



wwPDB EM Validation Summary Report ⓘ

Dec 18, 2022 – 04:13 pm GMT

PDB ID : 7OCD
EMDB ID : EMD-12804
Title : Resting state GluA1/A2 heterotetramer in complex with auxiliary subunit TARP gamma 8 (LBD-TMD)
Authors : Zhang, D.; Watson, J.F.; Matthews, P.M.; Cais, O.; Greger, I.H.
Deposited on : 2021-04-26
Resolution : 3.50 Å (reported)
Based on initial model : 6QKC

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.dev43
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
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) : 2.31.3

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 13624 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 Isoform Flip of Glutamate receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	395	2773	1828	450	479	16	0	0
1	C	395	2773	1828	450	479	16	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	ASP	-	insertion	UNP P19490
A	-5	TYR	-	insertion	UNP P19490
A	-4	LYS	-	insertion	UNP P19490
A	-3	ASP	-	insertion	UNP P19490
A	-2	ASP	-	insertion	UNP P19490
A	-1	ASP	-	insertion	UNP P19490
A	0	ASP	-	insertion	UNP P19490
A	1	LYS	-	insertion	UNP P19490
C	-6	ASP	-	insertion	UNP P19490
C	-5	TYR	-	insertion	UNP P19490
C	-4	LYS	-	insertion	UNP P19490
C	-3	ASP	-	insertion	UNP P19490
C	-2	ASP	-	insertion	UNP P19490
C	-1	ASP	-	insertion	UNP P19490
C	0	ASP	-	insertion	UNP P19490
C	1	LYS	-	insertion	UNP P19490

- Molecule 2 is a protein called Glutamate receptor 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	D	396	2777	1823	451	486	17	0	0
2	B	396	2777	1823	451	486	17	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	586	ARG	GLN	conflict	UNP P19491
B	586	ARG	GLN	conflict	UNP P19491

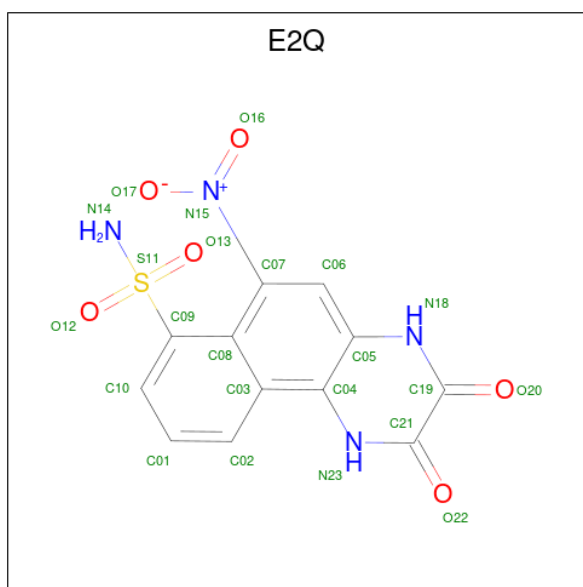
- Molecule 3 is a protein called Voltage-dependent calcium channel gamma-8 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	I	169	1153	761	188	198	6	0	0
3	J	169	1153	761	188	198	6	0	0

There are 14 discrepancies between the modelled and reference sequences:

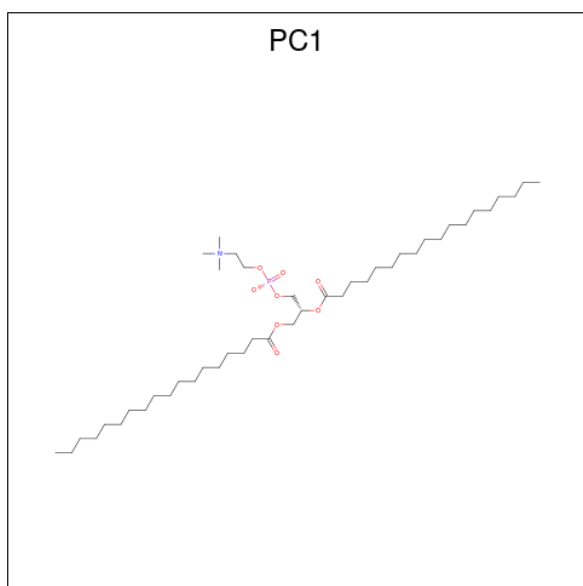
Chain	Residue	Modelled	Actual	Comment	Reference
I	1	GLY	-	expression tag	UNP Q8VHW5
I	418	LEU	-	expression tag	UNP Q8VHW5
I	419	GLU	-	expression tag	UNP Q8VHW5
I	420	VAL	-	expression tag	UNP Q8VHW5
I	421	LEU	-	expression tag	UNP Q8VHW5
I	422	PHE	-	expression tag	UNP Q8VHW5
I	423	GLN	-	expression tag	UNP Q8VHW5
J	1	GLY	-	expression tag	UNP Q8VHW5
J	418	LEU	-	expression tag	UNP Q8VHW5
J	419	GLU	-	expression tag	UNP Q8VHW5
J	420	VAL	-	expression tag	UNP Q8VHW5
J	421	LEU	-	expression tag	UNP Q8VHW5
J	422	PHE	-	expression tag	UNP Q8VHW5
J	423	GLN	-	expression tag	UNP Q8VHW5

- Molecule 4 is 6-nitro-2,3-bis(oxidanylidene)-1,4-dihydrobenzo[f]quinoxaline-7-sulfonamide (three-letter code: E2Q) (formula: C₁₂H₈N₄O₆S).

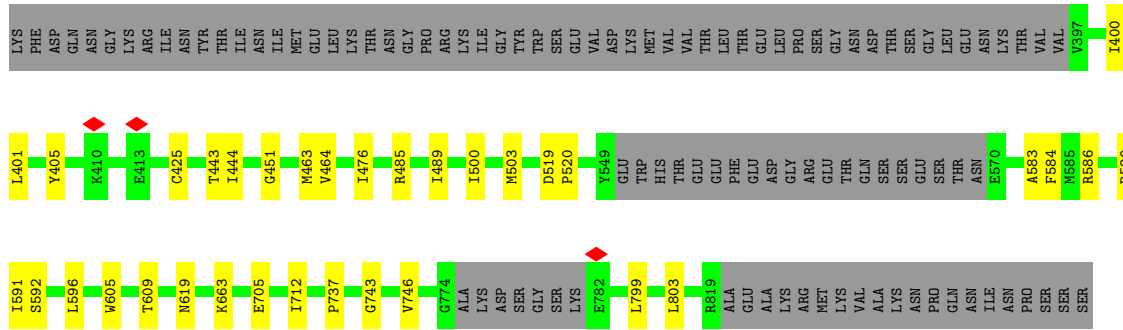


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
4	A	1	Total	C	N	O	S	0
			23	12	4	6	1	
4	C	1	Total	C	N	O	S	0
			23	12	4	6	1	
4	D	1	Total	C	N	O	S	0
			23	12	4	6	1	
4	B	1	Total	C	N	O	S	0
			23	12	4	6	1	

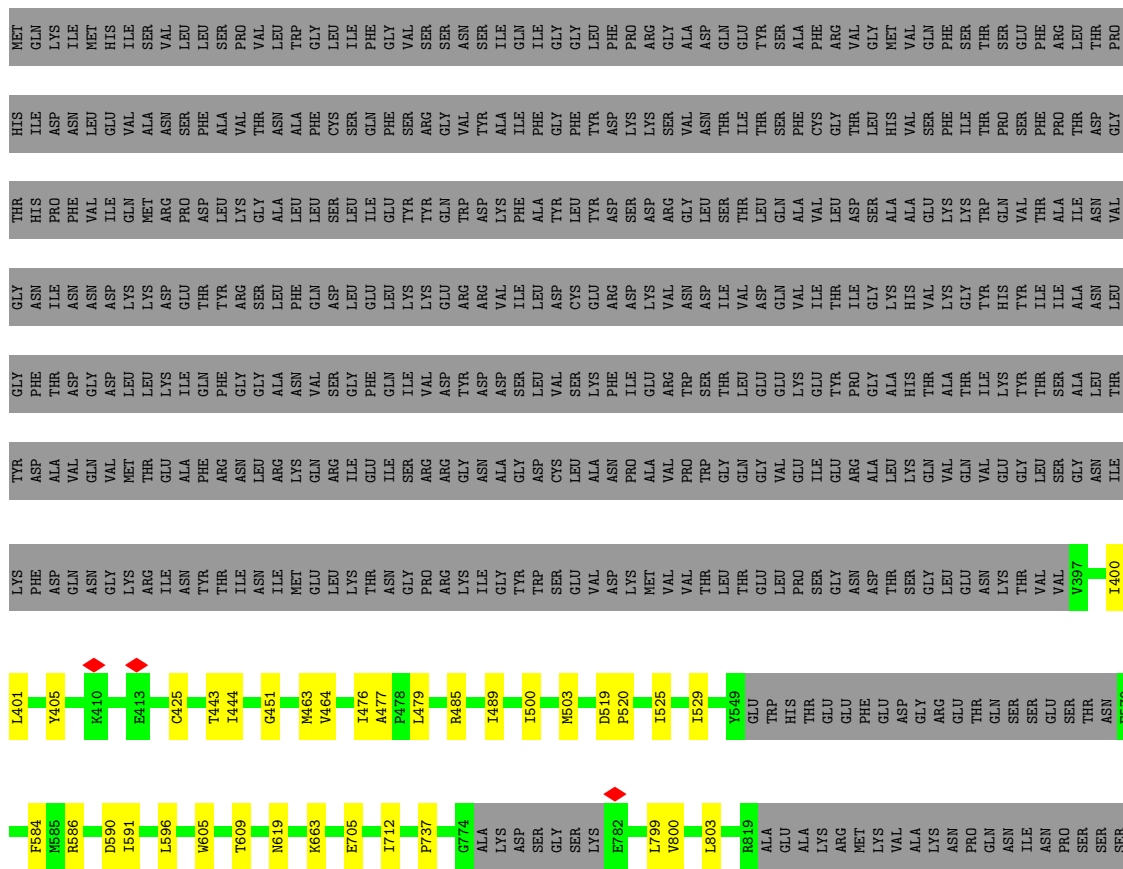
- Molecule 5 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: $C_{44}H_{88}NO_8P$).



