wwPDB NMR Structure Validation Summary Report

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PDB ID	:	2MJH
BMRB ID	:	19726
Title	:	Solution structure of the GLD-1 RNA-binding domain in complex with RNA
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This is a wwPDB NMR Structure 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/NMRValidationReportHelp
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:

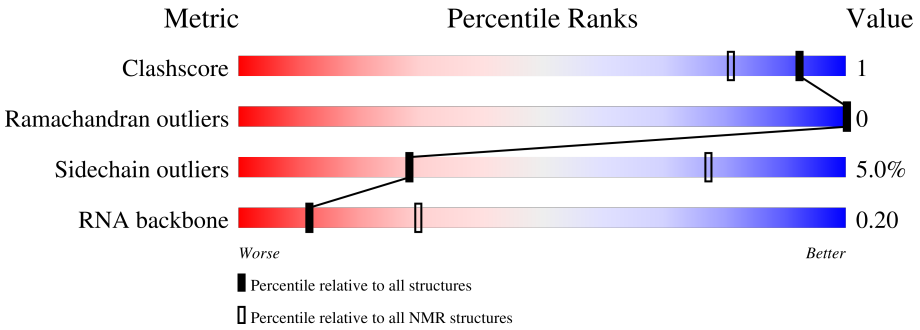
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
BMRB Restraints Analysis	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment is 74%.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428
RNA backbone	4643	676

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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	A	142	58% · 37%
2	B	10	60% 40%

2 Ensemble composition and analysis

This entry contains 20 models. Model 13 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *closest to the average*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	**Residue range (total)**	**Backbone RMSD (Å)**	**Medoid model**
1	A:201-A:246, A:274-A:305, A:317-A:327 (89)	0.34	13

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 4 clusters. No single-model clusters were found.

Cluster number	Models
1	4, 6, 9, 12, 16, 17, 18, 19
2	7, 10, 11, 14, 15
3	3, 5, 13, 20
4	1, 2, 8

3 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 2581 atoms, of which 1255 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Female germline-specific tumor suppressor gld-1.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	142	2270	702	1147	201	212	8	0

- Molecule 2 is a RNA chain called 5'-CUACUCAUAU-3'.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	P	
2	B	10	311	93	108	32	69	9	0

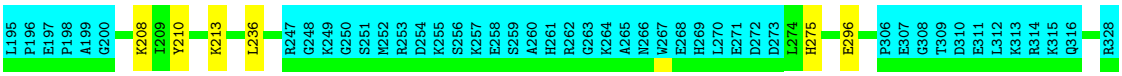
4 Residue-property plots

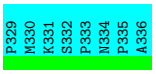
4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

• Molecule 1: Female germline-specific tumor suppressor gld-1

Chain A:





• Molecule 2: 5'-CUACUCAUAU-3'

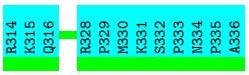
Chain B:

4.2 Residue scores for the representative (medoid) model from the NMR ensemble

The representative model is number 13. Colouring as in section 4.1 above.

• Molecule 1: Female germline-specific tumor suppressor gld-1

Chain A:



• Molecule 2: 5'-CUACUCAUAU-3'

Chain B:


C16
U17
A18
C19
U20
C21
A22
U25

5 Refinement protocol and experimental data overview

The models were refined using the following method: *simulated annealing.*

Of the 250 calculated structures, 20 were deposited, based on the following criterion: *Lowest energy and NOE violations.*

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
Amber	refinement	9
CYANA	structure solution	3.0

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	1564
Number of shifts mapped to atoms	1564
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	74%

6 Model quality (i)

6.1 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 (average) 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	0.46±0.00	0±0/717 (0.0± 0.0%)	0.71±0.01	0±0/971 (0.0± 0.0%)
2	B	1.01±0.01	0±0/225 (0.0± 0.0%)	1.49±0.03	1±1/347 (0.4± 0.2%)
All	All	0.64	0/18840 (0.0%)	0.98	29/26360 (0.1%)

There are no bond-length outliers.

5 of 9 unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})	Models	
								Worst	Total
2	B	21	C	O4'-C1'-N1	7.89	114.51	108.20	8	17
2	B	17	U	C5'-C4'-C3'	-5.83	106.68	116.00	12	1
2	B	24	A	O4'-C1'-N9	5.46	112.57	108.20	7	1
2	B	20	U	O4'-C1'-N1	5.41	112.53	108.20	16	2
2	B	21	C	C3'-C2'-C1'	5.39	105.81	101.50	1	2

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	706	737	737	2±1
2	B	203	108	108	0±0
All	All	18180	16900	16900	48

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 1.

