

Integrative Structure Validation Report

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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	9A8L pdb_00009a8l
PDB-Dev ID	PDBDEV_00000385
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	2024-07-02

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

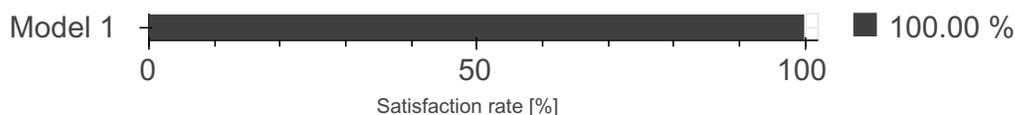
Name	Type	Count
3DEM volume	Experimental data	3

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

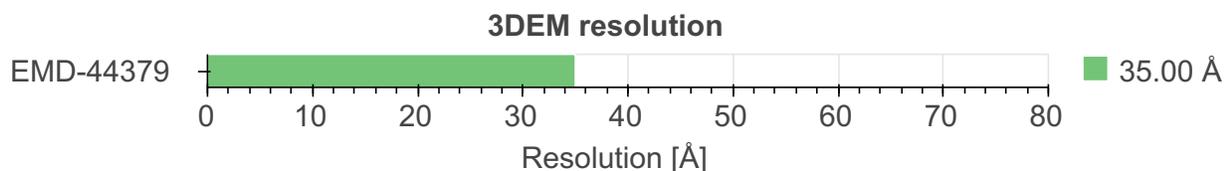
1.2. Overall quality ?

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

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
1	1	1	Nucleoprotein TPR	A	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
		B							
C									
D									
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
1	1	2	Nuclear pore complex protein Nup50	Q	466	151-204, 355-466	1-150, 205-354	100.00 / 35.62	Multiscale: Coarse-grained: 1 - 30 residue(s) per bead
		R							
		S							
		T							
		U							
		V							
		W							
		X							
		Y							
		Z							
		AA							
		AB							
		AC							
		AD							
AE									
AF									

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
		3	Nucleoporin 153	AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU AV	1462	36-57	1-35, 58-428, 540-574	31.67 / 4.75	Multiscale: Coarse-grained: 1 - 30 residue(s) per bead
		4	Nuclear pore complex protein Nup160	AW AX AY AZ BA BB BC BD BE BF BG BH BI BJ BK BL	1402	1-1402	-	100.00 / 100.00	Coarse-grained: 1 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
		5	Nuclear pore complex protein Nup85	BM BN BO BP BQ BR BS BT BU BV BW BX BY BZ CA CB	656	1-656	-	100.00 / 100.00	Coarse-grained: 1 residue(s) per bead
		6	Nuclear pore complex protein Nup98-Nup96	CC CD CE CF CG CH CI CJ CK CL CM CN CO CP CQ CR	1816	1111-1159, 1194-1816	-	37.00 / 100.00	Coarse-grained: 1 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
		7	Protein SEC13 homolog	CS	322	1-302	-	93.79 / 100.00	Coarse-grained: 1 residue(s) per bead
				CT					
				CU					
				CV					
				CW					
				CX					
				CY					
				CZ					
				DA					
				DB					
				DC					
				DD					
				DE					
				DF					
				DG					
				DH					
		8	Nucleoporin SEH1	DI	360	1-324	-	90.00 / 100.00	Coarse-grained: 1 residue(s) per bead
				DJ					
				DK					
				DL					
				DM					
				DN					
				DO					
				DP					
				DQ					
				DR					
				DS					
				DT					
				DU					
				DV					
				DW					
				DX					

