



Full wwPDB EM Validation Report ⓘ

Mar 29, 2026 – 08:17 AM UTC

PDB ID : 8U8F / pdb_00008u8f
EMDB ID : EMD-42023
Title : GPR3 Orphan G-coupled Protein Receptor in complex with Dominant Negative Gs.
Authors : Russell, I.C.; Belousoff, M.J.; Sexton, P.
Deposited on : 2023-09-17
Resolution : 3.49 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
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

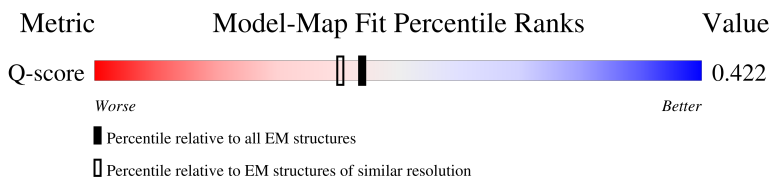
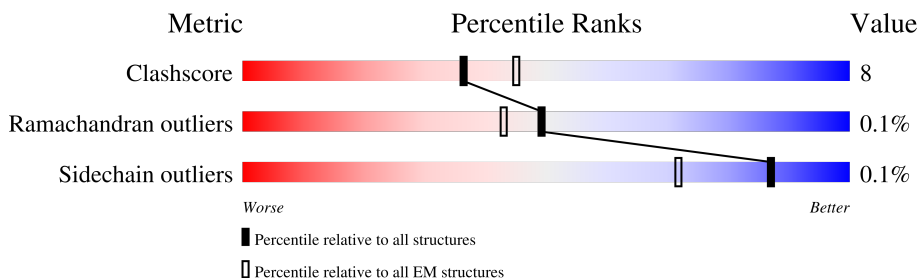
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.49 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	13600 (2.99 - 3.99)

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

Mol	Chain	Length	Quality of chain
1	A	394	13% 46% 13% 41%
2	B	340	11% 84% 15% .
3	G	58	47% 81% 16% .
4	R	390	6% 57% 11% 32%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 13953 atoms, of which 6987 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 Guanine nucleotide-binding protein G(s) subunit alpha isoforms short.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	231	Total	C	H	N	O	S	0	0
			3800	1207	1890	345	351	7		

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	54	ASN	SER	conflict	UNP P63092
A	226	ALA	GLY	conflict	UNP P63092
A	268	ALA	GLU	conflict	UNP P63092
A	271	LYS	ASN	conflict	UNP P63092
A	274	ASP	LYS	conflict	UNP P63092
A	280	LYS	ARG	conflict	UNP P63092
A	284	ASP	THR	conflict	UNP P63092
A	285	THR	ILE	conflict	UNP P63092
A	366	SER	ALA	conflict	UNP P63092

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	337	Total	C	H	N	O	S	0	0
			5094	1599	2503	466	505	21		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	GLN	-	expression tag	UNP P62873

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	G	56	Total	C	H	N	O	S	0	0
			871	269	442	76	81	3		

- Molecule 4 is a protein called G-protein coupled receptor 3.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	R	265	Total	C	H	N	O	S	0	0
			4094	1326	2090	322	338	18		

There are 61 discrepancies between the modelled and reference sequences:

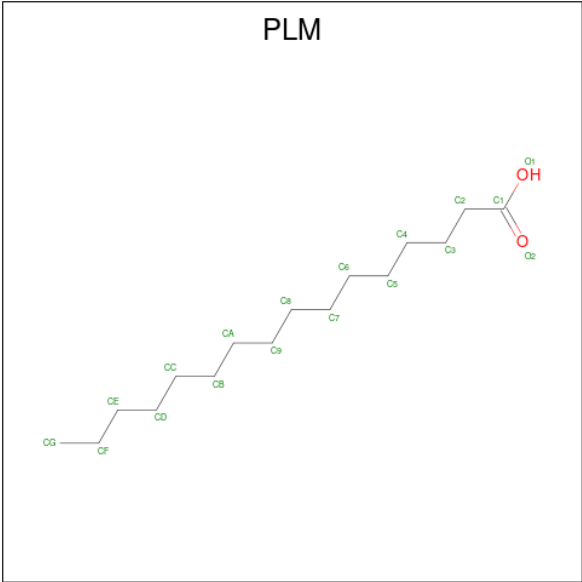
Chain	Residue	Modelled	Actual	Comment	Reference
R	-33	ASN	-	expression tag	UNP P46089
R	-32	SER	-	expression tag	UNP P46089
R	-31	THR	-	expression tag	UNP P46089
R	-30	MET	-	expression tag	UNP P46089
R	-29	LYS	-	expression tag	UNP P46089
R	-28	THR	-	expression tag	UNP P46089
R	-27	ILE	-	expression tag	UNP P46089
R	-26	ILE	-	expression tag	UNP P46089
R	-25	ALA	-	expression tag	UNP P46089
R	-24	LEU	-	expression tag	UNP P46089
R	-23	SER	-	expression tag	UNP P46089
R	-22	TYR	-	expression tag	UNP P46089
R	-21	ILE	-	expression tag	UNP P46089
R	-20	PHE	-	expression tag	UNP P46089
R	-19	CYS	-	expression tag	UNP P46089
R	-18	LEU	-	expression tag	UNP P46089
R	-17	VAL	-	expression tag	UNP P46089
R	-16	PHE	-	expression tag	UNP P46089
R	-15	ALA	-	expression tag	UNP P46089
R	-14	ASP	-	expression tag	UNP P46089
R	-13	TYR	-	expression tag	UNP P46089
R	-12	LYS	-	expression tag	UNP P46089
R	-11	ASP	-	expression tag	UNP P46089
R	-10	ASP	-	expression tag	UNP P46089
R	-9	ASP	-	expression tag	UNP P46089
R	-8	ASP	-	expression tag	UNP P46089
R	-7	LEU	-	expression tag	UNP P46089
R	-6	GLU	-	expression tag	UNP P46089
R	-5	VAL	-	expression tag	UNP P46089
R	-4	LEU	-	expression tag	UNP P46089
R	-3	PHE	-	expression tag	UNP P46089

Continued on next page...

Continued from previous page...

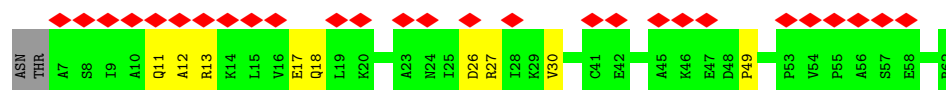
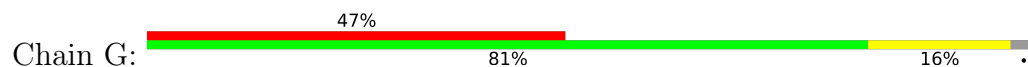
Chain	Residue	Modelled	Actual	Comment	Reference
R	-2	GLN	-	expression tag	UNP P46089
R	-1	GLY	-	expression tag	UNP P46089
R	0	PRO	-	expression tag	UNP P46089
R	1	ALA	-	expression tag	UNP P46089
R	331	PRO	-	expression tag	UNP P46089
R	332	ALA	-	expression tag	UNP P46089
R	333	GLY	-	expression tag	UNP P46089
R	334	LEU	-	expression tag	UNP P46089
R	335	GLU	-	expression tag	UNP P46089
R	336	VAL	-	expression tag	UNP P46089
R	337	LEU	-	expression tag	UNP P46089
R	338	PHE	-	expression tag	UNP P46089
R	339	GLN	-	expression tag	UNP P46089
R	340	GLY	-	expression tag	UNP P46089
R	341	PRO	-	expression tag	UNP P46089
R	342	HIS	-	expression tag	UNP P46089
R	343	HIS	-	expression tag	UNP P46089
R	344	HIS	-	expression tag	UNP P46089
R	345	HIS	-	expression tag	UNP P46089
R	346	HIS	-	expression tag	UNP P46089
R	347	HIS	-	expression tag	UNP P46089
R	348	HIS	-	expression tag	UNP P46089
R	349	HIS	-	expression tag	UNP P46089
R	350	ALA	-	expression tag	UNP P46089
R	351	ALA	-	expression tag	UNP P46089
R	352	ALA	-	expression tag	UNP P46089
R	353	PHE	-	expression tag	UNP P46089
R	354	GLU	-	expression tag	UNP P46089
R	355	SER	-	expression tag	UNP P46089
R	356	ARG	-	expression tag	UNP P46089

- Molecule 5 is PALMITIC ACID (CCD ID: PLM) (formula: $C_{16}H_{32}O_2$) (labeled as "Ligand of Interest" by depositor).