5 of 14 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:208:LYS:HE2	1:A:210:TYR:CE2	0.62	2.30	9	5
1:A:208:LYS:HE3	1:A:275:HIS:CD2	0.55	2.36	10	10
1:A:208:LYS:HE2	1:A:210:TYR:CE1	0.50	2.42	8	6
1:A:208:LYS:HE2	1:A:210:TYR:CZ	0.47	2.45	9	2
1:A:208:LYS:HE3	1:A:275:HIS:CG	0.46	2.45	9	3

6.3 Torsion angles (i)

6.3.1 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 NMR 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	89/142 (63%)	84±1 (94±1%)	5±1 (6±1%)	0±0 (0±0%)	100	100
All	All	1780/2840 (63%)	1672 (94%)	108 (6%)	0 (0%)	100	100

There are no Ramachandran outliers.

6.3.2 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 NMR 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	79/123 (64%)	75±1 (95±1%)	4±1 (5±1%)	28	77
All	All	1580/2460 (64%)	1501 (95%)	79 (5%)	28	77

5 of 14 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	296	GLU	20
1	A	236	LEU	18
1	A	213	LYS	11
1	A	202	MET	6
1	A	291	LEU	6

6.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers	Suiteness
2	B	10/10 (100%)	3±1 (28±9%)	1±1 (14±10%)	0.20±0.06
All	All	184/200 (92%)	55 (30%)	27 (15%)	0.20

The overall RNA backbone suiteness is 0.20.

5 of 8 unique RNA backbone outliers are listed below:

Mol	Chain	Res	Type	Models (Total)
2	B	18	A	20
2	B	17	U	12
2	B	25	U	8
2	B	21	C	4
2	B	20	U	4

All unique RNA pucker outliers are listed below:

Mol	Chain	Res	Type	Models (Total)
2	B	18	A	19
2	B	16	C	4
2	B	24	A	2
2	B	19	C	1
2	B	22	A	1

6.4 Non-standard residues in protein, DNA, RNA chains (i)

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry

There are no ligands in this entry.

6.7 Other polymers

There are no such molecules in this entry.

6.8 Polymer linkage issues

There are no chain breaks in this entry.

7 Chemical shift validation

The completeness of assignment taking into account all chemical shift lists is 74% for the well-defined parts and 71% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list_1*

7.1.1 Bookkeeping

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	1564
Number of shifts mapped to atoms	1564
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	2

The following errors were found when reading this chemical shift list.

- Chemical shift has been reported more than once. First 5 (of 0) occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	226	LEU	HD12	-0.548	0.001	1
1	A	226	LEU	HD13	-0.548	0.001	1
1	A	236	LEU	HD12	0.801	0.000	2
1	A	236	LEU	HD13	0.801	0.000	2
1	A	270	LEU	HD12	0.984	0.000	1
1	A	270	LEU	HD13	0.984	0.000	1
1	A	274	LEU	HD12	0.868	0.004	1
1	A	274	LEU	HD13	0.868	0.004	1
1	A	277	LEU	HD12	0.848	0.008	2
1	A	277	LEU	HD13	0.848	0.008	2
1	A	291	LEU	HD12	0.863	0.000	2
1	A	291	LEU	HD13	0.863	0.000	2
1	A	295	LEU	HD12	0.761	0.000	2
1	A	295	LEU	HD13	0.761	0.000	2

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	301	LEU	HD12	0.792	0.000	1
1	A	301	LEU	HD13	0.792	0.000	1
1	A	302	LEU	HD12	0.622	0.000	1
1	A	302	LEU	HD13	0.622	0.000	1
1	A	312	LEU	HD12	0.879	0.001	2
1	A	312	LEU	HD13	0.879	0.001	2
1	A	317	LEU	HD12	0.447	0.001	1
1	A	317	LEU	HD13	0.447	0.001	1
1	A	320	LEU	HD12	0.913	0.000	1
1	A	320	LEU	HD13	0.913	0.000	1

7.1.2 Chemical shift referencing (i)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_{\alpha}$	121	2.32 ± 0.14	Should be checked
$^{13}C_{\beta}$	108	2.74 ± 0.06	Should be checked
$^{13}C'$	0	—	None (insufficient data)
^{15}N	127	-0.34 ± 0.20	None needed (< 0.5 ppm)

