



wwPDB EM Validation Summary Report ⓘ

Mar 6, 2026 – 07:31 AM UTC

PDB ID : 9VMX / pdb_00009vmx
EMDB ID : EMD-65195
Title : Human PIEZO1-E756del-MDFIC
Authors : Zhang, M.F.; Pei, D.Q.
Deposited on : 2025-06-29
Resolution : 3.20 Å(reported)

This is a wwPDB EM 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/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:

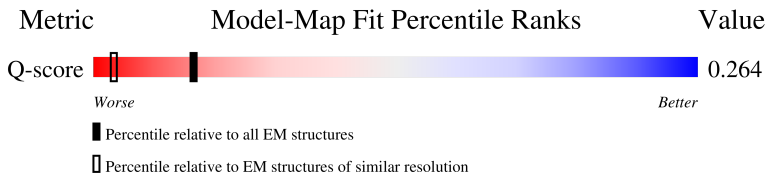
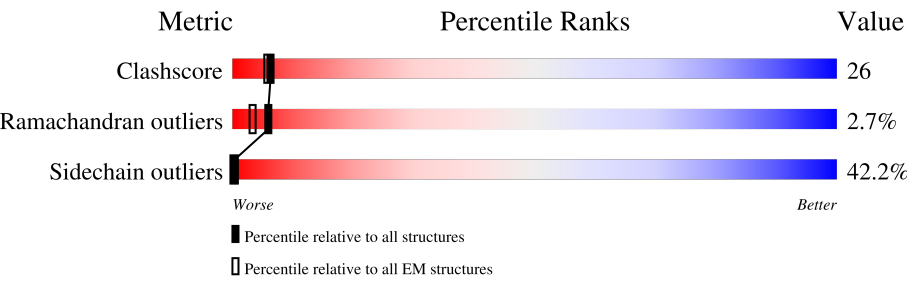
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 3.20 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	15020 (2.70 - 3.70)

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 $\leq 5\%$. 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	2521	<div><div>8%</div><div>22%</div><div>19%</div><div>9%</div><div>49%</div></div>
1	B	2521	<div><div>8%</div><div>22%</div><div>20%</div><div>9%</div><div>49%</div></div>
1	D	2521	<div><div>8%</div><div>22%</div><div>20%</div><div>9%</div><div>49%</div></div>
2	C	246	<div><div>6%</div><div>..</div><div>91%</div></div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	E	246	 6% .. 91%
2	F	246	 6% .. 91%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	D12	E	301	-	-	X	-

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 32172 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.

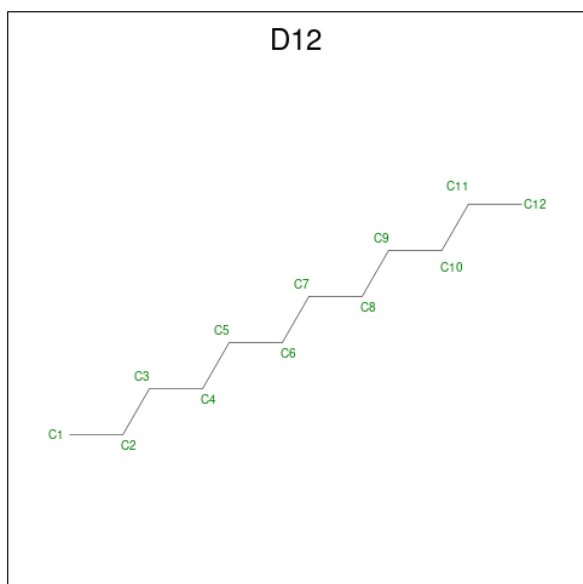
- Molecule 1 is a protein called Piezo-type mechanosensitive ion channel component 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1280	Total	C	N	O	S	0	0
			10463	6920	1743	1739	61		
1	B	1280	Total	C	N	O	S	0	0
			10463	6920	1743	1739	61		
1	D	1280	Total	C	N	O	S	0	0
			10463	6920	1743	1739	61		

- Molecule 2 is a protein called MyoD family inhibitor domain-containing protein.

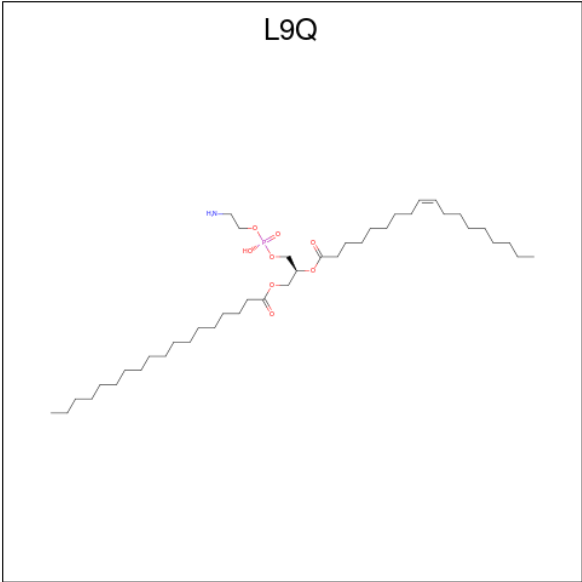
Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	21	Total	C	N	O	S	0	0
			150	88	21	33	8		
2	E	21	Total	C	N	O	S	0	0
			150	88	21	33	8		
2	F	21	Total	C	N	O	S	0	0
			150	88	21	33	8		

- Molecule 3 is DODECANE (CCD ID: D12) (formula: C₁₂H₂₆).



Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total C 12 12	0
3	A	1	Total C 12 12	0
3	B	1	Total C 12 12	0
3	B	1	Total C 12 12	0
3	D	1	Total C 12 12	0
3	D	1	Total C 12 12	0
3	C	1	Total C 12 12	0
3	C	1	Total C 12 12	0
3	C	1	Total C 12 12	0
3	E	1	Total C 12 12	0
3	E	1	Total C 12 12	0
3	E	1	Total C 12 12	0
3	F	1	Total C 12 12	0
3	F	1	Total C 12 12	0
3	F	1	Total C 12 12	0

- Molecule 4 is (1S)-2-{[(S)-(2-aminoethoxy)(hydroxy)phosphoryl]oxy}-1-[(octadecanoyloxy)methyl]ethyl (9Z)-octadec-9-enoate (CCD ID: L9Q) (formula: C₄₁H₈₀NO₈P).



Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total	C	N	O	P	0
			51	41	1	8	1	
4	B	1	Total	C	N	O	P	0
			51	41	1	8	1	
4	D	1	Total	C	N	O	P	0
			51	41	1	8	1	

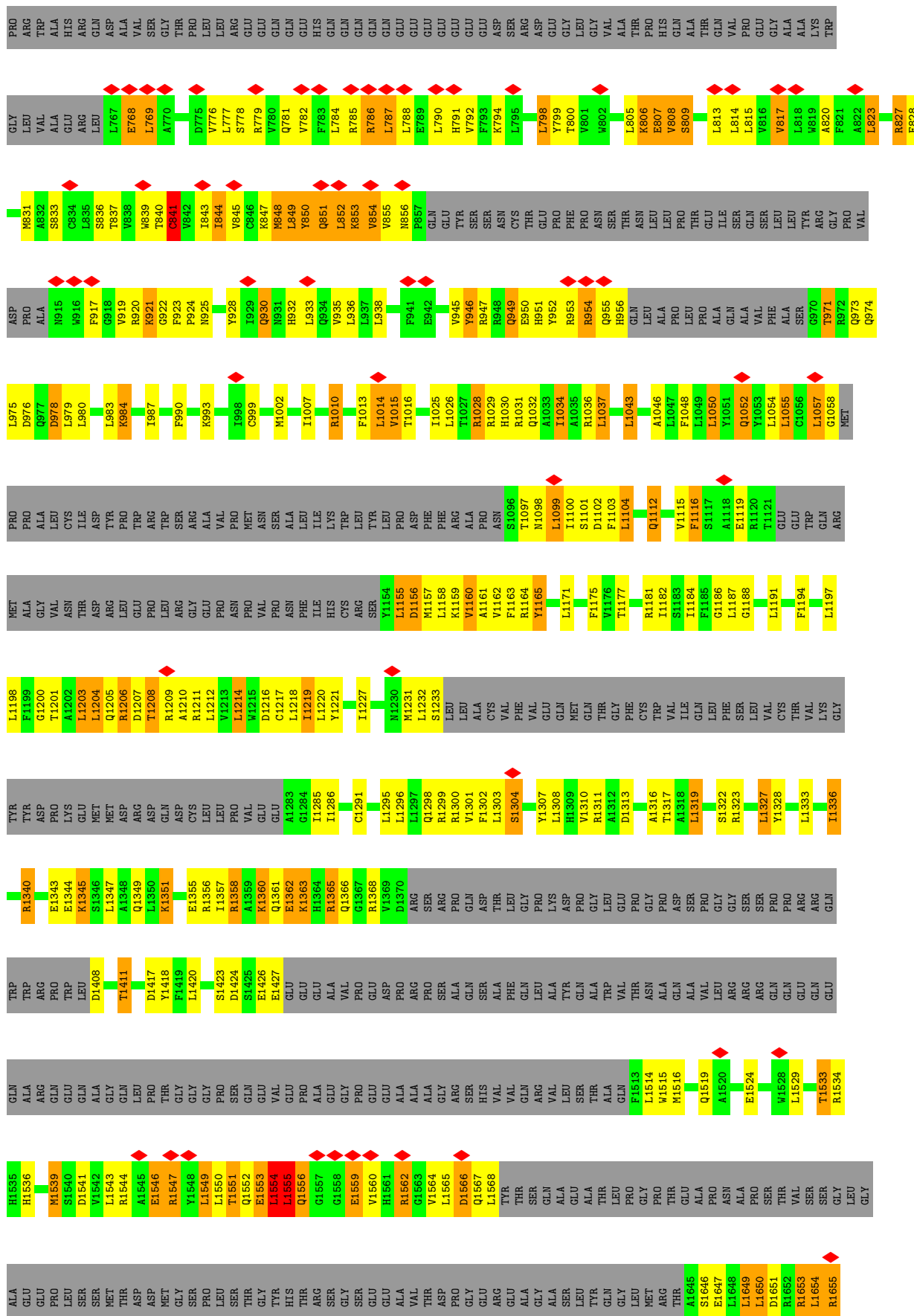
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

