wwPDB EM Validation Summary Report (i)

Nov 19, 2022 – 06:32 PM EST

PDB ID	:	3J1S
EMDB ID	:	EMD-5424
Title	:	Structure of adeno-associated virus-2 in complex with neutralizing monoclonal antibody A20
Authors	:	Chapman, M.S.; McCraw, D.M.
Deposited on	:	2012-05-23
Resolution	:	8.50 Å(reported)
Based on initial model	:	1LP3

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:

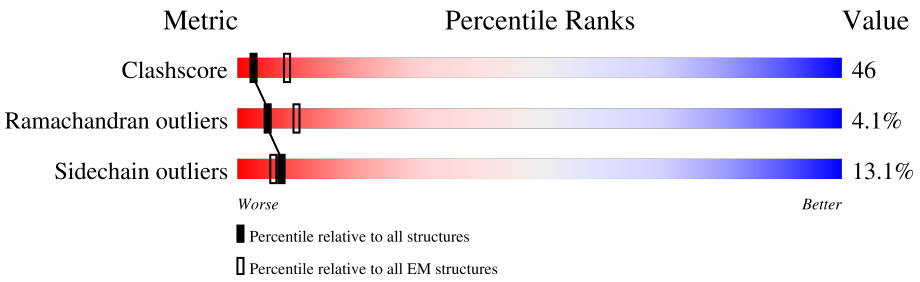
EMDB validation analysis	:	0.0.1.dev43
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

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 8.50 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	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	L	214	6% 55% 41% •
2	H	218	• 56% 38% 6%
3	A	519	8% 37% 47% 15% •

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 7485 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 A20 light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	L	214	1657	1028	281	341	7	0	0

- Molecule 2 is a protein called A20 heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	H	218	1676	1063	270	336	7	0	0

- Molecule 3 is a protein called Capsid protein VP1.

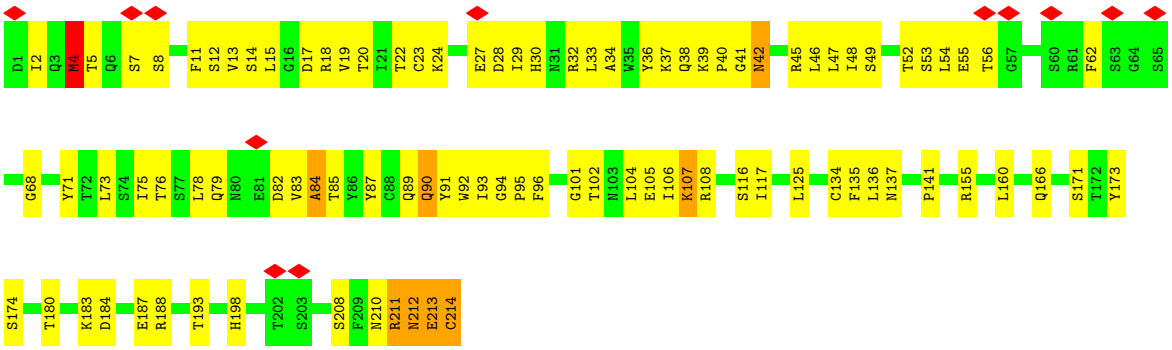
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	519	4152	2612	725	802	13	0	0

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.

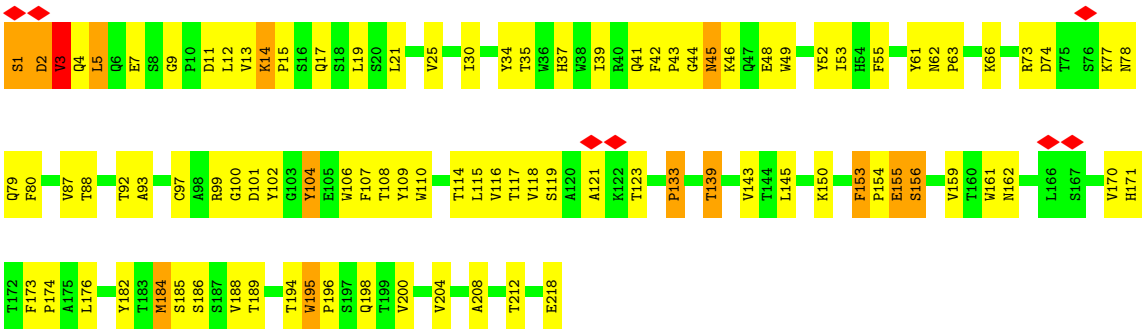
- Molecule 1: A20 light chain

Chain L:



