WORLDWIDE PDB

PROTEIN DATA BANK

Full wwPDB EM Validation Report (i)

Jun 29, 2025 – 04:51 am BST

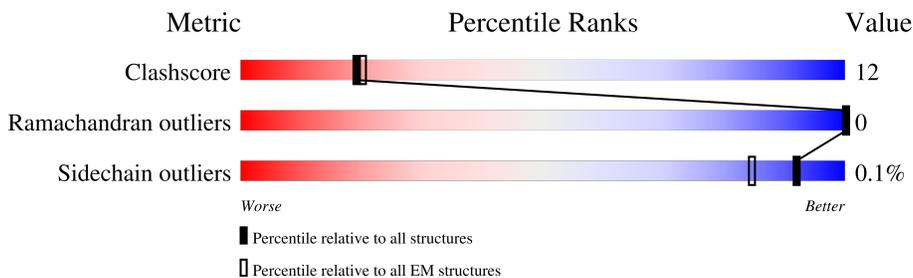|		
PDB ID	:	5MM4 / pdb_00005mm4
EMDB ID	:	EMD-3529
Title	:	Ustilago maydis kinesin-5 motor domain in the AMPPNP state bound to microtubules
Authors	:	Moores, C.A.; von Loeffelholz, O.
Deposited on	:	2016-12-08
Resolution	:	4.50 Å(reported)

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 4.50 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		12
Ramachandran outliers		0
Sidechain outliers		0.1%

Worse   *Better*

▌ Percentile relative to all structures

▯ Percentile relative to all EM structures

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	K	385	19% 71% 28% •
2	A	439	71% 27% •
3	B	427	71% 29%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 9776 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 kinesin-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	K	382	Total	C	N	O	S	0	0
			2919	1793	526	588	12		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	1	MET	-	initiating methionine	UNP A0A0D1DQH0

- Molecule 2 is a protein called Tubulin alpha-1A chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	428	Total	C	N	O	S	0	0
			3350	2121	570	638	21		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	265	GLY	ALA	conflict	UNP P02550

- Molecule 3 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	B	426	Total	C	N	O	S	0	0
			3352	2105	575	647	25		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
4	K	1	Total	Mg	0
			1	1	
4	A	1	Total	Mg	0
			1	1	

- Molecule 5 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: $C_{10}H_{17}N_6O_{12}P_3$).

ANP
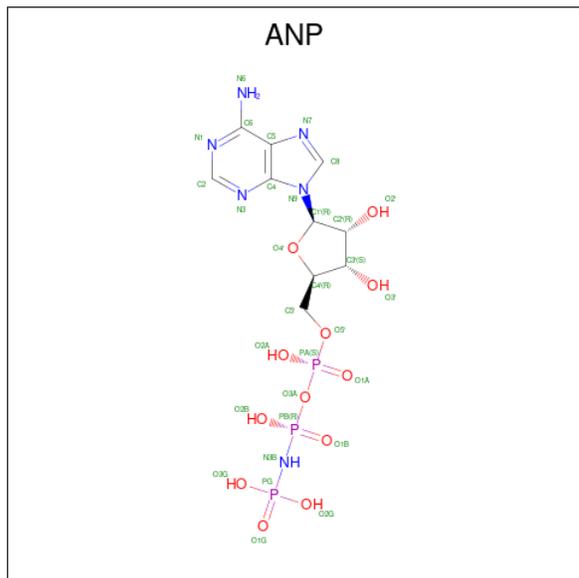
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
5	K	1	31	10	6	12	3	0

- Molecule 6 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).

GTP
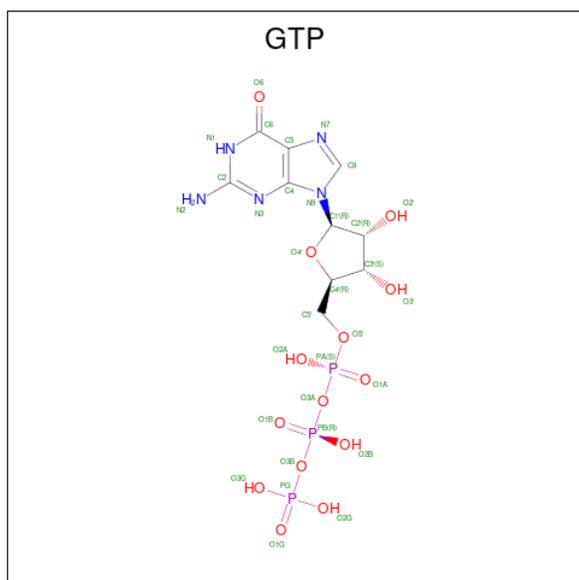
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
6	A	1	32	10	5	14	3	0

- Molecule 7 is TAXOL (CCD ID: TA1) (formula: $C_{47}H_{51}NO_{14}$).

TA1
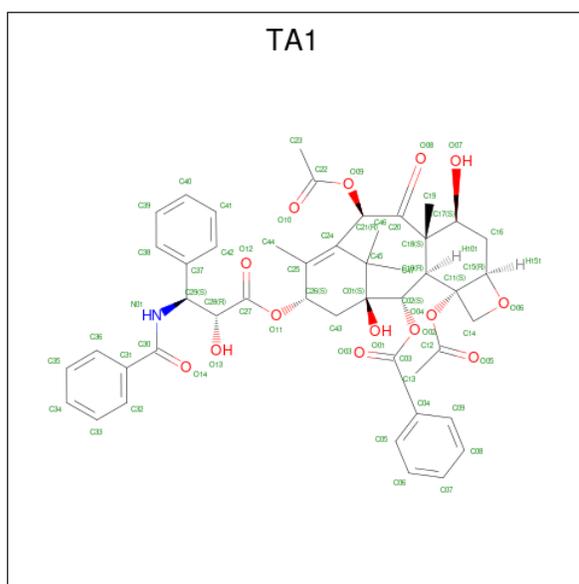
Mol	Chain	Residues	Atoms				AltConf
7	B	1	Total	C	N	O	0
			62	47	1	14	

- Molecule 8 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

GDP
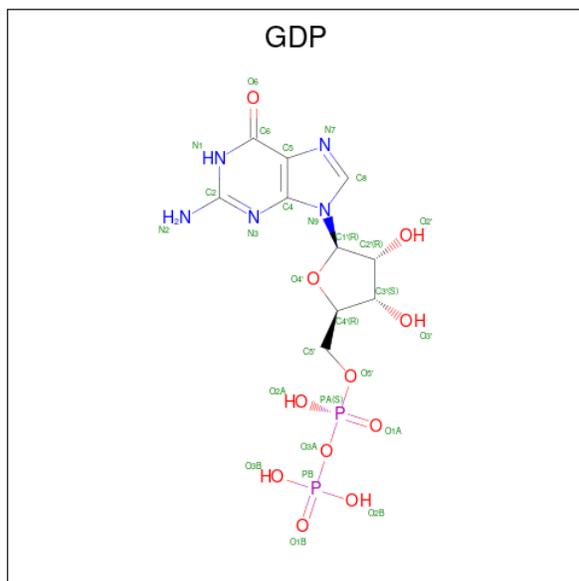
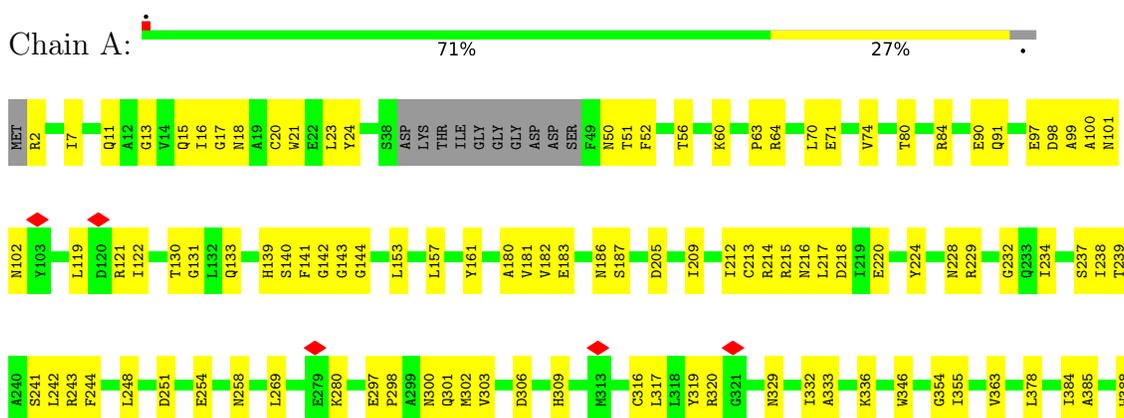| Mol	Chain	Residues	Atoms					AltConf
8	B	1	Total	C	N	O	P	0
			28	10	5	11	2	

