



Full wwPDB EM Validation Report ⓘ

Mar 18, 2024 – 12:16 PM EDT

PDB ID : 8VRD
EMDB ID : EMD-43481
Title : Rigid body fitted model for free recombinant gamma tubulin ring complex.
Authors : Aher, A.; Urnavicius, L.; Kapoor, T.M.
Deposited on : 2024-01-21
Resolution : 7.00 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:

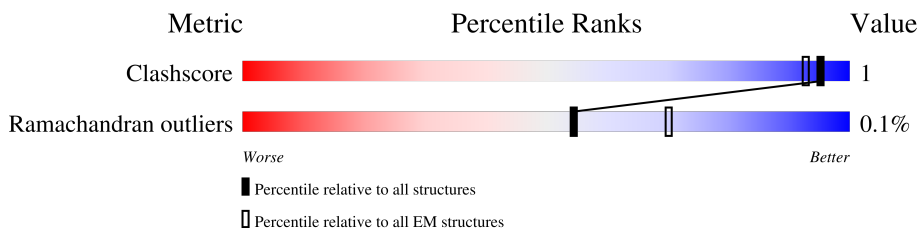
EMDB validation analysis : 0.0.1.dev70
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 7.00 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

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	B	907	
1	D	907	
1	F	907	
1	H	907	
1	N	907	
1	O	907	
2	L	1811	
2	P	1811	
2	T	1811	

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Mol	Chain	Length	Quality of chain
3	Q	82	79% 21%
3	R	82	72% 28%
4	S	375	93% 6%
5	A	930	57% 42%
5	C	930	57% 42%
5	E	930	57% 42%
5	G	930	57% 42%
5	M	930	57% 42%
6	a	457	81% 19%
6	b	457	81% 19%
6	c	457	81% 19%
6	d	457	81% 19%
6	e	457	81% 19%
6	f	457	81% 19%
6	g	457	81% 19%
6	h	457	81% 19%
6	i	457	81% 19%
6	j	457	81% 19%
6	k	457	81% 19%
6	l	457	81% 19%
6	m	457	81% 19%
6	n	457	81% 19%
7	I	666	80% 18%
7	K	666	80% 18%
8	J	1024	47% 53%

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 67053 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 Gamma-tubulin complex component 3.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	O	116	577	345	116	116	0	0
1	B	572	2840	1696	572	572	0	0
1	D	572	2840	1696	572	572	0	0
1	F	572	2840	1696	572	572	0	0
1	H	572	2840	1696	572	572	0	0
1	N	572	2840	1696	572	572	0	0

- Molecule 2 is a protein called TUBGCP6 protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	P	158	779	463	158	158	0	0
2	L	198	978	582	198	198	0	0
2	T	297	1476	882	297	297	0	0

- Molecule 3 is a protein called Mitotic-spindle organizing protein 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	Q	65	323	193	65	65	0	0
3	R	59	293	175	59	59	0	0

- Molecule 4 is a protein called Actin, cytoplasmic 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	S	354	1745	1037	354	354	0	0

- Molecule 5 is a protein called Isoform 3 of Gamma-tubulin complex component 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	A	539	2676	1598	539	539	0	0
5	C	539	2676	1598	539	539	0	0
5	E	539	2676	1598	539	539	0	0
5	G	539	2676	1598	539	539	0	0
5	M	539	2676	1598	539	539	0	0

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	209	GLY	ARG	conflict	UNP Q9BSJ2
A	211	SER	ASN	conflict	UNP Q9BSJ2
A	229	GLY	ASN	conflict	UNP Q9BSJ2
C	209	GLY	ARG	conflict	UNP Q9BSJ2
C	211	SER	ASN	conflict	UNP Q9BSJ2
C	229	GLY	ASN	conflict	UNP Q9BSJ2
E	209	GLY	ARG	conflict	UNP Q9BSJ2
E	211	SER	ASN	conflict	UNP Q9BSJ2
E	229	GLY	ASN	conflict	UNP Q9BSJ2
G	209	GLY	ARG	conflict	UNP Q9BSJ2
G	211	SER	ASN	conflict	UNP Q9BSJ2
G	229	GLY	ASN	conflict	UNP Q9BSJ2
M	209	GLY	ARG	conflict	UNP Q9BSJ2
M	211	SER	ASN	conflict	UNP Q9BSJ2
M	229	GLY	ASN	conflict	UNP Q9BSJ2

- Molecule 6 is a protein called Tubulin gamma-1 chain.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
6	a	368	1820	1084	368	368	0	0
6	b	368	1820	1084	368	368	0	0

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Mol	Chain	Residues	Atoms				AltConf	Trace
6	c	368	Total 1820	C 1084	N 368	O 368	0	0
6	d	368	Total 1820	C 1084	N 368	O 368	0	0
6	e	368	Total 1820	C 1084	N 368	O 368	0	0
6	f	368	Total 1820	C 1084	N 368	O 368	0	0
6	g	368	Total 1820	C 1084	N 368	O 368	0	0
6	h	368	Total 1820	C 1084	N 368	O 368	0	0
6	i	368	Total 1820	C 1084	N 368	O 368	0	0
6	j	368	Total 1820	C 1084	N 368	O 368	0	0
6	k	369	Total 1824	C 1086	N 369	O 369	0	0
6	l	369	Total 1824	C 1086	N 369	O 369	0	0
6	m	368	Total 1820	C 1084	N 368	O 368	0	0
6	n	368	Total 1820	C 1084	N 368	O 368	0	0

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	452	GLU	-	expression tag	UNP P23258
a	453	ASN	-	expression tag	UNP P23258
a	454	LEU	-	expression tag	UNP P23258
a	455	TYR	-	expression tag	UNP P23258
a	456	PHE	-	expression tag	UNP P23258
a	457	GLN	-	expression tag	UNP P23258
b	452	GLU	-	expression tag	UNP P23258
b	453	ASN	-	expression tag	UNP P23258
b	454	LEU	-	expression tag	UNP P23258
b	455	TYR	-	expression tag	UNP P23258
b	456	PHE	-	expression tag	UNP P23258
b	457	GLN	-	expression tag	UNP P23258
c	452	GLU	-	expression tag	UNP P23258
c	453	ASN	-	expression tag	UNP P23258
c	454	LEU	-	expression tag	UNP P23258

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Chain	Residue	Modelled	Actual	Comment	Reference
c	455	TYR	-	expression tag	UNP P23258
c	456	PHE	-	expression tag	UNP P23258
c	457	GLN	-	expression tag	UNP P23258
d	452	GLU	-	expression tag	UNP P23258
d	453	ASN	-	expression tag	UNP P23258
d	454	LEU	-	expression tag	UNP P23258
d	455	TYR	-	expression tag	UNP P23258
d	456	PHE	-	expression tag	UNP P23258
d	457	GLN	-	expression tag	UNP P23258
e	452	GLU	-	expression tag	UNP P23258
e	453	ASN	-	expression tag	UNP P23258
e	454	LEU	-	expression tag	UNP P23258
e	455	TYR	-	expression tag	UNP P23258
e	456	PHE	-	expression tag	UNP P23258
e	457	GLN	-	expression tag	UNP P23258
f	452	GLU	-	expression tag	UNP P23258
f	453	ASN	-	expression tag	UNP P23258
f	454	LEU	-	expression tag	UNP P23258
f	455	TYR	-	expression tag	UNP P23258
f	456	PHE	-	expression tag	UNP P23258
f	457	GLN	-	expression tag	UNP P23258
g	452	GLU	-	expression tag	UNP P23258
g	453	ASN	-	expression tag	UNP P23258
g	454	LEU	-	expression tag	UNP P23258
g	455	TYR	-	expression tag	UNP P23258
g	456	PHE	-	expression tag	UNP P23258
g	457	GLN	-	expression tag	UNP P23258
h	452	GLU	-	expression tag	UNP P23258
h	453	ASN	-	expression tag	UNP P23258
h	454	LEU	-	expression tag	UNP P23258
h	455	TYR	-	expression tag	UNP P23258
h	456	PHE	-	expression tag	UNP P23258
h	457	GLN	-	expression tag	UNP P23258
i	452	GLU	-	expression tag	UNP P23258
i	453	ASN	-	expression tag	UNP P23258
i	454	LEU	-	expression tag	UNP P23258
i	455	TYR	-	expression tag	UNP P23258
i	456	PHE	-	expression tag	UNP P23258
i	457	GLN	-	expression tag	UNP P23258
j	452	GLU	-	expression tag	UNP P23258
j	453	ASN	-	expression tag	UNP P23258
j	454	LEU	-	expression tag	UNP P23258

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Chain	Residue	Modelled	Actual	Comment	Reference
j	455	TYR	-	expression tag	UNP P23258
j	456	PHE	-	expression tag	UNP P23258
j	457	GLN	-	expression tag	UNP P23258
k	452	GLU	-	expression tag	UNP P23258
k	453	ASN	-	expression tag	UNP P23258
k	454	LEU	-	expression tag	UNP P23258
k	455	TYR	-	expression tag	UNP P23258
k	456	PHE	-	expression tag	UNP P23258
k	457	GLN	-	expression tag	UNP P23258
l	452	GLU	-	expression tag	UNP P23258
l	453	ASN	-	expression tag	UNP P23258
l	454	LEU	-	expression tag	UNP P23258
l	455	TYR	-	expression tag	UNP P23258
l	456	PHE	-	expression tag	UNP P23258
l	457	GLN	-	expression tag	UNP P23258
m	452	GLU	-	expression tag	UNP P23258
m	453	ASN	-	expression tag	UNP P23258
m	454	LEU	-	expression tag	UNP P23258
m	455	TYR	-	expression tag	UNP P23258
m	456	PHE	-	expression tag	UNP P23258
m	457	GLN	-	expression tag	UNP P23258
n	452	GLU	-	expression tag	UNP P23258
n	453	ASN	-	expression tag	UNP P23258
n	454	LEU	-	expression tag	UNP P23258
n	455	TYR	-	expression tag	UNP P23258
n	456	PHE	-	expression tag	UNP P23258
n	457	GLN	-	expression tag	UNP P23258

- Molecule 7 is a protein called Isoform 2 of Gamma-tubulin complex component 4.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	I	543	Total	C	N	O	2	0
			2703	1613	545	545		
7	K	543	Total	C	N	O	2	0
			2703	1613	545	545		

- Molecule 8 is a protein called Gamma-tubulin complex component 5.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	J	484	Total	C	N	O	0	0
			2408	1440	484	484		

