



## wwPDB EM Validation Summary Report ⓘ

Oct 5, 2024 – 07:32 PM EDT

PDB ID : 6MIZ  
EMDB ID : EMD-9133  
Title : Human TRPM2 ion channel in an ADPR-bound state  
Authors : Wang, L.; Fu, T.M.; Xia, S.; Wu, H.  
Deposited on : 2018-09-20  
Resolution : 6.10 Å(reported)

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

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<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>.

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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

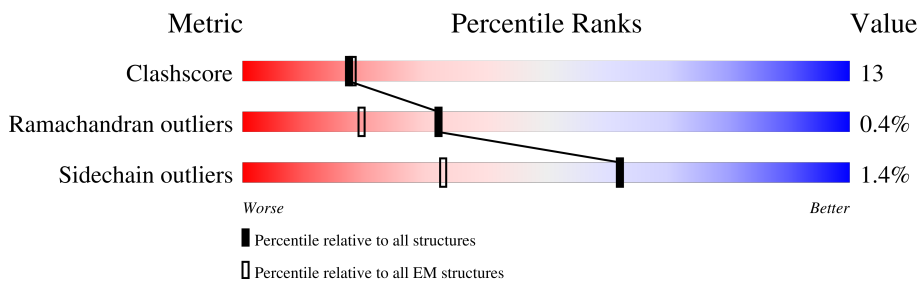
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 6.10 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  $\geq 3$ , 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	1503	<div> <div>83%</div> <div> <div>58%</div> <div>30%</div> <div>11%</div> </div> </div>
1	B	1503	<div> <div>89%</div> <div> <div>57%</div> <div>31%</div> <div>11%</div> </div> </div>
1	C	1503	<div> <div>89%</div> <div> <div>58%</div> <div>30%</div> <div>11%</div> </div> </div>
1	D	1503	<div> <div>89%</div> <div> <div>58%</div> <div>30%</div> <div>11%</div> </div> </div>

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 43120 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.

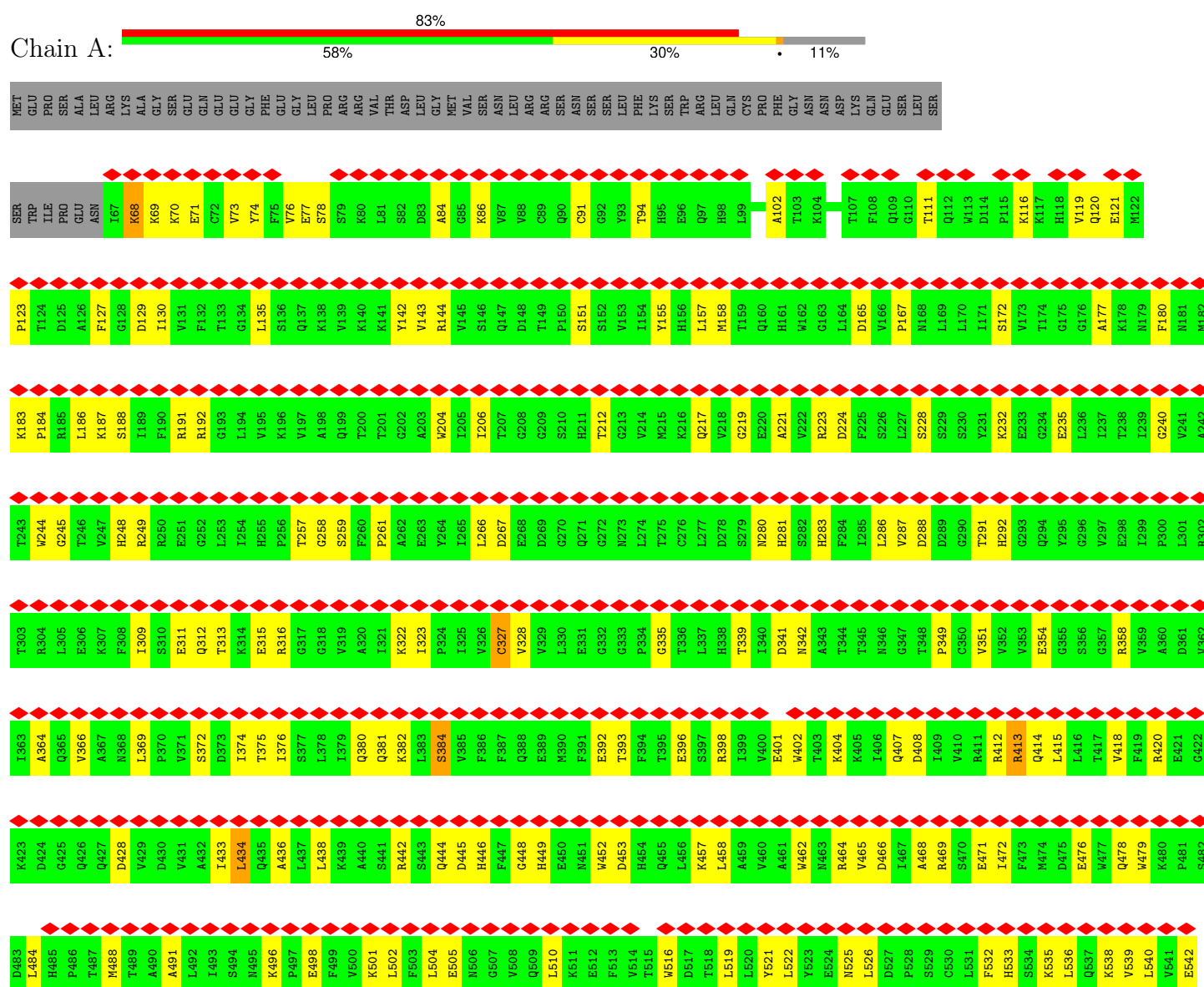
- Molecule 1 is a protein called Transient receptor potential cation channel subfamily M member 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1337	Total	C	N	O	S	0	0
			10780	6942	1865	1919	54		
1	B	1337	Total	C	N	O	S	0	0
			10780	6942	1865	1919	54		
1	C	1337	Total	C	N	O	S	0	0
			10780	6942	1865	1919	54		
1	D	1337	Total	C	N	O	S	0	0
			10780	6942	1865	1919	54		

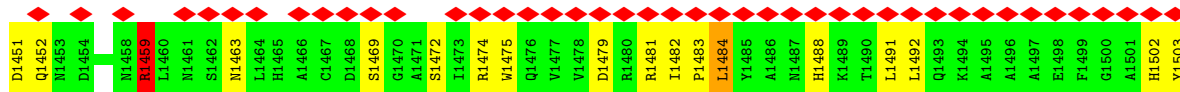
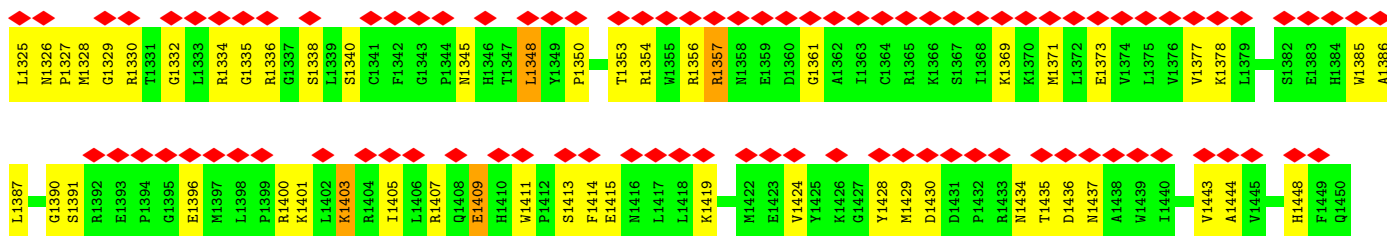
### 3 Residue-property plots

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.

