wwPDB EM Validation Summary Report

May 13, 2024 – 11:41 pm BST

PDB ID	:	6YS5
EMDB ID	:	EMD-10892
Title	:	Acinetobacter baumannii ribosome-amikacin complex - 30S subunit head
Authors	:	Nicholson, D.; Edwards, T.A.; O'Neill, A.J.; Ranson, N.A.
Deposited on	:	2020-04-21
Resolution	:	3.00 Å(reported)
Based on initial models	:	5MDZ, 5AFI

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:

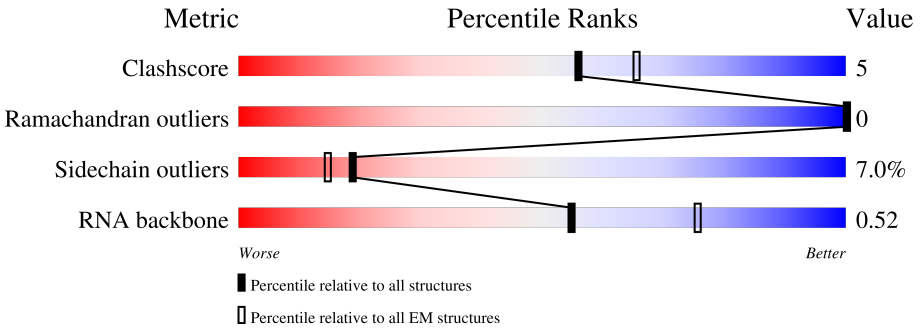
EMDB validation analysis	:	0.0.1.dev92
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 3.00 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
RNA backbone	4643	859

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%

Mol	Chain	Length	Quality of chain
1	3	1544	20% 8% · 71%
2	7	77	13% 10% · 74%
3	9	4	50% 50%
4	d	250	79% 5% 16%
5	h	156	72% · 25%
6	j	128	94% 5% ·
7	k	103	90% 7% ·

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Mol	Chain	Length	Quality of chain
8	n	118	92% 6%
9	o	101	94% 5%
10	t	91	87% 9%

2 Entry composition (i)

There are 11 unique types of molecules in this entry. The entry contains 16864 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 RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	3	453	9676	4320	1742	3161	453	0	0

- Molecule 2 is a RNA chain called E-site tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	7	20	428	191	79	138	20	0	0

- Molecule 3 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	9	4	80	36	8	32	4	0	0

- Molecule 4 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	d	210	1649	1040	310	292	7	0	0

- Molecule 5 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	h	117	871	547	161	159	4	0	0

- Molecule 6 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	j	127	995	621	198	175	1	0	0

- Molecule 7 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	k	100	Total	C	N	O	S	0	0
			797	498	149	147	3		

- Molecule 8 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	n	115	Total	C	N	O	S	0	0
			903	558	184	158	3		

- Molecule 9 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	o	100	Total	C	N	O	S	0	0
			791	493	158	136	4		

- Molecule 10 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	t	83	Total	C	N	O	S	0	0
			650	414	126	108	2		

