802	AGS	C5'-O5'-PA-O1A

There are no ring outliers.

6 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	801	AGS	1	0
5	E	802	ADP	1	0
4	C	801	AGS	1	0
4	D	802	AGS	1	0
5	F	801	ADP	1	0
4	B	802	AGS	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand AGS B 801

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS D 801

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP E 801

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP F 802

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP E 802

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS A 801

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS C 801

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS D 802

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP F 801

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS B 802

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP A 802

Bond lengths

Bond angles

Torsions

Rings

Ligand AGS C 802

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-26559. 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 ⓘ

6.1.1   Primary map

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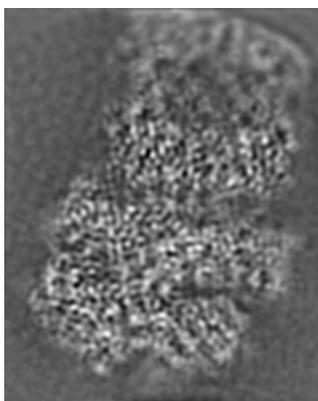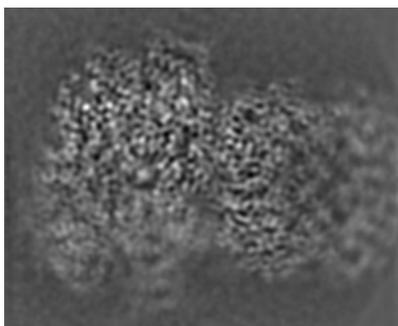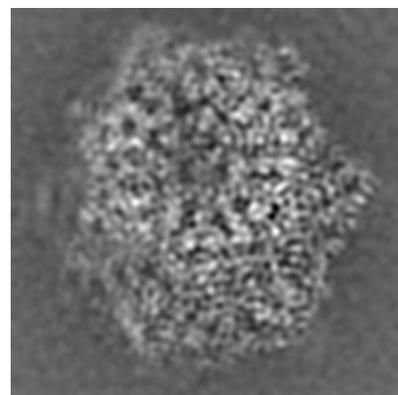
The images above show the map projected in three orthogonal directions.

6.2   Central slices ⓘ
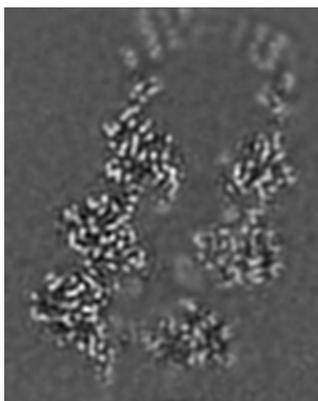
6.2.1   Primary map
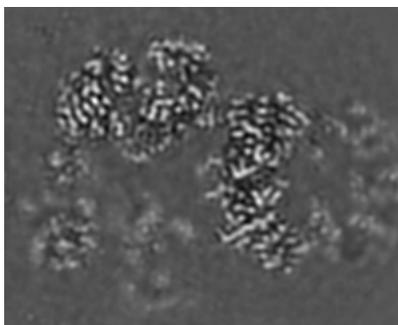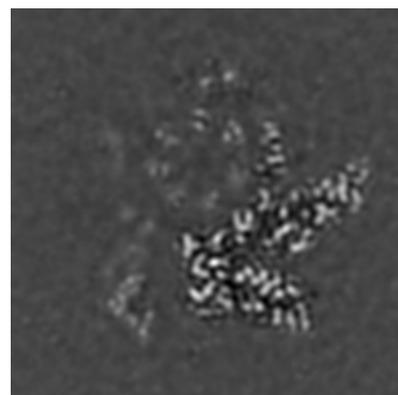
X Index: 86   Y Index: 85   Z Index: 107