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: kinesin-5
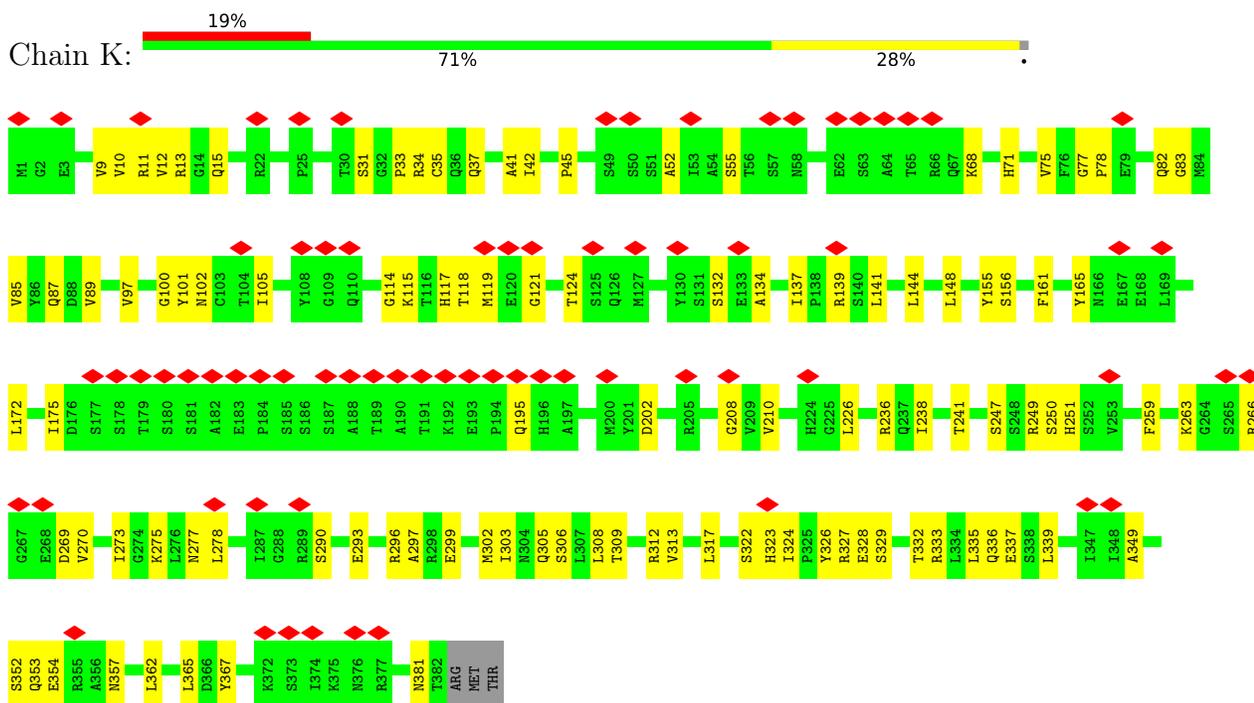
• Molecule 2: Tubulin alpha-1A chain

A389 D392 H393 D396 R402 V405 H406 V409 E414 E415 G416 E417 R422 D438 S439

• Molecule 3: Tubulin beta chain

Chain B:

71%　　　　　29%

MET R2 E3 I4 V5 H6 I7 Q8 A9 G10 Q11 C12 G13 N14 Q15 I16 V23 I24 S25 D26 E27 I30 D31 S35 L44 I49 N50 V51 Y52 Y53 N54 R64 L67 V68 D69 L70 G73 T74 M75 D76 S77 S80 R88 P89 F92 N102 K105

G106 H107 Y108 T109 D120 R123 K124 L132 Q133 G134 H139 S140 L141 G142 T145 G146 E160 D163 R164 S170 V171 V172 P173 S174 T180 V181 V182 E183 N186 L189 E196 I204 D205 L209 I212 C213 L217 Y224 L227 N228 H229 L230

V238 T239 L242 R243 G246 Q247 L248 N249 A250 D251 L252 R253 K254 L255 A256 V257 N258 R264 M269 P270 G271 L291 F296 D297 N300 A303 D306 H309 G310 R311 V318 F319 R320 M325 K326 E327 V328 N334 V335 Q336 N337 K338 S341 V351

A354 V355 C356 D357 M373 S374 F377 T382 A383 I384 Q385 E386 L387 E393 T396 K402 L405 F418 T419 E420 N424 D427 L428 V429 Q434 D437

4   Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	13581	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	30	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.174	Depositor
Minimum map value	-0.128	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.0171	Depositor
Map size (Å)	111.2, 102.86, 120.93	wwPDB
Map dimensions	80, 74, 87	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.39, 1.39, 1.39	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG, TA1, GDP, GTP, ANP

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	K	0.27	0/2955	0.61	2/3987 (0.1%)
2	A	0.39	0/3427	0.60	0/4651
3	B	0.38	0/3427	0.57	0/4642
All	All	0.35	0/9809	0.59	2/13280 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	K	175	ILE	CA-C-N	5.32	131.70	121.54
1	K	175	ILE	C-N-CA	5.32	131.70	121.54

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	K	2919	0	2927	84	0
2	A	3350	0	3253	91	0
3	B	3352	0	3229	87	0
4	A	1	0	0	0	0
4	K	1	0	0	0	0
5	K	31	0	13	4	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	32	0	12	4	0
7	B	62	0	51	3	0
8	B	28	0	12	1	0
All	All	9776	0	9497	240	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.

All (240) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:141:PHE:CD1	2:A:187:SER:HB2	1.82	1.15
2:A:141:PHE:HD1	2:A:187:SER:CB	1.63	1.11
2:A:141:PHE:CD1	2:A:187:SER:CB	2.45	0.97
2:A:141:PHE:HD1	2:A:187:SER:HB3	1.34	0.90
2:A:141:PHE:CE1	2:A:187:SER:HB2	2.07	0.89
2:A:101:ASN:ND2	2:A:142:GLY:O	2.14	0.80
2:A:2:ARG:HA	2:A:133:GLN:HE21	1.51	0.75
2:A:11:GLN:HE22	3:B:249:ASN:H	1.37	0.71
3:B:228:ASN:HD21	8:B:502:GDP:HN1	1.41	0.68
2:A:214:ARG:HG3	2:A:215:ARG:HG3	1.76	0.66
3:B:132:LEU:O	3:B:164:ARG:NH1	2.32	0.63
3:B:53:TYR:O	3:B:64:ARG:NH2	2.32	0.63
2:A:297:GLU:OE1	2:A:300:ASN:ND2	2.31	0.63
1:K:308:LEU:HD21	2:A:405:VAL:HG13	1.81	0.63
3:B:23:VAL:HG22	7:B:501:TA1:H321	1.81	0.62
3:B:251:ASP:HB3	3:B:254:LYS:H	1.64	0.62
1:K:31:SER:HB3	1:K:34:ARG:HB2	1.81	0.62
2:A:142:GLY:O	2:A:186:ASN:ND2	2.32	0.62
1:K:137:ILE:HG12	1:K:278:LEU:HD13	1.81	0.62
1:K:333:ARG:NH2	3:B:420:GLU:OE2	2.31	0.62
2:A:11:GLN:NE2	3:B:247:GLN:O	2.33	0.62
1:K:34:ARG:HG2	1:K:45:PRO:HB3	1.82	0.61
3:B:303:ALA:HB1	3:B:387:LEU:HD11	1.83	0.61
2:A:141:PHE:CD1	2:A:187:SER:HB3	2.26	0.61
3:B:12:CYS:SG	3:B:13:GLY:N	2.72	0.61
3:B:356:CYS:SG	3:B:357:ASP:N	2.73	0.61
3:B:269:MET:HE2	3:B:303:ALA:HB3	1.80	0.61
1:K:117:HIS:HD2	1:K:121:GLY:HA2	1.66	0.61
1:K:312:ARG:HH22	2:A:406:HIS:HB3	1.64	0.61
2:A:181:VAL:HB	3:B:258:ASN:HD22	1.65	0.61

