



Full wwPDB EM Validation Report ⓘ

Oct 13, 2024 – 02:26 am BST

PDB ID : 7PAS
EMDB ID : EMD-13282
Title : 70S ribosome with P/E-site tRNA in Mycoplasma pneumoniae cells
Authors : Xue, L.; Lenz, S.; Rappsilber, J.; Mahamid, J.
Deposited on : 2021-07-30
Resolution : 16.00 Å (reported)
Based on initial models : 4V7C, 7OOD, 7OOC

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.dev113
MolProbity : 4.02b-467
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) : 2.39

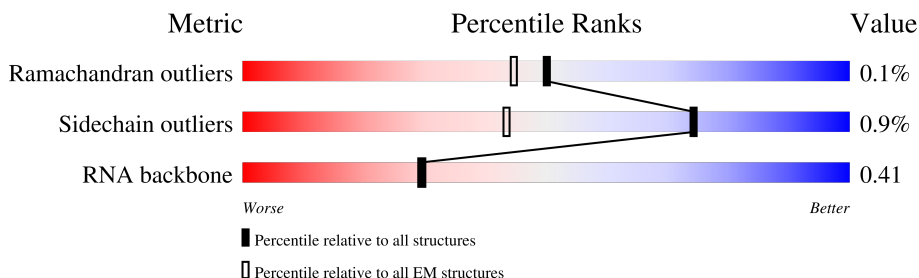
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 16.00 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)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	0	48	
2	1	59	
3	2	37	
4	A	294	
5	B	273	
6	C	205	
7	D	219	
8	E	215	

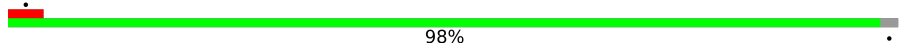
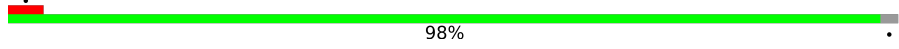
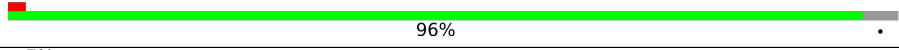
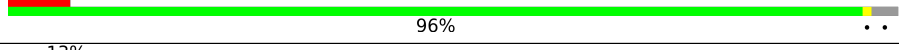
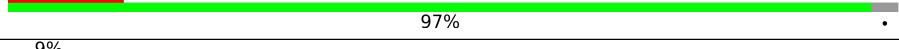
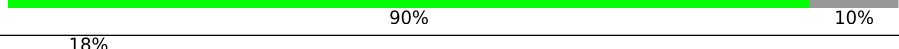
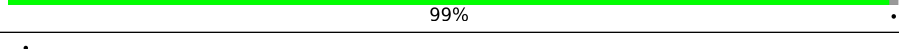
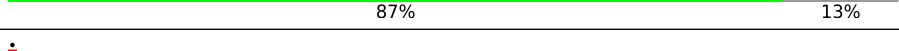
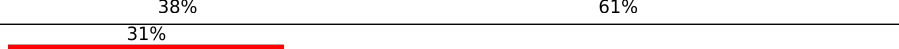
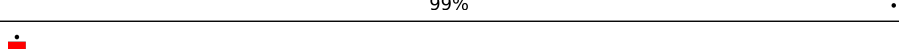
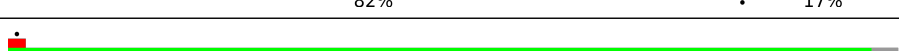
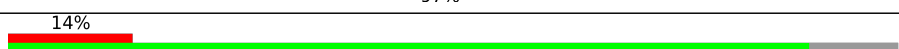

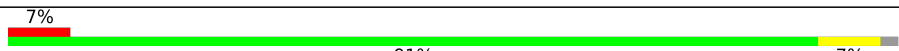
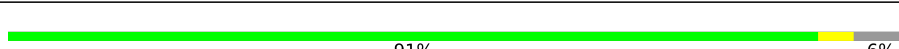





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Mol	Chain	Length	Quality of chain
9	F	155	
10	G	142	
11	H	132	
12	I	108	
13	J	121	
14	K	139	
15	L	124	
16	M	61	
17	N	86	
18	O	94	
19	P	85	
20	Q	104	
21	R	87	
22	S	87	
23	T	60	
24	a	287	
25	b	287	
26	c	212	
27	d	180	
28	e	184	
29	f	149	
30	g	161	
31	h	137	
32	i	146	
33	j	122	

