



Full wwPDB EM Validation Report ⓘ

May 26, 2026 – 10:16 AM JST

PDB ID : 9VB2 / pdb_00009vb2
EMDB ID : EMD-64913
Title : Cryo-EM structure of the human neurotensin receptor 1 (hNTSR1)-Gi1 complex in the GDP-bound, AHD-closed C state 1, plunge-frozen 8 seconds after GDP addition
Authors : Kobayashi, K.; Matsui, T.E.; Fukuda, M.; Kawakami, K.; Yamashita, K.; Kato, H.E.
Deposited on : 2025-06-04
Resolution : 3.08 Å(reported)

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A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : 0.0.1.dev132
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

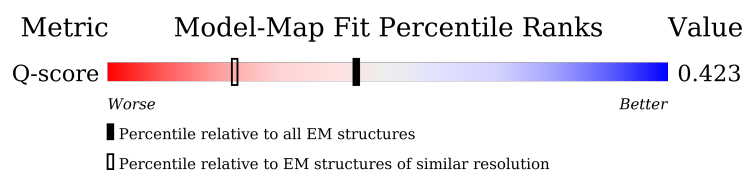
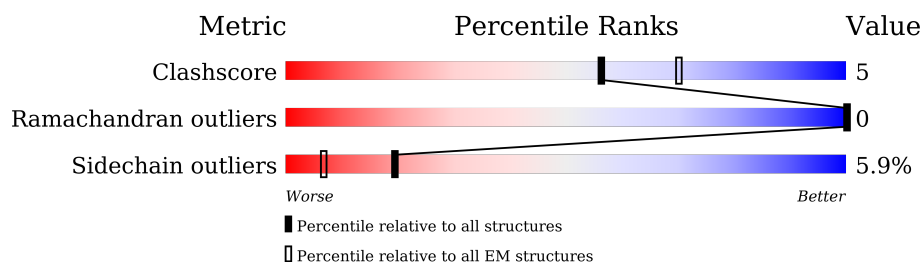
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.08 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14000 (2.58 - 3.58)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	R	436	<div> <div>25%</div> <div>49%</div> <div>16%</div> <div>• •</div> <div>30%</div> </div>
2	L	6	<div> <div>50%</div> <div>83%</div> <div>17%</div> </div>
3	A	354	<div> <div>21%</div> <div>79%</div> <div>17%</div> <div>• •</div> </div>
4	B	358	<div> <div>•</div> <div>80%</div> <div>13%</div> <div>• 6%</div> </div>

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Mol	Chain	Length	Quality of chain
5	C	71	
6	D	259	

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 10040 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 Neurotensin receptor type 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	R	306	Total	C	N	O	S	0	0
			2416	1589	400	412	15		

There are 38 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	-11	MET	-	initiating methionine	UNP P30989
R	-10	GLY	-	expression tag	UNP P30989
R	-9	GLN	-	expression tag	UNP P30989
R	-8	PRO	-	expression tag	UNP P30989
R	-7	GLY	-	expression tag	UNP P30989
R	-6	ASN	-	expression tag	UNP P30989
R	-5	GLY	-	expression tag	UNP P30989
R	-4	SER	-	expression tag	UNP P30989
R	-3	ALA	-	expression tag	UNP P30989
R	-2	PHE	-	expression tag	UNP P30989
R	-1	LEU	-	expression tag	UNP P30989
R	0	LEU	-	expression tag	UNP P30989
R	1	ALA	-	expression tag	UNP P30989
R	2	PRO	-	expression tag	UNP P30989
R	3	ASN	-	expression tag	UNP P30989
R	4	ARG	-	expression tag	UNP P30989
R	5	SER	-	expression tag	UNP P30989
R	6	HIS	-	expression tag	UNP P30989
R	7	ALA	-	expression tag	UNP P30989
R	8	PRO	-	expression tag	UNP P30989
R	9	ASP	-	expression tag	UNP P30989
R	10	HIS	-	expression tag	UNP P30989
R	11	ASP	-	expression tag	UNP P30989
R	12	VAL	-	expression tag	UNP P30989
R	13	GLU	-	expression tag	UNP P30989
R	14	ASN	-	expression tag	UNP P30989
R	15	LEU	-	expression tag	UNP P30989
R	16	TYR	-	expression tag	UNP P30989

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Chain	Residue	Modelled	Actual	Comment	Reference
R	17	PHE	-	expression tag	UNP P30989
R	18	GLN	-	expression tag	UNP P30989
R	19	GLY	-	expression tag	UNP P30989
R	85	LEU	ALA	engineered mutation	UNP P30989
R	419	LEU	-	expression tag	UNP P30989
R	420	GLU	-	expression tag	UNP P30989
R	421	VAL	-	expression tag	UNP P30989
R	422	LEU	-	expression tag	UNP P30989
R	423	PHE	-	expression tag	UNP P30989
R	424	GLN	-	expression tag	UNP P30989

- Molecule 2 is a protein called JMV449.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	L	6	Total	C	N	O	0	0
			53	38	8	7		

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(i) subunit alpha-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	351	Total	C	N	O	S	0	0
			2794	1767	471	539	17		

- Molecule 4 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	B	338	Total	C	N	O	S	0	0
			2584	1595	462	506	21		

There are 19 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-17	MET	-	initiating methionine	UNP P62873
B	-16	HIS	-	expression tag	UNP P62873
B	-15	HIS	-	expression tag	UNP P62873
B	-14	HIS	-	expression tag	UNP P62873
B	-13	HIS	-	expression tag	UNP P62873
B	-12	HIS	-	expression tag	UNP P62873
B	-11	HIS	-	expression tag	UNP P62873
B	-10	LEU	-	expression tag	UNP P62873
B	-9	GLU	-	expression tag	UNP P62873

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	VAL	-	expression tag	UNP P62873
B	-7	LEU	-	expression tag	UNP P62873
B	-6	PHE	-	expression tag	UNP P62873
B	-5	GLN	-	expression tag	UNP P62873
B	-4	GLY	-	expression tag	UNP P62873
B	-3	PRO	-	expression tag	UNP P62873
B	-2	GLY	-	expression tag	UNP P62873
B	-1	SER	-	expression tag	UNP P62873
B	0	SER	-	expression tag	UNP P62873
B	1	GLY	-	expression tag	UNP P62873

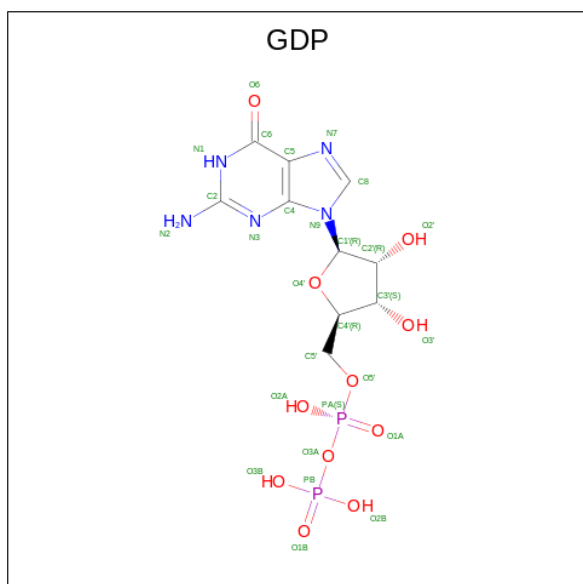
- Molecule 5 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	C	53	Total	C	N	O	S	0	0
			404	256	70	75	3		

- Molecule 6 is a protein called scFv16.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	D	231	Total	C	N	O	S	0	0
			1761	1121	294	336	10		

- Molecule 7 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: C₁₀H₁₅N₅O₁₁P₂) (labeled as "Ligand of Interest" by depositor).

