



wwPDB EM Validation Summary Report ⓘ

May 28, 2026 – 04:17 PM JST

PDB ID : 9VM3 / pdb_00009vm3
EMDB ID : EMD-65175
Title : Structure of DOCK6-Cdc42 complex
Authors : Kukimoto-Niino, M.; Katsura, K.; Ishizuka-Katsura, Y.; Yonemochi, M.;
Hanada, K.; Shirouzu, M.
Deposited on : 2025-06-27
Resolution : 4.52 Å(reported)

This is a wwPDB EM Validation Summary 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.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

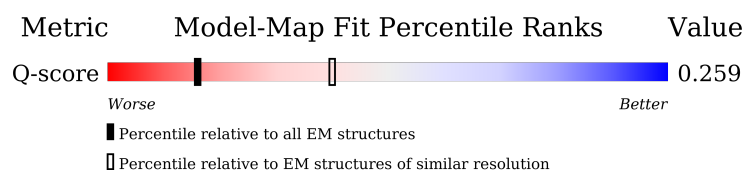
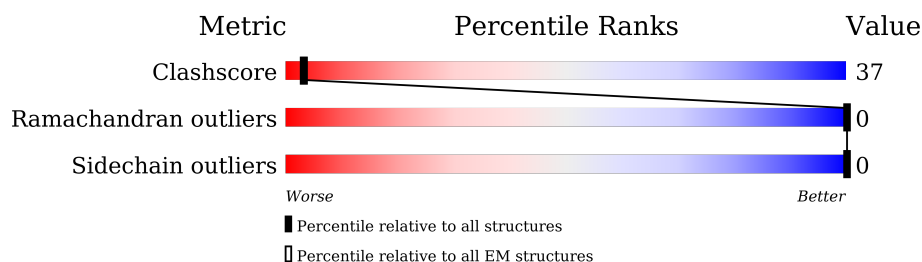
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.52 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	2506 (4.02 - 5.02)

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	2053	
1	C	2053	
2	B	195	
2	D	195	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 29720 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 Dedicator of cytokinesis protein 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1688	Total	C	N	O	S	0	0
			13471	8606	2331	2475	59		
1	C	1688	Total	C	N	O	S	0	0
			13471	8606	2331	2475	59		

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	GLY	-	expression tag	UNP Q96HP0
A	-4	GLY	-	expression tag	UNP Q96HP0
A	-3	SER	-	expression tag	UNP Q96HP0
A	-2	GLY	-	expression tag	UNP Q96HP0
A	-1	GLY	-	expression tag	UNP Q96HP0
A	0	SER	-	expression tag	UNP Q96HP0
C	-5	GLY	-	expression tag	UNP Q96HP0
C	-4	GLY	-	expression tag	UNP Q96HP0
C	-3	SER	-	expression tag	UNP Q96HP0
C	-2	GLY	-	expression tag	UNP Q96HP0
C	-1	GLY	-	expression tag	UNP Q96HP0
C	0	SER	-	expression tag	UNP Q96HP0

- Molecule 2 is a protein called Cell division control protein 42 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	178	Total	C	N	O	S	0	0
			1389	894	221	267	7		
2	D	178	Total	C	N	O	S	0	0
			1389	894	221	267	7		

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	GLY	-	expression tag	UNP P60953

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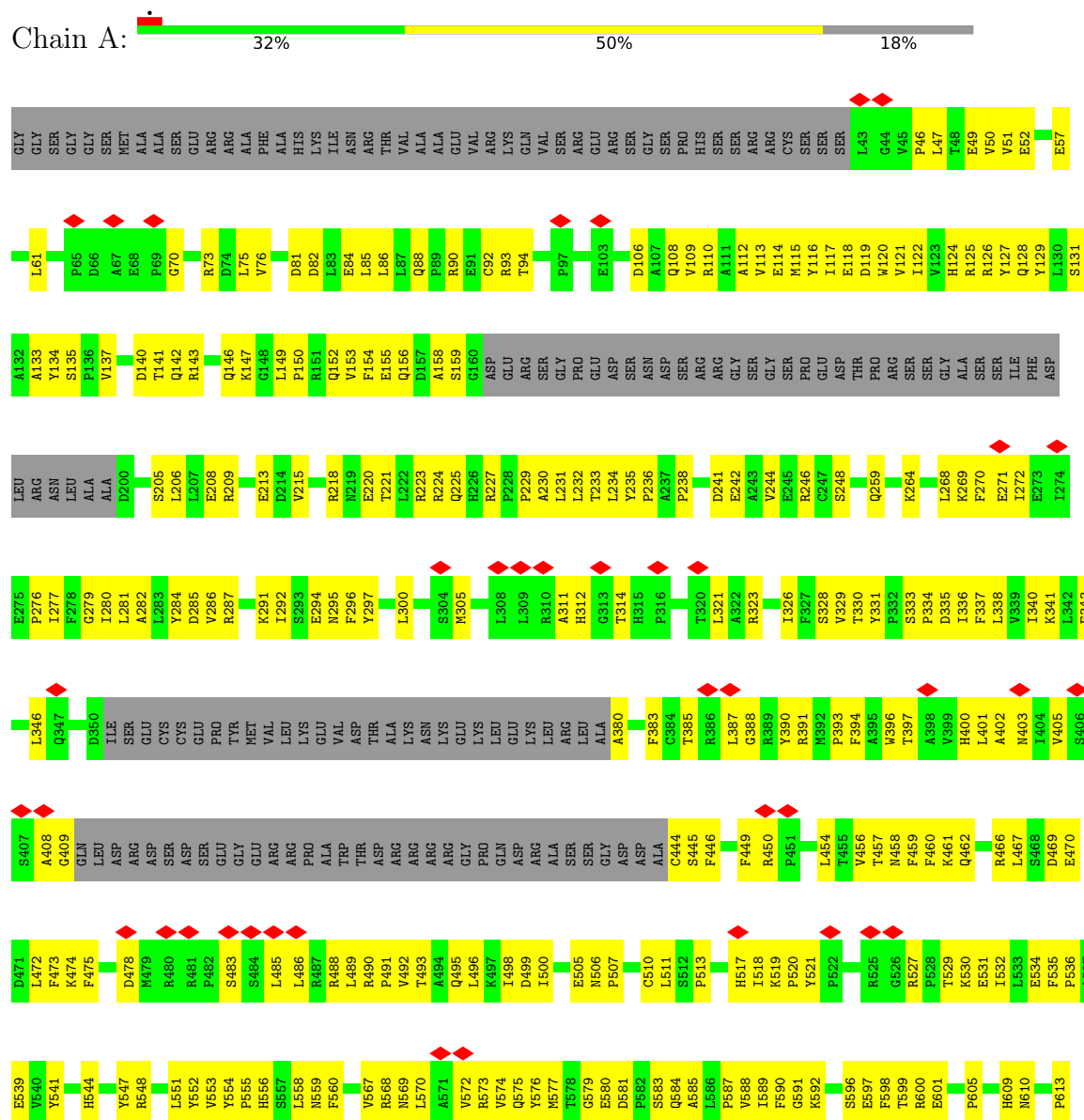
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Chain	Residue	Modelled	Actual	Comment	Reference
B	-5	SER	-	expression tag	UNP P60953
B	-4	SER	-	expression tag	UNP P60953
B	-3	GLY	-	expression tag	UNP P60953
B	-2	SER	-	expression tag	UNP P60953
B	-1	SER	-	expression tag	UNP P60953
B	0	GLY	-	expression tag	UNP P60953
B	15	ALA	GLY	engineered mutation	UNP P60953
B	188	SER	-	expression tag	UNP P60953
D	-6	GLY	-	expression tag	UNP P60953
D	-5	SER	-	expression tag	UNP P60953
D	-4	SER	-	expression tag	UNP P60953
D	-3	GLY	-	expression tag	UNP P60953
D	-2	SER	-	expression tag	UNP P60953
D	-1	SER	-	expression tag	UNP P60953
D	0	GLY	-	expression tag	UNP P60953
D	15	ALA	GLY	engineered mutation	UNP P60953
D	188	SER	-	expression tag	UNP P60953