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Mol	Chain	Length	Quality of chain
34	k	151	 98%
35	l	139	 98%
36	m	124	 96%
37	n	116	 96%
38	o	119	 97%
39	p	127	 90%
40	q	100	 99%
41	r	159	 87%
42	s	237	 38%
43	t	111	 99%
44	u	104	 82%
45	v	65	 97%
46	w	111	 90%
47	x	97	 45%
48	y	57	 91%
49	z	53	 91%
50	3	2907	 66%
51	4	108	 60%
52	5	1520	 67%
53	8	76	 50%

2 Entry composition

There are 53 unique types of molecules in this entry. The entry contains 144440 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 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	47	Total	C	N	O	S	0	0
			380	236	81	61	2		

- Molecule 2 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	59	Total	C	N	O	S	0	0
			477	300	99	77	1		

- Molecule 3 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	2	37	Total	C	N	O	S	0	0
			304	189	65	46	4		

- Molecule 4 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	A	240	Total	C	N	O	S	0	0
			1921	1226	334	352	9		

- Molecule 5 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	B	215	Total	C	N	O	S	0	0
			1698	1073	313	307	5		

- Molecule 6 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	C	203	Total	C	N	O	S	0	0
			1660	1051	314	290	5		

- Molecule 7 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	D	153	Total	C	N	O	S	0	0
			1173	742	226	202	3		

- Molecule 8 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	E	167	Total	C	N	O	S	0	0
			1362	857	240	263	2		

- Molecule 9 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	F	154	Total	C	N	O	S	0	0
			1246	785	239	216	6		

- Molecule 10 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	G	141	Total	C	N	O	S	0	0
			1110	723	193	192	2		

- Molecule 11 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	H	128	Total	C	N	O	S	0	0
			1028	655	191	181	1		

- Molecule 12 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	I	101	Total	C	N	O	S	0	0
			809	523	142	143	1		

- Molecule 13 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	J	114	Total	C	N	O	S	0	0
			829	514	153	156	6		

- Molecule 14 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	K	136	Total	C	N	O	S	0	0
			1076	680	213	181	2		

- Molecule 15 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	L	118	Total	C	N	O		0	0
			951	594	191	166			

- Molecule 16 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	M	60	Total	C	N	O	S	0	0
			474	302	96	72	4		

- Molecule 17 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	N	83	Total	C	N	O		0	0
			673	428	125	120			

- Molecule 18 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	O	80	Total	C	N	O	S	0	0
			646	414	119	111	2		

- Molecule 19 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	P	83	Total	C	N	O		0	0
			675	425	135	115			

- Molecule 20 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	Q	65	Total	C	N	O	S	0	0
			535	342	103	86	4		

- Molecule 21 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	R	84	Total	C	N	O	S	0	0
			682	435	127	118	2		

- Molecule 22 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	S	77	Total	C	N	O	S	0	0
			629	383	135	111			

- Molecule 23 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	T	53	Total	C	N	O	S	0	0
			471	295	103	72	1		

- Molecule 24 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	a	285	Total	C	N	O	S	0	0
			2225	1385	437	397	6		

- Molecule 25 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	b	229	Total	C	N	O	S	0	0
			1762	1119	318	318	7		

- Molecule 26 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	c	210	Total	C	N	O	S	0	0
			1644	1047	297	297	3		

- Molecule 27 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	d	175	Total	C	N	O	S	0	0
			1388	893	245	246	4		

- Molecule 28 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	e	176	Total	C	N	O		
			1396	899	247	250	0	0

- Molecule 29 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	f	145	Total	C	N	O	S	
			1160	746	204	207	3	0

- Molecule 30 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms				AltConf	Trace
30	g	126	Total	C	N	O	S	
			960	612	167	178	3	0

- Molecule 31 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms				AltConf	Trace
31	h	128	Total	C	N	O	S	
			959	616	160	177	6	0

- Molecule 32 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	i	144	Total	C	N	O	S	
			1164	737	213	209	5	0

- Molecule 33 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms				AltConf	Trace
33	j	122	Total	C	N	O	S	
			944	595	178	167	4	0

- Molecule 34 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms				AltConf	Trace
34	k	148	Total	C	N	O		
			1153	731	226	196	0	0

- Molecule 35 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	l	136	Total	C	N	O	S	0	0
			1079	694	196	182	7		