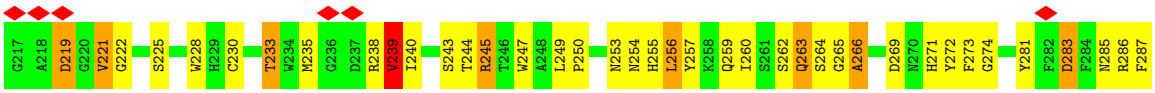
- Molecule 2: A20 heavy chain

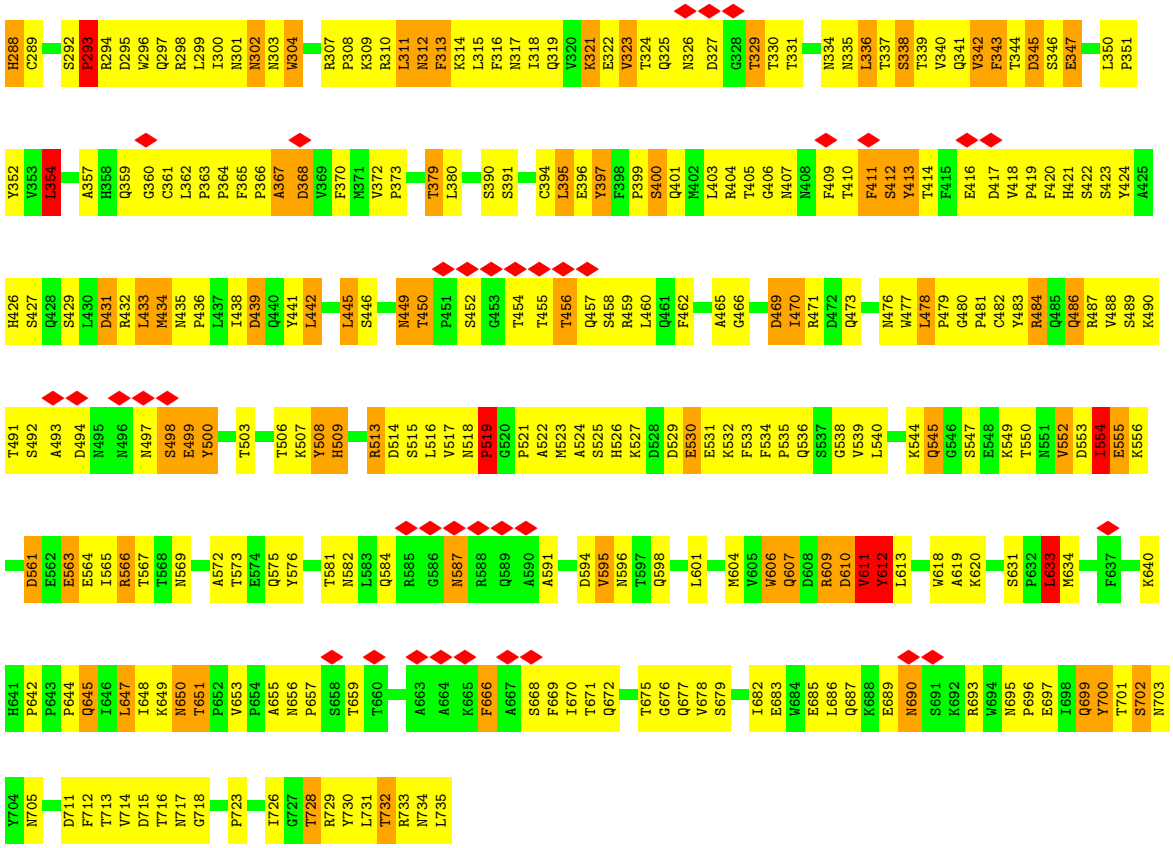
Chain H:



- Molecule 3: Capsid protein VP1

Chain A:




H288 C289 S292 P293 R294 D295 W296 Q297 R298 L299 I300 N301 N302 N303 W304 R307 P308 K309 R310 L311 N312 F313 K314 L315 F316 N317 I318 Q319 V320 K321 E322 V323 T324 Q325 N326 D327 G328 T329 T330 T331 N334 N335 L336 T337 S338 T339 V340 Q341 V342 F343 T344 D345 S346 E347 L350 P351
Y352 V353 L354 A357 H358 Q359 G360 C361 L362 P363 P364 F365 P366 A367 D368 V369 F370 M371 V372 P373 T379 L380 S390 S391 C394 L395 E396 Y397 F398 P399 S400 Q401 M402 L403 R404 T405 G406 N407 N408 F409 T410 F411 S412 Y413 T414 F415 E416 D417 V418 P419 F420 H421 S422 S423 Y424 A425
H426 S427 Q428 S429 L430 D431 R432 L433 M434 N435 P436 L437 I438 D439 Q440 Y441 L442 L445 S446 N449 T450 P451 S452 G453 T454 T455 T456 Q457 S458 R459 L460 Q461 F462 A465 G466 D469 I470 R471 D472 Q473 N476 W477 L478 P479 G480 P481 C482 Y483 R484 Q485 Q486 R487 V488 S489 K490
T491 S492 A493 D494 N495 N496 N497 S498 E499 Y500 T503 T506 K507 Y508 H509 R513 D514 S515 L516 V517 N518 P519 G520 P521 A522 M523 A524 S525 H526 K527 D528 D529 E530 E531 K532 F533 F534 P535 Q536 S537 G538 V539 L540 K544 Q545 G546 S547 E548 K549 T550 N551 V552 D553 I554 E555 K556
D561 E562 E563 E564 I565 R566 T567 T568 N569 A572 T573 E574 Q575 Y576 T581 N582 L583 Q584 R585 G586 N587 R588 Q589 A590 A591 D594 V595 N596 T597 Q598 L601 M604 V605 W606 Q607 D608 R609 D610 V611 Y612 L613 W618 A619 K620 S631 P632 L633 M634 F637 K640
H641 P642 P643 P644 Q645 I646 L647 I648 K649 N650 T651 P652 V653 P654 A655 N656 P657 S658 T659 T660 A663 A664 K665 F666 A667 S668 F669 I670 T671 Q672 T675 G676 Q677 V678 S679 I682 E683 W684 E685 L686 Q687 K688 E689 N690 S691 K692 R693 W694 N695 P696 E697 I698 Q699 Y700 T701 S702 N703
Y704 N705 D711 F712 T713 V714 D715 T716 N717 G718 P723 I726 G727 T728 R729 Y730 L731 T732 R733 N734 L735

