Full wwPDB EM Validation Report ⓘ

May 4, 2025 – 12:56 PM EDT

PDB ID	:	8TM5 / pdb_00008tm5
EMDB ID	:	EMD-41379
Title	:	Human mixed 13S proteasome assembly intermediate
Authors	:	Zhang, H.; Zhao, J.
Deposited on	:	2023-07-28
Resolution	:	3.00 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:

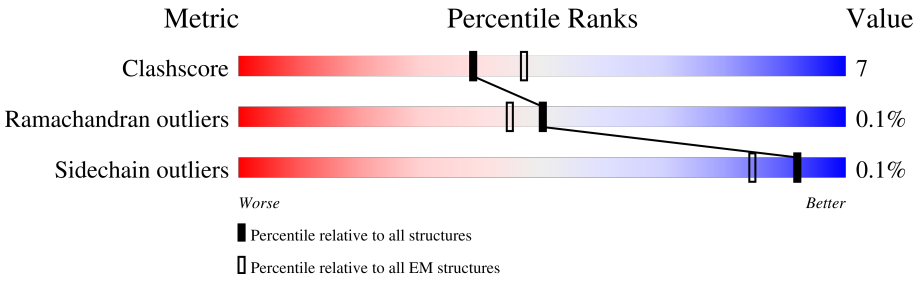
EMDB validation analysis	:	0.0.1.dev118
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 3.00 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=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	234	89% 11%
2	B	261	84% 12%
3	C	248	81% 15%
4	D	241	71% 25%
5	E	263	71% 18% 11%
6	F	255	84% 10% 6%
7	G	246	87% 13%
8	H	277	68% 11% 21%

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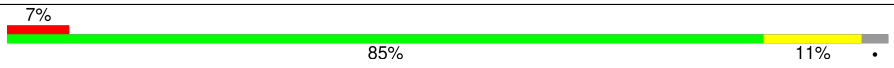
Mol	Chain	Length	Quality of chain
9	I	205	
10	J	201	
11	c	288	
12	d	264	
13	e	141	

2 Entry composition

There are 13 unique types of molecules in this entry. The entry contains 21689 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 Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	233	1800	1153	308	333	6	0	0

- Molecule 2 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	251	1933	1226	337	360	10	0	0

- Molecule 3 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	238	1792	1133	325	329	5	0	0

- Molecule 4 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	232	1708	1081	288	328	11	0	0

- Molecule 5 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	235	1816	1147	329	328	12	0	0

- Molecule 6 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	239	1832	1164	316	341	11	0	0

- Molecule 7 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	245	Total	C	N	O	S	0	0
			1873	1194	318	349	12		

- Molecule 8 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	219	Total	C	N	O	S	0	0
			1596	1010	271	305	10		

- Molecule 9 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	175	Total	C	N	O	S	0	0
			1331	856	222	239	14		

- Molecule 10 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	168	Total	C	N	O	S	0	0
			1222	786	205	224	7		

- Molecule 11 is a protein called Proteasome assembly chaperone 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	c	279	Total	C	N	O	S	0	0
			2092	1347	350	378	17		

- Molecule 12 is a protein called Proteasome assembly chaperone 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	d	247	Total	C	N	O	S	0	0
			1907	1232	311	350	14		

- Molecule 13 is a protein called Proteasome maturation protein.

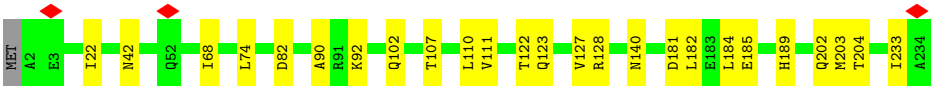
Mol	Chain	Residues	Atoms					AltConf	Trace
13	e	99	Total	C	N	O	S	0	0
			787	500	132	151	4		

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.

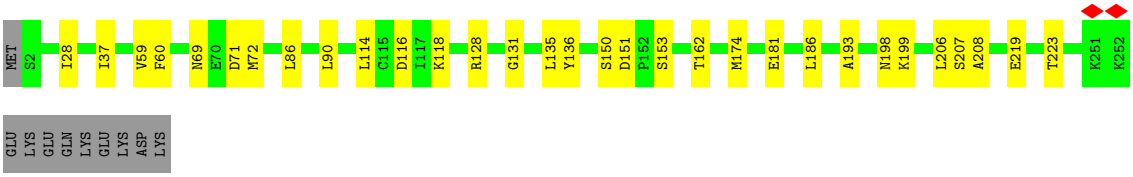
• Molecule 1: Proteasome subunit alpha type-2

Chain A:



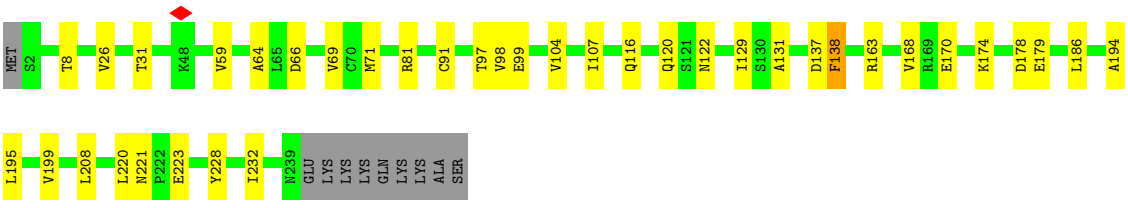
• Molecule 2: Proteasome subunit alpha type-4

Chain B:



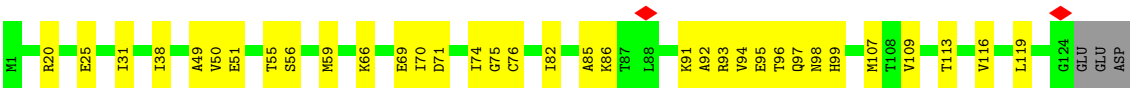
• Molecule 3: Proteasome subunit alpha type-7

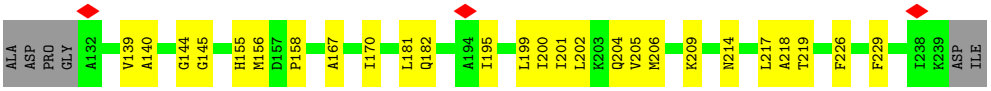
Chain C:



• Molecule 4: Proteasome subunit alpha type-5

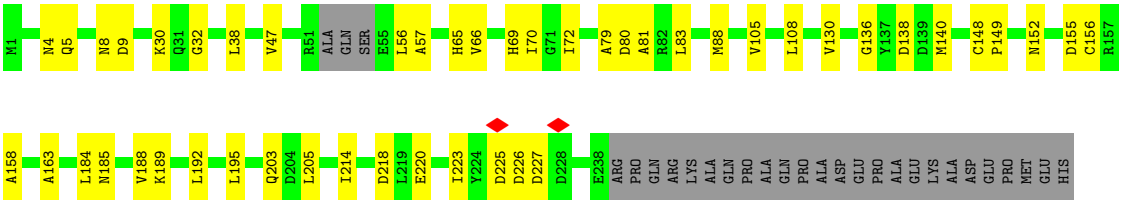
Chain D:





• Molecule 5: Proteasome subunit alpha type-1

Chain E:

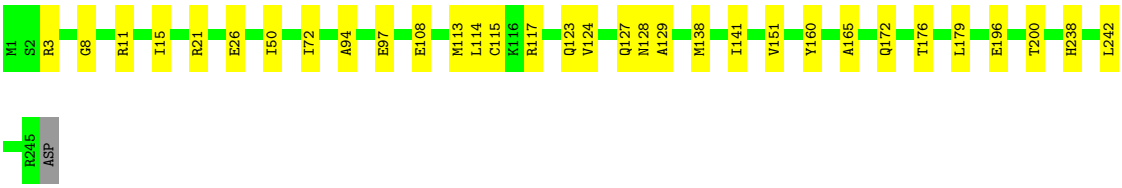


• Molecule 6: Proteasome subunit alpha type-3

Chain F:

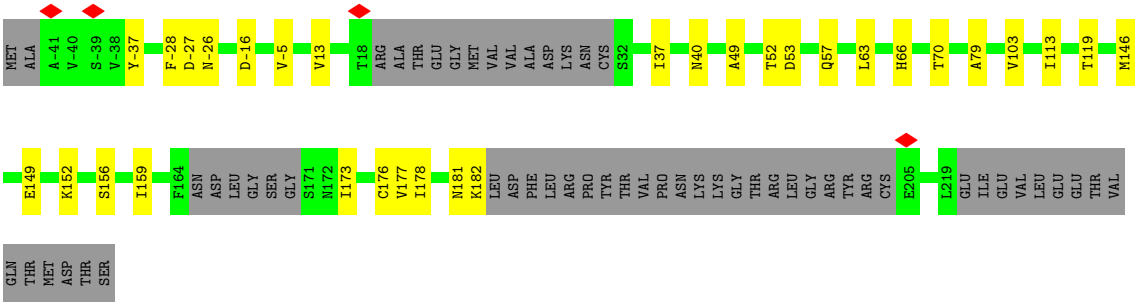
• Molecule 7: Proteasome subunit alpha type-6

Chain G:



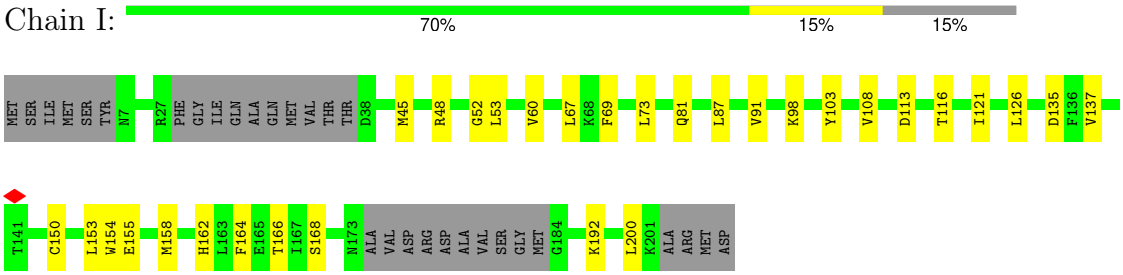
• Molecule 8: Proteasome subunit beta type-7

Chain H:



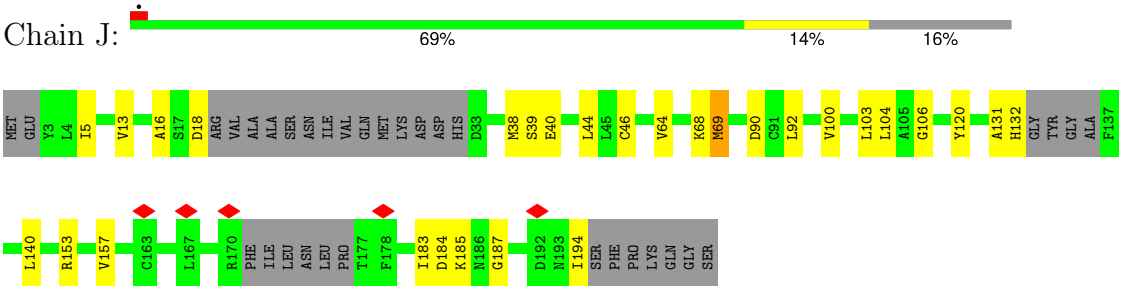
• Molecule 9: Proteasome subunit beta type-3

