wwPDB NMR Structure Validation Summary Report (i)

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PDB ID	:	6VGB
BMRB ID	:	30708
Title	:	De novo designed Rossmann fold protein ROS2_36830
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Deposited on	:	2020-01-07

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:

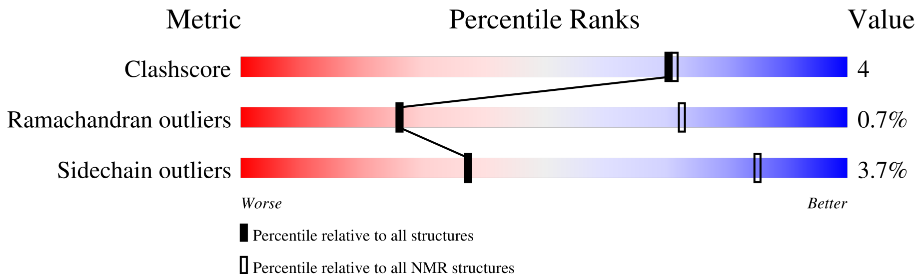
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
BMRB Restraints Analysis	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal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

1 Overall quality at a glance (i)

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

The overall completeness of chemical shifts assignment is 79%.

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

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	121	

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 4 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

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:22-A:121 (100)	0.97	4

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 3 clusters. No single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 1706 atoms, of which 888 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called De novo designed protein RO2_20.

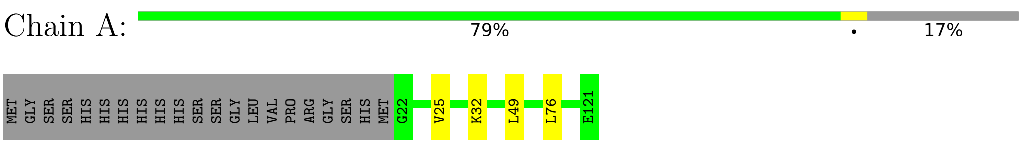
Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	100	1706	525	888	139	153	1	0

4 Residue-property plots (i)

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.

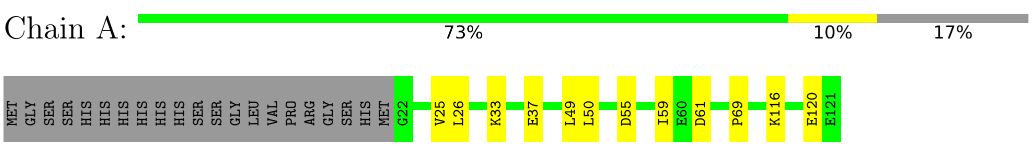
- Molecule 1: De novo designed protein RO2_20



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

The representative model is number 4. Colouring as in section 4.1 above.

- Molecule 1: De novo designed protein RO2_20



5 Refinement protocol and experimental data overview (i)

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

Of the 20 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy*.

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

Software name	Classification	Version
ARIA	structure calculation	2.3.2
CNS	refinement	1.21

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	1214
Number of shifts mapped to atoms	1164
Number of unparsed shifts	0
Number of shifts with mapping errors	50
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	79%

6 Model quality (i)

6.1 Standard geometry (i)

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

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	818	888	888	6±3
All	All	16360	17760	17760	124

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 4.

5 of 75 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:25:VAL:O	1:A:49:LEU:HA	0.68	1.88	20	17
1:A:81:ASP:O	1:A:84:LYS:HG2	0.58	1.98	1	2
1:A:74:VAL:HG22	1:A:102:ILE:HA	0.58	1.76	12	2
1:A:77:GLU:HA	1:A:105:VAL:O	0.57	1.98	6	1
1:A:41:MET:SD	1:A:116:LYS:HE2	0.57	2.39	19	1

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	98/121 (81%)	91±2 (93±2%)	7±2 (7±2%)	1±1 (1±1%)	26	73
All	All	1960/2420 (81%)	1814 (93%)	132 (7%)	14 (1%)	26	73

All 5 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	69	PRO	6
1	A	53	GLU	5
1	A	68	PRO	1
1	A	78	ASP	1
1	A	56	ASP	1

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	92/110 (84%)	89±2 (96±2%)	3±2 (4±2%)	37	85
All	All	1840/2200 (84%)	1772 (96%)	68 (4%)	37	85

5 of 32 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	32	LYS	13
1	A	52	LEU	5
1	A	79	THR	4
1	A	61	ASP	4
1	A	49	LEU	4

6.3.3 RNA (i)

There are no RNA molecules in this entry.

