



Full wwPDB EM Validation Report ⓘ

May 11, 2024 – 12:58 PM EDT

PDB ID : 8UCS
EMDB ID : EMD-42139
Title : Cryo-EM structure of the flagellar MotAB stator bound to FliG
Authors : Deme, J.C.; Johnson, S.; Lea, S.M.
Deposited on : 2023-09-27
Resolution : 2.40 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.dev92
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

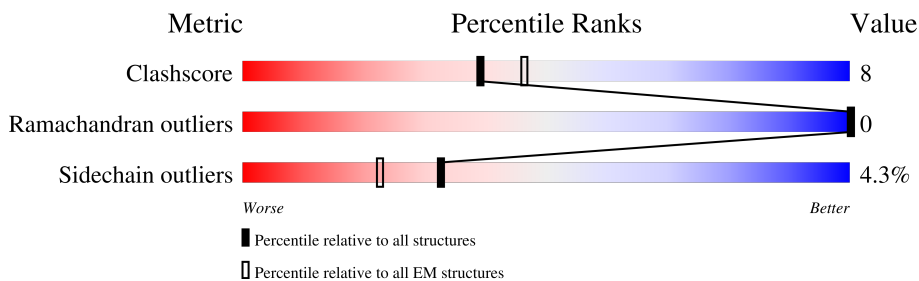
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.40 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.



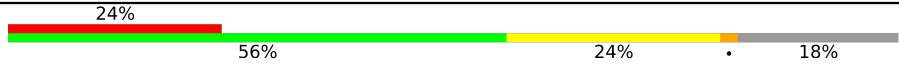

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	290	
1	B	290	
2	C	262	
2	D	262	
2	E	262	
2	F	262	
2	G	262	
3	H	107	

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Mol	Chain	Length	Quality of chain
3	I	107	
3	J	107	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 12605 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 OmpA family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	45	362	241	51	68	2	1	0
1	B	50	394	256	59	77	2	0	0

There are 78 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	252	GLU	-	expression tag	UNP J7SFK3
A	253	ASN	-	expression tag	UNP J7SFK3
A	254	LEU	-	expression tag	UNP J7SFK3
A	255	TYR	-	expression tag	UNP J7SFK3
A	256	PHE	-	expression tag	UNP J7SFK3
A	257	GLN	-	expression tag	UNP J7SFK3
A	258	GLY	-	expression tag	UNP J7SFK3
A	259	GLN	-	expression tag	UNP J7SFK3
A	260	PHE	-	expression tag	UNP J7SFK3
A	261	GLY	-	expression tag	UNP J7SFK3
A	262	SER	-	expression tag	UNP J7SFK3
A	263	TRP	-	expression tag	UNP J7SFK3
A	264	SER	-	expression tag	UNP J7SFK3
A	265	HIS	-	expression tag	UNP J7SFK3
A	266	PRO	-	expression tag	UNP J7SFK3
A	267	GLN	-	expression tag	UNP J7SFK3
A	268	PHE	-	expression tag	UNP J7SFK3
A	269	GLU	-	expression tag	UNP J7SFK3
A	270	LYS	-	expression tag	UNP J7SFK3
A	271	GLY	-	expression tag	UNP J7SFK3
A	272	GLY	-	expression tag	UNP J7SFK3
A	273	GLY	-	expression tag	UNP J7SFK3
A	274	SER	-	expression tag	UNP J7SFK3
A	275	GLY	-	expression tag	UNP J7SFK3
A	276	GLY	-	expression tag	UNP J7SFK3
A	277	GLY	-	expression tag	UNP J7SFK3

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Chain	Residue	Modelled	Actual	Comment	Reference
A	278	SER	-	expression tag	UNP J7SFK3
A	279	GLY	-	expression tag	UNP J7SFK3
A	280	GLY	-	expression tag	UNP J7SFK3
A	281	GLY	-	expression tag	UNP J7SFK3
A	282	SER	-	expression tag	UNP J7SFK3
A	283	TRP	-	expression tag	UNP J7SFK3
A	284	SER	-	expression tag	UNP J7SFK3
A	285	HIS	-	expression tag	UNP J7SFK3
A	286	PRO	-	expression tag	UNP J7SFK3
A	287	GLN	-	expression tag	UNP J7SFK3
A	288	PHE	-	expression tag	UNP J7SFK3
A	289	GLU	-	expression tag	UNP J7SFK3
A	290	LYS	-	expression tag	UNP J7SFK3
B	252	GLU	-	expression tag	UNP J7SFK3
B	253	ASN	-	expression tag	UNP J7SFK3
B	254	LEU	-	expression tag	UNP J7SFK3
B	255	TYR	-	expression tag	UNP J7SFK3
B	256	PHE	-	expression tag	UNP J7SFK3
B	257	GLN	-	expression tag	UNP J7SFK3
B	258	GLY	-	expression tag	UNP J7SFK3
B	259	GLN	-	expression tag	UNP J7SFK3
B	260	PHE	-	expression tag	UNP J7SFK3
B	261	GLY	-	expression tag	UNP J7SFK3
B	262	SER	-	expression tag	UNP J7SFK3
B	263	TRP	-	expression tag	UNP J7SFK3
B	264	SER	-	expression tag	UNP J7SFK3
B	265	HIS	-	expression tag	UNP J7SFK3
B	266	PRO	-	expression tag	UNP J7SFK3
B	267	GLN	-	expression tag	UNP J7SFK3
B	268	PHE	-	expression tag	UNP J7SFK3
B	269	GLU	-	expression tag	UNP J7SFK3
B	270	LYS	-	expression tag	UNP J7SFK3
B	271	GLY	-	expression tag	UNP J7SFK3
B	272	GLY	-	expression tag	UNP J7SFK3
B	273	GLY	-	expression tag	UNP J7SFK3
B	274	SER	-	expression tag	UNP J7SFK3
B	275	GLY	-	expression tag	UNP J7SFK3
B	276	GLY	-	expression tag	UNP J7SFK3
B	277	GLY	-	expression tag	UNP J7SFK3
B	278	SER	-	expression tag	UNP J7SFK3
B	279	GLY	-	expression tag	UNP J7SFK3
B	280	GLY	-	expression tag	UNP J7SFK3

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Chain	Residue	Modelled	Actual	Comment	Reference
B	281	GLY	-	expression tag	UNP J7SFK3
B	282	SER	-	expression tag	UNP J7SFK3
B	283	TRP	-	expression tag	UNP J7SFK3
B	284	SER	-	expression tag	UNP J7SFK3
B	285	HIS	-	expression tag	UNP J7SFK3
B	286	PRO	-	expression tag	UNP J7SFK3
B	287	GLN	-	expression tag	UNP J7SFK3
B	288	PHE	-	expression tag	UNP J7SFK3
B	289	GLU	-	expression tag	UNP J7SFK3
B	290	LYS	-	expression tag	UNP J7SFK3

- Molecule 2 is a protein called Motility protein A.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	253	Total	C	N	O	S	0	0
			1942	1241	320	362	19		
2	D	257	Total	C	N	O	S	0	0
			1978	1263	328	368	19		
2	E	253	Total	C	N	O	S	0	0
			1942	1241	320	362	19		
2	F	257	Total	C	N	O	S	0	0
			1978	1263	328	368	19		
2	G	253	Total	C	N	O	S	0	0
			1943	1240	321	363	19		

- Molecule 3 is a protein called Flagellar motor switch protein FliG.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	88	Total	C	N	O	S	0	0
			688	431	120	136	1		
3	I	88	Total	C	N	O	S	0	0
			688	431	120	136	1		
3	J	88	Total	C	N	O	S	0	0
			688	431	120	136	1		

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	227	GLY	-	expression tag	UNP A0A1V9IMV5
H	228	GLY	-	expression tag	UNP A0A1V9IMV5
H	229	GLY	-	expression tag	UNP A0A1V9IMV5
H	230	SER	-	expression tag	UNP A0A1V9IMV5

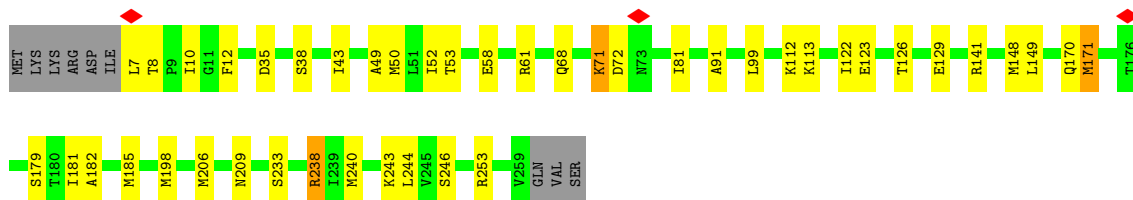
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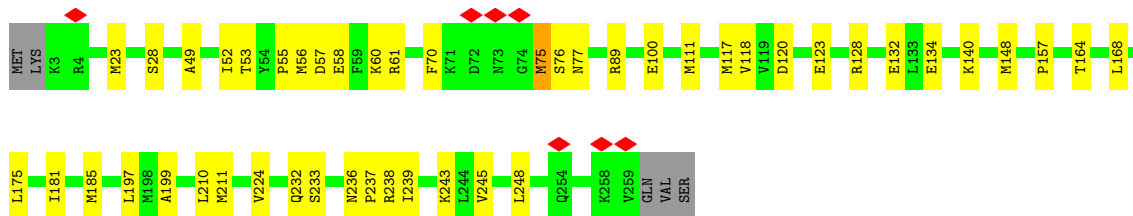
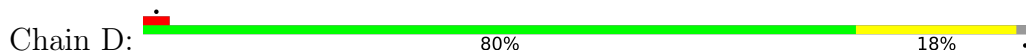
Chain	Residue	Modelled	Actual	Comment	Reference
H	231	GLY	-	expression tag	UNP A0A1V9IMV5
H	232	GLY	-	expression tag	UNP A0A1V9IMV5
H	233	GLY	-	expression tag	UNP A0A1V9IMV5
H	234	SER	-	expression tag	UNP A0A1V9IMV5
H	235	GLY	-	expression tag	UNP A0A1V9IMV5
H	236	GLY	-	expression tag	UNP A0A1V9IMV5
H	237	GLY	-	expression tag	UNP A0A1V9IMV5
H	238	SER	-	expression tag	UNP A0A1V9IMV5
I	227	GLY	-	expression tag	UNP A0A1V9IMV5
I	228	GLY	-	expression tag	UNP A0A1V9IMV5
I	229	GLY	-	expression tag	UNP A0A1V9IMV5
I	230	SER	-	expression tag	UNP A0A1V9IMV5
I	231	GLY	-	expression tag	UNP A0A1V9IMV5
I	232	GLY	-	expression tag	UNP A0A1V9IMV5
I	233	GLY	-	expression tag	UNP A0A1V9IMV5
I	234	SER	-	expression tag	UNP A0A1V9IMV5
I	235	GLY	-	expression tag	UNP A0A1V9IMV5
I	236	GLY	-	expression tag	UNP A0A1V9IMV5
I	237	GLY	-	expression tag	UNP A0A1V9IMV5
I	238	SER	-	expression tag	UNP A0A1V9IMV5
J	227	GLY	-	expression tag	UNP A0A1V9IMV5
J	228	GLY	-	expression tag	UNP A0A1V9IMV5
J	229	GLY	-	expression tag	UNP A0A1V9IMV5
J	230	SER	-	expression tag	UNP A0A1V9IMV5
J	231	GLY	-	expression tag	UNP A0A1V9IMV5
J	232	GLY	-	expression tag	UNP A0A1V9IMV5
J	233	GLY	-	expression tag	UNP A0A1V9IMV5
J	234	SER	-	expression tag	UNP A0A1V9IMV5
J	235	GLY	-	expression tag	UNP A0A1V9IMV5
J	236	GLY	-	expression tag	UNP A0A1V9IMV5
J	237	GLY	-	expression tag	UNP A0A1V9IMV5
J	238	SER	-	expression tag	UNP A0A1V9IMV5

- Molecule 4 is water.

