



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 17, 2023 – 12:58 AM EDT

PDB ID : 4X1K  
Title : Discovery of cytotoxic Dolastatin 10 analogs with N-terminal modifications  
Authors : Parris, K.D.  
Deposited on : 2014-11-24  
Resolution : 3.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35.1

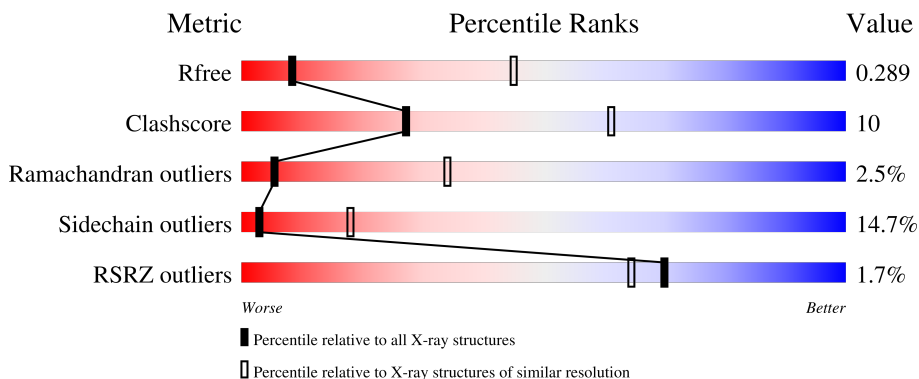
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.50 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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 electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	451	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 61%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 29%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">3%      61%      29%      • 5%</p>
1	C	451	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 63%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 28%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">%      63%      28%      • 5%</p>
2	B	445	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 63%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 27%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">3%      63%      27%      5%      •</p>
2	D	445	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 64%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 29%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">%      64%      29%      • •</p>
3	E	142	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 61%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 21%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 13%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">%      61%      21%      5%      13%</p>

## 2 Entry composition i

There are 8 unique types of molecules in this entry. The entry contains 14713 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Tubulin alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	429	3363	2132	572	638	21	0	0	0
1	C	430	3351	2124	569	635	23	0	2	0

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	428	3342	2100	568	649	25	0	0	0
2	D	430	3369	2112	578	655	24	0	1	0

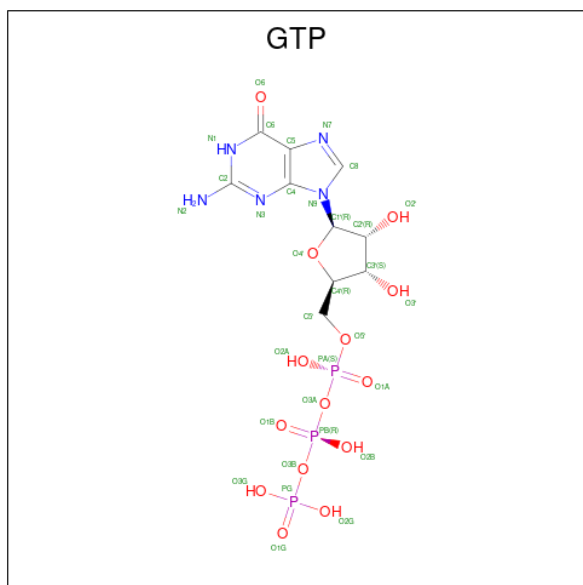
- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	123	1008	626	184	195	3	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	4	ALA	-	expression tag	UNP P63043
E	14	ALA	CYS	engineered mutation	UNP P63043
E	20	TRP	PHE	engineered mutation	UNP P63043

- Molecule 4 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>14</sub>P<sub>3</sub>).



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

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

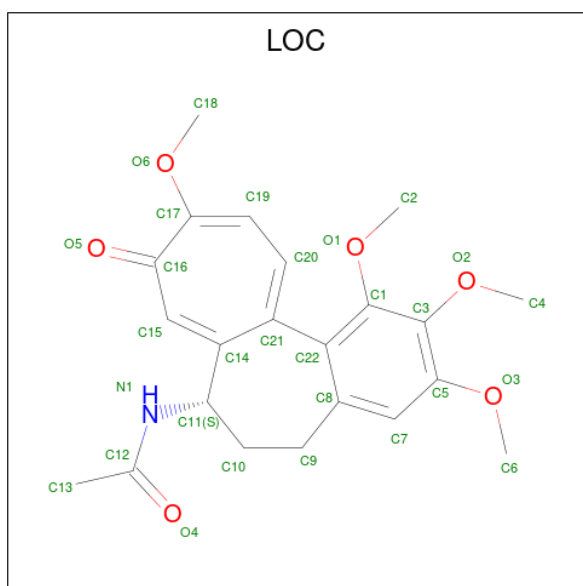
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		

- Molecule 6 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: C<sub>10</sub>H<sub>15</sub>N<sub>5</sub>O<sub>11</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
6	B	1	28	10	5	11	2	0	0
6	D	1	28	10	5	11	2	0	0

- Molecule 7 is N-[(7S)-1,2,3,10-tetramethoxy-9-oxo-6,7-dihydro-5H-benzo[d]heptalen-7-yl]ethanamide (three-letter code: LOC) (formula: C<sub>22</sub>H<sub>25</sub>NO<sub>6</sub>).



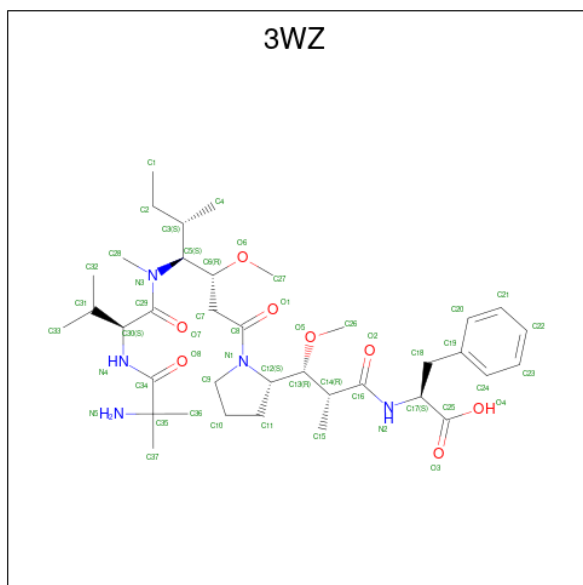
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	B	1	29	22	1	6	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	D	1	29	22	1	6	0	0

- Molecule 8 is 2-methyl-L-alanyl-N-[(3R,4S,5S)-1-{(2S)-2-[(1R,2R)-3-{(1S)-1-carboxy-2-phenylethyl]amino}-1-methoxy-2-methyl-3-oxopropyl]pyrrolidin-1-yl}-3-methoxy-5-methyl-1-oxoheptan-4-yl]-N-methyl-L-valinamide (three-letter code: 3WZ) (formula: C<sub>37</sub>H<sub>61</sub>N<sub>5</sub>O<sub>8</sub>).

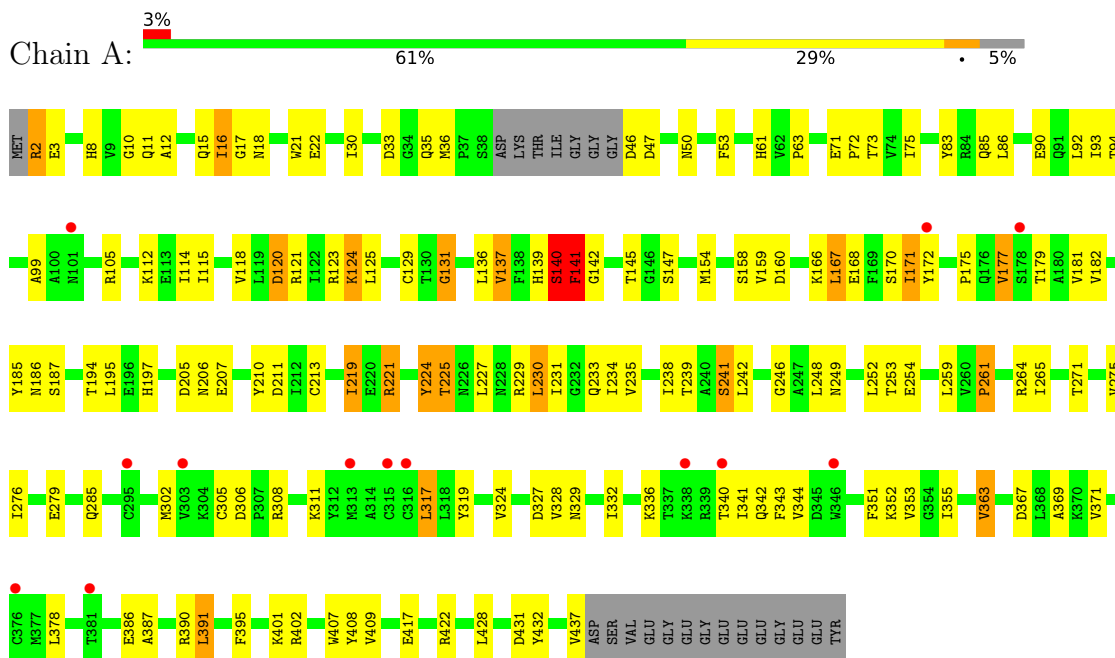


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
8	B	1	50	37	5	8	0	0
8	D	1	50	37	5	8	0	0

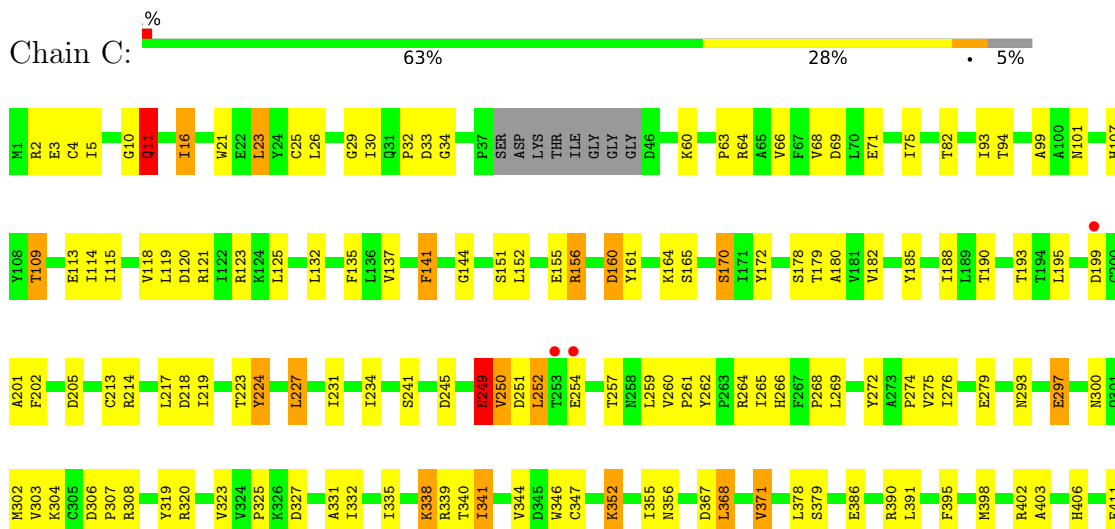
### 3 Residue-property plots

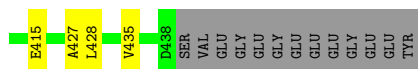
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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 dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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: Tubulin alpha chain