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 (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation (i)

The completeness of assignment taking into account all chemical shift lists is 79% for the well-defined parts and 79% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list*

7.1.1 Bookkeeping (i)

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	1214
Number of shifts mapped to atoms	1164
Number of unparsed shifts	0
Number of shifts with mapping errors	50
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	1

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

- Chemical shift has been reported more than once. All 3 occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	26	LEU	HD11	0.768	0.003	2
1	A	26	LEU	HD12	0.768	0.003	2
1	A	26	LEU	HD13	0.768	0.003	2

The following assigned chemical shifts were not mapped to the molecules present in the coordinate file.

- No matching atom found in the structure. First 5 (of 50) occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	16	PRO	CD	51.033	0.032	1
1	A	16	PRO	HD2	3.769	0.015	2
1	A	16	PRO	HD3	3.541	0.011	2
1	A	16	PRO	CA	63.155	0.011	1
1	A	16	PRO	HA	4.396	0.002	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	16	PRO	HB2	2.273	0.007	2
1	A	16	PRO	CB	32.18	0.026	1
1	A	16	PRO	HB3	1.889	0.001	2
1	A	16	PRO	CG	27.56	0.019	1
1	A	16	PRO	HG2	2.009	0.004	2
1	A	16	PRO	HG3	1.919	0.004	2
1	A	15	VAL	CG2	21.125	0.002	1
1	A	15	VAL	HG21	0.923	0.004	2
1	A	15	VAL	HG22	0.923	0.004	2
1	A	15	VAL	HG23	0.923	0.004	2
1	A	21	MET	CA	55.667	0.039	1
1	A	21	MET	HA	4.438	0.002	1
1	A	21	MET	HB2	2.033	0.003	2
1	A	21	MET	CB	32.742	0.055	1
1	A	21	MET	HB3	1.954	0.007	2
1	A	21	MET	CG	31.812	0.071	1
1	A	21	MET	HG2	2.441	0.003	2
1	A	21	MET	HG3	2.323	0.003	2
1	A	15	VAL	CB	32.738	0.001	1
1	A	15	VAL	HB	2.053	0.001	1
1	A	15	VAL	HA	4.345	0.001	1
1	A	15	VAL	HG11	0.926	0.006	2
1	A	15	VAL	HG12	0.926	0.006	2
1	A	15	VAL	HG13	0.926	0.006	2
1	A	14	LEU	HB2	1.618	0.001	2
1	A	14	LEU	HB3	1.581	0.005	2
1	A	14	LEU	HA	4.363	0.005	1
1	A	14	LEU	CD1	24.988	0.002	2
1	A	14	LEU	HD11	0.917	0.002	2
1	A	14	LEU	HD12	0.917	0.002	2
1	A	14	LEU	HD13	0.917	0.002	2
1	A	14	LEU	CD2	23.64	0.002	2
1	A	14	LEU	HD21	0.864	0.001	2
1	A	14	LEU	HD22	0.864	0.001	2
1	A	14	LEU	HD23	0.864	0.001	2
1	A	14	LEU	CA	55.371	0.051	1
1	A	14	LEU	CB	42.617	0.009	1
1	A	15	VAL	CA	59.795	0.028	1
1	A	22	GLY	H	8.728	0.014	1
1	A	14	LEU	H	8.059	0.006	1
1	A	14	LEU	N	121.357	0.011	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	15	VAL	H	8.011	0.011	1
1	A	15	VAL	N	121.464	0.09	1
1	A	21	MET	H	8.251	0.008	1
1	A	21	MET	N	122.065	0.066	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
$^{13}C_{\alpha}$	103	-0.11 ± 0.08	None needed (< 0.5 ppm)
$^{13}C_{\beta}$	102	0.01 ± 0.07	None needed (< 0.5 ppm)
$^{13}C'$	0	—	None (insufficient data)
^{15}N	99	0.60 ± 0.36	None needed (imprecise)

