



Full wwPDB EM Validation Report ⓘ

Oct 15, 2024 – 04:06 AM EDT

PDB ID : 8SEU
EMDB ID : EMD-40429
Title : Cryo-EM Structure of RyR1 (Local Refinement of TMD)
Authors : Cholak, S.; Saville, J.W.; Zhu, X.; Berezuk, A.M.; Tuttle, K.S.; Haji-Ghassemi, O.; Van Petegem, F.; Subramaniam, S.
Deposited on : 2023-04-10
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.dev113
MolProbity : 4.02b-467
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) : 2.39

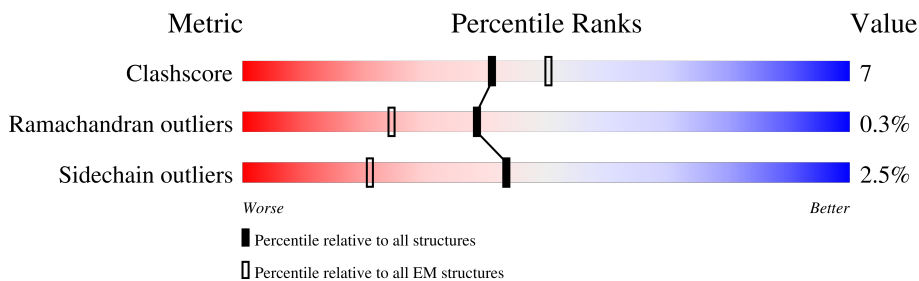
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 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 $\leq 5\%$. 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	5037	11% • 88%
1	B	5037	11% • 88%
1	C	5037	11% • 88%
1	D	5037	11% • 88%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 20576 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 Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	628	5143	3346	818	939	40	0	0
1	B	628	5143	3346	818	939	40	0	0
1	C	628	5143	3346	818	939	40	0	0
1	D	628	5143	3346	818	939	40	0	0

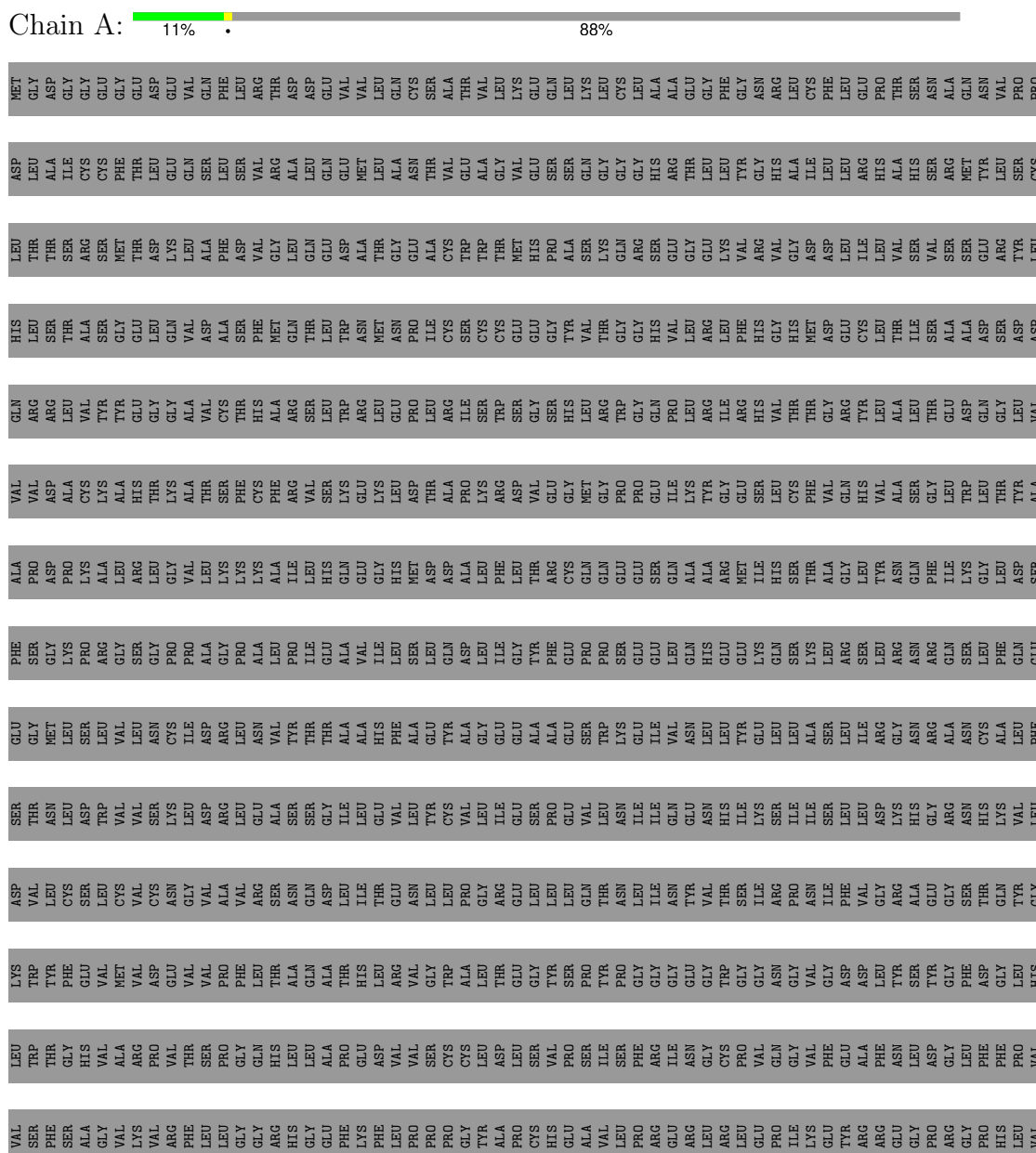
- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

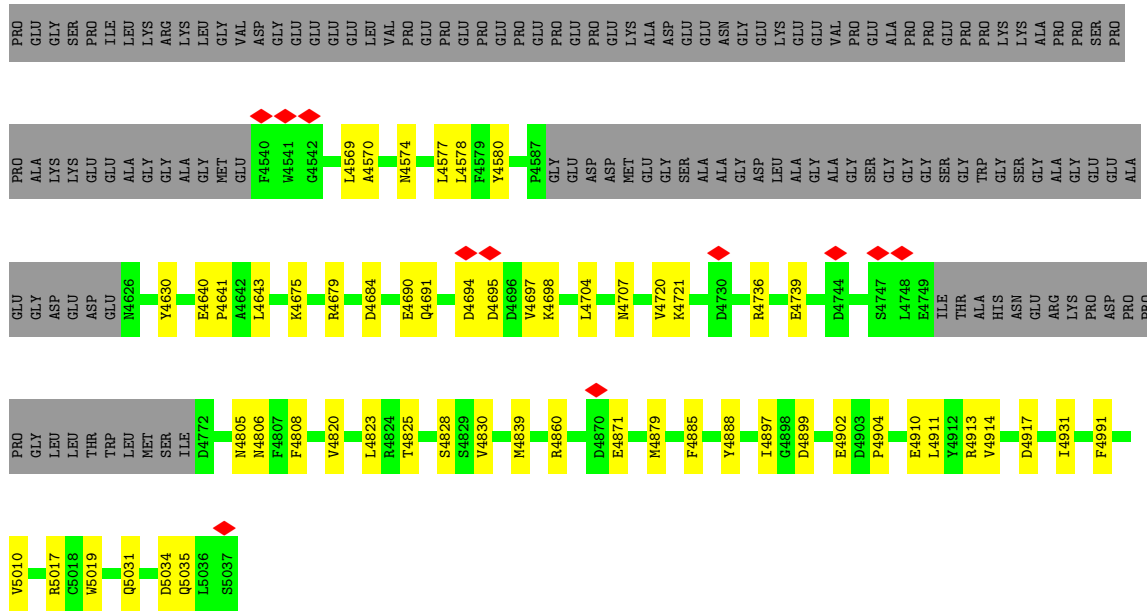
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
2	A	1	1	1	0
2	B	1	1	1	0
2	C	1	1	1	0
2	D	1	1	1	0

3 Residue-property plots

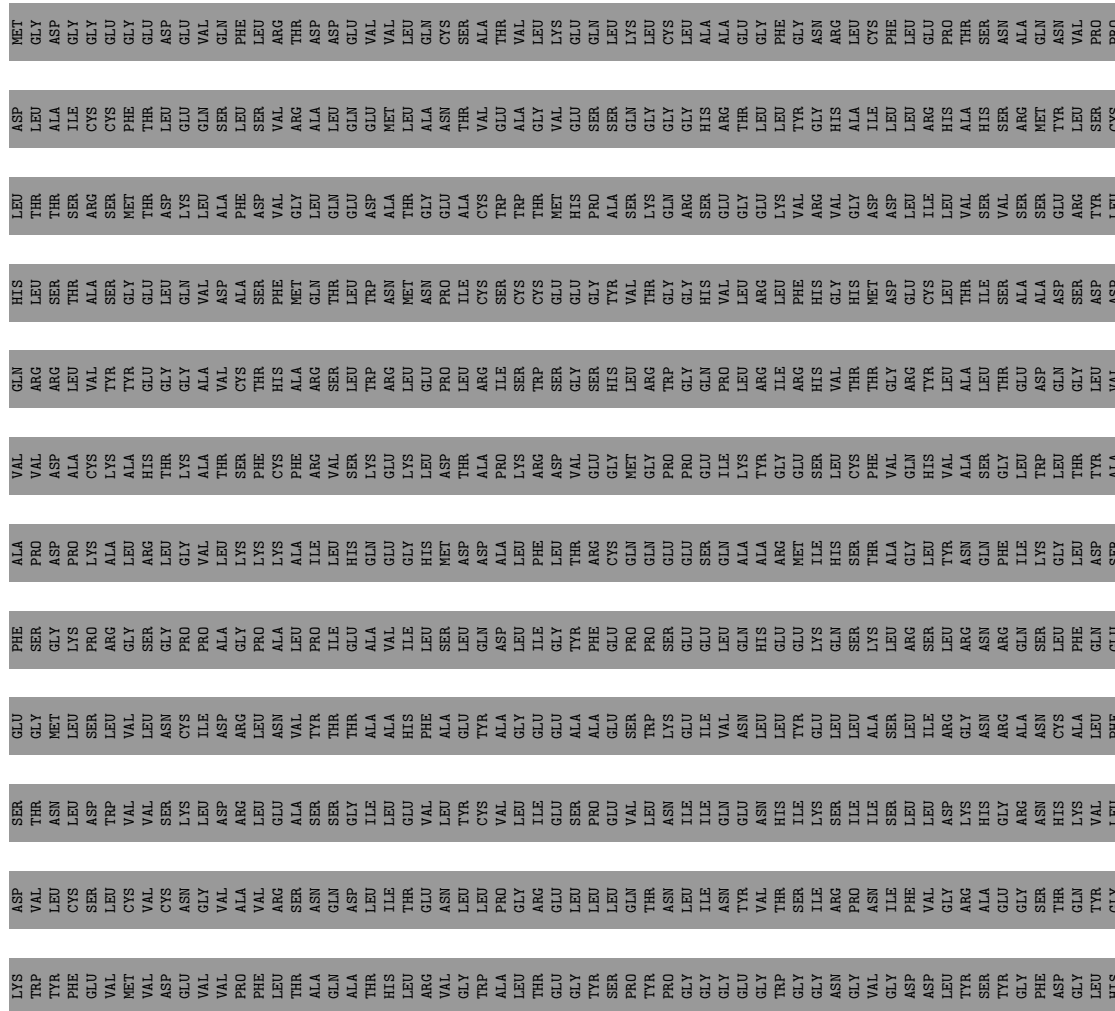
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Ryanodine receptor 1