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:312:ARG:NH1	1:K:328:GLU:OE1	2.34	0.60
2:A:98:ASP:O	3:B:253:ARG:NH2	2.34	0.60
1:K:100:GLY:HA3	1:K:381:ASN:H	1.66	0.60
3:B:189:LEU:HD11	3:B:418:PHE:HE1	1.66	0.60
1:K:195:GLN:NE2	3:B:107:HIS:O	2.35	0.60
3:B:291:LEU:HD11	3:B:373:MET:HB3	1.84	0.59
1:K:97:VAL:HA	1:K:101:TYR:HB2	1.83	0.59
1:K:156:SER:HB3	1:K:259:PHE:HB3	1.85	0.59
3:B:142:GLY:O	3:B:186:ASN:ND2	2.35	0.59
1:K:45:PRO:HG2	1:K:68:LYS:HE3	1.85	0.59
3:B:27:GLU:HG2	3:B:243:ARG:HH22	1.68	0.59
1:K:148:LEU:HD23	1:K:155:TYR:HB2	1.85	0.58
2:A:13:GLY:HA2	2:A:16:ILE:HD12	1.85	0.58
3:B:3:GLU:HA	3:B:51:VAL:HA	1.85	0.58
3:B:385:GLN:HB2	3:B:429:VAL:HG13	1.86	0.57
1:K:202:ASP:OD2	1:K:333:ARG:NH2	2.36	0.57
1:K:10:VAL:HG22	1:K:349:ALA:HB3	1.87	0.57
1:K:335:LEU:HB3	1:K:339:LEU:HD13	1.87	0.57
2:A:228:ASN:HD21	6:A:501:GTP:HN1	1.52	0.57
7:B:501:TA1:O08	7:B:501:TA1:O07	2.23	0.56
2:A:242:LEU:HD13	2:A:251:ASP:HA	1.87	0.56
1:K:327:ARG:O	3:B:264:ARG:NH1	2.38	0.56
3:B:74:THR:O	3:B:77:SER:OG	2.24	0.56
1:K:263:LYS:HA	1:K:269:ASP:HA	1.88	0.56
1:K:323:HIS:O	3:B:434:GLN:NE2	2.39	0.56
3:B:311:ARG:NE	3:B:341:SER:O	2.38	0.56
2:A:101:ASN:HB2	3:B:254:LYS:HE2	1.88	0.56
1:K:238:ILE:HA	1:K:249:ARG:H	1.71	0.56
2:A:157:LEU:O	2:A:161:TYR:N	2.37	0.55
2:A:119:LEU:HA	2:A:122:ILE:HD12	1.87	0.55
2:A:99:ALA:O	2:A:102:ASN:ND2	2.39	0.55
2:A:2:ARG:N	2:A:131:GLY:O	2.40	0.55
3:B:297:ASP:OD2	3:B:300:ASN:ND2	2.39	0.55
2:A:414:GLU:HG2	2:A:416:GLY:H	1.72	0.55
2:A:50:ASN:O	2:A:243:ARG:NH2	2.40	0.55
3:B:246:GLY:H	3:B:249:ASN:HD21	1.56	0.54
2:A:238:ILE:HG22	2:A:239:THR:HG23	1.89	0.54
1:K:362:LEU:HA	1:K:365:LEU:HB2	1.90	0.54
2:A:389:ALA:O	2:A:393:HIS:ND1	2.40	0.54
2:A:329:ASN:HA	2:A:332:ILE:HD12	1.90	0.54
2:A:97:GLU:OE2	3:B:253:ARG:NH1	2.41	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:251:ASP:H	3:B:254:LYS:HD2	1.73	0.53
3:B:306:ASP:HB3	3:B:309:HIS:HB2	1.90	0.53
2:A:213:CYS:HA	2:A:217:LEU:HB2	1.91	0.53
2:A:237:SER:HB3	2:A:320:ARG:HH11	1.74	0.53
3:B:10:GLY:O	3:B:14:ASN:ND2	2.41	0.53
1:K:35:CYS:HB3	1:K:37:GLN:HE22	1.74	0.53
1:K:273:ILE:HB	1:K:381:ASN:HD22	1.74	0.53
1:K:323:HIS:HB2	3:B:434:GLN:HE21	1.74	0.53
1:K:124:THR:HG22	1:K:132:SER:HB2	1.90	0.53
1:K:236:ARG:HH21	1:K:251:HIS:HA	1.74	0.53
2:A:2:ARG:O	2:A:243:ARG:NH2	2.42	0.53
2:A:241:SER:HA	2:A:244:PHE:HD2	1.74	0.53
2:A:298:PRO:HA	2:A:301:GLN:HE21	1.73	0.53
1:K:309:THR:HA	1:K:312:ARG:HD2	1.90	0.53
2:A:17:GLY:HA2	2:A:20:CYS:HB2	1.91	0.53
1:K:83:GLY:O	1:K:87:GLN:N	2.42	0.52
1:K:329:SER:HB3	1:K:332:THR:HG23	1.92	0.52
2:A:140:SER:OG	2:A:141:PHE:N	2.42	0.52
2:A:306:ASP:HB3	2:A:309:HIS:HD2	1.74	0.52
2:A:52:PHE:O	2:A:64:ARG:N	2.43	0.52
1:K:15:GLN:H	1:K:78:PRO:HB3	1.73	0.52
2:A:15:GLN:HA	2:A:18:ASN:HD22	1.74	0.52
3:B:54:ASN:OD1	3:B:64:ARG:NH2	2.39	0.52
3:B:180:THR:HG23	3:B:183:GLU:HB2	1.92	0.52
3:B:318:VAL:HA	3:B:354:ALA:HB3	1.90	0.52
1:K:303:ILE:O	1:K:306:SER:OG	2.27	0.51
3:B:12:CYS:O	3:B:16:ILE:N	2.39	0.51
1:K:195:GLN:HE22	3:B:107:HIS:CD2	2.28	0.51
1:K:293:GLU:H	1:K:296:ARG:HB2	1.74	0.51
2:A:317:LEU:O	2:A:354:GLY:N	2.38	0.51
2:A:333:ALA:HA	2:A:336:LYS:HD2	1.93	0.51
3:B:246:GLY:O	3:B:249:ASN:ND2	2.43	0.51
1:K:247:SER:OG	5:K:402:ANP:N3B	2.44	0.51
3:B:6:HIS:CE1	3:B:8:GLN:HE21	2.28	0.51
3:B:180:THR:OG1	3:B:181:VAL:N	2.42	0.51
1:K:308:LEU:HB2	2:A:409:VAL:HG11	1.92	0.51
3:B:310:GLY:H	3:B:383:ALA:HB2	1.76	0.51
2:A:224:TYR:O	2:A:228:ASN:ND2	2.44	0.51
1:K:241:THR:HB	1:K:290:SER:HB2	1.93	0.50
3:B:10:GLY:HA2	3:B:145:THR:HB	1.93	0.50
1:K:296:ARG:NH1	1:K:299:GLU:OE1	2.42	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:209:LEU:HA	3:B:212:ILE:HD12	1.92	0.50
1:K:68:LYS:HZ2	1:K:362:LEU:HD21	1.76	0.50
1:K:308:LEU:HD13	2:A:409:VAL:HG21	1.94	0.50
1:K:277:ASN:ND2	1:K:337:GLU:OE2	2.44	0.50
2:A:248:LEU:HB2	2:A:355:ILE:HB	1.92	0.50
3:B:123:ARG:NH2	3:B:160:GLU:OE2	2.40	0.50
1:K:33:PRO:HG2	1:K:34:ARG:HG3	1.93	0.49
3:B:4:ILE:HG12	3:B:134:GLY:HA3	1.94	0.49
1:K:308:LEU:HD22	2:A:409:VAL:HB	1.92	0.49
1:K:293:GLU:O	1:K:297:ALA:N	2.46	0.49
2:A:7:ILE:HD13	2:A:153:LEU:HD21	1.94	0.49
2:A:144:GLY:H	6:A:501:GTP:PG	2.36	0.49
3:B:102:ASN:HD22	3:B:105:LYS:HD3	1.78	0.48
1:K:322:SER:O	3:B:434:GLN:NE2	2.47	0.48
1:K:367:TYR:OH	2:A:402:ARG:NH1	2.37	0.48
2:A:384:ILE:O	2:A:388:TRP:N	2.37	0.48
1:K:11:ARG:HD2	1:K:85:VAL:HG21	1.96	0.48
2:A:414:GLU:HB3	2:A:417:GLU:HG3	1.96	0.48
1:K:326:TYR:O	1:K:332:THR:OG1	2.32	0.48
3:B:6:HIS:HE1	3:B:8:GLN:HE21	1.61	0.48
3:B:325:MET:HA	3:B:328:VAL:HB	1.96	0.48
1:K:52:ALA:HB3	1:K:55:SER:HA	1.96	0.47
3:B:311:ARG:H	3:B:382:THR:HG1	1.58	0.47
1:K:12:VAL:O	5:K:402:ANP:N6	2.47	0.47
3:B:67:LEU:HD12	3:B:92:PHE:HE1	1.79	0.47
1:K:114:GLY:N	5:K:402:ANP:O1B	2.47	0.47
2:A:218:ASP:OD2	2:A:280:LYS:NZ	2.44	0.47
2:A:23:LEU:HD21	2:A:363:VAL:HG22	1.95	0.47
3:B:174:SER:OG	3:B:205:ASP:OD1	2.26	0.47
3:B:69:ASP:OD1	3:B:70:LEU:N	2.48	0.47
1:K:41:ALA:HB1	1:K:75:VAL:HG13	1.97	0.47
3:B:140:SER:H	3:B:146:GLY:HA3	1.80	0.46
3:B:140:SER:OG	3:B:141:LEU:N	2.48	0.46
2:A:234:ILE:HD11	2:A:302:MET:HE1	1.96	0.46
1:K:105:ILE:HG22	1:K:119:MET:HE1	1.96	0.46
1:K:115:LYS:NZ	5:K:402:ANP:O1B	2.41	0.46
1:K:354:GLU:OE1	1:K:357:ASN:ND2	2.48	0.46
2:A:228:ASN:O	2:A:232:GLY:N	2.44	0.46
3:B:251:ASP:OD1	3:B:252:LEU:N	2.49	0.46
1:K:102:ASN:HB3	1:K:275:LYS:HB3	1.97	0.46
2:A:2:ARG:N	2:A:130:THR:O	2.49	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:327:ARG:NE	3:B:427:ASP:OD2	2.49	0.46
3:B:196:GLU:OE2	3:B:264:ARG:NH1	2.40	0.46
3:B:271:GLY:HA3	3:B:377:PHE:HB3	1.97	0.46
3:B:402:LYS:HB3	3:B:405:LEU:HD22	1.98	0.46
2:A:392:ASP:OD2	2:A:422:ARG:NH2	2.39	0.45
2:A:51:THR:OG1	2:A:52:PHE:N	2.48	0.45
2:A:205:ASP:HB3	2:A:303:VAL:HA	1.98	0.45
2:A:346:TRP:HZ2	2:A:438:ASP:HB2	1.80	0.45
1:K:42:ILE:HA	1:K:71:HIS:HA	1.97	0.45
3:B:336:GLN:HE21	3:B:351:VAL:HG23	1.80	0.45
2:A:269:LEU:HD13	2:A:384:ILE:HD11	1.99	0.45
3:B:139:HIS:ND1	3:B:146:GLY:O	2.50	0.45
3:B:209:LEU:HB3	3:B:227:LEU:HD22	1.97	0.45
2:A:63:PRO:O	2:A:91:GLN:NE2	2.40	0.45
2:A:143:GLY:HA2	6:A:501:GTP:O1G	2.17	0.45
3:B:120:ASP:O	3:B:124:LYS:N	2.46	0.45
1:K:305:GLN:HE22	2:A:406:HIS:HB2	1.81	0.45
1:K:134:ALA:O	1:K:139:ARG:NH1	2.47	0.44
2:A:385:ALA:HA	2:A:388:TRP:HD1	1.81	0.44
3:B:73:GLY:HA2	3:B:76:ASP:HB2	1.99	0.44
1:K:208:GLY:HA2	1:K:336:GLN:HG3	1.99	0.44
1:K:332:THR:O	1:K:336:GLN:N	2.50	0.44
2:A:180:ALA:N	2:A:183:GLU:OE2	2.50	0.44
2:A:396:ASP:OD2	2:A:422:ARG:NH2	2.51	0.44
3:B:172:VAL:N	3:B:204:ILE:O	2.43	0.44
3:B:320:ARG:HB2	3:B:374:SER:HB3	1.99	0.44
3:B:31:ASP:HB3	3:B:35:SER:H	1.83	0.44
1:K:141:LEU:HD13	1:K:226:LEU:HD11	1.99	0.44
2:A:71:GLU:HG3	2:A:98:ASP:HB2	1.99	0.44
1:K:13:ARG:HH22	1:K:354:GLU:HG3	1.83	0.43
2:A:220:GLU:OE1	3:B:326:LYS:NZ	2.39	0.43
2:A:229:ARG:HD3	2:A:363:VAL:HG11	2.00	0.43
3:B:238:VAL:HG12	3:B:239:THR:HG23	2.00	0.43
1:K:9:VAL:HG11	1:K:89:VAL:HG22	2.01	0.43
2:A:319:TYR:N	2:A:354:GLY:O	2.49	0.43
3:B:393:GLU:O	3:B:396:THR:OG1	2.28	0.43
1:K:144:LEU:HD12	1:K:148:LEU:HD13	2.01	0.43
1:K:266:ARG:HH22	1:K:270:VAL:HG22	1.84	0.43
2:A:213:CYS:HA	2:A:217:LEU:HD12	2.00	0.43
3:B:334:ASN:O	3:B:338:LYS:N	2.51	0.43
1:K:302:MET:HA	1:K:305:GLN:HB3	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:143:GLY:HA3	6:A:501:GTP:PB	2.58	0.42
2:A:11:GLN:HG3	2:A:74:VAL:HG21	2.01	0.42
2:A:254:GLU:C	2:A:258:ASN:HD22	2.28	0.42
3:B:25:SER:HA	3:B:30:ILE:HD12	2.00	0.42
1:K:115:LYS:O	1:K:118:THR:OG1	2.35	0.42
1:K:249:ARG:HD2	1:K:299:GLU:HB3	2.01	0.42
2:A:205:ASP:O	2:A:209:ILE:HG12	2.19	0.42
1:K:13:ARG:HE	1:K:352:SER:HA	1.84	0.42
1:K:12:VAL:HG22	1:K:77:GLY:HA2	2.01	0.42
2:A:80:THR:O	2:A:84:ARG:NH1	2.53	0.42
2:A:98:ASP:CG	2:A:100:ALA:H	2.27	0.42
1:K:11:ARG:NH1	1:K:82:GLN:OE1	2.42	0.42
3:B:420:GLU:O	3:B:424:ASN:N	2.53	0.42
1:K:312:ARG:NH2	2:A:406:HIS:HB3	2.33	0.42
1:K:313:VAL:HG13	1:K:324:ILE:HD11	2.02	0.42
3:B:224:TYR:O	3:B:228:ASN:ND2	2.53	0.42
1:K:317:LEU:HD11	1:K:339:LEU:HB3	2.02	0.41
3:B:242:LEU:HD11	3:B:252:LEU:N	2.35	0.41
7:B:501:TA1:H101	7:B:501:TA1:H432	1.61	0.41
2:A:21:TRP:HA	2:A:24:TYR:HB2	2.00	0.41
1:K:102:ASN:HD22	1:K:275:LYS:N	2.19	0.41
3:B:10:GLY:H	3:B:145:THR:HG22	1.85	0.41
3:B:88:ARG:HA	3:B:89:PRO:HD3	1.77	0.41
3:B:163:ASP:O	3:B:164:ARG:NE	2.53	0.41
2:A:119:LEU:HD23	2:A:122:ILE:HD12	2.01	0.41
2:A:90:GLU:HG3	2:A:121:ARG:NH1	2.36	0.41
1:K:13:ARG:CZ	1:K:353:GLN:HG2	2.50	0.41
1:K:13:ARG:NH2	1:K:353:GLN:H	2.18	0.41
3:B:108:TYR:CD2	3:B:109:THR:HG23	2.56	0.41
1:K:82:GLN:HB3	1:K:139:ARG:NH1	2.35	0.41
1:K:161:PHE:HE2	1:K:172:LEU:HD12	1.86	0.41
2:A:56:THR:HG1	2:A:60:LYS:H	1.64	0.41
3:B:209:LEU:HD22	3:B:230:LEU:HD23	2.03	0.41
1:K:165:TYR:HD1	1:K:250:SER:HB3	1.86	0.41
2:A:70:LEU:HD23	2:A:70:LEU:HA	1.88	0.41
2:A:98:ASP:OD1	2:A:99:ALA:N	2.54	0.41
2:A:139:HIS:ND1	2:A:140:SER:O	2.42	0.41
2:A:316:CYS:HB2	2:A:378:LEU:HB2	2.02	0.41
3:B:213:CYS:HA	3:B:217:LEU:HD12	2.02	0.41
3:B:44:LEU:HD12	3:B:49:ILE:HD11	2.02	0.41
2:A:182:VAL:HG22	3:B:258:ASN:HD21	1.87	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:10:VAL:HB	1:K:75:VAL:HA	2.02	0.40
3:B:252:LEU:O	3:B:256:ALA:N	2.51	0.40
3:B:76:ASP:O	3:B:80:SER:N	2.43	0.40
2:A:212:ILE:HG23	2:A:216:ASN:HB2	2.04	0.40
1:K:354:GLU:HB2	1:K:357:ASN:HB2	2.04	0.40