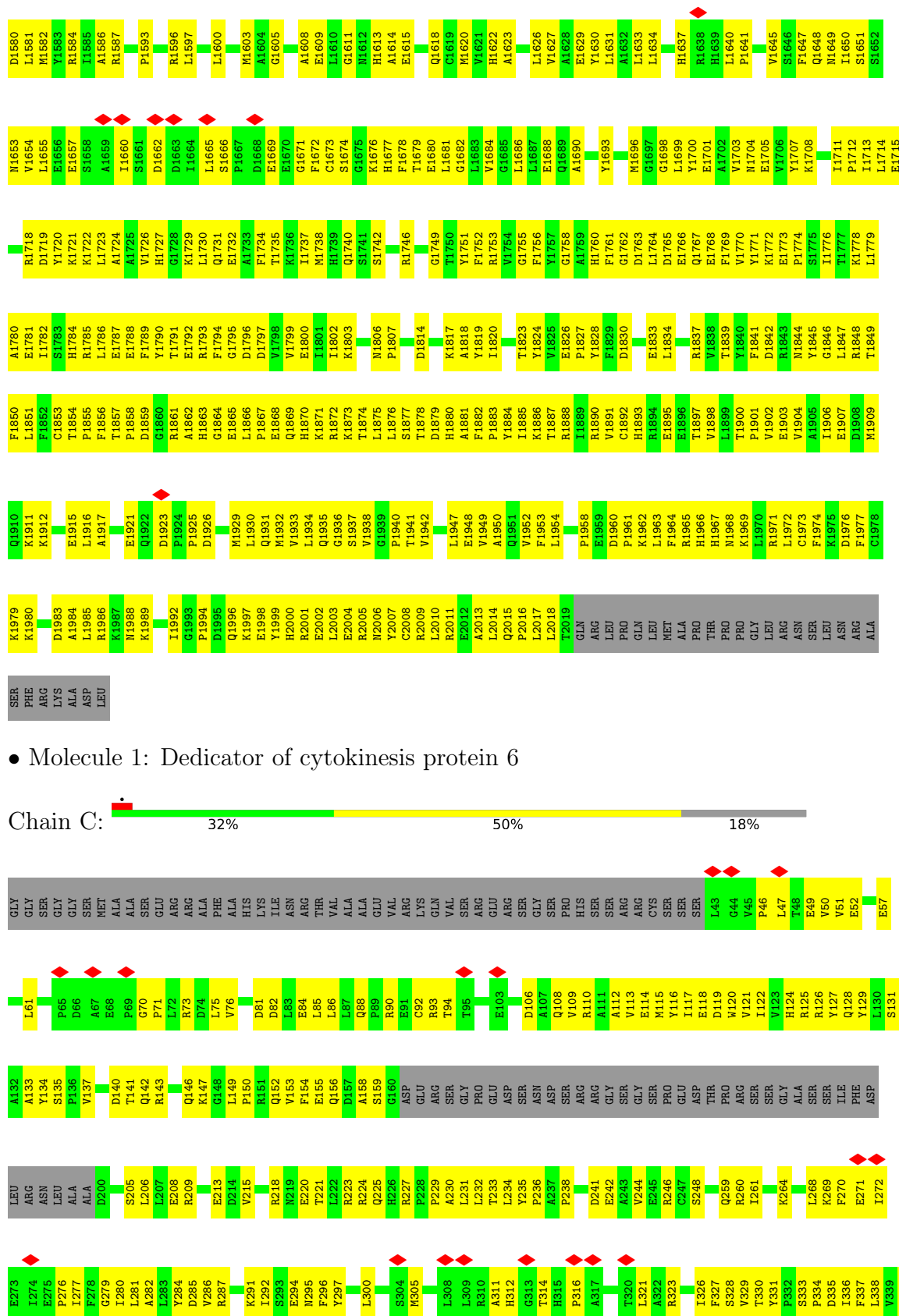
3 Residue-property plots

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: Dedicator of cytokinesis protein 6









LYS	M1374	V1514	M1577	S1651	K1778	R1848	D1908	F1977	ARG
SER		G1515	L1578	S1652	K1779	T1849	M1909	G1978	ALA
LEU	E1377	G1516	L1579	N1653	L1779	F1850	Q1910	K1979	SER
ASP		T1516	I1580	L1654	E1781	L1851	K1911	K1980	PHE
MET	G1382	T1517	L1581	L1655	F1719	F1852	K1912		ARG
LYS	N1383	F1520	M1582	E1656	Y1720	C1853	E1915	D1983	LYS
ALA	L1384	S1521	Y1583	E1657	K1721	T1854	E1916	A1984	ALA
ARG	A1385	E1522	I1584		K1722	F1785	A1917	L1985	ALA
LEU	A1386	E1523	I1585		L1723	F1786	L1916	L1986	LEU
GLU	A1387	H1524	A1586	S1661	L1723	P1856	A1917	L1987	
GLU	A1388	L1525	R1587	D1662	A1725	P1857	E1921	K1988	
ALA	S1389	D1526	P1593	D1663	H1726	D1859	Q1922	K1989	
ILE	L1390	R1527		I1664	H1727	D1859	D1923		
LEU	V1391	S1528		L1665	G1728	A1861	P1924		
GLY	V1392	K1530	R1596	L1666	K1729	A1862	P1925		
THR		K1530	L1597	S1666	L1730	H1863	D1926		
ILE	T1395	T1531	L1600	P1667	Q1731	G1864			
GLY	L1396	I1532	L1603	D1668	F1734	E1865	M1929		
ALA	E1397	L1533	E1603	E1669	A1733	L1866	Q1931		
ARG	L1398	T1534	L1604	E1670	F1735	P1867	M1932		
GLN	I1399	L1467	A1604	E1671	T1736	E1868	Q1933		
GLU	V1400	H1469	G1605	F1672	K1736	Q1869	V1933		
MET	Q1401	E1537	K1606	C1673	I1737	H1870	L1934		
VAL	T1402	E1538	H1607	L1687	M1738	K1871	Q1935		
ARG	V1403	D1539	A1608	L1688	H1739	L1872	G1936		
ARG	M1404	L1542	E1609	K1675	Q1740	K1873	S1937		
SER	L1405	L1543	L1610	K1676	S1741	T1874	V1938		
ARG	S1406	D1544	G1611	F1677	S1742	L1875	G1939		
GLU		L1477	H1612	F1678	R1746	S1876	P1940		
ARG	R1409	R1478	H1613	T1679		T1877	T1941		
SER	E1410	T1479	A1614	E1680		T1878	V1942		
PRO	S1411	H1480	E1615	L1681		D1879			
PHE	V1412	L1481	Q1550	L1682	G1749	H1880	L1947		
GLY	L1413	S1482	V1551	L1683	T1750	A1881	L1948		
ASN	A1414	V1551	G1618	V1684	Y1751	F1882	E1948		
PRO	A1415	Q1552	M1620	G1685	F1752	A1881	V1949		
GLU	V1416	D1553	V1621	L1686	R1753	P1883	A1950		
ASN	L1417	L1554	H1622	L1687	V1754	Y1884	Q1951		
VAL	K1418	M1555	A1623	E1688	G1755	T1883	V1952		
ARG	V1419	F1556	L1623	Q1689	F1756	K1886	F1953		
TRP	L1420	M1557	L1626	A1691	G1758	T1887	L1954		
ARG	V1421	L1558	V1627	G1692	A1759	I1889	P1958		
LYS	Y1422	H1559	E1628	Y1693	H1760	P1827	E1959		
SER	S1423	M1560	E1629	T1695	F1761	F1829	D1960		
VAL		L1561	Y1630	M1696	G1762	D1830	P1961		
THR	S1426	K1503	L1633	G1697	D1763	E1833	K1962		
HIS	A1427	M1504	H1637	G1698	D1765	L1834	F1964		
TRP	Q1428	K1504	R1638	L1699	E1766	E1896	R1965		
LYS	S1429	V1502	H1639	Y1700	Q1767	T1897	H1966		
GLN	A1430	V1506	L1640	E1701	E1768	V1898	H1967		
THR	L1433	M1506	P1641	A1702	F1769	L1838	N1968		
SER	Q1434	K1505		V1703	V1770	Y1840	P1969		
ASP	H1435	H1571	V1645	H1704	Y1771	F1841	P1970		
ARG	G1436	Q1572	S1646	S1705	K1772	R1842	L1971		
	D1368	E1572	F1647	Y1706	E1773	R1843	R1971		
	T1370	S1511	Q1648	Y1707	P1774	N1844	L1972		
		L1513	N1649	T1711	S1775	Y1845	C1973		
				P1712	I1776	G1846	F1974		
				I1713	T1777	E1907	K1975		
							D1976		