● Molecule 1: Ryanodine receptor 1



ALA GLY
GLY GLY
GLY ALA
SER ALA
GLY ALA
GLY ALA
GLY ASP
ALA LEU
LEU ALA
ARG ALA
LEU LEU
LEU LEU
TRP LEU
GLY ASP
SER ASP
LEU LEU
PHE GLY
GLY VAL
GLY GLY
GLY ALA
GLY LEU
LEU LEU

GLU GLY
GLY GLY
SER ALA
PRO GLY
ILE LEU
LEU ASP
LYS ALA
ARG ALA
LEU LEU
LEU LEU
GLY ASP
VAL GLY
ASP ASP
GLY GLY
LEU LEU
GLU VAL
GLY VAL
GLY ALA
GLY HIS
LEU LEU
VAL VAL
GLU VAL
ALA ALA
GLY GLY
PRO GLY
PRO ALA
GLY LYS
GLY LYS

PRO GLU
GLY GLY
SER GLY
PRO PRO
ILE ILE
LEU LEU
LYS LYS
ARG ARG
LEU LEU
LEU LEU
GLY ASP
VAL VAL
ASP ASP
GLY GLY
LEU LEU
GLU VAL
GLY VAL
GLY ALA
LEU LEU
VAL VAL
PRO ASP
PRO PHE
GLY ARG
GLY LYS
LEU LYS
GLY GLY
GLY VAL
ALA VAL
GLY HIS
GLY GLY
LEU LEU
GLN GLN
PRO ASP
PRO PRO
MET MET
GLY GLY
ASP PRO
PRO ASP
PRO PRO
GLY GLY

PRO ALA
ALA LYS
LYS LYS
GLY GLY
GLY ILE
ALA ALA
GLY LEU
GLY ALA
MET MET
GLU VAL
F4540
W4541
G4542
L4569
A4570
M4574
L4577
L4578
F4579
Y4580
P4587
GLY GLY
GLU VAL
ASP ASP
ASP ASP
MET MET
GLU GLY
GLY GLY
SER SER
GLU GLU
ASN ASN
ALA ALA
ALA ALA
GLY ASP
GLY ASP
LEU LEU
ALA ALA
GLY GLY
ALA ALA
VAL VAL
PRO PRO
GLY GLY
ALA ALA
GLY GLY
PRO PRO
PRO PRO
SER SER
SER SER
GLY GLY
TRP TRP
PRO PRO
LYS LYS
PRO PRO
ALA ALA
ASP ASP
GLY GLY
PRO PRO
PRO PRO
GLY GLY
ALA ALA

GLU GLY
GLY ASP
GLU ASP
GLU ASP
GLU M4626
M4630
Y4630
Y4638
M4639
E4640
P4641
A4642
L4643
K4675
R4679
D4684
E4690
Q4691
D4694
D4695
D4696
Y4697
K4698
L4704
M4707
V4720
K4721
D4730
R4736
E4739
D4744
S4747
L4748
E4749
ILE THR
THR ALA
ALA HIS
ASN ASN
GLU GLY
ARG ARG
PRO PRO
PRO PRO
ASP ASP

PRO PRO
PRO ASP
GLY GLY
LEU LEU
LEU LEU
THR THR
TRP TRP
LEU LEU
MET MET
SER SER
ILE ILE
D4772
M4805
M4806
F4807
F4808
V4820
K4821
T4822
L4823
V4830
M4839
R4860
D4870
E4871
M4879
F4885
Y4888
I4897
G4898
D4899
E4902
P4904
L4911
Y4912
R4913
V4914
D4917
I4931
F4991
V5010

R5017
S5018
W5019
Q5031
B5034
Q5035
L5036
S5037

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	45876	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 ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	96000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	5.030	Depositor
Minimum map value	-2.479	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.127	Depositor
Recommended contour level	0.614	Depositor
Map size (Å)	515.2, 515.2, 515.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.288, 1.288, 1.288	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.31	0/5265	0.48	1/7105 (0.0%)
1	B	0.31	0/5265	0.48	1/7105 (0.0%)
1	C	0.31	0/5265	0.48	1/7105 (0.0%)
1	D	0.31	0/5265	0.48	1/7105 (0.0%)
All	All	0.31	0/21060	0.48	4/28420 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	3971	GLY	N-CA-C	-5.06	100.44	113.10
1	B	3971	GLY	N-CA-C	-5.06	100.44	113.10
1	C	3971	GLY	N-CA-C	-5.06	100.44	113.10
1	D	3971	GLY	N-CA-C	-5.06	100.44	113.10

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	5143	0	5030	86	0
1	B	5143	0	5030	85	0
1	C	5143	0	5030	82	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	5143	0	5030	88	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
All	All	20576	0	20120	273	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 (273) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4577:LEU:HD23	1:A:4580:TYR:CE2	1.39	1.57
1:D:4577:LEU:HD23	1:D:4580:TYR:CE2	1.39	1.56
1:C:4823:LEU:CD1	1:D:4839:MET:HG3	1.35	1.55
1:B:4577:LEU:HD23	1:B:4580:TYR:CE2	1.39	1.55
1:B:4823:LEU:CD1	1:C:4839:MET:HG3	1.35	1.52
1:A:4839:MET:HG3	1:D:4823:LEU:CD1	1.35	1.52
1:C:4577:LEU:HD23	1:C:4580:TYR:CE2	1.39	1.51
1:A:4823:LEU:CD1	1:B:4839:MET:HG3	1.35	1.51
1:A:4839:MET:CG	1:D:4823:LEU:CD1	2.01	1.37
1:A:4823:LEU:CD1	1:B:4839:MET:CG	2.01	1.36
1:B:4823:LEU:CD1	1:C:4839:MET:CG	2.01	1.36
1:C:4577:LEU:HA	1:C:4580:TYR:CE2	1.62	1.34
1:C:4823:LEU:CD1	1:D:4839:MET:CG	2.01	1.34
1:A:4577:LEU:CD2	1:A:4580:TYR:CE2	2.11	1.33
1:D:4577:LEU:HA	1:D:4580:TYR:CE2	1.62	1.33
1:C:4577:LEU:CD2	1:C:4580:TYR:CE2	2.11	1.33
1:B:4577:LEU:CD2	1:B:4580:TYR:CE2	2.11	1.33
1:B:4577:LEU:HA	1:B:4580:TYR:CE2	1.62	1.32
1:A:4577:LEU:HA	1:A:4580:TYR:CE2	1.62	1.31
1:D:4577:LEU:CD2	1:D:4580:TYR:CE2	2.11	1.31
1:D:4577:LEU:HD23	1:D:4580:TYR:CZ	1.70	1.25
1:C:4577:LEU:HD23	1:C:4580:TYR:CZ	1.70	1.25
1:B:4577:LEU:HD23	1:B:4580:TYR:CZ	1.70	1.24
1:A:4577:LEU:HD23	1:A:4580:TYR:CZ	1.70	1.23
1:A:4839:MET:CG	1:D:4823:LEU:HD12	1.69	1.20
1:C:4823:LEU:HD12	1:D:4839:MET:CG	1.69	1.15
1:B:4823:LEU:HD12	1:C:4839:MET:CG	1.69	1.13
1:A:4823:LEU:HD12	1:B:4839:MET:CG	1.69	1.12

