Integrative Structure Validation Report

October 09, 2025 - 04:49 PM PDT

The following software was used in the production of this report:

IHMValidation Version 3.0
Python-IHM Version 2.5
EMDB validation analysis Version 0.0.1.dev127
ChimeraX Version 1.9
Chimera Version 1.19
MapQ Version 1.8.1

PDB ID	9A8K | pdb_00009a8k
PDB-Dev ID	PDBDEV_00000384
Structure Title	Modeling of Mouse NPC basket
Structure Authors	Singh, D.; Soni, N.; Hutchings, J.; Echeverria, I.; Shaikh, F.; Duquette, M.; Suslov, S.; Li, Z.; van Eeuwen, T.; Molloy, K.; Shi, Y.; Wang, J.; Guo, Q.; Chait, B.T.; Fernandez-Martinez, J.; Rout, M.P.; Sali, A.; Villa, E.
Deposited on	2024-06-27

This is a PDB-IHM Structure Validation Report.

We welcome your comments at helpdesk@pdb-ihm.org

A user guide is available at https://pdb-ihm.org/validation_help.html with specific help available everywhere you see the ? symbol.

List of references used to build this report is available here.

1. Overview

1.1. Summary

This entry consists of 22 model(s). A total of 6 dataset(s) were used to build this entry.

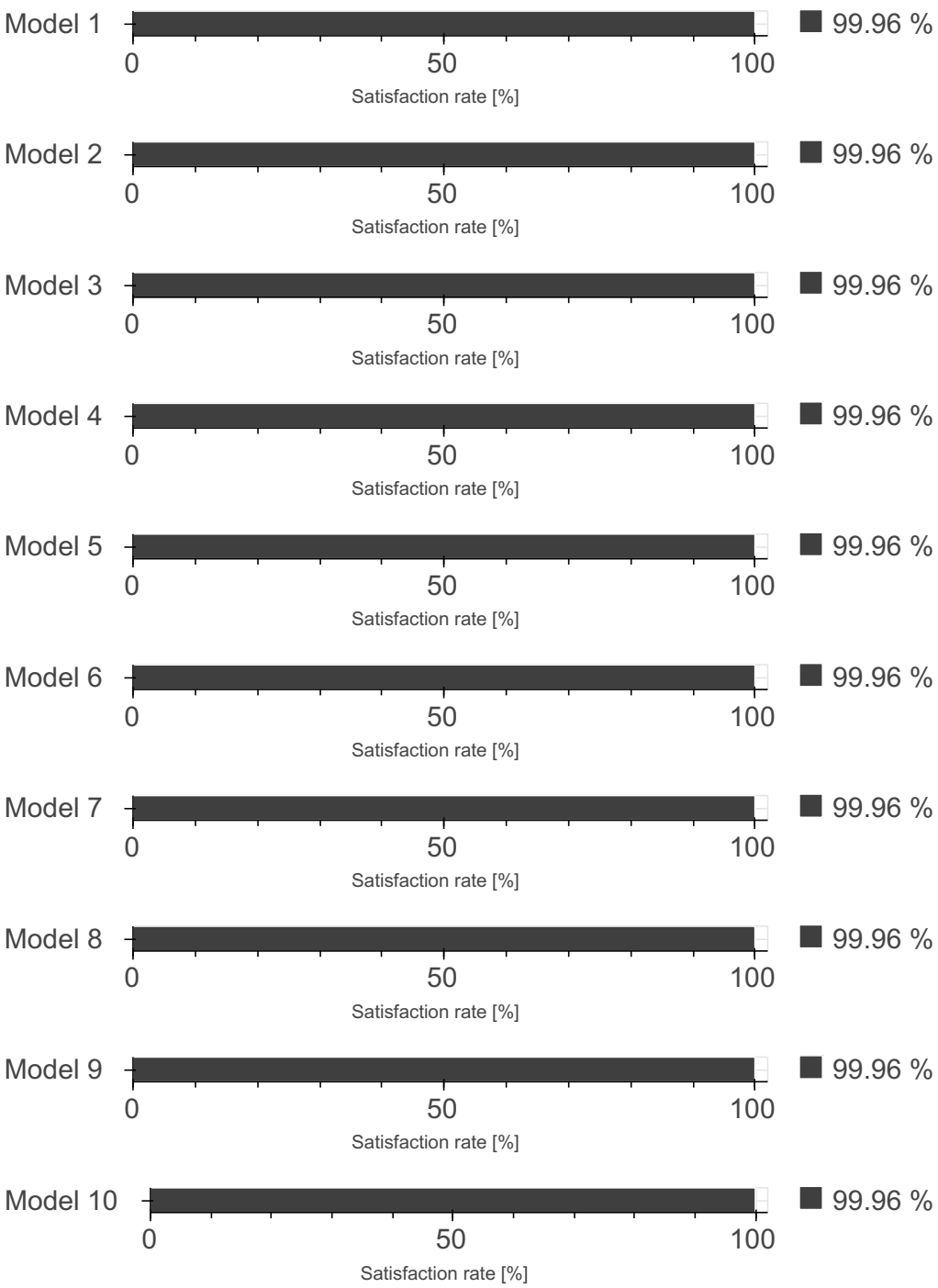
Name	Type	Count
3DEM volume	Experimental data	3

