

Figure S1. Related to Results and discussion section 'High values of Rama-Z score from cryo-EM' and Figure 6. Examples of grid-like distributions on Ramachandran plot with high Rama-Z score. Triplets of numbers on the bottom right on each plot indicate, from top to bottom: percentage of residues in favored and outlier regions, Rama-Z.

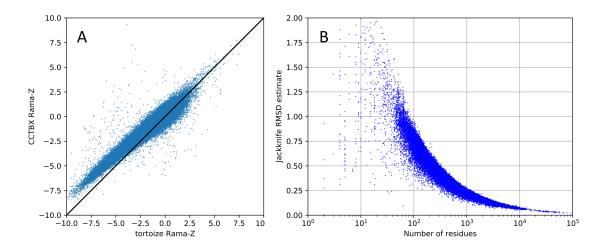


Figure S2. Validating the Rama-Z implementations and RMSD estimation. Related to STAR methods section 'Rama-Z implementation' and 'Rama-Z reliability'. Validating the Rama-Z implementations and RMSD estimation A. Rama-Z from CCTBX vs Rama-Z from *tortoize* for 124518 PDB-REDO entries; the diagonal is marked as a black line. B. Jackknife RMSD estimations (blue dots).

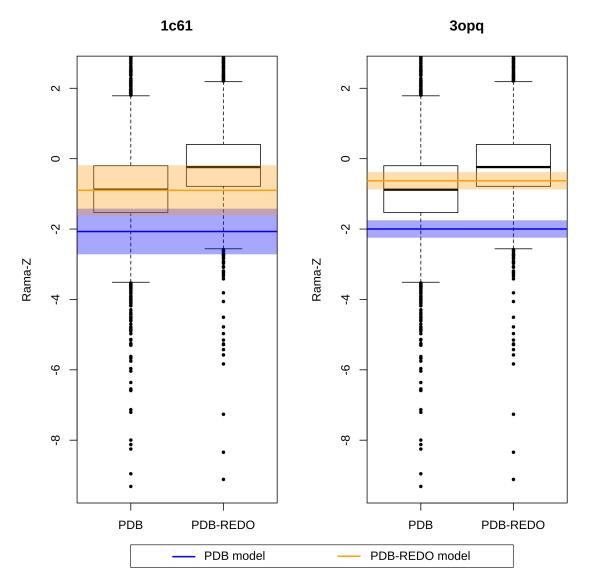


Figure S3. Related to STAR methods section 'Rama-Z reliability'. Two examples for the use of the RMSD value of Rama-Z in PDB-REDO: in 1c61 the improvement of the Rama-Z (blue line to orange line) appears significant, but it is not considering the large RMSD for this small structure (blue and orange background, indicating 1= RMSD); in 3opq a similar absolute value change in Rama-Z can be considered significant using the same criterion.

ALA706311989642026LEU674513046943158GLU499581282835618LYS368051258832908VAL358313936939014ARG356111293128789ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056TRP834151549754	Residue type	Helix	Sheet	Loop
GLU499581282835618LYS368051258832908VAL358313936939014ARG356111293128789ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	ALA	70631	19896	42026
LYS368051258832908VAL358313936939014ARG356111293128789ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	LEU	67451	30469	43158
VAL358313936939014ARG356111293128789ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	GLU	49958	12828	35618
ARG356111293128789ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	LYS	36805	12588	32908
ILE334852781629069SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	VAL	35831	39369	39014
SER332881561241675ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	ARG	35611	12931	28789
ASP320911121243895GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	ILE	33485	27816	29069
GLY314981660870883THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	SER	33288	15612	41675
THR279551985835816GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	ASP	32091	11212	43895
GLN27391776520117PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	GLY	31498	16608	70883
PHE227291637024794ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	THR	27955	19858	35816
ASN22412871532360TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	GLN	27391	7765	20117
TYR195851387922883MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	PHE	22729	16370	24794
MET16014673810847HIS12777680216117transPRO12581761547244prePRO12093816444056	ASN	22412	8715	32360
HIS12777680216117transPRO12581761547244prePRO12093816444056	TYR	19585	13879	22883
transPRO12581761547244prePRO12093816444056	MET	16014	6738	10847
prePRO 12093 8164 44056	HIS	12777	6802	16117
	transPRO	12581	7615	47244
TRP 8341 5154 9754	prePRO	12093	8164	44056
	TRP	8341	5154	9754
CYS 6606 5211 8371	CYS	6606	5211	8371
cisPRO 3953	cisPRO	-	-	3953

Table S1. Related to STAR methods section 'Rama-Z implementation'. Residue counts.