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	K	380/385 (99%)	331 (87%)	49 (13%)	0	100	100
2	A	424/439 (97%)	377 (89%)	47 (11%)	0	100	100
3	B	424/427 (99%)	387 (91%)	37 (9%)	0	100	100
All	All	1228/1251 (98%)	1095 (89%)	133 (11%)	0	100	100

There are no Ramachandran outliers to report.

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	K	323/326 (99%)	322 (100%)	1 (0%)	91	91
2	A	360/368 (98%)	360 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	B	367/368 (100%)	367 (100%)	0	100	100
All	All	1050/1062 (99%)	1049 (100%)	1 (0%)	92	94

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	210	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	K	87	GLN
1	K	195	GLN
1	K	237	GLN
1	K	242	ASN
1	K	305	GLN
1	K	376	ASN
2	A	11	GLN
2	A	133	GLN
2	A	186	ASN
2	A	197	HIS
2	A	228	ASN
2	A	309	HIS
3	B	8	GLN
3	B	91	ASN
3	B	102	ASN
3	B	193	GLN
3	B	249	ASN
3	B	258	ASN
3	B	336	GLN
3	B	385	GLN
3	B	434	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	$\#|Z| > 2$
6	GTP	A	501	4	26,34,34	1.47	3 (11%)	32,54,54	1.64	7 (21%)
5	ANP	K	402	4	29,33,33	1.56	2 (6%)	31,52,52	1.14	4 (12%)
7	TA1	B	501	-	68,68,68	0.68	2 (2%)	105,105,105	1.86	20 (19%)
8	GDP	B	502	-	24,30,30	1.18	3 (12%)	30,47,47	0.60	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
6	GTP	A	501	4	-	3/18/38/38	0/3/3/3
5	ANP	K	402	4	-	7/14/38/38	0/3/3/3
7	TA1	B	501	-	-	6/41/127/127	0/7/7/7
8	GDP	B	502	-	-	4/12/32/32	0/3/3/3

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	K	402	ANP	PG-O1G	6.56	1.56	1.46

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	501	GTP	C5-C6	-5.24	1.36	1.47
5	K	402	ANP	PG-O3G	-4.03	1.45	1.56
7	B	501	TA1	C11-C10	3.74	1.63	1.54
8	B	502	GDP	C5-C6	-3.35	1.40	1.47
8	B	502	GDP	C5-C4	-2.41	1.36	1.43
8	B	502	GDP	C8-N7	-2.34	1.31	1.35
7	B	501	TA1	C29-C28	-2.32	1.47	1.53
6	A	501	GTP	C5-C4	-2.26	1.37	1.43
6	A	501	GTP	O4'-C4'	-2.00	1.40	1.45

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	501	TA1	O08-C20-C21	-8.24	108.57	119.30
7	B	501	TA1	C18-C20-C21	7.48	138.53	121.44
7	B	501	TA1	O09-C21-C24	5.12	116.67	109.83
7	B	501	TA1	C21-O09-C22	4.97	127.79	116.11
7	B	501	TA1	C47-C45-C46	-4.70	92.42	106.26
6	A	501	GTP	PA-O3A-PB	-4.36	117.86	132.83
7	B	501	TA1	O11-C26-C25	4.18	119.90	109.78
6	A	501	GTP	PB-O3B-PG	-3.85	119.62	132.83
7	B	501	TA1	O09-C21-C20	-3.63	99.31	108.69
7	B	501	TA1	C10-C18-C20	3.50	122.34	116.31
6	A	501	GTP	C5-C6-N1	3.35	119.86	113.95
7	B	501	TA1	C43-C01-C02	-3.31	105.73	111.70
5	K	402	ANP	O1G-PG-N3B	-3.30	106.91	111.77
7	B	501	TA1	C43-C01-C45	3.12	117.24	111.50
7	B	501	TA1	C29-C28-C27	-3.09	102.60	111.12
7	B	501	TA1	C24-C21-C20	3.04	120.70	113.38
6	A	501	GTP	C2-N1-C6	-3.01	119.56	125.10
7	B	501	TA1	C14-C11-C15	-2.93	82.29	85.40
7	B	501	TA1	O08-C20-C18	-2.74	112.85	119.18
7	B	501	TA1	C47-C45-C24	2.67	123.67	112.83
6	A	501	GTP	C8-N7-C5	2.65	108.03	102.99
6	A	501	GTP	C3'-C2'-C1'	2.56	104.83	100.98
7	B	501	TA1	C11-O04-C12	2.44	125.37	119.06
7	B	501	TA1	C01-C43-C26	2.34	119.44	114.98
6	A	501	GTP	O6-C6-C5	-2.31	119.86	124.37
5	K	402	ANP	O2G-PG-O1G	-2.26	107.77	113.45
5	K	402	ANP	C5-C6-N6	2.14	123.60	120.35
7	B	501	TA1	C14-C11-C10	2.10	123.65	120.30
7	B	501	TA1	C19-C18-C20	-2.07	100.91	106.55

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	501	TA1	C15-C16-C17	-2.05	107.82	113.62
5	K	402	ANP	C4-C5-N7	2.03	111.52	109.40

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	K	402	ANP	PB-N3B-PG-O1G
5	K	402	ANP	PG-N3B-PB-O1B
5	K	402	ANP	C5'-O5'-PA-O1A
5	K	402	ANP	C5'-O5'-PA-O2A
7	B	501	TA1	C20-C21-O09-C22
7	B	501	TA1	C24-C21-O09-C22
8	B	502	GDP	C5'-O5'-PA-O2A
5	K	402	ANP	PB-O3A-PA-O1A
8	B	502	GDP	C5'-O5'-PA-O3A
8	B	502	GDP	C5'-O5'-PA-O1A
7	B	501	TA1	O14-C30-C31-C32
6	A	501	GTP	C3'-C4'-C5'-O5'
7	B	501	TA1	O14-C30-C31-C36
5	K	402	ANP	C4'-C5'-O5'-PA
7	B	501	TA1	N01-C30-C31-C32
7	B	501	TA1	N01-C30-C31-C36
5	K	402	ANP	C5'-O5'-PA-O3A
6	A	501	GTP	O4'-C4'-C5'-O5'
8	B	502	GDP	PB-O3A-PA-O2A
6	A	501	GTP	C5'-O5'-PA-O1A

There are no ring outliers.