• Molecule 2: Cell division control protein 42 homolog



GLY	SER	SER	GLY	SER	SER	GLY	M1	Q2	T3	T3	I4	K5	C6	V7	V8	V9	G10	D11	G12	A13	V14	A15	K16	T17	C18	L19	L20	T25	N26	K27	F28	P29	S30	E31	Y32	V33	F37	D38	N39	Y40	V44	M45	P50	Y51	T52	L53	F56	D57	T58	A59	G60	Y64	D65	R66																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	370326	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 ($e^-/\text{\AA}^2$)	48.5	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	64000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.077	Depositor
Minimum map value	-0.030	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	452.2, 452.2, 452.2	wwPDB
Map dimensions	340, 340, 340	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.33, 1.33, 1.33	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	0.34	0/13787	0.53	2/18706 (0.0%)
1	C	0.34	0/13787	0.53	2/18706 (0.0%)
2	B	0.22	0/1419	0.43	0/1932
2	D	0.22	0/1419	0.43	0/1932
All	All	0.33	0/30412	0.52	4/41276 (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	C	1446	LYS	CA-C-N	-5.11	116.59	122.52
1	C	1446	LYS	C-N-CA	-5.11	116.59	122.52
1	A	1446	LYS	CA-C-N	-5.11	116.60	122.52
1	A	1446	LYS	C-N-CA	-5.11	116.60	122.52

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	13471	0	13448	1040	0
1	C	13471	0	13448	1021	0
2	B	1389	0	1407	105	0
2	D	1389	0	1407	90	0
All	All	29720	0	29710	2202	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 37.

The worst 5 of 2202 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:259:GLN:HB2	1:A:329:VAL:HB	1.45	0.99
1:C:259:GLN:HB2	1:C:329:VAL:HB	1.45	0.96
1:A:1849:THR:HA	1:A:1876:LEU:O	1.67	0.93
1:C:1849:THR:HA	1:C:1876:LEU:O	1.67	0.93
1:A:1749:GLY:HA3	1:A:1773:GLU:O	1.69	0.92

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	1672/2053 (81%)	1492 (89%)	180 (11%)	0	100	100
1	C	1672/2053 (81%)	1493 (89%)	179 (11%)	0	100	100
2	B	176/195 (90%)	162 (92%)	14 (8%)	0	100	100
2	D	176/195 (90%)	162 (92%)	14 (8%)	0	100	100
All	All	3696/4496 (82%)	3309 (90%)	387 (10%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1476/1773 (83%)	1476 (100%)	0	100	100
1	C	1476/1773 (83%)	1476 (100%)	0	100	100
2	B	158/172 (92%)	158 (100%)	0	100	100
2	D	158/172 (92%)	158 (100%)	0	100	100
All	All	3268/3890 (84%)	3268 (100%)	0	100	100

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	575	GLN
1	C	1968	ASN
1	C	799	ASN
2	D	26	ASN
1	C	1550	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](#)

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 ⓘ

There are no chain breaks in this entry.

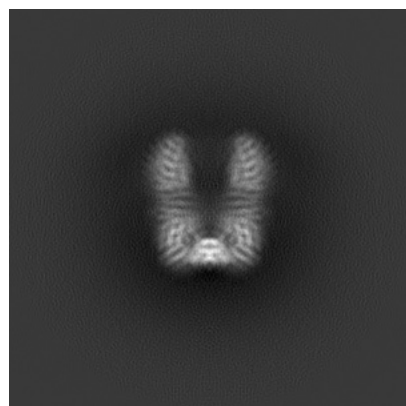
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-65175. These allow visual inspection of the internal detail of the map and identification of artifacts.

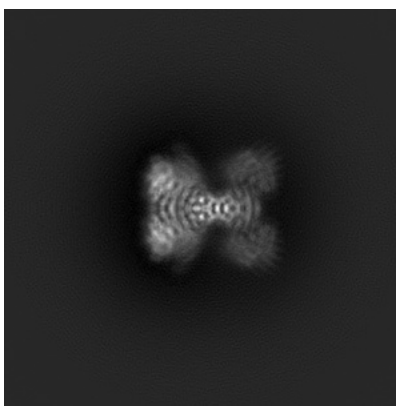
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

