



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 2, 2021 – 03:13 pm BST

PDB ID : 7AM1
Title : Structure of yeast Ssd1, a pseudonuclease
Authors : Cook, A.G.; Jayachandran, U.
Deposited on : 2020-10-07
Resolution : 1.90 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.23.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.1

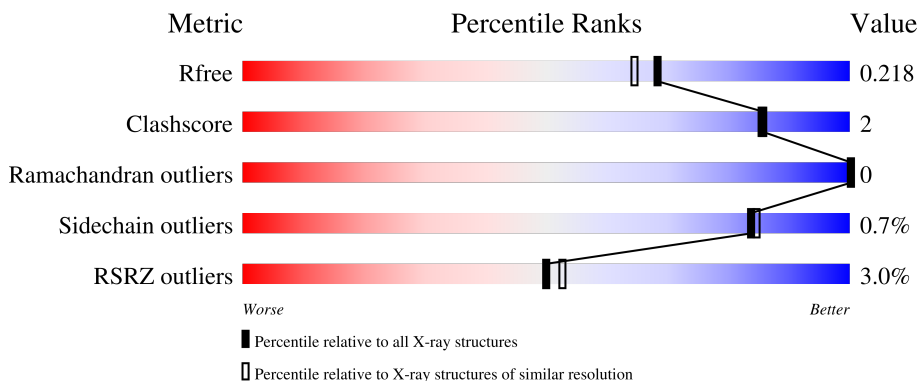
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 Å.

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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	916	 3% 84% 12%
1	B	916	 2% 84% 11%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 25110 atoms, of which 12095 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Protein SSD1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	810	12171	3937	5988	1048	1182	16	0	1	0
1	B	811	12274	3968	6048	1050	1192	16	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	335	GLY	-	expression tag	UNP P24276
A	336	PRO	-	expression tag	UNP P24276
A	337	ASP	-	expression tag	UNP P24276
A	338	SER	-	expression tag	UNP P24276
B	335	GLY	-	expression tag	UNP P24276
B	336	PRO	-	expression tag	UNP P24276
B	337	ASP	-	expression tag	UNP P24276
B	338	SER	-	expression tag	UNP P24276

- Molecule 2 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: C₁₀H₂₂O₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	1
			17	5	10	2		
2	A	1	Total	C	H	O	0	1
			19	5	11	3		
2	A	1	Total	C	H	O	0	0
			10	3	5	2		
2	B	1	Total	C	H	O	0	1
			17	5	10	2		
2	B	1	Total	C	H	O	0	1
			19	5	11	3		

- Molecule 3 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C₄H₁₂NO₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
3	B	1	20	4	12	1	3	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	279	Total	O	0	0
			279	279		
4	B	284	Total	O	0	0
			284	284		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	69.46Å 74.00Å 106.47Å 91.27° 91.80° 117.65°	Depositor
Resolution (Å)	61.46 – 1.90 106.32 – 1.84	Depositor EDS
% Data completeness (in resolution range)	96.8 (61.46-1.90) 96.6 (106.32-1.84)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.30 (at 1.83Å)	Xtrriage
Refinement program	PHENIX 1.13_2998, PHENIX 1.13_2998	Depositor
R, R_{free}	0.205 , 0.224 0.198 , 0.218	Depositor DCC
R_{free} test set	7918 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	33.8	Xtrriage
Anisotropy	0.623	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 55.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.000 for h,-h-k,-l 0.000 for -h,-k,l 0.000 for -h,h+k,-l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	25110	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: TRS, 1PE

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 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	0.27	0/6299	0.48	0/8575
1	B	0.28	0/6343	0.48	0/8634
All	All	0.28	0/12642	0.48	0/17209

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 the 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 within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6183	5988	5961	23	0
1	B	6226	6048	6025	30	0
2	A	20	26	5	0	0
2	B	15	21	0	0	0
3	B	8	12	12	0	0
4	A	279	0	0	2	0
4	B	284	0	0	1	0
All	All	13015	12095	12003	53	0

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 2.