7.1.3 Completeness of resonance assignments (i)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 74%, i.e. 1065 atoms were assigned a chemical shift out of a possible 1445. 0 out of 17 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	342/442 (77%)	179/179 (100%)	78/178 (44%)	85/85 (100%)
Sidechain	630/761 (83%)	445/498 (89%)	174/238 (73%)	11/25 (44%)
Aromatic	38/60 (63%)	24/29 (83%)	14/29 (48%)	0/2 (0%)
Sugar	39/110 (35%)	39/60 (65%)	0/50 (0%)	0/0 (—%)
Base	16/72 (22%)	16/42 (38%)	0/20 (0%)	0/10 (0%)
Overall	1065/1445 (74%)	703/808 (87%)	266/515 (52%)	96/122 (79%)

7.1.4 Statistically unusual chemical shifts (i)

The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules con-

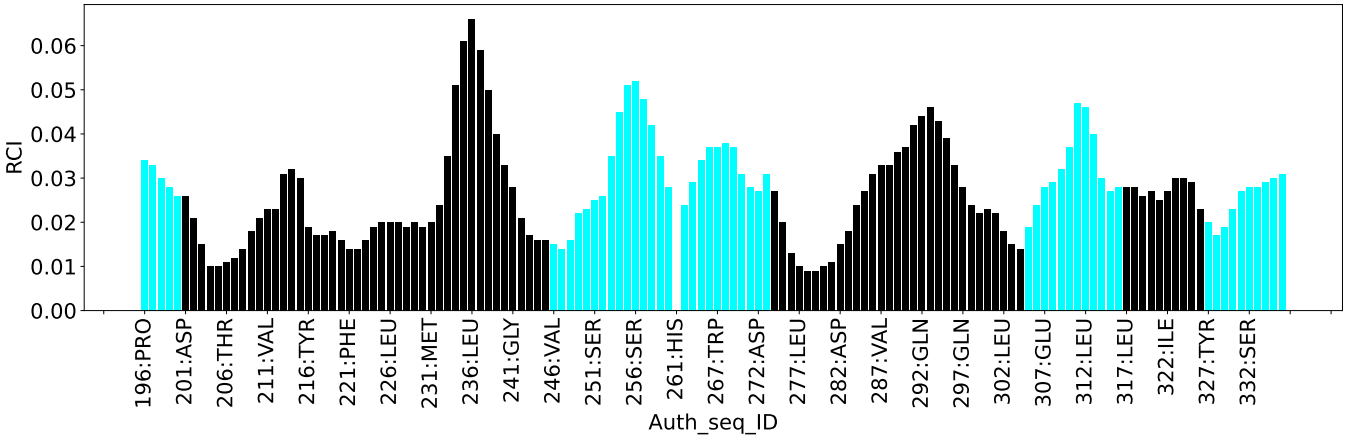
taining paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, *ppm*	Expected range, *ppm*	Z-score
1	A	304	PRO	HG2	0.22	0.41 – 3.45	-5.6
1	A	212	PRO	CB	25.42	26.06 – 37.61	-5.6

7.1.5 Random Coil Index (RCI) plots (i)

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.If well-defined core and ill-defined regions are not identified then it is shown as gray bars.

Random coil index (RCI) for chain A:



8 NMR restraints analysis

8.1 Conformationally restricting restraints

The following table provides the summary of experimentally observed NMR restraints in different categories. Restraints are classified into different categories based on the sequence separation of the atoms involved.

Description	Value
Total distance restraints	2873
Intra-residue (|i-j|=0)	639
Sequential (|i-j|=1)	827
Medium range (|i-j|>1 and |i-j|<5)	565
Long range (|i-j|≥5)	655
Inter-chain	111
Hydrogen bond restraints	76
Disulfide bond restraints	0
Total dihedral-angle restraints	0
Number of unmapped restraints	0
Number of restraints per residue	18.9
Number of long range restraints per residue[1]	4.5

[1]Long range hydrogen bonds and disulfide bonds are counted as long range restraints while calculating the number of long range restraints per residue

8.2 Residual restraint violations

This section provides the overview of the restraint violations analysis. The violations are binned as small, medium and large violations based on its absolute value. Average number of violations per model is calculated by dividing the total number of violations in each bin by the size of the ensemble.

8.2.1 Average number of distance violations per model

Distance violations less than 0.1 Å are not included in the calculation.