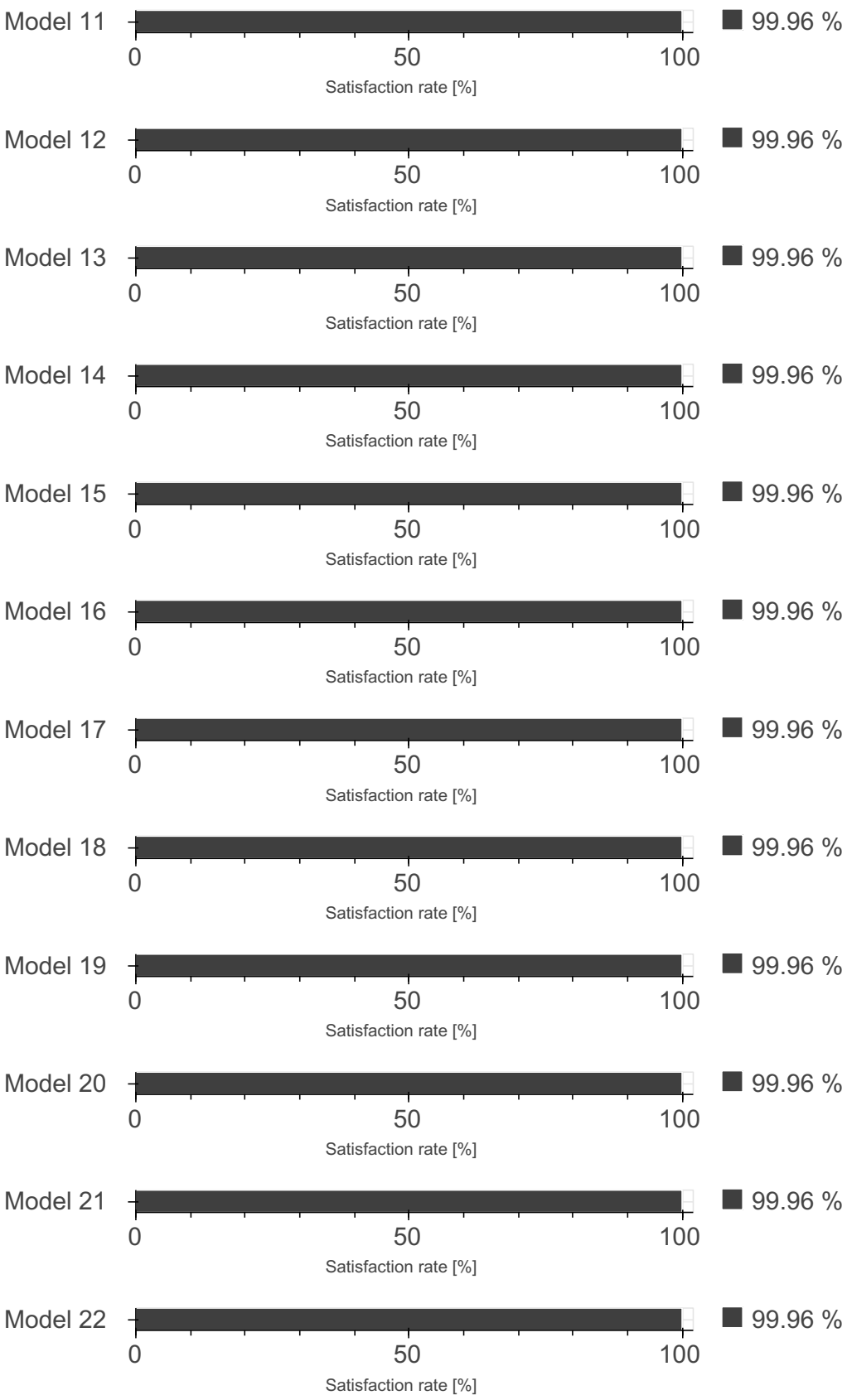
Name	Type	Count
De Novo model	Starting model	1
Comparative model	Starting model	1
Experimental model	Starting model	1

