# WORLDWIDE wwPDB PROTEIN DATA BANK

# Full wwPDB EM Validation Report (i)

May 19, 2025 – 01:28 AM EDT

|  |  |  |
|---|---|---|
| PDB ID | : | 6CMO / pdb_00006cmo |
| EMDB ID | : | EMD-7517 |
| Title | : | Rhodopsin-Gi complex |
| Authors | : | Kang, Y.; Kuybeda, O.; de Waal, P.W.; Mukherjee, S.; Van Eps, N.; Dutka, P.; Zhou, X.E.; Bartesaghi, A.; Erramilli, S.; Morizumi, T.; Gu, X.; Yin, Y.; Liu, P.; Jiang, Y.; Meng, X.; Zhao, G.; Melcher, K.; Earnst, O.P.; Kossiakoff, A.A.; Subramaniam, S.; Xu, H.E. |
| Deposited on | : | 2018-03-05 |
| Resolution | : | 4.50 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 (i) 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 (i)) were used in the production of this report:

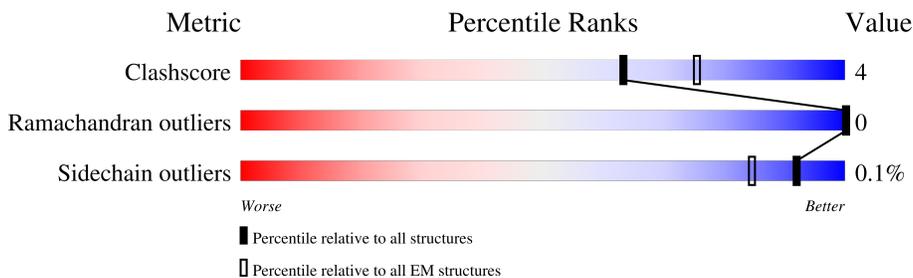|  |  |  |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev118 |
| Mogul | : | 2022.3.0, CSD as543be (2022) |
| MolProbity | : | 4-5-2 with Phenix2.0rc1 |
| Percentile statistics | : | 20231227.v01 (using entries in the PDB archive December 27th 2023) |
| MapQ | : | 1.9.13 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.43.1 |

# 1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 4.50 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 | Percentile Ranks | Value |
|---|---|---|
| Clashscore | | 4 |
| Ramachandran outliers | | 0 |
| Sidechain outliers | | 0.1% |

*Worse*   *Better*

▉ Percentile relative to all structures
▯ Percentile relative to all EM structures

| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 210492 | 15764 |
| Ramachandran outliers | 207382 | 16835 |
| Sidechain outliers | 206894 | 16415 |

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

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | R | 463 | 60% / 61% · 9% · 30% |
| 2 | A | 354 | 73% / 86% · 13% |
| 3 | B | 345 | 44% / 87% · 11% · |
| 4 | G | 68 | 74% / 75% · 10% · 15% |
| 5 | L | 215 | 78% / 85% · 13% · |
| 6 | H | 239 | 87% / 92% · 5% · |
| 7 | C | 2 | 100% / 100% |

# 2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 11834 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 chimera protein of Soluble cytochrome b562 and Rhodopsin.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|------|------|------|---------|-------|
| 1 | R | 323 | Total 2567 | C 1714 | N 393 | O 434 | S 26 | 0 | 0 |

There are 42 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|---------|-----------|
| R | -139 | PHE | - | expression tag | UNP P0ABE7 |
| R | -138 | ALA | - | expression tag | UNP P0ABE7 |
| R | -137 | ASP | - | expression tag | UNP P0ABE7 |
| R | -136 | TYR | - | expression tag | UNP P0ABE7 |
| R | -135 | LYS | - | expression tag | UNP P0ABE7 |
| R | -134 | ASP | - | expression tag | UNP P0ABE7 |
| R | -133 | ASP | - | expression tag | UNP P0ABE7 |
| R | -132 | ASP | - | expression tag | UNP P0ABE7 |
| R | -131 | ASP | - | expression tag | UNP P0ABE7 |
| R | -130 | ALA | - | expression tag | UNP P0ABE7 |
| R | -129 | LYS | - | expression tag | UNP P0ABE7 |
| R | -128 | LEU | - | expression tag | UNP P0ABE7 |
| R | -127 | GLN | - | expression tag | UNP P0ABE7 |
| R | -126 | THR | - | expression tag | UNP P0ABE7 |
| R | -125 | MET | - | expression tag | UNP P0ABE7 |
| R | -124 | HIS | - | expression tag | UNP P0ABE7 |
| R | -123 | HIS | - | expression tag | UNP P0ABE7 |
| R | -122 | HIS | - | expression tag | UNP P0ABE7 |
| R | -121 | HIS | - | expression tag | UNP P0ABE7 |
| R | -120 | HIS | - | expression tag | UNP P0ABE7 |
| R | -119 | HIS | - | expression tag | UNP P0ABE7 |
| R | -118 | HIS | - | expression tag | UNP P0ABE7 |
| R | -117 | HIS | - | expression tag | UNP P0ABE7 |
| R | -116 | HIS | - | expression tag | UNP P0ABE7 |
| R | -115 | HIS | - | expression tag | UNP P0ABE7 |
| R | -114 | GLU | - | expression tag | UNP P0ABE7 |
| R | -113 | ASN | - | expression tag | UNP P0ABE7 |
| R | -112 | LEU | - | expression tag | UNP P0ABE7 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-:|:-:|:-:|:-:|:-:|:-:|
| R | -111 | TYR | - | expression tag | UNP P0ABE7 |
| R | -110 | PHE | - | expression tag | UNP P0ABE7 |
| R | -109 | GLN | - | expression tag | UNP P0ABE7 |
| R | -108 | GLY | - | expression tag | UNP P0ABE7 |
| R | -107 | GLY | - | expression tag | UNP P0ABE7 |
| R | -106 | THR | - | expression tag | UNP P0ABE7 |
| R | -99 | TRP | MET | conflict | UNP P0ABE7 |
| R | -4 | ILE | HIS | conflict | UNP P0ABE7 |
| R | 0 | LEU | - | linker | UNP P0ABE7 |
| R | 1 | MET | - | linker | UNP P0ABE7 |
| R | 2 | CYS | - | linker | UNP P0ABE7 |
| R | 113 | GLN | GLU | conflict | UNP P08100 |
| R | 257 | TYR | MET | conflict | UNP P08100 |
| R | 282 | CYS | ASN | conflict | UNP P08100 |

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(i) subunit alpha-1.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|
| | | | Total | C | N | O | S | | |
| 2 | A | 354 | 2834 | 1790 | 481 | 544 | 19 | 0 | 0 |

There are 2 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-:|:-:|:-:|:-:|:-:|:-:|
| A | 203 | ALA | GLY | conflict | UNP P63096 |
| A | 326 | SER | ALA | conflict | UNP P63096 |

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|
| | | | Total | C | N | O | S | | |
| 3 | B | 340 | 2616 | 1612 | 470 | 513 | 21 | 0 | 0 |

There are 6 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-:|:-:|:-:|:-:|:-:|:-:|
| B | -4 | MET | - | initiating methionine | UNP P54311 |
| B | -3 | GLY | - | expression tag | UNP P54311 |
| B | -2 | SER | - | expression tag | UNP P54311 |
| B | -1 | LEU | - | expression tag | UNP P54311 |
| B | 0 | LEU | - | expression tag | UNP P54311 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|---------|-----------|
| B | 1 | GLN | - | expression tag | UNP P54311 |

- Molecule 4 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---------|-------|
| 4 | G | 58 | Total | C | N | O | S | 0 | 0 |
| | | | 444 | 277 | 79 | 85 | 3 | | |

- Molecule 5 is a protein called Fab light chain.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---------|-------|
| 5 | L | 211 | Total | C | N | O | S | 0 | 0 |
| | | | 1602 | 997 | 270 | 329 | 6 | | |

- Molecule 6 is a protein called Fab Heavy chain.