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 79%, i.e. 1159 atoms were assigned a chemical shift out of a possible 1475. 0 out of 20 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	392/494 (79%)	197/198 (99%)	99/200 (50%)	96/96 (100%)
Sidechain	748/938 (80%)	491/604 (81%)	257/297 (87%)	0/37 (0%)
Aromatic	19/43 (44%)	17/21 (81%)	0/20 (0%)	2/2 (100%)
Overall	1159/1475 (79%)	705/823 (86%)	356/517 (69%)	98/135 (73%)

7.1.4 Statistically unusual chemical shifts (i)

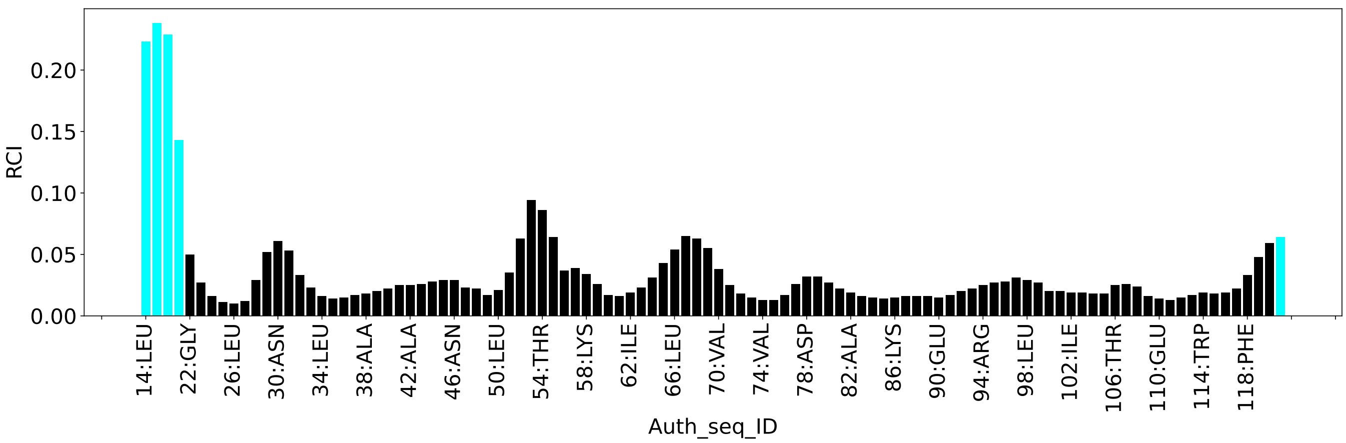
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, *ppm*	Expected range, *ppm*	Z-score
1	A	103	ARG	HD3	1.76	1.81 – 4.39	-5.2

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 (i)

8.1 Conformationally restricting restraints (i)

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	5170
Intra-residue (|i-j|=0)	2243
Sequential (|i-j|=1)	1182
Medium range (|i-j|>1 and |i-j|<5)	742
Long range (|i-j|≥5)	907
Inter-chain	0
Hydrogen bond restraints	96
Disulfide bond restraints	0
Total dihedral-angle restraints	0
Number of unmapped restraints	40
Number of restraints per residue	42.7
Number of long range restraints per residue[1]	7.7

[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 (i)

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 (i)

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)	175.2	0.2
0.2-0.5 (Medium)	423.9	0.5
>0.5 (Large)	1011.6	18.69

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)