4 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	501	GTP	4	0
5	K	402	ANP	4	0
7	B	501	TA1	3	0
8	B	502	GDP	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 GTP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ANP K 402

Bond lengths

Bond angles

Torsions

Rings

Ligand TA1 B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP B 502

Bond lengths

Bond angles

Torsions

Rings
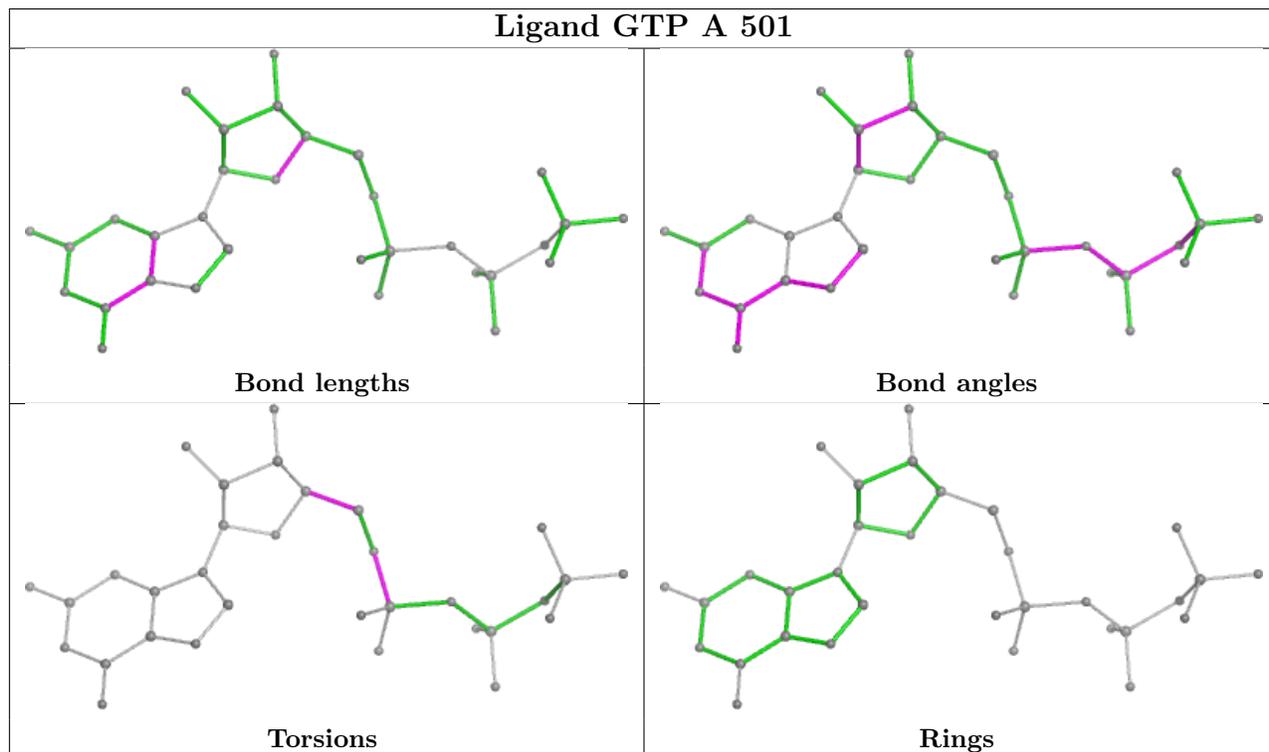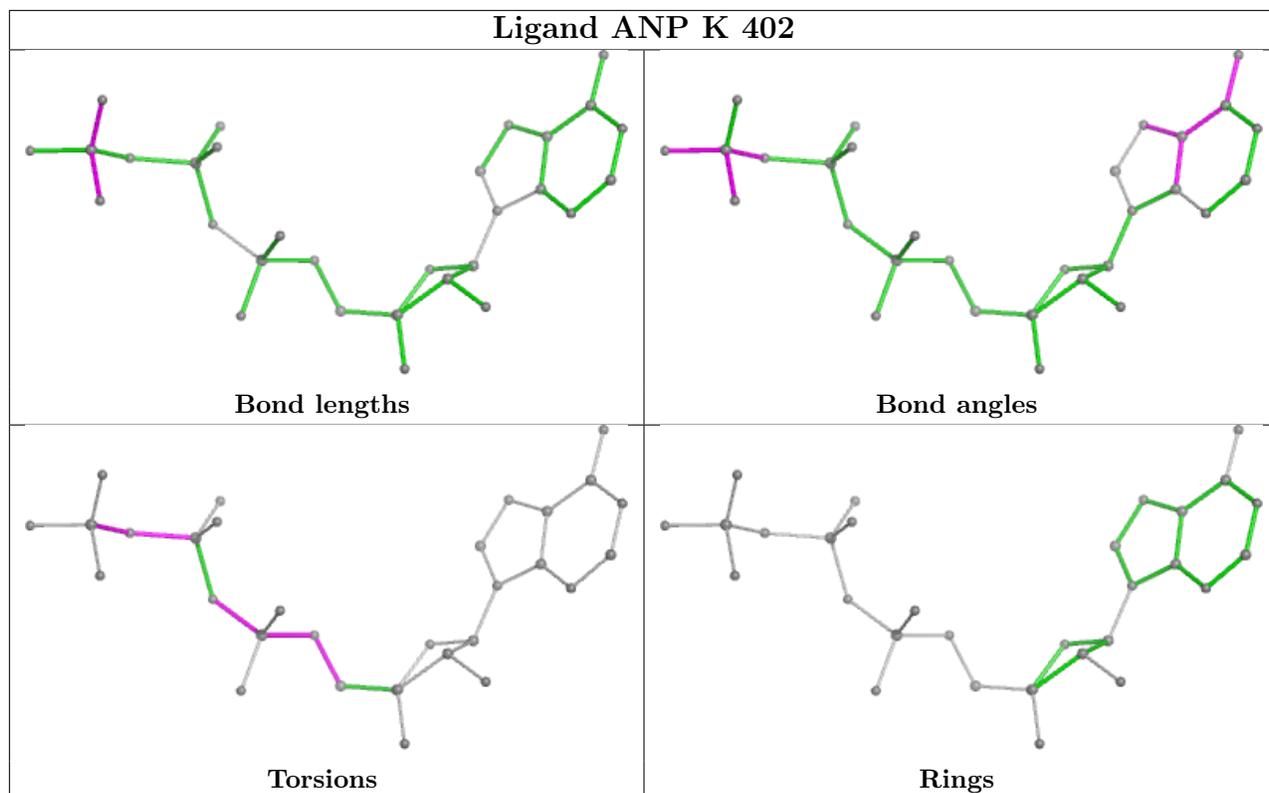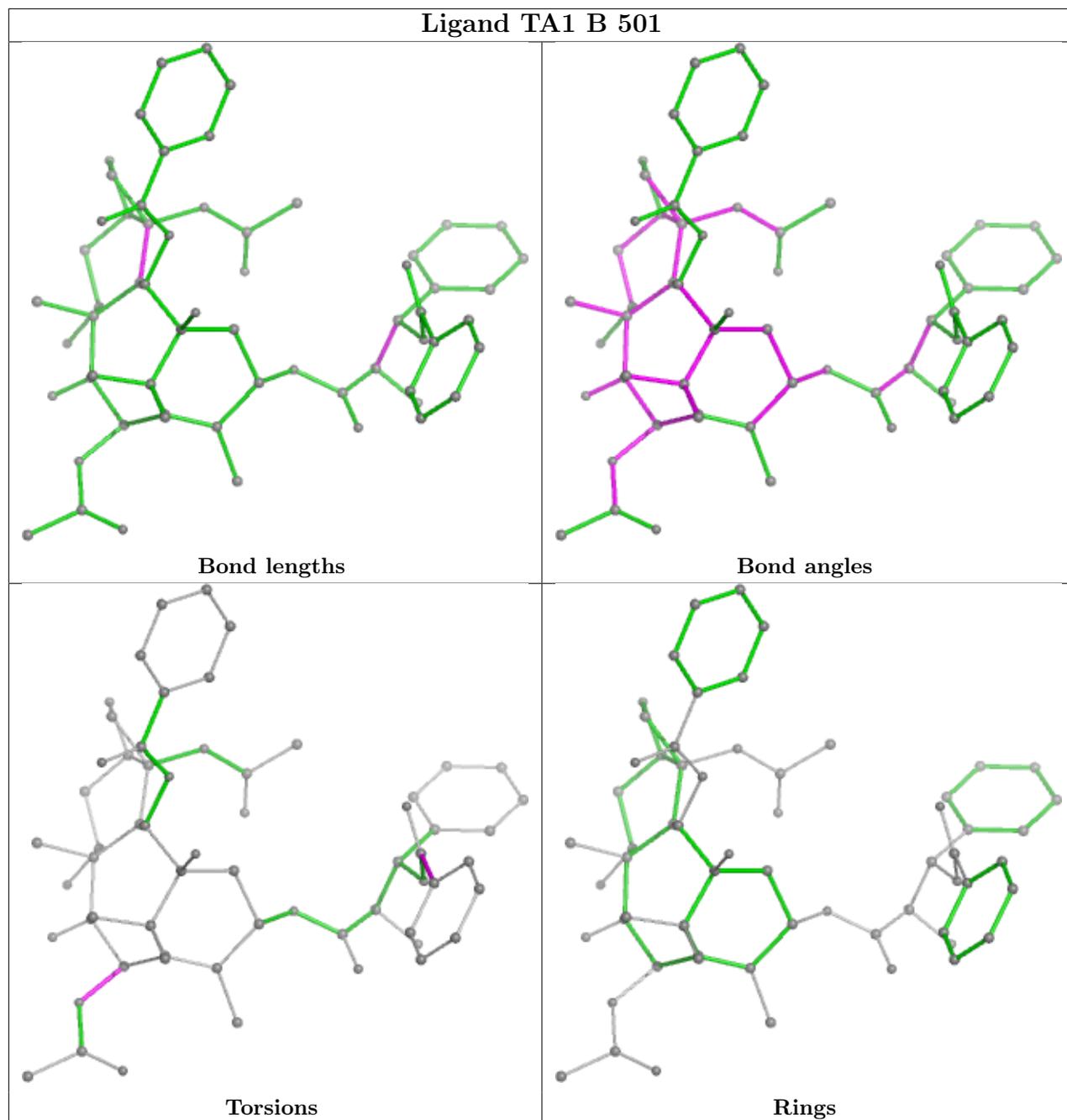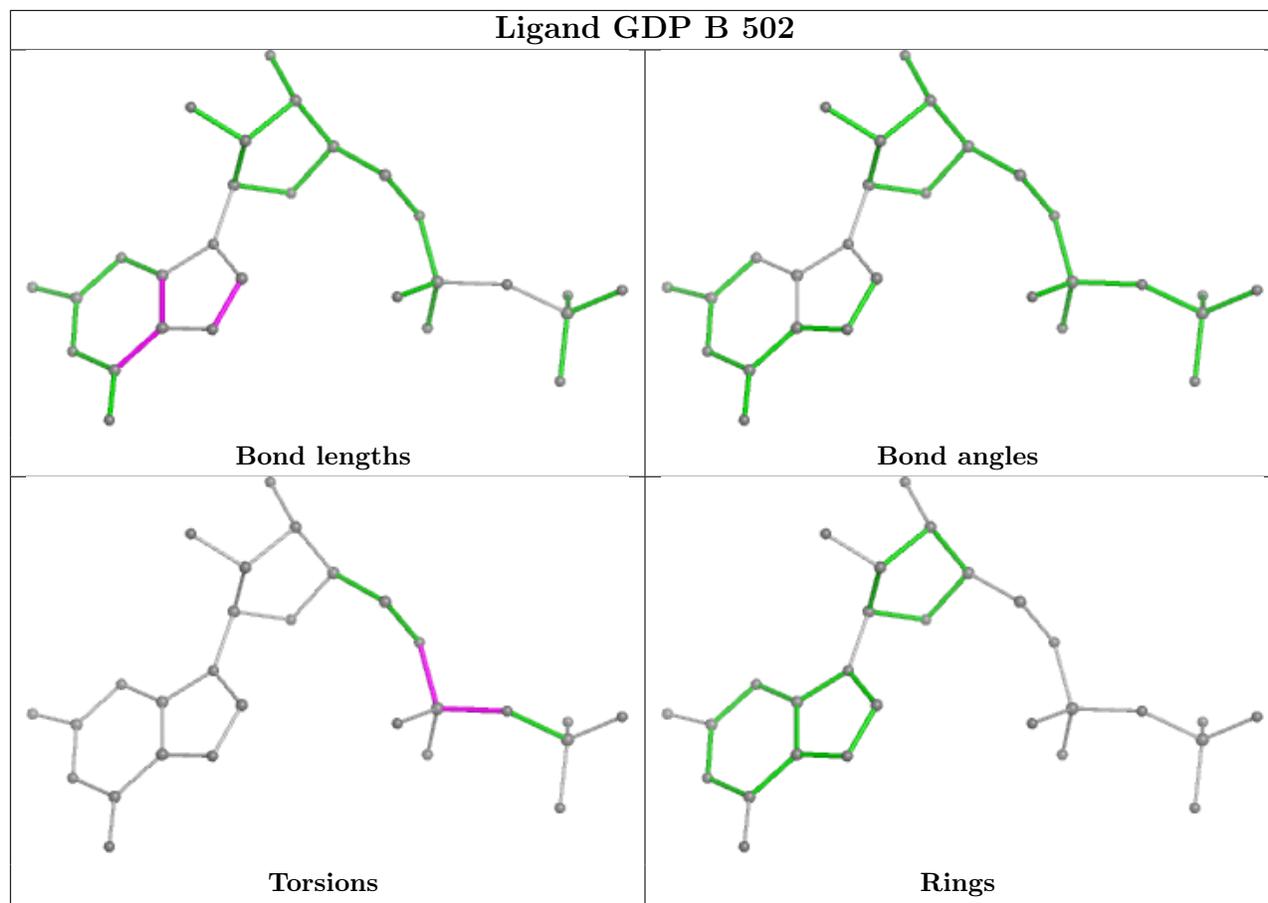
5.7 Other polymers ⓘ