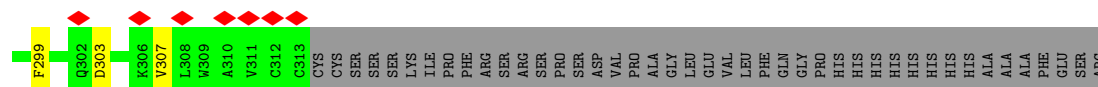
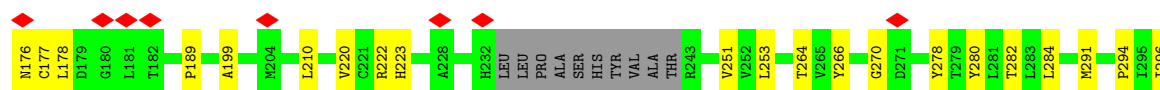
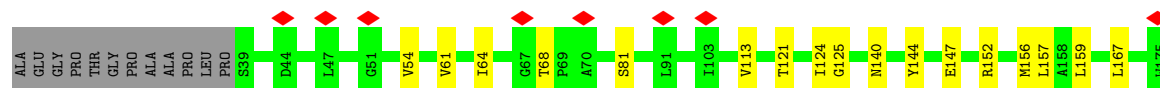


Mol	Chain	Residues	Atoms			AltConf
5	R	1	Total	C	H	1
			94	32	62	

- Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2



- Molecule 4: G-protein coupled receptor 3



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	184647	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1000	Depositor
Magnification	120000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	3.059	Depositor
Minimum map value	-2.275	Depositor
Average map value	-0.003	Depositor
Map value standard deviation	0.065	Depositor
Recommended contour level	0.36	Depositor
Map size (Å)	220.16, 220.16, 220.16	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.86, 0.86, 0.86	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.10	0/1946	0.25	0/2617
2	B	0.09	0/2638	0.25	0/3577
3	G	0.19	0/435	0.39	1/587 (0.2%)
4	R	0.24	0/2050	0.47	0/2807
All	All	0.16	0/7069	0.34	1/9588 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
4	R	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	49	PRO	CA-N-CD	-5.00	104.99	112.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	R	152	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	A	1910	1890	1890	38	0
2	B	2591	2503	2499	42	0
3	G	429	442	441	7	0
4	R	2004	2090	2087	32	0
5	R	32	62	62	7	0
All	All	6966	6987	6979	107	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 8.

All (107) 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:A:233:LYS:NZ	2:B:246:ASP:OD2	2.21	0.73
1:A:26:ILE:HD11	2:B:89:LYS:HB2	1.72	0.72
1:A:38:ARG:NH2	4:R:147:GLU:OE2	2.21	0.72
3:G:26:ASP:OD1	3:G:27:ARG:N	2.24	0.70
4:R:159:LEU:HD22	5:R:401[B]:PLM:HA2	1.77	0.67
1:A:232:ARG:NH2	2:B:204:CYS:SG	2.70	0.64
4:R:140:ASN:O	4:R:144:TYR:N	2.29	0.64
1:A:212:PHE:CE2	1:A:372:ILE:HD11	2.34	0.62
2:B:321:THR:OG1	2:B:324:GLY:N	2.33	0.61
1:A:30:LEU:HD21	2:B:80:ILE:HD13	1.82	0.61
2:B:251:ARG:NE	2:B:260:GLU:OE2	2.35	0.60
4:R:159:LEU:O	4:R:159:LEU:HD23	2.01	0.60
4:R:159:LEU:HD23	4:R:159:LEU:C	2.26	0.60
2:B:184:THR:OG1	2:B:205:ASP:OD2	2.12	0.60
2:B:186:ASP:O	2:B:204:CYS:N	2.35	0.59
2:B:185:GLY:N	2:B:205:ASP:OD2	2.36	0.58
4:R:113:VAL:HG21	4:R:189:PRO:CG	2.33	0.58
1:A:56:ILE:HD11	1:A:371:ASN:HD22	1.68	0.58
2:B:63:TRP:CZ3	2:B:321:THR:HG22	2.40	0.57
2:B:280:LYS:O	2:B:280:LYS:NZ	2.30	0.57
1:A:53:LYS:O	1:A:57:VAL:HG23	2.04	0.56
4:R:61:VAL:HG21	4:R:294:PRO:HB3	1.86	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:209:LYS:NZ	3:G:18:GLN:OE1	2.39	0.56
1:A:317:ARG:O	1:A:317:ARG:NH1	2.39	0.55
1:A:353:GLY:O	1:A:356:ARG:NH1	2.40	0.54
1:A:26:ILE:HD11	2:B:89:LYS:CB	2.37	0.53
1:A:354:ASP:O	1:A:354:ASP:OD1	2.26	0.53
4:R:64:ILE:O	4:R:68:THR:HG22	2.09	0.53
2:B:261:LEU:HD22	3:G:30:VAL:HG13	1.91	0.52
2:B:160:SER:HB3	2:B:190:LEU:HD22	1.91	0.51
2:B:289:TYR:OH	2:B:297:TRP:NE1	2.43	0.51
2:B:323:ASP:N	2:B:323:ASP:OD1	2.43	0.51
1:A:56:ILE:HD11	1:A:371:ASN:ND2	2.25	0.51
1:A:274:ASP:OD1	1:A:348:ILE:HG21	2.10	0.50
2:B:83:ASP:O	2:B:87:THR:N	2.44	0.50
1:A:44:LEU:O	1:A:245:ILE:N	2.45	0.50
4:R:113:VAL:HG21	4:R:189:PRO:CB	2.42	0.49
4:R:251:VAL:HG12	4:R:296:ILE:HD11	1.94	0.49
1:A:40:THR:O	1:A:42:ARG:NH1	2.45	0.49
4:R:280:TYR:O	4:R:284:LEU:HD12	2.13	0.49
4:R:210:LEU:HD23	4:R:253:LEU:HD11	1.94	0.48
1:A:384:GLN:OE1	4:R:222:ARG:NH2	2.46	0.48
4:R:266:TYR:O	4:R:270:GLY:N	2.37	0.48
2:B:149:CYS:O	2:B:150:ARG:NH1	2.47	0.48
4:R:176:ASN:O	4:R:178:LEU:N	2.47	0.48
2:B:147:SER:OG	2:B:188:MET:O	2.24	0.47
3:G:26:ASP:OD1	3:G:26:ASP:C	2.57	0.47
4:R:113:VAL:HG21	4:R:189:PRO:HG3	1.96	0.47
3:G:11:GLN:OE1	3:G:12:ALA:N	2.47	0.47
2:B:153:ASP:OD1	2:B:156:GLN:N	2.48	0.47
4:R:125:GLY:HA2	5:R:401[B]:PLM:H72	1.97	0.47
1:A:246:PHE:O	1:A:290:PHE:N	2.44	0.47
1:A:32:LYS:O	1:A:36:VAL:HG12	2.15	0.47
2:B:200:VAL:HG23	2:B:232:ILE:HG21	1.97	0.46
4:R:121:THR:HG23	5:R:401[B]:PLM:H32	1.96	0.46
1:A:31:GLN:HA	1:A:31:GLN:OE1	2.16	0.46
4:R:121:THR:HG21	4:R:167:LEU:HD12	1.97	0.46
2:B:87:THR:O	2:B:87:THR:CG2	2.63	0.46
2:B:195:ASP:O	2:B:196:THR:OG1	2.32	0.46
1:A:274:ASP:O	1:A:278:ASN:ND2	2.44	0.46
1:A:30:LEU:HD21	2:B:80:ILE:CD1	2.47	0.45
4:R:125:GLY:CA	5:R:401[B]:PLM:H72	2.45	0.45
1:A:381:ASP:OD1	4:R:223:HIS:NE2	2.48	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:4:LEU:HD23	2:B:4:LEU:O	2.16	0.45
1:A:14:ASN:OD1	1:A:14:ASN:N	2.49	0.45
2:B:164:THR:HG22	2:B:185:GLY:C	2.42	0.45
2:B:218:CYS:SG	2:B:219:ARG:N	2.90	0.44
2:B:63:TRP:N	2:B:63:TRP:CD1	2.86	0.44
1:A:318:TYR:OH	1:A:343:ASP:OD2	2.35	0.44
4:R:199:ALA:HB1	4:R:264:THR:HG23	2.00	0.44
2:B:40:VAL:HG21	2:B:305:ALA:HB2	1.99	0.44
2:B:164:THR:HG22	2:B:185:GLY:O	2.17	0.43
1:A:372:ILE:HG23	1:A:373:ARG:HD2	1.99	0.43
1:A:310:ASP:OD1	1:A:311:TYR:N	2.51	0.43
1:A:246:PHE:N	1:A:288:ILE:O	2.50	0.43
2:B:110:ASN:N	2:B:110:ASN:OD1	2.52	0.43
2:B:313:ASN:O	2:B:314:ARG:HB2	2.18	0.43
4:R:156:MET:HG2	5:R:401[B]:PLM:HC1	2.00	0.43
2:B:154:ASP:OD1	2:B:154:ASP:C	2.62	0.43
3:G:11:GLN:CD	3:G:11:GLN:C	2.87	0.43
4:R:156:MET:HG2	5:R:401[B]:PLM:CC	2.48	0.43
1:A:318:TYR:O	1:A:336:ARG:NH2	2.49	0.43
4:R:303:ASP:O	4:R:307:VAL:HG23	2.18	0.42
1:A:266:LEU:HD12	1:A:266:LEU:O	2.19	0.42
2:B:321:THR:OG1	2:B:323:ASP:OD1	2.35	0.42
1:A:295:ASP:OD1	1:A:296:LEU:N	2.50	0.42
2:B:160:SER:CB	2:B:190:LEU:HD22	2.50	0.42
1:A:362:HIS:NE2	1:A:378:ASP:OD2	2.51	0.42
2:B:163:ASP:C	2:B:164:THR:HG23	2.45	0.42
4:R:299:PHE:CD1	4:R:299:PHE:C	2.97	0.42
1:A:393:LEU:HD23	4:R:220:VAL:HG21	2.02	0.42
4:R:54:VAL:HG23	4:R:291:MET:HE3	2.02	0.42
2:B:128:THR:OG1	2:B:132:ASN:O	2.34	0.41
1:A:23:ASN:OD1	1:A:23:ASN:C	2.63	0.41
1:A:60:MET:SD	1:A:221:MET:HE1	2.61	0.41
1:A:294:GLN:NE2	1:A:294:GLN:HA	2.36	0.41
2:B:320:VAL:HG12	2:B:321:THR:N	2.36	0.41
3:G:13:ARG:O	3:G:17:GLU:HG2	2.21	0.41
2:B:100:VAL:O	2:B:100:VAL:HG13	2.21	0.41
1:A:270:LEU:HD11	1:A:344:GLU:HG2	2.03	0.41
4:R:81:SER:HB2	4:R:157:LEU:CD2	2.51	0.41
4:R:284:LEU:HD12	4:R:284:LEU:H	1.86	0.40
4:R:278:TYR:O	4:R:282:THR:OG1	2.37	0.40
2:B:63:TRP:HZ2	2:B:328:ALA:HB2	1.86	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:223:ASP:OD1	1:A:224:VAL:N	2.53	0.40
2:B:34:THR:HG22	2:B:300:LEU:HD12	2.04	0.40
4:R:124:ILE:CD1	5:R:401[A]:PLM:HA2	2.52	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	A	225/394 (57%)	221 (98%)	4 (2%)	0	100	100
2	B	335/340 (98%)	324 (97%)	11 (3%)	0	100	100
3	G	54/58 (93%)	54 (100%)	0	0	100	100
4	R	261/390 (67%)	253 (97%)	7 (3%)	1 (0%)	30	62
All	All	875/1182 (74%)	852 (97%)	22 (2%)	1 (0%)	49	79