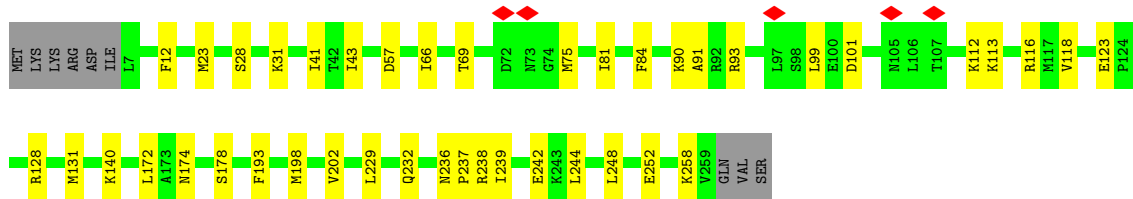
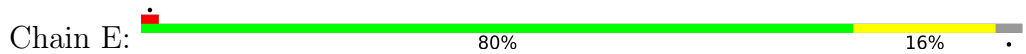
Mol	Chain	Residues	Atoms	AltConf
4	H	1	Total O 1 1	0
4	I	1	Total O 1 1	0



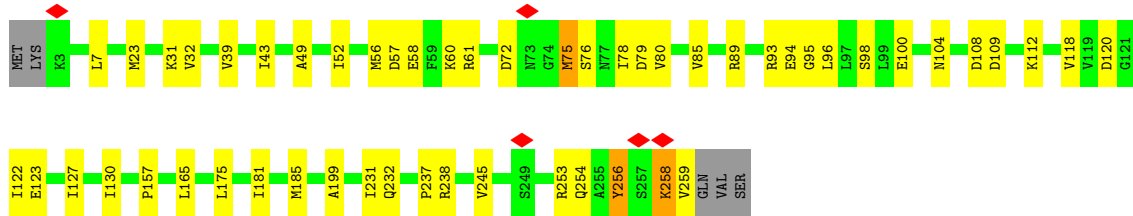
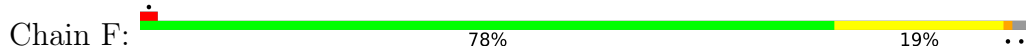
• Molecule 2: Motility protein A



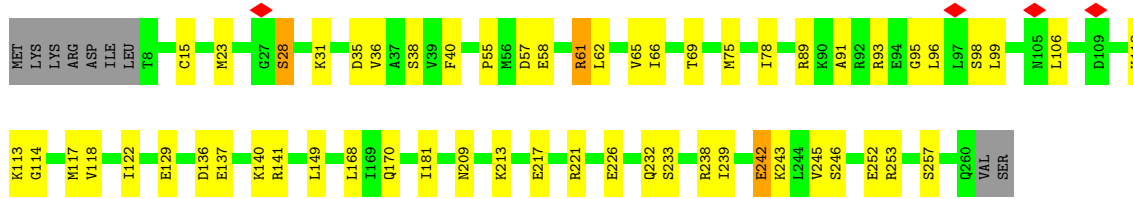
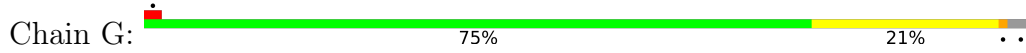
• Molecule 2: Motility protein A



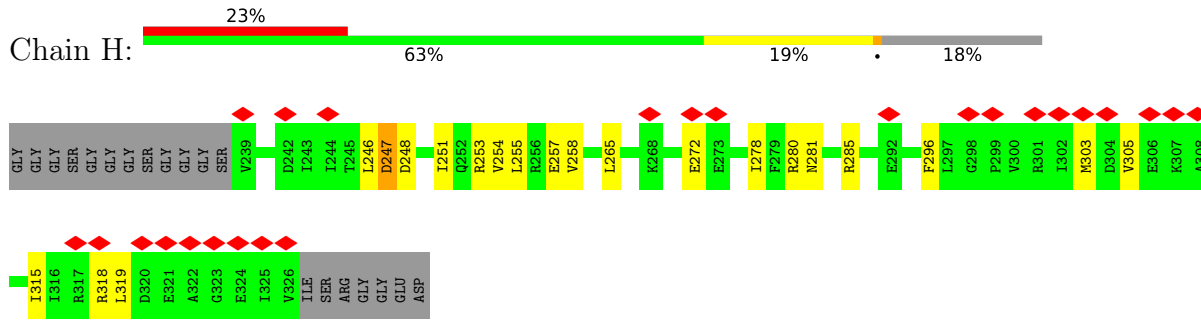
• Molecule 2: Motility protein A



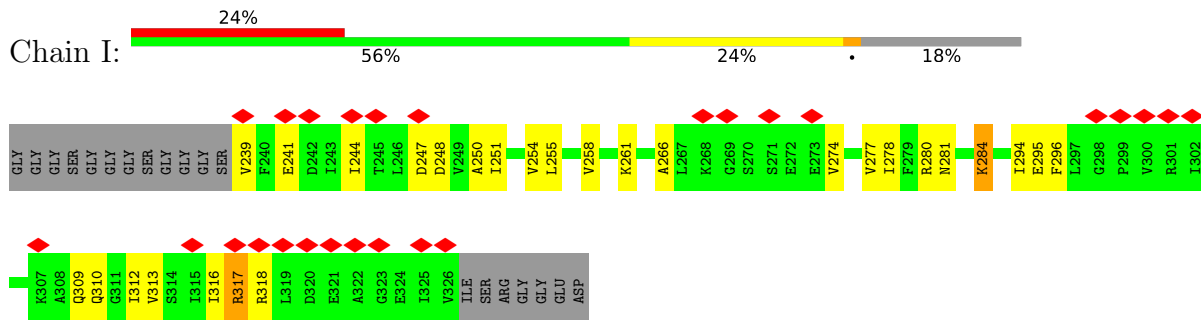
• Molecule 2: Motility protein A



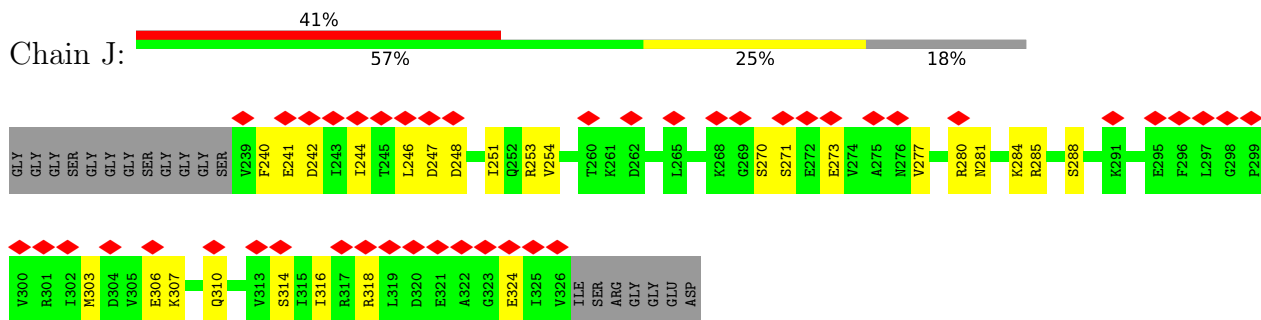
• Molecule 3: Flagellar motor switch protein FliG



• Molecule 3: Flagellar motor switch protein FliG



• Molecule 3: Flagellar motor switch protein FliG



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	719539	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	56.5	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	4.631	Depositor
Minimum map value	-3.092	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.073	Depositor
Recommended contour level	0.3	Depositor
Map size (\AA)	310.46402, 310.46402, 310.46402	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.693, 0.693, 0.693	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.25	0/373	0.40	0/506
1	B	0.25	0/401	0.40	0/543
2	C	0.25	0/1973	0.43	0/2659
2	D	0.25	0/2009	0.44	0/2706
2	E	0.24	0/1973	0.44	0/2659
2	F	0.25	0/2009	0.45	0/2706
2	G	0.24	0/1974	0.43	0/2660
3	H	0.24	0/691	0.53	1/929 (0.1%)
3	I	0.26	0/691	0.51	0/929
3	J	0.25	0/691	0.52	0/929
All	All	0.25	0/12785	0.45	1/17226 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	303	MET	CA-CB-CG	5.06	121.90	113.30