Chain I:



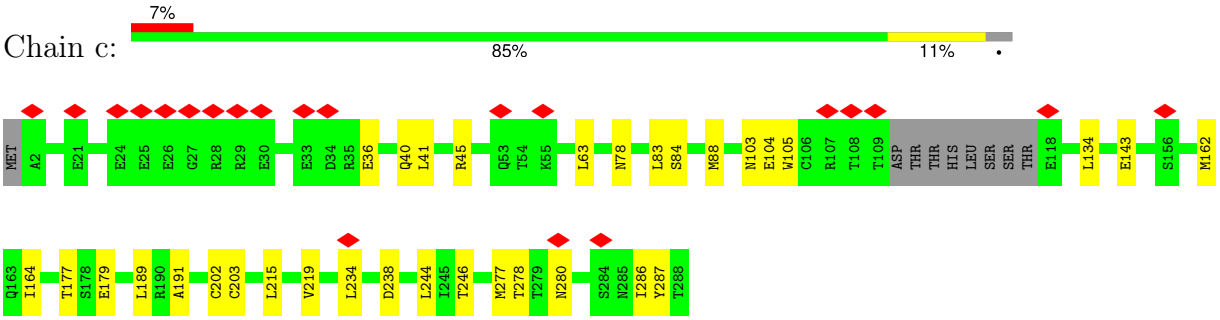
• Molecule 10: Proteasome subunit beta type-2

Chain J:



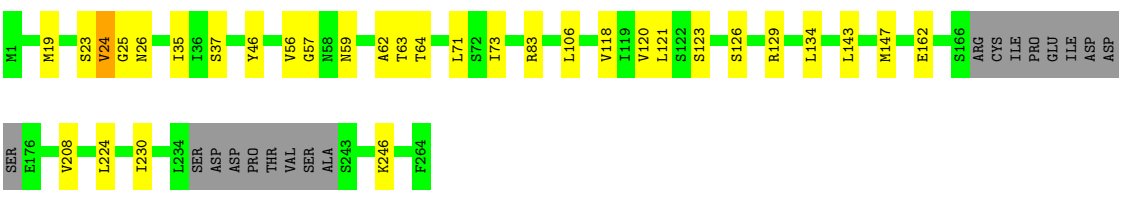
• Molecule 11: Proteasome assembly chaperone 1

Chain c:



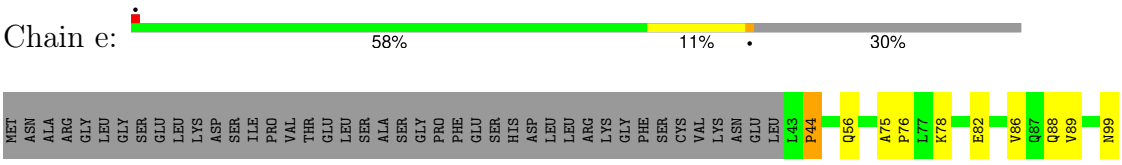
• Molecule 12: Proteasome assembly chaperone 2

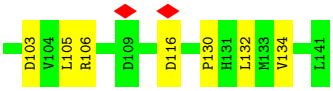
Chain d:



• Molecule 13: Proteasome maturation protein

Chain e:




D103
V104
L105
R106
D109
D116
P130
H131
L132
M133
V134
L141

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	44644	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 ($e^-/Å^2$)	30	Depositor
Minimum defocus (nm)	1700	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	34.712	Depositor
Minimum map value	-15.962	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	7	Depositor
Map size (Å)	423.99997, 423.99997, 423.99997	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality

5.1 Standard geometry

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	0.14	0/1839	0.34	0/2493
2	B	0.14	0/1963	0.35	0/2651
3	C	0.14	0/1818	0.34	0/2467
4	D	0.15	0/1735	0.34	0/2354
5	E	0.13	0/1850	0.36	0/2501
6	F	0.14	0/1867	0.33	0/2519
7	G	0.14	0/1907	0.35	0/2581
8	H	0.14	0/1621	0.37	0/2200
9	I	0.16	0/1355	0.34	0/1831
10	J	0.16	0/1242	0.37	0/1691
11	c	0.14	0/2137	0.38	0/2916
12	d	0.14	0/1949	0.38	0/2644
13	e	0.25	0/801	0.56	1/1081 (0.1%)
All	All	0.15	0/22084	0.36	1/29929 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
13	e	44	PRO	CA-N-CD	-11.50	95.89	112.00

There are no chirality outliers.

There are no planarity outliers.

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	1800	0	1792	20	0
2	B	1933	0	1923	24	0
3	C	1792	0	1757	28	0
4	D	1708	0	1639	44	0
5	E	1816	0	1797	35	0
6	F	1832	0	1791	20	0
7	G	1873	0	1870	26	0
8	H	1596	0	1577	26	0
9	I	1331	0	1327	23	0
10	J	1222	0	1145	24	0
11	c	2092	0	2023	21	0
12	d	1907	0	1916	22	0
13	e	787	0	780	14	0
All	All	21689	0	21337	306	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 7.

