Full wwPDB EM Validation Report ⓘ

Jun 9, 2025 – 10:39 AM EDT

PDB ID	:	9CAF / pdb_00009caf
EMDB ID	:	EMD-45389
Title	:	Cryo-EM structure of the reconstituted TRRAP lobe of the human TIP60 complex (composite structure)
Authors	:	Louder, R.K.; Park, G.; Patel, A.B.
Deposited on	:	2024-06-17
Resolution	:	2.35 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
with specific help available everywhere you see the ⓘ 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 ⓘ) were used in the production of this report:

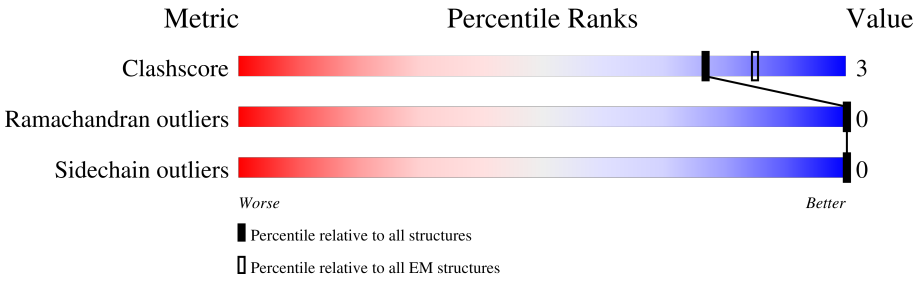
EMDB validation analysis	:	0.0.1.dev118
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

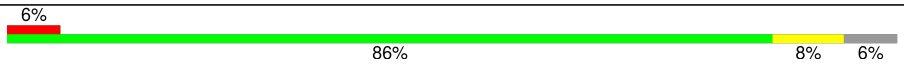
The reported resolution of this entry is 2.35 Å.

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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1122	
2	D	3811	

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 29921 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 E1A-binding protein p400,Haloalkane dehalogenase chimera.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	154	1235	779	222	230	4	0	0

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2132	PRO	-	linker	UNP Q96L91
A	2133	GLY	-	linker	UNP Q96L91
A	2364	ASP	-	insertion	UNP Q96L91
A	?	-	GLY	deletion	UNP Q96L91
A	2443	LEU	-	insertion	UNP Q96L91
A	?	-	SER	deletion	UNP Q96L91
A	2492	PRO	-	insertion	UNP Q96L91
A	2531	ASP	-	linker	UNP Q96L91
A	2532	GLY	-	linker	UNP Q96L91
A	2533	SER	-	linker	UNP Q96L91
A	2534	GLY	-	linker	UNP Q96L91
A	2535	GLY	-	linker	UNP Q96L91
A	2536	SER	-	linker	UNP Q96L91
A	2537	GLY	-	linker	UNP Q96L91
A	2538	GLU	-	linker	UNP Q96L91
A	2539	ASP	-	linker	UNP Q96L91
A	2540	LEU	-	linker	UNP Q96L91
A	2541	TYR	-	linker	UNP Q96L91
A	2542	PHE	-	linker	UNP Q96L91
A	2543	GLN	-	linker	UNP Q96L91
A	2544	SER	-	linker	UNP Q96L91
A	2545	GLY	-	linker	UNP Q96L91
A	2546	GLY	-	linker	UNP Q96L91
A	2547	SER	-	linker	UNP Q96L91
A	2548	MET	-	linker	UNP Q96L91
A	2549	ALA	-	linker	UNP Q96L91
A	2594	VAL	LEU	conflict	UNP P0A3G4
A	2605	THR	SER	conflict	UNP P0A3G4

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Chain	Residue	Modelled	Actual	Comment	Reference
A	2625	GLY	ASP	conflict	UNP P0A3G4
A	2634	PHE	TYR	conflict	UNP P0A3G4
A	2635	MET	LEU	conflict	UNP P0A3G4
A	2675	PHE	CYS	conflict	UNP P0A3G4
A	2702	THR	ALA	conflict	UNP P0A3G4
A	2707	LYS	GLU	conflict	UNP P0A3G4
A	2714	VAL	ALA	conflict	UNP P0A3G4
A	2719	THR	ALA	conflict	UNP P0A3G4
A	2722	MET	LYS	conflict	UNP P0A3G4
A	2723	GLY	CYS	conflict	UNP P0A3G4
A	2742	ASN	LYS	conflict	UNP P0A3G4
A	2771	GLU	ALA	conflict	UNP P0A3G4
A	2774	ASP	ASN	conflict	UNP P0A3G4
A	2804	LYS	GLU	conflict	UNP P0A3G4
A	2811	ALA	THR	conflict	UNP P0A3G4
A	2819	ASN	HIS	conflict	UNP P0A3G4
A	2820	LEU	TYR	conflict	UNP P0A3G4
A	2838	SER	-	expression tag	UNP P0A3G4
A	2839	THR	-	expression tag	UNP P0A3G4
A	2840	LEU	-	expression tag	UNP P0A3G4
A	2841	GLU	-	expression tag	UNP P0A3G4
A	2842	ILE	-	expression tag	UNP P0A3G4
A	2843	SER	-	expression tag	UNP P0A3G4
A	2844	GLY	-	expression tag	UNP P0A3G4
A	2845	GLY	-	expression tag	UNP P0A3G4
A	2846	GLY	-	expression tag	UNP P0A3G4
A	2847	HIS	-	expression tag	UNP P0A3G4
A	2848	HIS	-	expression tag	UNP P0A3G4
A	2849	HIS	-	expression tag	UNP P0A3G4
A	2850	HIS	-	expression tag	UNP P0A3G4
A	2851	HIS	-	expression tag	UNP P0A3G4
A	2852	HIS	-	expression tag	UNP P0A3G4

- Molecule 2 is a protein called Isoform 2 of Transformation/transcription domain-associated protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	D	3570	Total	C	N	O	S	0	0
			28650	18360	4952	5140	198		

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	521	SER	VAL	conflict	UNP Q9Y4A5
D	522	GLY	PRO	conflict	UNP Q9Y4A5
D	523	GLY	THR	conflict	UNP Q9Y4A5
D	524	GLY	ALA	conflict	UNP Q9Y4A5
D	525	ALA	PRO	conflict	UNP Q9Y4A5
D	526	SER	ALA	conflict	UNP Q9Y4A5
D	527	GLY	ALA	conflict	UNP Q9Y4A5
D	528	GLY	PRO	conflict	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	ALA	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	SER	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	ALA	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	VAL	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	ALA	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	ALA	deletion	UNP Q9Y4A5
D	?	-	THR	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	VAL	deletion	UNP Q9Y4A5
D	?	-	THR	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	ALA	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	VAL	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PRO	deletion	UNP Q9Y4A5
D	?	-	PHE	deletion	UNP Q9Y4A5
D	?	-	GLU	deletion	UNP Q9Y4A5
D	?	-	LYS	deletion	UNP Q9Y4A5
D	530	SER	GLN	conflict	UNP Q9Y4A5

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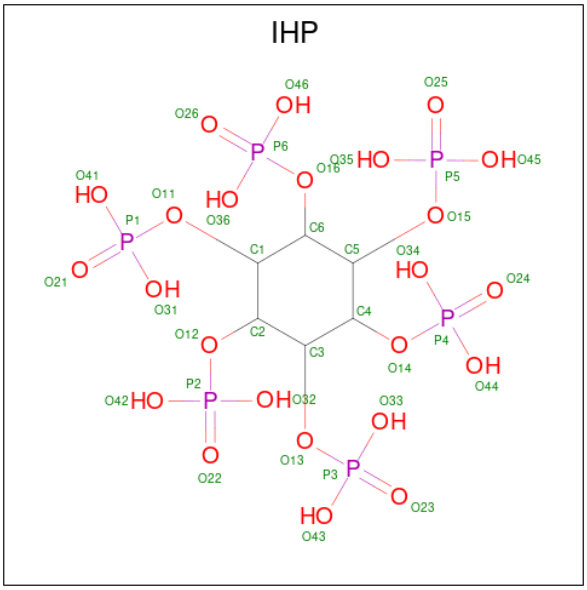
Chain	Residue	Modelled	Actual	Comment	Reference
D	2007N	GLY	-	insertion	UNP Q9Y4A5
D	2007O	ASP	-	insertion	UNP Q9Y4A5
D	2007P	TYR	-	insertion	UNP Q9Y4A5
D	2007Q	LYS	-	insertion	UNP Q9Y4A5
D	2007R	ASP	-	insertion	UNP Q9Y4A5
D	2007S	HIS	-	insertion	UNP Q9Y4A5
D	2007T	ASP	-	insertion	UNP Q9Y4A5
D	2007U	ILE	-	insertion	UNP Q9Y4A5
D	2007V	ASP	-	insertion	UNP Q9Y4A5
D	2007W	TYR	-	insertion	UNP Q9Y4A5
D	2007X	LYS	-	insertion	UNP Q9Y4A5
D	2007Y	ASP	-	insertion	UNP Q9Y4A5
D	2007Z	ASP	-	insertion	UNP Q9Y4A5
D	2008A	ASP	-	insertion	UNP Q9Y4A5
D	2008B	ASP	-	insertion	UNP Q9Y4A5
D	2008C	LYS	VAL	conflict	UNP Q9Y4A5
D	2008D	GLY	ASN	conflict	UNP Q9Y4A5

- Molecule 3 is INOSITOL HEXAKISPHOSPHATE (CCD ID: IHP) (formula: $C_6H_{18}O_{24}P_6$).