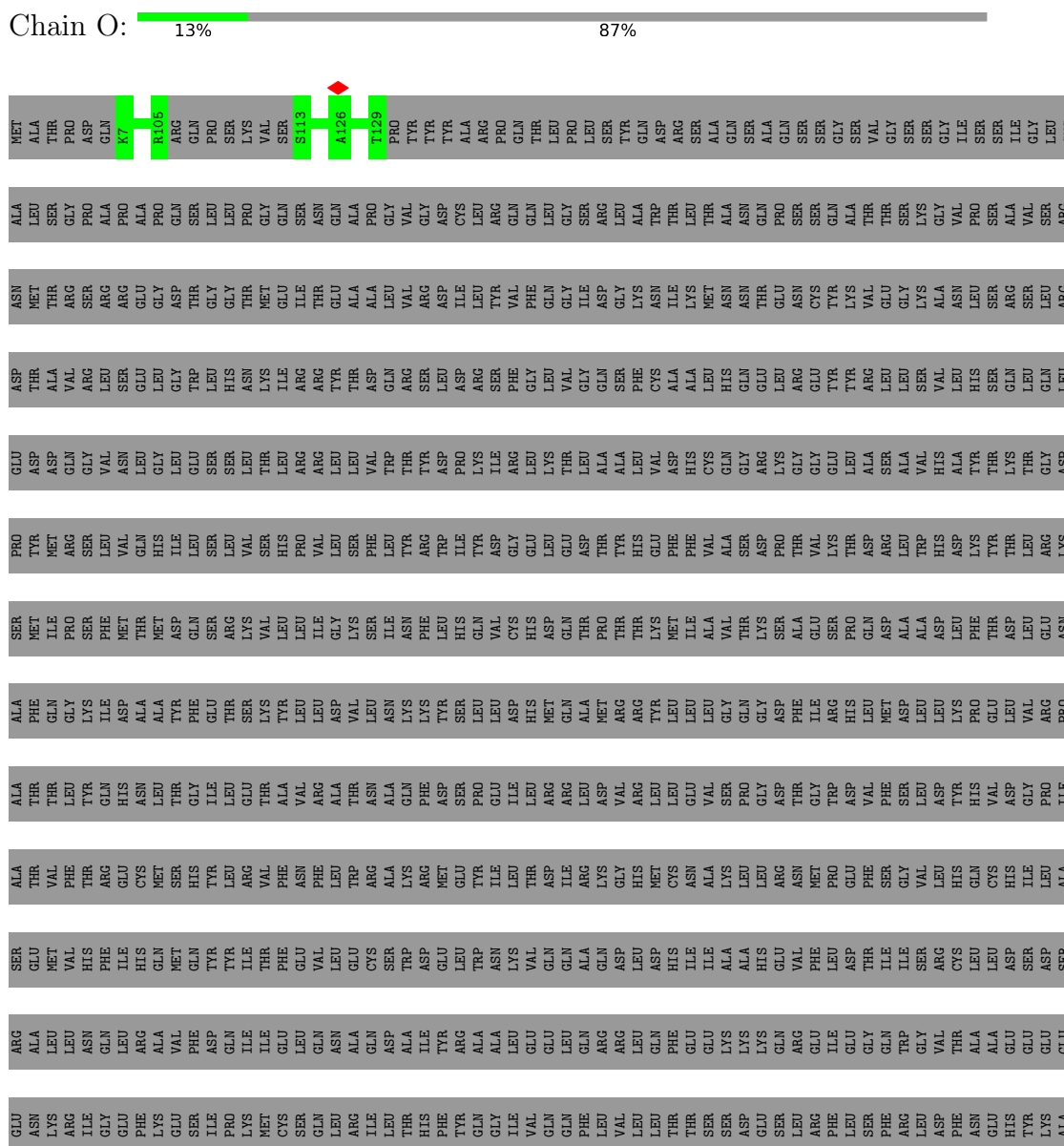
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	198	GLY	ARG	conflict	UNP Q96RT8


3 Residue-property plots [i](#)

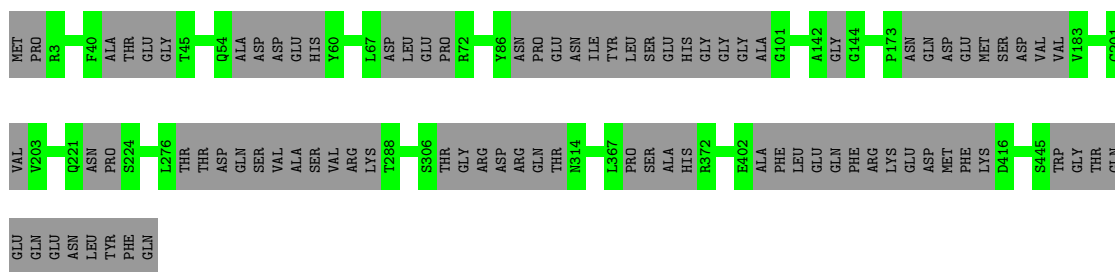
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Gamma-tubulin complex component 3




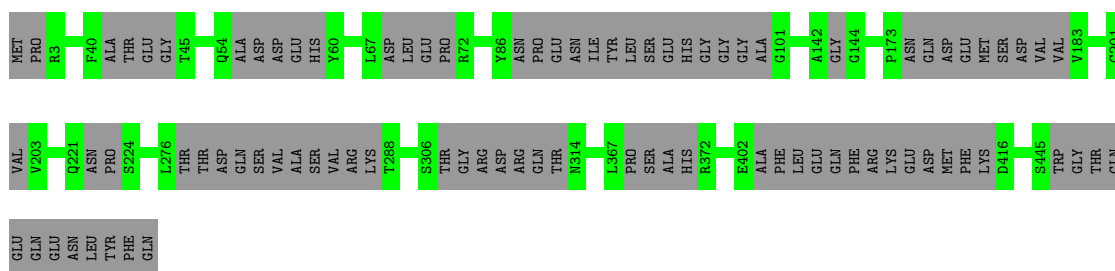
- Molecule 6: Tubulin gamma-1 chain

Chain h:  81% 19%




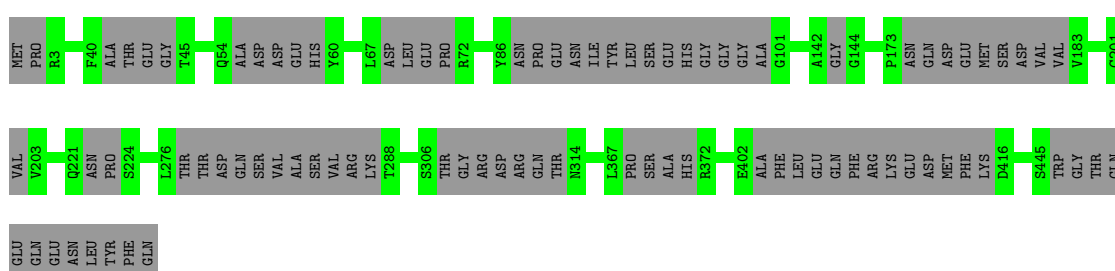
- Molecule 6: Tubulin gamma-1 chain

Chain i:  81% 19%




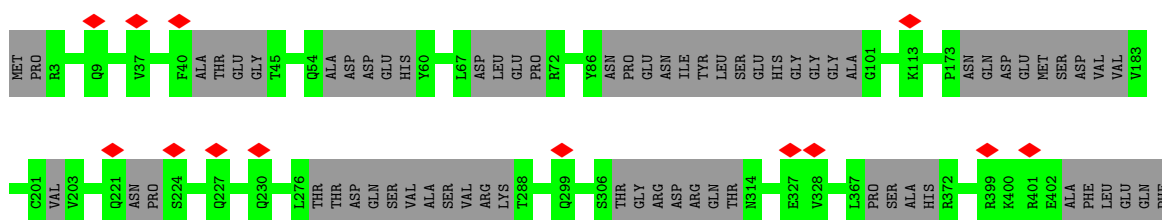
- Molecule 6: Tubulin gamma-1 chain

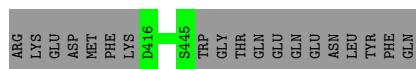
Chain j:  81% 19%



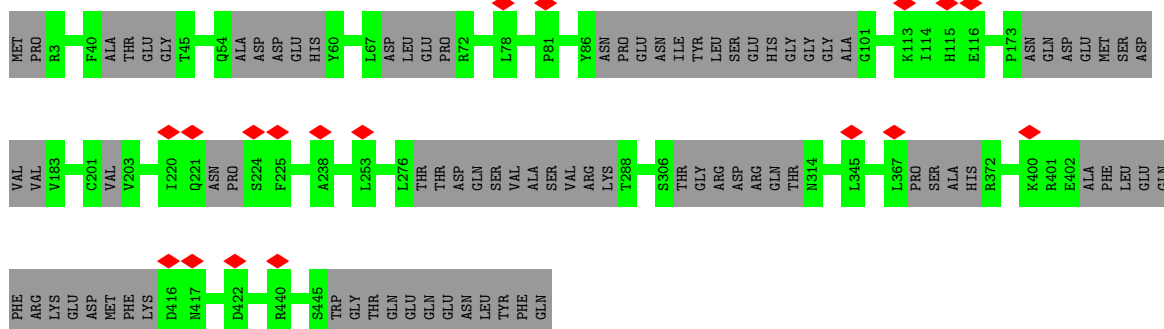
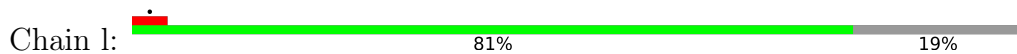
- Molecule 6: Tubulin gamma-1 chain