1.2. Overall quality

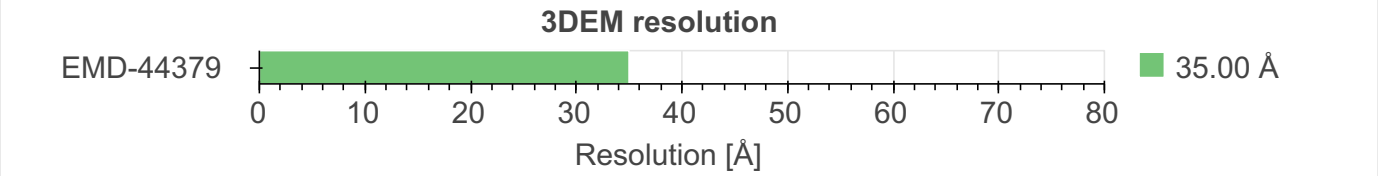
This validation report contains model quality assessments for all structures, data quality and fit to model assessments for SAS and crosslinking-MS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

Model Quality: Excluded Volume Analysis





Data Quality ?



2. Model Details

2.1. Ensemble information

This entry consists of 1 distinct ensemble(s).

2.2. Representation

This entry has 1 representation(s).

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1-22	1	Nucleoprotein TPR	A B	2431	96-120, 124-180, 187-247, 254-285, 289-356, 360-405, 413-451, 511-595, 639-681, 757-883, 901-946, 947-999, 1004-1060, 1064-1106, 1107-1131, 1135-1163, 1170-1201, 1205-1254, 1281-1337, 1343-1420, 1424-1491, 1543-1616, 1627-1690	1-95, 121-123, 181-186, 248-253, 286-288, 357-359, 406-412, 452-510, 596-638, 682-756, 884-900, 1000-1003, 1061-1063, 1132-1134, 1164-1169, 1202-1204, 1255-1280, 1338-1342, 1421-1423, 1492-1542, 1617-1626, 1691-2431	100.00 / 51.79	Multiscale: Coarse-grained: 1 - 50 residue(s) per bead
		2	Nuclear pore complex protein Nup50	C D	466	151-204, 355-466	1-150, 205-354	100.00 / 35.62	Multiscale: Coarse-grained: 1 - 30 residue(s) per bead
		3	Nucleoporin 153	E F	1462	36-57	1-35, 58-428, 540-574	31.67 / 4.75	Multiscale: Coarse-grained: 1 - 30 residue(s) per bead

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
		4	Nuclear pore complex protein Nup160	G H	1402	1-1402	-	100.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		5	Nuclear pore complex protein Nup85	I J	656	1-656	-	100.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		6	Nuclear pore complex protein Nup98-Nup96	K L	1816	1111-1159, 1194-1816	-	37.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		7	Protein SEC13 homolog	M N	322	1-302	-	93.79 / 100.00	Coarse-grained: 1 residue(s) per bead
		8	Nucleoporin SEH1	O P	360	1-324	-	90.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		9	Nuclear pore complex protein Nup107	Q R	926	145-926	-	84.45 / 100.00	Coarse-grained: 1 residue(s) per bead
		10	Nuclear pore complex protein Nup133	S T	1155	70-1155	-	94.03 / 100.00	Coarse-grained: 1 residue(s) per bead
		11	Nucleoporin Nup37	U V	326	1-326	-	100.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		12	Nucleoporin Nup43	W X	380	1-292, 327-380	-	91.05 / 100.00	Coarse-grained: 1 residue(s) per bead