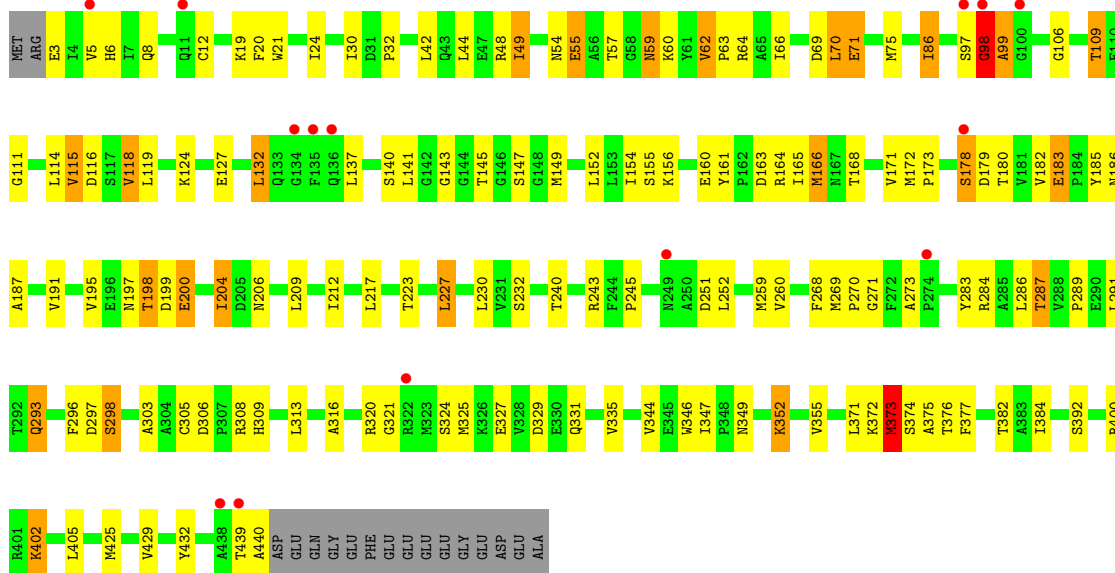


#### • Molecule 1: Tubulin alpha chain

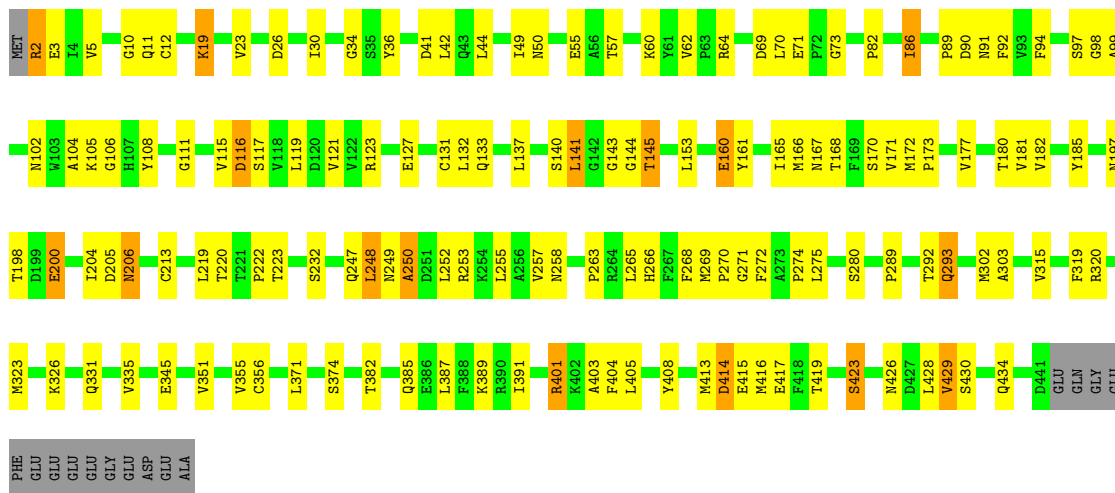




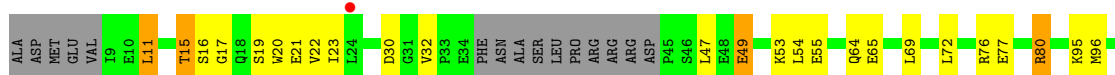
• Molecule 2: Tubulin beta chain



• Molecule 2: Tubulin beta chain



• Molecule 3: Stathmin-4





L101	A102	Q103	M119	L120	L123	Q124	D127	A130	E131	E132	V133	R134	K135	E141	GLU	ALA	SER	ARG
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## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	66.73Å 128.30Å 254.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.45 – 3.50 46.04 – 3.01	Depositor EDS
% Data completeness (in resolution range)	92.1 (45.45-3.50) 82.3 (46.04-3.01)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.95 (at 3.01Å)	Xtrriage
Refinement program	BUSTER 2.11.5	Depositor
R, $R_{free}$	0.200 , 0.263 0.216 , 0.289	Depositor DCC
$R_{free}$ test set	1816 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	115.6	Xtrriage
Anisotropy	0.323	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.26 , 108.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.43$ , $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	14713	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	144.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.24% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 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: GDP, 3WZ, GTP, MG, LOC

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	0.51	0/3440	0.76	0/4671
1	C	0.53	0/3432	0.79	0/4662
2	B	0.53	0/3417	0.82	1/4634 (0.0%)
2	D	0.54	0/3446	0.80	2/4670 (0.0%)
3	E	0.50	0/1019	0.75	0/1355
All	All	0.53	0/14754	0.79	3/19992 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	248	LEU	C-N-CA	6.53	138.01	121.70
2	D	249	ASN	C-N-CA	6.32	137.51	121.70
2	B	98	GLY	N-CA-C	5.41	126.63	113.10

There are no chirality outliers.

There are no planarity outliers.

### 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	3363	0	3274	71	0
1	C	3351	0	3258	70	0
2	B	3342	0	3198	77	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	3369	0	3237	71	0
3	E	1008	0	1022	17	0
4	A	32	0	12	1	0
4	C	32	0	12	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
6	B	28	0	12	1	0
6	D	28	0	12	3	0
7	B	29	0	25	1	0
7	D	29	0	25	2	0
8	B	50	0	60	0	0
8	D	50	0	60	0	0
All	All	14713	0	14207	291	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 10.