Bins (Å)	Average number of violations per model	Max (Å)
0.1-0.2 (Small)	29.6	0.2
0.2-0.5 (Medium)	11.4	0.41
>0.5 (Large)	None	None

8.2.2 Average number of dihedral-angle violations per model (i)

Dihedral-angle violations less than 1° are not included in the calculation.There are no dihedral-angle violations

9 Distance violation analysis (i)

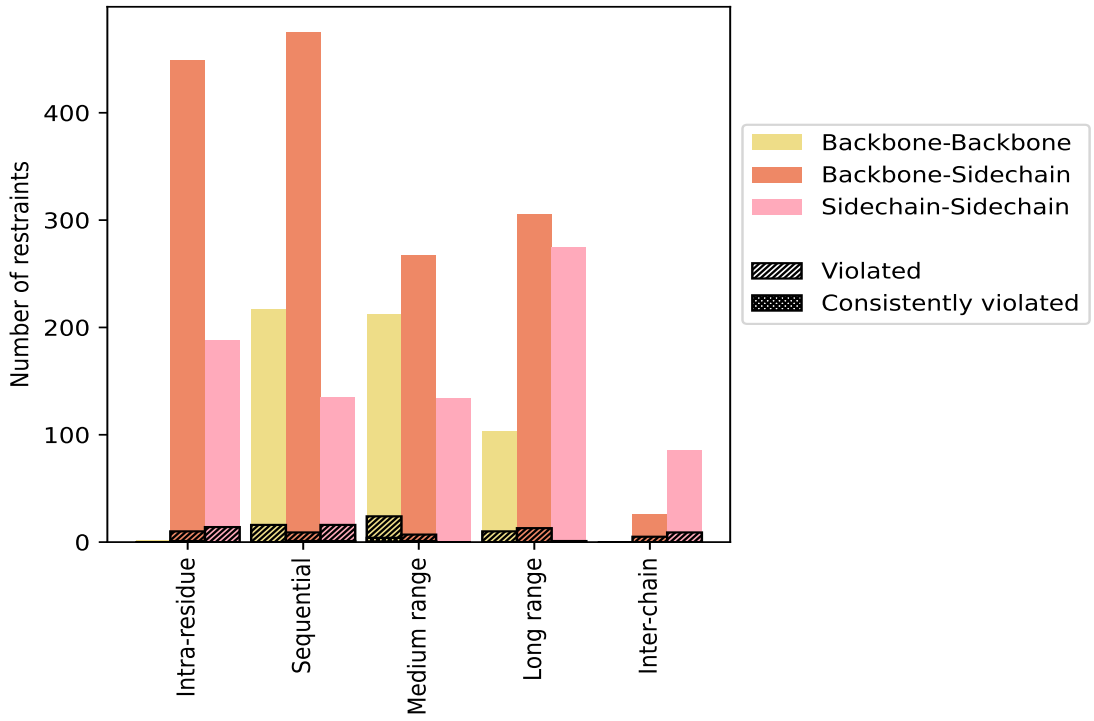
9.1 Summary of distance violations (i)

The following table shows the summary of distance violations in different restraint categories based on the sequence separation of the atoms involved. Each category is further sub-divided into three sub-categories based on the atoms involved. Violations less than 0.1 Å are not included in the statistics.

Restraints type	Count	%[1]	Violated[3]			Consistently Violated[4]		
			Count	%[2]	%[1]	Count	%[2]	%[1]
Intra-residue (|i-j|=0)	639	22.2	24	3.8	0.8	1	0.2	0.0
Backbone-Backbone	2	0.1	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	449	15.6	10	2.2	0.3	1	0.2	0.0
Sidechain-Sidechain	188	6.5	14	7.4	0.5	0	0.0	0.0
Sequential (|i-j|=1)	827	28.8	41	5.0	1.4	2	0.2	0.1
Backbone-Backbone	217	7.6	16	7.4	0.6	0	0.0	0.0
Backbone-Sidechain	475	16.5	9	1.9	0.3	1	0.2	0.0
Sidechain-Sidechain	135	4.7	16	11.9	0.6	1	0.7	0.0
Medium range (|i-j|>1 & |i-j|<5)	565	19.7	16	2.8	0.6	1	0.2	0.0
Backbone-Backbone	164	5.7	9	5.5	0.3	0	0.0	0.0
Backbone-Sidechain	267	9.3	7	2.6	0.2	1	0.4	0.0
Sidechain-Sidechain	134	4.7	0	0.0	0.0	0	0.0	0.0
Long range (|i-j|≥5)	655	22.8	22	3.4	0.8	0	0.0	0.0
Backbone-Backbone	75	2.6	8	10.7	0.3	0	0.0	0.0
Backbone-Sidechain	305	10.6	13	4.3	0.5	0	0.0	0.0
Sidechain-Sidechain	275	9.6	1	0.4	0.0	0	0.0	0.0
Inter-chain	111	3.9	14	12.6	0.5	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	26	0.9	5	19.2	0.2	0	0.0	0.0
Sidechain-Sidechain	85	3.0	9	10.6	0.3	0	0.0	0.0
Hydrogen bond	76	2.6	17	22.4	0.6	4	5.3	0.1
Disulfide bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Total	2873	100.0	134	4.7	4.7	8	0.3	0.3
Backbone-Backbone	534	18.6	50	9.4	1.7	4	0.7	0.1
Backbone-Sidechain	1522	53.0	44	2.9	1.5	3	0.2	0.1
Sidechain-Sidechain	817	28.4	40	4.9	1.4	1	0.1	0.0

