# wwPDB EM Validation Summary Report

Nov 6, 2022 – 08:26 AM EST

| | | |
|---|---|---|
| PDB ID | : | 6D7L |
| EMDB ID | : | EMD-7823 |
| Title | : | Cytoplasmic domain of TRPC3 |
| Authors | : | Sierra-Valdez, F.J.; Azumaya, C.M.; Nakagawa, T.; Cordero-Morales, J.F. |
| Deposited on | : | 2018-04-25 |
| Resolution | : | 4.00 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 (i) 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 (i)) were used in the production of this report:

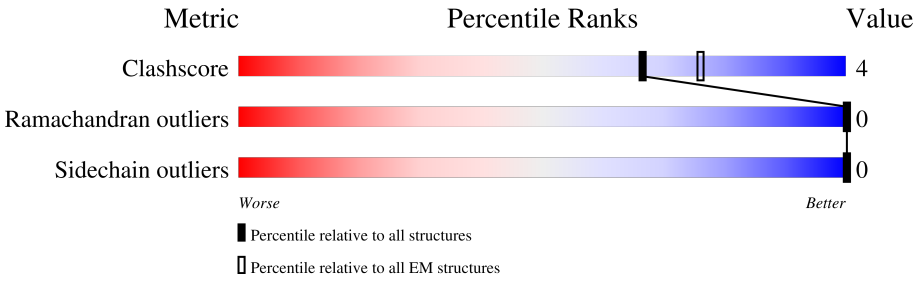
| | | |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev43 |
| MolProbity | : | 4.02b-467 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| MapQ | : | 1.9.9 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.31.2 |

# 1 Overall quality at a glance (i)

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

The reported resolution of this entry is 4.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 158937 | 4297 |
| Ramachandran outliers | 154571 | 4023 |
| Sidechain outliers | 154315 | 3826 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | A | 853 | 30% · 66% |
| 1 | B | 853 | 30% · 66% |
| 1 | C | 853 | 30% · 66% |
| 1 | D | 853 | 30% · 66% |

# 2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 9172 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 Short transient receptor potential channel 3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 288 | Total | C | N | O | S | 0 | 0 |
| | | | 2293 | 1440 | 396 | 443 | 14 | | |
| 1 | B | 288 | Total | C | N | O | S | 0 | 0 |
| | | | 2293 | 1440 | 396 | 443 | 14 | | |
| 1 | C | 288 | Total | C | N | O | S | 0 | 0 |
| | | | 2293 | 1440 | 396 | 443 | 14 | | |
| 1 | D | 288 | Total | C | N | O | S | 0 | 0 |
| | | | 2293 | 1440 | 396 | 443 | 14 | | |

There are 16 discrepancies between the modelled and reference sequences:

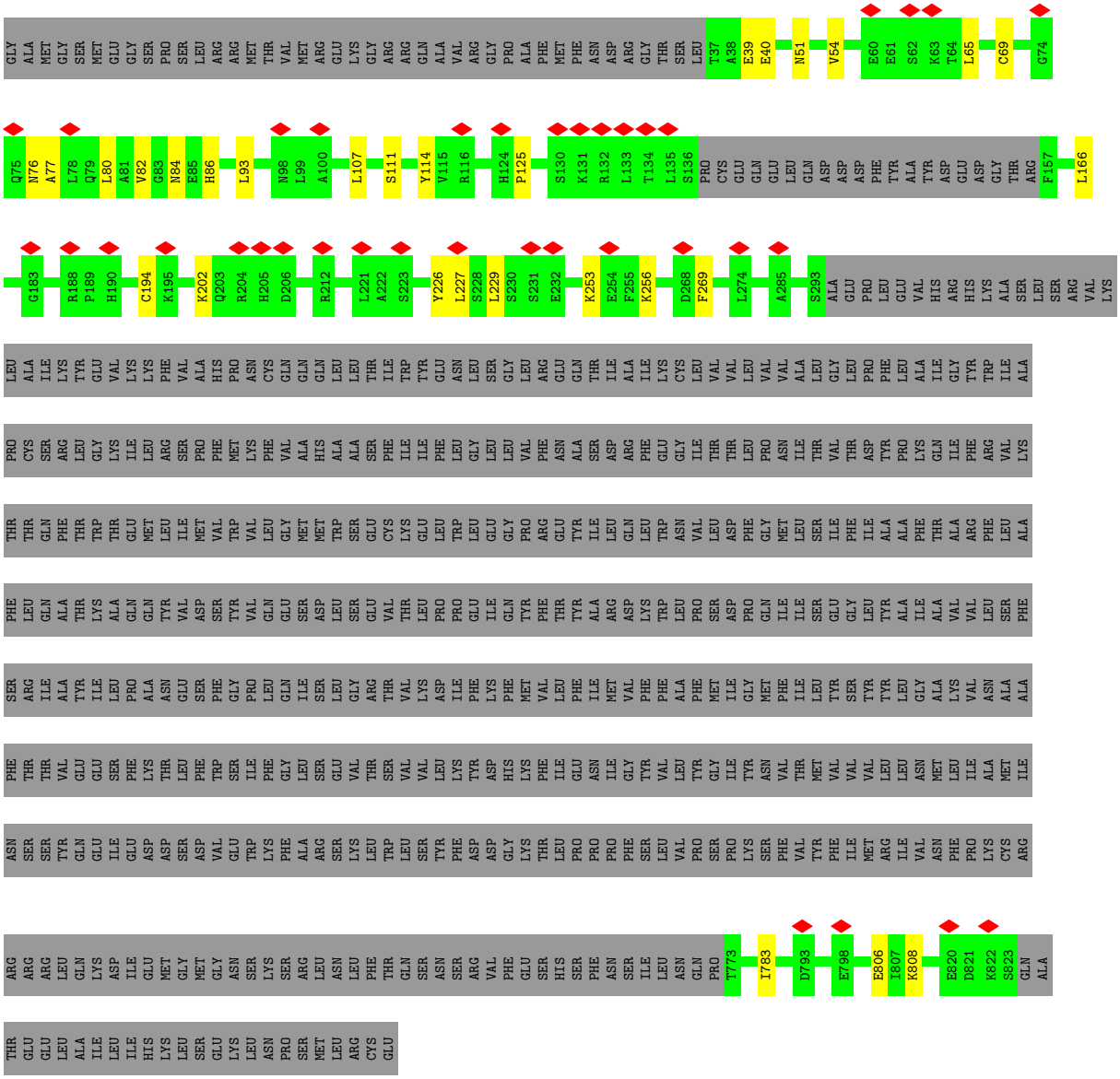
| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | -4 | GLY | - | expression tag | UNP Q13507 |
| A | -3 | ALA | - | expression tag | UNP Q13507 |
| A | -2 | MET | - | expression tag | UNP Q13507 |
| A | -1 | GLY | - | expression tag | UNP Q13507 |
| B | -4 | GLY | - | expression tag | UNP Q13507 |
| B | -3 | ALA | - | expression tag | UNP Q13507 |
| B | -2 | MET | - | expression tag | UNP Q13507 |
| B | -1 | GLY | - | expression tag | UNP Q13507 |
| C | -4 | GLY | - | expression tag | UNP Q13507 |
| C | -3 | ALA | - | expression tag | UNP Q13507 |
| C | -2 | MET | - | expression tag | UNP Q13507 |
| C | -1 | GLY | - | expression tag | UNP Q13507 |
| D | -4 | GLY | - | expression tag | UNP Q13507 |
| D | -3 | ALA | - | expression tag | UNP Q13507 |
| D | -2 | MET | - | expression tag | UNP Q13507 |
| D | -1 | GLY | - | expression tag | UNP Q13507 |