All (291) 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:C:338:LYS:HD3	1:C:340:THR:HG22	1.26	1.16
1:C:338:LYS:HD3	1:C:340:THR:CG2	1.92	0.99
1:C:338:LYS:CD	1:C:340:THR:HG22	1.95	0.97
1:A:33:ASP:HA	1:A:85:GLN:HB3	1.56	0.86
2:D:12:CYS:HB3	2:D:140:SER:HB3	1.59	0.83
2:D:247:GLN:HE22	2:D:355:VAL:H	1.28	0.80
1:C:155:GLU:HB3	3:E:101:LEU:HD21	1.66	0.76
2:B:30:ILE:HG22	2:B:86:ILE:HD11	1.66	0.76
2:B:287:THR:HG23	2:B:289:PRO:HD2	1.69	0.73
1:A:248:LEU:HB2	3:E:19:SER:HB3	1.70	0.73
1:A:246:GLY:HA2	3:E:17:GLY:HA3	1.70	0.71
2:B:200:GLU:HB3	2:B:268:PHE:HE1	1.57	0.70
1:A:158:SER:HB2	1:A:197:HIS:HD2	1.56	0.70
2:B:69:ASP:HA	2:B:145:THR:HG21	1.74	0.69
2:B:166:MET:HB3	2:B:198:THR:HG22	1.75	0.69
1:A:175:PRO:HA	1:A:179:THR:HG21	1.75	0.67
2:D:12:CYS:SG	2:D:171:VAL:HG11	2.35	0.67
1:C:241:SER:HA	1:C:250:VAL:HB	1.77	0.66
2:D:205:ASP:HB3	2:D:303:ALA:HA	1.77	0.66
2:B:402:LYS:HB3	2:B:405:LEU:HD22	1.75	0.66
2:D:401:ARG:HE	2:D:403:ALA:HB2	1.61	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:329:ASN:HD21	3:E:22:VAL:HG11	1.61	0.65
1:A:259:LEU:O	1:A:261:PRO:HD3	1.96	0.65
3:E:11:LEU:HB2	3:E:20:TRP:HA	1.76	0.65
1:A:387:ALA:HA	1:A:390:ARG:HE	1.60	0.65
2:D:270:PRO:HG2	2:D:302:MET:HB2	1.79	0.65
2:B:382:THR:HA	2:B:432:TYR:HD2	1.63	0.64
1:C:319:TYR:HB3	1:C:323:VAL:HG21	1.80	0.64
1:C:5:ILE:HD12	1:C:135:PHE:CE2	2.33	0.64
2:D:106:GLY:O	2:D:111:GLY:HA3	1.97	0.64
2:B:331:GLN:O	2:B:335:VAL:HG23	1.97	0.64
1:C:172:TYR:HB3	1:C:205:ASP:HA	1.80	0.64
2:D:172:MET:HG3	2:D:387:LEU:HD11	1.79	0.64
2:D:253:ARG:O	2:D:257:VAL:HG23	1.97	0.64
2:D:272:PHE:CE1	2:D:374:SER:HB2	2.33	0.63
2:B:48:ARG:HH11	2:B:245:PRO:HA	1.63	0.63
2:D:19:LYS:O	2:D:23:VAL:HG23	1.99	0.63
2:D:293:GLN:HE22	2:D:331:GLN:HE21	1.47	0.63
1:C:274:PRO:HG2	1:C:371:VAL:HG11	1.79	0.62
2:B:320:ARG:HB2	2:B:374:SER:HB3	1.81	0.62
2:B:179:ASP:HB2	1:C:352:LYS:HG2	1.83	0.61
2:D:250:ALA:HA	7:D:502:LOC:H6B	1.82	0.61
2:B:382:THR:HA	2:B:432:TYR:CD2	2.35	0.60
1:C:276:ILE:HD11	1:C:371:VAL:HG22	1.83	0.60
1:C:308:ARG:NH1	1:C:340:THR:HG21	2.16	0.60
1:A:225:THR:O	1:A:229:ARG:HG2	2.01	0.60
1:C:195:LEU:HD21	1:C:428:LEU:HD13	1.85	0.59
2:B:204:ILE:HD13	2:B:270:PRO:HG2	1.84	0.59
1:A:177:VAL:HG21	1:A:206:ASN:HB3	1.84	0.59
2:B:273:ALA:HB3	2:B:375:ALA:HB3	1.84	0.59
2:D:50:ASN:O	2:D:64:ARG:NH2	2.35	0.58
2:B:200:GLU:HB3	2:B:268:PHE:CE1	2.38	0.58
1:A:21:TRP:CE3	1:A:63:PRO:HB3	2.39	0.58
2:B:269:MET:HG3	2:B:303:ALA:HB3	1.86	0.57
1:C:141:PHE:CE1	1:C:170:SER:HB2	2.40	0.57
2:B:352:LYS:HE3	7:B:502:LOC:O5	2.04	0.57
2:D:36:TYR:CZ	2:D:44:LEU:HD11	2.39	0.57
1:A:317:LEU:HD12	1:A:353:VAL:HG22	1.87	0.57
2:D:133:GLN:HE21	2:D:252:LEU:H	1.52	0.57
1:A:311:LYS:HD3	1:A:344:VAL:HG12	1.87	0.56
2:B:293:GLN:HE22	2:B:331:GLN:HE21	1.52	0.56
2:B:313:LEU:HA	2:B:344:VAL:HG22	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:389:LYS:HG3	2:D:429:VAL:HG11	1.87	0.56
1:C:346:TRP:HZ2	1:C:435:VAL:HG22	1.69	0.56
3:E:130:ALA:HB1	3:E:134:ARG:HH12	1.72	0.55
1:A:15:GLN:HA	1:A:18:ASN:HD22	1.71	0.55
1:A:136:LEU:HD11	1:A:252:LEU:HD21	1.88	0.55
1:A:53:PHE:HB3	1:A:61:HIS:HB3	1.89	0.54
1:A:158:SER:CB	1:A:197:HIS:HD2	2.20	0.54
2:B:191:VAL:O	2:B:195:VAL:HG23	2.08	0.54
2:B:259:MET:HE2	2:B:316:ALA:HB2	1.90	0.54
1:C:3:GLU:HG2	1:C:64:ARG:CZ	2.37	0.54
1:A:21:TRP:CZ3	1:A:63:PRO:HB3	2.42	0.54
2:B:140:SER:HA	2:B:171:VAL:HG22	1.90	0.54
1:A:154:MET:HG3	1:A:194:THR:HG23	1.89	0.54
1:C:297:GLU:HB3	1:C:300:ASN:HD22	1.73	0.54
1:C:34:GLY:HA3	1:C:60:LYS:HG3	1.90	0.53
1:C:259:LEU:O	1:C:261:PRO:HD3	2.08	0.53
1:A:140:SER:HA	1:A:171:ILE:HG22	1.91	0.53
2:D:102:ASN:HB3	2:D:105:LYS:HB2	1.89	0.53
1:A:112:LYS:HE3	3:E:54:LEU:HB3	1.91	0.53
1:A:276:ILE:HG23	1:A:369:ALA:HB3	1.89	0.53
2:D:200:GLU:HB2	2:D:268:PHE:CE1	2.43	0.53
2:B:71:GLU:HB3	2:B:98:GLY:HA2	1.91	0.53
1:C:260:VAL:HG12	1:C:262:TYR:O	2.09	0.53
2:D:292:THR:HG22	2:D:335:VAL:HG21	1.91	0.53
2:D:319:PHE:HB2	2:D:355:VAL:HG22	1.91	0.53
1:A:249:ASN:HD22	1:A:254:GLU:HB3	1.74	0.53
2:B:3:GLU:HB2	2:B:132:LEU:HA	1.90	0.52
1:A:207:GLU:O	1:A:210:TYR:HB3	2.09	0.52
2:B:305:CYS:SG	2:B:384:ILE:HA	2.49	0.52
1:C:119:LEU:HD13	1:C:156:ARG:HE	1.73	0.52
1:A:235:VAL:HA	1:A:238:ILE:HD12	1.92	0.52
1:C:266:HIS:O	1:C:268:PRO:HD3	2.09	0.52
2:D:71:GLU:HG2	2:D:98:GLY:HA2	1.92	0.52
1:A:172:TYR:CE2	1:A:391:LEU:HD22	2.45	0.52
2:B:21:TRP:CZ3	2:B:63:PRO:HB3	2.44	0.52
2:B:106:GLY:O	2:B:111:GLY:HA3	2.09	0.52
2:D:62:VAL:HG23	2:D:86:ILE:O	2.10	0.52
2:D:165:ILE:HG21	2:D:252:LEU:HB3	1.92	0.52
2:D:274:PRO:HD3	2:D:374:SER:HA	1.92	0.52
1:A:182:VAL:O	1:A:185:TYR:HB2	2.10	0.52
2:B:206:ASN:HA	2:B:209:LEU:HB2	1.91	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:213:CYS:HA	1:C:217:LEU:HB2	1.93	0.51
1:C:188:ILE:HD13	1:C:395:PHE:HB2	1.93	0.51
2:B:141:LEU:HD12	2:B:172:MET:SD	2.51	0.51
1:A:12:ALA:O	1:A:16:ILE:HB	2.11	0.51
3:E:11:LEU:HD23	3:E:21:GLU:HB2	1.92	0.51
1:A:123:ARG:HH12	1:A:160:ASP:HB3	1.75	0.51
2:B:425:MET:O	2:B:429:VAL:HG23	2.09	0.51
2:D:171:VAL:HA	2:D:204:ILE:O	2.10	0.51
2:B:344:VAL:HG21	2:B:347:ILE:HD12	1.92	0.51
2:D:269:MET:HG3	2:D:303:ALA:HB3	1.93	0.51
2:D:30:ILE:HD11	2:D:49:ILE:HD11	1.93	0.50
2:B:54:ASN:HD21	2:B:64:ARG:HD3	1.76	0.50
2:B:143:GLY:O	2:B:147:SER:HB3	2.12	0.50
2:B:371:LEU:H	2:B:371:LEU:HD23	1.77	0.50
1:A:3:GLU:HG3	1:A:129:CYS:SG	2.51	0.50
1:A:230:LEU:HD23	1:A:234:ILE:HD11	1.94	0.50
2:D:23:VAL:HG21	2:D:232:SER:HB2	1.94	0.50
2:D:133:GLN:NE2	2:D:252:LEU:H	2.10	0.50
1:C:249:ASN:HB2	1:C:355:ILE:H	1.77	0.50
2:D:166:MET:HG3	2:D:198:THR:HG22	1.92	0.49
1:A:159:VAL:HG11	3:E:47:LEU:HB2	1.93	0.49
1:C:172:TYR:CE2	1:C:391:LEU:HD22	2.47	0.49
1:C:320:ARG:HB3	1:C:356:ASN:HB3	1.95	0.49
2:D:34:GLY:HA3	2:D:60:LYS:HE3	1.94	0.49
2:D:116:ASP:HA	2:D:119:LEU:HD12	1.95	0.49
1:A:142:GLY:HA2	1:A:186:ASN:HB2	1.94	0.49
2:B:259:MET:CE	2:B:316:ALA:HB2	2.43	0.49
2:D:141:LEU:HG	2:D:170:SER:HB3	1.95	0.49
1:A:340:THR:O	1:A:340:THR:HG22	2.13	0.49
3:E:132:GLU:HA	3:E:135:LYS:HB3	1.95	0.49
2:D:137:LEU:HB3	2:D:168:THR:HG22	1.94	0.48
3:E:49:GLU:HG3	3:E:53:LYS:HE2	1.95	0.48
1:A:16:ILE:HD11	1:A:231:ILE:HD13	1.94	0.48
1:A:139:HIS:CE1	1:A:170:SER:HB3	2.48	0.48
1:A:213:CYS:HB3	1:A:219:ILE:HD12	1.95	0.48
2:B:286:LEU:HD23	2:B:291:LEU:HD12	1.95	0.48
2:B:271:GLY:HA3	2:B:377:PHE:HB3	1.96	0.48
1:C:179:THR:HG22	1:C:180:ALA:H	1.78	0.48
2:D:5:VAL:HG23	2:D:132:LEU:CD1	2.43	0.48
1:C:202:PHE:HE2	1:C:378:LEU:HD22	1.78	0.48
1:C:252:LEU:C	1:C:254:GLU:H	2.16	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:119:LEU:HD21	2:B:156:LYS:HB3	1.95	0.48
2:B:217:LEU:HD11	2:B:230:LEU:HD21	1.96	0.48
2:B:346:TRP:HB3	2:B:440:ALA:HB2	1.96	0.48
1:A:407:TRP:HZ2	2:B:260:VAL:HB	1.78	0.47
1:C:66:VAL:HG12	1:C:68:VAL:HG23	1.95	0.47
1:A:265:ILE:HD11	1:A:431:ASP:HB3	1.95	0.47
2:B:137:LEU:HD23	2:B:154:ILE:HD11	1.95	0.47
2:D:213:CYS:HB3	2:D:219:LEU:HD12	1.96	0.47
2:D:423:SER:HA	2:D:426:ASN:HB2	1.94	0.47
2:B:21:TRP:CE3	2:B:24:ILE:HD11	2.50	0.47
1:A:167:LEU:HD13	1:A:252:LEU:HD22	1.96	0.47
2:B:12:CYS:CB	2:B:140:SER:HB3	2.45	0.47
2:B:179:ASP:HB2	1:C:352:LYS:HE3	1.96	0.47
1:C:224:TYR:HA	1:C:227:LEU:HD12	1.96	0.47
1:A:305:CYS:HB2	1:A:386:GLU:HB2	1.95	0.47
2:B:71:GLU:HB3	2:B:98:GLY:CA	2.45	0.47
2:D:220:THR:O	2:D:222:PRO:HD3	2.15	0.46
2:B:114:LEU:HB3	2:B:149:MET:HE3	1.97	0.46
1:C:160:ASP:HB3	1:C:161:TYR:CD1	2.51	0.46
2:B:137:LEU:HB3	2:B:168:THR:HG22	1.98	0.46
1:A:229:ARG:HD2	1:A:363:VAL:HG21	1.98	0.46
1:C:119:LEU:CD1	1:C:156:ARG:HE	2.29	0.46
1:A:2:ARG:N	1:A:131:GLY:O	2.48	0.46
1:A:224:TYR:HA	1:A:227:LEU:HD12	1.98	0.46
2:B:6:HIS:CE1	2:B:8:GLN:HE21	2.34	0.46
2:B:155:SER:HB2	3:E:76:ARG:HH22	1.80	0.46
2:B:119:LEU:HD23	2:B:160:GLU:OE1	2.16	0.45
2:D:185:TYR:HD1	2:D:408:TYR:CE1	2.34	0.45
2:D:272:PHE:HE1	2:D:374:SER:HB2	1.81	0.45
1:A:238:ILE:HG12	1:A:378:LEU:HD21	1.99	0.45
2:B:70:LEU:HD11	2:B:111:GLY:HA2	1.96	0.45
1:C:151[A]:SER:HB3	1:C:190:THR:HG1	1.81	0.45
1:C:275:VAL:HG13	1:C:368:LEU:HD11	1.98	0.45
1:C:241:SER:OG	1:C:252:LEU:HB2	2.16	0.45
2:D:414:ASP:OD1	2:D:417:GLU:HB2	2.17	0.45
2:D:320:ARG:HA	2:D:356:CYS:O	2.16	0.45
1:A:137:VAL:HG23	1:A:168:GLU:HA	1.99	0.45
2:B:19:LYS:HB3	2:B:232:SER:HB3	1.99	0.44
1:C:202:PHE:CE2	1:C:268:PRO:HG2	2.52	0.44
3:E:130:ALA:HB1	3:E:134:ARG:NH1	2.31	0.44
1:A:15:GLN:O	1:A:18:ASN:HB2	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:30:ILE:HA	1:A:36:MET:HB3	1.98	0.44
2:D:5:VAL:HG23	2:D:132:LEU:HD13	2.00	0.44
2:D:387:LEU:O	2:D:391:ILE:HG12	2.16	0.44
1:A:158:SER:HB2	1:A:197:HIS:CD2	2.45	0.44
2:B:44:LEU:HD23	2:B:49:ILE:HD13	1.98	0.44
2:D:89:PRO:HA	2:D:92:PHE:CD1	2.52	0.44
1:A:12:ALA:HA	4:A:600:GTP:C5	2.52	0.44
1:A:8:HIS:CD2	1:A:17:GLY:HA3	2.51	0.44
2:D:69:ASP:HA	2:D:145:THR:HG21	1.99	0.44
2:D:104:ALA:HB2	2:D:413:MET:SD	2.58	0.44
1:A:239:THR:HA	1:A:242:LEU:HD12	1.99	0.44
2:B:115:VAL:HG22	2:B:119:LEU:HD13	1.99	0.44
2:D:108:TYR:CE2	3:E:130:ALA:HA	2.52	0.44
2:B:12:CYS:HB3	2:B:140:SER:HB3	2.00	0.44
1:C:23:LEU:HA	1:C:26:LEU:HD12	2.00	0.43
1:C:25:CYS:O	1:C:30:ILE:N	2.51	0.43
1:C:69:ASP:CB	1:C:75:ILE:HD12	2.48	0.43
1:C:231:ILE:HA	1:C:234:ILE:HD12	2.00	0.43
2:D:2:ARG:HB3	2:D:131:CYS:O	2.17	0.43
2:B:173:PRO:HG3	2:B:187:ALA:HB2	1.99	0.43
1:C:331:ALA:O	1:C:335:ILE:HG12	2.19	0.43
2:D:315:VAL:HB	2:D:351:VAL:HG13	2.01	0.43
1:A:395:PHE:CE2	1:A:422:ARG:HB2	2.54	0.43
2:B:54:ASN:HB2	2:B:62:VAL:HG13	2.01	0.43
1:C:205:ASP:HB2	1:C:303:VAL:HG13	2.01	0.43
2:D:10:GLY:HA3	6:D:501:GDP:O1B	2.19	0.43
2:D:91:ASN:HA	2:D:121:VAL:HG11	1.99	0.43
2:D:206:ASN:HD21	6:D:501:GDP:HN22	1.65	0.43
3:E:131:GLU:HG2	3:E:134:ARG:HH21	1.82	0.43
2:B:70:LEU:HD11	2:B:111:GLY:CA	2.48	0.43
2:B:182:VAL:O	2:B:185:TYR:HB2	2.18	0.43
2:D:181:VAL:HG21	2:D:404:PHE:CZ	2.53	0.43
2:B:209:LEU:HB3	2:B:227:LEU:HG	2.01	0.43
2:B:384:ILE:HG22	2:B:432:TYR:CE2	2.54	0.43
1:C:346:TRP:CZ2	1:C:435:VAL:HG22	2.52	0.43
2:D:70:LEU:HD12	2:D:99:ALA:HB2	1.99	0.43
2:B:289:PRO:O	2:B:293:GLN:HG2	2.18	0.43
1:C:93:ILE:HG21	1:C:118:VAL:HG22	2.00	0.43
1:C:182:VAL:O	1:C:185:TYR:HB2	2.18	0.43
2:D:70:LEU:HD21	2:D:111:GLY:HA2	2.00	0.43
2:D:123:ARG:O	2:D:127:GLU:HG2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:173:PRO:HB3	6:D:501:GDP:O3'	2.19	0.43
2:D:382:THR:O	2:D:385:GLN:HG2	2.18	0.43
2:B:306:ASP:O	2:B:309:HIS:HB2	2.19	0.43
1:C:411:GLU:OE2	1:C:411:GLU:HA	2.19	0.43
1:A:195:LEU:HD21	1:A:264:ARG:NH1	2.33	0.42
2:D:263:PRO:O	2:D:266:HIS:HD2	2.01	0.42
1:A:319:TYR:HB2	1:A:355:ILE:HG12	2.00	0.42
1:C:11:GLN:HE21	1:C:11:GLN:HB2	1.72	0.42
1:A:83:TYR:HD2	1:A:86:LEU:HD22	1.83	0.42
2:B:55:GLU:HG2	2:B:59:ASN:O	2.19	0.42
1:A:93:ILE:HG21	1:A:118:VAL:HG22	2.01	0.42
1:A:329:ASN:HA	1:A:332:ILE:HB	2.02	0.42
1:C:107:HIS:O	1:C:152:LEU:HD22	2.19	0.42
1:C:132:LEU:HD23	1:C:164:LYS:HE3	2.01	0.42
1:C:340:THR:CG2	1:C:341:ILE:N	2.83	0.42
1:C:386:GLU:O	1:C:390:ARG:HB2	2.19	0.42
2:B:206:ASN:HD21	6:B:501:GDP:HN22	1.67	0.42
1:C:214:ARG:O	1:C:218:ASP:HA	2.20	0.42
2:B:149:MET:O	2:B:152:LEU:HB3	2.20	0.42
2:B:154:ILE:HG22	2:B:197:ASN:HB3	2.02	0.42
1:C:21:TRP:CZ3	1:C:63:PRO:HB3	2.54	0.42
1:C:205:ASP:HB3	1:C:303:VAL:HA	2.01	0.42
1:A:17:GLY:O	1:A:21:TRP:HD1	2.03	0.41
1:A:221:ARG:HG2	2:B:325:MET:HB3	2.01	0.41
1:A:328:VAL:HG11	1:A:353:VAL:HG11	2.01	0.41
2:D:160:GLU:HB3	2:D:161:TYR:CE1	2.55	0.41
3:E:77:GLU:HA	3:E:80:ARG:HB2	2.03	0.41
2:B:165:ILE:HG22	2:B:252:LEU:HD23	2.01	0.41
1:C:99:ALA:HB3	1:C:144:GLY:HA3	2.01	0.41
2:D:289:PRO:O	2:D:293:GLN:HB2	2.20	0.41
1:A:120:ASP:O	1:A:124:LYS:HD2	2.20	0.41
2:B:321:GLY:HA3	2:B:373:MET:HA	2.01	0.41
1:C:69:ASP:HB2	1:C:75:ILE:HD12	2.02	0.41
1:C:195:LEU:HD12	1:C:266:HIS:HE1	1.84	0.41
1:A:241:SER:HB3	1:A:248:LEU:O	2.21	0.41
1:C:93:ILE:HD13	1:C:118:VAL:HA	2.02	0.41
1:C:180:ALA:HA	7:D:502:LOC:O5	2.21	0.41
1:C:340:THR:HG23	1:C:341:ILE:N	2.34	0.41
2:D:70:LEU:O	2:D:98:GLY:N	2.53	0.41
1:C:201:ALA:H	1:C:266:HIS:HD2	1.69	0.41
2:D:5:VAL:HG13	2:D:64:ARG:HG2	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:PHE:O	1:A:147:SER:HB3	2.21	0.41
1:A:172:TYR:HB3	1:A:205:ASP:HA	2.03	0.41
1:A:428:LEU:O	1:A:432:TYR:HD1	2.04	0.41
2:B:183:GLU:HA	2:B:186:ASN:HD22	1.86	0.41
1:C:406:HIS:CG	2:D:263:PRO:HD3	2.56	0.41
1:A:324:VAL:O	1:A:328:VAL:HG23	2.21	0.41
1:A:329:ASN:ND2	3:E:22:VAL:HG11	2.34	0.41
2:B:5:VAL:HG13	2:B:66:ILE:HD13	2.02	0.41
2:B:97:SER:O	2:B:99:ALA:N	2.51	0.41
2:B:114:LEU:O	2:B:118:VAL:HG23	2.21	0.41
2:B:243:ARG:HH2	2:B:320:ARG:HH12	1.69	0.41
1:C:16:ILE:HD11	1:C:231:ILE:HD13	2.03	0.41
2:D:180:THR:HG22	2:D:182:VAL:HG22	2.03	0.41
1:C:264:ARG:HH2	1:C:427:ALA:HB3	1.86	0.40
2:D:331:GLN:O	2:D:335:VAL:HG23	2.21	0.40
2:B:160:GLU:HB3	2:B:161:TYR:CD1	2.56	0.40
2:D:140:SER:HA	2:D:171:VAL:HG13	2.03	0.40
1:A:99:ALA:HA	1:A:105:ARG:HG2	2.03	0.40
1:A:140:SER:HB2	1:A:141:PHE:H	1.70	0.40
1:C:101:ASN:HD22	2:D:258:ASN:HD21	1.68	0.40
1:C:398:MET:HB3	1:C:403:ALA:HB3	2.03	0.40
1:A:185:TYR:HD1	1:A:408:TYR:CE1	2.39	0.40
1:C:234:ILE:HG12	1:C:272:TYR:HB2	2.04	0.40
2:D:69:ASP:HB3	2:D:94:PHE:CD1	2.56	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 X-ray entries followed by that with respect to entries of similar resolution.