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

6.3　Largest variance slices　ⓘ
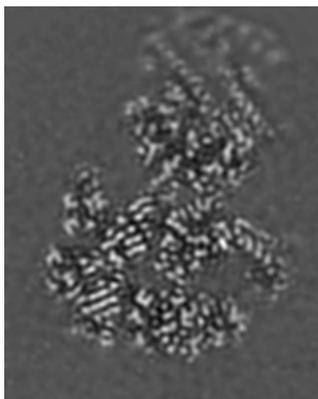
6.3.1　Primary map
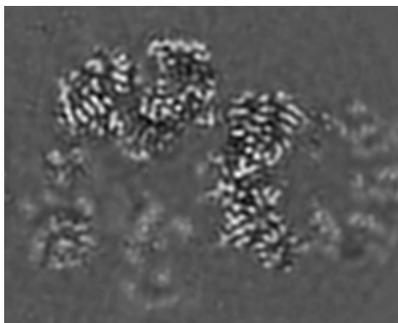
| X Index: 115 | Y Index: 86 | Z Index: 84 |
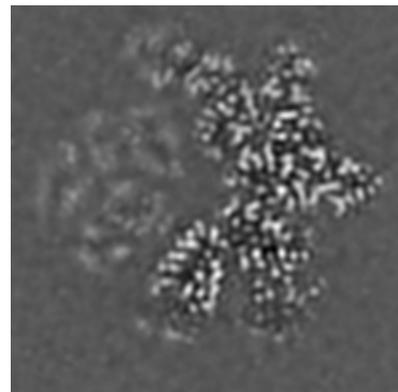
The images above show the largest variance slices of the map in three orthogonal directions.

6.4　Orthogonal surface views　ⓘ

6.4.1　Primary map

| X | Y | Z |
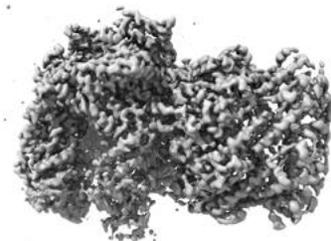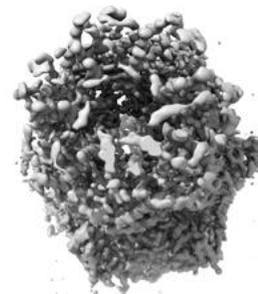
The images above show the 3D surface view of the map at the recommended contour level 1.4. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5   Mask visualisation (i)