# 3 Residue-property plots (i)

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

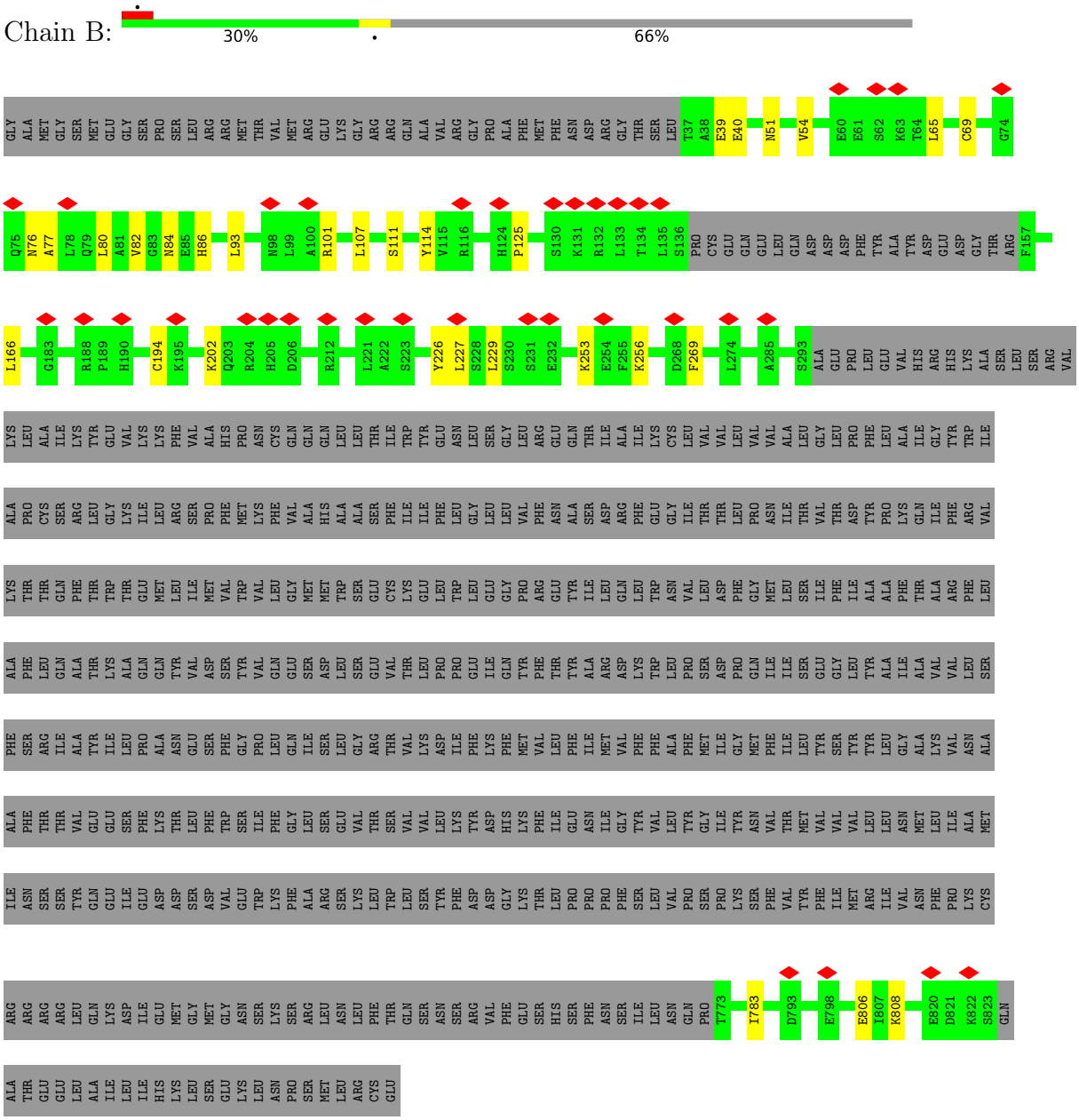
- Molecule 1: Short transient receptor potential channel 3

Chain A:



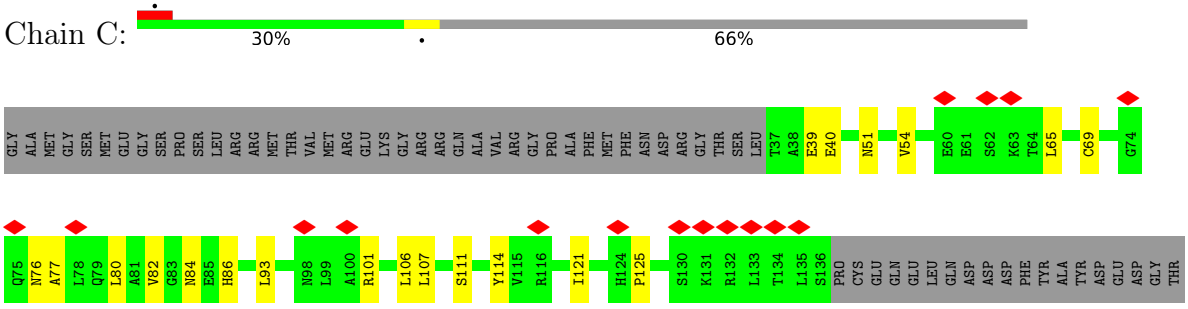
• Molecule 1: Short transient receptor potential channel 3

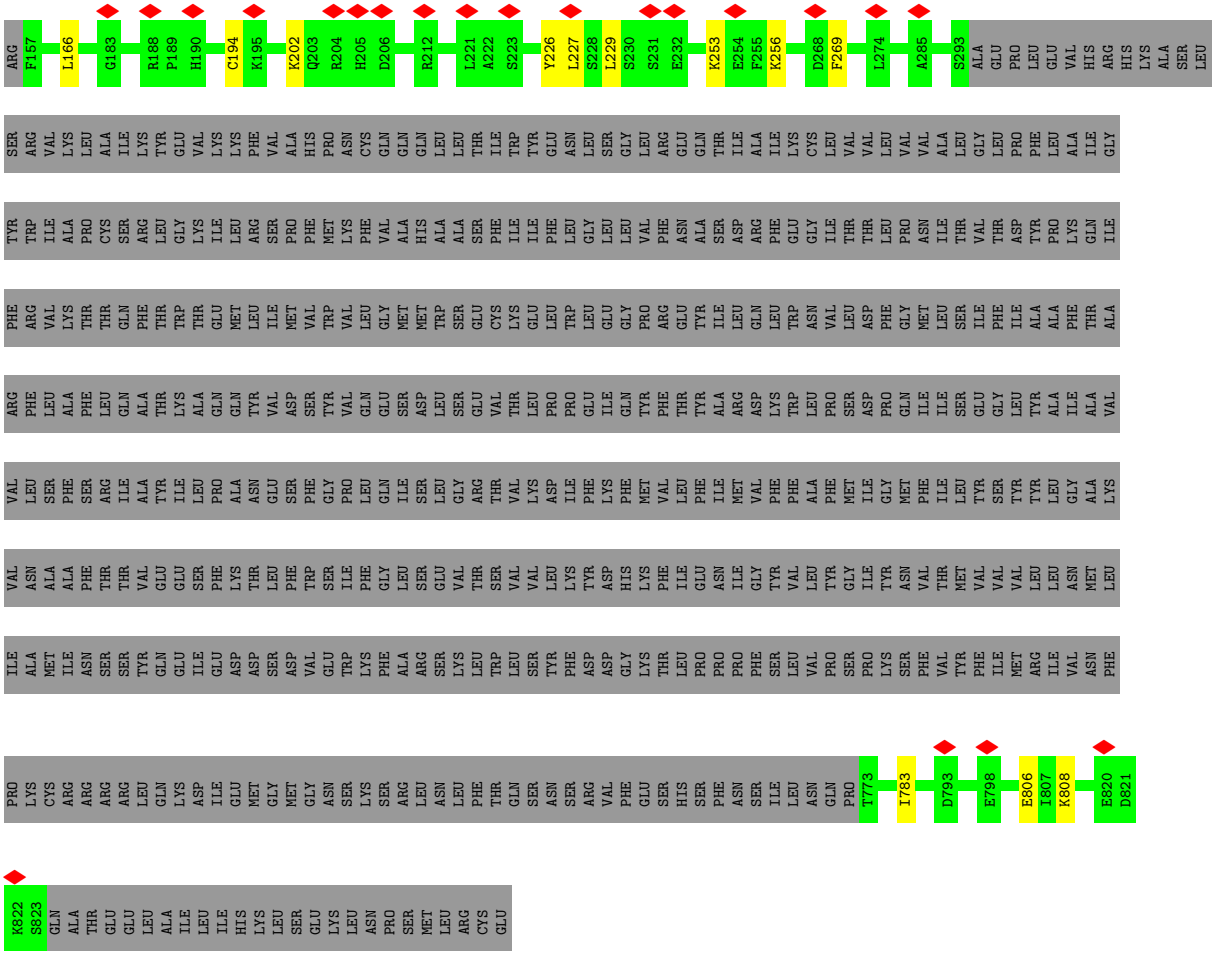
Chain B:




• Molecule 1: Short transient receptor potential channel 3

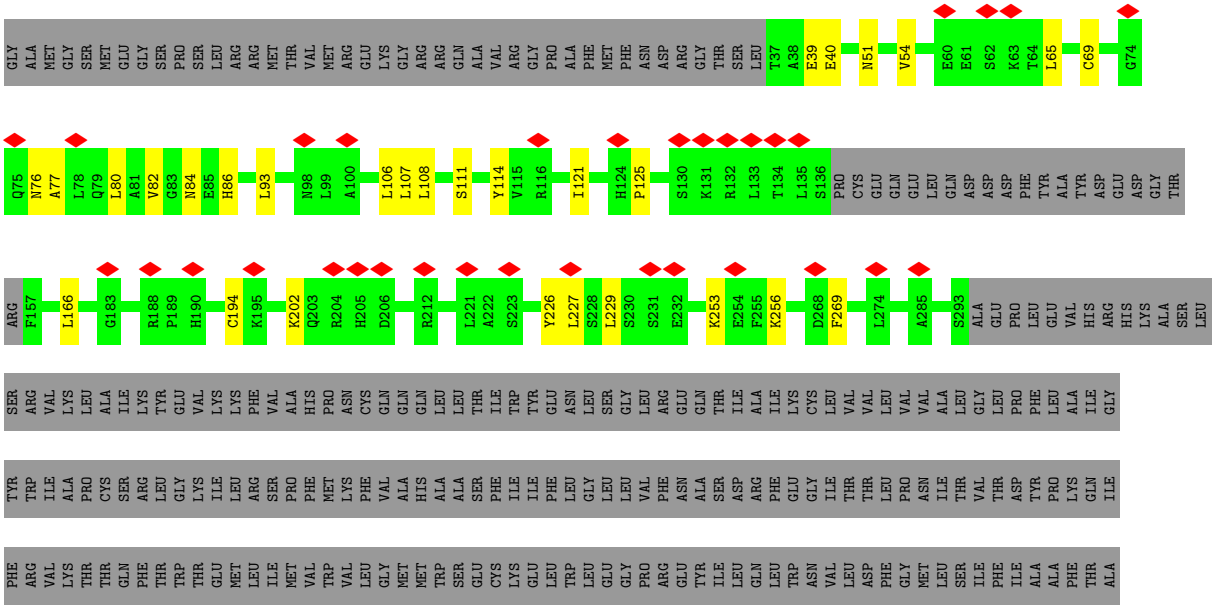
Chain C:






• Molecule 1: Short transient receptor potential channel 3

Chain D:



ARG PHE LEU ALA PHE LEU GLN ALA THR LYS ALA GLN GLN TYR VAL ASP SER TYR VAL GLN GLU SER ASP LEU SER GLU VAL THR LEU PRO PRO GLU ILE GLN TYR PHE THR TYR ALA ARG ASP LYS TRP LEU PRO SER ASP PRO GLN ILE ILE SER GLU GLY LEU TYR ALA ILE ALA VAL
VAL LEU SER PHE SER ARG ILE ALA TYR ILE LEU LEU PRO ALA ASN GLU SER PHE GLY PRO LEU GLN ILE SER LEU GLY ARG THR VAL LYS ASP ILE PHE LYS PHE MET VAL LEU PHE ILE MET VAL PHE PHE ALA PHE MET ILE GLY MET PHE ILE LEU LEU TYR SER TYR TYR LEU GLY ALA LYS
VAL ASN ALA ALA PHE THR THR VAL GLU GLU SER PHE LYS THR LEU PHE TRP SER ILE PHE GLY LEU SER GLU VAL THR SER VAL VAL LEU LYS TYR ASP HIS LYS PHE ILE GLU ASN ILE GLY TYR VAL LEU TYR GLY ILE TYR ASN VAL THR MET VAL VAL VAL LEU LEU LEU ASN MET LEU
ILE ALA MET ILE ASN SER SER TYR GLN GLU ILE GLU ASP ASP SER ASP VAL GLU TRP LYS PHE ALA ARG SER LYS LEU TRP LEU SER TYR PHE ASP ASP GLY LYS THR LEU PRO PRO PHE SER LEU VAL PRO SER PRO LYS SER PHE VAL TYR PHE ILE MET ARG ILE VAL ASN PHE
PRO LYS CYS ARG ARG ARG LEU GLN LYS ASP ILE GLU MET GLY MET GLY ASN SER LYS SER ARG LEU ASN LEU PHE THR GLN SER ASN SER ARG VAL PHE GLU SER HIS SER PHE ASN SER ILE LEU ASN GLN PRO T773 I783 D793 E798 E806 I807 K808 E820 D821
K822 S823 GLN ALA THR GLU GLU LEU ALA ILE LEU ILE HIS LYS LEU SER GLU LYS LEU ASN PRO SER MET LEU ARG CYS GLU

# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, C4 | Depositor |
| Number of particles used | 19398 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/Å^2$) | 1.63 | Depositor |
| Minimum defocus (nm) | Not provided | |
| Maximum defocus (nm) | Not provided | |
| Magnification | 105000 | Depositor |
| Image detector | GATAN K2 SUMMIT (4k x 4k) | Depositor |
| Maximum map value | 0.155 | Depositor |
| Minimum map value | -0.093 | Depositor |
| Average map value | 0.000 | Depositor |
| Map value standard deviation | 0.005 | Depositor |
| Recommended contour level | 0.0448 | Depositor |
| Map size (Å) | 280.576, 280.576, 280.576 | wwPDB |
| Map dimensions | 256, 256, 256 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 1.096, 1.096, 1.096 | 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 | 0.28 | 0/2322 | 0.50 | 0/3120 |
| 1 | B | 0.28 | 0/2322 | 0.50 | 0/3120 |
| 1 | C | 0.28 | 0/2322 | 0.50 | 0/3120 |
| 1 | D | 0.28 | 0/2322 | 0.50 | 0/3120 |
| All | All | 0.28 | 0/9288 | 0.50 | 0/12480 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts

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 | 2293 | 0 | 2317 | 18 | 0 |
| 1 | B | 2293 | 0 | 2317 | 19 | 0 |
| 1 | C | 2293 | 0 | 2317 | 20 | 0 |
| 1 | D | 2293 | 0 | 2317 | 20 | 0 |
| All | All | 9172 | 0 | 9268 | 73 | 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 4.