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	362	0	356	16	0
1	B	394	0	384	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	1942	0	1987	34	0
2	D	1978	0	2028	36	0
2	E	1942	0	1987	26	0
2	F	1978	0	2028	34	0
2	G	1943	0	1984	32	0
3	H	688	0	714	13	0
3	I	688	0	714	20	0
3	J	688	0	714	16	0
4	H	1	0	0	0	0
4	I	1	0	0	0	0
All	All	12605	0	12896	198	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 (198) 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:J:253:ARG:HG2	3:J:324:GLU:OE2	1.66	0.93
3:J:246:LEU:HD22	3:J:251:ILE:HB	1.66	0.78
1:A:32:THR:HG23	2:D:168:LEU:HD13	1.70	0.72
2:C:238:ARG:NH2	2:D:120:ASP:OD2	2.24	0.71
2:E:113:LYS:NZ	2:E:131:MET:SD	2.66	0.69
2:F:89:ARG:HG3	2:F:237:PRO:HG2	1.74	0.68
2:F:56:MET:HG3	2:F:60:LYS:NZ	2.09	0.68
2:D:211:MET:HA	2:D:211:MET:HE2	1.77	0.67
2:E:43:ILE:HD11	2:E:198:MET:HG3	1.76	0.67
3:H:253:ARG:NH1	3:H:253:ARG:O	2.27	0.66
3:H:257:GLU:N	3:H:257:GLU:OE1	2.30	0.65
1:A:35:ILE:HD11	2:C:182:ALA:HA	1.77	0.65
2:C:113:LYS:HE2	2:G:242:GLU:HG2	1.81	0.63
2:E:81:ILE:HD12	2:E:244:LEU:CB	2.29	0.63
3:I:309:GLN:O	3:I:313:VAL:HG12	1.99	0.63
2:F:93:ARG:HG2	2:F:94:GLU:HG3	1.81	0.62
3:H:258:VAL:HG12	3:H:315:ILE:HD12	1.81	0.62
3:J:246:LEU:CD2	3:J:251:ILE:HB	2.30	0.62
3:H:251:ILE:HB	3:H:281:ASN:HD22	1.64	0.62
1:B:29:LEU:HD13	2:G:168:LEU:HD11	1.82	0.61
2:E:236:ASN:HB3	2:E:239:ILE:HG12	1.82	0.60
2:C:8:THR:HG23	2:D:52:ILE:HG23	1.84	0.59
2:E:81:ILE:HD12	2:E:244:LEU:HB2	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:310:GLN:HA	3:I:313:VAL:HG12	1.83	0.59
2:E:81:ILE:CD1	2:E:244:LEU:HB2	2.33	0.58
2:C:43:ILE:HD11	2:C:198:MET:HG3	1.86	0.58
1:A:32:THR:CG2	2:D:185:MET:SD	2.92	0.57
3:J:248:ASP:OD1	3:J:281:ASN:ND2	2.37	0.57
3:I:274:VAL:O	3:I:277:VAL:HG12	2.04	0.57
1:A:32:THR:HG21	2:D:185:MET:SD	2.44	0.57
2:D:49:ALA:HA	2:D:52:ILE:HD12	1.87	0.57
2:G:137:GLU:OE1	2:G:141:ARG:NH1	2.38	0.57
2:C:170:GLN:NE2	2:G:23:MET:O	2.37	0.56
2:F:49:ALA:HA	2:F:52:ILE:HD12	1.87	0.56
2:G:117:MET:HB3	2:G:122:ILE:HD13	1.87	0.56
2:E:91:ALA:HB2	2:E:99:LEU:HD11	1.87	0.56
2:C:12:PHE:HZ	2:C:206:MET:HG2	1.71	0.56
3:H:246:LEU:HB2	3:H:251:ILE:HD11	1.86	0.56
2:G:58:GLU:OE1	2:G:61:ARG:NH2	2.36	0.56
1:A:27:ILE:HG22	1:B:27:ILE:HG22	1.88	0.55
2:E:90:LYS:HD3	2:E:90:LYS:N	2.19	0.55
2:C:129:GLU:OE2	2:G:243:LYS:NZ	2.30	0.55
1:B:33:PHE:HE1	2:G:181:ILE:HG22	1.70	0.55
2:F:122:ILE:O	2:F:232:GLN:NE2	2.40	0.55
3:J:303:MET:O	3:J:307:LYS:NZ	2.38	0.55
2:C:123:GLU:HG2	2:C:126:THR:HG22	1.88	0.55
2:D:118:VAL:HG22	2:D:232:GLN:HB2	1.89	0.55
3:I:247:ASP:OD1	3:I:250:ALA:CB	2.55	0.55
2:F:75:MET:HG3	2:F:79:ASP:HB3	1.89	0.55
3:H:247:ASP:OD1	3:H:247:ASP:N	2.35	0.55
2:D:123:GLU:OE2	2:D:123:GLU:N	2.32	0.54
2:C:68:GLN:HA	2:C:71:LYS:HE3	1.89	0.54
1:B:48:PHE:CD2	2:E:178:SER:HB2	2.42	0.54
2:C:91:ALA:HB2	2:C:99:LEU:HD11	1.89	0.53
2:F:253:ARG:O	2:F:253:ARG:NH1	2.39	0.53
2:G:66:ILE:HD11	2:G:149:LEU:HD11	1.91	0.53
2:C:8:THR:HA	2:D:52:ILE:HA	1.91	0.53
2:D:89:ARG:HG2	2:D:237:PRO:HG2	1.91	0.53
2:F:100:GLU:O	2:F:104:ASN:ND2	2.42	0.53
2:F:39:VAL:HA	2:F:43:ILE:HD12	1.90	0.52
2:G:95:GLY:O	2:G:98:SER:OG	2.26	0.52
2:C:253:ARG:NH2	2:D:134:GLU:OE1	2.42	0.52
2:E:112:LYS:HE2	2:E:116:ARG:HH21	1.74	0.52
3:H:255:LEU:HD21	3:H:278:ILE:HG23	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:247:ASP:OD1	3:I:250:ALA:HB3	2.09	0.52
3:I:277:VAL:O	3:I:281:ASN:ND2	2.41	0.52
2:E:248:LEU:HB3	2:E:252:GLU:HB2	1.92	0.52
2:G:78:ILE:HD11	2:G:252:GLU:HB3	1.92	0.52
2:D:123:GLU:H	2:D:123:GLU:CD	2.13	0.52
2:F:123:GLU:H	2:F:123:GLU:CD	2.14	0.51
2:C:171:MET:HE1	2:C:181:ILE:HG23	1.93	0.51
3:J:306:GLU:OE2	3:J:306:GLU:N	2.30	0.51
2:D:56:MET:HG3	2:D:60:LYS:HE3	1.91	0.51
2:C:81:ILE:HD13	2:C:244:LEU:HB3	1.92	0.51
3:J:246:LEU:HD23	3:J:247:ASP:O	2.11	0.51
2:C:122:ILE:HD12	2:G:239:ILE:HD11	1.92	0.51
2:D:55:PRO:HG2	2:D:58:GLU:HG3	1.93	0.51
2:E:118:VAL:HG22	2:E:232:GLN:HB2	1.92	0.51
3:J:314:SER:OG	3:J:318:ARG:NH2	2.43	0.51
3:I:258:VAL:HG21	3:I:312:ILE:HG23	1.93	0.51
2:E:101:ASP:N	2:E:101:ASP:OD1	2.35	0.50
1:A:31:LEU:HD13	1:B:31:LEU:HA	1.94	0.50
2:F:95:GLY:O	2:F:98:SER:OG	2.27	0.50
1:A:60:THR:HG22	2:F:32:VAL:HG12	1.92	0.50
2:D:157:PRO:HD3	2:D:199:ALA:HB2	1.93	0.50
2:C:209:ASN:HB2	2:D:53:THR:HA	1.93	0.50
2:G:106:LEU:HB2	2:G:112:LYS:HG2	1.93	0.49
2:F:58:GLU:OE1	2:F:61:ARG:NH2	2.39	0.49
1:A:36:LEU:O	1:A:39:SER:OG	2.30	0.49
1:A:55:MET:O	1:A:59:MET:HG3	2.13	0.49
2:D:175:LEU:HA	2:D:181:ILE:HD11	1.94	0.49
2:G:91:ALA:HB2	2:G:99:LEU:HD11	1.94	0.49
1:A:33[A]:PHE:CE1	2:E:172:LEU:HD13	2.47	0.49
1:B:39:SER:HB2	2:F:181:ILE:HD13	1.94	0.49
3:I:310:GLN:HA	3:I:313:VAL:CG1	2.43	0.49
2:D:185:MET:HG2	2:E:172:LEU:HD21	1.95	0.48
3:H:265:LEU:HG	3:H:305:VAL:HG22	1.96	0.48
3:J:254:VAL:HG21	3:J:316:ILE:HG12	1.96	0.48
2:D:23:MET:O	2:D:28:SER:OG	2.31	0.48
2:F:78:ILE:HG12	2:F:256:TYR:HB3	1.95	0.48
3:H:251:ILE:HA	3:H:254:VAL:HG22	1.95	0.48
2:D:236:ASN:ND2	2:D:238:ARG:HG2	2.29	0.48
2:C:238:ARG:HH12	2:D:117:MET:HG2	1.79	0.47
2:G:55:PRO:HG2	2:G:58:GLU:HG2	1.96	0.47
3:I:317:ARG:HB3	3:I:317:ARG:CZ	2.43	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:141:ARG:NH2	2:G:246:SER:O	2.48	0.47
2:G:233:SER:O	2:G:233:SER:OG	2.31	0.47
2:D:233:SER:O	2:D:233:SER:OG	2.29	0.47
2:F:76:SER:O	2:F:80:VAL:HG23	2.14	0.47
1:B:60:THR:O	1:B:60:THR:OG1	2.31	0.47
2:G:35:ASP:HB3	2:G:38:SER:HB2	1.97	0.47
2:F:96:LEU:HD21	2:F:231:ILE:HG22	1.95	0.47
3:J:284:LYS:HA	3:J:284:LYS:HD3	1.69	0.47
2:C:149:LEU:HD13	2:C:206:MET:HB3	1.97	0.47
3:H:315:ILE:O	3:H:318:ARG:HG3	2.15	0.47
2:C:7:LEU:HB2	2:C:10:ILE:HG22	1.97	0.46
2:D:70:PHE:CZ	2:D:210:LEU:HD13	2.51	0.46
2:E:12:PHE:HE1	2:E:202:VAL:HA	1.79	0.46
2:F:122:ILE:HG22	2:F:127:ILE:HG13	1.98	0.46
2:C:246:SER:HA	2:C:253:ARG:HH21	1.80	0.46
2:D:239:ILE:O	2:D:243:LYS:HG2	2.14	0.46
2:F:245:VAL:HG11	2:F:256:TYR:OH	2.14	0.46
3:I:284:LYS:N	3:I:284:LYS:HD2	2.31	0.46
2:D:120:ASP:OD1	3:J:285:ARG:NH1	2.47	0.46
2:D:76:SER:OG	2:D:77:ASN:N	2.49	0.46
2:G:62:LEU:HA	2:G:65:VAL:HG22	1.98	0.46
3:J:303:MET:HG2	3:J:307:LYS:HZ1	1.80	0.46
2:F:7:LEU:HD12	2:F:7:LEU:HA	1.81	0.45
3:I:239:VAL:HG23	3:I:241:GLU:H	1.81	0.45
1:A:41:SER:HB3	1:B:41:SER:HB3	1.97	0.45
2:C:10:ILE:HD12	2:C:10:ILE:HA	1.84	0.45
2:E:23:MET:O	2:E:28:SER:OG	2.34	0.45
2:G:245:VAL:HG13	2:G:253:ARG:HG2	1.99	0.45
2:C:123:GLU:OE1	2:C:123:GLU:N	2.31	0.45
3:I:266:ALA:HB1	3:I:309:GLN:HG2	1.98	0.45
3:J:270:SER:OG	3:J:271:SER:N	2.49	0.45
2:D:111:MET:HG3	2:D:224:VAL:HG13	1.99	0.45
2:E:93:ARG:HD3	3:H:296:PHE:CG	2.52	0.45
3:I:254:VAL:HG11	3:I:316:ILE:HG22	1.99	0.45
2:G:114:GLY:HA2	2:G:117:MET:HE2	1.99	0.45
3:J:280:ARG:HG3	3:J:281:ASN:ND2	2.31	0.45
2:F:118:VAL:HG13	2:F:232:GLN:HG3	1.99	0.44
2:F:175:LEU:HD12	2:F:181:ILE:HG12	1.98	0.44
2:G:89:ARG:O	2:G:93:ARG:HG2	2.17	0.44
2:F:56:MET:HG3	2:F:60:LYS:HZ1	1.83	0.44
2:C:58:GLU:OE1	2:C:61:ARG:NH2	2.41	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:170:GLN:HG2	2:G:28:SER:HB3	1.99	0.44
2:E:242:GLU:HG3	2:F:130:ILE:HD13	1.98	0.44
2:G:93:ARG:HD2	3:I:296:PHE:HB3	1.99	0.44
3:H:315:ILE:O	3:H:319:LEU:HG	2.18	0.44
2:D:75:MET:SD	2:D:75:MET:N	2.91	0.44
3:I:251:ILE:HD13	3:I:277:VAL:HG22	2.00	0.44
1:A:17:ASP:HB2	1:A:20:LEU:HD12	2.00	0.44
2:D:61:ARG:NH1	2:D:61:ARG:HB3	2.32	0.44
2:D:128:ARG:NH1	2:D:132:GLU:OE2	2.50	0.44
2:E:128:ARG:HH21	2:E:229:LEU:HD12	1.82	0.44
2:F:108:ASP:O	2:F:112:LYS:HG3	2.18	0.44
2:F:254:GLN:H	2:F:254:GLN:CD	2.20	0.44
3:I:294:ILE:HG13	3:I:295:GLU:N	2.32	0.43
1:A:48:PHE:HE1	2:G:181:ILE:HD11	1.83	0.43
2:F:85:VAL:HB	2:F:237:PRO:HB3	2.01	0.43
2:G:113:LYS:O	2:G:117:MET:HG3	2.18	0.43
2:C:112:LYS:HE3	2:C:112:LYS:HB2	1.80	0.43
2:F:120:ASP:OD1	3:H:285:ARG:NH2	2.36	0.43
2:G:217:GLU:O	2:G:221:ARG:HG2	2.19	0.43
1:A:32:THR:HG22	2:D:185:MET:SD	2.59	0.43
2:F:157:PRO:HD3	2:F:199:ALA:HB2	2.00	0.43
3:I:255:LEU:HD23	3:I:255:LEU:HA	1.80	0.43
3:I:248:ASP:OD1	3:I:280:ARG:NH1	2.51	0.43
2:C:53:THR:HA	2:G:209:ASN:HB2	2.01	0.43
2:E:123:GLU:HG3	2:E:125:GLU:H	1.83	0.43
2:C:243:LYS:O	2:C:246:SER:OG	2.35	0.42
2:G:36:VAL:HG12	2:G:40:PHE:CE2	2.54	0.42
1:A:18:GLU:H	1:A:18:GLU:HG2	1.64	0.42
1:B:32:THR:HG22	2:F:185:MET:SD	2.58	0.42
3:I:255:LEU:HD21	3:I:278:ILE:HD12	2.00	0.42
2:C:50:MET:HE1	2:C:148:MET:HG2	2.02	0.42
2:F:258:LYS:HD2	2:F:259:VAL:HG12	2.02	0.42
2:D:197:LEU:HD23	2:D:197:LEU:HA	1.95	0.41
2:E:123:GLU:HG3	2:E:125:GLU:N	2.34	0.41
2:D:245:VAL:HA	2:D:248:LEU:HG	2.02	0.41
2:F:23:MET:O	2:G:170:GLN:NE2	2.50	0.41
2:F:75:MET:HE3	2:F:80:VAL:HA	2.02	0.41
2:C:81:ILE:CD1	2:C:244:LEU:HB3	2.51	0.41
2:E:66:ILE:O	2:E:69:THR:HG22	2.19	0.41
3:J:242:ASP:OD1	3:J:242:ASP:N	2.53	0.41
3:I:244:ILE:HD11	3:I:274:VAL:HG22	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:G:69:THR:HA	2:G:213:LYS:HE2	2.03	0.41
2:E:193:PHE:HA	2:F:165:LEU:HD13	2.03	0.40
1:A:29:LEU:HD13	2:D:164:THR:HG23	2.04	0.40
2:E:236:ASN:OD1	2:E:237:PRO:HD2	2.22	0.40
2:C:244:LEU:HD23	2:C:244:LEU:HA	1.86	0.40
3:J:244:ILE:HG13	3:J:277:VAL:HG21	2.03	0.40
2:C:35:ASP:HB3	2:C:38:SER:HB2	2.04	0.40
2:C:49:ALA:HA	2:C:52:ILE:HD12	2.04	0.40
2:D:140:LYS:HB3	2:D:140:LYS:HE2	1.76	0.40
2:E:41:ILE:HD13	2:E:41:ILE:HA	1.94	0.40
2:G:118:VAL:HG13	2:G:232:GLN:HG3	2.03	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	44/290 (15%)	43 (98%)	1 (2%)	0	100	100
1	B	48/290 (17%)	48 (100%)	0	0	100	100
2	C	251/262 (96%)	243 (97%)	8 (3%)	0	100	100
2	D	255/262 (97%)	248 (97%)	7 (3%)	0	100	100
2	E	251/262 (96%)	240 (96%)	11 (4%)	0	100	100
2	F	255/262 (97%)	249 (98%)	6 (2%)	0	100	100
2	G	251/262 (96%)	245 (98%)	6 (2%)	0	100	100
3	H	86/107 (80%)	81 (94%)	5 (6%)	0	100	100
3	I	86/107 (80%)	85 (99%)	1 (1%)	0	100	100
3	J	86/107 (80%)	82 (95%)	4 (5%)	0	100	100
All	All	1613/2211 (73%)	1564 (97%)	49 (3%)	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	A	40/245 (16%)	38 (95%)	2 (5%)	24	40
1	B	43/245 (18%)	41 (95%)	2 (5%)	26	42
2	C	211/220 (96%)	203 (96%)	8 (4%)	33	51
2	D	215/220 (98%)	211 (98%)	4 (2%)	57	75
2	E	211/220 (96%)	203 (96%)	8 (4%)	33	51
2	F	215/220 (98%)	207 (96%)	8 (4%)	34	53
2	G	211/220 (96%)	197 (93%)	14 (7%)	16	26
3	H	76/84 (90%)	72 (95%)	4 (5%)	22	37
3	I	76/84 (90%)	72 (95%)	4 (5%)	22	37
3	J	76/84 (90%)	71 (93%)	5 (7%)	16	26
All	All	1374/1842 (75%)	1315 (96%)	59 (4%)	33	46