Chain k:  81% 19%

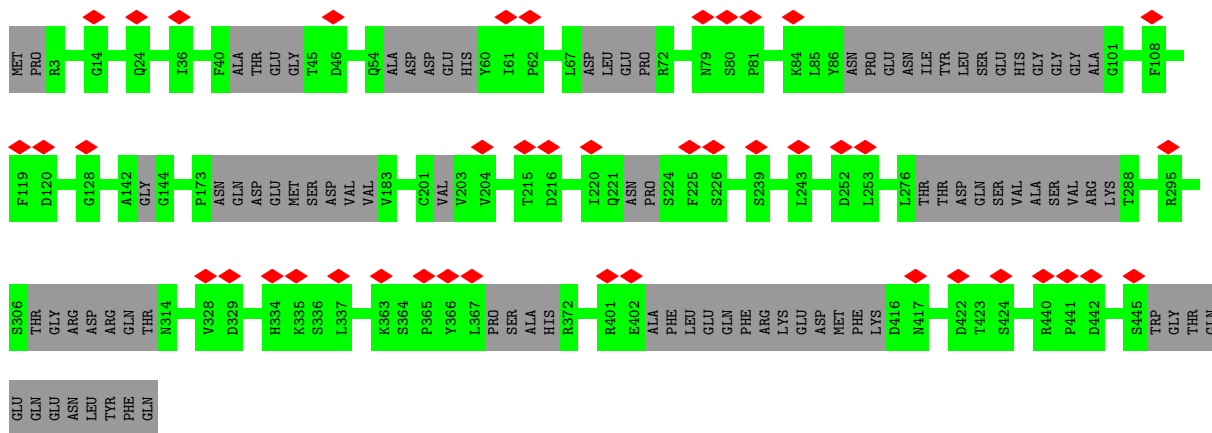
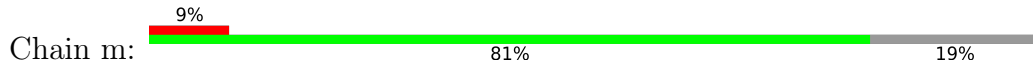




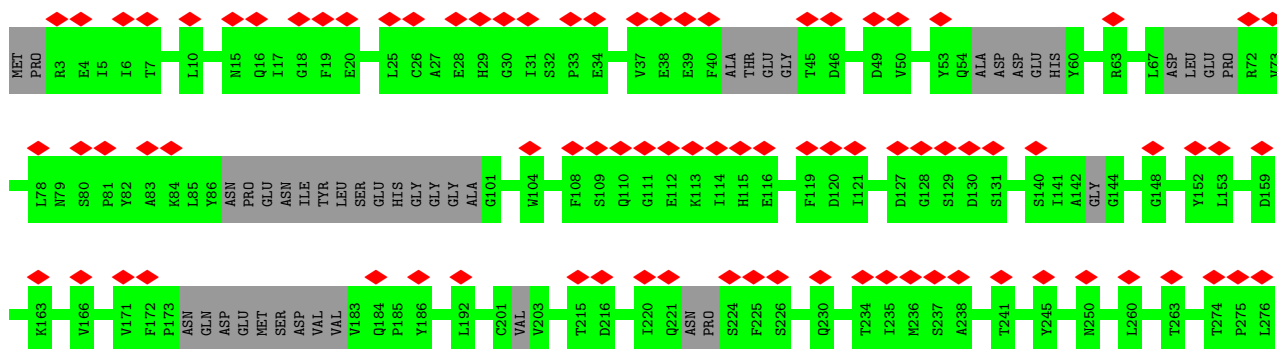
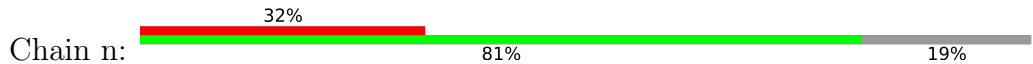
• Molecule 6: Tubulin gamma-1 chain



• Molecule 6: Tubulin gamma-1 chain



• Molecule 6: Tubulin gamma-1 chain



ASN	LEU	ALA	ALA	VAL	TRP	ASP	GLN	HIS	TYR	SER	SER	ASP	PRO	LEU	VAL	TYR	PRO	D280	G336	HIS	SER	SER	GLU	MET	PRO	GLY	SER	GLY	SER	VAL	PRO	GLU	TYR	GLU	ALA	P357	T380	A363	F364	R388	ASN	ASP	T391	E422	VAL	PRO	PRO	ASP	T427															
D448	ASN	VAL	GLY	ALA	SER	E455	R496	ASN	LYS	ASN	LYS	ASN	VAL	PRO	LEU	VAL	TYR	ASN	HIS	ARG	ASP	PHE	TRP	TYR	ALA	THR	TYR	LEU	LEU	TYR	PRO	GLY	SER	VAL	SER	GLY	ASN	ASP	ASN	ALA	SER	ALA	SER	SER	GLY	ASN	ASP	ASP	GLN															
HIS	T547	L572	GLN	CYS	ALA	ALA	GLU	SER	THR	THR	CYS	ASN	GLN	ALA	GLY	ALA	ASP	ASP	ASP	ASP	ALA	GLU	GLU	ARG	LYS	PHE	SER	LEU	HIS	LEU	TYR	ALA	THR	THR	LEU	PHE	THR	LEU	GLY	GLU	SER	VAL	VAL	GLN	SER	ARG	GLY	ASP	THR	PRO	GLN													
GLN	SER	ILE	ALA	GLU	SER	HIS	LEU	E637	I648	ASN	PHE	ALA	ALA	ARG	GLU	ASP	TYR	SER	LEU	ARG	GLU	GLN	SER	SER	ASP	PHE	SER	HIS	GLU	GLY	LYS	PHE	ALA	THR	GLY	GLU	ALA	GLY	ASP	VAL	CYS	VAL	VAL	LEU	SER	THR	CYS	THR	GLN	T682	R715	L728	MET	GLU	GLY	GLY	THR	GLY	D733	D744	LYS	ILE	ARG	GLU
LYS	GLU	THR	TRP	VAL	E764	ALA	VAL	GLN	ARG	PRO	TYR	PRO	GLU	ASP	SER	GLN	ARG	LEU	LEU	ILE	ALA	ILE	VAL	VAL	PRO	VAL	ARG	HIS	ILE	E796	L842	PHE	GLY	GLU	LEU	VAL	SER	THR	ALA	GLU	LYS	PRO	ARG	LEU	LYS	GLY	PRO	GLY	LEU	ILE	LEU	ILE	HIS											
GLU	GLN	ASP	THR	VAL	ALA	GLN	PHE	GLY	GLN	LYS	GLU	PRO	VAL	ARG	GLN	Q879	R968	GLN	ALA	GLY	LEU	GLY	THR	TRP	ARG	MET	GLU	S979	A1001	VAL	CYS	ARG	GLY	SER	F1007	S1016	LEU	MET	ALA	GLY	MET	GLU	GLN	SER																				

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	98558	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.052	Depositor
Minimum map value	-0.019	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.004	Depositor
Map size (Å)	485.76, 485.76, 485.76	wwPDB
Map dimensions	368, 368, 368	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.32, 1.32, 1.32	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	B	0.32	0/2830	0.45	0/3934
1	D	0.32	0/2830	0.45	0/3934
1	F	0.32	0/2830	0.45	0/3934
1	H	0.32	0/2830	0.45	0/3934
1	N	0.32	0/2830	0.45	0/3934
1	O	0.25	0/575	0.42	0/800
2	L	0.28	0/972	0.43	0/1344
2	P	0.24	0/774	0.42	0/1069
2	T	0.27	0/1467	0.42	0/2034
3	Q	0.23	0/322	0.37	0/448
3	R	0.22	0/292	0.35	0/406
4	S	0.24	0/1737	0.59	0/2404
5	A	0.30	0/2667	0.44	0/3708
5	C	0.30	0/2667	0.44	0/3708
5	E	0.30	0/2667	0.44	0/3708
5	G	0.30	0/2667	0.44	0/3708
5	M	0.30	0/2667	0.44	0/3708
6	a	0.35	0/1807	0.46	0/2497
6	b	0.35	0/1807	0.46	0/2497
6	c	0.35	0/1807	0.46	0/2497
6	d	0.35	0/1807	0.46	0/2497
6	e	0.35	0/1807	0.46	0/2497
6	f	0.35	0/1807	0.46	0/2497
6	g	0.35	0/1807	0.46	0/2497
6	h	0.35	0/1807	0.46	0/2497
6	i	0.30	0/1807	0.44	0/2497
6	j	0.25	0/1807	0.42	0/2497
6	k	0.33	0/1812	0.44	0/2505
6	l	0.28	0/1812	0.44	0/2505
6	m	0.35	0/1807	0.46	0/2497
6	n	0.35	0/1807	0.46	0/2497
7	I	0.34	0/2696	0.44	0/3750
7	K	0.35	0/2696	0.44	0/3750
8	J	0.33	0/2394	0.43	0/3322

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
All	All	0.32	0/66718	0.45	0/92511

There are no bond length outliers.

There are no bond angle outliers.

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	B	2840	0	1242	3	0
1	D	2840	0	1242	3	0
1	F	2840	0	1242	3	0
1	H	2840	0	1242	7	0
1	N	2840	0	1242	2	0
1	O	577	0	265	0	0
2	L	978	0	423	8	0
2	P	779	0	350	4	0
2	T	1476	0	653	1	0
3	Q	323	0	160	0	0
3	R	293	0	130	0	0
4	S	1745	0	791	2	0
5	A	2676	0	1177	5	0
5	C	2676	0	1177	7	0
5	E	2676	0	1177	5	0
5	G	2676	0	1177	4	0
5	M	2676	0	1177	7	0
6	a	1820	0	781	0	0
6	b	1820	0	781	0	0
6	c	1820	0	781	0	0
6	d	1820	0	781	0	0
6	e	1820	0	781	0	0
6	f	1820	0	781	0	0
6	g	1820	0	781	0	0
6	h	1820	0	781	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	i	1820	0	781	0	0
6	j	1820	0	781	0	0
6	k	1824	0	785	0	0
6	l	1824	0	785	0	0
6	m	1820	0	781	0	0
6	n	1820	0	781	0	0
7	I	2703	0	1172	9	0
7	K	2703	0	1172	5	0
8	J	2408	0	1021	2	0
All	All	67053	0	29174	62	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 1.