The worst 5 of 73 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:806:GLU:OE1 | 1:B:808:LYS:NZ | 2.30 | 0.64 |
| 1:C:806:GLU:OE1 | 1:D:808:LYS:NZ | 2.30 | 0.61 |
| 1:D:107:LEU:HD22 | 1:D:166:LEU:HD13 | 1.85 | 0.59 |
| 1:A:107:LEU:HD22 | 1:A:166:LEU:HD13 | 1.85 | 0.58 |
| 1:A:808:LYS:NZ | 1:D:806:GLU:OE1 | 2.30 | 0.58 |

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 | 282/853 (33%) | 258 (92%) | 24 (8%) | 0 | 100 | 100 |
| 1 | B | 282/853 (33%) | 258 (92%) | 24 (8%) | 0 | 100 | 100 |
| 1 | C | 282/853 (33%) | 258 (92%) | 24 (8%) | 0 | 100 | 100 |
| 1 | D | 282/853 (33%) | 258 (92%) | 24 (8%) | 0 | 100 | 100 |
| All | All | 1128/3412 (33%) | 1032 (92%) | 96 (8%) | 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 | 254/757 (34%) | 254 (100%) | 0 | 100 | 100 |
| 1 | B | 254/757 (34%) | 254 (100%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|---|---|---|---|---|---|---|
| 1 | C | 254/757 (34%) | 254 (100%) | 0 | 100 | 100 |
| 1 | D | 254/757 (34%) | 254 (100%) | 0 | 100 | 100 |
| All | All | 1016/3028 (34%) | 1016 (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. All (1) such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 84 | ASN |

### 5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry (i)

There are no ligands in this entry.

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

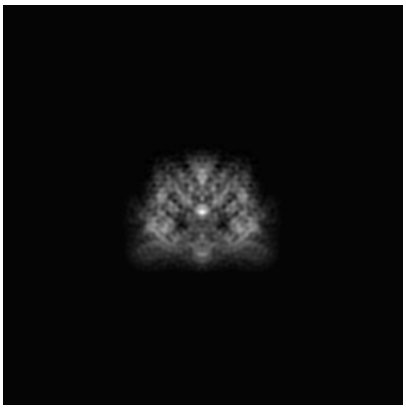
# 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-7823. These allow visual inspection of the internal detail of the map and identification of artifacts.

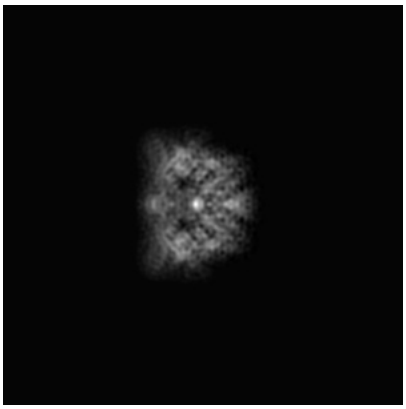
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

## 6.1 Orthogonal projections

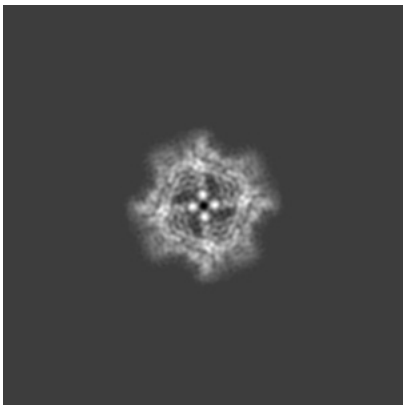
### 6.1.1 Primary map



X

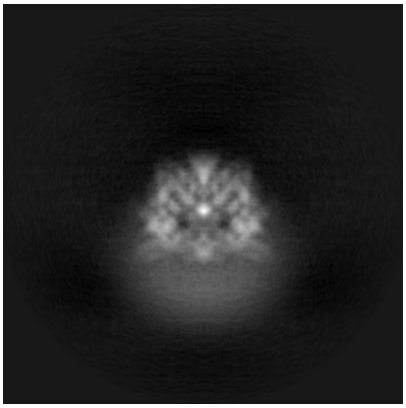


Y

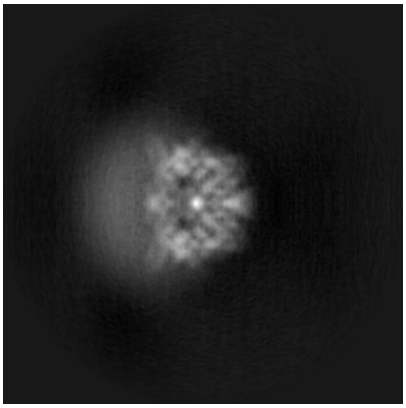


Z

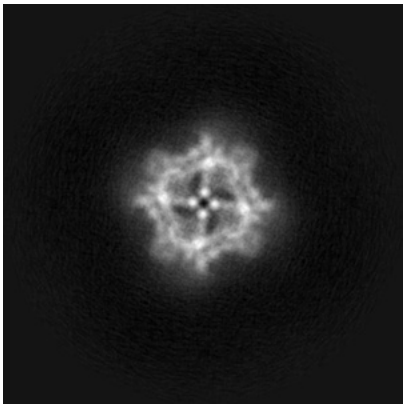
### 6.1.2 Raw map



X



Y



Z

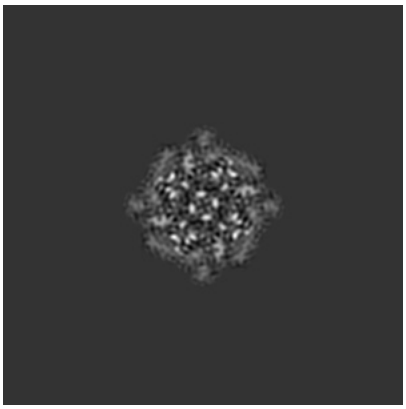
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices (i)