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	425/451 (94%)	364 (86%)	51 (12%)	10 (2%)	<b>6</b>   35

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	428/451 (95%)	363 (85%)	53 (12%)	12 (3%)	5	32
2	B	426/445 (96%)	366 (86%)	47 (11%)	13 (3%)	4	30
2	D	429/445 (96%)	381 (89%)	40 (9%)	8 (2%)	8	40
3	E	119/142 (84%)	108 (91%)	9 (8%)	2 (2%)	9	42
All	All	1827/1934 (94%)	1582 (87%)	200 (11%)	45 (2%)	5	34

All (45) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	11	GLN
1	A	73	THR
1	A	341	ILE
2	B	60	LYS
2	B	98	GLY
2	B	109	THR
1	C	10	GLY
1	C	109	THR
1	C	249	ASN
2	D	82	PRO
2	D	115	VAL
2	D	250	ALA
3	E	32	VAL
1	A	10	GLY
1	A	72	PRO
1	A	115	ILE
1	A	131	GLY
2	B	57	THR
2	B	99	ALA
2	B	298	SER
2	B	373	MET
1	C	11	GLN
1	C	29	GLY
1	C	250	VAL
2	D	73	GLY
1	A	140	SER
1	A	261	PRO
1	C	115	ILE
2	D	144	GLY
3	E	15	THR
1	A	141	PHE
2	B	178	SER

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Mol	Chain	Res	Type
2	B	283	TYR
2	B	284	ARG
2	D	97	SER
2	B	32	PRO
1	C	265	ILE
1	C	279	GLU
1	C	325	PRO
1	C	32	PRO
1	C	341	ILE
2	D	143	GLY
2	B	183	GLU
2	D	271	GLY
2	B	115	VAL

### 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 X-ray entries followed by that with respect to entries of similar resolution.

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	362/378 (96%)	303 (84%)	59 (16%)	2	13
1	C	359/378 (95%)	304 (85%)	55 (15%)	2	17
2	B	364/383 (95%)	315 (86%)	49 (14%)	4	21
2	D	369/383 (96%)	325 (88%)	44 (12%)	5	25
3	E	107/125 (86%)	84 (78%)	23 (22%)	1	5
All	All	1561/1647 (95%)	1331 (85%)	230 (15%)	3	18

All (230) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ARG
1	A	16	ILE
1	A	22	GLU
1	A	35	GLN
1	A	46	ASP
1	A	47	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	50	ASN
1	A	71	GLU
1	A	75	ILE
1	A	90	GLU
1	A	92	LEU
1	A	94	THR
1	A	114	ILE
1	A	120	ASP
1	A	121	ARG
1	A	124	LYS
1	A	125	LEU
1	A	137	VAL
1	A	140	SER
1	A	141	PHE
1	A	145	THR
1	A	166	LYS
1	A	167	LEU
1	A	171	ILE
1	A	177	VAL
1	A	181	VAL
1	A	187	SER
1	A	211	ASP
1	A	219	ILE
1	A	221	ARG
1	A	224	TYR
1	A	225	THR
1	A	230	LEU
1	A	233	GLN
1	A	241	SER
1	A	253	THR
1	A	271	THR
1	A	275	VAL
1	A	279	GLU
1	A	285	GLN
1	A	302	MET
1	A	306	ASP
1	A	308	ARG
1	A	317	LEU
1	A	327	ASP
1	A	336	LYS
1	A	342	GLN
1	A	343	PHE

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	351	PHE
1	A	352	LYS
1	A	363	VAL
1	A	367	ASP
1	A	371	VAL
1	A	391	LEU
1	A	401	LYS
1	A	402	ARG
1	A	409	VAL
1	A	417	GLU
1	A	437	VAL
2	B	20	PHE
2	B	42	LEU
2	B	49	ILE
2	B	55	GLU
2	B	59	ASN
2	B	62	VAL
2	B	70	LEU
2	B	71	GLU
2	B	75	MET
2	B	86	ILE
2	B	109	THR
2	B	116	ASP
2	B	118	VAL
2	B	124	LYS
2	B	127	GLU
2	B	132	LEU
2	B	163	ASP
2	B	164	ARG
2	B	166	MET
2	B	178	SER
2	B	180	THR
2	B	198	THR
2	B	199	ASP
2	B	200	GLU
2	B	204	ILE
2	B	212	ILE
2	B	223	THR
2	B	227	LEU
2	B	240	THR
2	B	251	ASP
2	B	287	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	B	293	GLN
2	B	296	PHE
2	B	297	ASP
2	B	298	SER
2	B	308	ARG
2	B	324	SER
2	B	327	GLU
2	B	329	ASP
2	B	349	ASN
2	B	352	LYS
2	B	355	VAL
2	B	372	LYS
2	B	373	MET
2	B	376	THR
2	B	392	SER
2	B	400	ARG
2	B	402	LYS
2	B	439	THR
1	C	2	ARG
1	C	4[A]	CYS
1	C	4[B]	CYS
1	C	11	GLN
1	C	16	ILE
1	C	23	LEU
1	C	33	ASP
1	C	71	GLU
1	C	82	THR
1	C	94	THR
1	C	109	THR
1	C	113	GLU
1	C	114	ILE
1	C	120	ASP
1	C	121	ARG
1	C	123	ARG
1	C	125	LEU
1	C	137	VAL
1	C	141	PHE
1	C	156	ARG
1	C	160	ASP
1	C	165	SER
1	C	170	SER
1	C	178	SER

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	C	193	THR
1	C	199	ASP
1	C	219	ILE
1	C	223	THR
1	C	224	TYR
1	C	227	LEU
1	C	245	ASP
1	C	249	ASN
1	C	251	ASP
1	C	252	LEU
1	C	257	THR
1	C	269	LEU
1	C	293	ASN
1	C	297	GLU
1	C	302	MET
1	C	304	LYS
1	C	306	ASP
1	C	307	PRO
1	C	327	ASP
1	C	332	ILE
1	C	338	LYS
1	C	339	ARG
1	C	344	VAL
1	C	347	CYS
1	C	352	LYS
1	C	367	ASP
1	C	368	LEU
1	C	371	VAL
1	C	379	SER
1	C	402	ARG
1	C	415	GLU
2	D	2	ARG
2	D	3	GLU
2	D	11	GLN
2	D	19	LYS
2	D	26	ASP
2	D	41	ASP
2	D	42	LEU
2	D	55	GLU
2	D	57	THR
2	D	86	ILE
2	D	90	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	D	116	ASP
2	D	117	SER
2	D	141	LEU
2	D	145	THR
2	D	153	LEU
2	D	160	GLU
2	D	167	ASN
2	D	177	VAL
2	D	197	ASN
2	D	200	GLU
2	D	206	ASN
2	D	223	THR
2	D	248	LEU
2	D	255	LEU
2	D	265	LEU
2	D	275	LEU
2	D	280	SER
2	D	293	GLN
2	D	323	MET
2	D	326	LYS
2	D	345	GLU
2	D	371	LEU
2	D	401	ARG
2	D	405	LEU
2	D	414	ASP
2	D	415	GLU
2	D	416	MET
2	D	419	THR
2	D	423	SER
2	D	428	LEU
2	D	429	VAL
2	D	430	SER
2	D	434	GLN
3	E	11	LEU
3	E	15	THR
3	E	16	SER
3	E	23	ILE
3	E	30	ASP
3	E	49	GLU
3	E	55	GLU
3	E	64	GLN
3	E	65	GLU

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Mol	Chain	Res	Type
3	E	69	LEU
3	E	72	LEU
3	E	80	ARG
3	E	95	LYS
3	E	96	MET
3	E	103	GLN
3	E	119	MET
3	E	120	LEU
3	E	123	LEU
3	E	124	GLN
3	E	127	ASP
3	E	131	GLU
3	E	132	GLU
3	E	135	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (51) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	HIS
1	A	28	HIS
1	A	50	ASN
1	A	61	HIS
1	A	91	GLN
1	A	139	HIS
1	A	197	HIS
1	A	249	ASN
1	A	301	GLN
2	B	8	GLN
2	B	14	ASN
2	B	54	ASN
2	B	139	HIS
2	B	193	GLN
2	B	206	ASN
2	B	229	HIS
2	B	293	GLN
2	B	309	HIS
2	B	385	GLN
2	B	424	ASN
2	B	433	GLN
2	B	436	GLN
1	C	8	HIS
1	C	11	GLN

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Mol	Chain	Res	Type
1	C	50	ASN
1	C	61	HIS
1	C	107	HIS
1	C	266	HIS
1	C	300	ASN
1	C	380	ASN
2	D	6	HIS
2	D	14	ASN
2	D	133	GLN
2	D	136	GLN
2	D	139	HIS
2	D	193	GLN
2	D	197	ASN
2	D	206	ASN
2	D	247	GLN
2	D	258	ASN
2	D	266	HIS
2	D	293	GLN
2	D	300	ASN
2	D	331	GLN
2	D	394	GLN
2	D	424	ASN
2	D	426	ASN
2	D	433	GLN
3	E	12	ASN
3	E	111	ASN
3	E	115	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 2 are monoatomic - leaving 8 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	GDP	D	501	-	24,30,30	0.82	1 (4%)	30,47,47	0.73	1 (3%)
7	LOC	D	502	-	31,31,31	0.47	0	44,44,44	0.86	2 (4%)
6	GDP	B	501	-	24,30,30	0.70	0	30,47,47	0.91	1 (3%)
8	3WZ	B	503	-	47,51,51	1.19	6 (12%)	54,72,72	1.53	7 (12%)
4	GTP	C	600	5	26,34,34	0.75	1 (3%)	32,54,54	0.66	0
7	LOC	B	502	-	31,31,31	0.47	0	44,44,44	0.72	1 (2%)
8	3WZ	D	503	-	47,51,51	1.12	5 (10%)	54,72,72	1.59	11 (20%)
4	GTP	A	600	5	26,34,34	0.73	0	32,54,54	0.68	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	GDP	D	501	-	-	3/12/32/32	0/3/3/3
7	LOC	D	502	-	-	0/12/25/25	0/3/3/3
6	GDP	B	501	-	-	5/12/32/32	0/3/3/3
8	3WZ	B	503	-	-	16/70/82/82	0/2/2/2
4	GTP	C	600	5	-	8/18/38/38	0/3/3/3
7	LOC	B	502	-	-	0/12/25/25	0/3/3/3
8	3WZ	D	503	-	-	16/70/82/82	0/2/2/2
4	GTP	A	600	5	-	8/18/38/38	0/3/3/3