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4630:TYR:OH	1:B:4860:ARG:NH1	1.87	1.07
1:A:4860:ARG:NH1	1:D:4630:TYR:OH	1.87	1.07
1:B:4823:LEU:HD12	1:C:4839:MET:HG2	1.33	1.06
1:B:4630:TYR:OH	1:C:4860:ARG:NH1	1.87	1.06
1:A:4823:LEU:HD12	1:B:4839:MET:HG2	1.33	1.05
1:C:4630:TYR:OH	1:D:4860:ARG:NH1	1.87	1.05
1:A:4839:MET:HG2	1:D:4823:LEU:HD12	1.33	1.05
1:C:4823:LEU:HD12	1:D:4839:MET:HG2	1.33	1.03
1:B:4580:TYR:OH	1:B:4643:LEU:HD21	1.60	1.02
1:C:4580:TYR:OH	1:C:4643:LEU:HD21	1.60	1.02
1:A:4580:TYR:OH	1:A:4643:LEU:HD21	1.60	1.00
1:D:4580:TYR:OH	1:D:4643:LEU:HD21	1.60	1.00
1:D:4580:TYR:OH	1:D:4643:LEU:CD2	2.13	0.97
1:B:4580:TYR:OH	1:B:4643:LEU:CD2	2.13	0.96
1:A:4580:TYR:OH	1:A:4643:LEU:CD2	2.13	0.95
1:C:4580:TYR:OH	1:C:4643:LEU:CD2	2.13	0.95
1:B:4577:LEU:CA	1:B:4580:TYR:HE2	1.80	0.95
1:C:4577:LEU:CA	1:C:4580:TYR:HE2	1.80	0.95
1:D:4577:LEU:CA	1:D:4580:TYR:HE2	1.80	0.95
1:A:4577:LEU:CA	1:A:4580:TYR:HE2	1.80	0.94
1:A:4577:LEU:CA	1:A:4580:TYR:CE2	2.51	0.94
1:D:4577:LEU:CA	1:D:4580:TYR:CE2	2.51	0.93
1:B:4577:LEU:CA	1:B:4580:TYR:CE2	2.51	0.93
1:C:4577:LEU:CA	1:C:4580:TYR:CE2	2.51	0.92
1:A:4577:LEU:HA	1:A:4580:TYR:HE2	1.05	0.92
1:C:4823:LEU:HD11	1:D:4839:MET:HG3	0.92	0.92
1:B:4823:LEU:HD11	1:C:4839:MET:HG3	0.92	0.92
1:A:4839:MET:HG3	1:D:4823:LEU:HD11	0.92	0.91
1:A:4823:LEU:HD11	1:B:4839:MET:HG3	0.92	0.90
1:B:4577:LEU:O	1:B:4580:TYR:HD2	1.54	0.90
1:D:4577:LEU:HD23	1:D:4580:TYR:HE2	1.08	0.89
1:B:4577:LEU:HD23	1:B:4580:TYR:HE2	1.08	0.89
1:A:4577:LEU:O	1:A:4580:TYR:HD2	1.54	0.89
1:C:4577:LEU:O	1:C:4580:TYR:HD2	1.54	0.89
1:D:4577:LEU:O	1:D:4580:TYR:HD2	1.54	0.89
1:B:4577:LEU:HA	1:B:4580:TYR:HE2	1.05	0.88
1:B:4577:LEU:CD2	1:B:4580:TYR:CZ	2.48	0.87
1:B:4823:LEU:HD12	1:C:4839:MET:HG3	1.39	0.87
1:C:4823:LEU:HD11	1:D:4839:MET:CG	1.86	0.87
1:A:4577:LEU:CD2	1:A:4580:TYR:CZ	2.48	0.87
1:D:4239:GLU:OE1	1:D:4675:LYS:HD2	1.75	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:4239:GLU:OE1	1:C:4675:LYS:HD2	1.75	0.87
1:A:4239:GLU:OE1	1:A:4675:LYS:HD2	1.75	0.86
1:B:4239:GLU:OE1	1:B:4675:LYS:HD2	1.75	0.86
1:C:4830:VAL:CG2	1:D:4931:ILE:HD11	2.07	0.85
1:A:4931:ILE:HD11	1:D:4830:VAL:CG2	2.07	0.84
1:A:4839:MET:CG	1:D:4823:LEU:HD11	1.86	0.84
1:B:4823:LEU:HD11	1:C:4839:MET:CG	1.86	0.83
1:C:4580:TYR:HH	1:C:4643:LEU:HD21	1.40	0.83
1:B:4830:VAL:CG2	1:C:4931:ILE:HD11	2.07	0.83
1:A:4830:VAL:CG2	1:B:4931:ILE:HD11	2.07	0.83
1:D:4577:LEU:CD2	1:D:4580:TYR:CZ	2.48	0.83
1:D:4577:LEU:HD22	1:D:4580:TYR:CE2	2.14	0.82
1:C:4577:LEU:HD22	1:C:4580:TYR:CE2	2.14	0.82
1:C:4577:LEU:CD2	1:C:4580:TYR:CZ	2.48	0.81
1:B:4577:LEU:CD2	1:B:4580:TYR:HE2	1.73	0.81
1:D:4577:LEU:HA	1:D:4580:TYR:HE2	1.05	0.81
1:C:4577:LEU:HD23	1:C:4580:TYR:HE2	1.08	0.80
1:A:4577:LEU:CD2	1:A:4580:TYR:HE2	1.73	0.80
1:A:4577:LEU:HD22	1:A:4580:TYR:CE2	2.14	0.80
1:A:4577:LEU:HD23	1:A:4580:TYR:OH	1.82	0.79
1:B:4577:LEU:HD22	1:B:4580:TYR:CE2	2.14	0.79
1:B:4577:LEU:HA	1:B:4580:TYR:CD2	2.17	0.79
1:B:4580:TYR:HH	1:B:4643:LEU:HD21	1.45	0.79
1:A:4577:LEU:HA	1:A:4580:TYR:CD2	2.17	0.79
1:D:4577:LEU:HD23	1:D:4580:TYR:OH	1.82	0.79
1:A:4823:LEU:HD11	1:B:4839:MET:CG	1.86	0.79
1:B:4577:LEU:HD23	1:B:4580:TYR:OH	1.82	0.79
1:C:4577:LEU:HD23	1:C:4580:TYR:OH	1.82	0.78
1:C:4577:LEU:HA	1:C:4580:TYR:CD2	2.17	0.78
1:D:4577:LEU:HA	1:D:4580:TYR:CD2	2.17	0.77
1:C:4577:LEU:HA	1:C:4580:TYR:HE2	1.05	0.77
1:D:4577:LEU:CD2	1:D:4580:TYR:HE2	1.73	0.76
1:A:4580:TYR:HH	1:A:4643:LEU:HD21	1.48	0.76
1:A:4839:MET:HG3	1:D:4823:LEU:HD12	1.39	0.74
1:A:4580:TYR:OH	1:A:4643:LEU:HD22	1.91	0.70
1:C:4580:TYR:OH	1:C:4643:LEU:HD22	1.91	0.70
1:B:4580:TYR:OH	1:B:4643:LEU:HD22	1.91	0.69
1:B:4577:LEU:O	1:B:4580:TYR:CD2	2.45	0.68
1:D:4580:TYR:OH	1:D:4643:LEU:HD22	1.91	0.67
1:D:5034:ASP:OD1	1:D:5035:GLN:NE2	2.27	0.66
1:B:4888:TYR:OH	1:C:4917:ASP:OD2	2.14	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:4577:LEU:CD2	1:C:4580:TYR:HE2	1.73	0.65
1:B:3959:LYS:NZ	1:B:4022:ASP:OD2	2.28	0.65
1:A:5034:ASP:OD1	1:A:5035:GLN:NE2	2.27	0.65
1:C:4888:TYR:OH	1:D:4917:ASP:OD2	2.14	0.65
1:D:3959:LYS:NZ	1:D:4022:ASP:OD2	2.28	0.65
1:A:4232:GLU:OE2	1:A:5017:ARG:NH2	2.31	0.65
1:A:4577:LEU:O	1:A:4580:TYR:CD2	2.45	0.65
1:A:4888:TYR:OH	1:B:4917:ASP:OD2	2.14	0.64
1:A:3959:LYS:NZ	1:A:4022:ASP:OD2	2.28	0.64
1:B:5034:ASP:OD1	1:B:5035:GLN:NE2	2.27	0.64
1:D:4232:GLU:OE2	1:D:5017:ARG:NH2	2.31	0.64
1:C:4232:GLU:OE2	1:C:5017:ARG:NH2	2.31	0.64
1:B:4232:GLU:OE2	1:B:5017:ARG:NH2	2.31	0.63
1:A:4839:MET:CG	1:D:4823:LEU:HD13	2.23	0.63
1:C:4830:VAL:HG21	1:D:4931:ILE:HD11	1.81	0.63
1:C:3959:LYS:NZ	1:C:4022:ASP:OD2	2.28	0.63
1:A:4931:ILE:HD11	1:D:4830:VAL:HG21	1.81	0.62
1:A:4577:LEU:HD23	1:A:4580:TYR:HE2	1.08	0.62
1:A:4917:ASP:OD2	1:D:4888:TYR:OH	2.14	0.62
1:C:4577:LEU:O	1:C:4580:TYR:CD2	2.45	0.62
1:C:5034:ASP:OD1	1:C:5035:GLN:NE2	2.27	0.62
1:B:4830:VAL:HG21	1:C:4931:ILE:HD11	1.81	0.61
1:D:4577:LEU:O	1:D:4580:TYR:CD2	2.45	0.61
1:A:4570:ALA:O	1:A:4574:ASN:ND2	2.34	0.60
1:B:4570:ALA:O	1:B:4574:ASN:ND2	2.34	0.60
1:A:4823:LEU:HD13	1:B:4839:MET:CG	2.23	0.60
1:C:4570:ALA:O	1:C:4574:ASN:ND2	2.34	0.59
1:B:4577:LEU:CD2	1:B:4580:TYR:OH	2.49	0.59
1:A:4830:VAL:HG21	1:B:4931:ILE:HD11	1.81	0.59
1:D:4570:ALA:O	1:D:4574:ASN:ND2	2.34	0.59
1:C:4577:LEU:CD2	1:C:4580:TYR:OH	2.49	0.59
1:C:4823:LEU:HD13	1:D:4839:MET:CG	2.23	0.58
1:D:4189:ARG:HB3	1:D:5031:GLN:HE22	1.69	0.57
1:A:4189:ARG:HB3	1:A:5031:GLN:HE22	1.69	0.56
1:A:4577:LEU:CD2	1:A:4580:TYR:OH	2.49	0.56
1:B:4189:ARG:HB3	1:B:5031:GLN:HE22	1.69	0.56
1:C:4189:ARG:HB3	1:C:5031:GLN:HE22	1.69	0.56
1:D:4577:LEU:HD23	1:D:4580:TYR:HH	1.68	0.56
1:B:4823:LEU:HD13	1:C:4839:MET:CG	2.23	0.55
1:A:4577:LEU:CB	1:A:4580:TYR:HE2	2.20	0.55
1:D:4577:LEU:CB	1:D:4580:TYR:HE2	2.20	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:4577:LEU:CB	1:C:4580:TYR:HE2	2.20	0.55
1:B:4577:LEU:CB	1:B:4580:TYR:HE2	2.20	0.54
1:D:4577:LEU:CD2	1:D:4580:TYR:OH	2.49	0.54
1:C:4577:LEU:CA	1:C:4580:TYR:CD2	2.88	0.54
1:B:4904:PRO:HB3	1:B:4913:ARG:HG2	1.90	0.54
1:D:4904:PRO:HB3	1:D:4913:ARG:HG2	1.90	0.53
1:A:4904:PRO:HB3	1:A:4913:ARG:HG2	1.90	0.53
1:B:4577:LEU:CA	1:B:4580:TYR:CD2	2.88	0.53
1:C:4904:PRO:HB3	1:C:4913:ARG:HG2	1.90	0.52
1:B:4902:GLU:O	1:B:4913:ARG:NH1	2.33	0.52
1:A:4577:LEU:CA	1:A:4580:TYR:CD2	2.88	0.51
1:D:4232:GLU:HG2	1:D:5019:TRP:HE1	1.76	0.51
1:A:4675:LYS:O	1:A:4679:ARG:HG2	2.11	0.50
1:A:4823:LEU:CD1	1:B:4839:MET:SD	2.99	0.50
1:C:4232:GLU:HG2	1:C:5019:TRP:HE1	1.76	0.50
1:D:4577:LEU:CA	1:D:4580:TYR:CD2	2.88	0.50
1:D:4580:TYR:HH	1:D:4643:LEU:CD2	2.20	0.50
1:B:4823:LEU:CD1	1:C:4839:MET:SD	2.99	0.50
1:B:4675:LYS:O	1:B:4679:ARG:HG2	2.11	0.50
1:C:4675:LYS:O	1:C:4679:ARG:HG2	2.11	0.50
1:A:4839:MET:HG2	1:D:4823:LEU:CD1	2.02	0.50
1:B:4177:TYR:HE1	1:B:4199:GLU:HB3	1.77	0.50
1:A:4232:GLU:HG2	1:A:5019:TRP:HE1	1.76	0.50
1:C:4177:TYR:HE1	1:C:4199:GLU:HB3	1.77	0.50
1:D:4052:SER:O	1:D:4056:GLU:HG2	2.12	0.50
1:B:4232:GLU:HG2	1:B:5019:TRP:HE1	1.76	0.50
1:A:4902:GLU:O	1:A:4913:ARG:NH1	2.33	0.49
1:C:4823:LEU:CD1	1:D:4839:MET:SD	2.99	0.49
1:D:4675:LYS:O	1:D:4679:ARG:HG2	2.11	0.49
1:A:4052:SER:O	1:A:4056:GLU:HG2	2.12	0.49
1:A:4177:TYR:HE1	1:A:4199:GLU:HB3	1.77	0.49
1:C:4052:SER:O	1:C:4056:GLU:HG2	2.12	0.49
1:C:4006:ASP:OD1	1:C:4006:ASP:N	2.46	0.49
1:A:4839:MET:SD	1:D:4823:LEU:CD1	2.99	0.49
1:A:4006:ASP:OD1	1:A:4006:ASP:N	2.46	0.49
1:B:4052:SER:O	1:B:4056:GLU:HG2	2.12	0.49
1:D:4577:LEU:CG	1:D:4580:TYR:HE2	2.26	0.49
1:B:4577:LEU:CG	1:B:4580:TYR:HE2	2.26	0.48
1:A:4577:LEU:CG	1:A:4580:TYR:HE2	2.26	0.48
1:B:4006:ASP:OD1	1:B:4006:ASP:N	2.46	0.48
1:D:4177:TYR:HE1	1:D:4199:GLU:HB3	1.77	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:4902:GLU:O	1:C:4913:ARG:NH1	2.33	0.48
1:A:4823:LEU:CD1	1:B:4839:MET:HG2	2.02	0.47
1:C:4577:LEU:HD21	1:C:4806:ASN:HB3	1.97	0.47
1:D:4006:ASP:OD1	1:D:4006:ASP:N	2.46	0.47
1:B:4577:LEU:HD21	1:B:4806:ASN:HB3	1.97	0.47
1:D:4577:LEU:HD21	1:D:4806:ASN:HB3	1.97	0.46
1:D:4820:VAL:HG12	1:D:4823:LEU:H	1.81	0.46
1:C:4820:VAL:HG12	1:C:4823:LEU:H	1.81	0.45
1:D:4902:GLU:O	1:D:4913:ARG:NH1	2.33	0.45
1:A:4577:LEU:HD21	1:A:4806:ASN:HB3	1.97	0.45
1:A:4805:ASN:HB3	1:A:4808:PHE:HD2	1.81	0.45
1:C:4805:ASN:HB3	1:C:4808:PHE:HD2	1.81	0.45
1:A:4820:VAL:HG12	1:A:4823:LEU:H	1.81	0.45
1:B:4805:ASN:HB3	1:B:4808:PHE:HD2	1.81	0.45
1:B:4825:THR:O	1:B:4828:SER:OG	2.33	0.45
1:B:4991:PHE:HE2	1:B:5010:VAL:HG11	1.82	0.45
1:A:4640:GLU:HB3	1:A:4641:PRO:HD3	2.00	0.44
1:A:4736:ARG:O	1:A:4739:GLU:HG3	2.18	0.44
1:D:4736:ARG:O	1:D:4739:GLU:HG3	2.18	0.44
1:A:5012:LYS:HE2	1:A:5012:LYS:HB3	1.88	0.44
1:C:4822:THR:HG21	1:D:4839:MET:HE2	1.98	0.44
1:D:4720:VAL:HG13	1:D:4721:LYS:N	2.32	0.44
1:A:4630:TYR:CZ	1:B:4860:ARG:NH1	2.83	0.44
1:B:4720:VAL:HG13	1:B:4721:LYS:N	2.32	0.44
1:A:4839:MET:HE2	1:D:4822:THR:HG21	2.00	0.44
1:D:4991:PHE:HE2	1:D:5010:VAL:HG11	1.82	0.44
1:B:4820:VAL:HG12	1:B:4823:LEU:H	1.81	0.44
1:C:4640:GLU:HB3	1:C:4641:PRO:HD3	2.00	0.44
1:C:4991:PHE:HE2	1:C:5010:VAL:HG11	1.82	0.44
1:D:4805:ASN:HB3	1:D:4808:PHE:HD2	1.81	0.44
1:A:4879:MET:HG2	1:D:4578:LEU:HA	2.00	0.44
1:C:4736:ARG:O	1:C:4739:GLU:HG3	2.18	0.44
1:A:3971:GLY:O	1:A:3972:PRO:C	2.56	0.44
1:A:4991:PHE:HE2	1:A:5010:VAL:HG11	1.82	0.44
1:C:3971:GLY:O	1:C:3972:PRO:C	2.56	0.44
1:C:4578:LEU:HA	1:D:4879:MET:HG2	2.00	0.44
1:B:4736:ARG:O	1:B:4739:GLU:HG3	2.18	0.43
1:C:4577:LEU:CG	1:C:4580:TYR:HE2	2.26	0.43
1:C:4720:VAL:HG13	1:C:4721:LYS:N	2.32	0.43
1:A:4720:VAL:HG13	1:A:4721:LYS:N	2.32	0.43
1:B:4640:GLU:HB3	1:B:4641:PRO:HD3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:4640:GLU:HB3	1:D:4641:PRO:HD3	2.00	0.43
1:A:4823:LEU:HD13	1:B:4839:MET:SD	2.59	0.43
1:A:4825:THR:O	1:A:4828:SER:OG	2.33	0.43
1:B:3971:GLY:O	1:B:3972:PRO:C	2.56	0.43
1:B:4823:LEU:HD13	1:C:4839:MET:SD	2.59	0.43
1:D:3971:GLY:O	1:D:3972:PRO:C	2.56	0.43
1:A:4839:MET:SD	1:D:4823:LEU:HD13	2.59	0.43
1:A:4860:ARG:NH1	1:D:4630:TYR:CZ	2.83	0.43
1:C:4823:LEU:HD13	1:D:4839:MET:SD	2.59	0.43
1:B:4577:LEU:CB	1:B:4580:TYR:CE2	3.00	0.43
1:B:4578:LEU:HA	1:C:4879:MET:HG2	2.00	0.43
1:A:4892:ARG:NH1	1:B:4899:ASP:OD1	2.49	0.42
1:A:4578:LEU:HA	1:B:4879:MET:HG2	2.00	0.42
1:C:4235:VAL:HG11	1:C:5019:TRP:CH2	2.55	0.42
1:D:4580:TYR:HH	1:D:4643:LEU:HD22	1.82	0.42
1:B:4235:VAL:HG11	1:B:5019:TRP:CH2	2.55	0.42
1:C:4577:LEU:CB	1:C:4580:TYR:CE2	3.00	0.42
1:D:4235:VAL:HG11	1:D:5019:TRP:CH2	2.55	0.42
1:B:4911:LEU:HA	1:B:4914:VAL:HG22	2.02	0.42
1:A:4058:ILE:HD13	1:A:4058:ILE:HA	1.91	0.41
1:D:4911:LEU:HD13	1:D:4911:LEU:HA	1.90	0.41
1:A:4235:VAL:HG11	1:A:5019:TRP:CH2	2.55	0.41
1:A:4911:LEU:HA	1:A:4914:VAL:HG22	2.02	0.41
1:C:4630:TYR:CZ	1:D:4860:ARG:NH1	2.83	0.41
1:C:4892:ARG:NH1	1:D:4899:ASP:OD1	2.49	0.41
1:A:4638:TYR:O	1:A:4641:PRO:HD2	2.21	0.41
1:A:4791:TYR:OH	1:A:4815:ASP:OD1	2.30	0.41
1:B:4630:TYR:CZ	1:C:4860:ARG:NH1	2.83	0.41
1:B:4885:PHE:CE2	1:B:4897:ILE:HD11	2.56	0.41
1:B:4910:GLU:O	1:B:4914:VAL:HG13	2.21	0.41
1:C:4638:TYR:O	1:C:4641:PRO:HD2	2.21	0.41
1:C:4885:PHE:CE2	1:C:4897:ILE:HD11	2.56	0.41
1:C:4911:LEU:HA	1:C:4914:VAL:HG22	2.02	0.41
1:B:4805:ASN:HB3	1:B:4808:PHE:CD2	2.56	0.40
1:D:4577:LEU:CB	1:D:4580:TYR:CE2	3.00	0.40
1:D:4885:PHE:CE2	1:D:4897:ILE:HD11	2.56	0.40
1:B:3980:LEU:HD23	1:B:3980:LEU:HA	1.94	0.40
1:D:4176:PRO:O	1:D:4202:ARG:NH1	2.55	0.40
1:D:4638:TYR:O	1:D:4641:PRO:HD2	2.21	0.40
1:D:4911:LEU:HA	1:D:4914:VAL:HG22	2.02	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	618/5037 (12%)	602 (97%)	14 (2%)	2 (0%)	37	70
1	B	618/5037 (12%)	602 (97%)	14 (2%)	2 (0%)	37	70
1	C	618/5037 (12%)	602 (97%)	14 (2%)	2 (0%)	37	70
1	D	618/5037 (12%)	602 (97%)	14 (2%)	2 (0%)	37	70
All	All	2472/20148 (12%)	2408 (97%)	56 (2%)	8 (0%)	38	70