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, I	Depositor
Number of particles used	11898	Depositor
Resolution determination method	FSC 0.5 CUT-OFF	Depositor
CTF correction method	Whole image	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	120	Depositor
Electron dose ($e^-/Å^2$)	15	Depositor
Minimum defocus (nm)	-500	Depositor
Maximum defocus (nm)	-4000	Depositor
Magnification	39775	Depositor
Image detector	GENERIC GATAN	Depositor
Maximum map value	9.860	Depositor
Minimum map value	-8.442	Depositor
Average map value	0.011	Depositor
Map value standard deviation	0.998	Depositor
Recommended contour level	1.34	Depositor
Map size (Å)	588.0, 588.0, 588.0	wwPDB
Map dimensions	240, 240, 240	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.45, 2.45, 2.45	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

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	L	0.85	3/1692 (0.2%)	0.96	4/2295 (0.2%)
2	H	0.95	8/1726 (0.5%)	1.18	11/2364 (0.5%)
3	A	0.94	3/4275 (0.1%)	1.06	7/5827 (0.1%)
All	All	0.92	14/7693 (0.2%)	1.07	22/10486 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	L	0	2
3	A	0	3
All	All	0	5

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	L	213	GLU	C-N	14.56	1.67	1.34
2	H	133	PRO	C-N	14.54	1.59	1.33
1	L	211	ARG	C-N	-8.26	1.15	1.34
1	L	212	ASN	C-N	-7.96	1.15	1.34
2	H	2	ASP	N-CA	7.54	1.61	1.46

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	133	PRO	O-C-N	15.73	149.94	123.20
2	H	133	PRO	CA-C-N	-13.60	89.01	116.20
1	L	211	ARG	O-C-N	-10.85	105.34	122.70
3	A	633	LEU	CA-CB-CG	-8.48	95.79	115.30
1	L	4	MET	CG-SD-CE	-6.52	89.76	100.20

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	A	413	TYR	Sidechain
3	A	612	TYR	Sidechain
3	A	730	TYR	Sidechain
1	L	211	ARG	Mainchain
1	L	212	ASN	Mainchain

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	L	1657	0	1581	145	0
2	H	1676	0	1594	161	0
3	A	4152	0	3904	385	0
All	All	7485	0	7079	674	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 46.

The worst 5 of 674 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:L:213:GLU:C	1:L:214:CYS:N	1.67	1.45
1:L:107:LYS:CE	1:L:108:ARG:HB3	1.66	1.25
2:H:5:LEU:HD22	2:H:25:VAL:HG12	1.18	1.16
1:L:107:LYS:HE2	1:L:108:ARG:CB	1.76	1.15
2:H:139:THR:CG2	2:H:143:VAL:HG12	1.77	1.14

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	L	210/214 (98%)	199 (95%)	9 (4%)	2 (1%)	15 55
2	H	214/218 (98%)	197 (92%)	10 (5%)	7 (3%)	4 26
3	A	517/519 (100%)	402 (78%)	85 (16%)	30 (6%)	1 18
All	All	941/951 (99%)	798 (85%)	104 (11%)	39 (4%)	5 23

5 of 39 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	7	SER
2	H	3	VAL
2	H	5	LEU
2	H	45	ASN
3	A	264	SER

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	L	190/190 (100%)	185 (97%)	5 (3%)	46 66
2	H	193/193 (100%)	189 (98%)	4 (2%)	53 72
3	A	459/459 (100%)	358 (78%)	101 (22%)	1 5
All	All	842/842 (100%)	732 (87%)	110 (13%)	7 18

5 of 110 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	A	450	THR
3	A	506	THR
3	A	735	LEU
3	A	668	SER
3	A	456	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
3	A	407	ASN
3	A	650	ASN
3	A	699	GLN
3	A	672	GLN
3	A	607	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 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)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	L	4
2	H	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	L	107:LYS	C	108:ARG	N	6.89
1	H	120:ALA	C	121:ALA	N	4.06
1	L	213:GLU	C	214:CYS	N	1.67
1	L	211:ARG	C	212:ASN	N	1.15
1	L	212:ASN	C	213:GLU	N	1.15

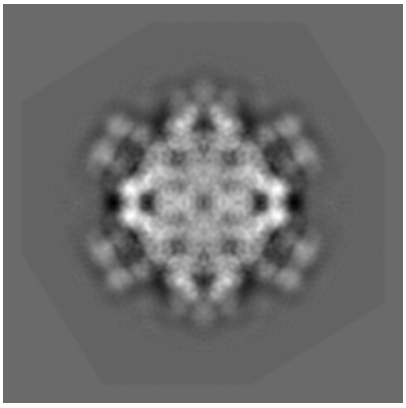
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-5424. These allow visual inspection of the internal detail of the map and identification of artifacts.