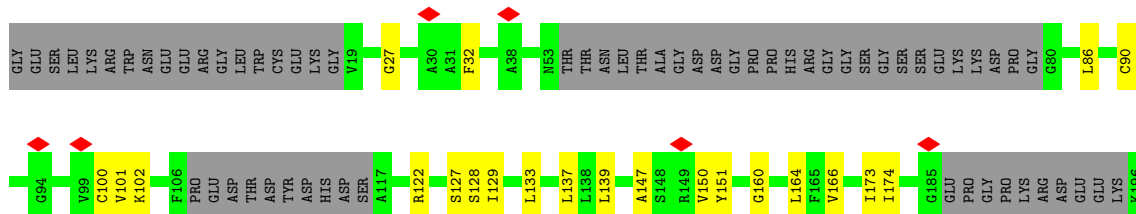
Mol	Chain	Residues	Atoms			AltConf
5	A	1	Total	C	O	0
			38	34	4	
5	A	1	Total	C	O	0
			38	34	4	
5	C	1	Total	C	O	0
			38	34	4	
5	C	1	Total	C	O	0
			38	34	4	
5	D	1	Total	C	O	0
			25	21	4	
5	B	1	Total	C	O	0
			25	21	4	

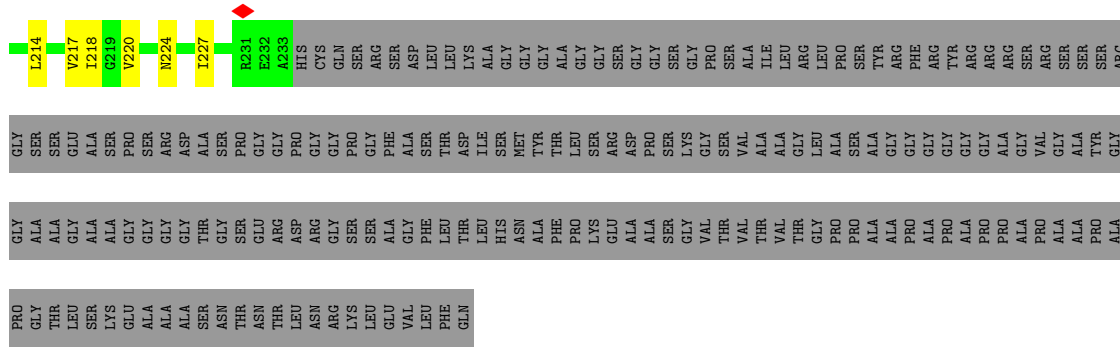


• Molecule 2: Glutamate receptor 2

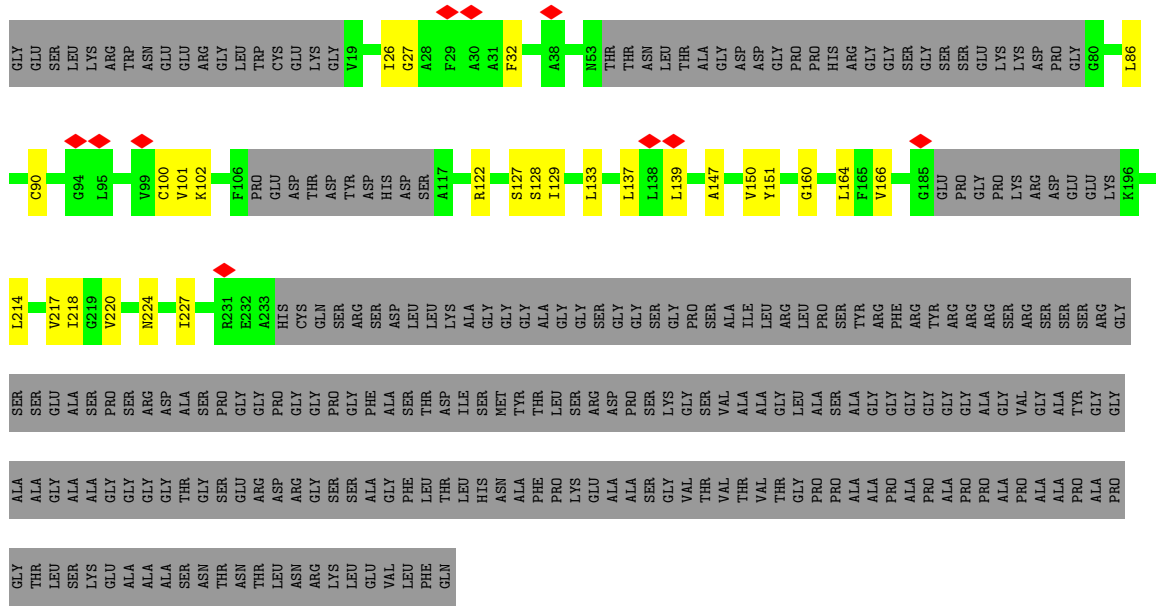


• Molecule 3: Voltage-dependent calcium channel gamma-8 subunit





● Molecule 3: Voltage-dependent calcium channel gamma-8 subunit



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	105471	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.125	Depositor
Minimum map value	-0.054	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.019	Depositor
Map size (Å)	342.40002, 342.40002, 342.40002	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.07, 1.07, 1.07	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: E2Q, PC1

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	0.40	0/2838	0.45	0/3879
1	C	0.40	0/2838	0.45	0/3879
2	B	0.38	0/2843	0.45	0/3893
2	D	0.38	0/2843	0.45	0/3893
3	I	0.34	0/1173	0.45	0/1604
3	J	0.34	0/1173	0.45	0/1604
All	All	0.38	0/13708	0.45	0/18752

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 [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2773	0	2541	46	0
1	C	2773	0	2541	50	0
2	B	2777	0	2551	27	0
2	D	2777	0	2551	27	0
3	I	1153	0	1077	21	0
3	J	1153	0	1077	19	0
4	A	23	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	23	0	0	2	0
4	C	23	0	0	3	0
4	D	23	0	0	2	0
5	A	38	0	63	0	0
5	B	25	0	40	0	0
5	C	38	0	63	0	0
5	D	25	0	40	0	0
All	All	13624	0	12544	178	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

The worst 5 of 178 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)
4:C:901:E2Q:N14	4:C:901:E2Q:O16	2.14	0.81
4:A:901:E2Q:O16	4:A:901:E2Q:N14	2.13	0.80
4:D:901:E2Q:O16	4:D:901:E2Q:N14	2.14	0.80
4:B:901:E2Q:O16	4:B:901:E2Q:N14	2.14	0.80
1:A:568:GLY:O	1:A:572:SER:N	2.20	0.70

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	389/915 (42%)	365 (94%)	24 (6%)	0	100	100
1	C	389/915 (42%)	364 (94%)	25 (6%)	0	100	100
2	B	390/860 (45%)	373 (96%)	17 (4%)	0	100	100
2	D	390/860 (45%)	373 (96%)	17 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	I	161/423 (38%)	153 (95%)	8 (5%)	0	100	100
3	J	161/423 (38%)	153 (95%)	8 (5%)	0	100	100
All	All	1880/4396 (43%)	1781 (95%)	99 (5%)	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	238/778 (31%)	238 (100%)	0	100	100
1	C	238/778 (31%)	238 (100%)	0	100	100
2	B	246/737 (33%)	246 (100%)	0	100	100
2	D	246/737 (33%)	246 (100%)	0	100	100
3	I	98/309 (32%)	98 (100%)	0	100	100
3	J	98/309 (32%)	98 (100%)	0	100	100
All	All	1164/3648 (32%)	1164 (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 (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	431	HIS
1	C	431	HIS
3	I	83	HIS
3	J	83	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 ligands 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
5	PC1	C	903	-	17,17,53	0.82	1 (5%)	17,17,61	1.08	1 (5%)
5	PC1	A	903	-	17,17,53	0.82	1 (5%)	17,17,61	1.08	1 (5%)
5	PC1	B	902	-	24,24,53	0.79	2 (8%)	25,25,61	1.03	1 (4%)
4	E2Q	B	901	-	24,25,25	1.66	4 (16%)	32,39,39	2.02	11 (34%)
5	PC1	D	902	-	24,24,53	0.79	2 (8%)	25,25,61	1.03	1 (4%)
5	PC1	C	902	-	19,19,53	0.77	1 (5%)	19,19,61	1.05	0
4	E2Q	A	901	-	24,25,25	1.76	5 (20%)	32,39,39	2.02	11 (34%)
5	PC1	A	902	-	19,19,53	0.77	1 (5%)	19,19,61	1.05	0
4	E2Q	D	901	-	24,25,25	1.66	4 (16%)	32,39,39	2.03	11 (34%)
4	E2Q	C	901	-	24,25,25	1.74	5 (20%)	32,39,39	2.01	11 (34%)