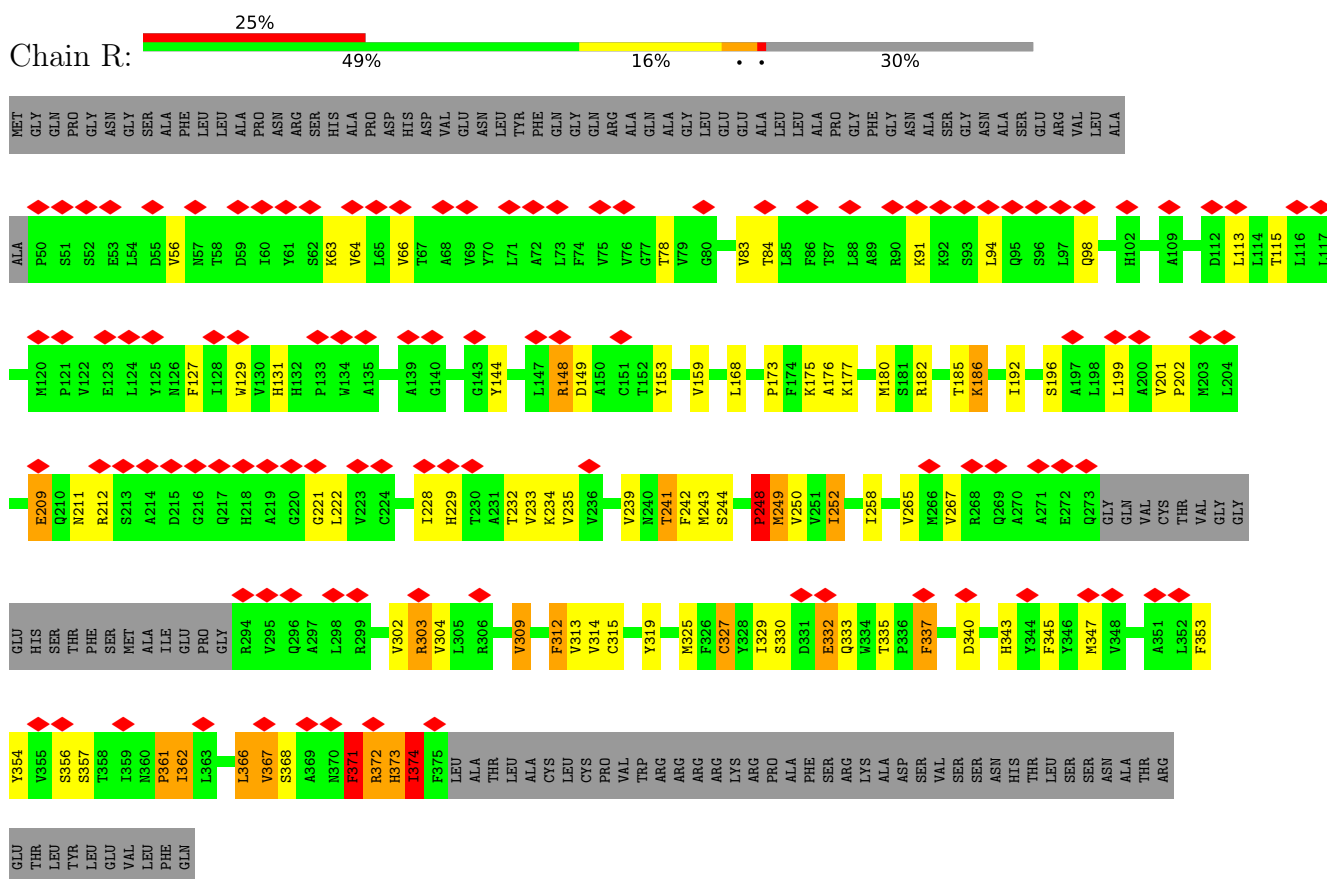


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
7	A	1	28	10	5	11	2	0

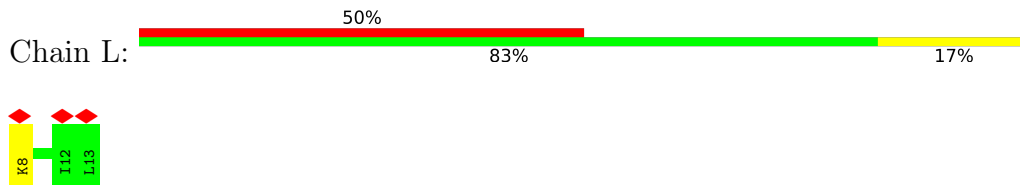
3 Residue-property plots

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 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.

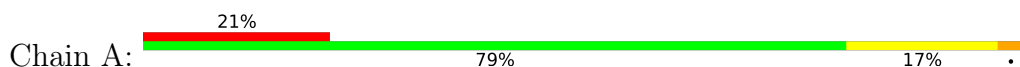
• Molecule 1: Neurotensin receptor type 1



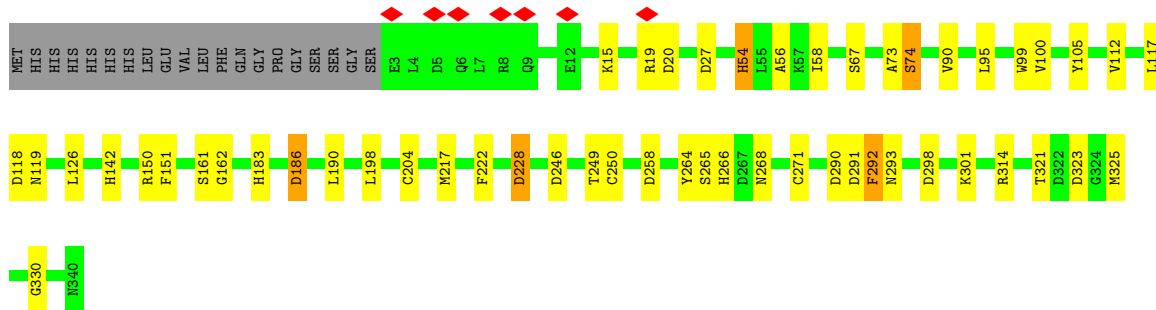
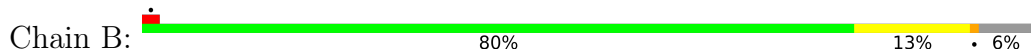
• Molecule 2: JMV449



• Molecule 3: Guanine nucleotide-binding protein G(i) subunit alpha-1



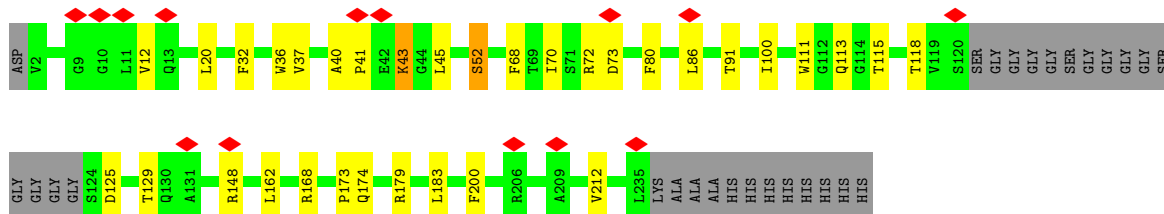
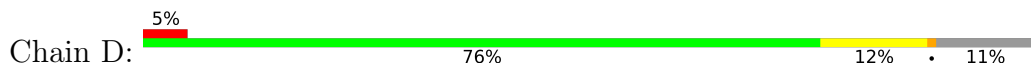
- Molecule 4: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1



- Molecule 5: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



- Molecule 6: scFv16



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	250687	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.652	Depositor
Minimum map value	-0.746	Depositor
Average map value	-0.009	Depositor
Map value standard deviation	0.088	Depositor
Recommended contour level	0.308	Depositor
Map size (\AA)	160.46666, 160.46666, 160.46666	wwPDB
Map dimensions	116, 116, 116	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.3833333, 1.3833333, 1.3833333	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GDP

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	R	0.76	2/2480 (0.1%)	1.75	39/3386 (1.2%)
2	L	0.79	0/54	1.41	0/69
3	A	0.71	0/2841	1.61	19/3825 (0.5%)
4	B	0.78	3/2631 (0.1%)	1.42	19/3569 (0.5%)
5	C	0.67	0/410	1.45	1/554 (0.2%)
6	D	0.70	0/1805	1.30	4/2449 (0.2%)
All	All	0.74	5/10221 (0.0%)	1.54	82/13852 (0.6%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	R	0	3
3	A	0	2
All	All	0	5

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	54	HIS	CG-CD2	-6.16	1.29	1.35
1	R	330	SER	CA-CB	-6.06	1.43	1.53
4	B	74	SER	CA-CB	-5.74	1.44	1.53
4	B	161	SER	CA-CB	-5.72	1.44	1.53
1	R	332	GLU	CA-CB	-5.04	1.45	1.53

All (82) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	287	TYR	CB-CA-C	12.78	121.94	110.44
1	R	371	PHE	CA-CB-CG	9.47	123.27	113.80
1	R	250	VAL	N-CA-CB	8.72	120.50	110.65
1	R	303	ARG	NE-CZ-NH1	-7.80	113.70	121.50
3	A	178	ARG	CD-NE-CZ	7.11	134.36	124.40
1	R	159	VAL	N-CA-CB	7.10	120.20	110.54
1	R	127	PHE	CB-CA-C	7.00	121.90	110.83
3	A	309	ASP	CA-CB-CG	7.00	119.60	112.60
1	R	309	VAL	N-CA-CB	6.84	118.55	110.55
1	R	144	TYR	N-CA-CB	6.83	119.88	109.91
1	R	345	PHE	CA-CB-CG	6.83	120.63	113.80
4	B	293	ASN	CB-CA-C	-6.82	97.68	110.16
1	R	239	VAL	N-CA-CB	6.70	118.38	110.55
4	B	323	ASP	CA-CB-CG	6.66	119.26	112.60
1	R	233	VAL	N-CA-CB	6.65	117.89	110.51
1	R	340	ASP	CA-CB-CG	6.59	119.19	112.60
4	B	151	PHE	CA-CB-CG	6.41	120.21	113.80
1	R	367	VAL	N-CA-CB	6.38	119.21	110.54
3	A	103	ASP	CA-CB-CG	6.37	118.97	112.60
1	R	332	GLU	N-CA-CB	6.33	119.37	109.94
1	R	319	TYR	CB-CA-C	6.29	120.85	110.90
1	R	362	ILE	CA-C-O	-6.26	114.89	121.41
1	R	374	ILE	N-CA-CB	6.26	119.06	110.54
1	R	148	ARG	CG-CD-NE	6.21	125.67	112.00
1	R	373	HIS	CB-CG-CD2	6.18	139.24	131.20
3	A	251	ASP	CA-CB-CG	6.14	118.74	112.60
4	B	258	ASP	CA-CB-CG	6.14	118.74	112.60
4	B	186	ASP	CA-CB-CG	6.02	118.62	112.60
3	A	165	PRO	N-CA-C	5.99	122.04	113.47
1	R	242	PHE	N-CA-CB	5.99	118.92	109.82
3	A	247	MET	CG-SD-CE	5.95	113.98	100.90
1	R	91	LYS	CB-CA-C	5.93	120.59	110.81
3	A	339	VAL	N-CA-CB	5.93	117.48	110.55
3	A	55	ILE	N-CA-C	-5.87	106.52	111.56
1	R	148	ARG	NE-CZ-NH1	-5.84	115.66	121.50
1	R	353	PHE	CA-CB-CG	5.82	119.62	113.80
1	R	173	PRO	N-CA-C	5.81	121.18	113.57
1	R	343	HIS	CB-CA-C	5.81	121.83	110.67
1	R	186	LYS	CA-CB-CG	-5.80	102.50	114.10
3	A	142	ARG	NE-CZ-NH1	-5.77	115.73	121.50
4	B	190	LEU	N-CA-CB	-5.73	101.36	111.39
4	B	27	ASP	CA-CB-CG	5.72	118.32	112.60
1	R	354	TYR	CB-CA-C	5.69	121.59	110.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	237	ASP	CA-CB-CG	5.66	118.26	112.60
4	B	290	ASP	CA-CB-CG	5.62	118.22	112.60
3	A	210	LYS	CG-CD-CE	5.62	124.22	111.30
4	B	19	ARG	N-CA-CB	5.59	118.12	110.01
4	B	222	PHE	CA-CB-CG	5.58	119.38	113.80
1	R	185	THR	CA-CB-OG1	-5.58	101.24	109.60
4	B	291	ASP	N-CA-C	-5.57	106.38	112.72
1	R	148	ARG	NE-CZ-NH2	5.56	124.21	119.20
1	R	303	ARG	NE-CZ-NH2	5.56	124.20	119.20
5	C	49	PRO	N-CA-C	5.56	121.06	113.84
1	R	372	ARG	N-CA-CB	5.54	118.19	109.94
3	A	46	LYS	N-CA-CB	5.52	118.72	110.22
6	D	68	PHE	CA-CB-CG	5.45	119.25	113.80
1	R	361	PRO	CA-N-CD	-5.45	104.38	112.00
6	D	41	PRO	N-CA-C	5.39	120.93	113.65
4	B	298	ASP	CA-CB-CG	5.36	117.96	112.60
6	D	73	ASP	CA-CB-CG	5.33	117.93	112.60
4	B	20	ASP	CA-CB-CG	5.31	117.91	112.60
3	A	9	ASP	CA-CB-CG	5.29	117.89	112.60
3	A	261	ASP	CA-CB-CG	5.29	117.89	112.60
1	R	258	ILE	N-CA-CB	5.25	117.03	110.47
1	R	241	THR	O-C-N	5.23	127.67	122.08
1	R	312	PHE	N-CA-CB	5.22	117.80	110.12
1	R	337	PHE	CA-CB-CG	5.20	119.00	113.80
4	B	292	PHE	CA-CB-CG	5.20	119.00	113.80
1	R	302	VAL	N-CA-CB	5.19	117.60	110.54
4	B	183	HIS	CA-CB-CG	5.17	118.97	113.80
3	A	336	PHE	N-CA-CB	5.15	117.78	110.16
4	B	228	ASP	CB-CA-C	-5.14	100.19	110.42
3	A	229	ASP	CA-CB-CG	5.13	117.73	112.60
1	R	209	GLU	CB-CG-CD	5.12	121.30	112.60
4	B	301	LYS	CB-CA-C	5.10	118.52	109.65
3	A	216	GLU	CB-CA-C	5.09	118.35	109.65
1	R	243	MET	CA-C-O	-5.07	115.68	121.00
6	D	125	ASP	CA-CB-CG	5.06	117.66	112.60
4	B	314	ARG	CG-CD-NE	5.05	123.10	112.00
1	R	248	PRO	N-CA-C	5.02	121.92	113.78
3	A	161	ARG	NE-CZ-NH2	5.01	123.71	119.20
4	B	246	ASP	CA-CB-CG	5.00	117.60	112.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	A	142	ARG	Sidechain
3	A	161	ARG	Sidechain
1	R	148	ARG	Sidechain
1	R	182	ARG	Sidechain
1	R	303	ARG	Sidechain