[1] percentage calculated with respect to the total number of distance restraints, [2] percentage calculated with respect to the number of restraints in a particular restraint category, [3] violated in at least one model, [4] violated in all the models

9.1.1 Bar chart : Distribution of distance restraints and violations



Violated and consistently violated restraints are shown using different hatch patterns in their respective categories. The hydrogen bonds and disulfied bonds are counted in their appropriate category on the x-axis

9.2 Distance violation statistics for each model

The following table provides the distance violation statistics for each model in the ensemble. Violations less than 0.1 Å are not included in the statistics.

Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
1	4	19	11	10	2	46	0.18	0.33	0.06	0.17
2	7	15	9	8	3	42	0.18	0.34	0.06	0.16
3	6	10	12	7	2	37	0.16	0.28	0.05	0.15
4	4	7	11	9	3	34	0.18	0.33	0.05	0.16
5	9	7	9	7	3	35	0.18	0.37	0.06	0.16
6	7	12	12	6	4	41	0.19	0.34	0.06	0.17
7	9	12	9	6	5	41	0.18	0.36	0.06	0.16
8	7	12	10	6	2	37	0.18	0.33	0.06	0.16
9	8	11	12	7	2	40	0.17	0.37	0.06	0.15
10	7	10	9	6	4	36	0.18	0.31	0.05	0.17
11	7	9	11	8	2	37	0.18	0.4	0.06	0.17

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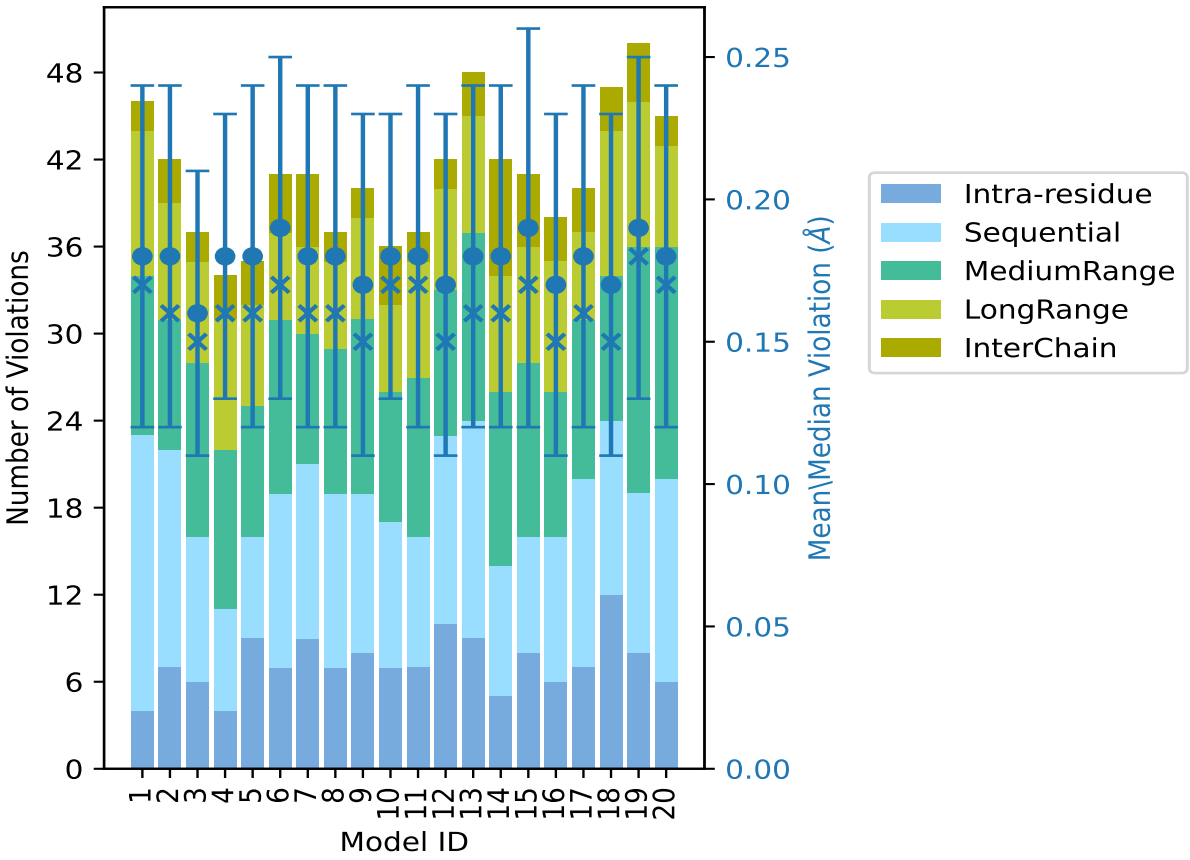
Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
12	10	13	10	7	2	42	0.17	0.31	0.06	0.15
13	9	15	13	8	3	48	0.18	0.38	0.06	0.16
14	5	9	12	8	8	42	0.18	0.38	0.06	0.16
15	8	8	12	8	5	41	0.19	0.4	0.07	0.17
16	6	10	10	9	3	38	0.17	0.32	0.06	0.15
17	7	13	11	6	3	40	0.18	0.35	0.06	0.16
18	12	12	10	10	3	47	0.17	0.37	0.06	0.15
19	8	11	17	10	4	50	0.19	0.38	0.06	0.18
20	6	14	16	7	2	45	0.18	0.41	0.06	0.17