ID	Model(s)	Entity ID	Molecule name	Chain(s) [auth]	Total residues	Rigid segments	Flexible segments	Model coverage/ Starting model coverage (%)	Scale
		9	Nuclear pore complex protein Nup107	DY DZ EA EB EC ED EE EF EG EH EI EJ EK EL EM EN	926	145-926	-	84.45 / 100.00	Coarse-grained: 1 residue(s) per bead
		10	Nuclear pore complex protein Nup133	EO EP EQ ER ES ET EU EV EW EX EY EZ FA FB FC FD	1155	70-1155	-	94.03 / 100.00	Coarse-grained: 1 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
		11	Nucleoporin Nup37	FE	326	1-326	-	100.00 / 100.00	Coarse-grained: 1 residue(s) per bead
				FF					
				FG					
				FH					
				FI					
				FJ					
				FK					
				FL					
				FM					
				FN					
				FO					
				FP					
				FQ					
				FR					
				FS					
				FT					
		12	Nucleoporin Nup43	FU	380	1-292, 327-380	-	91.05 / 100.00	Coarse-grained: 1 residue(s) per bead
				FV					
				FW					
				FX					
				FY					
				FZ					
				GA					
				GB					
				GC					
				GD					
				GE					
				GF					
				GG					
				GH					
				GI					
				GJ					

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)	2.19.0	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

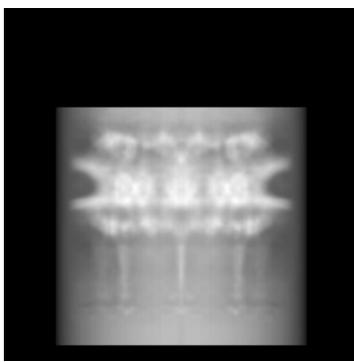
Recommended level:	1.280
Estimated volume:	399596.00 nm ³
Specimen preparation:	Preparation ID 1 Vitrification
Map-only validation report:	wwPDB validation report

3.3.2. Map visualisation ?

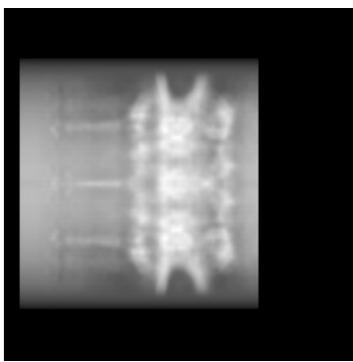
This section contains visualisations of the EMDB entry EMD-44379. These allow visual inspection of the internal detail of the map and identification of artifacts. Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

3.3.2.1. Orthogonal projections ?

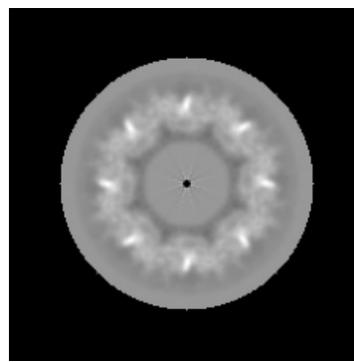
Primary map



X



Y

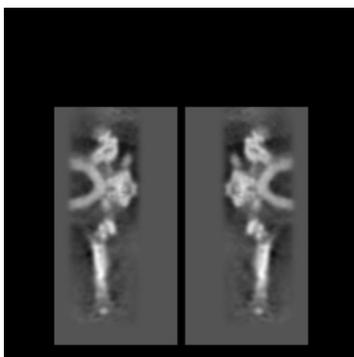


Z

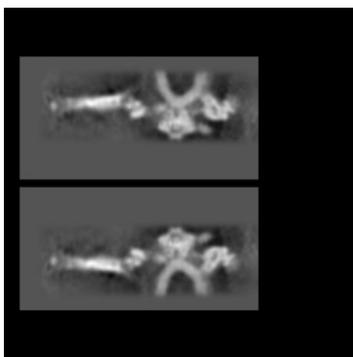
The images above show the map projected in three orthogonal directions.