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	R	2416	0	2438	37	0
2	L	53	0	63	0	0
3	A	2794	0	2746	29	0
4	B	2584	0	2473	19	0
5	C	404	0	416	1	0
6	D	1761	0	1691	13	0
7	A	28	0	12	0	0
All	All	10040	0	9839	98	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 5.

All (98) 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:A:336:PHE:HA	3:A:339:VAL:HG12	1.72	0.72
6:D:37:VAL:HG21	6:D:111:TRP:CZ3	2.27	0.69
1:R:199:LEU:O	1:R:202:PRO:HD2	1.95	0.66
4:B:54:HIS:NE2	4:B:56:ALA:O	2.31	0.64
1:R:64:VAL:HG22	1:R:129:TRP:CH2	2.33	0.64
4:B:54:HIS:CE1	4:B:74:SER:HG	2.12	0.64
3:A:100:ARG:O	3:A:104:ALA:N	2.30	0.63
1:R:211:ASN:HD22	1:R:222:LEU:HG	1.64	0.62
1:R:325:MET:HG3	1:R:329:ILE:HD12	1.81	0.62
3:A:110:LEU:HD13	3:A:123:LEU:HD22	1.82	0.62
1:R:211:ASN:ND2	1:R:222:LEU:HG	2.15	0.60
4:B:162:GLY:HA2	4:B:186:ASP:HB2	1.83	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:R:332:GLU:HG2	1:R:333:GLN:N	2.17	0.59
1:R:209:GLU:HG2	1:R:222:LEU:HD22	1.85	0.58
3:A:162:ILE:HG12	3:A:167:TYR:CZ	2.38	0.58
6:D:52:SER:O	6:D:72:ARG:NH2	2.36	0.58
4:B:58:ILE:HD11	4:B:330:GLY:HA3	1.85	0.58
1:R:64:VAL:HG22	1:R:129:TRP:HH2	1.69	0.58
1:R:149:ASP:O	1:R:153:TYR:HD2	1.89	0.56
1:R:357:SER:O	1:R:361:PRO:HD2	2.08	0.54
4:B:99:TRP:HB3	4:B:117:LEU:HD12	1.91	0.53
1:R:371:PHE:HA	1:R:374:ILE:HG23	1.90	0.53
4:B:54:HIS:NE2	4:B:74:SER:OG	2.33	0.53
4:B:54:HIS:CE1	4:B:74:SER:OG	2.62	0.53
4:B:112:VAL:HG13	4:B:126:LEU:HD11	1.90	0.53
3:A:159:LEU:HA	3:A:162:ILE:HB	1.91	0.52
6:D:129:THR:HG21	6:D:148:ARG:NH1	2.24	0.52
1:R:234:LYS:HA	1:R:327:CYS:SG	2.49	0.52
1:R:252:ILE:O	1:R:309:VAL:HG22	2.09	0.52
1:R:244:SER:O	1:R:248:PRO:HD2	2.10	0.51
1:R:362:ILE:O	1:R:366:LEU:HB2	2.11	0.50
3:A:69:TYR:CG	3:A:174:VAL:HG23	2.47	0.50
3:A:114:ALA:HB3	3:A:118:PHE:HD2	1.75	0.50
4:B:105:TYR:CD1	4:B:112:VAL:HG12	2.46	0.50
3:A:56:ILE:HD11	3:A:329:THR:HB	1.94	0.50
3:A:331:ASN:O	3:A:335:VAL:HG23	2.12	0.49
3:A:85:ILE:CD1	3:A:130:LEU:HD23	2.43	0.49
1:R:83:VAL:HG13	1:R:373:HIS:CD2	2.48	0.49
3:A:100:ARG:HA	3:A:103:ASP:HB2	1.95	0.49
6:D:168:ARG:NH2	6:D:174:GLN:OE1	2.46	0.49
1:R:252:ILE:HD11	1:R:312:PHE:CB	2.43	0.49
1:R:209:GLU:CG	1:R:222:LEU:HD22	2.42	0.48
3:A:57:HIS:HE1	3:A:336:PHE:CD2	2.32	0.48
4:B:67:SER:HB2	4:B:321:THR:HB	1.95	0.48
1:R:83:VAL:HG13	1:R:373:HIS:HD2	1.79	0.48
1:R:149:ASP:O	1:R:153:TYR:CD2	2.67	0.47
3:A:124:ALA:HB1	3:A:159:LEU:HD11	1.97	0.47
6:D:162:LEU:HD22	6:D:200:PHE:CG	2.49	0.47
1:R:212:ARG:N	1:R:221:GLY:O	2.47	0.47
1:R:234:LYS:O	1:R:235:VAL:C	2.57	0.47
6:D:91:THR:HG23	6:D:118:THR:HA	1.97	0.47
6:D:40:ALA:HB3	6:D:43:LYS:HB3	1.97	0.47
3:A:104:ALA:HA	3:A:130:LEU:HD21	1.95	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:D:20:LEU:HD22	6:D:115:THR:HG21	1.98	0.46
3:A:268:LEU:HD12	3:A:321:THR:CG2	2.45	0.46
1:R:325:MET:CG	1:R:329:ILE:HD12	2.45	0.46
3:A:221:ILE:HD11	3:A:259:PHE:CG	2.50	0.46
1:R:177:LYS:O	1:R:180:MET:HG2	2.17	0.45
1:R:192:ILE:O	1:R:196:SER:OG	2.34	0.45
3:A:171:GLN:HA	3:A:174:VAL:HG12	1.98	0.45
4:B:204:CYS:SG	4:B:228:ASP:OD1	2.65	0.45
1:R:249:MET:HG3	1:R:313:VAL:HG22	1.98	0.45
3:A:265:ILE:HD13	3:A:339:VAL:HG23	1.99	0.45
6:D:111:TRP:CE3	6:D:173:PRO:HG2	2.52	0.44
4:B:73:ALA:HB1	4:B:100:VAL:HG11	1.99	0.44
6:D:12:VAL:HG11	6:D:86:LEU:HD13	1.99	0.44
4:B:95:LEU:HD13	4:B:100:VAL:HG21	2.00	0.44
1:R:78:THR:HA	1:R:113:LEU:HD12	1.99	0.44
1:R:335:THR:HG22	1:R:337:PHE:H	1.81	0.44
1:R:228:ILE:HD12	1:R:232:THR:HG23	2.00	0.43
3:A:37:LEU:HD12	3:A:199:PHE:O	2.18	0.43
3:A:69:TYR:CB	3:A:174:VAL:HG23	2.48	0.43
1:R:229:HIS:HB2	1:R:232:THR:HG22	2.00	0.43
3:A:211:TRP:HE3	3:A:211:TRP:O	2.01	0.43
3:A:69:TYR:O	3:A:73:VAL:HG23	2.17	0.43
1:R:56:VAL:HB	1:R:131:HIS:CD2	2.53	0.43
3:A:159:LEU:O	3:A:162:ILE:N	2.52	0.43
4:B:250:CYS:HB2	4:B:264:TYR:HB2	2.00	0.43
4:B:54:HIS:CD2	4:B:58:ILE:HG22	2.54	0.43
6:D:32:PHE:CD1	6:D:100:ILE:HB	2.54	0.43
3:A:90:ARG:HG2	3:A:91:LEU:HD23	2.01	0.43
1:R:368:SER:O	1:R:372:ARG:HB2	2.19	0.42
4:B:268:ASN:OD1	4:B:268:ASN:N	2.44	0.42
6:D:36:TRP:CD1	6:D:70:ILE:HD13	2.55	0.42
3:A:123:LEU:O	3:A:126:VAL:HG12	2.19	0.42
3:A:167:TYR:O	3:A:167:TYR:CG	2.70	0.42
1:R:315:CYS:CB	1:R:356:SER:HB2	2.50	0.42
3:A:278:ILE:HD11	3:A:296:TYR:HA	2.01	0.42
4:B:249:THR:HG22	4:B:265:SER:HB3	2.03	0.41
1:R:66:VAL:HG21	1:R:347:MET:HG2	2.01	0.41
3:A:70:LYS:HG3	3:A:167:TYR:CD2	2.55	0.41
4:B:54:HIS:CE1	4:B:74:SER:CB	3.04	0.41
1:R:176:ALA:O	1:R:177:LYS:C	2.64	0.41
1:R:371:PHE:HD1	1:R:372:ARG:N	2.19	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:R:309:VAL:O	1:R:313:VAL:HG23	2.20	0.41
3:A:269:ASN:ND2	3:A:270:LYS:H	2.18	0.41
6:D:70:ILE:HD12	6:D:80:PHE:O	2.21	0.41
4:B:325:MET:CE	5:C:54:VAL:HG11	2.51	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	R	302/436 (69%)	288 (95%)	14 (5%)	0	100	100
2	L	4/6 (67%)	4 (100%)	0	0	100	100
3	A	349/354 (99%)	333 (95%)	16 (5%)	0	100	100
4	B	336/358 (94%)	324 (96%)	12 (4%)	0	100	100
5	C	51/71 (72%)	51 (100%)	0	0	100	100
6	D	227/259 (88%)	223 (98%)	4 (2%)	0	100	100
All	All	1269/1484 (86%)	1223 (96%)	46 (4%)	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	R	262/368 (71%)	240 (92%)	22 (8%)	10	33
2	L	6/6 (100%)	5 (83%)	1 (17%)	2	9
3	A	298/305 (98%)	277 (93%)	21 (7%)	14	39
4	B	277/298 (93%)	266 (96%)	11 (4%)	28	56
5	C	42/58 (72%)	41 (98%)	1 (2%)	43	66
6	D	190/209 (91%)	183 (96%)	7 (4%)	30	58
All	All	1075/1244 (86%)	1012 (94%)	63 (6%)	19	45