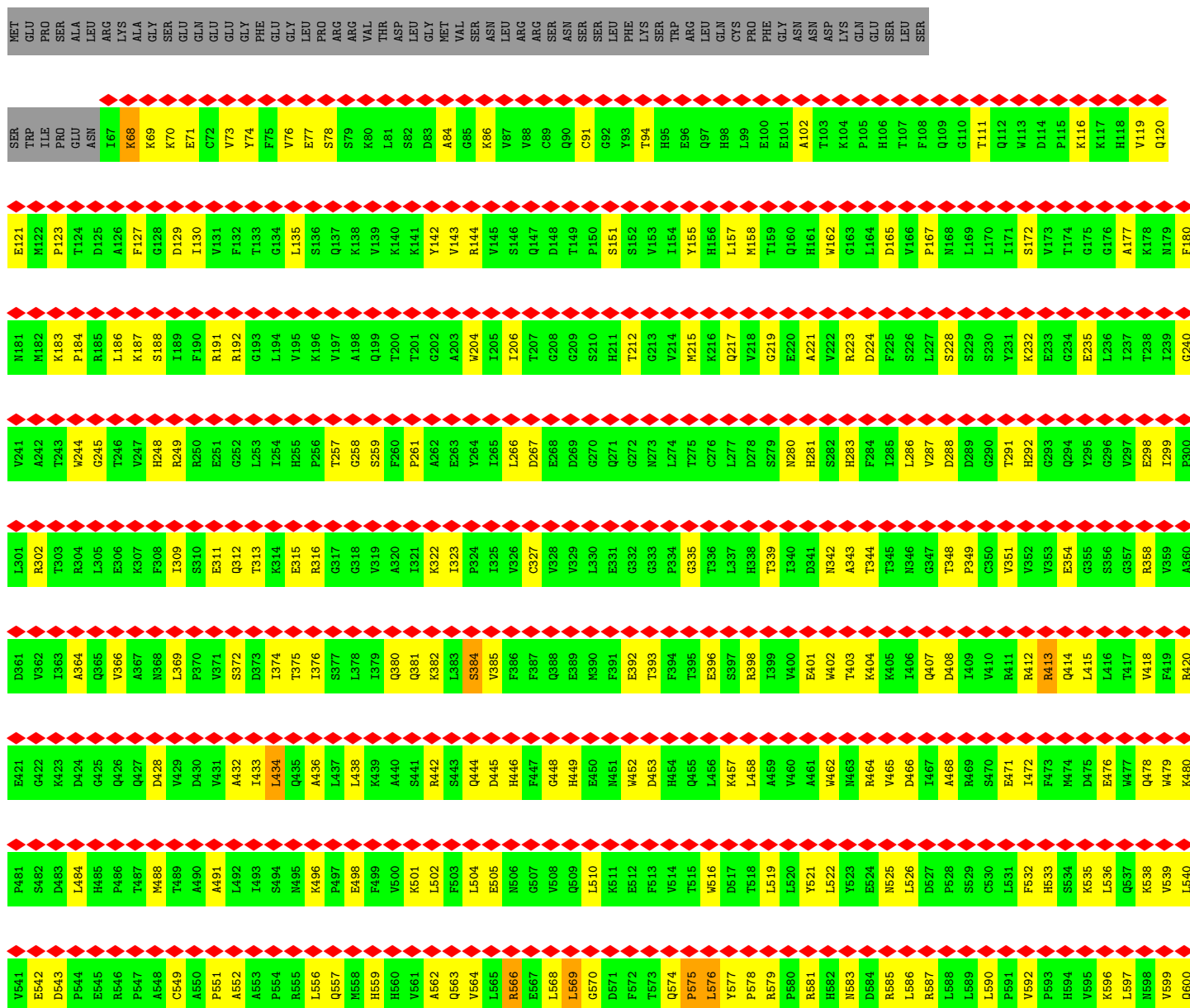
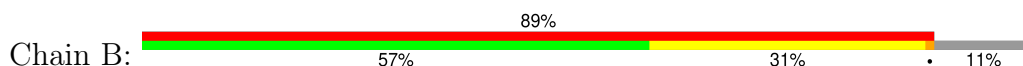
- Molecule 1: Transient receptor potential cation channel subfamily M member 2