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	R	177	CYS

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	206/350 (59%)	206 (100%)	0	100	100
2	B	280/283 (99%)	279 (100%)	1 (0%)	84	81
3	G	45/47 (96%)	45 (100%)	0	100	100
4	R	214/314 (68%)	214 (100%)	0	100	100
All	All	745/994 (75%)	744 (100%)	1 (0%)	87	87

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

Mol	Chain	Res	Type
2	B	234	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	HIS
1	A	371	ASN
1	A	390	GLN
4	R	194	HIS
4	R	226	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	PLM	R	401[B]	-	15,15,17	0.22	0	14,14,17	0.15	0
5	PLM	R	401[A]	-	15,15,17	0.22	0	14,14,17	0.14	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
5	PLM	R	401[B]	-	-	3/13/13/15	-
5	PLM	R	401[A]	-	-	2/13/13/15	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	R	401[B]	PLM	C4-C5-C6-C7
5	R	401[B]	PLM	C8-C9-CA-CB
5	R	401[B]	PLM	C7-C8-C9-CA
5	R	401[A]	PLM	CB-CC-CD-CE
5	R	401[A]	PLM	CC-CD-CE-CF

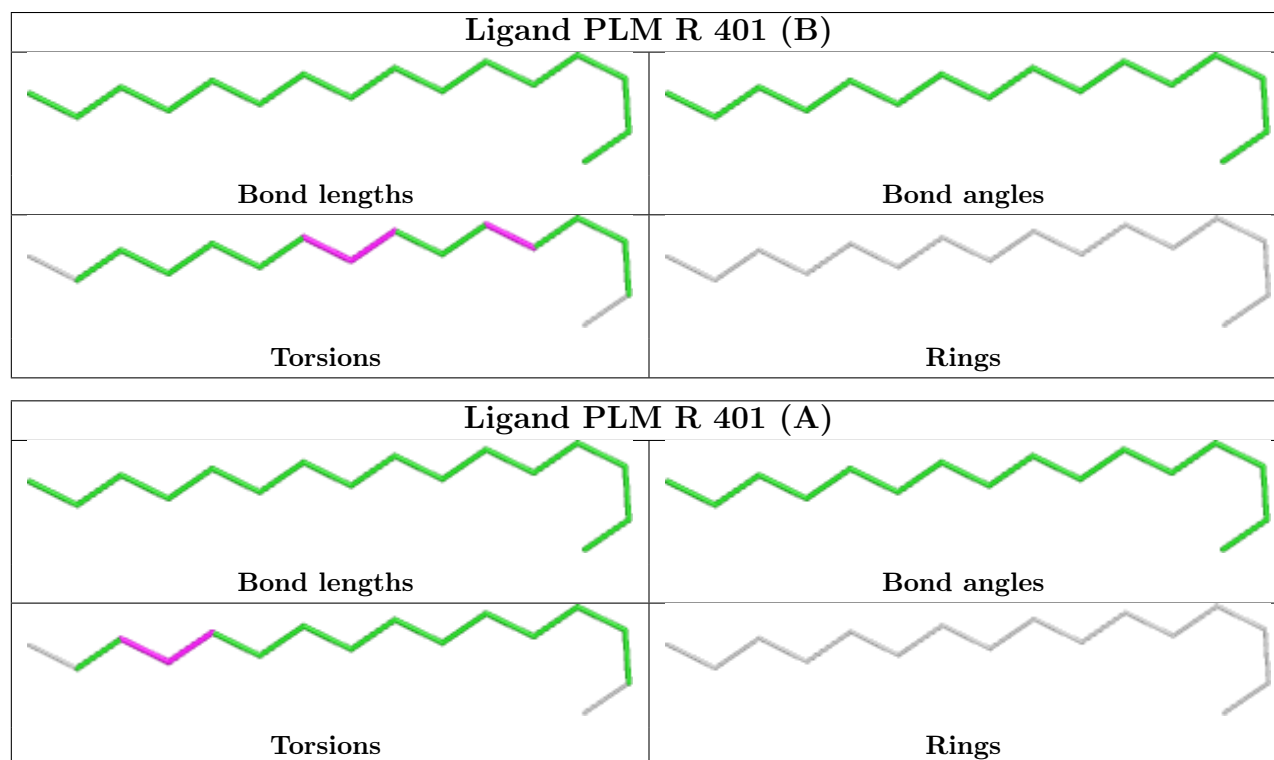
There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	R	401[B]	PLM	6	0
5	R	401[A]	PLM	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.

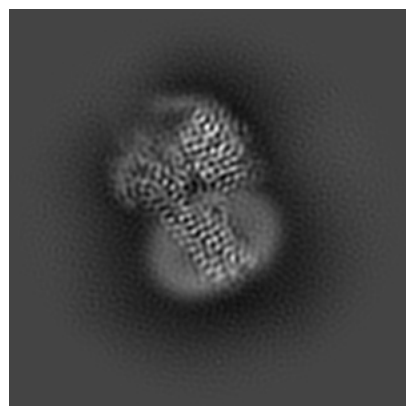
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42023. These allow visual inspection of the internal detail of the map and identification of artifacts.