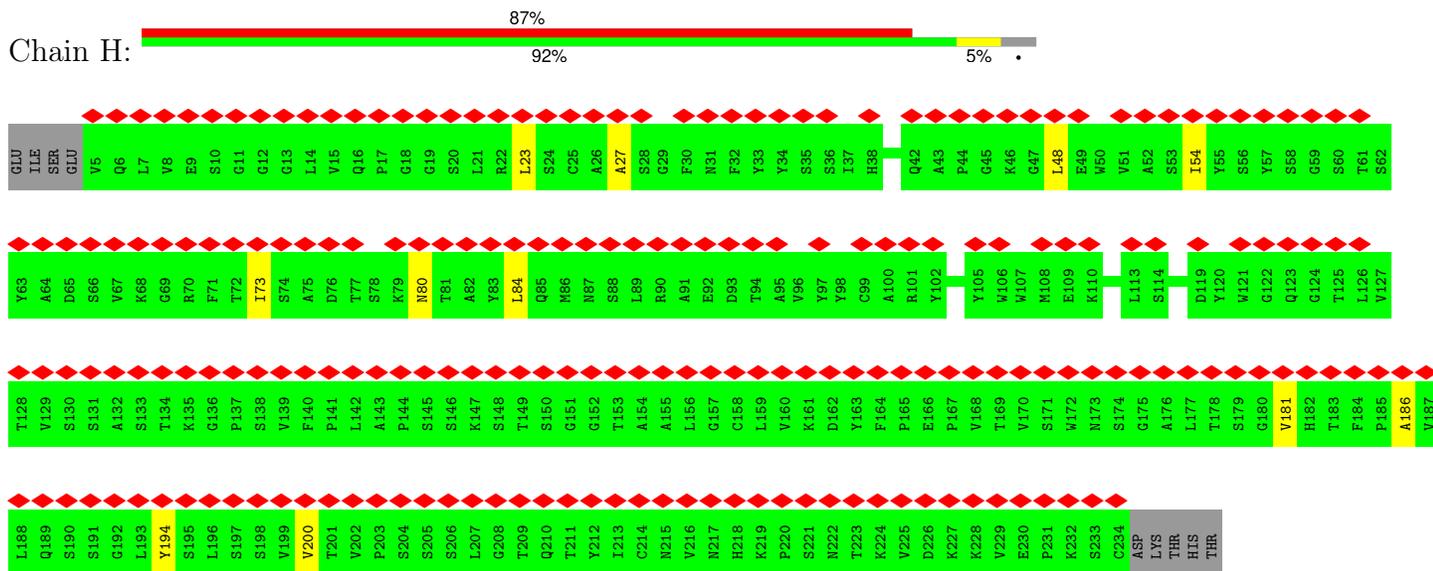| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---------|-------|
| 6 | H | 230 | Total | C | N | O | S | 0 | 0 |
| | | | 1743 | 1113 | 284 | 338 | 8 | | |

- Molecule 7 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.
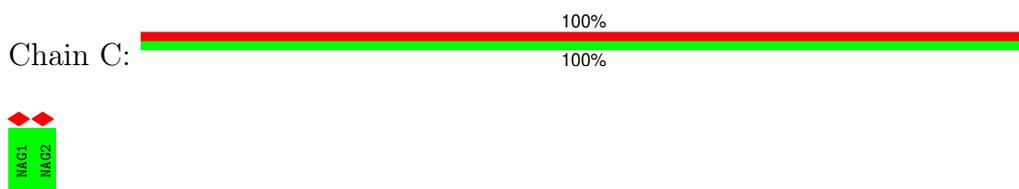


| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---------|-------|
| 7 | C | 2 | Total | C | N | O | 0 | 0 |
| | | | 28 | 16 | 2 | 10 | | |

# 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: chimera protein of Soluble cytochrome b562 and Rhodopsin



• Molecule 2: Guanine nucleotide-binding protein G(i) subunit alpha-1

• Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1

Chain B:





• Molecule 4: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2

Chain G:



• Molecule 5: Fab light chain

Chain L:

78%

85%

13%

SER ASP ILE GLN M5 T6 Q7 S11 L12 S13 A14 S15 V16 G17 D18 R19 V20 T21 I22 R25 A26 S27 Q28 S29 V30 S31 S32 A33 V34 Q39 K40 P41 G42 K43 A44 P45 K46 A52 Y56 S57 G58 V59 P60 S61 R62 F63 S68 G69 T70 I76 S77 S78 L79

Q80 P81 E82 D83 F84 A85 T86 Y87 Y88 C89 Q90 Q91 S92 S93 L96 G100 Q101 G102 T103 K104 V105 E106 I107 K108 R109 T110 V111 A112 A113 P114 S115 V116 F117 I118 F119 P120 P121 S122 D123 S124 Q125 L126 K127 S128 G129 T130 A131 S132 V133 V134 C135 L136 L137 N138 N139 F140 Y141 P142

R143 E144 A145 K146 V147 Q148 W149 K150 V151 D152 N153 A154 L155 Q156 S157 G158 N159 S160 Q161 E162 S163 V164 T165 E166 Q167 D168 S169 K170 D171 S172 T173 Y174 S175 L176 S177 S178 T179 L180 T181 L182 S183 K184 A185 D186 Y187 E188 K189 H190 K191 V192 Y193 A194 C195 E196 V197 T198 H199 Q200 G201 L202

S203 S204 P205 V206 T207 K208 S209 F210 N211 R212 G213 E214 C215

• Molecule 6: Fab Heavy chain

Chain H:

87%

92%

5%

GLU ILE SER GLU V5 Q6 L7 V8 E9 S10 G11 G12 G13 L14 V15 Q16 P17 G18 G19 S20 L21 R22 L23 S24 C25 A26 A27 S28 G29 F30 N31 F32 Y33 Y34 S35 S36 I37 H38 Q42 A43 P44 G45 K46 G47 L48 E49 W50 V51 A52 S53 I54 Y55 S56 Y57 S58 G59 S60 T61 S62

Y63 A64 D65 S66 V67 K68 G69 R70 F71 T72 I73 S74 A75 D76 T77 S78 K79 N80 T81 A82 Y83 L84 Q85 M86 N87 S88 L89 R90 A91 E92 D93 T94 A95 V96 Y97 Y98 C99 A100 R101 Y102 Y105 W106 W107 M108 E109 K110 L113 S114 D119 Y120 W121 G122 Q123 G124 T125 L126 V127

T128 V129 S130 S131 A132 S133 T134 K135 G136 P137 S138 V139 F140 P141 L142 A143 P144 S145 S146 K147 S148 T149 S150 G151 G152 T153 A154 A155 L156 G157 C158 L159 V160 K161 D162 Y163 F164 P165 E166 P167 V168 T169 V170 S171 W172 N173 S174 G175 A176 L177 T178 S179 G180 V181 H182 T183 F184 P185 A186 V187

L188 Q189 S190 S191 G192 L193 Y194 S195 L196 S197 S198 V199 V200 T201 V202 P203 S204 S205 S206 L207 G208 T209 Q210 T211 Y212 I213 C214 N215 V216 N217 H218 K219 P220 S221 N222 T223 K224 V225 D226 K227 K228 V229 E230 P231 K232 S233 C234 ASP LYS THR HIS THR

• Molecule 7: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:

100%

100%

NAG1 NAG2

# 4 Experimental information ⓘ

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 227386 | 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 $(e^-/Å^2)$ | 1.92 | 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 | 0.207 | Depositor |
| Minimum map value | -0.128 | Depositor |
| Average map value | 0.001 | Depositor |
| Map value standard deviation | 0.005 | Depositor |
| Recommended contour level | 0.063 | Depositor |
| Map size (Å) | 278.528, 278.528, 278.528 | wwPDB |
| Map dimensions | 256, 256, 256 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 1.088, 1.088, 1.088 | Depositor |

# 5 Model quality ⓘ

## 5.1 Standard geometry ⓘ

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

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 | R | 0.29 | 0/2649 | 0.67 | 1/3611 (0.0%) |
| 2 | A | 0.23 | 0/2881 | 0.63 | 3/3874 (0.1%) |
| 3 | B | 0.19 | 0/2663 | 0.51 | 0/3609 |
| 4 | G | 0.19 | 0/450 | 0.51 | 0/608 |
| 5 | L | 0.17 | 0/1634 | 0.50 | 0/2215 |
| 6 | H | 0.16 | 0/1794 | 0.47 | 0/2449 |
| All | All | 0.22 | 0/12071 | 0.57 | 4/16366 (0.0%) |

There are no bond length outliers.