All (306) 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)
10:J:184:ASP:OD1	10:J:185:LYS:N	2.06	0.87
8:H:-27:ASP:OD1	8:H:-26:ASN:N	2.14	0.81
3:C:170:GLU:OE2	3:C:174:LYS:NZ	2.13	0.80
1:A:68:ILE:HD11	1:A:74:LEU:HD22	1.67	0.77
3:C:8:THR:OG1	3:C:122:ASN:OD1	2.03	0.77
4:D:206:MET:HE2	4:D:206:MET:HA	1.67	0.76
1:A:202:GLN:OE1	1:A:204:THR:OG1	2.03	0.75
6:F:164:CYS:SG	6:F:165:ALA:N	2.60	0.74
4:D:31:ILE:HD13	4:D:140:ALA:HB2	1.70	0.74
7:G:11:ARG:NH2	12:d:126:SER:OG	2.21	0.73
13:e:56:GLN:OE1	13:e:106:ARG:NH1	2.21	0.73
12:d:162:GLU:N	12:d:162:GLU:OE2	2.21	0.72
6:F:171:GLN:OE1	6:F:175:THR:HG23	1.89	0.71
12:d:59:ASN:OD1	12:d:62:ALA:N	2.23	0.70
1:A:128:ARG:O	7:G:127:GLN:NE2	2.24	0.70
2:B:86:LEU:HD22	2:B:114:LEU:HD11	1.71	0.70
7:G:165:ALA:HB1	7:G:179:LEU:HD13	1.71	0.70
4:D:199:LEU:HD21	4:D:217:LEU:CD1	2.21	0.69
7:G:172:GLN:O	7:G:176:THR:HG23	1.91	0.69
7:G:108:GLU:N	7:G:108:GLU:OE2	2.25	0.69
7:G:8:GLY:O	7:G:15:ILE:HD11	1.92	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:120:VAL:O	6:F:124:THR:HG23	1.92	0.67
4:D:199:LEU:HD21	4:D:217:LEU:HD11	1.75	0.66
9:I:81:GLN:N	9:I:81:GLN:OE1	2.28	0.66
3:C:178:ASP:OD1	3:C:179:GLU:N	2.29	0.66
11:c:143:GLU:OE1	11:c:143:GLU:N	2.28	0.65
4:D:20:ARG:NH2	4:D:25:GLU:OE1	2.30	0.65
8:H:63:LEU:HD11	8:H:79:ALA:HB2	1.79	0.65
3:C:31:THR:OG1	3:C:163:ARG:O	2.15	0.64
5:E:4:ASN:OD1	5:E:5:GLN:N	2.30	0.64
12:d:126:SER:O	12:d:129:ARG:NE	2.31	0.64
10:J:153:ARG:O	10:J:157:VAL:HG23	1.98	0.64
6:F:182:MET:SD	6:F:182:MET:N	2.71	0.64
4:D:70:ILE:HD11	4:D:76:CYS:SG	2.37	0.64
4:D:70:ILE:HG23	4:D:93:ARG:HG3	1.80	0.64
2:B:71:ASP:OD1	2:B:223:THR:OG1	2.11	0.64
13:e:44:PRO:HD2	13:e:44:PRO:O	1.98	0.64
8:H:66:HIS:O	8:H:70:THR:HG23	1.98	0.63
7:G:128:ASN:OD1	7:G:129:ALA:N	2.31	0.63
7:G:21:ARG:NH2	7:G:26:GLU:OE1	2.32	0.62
1:A:68:ILE:CD1	1:A:74:LEU:HD22	2.30	0.61
5:E:220:GLU:N	5:E:220:GLU:OE2	2.33	0.61
6:F:60:GLU:OE2	6:F:61:GLU:N	2.34	0.59
6:F:38:ILE:HD12	6:F:197:ILE:HG21	1.85	0.59
8:H:37:ILE:HG22	8:H:63:LEU:HD12	1.85	0.58
13:e:78:LYS:O	13:e:82:GLU:HG3	2.02	0.58
6:F:127:SER:O	7:G:3:ARG:NH2	2.36	0.58
1:A:92:LYS:NZ	13:e:116:ASP:OD2	2.36	0.58
2:B:186:LEU:HD23	2:B:186:LEU:O	2.04	0.58
3:C:195:LEU:O	3:C:199:VAL:N	2.32	0.57
6:F:214:LEU:HD12	6:F:233:ARG:HG3	1.86	0.57
1:A:189:HIS:HB3	1:A:233:ILE:HD11	1.86	0.57
2:B:151:ASP:OD1	2:B:153:SER:N	2.38	0.57
2:B:219:GLU:N	2:B:219:GLU:OE2	2.38	0.57
2:B:135:LEU:HD11	2:B:162:THR:HG23	1.87	0.57
9:I:87:LEU:O	9:I:91:VAL:HG23	2.05	0.56
5:E:185:ASN:O	5:E:189:LYS:HG3	2.05	0.56
9:I:150:CYS:O	9:I:154:TRP:N	2.36	0.56
6:F:40:ILE:HD12	6:F:194:VAL:HG23	1.87	0.56
8:H:49:ALA:O	8:H:52:THR:HG22	2.06	0.56
8:H:181:ASN:OD1	8:H:182:LYS:N	2.38	0.56
11:c:63:LEU:HD13	11:c:162:MET:HE1	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:d:83:ARG:NH2	12:d:230:ILE:O	2.39	0.55
6:F:9:ASP:OD1	6:F:9:ASP:N	2.38	0.55
5:E:225:ASP:OD1	5:E:226:ASP:N	2.34	0.55
7:G:113:MET:HE2	8:H:70:THR:HG22	1.88	0.55
4:D:116:VAL:HG13	4:D:156:MET:HE3	1.88	0.55
2:B:114:LEU:HD12	2:B:114:LEU:O	2.07	0.55
3:C:91:CYS:SG	3:C:107:ILE:HD13	2.47	0.55
12:d:46:TYR:HB3	12:d:73:ILE:HD11	1.88	0.55
1:A:22:ILE:HD11	1:A:122:THR:HG23	1.89	0.55
4:D:51:GLU:CG	4:D:51:GLU:O	2.54	0.55
8:H:-5:VAL:HG22	9:I:126:LEU:HD21	1.89	0.55
3:C:66:ASP:C	10:J:69:MET:HE1	2.32	0.55
2:B:174:MET:HE1	2:B:199:LYS:CB	2.36	0.55
2:B:186:LEU:HD23	2:B:186:LEU:C	2.33	0.54
5:E:56:LEU:O	5:E:57:ALA:HB3	2.06	0.54
2:B:181:GLU:N	2:B:181:GLU:OE2	2.40	0.54
2:B:174:MET:HE1	2:B:199:LYS:HB2	1.89	0.54
10:J:39:SER:OG	10:J:40:GLU:N	2.40	0.54
3:C:69:VAL:HG23	3:C:104:VAL:HG22	1.90	0.54
4:D:167:ALA:HB1	4:D:181:LEU:HD21	1.89	0.54
11:c:280:ASN:C	11:c:280:ASN:OD1	2.51	0.54
2:B:135:LEU:HD11	2:B:162:THR:CG2	2.38	0.54
5:E:138:ASP:O	5:E:140:MET:N	2.40	0.54
4:D:74:ILE:HD11	4:D:109:VAL:HG22	1.90	0.54
12:d:23:SER:O	12:d:24:VAL:C	2.51	0.53
9:I:164:PHE:CZ	9:I:200:LEU:HD11	2.44	0.53
1:A:202:GLN:NE2	1:A:203:MET:O	2.42	0.53
8:H:159:ILE:HG21	8:H:173:ILE:HG21	1.89	0.53
9:I:45:MET:HE2	9:I:45:MET:HA	1.89	0.53
2:B:114:LEU:HD23	2:B:136:TYR:OH	2.08	0.53
3:C:168:VAL:HG13	3:C:194:ALA:HB1	1.90	0.53
5:E:192:LEU:O	5:E:205:LEU:HD11	2.08	0.53
5:E:203:GLN:OE1	11:c:244:LEU:HD12	2.09	0.53
2:B:198:ASN:HB2	2:B:206:LEU:HD11	1.91	0.53
9:I:48:ARG:NH2	9:I:192:LYS:O	2.42	0.53
5:E:47:VAL:HG11	5:E:192:LEU:HD23	1.90	0.53
8:H:181:ASN:OD1	8:H:181:ASN:C	2.51	0.53
8:H:49:ALA:O	8:H:53:ASP:OD1	2.25	0.53
8:H:-37:TYR:CE1	13:e:132:LEU:HD21	2.44	0.52
8:H:-27:ASP:OD1	8:H:-27:ASP:C	2.51	0.52
12:d:143:LEU:HD22	12:d:147:MET:HG2	1.90	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:118:LYS:NZ	2:B:150:SER:OG	2.43	0.52
2:B:151:ASP:OD1	2:B:151:ASP:C	2.51	0.52
8:H:113:ILE:HD13	8:H:119:THR:HG22	1.91	0.52
5:E:79:ALA:O	5:E:83:LEU:HD12	2.09	0.52
10:J:104:LEU:C	10:J:104:LEU:HD23	2.35	0.52
1:A:102:GLN:NE2	8:H:57:GLN:OE1	2.41	0.52
2:B:90:LEU:HG	2:B:114:LEU:HD22	1.92	0.52
11:c:238:ASP:OD1	11:c:238:ASP:N	2.41	0.52
9:I:168:SER:HB2	9:I:200:LEU:HD12	1.91	0.52
3:C:97:THR:HG23	3:C:98:VAL:HG23	1.92	0.51
7:G:50:ILE:HG23	7:G:141:ILE:HD13	1.92	0.51
3:C:66:ASP:CA	10:J:69:MET:HE1	2.39	0.51
9:I:113:ASP:OD2	9:I:116:THR:OG1	2.20	0.51
5:E:47:VAL:HG12	5:E:195:LEU:CD1	2.40	0.51
9:I:69:PHE:CZ	9:I:73:LEU:HD11	2.46	0.51
9:I:98:LYS:NZ	9:I:103:TYR:OH	2.43	0.51
4:D:31:ILE:HD11	4:D:158:PRO:HD3	1.91	0.51
11:c:177:THR:HG23	11:c:179:GLU:O	2.11	0.51
12:d:25:GLY:O	12:d:26:ASN:ND2	2.44	0.51
5:E:30:LYS:HB2	5:E:30:LYS:NZ	2.27	0.50
5:E:81:ALA:HB2	5:E:130:VAL:HG21	1.93	0.50
4:D:75:GLY:O	4:D:144:GLY:N	2.45	0.50
12:d:134:LEU:C	12:d:134:LEU:HD23	2.37	0.50
4:D:209:LYS:O	4:D:214:ASN:ND2	2.41	0.49
7:G:238:HIS:O	7:G:242:LEU:HD23	2.11	0.49
12:d:57:GLY:O	12:d:71:LEU:HD12	2.13	0.49
2:B:28:ILE:HD11	2:B:131:GLY:C	2.37	0.49
2:B:59:VAL:HG13	2:B:60:PHE:CD1	2.48	0.49
5:E:72:ILE:HG21	5:E:88:MET:HE1	1.94	0.49
5:E:152:ASN:OD1	5:E:152:ASN:C	2.55	0.49
11:c:286:ILE:HG23	11:c:287:TYR:CD2	2.48	0.48
10:J:90:ASP:C	10:J:90:ASP:OD1	2.56	0.48
10:J:184:ASP:OD1	10:J:184:ASP:C	2.56	0.48
5:E:65:HIS:HB2	5:E:223:ILE:HD11	1.96	0.48
5:E:148:CYS:SG	5:E:149:PRO:HD2	2.54	0.48
6:F:171:GLN:OE1	6:F:171:GLN:O	2.31	0.48
13:e:89:VAL:HG13	13:e:89:VAL:O	2.12	0.48
7:G:113:MET:CE	8:H:70:THR:HG22	2.43	0.48
6:F:47:VAL:HG11	6:F:191:VAL:HA	1.95	0.48
5:E:184:LEU:HD11	5:E:214:ILE:HG21	1.94	0.48
12:d:56:VAL:HB	12:d:71:LEU:HD11	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:59:VAL:HG13	3:C:59:VAL:O	2.13	0.48
7:G:50:ILE:CG2	7:G:141:ILE:HG21	2.44	0.48
12:d:123:SER:HG	12:d:208:VAL:HG12	1.78	0.48
1:A:181:ASP:OD1	1:A:181:ASP:O	2.30	0.48
4:D:195:ILE:HD11	4:D:219:THR:HG21	1.94	0.48
9:I:164:PHE:CE1	9:I:200:LEU:HD11	2.48	0.48
11:c:277:MET:HE3	11:c:278:THR:N	2.28	0.48
12:d:19:MET:HB2	12:d:120:VAL:HG22	1.96	0.48
4:D:85:ALA:HB2	4:D:139:VAL:HG21	1.96	0.48
3:C:26:VAL:HG22	3:C:129:ILE:HA	1.96	0.48
3:C:208:LEU:HD22	3:C:220:LEU:HD12	1.96	0.48
5:E:158:ALA:O	6:F:58:LEU:HD12	2.14	0.48
6:F:38:ILE:HD12	6:F:197:ILE:CG2	2.44	0.48
9:I:158:MET:HE3	9:I:166:THR:HG21	1.96	0.48
12:d:63:THR:HG23	12:d:64:THR:HG23	1.96	0.47
7:G:72:ILE:HD12	7:G:72:ILE:N	2.29	0.47
8:H:176:CYS:SG	8:H:178:ILE:HD11	2.53	0.47
5:E:226:ASP:OD1	5:E:227:ASP:N	2.45	0.47
8:H:13:VAL:HG13	8:H:177:VAL:HG22	1.95	0.47
6:F:9:ASP:O	6:F:23:GLN:NE2	2.39	0.47
5:E:188:VAL:O	5:E:192:LEU:HG	2.15	0.47
6:F:117:ALA:HB2	6:F:152:ILE:HD12	1.97	0.47
10:J:184:ASP:O	10:J:187:GLY:N	2.48	0.47
3:C:69:VAL:CG2	3:C:104:VAL:HG22	2.45	0.47
9:I:153:LEU:O	9:I:153:LEU:HD23	2.15	0.47
10:J:18:ASP:C	10:J:18:ASP:OD1	2.58	0.47
7:G:97:GLU:OE1	7:G:117:ARG:NE	2.46	0.47
8:H:-37:TYR:HE1	13:e:132:LEU:HD21	1.78	0.47
3:C:228:TYR:O	3:C:232:ILE:HG13	2.15	0.47
7:G:72:ILE:HG21	7:G:114:LEU:HD21	1.97	0.47
11:c:277:MET:SD	11:c:277:MET:C	2.97	0.47
2:B:116:ASP:OD1	3:C:81:ARG:NH1	2.47	0.46
4:D:74:ILE:CD1	4:D:109:VAL:HG22	2.45	0.46
2:B:37:ILE:HD12	2:B:193:ALA:HB2	1.97	0.46
3:C:137:ASP:O	3:C:138:PHE:CB	2.63	0.46
4:D:94:VAL:O	4:D:98:ASN:OD1	2.32	0.46
8:H:13:VAL:HG11	8:H:152:LYS:HA	1.98	0.46
13:e:86:VAL:HG11	13:e:105:LEU:HD12	1.98	0.46
7:G:165:ALA:HB1	7:G:179:LEU:CD1	2.40	0.46
1:A:82:ASP:OD1	7:G:123:GLN:NE2	2.45	0.46
4:D:91:LYS:HB2	4:D:119:LEU:HD22	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:J:5:ILE:O	10:J:16:ALA:N	2.48	0.46
5:E:4:ASN:OD1	5:E:4:ASN:C	2.59	0.46
7:G:115:CYS:SG	7:G:160:TYR:HB2	2.55	0.46
5:E:66:VAL:HG21	5:E:88:MET:HB3	1.97	0.46
8:H:146:MET:HE2	8:H:146:MET:HA	1.98	0.45
5:E:69:HIS:CE1	5:E:70:ILE:HD11	2.52	0.45
6:F:69:ASN:OD1	6:F:69:ASN:N	2.49	0.45
3:C:71:MET:HE3	3:C:131:ALA:HB1	1.98	0.45
4:D:71:ASP:OD2	4:D:96:THR:OG1	2.30	0.45
10:J:13:VAL:HG23	10:J:183:ILE:HG12	1.99	0.45
11:c:215:LEU:O	11:c:219:VAL:HG23	2.16	0.45
4:D:49:ALA:HB1	4:D:202:LEU:HD11	1.98	0.45
3:C:178:ASP:OD1	3:C:178:ASP:C	2.59	0.45
1:A:123:GLN:OE1	2:B:128:ARG:NH2	2.50	0.45
3:C:179:GLU:O	3:C:186:LEU:HD13	2.17	0.45
7:G:196:GLU:HA	7:G:242:LEU:HD21	1.98	0.45
10:J:44:LEU:C	10:J:44:LEU:HD23	2.41	0.45
6:F:38:ILE:HD11	6:F:177:ILE:HD11	1.99	0.45
8:H:149:GLU:OE2	8:H:149:GLU:N	2.47	0.45
11:c:202:CYS:O	11:c:202:CYS:SG	2.75	0.45
9:I:67:LEU:HD22	9:I:91:VAL:HG22	1.99	0.45
5:E:38:LEU:N	5:E:38:LEU:HD23	2.32	0.44
4:D:113:THR:HA	4:D:116:VAL:HG12	1.99	0.44
5:E:32:GLY:O	5:E:163:ALA:N	2.50	0.44
5:E:80:ASP:OD1	5:E:80:ASP:N	2.50	0.44
4:D:70:ILE:HD12	4:D:70:ILE:H	1.83	0.44
4:D:97:GLN:C	4:D:97:GLN:OE1	2.60	0.44
4:D:201:ILE:O	4:D:205:VAL:HG22	2.18	0.44
11:c:84:SER:HA	11:c:88:MET:HG2	2.00	0.44
1:A:90:ALA:HB1	1:A:110:LEU:HD11	1.99	0.44
10:J:194:ILE:HD13	10:J:194:ILE:HA	1.92	0.44
10:J:131:ALA:HB3	10:J:140:LEU:HG	1.99	0.44
1:A:184:LEU:O	1:A:185:GLU:HB2	2.17	0.44
10:J:68:LYS:HD2	10:J:68:LYS:C	2.42	0.44
1:A:189:HIS:CB	1:A:233:ILE:HD11	2.47	0.44
3:C:221:ASN:OD1	3:C:223:GLU:N	2.50	0.44
5:E:218:ASP:OD1	5:E:218:ASP:C	2.61	0.44
7:G:141:ILE:HG22	7:G:151:VAL:HG22	2.00	0.44
5:E:47:VAL:HG12	5:E:195:LEU:HD12	1.98	0.44
4:D:50:VAL:HG11	4:D:66:LYS:HB2	1.99	0.43
9:I:135:ASP:OD1	9:I:135:ASP:N	2.50	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:c:41:LEU:C	11:c:41:LEU:HD23	2.43	0.43
11:c:78:ASN:OD1	11:c:246:THR:OG1	2.36	0.43
11:c:162:MET:SD	11:c:164:ILE:HD11	2.58	0.43
13:e:75:ALA:HB3	13:e:76:PRO:HD3	1.99	0.43
13:e:86:VAL:HG11	13:e:105:LEU:CD1	2.48	0.43
9:I:121:ILE:HD12	9:I:137:VAL:HG13	2.01	0.43
12:d:123:SER:OG	12:d:208:VAL:HG12	2.19	0.43
3:C:64:ALA:C	10:J:69:MET:HE3	2.44	0.43
3:C:116:GLN:O	3:C:120:GLN:HG2	2.19	0.43
6:F:40:ILE:HD12	6:F:194:VAL:CG2	2.49	0.43
8:H:-16:ASP:OD1	8:H:-16:ASP:C	2.62	0.43
1:A:42:ASN:OD1	1:A:184:LEU:N	2.43	0.43
5:E:8:ASN:OD1	5:E:8:ASN:C	2.61	0.43
5:E:88:MET:HG2	5:E:108:LEU:HD11	2.00	0.43
9:I:154:TRP:CE2	9:I:155:GLU:O	2.72	0.43
12:d:37:SER:OG	12:d:246:LYS:O	2.37	0.43
4:D:95:GLU:OE2	4:D:95:GLU:HA	2.19	0.43
11:c:36:GLU:O	11:c:40:GLN:NE2	2.47	0.43
13:e:99:ASN:O	13:e:103:ASP:OD2	2.37	0.43
4:D:55:THR:HG22	4:D:59:MET:SD	2.59	0.42
4:D:200:ILE:HG22	4:D:204:GLN:NE2	2.33	0.42
11:c:83:LEU:HD21	11:c:134:LEU:HD22	2.01	0.42
4:D:99:HIS:CG	4:D:107:MET:SD	3.12	0.42
12:d:19:MET:CE	12:d:106:LEU:HD22	2.49	0.42
1:A:107:THR:O	1:A:111:VAL:HG23	2.19	0.42
7:G:50:ILE:O	7:G:50:ILE:HG13	2.17	0.42
7:G:94:ALA:HB2	7:G:138:MET:HE1	2.01	0.42
7:G:196:GLU:O	7:G:200:THR:HG22	2.19	0.42
9:I:53:LEU:HB2	9:I:60:VAL:HG13	2.01	0.42
10:J:92:LEU:HD22	10:J:120:TYR:O	2.20	0.42
11:c:191:ALA:HB2	11:c:203:CYS:SG	2.59	0.42
3:C:66:ASP:N	10:J:69:MET:HE1	2.34	0.42
7:G:124:VAL:HG11	13:e:105:LEU:HD11	2.01	0.42
5:E:8:ASN:OD1	5:E:9:ASP:N	2.53	0.42
10:J:38:MET:HB3	10:J:64:VAL:HG11	2.01	0.42
11:c:103:ASN:OD1	11:c:105:TRP:N	2.45	0.42
9:I:153:LEU:HD23	9:I:153:LEU:C	2.44	0.42
12:d:121:LEU:N	12:d:121:LEU:HD23	2.34	0.42
1:A:127:VAL:HG13	13:e:89:VAL:HG21	2.02	0.42
9:I:52:GLY:N	9:I:108:VAL:O	2.53	0.42
11:c:45:ARG:NH1	11:c:104:GLU:OE2	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:70:ILE:HG21	4:D:92:ALA:CB	2.50	0.42
4:D:200:ILE:HG22	4:D:204:GLN:HE21	1.85	0.42
4:D:217:LEU:HB3	4:D:229:PHE:HB2	2.02	0.41
8:H:156:SER:HA	8:H:159:ILE:HG22	2.01	0.41
13:e:130:PRO:O	13:e:134:VAL:HG23	2.20	0.41
4:D:70:ILE:HD13	4:D:74:ILE:HG22	2.01	0.41
4:D:82:ILE:O	4:D:86:LYS:HG2	2.20	0.41
2:B:207:SER:O	2:B:208:ALA:HB3	2.19	0.41
12:d:35:ILE:HD11	12:d:224:LEU:HD23	2.02	0.41
10:J:46:CYS:SG	10:J:100:VAL:HG13	2.61	0.41
12:d:118:VAL:HG12	12:d:118:VAL:O	2.20	0.41
3:C:66:ASP:HB3	3:C:69:VAL:HG12	2.02	0.41
4:D:38:ILE:N	4:D:49:ALA:O	2.51	0.41
4:D:99:HIS:ND1	4:D:107:MET:SD	2.93	0.41
4:D:167:ALA:HB1	4:D:181:LEU:CD2	2.51	0.41
5:E:155:ASP:OD1	5:E:156:CYS:N	2.53	0.41
1:A:181:ASP:O	1:A:182:LEU:C	2.64	0.41
5:E:56:LEU:O	5:E:57:ALA:CB	2.69	0.41
8:H:40:ASN:ND2	8:H:103:VAL:O	2.54	0.41
4:D:55:THR:HG23	4:D:56:SER:N	2.36	0.41
4:D:69:GLU:O	4:D:93:ARG:NH2	2.50	0.41
4:D:218:ALA:HB1	4:D:226:PHE:CE1	2.56	0.41
5:E:105:VAL:HG21	5:E:136:GLY:HA3	2.02	0.41
10:J:103:LEU:HD12	10:J:103:LEU:HA	1.94	0.41
4:D:155:HIS:CE1	4:D:170:ILE:HG21	2.55	0.40
3:C:98:VAL:O	3:C:99:GLU:HB3	2.21	0.40
9:I:158:MET:SD	9:I:162:HIS:ND1	2.95	0.40
10:J:103:LEU:HD13	10:J:132:HIS:CD2	2.56	0.40
1:A:107:THR:HG23	1:A:140:ASN:OD1	2.21	0.40
4:D:74:ILE:HD13	4:D:145:GLY:HA3	2.04	0.40
4:D:182:GLN:CD	4:D:182:GLN:C	2.89	0.40
6:F:98:ASN:OD1	6:F:98:ASN:C	2.64	0.40
12:d:19:MET:HE2	12:d:106:LEU:HD22	2.03	0.40
2:B:69:ASN:OD1	2:B:72:MET:N	2.54	0.40
8:H:-28:PHE:N	8:H:-28:PHE:CD1	2.89	0.40
10:J:106:GLY:HA2	10:J:183:ILE:HG21	2.03	0.40
3:C:107:ILE:HD12	3:C:107:ILE:HA	1.97	0.40
9:I:155:GLU:CB	9:I:158:MET:HE1	2.52	0.40
11:c:189:LEU:HA	11:c:234:LEU:O	2.22	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	231/234 (99%)	222 (96%)	9 (4%)	0	100	100
2	B	249/261 (95%)	247 (99%)	2 (1%)	0	100	100
3	C	236/248 (95%)	229 (97%)	6 (2%)	1 (0%)	30	66
4	D	228/241 (95%)	224 (98%)	4 (2%)	0	100	100
5	E	231/263 (88%)	221 (96%)	10 (4%)	0	100	100
6	F	237/255 (93%)	233 (98%)	4 (2%)	0	100	100
7	G	243/246 (99%)	237 (98%)	6 (2%)	0	100	100
8	H	211/277 (76%)	204 (97%)	7 (3%)	0	100	100
9	I	169/205 (82%)	162 (96%)	7 (4%)	0	100	100
10	J	160/201 (80%)	157 (98%)	3 (2%)	0	100	100
11	c	275/288 (96%)	265 (96%)	10 (4%)	0	100	100
12	d	241/264 (91%)	227 (94%)	13 (5%)	1 (0%)	30	66
13	e	97/141 (69%)	92 (95%)	5 (5%)	0	100	100
All	All	2808/3124 (90%)	2720 (97%)	86 (3%)	2 (0%)	50	81