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	R	63	LYS
1	R	84	THR
1	R	94	LEU
1	R	98	GLN
1	R	115	THR
1	R	168	LEU
1	R	175	LYS
1	R	186	LYS
1	R	201	VAL
1	R	241	THR
1	R	248	PRO
1	R	249	MET
1	R	252	ILE
1	R	265	VAL
1	R	267	VAL
1	R	304	VAL
1	R	314	VAL
1	R	327	CYS
1	R	366	LEU
1	R	367	VAL
1	R	371	PHE
1	R	374	ILE
2	L	8	LYS
3	A	35	LYS
3	A	52	GLN
3	A	84	ILE
3	A	85	ILE
3	A	107	LEU
3	A	116	GLU
3	A	123	LEU

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Mol	Chain	Res	Type
3	A	127	ILE
3	A	136	VAL
3	A	144	ARG
3	A	178	ARG
3	A	208	ARG
3	A	232	LEU
3	A	233	VAL
3	A	266	LEU
3	A	270	LYS
3	A	310	LEU
3	A	329	THR
3	A	335	VAL
3	A	343	ILE
3	A	353	LEU
4	B	15	LYS
4	B	90	VAL
4	B	118	ASP
4	B	119	ASN
4	B	142	HIS
4	B	150	ARG
4	B	198	LEU
4	B	217	MET
4	B	266	HIS
4	B	271	CYS
4	B	292	PHE
5	C	20	LYS
6	D	43	LYS
6	D	45	LEU
6	D	52	SER
6	D	113	GLN
6	D	179	ARG
6	D	183	LEU
6	D	212	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	R	126	ASN
1	R	238	GLN
3	A	52	GLN
3	A	57	HIS
3	A	157	ASN

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Mol	Chain	Res	Type
3	A	195	HIS
3	A	269	ASN
4	B	75	GLN
4	B	91	HIS
4	B	110	ASN
4	B	156	GLN
4	B	220	GLN
4	B	259	GLN
4	B	266	HIS
4	B	311	HIS
6	D	39	GLN
6	D	82	GLN
6	D	113	GLN
6	D	130	GLN
6	D	167	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	GDP	A	401	-	28,30,30	0.62	0	44,47,47	1.19	4 (9%)

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
7	GDP	A	401	-	-	5/16/32/32	0/3/3/3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	401	GDP	PA-O3A-PB	-4.55	117.23	132.83
7	A	401	GDP	O2B-PB-O3A	3.00	114.68	104.64
7	A	401	GDP	O3'-C3'-C4'	-2.32	104.33	111.05
7	A	401	GDP	O2B-PB-O1B	2.30	119.69	110.68

There are no chirality outliers.

All (5) torsion outliers are listed below:

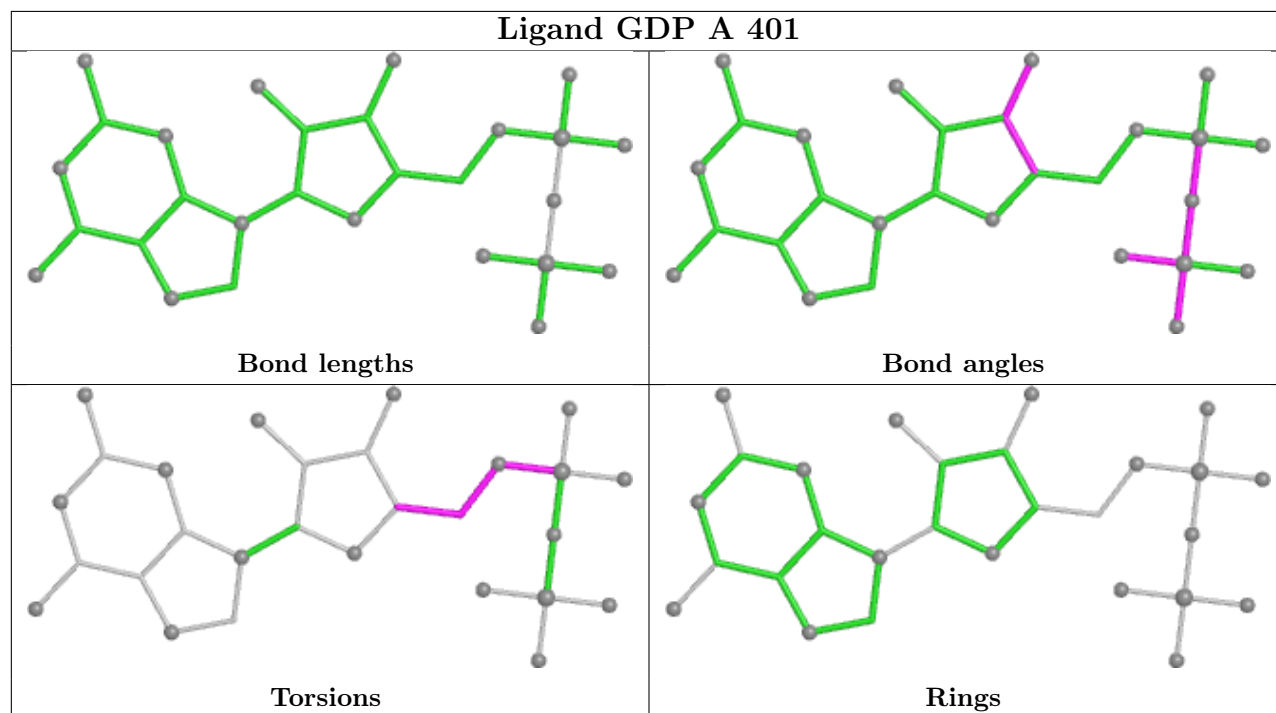
Mol	Chain	Res	Type	Atoms
7	A	401	GDP	C5'-O5'-PA-O1A
7	A	401	GDP	O4'-C4'-C5'-O5'
7	A	401	GDP	C4'-C5'-O5'-PA
7	A	401	GDP	C5'-O5'-PA-O3A
7	A	401	GDP	C5'-O5'-PA-O2A

There are no ring outliers.

No monomer is involved in short contacts.

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.

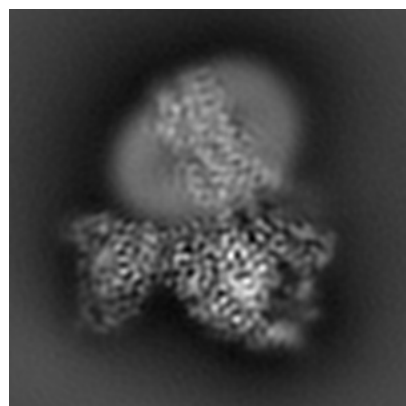
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-64913. These allow visual inspection of the internal detail of the map and identification of artifacts.

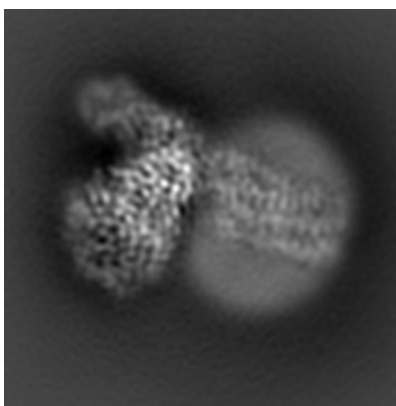
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