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
5	PC1	C	903	-	-	4/15/15/57	-
5	PC1	A	903	-	-	4/15/15/57	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	PC1	B	902	-	-	6/24/24/57	-
4	E2Q	B	901	-	-	2/8/10/10	0/3/3/3
5	PC1	D	902	-	-	6/24/24/57	-
5	PC1	C	902	-	-	4/17/17/57	-
4	E2Q	A	901	-	-	2/8/10/10	0/3/3/3
5	PC1	A	902	-	-	4/17/17/57	-
4	E2Q	D	901	-	-	2/8/10/10	0/3/3/3
4	E2Q	C	901	-	-	2/8/10/10	0/3/3/3

The worst 5 of 26 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	901	E2Q	C09-S11	-5.60	1.69	1.77
4	C	901	E2Q	C09-S11	-5.39	1.69	1.77
4	D	901	E2Q	C09-S11	-5.07	1.70	1.77
4	B	901	E2Q	C09-S11	-5.07	1.70	1.77
4	A	901	E2Q	C06-C07	-3.29	1.36	1.38

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	901	E2Q	C01-C10-C09	3.89	124.39	120.37
4	B	901	E2Q	C01-C10-C09	3.86	124.36	120.37
4	A	901	E2Q	C01-C10-C09	3.82	124.32	120.37
4	C	901	E2Q	C01-C10-C09	3.82	124.31	120.37
4	C	901	E2Q	O22-C21-C19	3.61	122.92	119.64

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

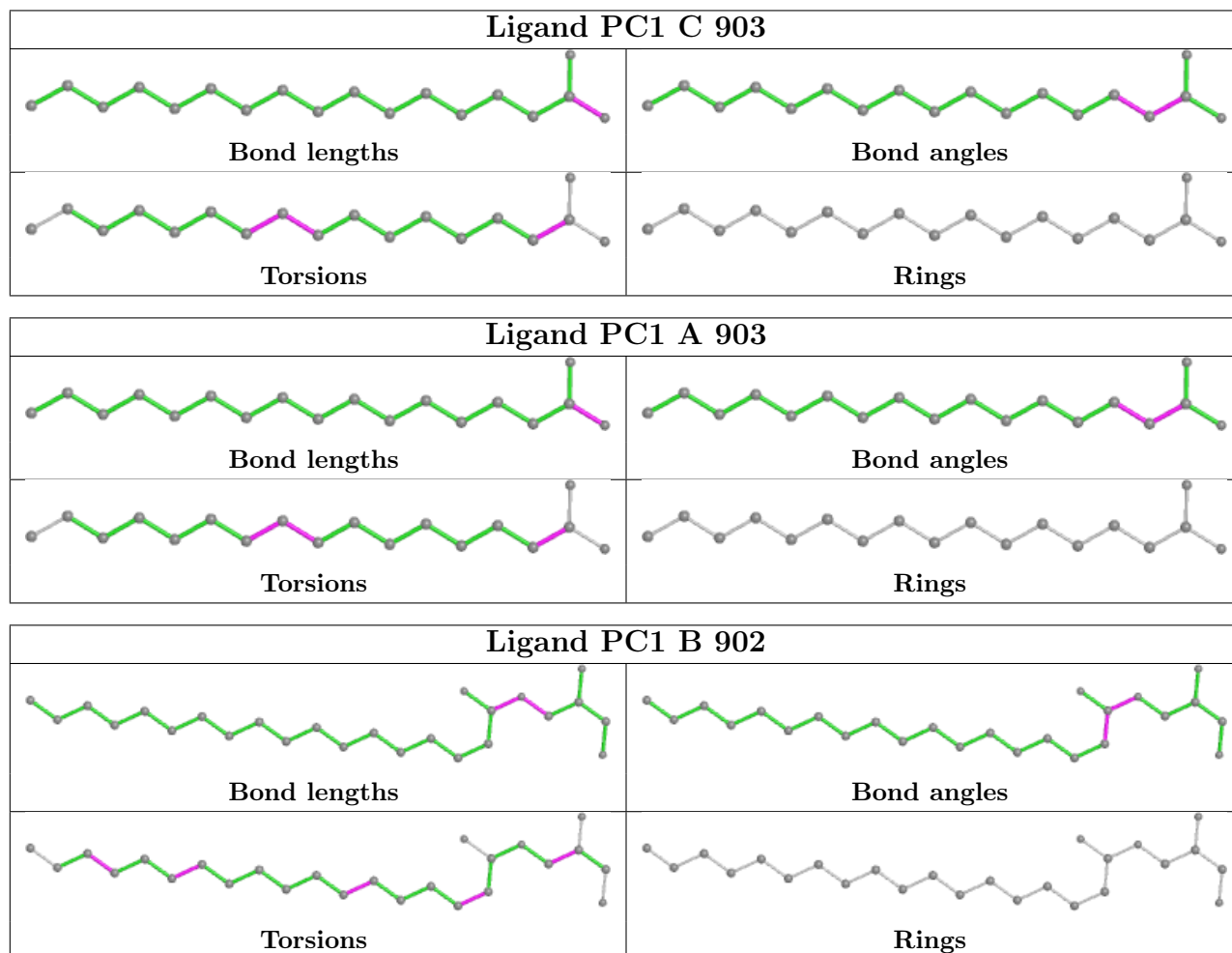
Mol	Chain	Res	Type	Atoms
5	D	902	PC1	C1-C2-C3-O31
5	B	902	PC1	C1-C2-C3-O31
5	D	902	PC1	O21-C2-C3-O31
5	B	902	PC1	O21-C2-C3-O31
5	D	902	PC1	C31-C32-C33-C34

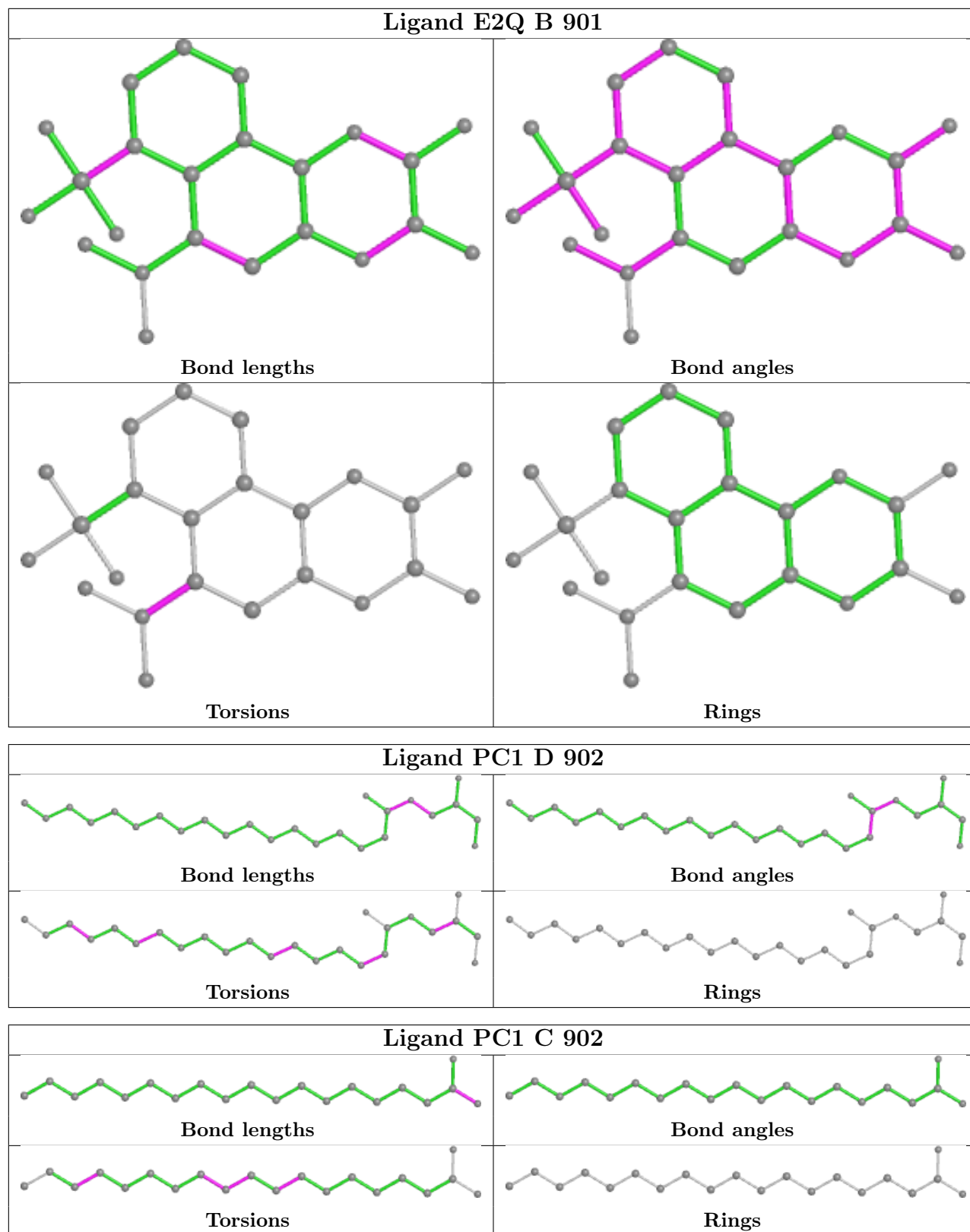
There are no ring outliers.