### 6.2.1 Primary map

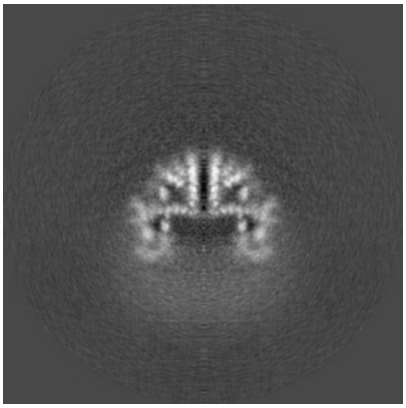
X Index: 128

Y Index: 128

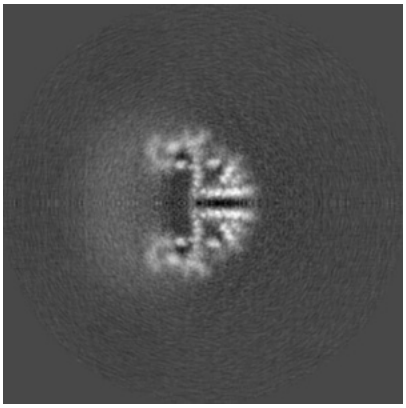


Z Index: 128

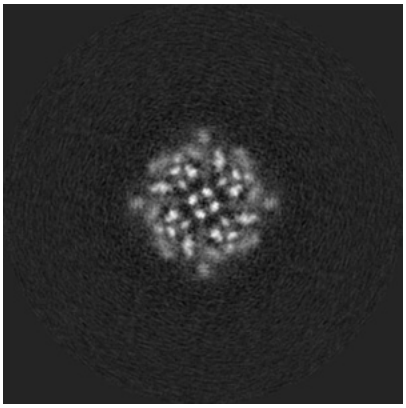
### 6.2.2 Raw map



X Index: 128



Y Index: 128



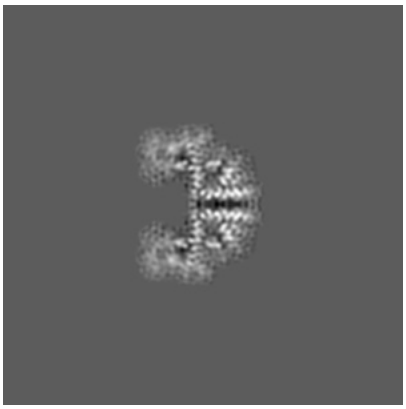
Z Index: 128

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

## 6.3 Largest variance slices (i)

### 6.3.1 Primary map

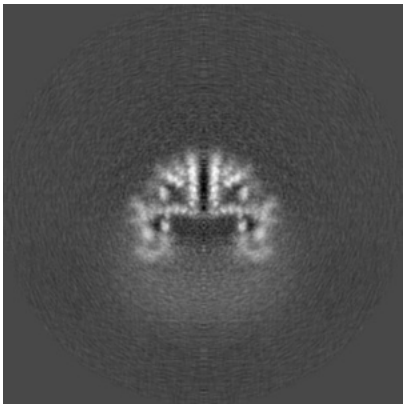
X Index: 128



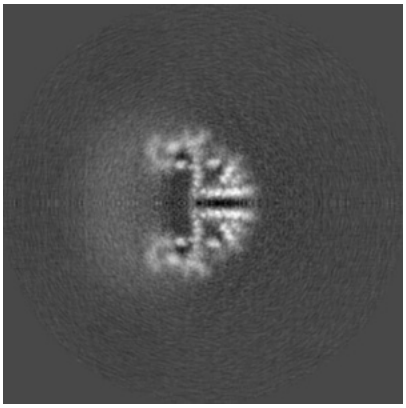
Y Index: 127

Z Index: 123

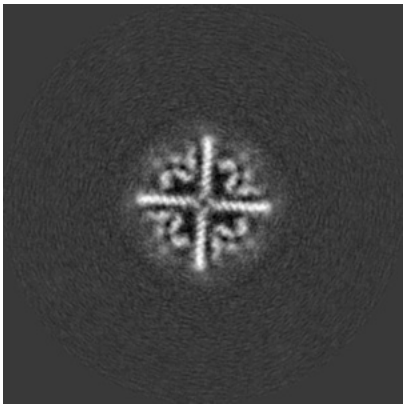
### 6.3.2 Raw map



X Index: 128



Y Index: 128



Z Index: 123

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

## 6.4 Orthogonal surface views (i)

### 6.4.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.0448. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 Raw map

X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

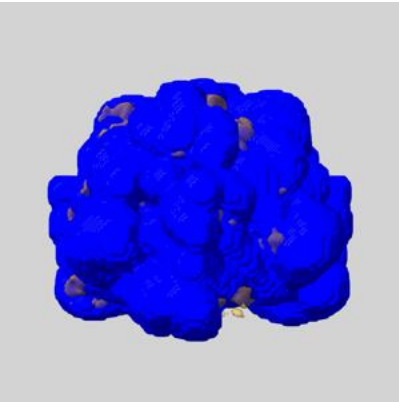
## 6.5 Mask visualisation (i)

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

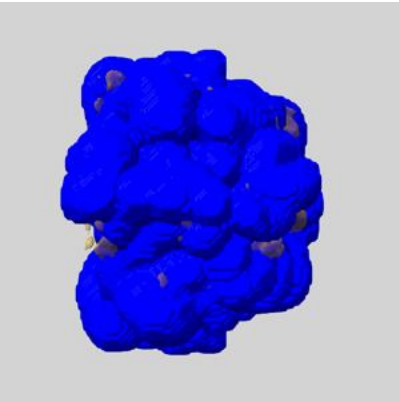
A mask typically either:

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

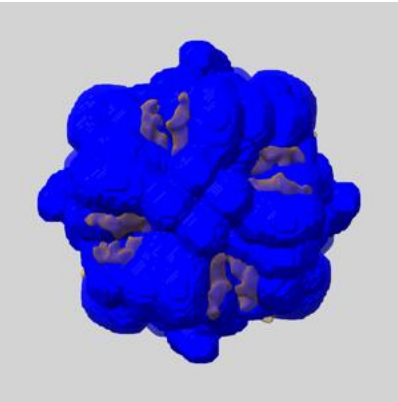
### 6.5.1 emd_7823_msk_1.map (i)