All (59) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	LEU
1	A	55	MET
1	B	15	ARG
1	B	33	PHE
2	C	71	LYS
2	C	72	ASP
2	C	171	MET
2	C	179	SER
2	C	185	MET
2	C	233	SER
2	C	238	ARG
2	C	240	MET
2	D	57	ASP
2	D	75	MET

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Mol	Chain	Res	Type
2	D	100	GLU
2	D	148	MET
2	E	31	LYS
2	E	57	ASP
2	E	75	MET
2	E	84	PHE
2	E	140	LYS
2	E	174	ASN
2	E	238	ARG
2	E	258	LYS
2	F	31	LYS
2	F	57	ASP
2	F	72	ASP
2	F	75	MET
2	F	109	ASP
2	F	238	ARG
2	F	256	TYR
2	F	258	LYS
2	G	15	CYS
2	G	28	SER
2	G	31	LYS
2	G	57	ASP
2	G	61	ARG
2	G	75	MET
2	G	96	LEU
2	G	129	GLU
2	G	136	ASP
2	G	140	LYS
2	G	226	GLU
2	G	238	ARG
2	G	242	GLU
2	G	257	SER
3	H	247	ASP
3	H	248	ASP
3	H	272	GLU
3	H	280	ARG
3	I	261	LYS
3	I	284	LYS
3	I	317	ARG
3	I	318	ARG
3	J	240	PHE
3	J	241	GLU

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Mol	Chain	Res	Type
3	J	273	GLU
3	J	288	SER
3	J	310	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	F	254	GLN
3	J	281	ASN

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](#)

There are no ligands in this entry.

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.

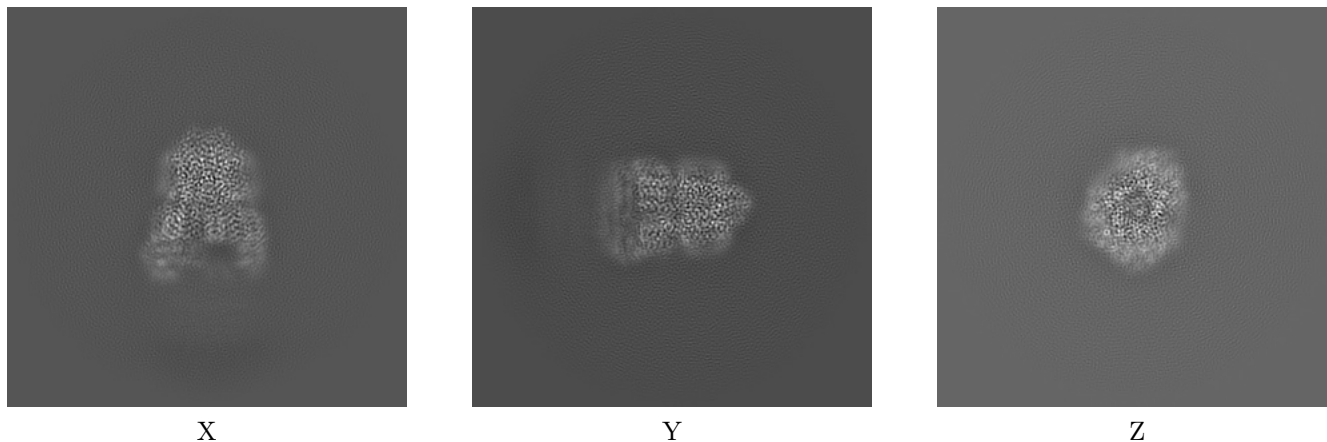
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42139. These allow visual inspection of the internal detail of the map and identification of artifacts.