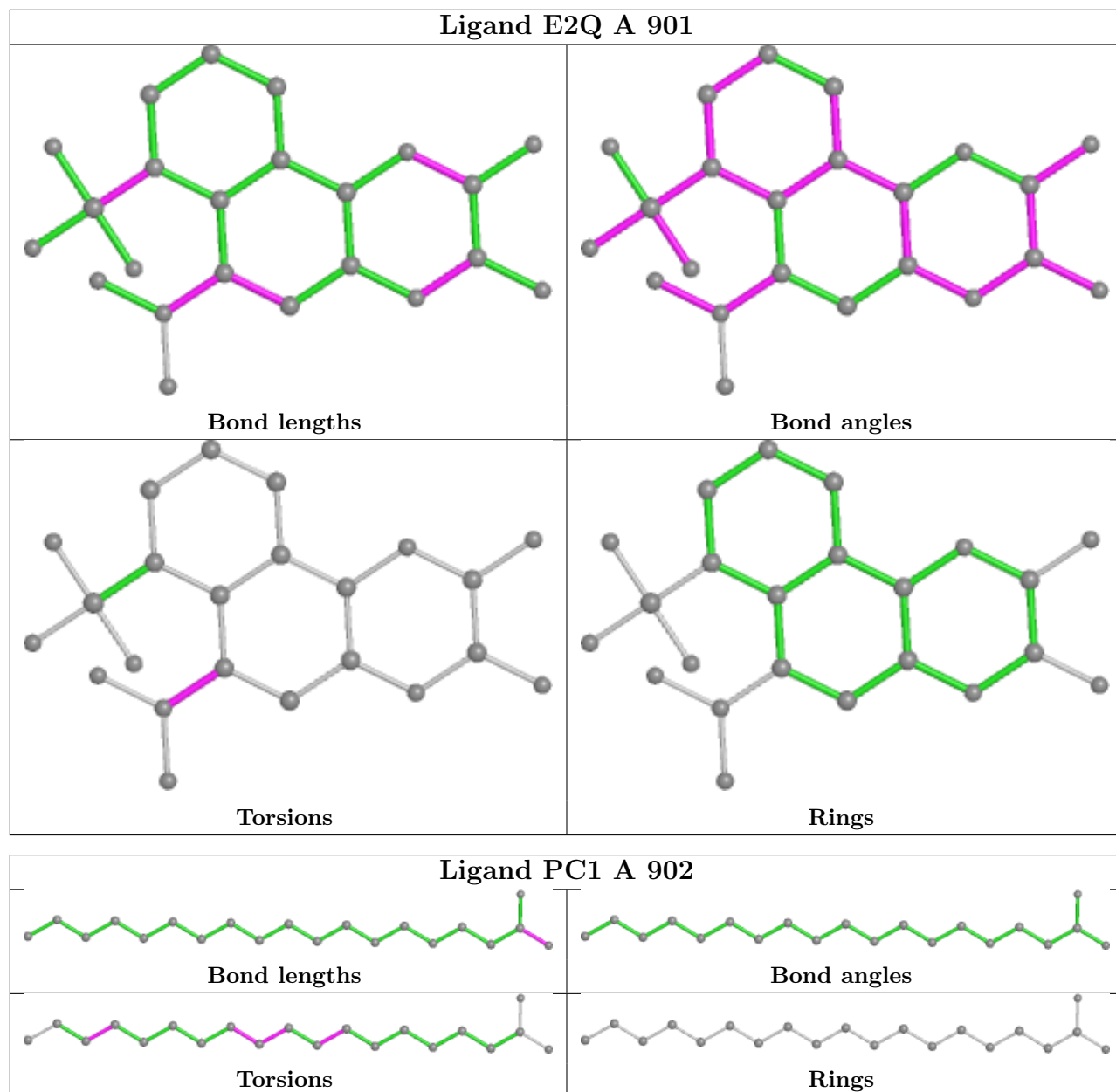
4 monomers are involved in 9 short contacts:

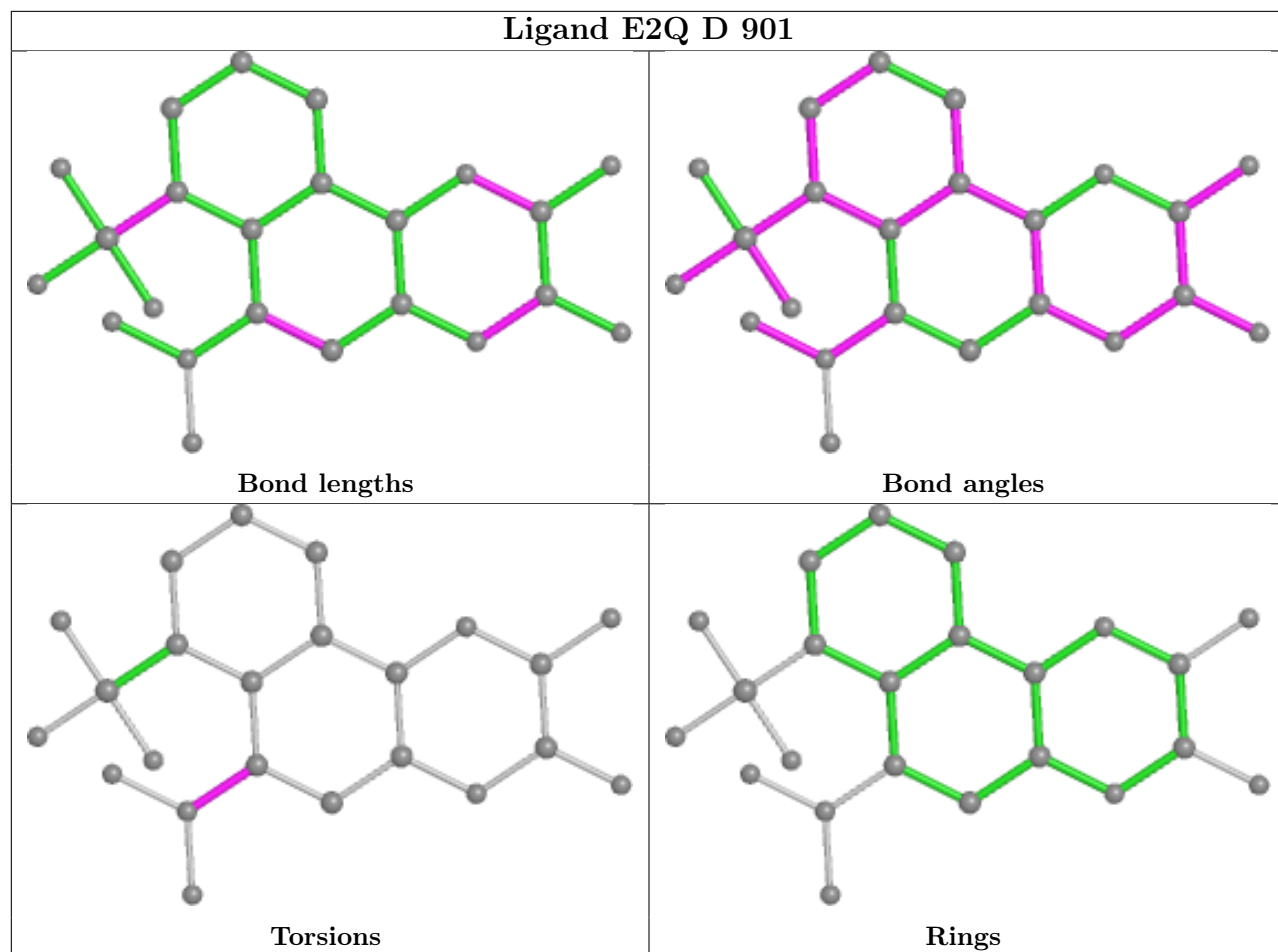
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	901	E2Q	2	0
4	A	901	E2Q	2	0
4	D	901	E2Q	2	0
4	C	901	E2Q	3	0