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3972	PRO
1	B	3972	PRO
1	C	3972	PRO
1	D	3972	PRO
1	A	4691	GLN
1	B	4691	GLN
1	C	4691	GLN
1	D	4691	GLN

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	560/4276 (13%)	546 (98%)	14 (2%)	42	73
1	B	560/4276 (13%)	546 (98%)	14 (2%)	42	73

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	560/4276 (13%)	546 (98%)	14 (2%)	42	73
1	D	560/4276 (13%)	546 (98%)	14 (2%)	42	73
All	All	2240/17104 (13%)	2184 (98%)	56 (2%)	43	73

All (56) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3951	PHE
1	A	3969	ILE
1	A	3974	THR
1	A	4006	ASP
1	A	4569	LEU
1	A	4684	ASP
1	A	4690	GLU
1	A	4694	ASP
1	A	4695	ASP
1	A	4697	VAL
1	A	4698	LYS
1	A	4704	LEU
1	A	4707	ASN
1	A	4871	GLU
1	B	3951	PHE
1	B	3969	ILE
1	B	3974	THR
1	B	4006	ASP
1	B	4569	LEU
1	B	4684	ASP
1	B	4690	GLU
1	B	4694	ASP
1	B	4695	ASP
1	B	4697	VAL
1	B	4698	LYS
1	B	4704	LEU
1	B	4707	ASN
1	B	4871	GLU
1	C	3951	PHE
1	C	3969	ILE
1	C	3974	THR
1	C	4006	ASP
1	C	4569	LEU
1	C	4684	ASP

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Mol	Chain	Res	Type
1	C	4690	GLU
1	C	4694	ASP
1	C	4695	ASP
1	C	4697	VAL
1	C	4698	LYS
1	C	4704	LEU
1	C	4707	ASN
1	C	4871	GLU
1	D	3951	PHE
1	D	3969	ILE
1	D	3974	THR
1	D	4006	ASP
1	D	4569	LEU
1	D	4684	ASP
1	D	4690	GLU
1	D	4694	ASP
1	D	4695	ASP
1	D	4697	VAL
1	D	4698	LYS
1	D	4704	LEU
1	D	4707	ASN
1	D	4871	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	4700	GLN
1	B	4700	GLN
1	C	4700	GLN
1	D	4700	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.