All (53) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:622:LYS:CD	1:B:634:ILE:HG23	2.12	0.79
1:B:622:LYS:HD2	1:B:634:ILE:HG23	1.65	0.79
1:B:701:PHE:CZ	1:B:714:LEU:HD11	2.34	0.62
1:B:969:ARG:NH1	4:B:1404:HOH:O	2.27	0.62
1:B:622:LYS:HD3	1:B:634:ILE:HG23	1.82	0.61
1:A:1156:LEU:HD12	1:A:1196:ALA:HB1	1.83	0.60
1:A:1061:ASN:OD1	1:A:1062:THR:HG23	2.03	0.59
1:A:1123:ALA:O	1:A:1145[B]:ARG:HD3	2.05	0.57
1:B:1194:GLN:HG2	1:B:1198:GLU:CB	2.37	0.55
1:B:347:GLN:HA	1:B:350:ILE:HD12	1.89	0.54
1:B:1194:GLN:CG	1:B:1198:GLU:CB	2.87	0.53
1:A:706:LEU:HD11	1:A:1178:HIS:CG	2.44	0.52
1:B:366:VAL:HG13	1:B:399:GLU:OE1	2.11	0.50
1:B:512:LYS:O	1:B:516:VAL:HG23	2.12	0.50
1:B:600:LEU:CD1	1:B:634:ILE:HG22	2.42	0.49
1:A:907:LEU:C	1:A:907:LEU:HD23	2.33	0.48
1:A:554:LEU:O	4:A:1401:HOH:O	2.20	0.47
1:A:1065:GLN:OE1	1:A:1151:ILE:HD11	2.13	0.47
1:A:716:VAL:HB	1:A:829:TYR:HE1	1.80	0.47
1:B:1156:LEU:HD12	1:B:1196:ALA:HB1	1.96	0.46
1:A:895:ALA:HB2	1:A:992:THR:HG22	1.98	0.46
1:A:1064:GLY:O	1:A:1228:ARG:HD2	2.15	0.46
1:A:662:GLU:O	1:A:746:ARG:NH1	2.46	0.46
1:A:1233:MET:HE3	4:A:1672:HOH:O	2.15	0.46
1:B:622:LYS:HD2	1:B:634:ILE:CG2	2.42	0.45
1:A:760:LEU:C	1:A:760:LEU:HD12	2.37	0.45
1:B:1207:ARG:NH2	1:B:1216:GLU:OE2	2.50	0.45
1:A:948:ILE:CD1	1:A:957:ILE:HD12	2.47	0.45
1:B:843:ARG:HH11	1:B:843:ARG:HG2	1.82	0.45
1:B:701:PHE:HA	1:B:810:ASN:O	2.17	0.44
1:B:1194:GLN:HE21	1:B:1198:GLU:CB	2.30	0.44
1:A:601:ALA:HA	1:A:635:LEU:HD12	1.98	0.44
1:A:1054:LYS:HE2	1:A:1170:LEU:HD13	2.00	0.43
1:B:557:GLY:HA2	1:B:587:THR:HG23	2.00	0.43
1:B:550:ILE:HG21	1:B:1035:PHE:CD2	2.54	0.43
1:A:869:VAL:CG1	1:A:1048:ILE:HD11	2.49	0.43
1:B:1194:GLN:NE2	1:B:1198:GLU:O	2.52	0.43
1:A:1148:ALA:HA	1:A:1151:ILE:HD12	2.02	0.42
1:A:386:ILE:HD13	1:A:405:VAL:HG21	2.02	0.42
1:B:701:PHE:HE1	1:B:829:TYR:HE1	1.68	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1156:LEU:HD12	1:B:1196:ALA:CB	2.50	0.41
1:B:516:VAL:HG21	1:B:1136:TYR:CZ	2.56	0.41
1:B:678:PRO:HG2	1:B:771:GLU:OE1	2.19	0.41
1:B:760:LEU:HD12	1:B:760:LEU:C	2.40	0.41
1:B:657:ASN:O	1:B:1036:LYS:NZ	2.53	0.41
1:B:642:ILE:HD11	1:B:1234:ALA:HA	2.03	0.41
1:A:557:GLY:HA2	1:A:587:THR:HG23	2.03	0.41
1:A:1189:ALA:HB3	1:A:1199:LYS:HG2	2.03	0.41
1:A:1145[B]:ARG:CZ	1:A:1228:ARG:HD3	2.51	0.41
1:A:1156:LEU:HD12	1:A:1196:ALA:CB	2.48	0.40
1:B:378:THR:HG21	1:B:382:LEU:HD12	2.04	0.40
1:B:895:ALA:HB2	1:B:992:THR:HG22	2.04	0.40
1:B:1168:ASP:N	1:B:1169:PRO:CD	2.85	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 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 X-ray entries followed by that with respect to entries of similar resolution.