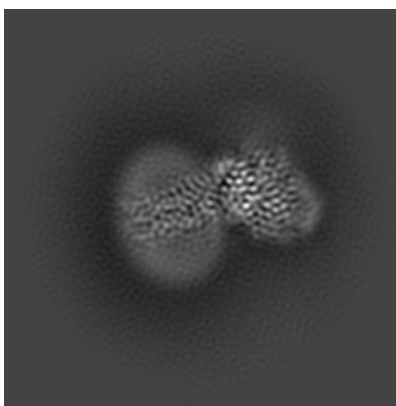
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

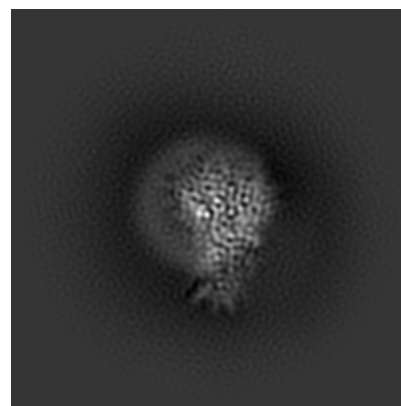
6.1.1 Primary map



X

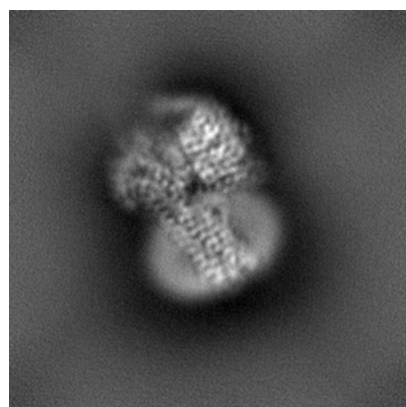


Y

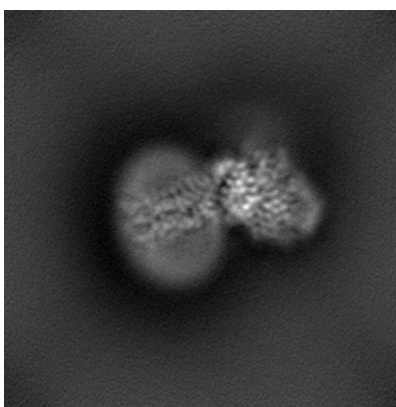


Z

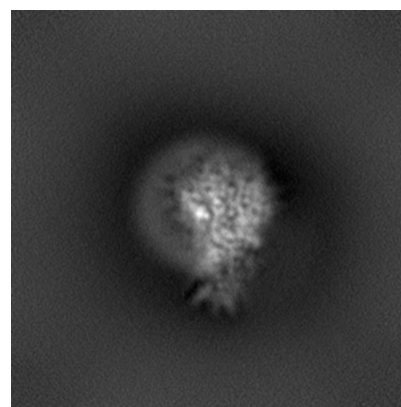
6.1.2 Raw map



X



Y

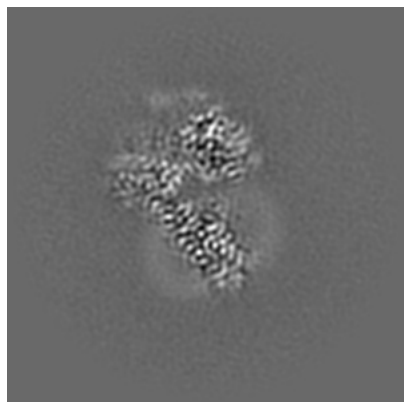


Z

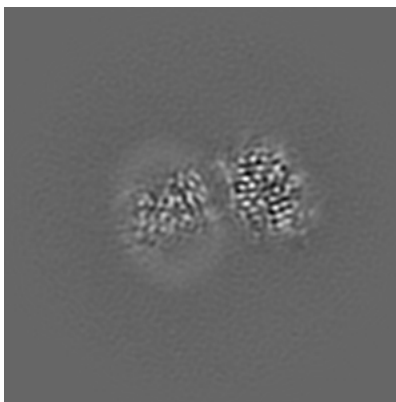
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

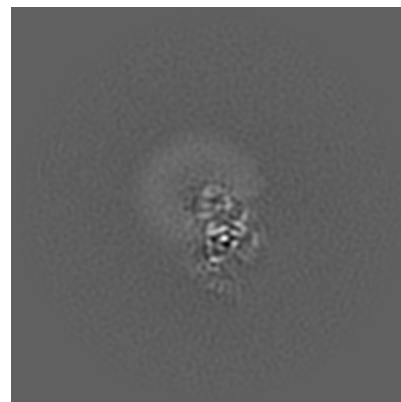
6.2.1 Primary map



X Index: 128

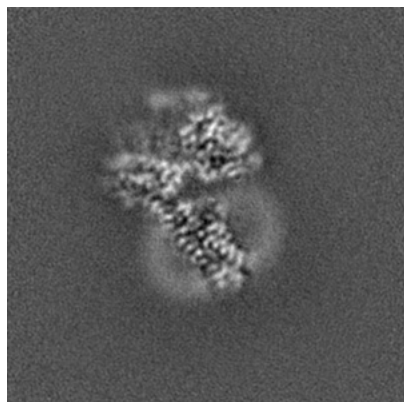


Y Index: 128

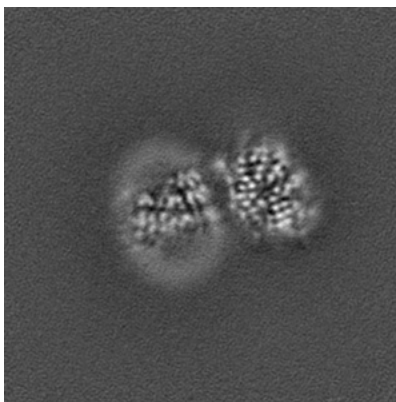


Z Index: 128

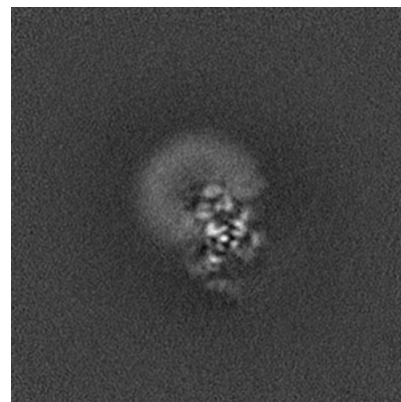
6.2.2 Raw map



X Index: 128



Y Index: 128

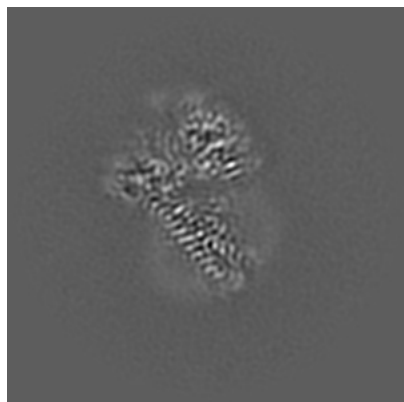


Z Index: 128

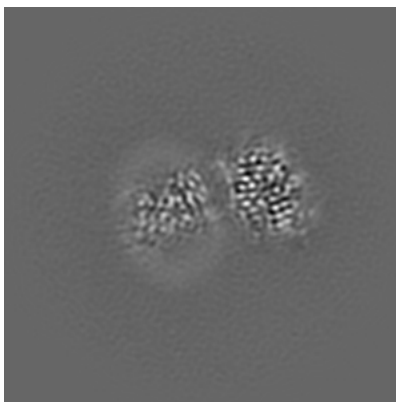
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