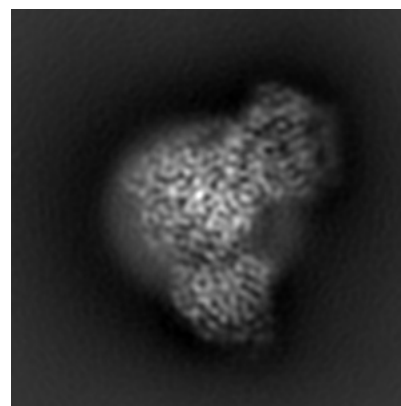
6.1.1 Primary map



X

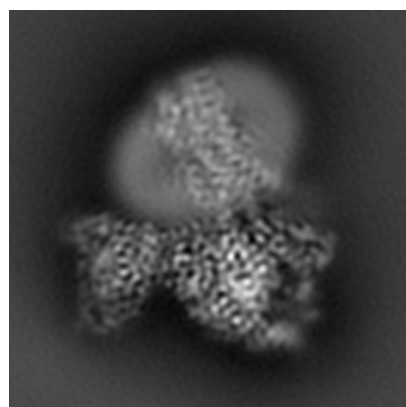


Y

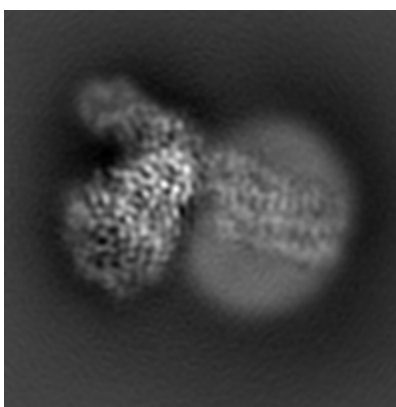


Z

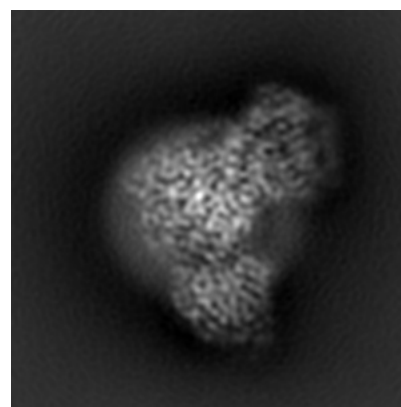
6.1.2 Raw map



X



Y

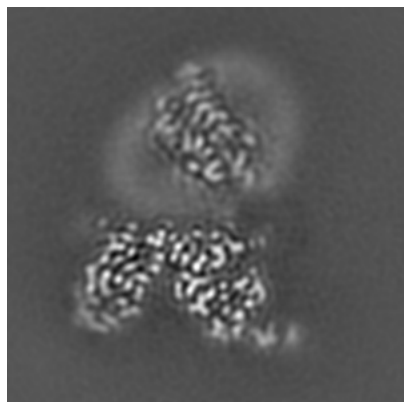


Z

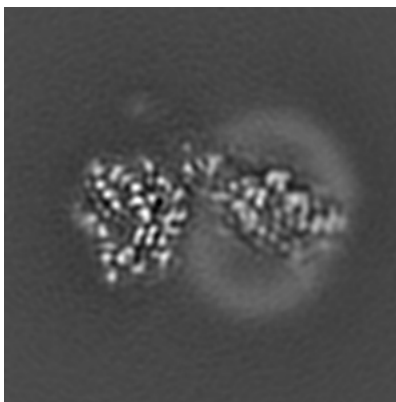
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

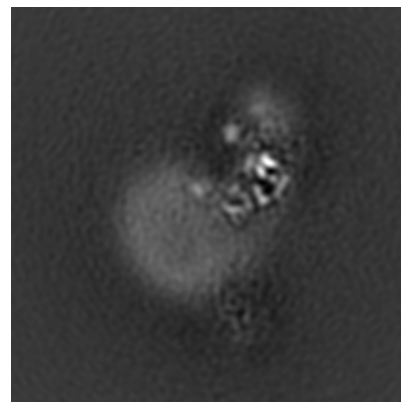
6.2.1 Primary map



X Index: 58

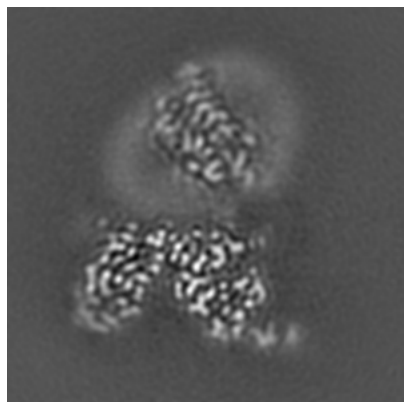


Y Index: 58

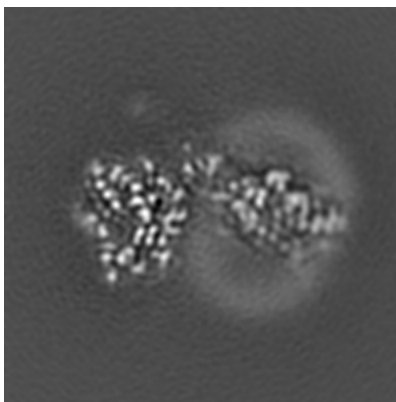


Z Index: 58

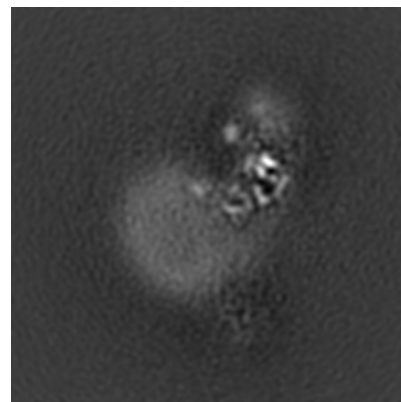
6.2.2 Raw map



X Index: 58



Y Index: 58

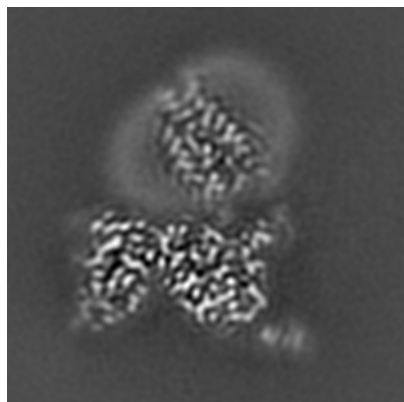


Z Index: 58

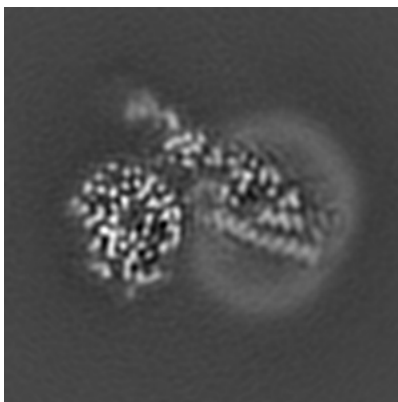
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

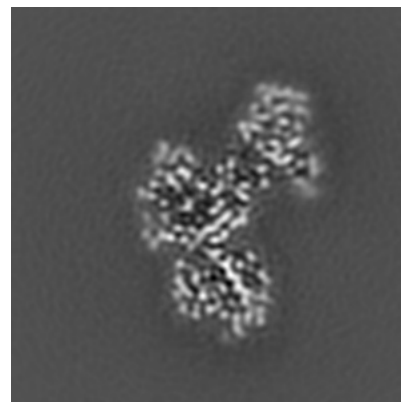
6.3.1 Primary map



X Index: 61

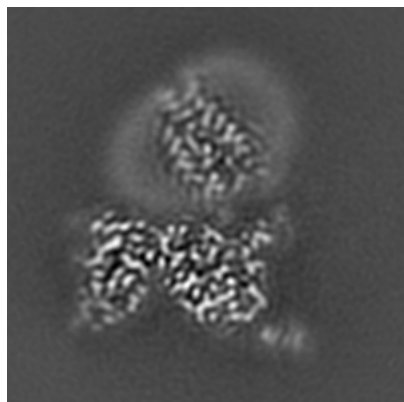


Y Index: 62

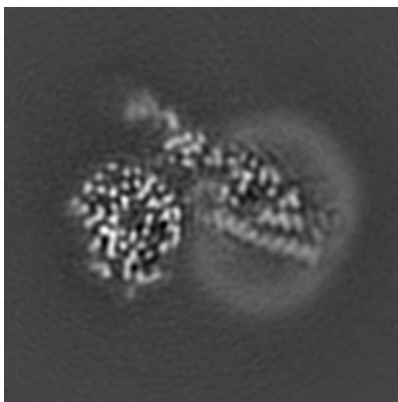


Z Index: 43

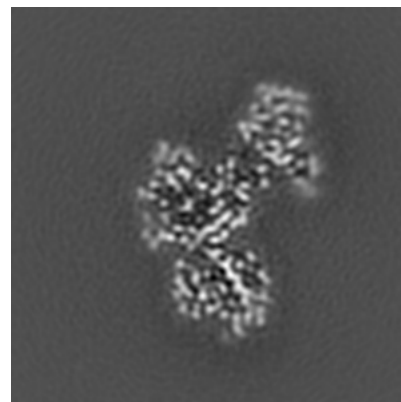
6.3.2 Raw map



X Index: 61



Y Index: 62

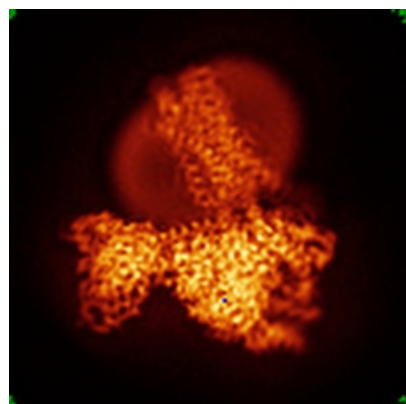


Z Index: 43

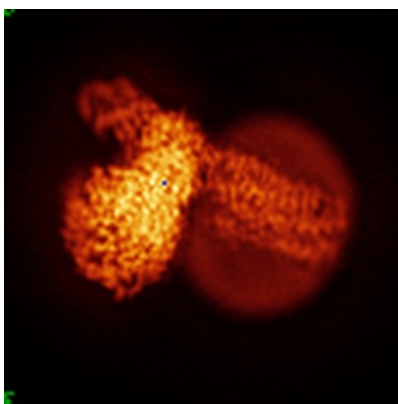
The images above show the largest variance slices of the map in three orthogonal directions.