All (62) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:363:VAL:CB	5:M:283:SER:HA	1.68	1.22
2:L:363:VAL:CB	5:M:283:SER:CA	2.52	0.86
5:A:318:HIS:CB	1:B:406:THR:O	2.34	0.76
1:H:319:LEU:O	7:I:164:GLY:HA3	1.88	0.74
2:P:193:VAL:CB	5:C:358:PRO:CB	2.66	0.73
1:D:257:VAL:O	1:D:298:GLY:HA3	1.99	0.63
5:A:311:PHE:O	5:A:313:TYR:N	2.32	0.63
5:E:311:PHE:O	5:E:313:TYR:N	2.32	0.63
1:F:257:VAL:O	1:F:298:GLY:HA3	1.99	0.63
1:B:257:VAL:O	1:B:298:GLY:HA3	1.99	0.62
1:H:257:VAL:O	1:H:298:GLY:HA3	1.99	0.62
1:N:257:VAL:O	1:N:298:GLY:HA3	1.99	0.62
5:C:311:PHE:O	5:C:313:TYR:N	2.32	0.62
5:G:311:PHE:O	5:G:313:TYR:N	2.32	0.62
5:M:311:PHE:O	5:M:313:TYR:N	2.32	0.62
1:H:319:LEU:O	7:I:164:GLY:CA	2.52	0.57
8:J:363:ALA:HB2	7:K:164:GLY:HA3	1.86	0.57
2:T:1635:ASP:O	2:T:1639:HIS:N	2.30	0.55
5:G:682:GLN:O	5:G:685:SER:N	2.40	0.54
5:M:682:GLN:O	5:M:685:SER:N	2.40	0.53
5:A:682:GLN:O	5:A:685:SER:N	2.40	0.52
7:K:618:PHE:O	7:K:622:SER:N	2.40	0.52
1:H:322:GLN:CB	7:I:165:LEU:N	2.73	0.52
7:I:618:PHE:O	7:I:622:SER:N	2.40	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:M:311:PHE:C	5:M:313:TYR:H	2.14	0.51
5:A:311:PHE:C	5:A:313:TYR:H	2.14	0.51
5:E:682:GLN:O	5:E:685:SER:N	2.40	0.51
5:C:682:GLN:O	5:C:685:SER:N	2.40	0.50
5:E:311:PHE:C	5:E:313:TYR:H	2.14	0.50
2:P:143:VAL:O	1:F:413:SER:CB	2.60	0.50
5:C:311:PHE:C	5:C:313:TYR:H	2.14	0.50
5:G:311:PHE:C	5:G:313:TYR:H	2.14	0.49
1:H:322:GLN:CB	7:I:165:LEU:H	2.26	0.48
7:K:607:GLY:O	7:K:611:LEU:N	2.47	0.48
2:P:195:LEU:C	5:C:399:GLN:CB	2.82	0.48
7:I:607:GLY:O	7:I:611:LEU:N	2.47	0.47
1:B:322:GLN:O	1:B:326:ALA:N	2.47	0.47
2:P:193:VAL:HA	5:C:358:PRO:CB	2.45	0.47
1:F:322:GLN:O	1:F:326:ALA:N	2.47	0.47
2:L:393:ILE:O	2:L:397:LEU:N	2.41	0.47
5:C:602:LYS:O	5:C:647:ASP:N	2.49	0.46
5:G:602:LYS:O	5:G:647:ASP:N	2.49	0.46
5:M:602:LYS:O	5:M:647:ASP:N	2.49	0.46
4:S:14:SER:HA	4:S:71:ILE:O	2.15	0.45
5:A:602:LYS:O	5:A:647:ASP:N	2.49	0.45
2:L:430:GLN:O	2:L:434:SER:N	2.46	0.45
1:N:322:GLN:O	1:N:326:ALA:N	2.47	0.45
5:E:602:LYS:O	5:E:647:ASP:N	2.49	0.43
4:S:218:TYR:O	4:S:255:PHE:HA	2.18	0.43
2:L:363:VAL:CB	5:M:283:SER:CB	2.97	0.43
1:D:322:GLN:O	1:D:326:ALA:N	2.47	0.42
1:D:323:SER:CB	5:E:396:GLY:O	2.68	0.42
7:I:530:TYR:C	7:I:532:GLN:H	2.22	0.42
2:L:431:ALA:O	2:L:435:GLY:N	2.50	0.42
7:I:359:ASP:HA	7:I:364:GLY:HA3	2.02	0.41
7:K:530:TYR:C	7:K:532:GLN:H	2.22	0.41
1:H:322:GLN:CB	7:I:164:GLY:HA3	2.51	0.41
7:K:359:ASP:HA	7:K:364:GLY:HA3	2.01	0.41
2:L:441:GLN:O	2:L:445:ALA:N	2.51	0.41
1:H:322:GLN:O	1:H:326:ALA:N	2.47	0.41
8:J:360:THR:O	8:J:364:PHE:N	2.54	0.41
2:L:533:THR:O	2:L:537:HIS:N	2.54	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	B	552/907 (61%)	531 (96%)	21 (4%)	0	100	100
1	D	552/907 (61%)	530 (96%)	22 (4%)	0	100	100
1	F	552/907 (61%)	530 (96%)	22 (4%)	0	100	100
1	H	552/907 (61%)	530 (96%)	22 (4%)	0	100	100
1	N	552/907 (61%)	530 (96%)	22 (4%)	0	100	100
1	O	112/907 (12%)	109 (97%)	3 (3%)	0	100	100
2	L	186/1811 (10%)	170 (91%)	16 (9%)	0	100	100
2	P	148/1811 (8%)	138 (93%)	9 (6%)	1 (1%)	22	63
2	T	279/1811 (15%)	262 (94%)	17 (6%)	0	100	100
3	Q	63/82 (77%)	63 (100%)	0	0	100	100
3	R	57/82 (70%)	55 (96%)	2 (4%)	0	100	100
4	S	338/375 (90%)	331 (98%)	7 (2%)	0	100	100
5	A	521/930 (56%)	483 (93%)	37 (7%)	1 (0%)	47	81
5	C	521/930 (56%)	482 (92%)	38 (7%)	1 (0%)	47	81
5	E	521/930 (56%)	483 (93%)	37 (7%)	1 (0%)	47	81
5	G	521/930 (56%)	483 (93%)	37 (7%)	1 (0%)	47	81
5	M	521/930 (56%)	483 (93%)	37 (7%)	1 (0%)	47	81
6	a	342/457 (75%)	326 (95%)	16 (5%)	0	100	100
6	b	342/457 (75%)	325 (95%)	17 (5%)	0	100	100
6	c	342/457 (75%)	325 (95%)	17 (5%)	0	100	100
6	d	342/457 (75%)	325 (95%)	17 (5%)	0	100	100
6	e	342/457 (75%)	326 (95%)	16 (5%)	0	100	100
6	f	342/457 (75%)	325 (95%)	17 (5%)	0	100	100
6	g	342/457 (75%)	326 (95%)	16 (5%)	0	100	100
6	h	342/457 (75%)	325 (95%)	17 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	i	342/457 (75%)	327 (96%)	15 (4%)	0	100	100
6	j	342/457 (75%)	327 (96%)	15 (4%)	0	100	100
6	k	345/457 (76%)	325 (94%)	20 (6%)	0	100	100
6	l	345/457 (76%)	326 (94%)	19 (6%)	0	100	100
6	m	342/457 (75%)	326 (95%)	16 (5%)	0	100	100
6	n	342/457 (75%)	325 (95%)	17 (5%)	0	100	100
7	I	531/666 (80%)	498 (94%)	31 (6%)	2 (0%)	34	72
7	K	531/666 (80%)	498 (94%)	31 (6%)	2 (0%)	34	72
8	J	456/1024 (44%)	435 (95%)	20 (4%)	1 (0%)	47	81
All	All	12860/24818 (52%)	12183 (95%)	666 (5%)	11 (0%)	54	86

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
7	I	127	ASP
8	J	715	ARG
7	K	127	ASP
2	P	134	LEU
5	A	312	GLU
5	C	312	GLU
5	E	312	GLU
5	G	312	GLU
5	M	312	GLU
7	I	39	THR
7	K	39	THR

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

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.

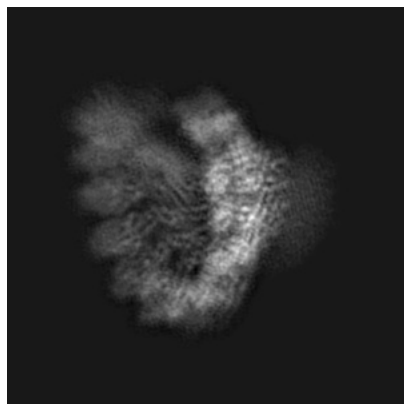
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-43481. These allow visual inspection of the internal detail of the map and identification of artifacts.

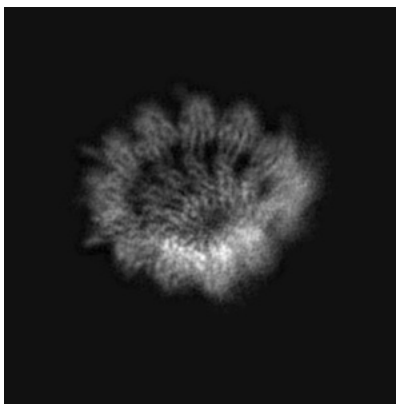
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

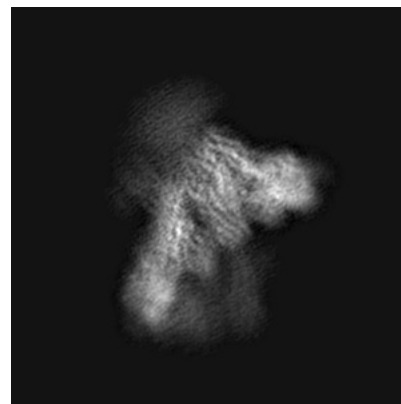
6.1.1 Primary map



X

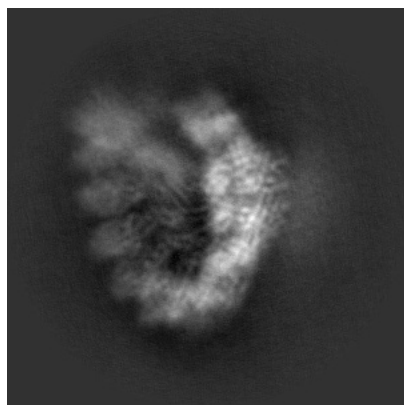


Y

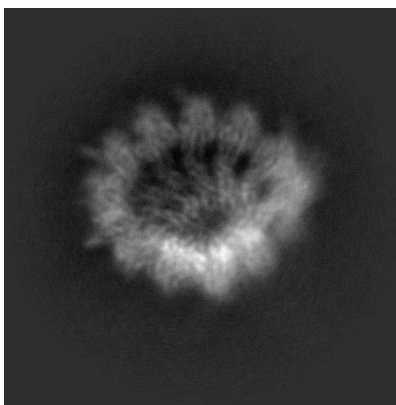


Z

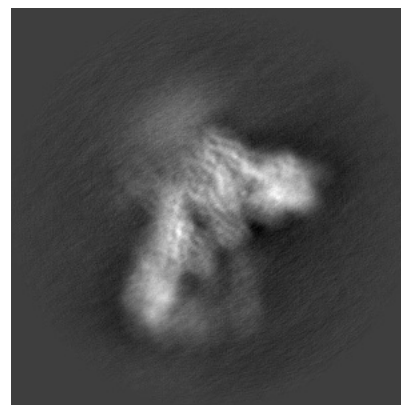
6.1.2 Raw map



X



Y

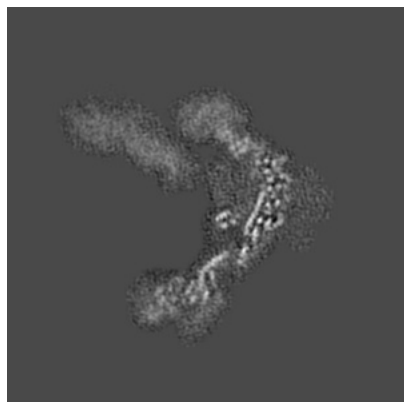


Z

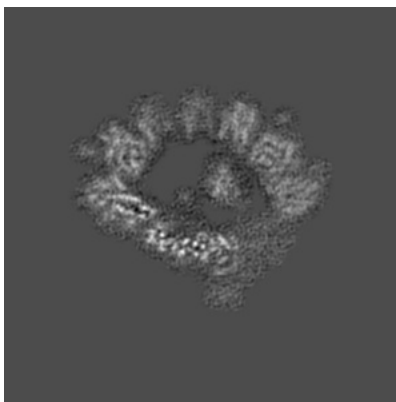
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