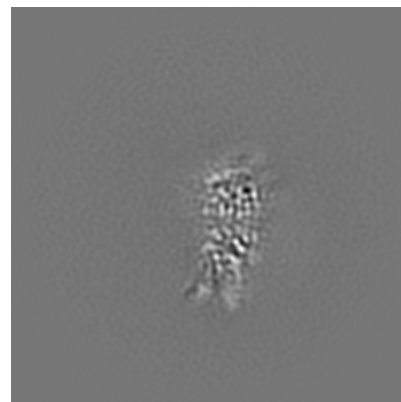
6.3.1 Primary map



X Index: 130

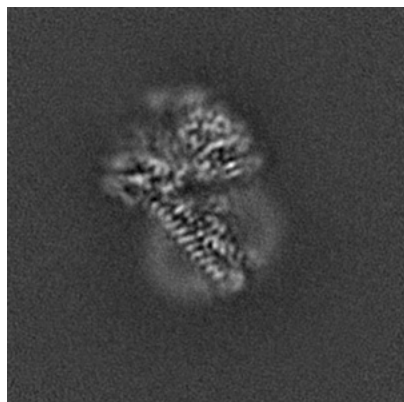


Y Index: 128

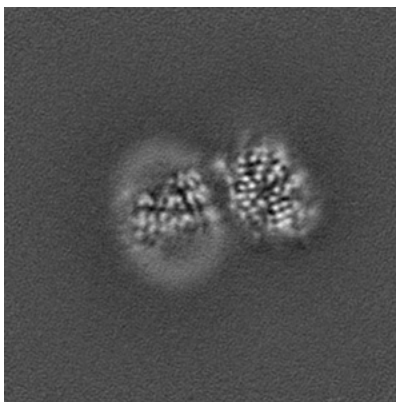


Z Index: 150

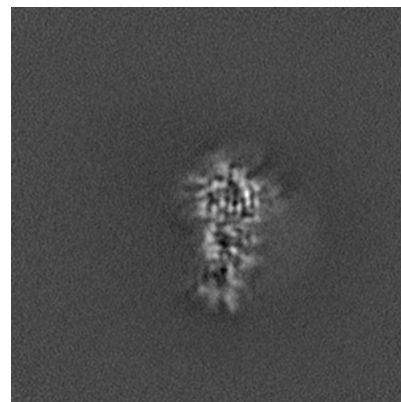
6.3.2 Raw map



X Index: 130



Y Index: 128

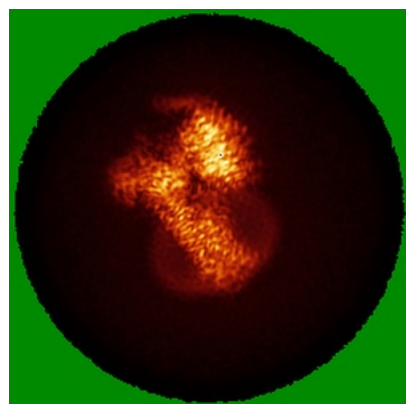


Z Index: 153

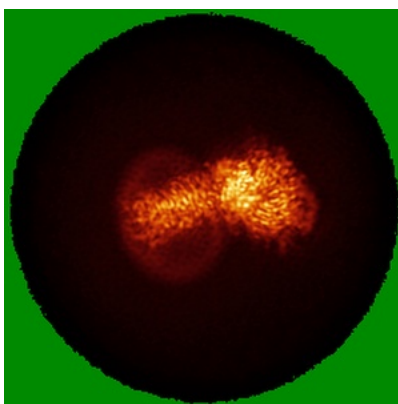
The images above show the largest variance slices of the map in three orthogonal directions.

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

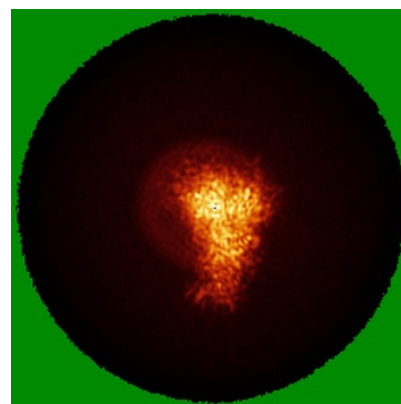
6.4.1 Primary map



X

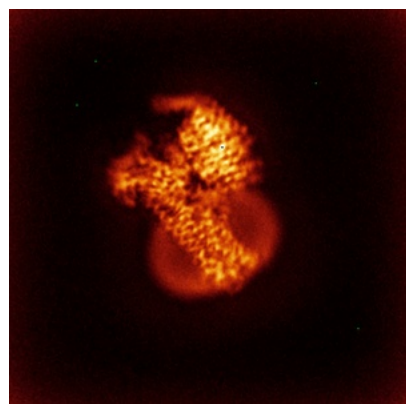


Y

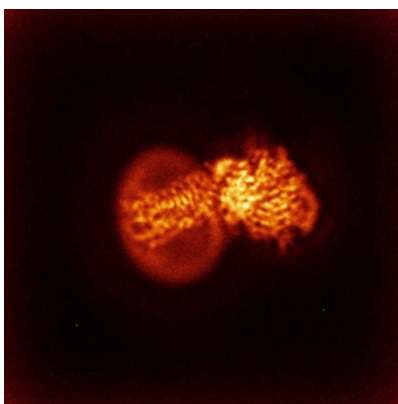


Z

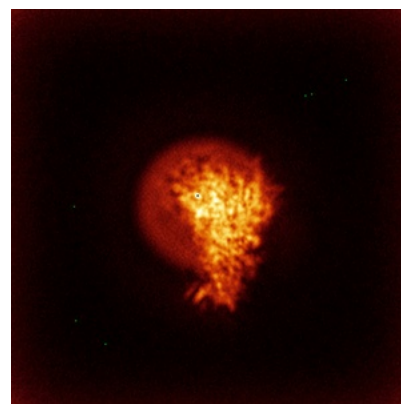
6.4.2 Raw map



X



Y

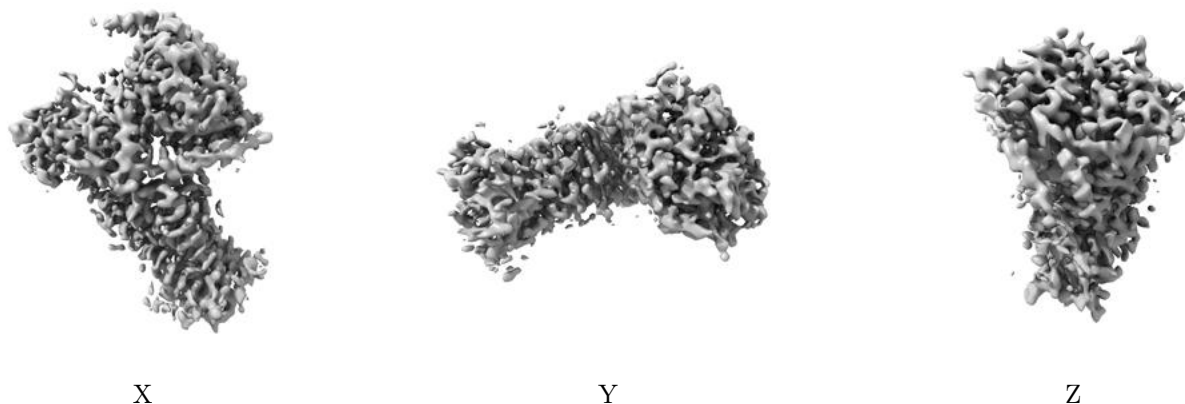


Z

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.

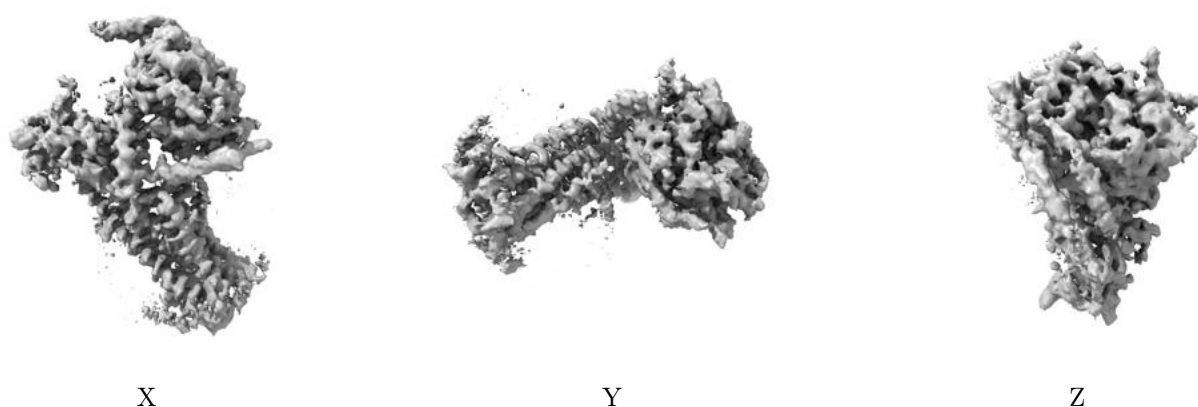
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.36. 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.