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6]Standard deviation

9.2.1 Bar graph : Distance Violation statistics for each model



The mean(dot),median(x) and the standard deviation are shown in blue with respect to the y axis on the right

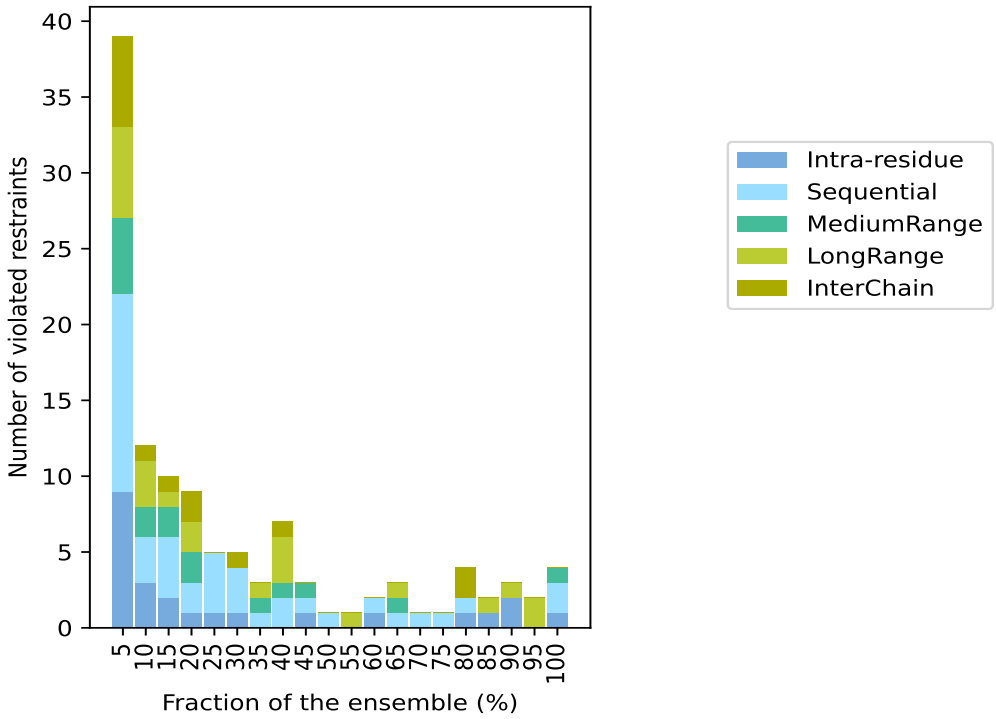
9.3 Distance violation statistics for the ensemble (i)

Violation analysis may find that some restraints are violated in few models and some are violated in most of models. The following table provides this information as number of violated restraints for a given fraction of the ensemble. In total, 2680(IR:615, SQ:786, MR:549, LR:633, IC:97) restraints are not violated in the ensemble.