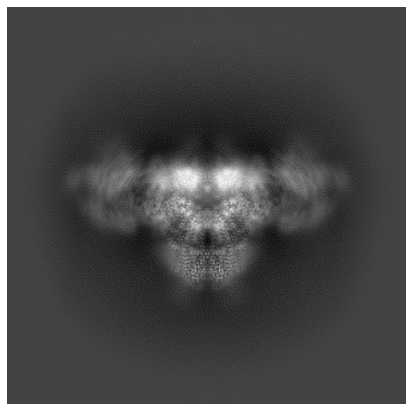
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-40429. These allow visual inspection of the internal detail of the map and identification of artifacts.

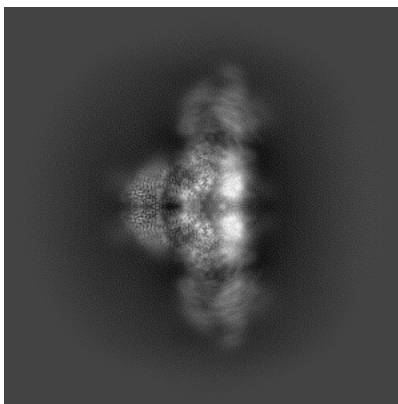
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

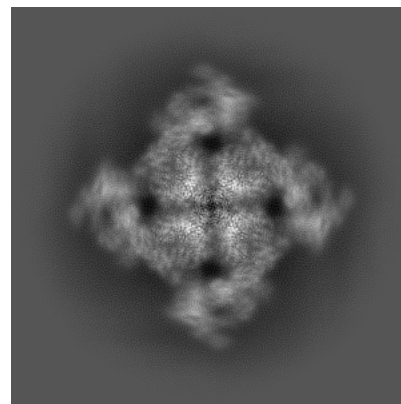
6.1.1 Primary map



X

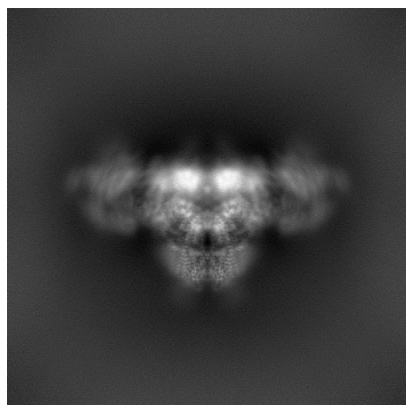


Y

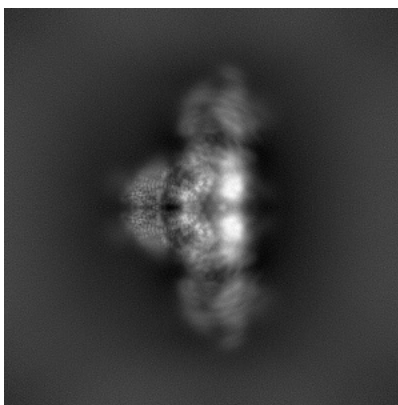


Z

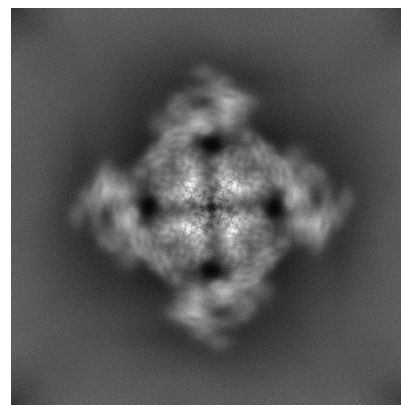
6.1.2 Raw map



X



Y

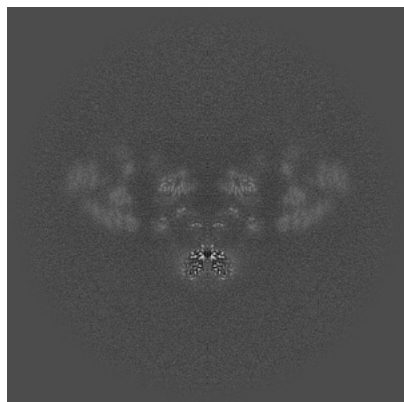


Z

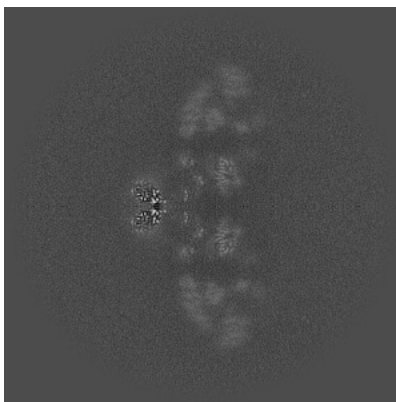
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

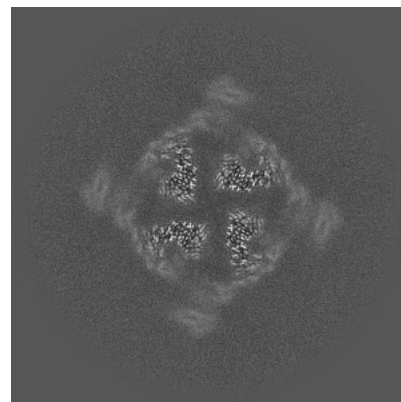
6.2.1 Primary map



X Index: 200

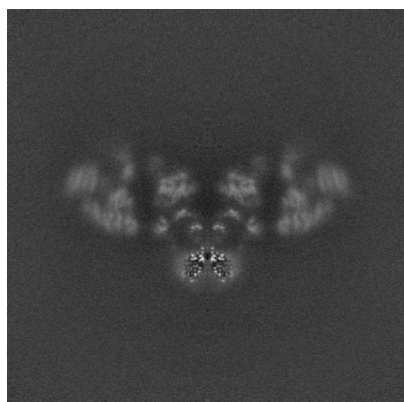


Y Index: 200

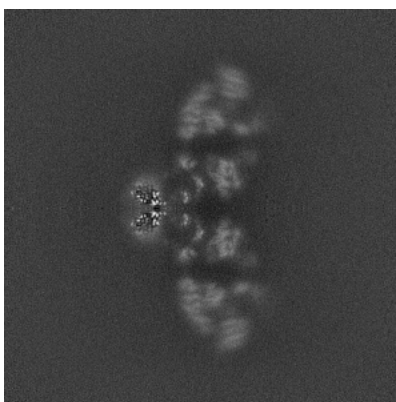


Z Index: 200

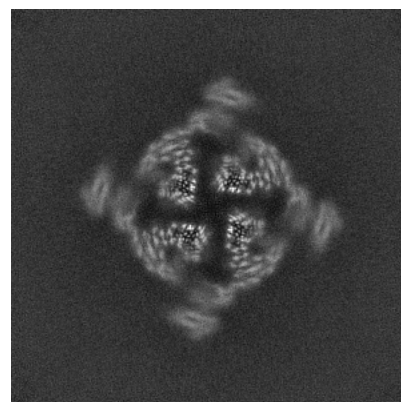
6.2.2 Raw map



X Index: 200



Y Index: 200

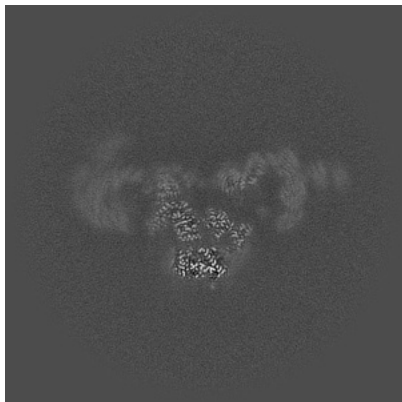


Z Index: 200

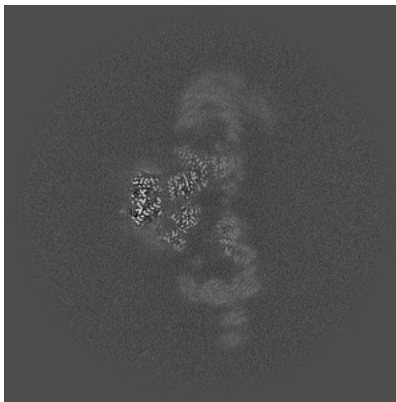
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