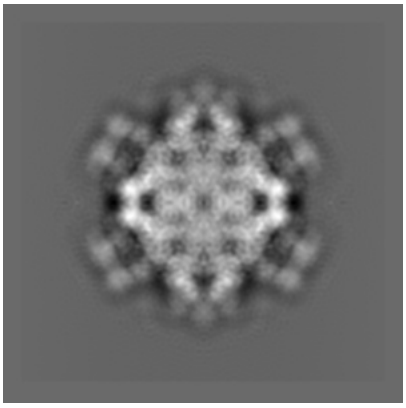
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections (i)

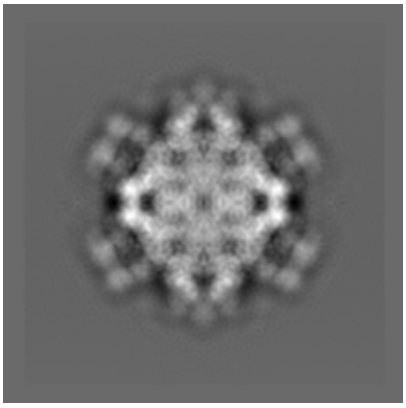
6.1.1 Primary map



X



Y

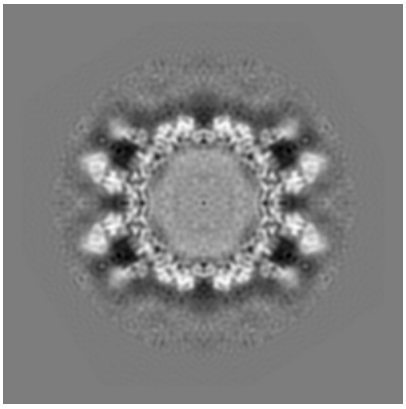


Z

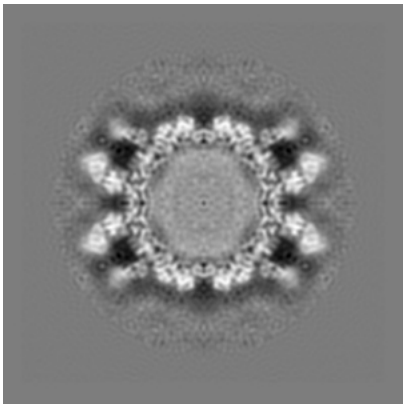
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

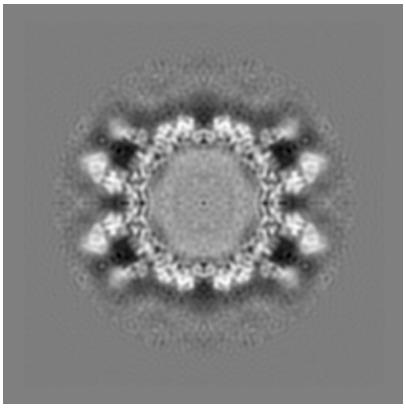
6.2.1 Primary map



X Index: 120



Y Index: 120

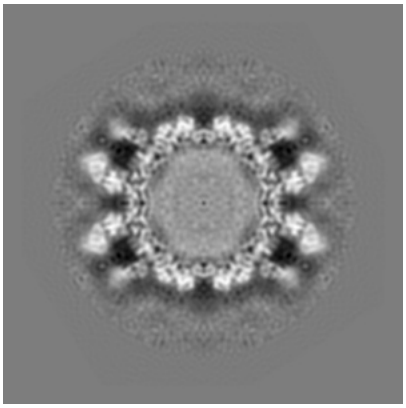


Z Index: 120

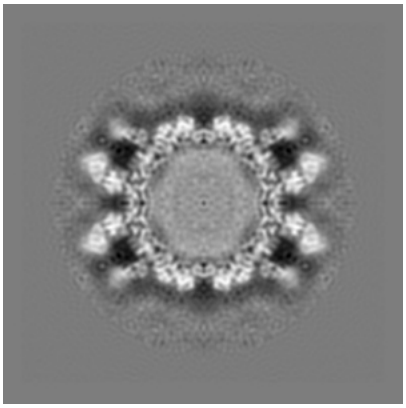
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

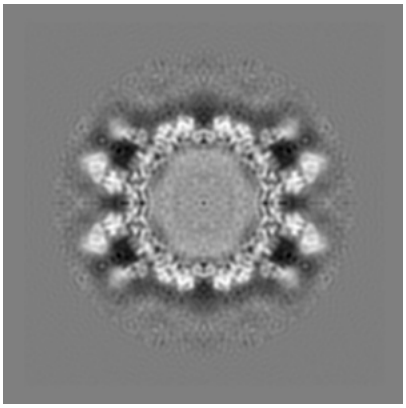
6.3.1 Primary map



X Index: 120



Y Index: 120

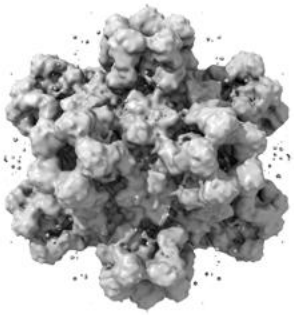


Z Index: 120

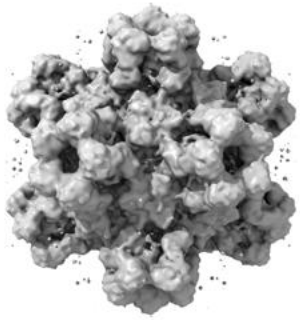
The images above show the largest variance slices of the map in three orthogonal directions.