2.3. Datasets used for modeling

There are 6 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	De Novo model	Zenodo	10.5281/zenodo.13131753
2	Experimental model	PDB	pdb_00007r5j
3	Comparative model	Zenodo	10.5281/zenodo.13131753
4	3DEM volume	EMDB	EMD-44379
5	3DEM volume	Zenodo	10.5281/zenodo.13131753
6	3DEM volume	Zenodo	10.5281/zenodo.13131753

2.4. Methodology and software

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Sampling	Replica exchange monte carlo	Not available	500	False	True
2	1	Sampling	Replica exchange monte carlo	Not available	9569309	False	True

There are 3 software packages reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	IMP PMI module	2.19.0	integrative model building	https://integrativemodeling.org
3	COCONUT	1.0.0	Coiled-coil model building	https://github.com/neeleshsoni21/COCONUT
2	Integrative Modeling Platform (IMP)	2.18.0	integrative model building	https://integrativemodeling.org

3. Data quality

3.3. 3DEM

This section describes quality of the 3DEM datasets

EMD-44379

3.3.1. Experimental information

EM reconstruction method:	SUBTOMOGRAM AVERAGING
Resolution:	35.00 Å
Recommended level:	1.280
Estimated volume:	399596.00 nm³

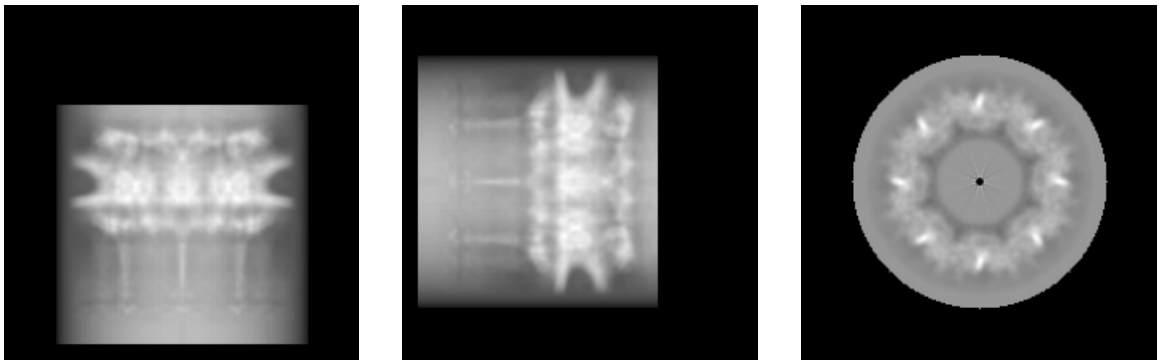
Specimen preparation:	Preparation ID 1 Vitrification
Map-only validation report:	wwPDB validation report

3.3.2. Map visualisation

This section contains visualisations of the EMDB entry EMD-44379. 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.