Table S2. Related to STAR methods section 'Key Resource Table'.

Table 52. Related to STAR methods section 'Re		1
REAGENT or RESOURCE	SOURCE	IDENTIFIER
Deposited Data		
The model was used to generate the Ramachandran	Anderson et al., 2002	PDB ID: 1ix9
plot on Figure 1 and Graphical abstract	·	
The model was used to generate the Ramachandran	Kumar <i>et al.</i> , 2015	PDB ID: 5a9z
plot on Figure 1		1 00 10. 0002
The model was used to generate the Ramachandran	Coleman et al., 2019	PDB ID: 6dzv
plot on Figure 1		1 00 10.0021
The model was used to generate the Ramachandran	Twomey et al., 2017	PDB ID: 5vhw
plot on Figure 4		
The model was used to generate the Ramachandran	Gorzelnik et al., 2016	PDB ID: 5kip
plot on Figure 4		
The model was used to generate the Ramachandran	Myasnikov et al., 2016	PDB ID: 5Lks
plot on Figure 4	,	
The model was used to generate the Ramachandran	Ding <i>et al.</i> , 2019	PDB ID: 6j2q
plot on Figure 4 and Graphical abstract	3	
The model was used to generate the Ramachandran	Li <i>et al.</i> , 2015	PDB ID: 3ja8
plot on Figure 4	,	,
The model was used to generate the Ramachandran	Croll, 2018	PDB ID: 6eyc
plot on Figure 4		
The model was used to generate the Ramachandran	von der Ecken et al.,	PDB ID: 3j8a
plot on Figure 4	2015	
The model was used to generate the Ramachandran	Sobti <i>et al.</i> , 2016	PDB ID: 5t4q
plot on Figure 4		
The model was used to generate the Ramachandran	Urnavicius et al., 2018	PDB ID: 6f38
plot on Figure 4		
The model was used to generate the Ramachandran	Estrozi <i>et al</i> ., 2011	PDB ID: 2xkv
plot on Figure 4		
The model was used to generate the Ramachandran	Vassal-Stermann et	PDB ID: 6qnt
plot on Figure 4	<i>al.</i> , 2019	
The model was used to generate the Ramachandran	Zhao <i>et al.</i> , 2017	PDB ID: 5voy
plot on Figure 4		
The model was used to generate the Ramachandran	Juers <i>et al.</i> , 2001	PDB ID: 1jz7
plot on Figure 5		
The model was used to generate the Ramachandran	Bartesaghi et al., 2014	PDB ID: 3j7h
plot on Figure 5	Eakon at al. 2016	
The model was used to generate the Ramachandran	Ecken <i>et al.</i> , 2016	PDB ID: 5jLh
plot on Figure 6	Risi <i>et al.</i> , 2018	PDB ID: 6g2t
The model was used to generate the Ramachandran plot on Figure 6 and Graphical abstract	RISI <i>et al.</i> , 2010	PDB ID. 0yzi
The model was used to generate the Ramachandran	Leulliot <i>et al.</i> , 2004	PDB ID: 1rje
plot on Figure 7		י טו טט י. ווןכ
The model was used to generate the Ramachandran	Huang <i>et al.</i> , 2004	PDB ID: 1ycy
plot on Figure 7	1 luang of al., 2007	
The model was used to generate the Ramachandran	Xu <i>et al.</i> , 2012	PDB ID: 3vbb
plot on Figure 7		
The model was used to generate the Ramachandran	Schmidt et al., 2012	PDB ID: 4akg
plot on Figure 7		
The model was used to generate the Ramachandran	Khan <i>et al.</i> , 2015	PDB ID: 4s0s
plot on Figure 7	, , , , ,	
The model was used to generate the Ramachandran	Ma & Yun, 2018	PDB ID: 6adg
plot on Figure 7	,	ۍ
The model was used to generate the Ramachandran	Risi <i>et al.</i> , 2018	PDB ID: 6cxi
plot on Figure S1		
The model was used to generate the Ramachandran	Risi <i>et al.</i> , 2018	PDB ID: 6cxj
plot on Figure S1		_