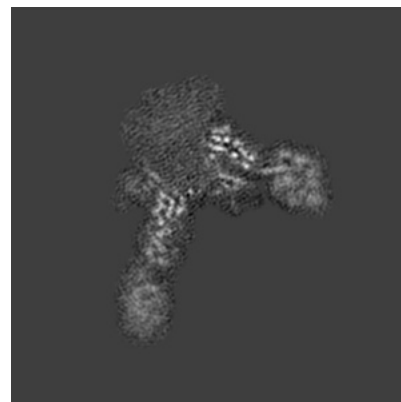
6.2.1 Primary map



X Index: 184

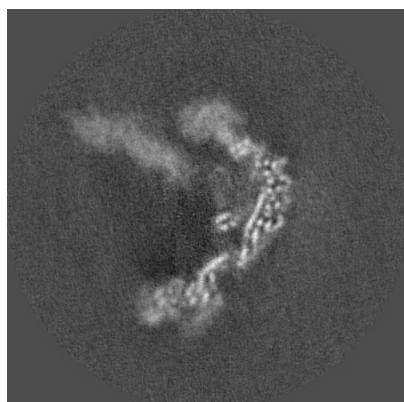


Y Index: 184

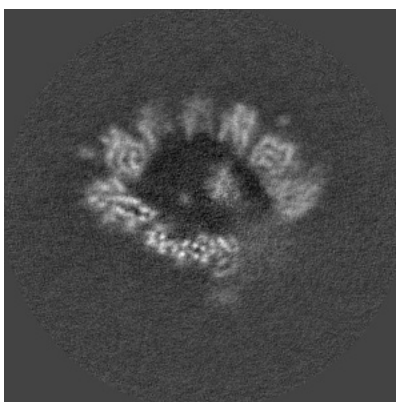


Z Index: 184

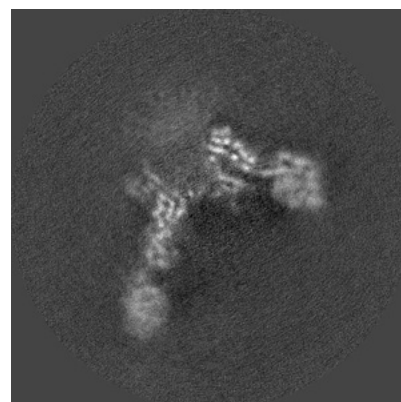
6.2.2 Raw map



X Index: 184



Y Index: 184

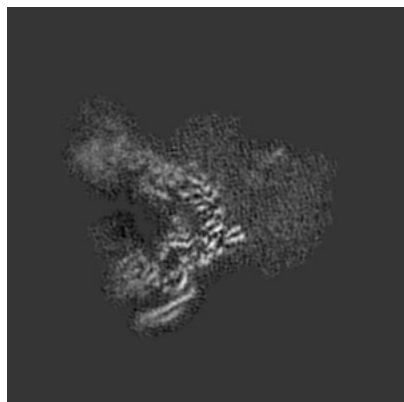


Z Index: 184

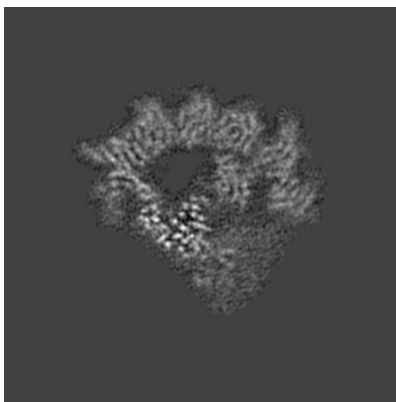
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

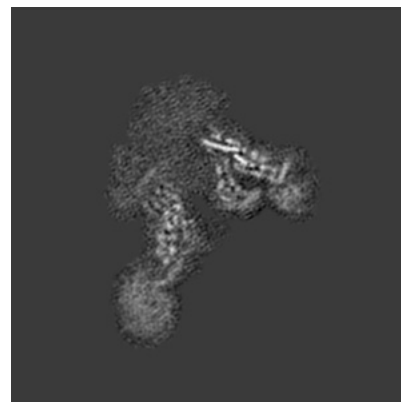
6.3.1 Primary map



X Index: 153

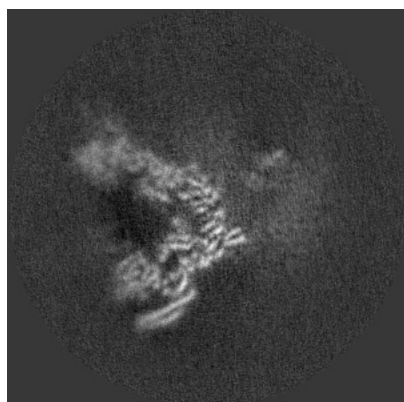


Y Index: 197

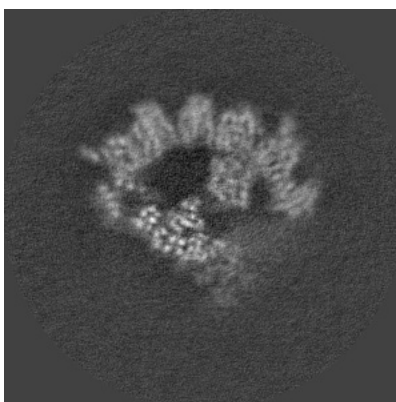


Z Index: 200

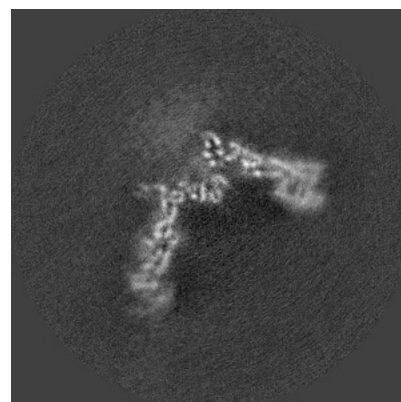
6.3.2 Raw map



X Index: 153



Y Index: 193

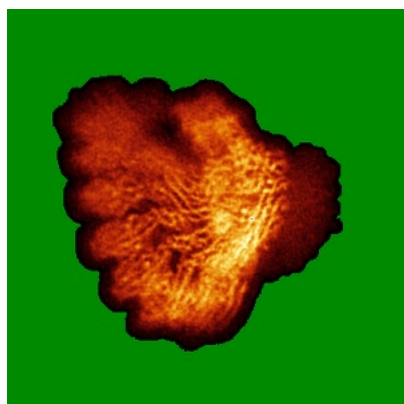


Z Index: 174

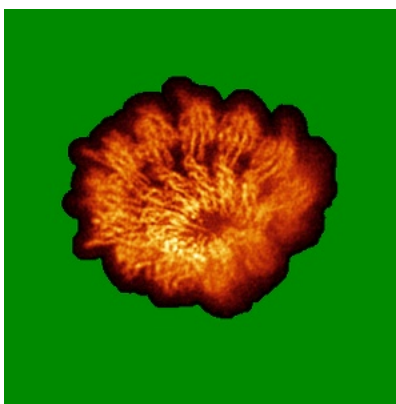
The images above show the largest variance slices of the map in three orthogonal directions.