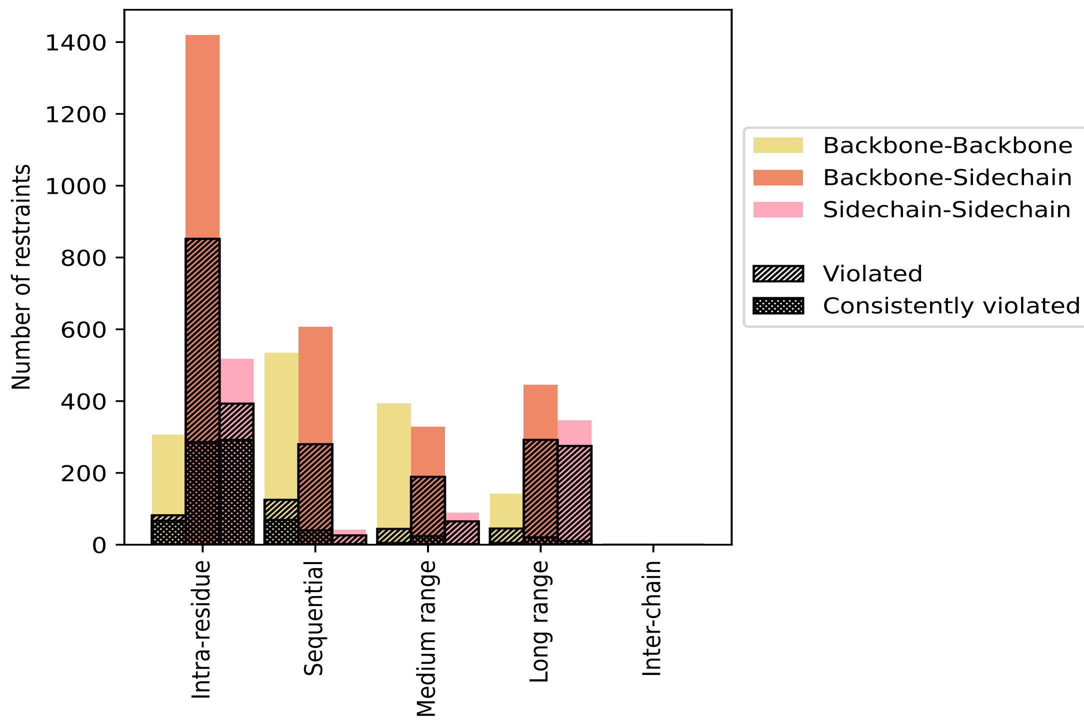
9.1 Summary of distance violations (i)

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)	2243	43.4	1327	59.2	25.7	645	28.8	12.5
Backbone-Backbone	306	5.9	82	26.8	1.6	67	21.9	1.3
Backbone-Sidechain	1419	27.4	852	60.0	16.5	286	20.2	5.5
Sidechain-Sidechain	518	10.0	393	75.9	7.6	292	56.4	5.6
Sequential (|i-j|=1)	1182	22.9	431	36.5	8.3	111	9.4	2.1
Backbone-Backbone	534	10.3	125	23.4	2.4	69	12.9	1.3
Backbone-Sidechain	607	11.7	280	46.1	5.4	40	6.6	0.8
Sidechain-Sidechain	41	0.8	26	63.4	0.5	2	4.9	0.0
Medium range (|i-j|>1 & |i-j|<5)	742	14.4	296	39.9	5.7	31	4.2	0.6
Backbone-Backbone	324	6.3	42	13.0	0.8	5	1.5	0.1
Backbone-Sidechain	329	6.4	189	57.4	3.7	24	7.3	0.5
Sidechain-Sidechain	89	1.7	65	73.0	1.3	2	2.2	0.0
Long range (|i-j|≥5)	907	17.5	611	67.4	11.8	36	4.0	0.7
Backbone-Backbone	116	2.2	44	37.9	0.9	5	4.3	0.1
Backbone-Sidechain	445	8.6	292	65.6	5.6	21	4.7	0.4
Sidechain-Sidechain	346	6.7	275	79.5	5.3	10	2.9	0.2
Inter-chain	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Hydrogen bond	96	1.9	3	3.1	0.1	0	0.0	0.0
Disulfide bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Total	5170	100.0	2668	51.6	51.6	823	15.9	15.9
Backbone-Backbone	1376	26.6	296	21.5	5.7	146	10.6	2.8
Backbone-Sidechain	2800	54.2	1613	57.6	31.2	371	13.2	7.2
Sidechain-Sidechain	994	19.2	759	76.4	14.7	306	30.8	5.9