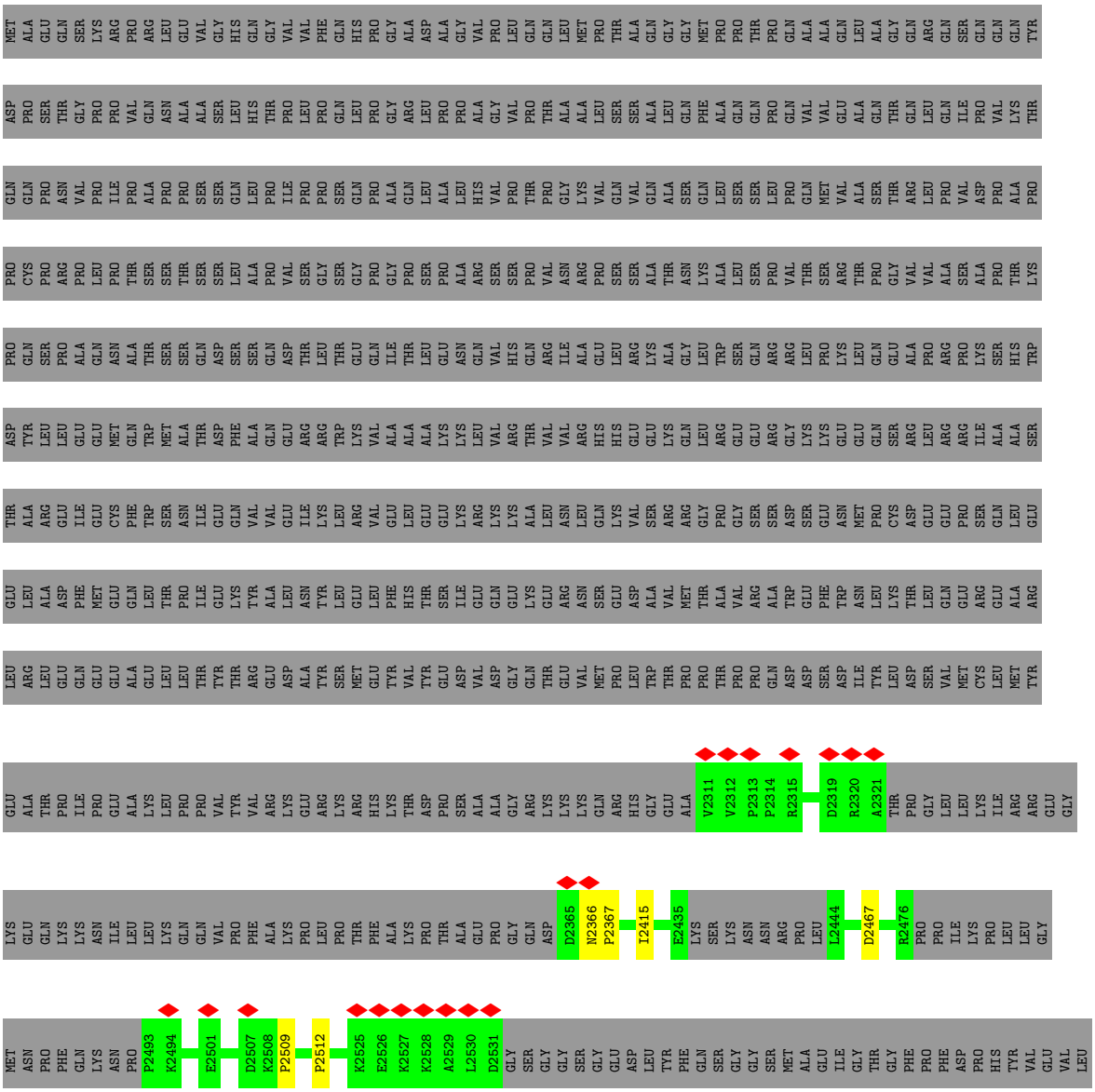
Mol	Chain	Residues	Atoms				AltConf
			Total	C	O	P	
3	D	1	36	6	24	6	0

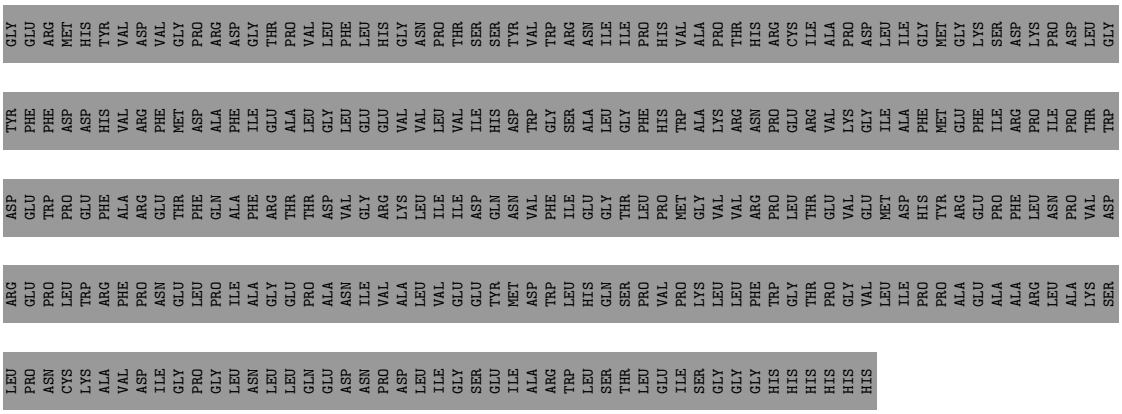
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-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. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: E1A-binding protein p400,Haloalkane dehalogenase chimera

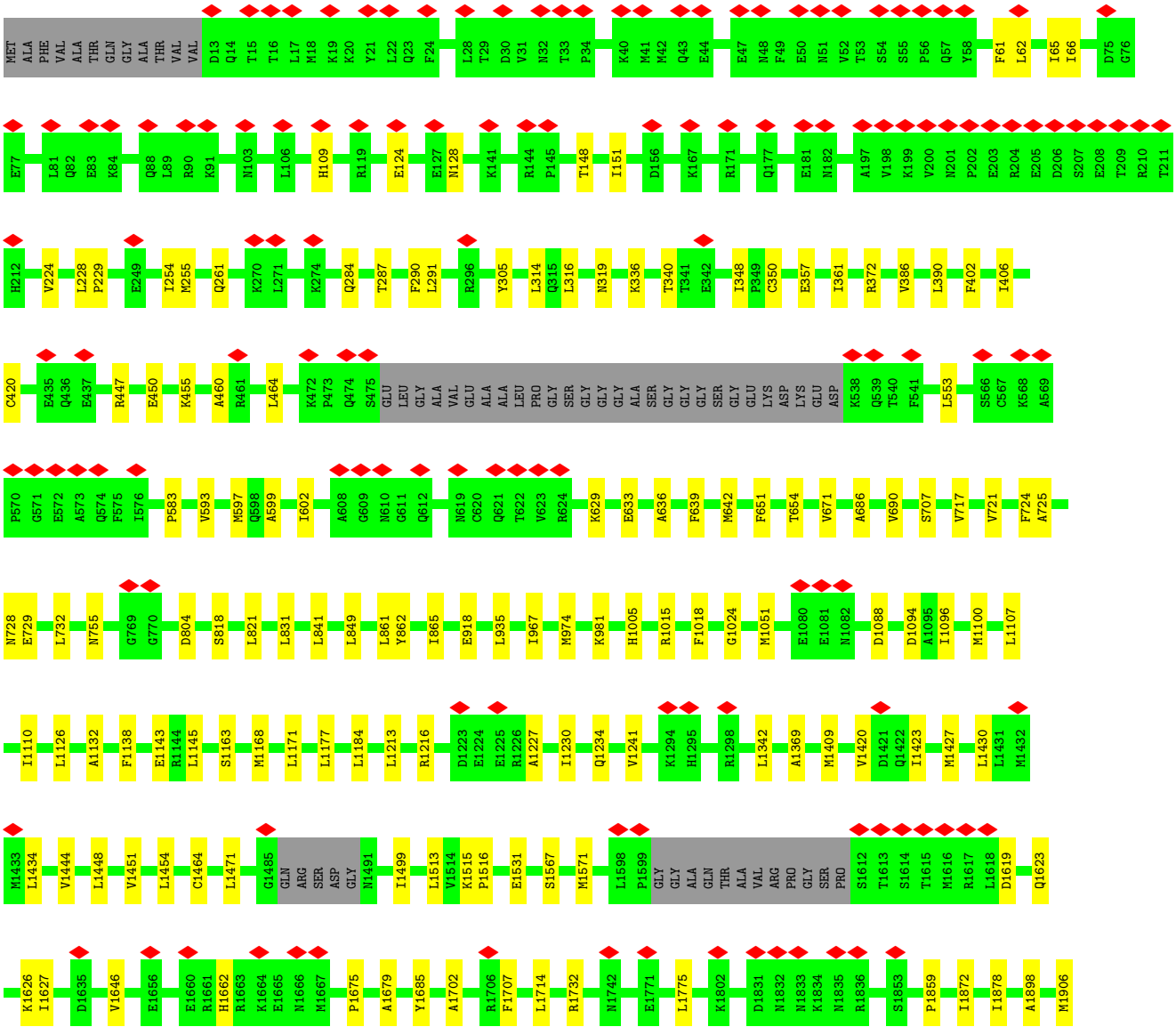
Chain A:

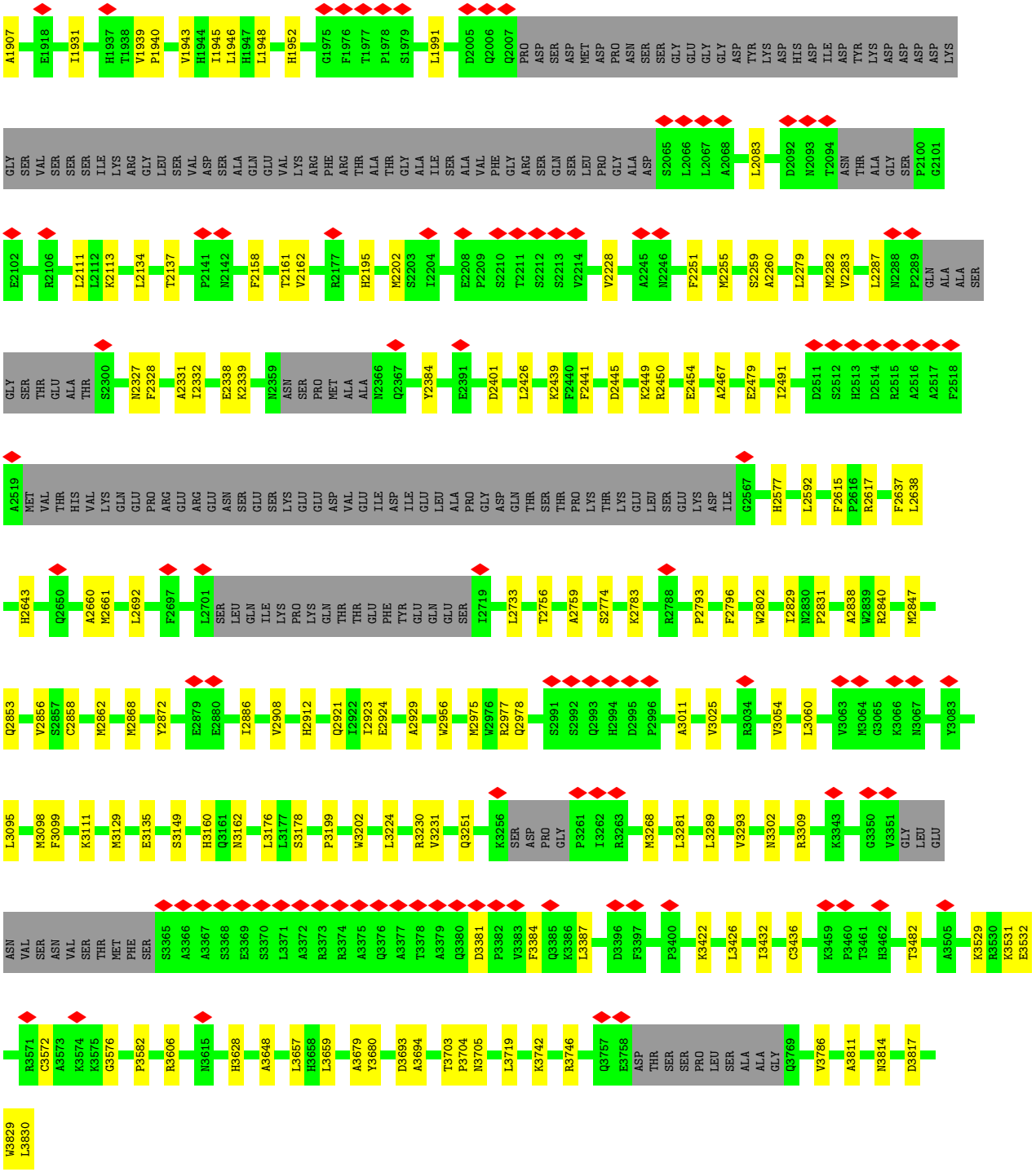




• Molecule 2: Isoform 2 of Transformation/transcription domain-associated protein

Chain D:




A1907 E1918 I1931 H1937 T1938 V1939 P1940 V1943 H1944 I1945 L1946 H1947 L1948 H1952 G1975 F1976 T1977 P1978 S1979 L1991 D2005 Q2006 Q2007
PRO ASP SER ASP MET ASP PRO ASN SER SER GLY GLU GLY GLY ASP TYR LYS ASP HIS ASP ILE ASP TYR LYS ASP ASP ASP ASP LYS
GLY SER VAL SER SER SER ILE LYS ARG GLY LEU SER VAL ASP SER ALA GLN GLU VAL LYS ARG PHE ARG THR ALA THR GLY ALA ILE SER ALA VAL PHE GLY ARG SER GLN SER LEU PRO GLY ALA ASP S2065 L2066 L2067 A2068 L2083 D2092 N2093 T2094 ASN THR ALA GLY SER P2100 G2101
E2102 R2106 L2111 L2112 K2113 L2134 T2137 P2141 N2142 F2158 T2161 V2162 R2177 H2195 M2202 S2203 I2204 E2208 P2209 S2210 T2211 S2212 S2213 V2214 V2228 A2245 N2246 F2251 M2255 S2259 A2260 L2279 M2282 V2283 L2287 N2288 P2289 GLN ALA ALA SER
GLY SER THR GLU ALA THR S2300 N2327 F2328 A2331 I2332 E2338 K2339 N2359 ASN SER PRO MET ALA ALA N2366 Q2367 Y2384 E2391 D2401 L2426 K2439 F2440 F2441 D2445 K2449 R2450 E2454 A2467 E2479 I2491 D2511 S2512 H2513 D2514 R2515 A2516 A2517 F2518
A2519 MET VAL THR HIS VAL LYS GLN GLU PRO ARG GLU ARG GLU ASN SER GLU SER LYS GLU GLU ASP VAL GLU ILE ASP ILE GLU LEU ALA PRO GLY ASP GLN THR SER THR PRO LYS THR LYS GLU LEU SER GLU LYS ASP ILE G2567 H2577 L2592 F2615 P2616 R2617 F2637 L2638
H2643 Q2650 A2660 M2661 L2692 F2697 L2701 SER LEU GLN ILE LYS PRO LYS GLN THR THR GLU PHE TYR GLU GLN GLU SER I2719 L2733 T2756 A2759 S2774 K2783 R2788 P2793 F2796 W2802 I2829 N2830 P2831 A2838 W2839 R2840 M2847
Q2853 V2856 S2857 C2858 M2862 M2868 Y2872 E2879 E2880 I2886 V2908 H2912 Q2921 I2922 I2923 E2924 A2929 W2956 M2975 W2976 R2977 Q2978 S2991 S2992 Q2993 H2994 D2995 P2996 A3011 V3025 R3034 V3054 L3060 V3063 M3064 G3065 K3066 N3067 Y3083
L3095 M3098 F3099 K3111 M3129 E3135 S3149 H3160 Q3161 N3162 L3176 L3177 S3178 P3199 W3202 L3224 R3230 V3231 Q3251 K3256 SER ASP PRO GLY P3261 I3262 R3263 M3268 L3281 L3289 V3293 N3302 R3309 K3343 G3350 V3351 GLY LEU GLU
ASN VAL SER ASN VAL SER THR MET PHE SER S3365 A3366 A3367 S3368 E3369 S3370 L3371 A3372 R3373 R3374 A3375 Q3376 A3377 T3378 A3379 Q3380 D3381 P3382 V3383 F3384 Q3385 K3386 L3387 D3396 F3397 P3400 K3422 L3426 I3432 C3436 K3459 P3460 T3461 H3462 T3482 A3505 K3529 R3530 K3531 E3532
R3571 C3572 A3573 K3574 K3575 G3576 P3582 R3606 N3615 H3628 A3648 L3657 H3658 L3659 A3679 Y3680 D3693 A3694 T3703 P3704 N3705 L3719 K3742 R3746 Q3757 E3758 ASP THR SER SER PRO LEU SER ALA ALA GLY Q3769 V3786 A3811 N3814 D3817
W3829 L3830

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	141352	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	Not provided	
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	2.099	Depositor
Minimum map value	-0.178	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.022	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	371.712, 371.712, 371.712	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.726, 0.726, 0.726	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: IHP

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	0.14	0/1259	0.32	0/1707
2	D	0.16	0/29263	0.35	0/39628
All	All	0.16	0/30522	0.35	0/41335

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

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	1235	0	1242	5	0
2	D	28650	0	29217	167	0
3	D	36	0	6	1	0
All	All	29921	0	30465	169	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 3.