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

7 Map analysis ⓘ

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

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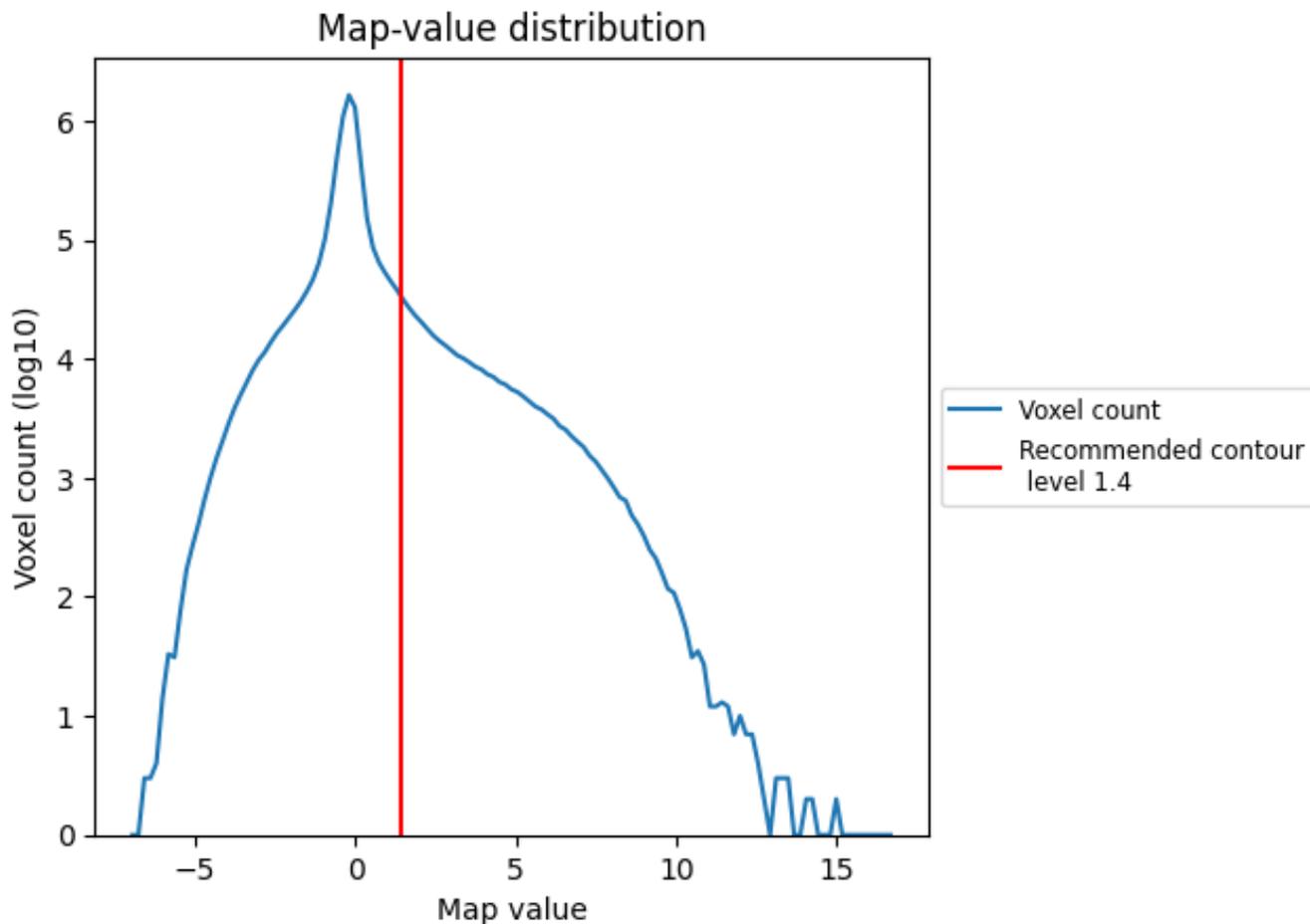
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2   Volume estimate ⓘ
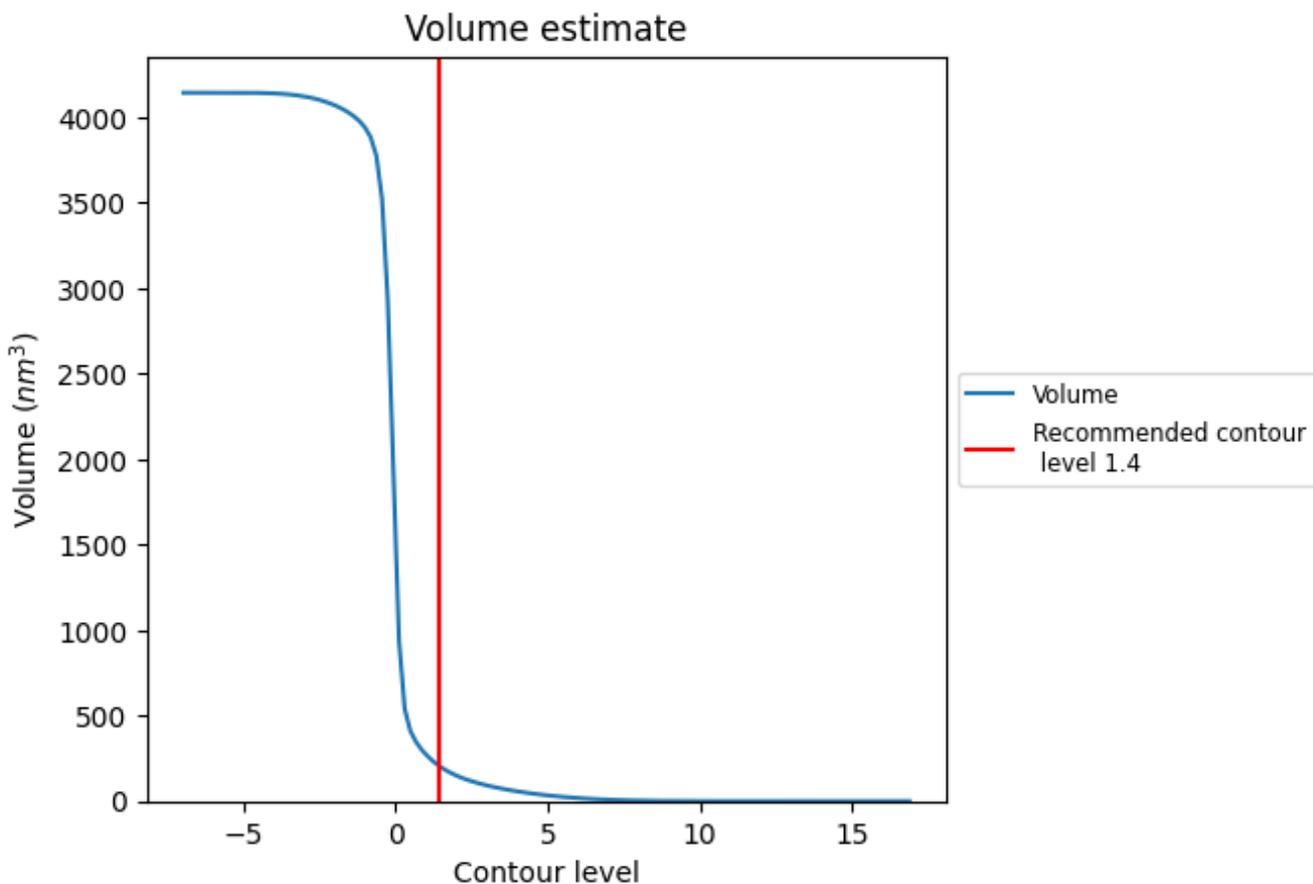
The volume at the recommended contour level is 210 nm^3; this corresponds to an approximate mass of 190 kDa.