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-3529. 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 |
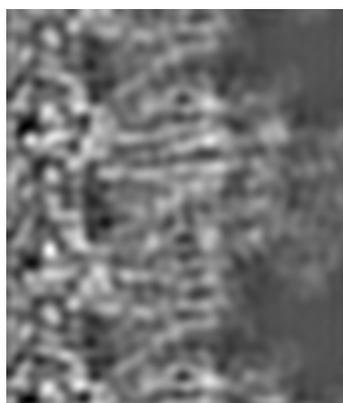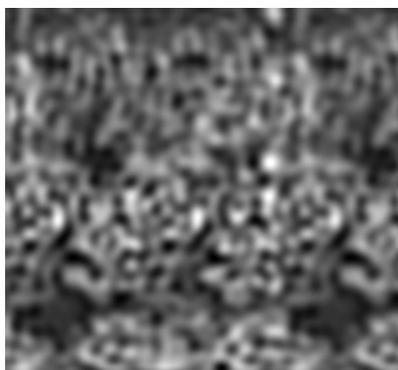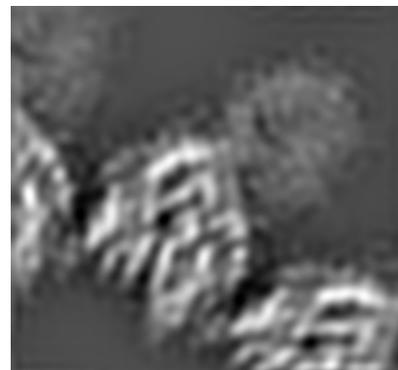
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
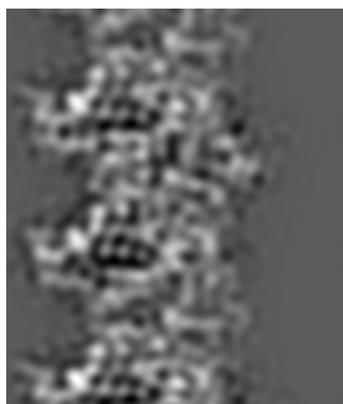
6.2.1 Primary map
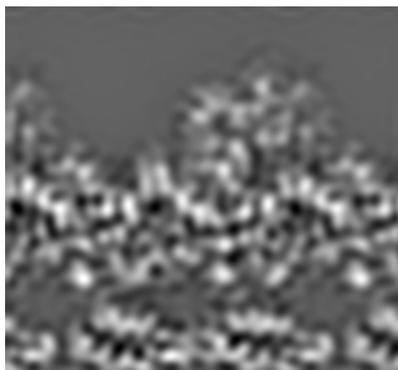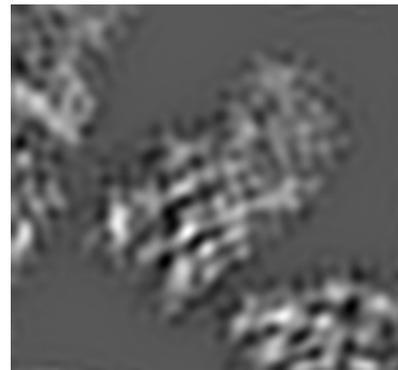
| X Index: 40 | Y Index: 37 | Z Index: 43 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
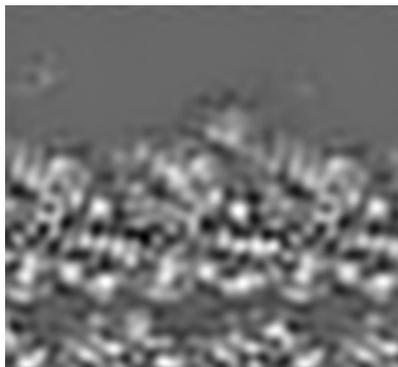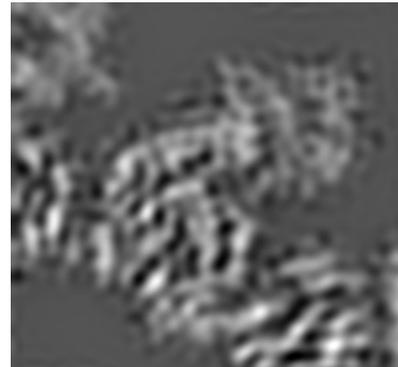
X Index: 35   Y Index: 31   Z Index: 58

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

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

6.4.1 Primary map

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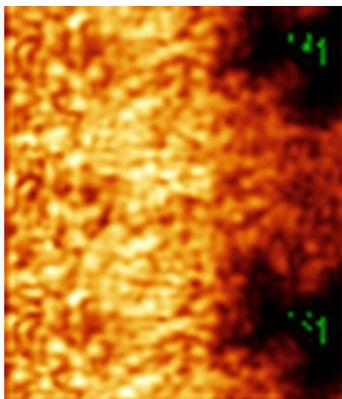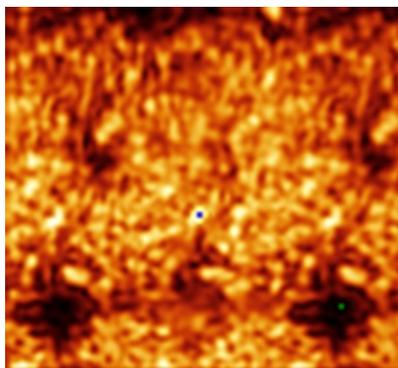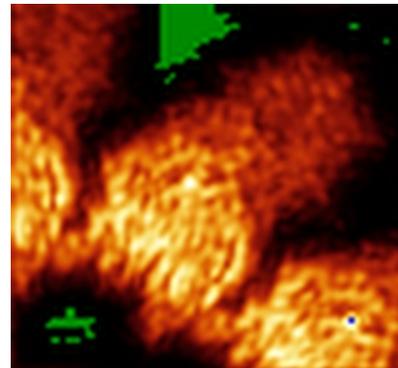
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