All (169) 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)
2:D:2868:MET:HE1	2:D:2921:GLN:HB3	1.59	0.85
2:D:3432:ILE:HG23	2:D:3436:CYS:HB2	1.64	0.77
2:D:2327:ASN:O	2:D:2331:ALA:HB3	1.86	0.75
2:D:2426:LEU:HD12	2:D:2467:ALA:HB3	1.70	0.72
2:D:361:ILE:HD13	2:D:372:ARG:HG2	1.73	0.70
2:D:1906:MET:HE2	2:D:1948:LEU:HD13	1.74	0.68
2:D:124:GLU:OE2	2:D:128:ASN:ND2	2.20	0.66
2:D:707:SER:OG	2:D:755:ASN:ND2	2.29	0.66
2:D:1145:LEU:HD13	2:D:1163:SER:HB3	1.81	0.62
2:D:2886:ILE:HG21	2:D:2929:ALA:HB2	1.83	0.61
2:D:918:GLU:HA	2:D:3628:HIS:NE2	2.17	0.60
2:D:935:LEU:HD22	2:D:2617:ARG:HB3	1.84	0.59
2:D:3703:THR:HG22	2:D:3704:PRO:HD2	1.85	0.59
2:D:1859:PRO:HB2	2:D:1898:ALA:HB2	1.84	0.58
2:D:2279:LEU:HA	2:D:2282:MET:HE3	1.86	0.58
2:D:1126:LEU:HD12	2:D:1132:ALA:HA	1.87	0.57
2:D:3054:VAL:HG13	2:D:3099:PHE:HE2	1.69	0.57
2:D:818:SER:HA	2:D:821:LEU:HD23	1.86	0.57
2:D:861:LEU:O	2:D:865:ILE:HG23	2.03	0.57
2:D:148:THR:H	2:D:151:ILE:HD12	1.70	0.56
2:D:357:GLU:HG3	2:D:361:ILE:HD12	1.86	0.56
2:D:2283:VAL:HG21	2:D:2332:ILE:HG23	1.89	0.55
2:D:1430:LEU:HD11	2:D:1444:VAL:HG13	1.86	0.55
2:D:967:ILE:HD13	2:D:1024:GLY:HA3	1.89	0.54
2:D:629:LYS:NZ	2:D:633:GLU:OE2	2.33	0.54
2:D:3054:VAL:HG13	2:D:3099:PHE:CE2	2.42	0.54
2:D:3178:SER:OG	2:D:3746:ARG:NH1	2.40	0.54
2:D:1168:MET:O	2:D:1216:ARG:NH1	2.38	0.54
2:D:3025:VAL:HG11	2:D:3060:LEU:HG	1.90	0.54
2:D:2491:ILE:HD11	2:D:2592:LEU:HD13	1.89	0.54
1:A:2367:PRO:HG2	1:A:2415:ILE:HG21	1.89	0.53
2:D:1872:ILE:HG22	2:D:1878:ILE:HD11	1.90	0.53
2:D:1646:VAL:HG21	2:D:1685:TYR:CD1	2.42	0.53
1:A:2366:ASN:HB2	1:A:2367:PRO:HD3	1.91	0.53
2:D:1940:PRO:HA	2:D:1943:VAL:HG22	1.91	0.53
2:D:2840:ARG:HB3	2:D:2975:MET:SD	2.49	0.53
2:D:261:GLN:OE1	2:D:319:ASN:ND2	2.41	0.53
2:D:254:ILE:HG21	2:D:291:LEU:HB2	1.91	0.52
2:D:3693:ASP:OD1	2:D:3694:ALA:N	2.36	0.52
2:D:1662:HIS:CD2	2:D:1675:PRO:HD3	2.45	0.52
2:D:2838:ALA:HB3	2:D:2847:MET:HG2	1.92	0.52
2:D:639:PHE:HA	2:D:642:MET:HE3	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:2793:PRO:HA	2:D:2796:PHE:CD2	2.45	0.51
2:D:2445:ASP:OD2	2:D:2450:ARG:NH1	2.42	0.51
2:D:406:ILE:HD12	2:D:420:CYS:SG	2.50	0.51
2:D:1567:SER:O	2:D:1571:MET:HG2	2.11	0.51
2:D:593:VAL:HG12	2:D:597:MET:HE2	1.93	0.51
2:D:2401:ASP:OD1	2:D:2439:LYS:NZ	2.33	0.50
2:D:2251:PHE:O	2:D:2255:MET:HG2	2.11	0.50
2:D:1184:LEU:HD22	2:D:1241:VAL:HG13	1.92	0.50
2:D:2338:GLU:OE2	2:D:2384:TYR:OH	2.23	0.50
2:D:255:MET:HG3	2:D:305:TYR:HB3	1.94	0.50
2:D:2158:PHE:O	2:D:2161:THR:HG22	2.12	0.50
2:D:402:PHE:O	2:D:406:ILE:HG12	2.13	0.49
2:D:314:LEU:HD11	2:D:350:CYS:SG	2.51	0.49
2:D:66:ILE:HG21	2:D:109:HIS:HB3	1.94	0.49
2:D:2083:LEU:HD21	2:D:2111:LEU:HD23	1.94	0.49
2:D:1434:LEU:HD22	2:D:1448:LEU:HD11	1.95	0.49
2:D:2853:GLN:O	2:D:2856:VAL:HG22	2.13	0.49
2:D:3582:PRO:HB2	2:D:3829:TRP:CZ2	2.48	0.49
2:D:1946:LEU:HD13	2:D:1991:LEU:HD11	1.95	0.48
2:D:2868:MET:HE2	2:D:2872:TYR:CE1	2.47	0.48
2:D:3529:LYS:HD2	3:D:3901:IHP:O36	2.14	0.48
1:A:2467:ASP:OD1	2:D:2783:LYS:NZ	2.42	0.48
2:D:3381:ASP:HB3	2:D:3384:PHE:HB3	1.96	0.48
2:D:1619:ASP:O	2:D:1623:GLN:HG2	2.13	0.48
2:D:2441:PHE:CE1	2:D:2479:GLU:HG2	2.48	0.48
2:D:2638:LEU:HD11	2:D:2661:MET:HE1	1.96	0.48
2:D:3302:ASN:HD21	2:D:3426:LEU:HD13	1.79	0.48
2:D:1342:LEU:HD23	2:D:1369:ALA:HB2	1.97	0.47
2:D:2202:MET:HE1	2:D:2228:VAL:HG11	1.96	0.47
2:D:2449:LYS:HD2	2:D:2454:GLU:HG2	1.97	0.47
2:D:3251:GLN:HB2	2:D:3268:MET:HE1	1.95	0.47
2:D:62:LEU:HD22	2:D:66:ILE:HD11	1.96	0.47
2:D:3742:LYS:HG3	2:D:3786:VAL:HG21	1.96	0.47
2:D:254:ILE:HG23	2:D:287:THR:HG22	1.97	0.47
2:D:1732:ARG:HG3	2:D:1775:LEU:HD12	1.96	0.47
2:D:831:LEU:HD21	2:D:849:LEU:HD13	1.96	0.47
2:D:1571:MET:HE1	2:D:1627:ILE:HG13	1.97	0.46
2:D:1662:HIS:NE2	2:D:1675:PRO:HD3	2.30	0.46
2:D:862:TYR:O	2:D:865:ILE:HG12	2.16	0.46
2:D:2759:ALA:HB2	2:D:2774:SER:HB2	1.96	0.46
2:D:65:ILE:HG13	2:D:66:ILE:N	2.31	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:1907:ALA:HA	2:D:1952:HIS:NE2	2.30	0.46
2:D:3657:LEU:O	2:D:3659:LEU:N	2.49	0.46
2:D:583:PRO:HB3	2:D:1531:GLU:HB2	1.99	0.45
2:D:3679:ALA:HA	2:D:3680:TYR:CG	2.51	0.45
2:D:1051:MET:HE1	2:D:2577:HIS:CG	2.51	0.45
2:D:1168:MET:HE1	2:D:1213:LEU:HB2	1.97	0.45
1:A:2509:PRO:HG3	2:D:3111:LYS:HG2	1.98	0.45
2:D:1427:MET:HE2	2:D:1451:VAL:HG21	1.98	0.45
2:D:2113:LYS:HA	2:D:2158:PHE:CZ	2.52	0.45
2:D:2637:PHE:O	2:D:2643:HIS:NE2	2.45	0.45
2:D:2978:GLN:NE2	2:D:3011:ALA:HB3	2.32	0.45
2:D:1409:MET:HG2	2:D:1454:LEU:HD13	1.99	0.44
2:D:224:VAL:O	2:D:228:LEU:HG	2.17	0.44
2:D:3202:TRP:CZ2	2:D:3224:LEU:HD11	2.53	0.44
2:D:455:LYS:HG3	2:D:553:LEU:HD11	2.00	0.44
2:D:3309:ARG:HG3	2:D:3482:THR:HG22	1.99	0.44
2:D:3098:MET:SD	2:D:3129:MET:HE2	2.58	0.44
2:D:3160:HIS:CE1	2:D:3162:ASN:HB3	2.52	0.44
2:D:690:VAL:CG1	2:D:717:VAL:HG11	2.48	0.43
2:D:1679:ALA:HB1	2:D:1714:LEU:HD11	1.99	0.43
2:D:1005:HIS:ND1	2:D:1143:GLU:OE1	2.34	0.43
2:D:1471:LEU:HB2	2:D:1499:ILE:HG21	2.00	0.43
2:D:974:MET:HB3	2:D:1018:PHE:CZ	2.52	0.43
2:D:2829:ILE:HG22	2:D:2831:PRO:HD3	1.99	0.43
2:D:3705:ASN:HB2	2:D:3830:LEU:O	2.18	0.43
2:D:2195:HIS:ND1	2:D:2259:SER:OG	2.52	0.43
2:D:2287:LEU:HD13	2:D:2339:LYS:HE3	2.01	0.43
2:D:3703:THR:HG22	2:D:3704:PRO:CD	2.48	0.43
2:D:1464:CYS:HB3	2:D:1513:LEU:HD11	1.99	0.43
2:D:2328:PHE:HA	2:D:2332:ILE:HD12	2.01	0.43
2:D:1227:ALA:HB3	2:D:1230:ILE:HG22	2.00	0.43
2:D:2692:LEU:HD12	2:D:2733:LEU:HD12	1.99	0.43
2:D:1515:LYS:HB3	2:D:1516:PRO:HD3	2.00	0.43
1:A:2512:PRO:HG2	2:D:3149:SER:HB3	2.01	0.43
2:D:386:VAL:HG12	2:D:390:LEU:HG	2.00	0.43
2:D:447:ARG:NH1	2:D:450:GLU:OE1	2.50	0.42
2:D:2441:PHE:CZ	2:D:2479:GLU:HG2	2.54	0.42
2:D:2615:PHE:HB3	2:D:2660:ALA:HB1	2.01	0.42
2:D:3811:ALA:HA	2:D:3814:ASN:ND2	2.33	0.42
2:D:3135:GLU:HG3	2:D:3176:LEU:HD21	2.02	0.42
2:D:1177:LEU:HD22	2:D:1234:GLN:HA	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:2858:CYS:SG	2:D:2862:MET:HB3	2.59	0.42
2:D:686:ALA:O	2:D:690:VAL:HG22	2.19	0.42
2:D:724:PHE:HB2	2:D:728:ASN:ND2	2.34	0.42
2:D:1096:ILE:O	2:D:1100:MET:HG2	2.19	0.42
2:D:1107:LEU:O	2:D:1110:ILE:HG22	2.20	0.42
2:D:725:ALA:HB1	2:D:729:GLU:OE2	2.20	0.42
2:D:1931:ILE:HG12	2:D:1945:ILE:HD11	2.01	0.42
2:D:3230:ARG:HG2	2:D:3281:LEU:HD22	2.02	0.42
2:D:464:LEU:HD21	2:D:602:ILE:HB	2.00	0.42
2:D:862:TYR:HA	2:D:865:ILE:HG12	2.02	0.41
2:D:336:LYS:O	2:D:340:THR:HG23	2.20	0.41
2:D:460:ALA:HA	2:D:464:LEU:HD12	2.02	0.41
2:D:2923:ILE:HG13	2:D:2924:GLU:N	2.34	0.41
2:D:3572:CYS:O	2:D:3576:GLY:N	2.54	0.41
2:D:61:PHE:O	2:D:65:ILE:HG12	2.19	0.41
2:D:229:PRO:HB3	2:D:290:PHE:HB2	2.02	0.41
2:D:284:GLN:HB3	2:D:316:LEU:HD21	2.03	0.41
2:D:981:LYS:HB3	2:D:981:LYS:HE2	1.96	0.41
2:D:1138:PHE:CE1	2:D:1171:LEU:HD21	2.55	0.41
2:D:1702:ALA:HA	2:D:1707:PHE:HE2	1.85	0.41
2:D:651:PHE:HA	2:D:654:THR:OG1	2.20	0.41
2:D:1015:ARG:NH1	2:D:1088:ASP:OD1	2.54	0.41
2:D:1015:ARG:NH2	2:D:1094:ASP:OD2	2.54	0.41
2:D:348:ILE:HG12	2:D:386:VAL:HG13	2.02	0.41
2:D:464:LEU:HD11	2:D:599:ALA:HA	2.03	0.41
2:D:804:ASP:HA	2:D:841:LEU:HD11	2.03	0.41
2:D:1420:VAL:HA	2:D:1423:ILE:HD12	2.03	0.41
2:D:1571:MET:HG3	2:D:1626:LYS:HE3	2.02	0.41
2:D:2134:LEU:O	2:D:2137:THR:OG1	2.36	0.41
2:D:3199:PRO:HG3	2:D:3231:VAL:HG21	2.02	0.41
2:D:3387:LEU:HD21	2:D:3422:LYS:HE3	2.03	0.41
2:D:1939:VAL:N	2:D:1940:PRO:HD2	2.36	0.41
2:D:1702:ALA:HA	2:D:1707:PHE:CE2	2.56	0.40
2:D:3289:LEU:O	2:D:3293:VAL:HG23	2.21	0.40
2:D:3531:LYS:HG2	2:D:3532:GLU:H	1.86	0.40
2:D:721:VAL:HG21	2:D:732:LEU:HD22	2.03	0.40
2:D:2158:PHE:O	2:D:2162:VAL:HG23	2.21	0.40
2:D:2756:THR:OG1	2:D:2802:TRP:NE1	2.49	0.40
2:D:2908:VAL:HA	2:D:2912:HIS:CE1	2.56	0.40
2:D:3054:VAL:HG11	2:D:3095:LEU:HD13	2.03	0.40
2:D:636:ALA:HB2	2:D:671:VAL:HG13	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:2202:MET:SD	2:D:2260:ALA:HA	2.61	0.40
2:D:2956:TRP:O	2:D:2977:ARG:NH1	2.55	0.40
2:D:3606:ARG:NH1	2:D:3817:ASP:OD1	2.55	0.40
2:D:3648:ALA:HB2	2:D:3719:LEU:HD12	2.03	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 PDB entries followed by that with respect to all EM 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	146/1122 (13%)	145 (99%)	1 (1%)	0	100	100
2	D	3544/3811 (93%)	3488 (98%)	56 (2%)	0	100	100
All	All	3690/4933 (75%)	3633 (98%)	57 (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 PDB entries followed by that with respect to all EM 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	138/974 (14%)	138 (100%)	0	100	100
2	D	3187/3377 (94%)	3187 (100%)	0	100	100
All	All	3325/4351 (76%)	3325 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (33) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2455	ASN
1	A	2465	HIS
2	D	57	GLN
2	D	98	HIS
2	D	140	HIS
2	D	212	HIS
2	D	307	GLN
2	D	346	GLN
2	D	457	HIS
2	D	610	ASN
2	D	612	GLN
2	D	755	ASN
2	D	874	GLN
2	D	920	GLN
2	D	1234	GLN
2	D	1504	HIS
2	D	1562	ASN
2	D	1634	ASN
2	D	1824	HIS
2	D	1951	GLN
2	D	2280	GLN
2	D	2496	GLN
2	D	2683	ASN
2	D	2694	HIS
2	D	2765	HIS
2	D	2772	GLN
2	D	2853	GLN
2	D	2939	ASN
2	D	2982	GLN
2	D	3000	ASN
2	D	3278	GLN
2	D	3302	ASN
2	D	3686	ASN