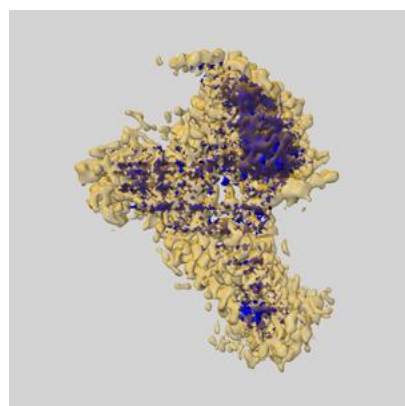
6.6 Mask visualisation [i](#)

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

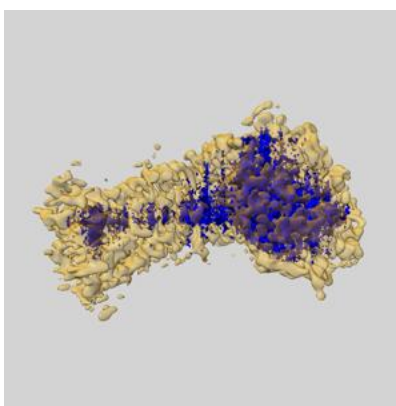
A mask typically either:

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

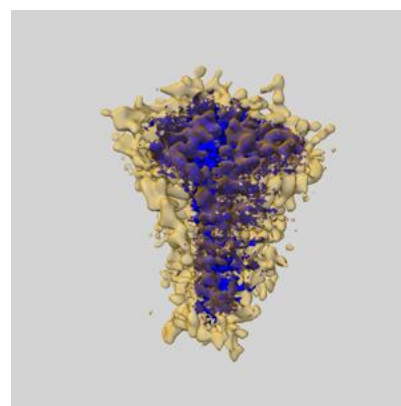
6.6.1 emd_42023_msk_1.map [i](#)



X



Y

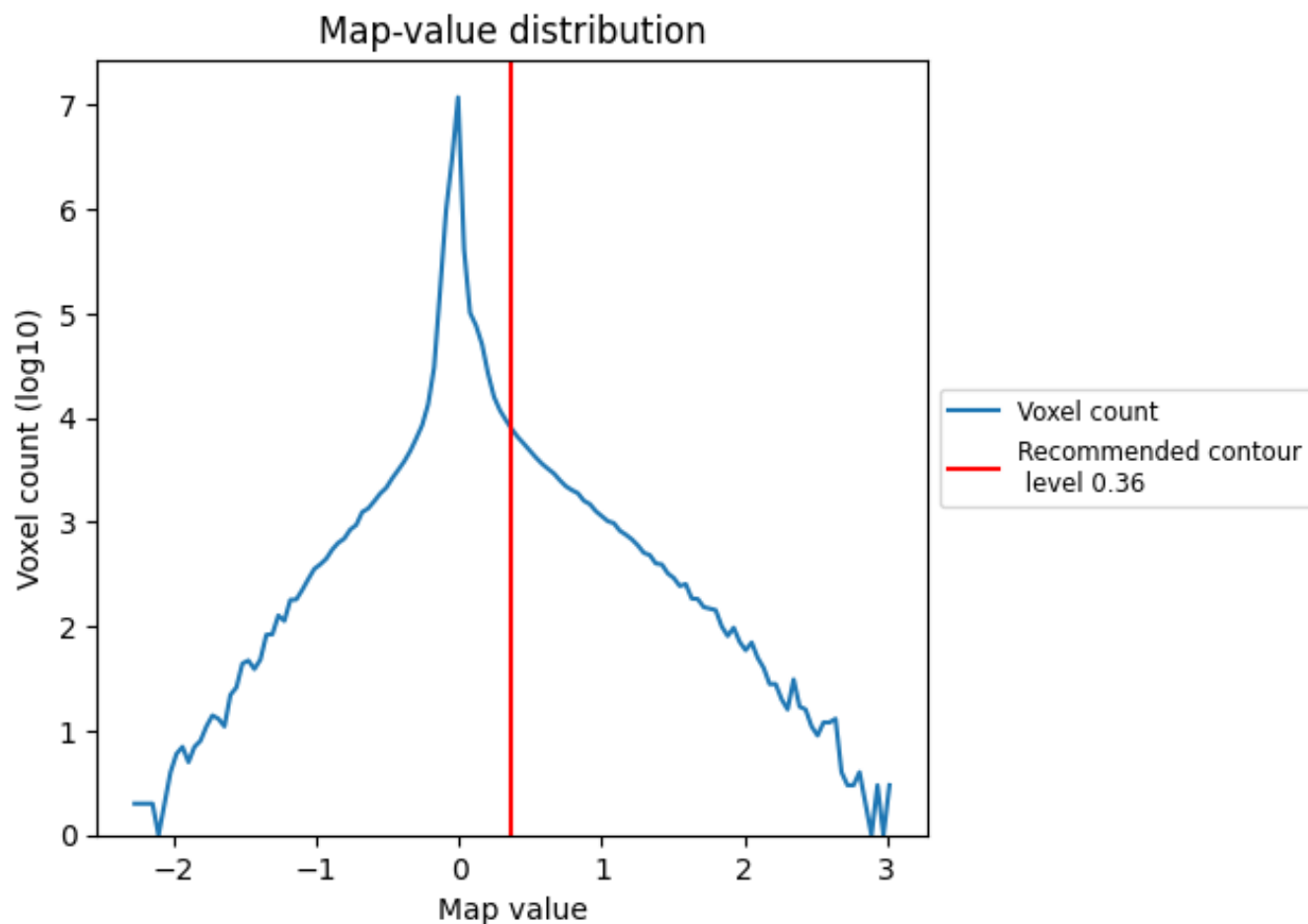


Z

7 Map analysis [i](#)

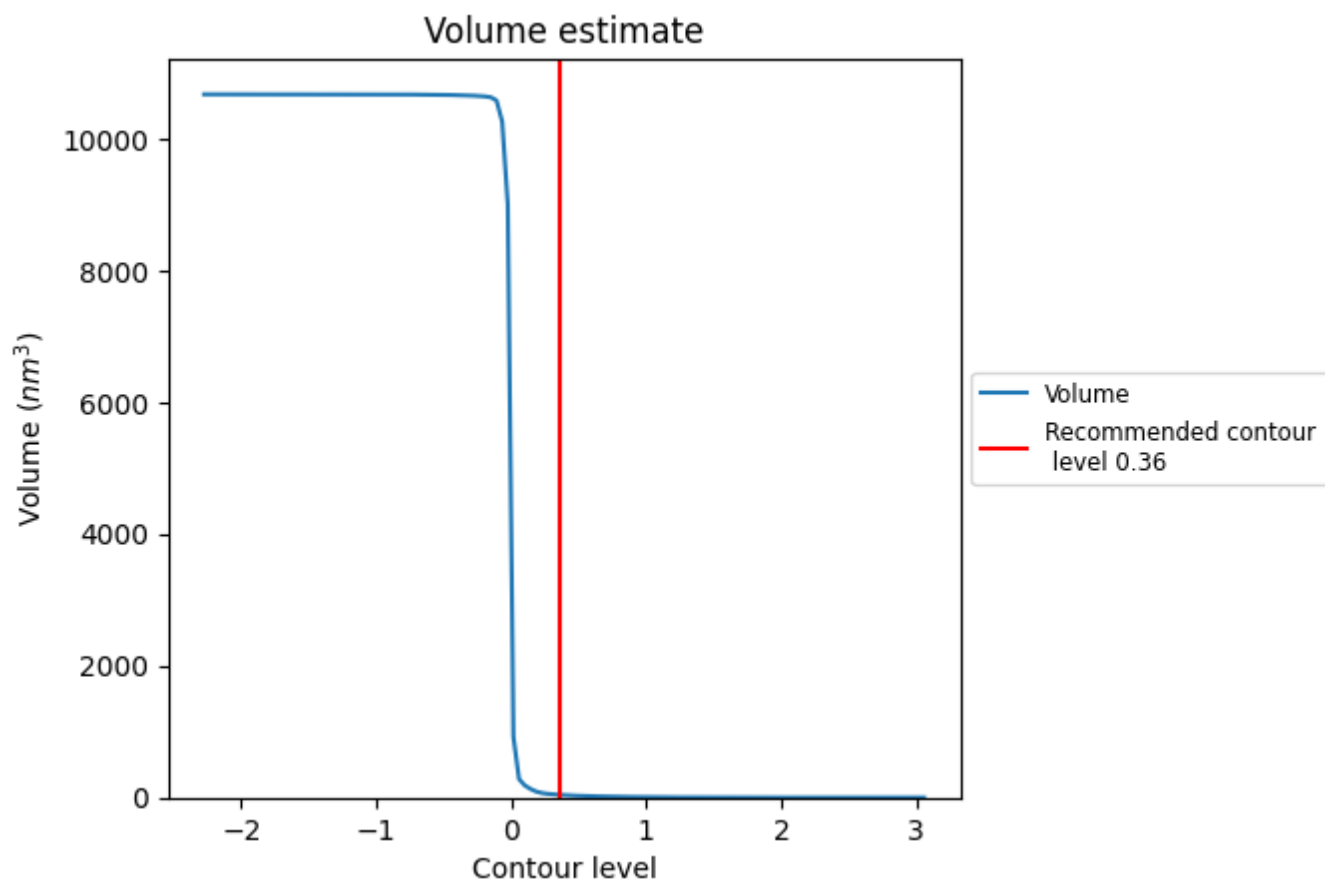
This section contains the results of statistical analysis of the map.

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.