All (4) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|---|---|---|---|---|---|---|---|
| 2 | A | 297 | GLU | N-CA-C | 5.84 | 118.12 | 111.11 |
| 1 | R | 43 | TYR | CA-CB-CG | 5.47 | 123.74 | 113.90 |
| 2 | A | 327 | THR | CA-C-N | 5.04 | 127.74 | 120.38 |
| 2 | A | 327 | THR | C-N-CA | 5.04 | 127.74 | 120.38 |

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 | R | 2567 | 0 | 2553 | 22 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 2 | A | 2834 | 0 | 2813 | 25 | 0 |
| 3 | B | 2616 | 0 | 2521 | 22 | 0 |
| 4 | G | 444 | 0 | 454 | 6 | 0 |
| 5 | L | 1602 | 0 | 1565 | 16 | 0 |
| 6 | H | 1743 | 0 | 1684 | 7 | 0 |
| 7 | C | 28 | 0 | 25 | 0 | 0 |
| All | All | 11834 | 0 | 11615 | 94 | 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.

All (94) 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:R:115:PHE:O | 1:R:119:LEU:HB2 | 1.91 | 0.70 |
| 1:R:87:VAL:O | 1:R:91:PHE:HB2 | 1.93 | 0.68 |
| 5:L:90:GLN:HE22 | 5:L:92:SER:HB2 | 1.60 | 0.66 |
| 2:A:209:LYS:HG2 | 2:A:210:LYS:HG3 | 1.79 | 0.64 |
| 1:R:125:LEU:HD11 | 1:R:215:PRO:HG3 | 1.80 | 0.63 |
| 3:B:286:LEU:HB3 | 3:B:318:LEU:HD21 | 1.81 | 0.63 |
| 6:H:23:LEU:HD12 | 6:H:84:LEU:HD22 | 1.84 | 0.60 |
| 4:G:41:CYS:O | 4:G:45:ALA:HB2 | 2.01 | 0.60 |
| 2:A:229:ASP:HB2 | 2:A:242:ARG:HB3 | 1.83 | 0.59 |
| 4:G:41:CYS:O | 4:G:45:ALA:CB | 2.51 | 0.59 |
| 1:R:135:ARG:NH2 | 1:R:309:MET:SD | 2.69 | 0.59 |
| 3:B:26:ALA:HB2 | 3:B:259:GLN:HE22 | 1.66 | 0.59 |
| 2:A:234:LEU:HB2 | 2:A:242:ARG:HH21 | 1.68 | 0.58 |
| 3:B:271:CYS:HB3 | 3:B:290:ASP:HB2 | 1.86 | 0.58 |
| 3:B:119:ASN:ND2 | 3:B:144:GLY:O | 2.37 | 0.57 |
| 6:H:54:ILE:HG12 | 6:H:73:ILE:HD13 | 1.86 | 0.57 |
| 3:B:256:ARG:HH11 | 4:G:28:ILE:HG13 | 1.69 | 0.57 |
| 2:A:159:LEU:HA | 2:A:162:ILE:HB | 1.87 | 0.56 |
| 2:A:210:LYS:O | 2:A:213:HIS:ND1 | 2.39 | 0.55 |
| 3:B:224:GLY:O | 3:B:251:ARG:NH1 | 2.40 | 0.55 |
| 2:A:201:VAL:HG12 | 2:A:203:ALA:H | 1.72 | 0.55 |
| 3:B:7:LEU:HD12 | 4:G:16:VAL:HG21 | 1.88 | 0.55 |
| 2:A:304:GLN:O | 2:A:308:GLU:HB2 | 2.07 | 0.54 |
| 5:L:131:ALA:HB3 | 5:L:187:TYR:HE2 | 1.72 | 0.54 |
| 5:L:116:VAL:HB | 5:L:137:LEU:HD23 | 1.90 | 0.54 |
| 2:A:277:LYS:HA | 2:A:280:LYS:HB3 | 1.90 | 0.53 |
| 5:L:91:GLN:NE2 | 5:L:93:SER:OG | 2.38 | 0.53 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 2:A:49:ILE:HG22 | 2:A:53:MET:HE2 | 1.91 | 0.53 |
| 3:B:50:THR:HG22 | 3:B:337:LYS:HG2 | 1.91 | 0.52 |
| 1:R:110:CYS:HA | 1:R:113:GLN:HB3 | 1.91 | 0.52 |
| 1:R:119:LEU:HD21 | 1:R:168:ALA:HB2 | 1.91 | 0.52 |
| 3:B:60:ALA:HB3 | 3:B:73:ALA:HB3 | 1.92 | 0.51 |
| 5:L:149:TRP:NE1 | 5:L:195:CYS:SG | 2.83 | 0.51 |
| 3:B:16:ASN:HA | 3:B:19:ARG:HG2 | 1.91 | 0.51 |
| 3:B:31:SER:O | 3:B:35:ASN:HB2 | 2.12 | 0.50 |
| 3:B:248:ALA:HB1 | 3:B:269:ILE:HG22 | 1.92 | 0.49 |
| 1:R:88:LEU:O | 1:R:92:THR:OG1 | 2.18 | 0.49 |
| 2:A:76:ASN:O | 2:A:80:SER:HB3 | 2.12 | 0.49 |
| 2:A:286:CYS:SG | 2:A:287:TYR:N | 2.85 | 0.49 |
| 1:R:262:LEU:HD12 | 1:R:266:VAL:HG21 | 1.95 | 0.49 |
| 3:B:285:LEU:HD23 | 3:B:299:ALA:HB2 | 1.95 | 0.49 |
| 6:H:27:ALA:HB3 | 6:H:80:ASN:HB3 | 1.93 | 0.49 |
| 3:B:180:PHE:HE1 | 3:B:216:GLY:HA2 | 1.78 | 0.48 |
| 3:B:264:TYR:OH | 3:B:299:ALA:O | 2.28 | 0.48 |
| 1:R:303:PRO:O | 1:R:307:ILE:HB | 2.13 | 0.48 |
| 2:A:48:THR:O | 2:A:52:GLN:HB2 | 2.13 | 0.48 |
| 5:L:17:GLY:H | 5:L:79:LEU:HB3 | 1.79 | 0.48 |
| 6:H:23:LEU:HB2 | 6:H:84:LEU:HB3 | 1.96 | 0.48 |
| 2:A:154:TYR:O | 2:A:158:ASP:HB2 | 2.14 | 0.48 |
| 3:B:103:CYS:SG | 3:B:104:ALA:N | 2.87 | 0.48 |
| 2:A:125:GLY:HA2 | 2:A:128:LYS:HE2 | 1.96 | 0.47 |
| 2:A:164:GLN:HE22 | 2:A:167:TYR:HB3 | 1.79 | 0.47 |
| 5:L:109:ARG:NH1 | 5:L:110:THR:O | 2.47 | 0.47 |
| 2:A:327:THR:HG22 | 2:A:329:THR:H | 1.79 | 0.47 |
| 2:A:339:VAL:HA | 2:A:342:VAL:HG12 | 1.96 | 0.47 |
| 5:L:34:VAL:HB | 5:L:52:ALA:HB2 | 1.97 | 0.47 |
| 5:L:190:HIS:HE2 | 5:L:193:TYR:HB3 | 1.81 | 0.46 |
| 5:L:163:SER:HB3 | 5:L:177:SER:HB3 | 1.96 | 0.46 |
| 1:R:87:VAL:HG23 | 1:R:91:PHE:CD2 | 2.51 | 0.46 |
| 1:R:195:LYS:HE2 | 1:R:198:VAL:HB | 1.99 | 0.45 |
| 2:A:311:ASN:ND2 | 2:A:314:LYS:O | 2.48 | 0.45 |
| 3:B:321:THR:HG23 | 3:B:324:GLY:H | 1.79 | 0.45 |
| 5:L:118:ILE:HD11 | 5:L:208:LYS:HB3 | 1.98 | 0.45 |
| 1:R:222:CYS:SG | 1:R:223:TYR:N | 2.89 | 0.45 |
| 1:R:253:MET:HB3 | 1:R:253:MET:HE3 | 1.75 | 0.45 |
| 1:R:81:VAL:HA | 1:R:84:LEU:HD23 | 1.98 | 0.45 |
| 2:A:97:ASP:O | 2:A:100:ARG:NH1 | 2.51 | 0.44 |
| 1:R:264:CYS:HG | 1:R:265:TRP:CD1 | 2.35 | 0.44 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:R:68:LEU:O | 1:R:73:ASN:ND2 | 2.48 | 0.43 |
| 5:L:150:LYS:HD3 | 5:L:194:ALA:HB3 | 2.00 | 0.43 |
| 3:B:254:ASP:HB2 | 3:B:261:LEU:HD21 | 2.01 | 0.43 |
| 2:A:172:GLN:O | 2:A:176:ARG:HB2 | 2.19 | 0.43 |
| 2:A:274:PHE:O | 2:A:278:ILE:HG12 | 2.18 | 0.42 |
| 2:A:304:GLN:O | 2:A:308:GLU:CB | 2.66 | 0.42 |
| 5:L:163:SER:N | 5:L:177:SER:O | 2.51 | 0.42 |
| 6:H:186:ALA:HB1 | 6:H:194:TYR:HB3 | 2.01 | 0.42 |
| 1:R:71:PRO:HA | 1:R:74:TYR:HD2 | 1.83 | 0.42 |
| 1:R:170:PRO:HA | 1:R:175:TRP:HB3 | 2.01 | 0.42 |
| 3:B:30:LEU:HD21 | 3:B:261:LEU:HD12 | 2.01 | 0.42 |
| 5:L:26:ALA:HB3 | 5:L:70:THR:HB | 2.00 | 0.42 |
| 3:B:241:PHE:HD2 | 3:B:253:PHE:HB2 | 1.84 | 0.42 |
| 2:A:235:ALA:HB2 | 2:A:240:MET:HA | 2.01 | 0.42 |
| 3:B:51:LEU:HB2 | 3:B:336:LEU:HB2 | 2.01 | 0.42 |
| 5:L:144:GLU:O | 5:L:199:HIS:NE2 | 2.53 | 0.41 |
| 1:R:247:GLU:HA | 1:R:250:VAL:HG12 | 2.02 | 0.41 |
| 3:B:220:GLN:HE21 | 4:G:25:ILE:HG21 | 1.86 | 0.41 |
| 4:G:18:GLN:O | 4:G:22:GLU:HB2 | 2.21 | 0.41 |
| 1:R:256:ILE:HA | 1:R:259:ILE:HG12 | 2.02 | 0.41 |
| 6:H:181:VAL:HG12 | 6:H:200:VAL:HG13 | 2.02 | 0.41 |
| 2:A:106:GLN:HA | 2:A:109:VAL:HG12 | 2.03 | 0.41 |
| 1:R:126:TRP:HA | 1:R:129:VAL:HG12 | 2.03 | 0.40 |
| 2:A:25:GLU:HA | 2:A:28:GLU:HG2 | 2.02 | 0.40 |
| 5:L:88:TYR:HE2 | 6:H:48:LEU:HD23 | 1.86 | 0.40 |
| 1:R:82:ALA:O | 1:R:86:MET:HG2 | 2.22 | 0.40 |