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 ⓘ

This section was not generated. The rotationally averaged power spectrum is only generated for cubic maps.

8 Fourier-Shell correlation (i)

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-26559 and PDB model 7UJ0. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay (i)

X   Y   Z
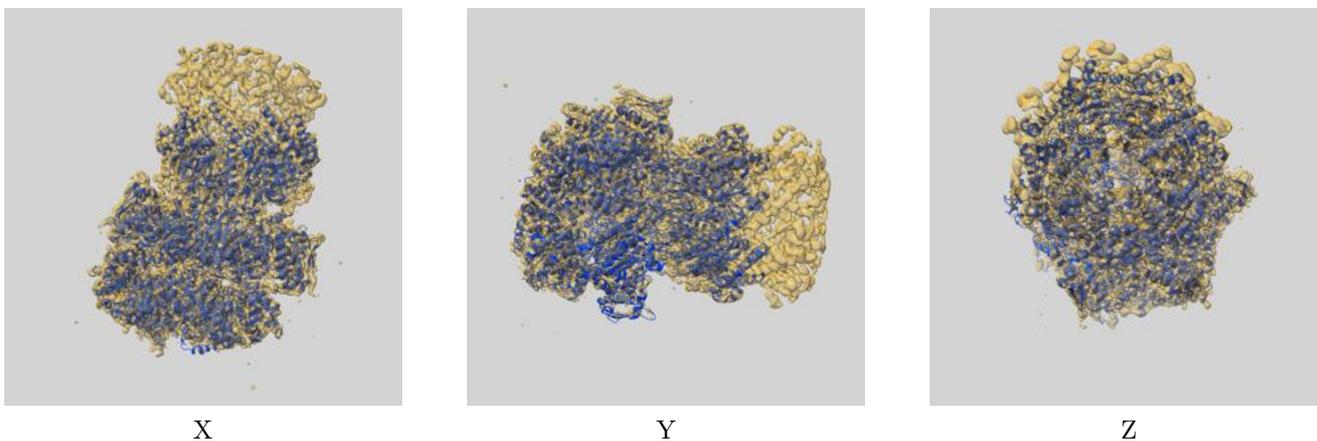
The images above show the 3D surface view of the map at the recommended contour level 1.4 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model (i)