5.3.3 RNA

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is 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	IHP	D	3901	-	36,36,36	2.04	7 (19%)	60,60,60	1.29	5 (8%)

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	IHP	D	3901	-	-	4/30/54/54	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	3901	IHP	P4-O14	4.77	1.67	1.59
3	D	3901	IHP	P5-O15	4.69	1.67	1.59
3	D	3901	IHP	P6-O16	4.42	1.67	1.59
3	D	3901	IHP	P2-O12	4.40	1.67	1.59
3	D	3901	IHP	P1-O11	4.39	1.67	1.59
3	D	3901	IHP	P3-O13	4.08	1.66	1.59
3	D	3901	IHP	O16-C6	-3.14	1.33	1.44

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	3901	IHP	C5-C6-C1	5.04	121.49	110.43
3	D	3901	IHP	C6-C5-C4	3.80	118.76	110.43
3	D	3901	IHP	C5-C4-C3	2.41	115.71	110.43
3	D	3901	IHP	C6-C1-C2	2.36	115.59	110.43
3	D	3901	IHP	C4-C3-C2	2.14	115.12	110.43

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	3901	IHP	C1-O11-P1-O21
3	D	3901	IHP	C5-O15-P5-O35
3	D	3901	IHP	C6-O16-P6-O46
3	D	3901	IHP	C6-O16-P6-O26

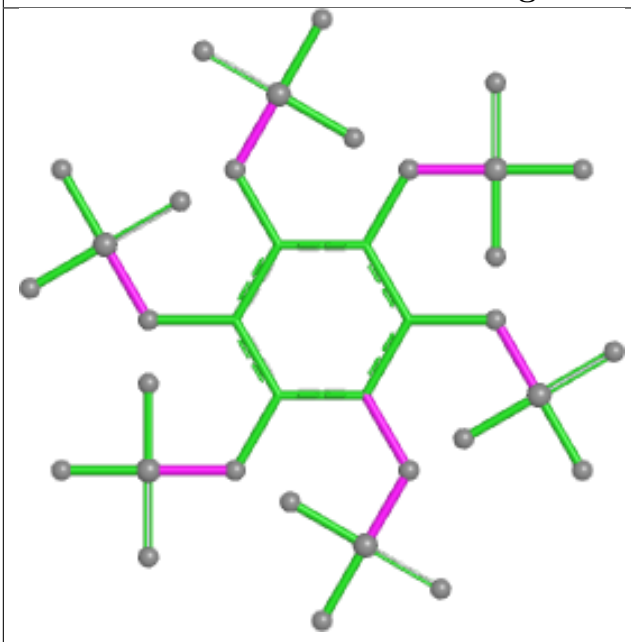
There are no ring outliers.