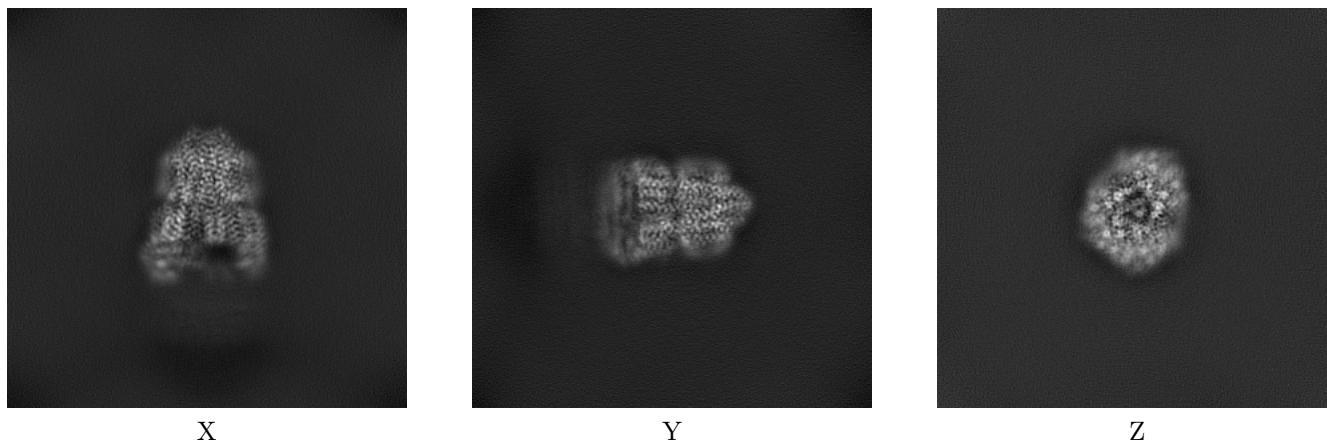
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

6.1.1 Primary map



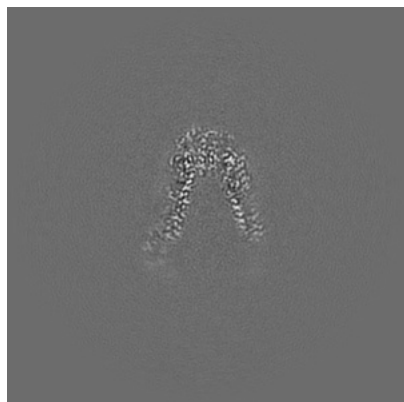
6.1.2 Raw map



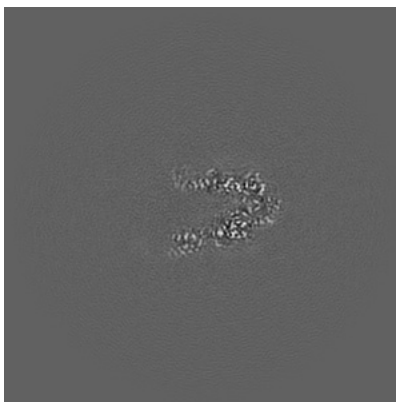
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

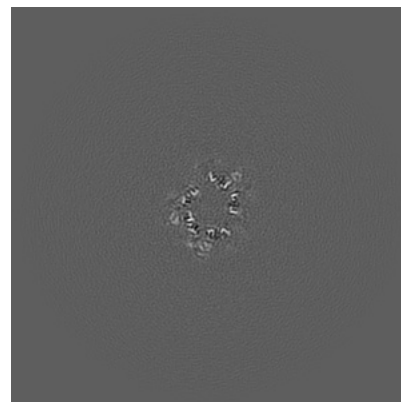
6.2.1 Primary map



X Index: 224

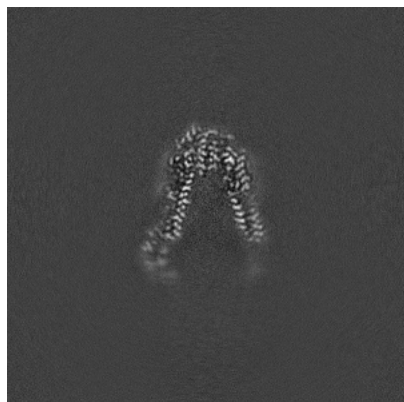


Y Index: 224

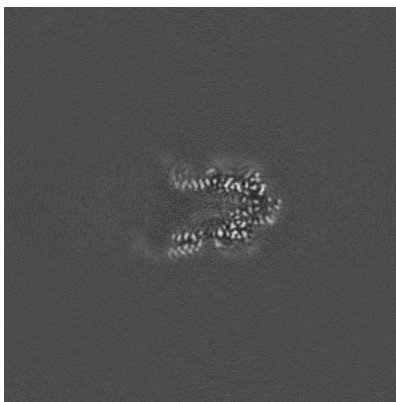


Z Index: 224

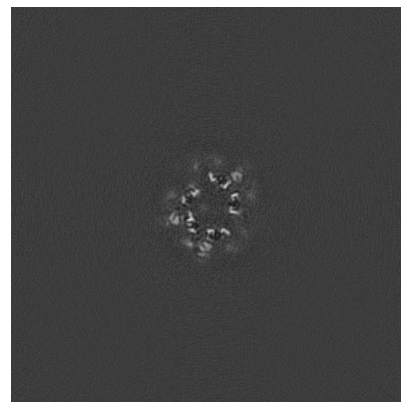
6.2.2 Raw map



X Index: 224



Y Index: 224

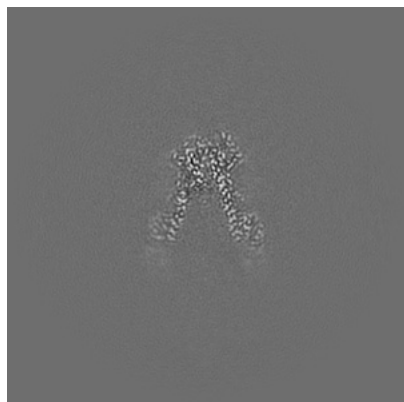


Z Index: 224

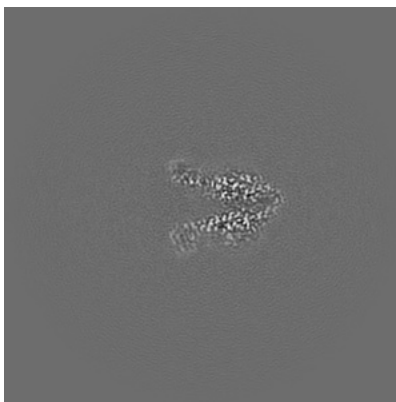
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

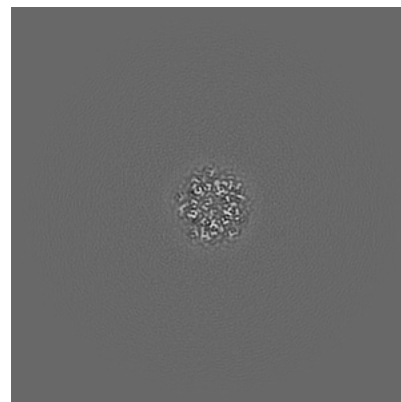
6.3.1 Primary map



X Index: 239



Y Index: 240

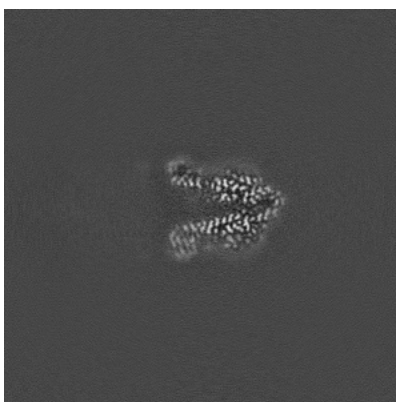


Z Index: 270

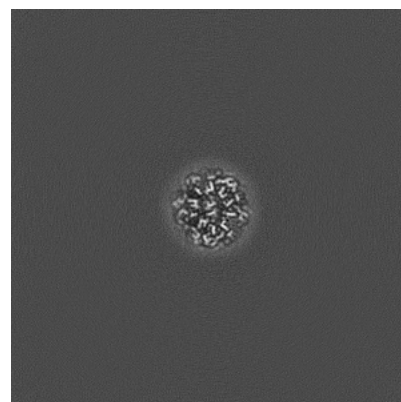
6.3.2 Raw map



X Index: 239



Y Index: 240

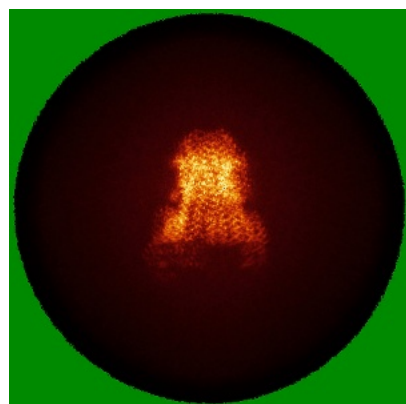


Z Index: 276

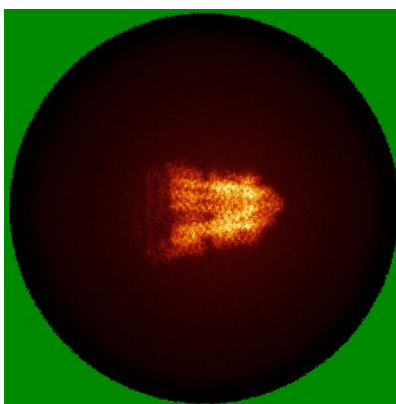
The images above show the largest variance slices of the map in three orthogonal directions.