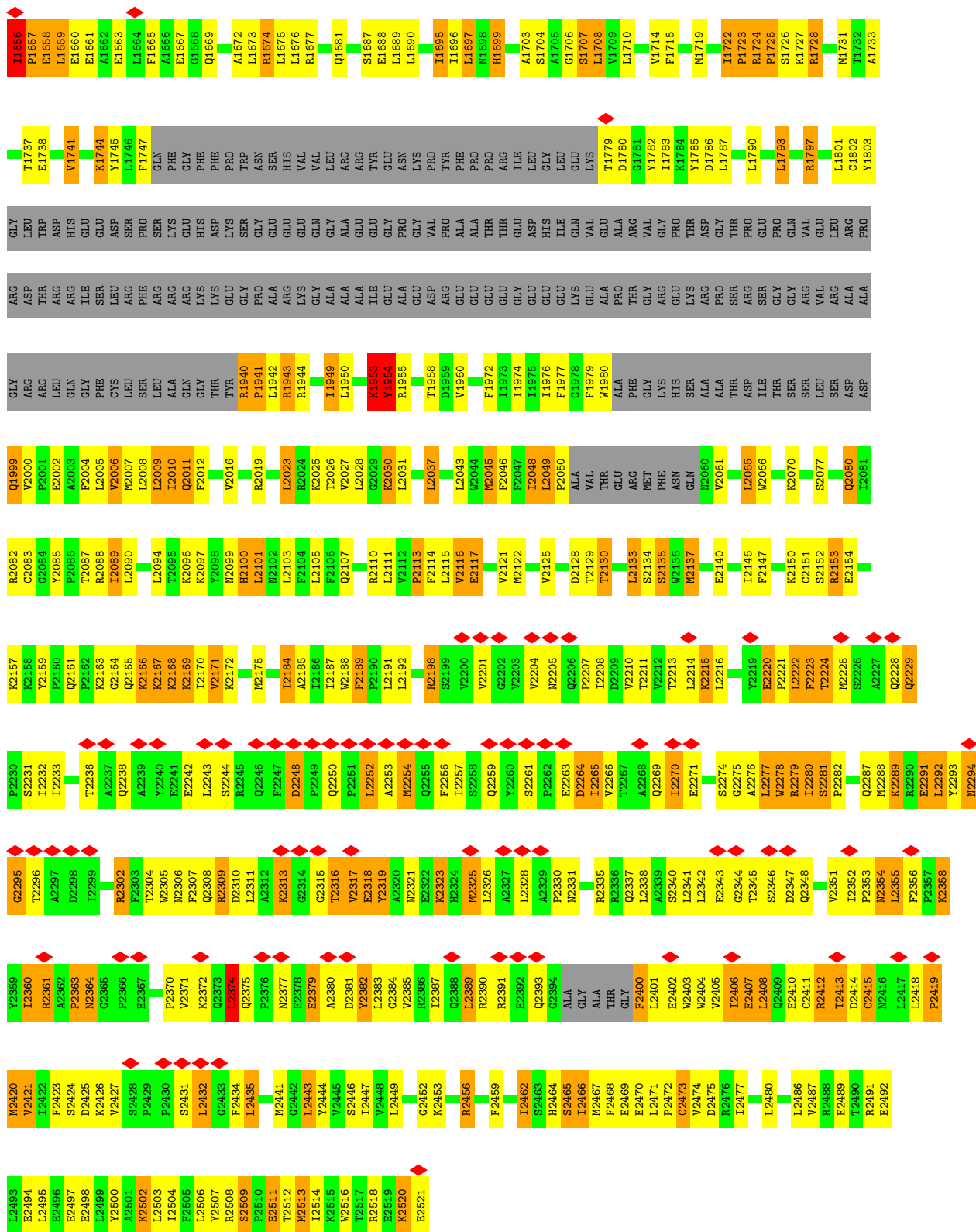
- Chain A:

8% 22% 19% 9% 49%

Chain A residues (from top to bottom):

Met 1, Glu 2, Pro 3, His 4, Val 5, Leu 6, Gly 7, Ala 8, Val 9, Leu 10, Leu 11, Tyr 12, Trp 13, Leu 14, Leu 15, Leu 16, Leu 17, Leu 18, Leu 19, Leu 20, Leu 21, Leu 22, Leu 23, Leu 24, Leu 25, Leu 26, Leu 27, Leu 28, Leu 29, Leu 30, Leu 31, Leu 32, Leu 33, Leu 34, Leu 35, Leu 36, Leu 37, Leu 38, Leu 39, Leu 40, Leu 41, Leu 42, Leu 43, Leu 44, Leu 45, Leu 46, Leu 47, Leu 48, Leu 49, Leu 50, Leu 51, Leu 52, Leu 53, Leu 54, Leu 55, Leu 56, Leu 57, Leu 58, Leu 59, Leu 60, Leu 61, Leu 62, Leu 63, Leu 64, Leu 65, Leu 66, Leu 67, Leu 68, Leu 69, Leu 70, Leu 71, Leu 72, Leu 73, Leu 74, Leu 75, Leu 76, Leu 77, Leu 78, Leu 79, Leu 80, Leu 81, Leu 82, Leu 83, Leu 84, Leu 85, Leu 86, Leu 87, Leu 88, Leu 89, Leu 90, Leu 91, Leu 92, Leu 93, Leu 94, Leu 95, Leu 96, Leu 97, Leu 98, Leu 99, Leu 100, Leu 101, Leu 102, Leu 103, Leu 104, Leu 105, Leu 106, Leu 107, Leu 108, Leu 109, Leu 110, Leu 111, Leu 112, Leu 113, Leu 114, Leu 115, Leu 116, Leu 117, Leu 118, Leu 119, Leu 120, Leu 121, Leu 122, Leu 123, Leu 124, Leu 125, Leu 126, Leu 127, Leu 128, Leu 129, Leu 130, Leu 131, Leu 132, Leu 133, Leu 134, Leu 135, Leu 136, Leu 137, Leu 138, Leu 139, Leu 140, Leu 141, Leu 142, Leu 143, Leu 144, Leu 145, Leu 146, Leu 147, Leu 148, Leu 149, Leu 150, Leu 151, Leu 152, Leu 153, Leu 154, Leu 155, Leu 156, Leu 157, Leu 158, Leu 159, Leu 160, Leu 161, Leu 162, Leu 163, Leu 164, Leu 165, Leu 166, Leu 167, Leu 168, Leu 169, Leu 170, Leu 171, Leu 172, Leu 173, Leu 174, Leu 175, Leu 176, Leu 177, Leu 178, Leu 179, Leu 180, Leu 181, Leu 182, Leu 183, Leu 184, Leu 185, Leu 186, Leu 187, Leu 188, Leu 189, Leu 190, Leu 191, Leu 192, Leu 193, Leu 194, Leu 195, Leu 196, Leu 197, Leu 198, Leu 199, Leu 200, Leu 201, Leu 202, Leu 203, Leu 204, Leu 205, Leu 206, Leu 207, Leu 208, Leu 209, Leu 210, Leu 211, Leu 212, Leu 213, Leu 214, Leu 215, Leu 216, Leu 217, Leu 218, Leu 219, Leu 220, Leu 221, Leu 222, Leu 223, Leu 224, Leu 225, Leu 226, Leu 227, Leu 228, Leu 229, Leu 230, Leu 231, Leu 232, Leu 233, Leu 234, Leu 235, Leu 236, Leu 237, Leu 238, Leu 239, Leu 240, Leu 241, Leu 242, Leu 243, Leu 244, Leu 245, Leu 246, Leu 247, Leu 248, Leu 249, Leu 250, Leu 251, Leu 252, Leu 253, Leu 254, Leu 255, Leu 256, Leu 257, Leu 258, Leu 259, Leu 260, Leu 261, Leu 262, Leu 263, Leu 264, Leu 265, Leu 266, Leu 267, Leu 268, Leu 269, Leu 270, Leu 271, Leu 272, Leu 273, Leu 274, Leu 275, Leu 276, Leu 277, Leu 278, Leu 279, Leu 280, Leu 281, Leu 282, Leu 283, Leu 284, Leu 285, Leu 286, Leu 287, Leu 288, Leu 289, Leu 290, Leu 291, Leu 292, Leu 293, Leu 294, Leu 295, Leu 296, Leu 297, Leu 298, Leu 299, Leu 300, Leu 301, Leu 302, Leu 303, Leu 304, Leu 305, Leu 306, Leu 307, Leu 308, Leu 309, Leu 310, Leu 311, Leu 312, Leu 313, Leu 314, Leu 315, Leu 316, Leu 317, Leu 318, Leu 319, Leu 320, Leu 321, Leu 322, Leu 323, Leu 324, Leu 325, Leu 326, Leu 327, Leu 328, Leu 329, Leu 330, Leu 331, Leu 332, Leu 333, Leu 334, Leu 335, Leu 336, Leu 337, Leu 338, Leu 339, Leu 340, Leu 341, Leu 342, Leu 343, Leu 344, Leu 345, Leu 346, Leu 347, Leu 348, Leu 349, Leu 350, Leu 351, Leu 352, Leu 353, Leu 354, Leu 355, Leu 356, Leu 357, Leu 358, Leu 359, Leu 360, Leu 361, Leu 362, Leu 363, Leu 364, Leu 365, Leu 366, Leu 367, Leu 368, Leu 369, Leu 370, Leu 371, Leu 372, Leu 373, Leu 374, Leu 375, Leu 376, Leu 377, Leu 378, Leu 379, Leu 380, Leu 381, Leu 382, Leu 383, Leu 384, Leu 385, Leu 386, Leu 387, Leu 388, Leu 389, Leu 390, Leu 391, Leu 392, Leu 393, Leu 394, Leu 395, Leu 396, Leu 397, Leu 398, Leu 399, Leu 400, Leu 401, Leu 402, Leu 403, Leu 404, Leu 405, Leu 406, Leu 407, Leu 408, Leu 409, Leu 410, Leu 411, Leu 412, Leu 413, Leu 414, Leu 415, Leu 416, Leu 417, Leu 418, Leu 419, Leu 420, Leu 421, Leu 422, Leu 423, Leu 424, Leu 425, Leu 426, Leu 427, Leu 428, Leu 429, Leu 430, Leu 431, Leu 432, Leu 433, Leu 434, Leu 435, Leu 436, Leu 437, Leu 438, Leu 439, Leu 440, Leu 441, Leu 442, Leu 443, Leu 444, Leu 445, Leu 446, Leu 447, Leu 448, Leu 449, Leu 450, Leu 451, Leu 452, Leu 453, Leu 454, Leu 455, Leu 456, Leu 457, Leu 458, Leu 459, Leu 460, Leu 461, Leu 462, Leu 463, Leu 464, Leu 465, Leu 466, Leu 467, Leu 468, Leu 469, Leu 470, Leu 471, Leu 472, Leu 473, Leu 474, Leu 475, Leu 476, Leu 477, Leu 478, Leu 479, Leu 480, Leu 481, Leu 482, Leu 483, Leu 484, Leu 485, Leu 486, Leu 487, Leu 488, Leu 489, Leu 490, Leu 491, Leu 492, Leu 493, Leu 494, Leu 495, Leu 496, Leu 497, Leu 498, Leu 499, Leu 500, Leu 501, Leu 502, Leu 503, Leu 504, Leu 505, Leu 506, Leu 507, Leu 508, Leu 509, Leu 510, Leu 511, Leu 512, Leu 513, Leu 514, Leu 515, Leu 516, Leu 517, Leu 518, Leu 519, Leu 520, Leu 521, Leu 522, Leu 523, Leu 524, Leu 525, Leu 526, Leu 527, Leu 528, Leu 529, Leu 530, Leu 531, Leu 532, Leu 533, Leu 534, Leu 535, Leu 536, Leu 537, Leu 538, Leu 539, Leu 540, Leu 541, Leu 542, Leu 543, Leu 544, Leu 545, Leu 546, Leu 547, Leu 548, Leu 549, Leu 550, Leu 551, Leu 552, Leu 553, Leu 554, Leu 555, Leu 556, Leu 557, Leu 558, Leu 559, Leu 560, Leu 561, Leu 562,