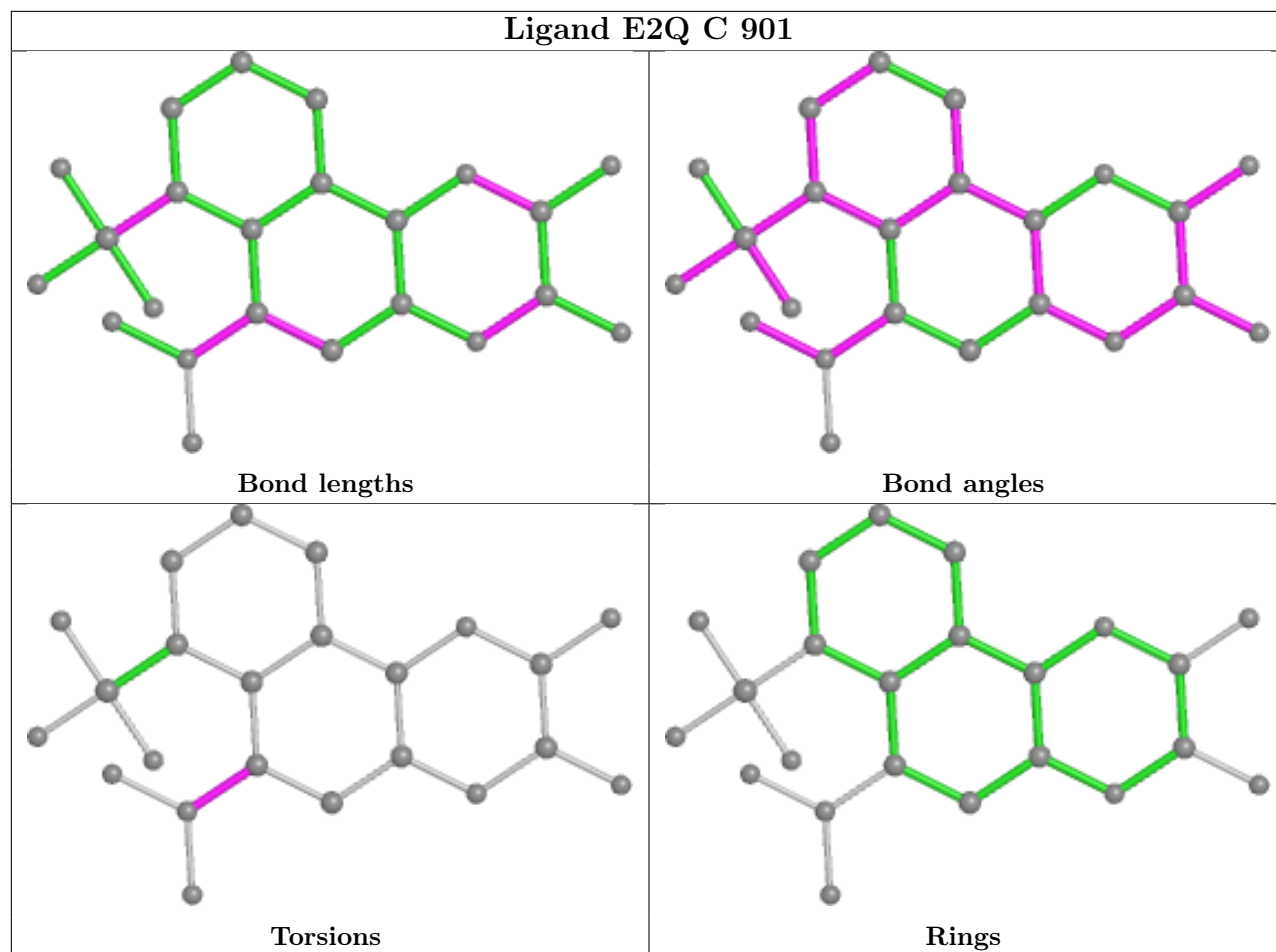
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.











5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [\(i\)](#)

There are no chain breaks in this entry.

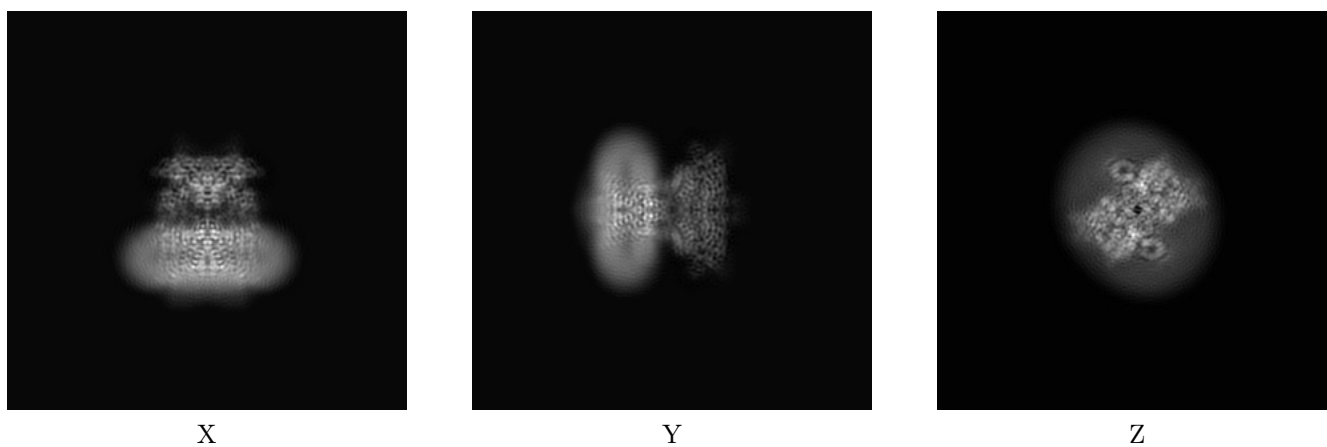
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12804. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections [i](#)

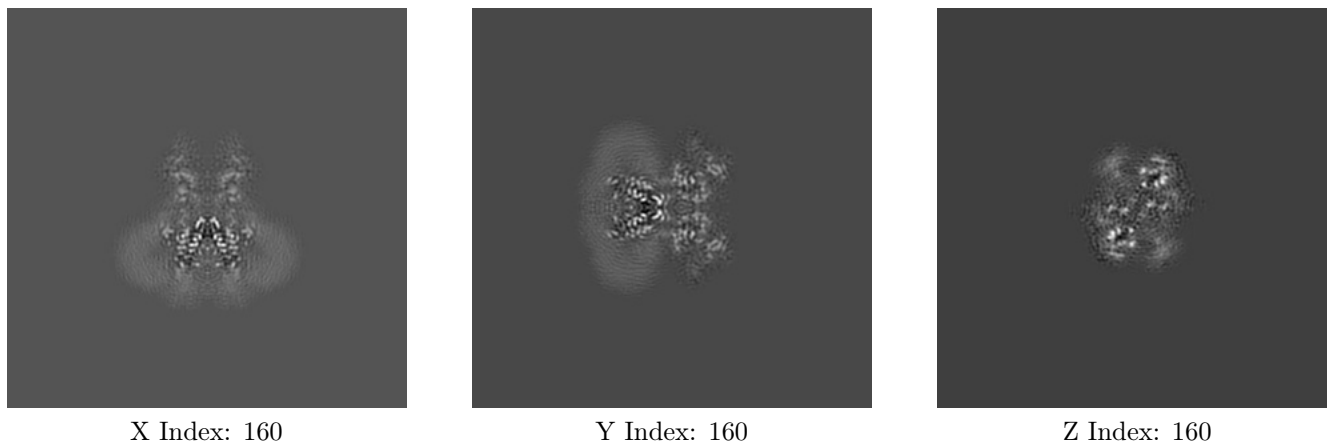
6.1.1 Primary map



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

6.2 Central slices [i](#)

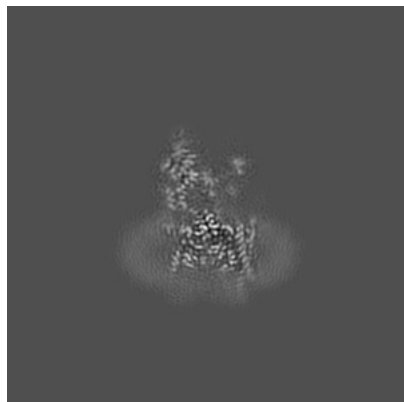
6.2.1 Primary map



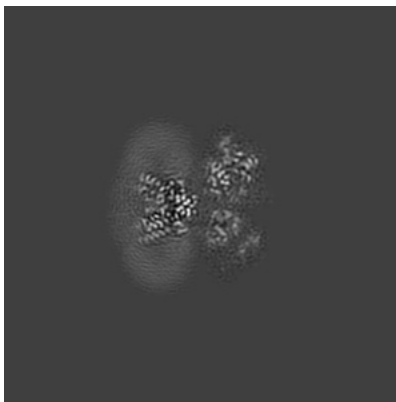
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