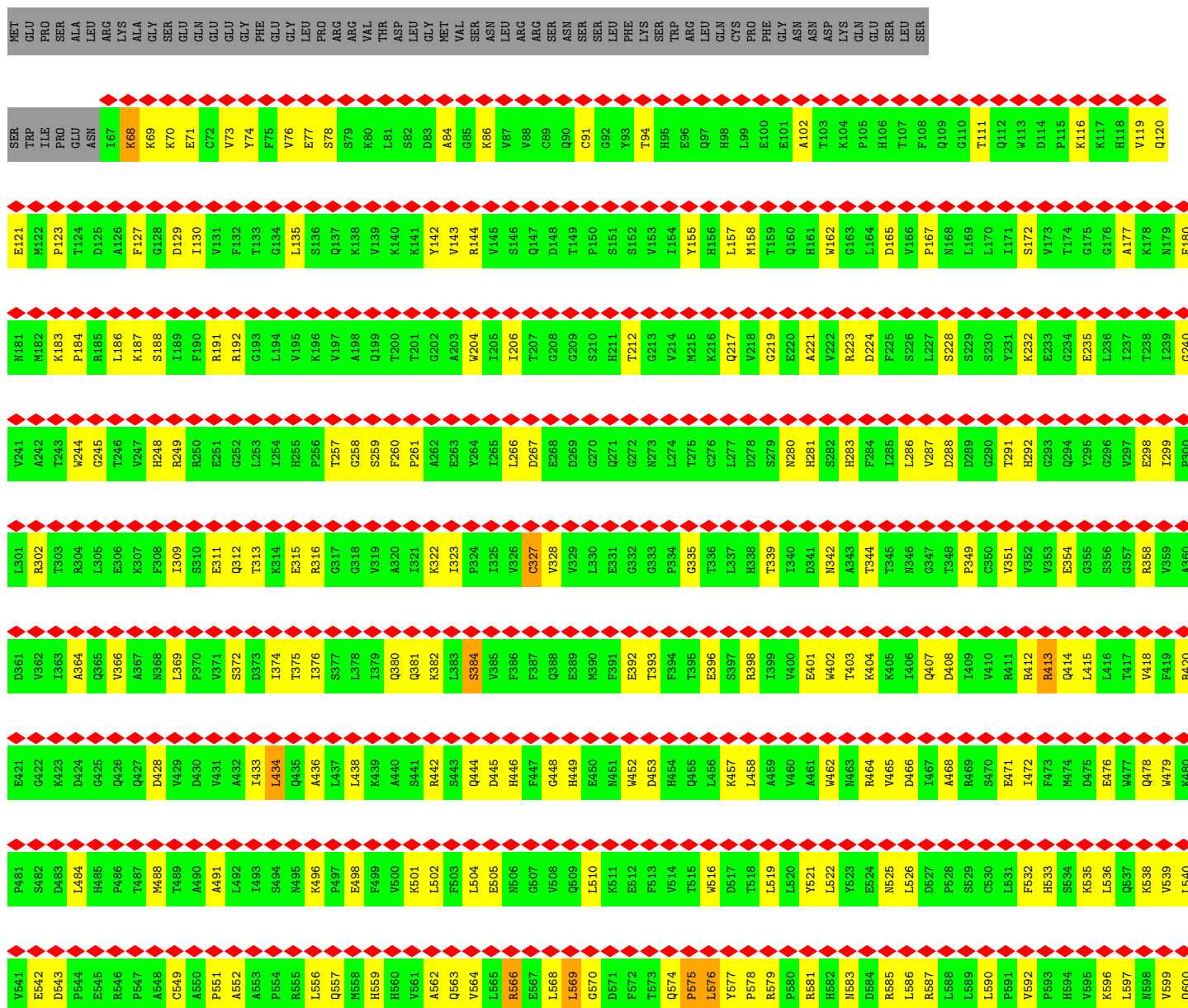




- Molecule 1: Transient receptor potential cation channel subfamily M member 2



A1321	G1322	L1323	P1324	L1325	L1326	P1327	M1328	G1329	R1330	T1331	G1332	L1333	R1334	G1335	R1336	G1337	S1338	L1339	S1340	C1341	F1342	G1343	P1344	N1345	H1346	T1347	L1348	Y1349	P1350	M1351	V1352	T1353	R1354	W1355	R1356	R1357	N1358	E1359	D1360	G1361	A1362	I1363	C1364	R1365	K1366	S1367	R1368	K1369	K1370	M1371	L1372	E1373	V1374	L1375	V1376	V1377	K1378	L1379	P1380	
K1261	V1262	P1263	W1264	E1265	T1266	E1267	F1268	L1269	I1270	Y1271	D1272	P1273	P1274	F1275	Y1276	T1277	A1278	E1279	R1280	K1281	D1282	A1283	A1284	N1285	M1286	D1287	P1288	M1289	G1290	D1291	T1292	L1293	E1294	P1295	L1296	S1297	T1298	I1299	Q1300	Y1301	M1302	V1303	V1304	D1305	K1306	L1307	R1308	D1309	R1310	R1311	S1312	F1313	H1314	G1315	P1316	T1317	T1318	V1319	Q1320	
SER	GLY	PHE	SER	SER	GLU	ALA	ASP	VAL	PRO	THR	LEU	ALA	SER	GLN	LYS	ALA	GLY	PRO	GLY	ARG	LYS	THR	GLY	GLU	PRO	G1235	D1236	S1237	Y1238	H1239	V1240	N1241	A1242	R1243	H1244	L1245	L1246	Y1247	P1248	N1249	C1250	T1251	V1252	T1253	R1254	F1255	P1256	V1257	N1258	P1259	E1260									
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F1021	E1022	W1023	L1024	T1025	W1026	L1027	L1028	L1029	C1030	L1031	Y1032	L1033	L1034	F1035	T1036	N1037	I1038	L1039	L1040	L1041	N1042	L1043	L1044	I1045	A1046	M1047	F1048	N1049	Y1050	T1051	F1052	Q1053	Q1054	V1055	Q1056	E1057	H1058	T1059	D1060	Q1061	L1062	W1063	K1064	F1065	Q1066	R1067	H1068	D1069	K1129	L1070	I1071	E1072	E1073	Y1074	H1075	G1076	R1077	P1078	A1079	A1080
R961	R962	V963	D964	W965	L966	P967	R968	G969	A970	V971	Y972	H973	S974	Y975	L976	T977	I978	F979	G980	Q981	I982	P983	Q984	Y985	I986	D987	G988	VAL	ASN	PHE	ASN	GLU	HIS	CYS	SER	PRO	ASN	GLY	THR	ASP	PRO	TYR	LYS	PRO	LYS	CYS	PRO	GLU	SER	ASP	ALA	THR	GLN	ARG	ALA	F1020				
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C941	E942	E943	M944	R945	Q946	L947	F948	Y949	D950	P951	D952	E953	C954	G955	L956	M957	K958	K959	A960	A961	Y962	Y963	F964	S965	D966	F967	W968	N969	K970	L971	D972	V973	G974	A975	I976	L977	L978	F979	V980	D980	F981	Q982	P983	T984	C985	R986	L987	I988	P989	A990	T991	L992	Y993	G994	R996	V997	I998	L999	S900	
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A1321	G1322	L1323	P1324	L1325	M1326	P1327	M1328	G1329	R1330	G1331	G1332	L1333	R1334	G1335	R1336	G1337	S1338	L1339	S1340	C1341	F1342	G1343	P1344	N1345	N1346	T1347	L1348	Y1349	P1350	M1351	V1352	T1353	R1354	W1355	R1356	R1357	N1358	E1359	D1360	G1361	A1362	I1363	C1364	R1365	K1366	S1367	T1368	K1369	K1370	M1371	L1372	E1373	V1374	L1375	V1376	V1377	K1378	L1379	P1380					
K1261	V1262	P1263	W1264	E1265	T1266	E1267	F1268	L1269	I1270	Y1271	D1272	P1273	P1274	F1275	Y1276	T1277	A1278	E1279	R1280	K1281	D1282	A1283	A1284	A1285	M1286	D1287	P1288	M1289	G1290	D1291	T1292	L1293	E1294	P1295	L1296	S1297	T1298	I1299	Q1300	Y1301	N1302	V1303	V1304	D1305	K1306	L1307	R1308	D1309	R1310	R1311	S1312	F1313	G1314	G1315	P1316	T1317	T1318	V1319	Q1320					
SER	GLY	PHE	SER	SER	GLU	ALA	ASP	VAL	PRO	THR	LEU	ALA	SER	GLN	LYS	ALA	GLU	PRO	GLY	GLY	ARG	LYS	THR	GLU	GLU	PRO	G1235	D1236	S1237	Y1238	H1239	V1240	N1241	A1242	R1243	H1244	L1245	L1246	Y1247	P1248	N1249	C1250	T1251	V1252	T1253	R1254	F1255	P1256	V1257	N1258	P1259	E1260												
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			V1443	E1383
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			V1448	W1385
			F1449	A1386
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			V1457	P1388
			H1458	G1389
R1459	L1460	S1462	D1451	G1390
			V1467	S1391
			H1468	R1392
S1469	M1470	T1472	L1452	E1393
			H1470	P1394
			A1471	G1395
V1473	R1474	V1475	V1447	E1396
			L1474	M1397
			M1476	L1398
Y1478	D1479	R1480	L1457	P1399
			H1480	R1400
			A1481	K1401
A1486	T1482	P1483	L1462	L1402
			H1488	K1403
			K1489	R1404
Y1490	V1491	L1492	L1484	L1405
			H1491	L1406
			A1493	L1407
Q1494	H1495	V1497	V1428	Q1408
			T1435	E1409
			A1436	H1410
A1439	F1439	G1500	Y1428	W1411
			D1430	P1412
			D1431	S1413
F1432	N1434	T1435	G1420	F1414
			H1438	E1415
			K1429	N1416
D1430	Y1428	G1427	G1421	L1417
			M1422	L1418
			L1419	L1419
V1425	K1426	G1427	G1420	G1420
			M1422	G1421
			E1423	M1422
Y1424	V1425	K1426	L1484	E1423
			H1485	V1424
			A1486	Y1425
H1487	V1487	G1427	A1486	K1426
			H1488	G1427
			K1489	Y1428
T1490	L1491	P1432	M1429	M1429
			D1430	D1430
			D1431	D1431
Q1493	H1434	T1435	L1492	P1432
			A1495	R1433
			A1496	N1434
A1497	T1435	M1437	A1495	T1435
			A1497	T1436
			A1498	A1439
F1499	G1500	W1440	F1499	W1439
			G1500	L1440