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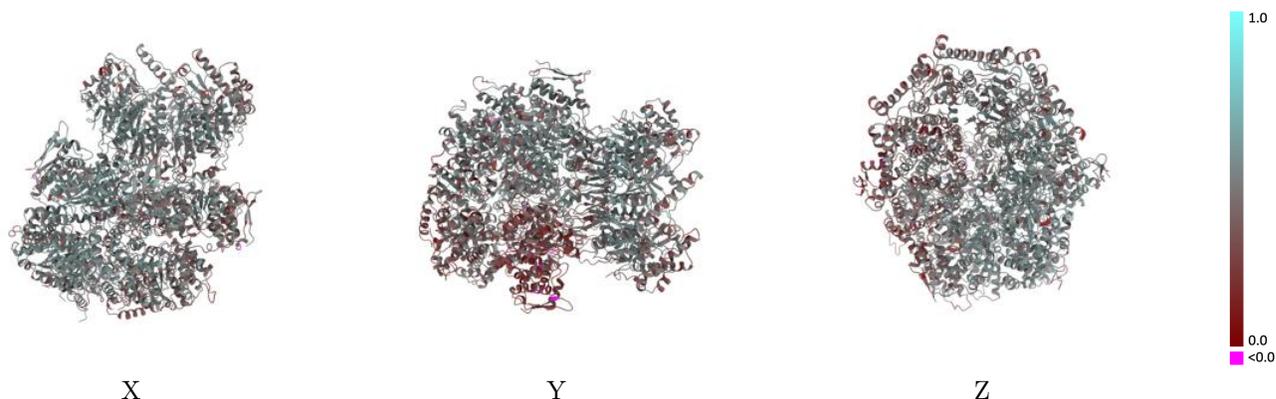
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

X   Y   Z
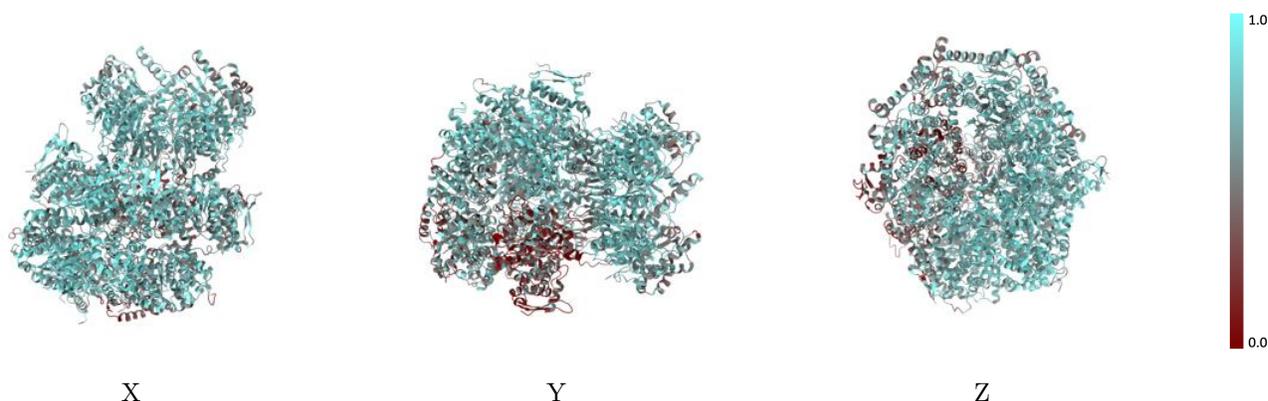
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (1.4).