3.3.2.1. Orthogonal projections

Primary map

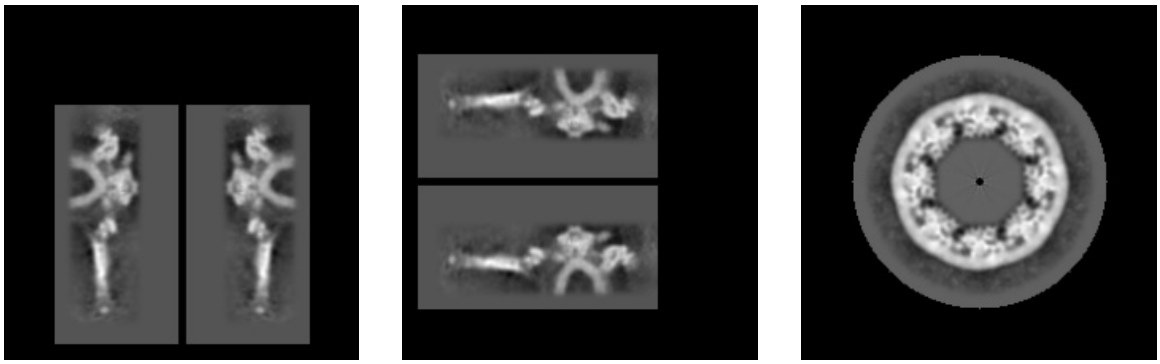


X **Y** **Z**

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

3.3.2.2. Central slices

Primary map

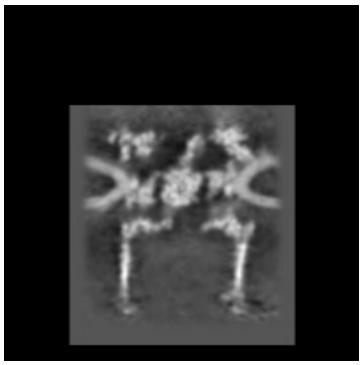
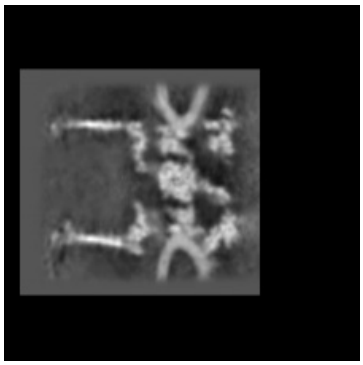
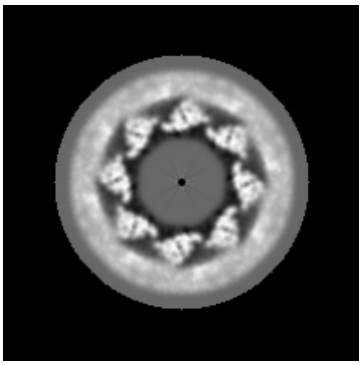


X Index: 112 **Y Index: 112** **Z Index: 112**

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

3.3.2.3. Largest variance slices

Primary map

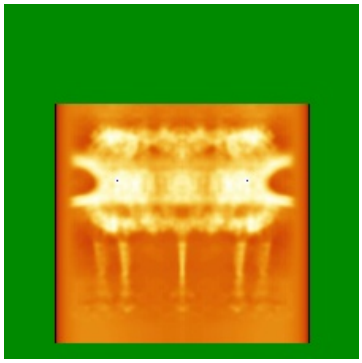
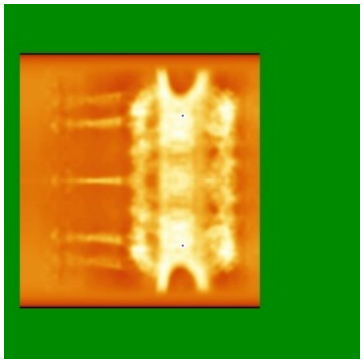
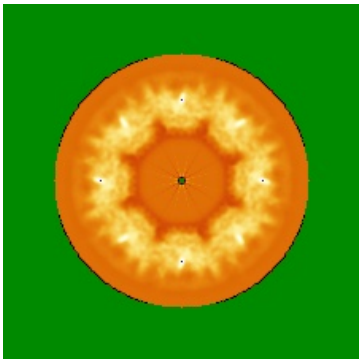




X Index: 76 **Y Index: 76** **Z Index: 101**

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

3.3.2.4 Orthogonal standard-deviation projections (false-color)

Primary map

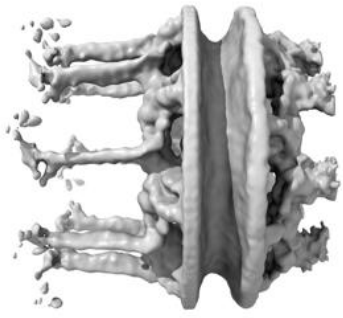




X **Y** **Z**

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.