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

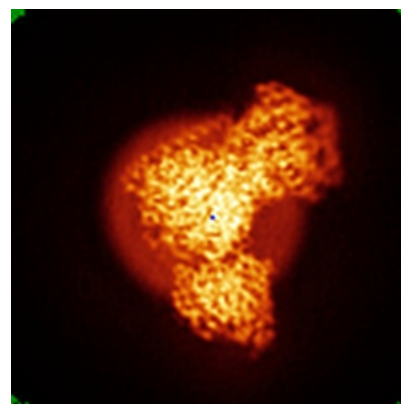
6.4.1 Primary map



X

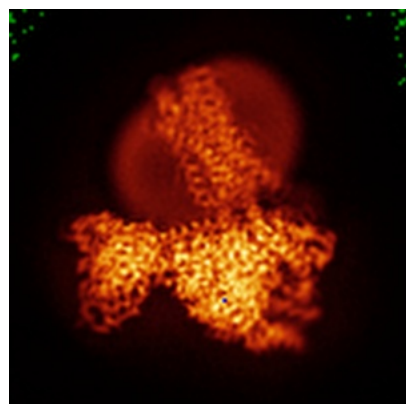


Y

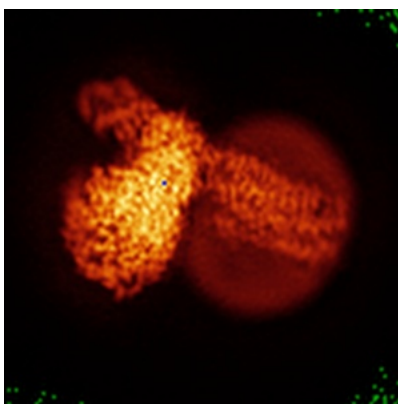


Z

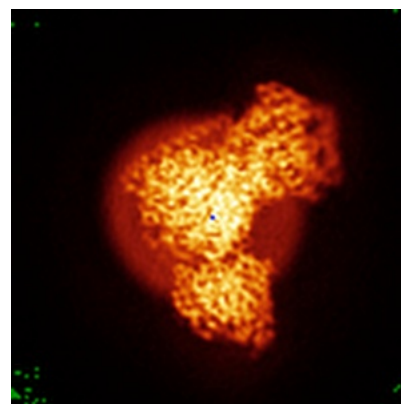
6.4.2 Raw map



X



Y

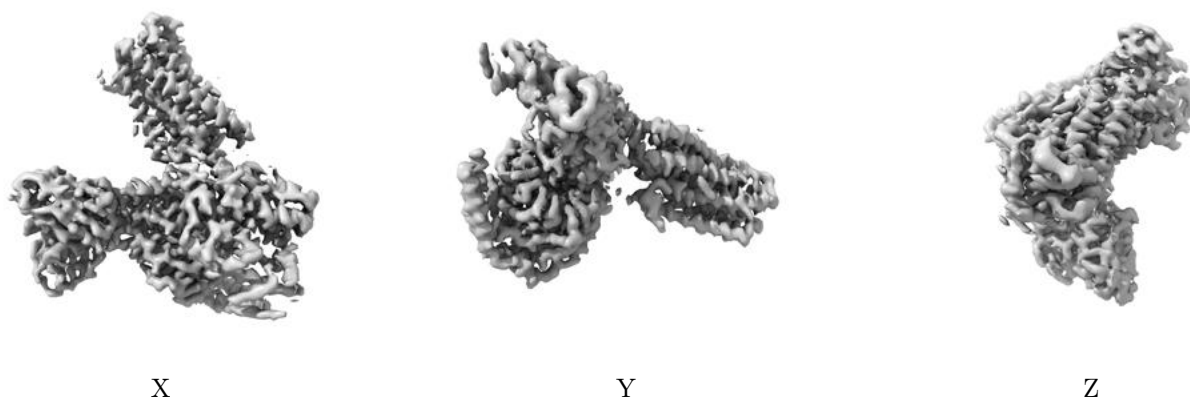


Z

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

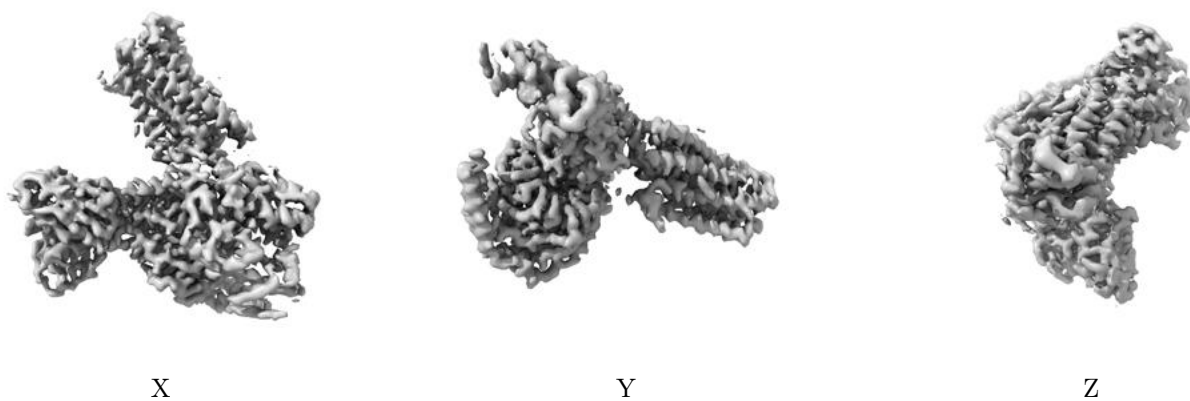
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.308. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

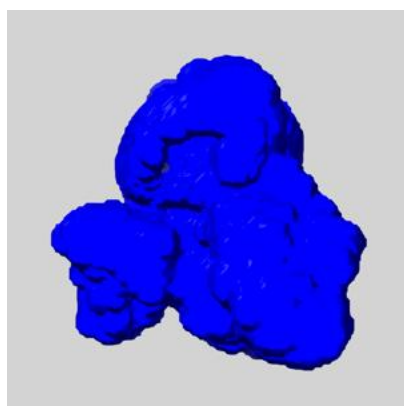
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

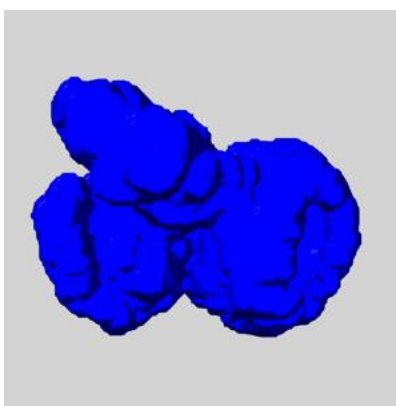
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

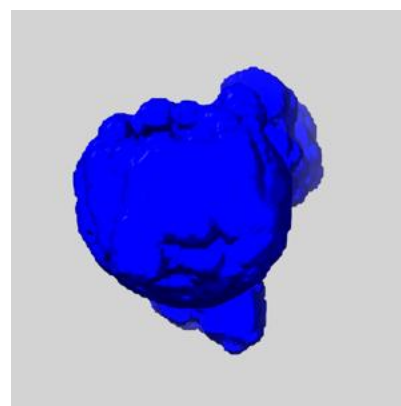
6.6.1 emd_64913_msk_1.map [i](#)