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	d	24	VAL
3	C	138	PHE

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	185/191 (97%)	185 (100%)	0	100 100
2	B	196/221 (89%)	196 (100%)	0	100 100
3	C	175/211 (83%)	175 (100%)	0	100 100
4	D	173/203 (85%)	173 (100%)	0	100 100
5	E	190/224 (85%)	190 (100%)	0	100 100
6	F	185/212 (87%)	185 (100%)	0	100 100
7	G	197/210 (94%)	197 (100%)	0	100 100
8	H	166/228 (73%)	166 (100%)	0	100 100
9	I	139/174 (80%)	139 (100%)	0	100 100
10	J	114/171 (67%)	113 (99%)	1 (1%)	75 89
11	c	218/262 (83%)	218 (100%)	0	100 100
12	d	212/237 (90%)	212 (100%)	0	100 100
13	e	90/128 (70%)	89 (99%)	1 (1%)	70 87
All	All	2240/2672 (84%)	2238 (100%)	2 (0%)	92 98

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
10	J	69	MET
13	e	88	GLN

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

Mol	Chain	Res	Type
1	A	96	GLN
1	A	109	GLN
2	B	155	ASN
3	C	23	GLN
3	C	92	GLN
4	D	182	GLN
5	E	65	HIS
5	E	146	GLN
6	F	98	ASN
6	F	102	ASN
7	G	147	GLN
7	G	238	HIS
9	I	61	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
9	I	93	ASN
10	J	63	ASN
10	J	71	ASN
10	J	189	HIS
11	c	146	GLN
13	e	99	ASN
13	e	131	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides 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.