X　　　　　　　　　　　　　　Y　　　　　　　　　　　　　　Z
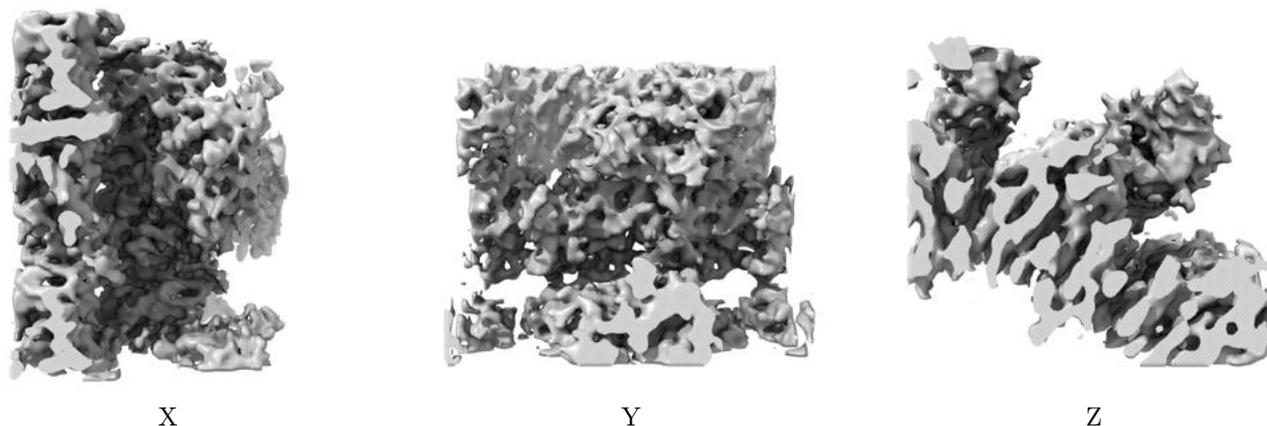
The images above show the 3D surface view of the map at the recommended contour level 0.0171. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.6 Mask visualisation ⓘ

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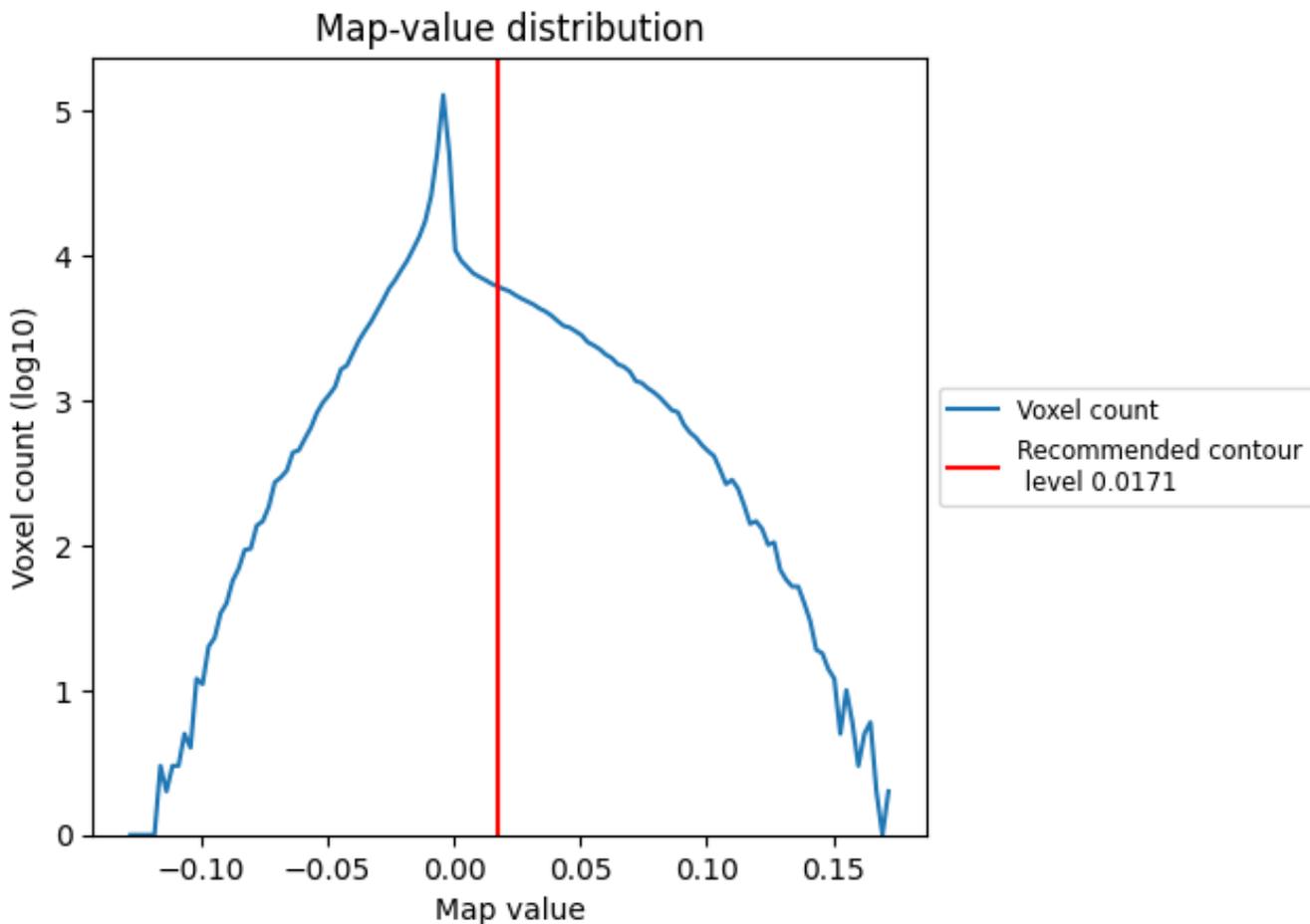
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
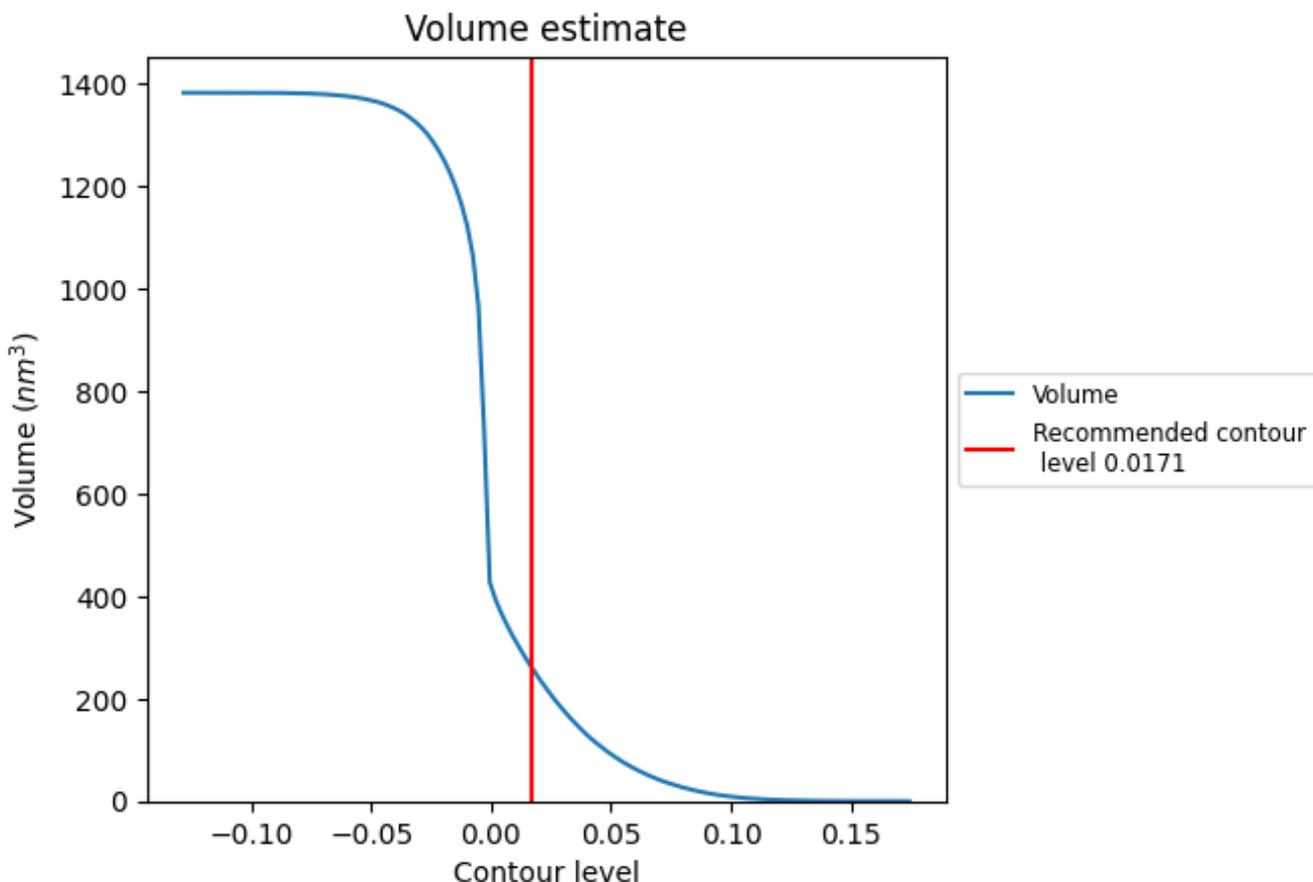
The volume at the recommended contour level is 260 nm^3; this corresponds to an approximate mass of 235 kDa.