- Molecule 11 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

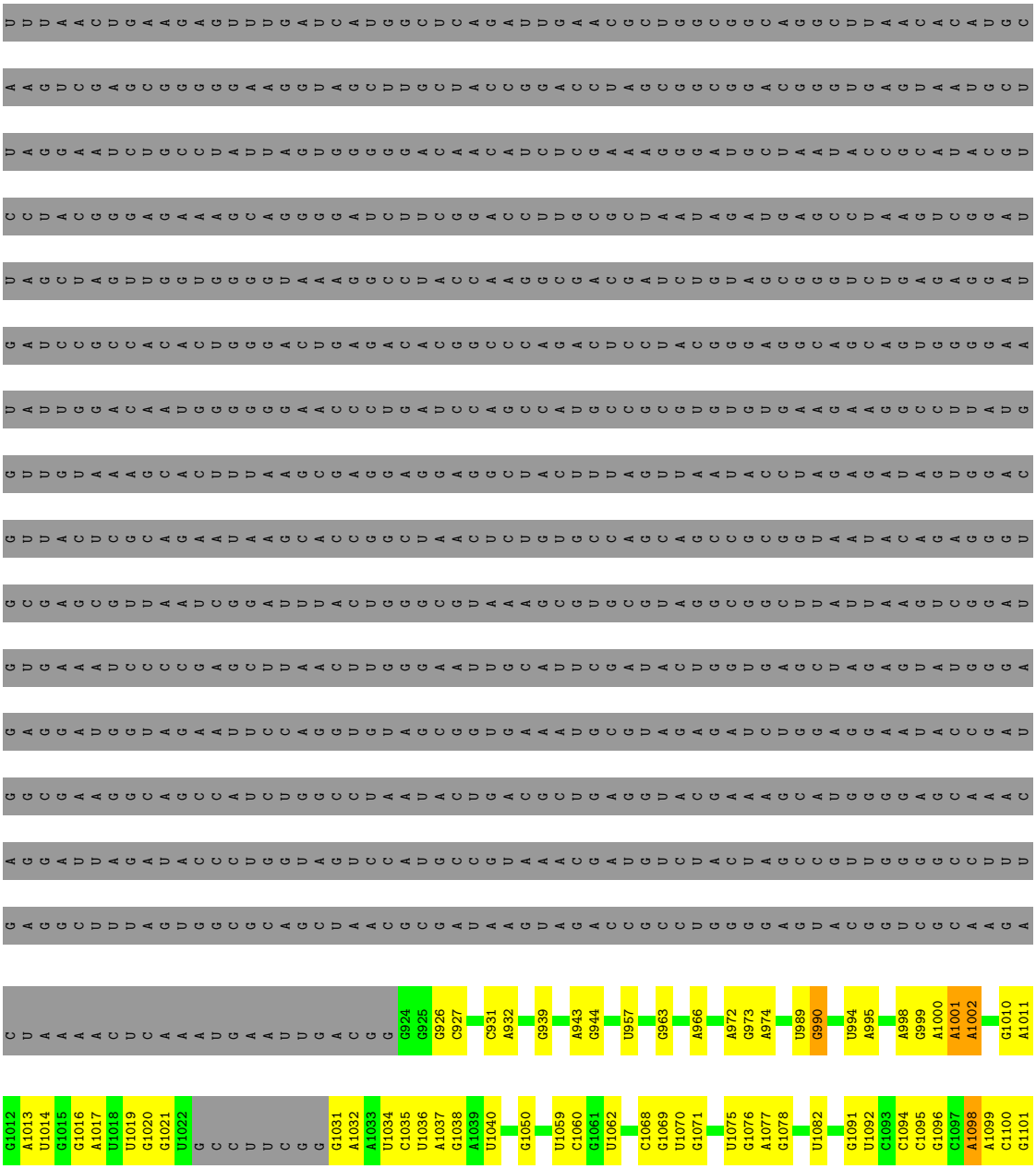
Mol	Chain	Residues	Atoms		AltConf
11	3	22	Total	Mg	0
			22	22	
11	j	1	Total	Mg	0
			1	1	
11	n	1	Total	Mg	0
			1	1	

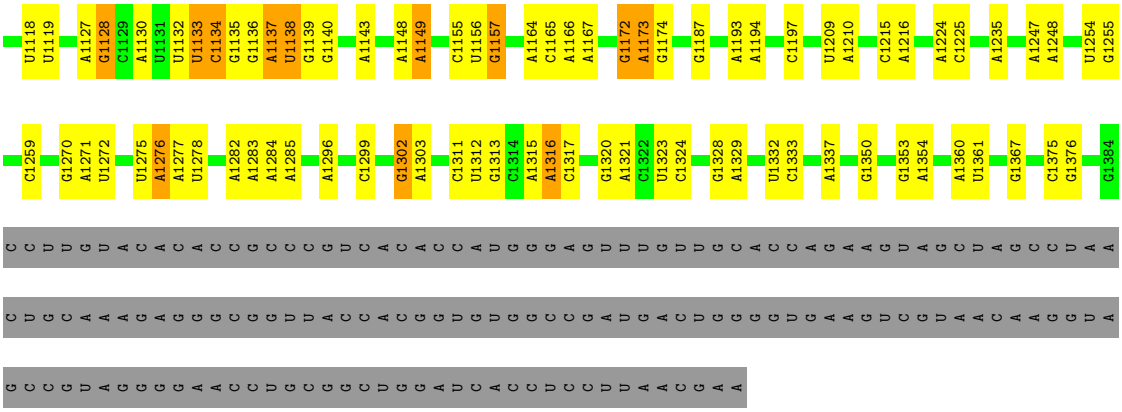
3 Residue-property plots (i)