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

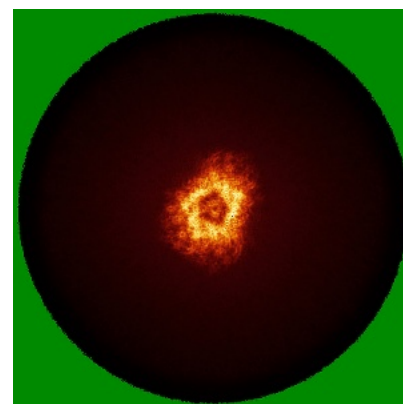
6.4.1 Primary map



X

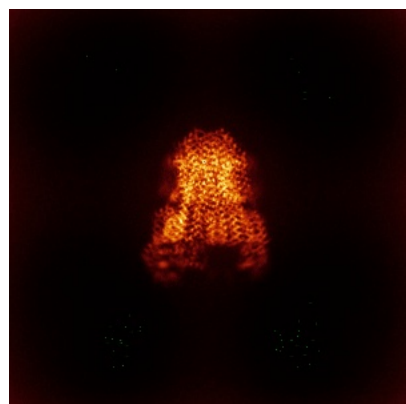


Y

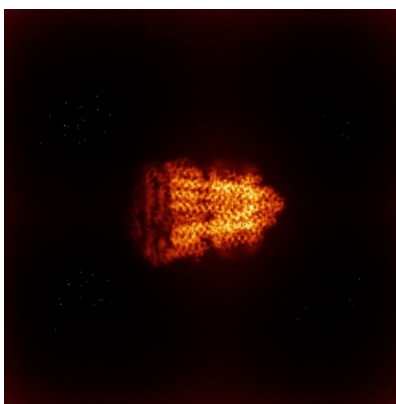


Z

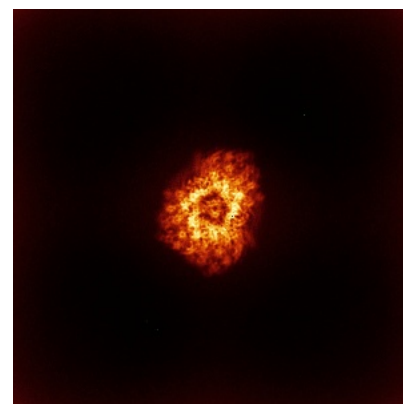
6.4.2 Raw map



X



Y

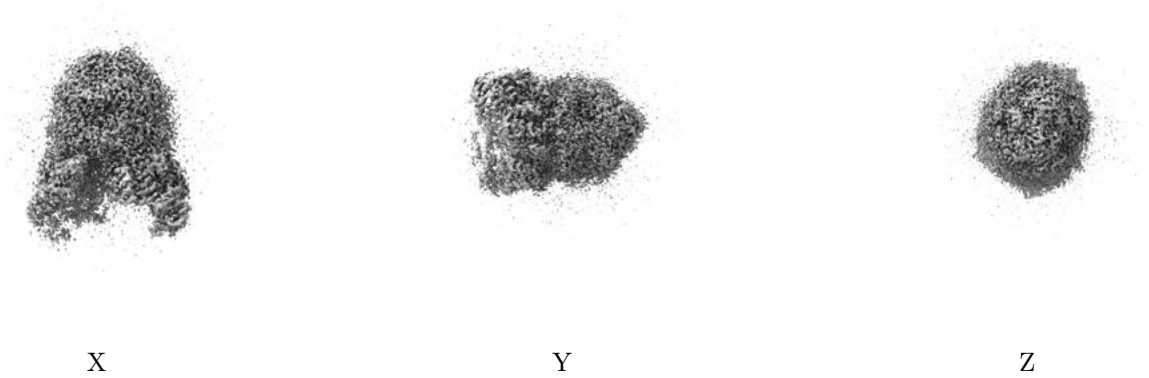


Z

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.

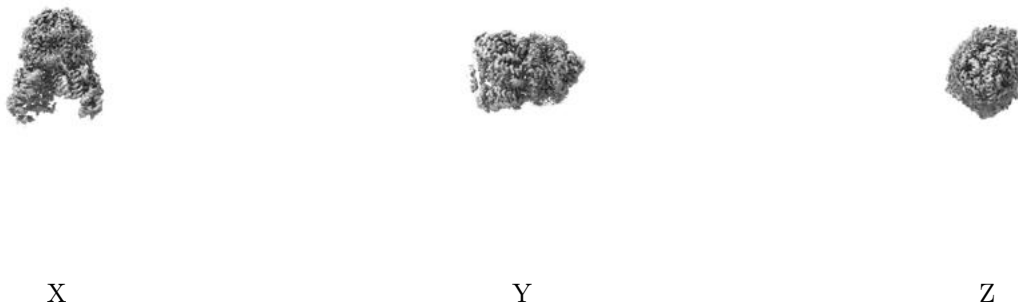
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.3. 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.

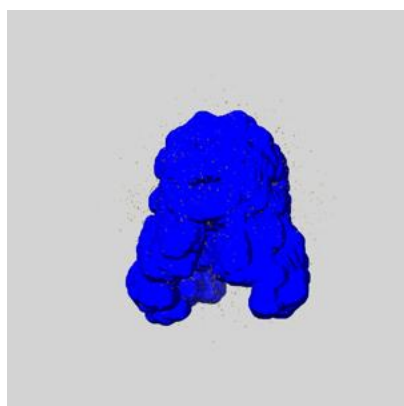
6.6 Mask visualisation [i](#)

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

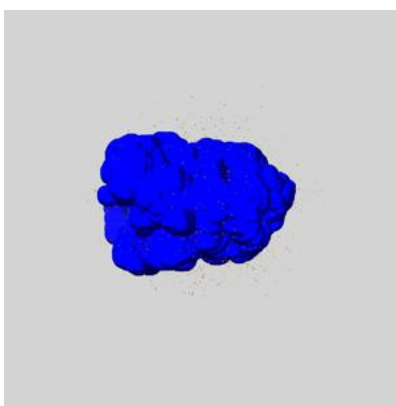
A mask typically either:

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

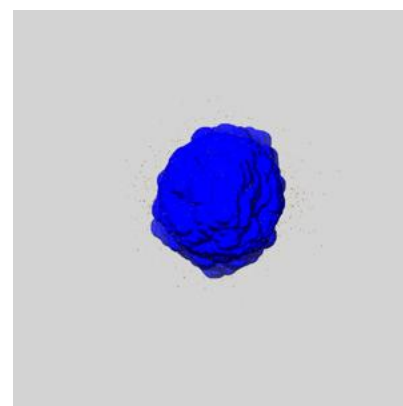
6.6.1 emd_42139_msk_1.map [i](#)