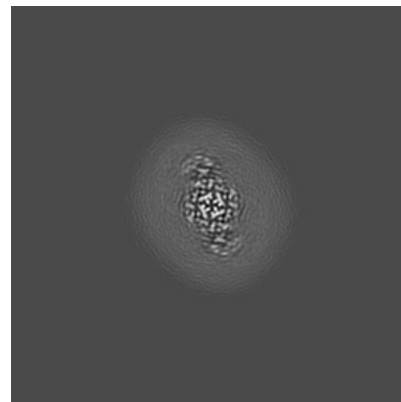
6.3.1 Primary map



X Index: 155



Y Index: 164

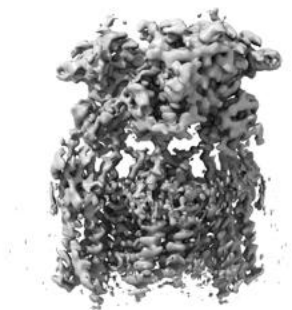


Z Index: 138

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

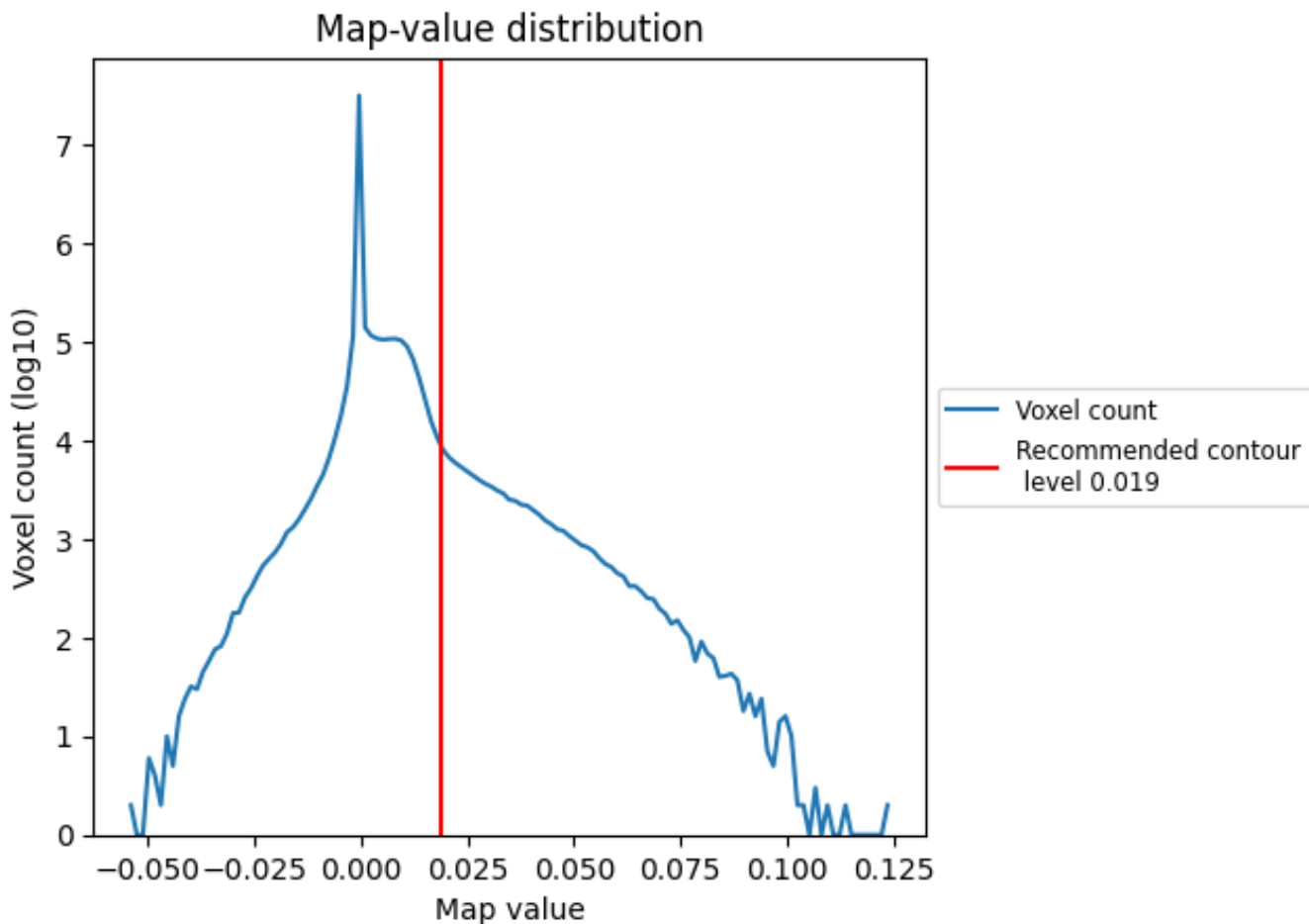
6.5 Mask visualisation

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

7 Map analysis [i](#)

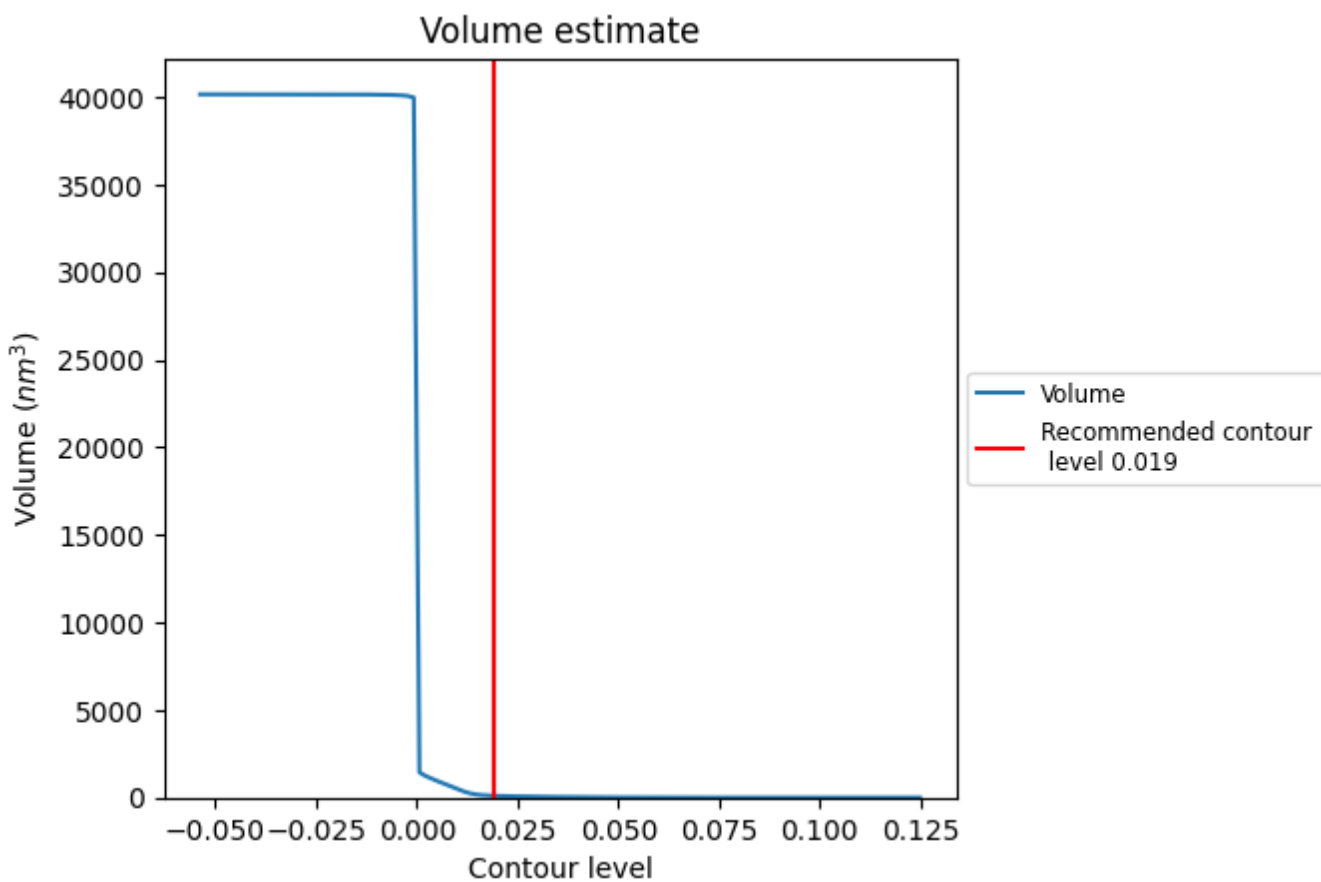
This section contains the results of statistical analysis of the map.