- Molecule 36 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	m	119	Total	C	N	O	S	0	0
			958	609	175	171	3		

- Molecule 37 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	n	112	Total	C	N	O	S	0	0
			889	557	175	155	2		

- Molecule 38 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	o	115	Total	C	N	O	S	0	0
			938	592	180	165	1		

- Molecule 39 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	p	114	Total	C	N	O	S	0	0
			947	603	188	154	2		

- Molecule 40 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	q	99	Total	C	N	O	S	0	0
			811	525	148	134	4		

- Molecule 41 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	r	139	Total	C	N	O	S	0	0
			1068	663	207	191	7		

- Molecule 42 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	s	92	Total	C	N	O	S	0	0
			720	475	122	122	1		

- Molecule 43 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	t	111	Total	C	N	O	S	0	0
			872	550	166	153	3		

- Molecule 44 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	u	86	Total	C	N	O	S	0	0
			657	409	130	117	1		

- Molecule 45 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	v	63	Total	C	N	O	S	0	0
			513	317	108	87	1		

- Molecule 46 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms				AltConf	Trace
46	w	100	Total	C	N	O	0	0
			818	517	153	148		

- Molecule 47 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	x	44	Total	C	N	O	S	0	0
			344	221	55	64	4		

- Molecule 48 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	y	56	Total	C	N	O	S	0	0
			452	274	98	75	5		

- Molecule 49 is a protein called 50S ribosomal protein L33 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	z	50	Total	C	N	O	S	0	0
			408	255	81	68	4		

- Molecule 50 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	3	2878	Total	C	N	O	P	0	0
			61664	27558	11236	19995	2875		

- Molecule 51 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	4	105	Total	C	N	O	P	0	0
			2239	1003	409	724	103		

- Molecule 52 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	5	1493	Total	C	N	O	P	0	0
			31943	14279	5792	10382	1490		

- Molecule 53 is a RNA chain called tRNA-Phe.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	8	73	Total	C	N	O	P	0	0
			1556	695	278	511	72		

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: 50S ribosomal protein L34

Chain 0:  98%



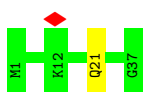
- Molecule 2: 50S ribosomal protein L35

Chain 1:  100%


There are no outlier residues recorded for this chain.