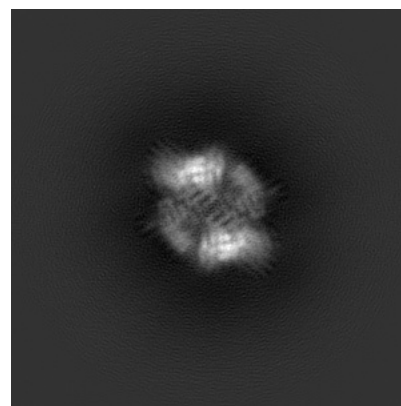
6.1.1 Primary map



X

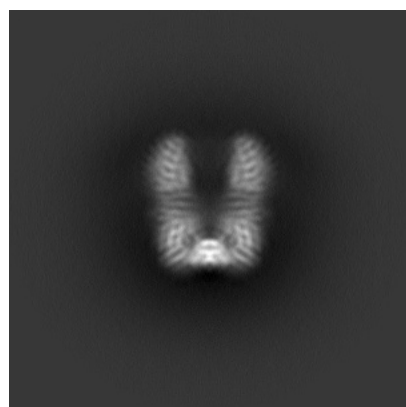


Y

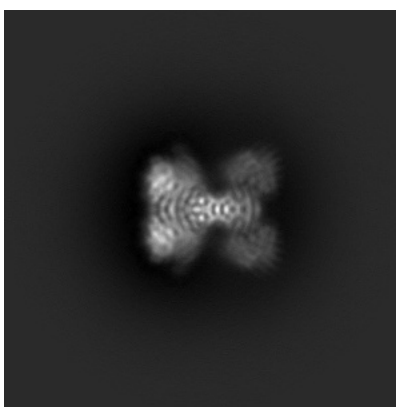


Z

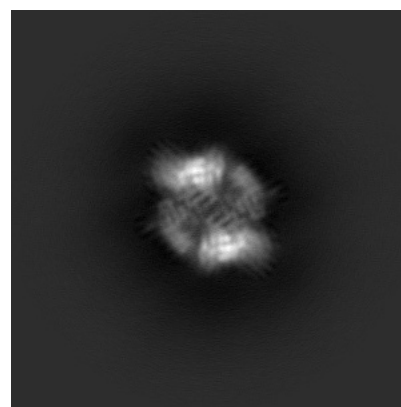
6.1.2 Raw map



X



Y

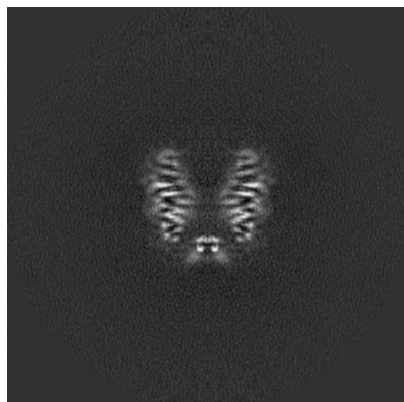


Z

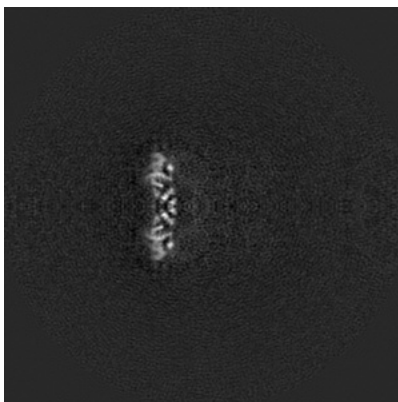
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

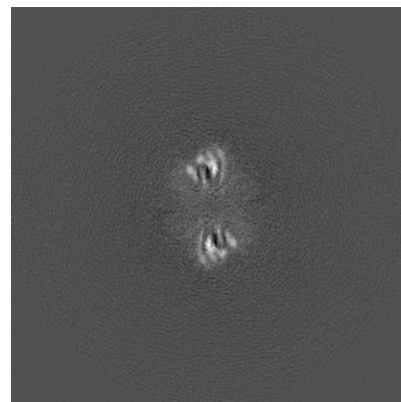
6.2.1 Primary map



X Index: 170

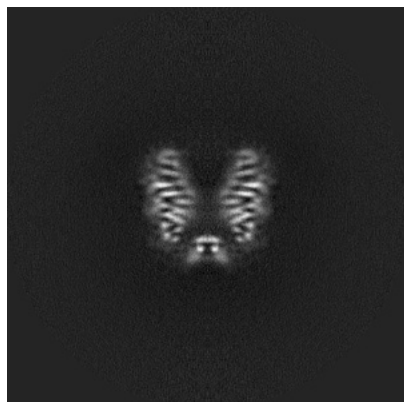


Y Index: 170

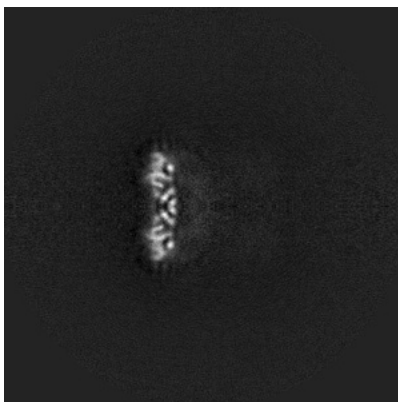


Z Index: 170

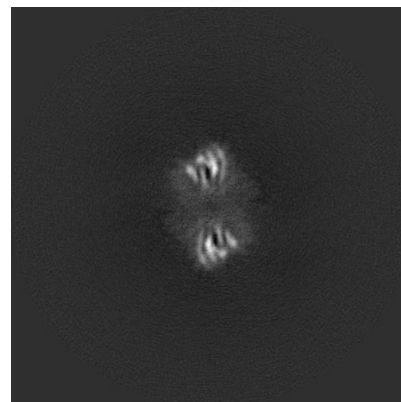
6.2.2 Raw map



X Index: 170



Y Index: 170

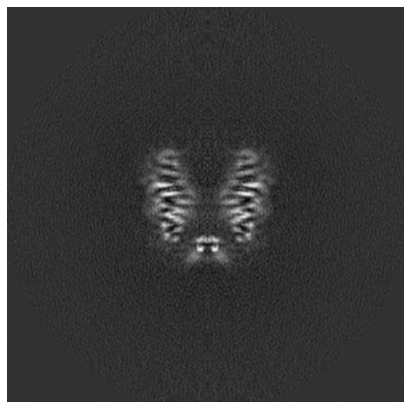


Z Index: 170

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

6.3 Largest variance slices [i](#)

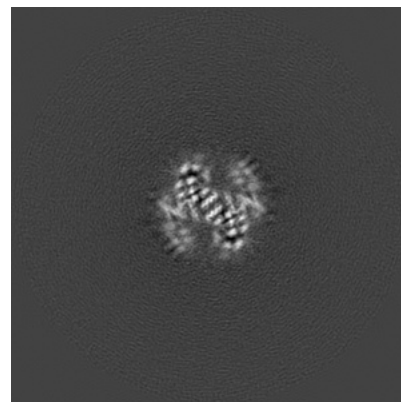
6.3.1 Primary map



X Index: 170

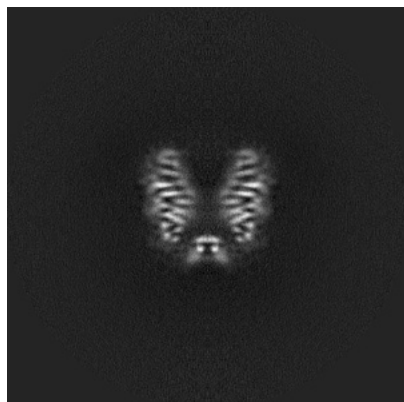


Y Index: 138



Z Index: 134

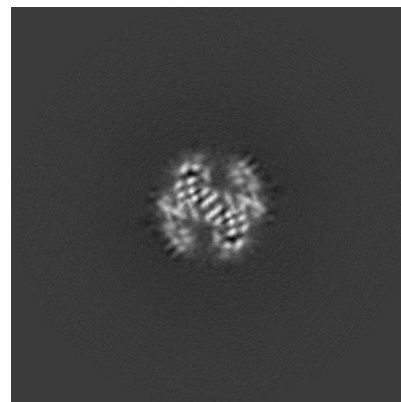
6.3.2 Raw map



X Index: 170



Y Index: 202

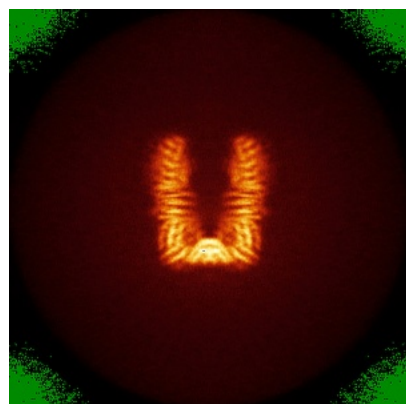


Z Index: 134

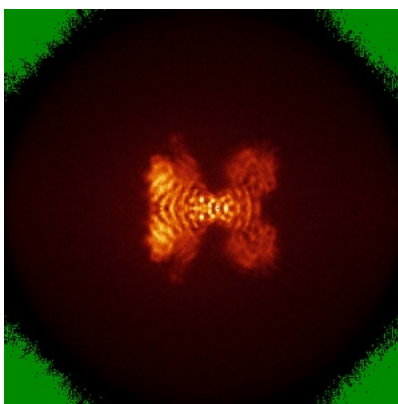
The images above show the largest variance slices of the map in three orthogonal directions.