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. 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. 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: 16S ribosomal RNA

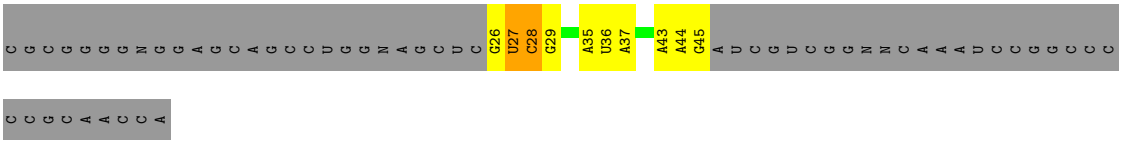
Chain 3: 20% 8% 71%





• Molecule 2: E-site tRNA

Chain 7:

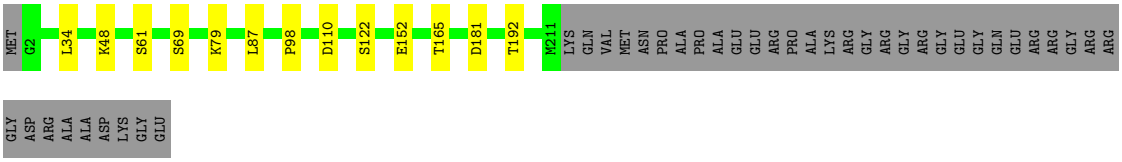


• Molecule 3: mRNA

Chain 9:

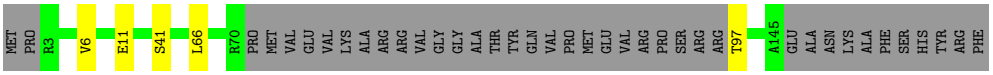
• Molecule 4: 30S ribosomal protein S3

Chain d:



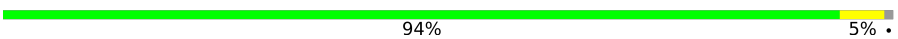
• Molecule 5: 30S ribosomal protein S7

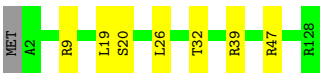
Chain h:



• Molecule 6: 30S ribosomal protein S9

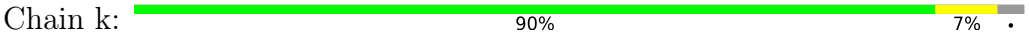
Chain j:





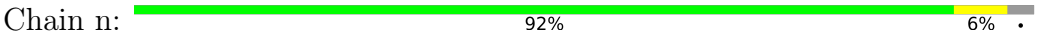
• Molecule 7: 30S ribosomal protein S10

Chain k:



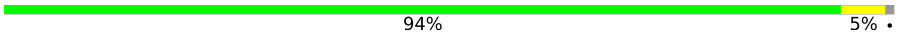
• Molecule 8: 30S ribosomal protein S13

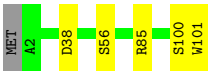
Chain n:



• Molecule 9: 30S ribosomal protein S14

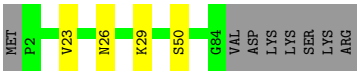
Chain o:





• Molecule 10: 30S ribosomal protein S19

Chain t:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	51958	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 ($e^-/Å^2$)	58	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2700	Depositor
Magnification	130000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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