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

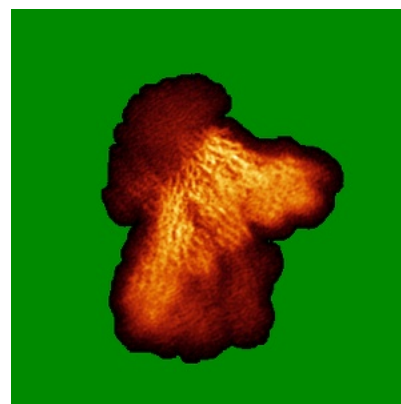
6.4.1 Primary map



X

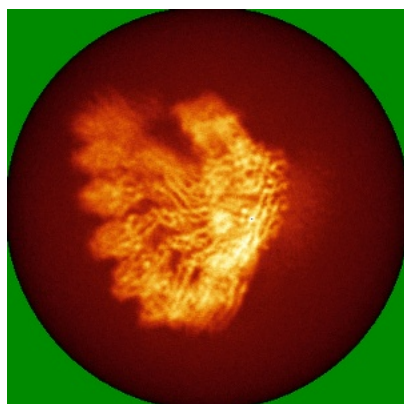


Y

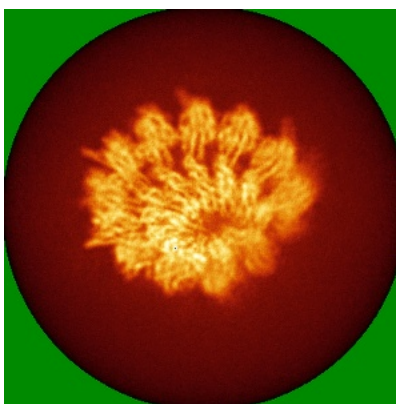


Z

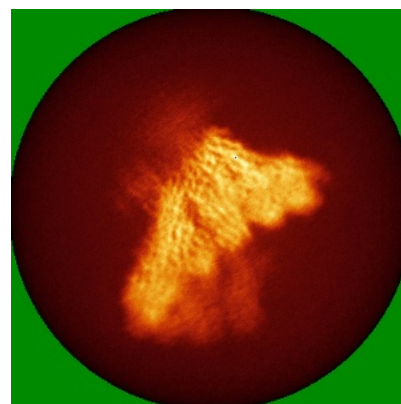
6.4.2 Raw map



X



Y

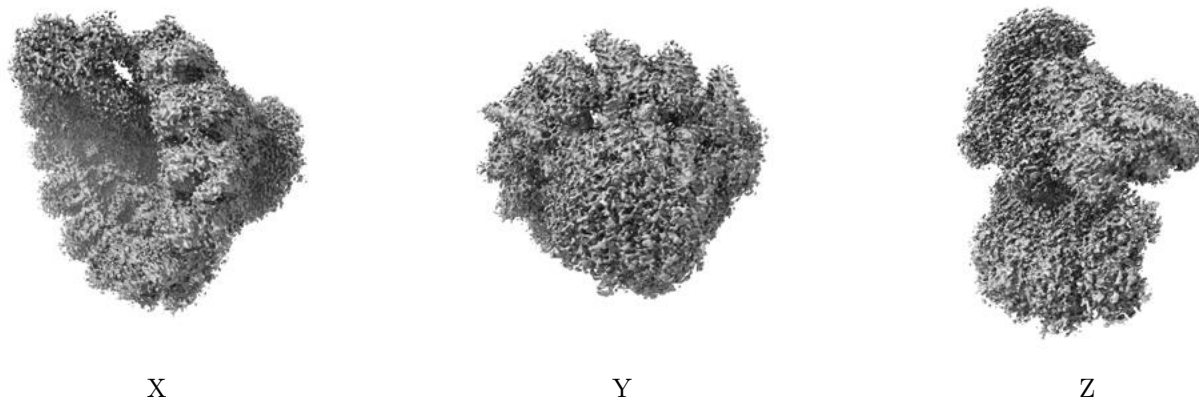


Z

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.

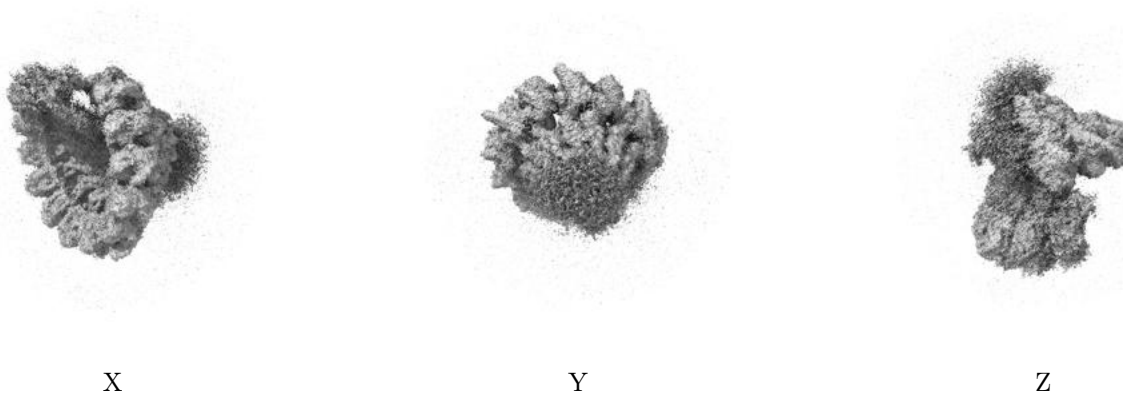
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.004. 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.

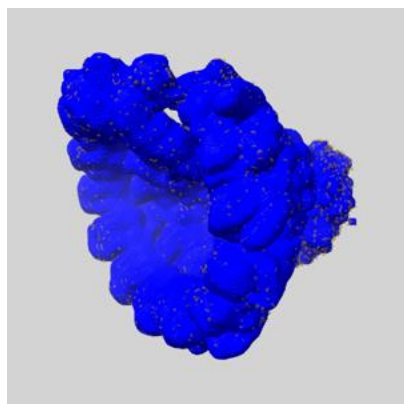
6.6 Mask visualisation [i](#)

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

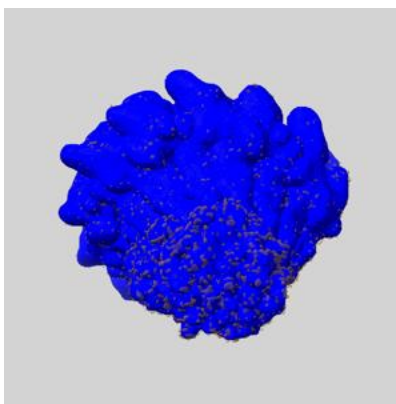
A mask typically either:

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

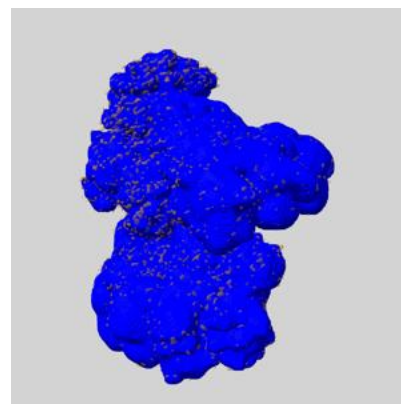
6.6.1 emd_43481_msk_1.map [i](#)