9.4   Atom inclusion ⓘ
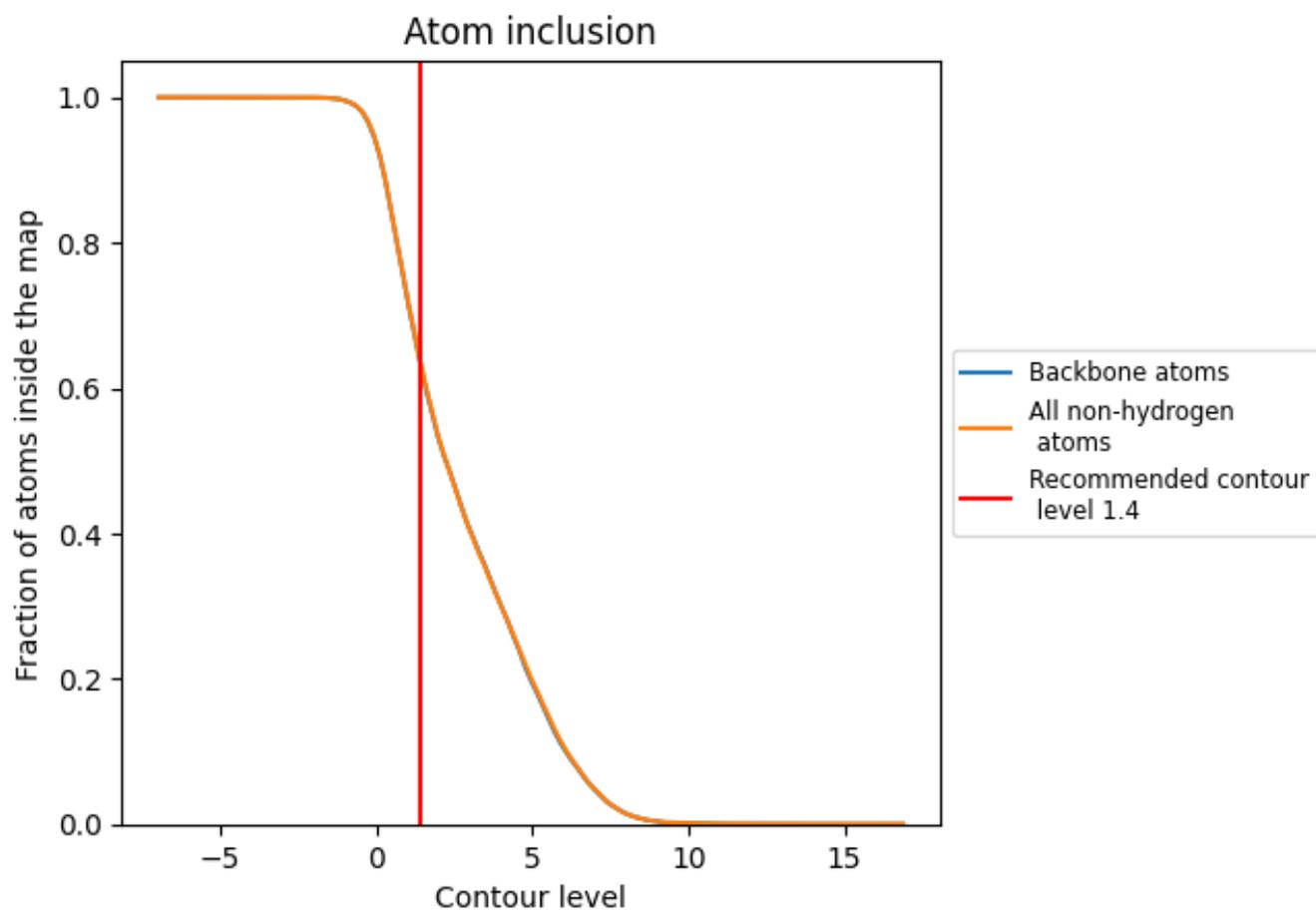
At the recommended contour level, 64% of all backbone atoms, 64% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (1.4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6394	0.4450
A	0.4400	0.3370
B	0.7164	0.4800
C	0.7747	0.5140
D	0.7656	0.5050
E	0.6498	0.4440
F	0.4106	0.3220
H	0.7031	0.4750
I	0.7317	0.4890
J	0.7276	0.4920
K	0.7372	0.4940
L	0.7181	0.4710
M	0.6676	0.4360
N	0.6628	0.4530
S	0.4881	0.4520

1.0

0.0
<0.0