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.

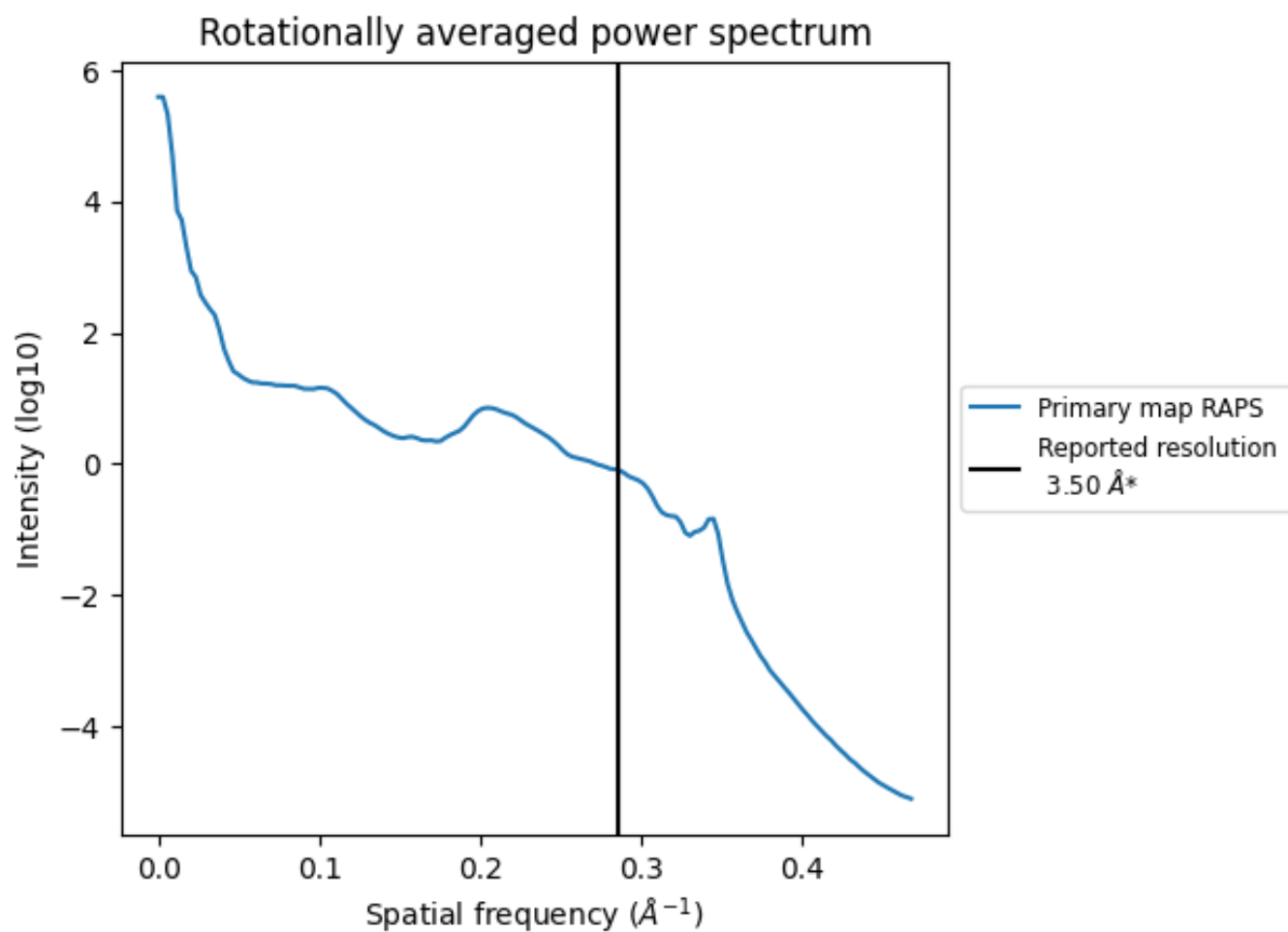
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 102 nm³; this corresponds to an approximate mass of 92 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](#)

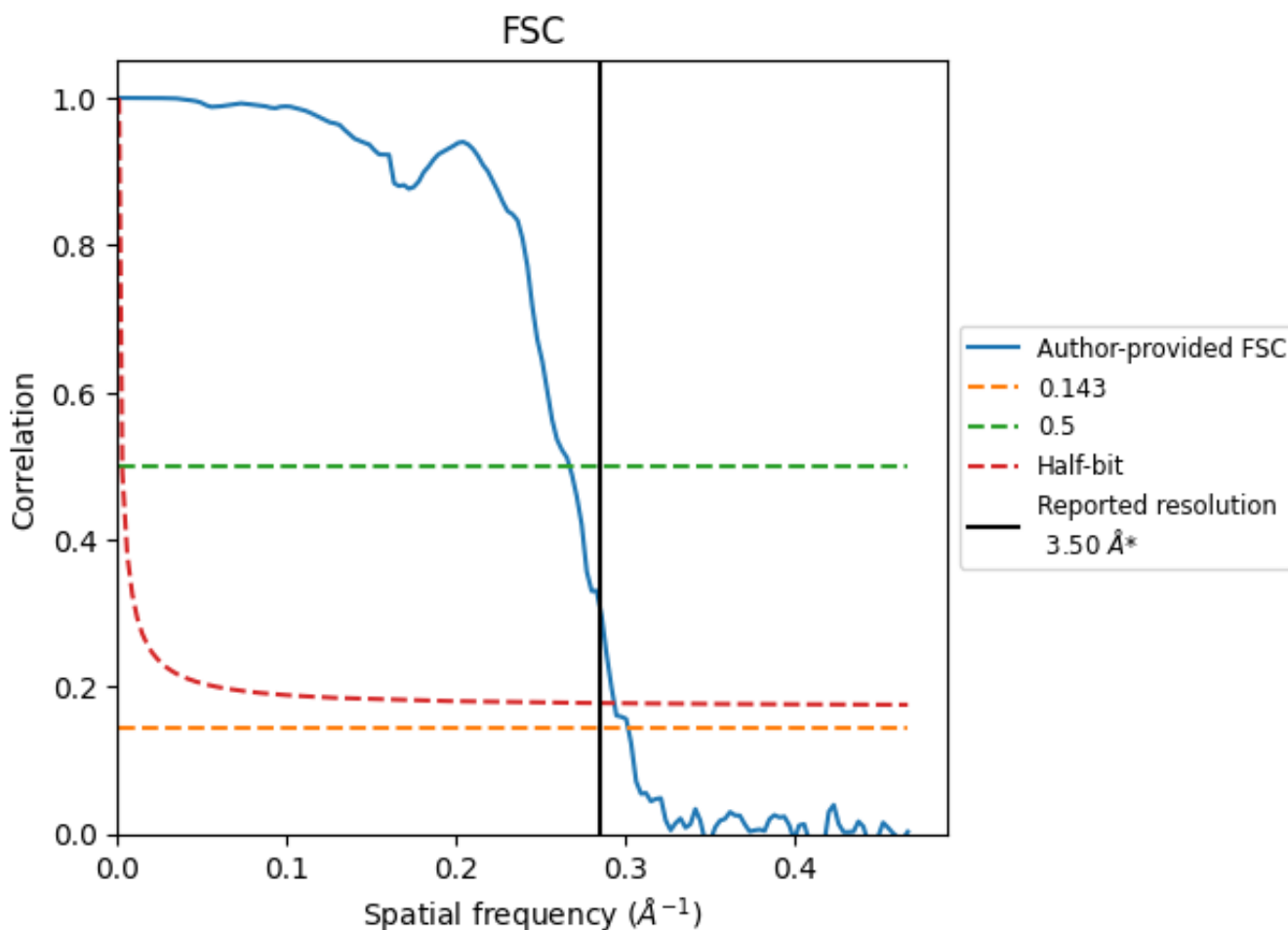


*Reported resolution corresponds to spatial frequency of 0.286 Å⁻¹

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 0.286 Å⁻¹

8.2 Resolution estimates [i](#)

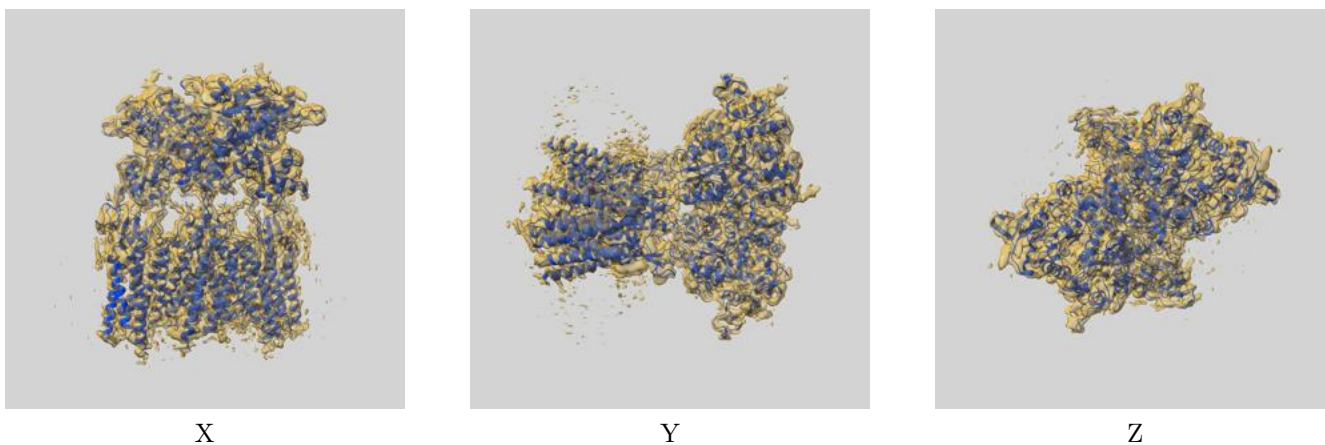
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.50	-	-
Author-provided FSC curve	3.31	3.74	3.40
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