1 monomer is involved in 1 short contact:

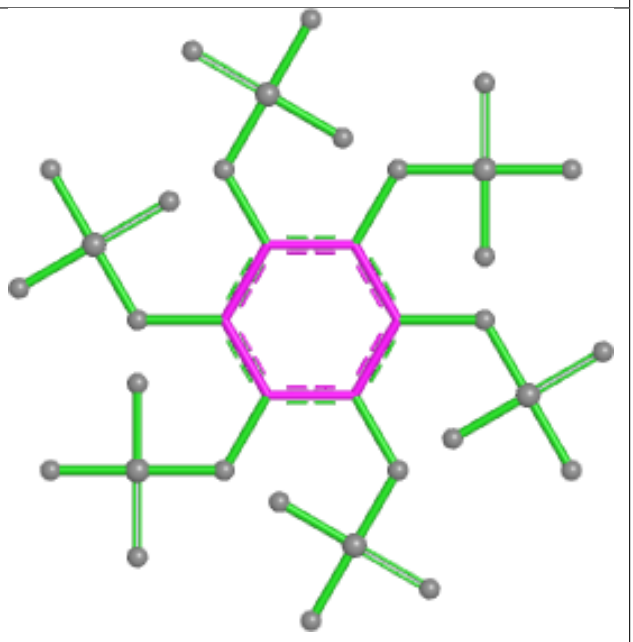
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	3901	IHP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

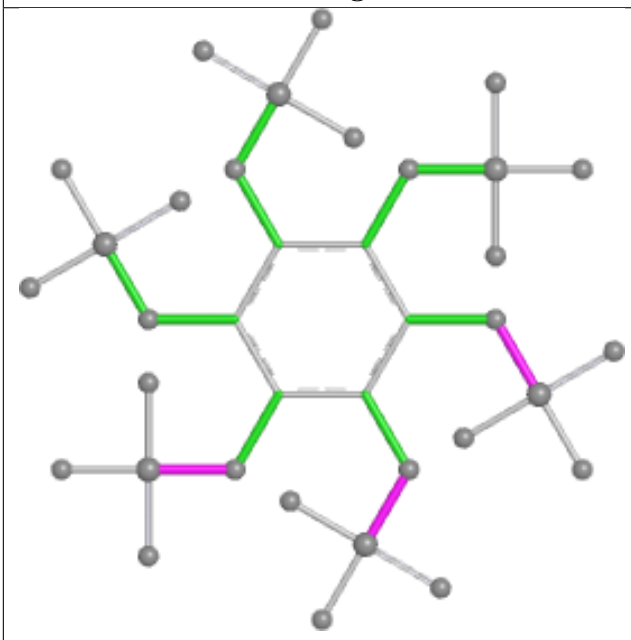
Ligand IHP D 3901



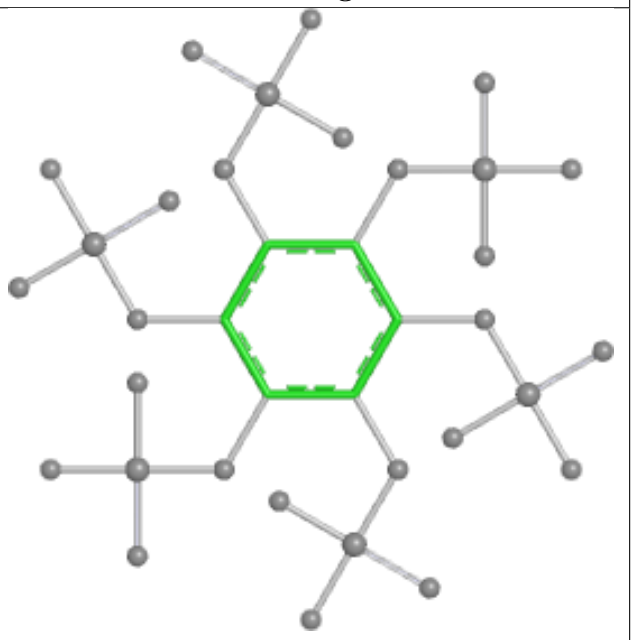
Bond lengths



Bond angles



Torsions



Rings

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.

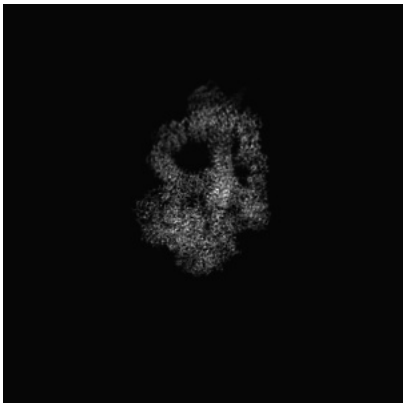
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-45389. These allow visual inspection of the internal detail of the map and identification of artifacts.

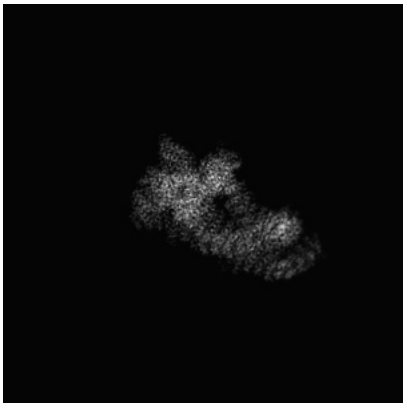
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

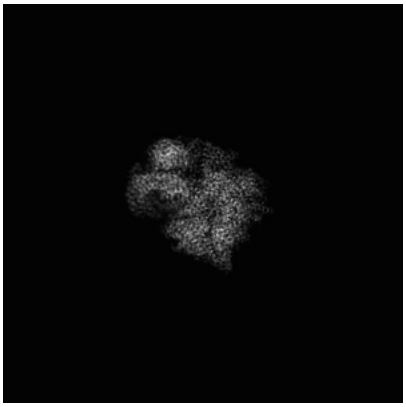
6.1.1 Primary map



X



Y



Z

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

6.2 Central slices

6.2.1 Primary map

X Index: 256

Y Index: 256

Z Index: 256

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

6.3 Largest variance slices (i)

6.3.1 Primary map

X Index: 274

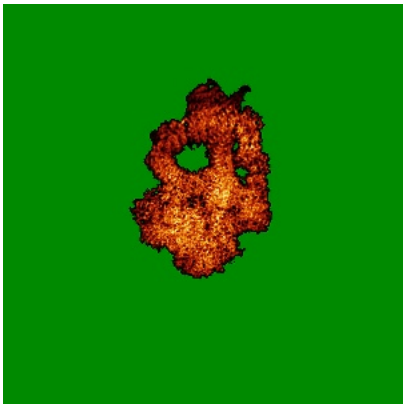
Y Index: 282

Z Index: 240

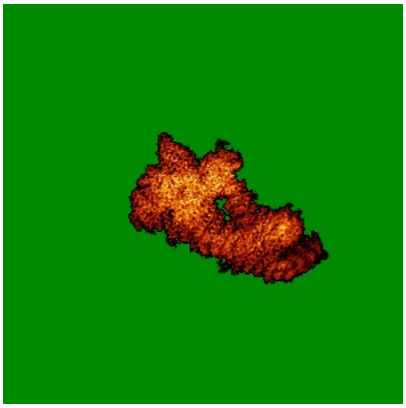
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

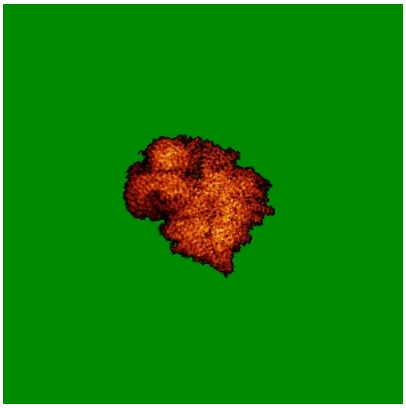
6.4.1 Primary map



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.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.1. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