Number of violated restraints						Fraction of the ensemble	
IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total	Count[6]	%
9	13	5	6	6	39	1	5.0
3	3	2	3	1	12	2	10.0
2	4	2	1	1	10	3	15.0
1	2	2	2	2	9	4	20.0
1	4	0	0	0	5	5	25.0
1	3	0	0	1	5	6	30.0
0	1	1	1	0	3	7	35.0
0	2	1	3	1	7	8	40.0
1	1	1	0	0	3	9	45.0
0	1	0	0	0	1	10	50.0
0	0	0	1	0	1	11	55.0
1	1	0	0	0	2	12	60.0
0	1	1	1	0	3	13	65.0
0	1	0	0	0	1	14	70.0
0	1	0	0	0	1	15	75.0
1	1	0	0	2	4	16	80.0
1	0	0	1	0	2	17	85.0
2	0	0	1	0	3	18	90.0
0	0	0	2	0	2	19	95.0
1	2	1	0	0	4	20	100.0

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6] Number of models with violations

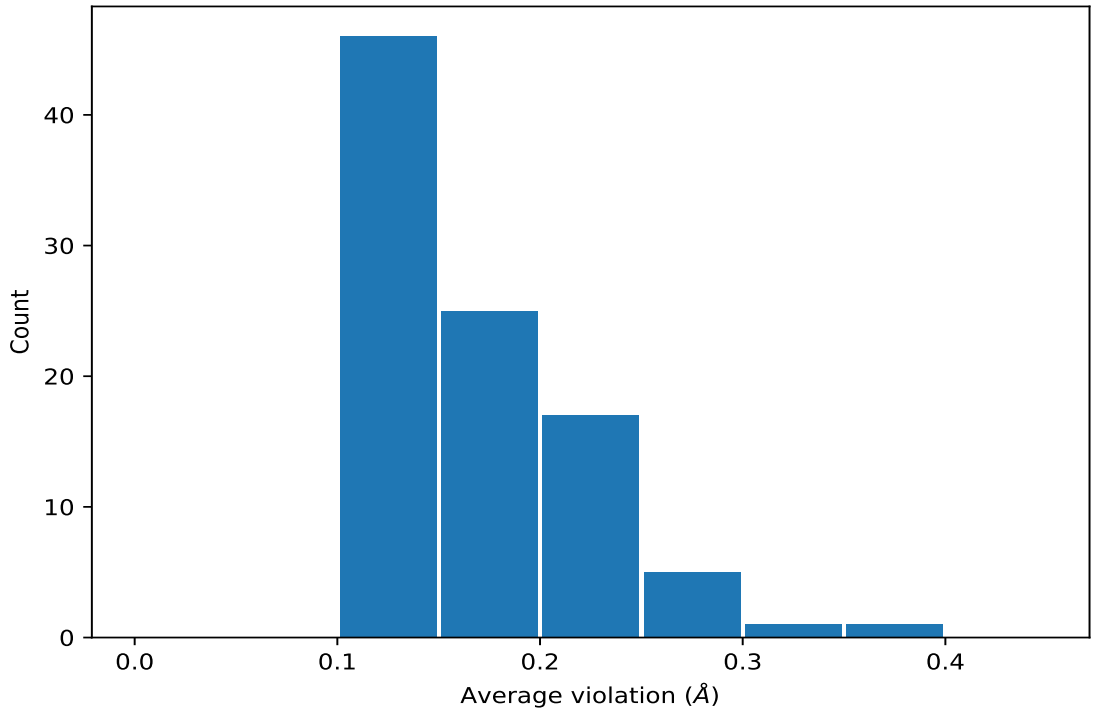
9.3.1 Bar graph : Distance violation statistics for the ensemble



9.4 Most violated distance restraints in the ensemble

9.4.1 Histogram : Distribution of mean distance violations

The following histogram shows the distribution of the average value of the violation. The average is calculated for each restraint that is violated in more than one model over all the violated models in the ensemble



9.4.2 Table: Most violated distance restraints

The following table provides the mean and the standard deviation of the violations for the 10 worst performing restraints, sorted by number of violated models and the mean violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