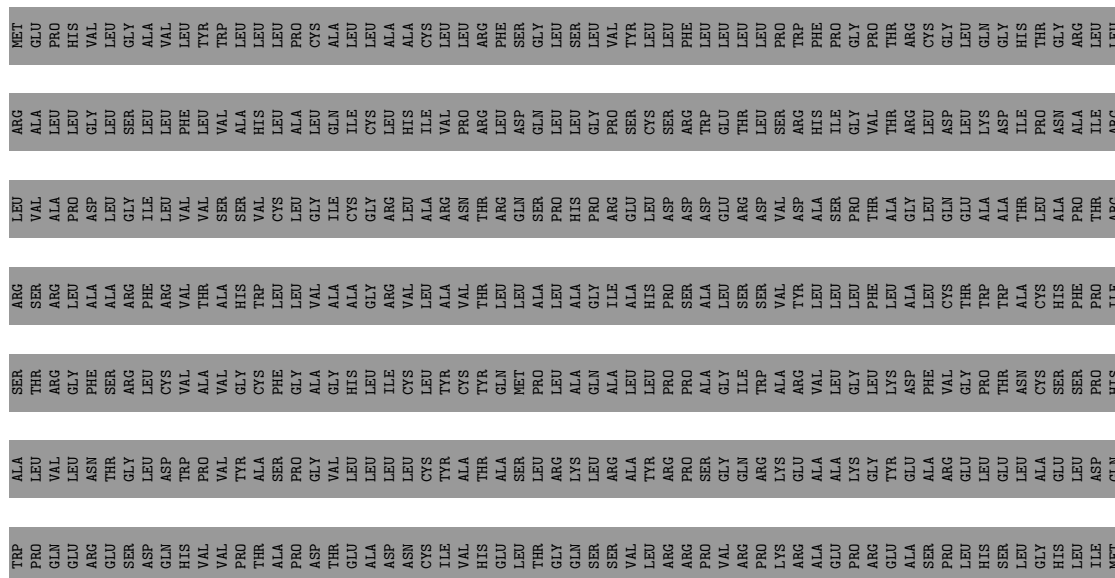


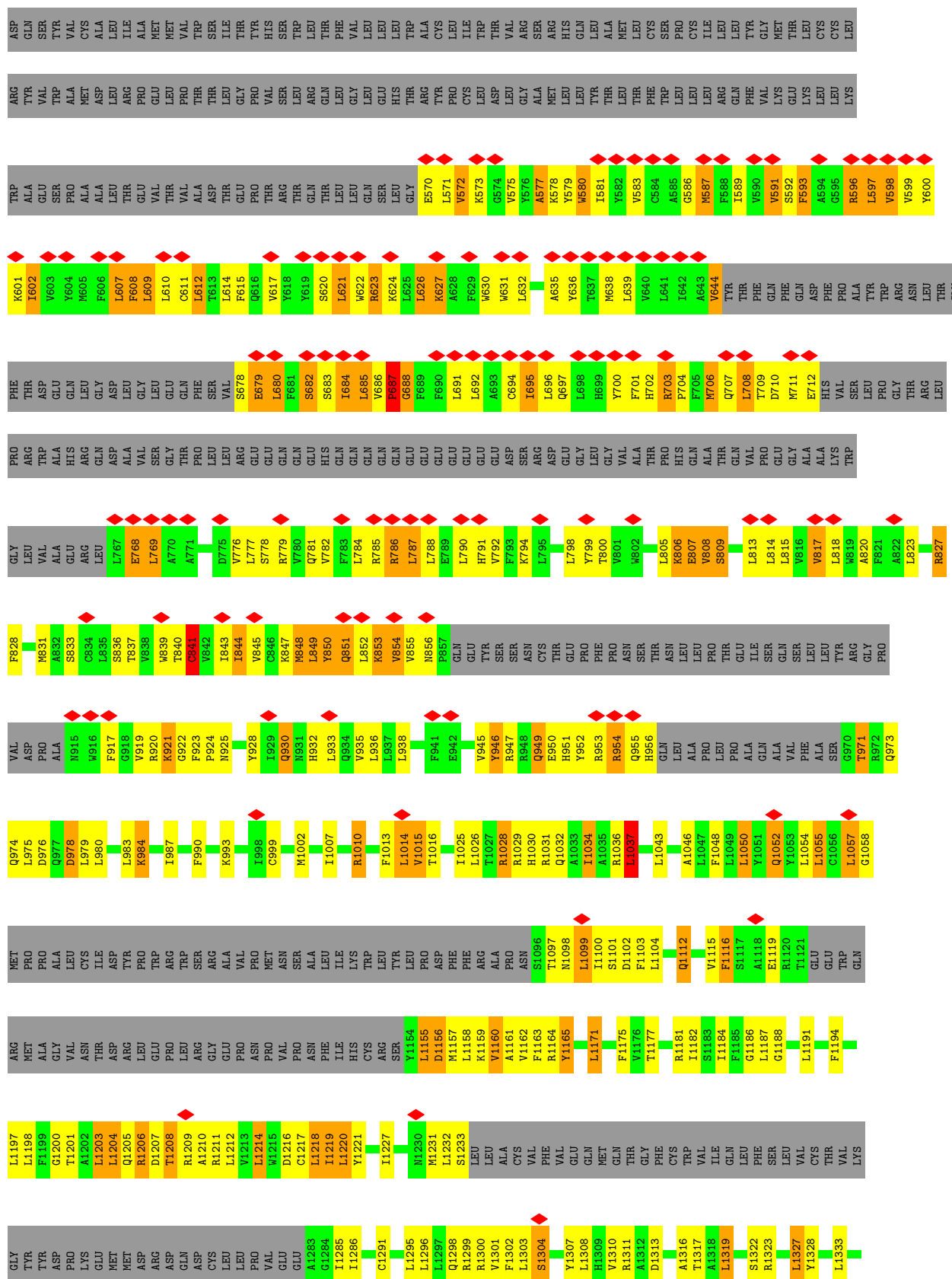
- Molecule 1: Piezo-type mechanosensitive ion channel component 1



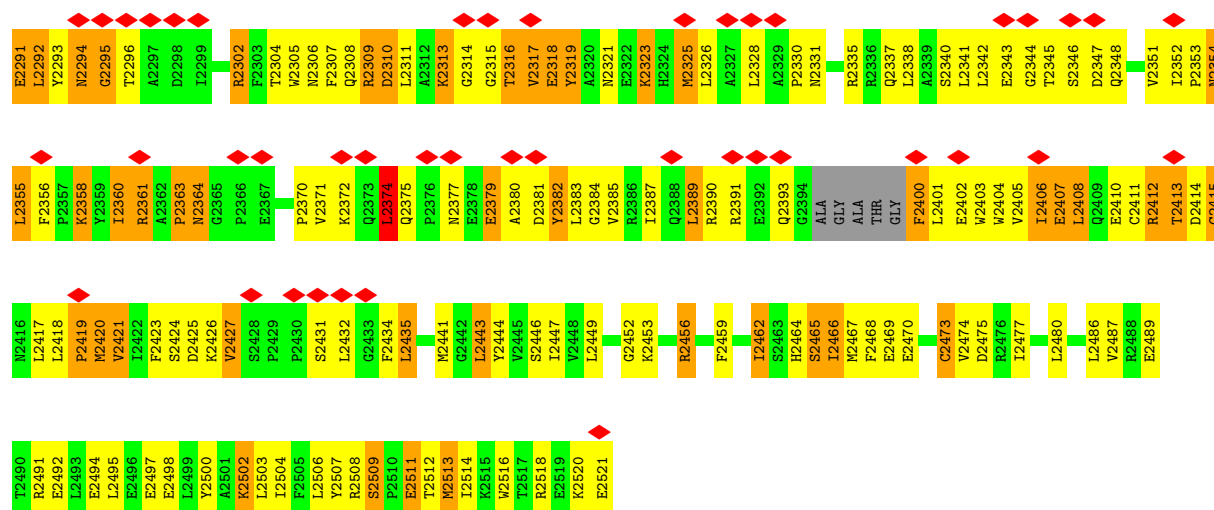






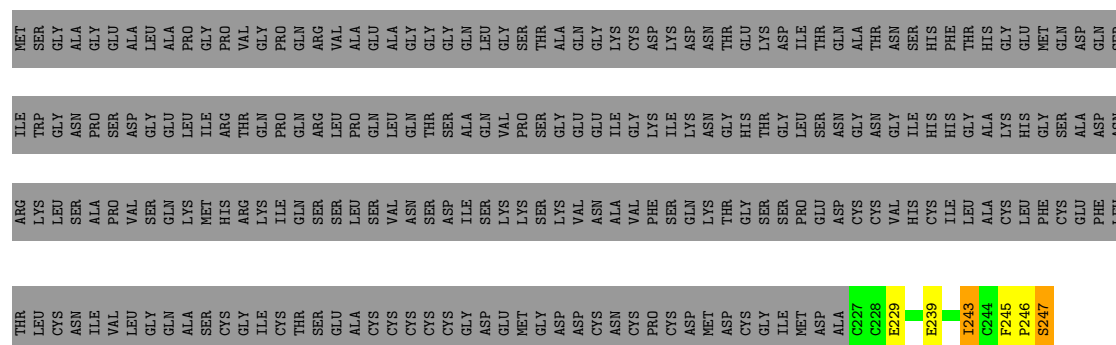






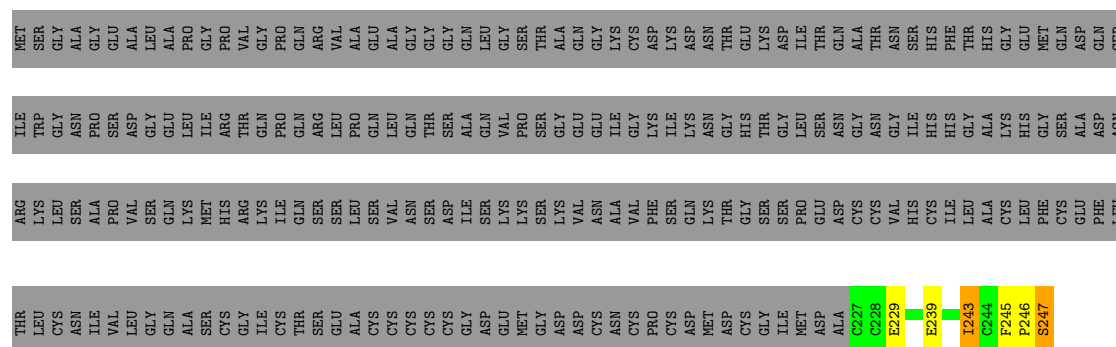
• Molecule 2: MyoD family inhibitor domain-containing protein

Chain C: 6% .. 91%



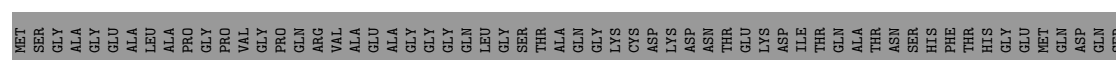
• Molecule 2: MyoD family inhibitor domain-containing protein

Chain E: 6% .. 91%



• Molecule 2: MyoD family inhibitor domain-containing protein

Chain F: 6% .. 91%



THR	ARG	ILE
LEU	LYS	TRP
CYS	LEU	GLY
ASN	SER	ASN
ILE	ALA	PRO
VAL	PRO	SER
LEU	VAL	ASP
GLY	SER	GLY
GLN	SER	GLN
ALA	LYS	LEU
ALA	MET	ILE
CYS	HIS	ARG
GLY	ARG	THR
ILE	LYS	GLN
CYS	ILE	PRO
THR	GLN	GLN
SER	SER	ARG
GLU	SER	LEU
ALA	LEU	PRO
CYS	SER	GLN
CYS	VAL	LEU
CYS	ASN	GLN
CYS	SER	THR
CYS	ASP	SER
GLY	ILE	ALA
ASP	SER	GLN
GLU	LYS	VAL
MET	LYS	GLY
ASN	ASN	GLU
CYS	ALA	GLU
CYS	VAL	ILE
PRO	PHE	LYS
CYS	SER	ILE
ASP	GLN	LYS
MET	LYS	ASN
ASP	THR	GLY
CYS	GLY	HIS
ILE	SER	THR
ILE	SER	GLY
MET	PRO	LEU
ASP	GLU	SER
ALA	ASP	ASN
C227	CYS	GLY
C228	CYS	ASN
E229	VAL	GLY
E239	HIS	ILE
E239	CYS	HIS
I243	ILE	HIS
C244	LEU	GLY
F245	ALA	ALA
P246	CYS	LYS
S247	LEU	HIS
	PHE	GLY
	CYS	SER
	GLU	ALA
	PHE	ASP
	LEU	ASN

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	40207	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	900	Depositor
Maximum defocus (nm)	1300	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.596	Depositor
Minimum map value	-0.385	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.010	Depositor
Recommended contour level	0.035	Depositor
Map size (\AA)	456.0, 456.0, 456.0	wwPDB
Map dimensions	800, 800, 800	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.57, 0.57, 0.57	Depositor

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: D12, L9Q

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	0.55	2/10719 (0.0%)	0.91	51/14526 (0.4%)
1	B	0.55	2/10719 (0.0%)	0.96	53/14526 (0.4%)
1	D	0.55	2/10719 (0.0%)	0.91	51/14526 (0.4%)
2	C	0.71	0/151	1.16	0/200
2	E	0.71	0/151	1.16	0/200
2	F	0.70	0/151	1.16	0/200
All	All	0.55	6/32610 (0.0%)	0.93	155/44178 (0.4%)

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	1160	VAL	CA-CB	6.03	1.62	1.54
1	A	1160	VAL	CA-CB	6.02	1.62	1.54
1	B	1160	VAL	CA-CB	6.00	1.62	1.54
1	D	2289	LYS	C-N	-5.10	1.27	1.33
1	B	2289	LYS	C-N	-5.09	1.27	1.33

The worst 5 of 155 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	584	CYS	CA-CB-SG	-35.48	29.68	104.20
1	B	930	GLN	N-CA-C	11.20	126.52	113.19
1	A	930	GLN	N-CA-C	11.19	126.51	113.19
1	D	930	GLN	N-CA-C	11.19	126.51	113.19
1	D	2374	LEU	N-CA-C	-10.05	100.31	111.07

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	10463	0	10689	610	0
1	B	10463	0	10689	603	0
1	D	10463	0	10689	603	0
2	C	150	0	132	11	0
2	E	150	0	132	12	0
2	F	150	0	132	11	0
3	A	24	0	52	3	0
3	B	24	0	52	4	0
3	C	36	0	78	8	0
3	D	24	0	52	4	0
3	E	36	0	78	10	0
3	F	36	0	78	8	0
4	A	51	0	79	8	0
4	B	51	0	79	9	0
4	D	51	0	79	8	0
All	All	32172	0	33090	1679	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 26.