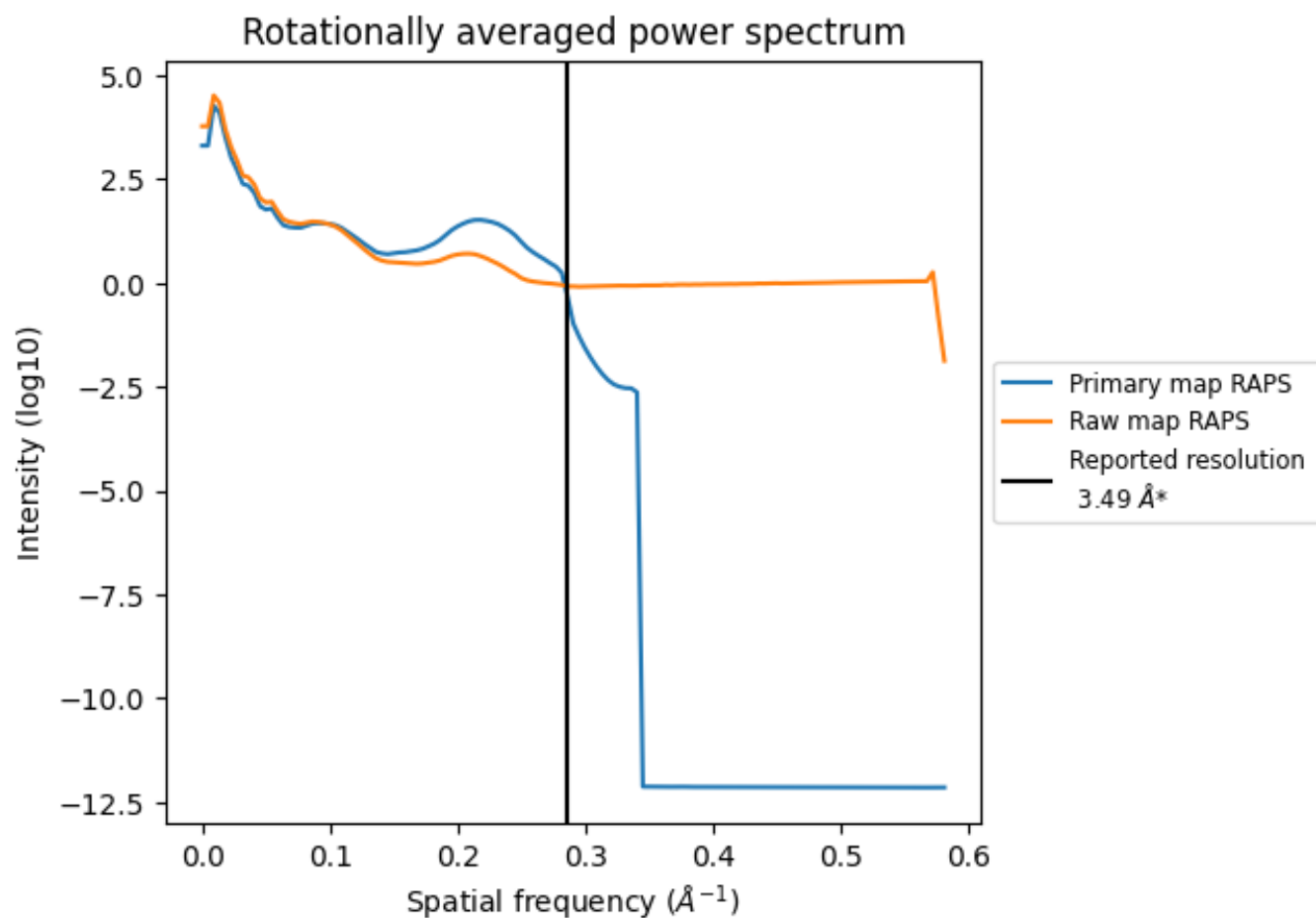
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 41 nm³; this corresponds to an approximate mass of 37 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 ⓘ

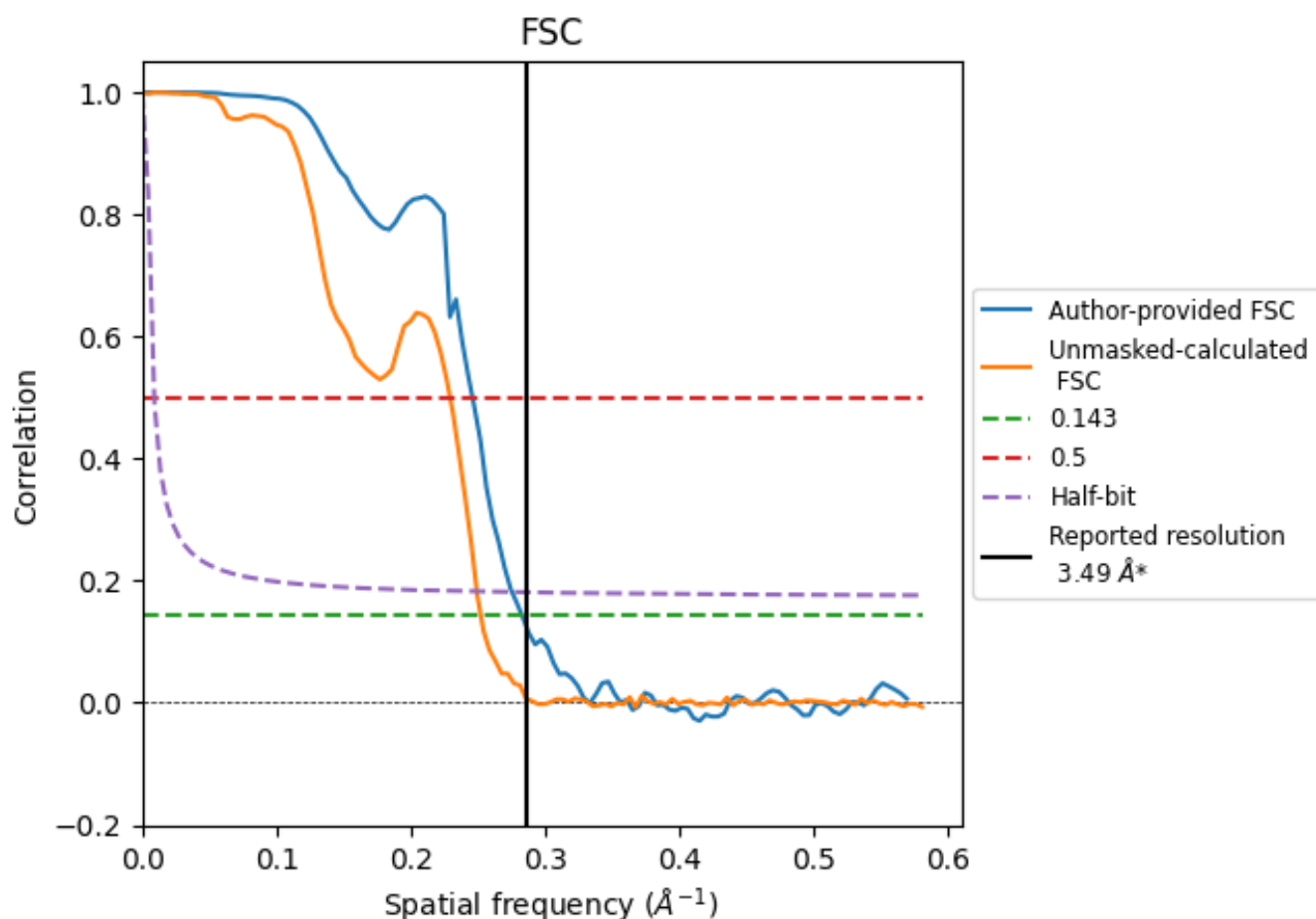


*Reported resolution corresponds to spatial frequency of 0.287 Å⁻¹

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 0.287 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

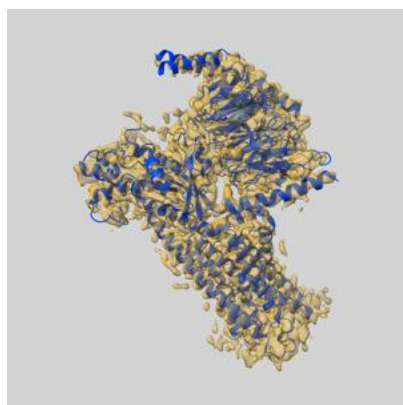
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.49	-	-
Author-provided FSC curve	3.53	4.06	3.63
Unmasked-calculated*	3.96	4.36	4.01

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.96 differs from the reported value 3.49 by more than 10 %

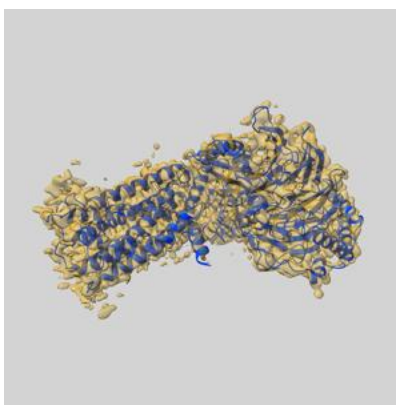
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-42023 and PDB model 8U8F. Per-residue inclusion information can be found in section [3](#) on page [7](#).