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

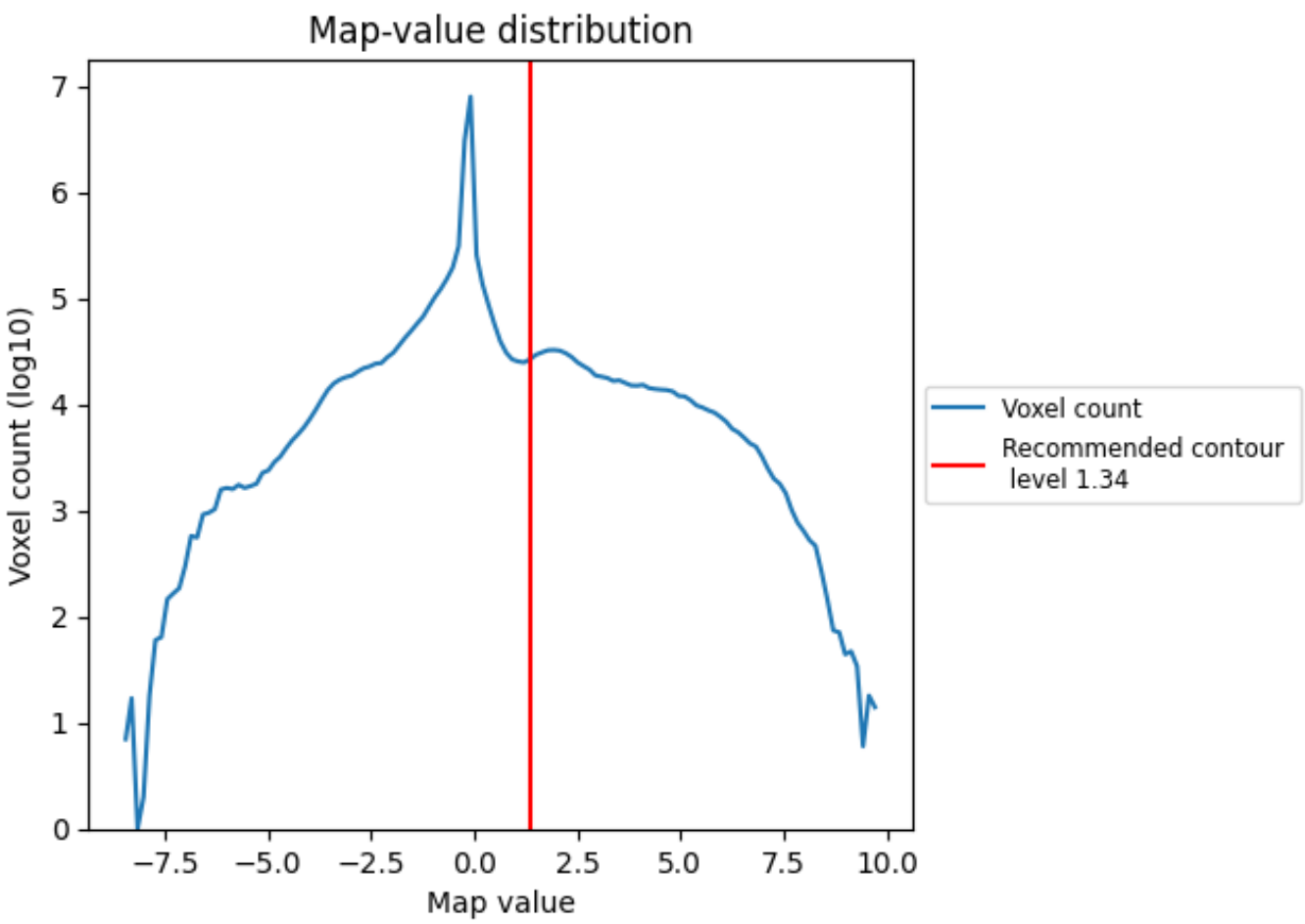
6.5 Mask visualisation (i)

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

7 Map analysis (i)

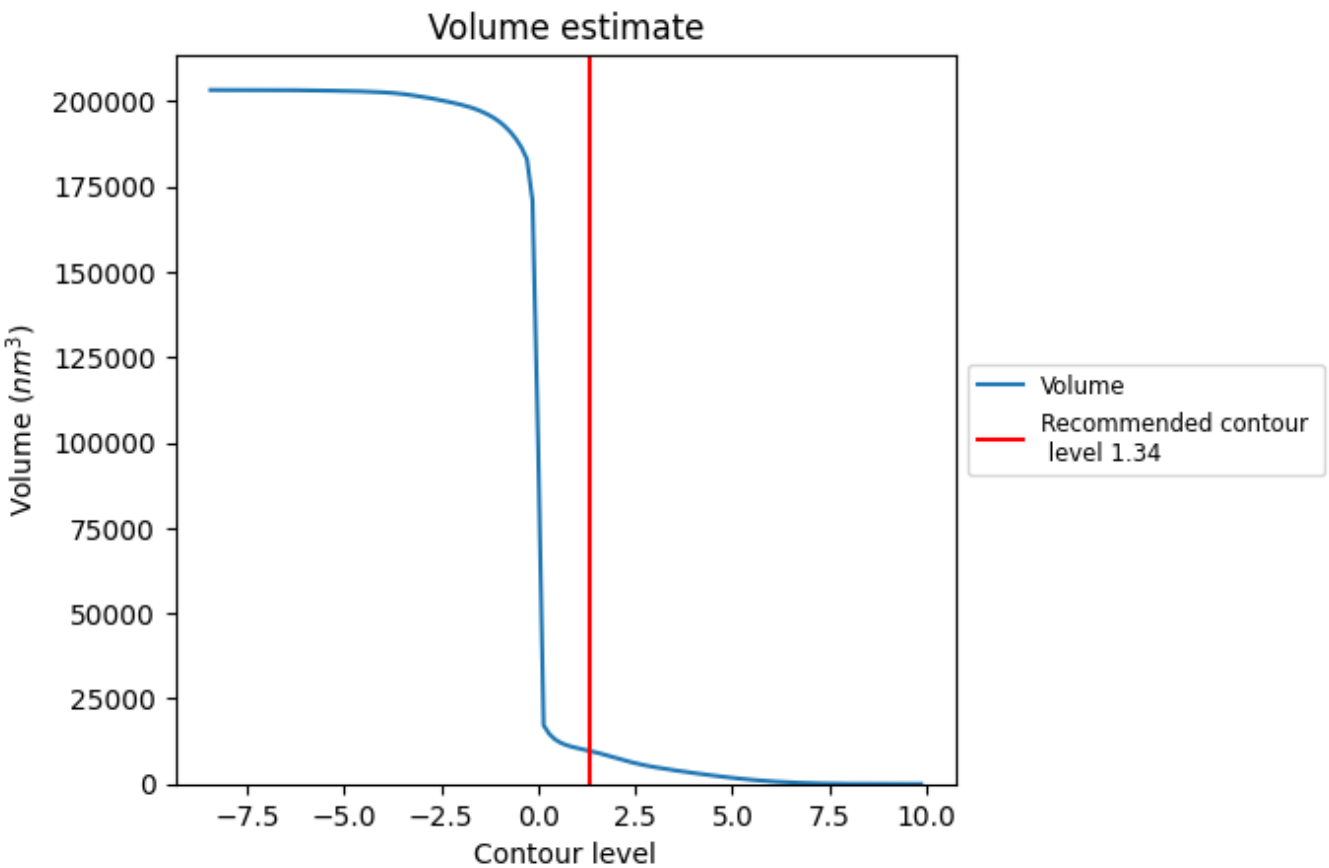
This section contains the results of statistical analysis of the map.