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

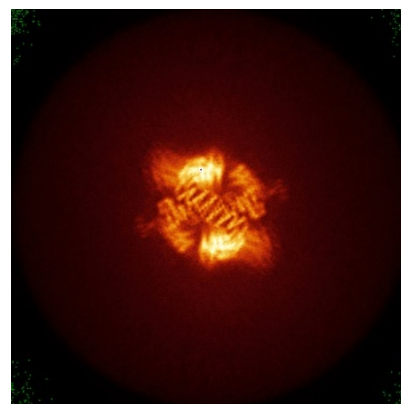
6.4.1 Primary map



X



Y

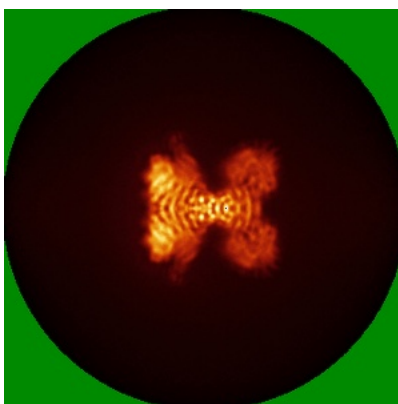


Z

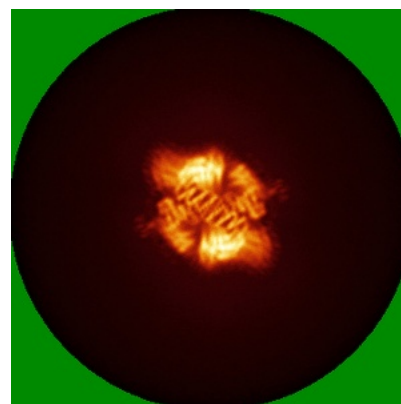
6.4.2 Raw map



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.

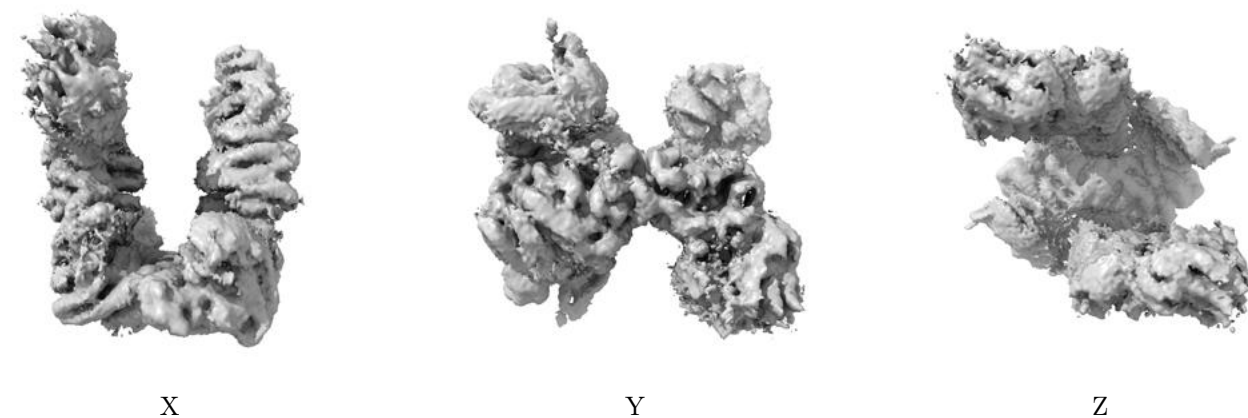
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.01. 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.

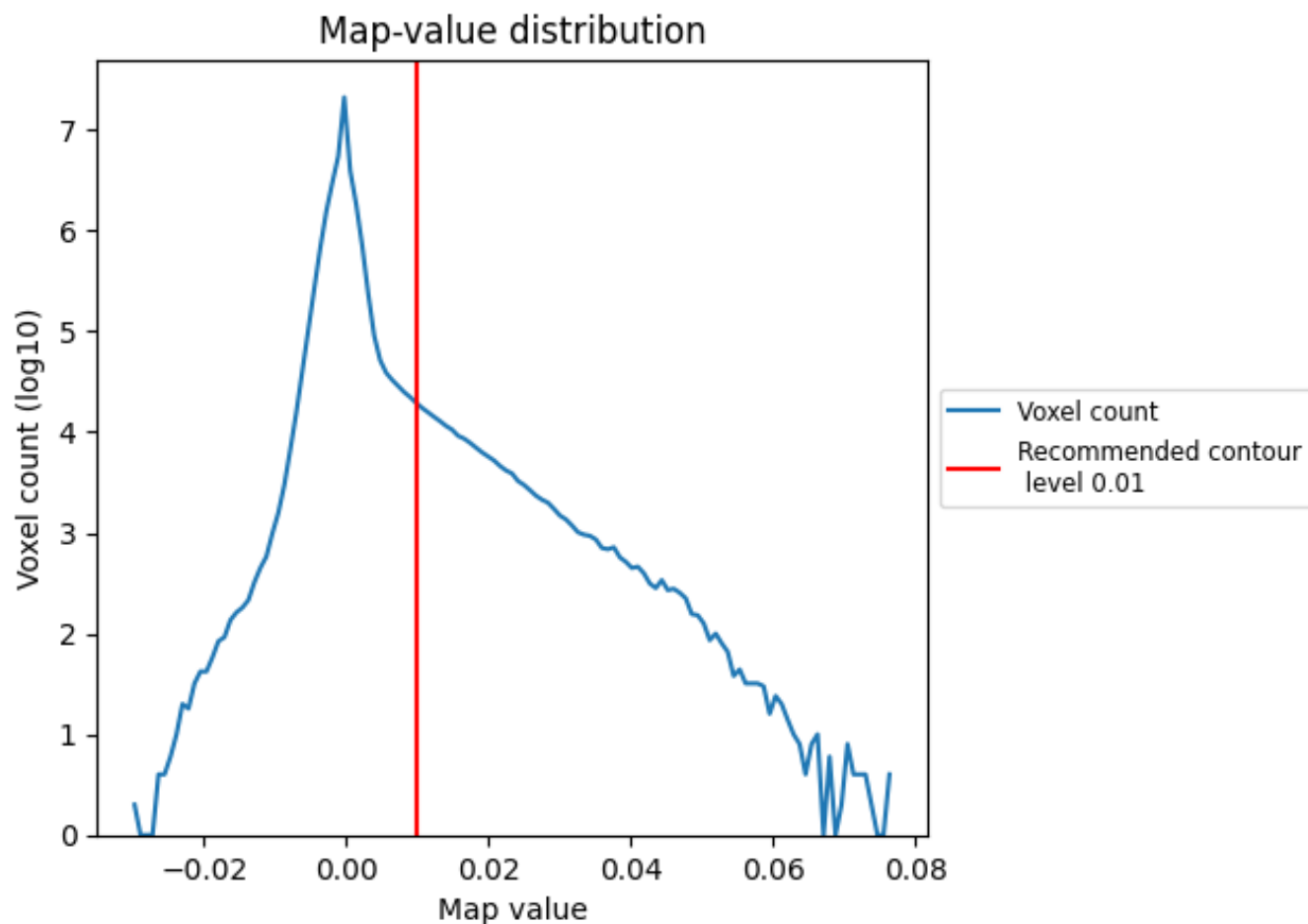
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