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 | R | 321/463 (69%) | 319 (99%) | 2 (1%) | 0 | 100 | 100 |
| 2 | A | 352/354 (99%) | 344 (98%) | 8 (2%) | 0 | 100 | 100 |
| 3 | B | 338/345 (98%) | 335 (99%) | 3 (1%) | 0 | 100 | 100 |
| 4 | G | 56/68 (82%) | 56 (100%) | 0 | 0 | 100 | 100 |
| 5 | L | 209/215 (97%) | 205 (98%) | 4 (2%) | 0 | 100 | 100 |
| 6 | H | 228/239 (95%) | 226 (99%) | 2 (1%) | 0 | 100 | 100 |
| All | All | 1504/1684 (89%) | 1485 (99%) | 19 (1%) | 0 | 100 | 100 |

There are no Ramachandran outliers to report.

### 5.3.2   Protein sidechains ⓘ

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 | R | 275/391 (70%) | 275 (100%) | 0 | 100 | 100 |
| 2 | A | 306/306 (100%) | 305 (100%) | 1 (0%) | 91 | 91 |
| 3 | B | 283/287 (99%) | 283 (100%) | 0 | 100 | 100 |
| 4 | G | 47/56 (84%) | 47 (100%) | 0 | 100 | 100 |
| 5 | L | 186/190 (98%) | 186 (100%) | 0 | 100 | 100 |
| 6 | H | 193/202 (96%) | 193 (100%) | 0 | 100 | 100 |
| All | All | 1290/1432 (90%) | 1289 (100%) | 1 (0%) | 92 | 94 |

All (1) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2 | A | 283 | LEU |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | R | 111 | ASN |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2 | A | 76 | ASN |
| 2 | A | 164 | GLN |
| 2 | A | 188 | HIS |
| 2 | A | 346 | ASN |
| 2 | A | 347 | ASN |
| 3 | B | 119 | ASN |
| 3 | B | 175 | GLN |
| 3 | B | 220 | GLN |
| 3 | B | 259 | GLN |
| 3 | B | 293 | ASN |
| 5 | L | 90 | GLN |
| 5 | L | 91 | GLN |
| 5 | L | 138 | ASN |
| 5 | L | 200 | GLN |
| 6 | H | 31 | ASN |
| 6 | H | 85 | GLN |
| 6 | H | 87 | ASN |

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

2 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|-----|------|----------|------|---------|----------|------|---------|
| | | | | | Counts | RMSZ | $\#|Z| > 2$ | Counts | RMSZ | $\#|Z| > 2$ |
| 7 | NAG | C | 1 | 7,1 | 14,14,15 | 0.32 | 0 | 17,19,21 | 0.54 | 0 |
| 7 | NAG | C | 2 | 7 | 14,14,15 | 0.29 | 0 | 17,19,21 | 0.54 | 0 |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|-----|------|---------|----------|-------|
| 7 | NAG | C | 1 | 7,1 | - | 4/6/23/26 | 0/1/1/1 |
| 7 | NAG | C | 2 | 7 | - | 3/6/23/26 | 0/1/1/1 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (7) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-------|
| 7 | C | 1 | NAG | O5-C5-C6-O6 |
| 7 | C | 1 | NAG | C4-C5-C6-O6 |
| 7 | C | 1 | NAG | C8-C7-N2-C2 |
| 7 | C | 1 | NAG | O7-C7-N2-C2 |
| 7 | C | 2 | NAG | C8-C7-N2-C2 |
| 7 | C | 2 | NAG | O7-C7-N2-C2 |
| 7 | C | 2 | NAG | O5-C5-C6-O6 |