The worst 5 of 1679 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:A:2459:PHE:CD1	1:D:2137:MET:HE2	1.54	1.42
1:B:2137:MET:HE2	1:D:2459:PHE:CD1	1.54	1.39
1:D:1650:LEU:CD2	1:D:1654:LEU:HD12	1.53	1.39
1:A:2137:MET:HE2	1:B:2459:PHE:CD1	1.54	1.38
1:B:1650:LEU:CD2	1:B:1654:LEU:HD12	1.53	1.38

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	1248/2521 (50%)	1069 (86%)	145 (12%)	34 (3%)	4	25
1	B	1248/2521 (50%)	1069 (86%)	145 (12%)	34 (3%)	4	25
1	D	1248/2521 (50%)	1069 (86%)	145 (12%)	34 (3%)	4	25
2	C	19/246 (8%)	17 (90%)	2 (10%)	0	100	100
2	E	19/246 (8%)	17 (90%)	2 (10%)	0	100	100
2	F	19/246 (8%)	17 (90%)	2 (10%)	0	100	100
All	All	3801/8301 (46%)	3258 (86%)	441 (12%)	102 (3%)	6	25

5 of 102 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1723	PRO
1	A	1725	PRO
1	A	1953	LYS
1	A	2316	THR
1	A	2379	GLU

5.3.2 Protein sidechains

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	1121/2172 (52%)	642 (57%)	479 (43%)	0	0
1	B	1121/2172 (52%)	642 (57%)	479 (43%)	0	0
1	D	1121/2172 (52%)	642 (57%)	479 (43%)	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	20/203 (10%)	17 (85%)	3 (15%)	3	15
2	E	20/203 (10%)	17 (85%)	3 (15%)	3	15
2	F	20/203 (10%)	17 (85%)	3 (15%)	3	15
All	All	3423/7125 (48%)	1977 (58%)	1446 (42%)	0	0

5 of 1446 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	2431	SER
1	D	1336	ILE
1	B	2512	THR
1	B	2427	VAL
1	D	856	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 65 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	2080	GLN
1	D	2161	GLN
1	B	851	GLN
1	B	702	HIS
1	D	2229	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

18 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
4	L9Q	D	2601	-	50,50,50	1.06	3 (6%)	53,55,55	1.08	3 (5%)
4	L9Q	A	2603	-	50,50,50	1.06	3 (6%)	53,55,55	1.08	3 (5%)
3	D12	C	302	-	11,11,11	0.26	0	10,10,10	0.45	0
3	D12	E	302	-	11,11,11	0.26	0	10,10,10	0.45	0
3	D12	F	303	-	11,11,11	0.29	0	10,10,10	0.35	0
4	L9Q	B	2601	-	50,50,50	1.06	3 (6%)	53,55,55	1.08	3 (5%)
3	D12	B	2603	-	11,11,11	0.27	0	10,10,10	0.39	0
3	D12	A	2601	-	11,11,11	0.26	0	10,10,10	0.42	0
3	D12	C	303	-	11,11,11	0.29	0	10,10,10	0.35	0
3	D12	A	2602	-	11,11,11	0.27	0	10,10,10	0.39	0
3	D12	E	303	-	11,11,11	0.29	0	10,10,10	0.35	0
3	D12	F	301	-	11,11,11	0.30	0	10,10,10	0.40	0
3	D12	C	301	-	11,11,11	0.30	0	10,10,10	0.40	0
3	D12	B	2602	-	11,11,11	0.26	0	10,10,10	0.42	0
3	D12	D	2602	-	11,11,11	0.26	0	10,10,10	0.42	0
3	D12	E	301	-	11,11,11	0.29	0	10,10,10	0.40	0
3	D12	F	302	-	11,11,11	0.26	0	10,10,10	0.45	0
3	D12	D	2603	-	11,11,11	0.27	0	10,10,10	0.39	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
4	L9Q	D	2601	-	-	30/54/54/54	-
4	L9Q	A	2603	-	-	30/54/54/54	-
3	D12	C	302	-	-	8/9/9/9	-
3	D12	E	302	-	-	8/9/9/9	-
3	D12	F	303	-	-	5/9/9/9	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	L9Q	B	2601	-	-	30/54/54/54	-
3	D12	B	2603	-	-	6/9/9/9	-
3	D12	A	2601	-	-	7/9/9/9	-
3	D12	C	303	-	-	5/9/9/9	-
3	D12	A	2602	-	-	6/9/9/9	-
3	D12	E	303	-	-	5/9/9/9	-
3	D12	F	301	-	-	7/9/9/9	-
3	D12	C	301	-	-	7/9/9/9	-
3	D12	B	2602	-	-	7/9/9/9	-
3	D12	D	2602	-	-	7/9/9/9	-
3	D12	E	301	-	-	7/9/9/9	-
3	D12	F	302	-	-	8/9/9/9	-
3	D12	D	2603	-	-	6/9/9/9	-

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	2603	L9Q	O3-C11	4.24	1.45	1.33
4	B	2601	L9Q	O3-C11	4.23	1.45	1.33
4	D	2601	L9Q	O3-C11	4.23	1.45	1.33
4	B	2601	L9Q	O2-C31	4.05	1.45	1.34
4	A	2603	L9Q	O2-C31	4.05	1.45	1.34

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	2601	L9Q	O2-C31-C32	3.86	119.82	111.48
4	D	2601	L9Q	O2-C31-C32	3.85	119.81	111.48
4	A	2603	L9Q	O2-C31-C32	3.84	119.80	111.48
4	D	2601	L9Q	O3-C11-C12	2.85	120.51	111.83
4	A	2603	L9Q	O3-C11-C12	2.84	120.50	111.83

There are no chirality outliers.

5 of 189 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	2603	L9Q	C1-O3P-P-O1P
4	A	2603	L9Q	C1-O3P-P-O2P

Continued on next page...

Continued from previous page...

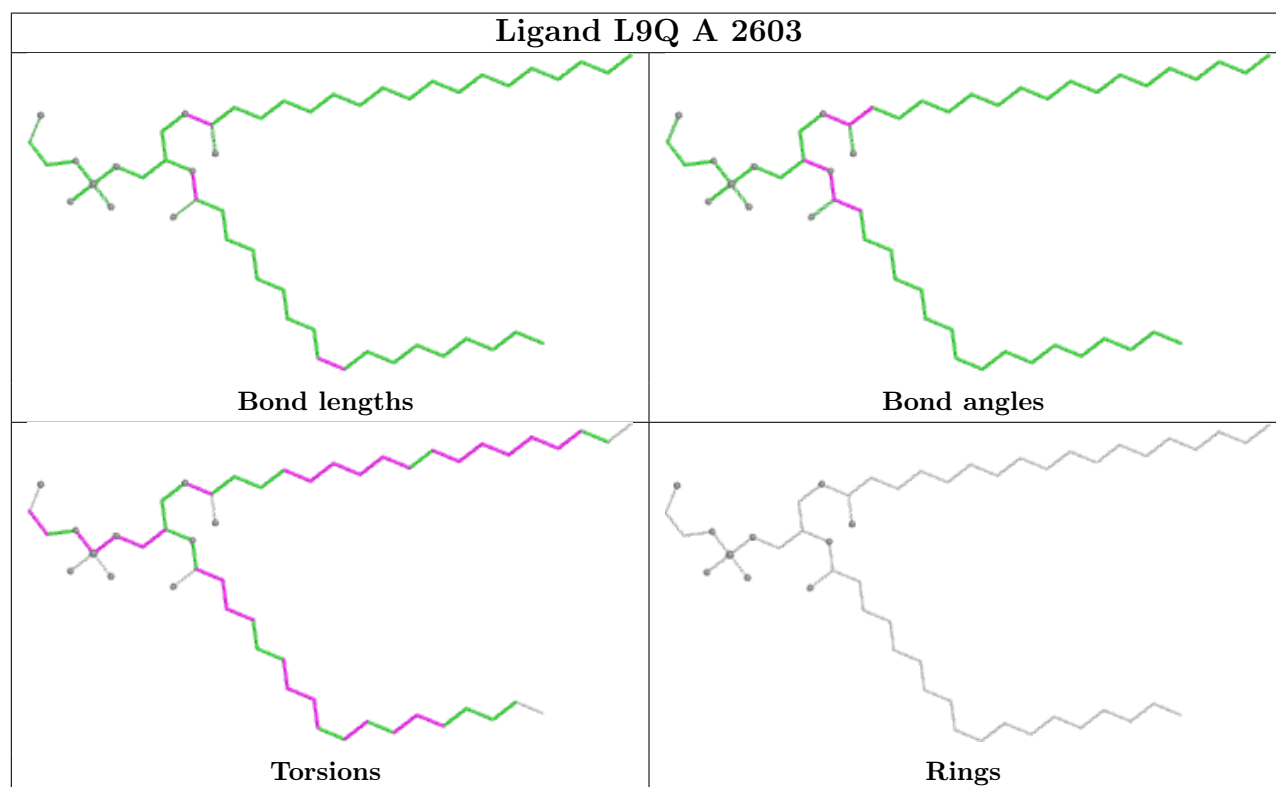
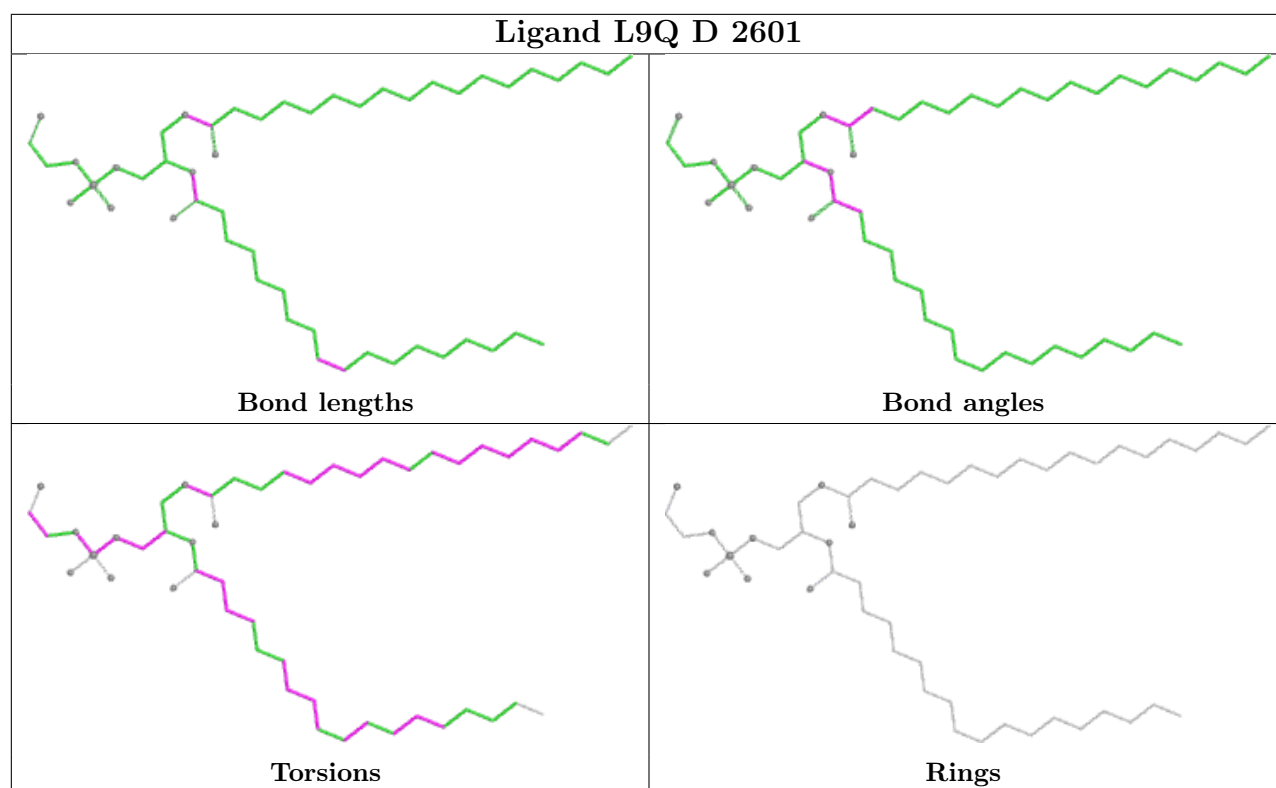
Mol	Chain	Res	Type	Atoms
4	A	2603	L9Q	C1-O3P-P-O4P
4	A	2603	L9Q	O4P-C4-C5-N
4	B	2601	L9Q	C1-O3P-P-O1P