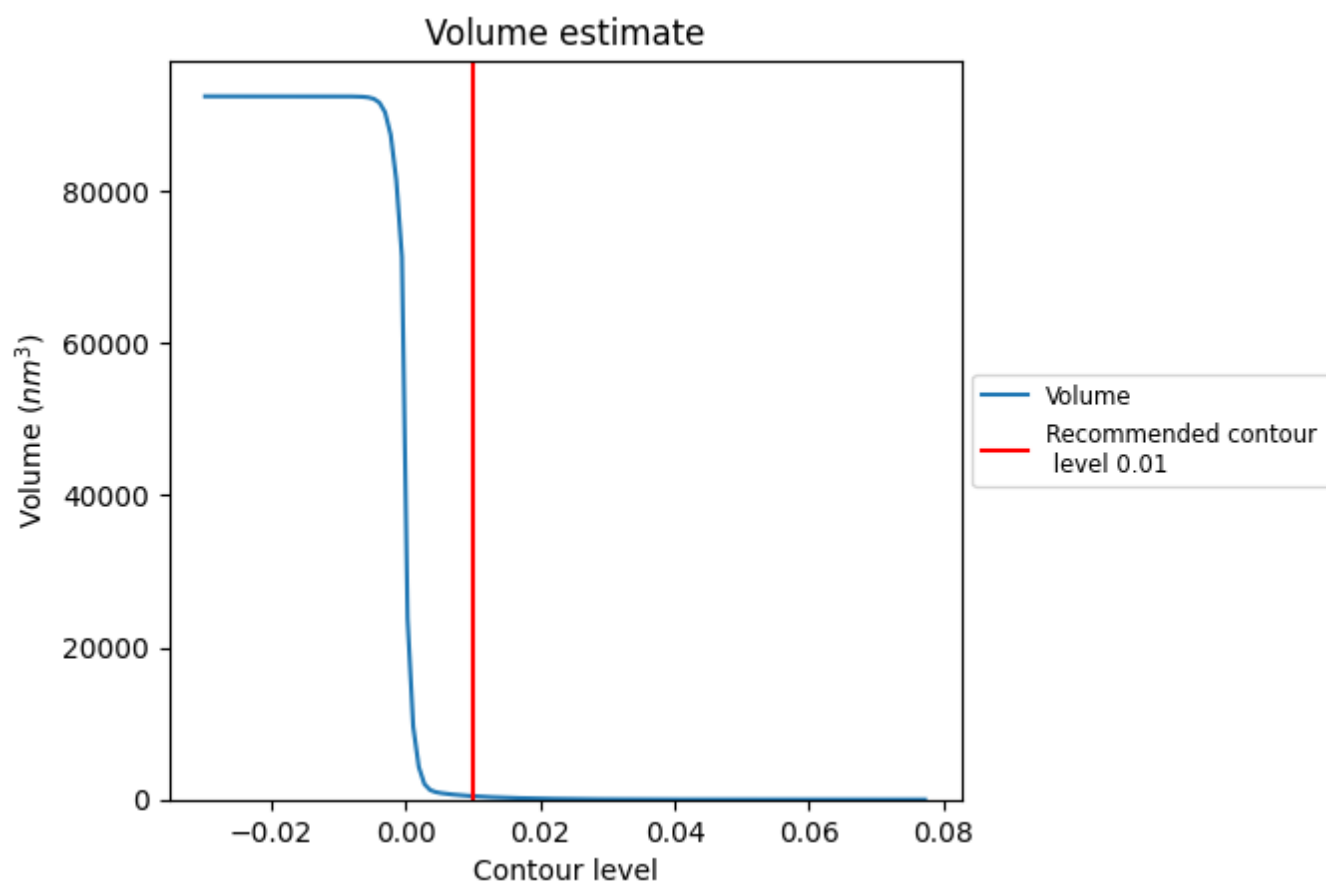
This section contains the results of statistical analysis of the map.

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.

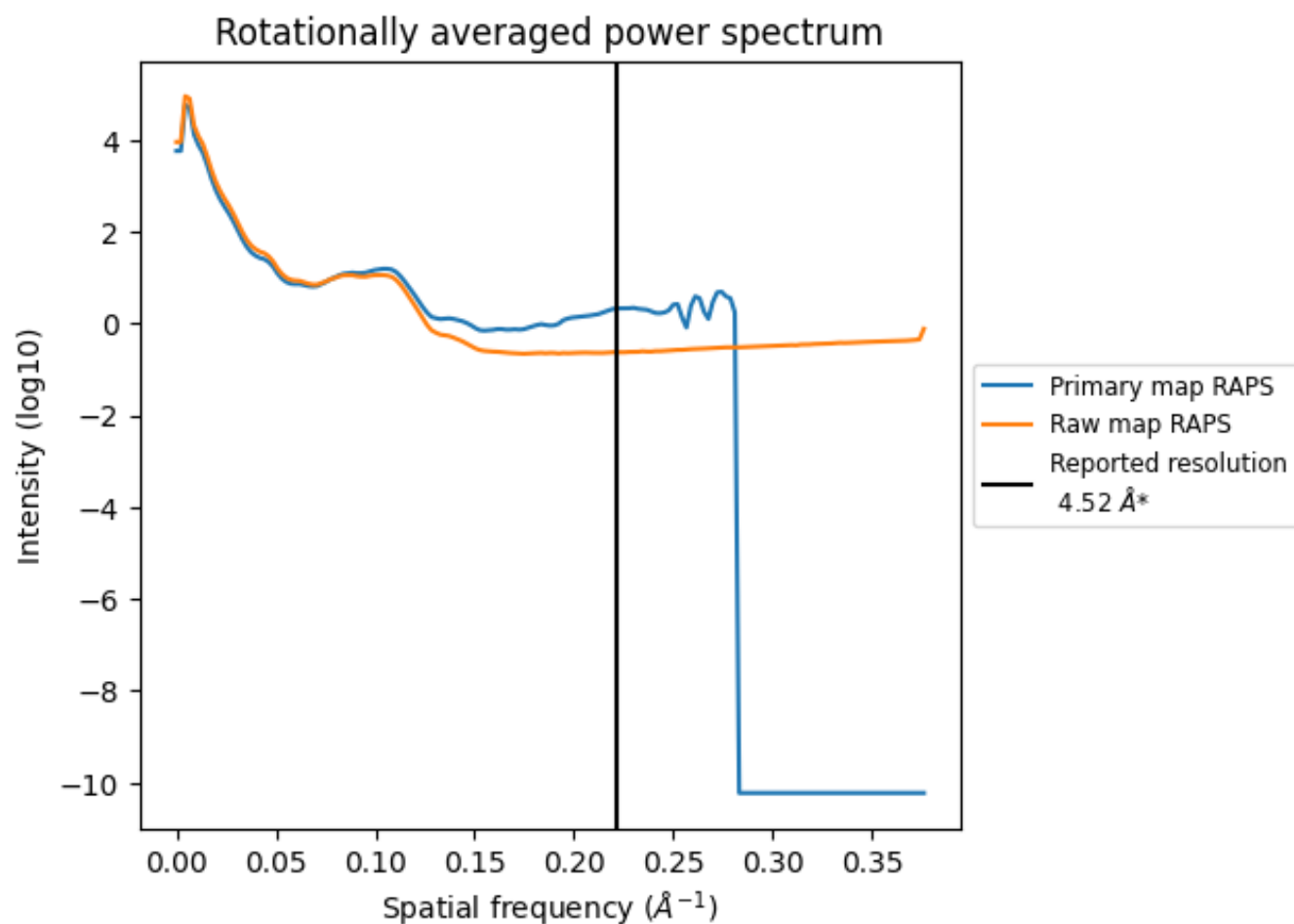
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 453 nm³; this corresponds to an approximate mass of 409 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 ⓘ