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	3	0.84	0/10823	0.88	4/16869 (0.0%)
2	7	0.50	0/478	0.90	0/743
3	9	0.33	0/87	0.83	0/132
4	d	0.37	0/1673	0.48	0/2250
5	h	0.31	0/880	0.45	0/1183
6	j	0.42	0/1006	0.51	0/1346
7	k	0.40	0/807	0.50	0/1090
8	n	0.35	0/913	0.51	0/1226
9	o	0.43	0/802	0.48	0/1071
10	t	0.41	0/668	0.46	0/902
All	All	0.70	0/18137	0.77	4/26812 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	3	1155	C	C2-N1-C1'	6.77	126.25	118.80
1	3	990	G	C4-N9-C1'	5.77	134.00	126.50
1	3	1155	C	N1-C2-O2	5.55	122.23	118.90
1	3	1328	G	O4'-C1'-N9	5.30	112.44	108.20

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	3	9676	0	4882	51	0
2	7	428	0	218	11	0
3	9	80	0	41	1	0
4	d	1649	0	1729	0	0
5	h	871	0	867	0	0
6	j	995	0	1053	0	0
7	k	797	0	829	0	0
8	n	903	0	962	0	0
9	o	791	0	833	0	0
10	t	650	0	666	0	0
11	3	22	0	0	0	0
11	j	1	0	0	0	0
11	n	1	0	0	0	0
All	All	16864	0	12080	63	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 5.

The worst 5 of 63 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)
1:3:1302:G:H21	1:3:1329:A:H2	1.22	0.86
2:7:26:G:O6	2:7:44:A:N1	2.17	0.78
2:7:26:G:H1	2:7:44:A:H2	1.35	0.73
1:3:1313:G:H22	1:3:1316:A:H5”	1.56	0.69
1:3:1173:A:H2’	1:3:1174:G:C8	2.28	0.67

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	
4	d	208/250 (83%)	192 (92%)	16 (8%)	0	100	100
5	h	113/156 (72%)	100 (88%)	13 (12%)	0	100	100
6	j	125/128 (98%)	113 (90%)	12 (10%)	0	100	100
7	k	98/103 (95%)	88 (90%)	10 (10%)	0	100	100
8	n	113/118 (96%)	109 (96%)	4 (4%)	0	100	100
9	o	98/101 (97%)	95 (97%)	3 (3%)	0	100	100
10	t	81/91 (89%)	77 (95%)	4 (5%)	0	100	100
All	All	836/947 (88%)	774 (93%)	62 (7%)	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	
4	d	170/198 (86%)	157 (92%)	13 (8%)	13	43
5	h	82/128 (64%)	77 (94%)	5 (6%)	18	53
6	j	99/100 (99%)	92 (93%)	7 (7%)	14	46
7	k	88/91 (97%)	81 (92%)	7 (8%)	12	40
8	n	95/98 (97%)	88 (93%)	7 (7%)	13	44
9	o	81/82 (99%)	76 (94%)	5 (6%)	18	52
10	t	70/78 (90%)	66 (94%)	4 (6%)	20	56
All	All	685/775 (88%)	637 (93%)	48 (7%)	19	47

5 of 48 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
7	k	27	GLU
8	n	68	ASP
7	k	47	GLU
8	n	11	ASP
8	n	104	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
7	k	99	GLN
9	o	71	HIS
9	o	8	ASN
6	j	35	GLN
7	k	50	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	3	451/1544 (29%)	80 (17%)	0
2	7	19/77 (24%)	2 (10%)	1 (5%)
3	9	3/4 (75%)	0	0
All	All	473/1625 (29%)	82 (17%)	1 (0%)

5 of 82 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	3	931	C
1	3	932	A
1	3	939	G
1	3	957	U
1	3	963	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	7	27	U

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)

Of 24 ligands modelled in this entry, 24 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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-10892. 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

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

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

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation (i)

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

9 Map-model fit

This section was not generated.