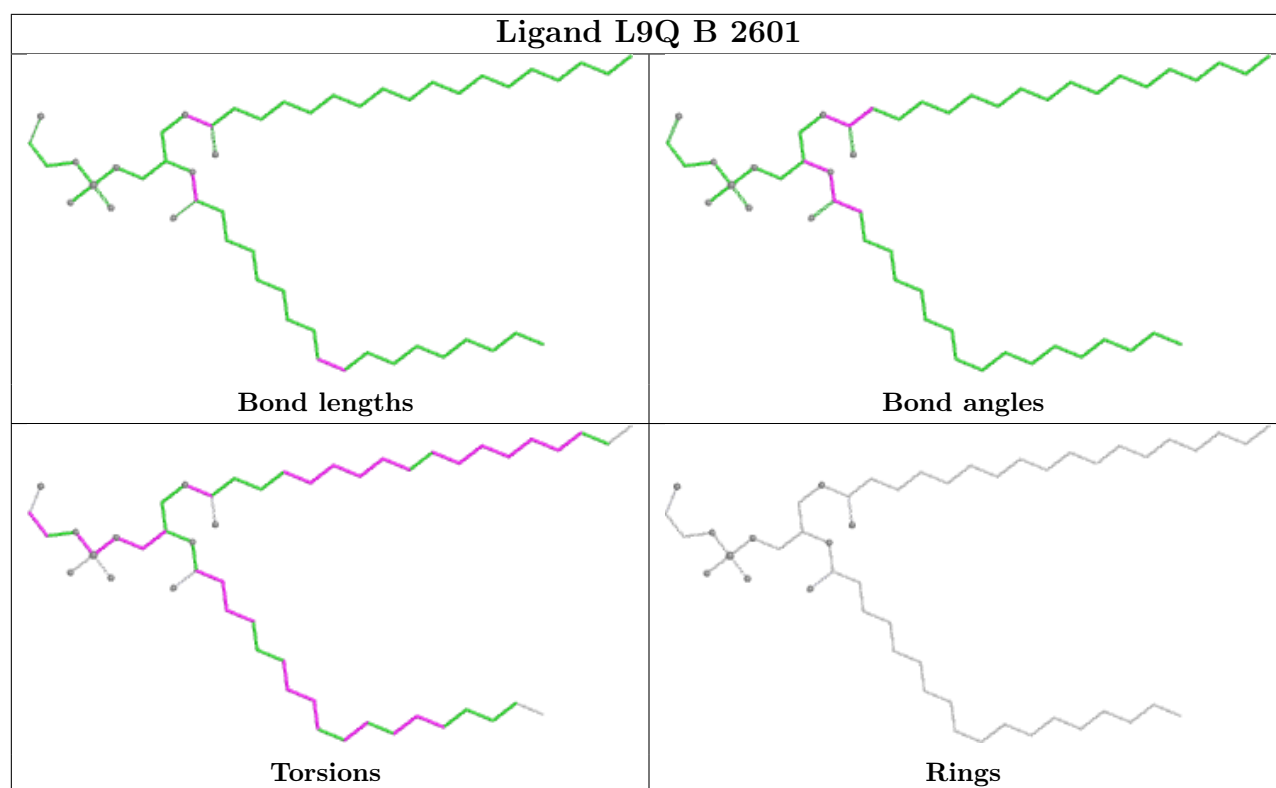
There are no ring outliers.

18 monomers are involved in 53 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	2601	L9Q	8	0
4	A	2603	L9Q	8	0
3	C	302	D12	2	0
3	E	302	D12	2	0
3	F	303	D12	3	0
4	B	2601	L9Q	9	0
3	B	2603	D12	2	0
3	A	2601	D12	1	0
3	C	303	D12	3	0
3	A	2602	D12	2	0
3	E	303	D12	3	0
3	F	301	D12	5	0
3	C	301	D12	5	0
3	B	2602	D12	2	0
3	D	2602	D12	2	0
3	E	301	D12	7	0
3	F	302	D12	2	0
3	D	2603	D12	2	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 than 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.





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.

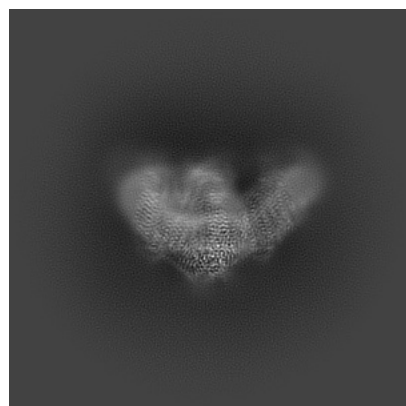
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-65195. These allow visual inspection of the internal detail of the map and identification of artifacts.

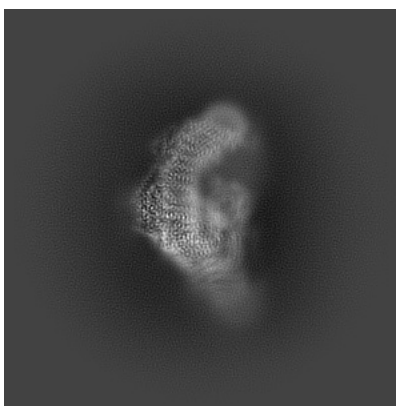
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

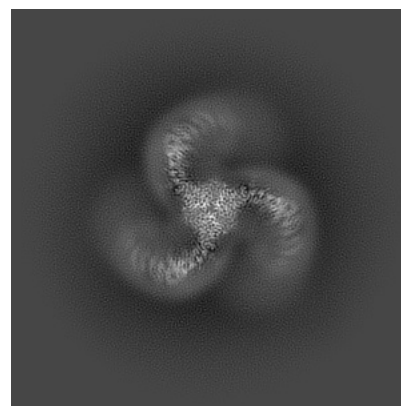
6.1.1 Primary map



X

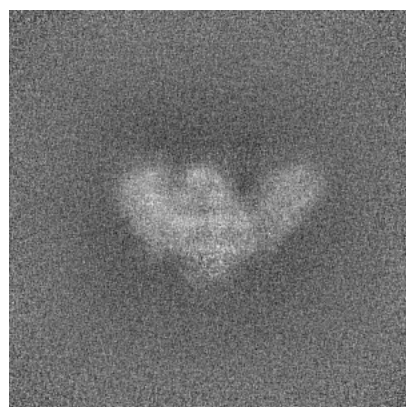


Y

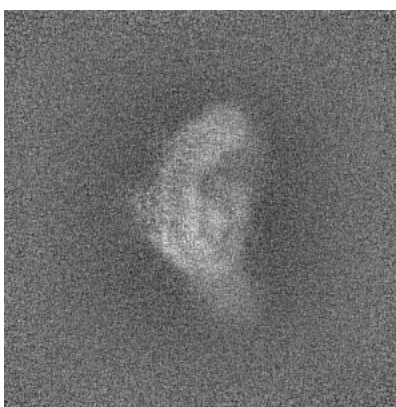


Z

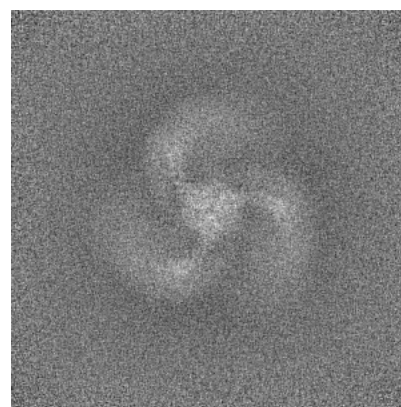
6.1.2 Raw map



X



Y



Z

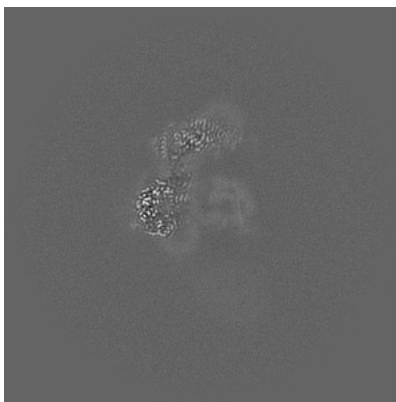
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

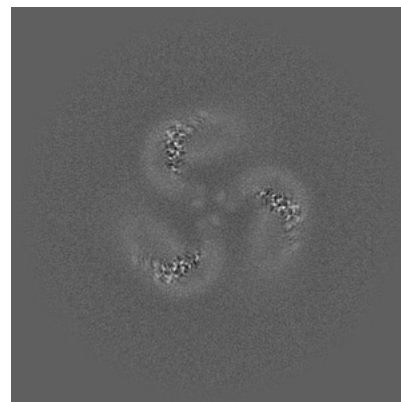
6.2.1 Primary map



X Index: 400

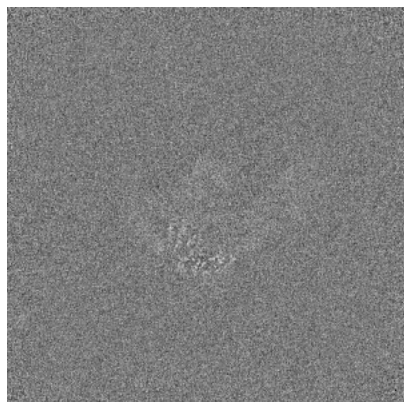


Y Index: 400

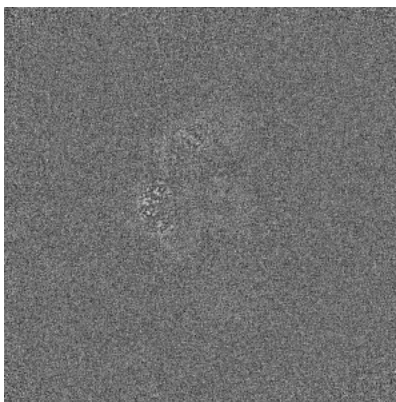


Z Index: 400

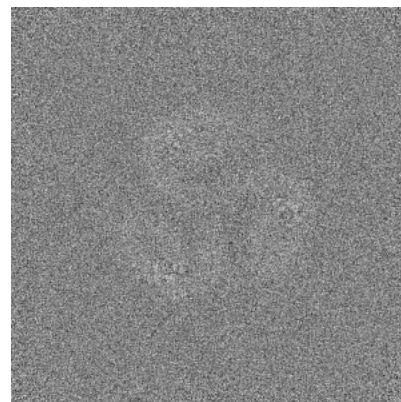
6.2.2 Raw map



X Index: 400



Y Index: 400

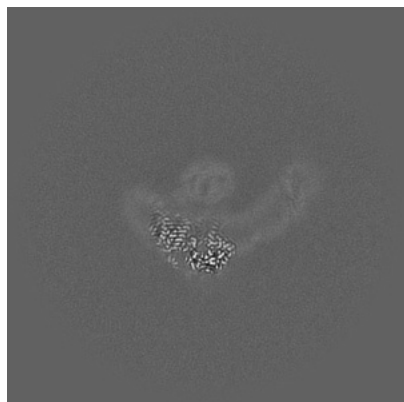


Z Index: 400

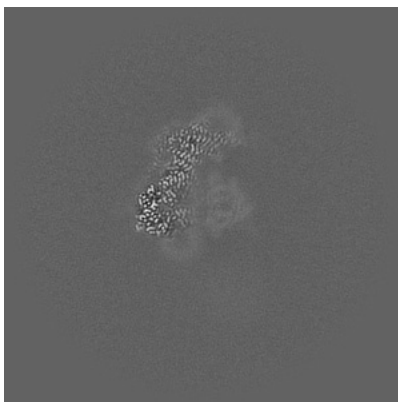
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