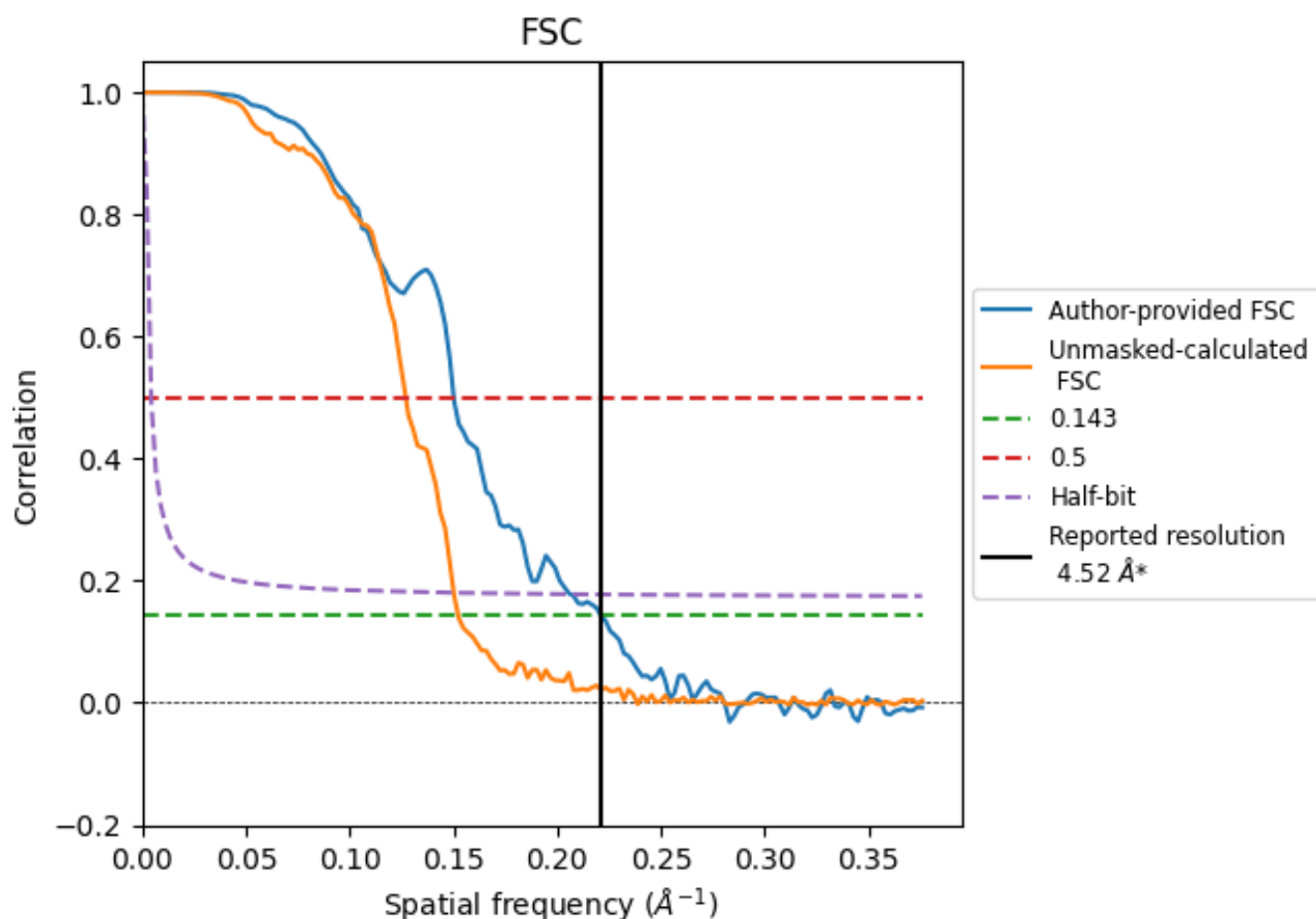


*Reported resolution corresponds to spatial frequency of 0.221 Å⁻¹

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.221 \AA^{-1}

8.2 Resolution estimates [i](#)

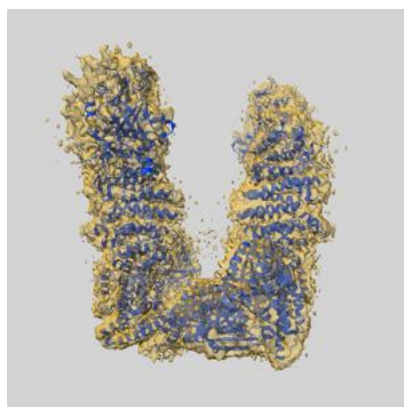
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.52	-	-
Author-provided FSC curve	4.52	6.66	4.84
Unmasked-calculated*	6.57	7.87	6.66

*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 6.57 differs from the reported value 4.52 by more than 10 %

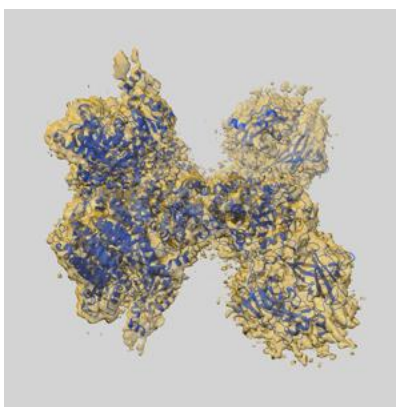
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-65175 and PDB model 9VM3. Per-residue inclusion information can be found in [section 3](#) on [page 5](#).