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	D	503	3WZ	C5-N3	5.03	1.58	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	503	3WZ	C5-N3	4.60	1.57	1.47
8	B	503	3WZ	C6-C5	3.85	1.61	1.52
8	B	503	3WZ	O3-C25	3.18	1.31	1.22
8	D	503	3WZ	C6-C5	2.99	1.59	1.52
8	D	503	3WZ	O3-C25	2.89	1.30	1.22
8	B	503	3WZ	C3-C5	2.59	1.60	1.54
8	D	503	3WZ	O4-C25	-2.50	1.22	1.30
8	D	503	3WZ	C3-C5	2.44	1.59	1.54
8	B	503	3WZ	O4-C25	-2.32	1.23	1.30
8	B	503	3WZ	C14-C16	2.20	1.56	1.52
6	D	501	GDP	C8-N7	-2.13	1.31	1.35
4	C	600	GTP	C8-N7	-2.09	1.31	1.35

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	D	503	3WZ	C28-N3-C5	-5.44	108.75	119.46
8	B	503	3WZ	C28-N3-C5	-4.99	109.64	119.46
8	B	503	3WZ	C5-N3-C29	4.62	133.58	120.34
8	B	503	3WZ	C4-C3-C5	3.96	122.16	111.20
7	D	502	LOC	C14-C11-N1	3.90	117.41	114.34
8	B	503	3WZ	O5-C13-C14	3.26	113.54	105.83
7	B	502	LOC	C14-C11-N1	3.23	116.89	114.34
8	D	503	3WZ	C30-C29-N3	3.22	125.39	118.74
8	D	503	3WZ	C31-C30-C29	3.01	116.82	110.73
8	D	503	3WZ	O3-C25-C17	-2.97	112.52	122.26
8	D	503	3WZ	O4-C25-C17	2.93	123.13	113.40
8	D	503	3WZ	O7-C29-C30	-2.87	114.38	119.99
8	D	503	3WZ	C15-C14-C16	-2.78	103.19	108.78
8	D	503	3WZ	C28-N3-C29	2.70	131.04	122.26
8	B	503	3WZ	O4-C25-C17	2.68	122.32	113.40
8	B	503	3WZ	O3-C25-C17	-2.57	113.83	122.26
8	D	503	3WZ	O8-C34-C35	-2.48	115.78	120.57
8	D	503	3WZ	C14-C16-N2	-2.47	112.70	116.44
8	D	503	3WZ	C29-C30-N4	2.46	113.82	108.03
8	B	503	3WZ	C30-C29-N3	2.36	123.61	118.74
6	D	501	GDP	PA-O3A-PB	2.11	140.05	132.83
7	D	502	LOC	C10-C11-N1	2.06	113.82	110.11
6	B	501	GDP	O3B-PB-O2B	2.00	115.28	107.64

There are no chirality outliers.

All (56) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	600	GTP	PB-O3B-PG-O2G
4	A	600	GTP	PB-O3B-PG-O3G
4	C	600	GTP	PB-O3B-PG-O2G
4	C	600	GTP	C5'-O5'-PA-O1A
4	C	600	GTP	C5'-O5'-PA-O2A
6	B	501	GDP	C5'-O5'-PA-O1A
6	B	501	GDP	C5'-O5'-PA-O2A
6	D	501	GDP	C5'-O5'-PA-O1A
6	D	501	GDP	C5'-O5'-PA-O2A
8	B	503	3WZ	C3-C5-C6-C7
8	B	503	3WZ	N3-C5-C6-O6
8	B	503	3WZ	C3-C5-C6-O6
8	B	503	3WZ	C5-C6-C7-C8
8	B	503	3WZ	C2-C3-C5-C6
8	B	503	3WZ	C4-C3-C5-C6
8	B	503	3WZ	C14-C13-O5-C26
8	D	503	3WZ	C35-C34-N4-C30
8	D	503	3WZ	O8-C34-N4-C30
8	D	503	3WZ	N3-C5-C6-C7
8	D	503	3WZ	C7-C6-O6-C27
8	B	503	3WZ	C1-C2-C3-C4
8	D	503	3WZ	O8-C34-C35-C37
8	D	503	3WZ	N4-C34-C35-C37
8	D	503	3WZ	C29-C30-C31-C33
8	B	503	3WZ	N4-C34-C35-C37
8	B	503	3WZ	O8-C34-C35-C37
8	D	503	3WZ	C29-C30-C31-C32
8	B	503	3WZ	C1-C2-C3-C5
8	B	503	3WZ	N4-C34-C35-C36
8	D	503	3WZ	N4-C30-C31-C33
4	C	600	GTP	PB-O3B-PG-O1G
8	B	503	3WZ	O8-C34-C35-C36
8	D	503	3WZ	C5-C6-C7-C8
8	B	503	3WZ	C4-C3-C5-N3
4	A	600	GTP	C5'-O5'-PA-O3A
4	A	600	GTP	PB-O3A-PA-O1A
4	C	600	GTP	PB-O3A-PA-O1A
6	B	501	GDP	PB-O3A-PA-O1A
4	A	600	GTP	C5'-O5'-PA-O1A
8	B	503	3WZ	C2-C3-C5-N3
8	D	503	3WZ	C3-C5-C6-C7
8	D	503	3WZ	C2-C3-C5-N3
8	B	503	3WZ	N3-C5-C6-C7

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Mol	Chain	Res	Type	Atoms
8	D	503	3WZ	N3-C5-C6-O6
8	D	503	3WZ	O7-C29-C30-C31
6	B	501	GDP	C4'-C5'-O5'-PA
4	A	600	GTP	PG-O3B-PB-O2B
4	A	600	GTP	C4'-C5'-O5'-PA
4	C	600	GTP	C4'-C5'-O5'-PA
4	C	600	GTP	PG-O3B-PB-O1B
8	D	503	3WZ	N3-C29-C30-C31
4	C	600	GTP	C5'-O5'-PA-O3A
6	B	501	GDP	C5'-O5'-PA-O3A
6	D	501	GDP	C5'-O5'-PA-O3A
4	A	600	GTP	PG-O3B-PB-O1B
8	D	503	3WZ	C6-C7-C8-N1

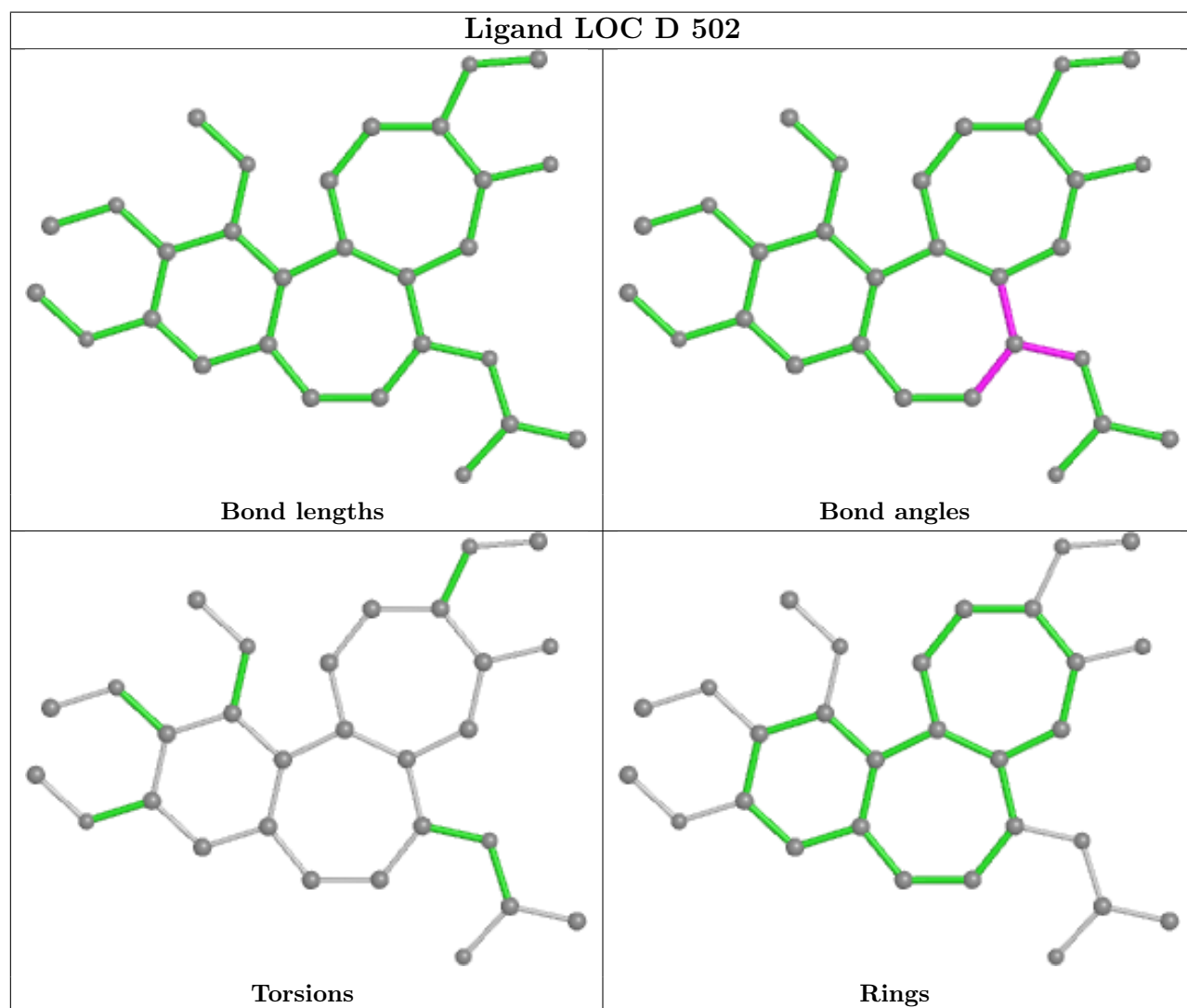
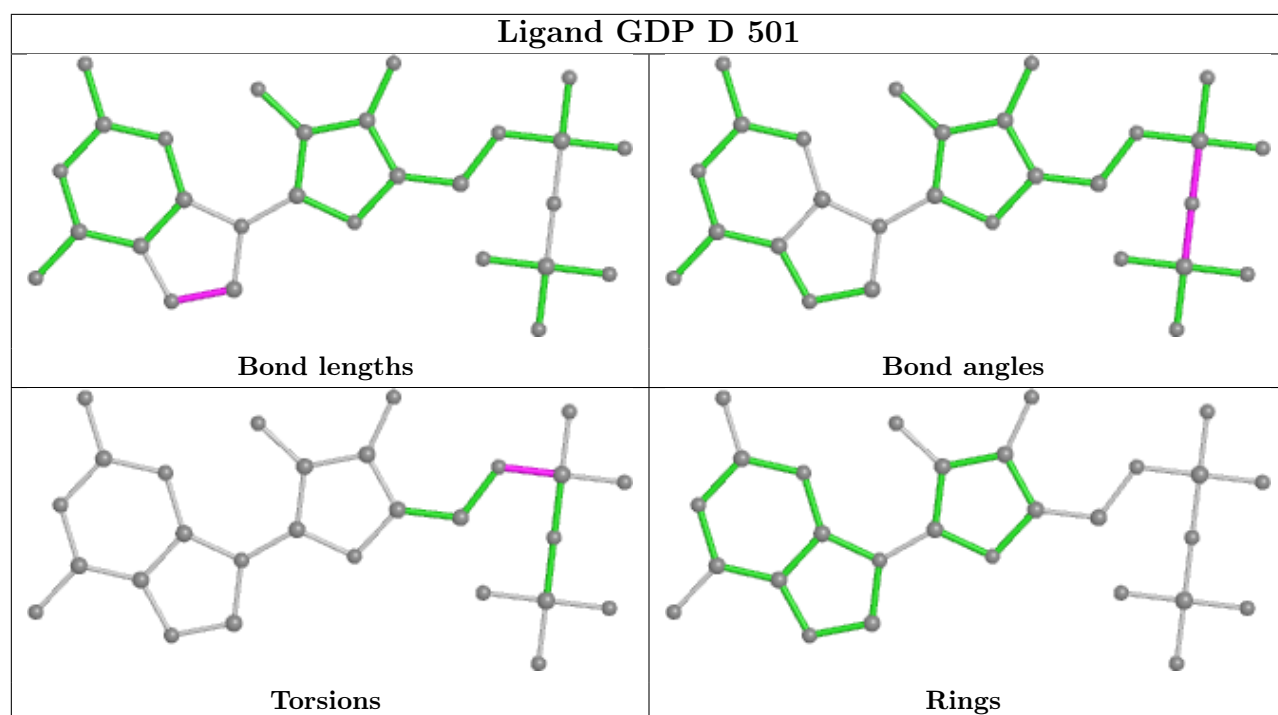
There are no ring outliers.