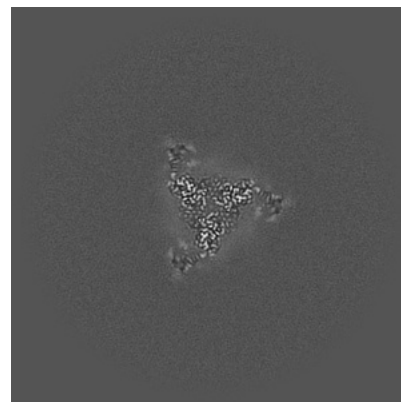
6.3.1 Primary map



X Index: 385

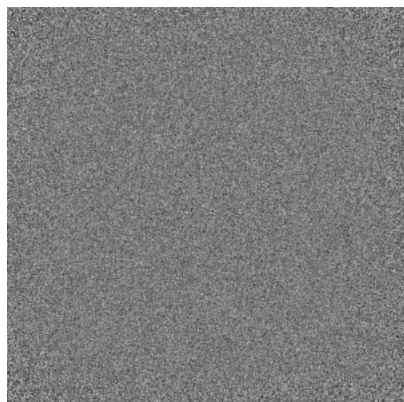


Y Index: 413

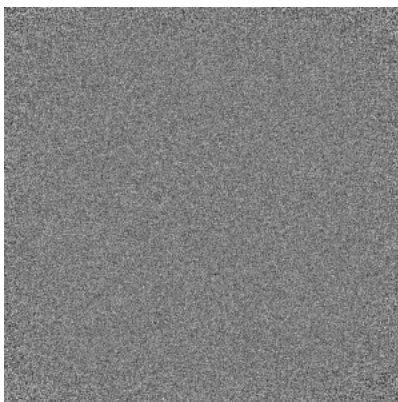


Z Index: 326

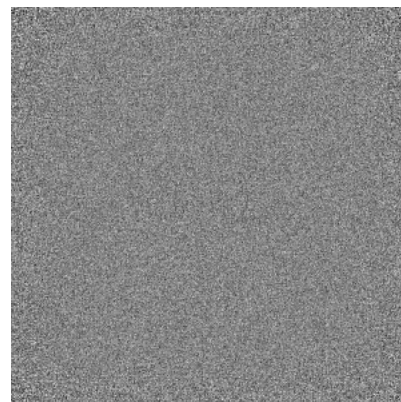
6.3.2 Raw map



X Index: 0



Y Index: 0

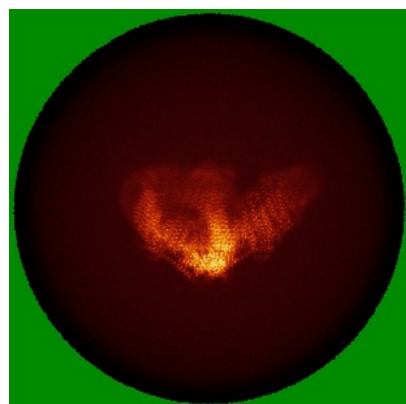


Z Index: 0

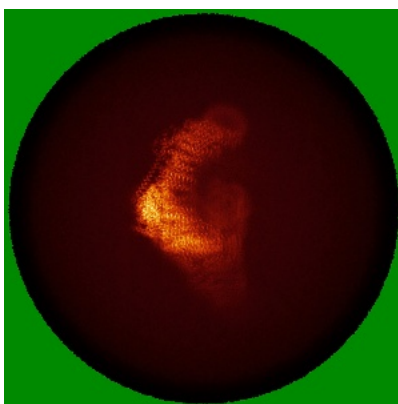
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

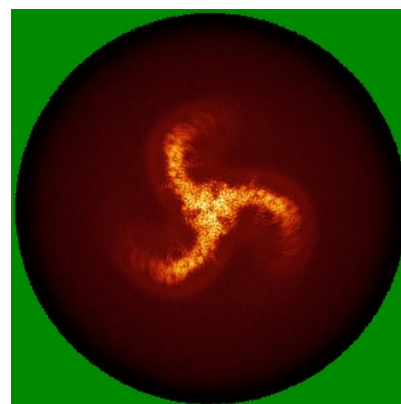
6.4.1 Primary map



X

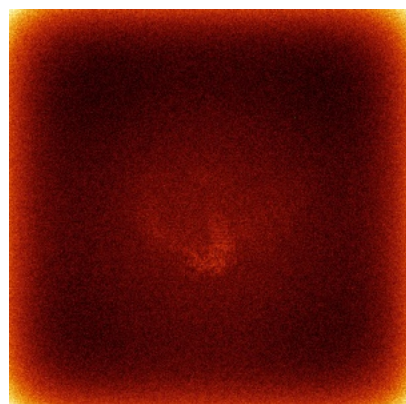


Y

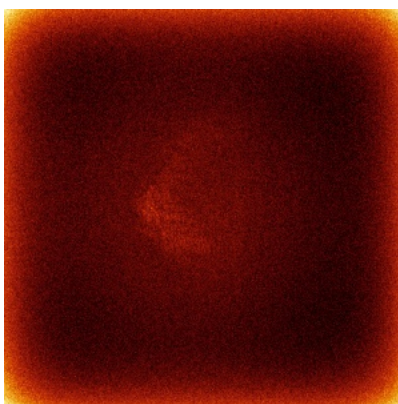


Z

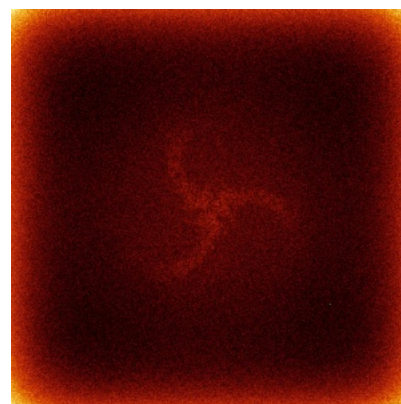
6.4.2 Raw map



X



Y

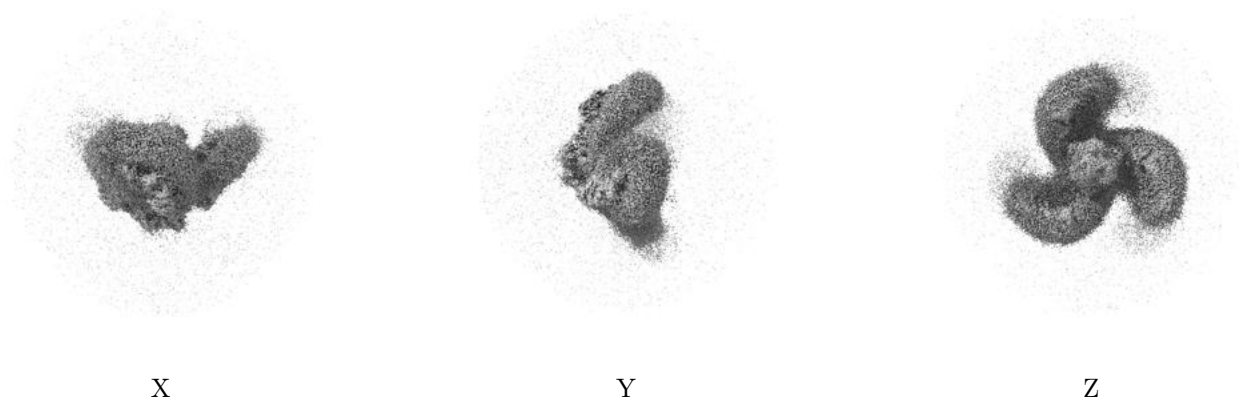


Z

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.

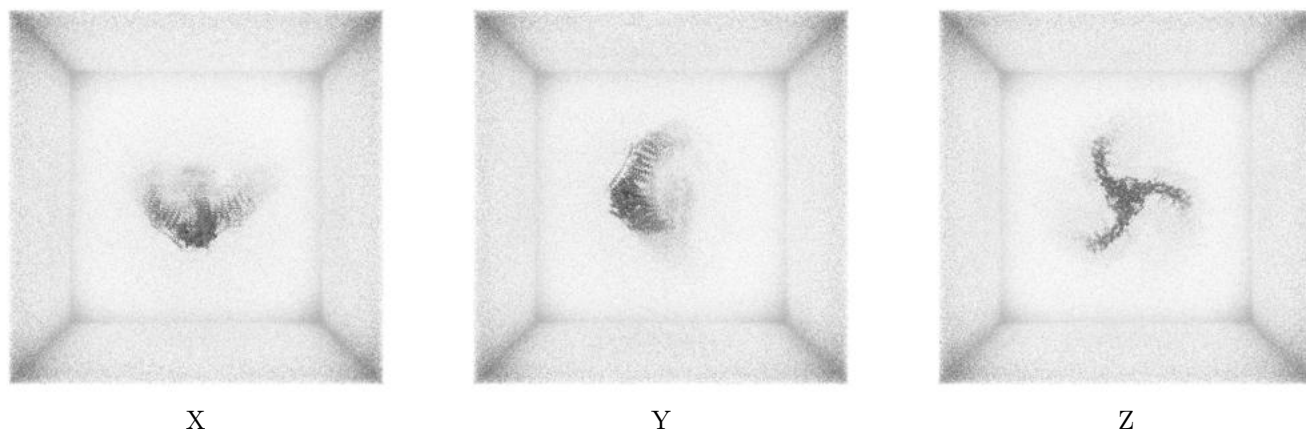
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

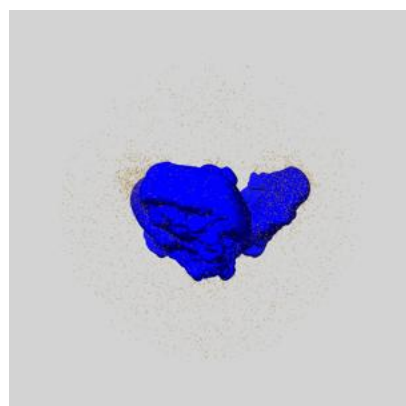
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

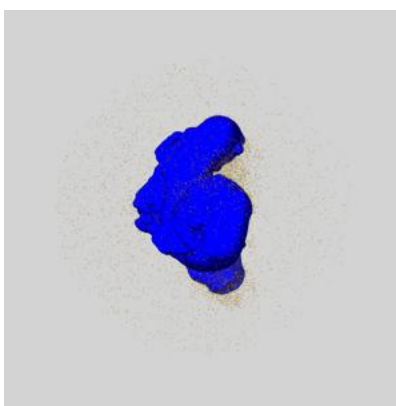
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

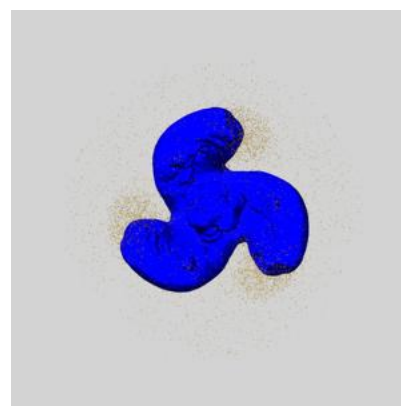
6.6.1 emd_65195_msk_1.map [i](#)