3.3.2.5. Orthogonal surface views

Primary map

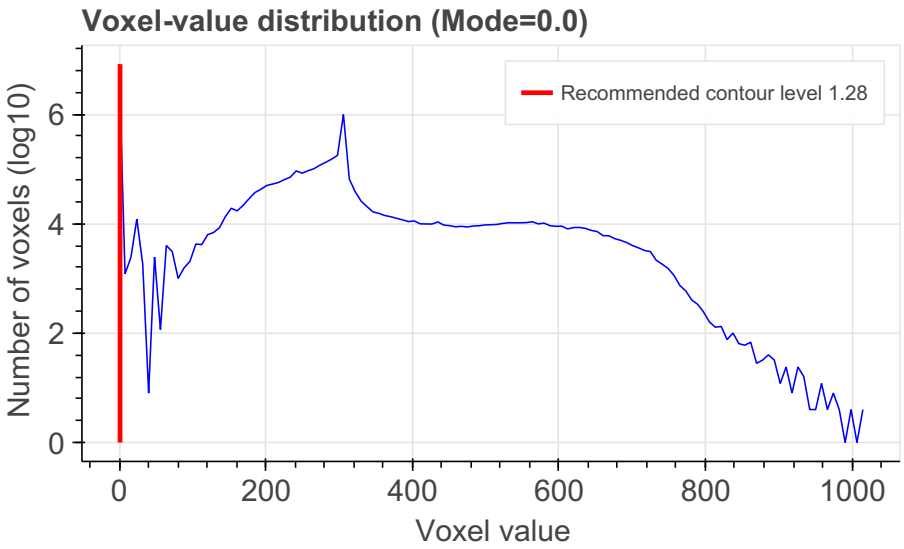

X **Y** **Z**

The images above show the 3D surface view of the map at the recommended contour level 1.280 . These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

3.3.3. Map analysis

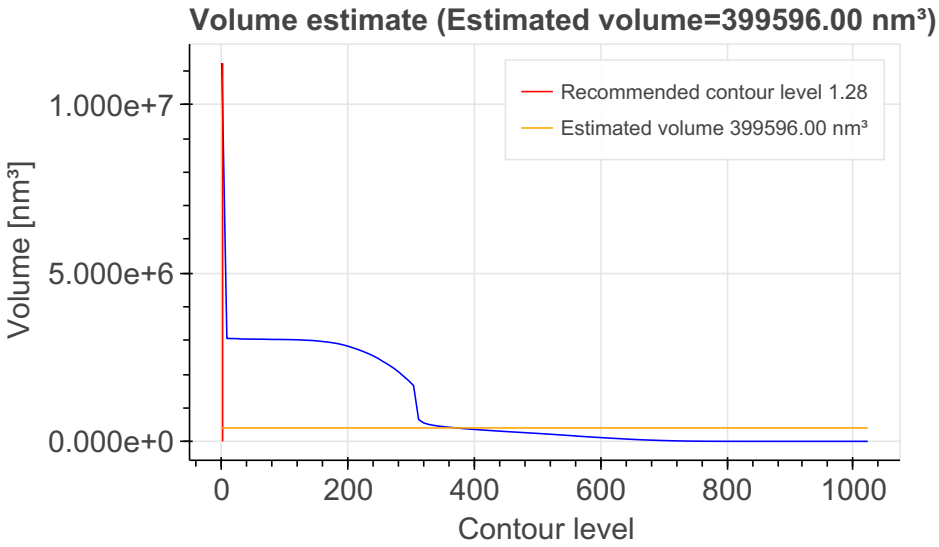
This section contains the results of statistical analysis of the map.

3.3.3.1. 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.