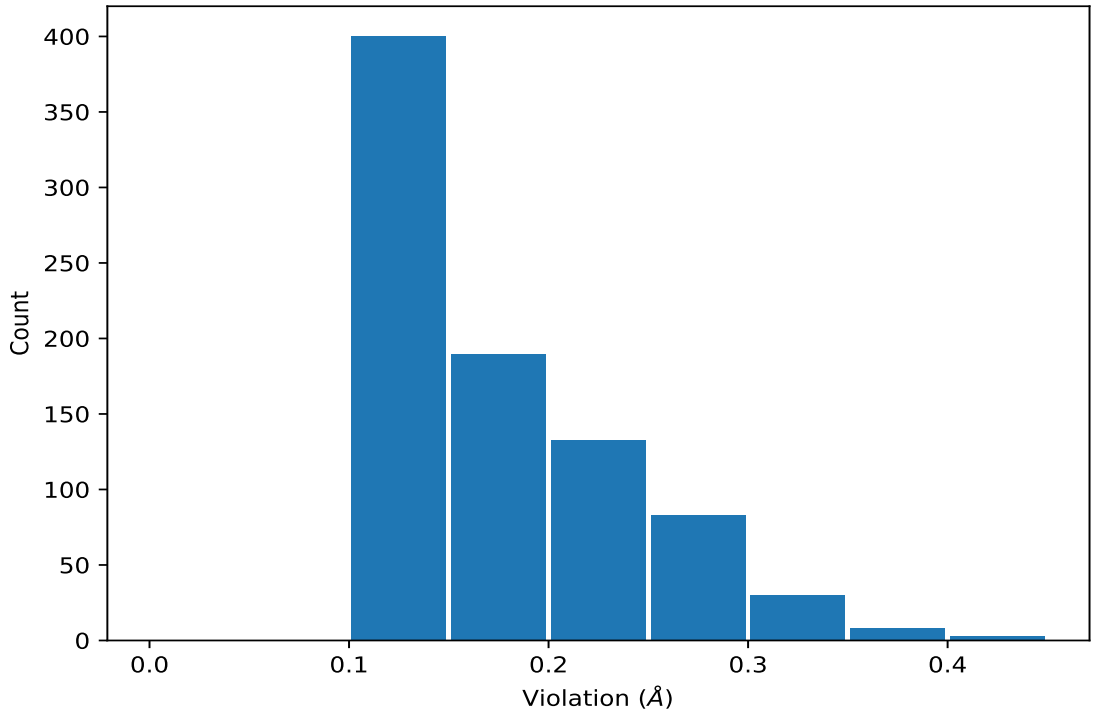
Key	Atom-1	Atom-2	Models[1]	Mean (Å)	SD[1] (Å)	Median (Å)
(1,1369)	1:A:279:GLN:H	1:A:279:GLN:HE22	20	0.33	0.03	0.32
(2,67)	1:A:301:LEU:H	1:A:297:GLN:O	20	0.29	0.04	0.29
(2,59)	1:A:297:GLN:H	1:A:293:ALA:O	20	0.23	0.03	0.24
(1,2618)	2:B:18:A:H2'	2:B:19:C:H5	20	0.21	0.04	0.2
(2,65)	1:A:300:LYS:H	1:A:296:GLU:O	20	0.2	0.04	0.2
(1,681)	1:A:302:LEU:HG	1:A:303:ILE:H	20	0.17	0.02	0.17
(1,804)	1:A:239:ASP:HB3	1:A:241:GLY:H	20	0.16	0.01	0.16
(2,57)	1:A:296:GLU:H	1:A:292:GLN:O	20	0.16	0.02	0.16
(1,485)	1:A:203:ILE:HG12	1:A:283:THR:H	19	0.18	0.03	0.18
(1,796)	1:A:212:PRO:HD2	1:A:302:LEU:H	19	0.16	0.02	0.16

[1]Number of violated models, [2]Standard deviation

9.5 All violated distance restraints (i)

9.5.1 Histogram : Distribution of distance violations (i)

The following histogram shows the distribution of the absolute value of the violation for all violated restraints in the ensemble.



9.5.2 Table : All distance violations (i)

The following table provides the 10 worst performing restraints, sorted by the violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,27)	1:A:267:TRP:HA	1:A:270:LEU:HA	20	0.41
(1,1369)	1:A:279:GLN:H	1:A:279:GLN:HE22	11	0.4
(1,1369)	1:A:279:GLN:H	1:A:279:GLN:HE22	15	0.4
(1,845)	1:A:214:ASN:HA	1:A:214:ASN:HD21	14	0.38
(1,27)	1:A:267:TRP:HA	1:A:270:LEU:HA	13	0.38
(1,1369)	1:A:279:GLN:H	1:A:279:GLN:HE22	19	0.38
(2,67)	1:A:301:LEU:H	1:A:297:GLN:O	9	0.37
(1,845)	1:A:214:ASN:HA	1:A:214:ASN:HD21	18	0.37
(1,2785)	2:B:24:A:H2	1:A:266:ASN:HB2	15	0.37
(1,1369)	1:A:279:GLN:H	1:A:279:GLN:HE22	5	0.37

10 Dihedral-angle violation analysis (i)

Dihedral angle analysis failed due to data error in the dihedral angle restraints, possibly missing target value