X



Y

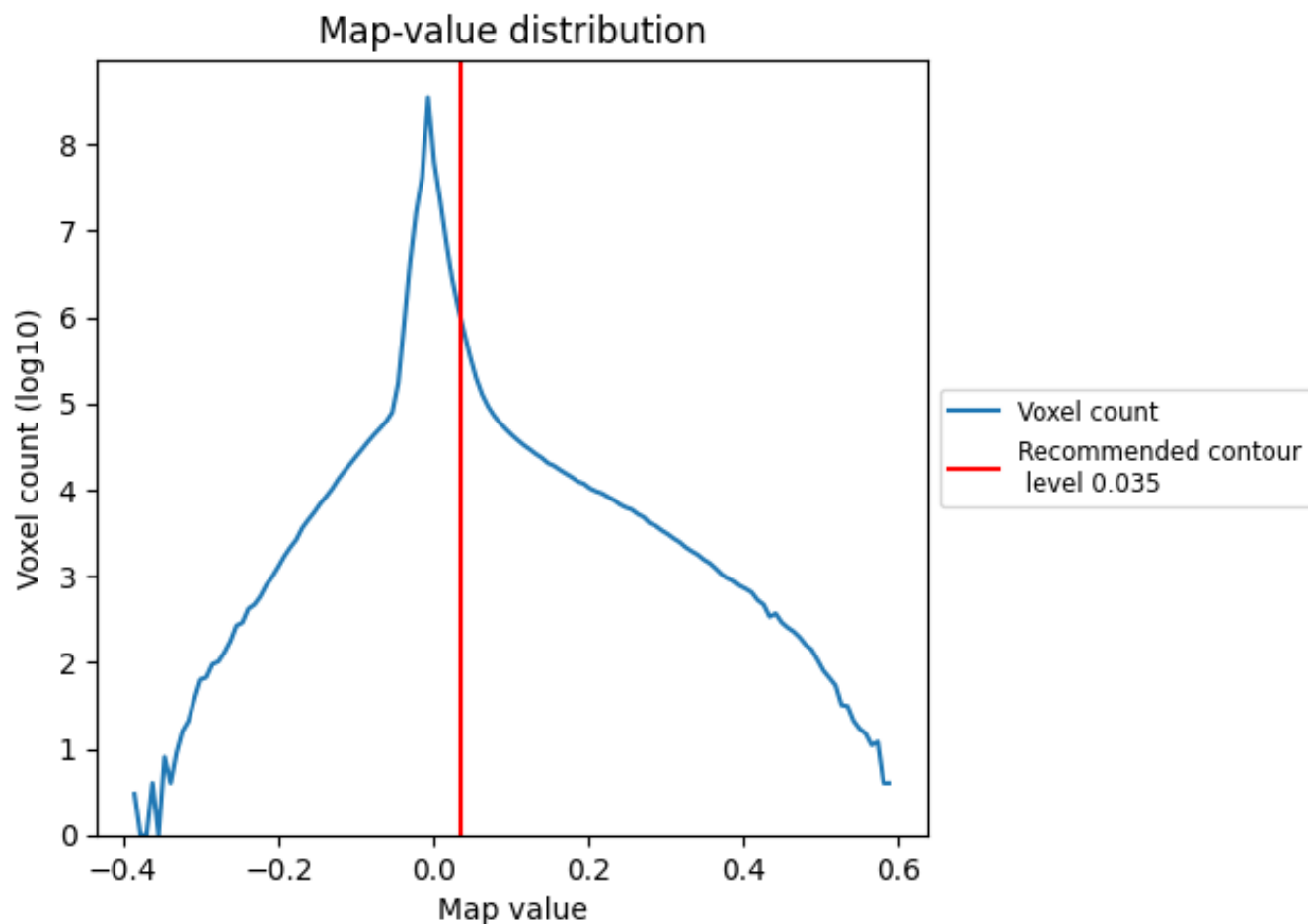


Z

7 Map analysis [i](#)

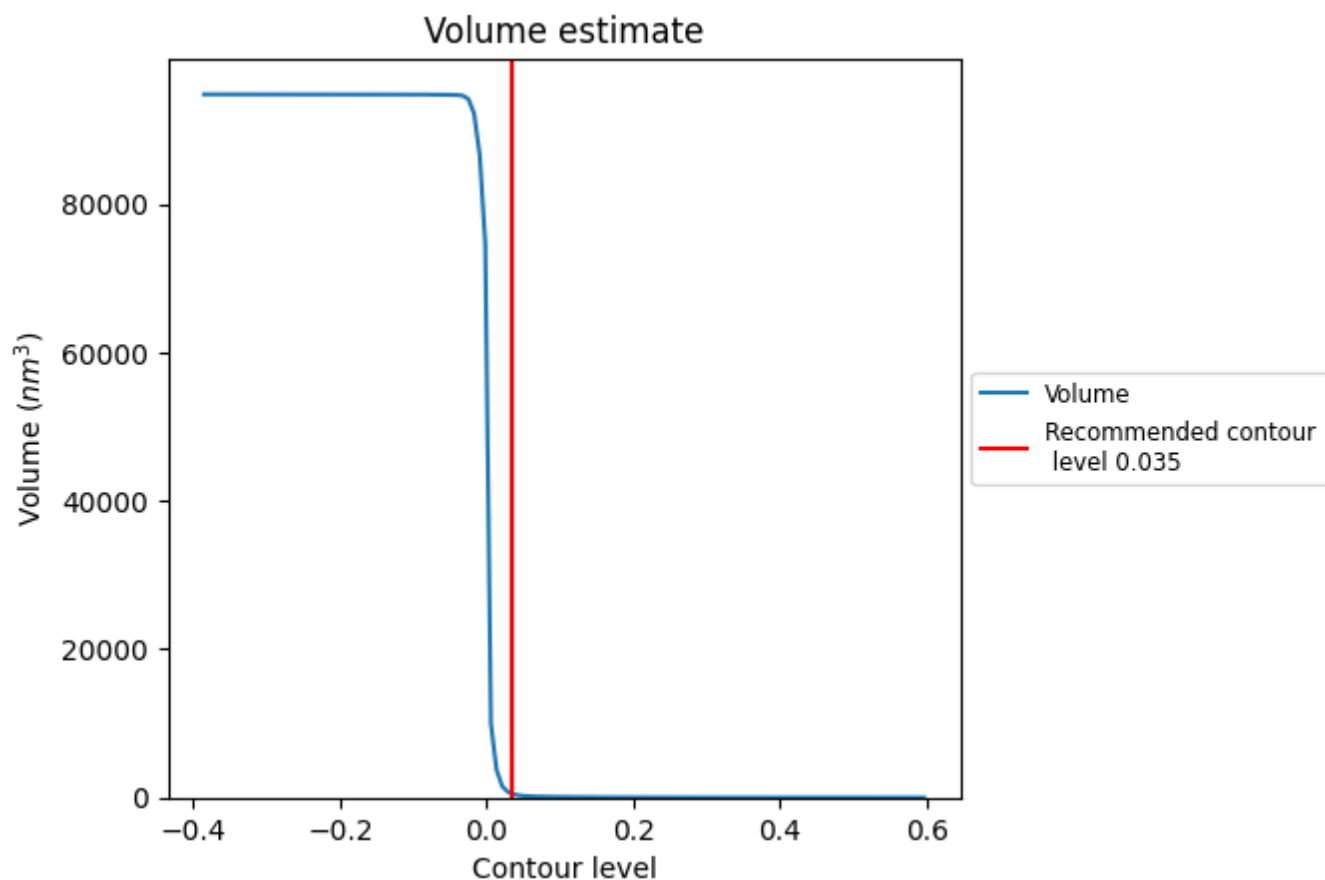
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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.

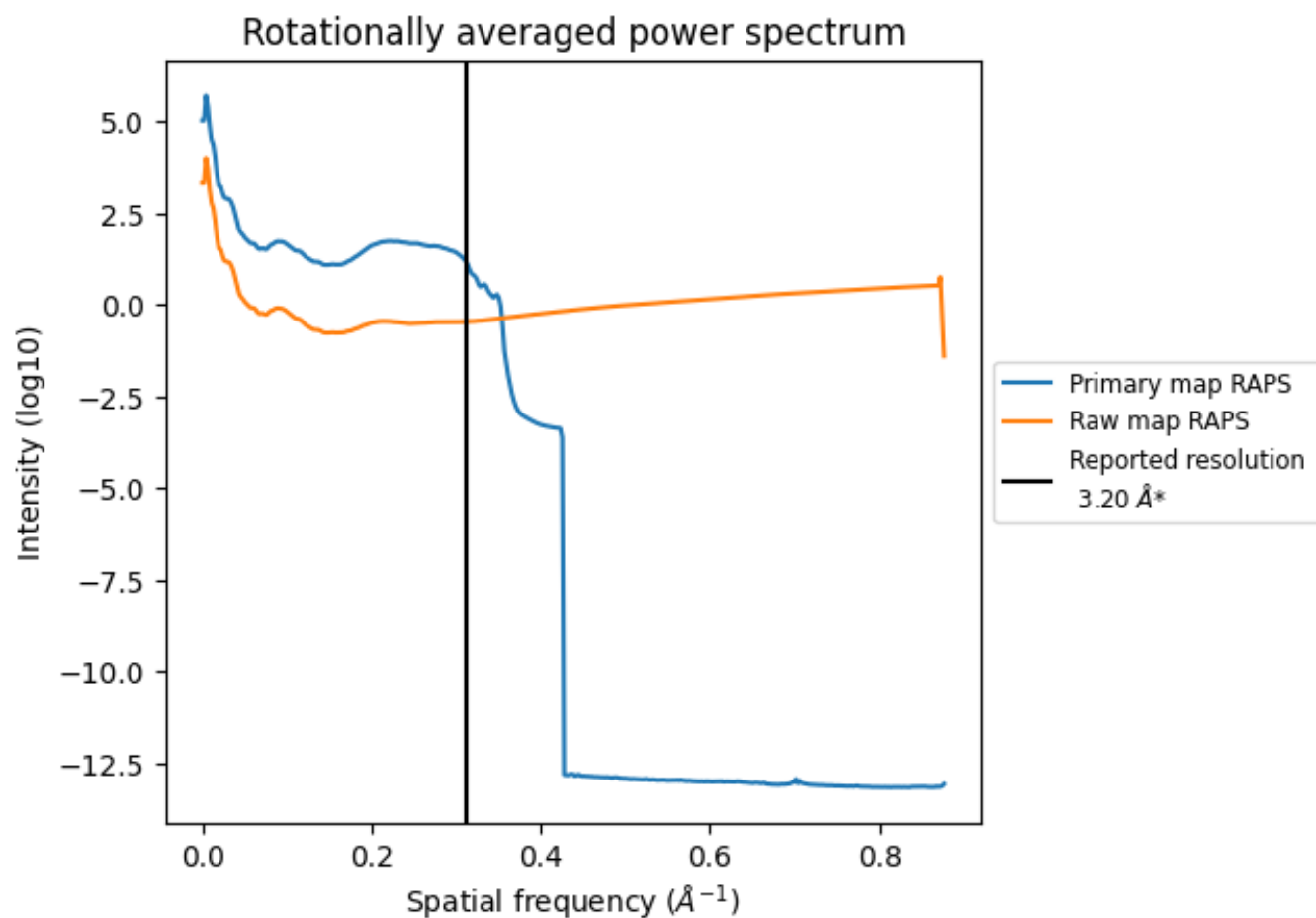
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 519 nm³; this corresponds to an approximate mass of 469 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 ⓘ