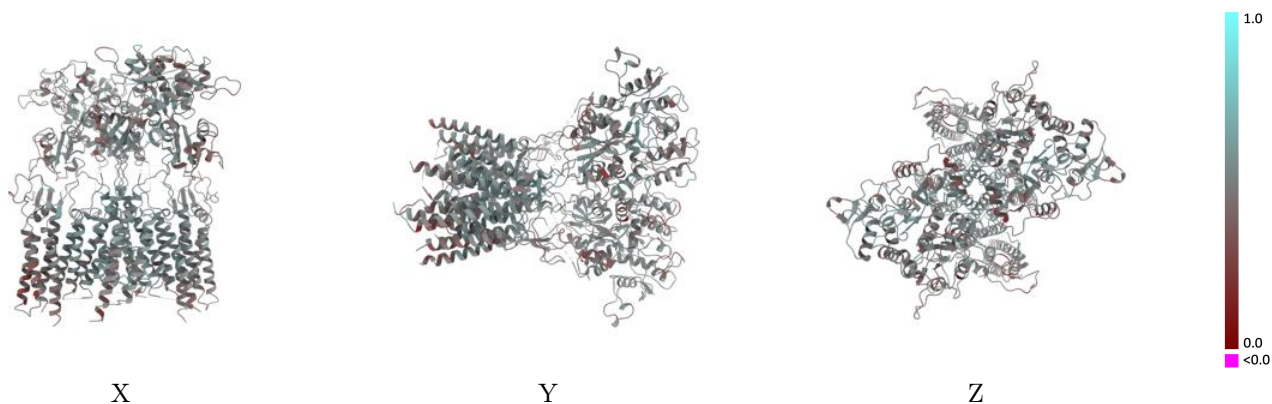
This section contains information regarding the fit between EMDB map EMD-12804 and PDB model 7OCD. Per-residue inclusion information can be found in section [3](#) on page [7](#).

9.1 Map-model overlay [i](#)



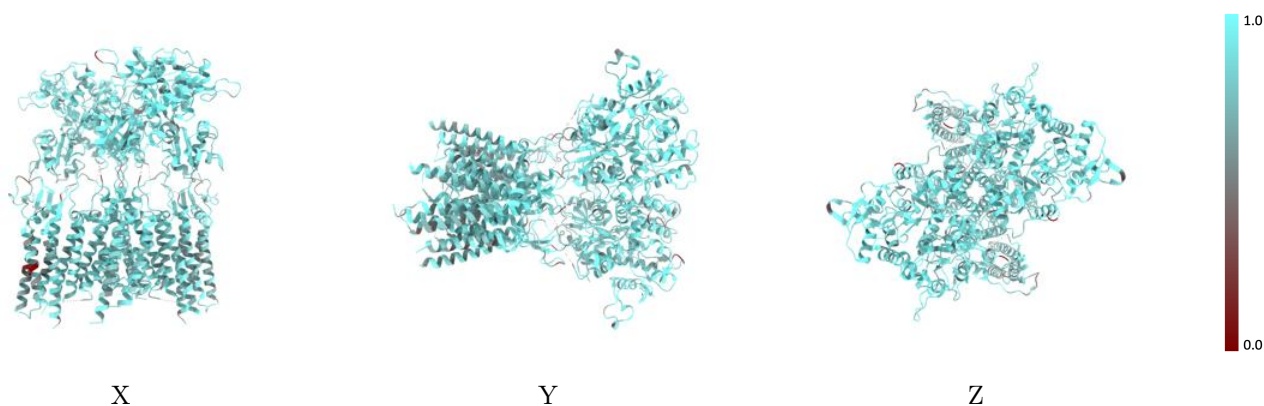
The images above show the 3D surface view of the map at the recommended contour level 0.019 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



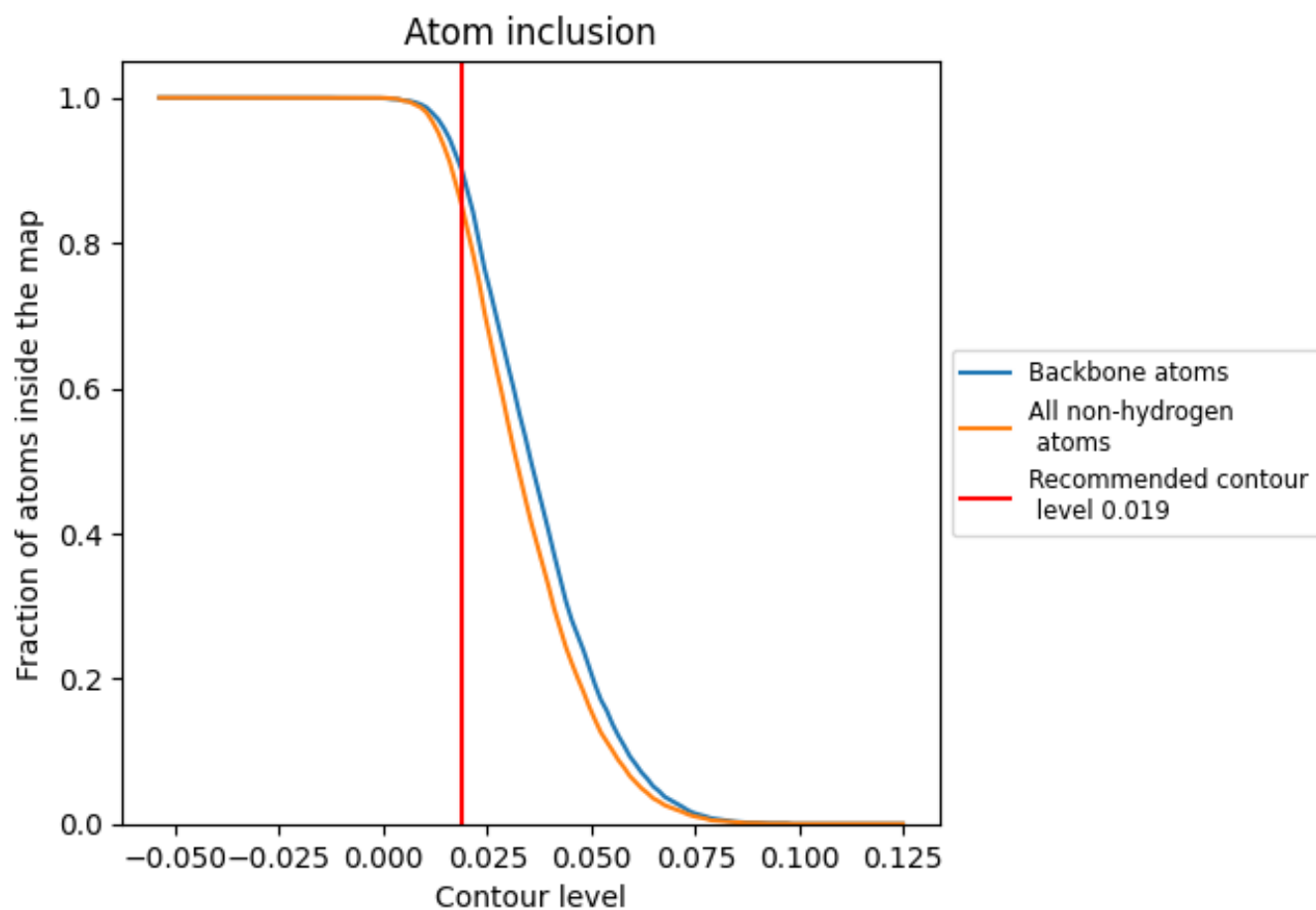
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.019).















9.4 Atom inclusion [i](#)



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

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.019) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8494	 0.4950
A	 0.8638	 0.5050
B	 0.8625	 0.4970
C	 0.8659	 0.5050
D	 0.8633	 0.5000
I	 0.7887	 0.4680
J	 0.7676	 0.4560