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

**Oligosaccharide Chain C**

Bond lengths / Bond angles / Torsions / Rings
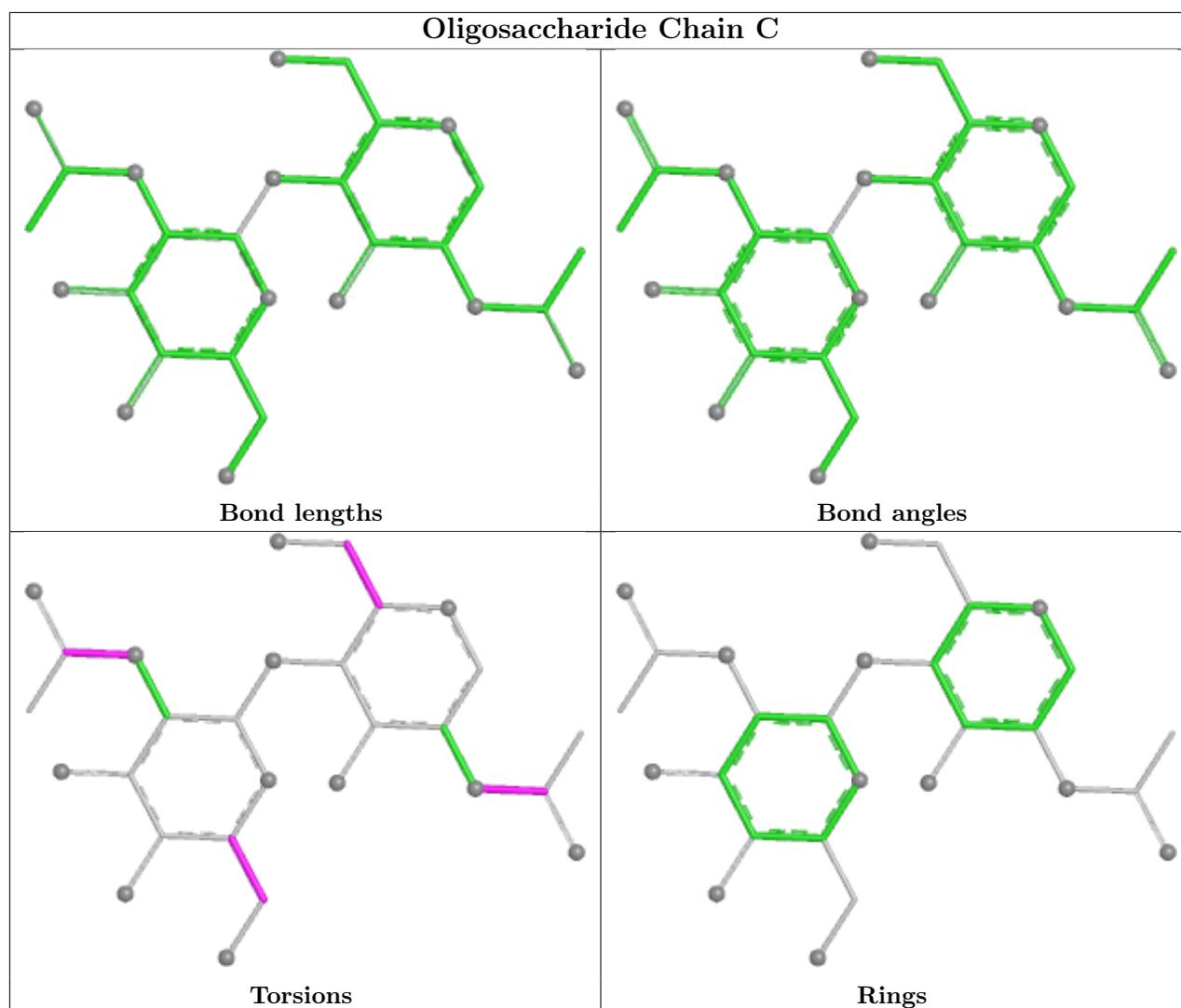
## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

# 6　Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-7517. 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 ⓘ

### 6.1.1　Primary map



| X | Y | Z |
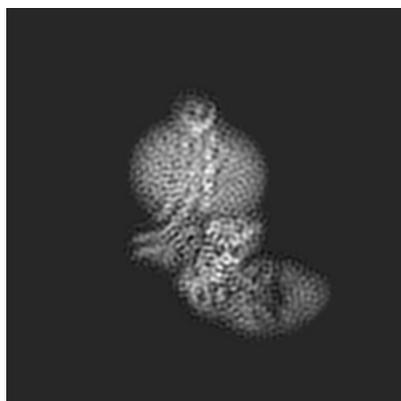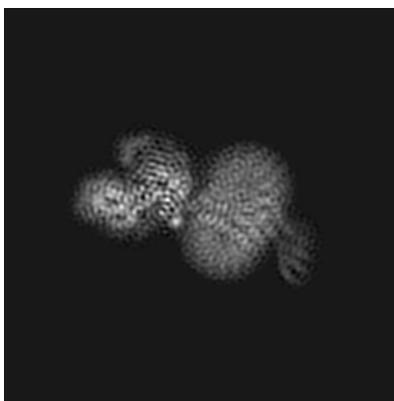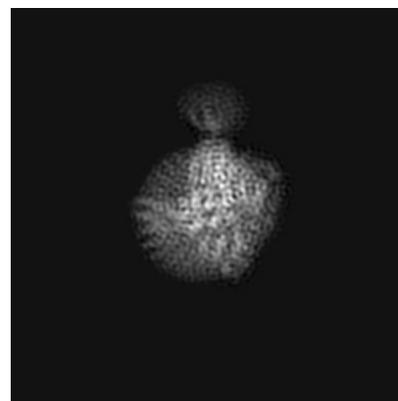
The images above show the map projected in three orthogonal directions.

## 6.2　Central slices ⓘ
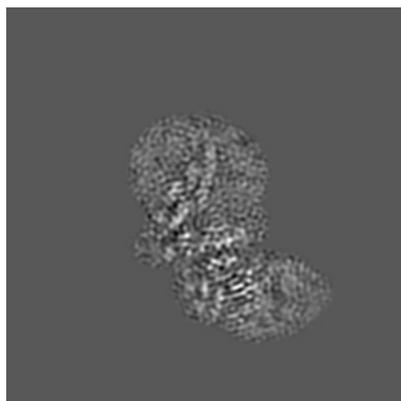
### 6.2.1　Primary map



| X Index: 128 | Y Index: 128 | Z Index: 128 |
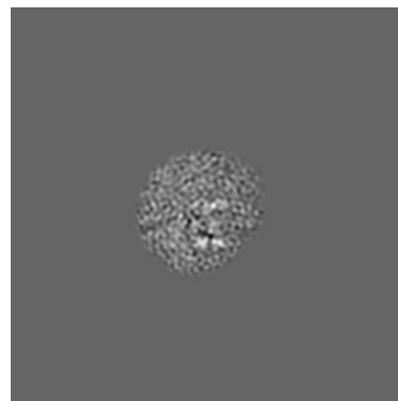
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices ⓘ
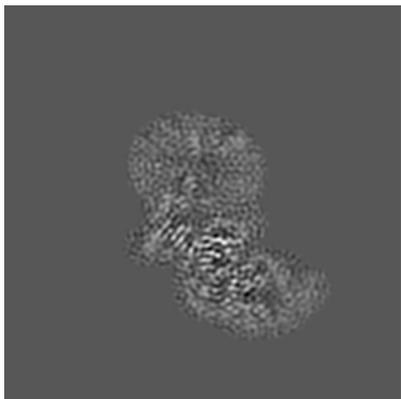
### 6.3.1 Primary map
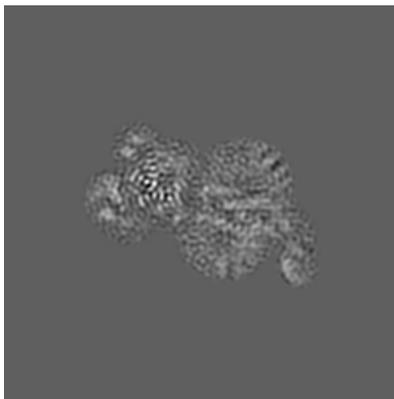


| X Index: 132 | Y Index: 130 | Z Index: 108 |
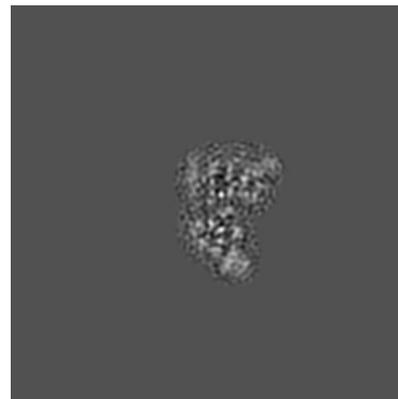
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