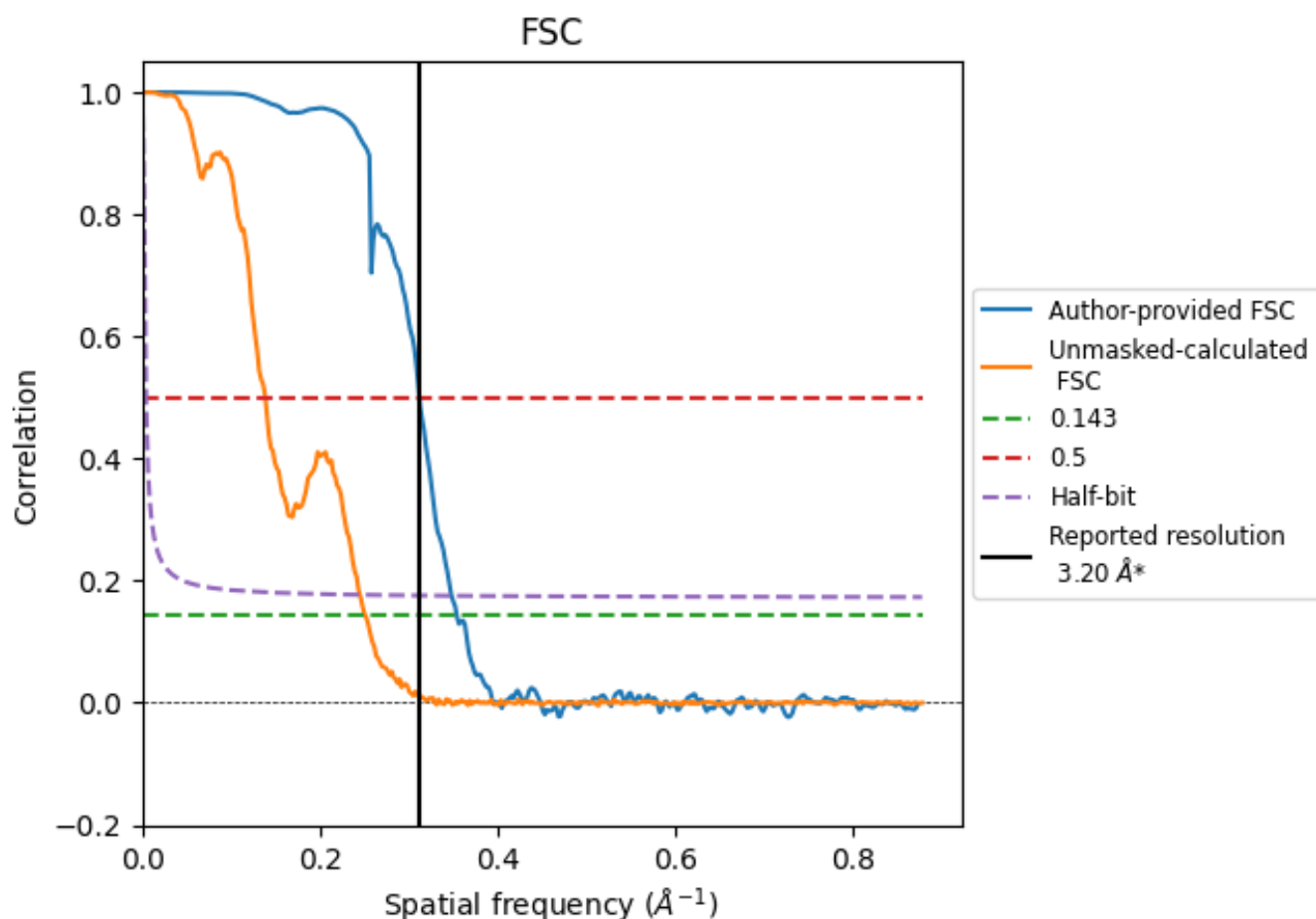


*Reported resolution corresponds to spatial frequency of 0.312 \AA^{-1}

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.312 \AA^{-1}

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	2.83	3.21	2.87
Unmasked-calculated*	3.99	7.23	4.08

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 2.83 differs from the reported value 3.2 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.99 differs from the reported value 3.2 by more than 10 %

9 Map-model fit [i](#)

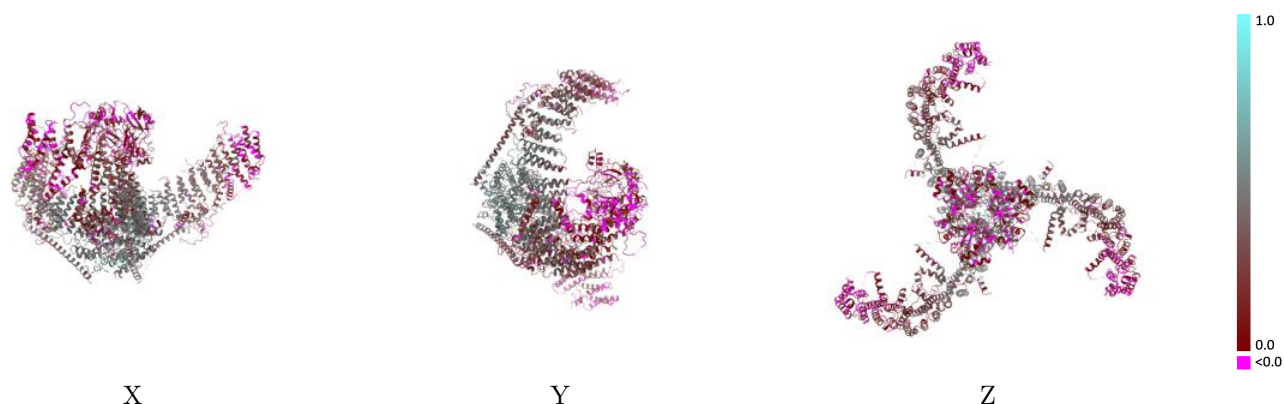
This section contains information regarding the fit between EMDB map EMD-65195 and PDB model 9VMX. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

9.1 Map-model overlay [i](#)



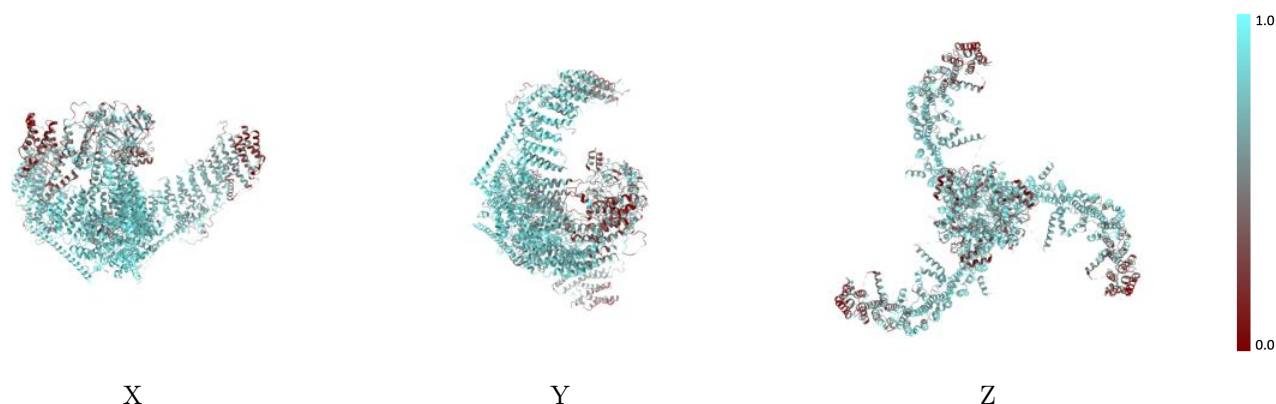
The images above show the 3D surface view of the map at the recommended contour level 0.035 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



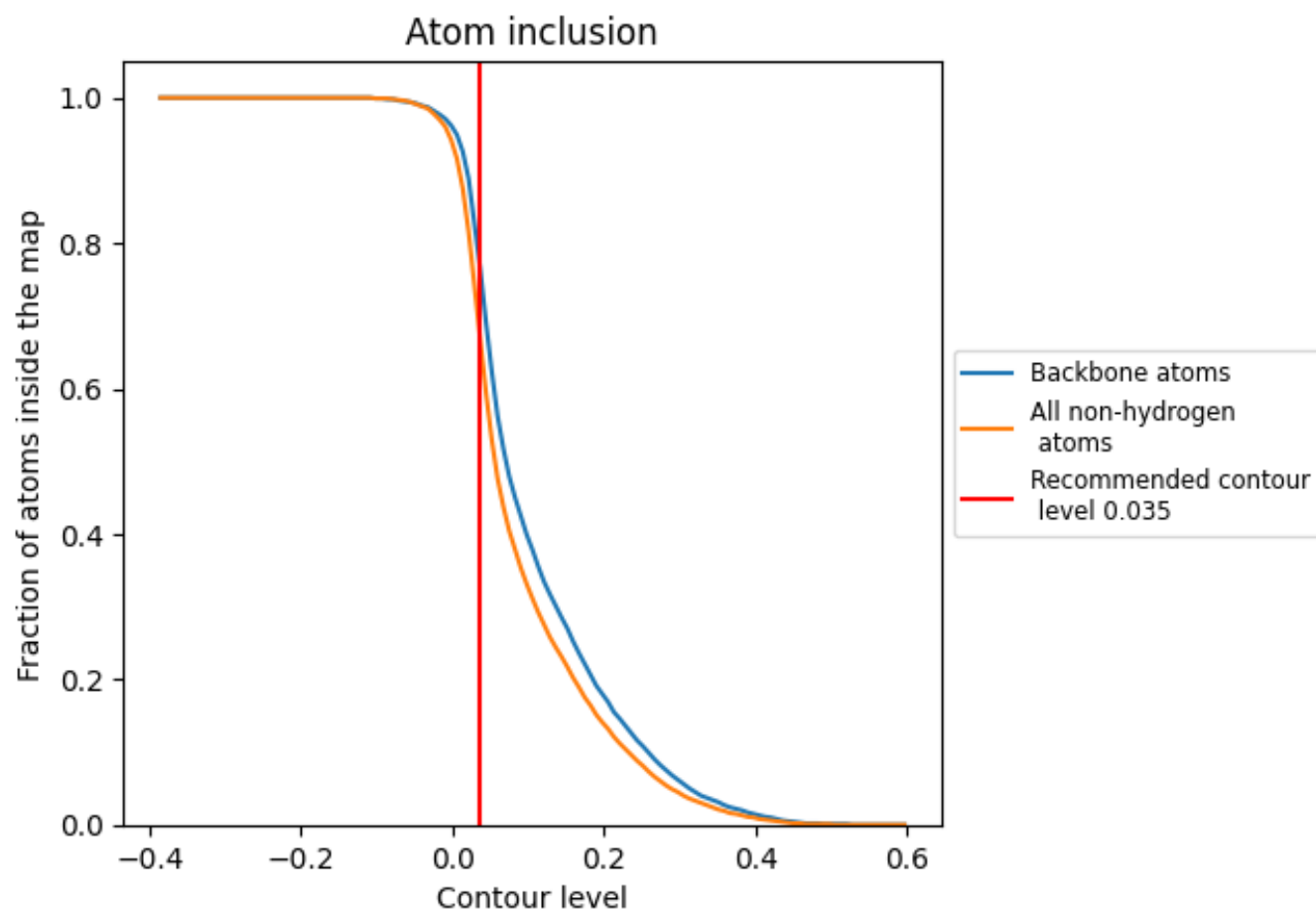
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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](#)



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 (0.035).

9.4 Atom inclusion [i](#)



At the recommended contour level, 78% of all backbone atoms, 68% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.035) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div></div> 0.6840	<div><div></div></div> 0.2640
A	<div><div></div></div> 0.6840	<div><div></div></div> 0.2630
B	<div><div></div></div> 0.6830	<div><div></div></div> 0.2620
C	<div><div></div></div> 0.7150	<div><div></div></div> 0.3540
D	<div><div></div></div> 0.6840	<div><div></div></div> 0.2630
E	<div><div></div></div> 0.7150	<div><div></div></div> 0.3580
F	<div><div></div></div> 0.7040	<div><div></div></div> 0.3580

1.0

0.0

<0.0