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.

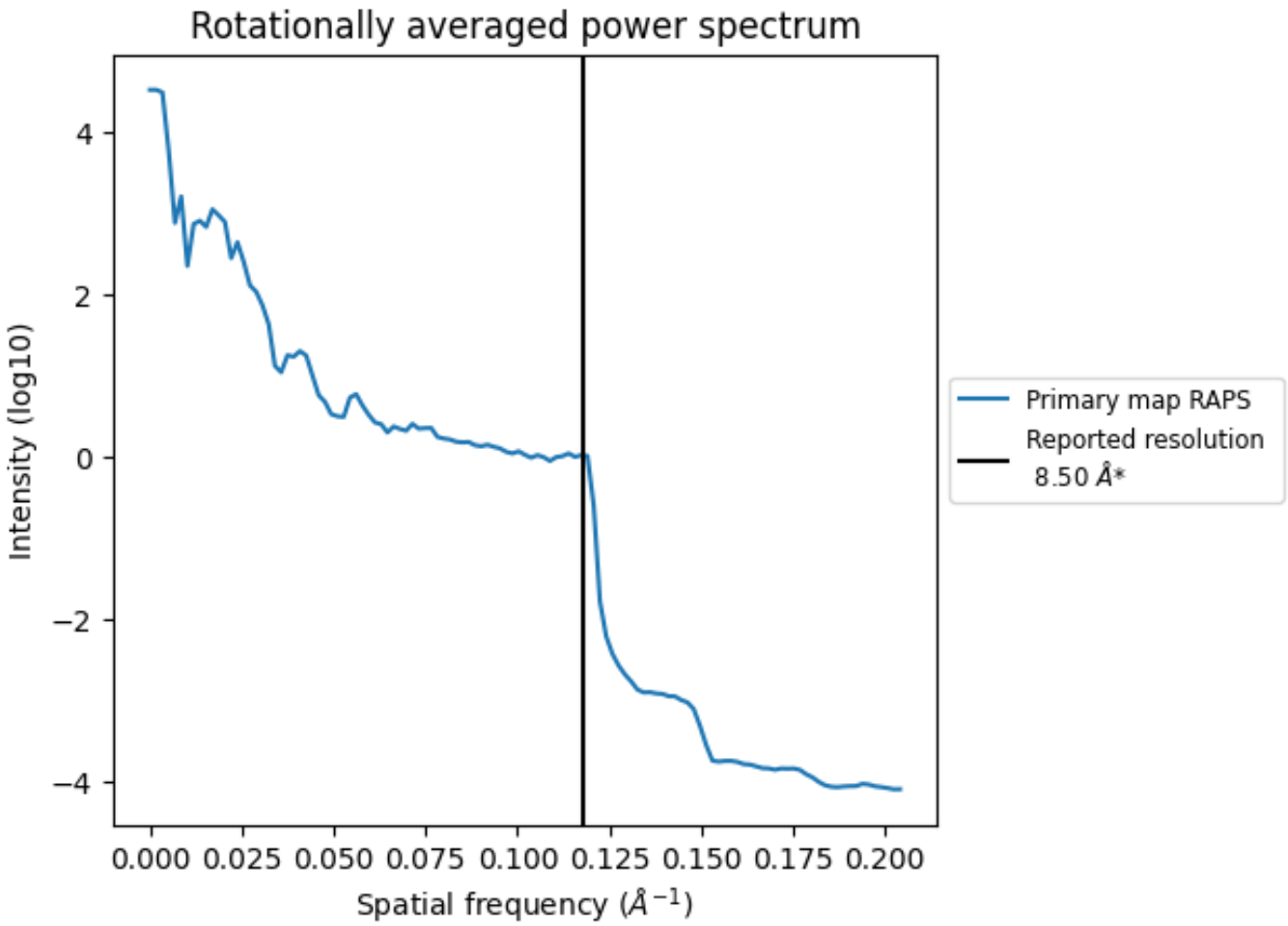
7.2 Volume estimate (i)



The volume at the recommended contour level is 9636 nm^3; this corresponds to an approximate mass of 8705 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 0.118 Å^{-1}