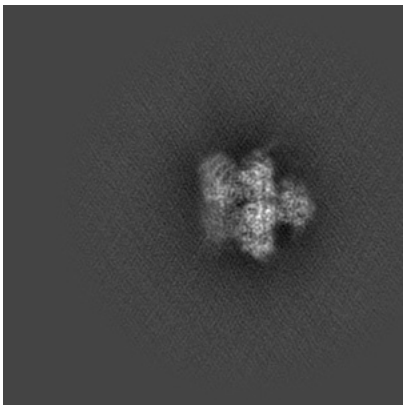
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-41379. These allow visual inspection of the internal detail of the map and identification of artifacts.

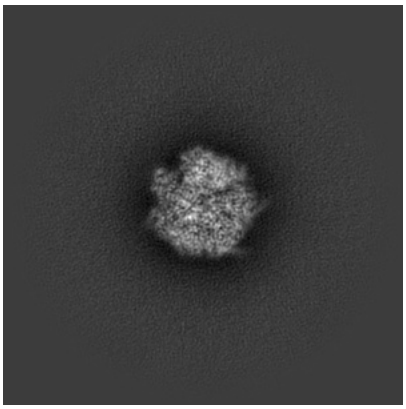
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

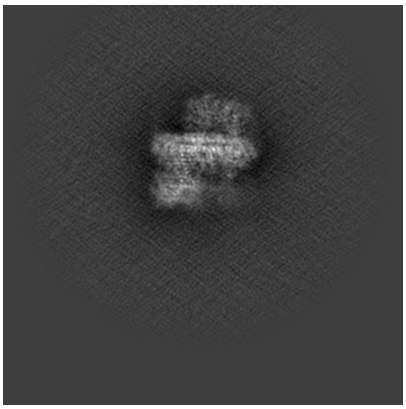
6.1.1 Primary map



X

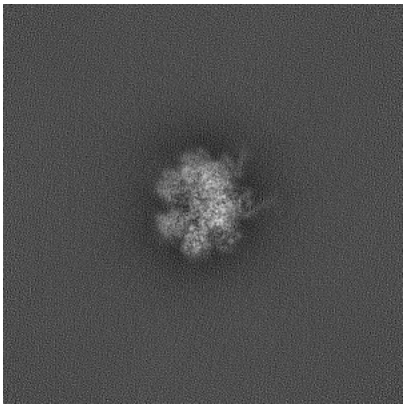


Y

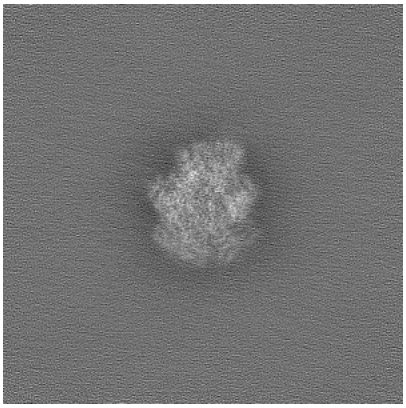


Z

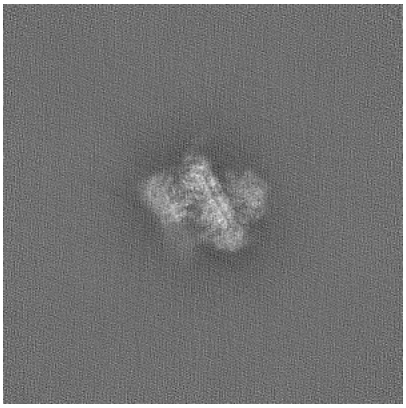
6.1.2 Raw map



X



Y

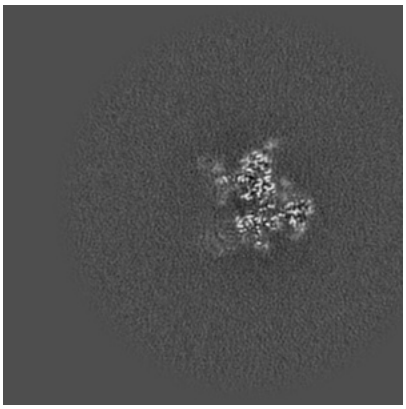


Z

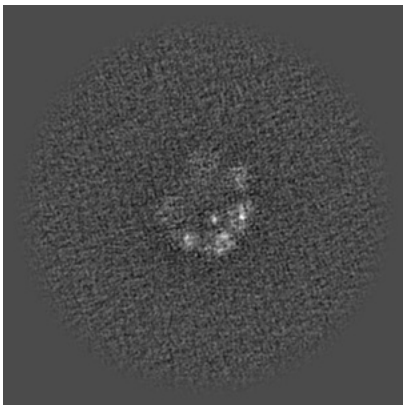
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

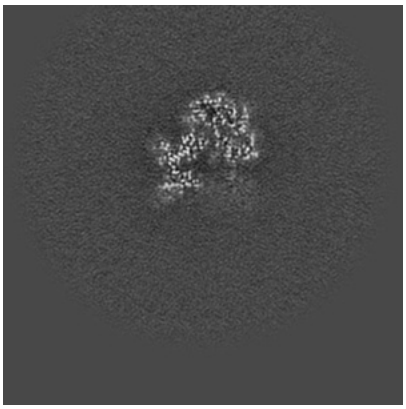
6.2.1 Primary map



X Index: 200

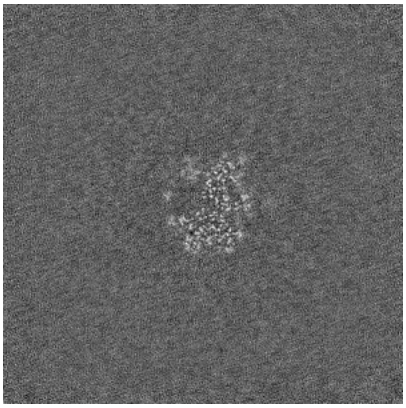


Y Index: 200

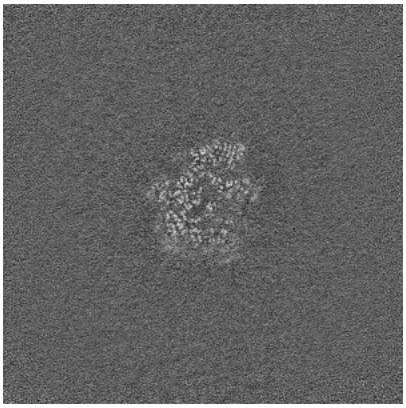


Z Index: 200

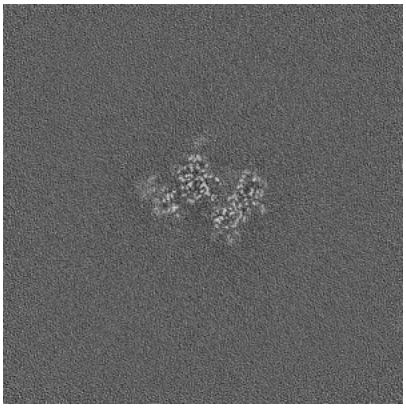
6.2.2 Raw map



X Index: 200



Y Index: 200

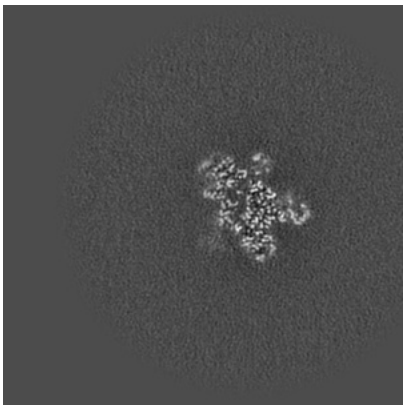


Z Index: 200

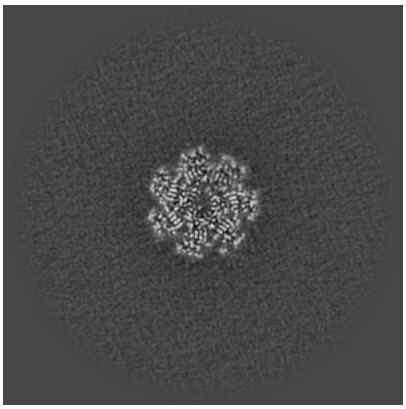
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