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	799/916 (87%)	782 (98%)	17 (2%)	0	100	100
1	B	799/916 (87%)	785 (98%)	14 (2%)	0	100	100
All	All	1598/1832 (87%)	1567 (98%)	31 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 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 X-ray entries followed by that with respect to entries of similar resolution.

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	640/822 (78%)	635 (99%)	5 (1%)	81	82
1	B	652/822 (79%)	648 (99%)	4 (1%)	86	87
All	All	1292/1644 (79%)	1283 (99%)	9 (1%)	84	84

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	366	VAL
1	A	405	VAL
1	A	526	VAL
1	A	1003	ASP
1	A	1195	ASN
1	B	366	VAL
1	B	912	MET
1	B	1003	ASP
1	B	1228	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1194	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

10 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	TRS	B	1302	-	7,7,7	0.43	0	9,9,9	0.32	0
2	1PE	A	1303	-	4,4,15	0.41	0	3,3,14	0.33	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	TRS	B	1302	-	-	4/9/9/9	-
2	1PE	A	1303	-	-	1/2/2/13	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	1302	TRS	C2-C-C1-O1
2	A	1303	1PE	OH7-C16-C26-OH6
3	B	1302	TRS	C3-C-C1-O1
3	B	1302	TRS	N-C-C1-O1
3	B	1302	TRS	N-C-C3-O3

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	810/916 (88%)	0.13	29 (3%) 42 45	32, 51, 101, 147	0
1	B	811/916 (88%)	0.05	19 (2%) 60 63	31, 50, 92, 135	0
All	All	1621/1832 (88%)	0.09	48 (2%) 50 53	31, 51, 96, 147	0

All (48) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	826	PRO	4.9
1	B	1194	GLN	4.5
1	A	1210	ASN	4.3
1	A	498	VAL	4.3
1	A	684	GLU	4.0
1	A	601	ALA	4.0
1	B	413	VAL	3.9
1	A	357	GLY	3.6
1	A	600	LEU	3.6
1	A	602	PRO	3.5
1	A	606	VAL	3.4
1	A	381	ALA	3.4
1	B	827	THR	3.4
1	A	720	GLY	3.2
1	A	336	PRO	3.2
1	A	1188	SER	3.1
1	A	360	VAL	3.0
1	A	338	SER	2.9
1	B	1192	ASN	2.7
1	A	1189	ALA	2.6
1	A	384	ALA	2.6
1	A	599	GLU	2.5
1	A	410	VAL	2.4
1	B	539	TYR	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	500	ARG	2.4
1	A	827	THR	2.4
1	B	360	VAL	2.4
1	A	361	ALA	2.4
1	A	339	SER	2.4
1	B	669	PRO	2.4
1	B	686	LEU	2.4
1	B	683	ALA	2.3
1	B	414	TRP	2.3
1	A	340	LEU	2.3
1	B	829	TYR	2.2
1	A	359	LEU	2.2
1	B	501	ARG	2.2
1	A	412	ASP	2.2
1	B	538	LEU	2.2
1	B	339	SER	2.1
1	A	829	TYR	2.1
1	B	1144	PHE	2.1
1	B	681	LEU	2.1
1	B	516	VAL	2.1
1	A	579	PRO	2.0
1	A	1234	ALA	2.0
1	A	350	ILE	2.0
1	A	1161	GLU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	TRS	B	1302	8/8	0.51	0.25	73,89,90,90	0
2	1PE	B	1301[B]	7/16	0.53	0.23	73,82,98,98	2
2	1PE	B	1301[A]	7/16	0.53	0.23	73,82,98,98	2
2	1PE	A	1303	5/16	0.65	0.20	94,95,114,114	0
2	1PE	A	1302[A]	8/16	0.72	0.12	86,103,109,110	1
2	1PE	A	1302[B]	8/16	0.72	0.12	86,103,109,110	1
2	1PE	A	1301[A]	7/16	0.83	0.12	70,74,89,89	2
2	1PE	A	1301[B]	7/16	0.83	0.12	70,74,89,89	2
2	1PE	B	1303[B]	8/16	0.86	0.15	56,68,71,75	1
2	1PE	B	1303[A]	8/16	0.86	0.15	56,68,71,75	1

6.5 Other polymers [i](#)

There are no such residues in this entry.