| X | Y | Z |
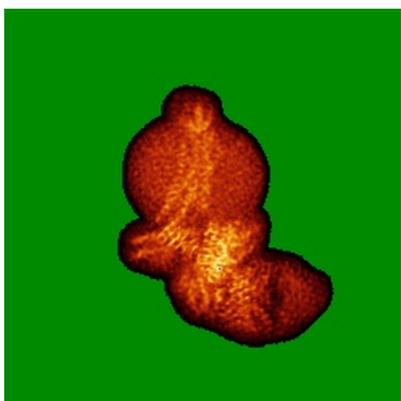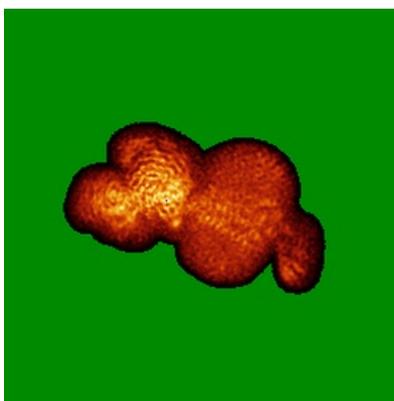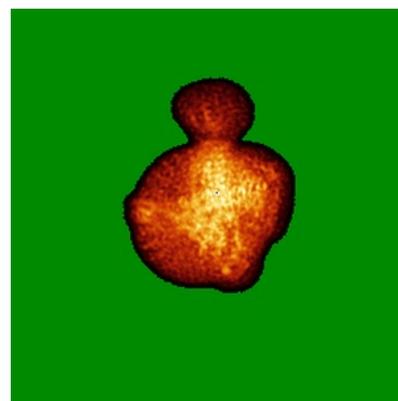
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views (i)

### 6.5.1 Primary map



| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.063. 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 ⓘ