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	49383	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	70.072	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	31.379	Depositor
Minimum map value	-14.438	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	3.6	Depositor
Map size ( $\text{\AA}$ )	321.00003, 321.00003, 321.00003	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.07, 1.07, 1.07	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	0.30	0/11050	0.65	12/14990 (0.1%)
1	B	0.30	0/11050	0.65	12/14990 (0.1%)
1	C	0.30	0/11050	0.65	12/14990 (0.1%)
1	D	0.30	0/11050	0.65	12/14990 (0.1%)
All	All	0.30	0/44200	0.65	48/59960 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	10
1	B	0	10
1	C	0	10
1	D	0	10
All	All	0	40

There are no bond length outliers.

The worst 5 of 48 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	1459	ARG	NE-CZ-NH1	9.20	124.90	120.30
1	D	1459	ARG	NE-CZ-NH1	9.16	124.88	120.30
1	A	1459	ARG	NE-CZ-NH1	9.15	124.88	120.30
1	B	1459	ARG	NE-CZ-NH1	9.14	124.87	120.30
1	A	929	ARG	CD-NE-CZ	6.60	132.84	123.60

There are no chirality outliers.

5 of 40 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	375	THR	Peptide
1	A	452	TRP	Peptide
1	A	479	TRP	Peptide
1	A	616	THR	Peptide
1	A	618	THR	Peptide

## 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	10780	0	10822	285	0
1	B	10780	0	10822	300	0
1	C	10780	0	10822	291	0
1	D	10780	0	10822	291	0
All	All	43120	0	43288	1148	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 13.

The worst 5 of 1148 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:559:HIS:H	1:A:585:ARG:HB2	1.54	0.73
1:B:559:HIS:H	1:B:585:ARG:HB2	1.54	0.73
1:D:559:HIS:H	1:D:585:ARG:HB2	1.54	0.73
1:C:559:HIS:H	1:C:585:ARG:HB2	1.54	0.72
1:B:471:GLU:HG3	1:B:472:ILE:HG12	1.72	0.70

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	A	1331/1503 (89%)	1115 (84%)	211 (16%)	5 (0%)	30	68
1	B	1331/1503 (89%)	1115 (84%)	211 (16%)	5 (0%)	30	68
1	C	1331/1503 (89%)	1114 (84%)	212 (16%)	5 (0%)	30	68
1	D	1331/1503 (89%)	1115 (84%)	211 (16%)	5 (0%)	30	68
All	All	5324/6012 (89%)	4459 (84%)	845 (16%)	20 (0%)	32	68

5 of 20 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	576	LEU
1	B	576	LEU
1	C	576	LEU
1	D	576	LEU
1	A	575	PRO

### 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	1176/1318 (89%)	1159 (99%)	17 (1%)	62	75
1	B	1176/1318 (89%)	1159 (99%)	17 (1%)	62	75
1	C	1176/1318 (89%)	1159 (99%)	17 (1%)	62	75
1	D	1176/1318 (89%)	1159 (99%)	17 (1%)	62	75
All	All	4704/5272 (89%)	4636 (99%)	68 (1%)	62	75

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	596	LYS
1	D	668	ASP
1	D	1311	ARG

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
1	B	619	MET
1	B	596	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 86 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	822	GLN
1	D	525	ASN
1	C	1116	ASN
1	D	168	ASN
1	D	614	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 [i](#)

This section contains visualisations of the EMDB entry EMD-9133. These allow visual inspection of the internal detail of the map and identification of artifacts.

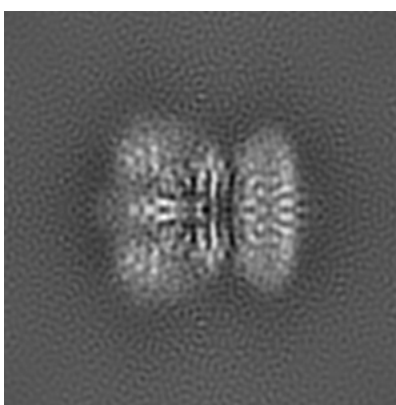
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

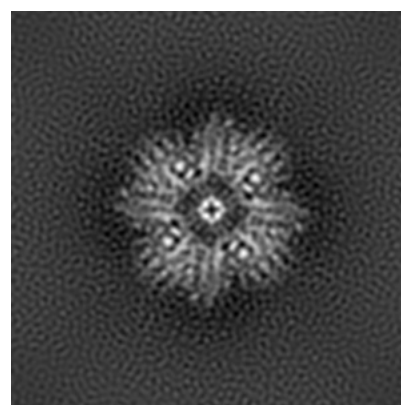
#### 6.1.1 Primary map



X



Y

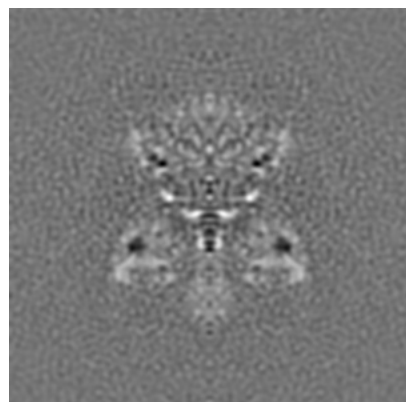


Z

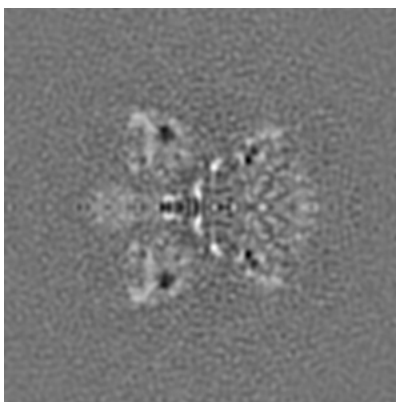
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