[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 (i)



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 (i)

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	941	242	131	272	0	1586	0.74	18.07	0.65	0.68
2	958	241	142	297	0	1638	0.76	17.83	0.68	0.67
3	960	248	143	267	0	1618	0.75	18.58	0.68	0.67
4	941	236	151	267	0	1595	0.76	16.97	0.64	0.69
5	952	249	136	288	0	1625	0.77	18.39	0.71	0.69
6	962	226	140	272	0	1600	0.74	17.68	0.63	0.67
7	935	243	141	277	0	1596	0.76	18.5	0.68	0.7
8	967	237	144	300	0	1648	0.75	17.37	0.67	0.67
9	948	246	138	300	0	1632	0.76	17.37	0.66	0.7
10	969	239	147	283	0	1638	0.73	17.93	0.64	0.69
11	930	234	148	299	0	1611	0.78	17.31	0.68	0.71

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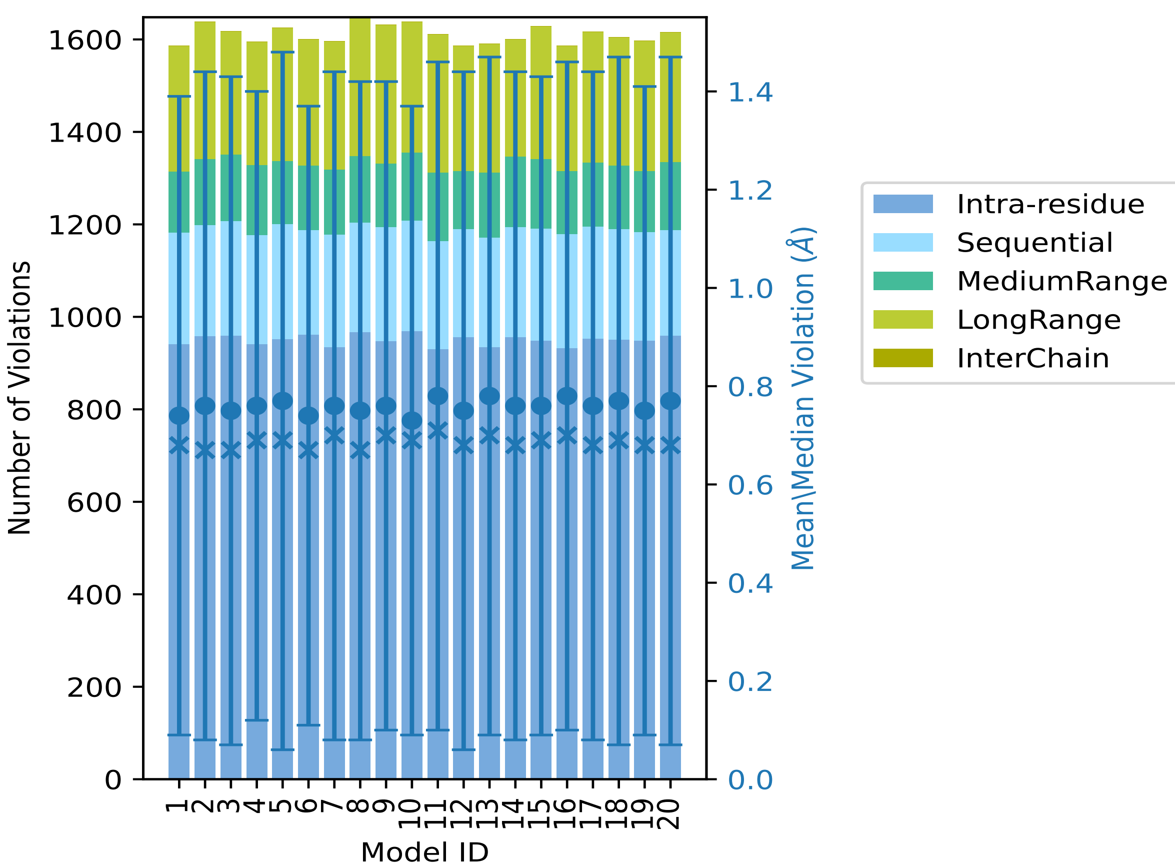
Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
12	956	234	126	270	0	1586	0.75	18.19	0.69	0.68
13	935	237	140	279	0	1591	0.78	18.42	0.69	0.7
14	956	238	153	253	0	1600	0.76	17.5	0.68	0.68
15	949	242	151	286	0	1628	0.76	17.49	0.67	0.69
16	933	246	137	270	0	1586	0.78	17.59	0.68	0.7
17	953	242	139	283	0	1617	0.76	17.09	0.68	0.68
18	951	239	137	278	0	1605	0.77	18.02	0.7	0.69
19	949	234	132	282	0	1597	0.75	18.23	0.66	0.68
20	959	229	147	281	0	1616	0.77	18.69	0.7	0.68