8 Fourier-Shell correlation (i)

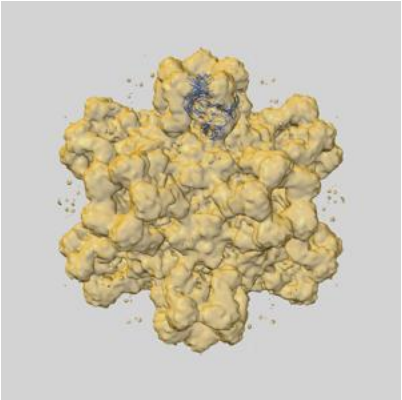
This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit (i)

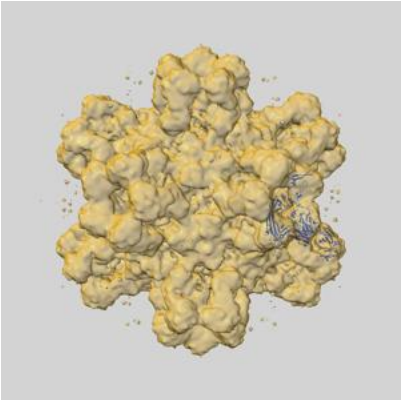
This section contains information regarding the fit between EMDB map EMD-5424 and PDB model 3J1S. Per-residue inclusion information can be found in section 3 on page 4.

9.1 Map-model overlays

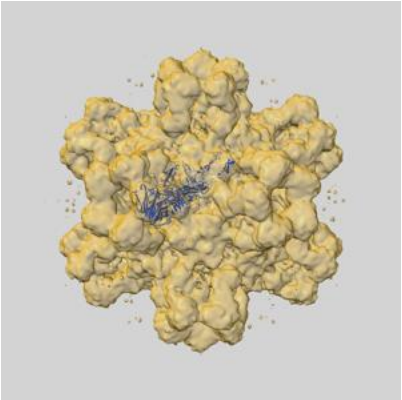
9.1.1 Map-model overlay (i)



X

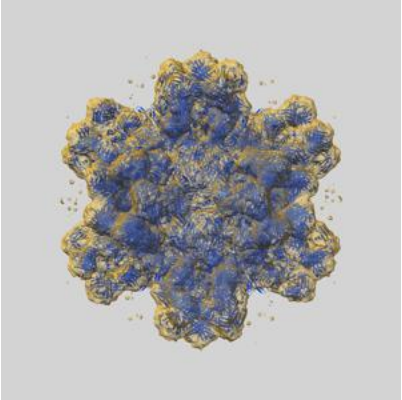


Y

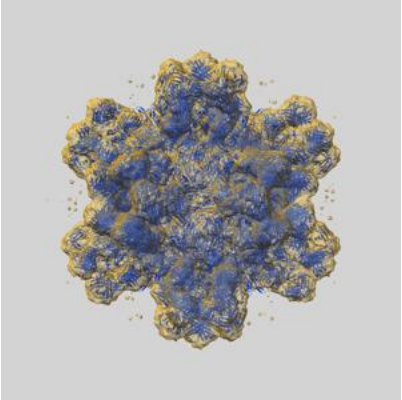


Z

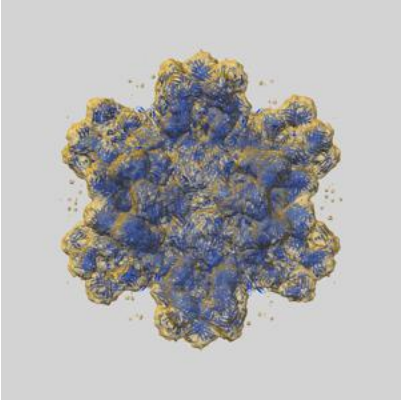
9.1.2 Map-model assembly overlay (i)



X



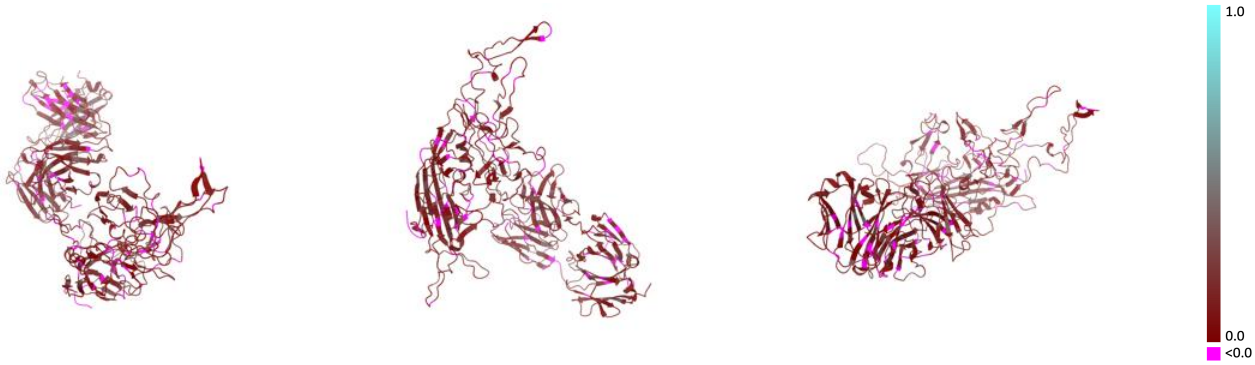
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 1.34 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.