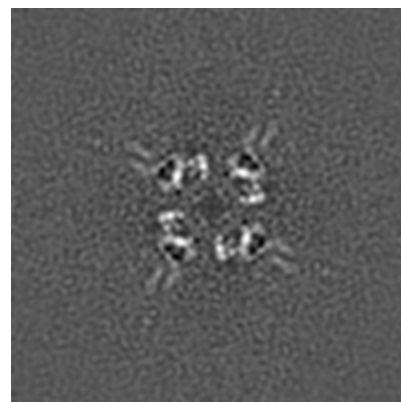
#### 6.2.1 Primary map



X Index: 150



Y Index: 150

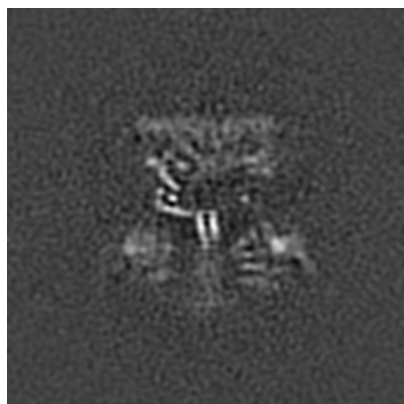


Z Index: 150

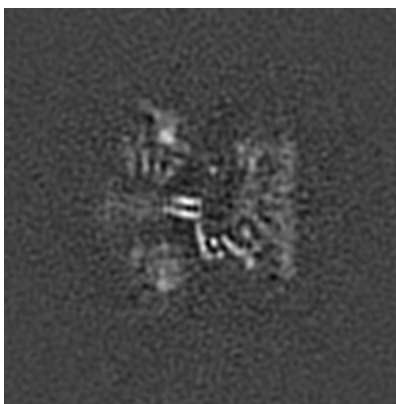
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

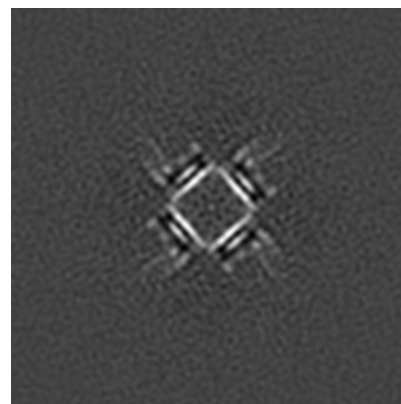
### 6.3.1 Primary map



X Index: 155



Y Index: 145

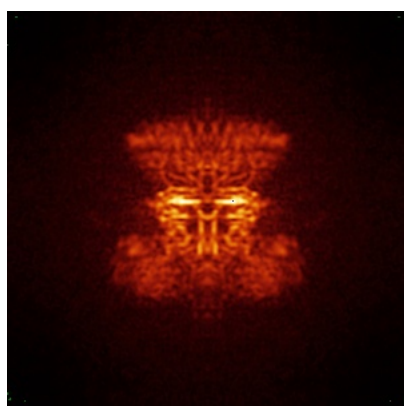


Z Index: 157

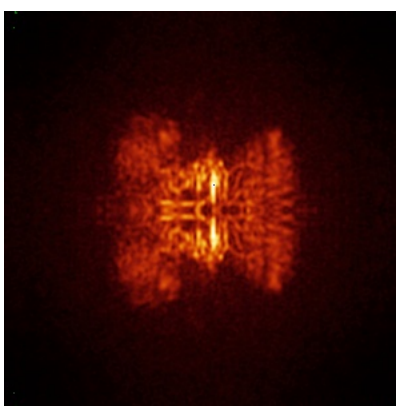
The images above show the largest variance slices of the map in three orthogonal directions.

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

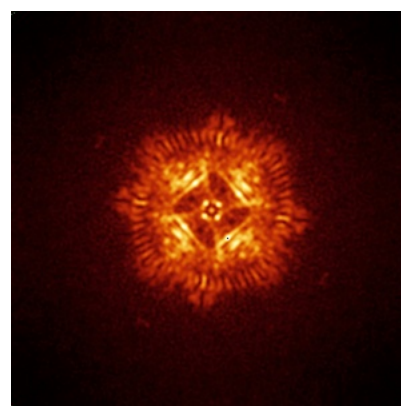
### 6.4.1 Primary map



X



Y

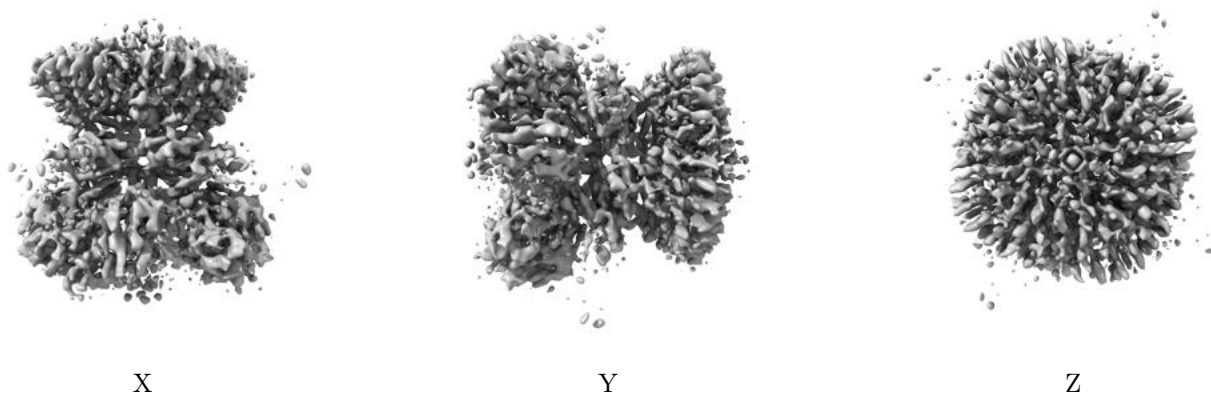


Z

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 3.6. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