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

## 7.1   Map-value distribution ⓘ
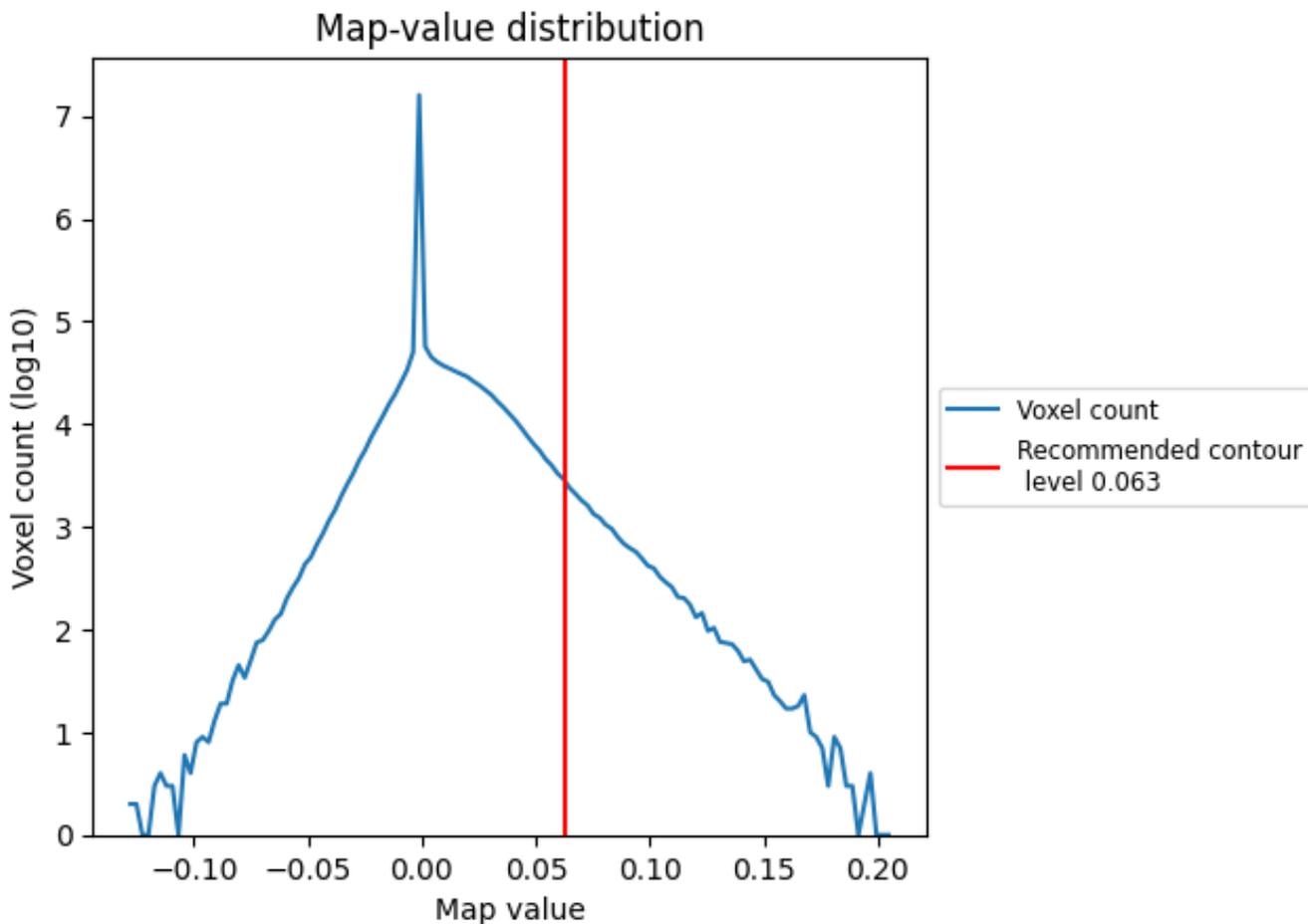


The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

## 7.2 Volume estimate ⓘ
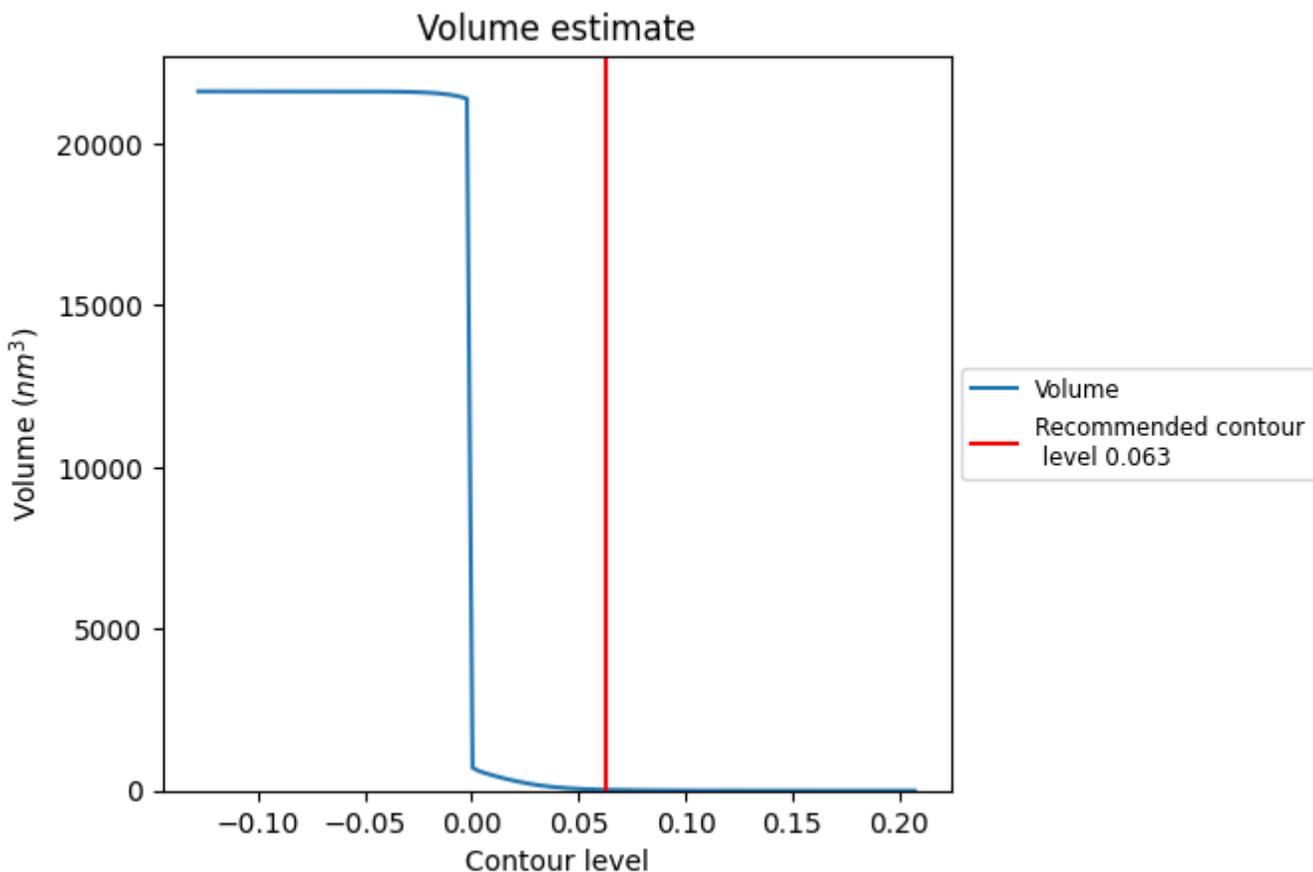


The volume at the recommended contour level is 27 nm$^3$; this corresponds to an approximate mass of 24 kDa.

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 ⓘ
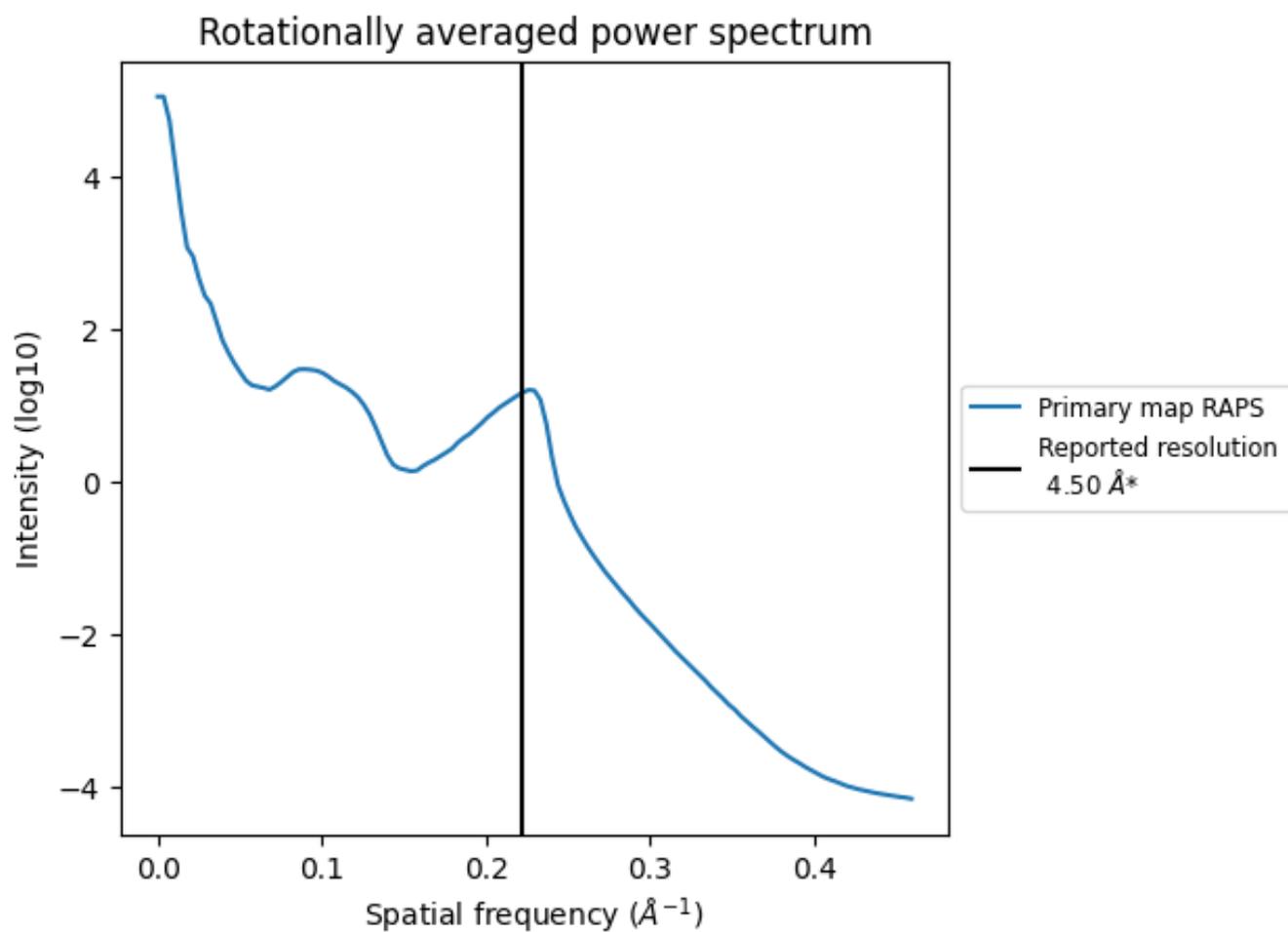


*Reported resolution corresponds to spatial frequency of 0.222 Å$^{-1}$

# 8 Fourier-Shell correlation ⓘ

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

# 9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-7517 and PDB model 6CMO. Per-residue inclusion information can be found in section 3 on page 6.

## 9.1 Map-model overlay ⓘ



X          Y          Z
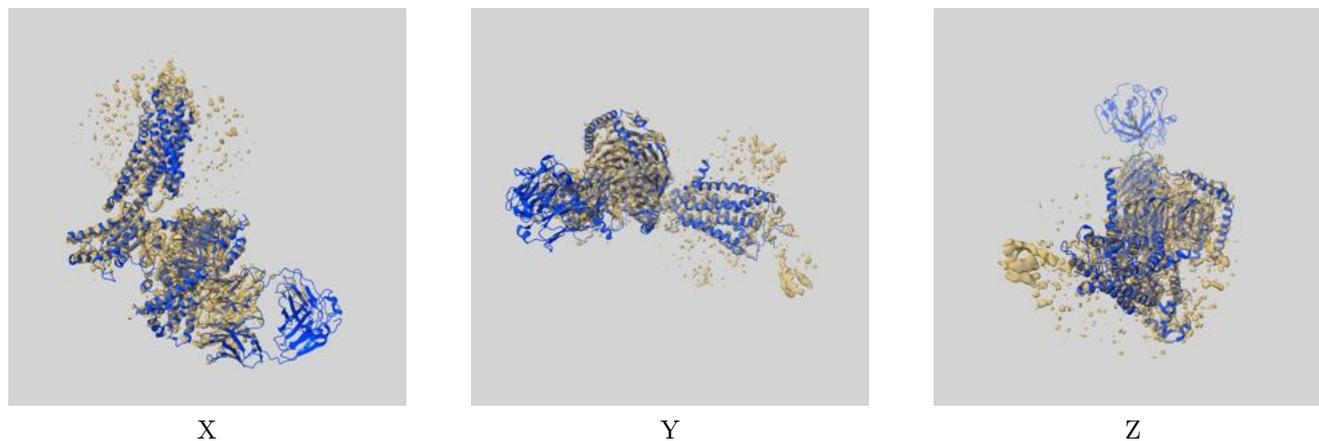
The images above show the 3D surface view of the map at the recommended contour level 0.063 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model ⓘ