X



Y

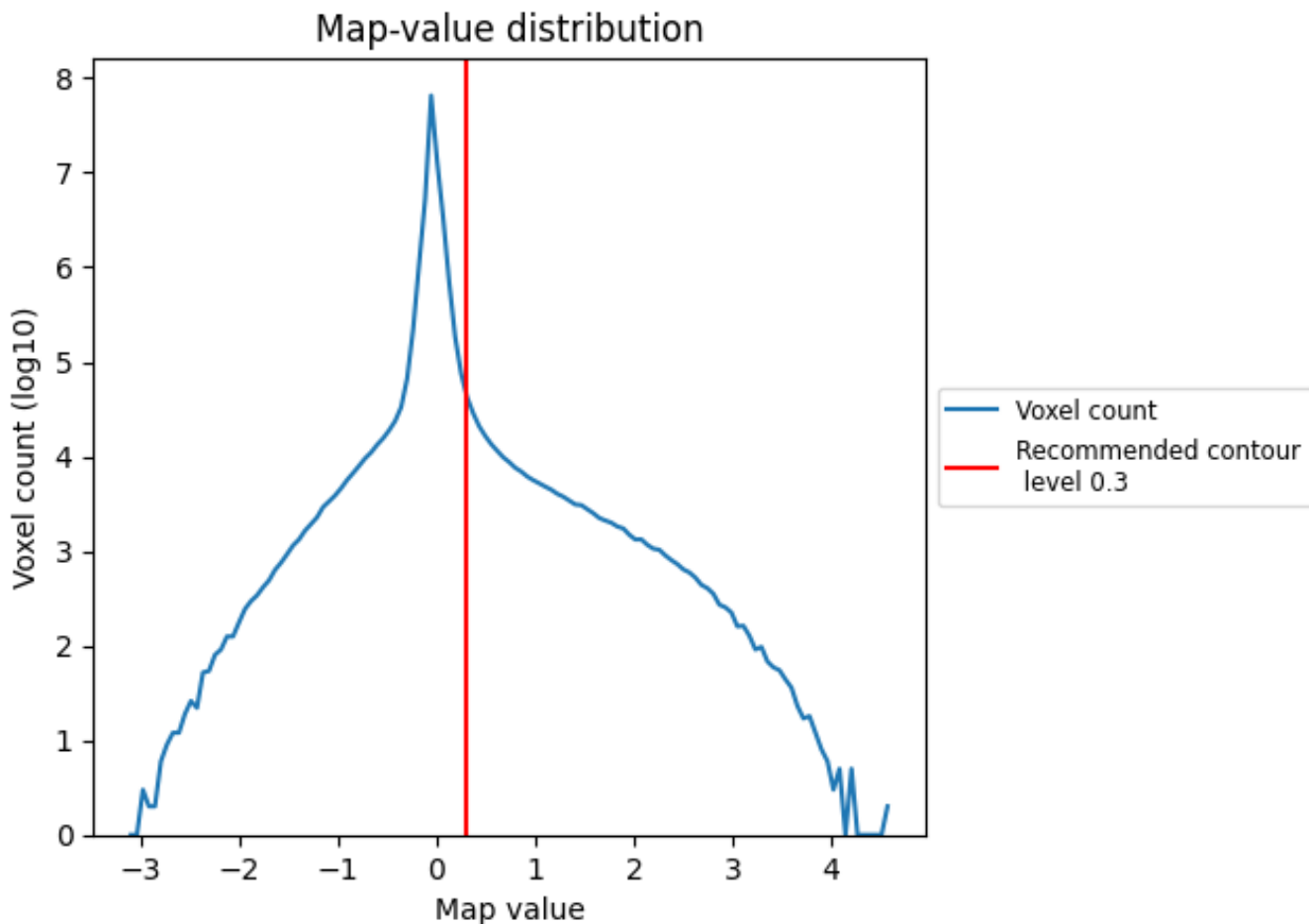


Z

7 Map analysis [i](#)

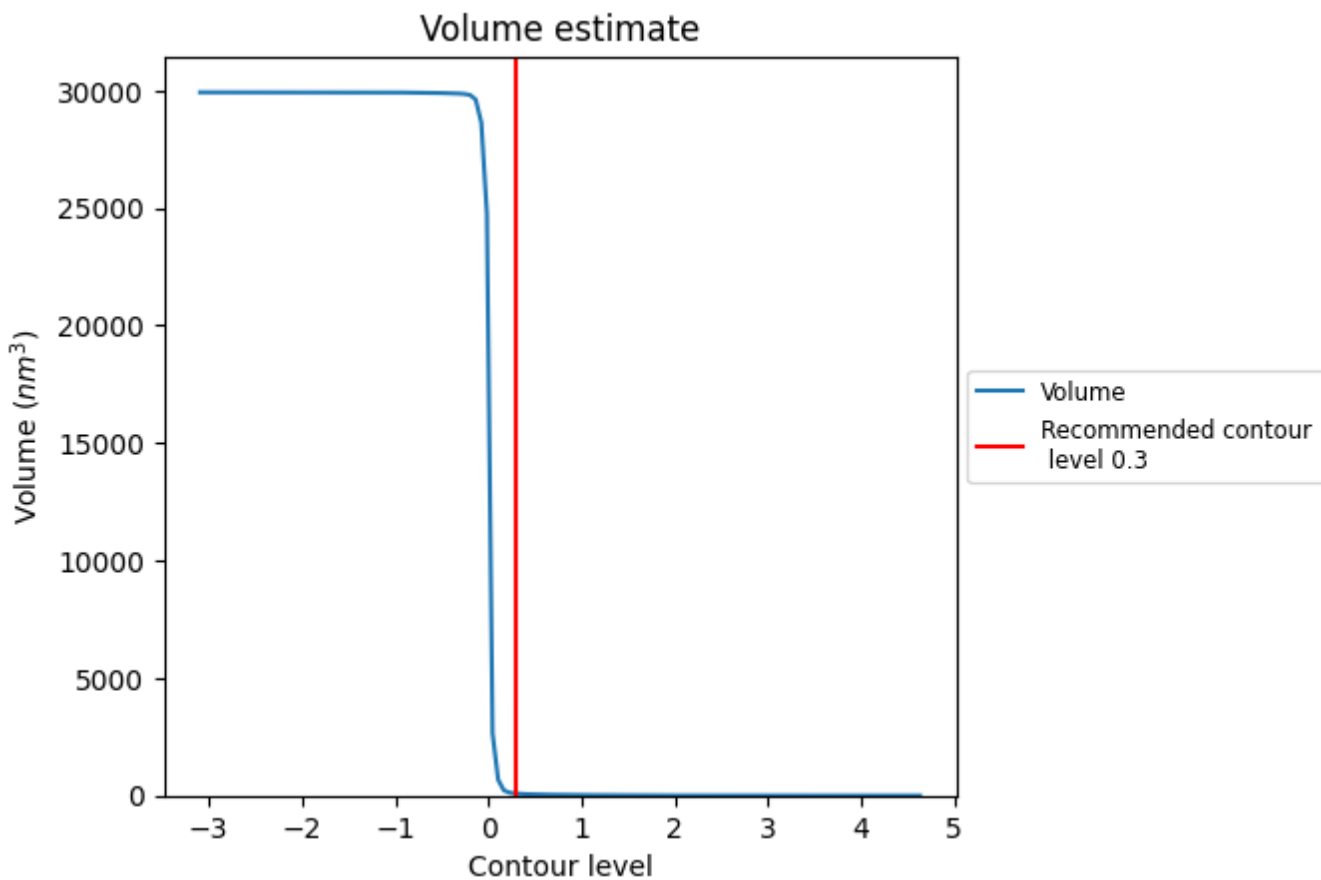
This section contains the results of statistical analysis of the map.

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.

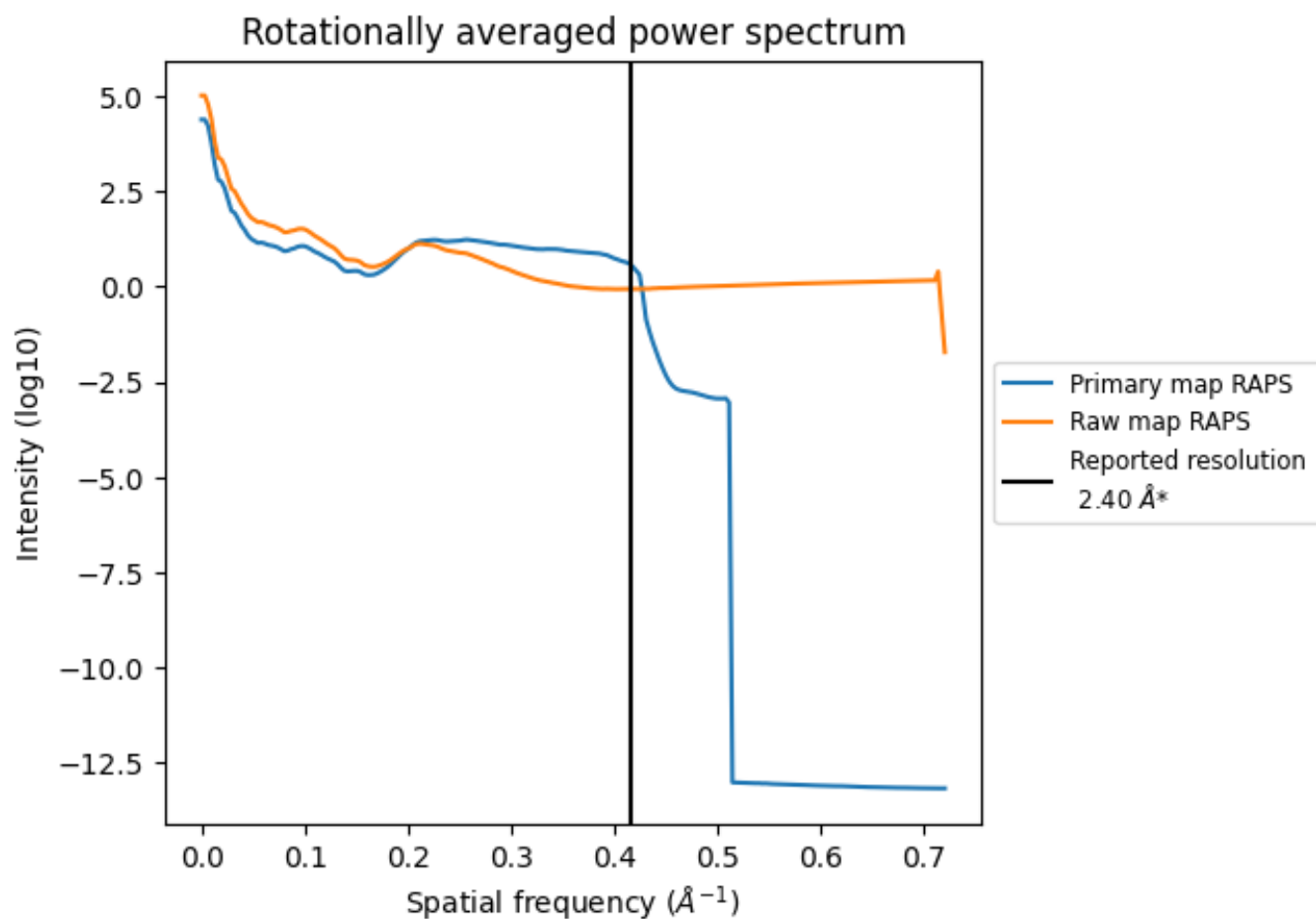
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 85 nm³; this corresponds to an approximate mass of 76 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 [i](#)