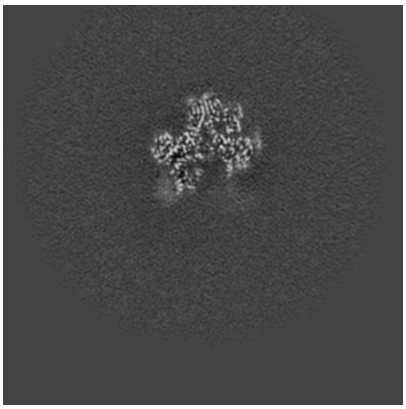
6.3.1 Primary map



X Index: 187

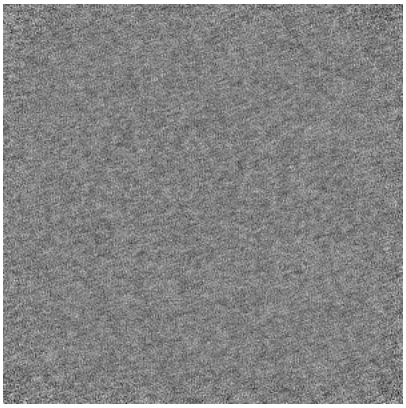


Y Index: 254

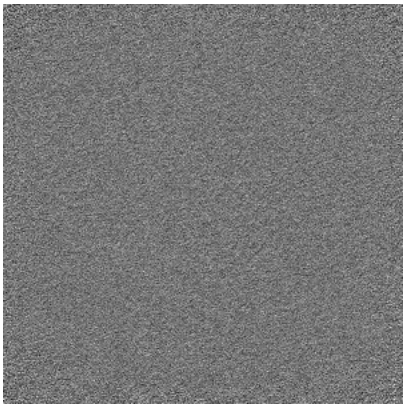


Z Index: 193

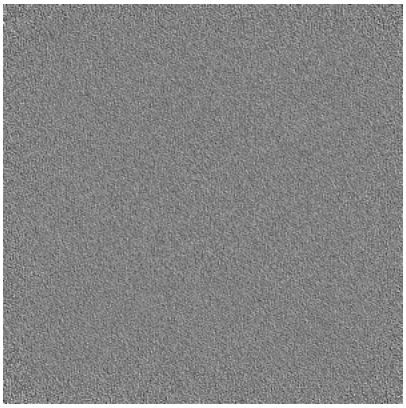
6.3.2 Raw map



X Index: 0



Y Index: 0

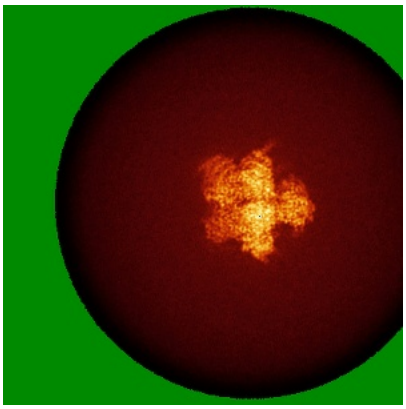


Z Index: 0

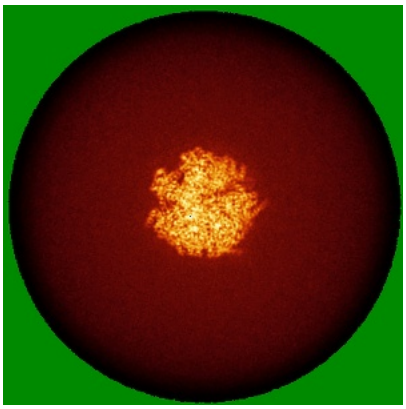
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

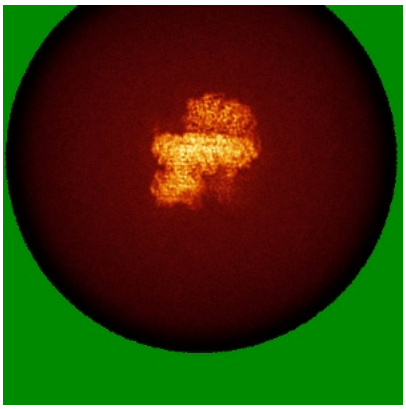
6.4.1 Primary map



X

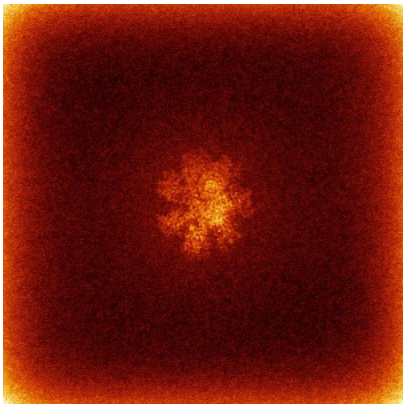


Y

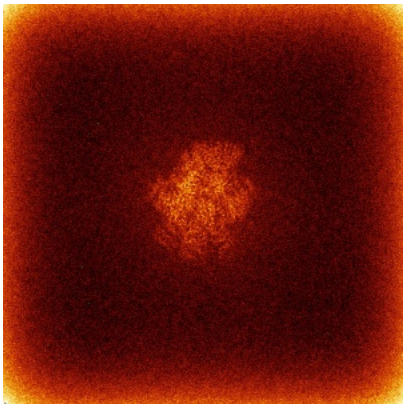


Z

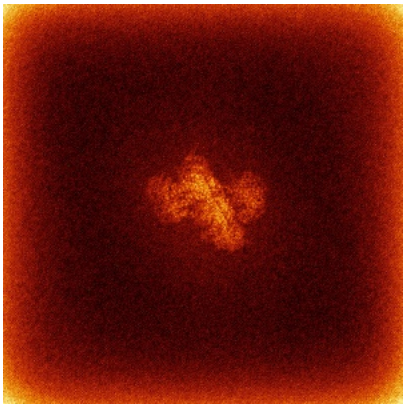
6.4.2 Raw map



X



Y

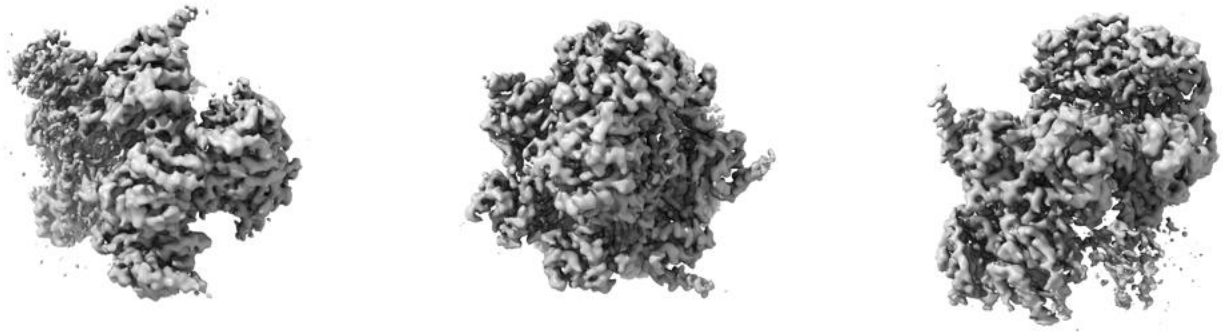


Z

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



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 7.0. 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

X Y Z

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.

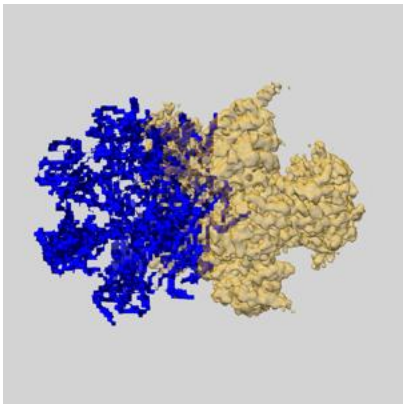
6.6 Mask visualisation (i)

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

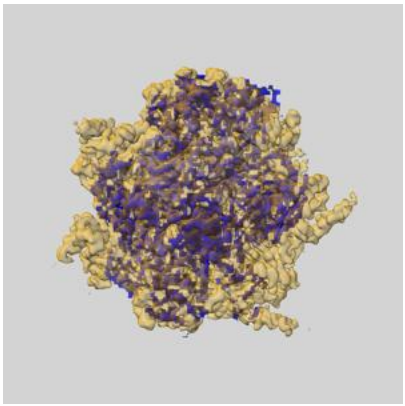
A mask typically either:

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

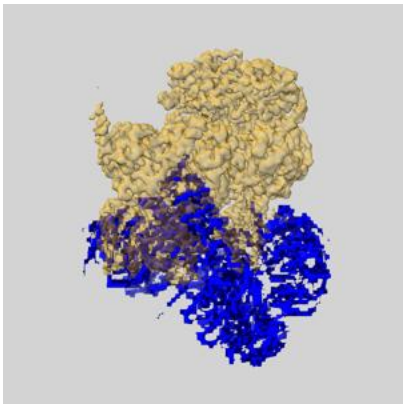
6.6.1 emd_41379_msk_1.map (i)