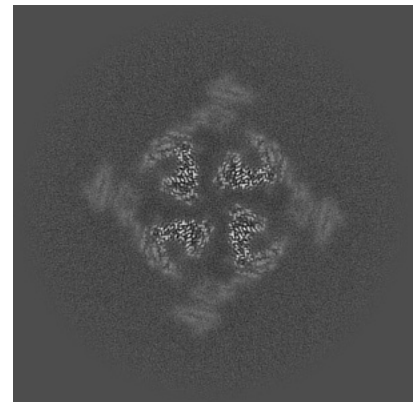
6.3.1 Primary map



X Index: 188

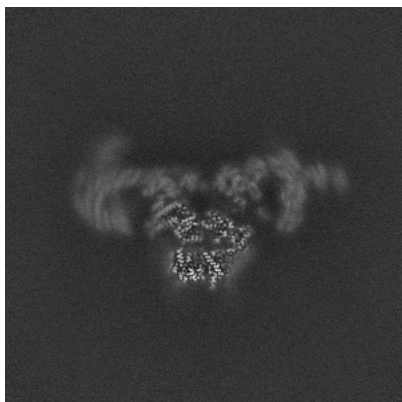


Y Index: 188

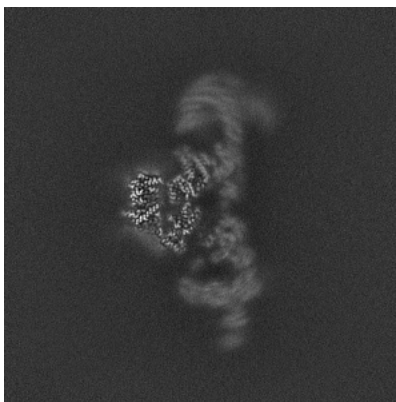


Z Index: 198

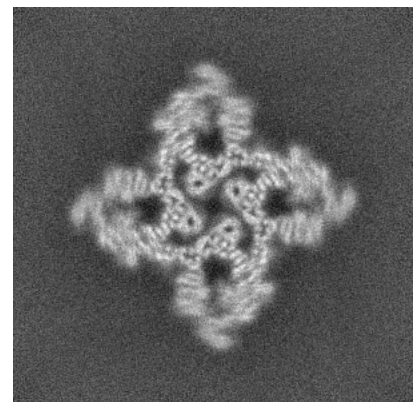
6.3.2 Raw map



X Index: 186



Y Index: 186

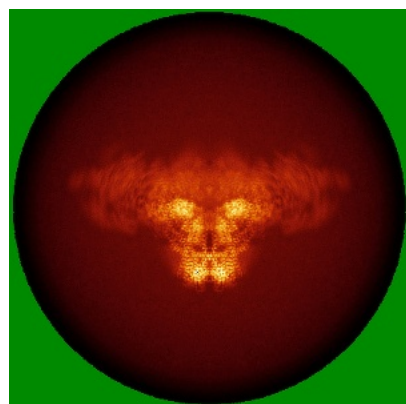


Z Index: 225

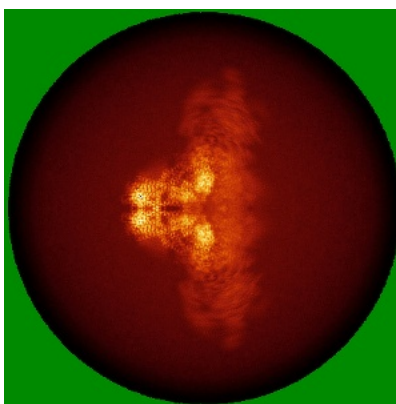
The images above show the largest variance slices of the map in three orthogonal directions.

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

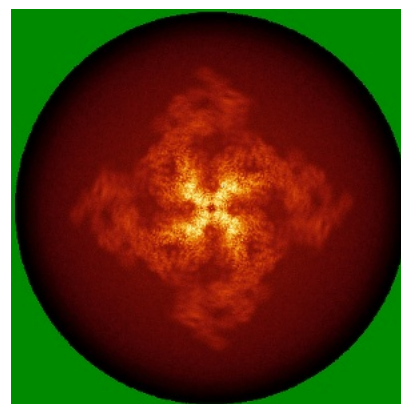
6.4.1 Primary map



X

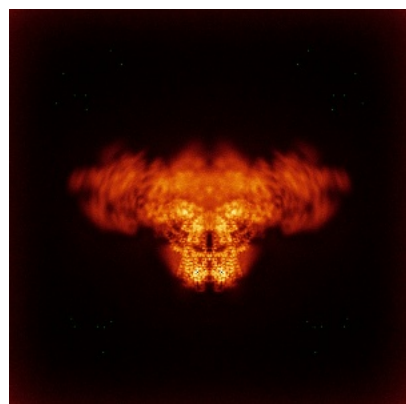


Y

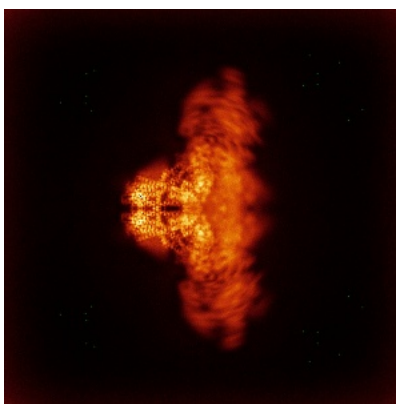


Z

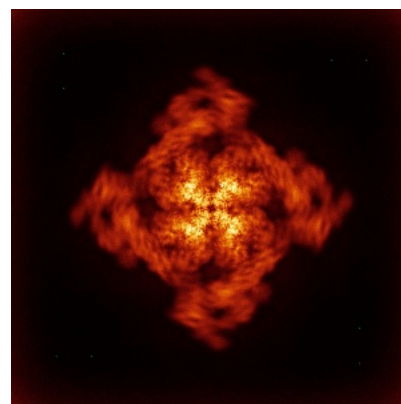
6.4.2 Raw map



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.

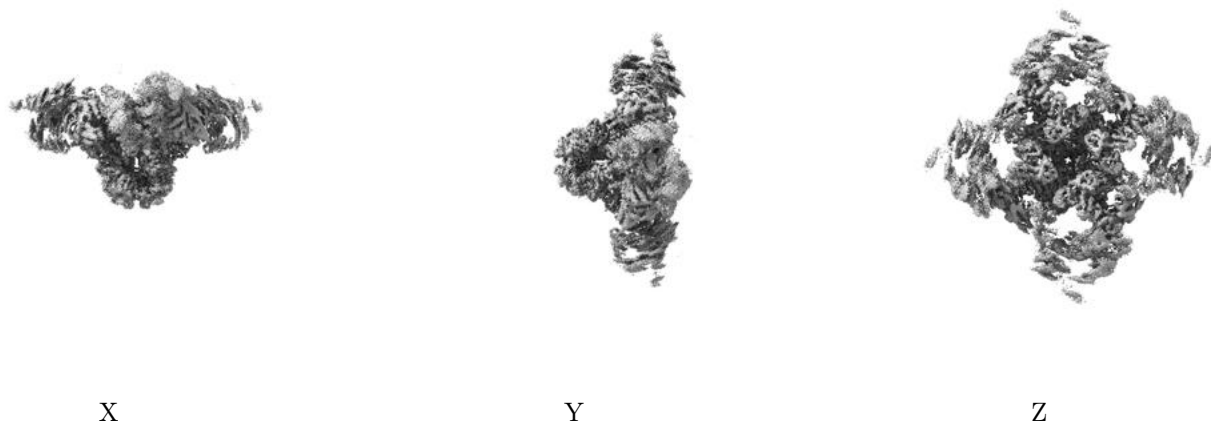
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.614. 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.

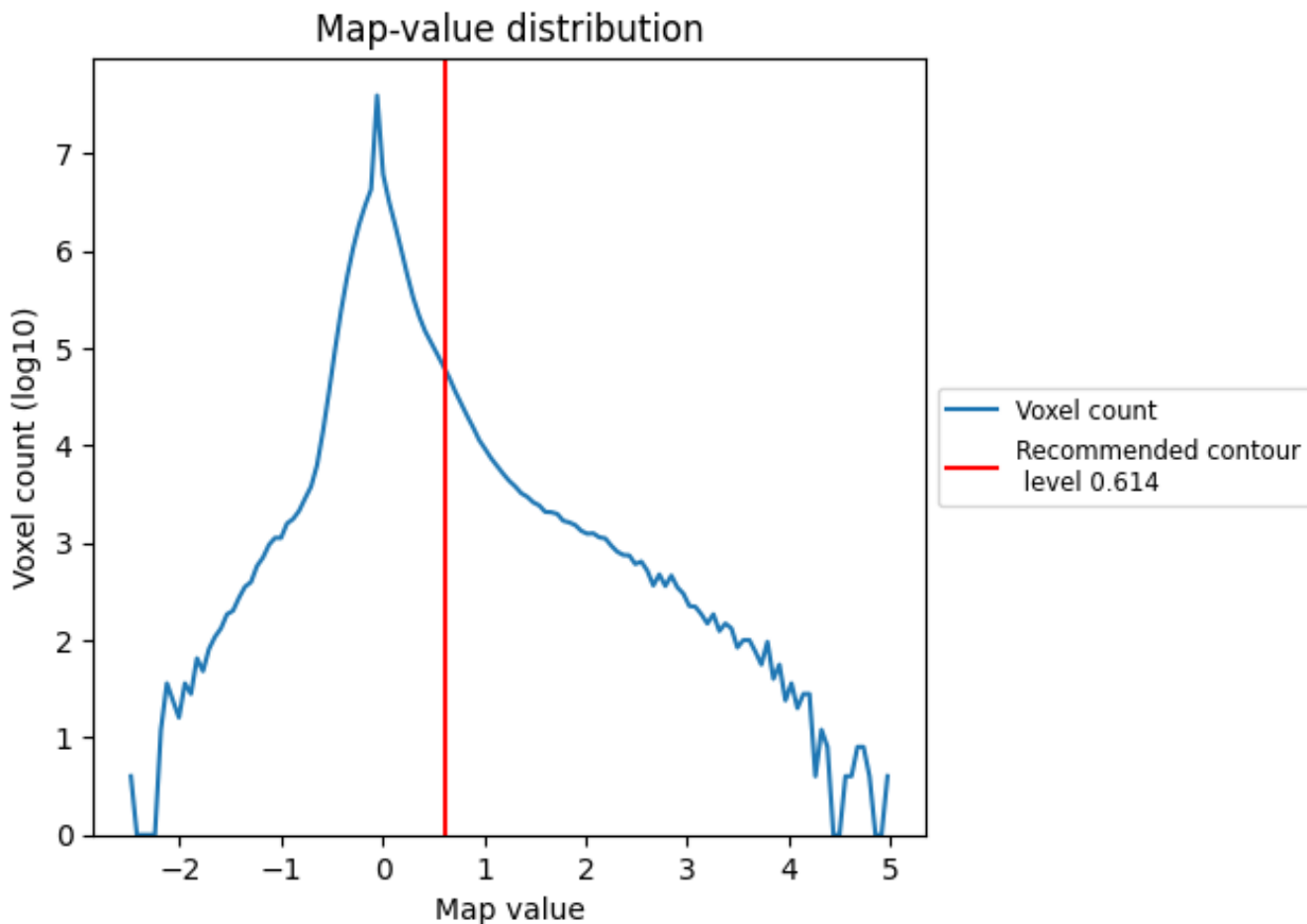
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