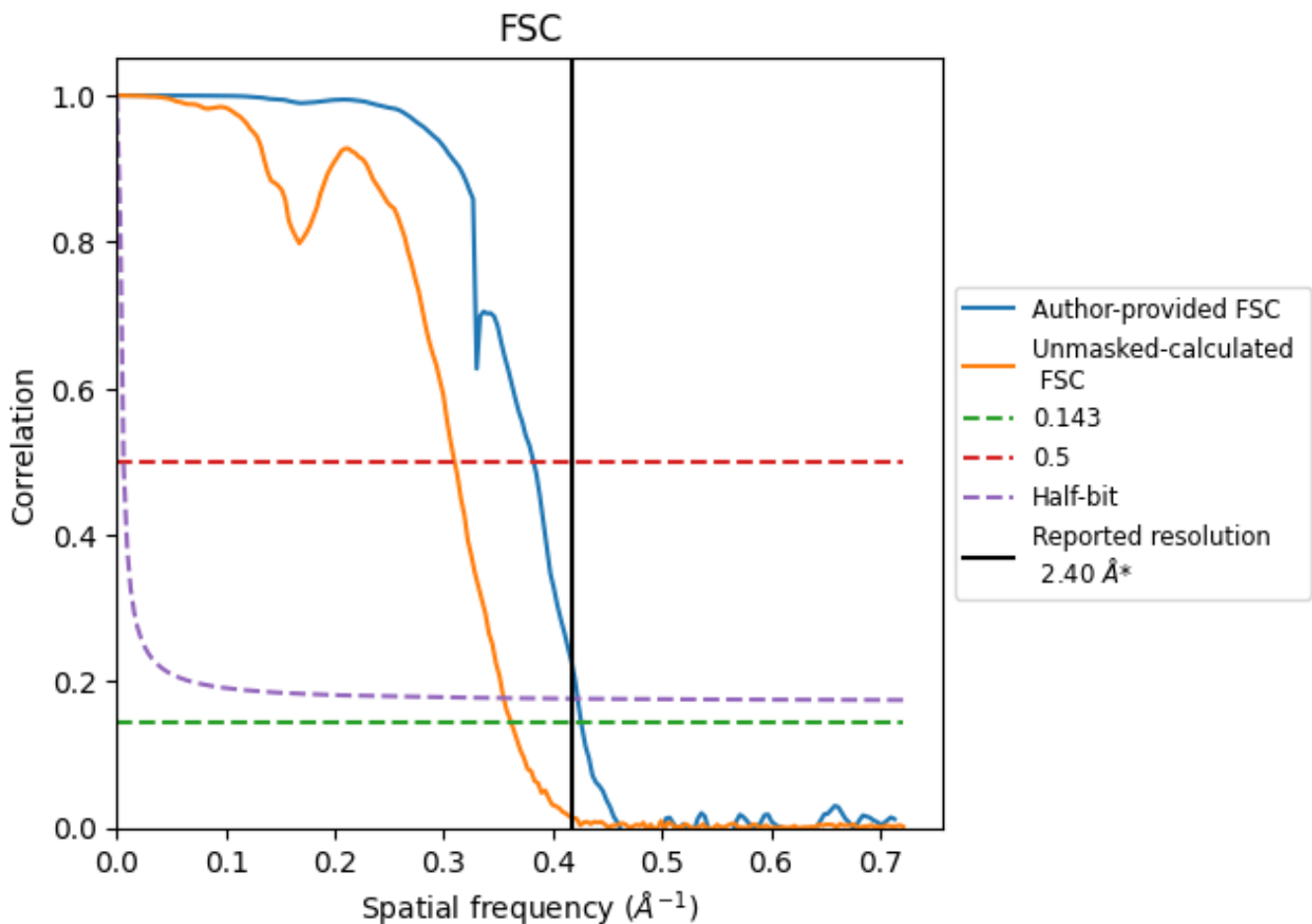


*Reported resolution corresponds to spatial frequency of 0.417 Å⁻¹

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 0.417 Å⁻¹

8.2 Resolution estimates

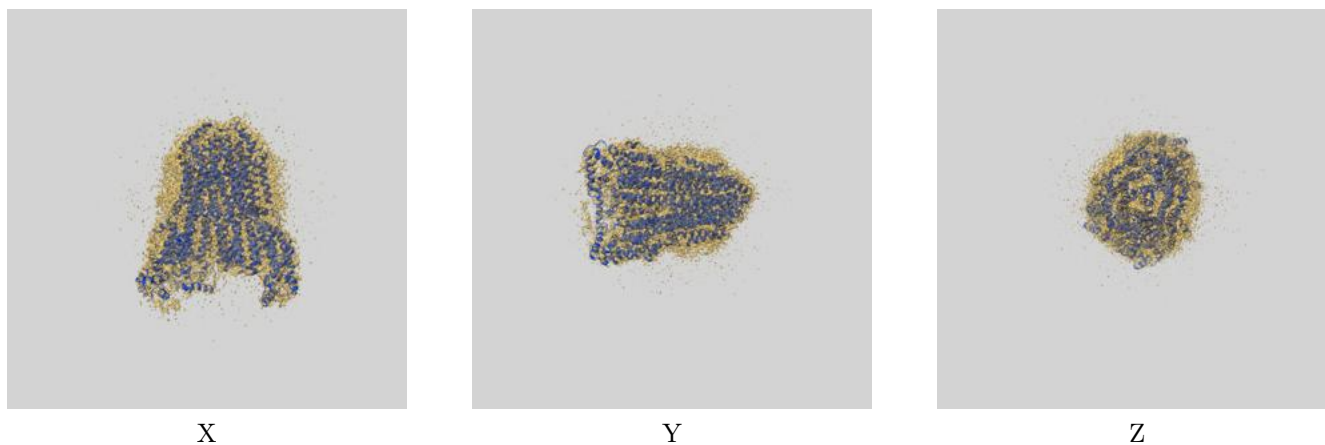
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.40	-	-
Author-provided FSC curve	2.35	2.62	2.37
Unmasked-calculated*	2.76	3.23	2.82

*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 2.76 differs from the reported value 2.4 by more than 10 %

9 Map-model fit [i](#)

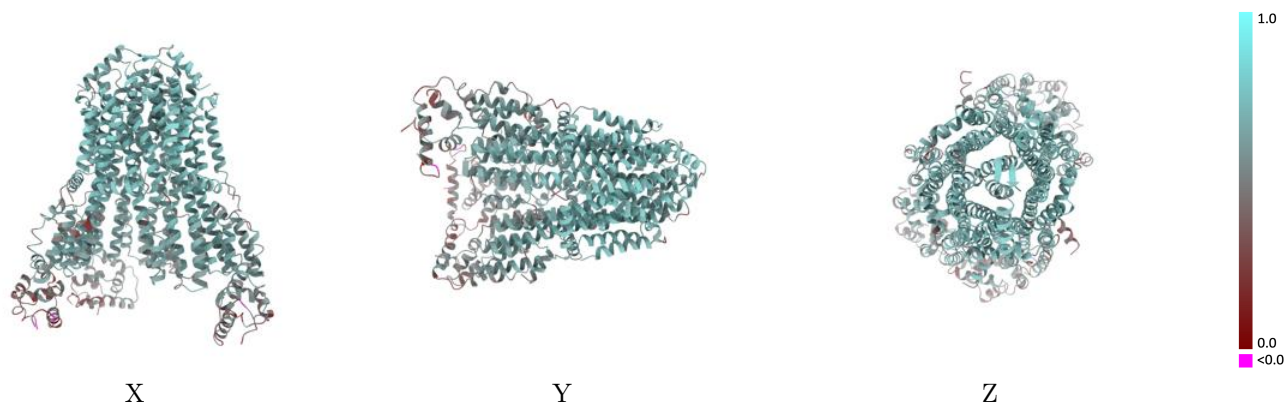
This section contains information regarding the fit between EMDB map EMD-42139 and PDB model 8UCS. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



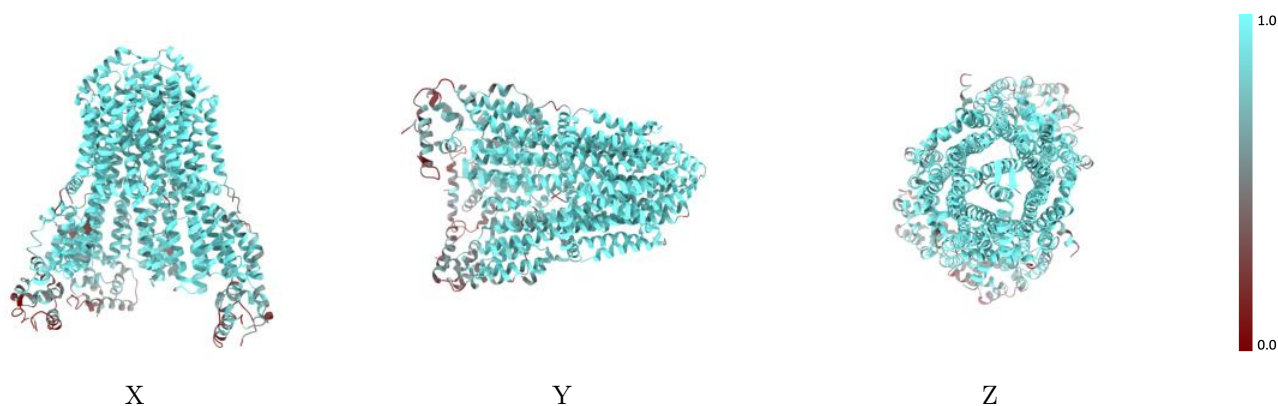
The images above show the 3D surface view of the map at the recommended contour level 0.3 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



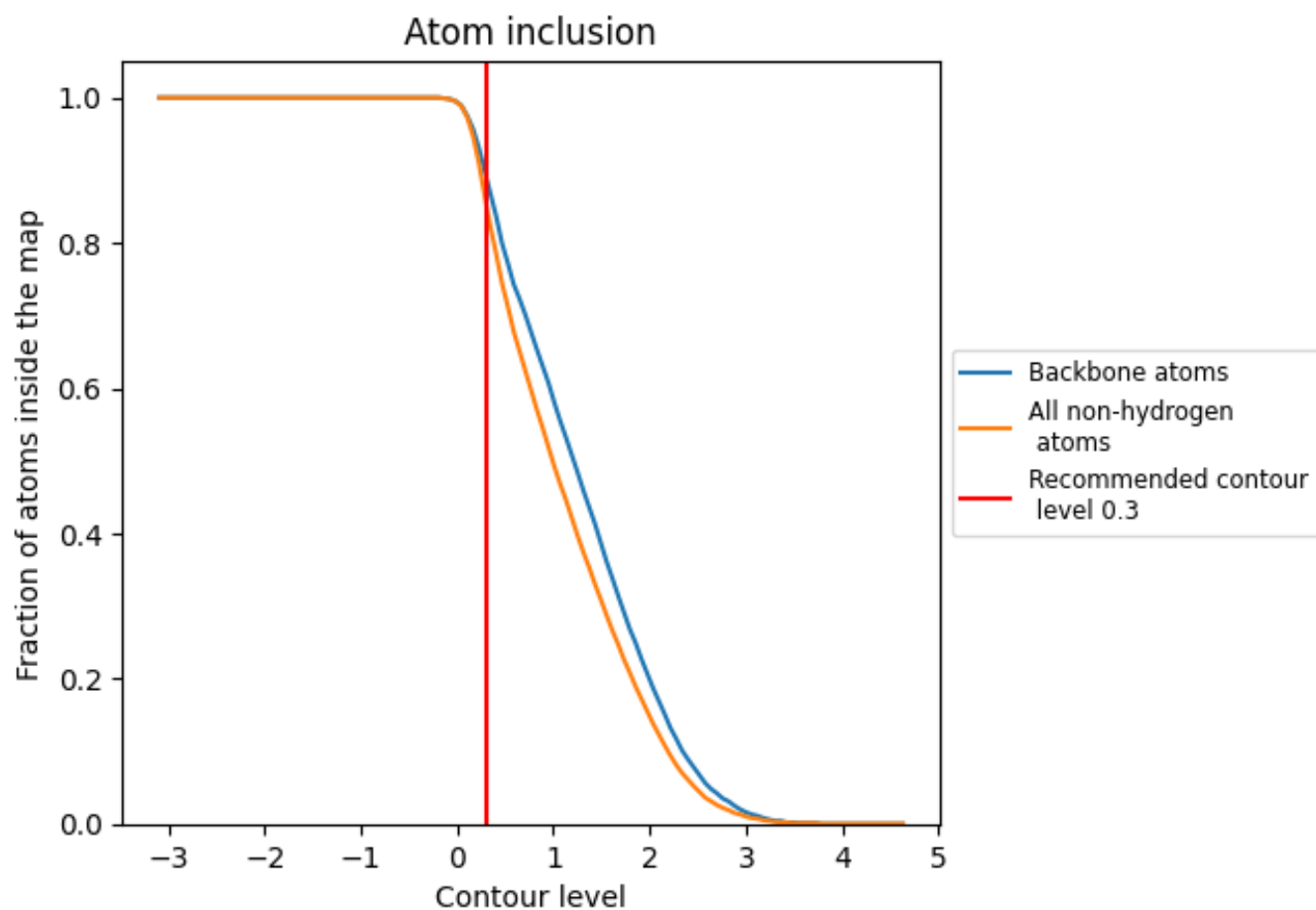
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.3).























9.4 Atom inclusion [i](#)



At the recommended contour level, 89% of all backbone atoms, 86% 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 (0.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8550	 0.6100
A	 0.9350	 0.6520
B	 0.9410	 0.6640
C	 0.9410	 0.6530
D	 0.9140	 0.6370
E	 0.9210	 0.6410
F	 0.9140	 0.6430
G	 0.9160	 0.6430
H	 0.5500	 0.4570
I	 0.5550	 0.4640
J	 0.4320	 0.3870