X



Y

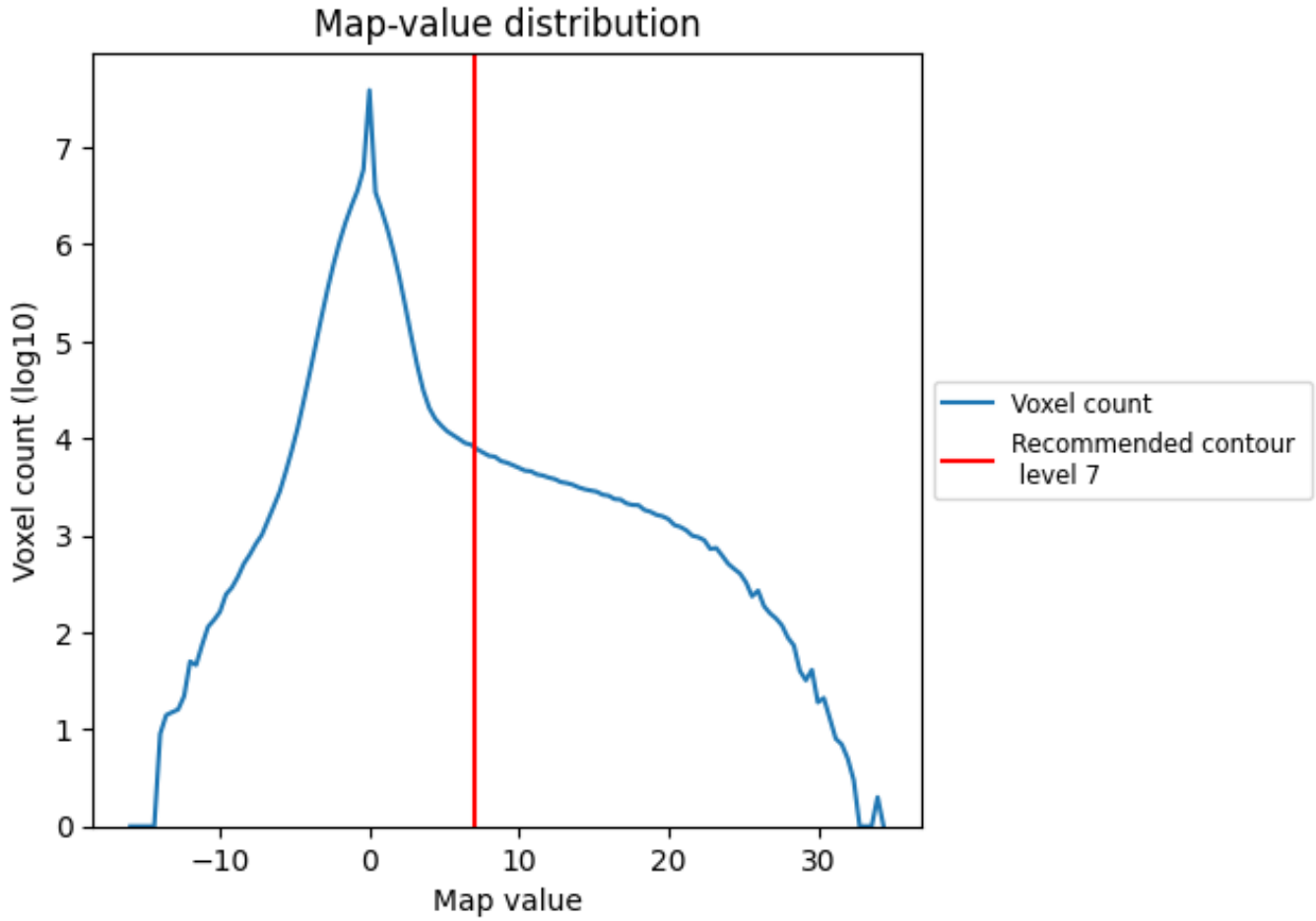


Z

7 Map analysis

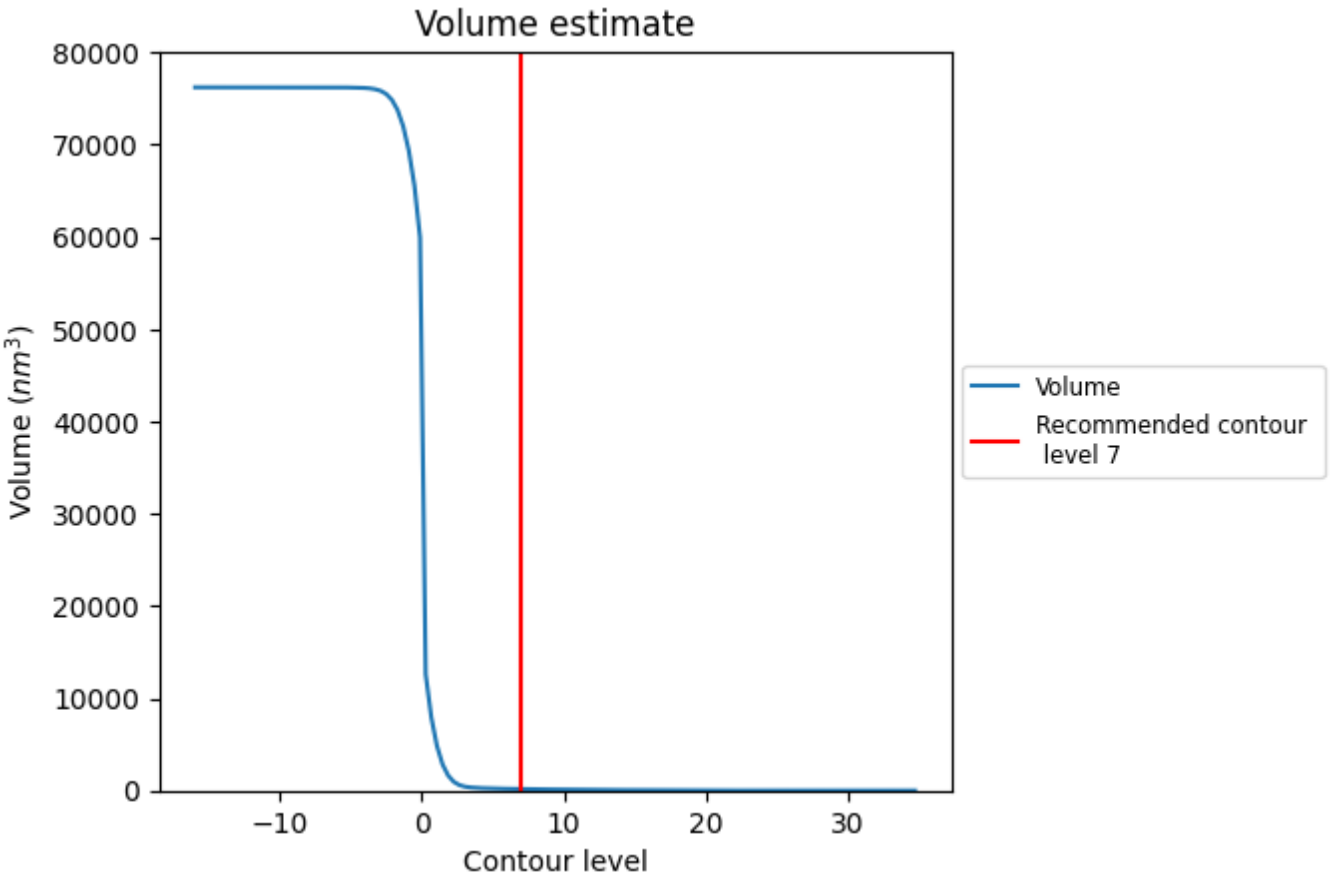
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

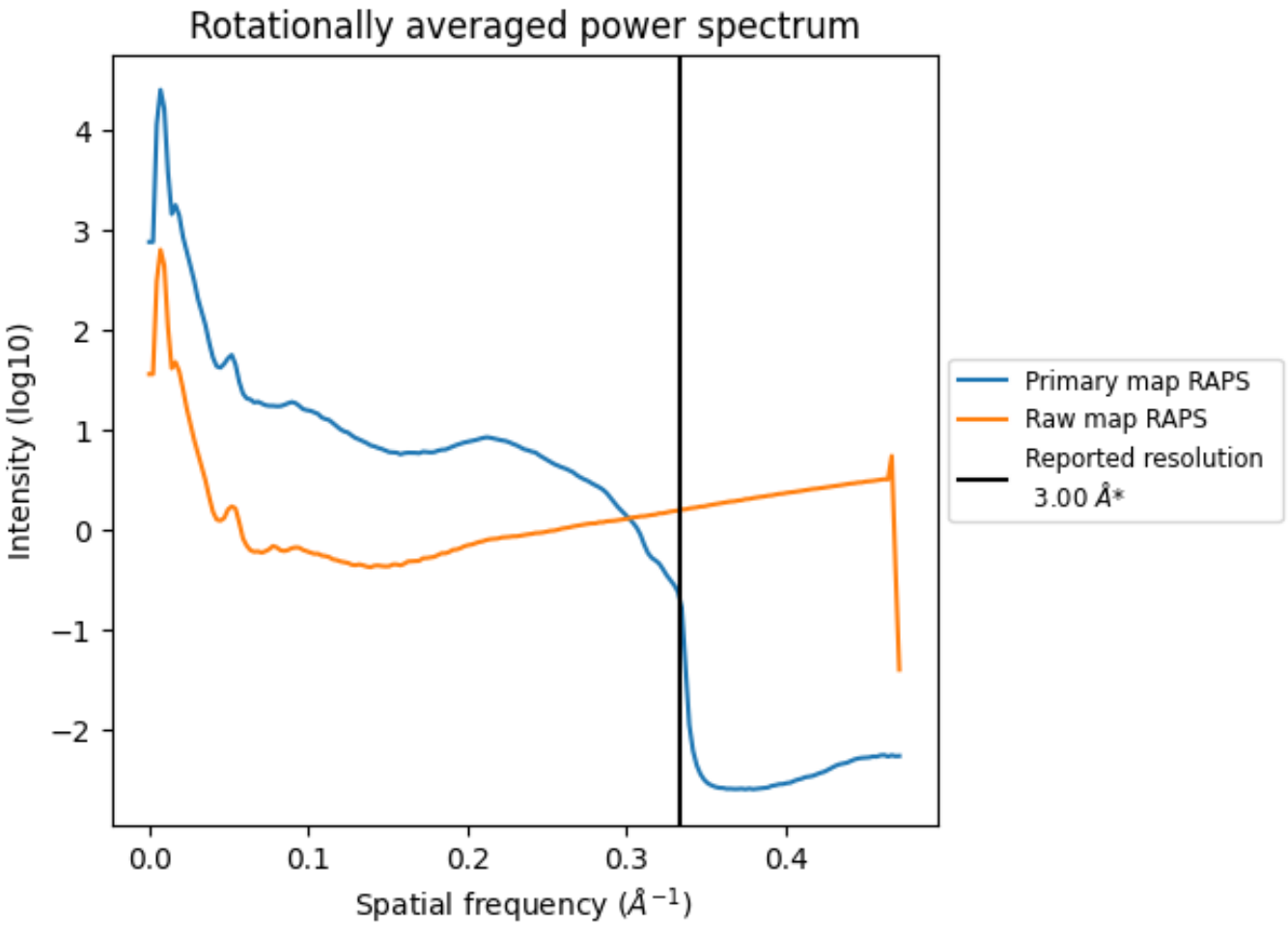
7.2 Volume estimate



The volume at the recommended contour level is 163 nm^3; this corresponds to an approximate mass of 147 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)

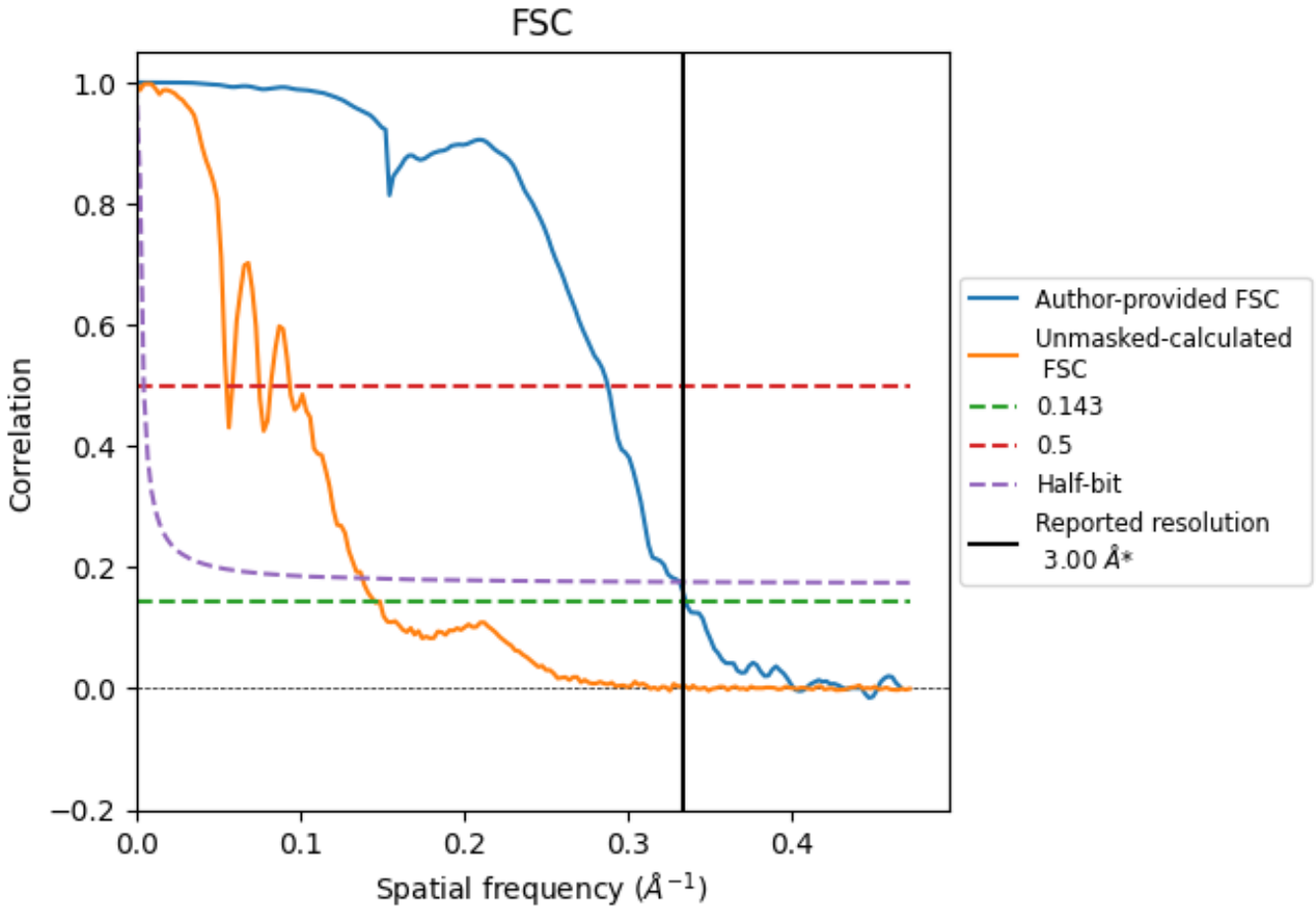


*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8.2 Resolution estimates (i)