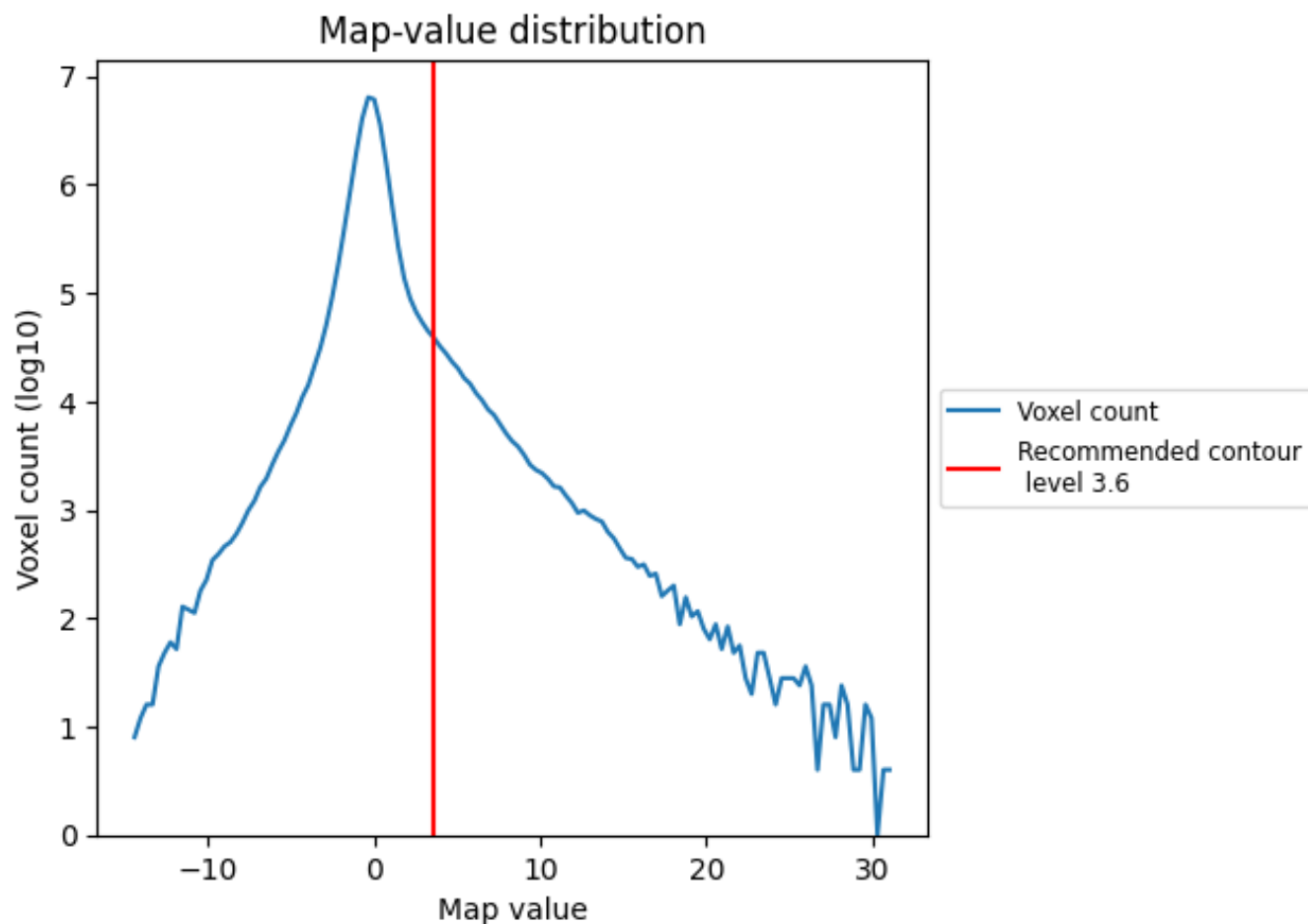
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

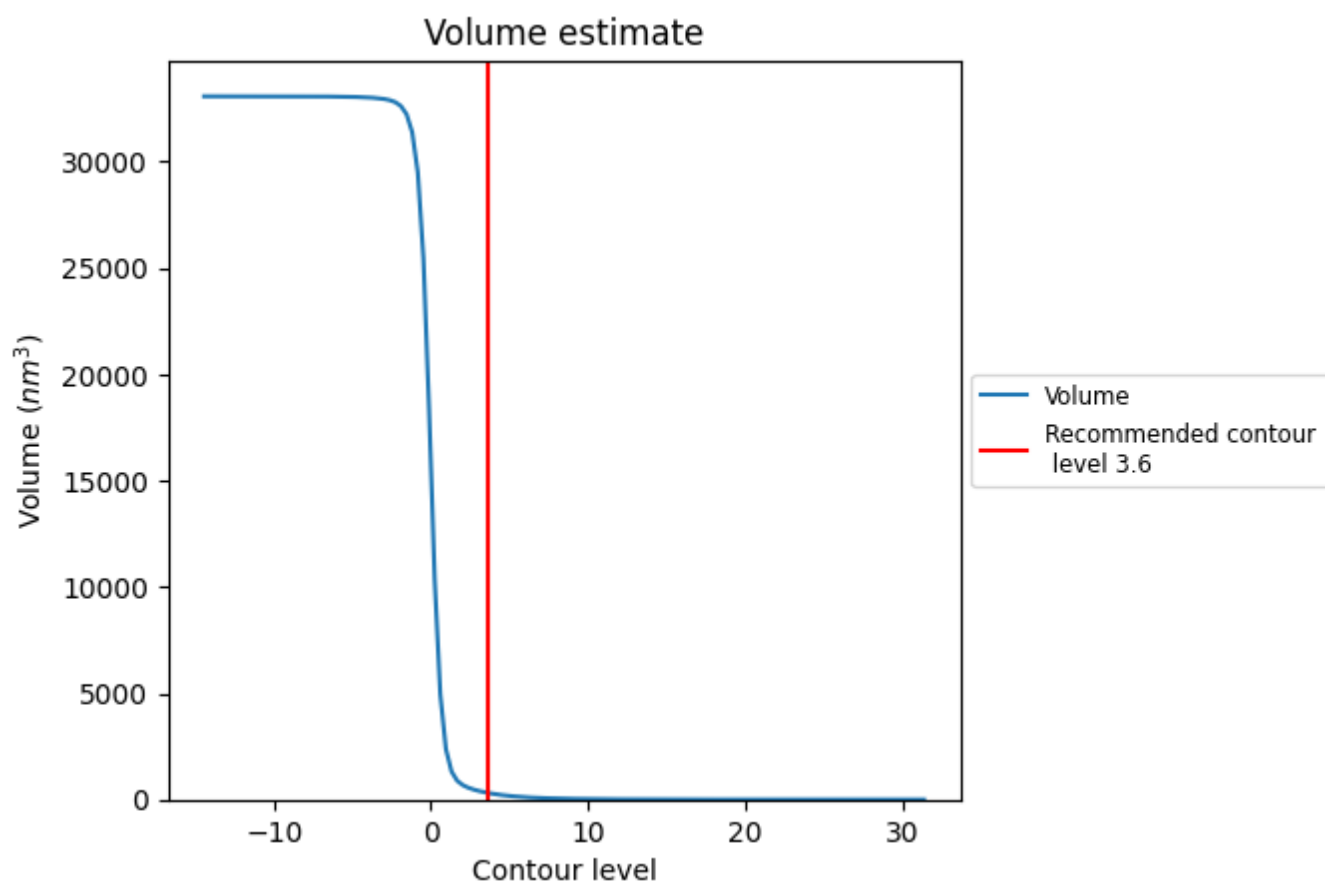
This section contains the results of statistical analysis of the map.