[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

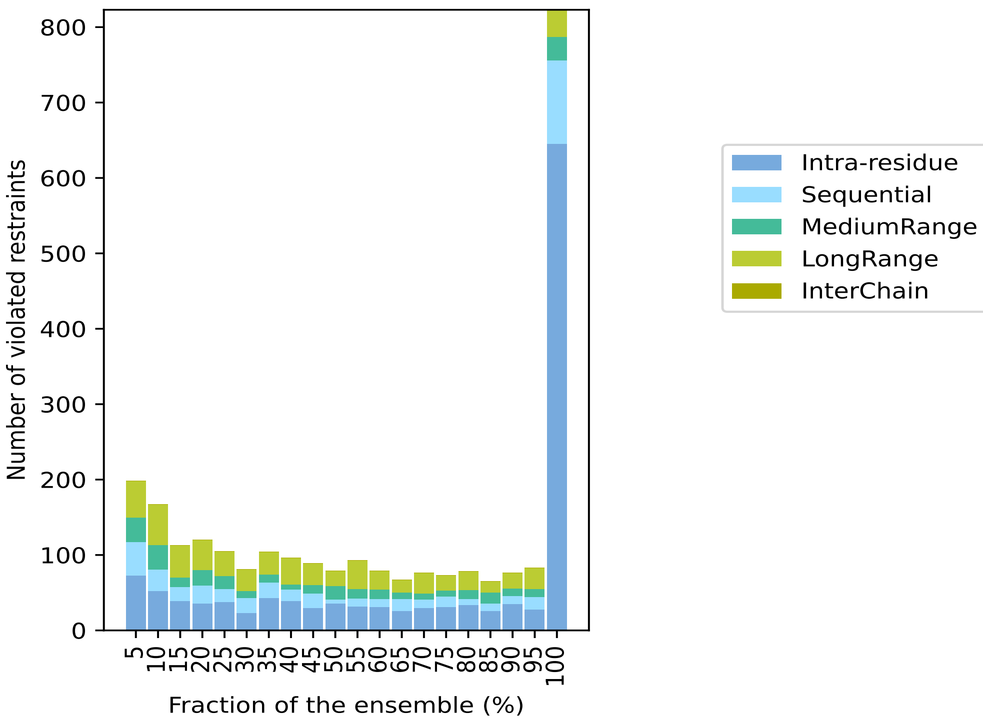
9.3 Distance violation statistics for the ensemble (i)

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, 2409(IR:916, SQ:751, MR:446, LR:296, IC:0) 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]	%
73	44	33	48	0	198	1	5.0
52	29	32	54	0	167	2	10.0
39	19	12	43	0	113	3	15.0
36	24	20	40	0	120	4	20.0
38	17	17	33	0	105	5	25.0
23	20	9	29	0	81	6	30.0
43	21	10	30	0	104	7	35.0
39	15	7	35	0	96	8	40.0
30	19	11	29	0	89	9	45.0
36	5	18	20	0	79	10	50.0
32	10	13	38	0	93	11	55.0
31	11	12	25	0	79	12	60.0
26	16	8	17	0	67	13	65.0
30	11	8	27	0	76	14	70.0
31	14	8	20	0	73	15	75.0
34	8	12	24	0	78	16	80.0
26	10	14	15	0	65	17	85.0
35	11	10	20	0	76	18	90.0
28	16	11	28	0	83	19	95.0
645	111	31	36	0	823	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