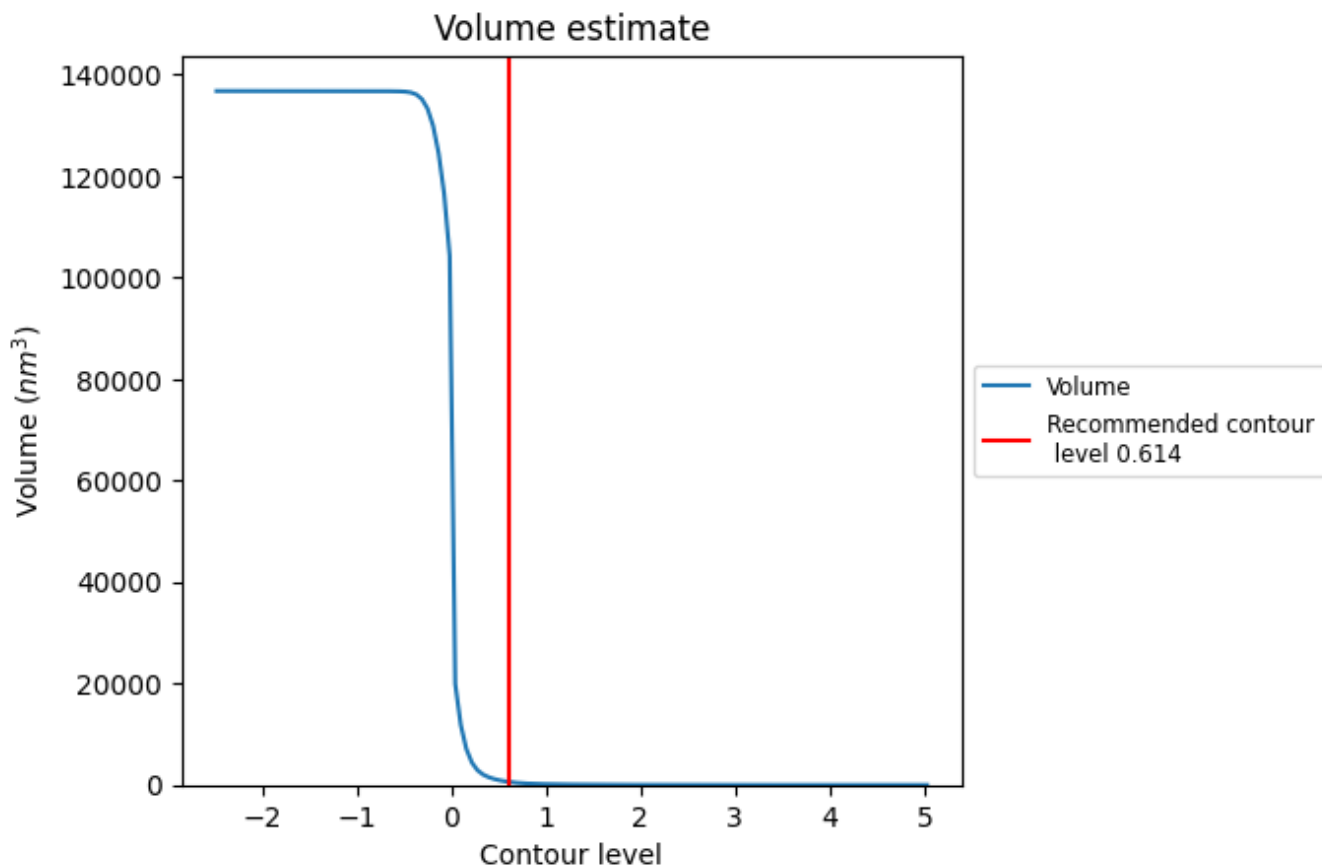
This section contains the results of statistical analysis of the map.

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.

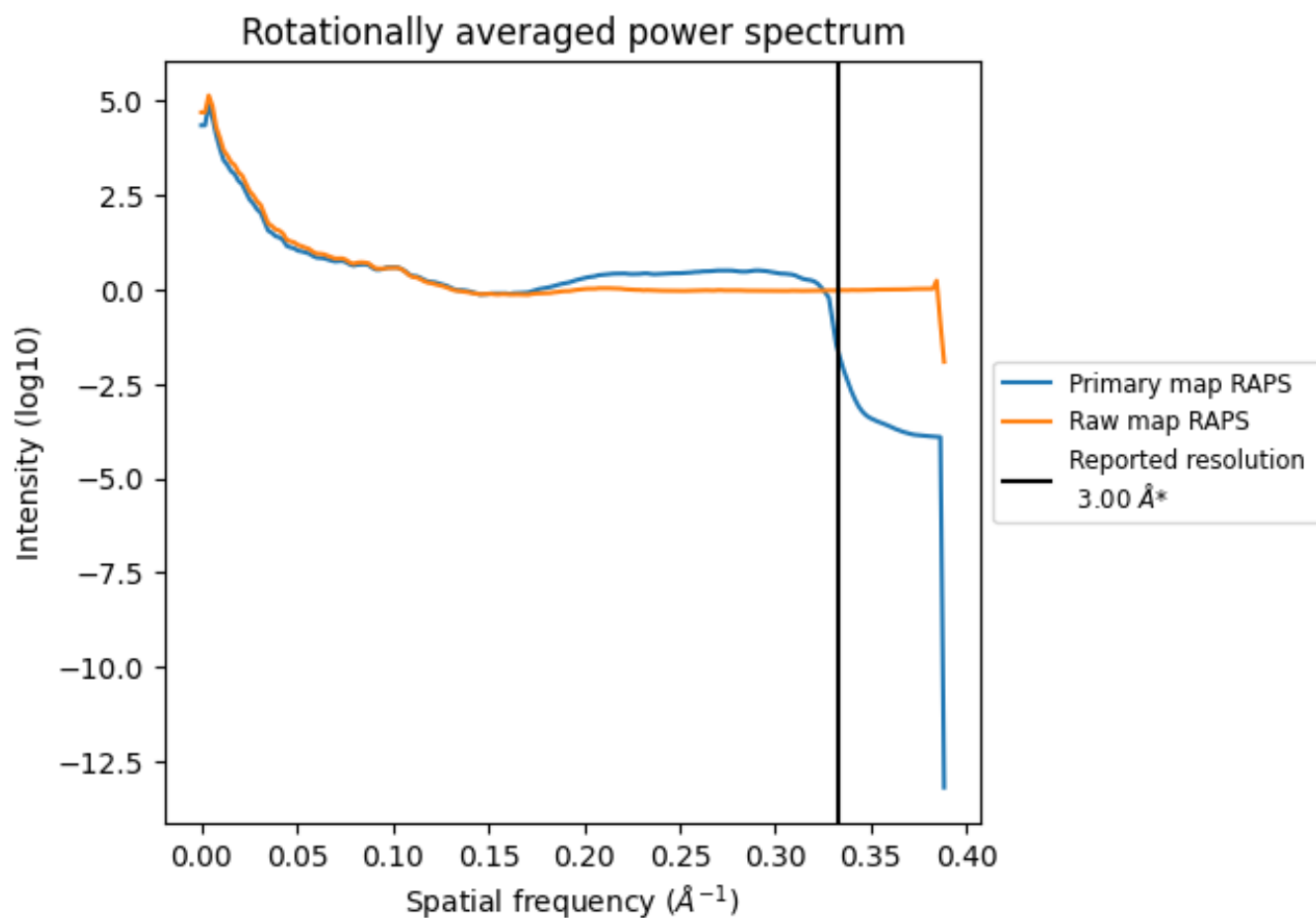
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 594 nm^3 ; this corresponds to an approximate mass of 537 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