X



Y

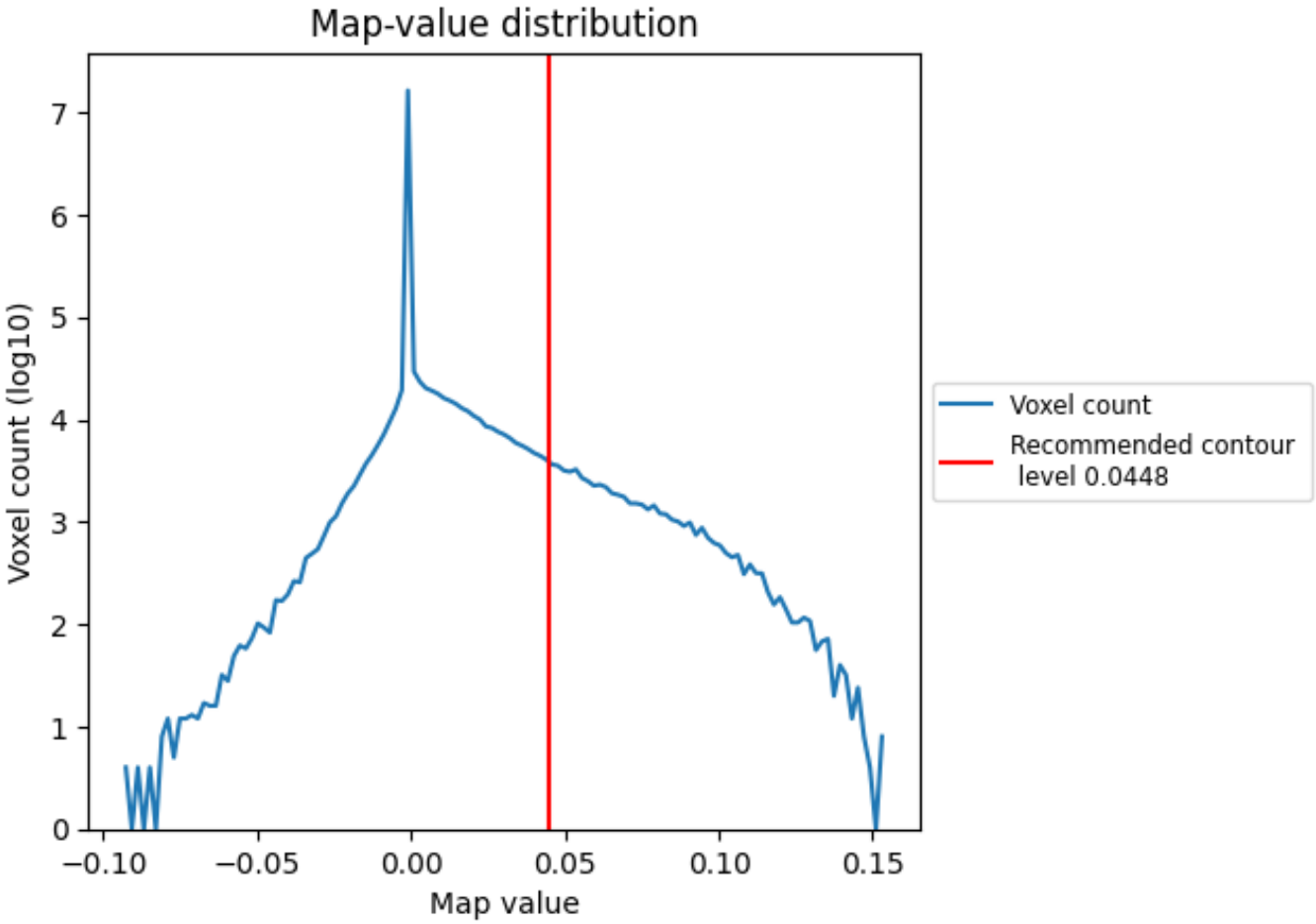


Z

# 7 Map analysis

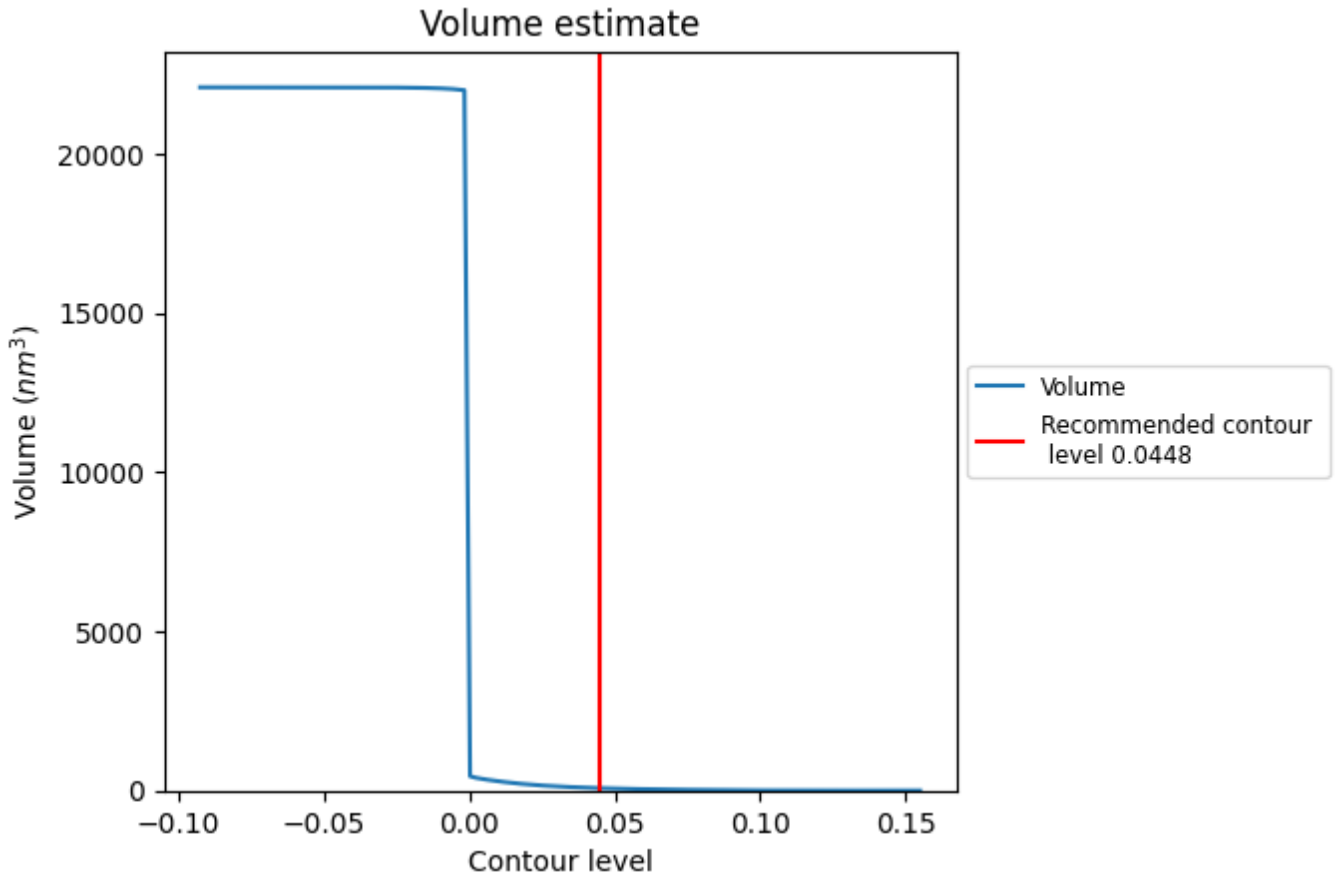
This section contains the results of statistical analysis of the map.

## 7.1 Map-value distribution




The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

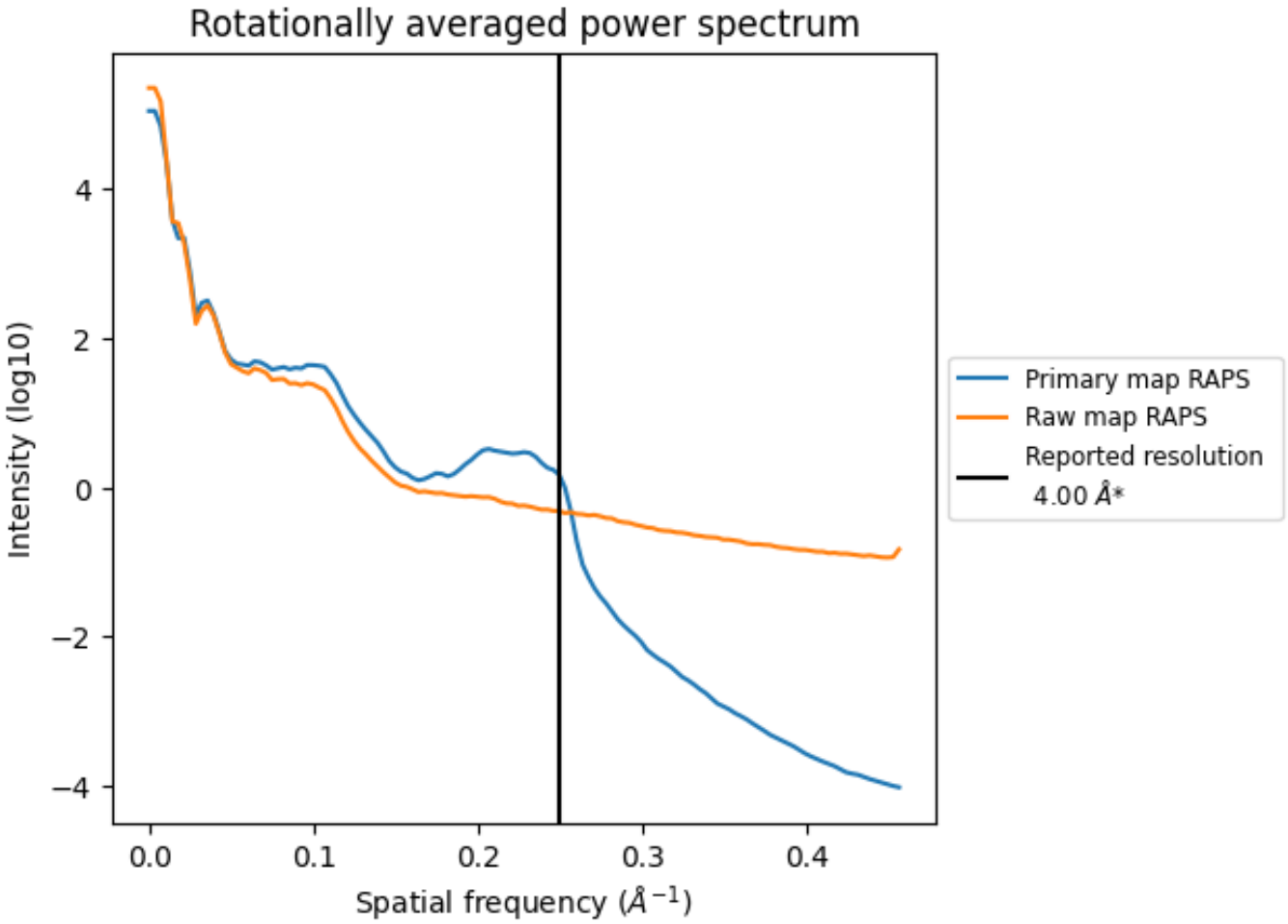
## 7.2 Volume estimate (i)