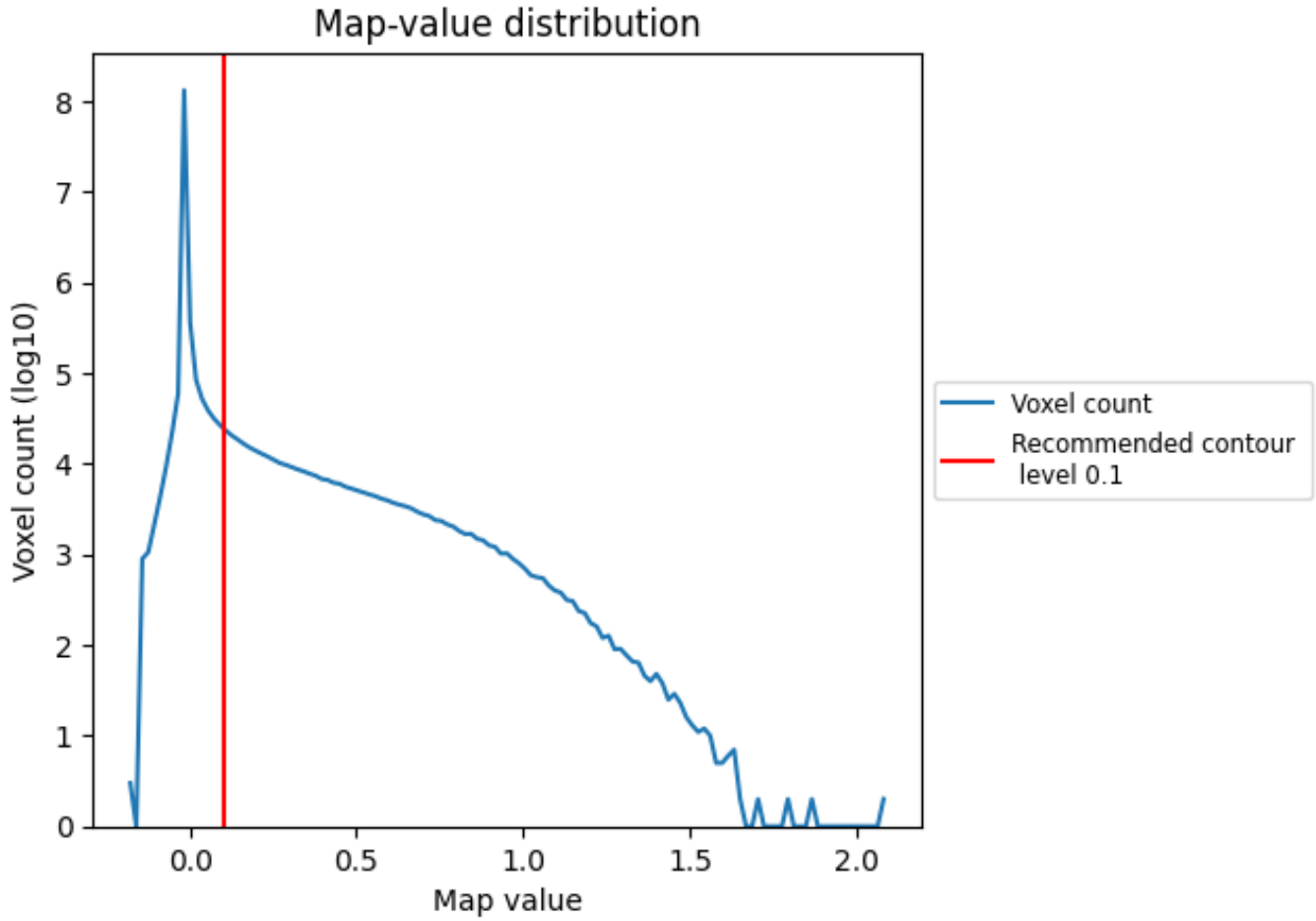
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

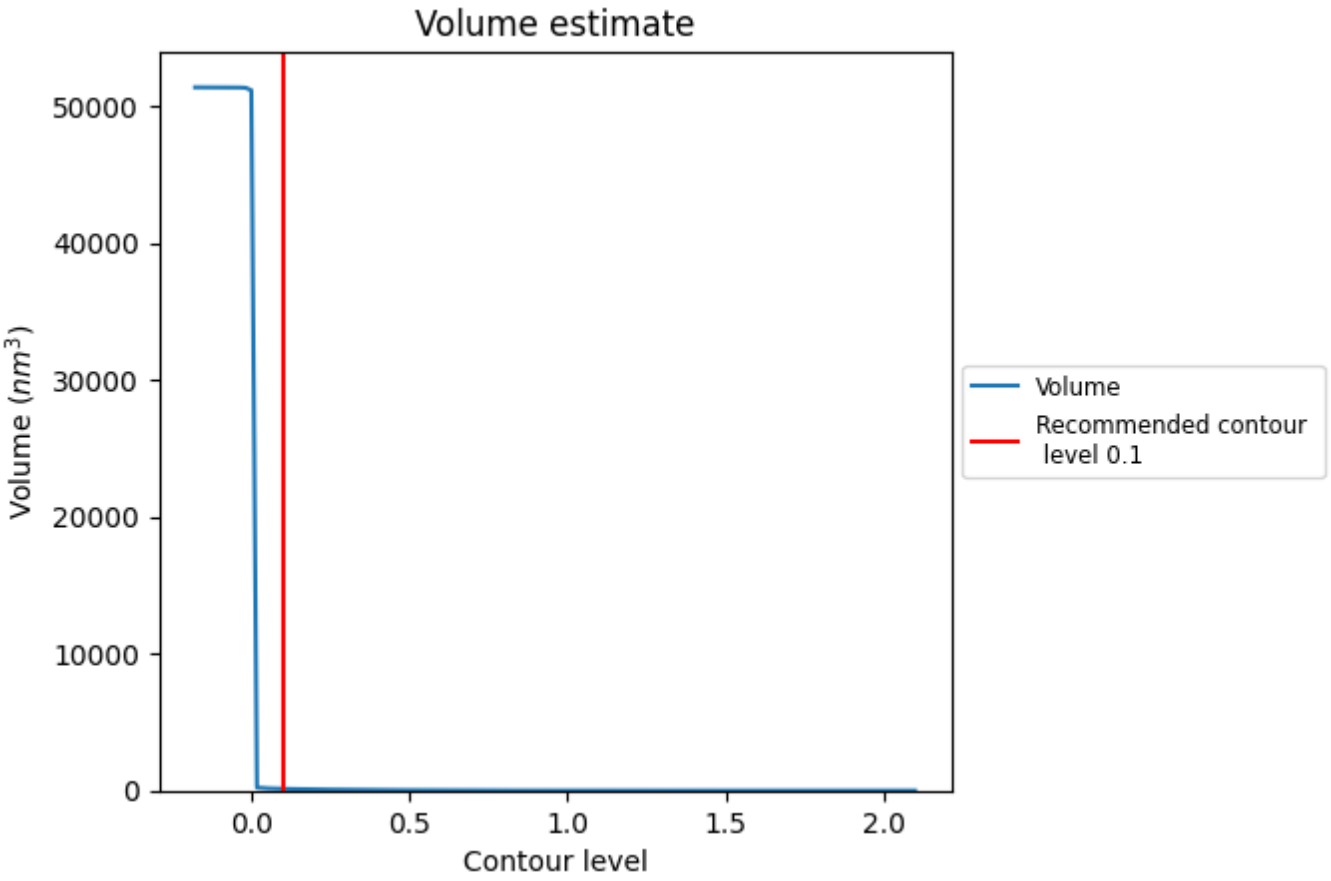
This section contains the results of statistical analysis of the map.

7.1 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.

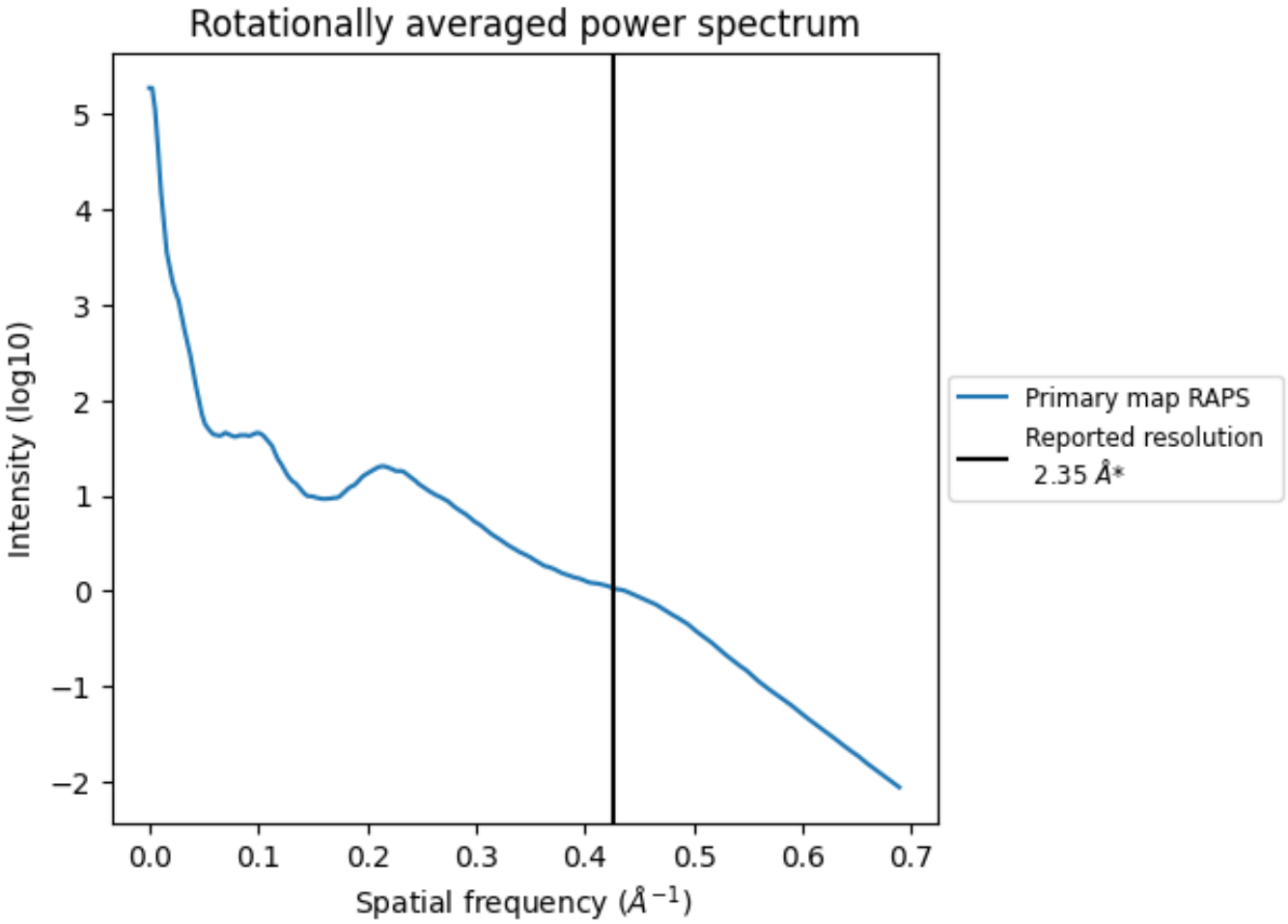
7.2 Volume estimate



The volume at the recommended contour level is 128 nm^3; this corresponds to an approximate mass of 115 kDa.