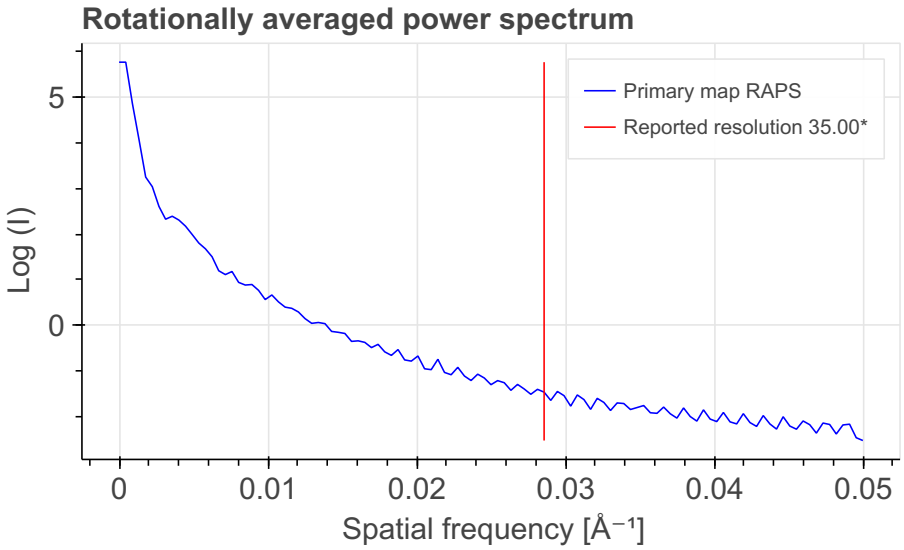
3.3.3.2. Volume estimate



The volume at the recommended contour level is 399596.00 nm³.

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.

3.3.3.3. Rotationally averaged power spectrum



*Reported resolution corresponds to spatial frequency of 0.029 Å^{-1}

3.3.4. Fourier-Shell correlation

3.3.4.2. Resolution estimates

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	35.00	-	-

Author-provided FSC curve is not available.

4. Model quality

For models with atomic structures, MolProbity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

4.1a. Excluded Volume Analysis

Excluded volume satisfaction for the models in the entry are listed below. The Analysed column shows the number of particle-partice or particle-atom pairs for which excluded volume was analysed.

Model ID	Analysed	Number of violations	Excluded Volume Satisfaction (%)
1	109868076	39412	99.96
2	109868076	39409	99.96
3	109868076	39694	99.96
4	109868076	39195	99.96
5	109868076	39325	99.96
6	109868076	39716	99.96
7	109868076	39884	99.96
8	109868076	39444	99.96
9	109868076	39381	99.96

Model ID	Analysed	Number of violations	Excluded Volume Satisfaction (%)
10	109868076	39327	99.96
11	109868076	39609	99.96
12	109868076	39418	99.96
13	109868076	39437	99.96
14	109868076	39295	99.96
15	109868076	39387	99.96
16	109868076	39399	99.96
17	109868076	39414	99.96
18	109868076	39381	99.96
19	109868076	39123	99.96
20	109868076	39195	99.96
21	109868076	39336	99.96
22	109868076	39412	99.96

5. Fit to Data Used for Modeling Assessment

5.3. 3DEM

This section describes fit of models to the 3DEM data. Only results for the representative model, selected as a first model with the largest number of asymmetric units.

3DEM validation for coarse-grained structures is under development.

6. Fit to Data Used for Validation Assessment

Validation for this section is under development.

Acknowledgments

The development of integrative model validation metrics, implementation of a model validation pipeline, and creation of a validation report for integrative structures are funded by NSF awards to the PDB-IHM team (DBI-1756248, DBI-2112966, DBI-2112967, DBI-2112968, and DBI-1756250) and awards from NSF, NIH, and DOE to the RCSB PDB (DBI-2321666, R01GM157729, and DE-SC0019749). The PDB-IHM team and members of the Sali lab contributed model validation metrics and software packages.

Dr. Jill Trewhella, Dr. Dina Schneidman, and members of the SASBDB repository are acknowledged for their advice and support in implementing SAS validation methods. Team members from the labs of Dr. Juri Rappsilber, Dr. Alexander Leitner, Dr. Andrea Graziadei, and members of PRIDE database are acknowledged for their advice and support in implementing crosslinking-MS validation methods. We are grateful to Dr. Shruthi Viswanath for discussions about uncertainty assessment of integrative structural models.

Members of the wwPDB Integrative/Hybrid Methods Task Force provided recommendations and community support for the project.