The volume at the recommended contour level is 76 $nm^3$; this corresponds to an approximate mass of 69 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)

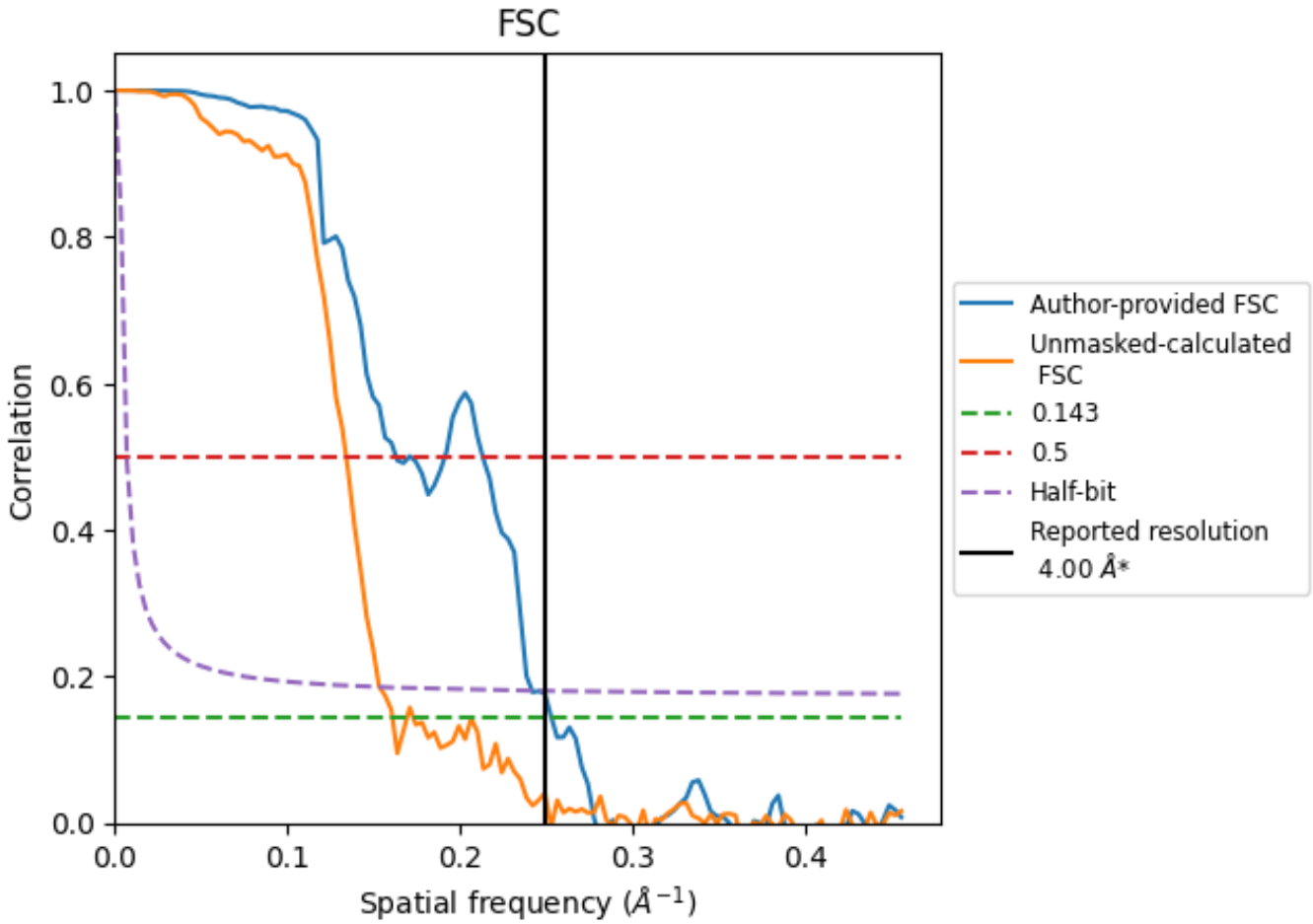



*Reported resolution corresponds to spatial frequency of 0.250 Å$^{-1}$

# 8 Fourier-Shell correlation

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

## 8.1 FSC




*Reported resolution corresponds to spatial frequency of 0.250 Å$^{-1}$

## 8.2 Resolution estimates (i)

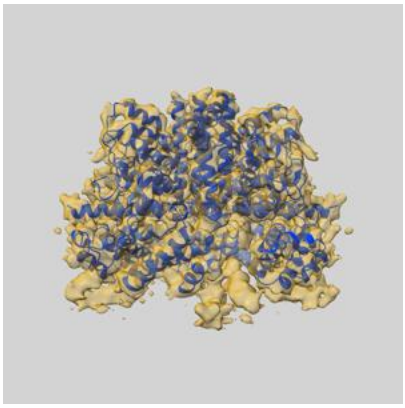
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 4.00 | - | - |
| Author-provided FSC curve | 3.95 | 6.13 | 4.13 |
| Unmasked-calculated* | 6.21 | 7.45 | 6.51 |

*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 6.21 differs from the reported value 4.0 by more than 10 %

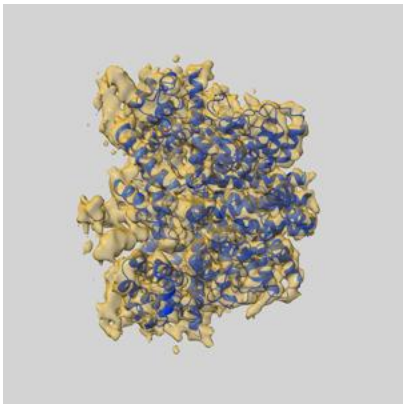
# 9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-7823 and PDB model 6D7L. Per-residue inclusion information can be found in section 3 on page 4.