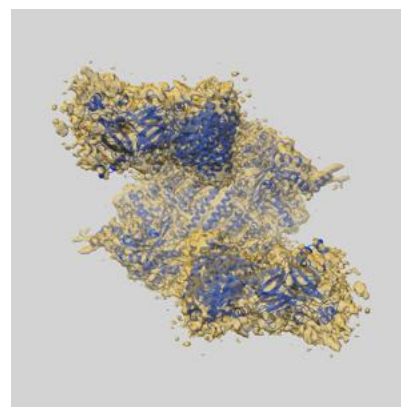
9.1 Map-model overlay [i](#)



X



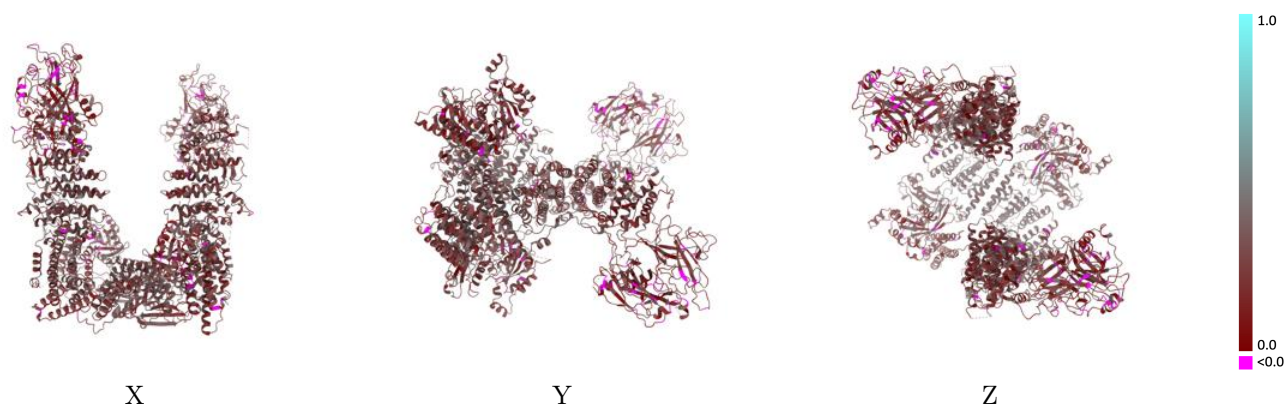
Y



Z

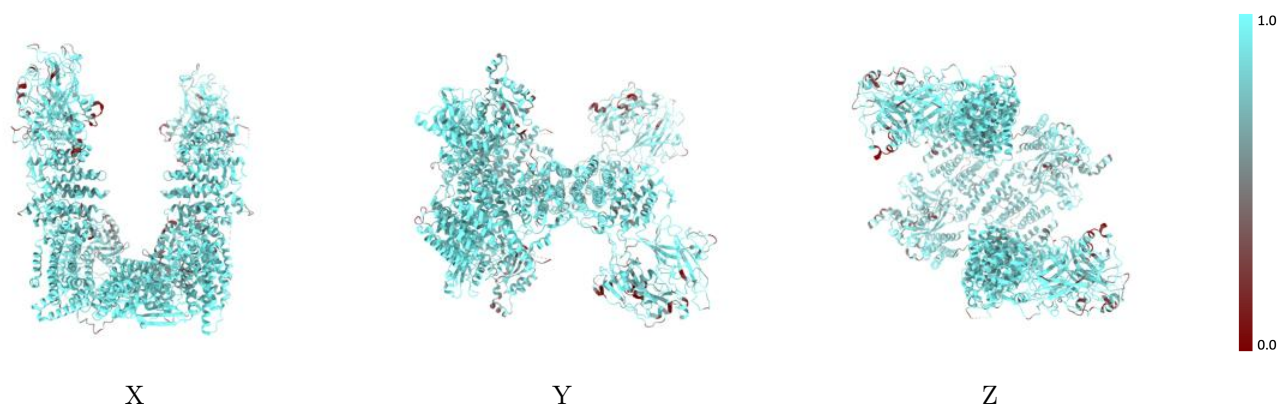
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



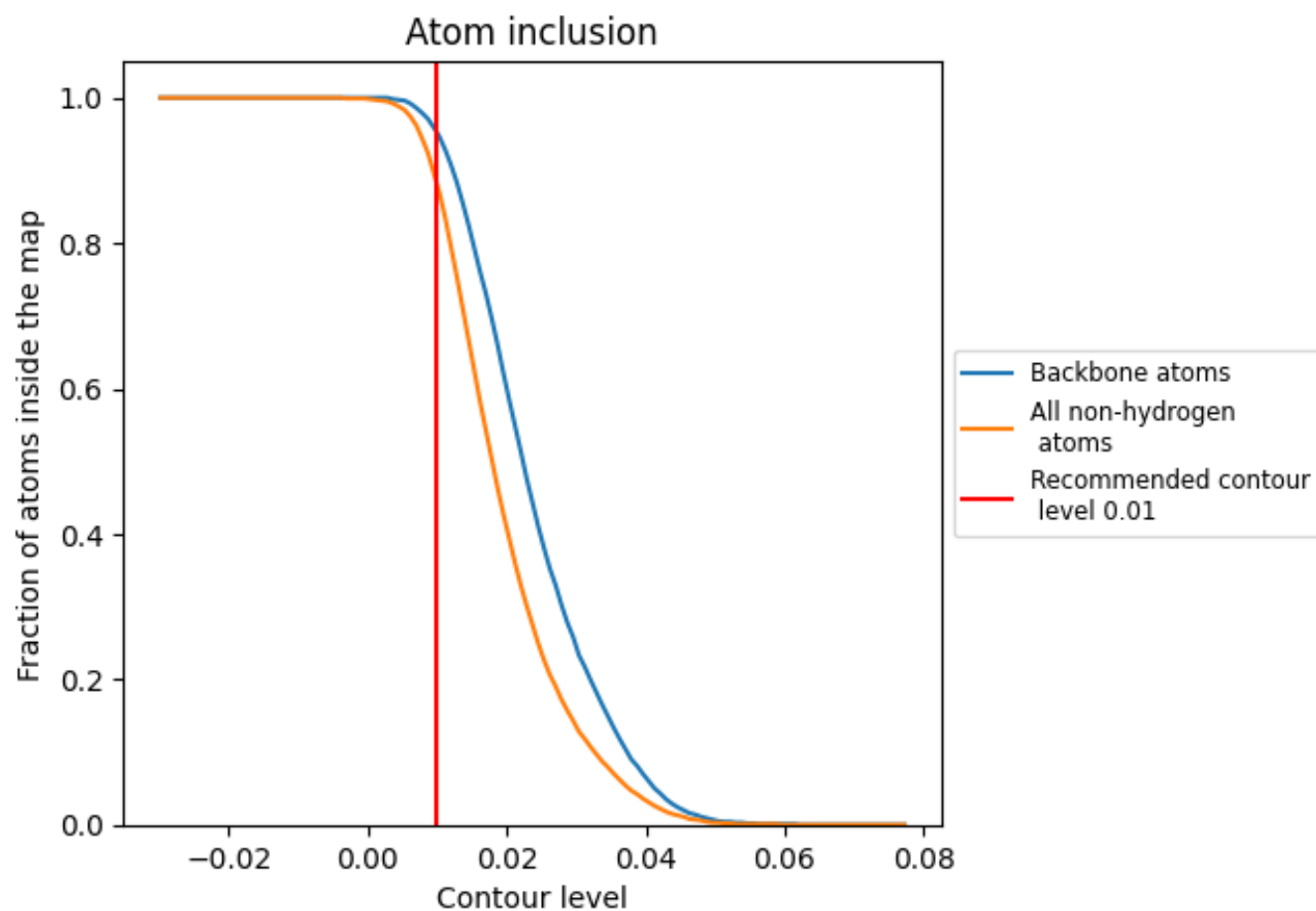
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.01).

9.4 Atom inclusion [i](#)



At the recommended contour level, 95% of all backbone atoms, 88% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.8810	<div></div> 0.2590
A	<div></div> 0.8900	<div></div> 0.2630
B	<div></div> 0.7890	<div></div> 0.2200
C	<div></div> 0.8910	<div></div> 0.2630
D	<div></div> 0.7980	<div></div> 0.2270