3.3.2.2. Central slices ?

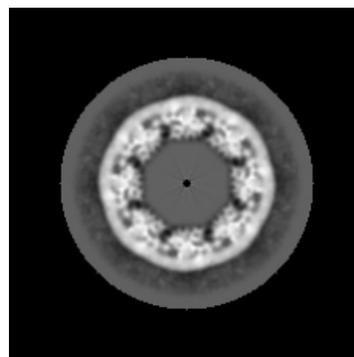
Primary map



X Index: 112



Y Index: 112

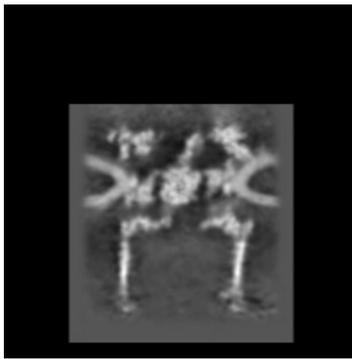
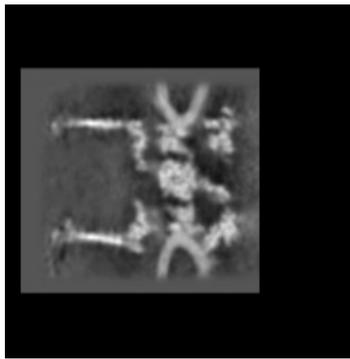
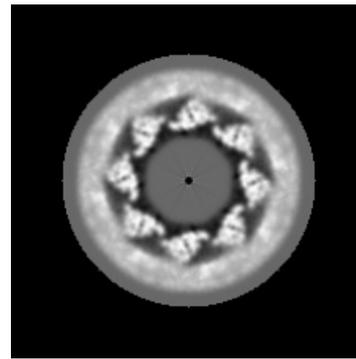


Z Index: 112

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

3.3.2.3. Largest variance slices ?

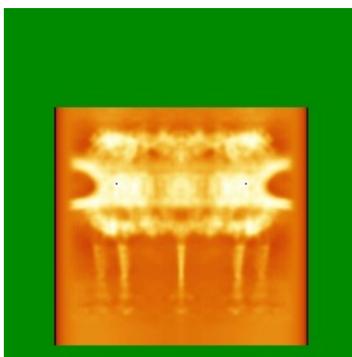
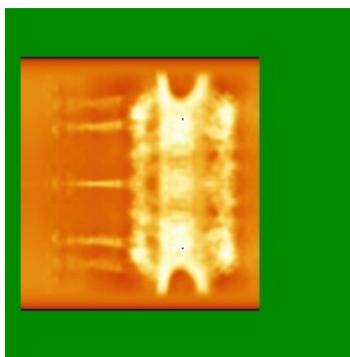
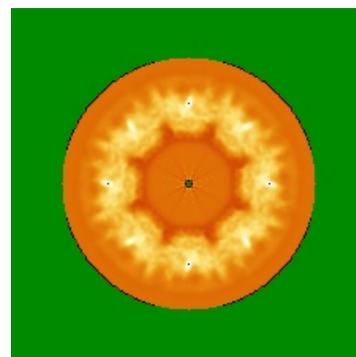
Primary map

**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) ?

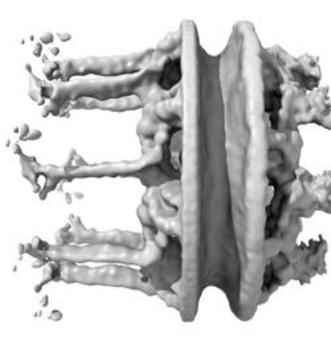
Primary map

**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

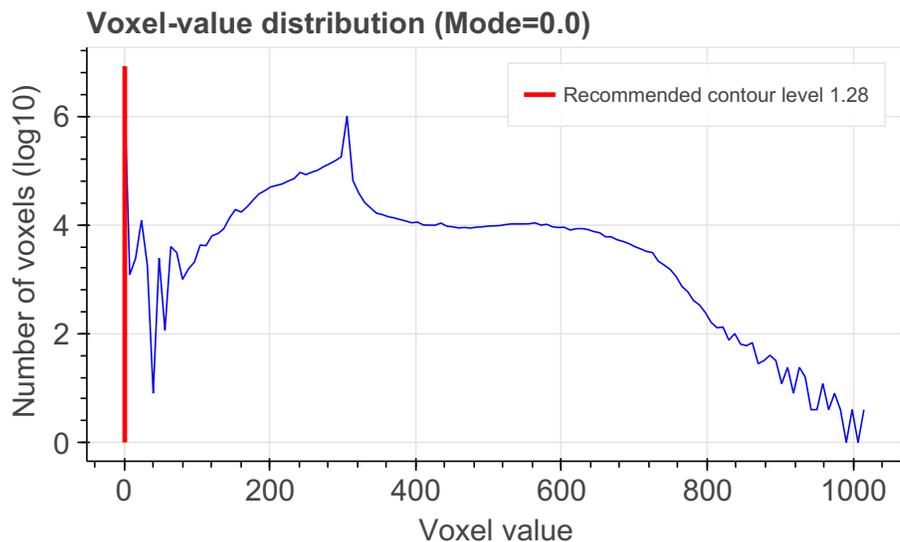
**X****Y****Z**

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 ?