### 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.

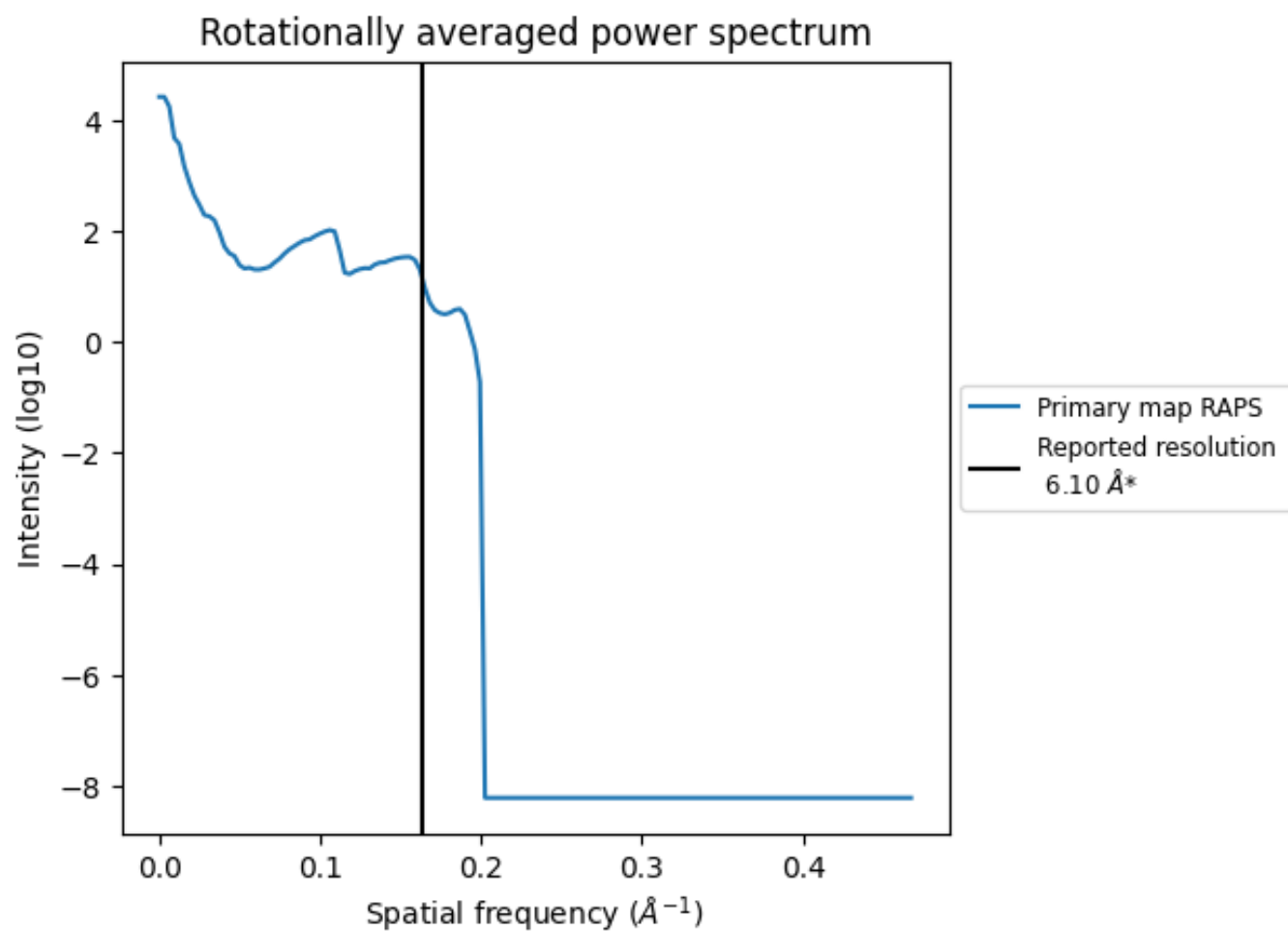
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 317  $\text{nm}^3$ ; this corresponds to an approximate mass of 286 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum ⓘ



\*Reported resolution corresponds to spatial frequency of 0.164 Å<sup>-1</sup>

## 8 Fourier-Shell correlation

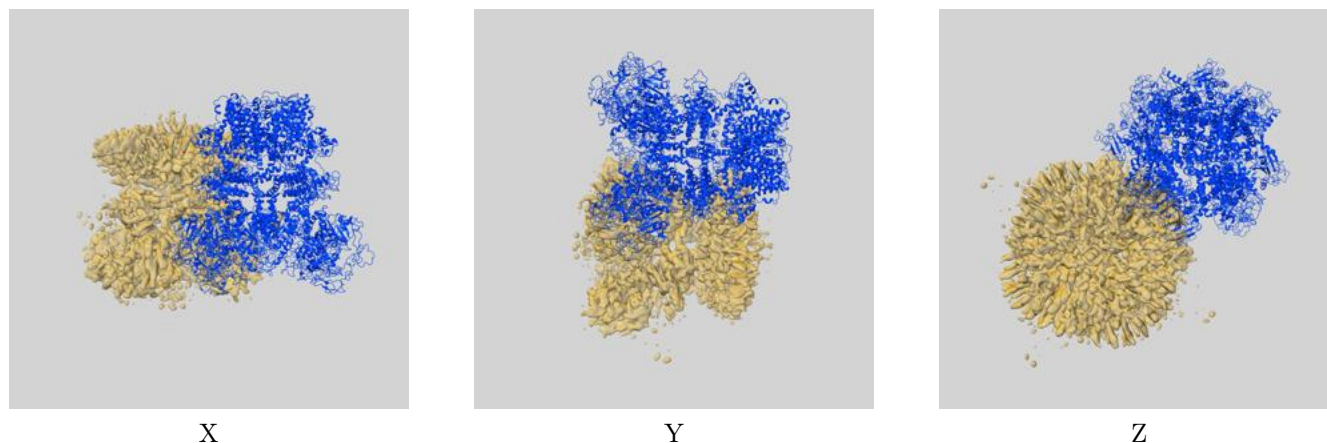
This section was not generated. No FSC curve or half-maps provided.