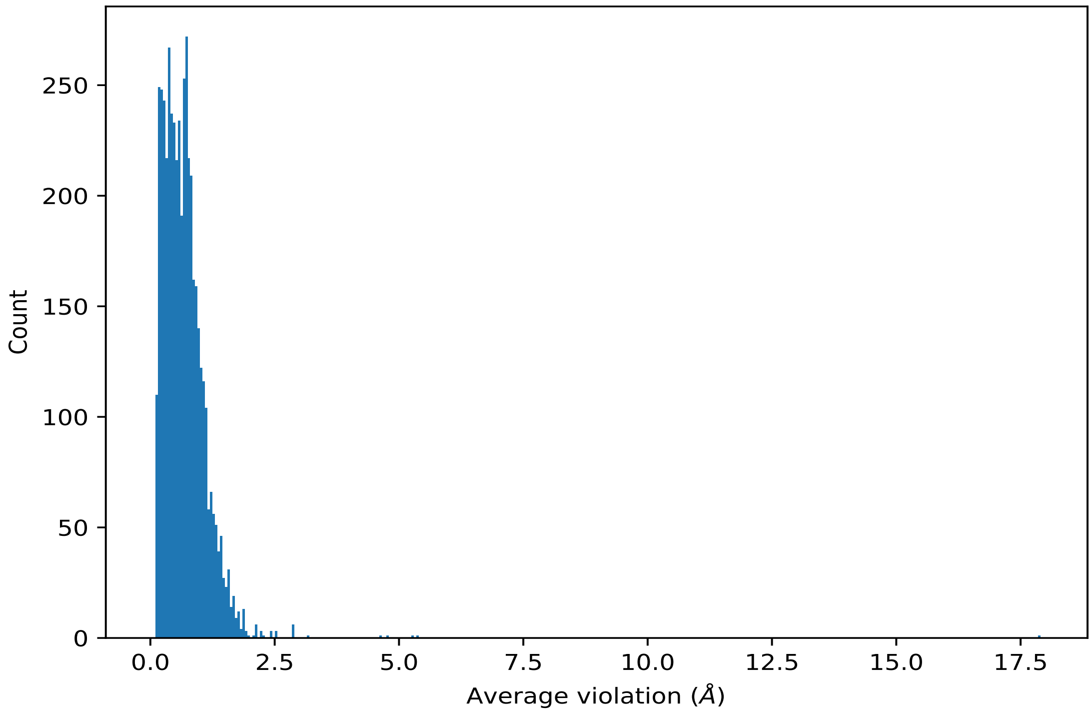
9.3.1 Bar graph : Distance violation statistics for the ensemble (i)



9.4 Most violated distance restraints in the ensemble (i)

9.4.1 Histogram : Distribution of mean distance violations (i)

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 (i)

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.