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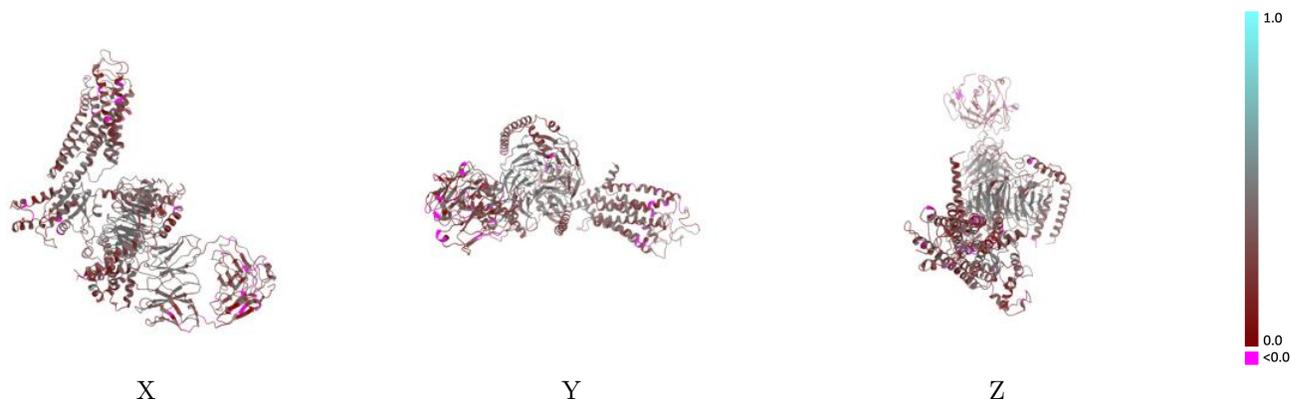
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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



X Y Z
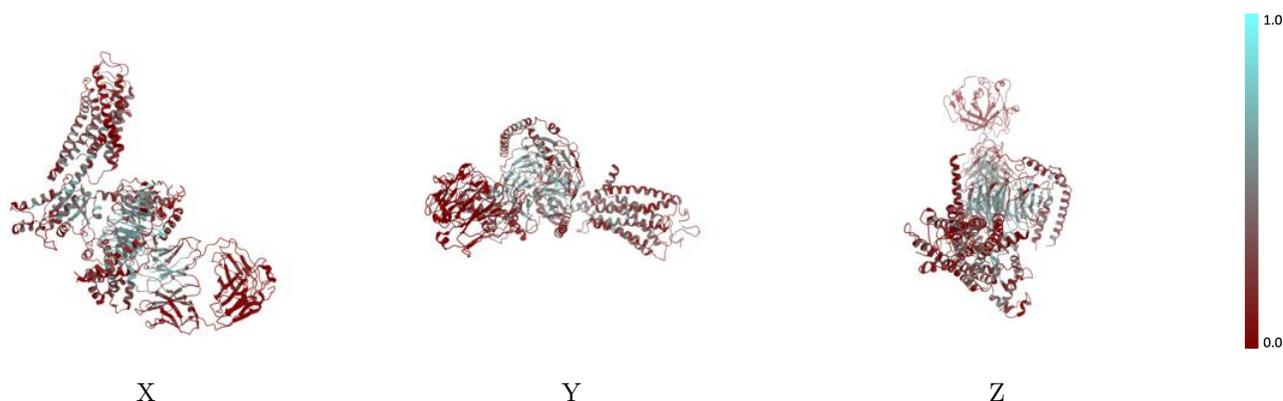
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.063).

## 9.4 Atom inclusion ⓘ
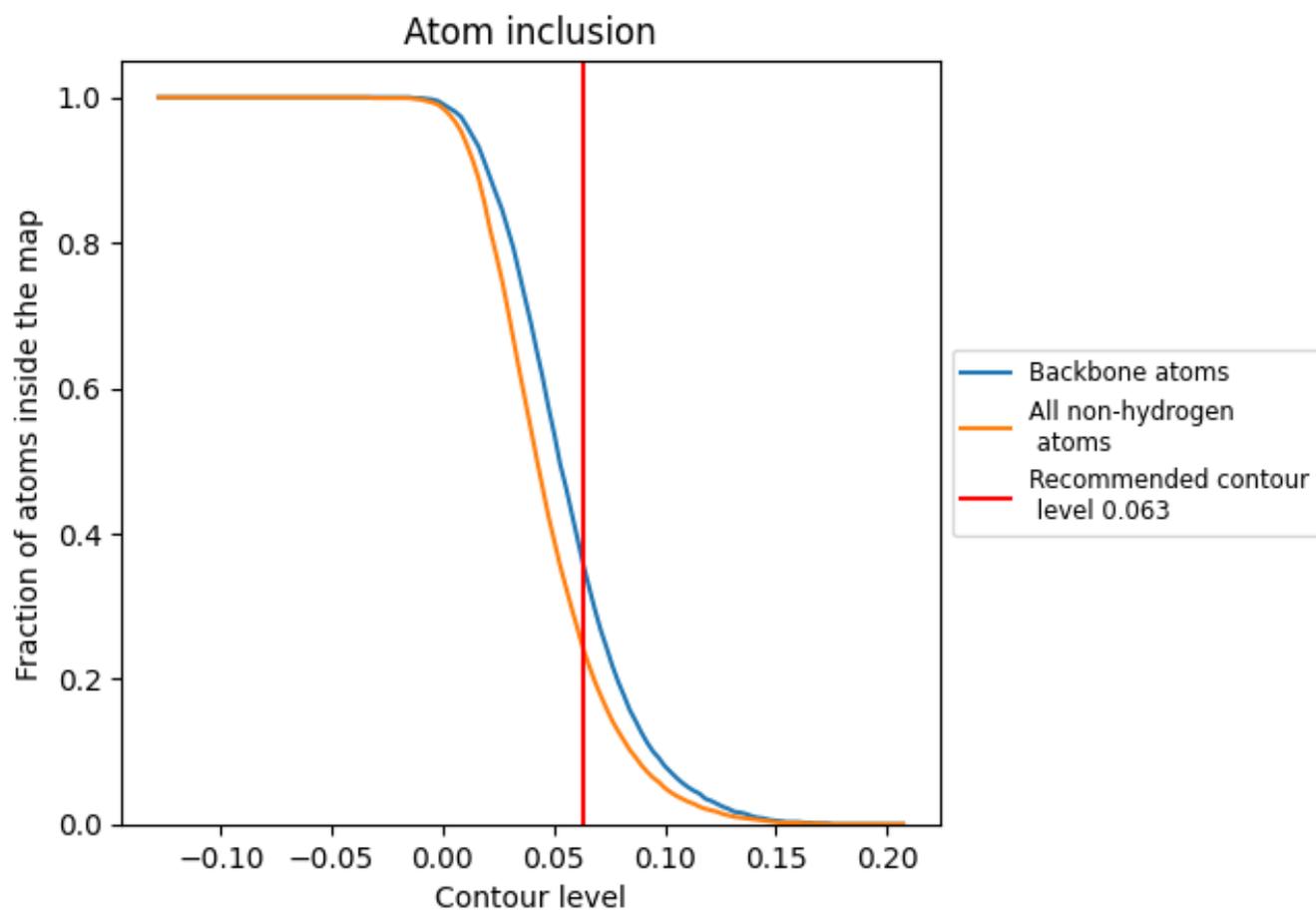


At the recommended contour level, 36% of all backbone atoms, 24% of all non-hydrogen atoms, are inside the map.

## 9.5   Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.063) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|:-----:|:--------------:|:-------:|
| All | 0.2450 | 0.3150 |
| A | 0.2500 | 0.3040 |
| B | 0.4230 | 0.4030 |
| C | 0.0710 | 0.3520 |
| G | 0.1780 | 0.2740 |
| H | 0.1190 | 0.2770 |
| L | 0.1780 | 0.3050 |
| R | 0.1990 | 0.2780 |

1.0

0.0
<0.0