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.

7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.426 Å^{-1}

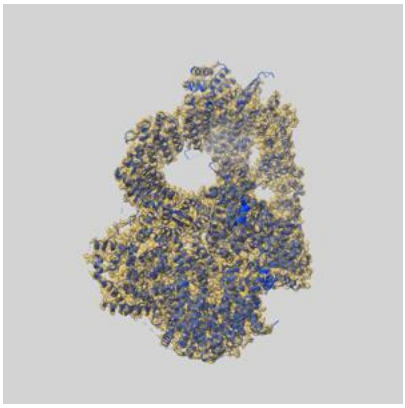
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

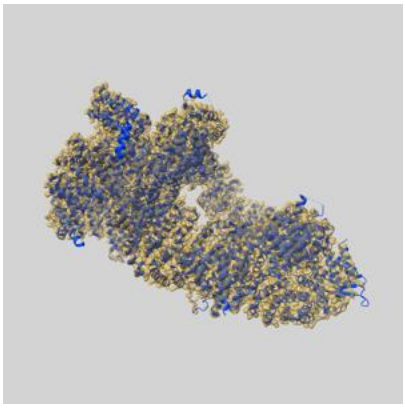
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-45389 and PDB model 9CAF. Per-residue inclusion information can be found in section 3 on page 7.

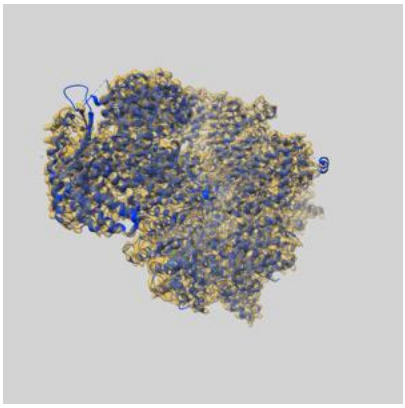
9.1 Map-model overlay



X



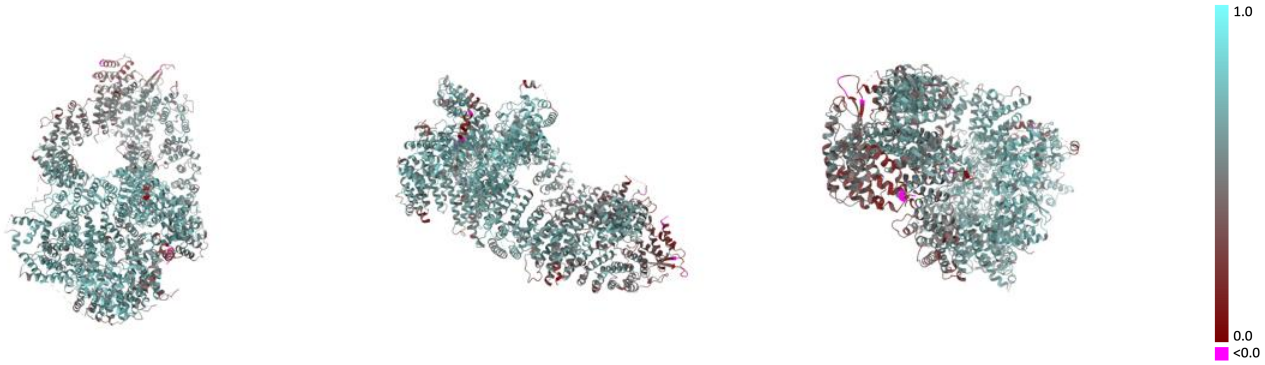
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

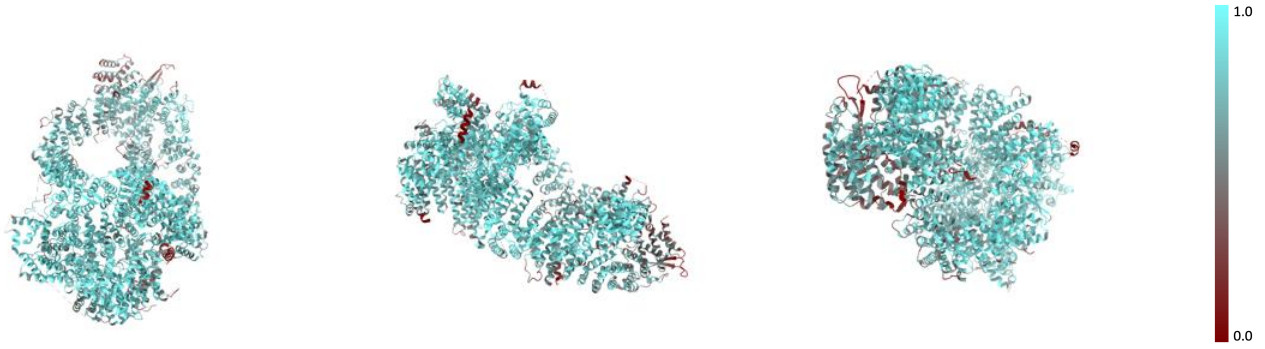
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

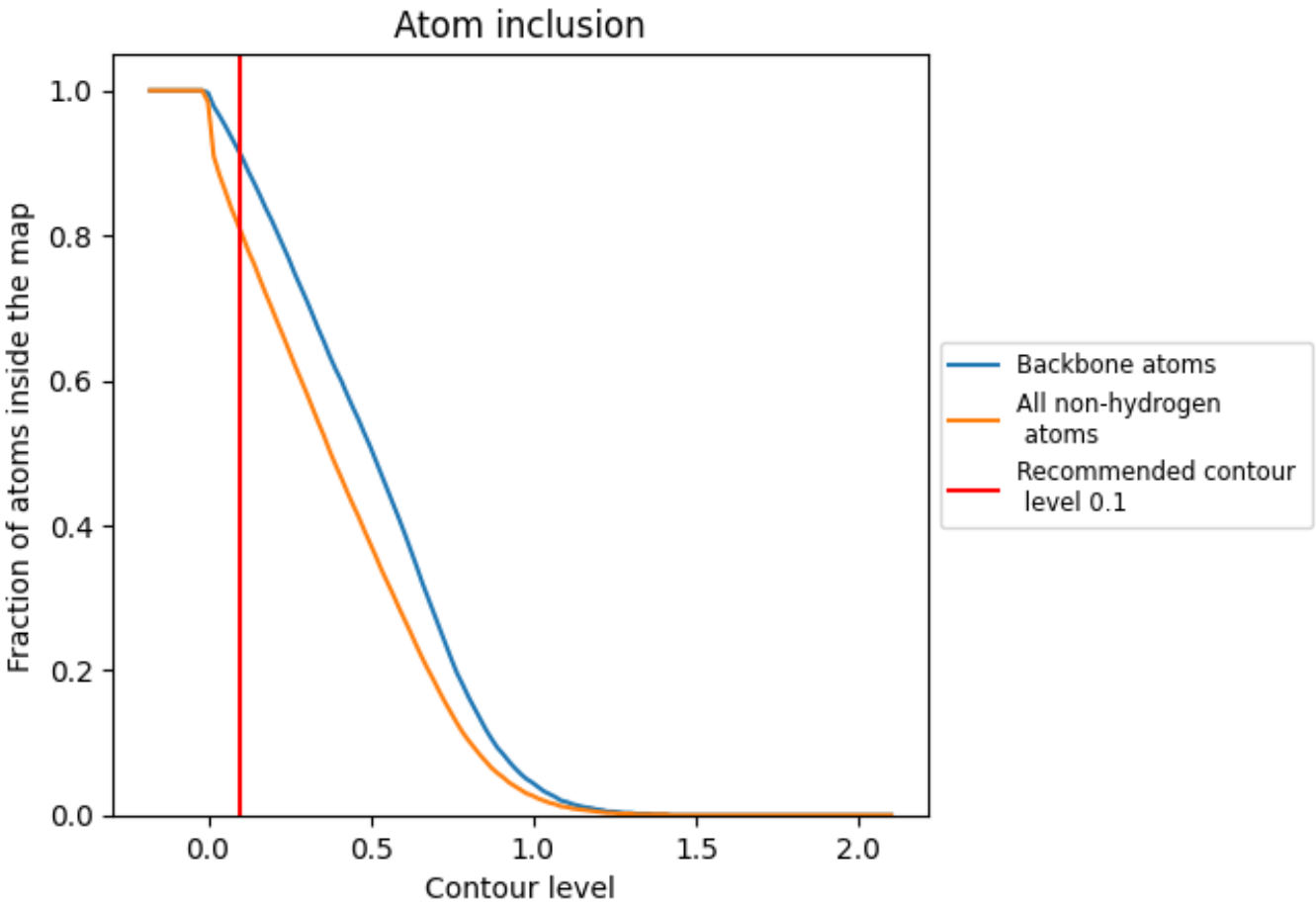
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.1).

9.4 Atom inclusion (i)



At the recommended contour level, 91% of all backbone atoms, 81% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8060	0.5810
A	0.7460	0.5730
D	0.8090	0.5810