## 9 Map-model fit [i](#)

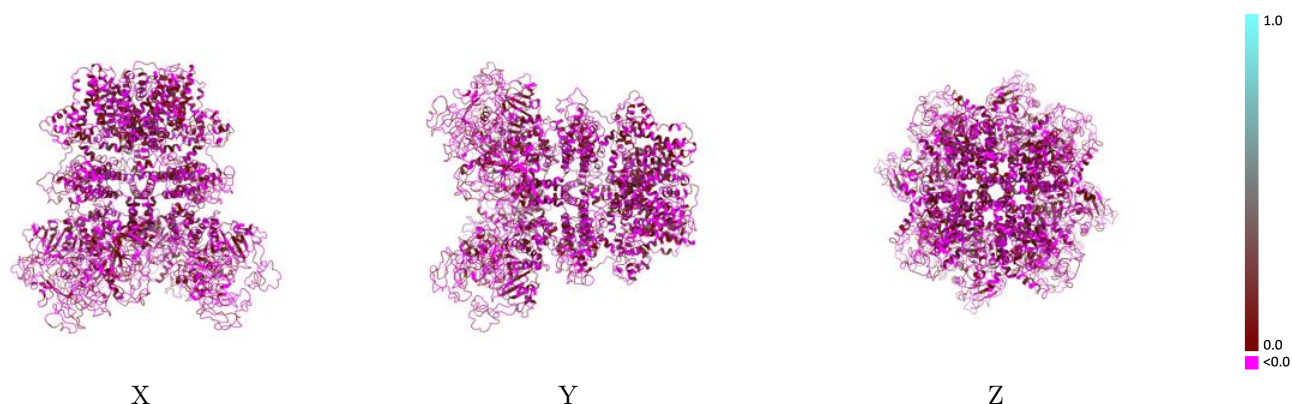
This section contains information regarding the fit between EMDB map EMD-9133 and PDB model 6MIZ. Per-residue inclusion information can be found in [section 3](#) on [page 4](#).

### 9.1 Map-model overlay [i](#)



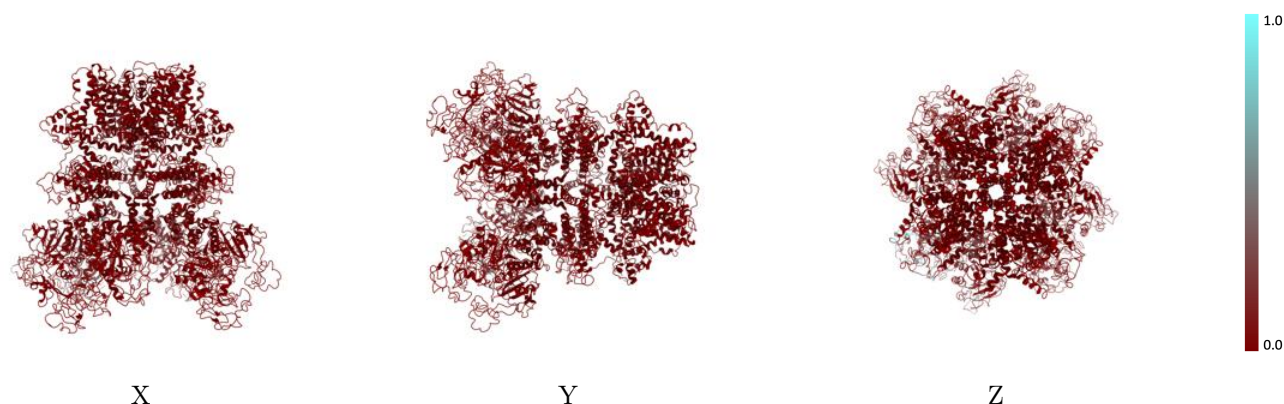
The images above show the 3D surface view of the map at the recommended contour level 3.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



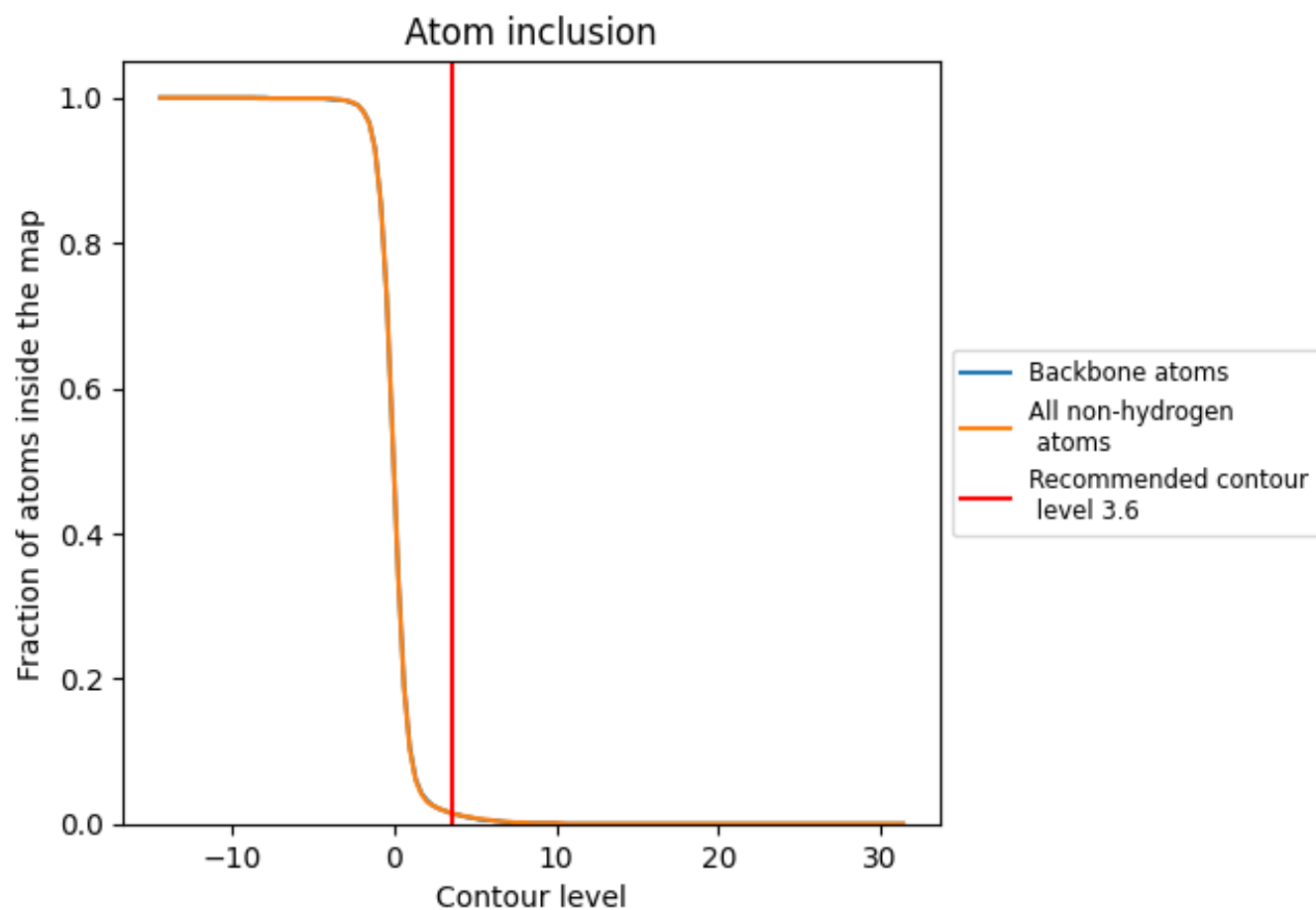
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (3.6).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 1% of all backbone atoms, 1% 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 (3.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.0140	<div></div> -0.0020
A	<div></div> 0.0570	<div></div> -0.0020
B	<div></div> 0.0000	<div></div> 0.0020
C	<div></div> 0.0000	<div></div> -0.0030
D	<div></div> 0.0000	<div></div> -0.0030