X



Y

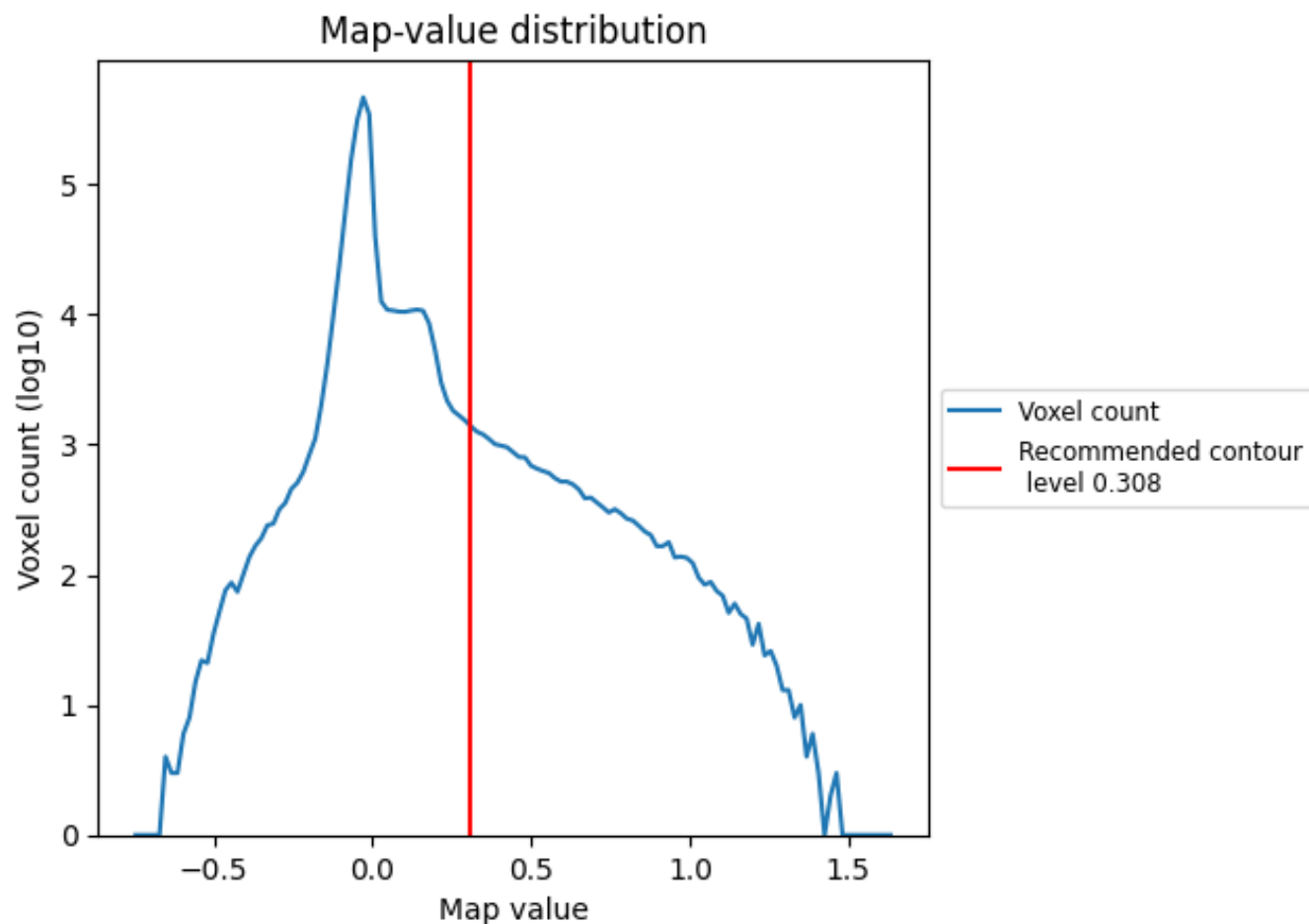


Z

7 Map analysis [i](#)

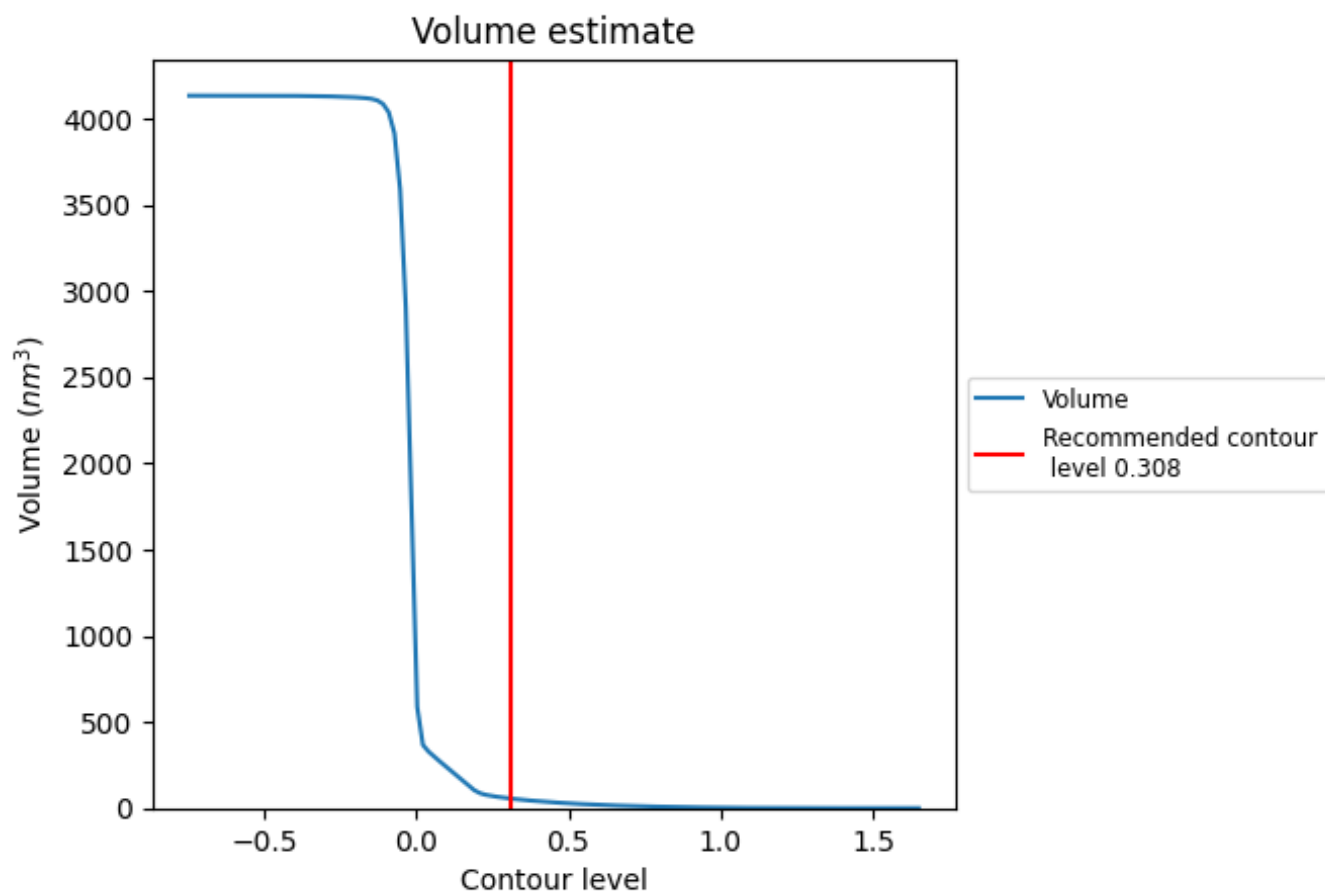
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

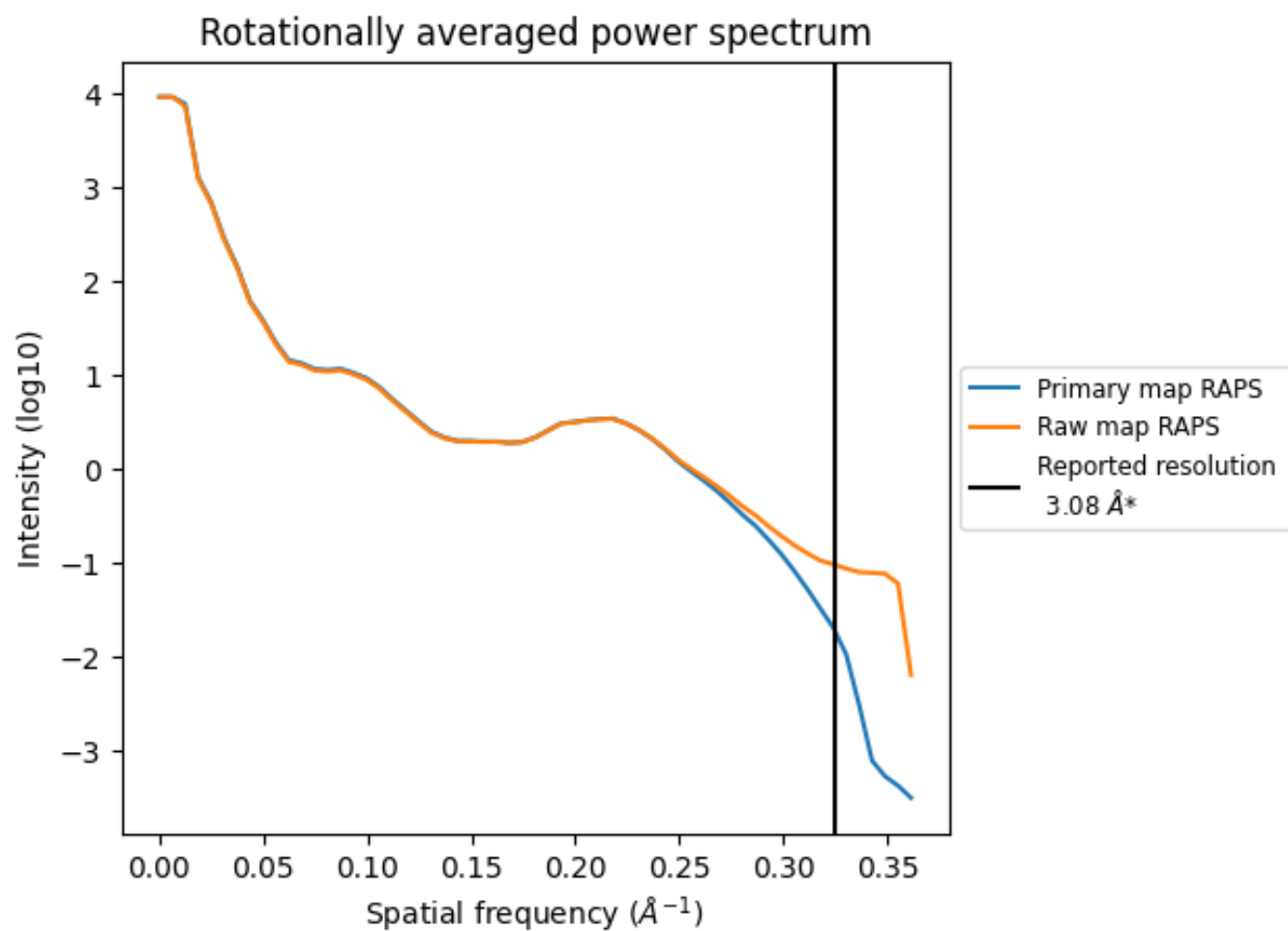
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 56 nm^3 ; this corresponds to an approximate mass of 51 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

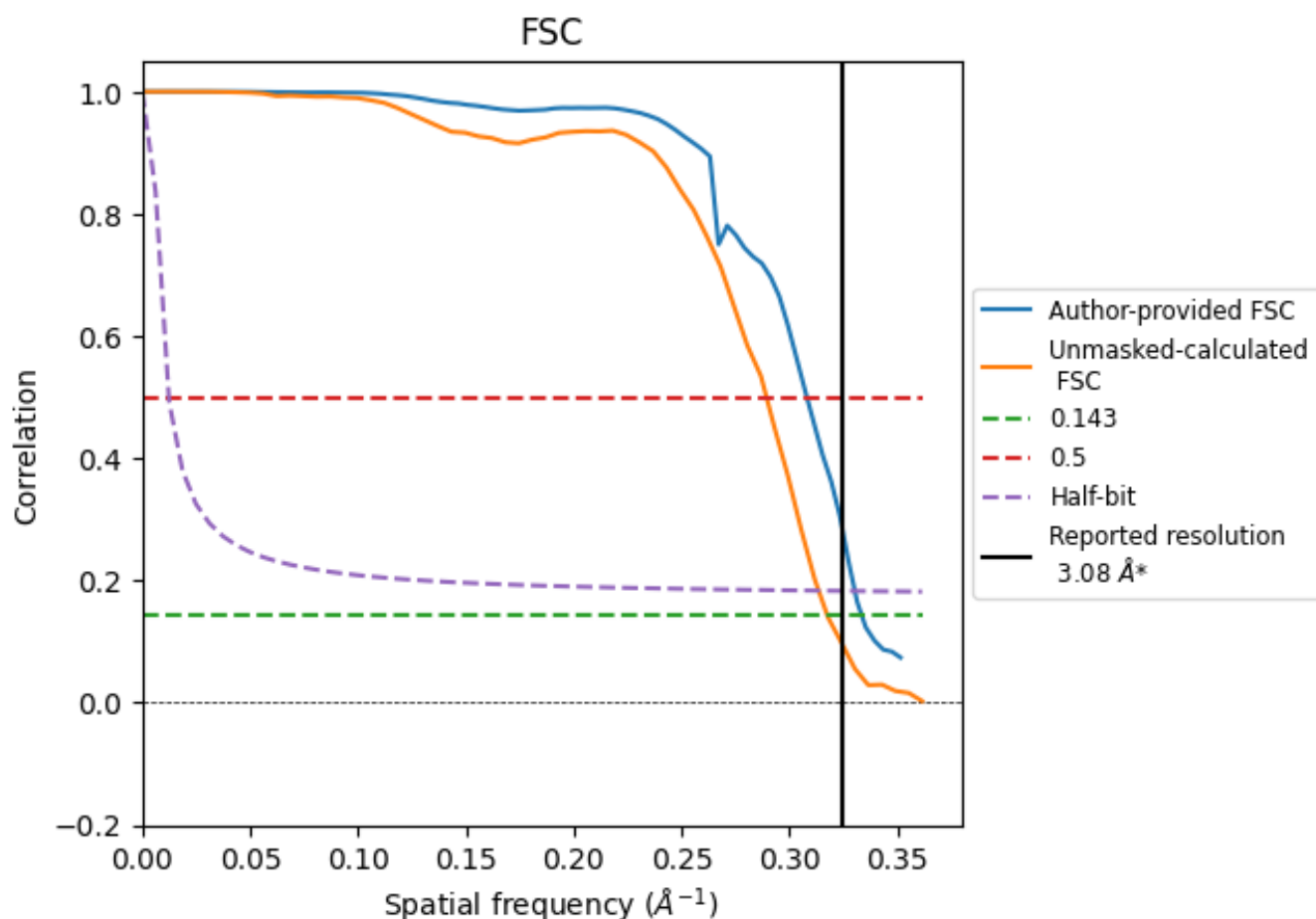


*Reported resolution corresponds to spatial frequency of 0.325 \AA^{-1}

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.325 \AA^{-1}

8.2 Resolution estimates [i](#)

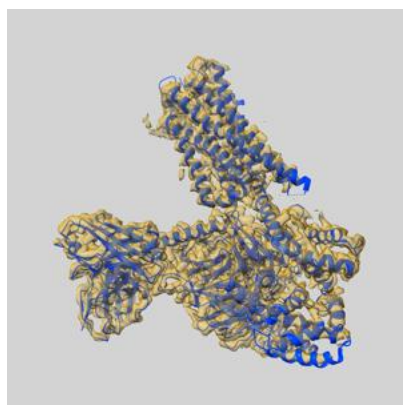
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.08	-	-
Author-provided FSC curve	3.00	3.25	3.03
Unmasked-calculated*	3.15	3.46	3.19