X



Y

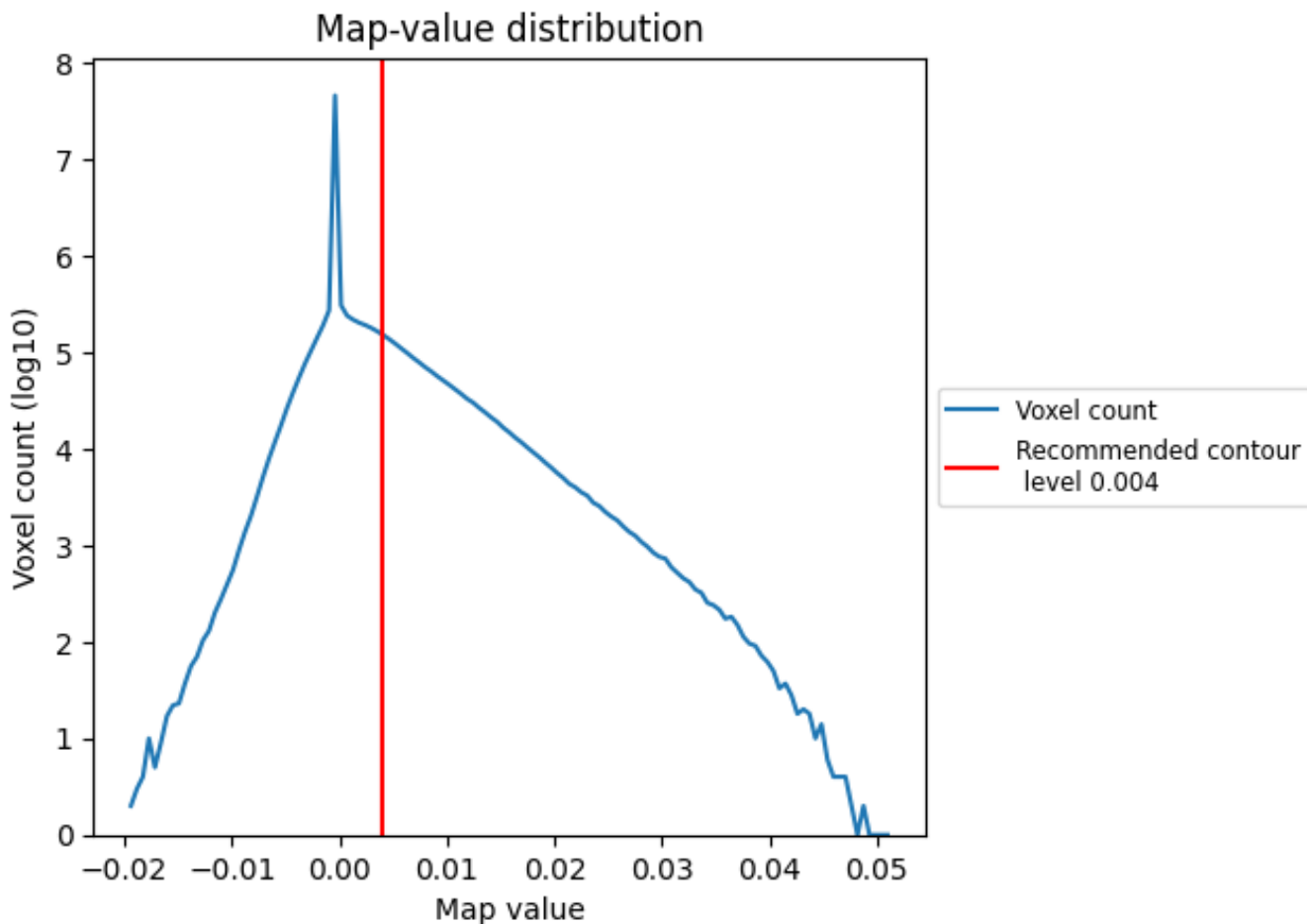


Z

7 Map analysis [i](#)

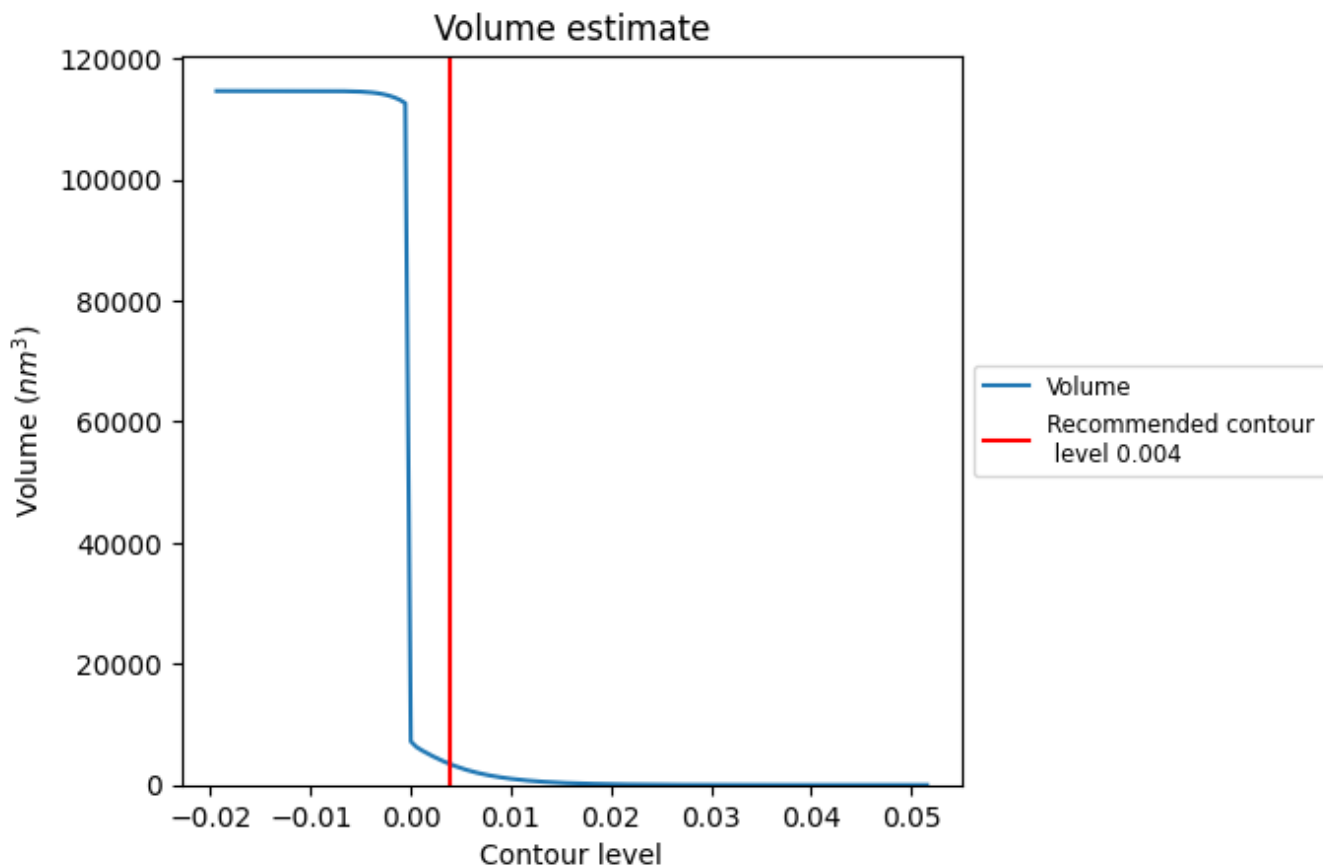
This section contains the results of statistical analysis of the map.

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.

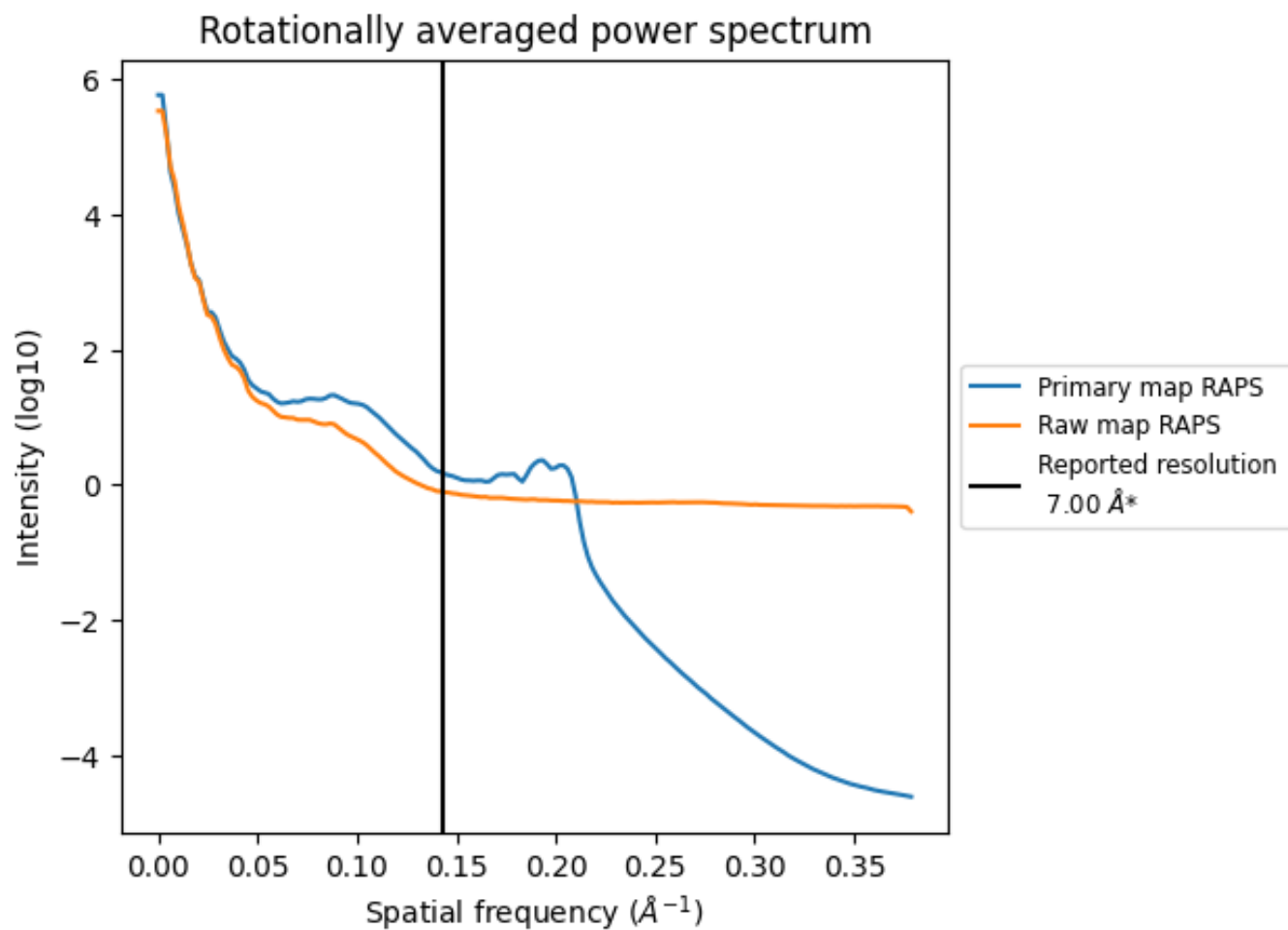
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 3402 nm^3 ; this corresponds to an approximate mass of 3073 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](#)