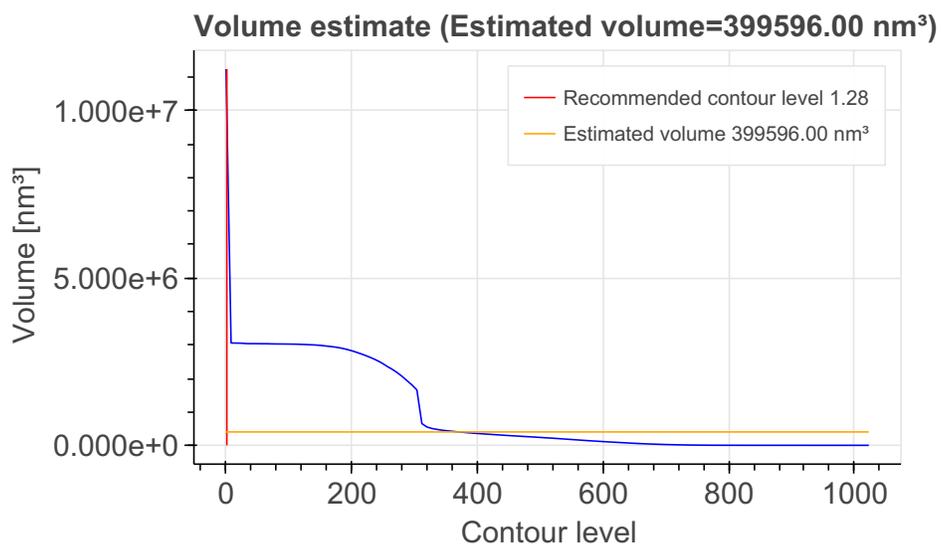
This section contains the results of statistical analysis of the map.

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.

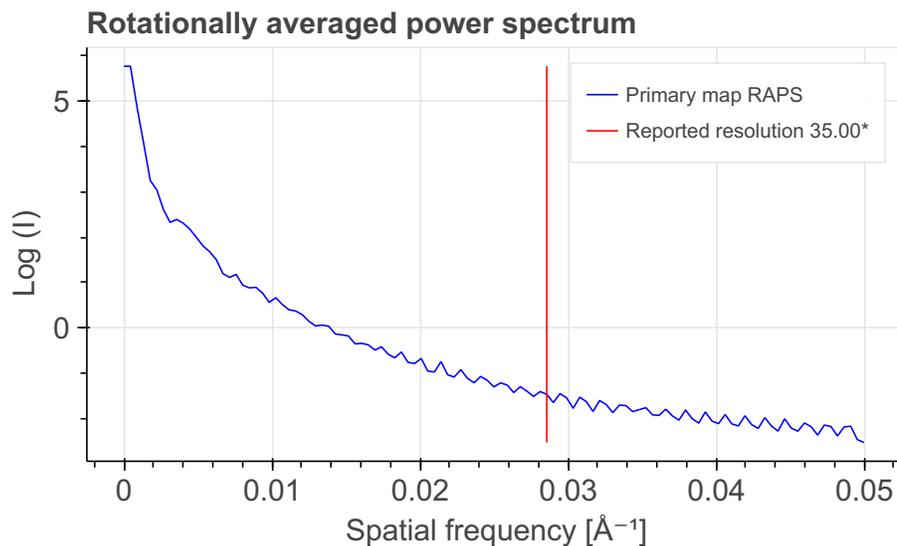
3.3.3.2. Volume estimate



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



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-particle or particle-atom pairs for which excluded volume was analysed.

Model ID	Analysed	Number of violations	Excluded Volume Satisfaction (%)
1	7031971936	316896	100.00

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.

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