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 ⓘ

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

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-3529 and PDB model 5MM4. Per-residue inclusion information can be found in section 3 on page 6.

9.1 Map-model overlay ⓘ
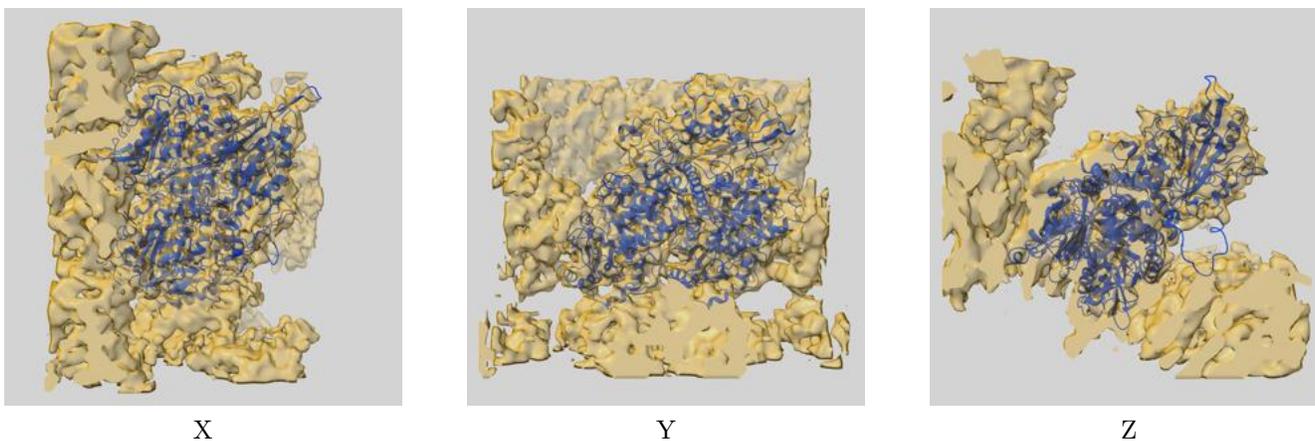


X   Y   Z

The images above show the 3D surface view of the map at the recommended contour level 0.0171 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 ⓘ


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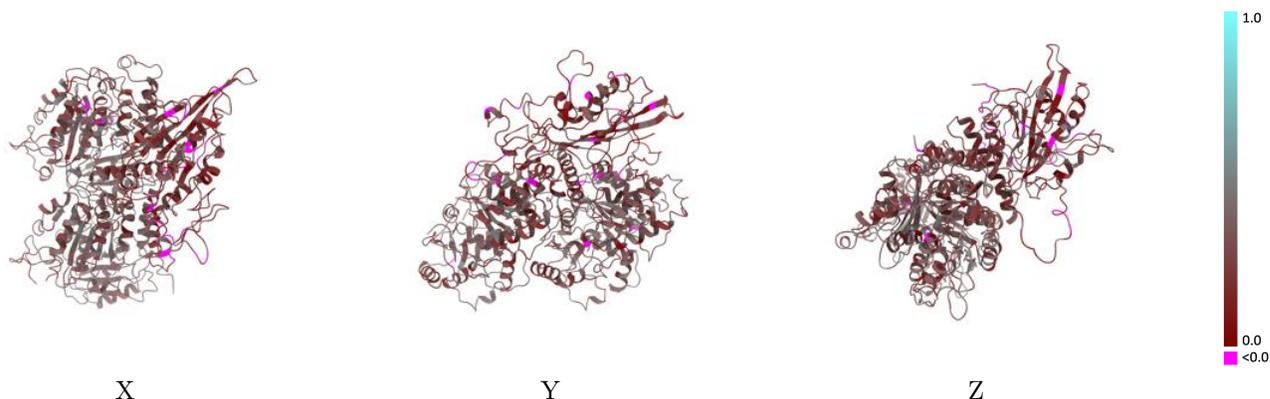
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

X   Y   Z
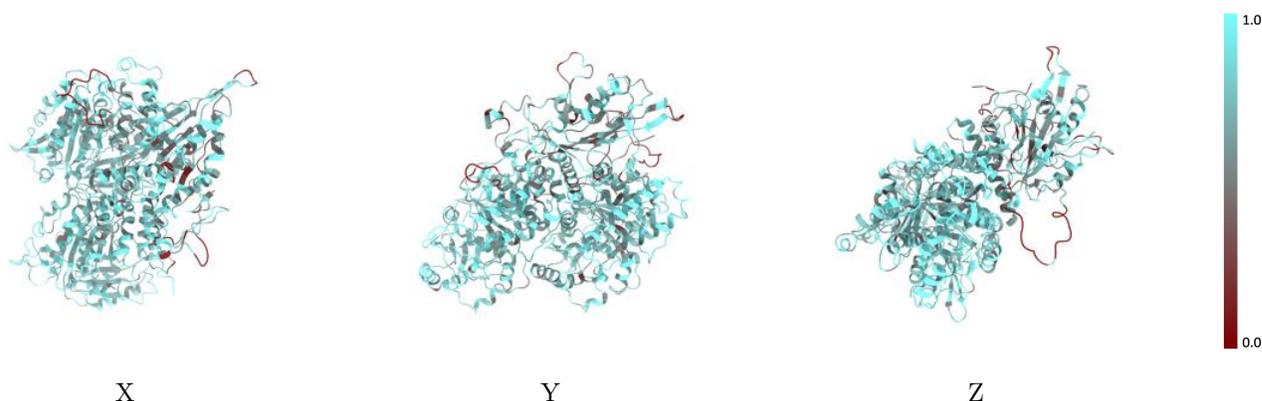
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0171).

9.4   Atom inclusion ⓘ
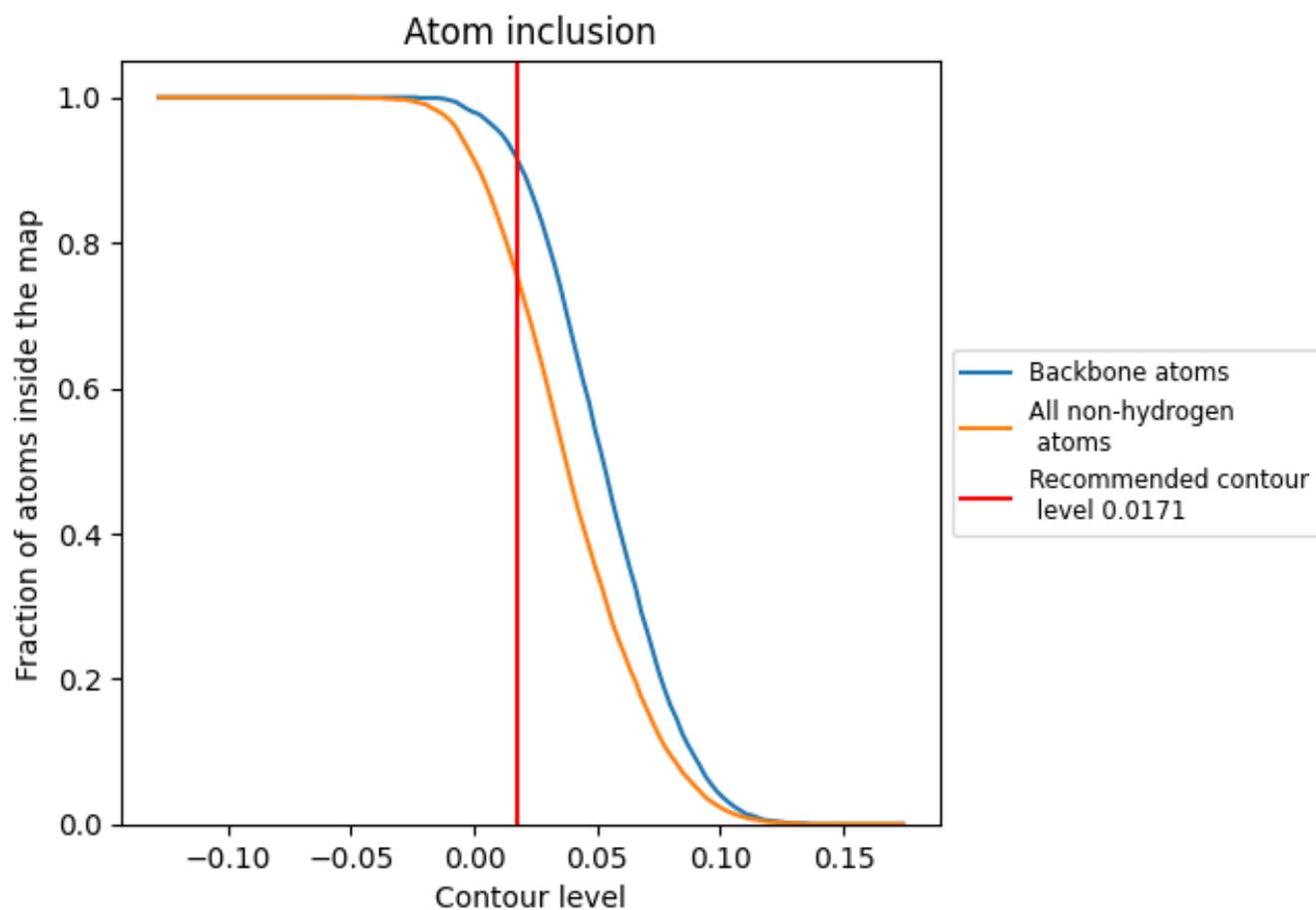
At the recommended contour level, 92% of all backbone atoms, 76% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.0171) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7580	0.2840
A	0.8100	0.3120
B	0.8120	0.3150
K	0.6370	0.2160

1.0

0.0
<0.0