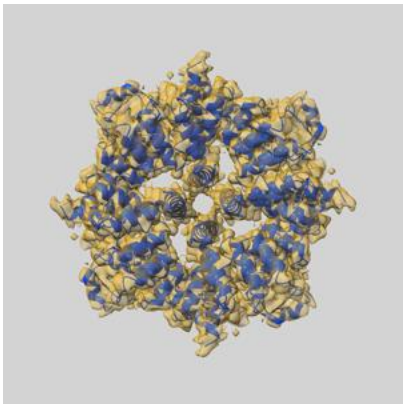
## 9.1 Map-model overlay



X



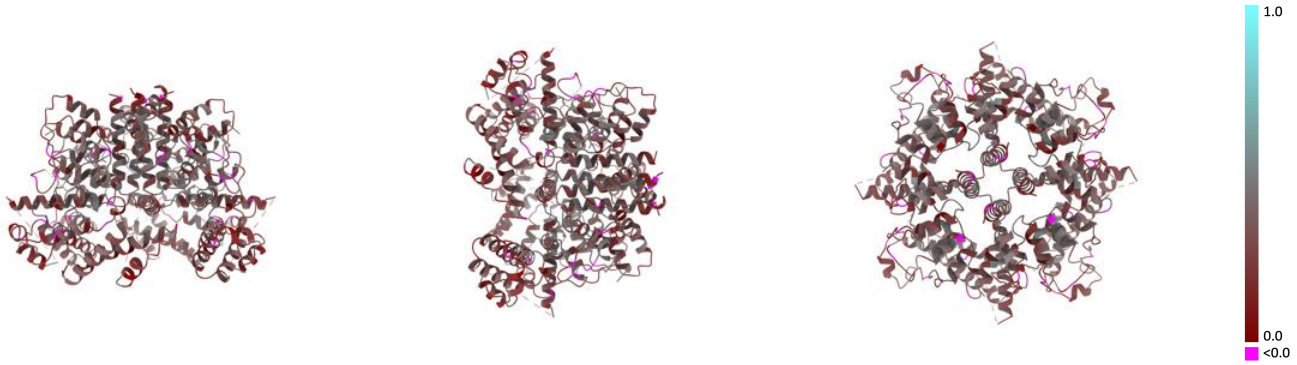
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0448 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

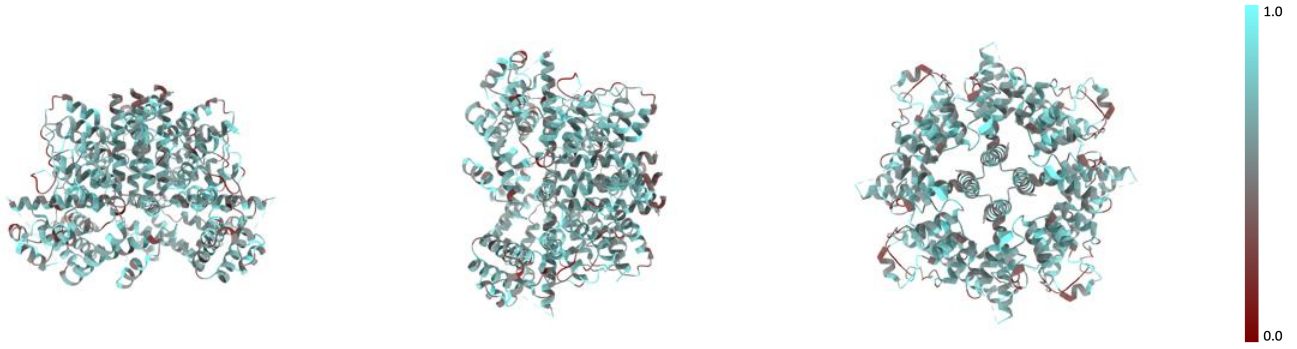
## 9.2 Q-score mapped to coordinate model (i)




X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

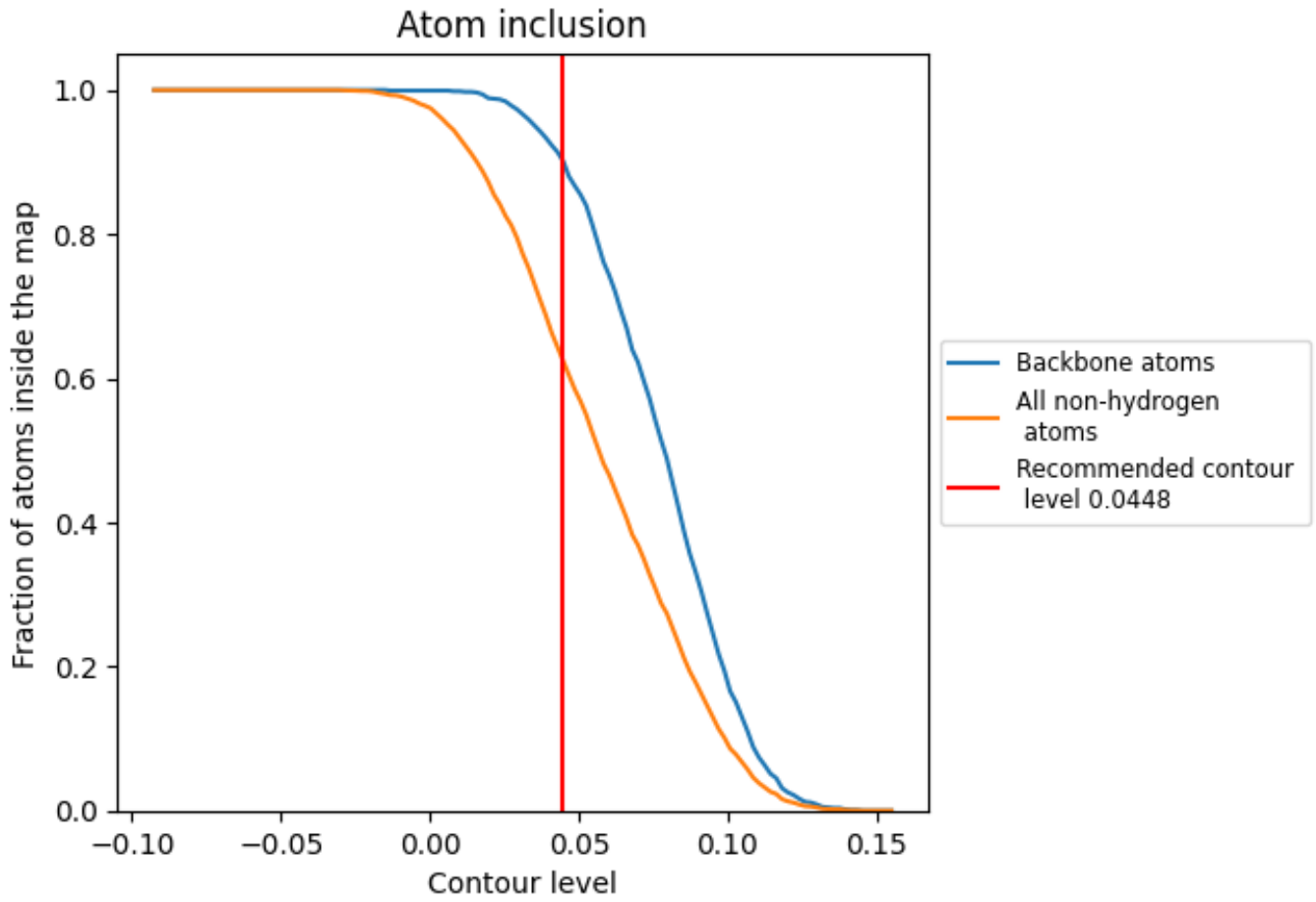
## 9.3 Atom inclusion mapped to coordinate model (i)




X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0448).

## 9.4 Atom inclusion (i)




At the recommended contour level, 90% of all backbone atoms, 62% 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 (0.0448) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|---|---|---|
| All | 0.6242 | 0.2870 |
| A | 0.6244 | 0.2880 |
| B | 0.6240 | 0.2870 |
| C | 0.6240 | 0.2870 |
| D | 0.6244 | 0.2870 |