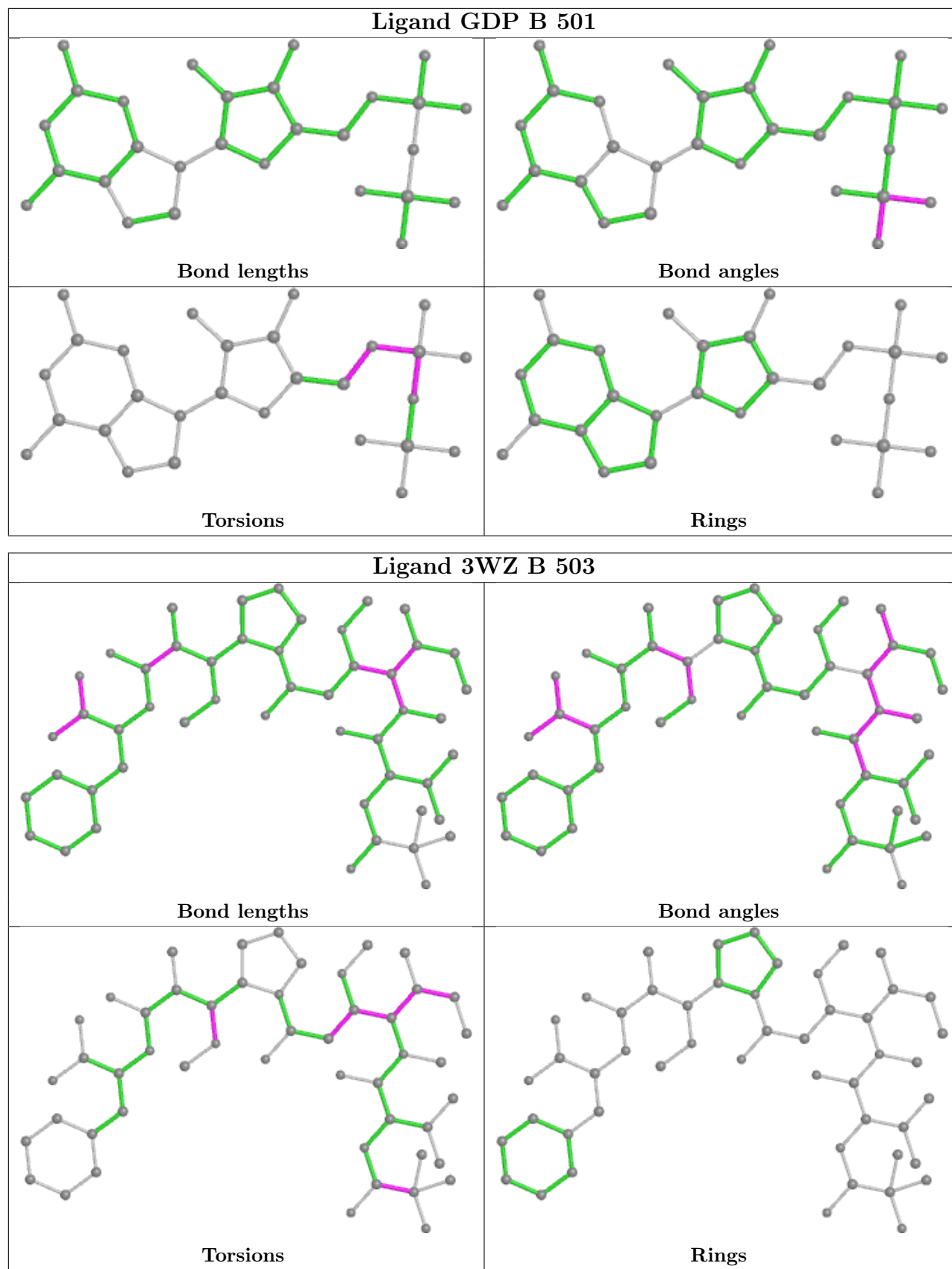
5 monomers are involved in 8 short contacts:

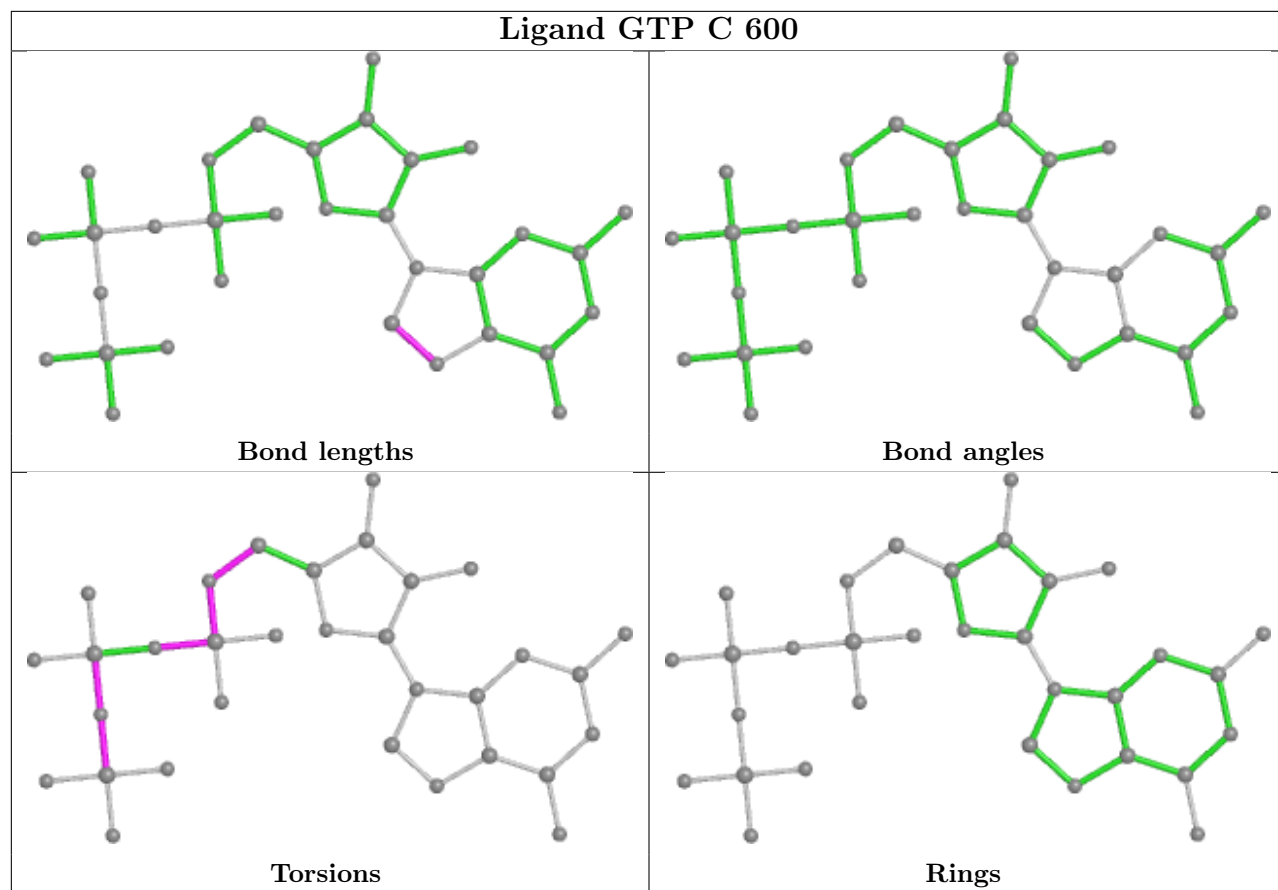
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	501	GDP	3	0
7	D	502	LOC	2	0
6	B	501	GDP	1	0
7	B	502	LOC	1	0
4	A	600	GTP	1	0

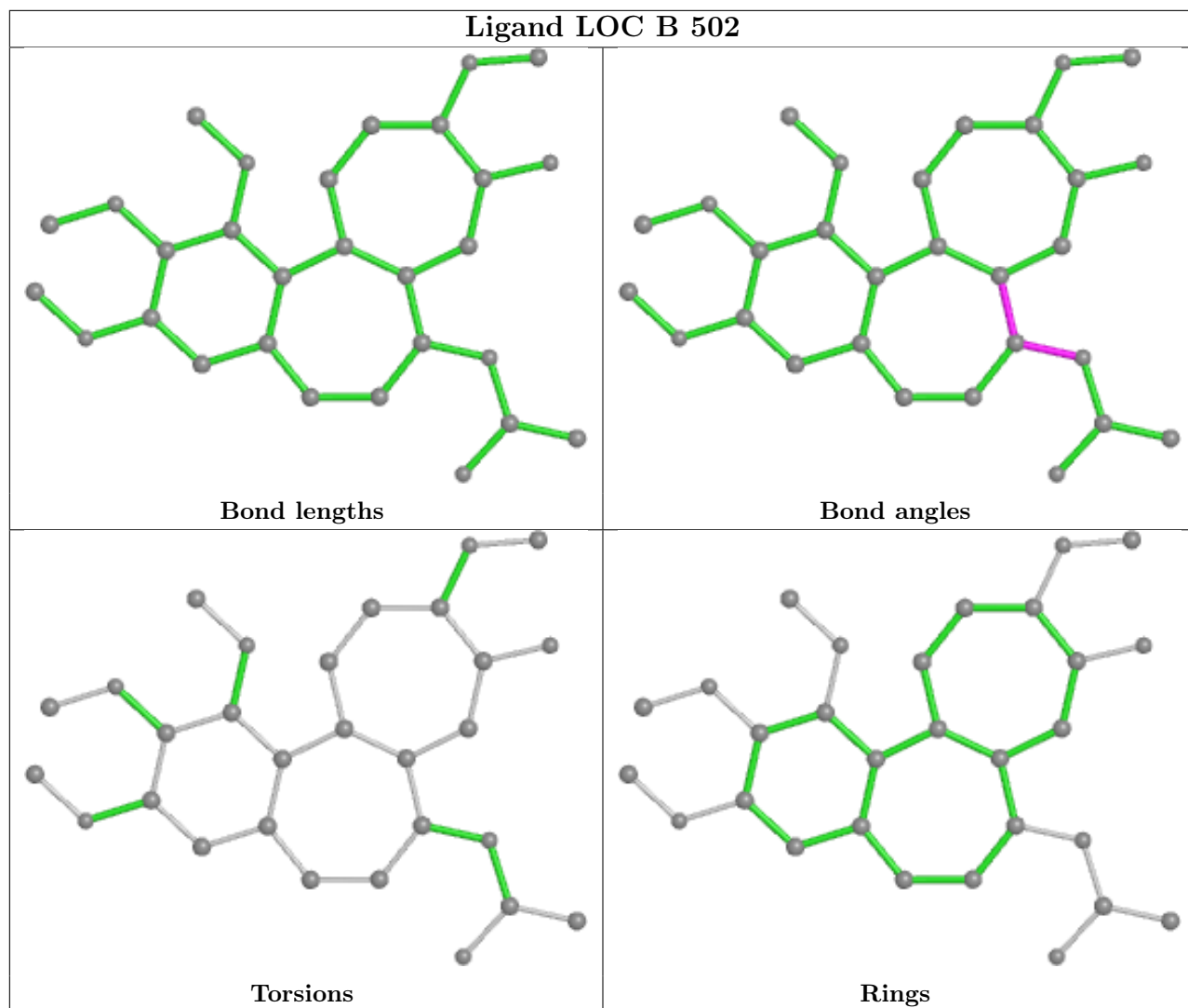
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.