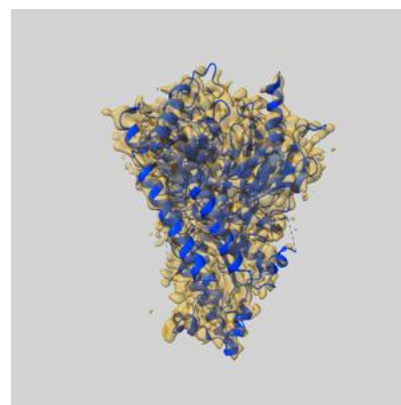
9.1 Map-model overlay [i](#)



X



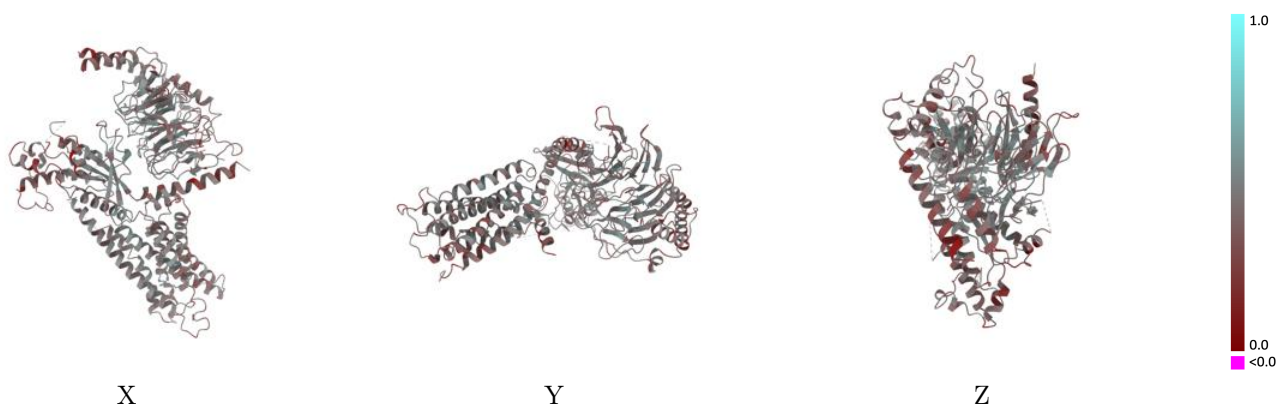
Y



Z

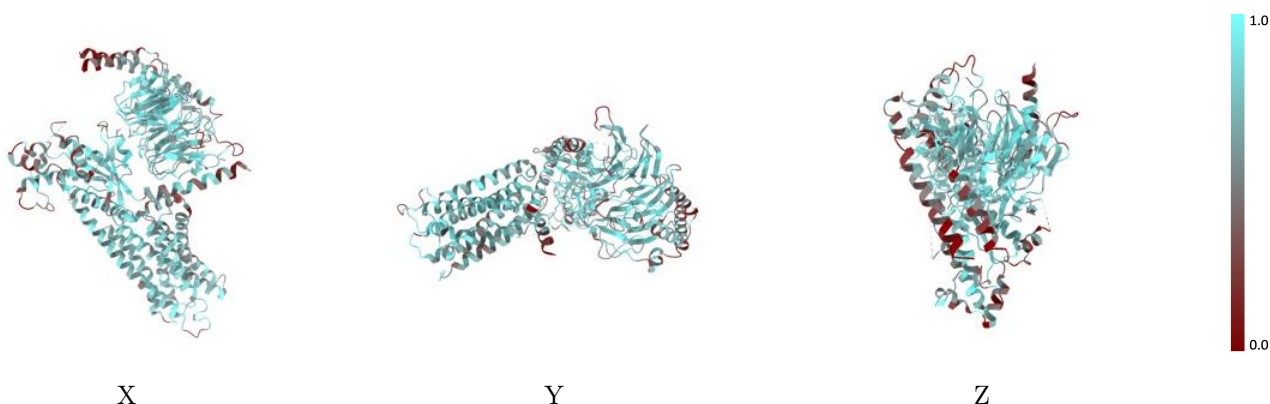
The images above show the 3D surface view of the map at the recommended contour level 0.36 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



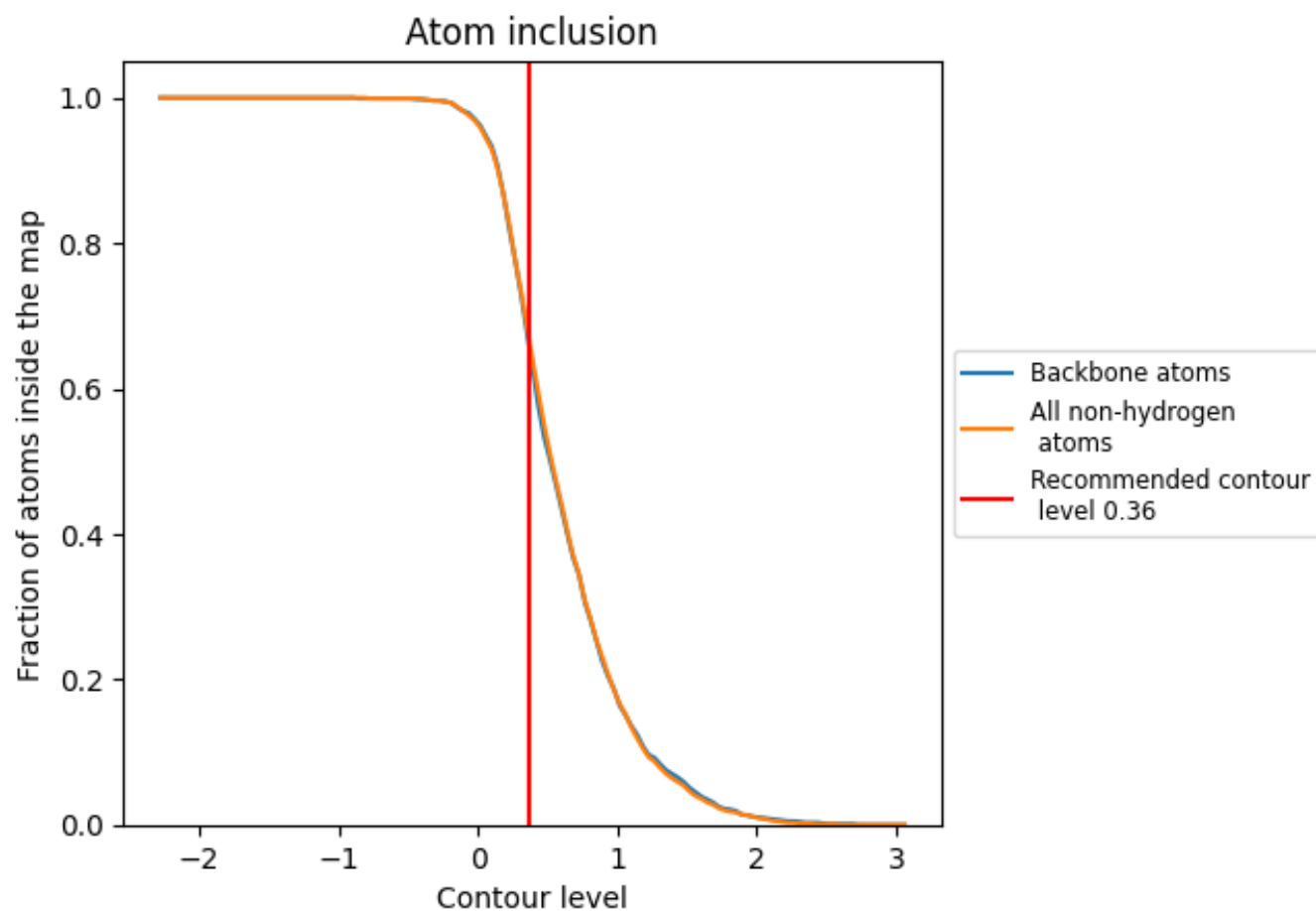
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.36).

9.4 Atom inclusion [i](#)



At the recommended contour level, 67% of all backbone atoms, 68% 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 (0.36) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6770	0.4220
A	0.6490	0.4110
B	0.7140	0.4360
G	0.4530	0.3780
R	0.6900	0.4230