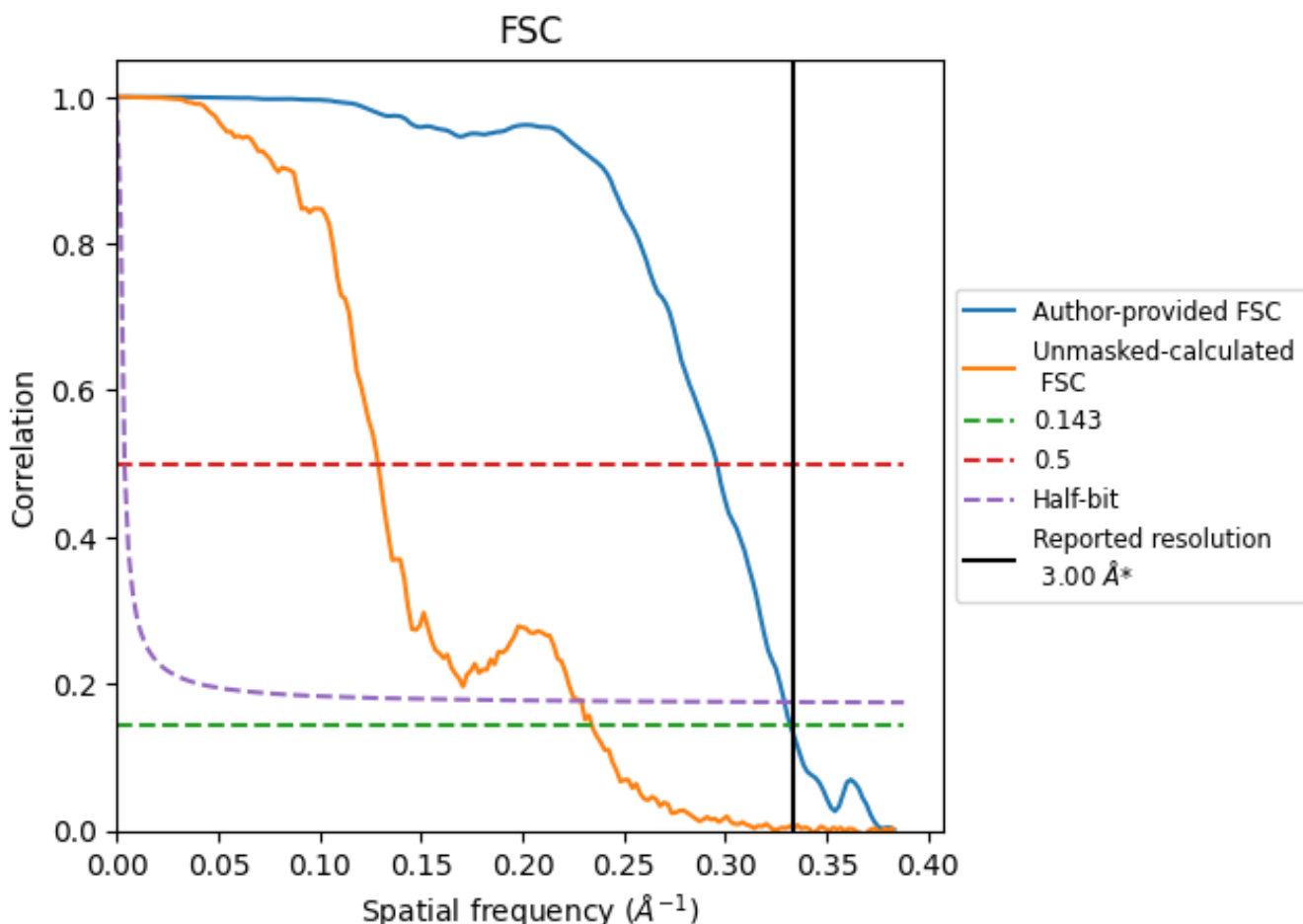


*Reported resolution corresponds to spatial frequency of 0.333 \AA^{-1}

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.333 Å⁻¹

8.2 Resolution estimates [i](#)

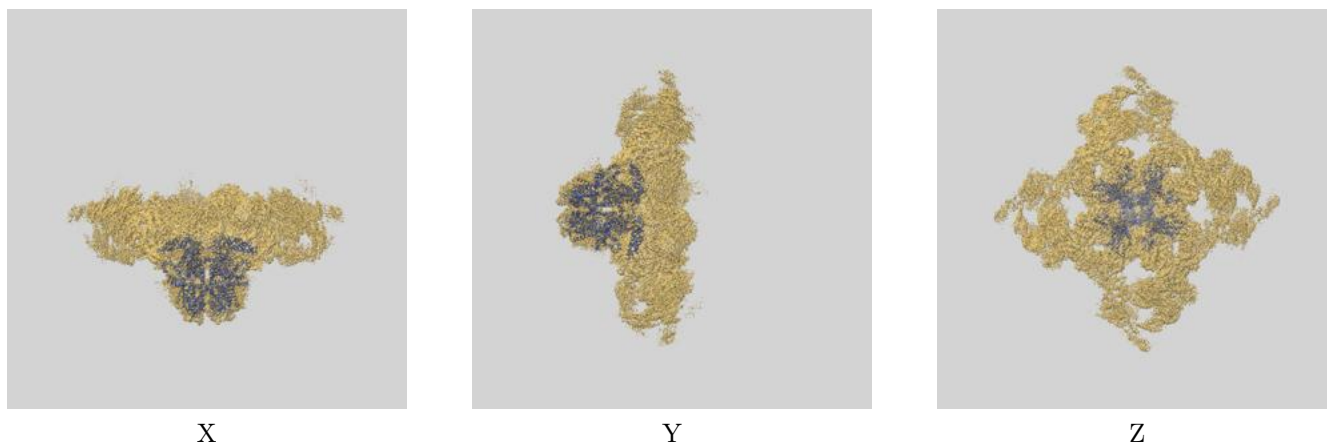
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	3.01	3.38	3.04
Unmasked-calculated*	4.27	7.76	4.36

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

9 Map-model fit [i](#)

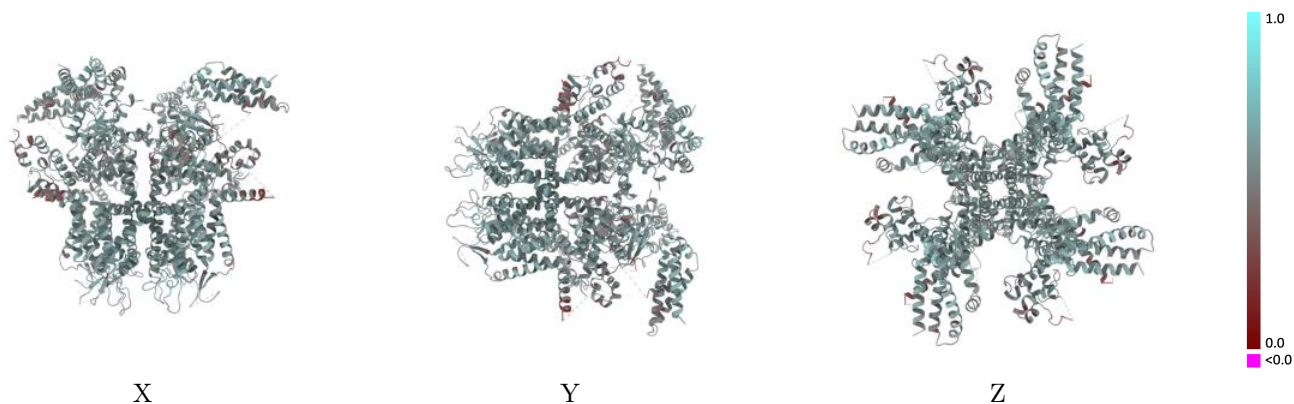
This section contains information regarding the fit between EMDB map EMD-40429 and PDB model 8SEU. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlay [i](#)



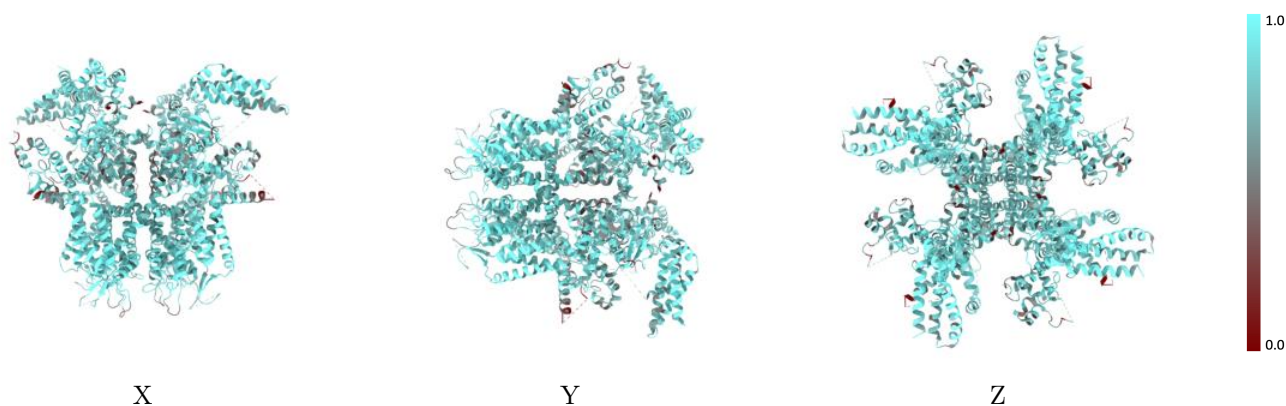
The images above show the 3D surface view of the map at the recommended contour level 0.614 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



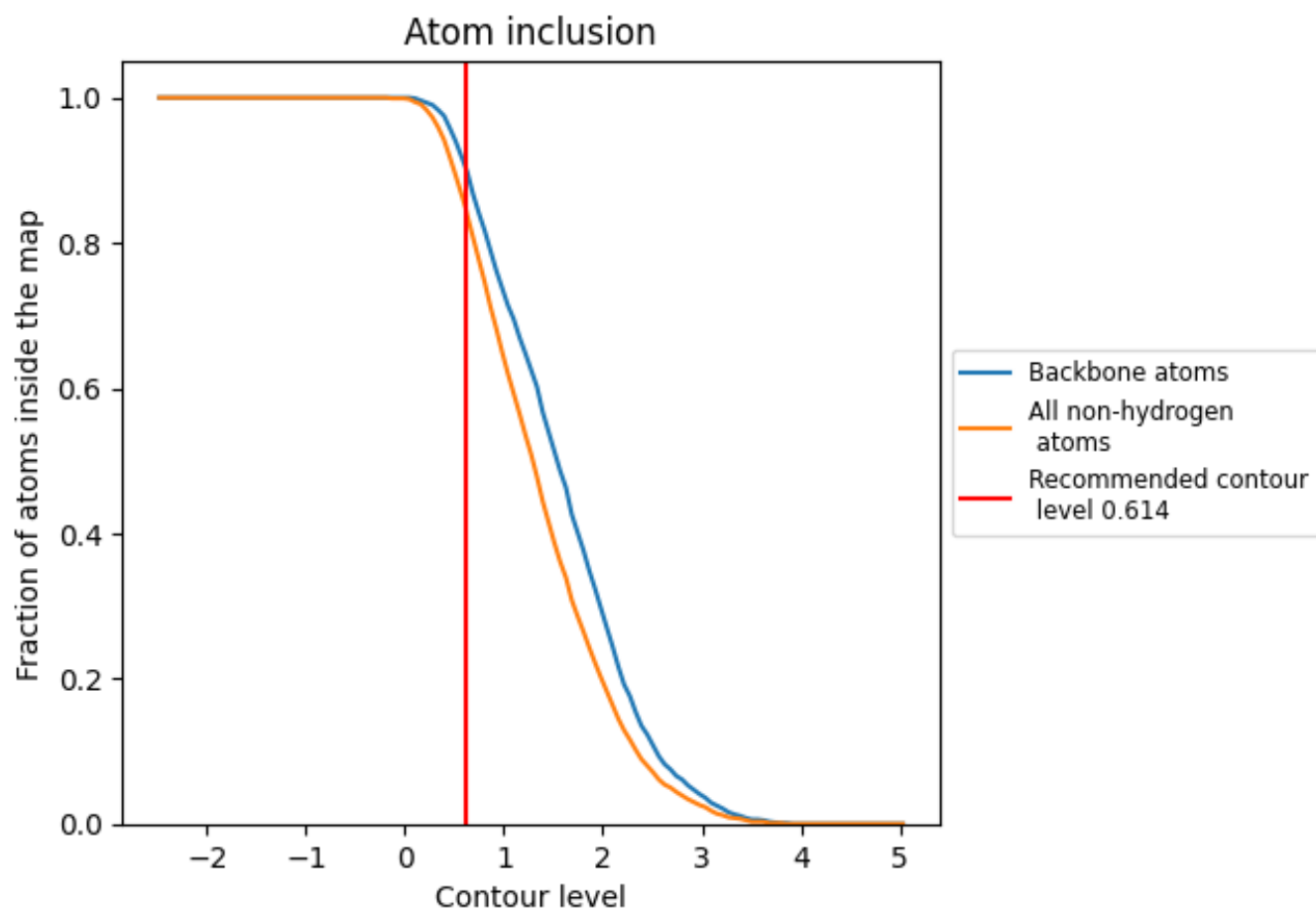
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.614).











9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 85% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.614) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8480	 0.5490
A	 0.8480	 0.5490
B	 0.8480	 0.5490
C	 0.8480	 0.5500
D	 0.8480	 0.5500