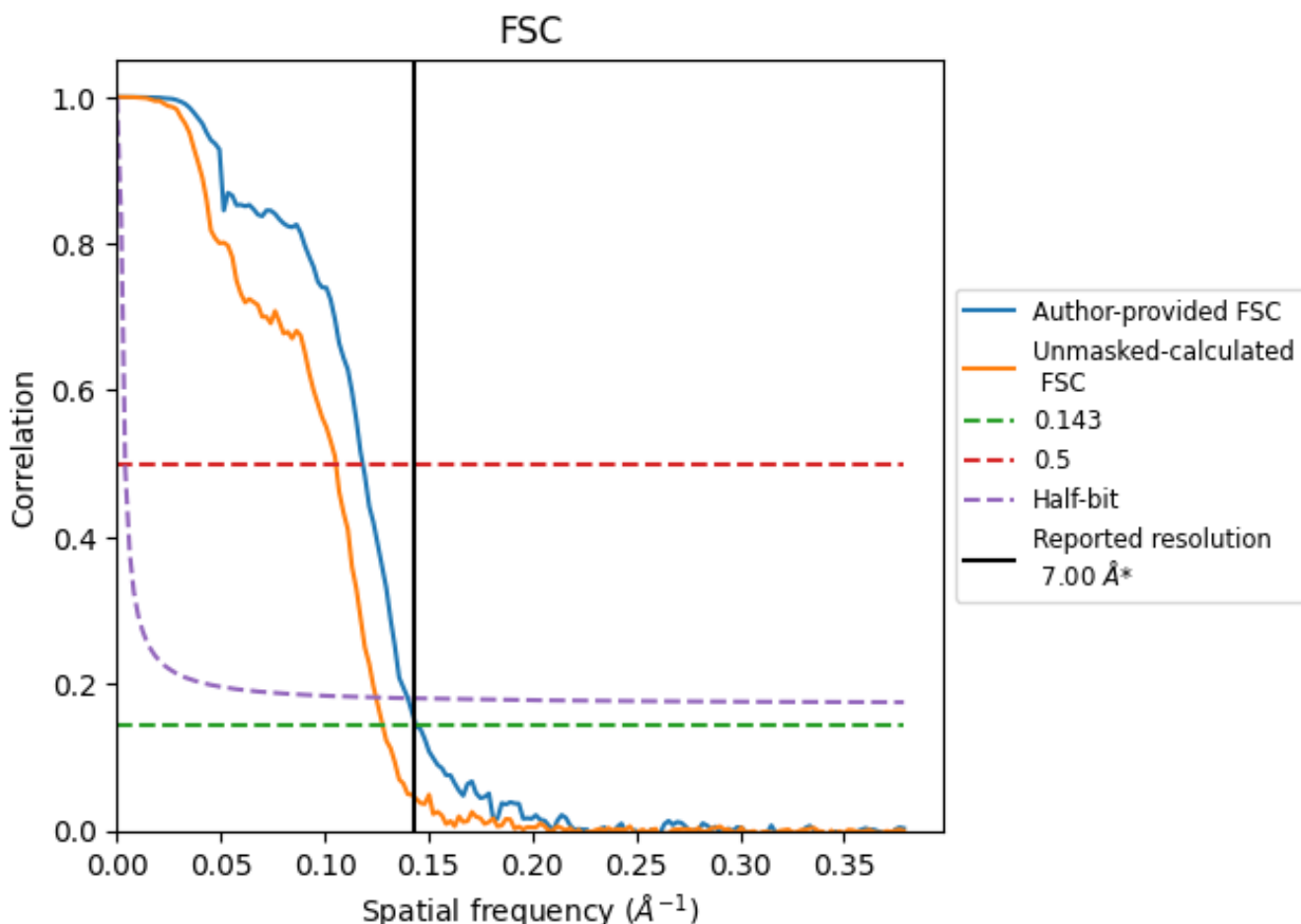


*Reported resolution corresponds to spatial frequency of 0.143 Å⁻¹

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 0.143 Å⁻¹

8.2 Resolution estimates [i](#)

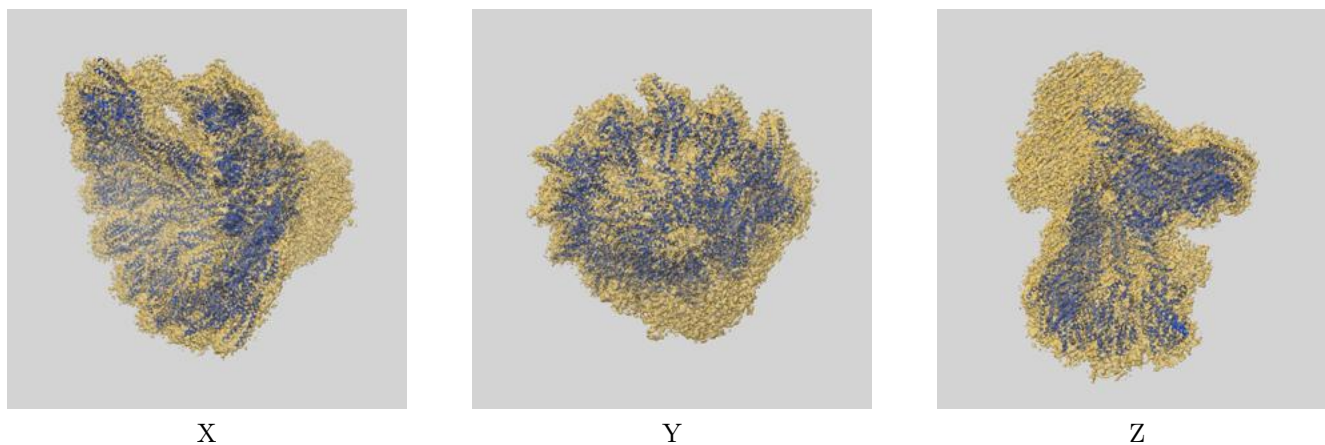
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	7.00	-	-
Author-provided FSC curve	6.94	8.45	7.14
Unmasked-calculated*	7.81	9.49	8.01

*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 7.81 differs from the reported value 7.0 by more than 10 %

9 Map-model fit [i](#)

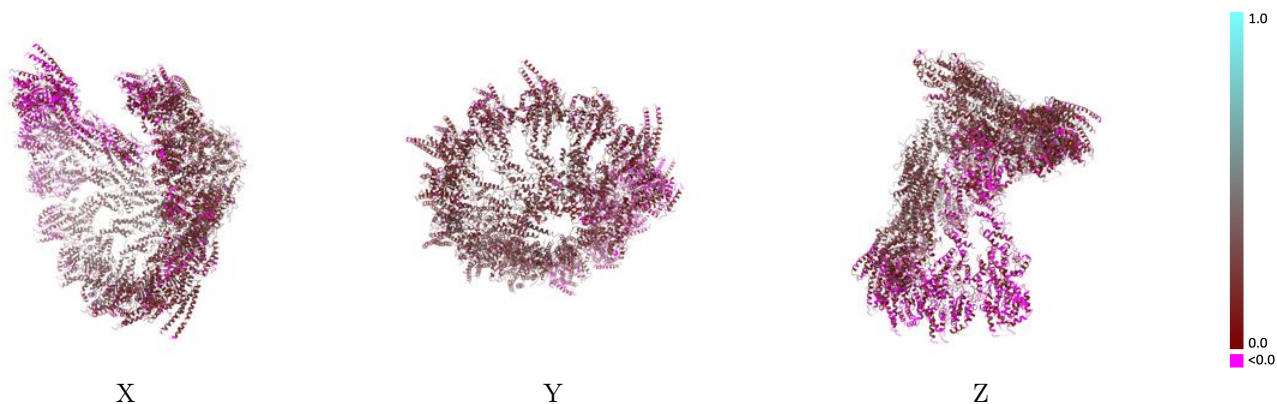
This section contains information regarding the fit between EMDB map EMD-43481 and PDB model 8VRD. Per-residue inclusion information can be found in section [3](#) on page [10](#).

9.1 Map-model overlay [i](#)



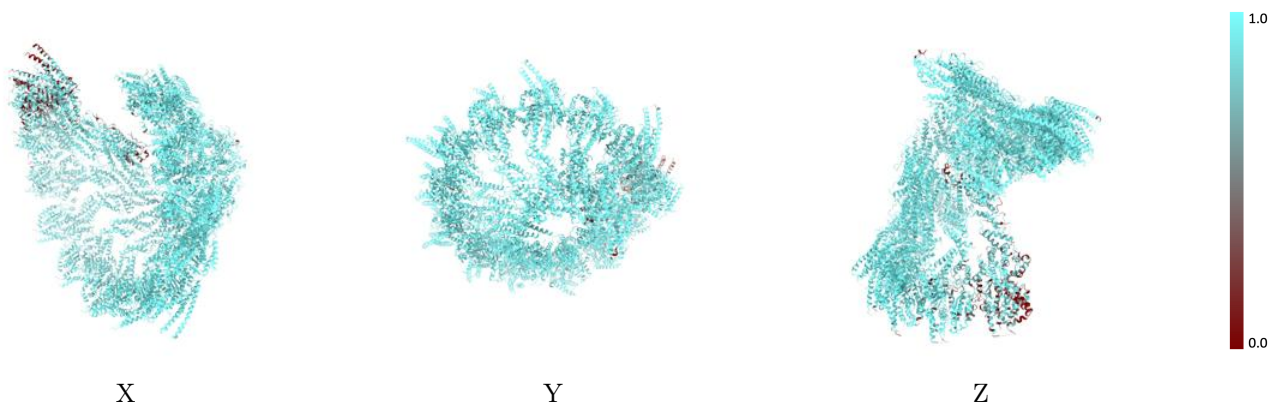
The images above show the 3D surface view of the map at the recommended contour level 0.004 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



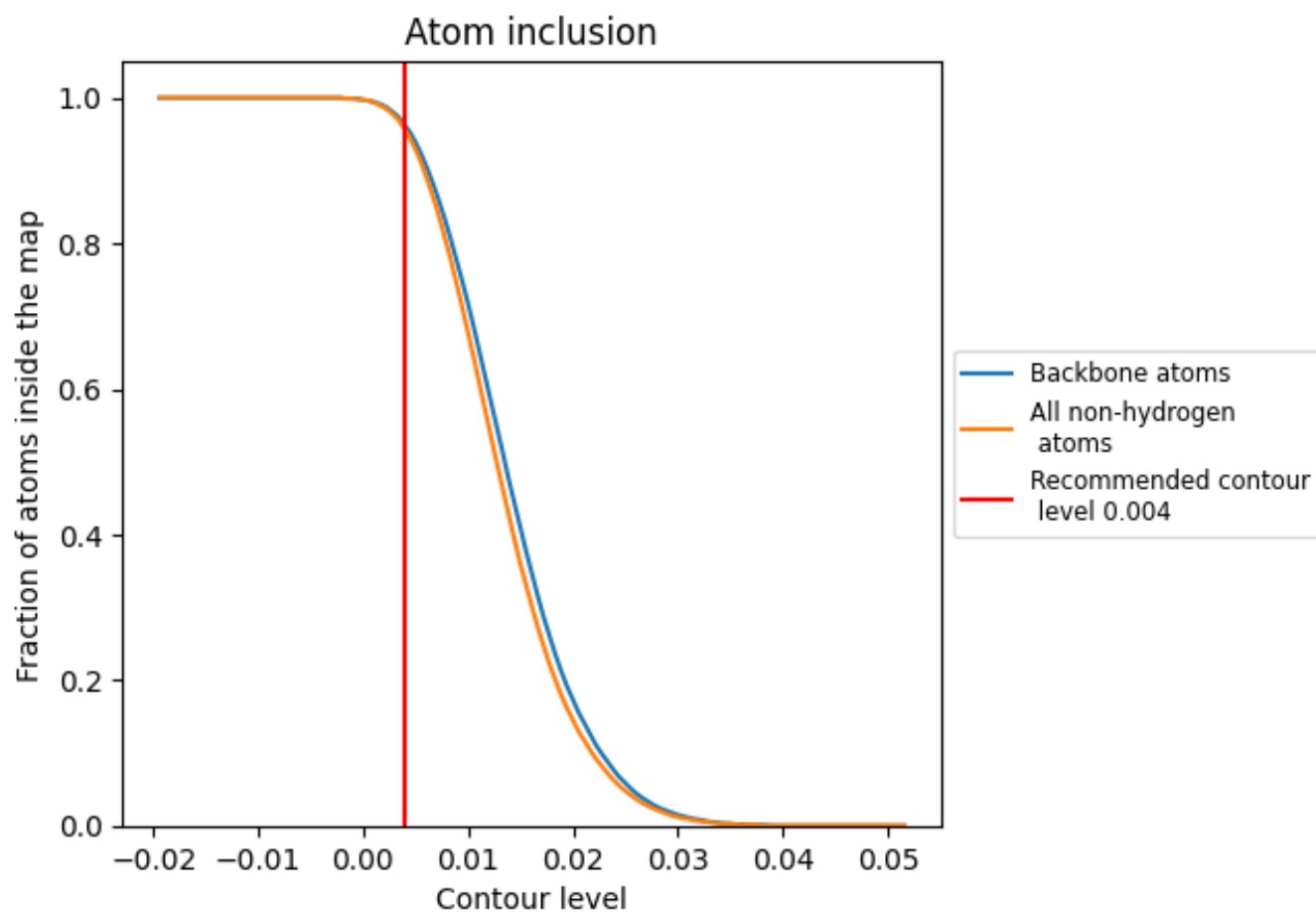
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.004).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 96% of all backbone atoms, 96% 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 (0.004) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9560	 0.1800
A	 0.9770	 0.1740
B	 0.9870	 0.2250
C	 0.9820	 0.2300
D	 0.9880	 0.2320
E	 0.9910	 0.2430
F	 0.9940	 0.2470
G	 0.9900	 0.2520
H	 0.9950	 0.2580
I	 0.9940	 0.2710
J	 0.9950	 0.2540
K	 0.9860	 0.2000
L	 0.9980	 0.2110
M	 0.8860	 0.0570
N	 0.7240	 0.0210
O	 0.9790	 0.3080
P	 0.9880	 0.2790
Q	 0.9880	 0.2820
R	 1.0000	 0.2730
S	 0.9780	 0.2150
T	 0.9750	 0.1440
a	 0.9660	 0.0860
b	 0.9840	 0.1590
c	 0.9870	 0.1950
d	 0.9850	 0.1620
e	 0.9890	 0.1580
f	 0.9920	 0.2010
g	 0.9890	 0.2000
h	 0.9950	 0.2430
i	 0.9960	 0.1990
j	 0.9900	 0.1570
k	 0.9530	 0.0530
l	 0.9360	 0.0550
m	 0.8590	 0.0300
n	 0.5860	 -0.0020