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

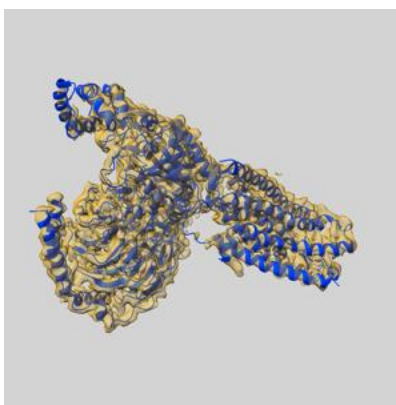
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-64913 and PDB model 9VB2. Per-residue inclusion information can be found in section [3](#) on page [8](#).

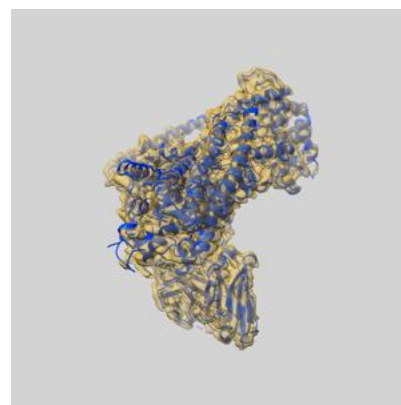
9.1 Map-model overlay [i](#)



X



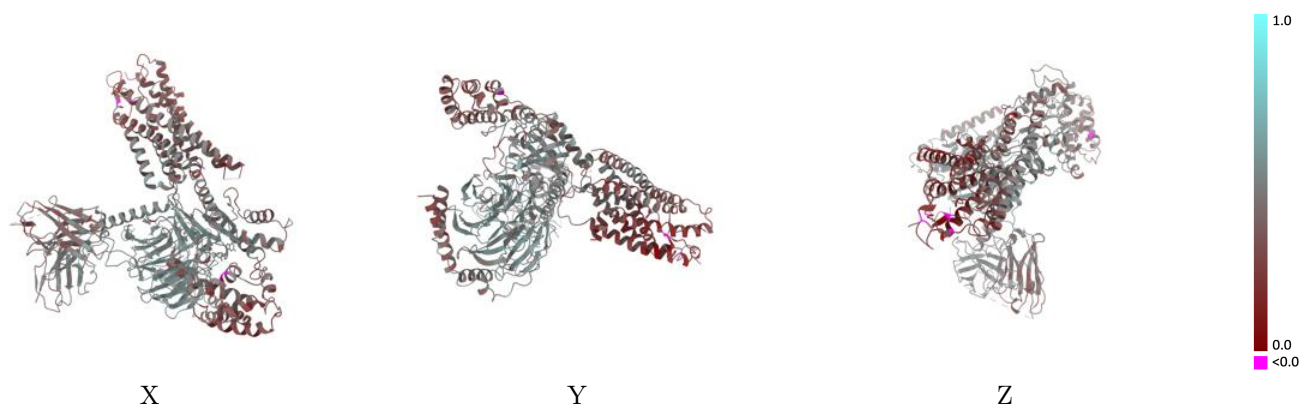
Y



Z

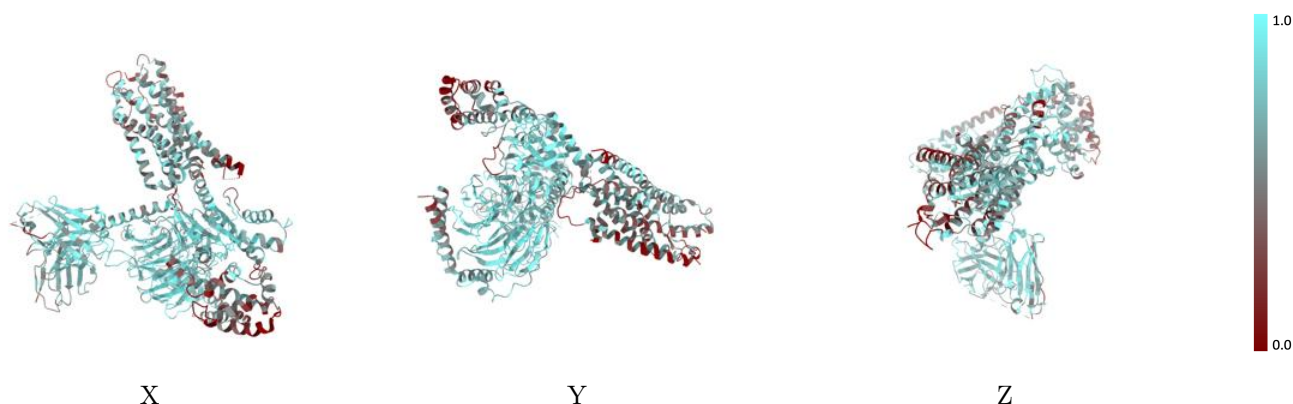
The images above show the 3D surface view of the map at the recommended contour level 0.308 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



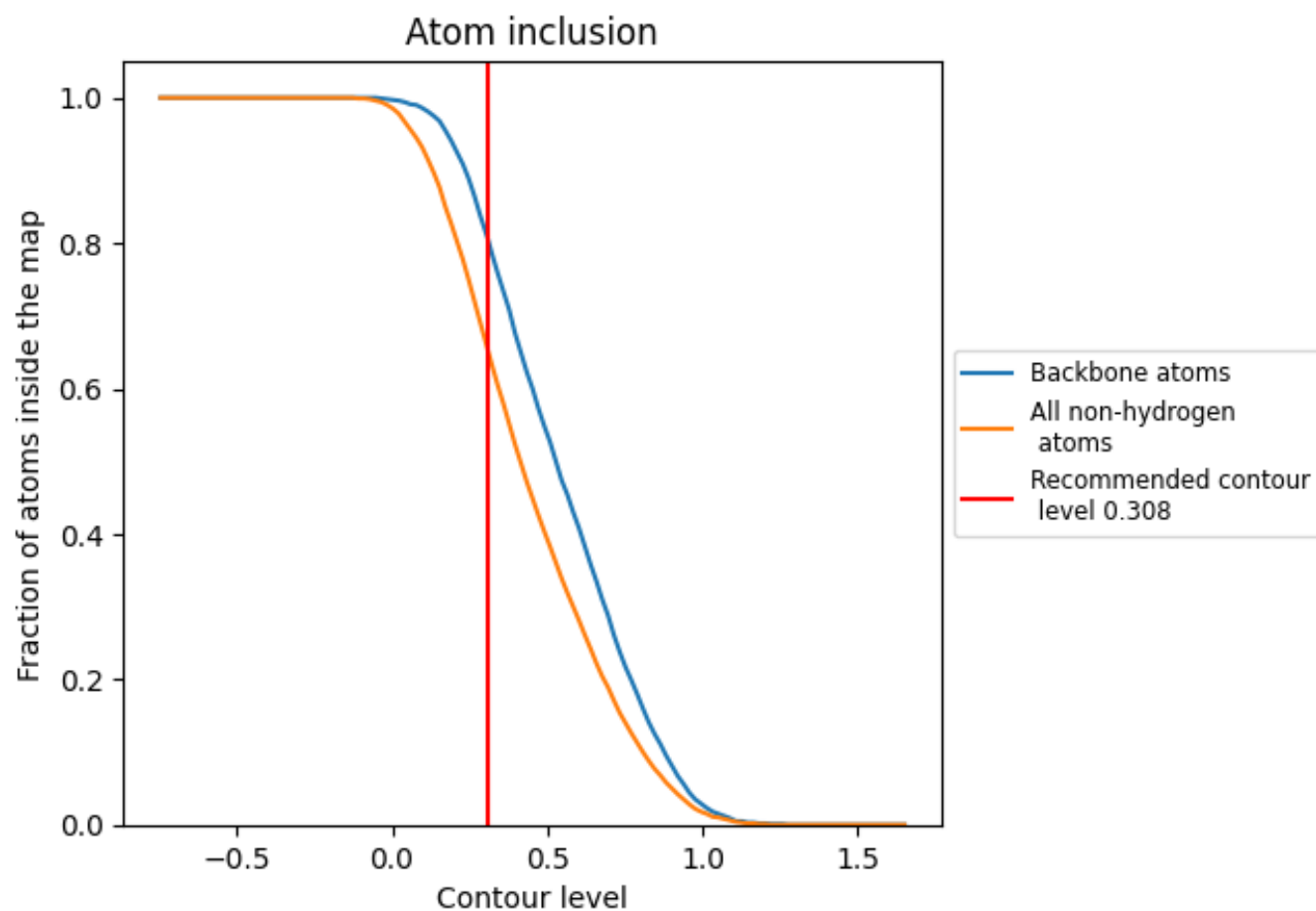
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.308).

9.4 Atom inclusion [i](#)



At the recommended contour level, 81% of all backbone atoms, 65% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.308) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div>0.6540</div>	<div><div></div>0.4230</div>
A	<div><div></div>0.6060</div>	<div><div></div>0.4270</div>
B	<div><div></div>0.8060</div>	<div><div></div>0.5130</div>
C	<div><div></div>0.6640</div>	<div><div></div>0.4400</div>
D	<div><div></div>0.7170</div>	<div><div></div>0.4460</div>
L	<div><div></div>0.4420</div>	<div><div></div>0.2130</div>
R	<div><div></div>0.5040</div>	<div><div></div>0.3090</div>

1.0

0.0

<0.0