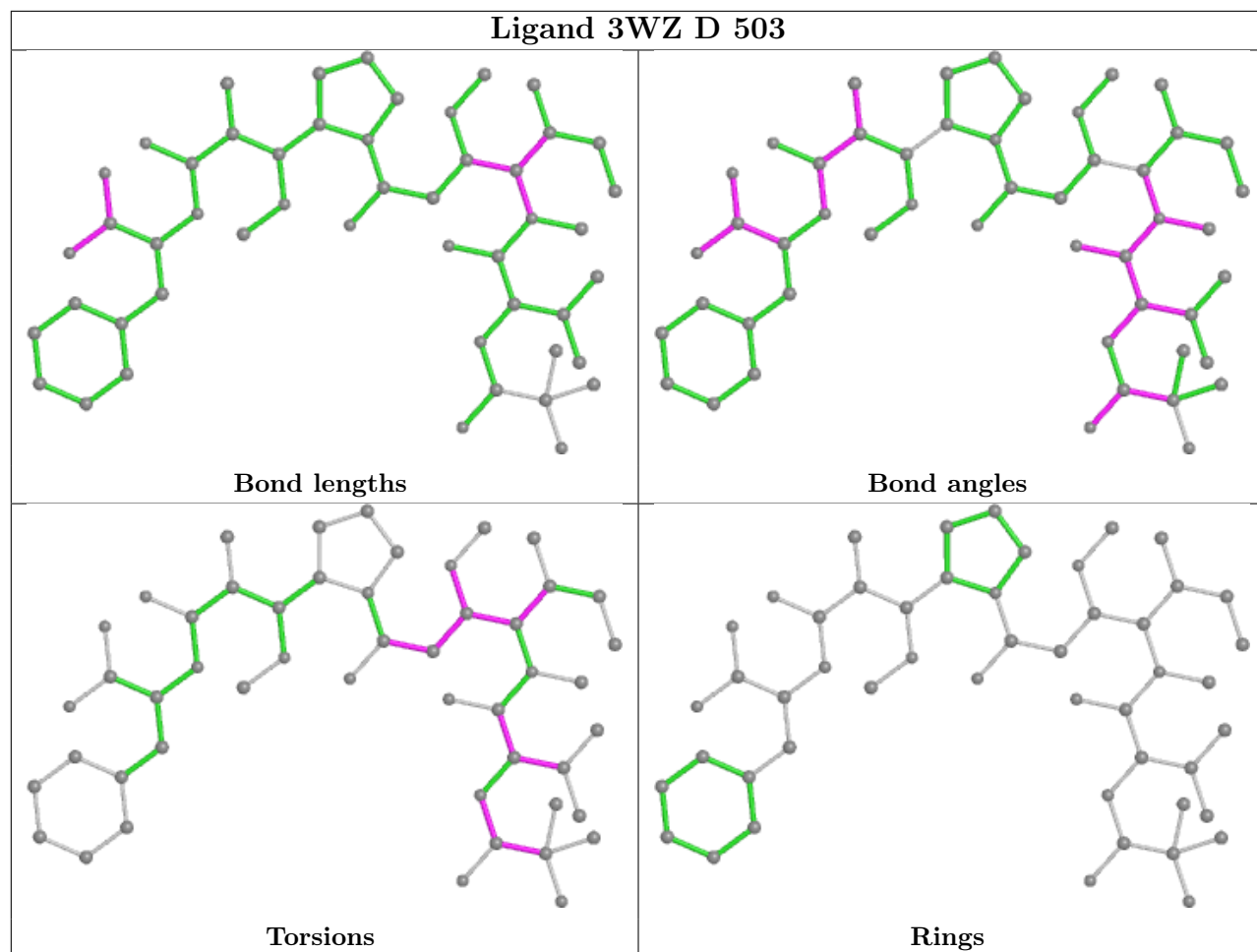


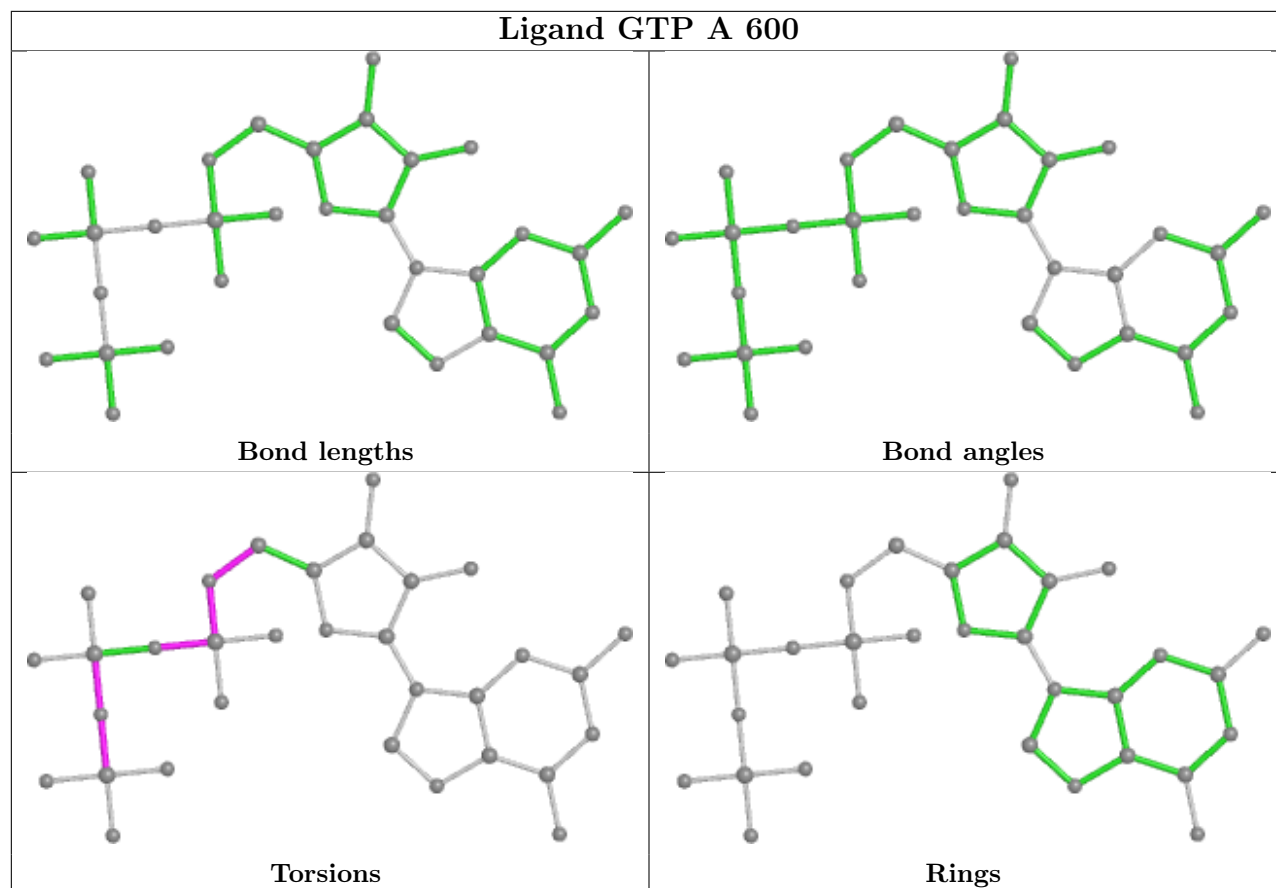












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	429/451 (95%)	-0.15	13 (3%) 50 44	118, 157, 210, 234	0
1	C	430/451 (95%)	-0.37	3 (0%) 87 83	100, 132, 174, 197	1 (0%)
2	B	428/445 (96%)	-0.16	14 (3%) 46 41	108, 144, 181, 202	2 (0%)
2	D	430/445 (96%)	-0.41	0 100 100	93, 124, 158, 185	2 (0%)
3	E	123/142 (86%)	-0.46	1 (0%) 86 81	127, 160, 208, 215	0
All	All	1840/1934 (95%)	-0.29	31 (1%) 70 64	93, 142, 190, 234	5 (0%)

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	E	24	LEU	5.1
2	B	438	ALA	5.0
1	A	340	THR	4.3
2	B	135	PHE	3.7
2	B	439	THR	3.7
1	A	316	CYS	3.6
2	B	178	SER	3.4
2	B	136	GLN	3.4
2	B	134	GLY	3.3
2	B	5	VAL	3.1
1	A	346	TRP	2.9
1	A	101	ASN	2.8
1	C	253	THR	2.8
1	A	172	TYR	2.7
1	A	303	VAL	2.6
1	A	178	SER	2.6
2	B	322	ARG	2.5
1	A	381	THR	2.5
1	A	313	MET	2.5
1	C	254	GLU	2.4

*Continued on next page...*

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Mol	Chain	Res	Type	RSRZ
1	A	315	CYS	2.4
2	B	97	SER	2.3
1	A	295	CYS	2.3
2	B	274	PRO	2.2
2	B	249	ASN	2.2
2	B	100	GLY	2.2
1	C	199	ASP	2.2
2	B	98	GLY	2.1
2	B	11	GLN	2.1
1	A	376	CYS	2.0
1	A	338	LYS	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

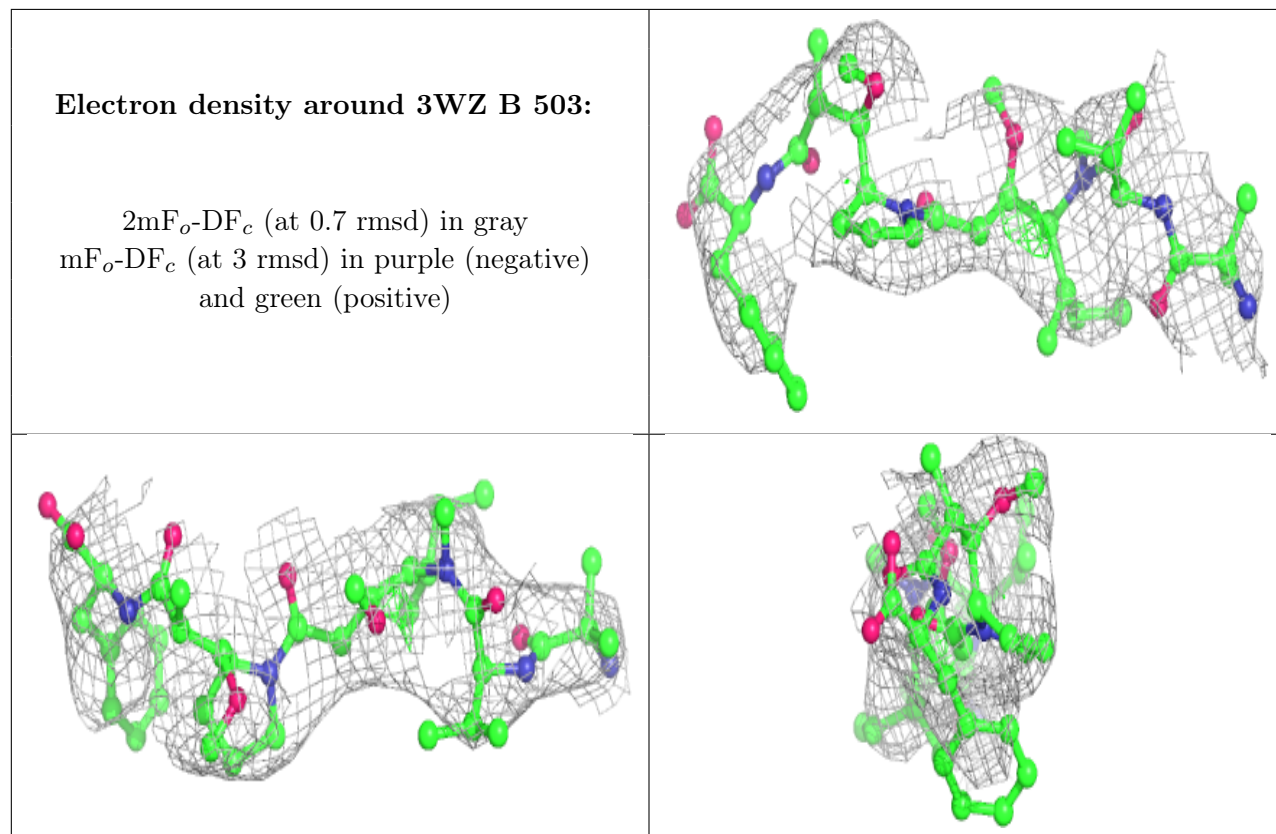
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
5	MG	A	601	1/1	0.87	0.40	78,78,78,78	0
8	3WZ	B	503	50/50	0.88	0.25	147,163,172,175	0
6	GDP	D	501	28/28	0.90	0.29	110,117,129,130	0
4	GTP	A	600	32/32	0.90	0.48	141,151,161,161	0
8	3WZ	D	503	50/50	0.90	0.26	109,139,162,172	0
7	LOC	B	502	29/29	0.91	0.31	153,162,166,167	0
4	GTP	C	600	32/32	0.92	0.30	112,116,120,122	0
6	GDP	B	501	28/28	0.92	0.32	122,136,140,143	0
7	LOC	D	502	29/29	0.93	0.35	123,139,142,144	0
5	MG	C	601	1/1	0.99	0.41	92,92,92,92	0

The following is a graphical depiction of the model fit to experimental electron density of all

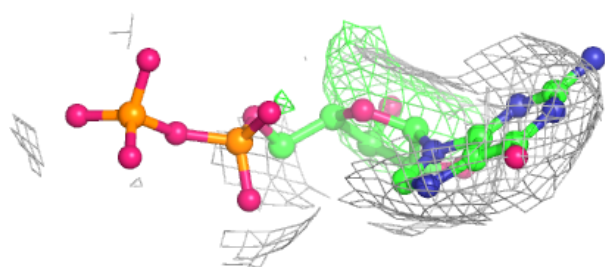
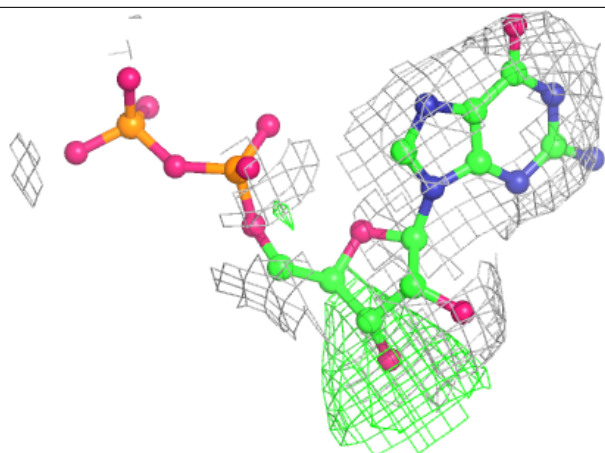


instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

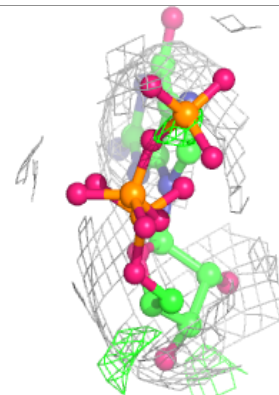
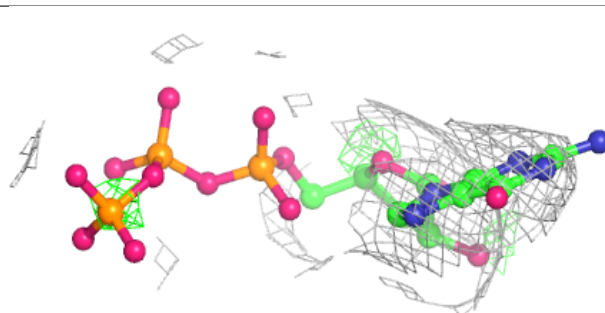
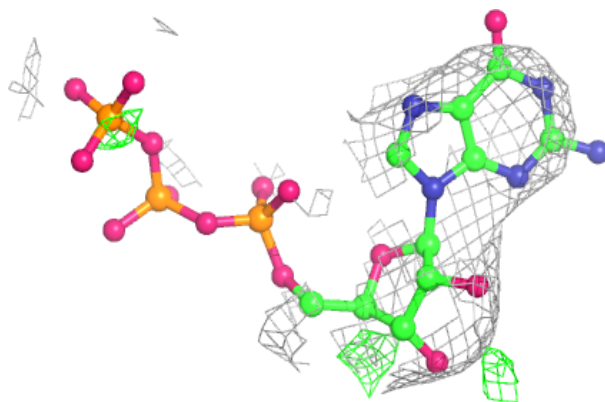