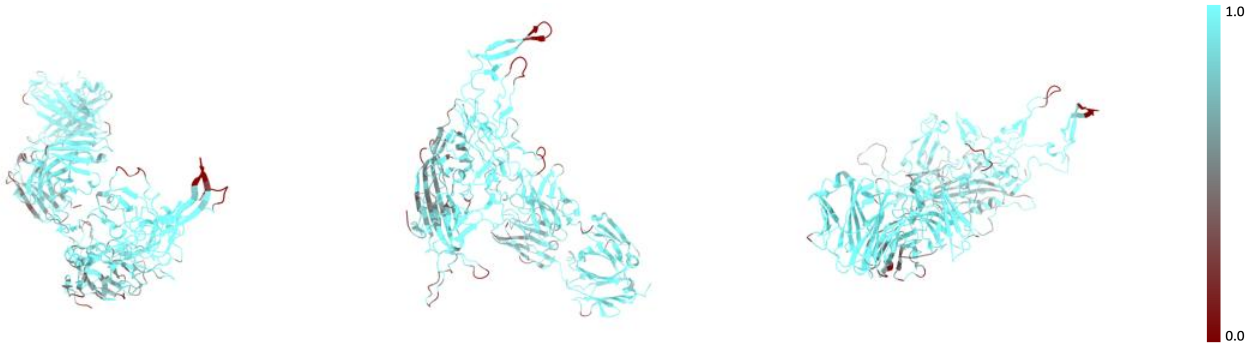
9.2 Q-score mapped to coordinate model (i)



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.

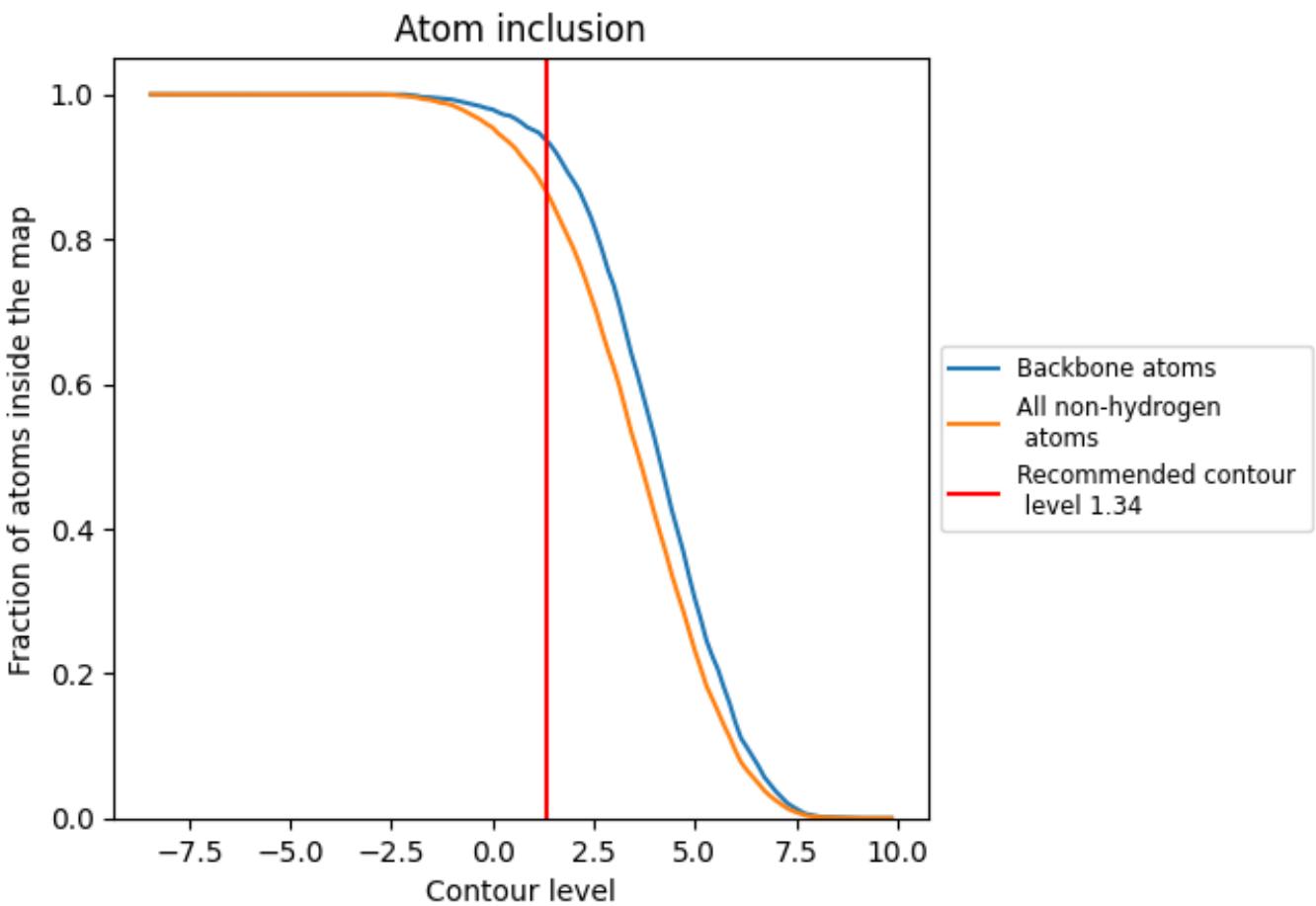
9.3 Atom inclusion mapped to coordinate model (i)



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 (1.34).

9.4 Atom inclusion (i)



At the recommended contour level, 94% of all backbone atoms, 86% 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 (1.34) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8644	0.1170
A	0.8263	0.1190
H	0.9436	0.1090
L	0.8796	0.1210