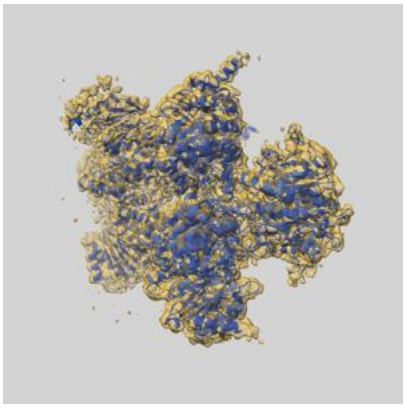
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	2.98	3.48	3.02
Unmasked-calculated*	6.86	18.15	7.25

*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 6.86 differs from the reported value 3.0 by more than 10 %

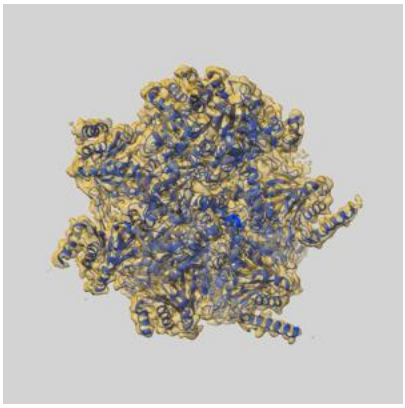
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-41379 and PDB model 8TM5. Per-residue inclusion information can be found in section 3 on page 6.

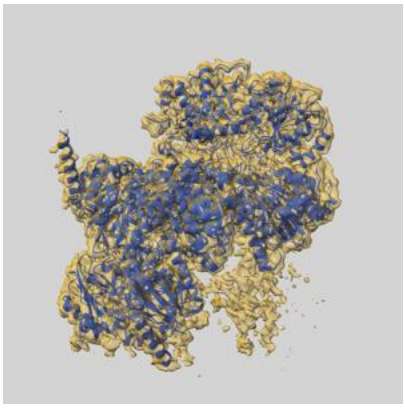
9.1 Map-model overlay



X



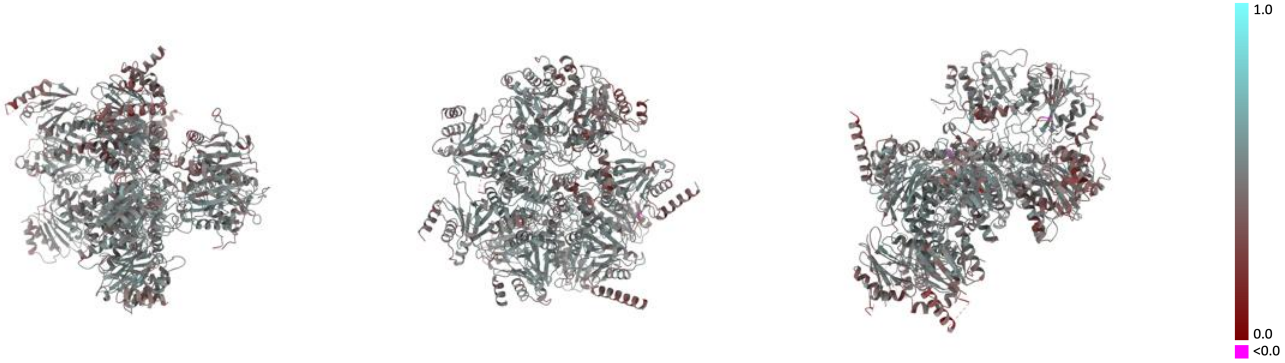
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 7.0 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.

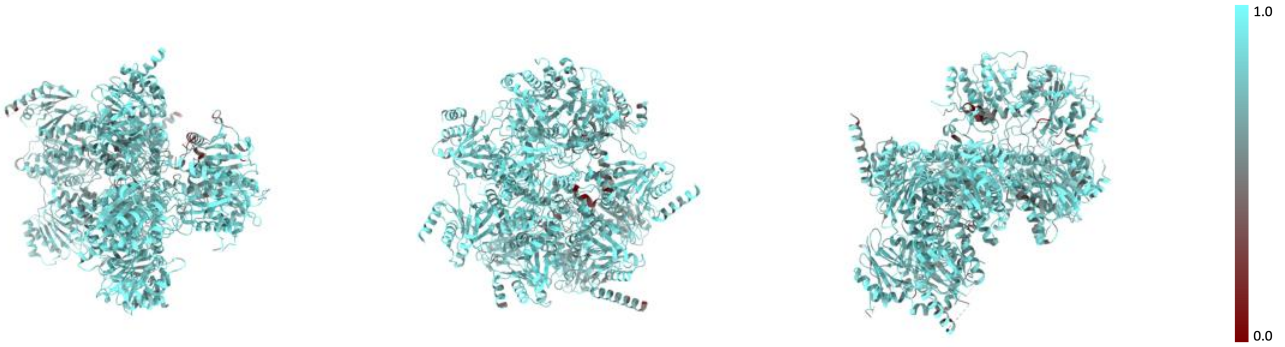
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according 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.

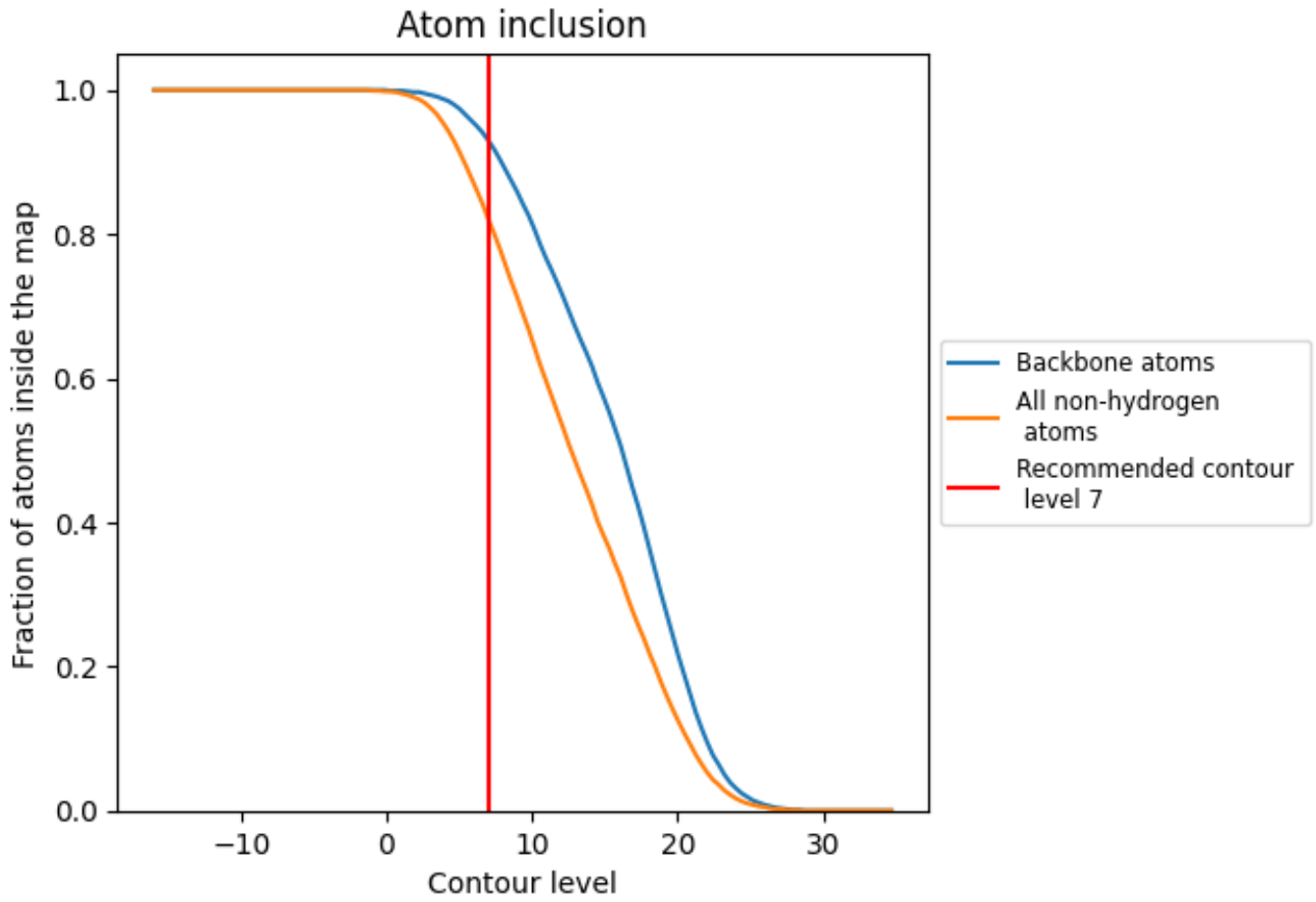
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (7).

9.4 Atom inclusion (i)



At the recommended contour level, 93% of all backbone atoms, 82% 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 (7) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8210	0.4770
A	0.8500	0.5020
B	0.8200	0.4890
C	0.8490	0.4760
D	0.7790	0.4280
E	0.8420	0.4820
F	0.8570	0.4890
G	0.8540	0.4910
H	0.8140	0.4680
I	0.8330	0.4800
J	0.7730	0.4460
c	0.7540	0.4570
d	0.8490	0.4910
e	0.7450	0.5000