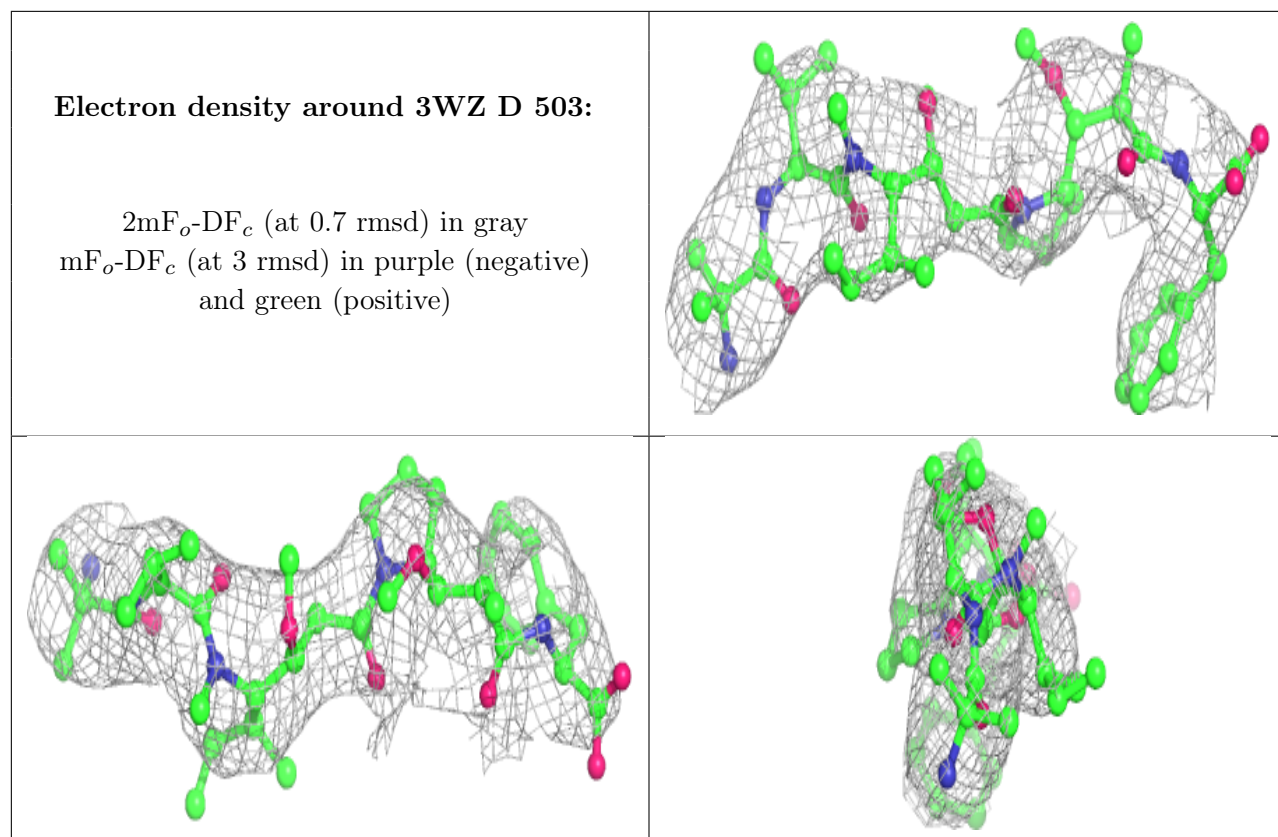
**Electron density around GDP D 501:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around GTP A 600:**

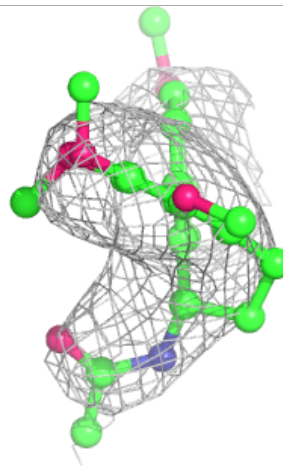
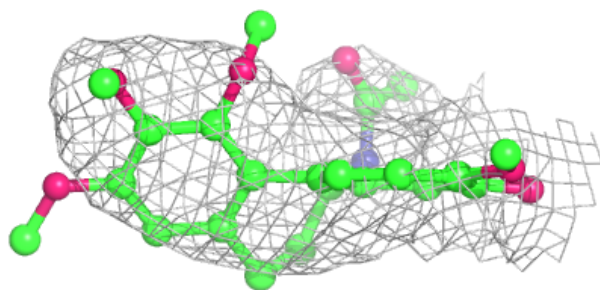
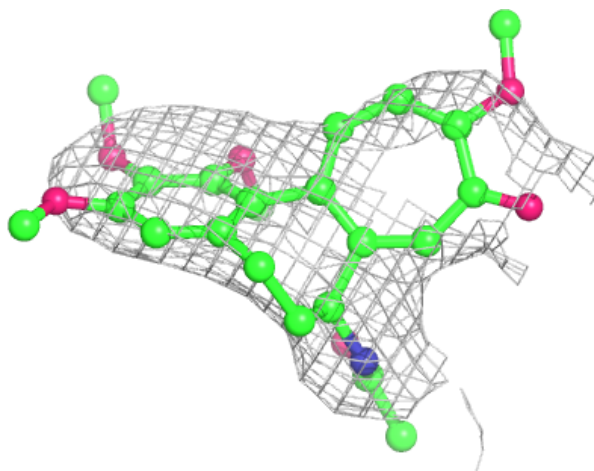
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

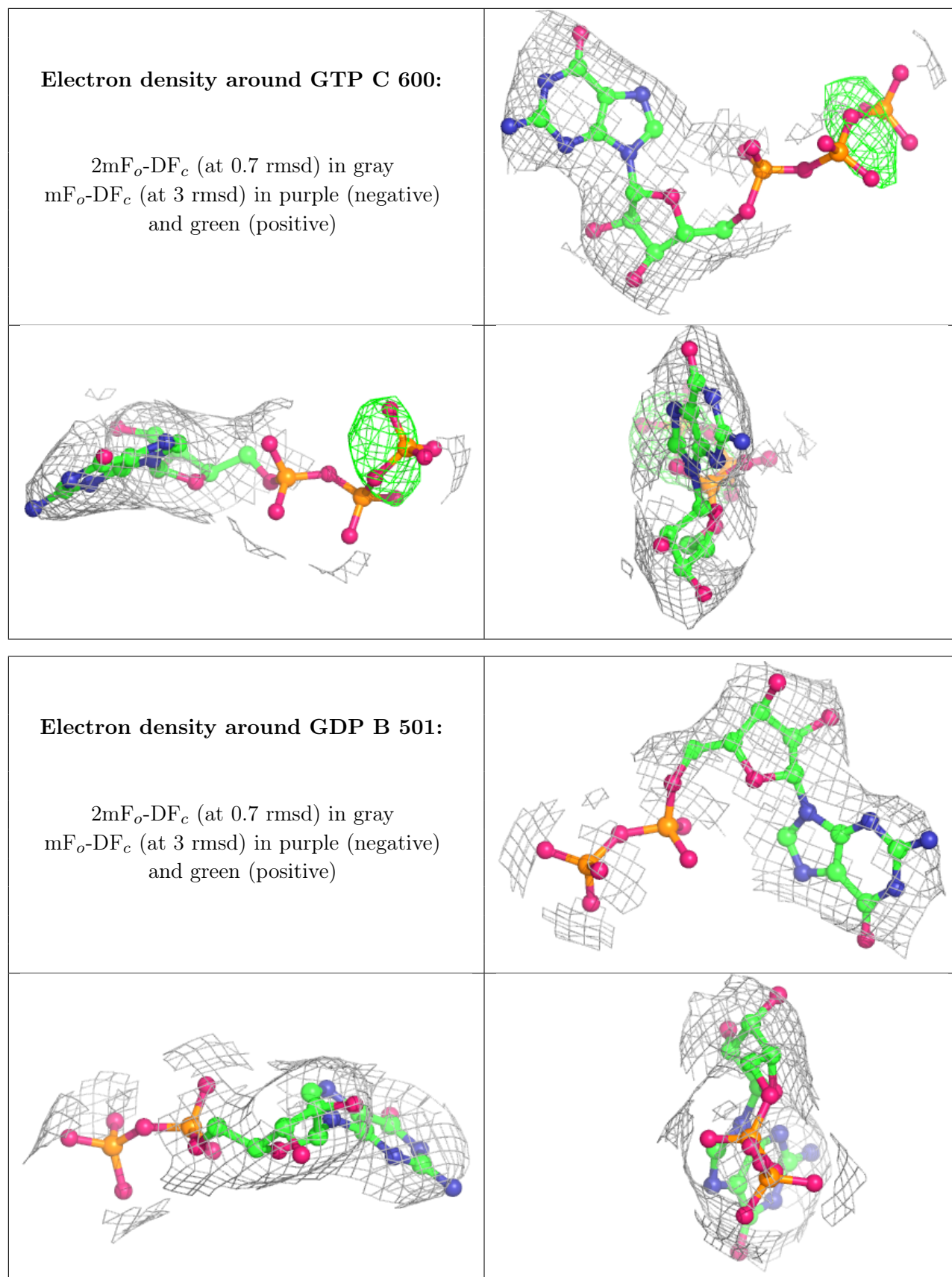


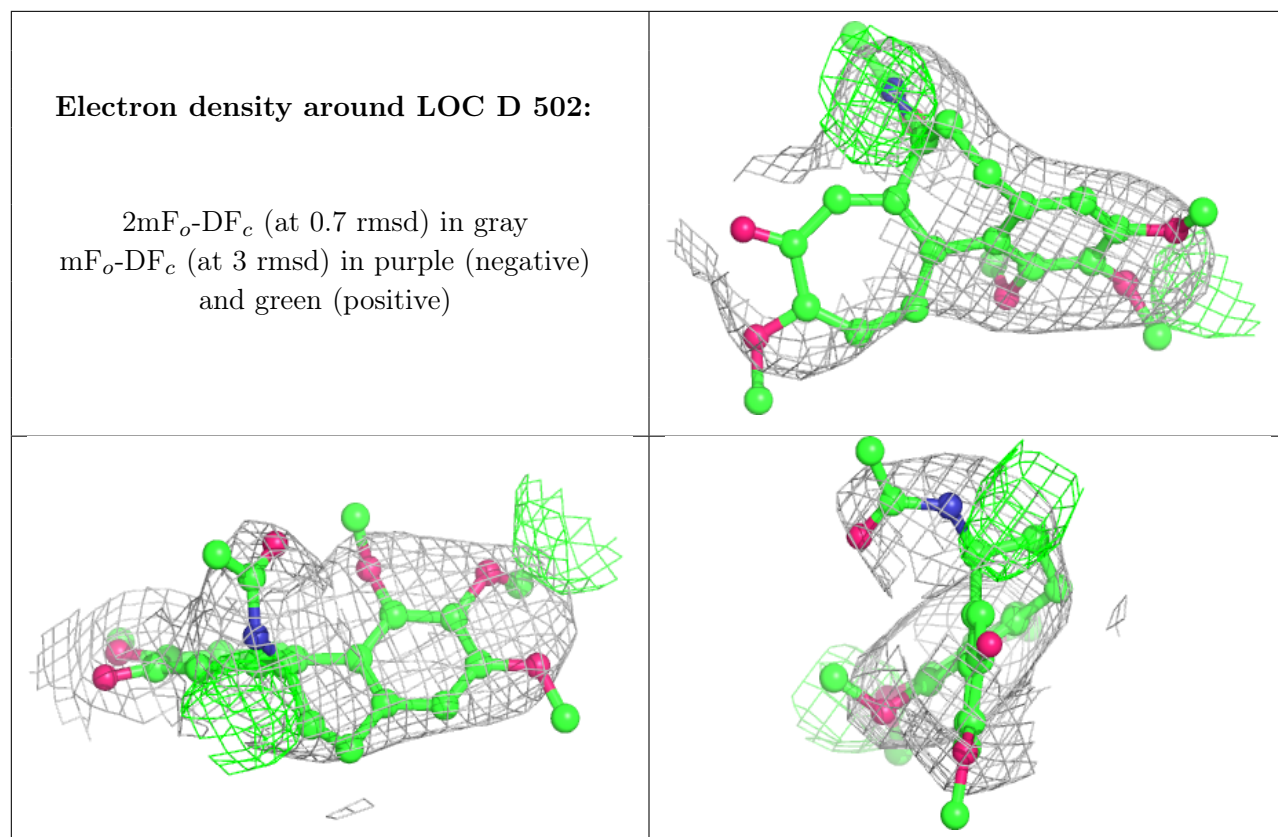


**Electron density around LOC B 502:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)







## 6.5 Other polymers [i](#)

There are no such residues in this entry.