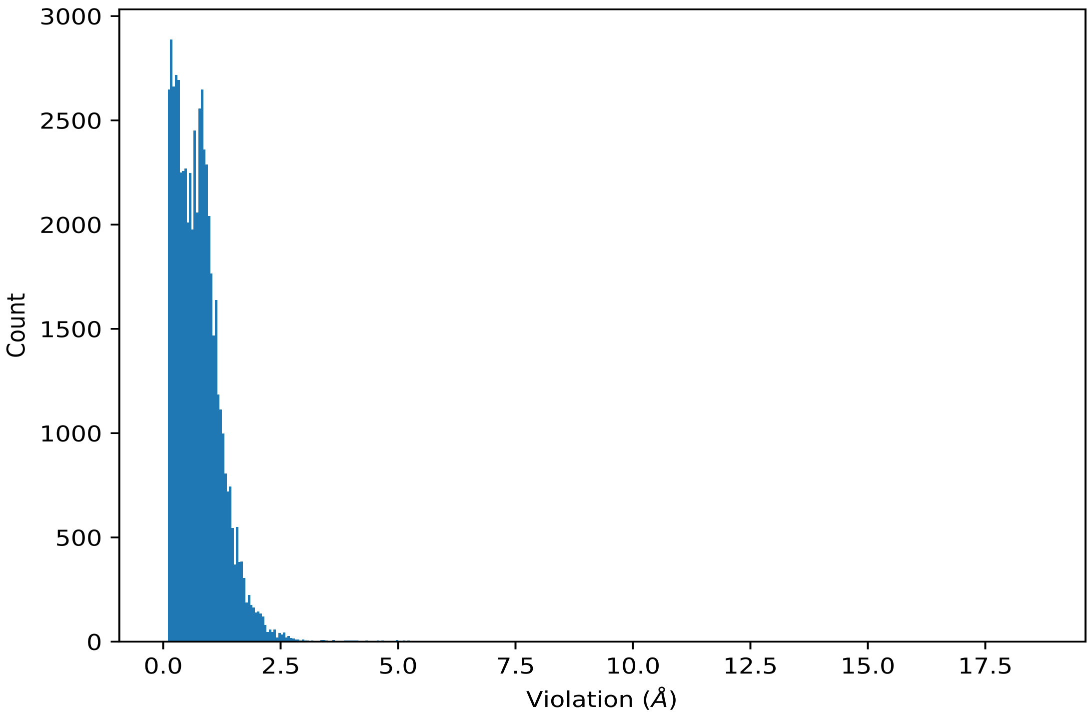
Key	Atom-1	Atom-2	Models[1]	Mean (Å)	SD[1] (Å)	Median (Å)
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	20	17.86	0.5	17.88
(2,2164)	1:A:32:LYS:HE2	1:A:29:SER:H	20	5.38	1.11	5.28
(2,386)	1:A:50:LEU:HA	1:A:54:THR:HB	20	5.26	1.2	5.4
(2,135)	1:A:29:SER:HB2	1:A:32:LYS:HE2	20	4.79	1.14	5.01
(2,131)	1:A:29:SER:HA	1:A:32:LYS:HE2	20	4.6	0.96	4.54
(2,2435)	1:A:74:VAL:H	1:A:76:LEU:HG	20	3.17	1.7	4.04
(2,2486)	1:A:35:ILE:HD11	1:A:28:TRP:HE1	20	2.87	1.02	2.64
(2,2486)	1:A:35:ILE:HD12	1:A:28:TRP:HE1	20	2.87	1.02	2.64
(2,2486)	1:A:35:ILE:HD13	1:A:28:TRP:HE1	20	2.87	1.02	2.64
(2,766)	1:A:75:LEU:HD11	1:A:76:LEU:HG	20	2.5	1.23	2.51
(2,766)	1:A:75:LEU:HD12	1:A:76:LEU:HG	20	2.5	1.23	2.51
(2,766)	1:A:75:LEU:HD13	1:A:76:LEU:HG	20	2.5	1.23	2.51
(2,2141)	1:A:27:ILE:HD11	1:A:26:LEU:H	20	2.42	0.34	2.45
(2,2141)	1:A:27:ILE:HD12	1:A:26:LEU:H	20	2.42	0.34	2.45
(2,2141)	1:A:27:ILE:HD13	1:A:26:LEU:H	20	2.42	0.34	2.45
(2,159)	1:A:64:LYS:HB2	1:A:67:GLY:HA2	20	2.29	0.42	2.34

[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)
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	20	18.69
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	3	18.58
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	7	18.5
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	13	18.42
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	5	18.39
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	19	18.23
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	12	18.19
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	1	18.07

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	18	18.02
(2,1741)	1:A:30:ASN:HB2	1:A:24:LEU:H	10	17.93

10 Dihedral-angle violation analysis (i)

No dihedral-angle restraints found