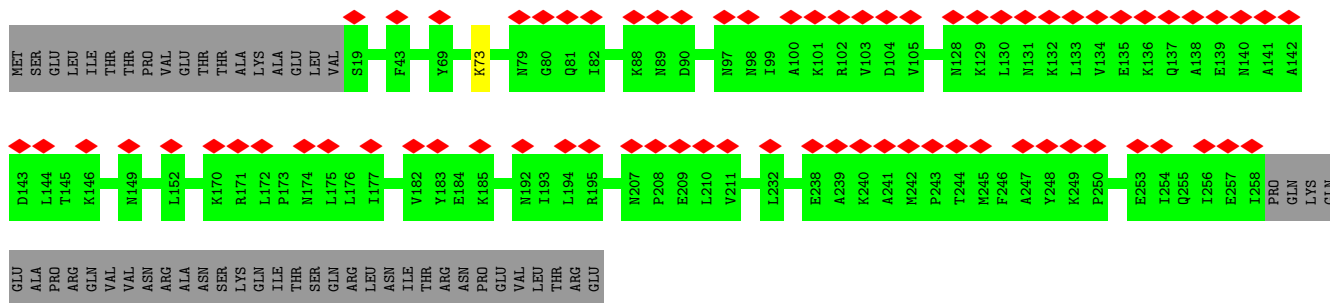
- Molecule 3: 50S ribosomal protein L36

Chain 2:  97%




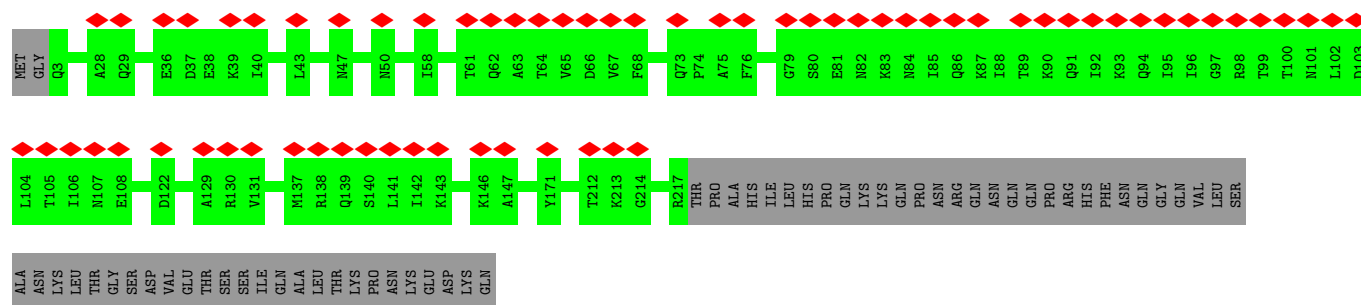
- Molecule 4: 30S ribosomal protein S2

Chain A:  25% 81% 18%

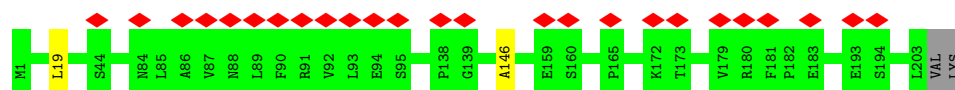


- Molecule 5: 30S ribosomal protein S3

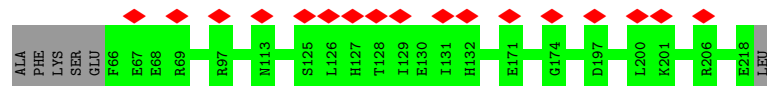
Chain B:  25% 79% 21%



• Molecule 6: 30S ribosomal protein S4



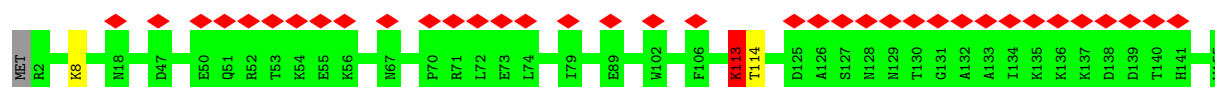
• Molecule 7: 30S ribosomal protein S5



• Molecule 8: 30S ribosomal protein S6

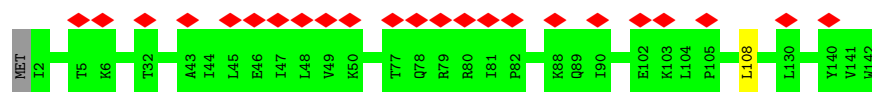


• Molecule 9: 30S ribosomal protein S7

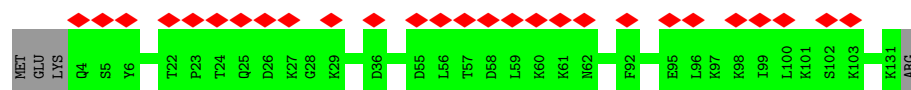


• Molecule 10: 30S ribosomal protein S8

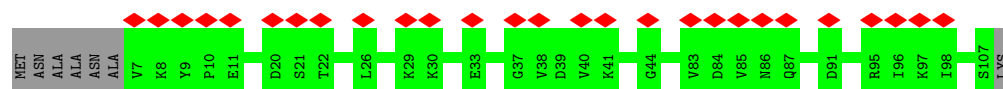




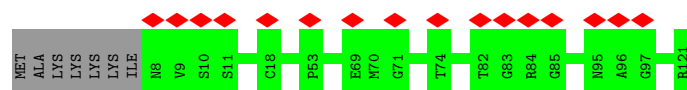
- Molecule 11: 30S ribosomal protein S9



- Molecule 12: 30S ribosomal protein S10



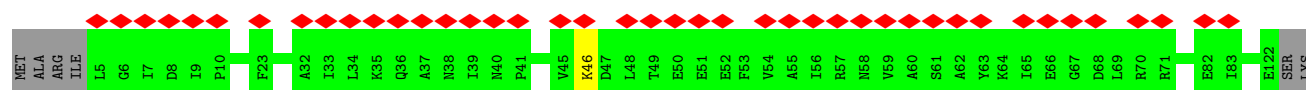
- Molecule 13: 30S ribosomal protein S11



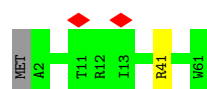
- Molecule 14: 30S ribosomal protein S12



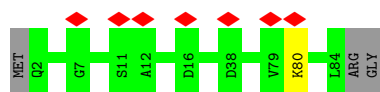
- Molecule 15: 30S ribosomal protein S13



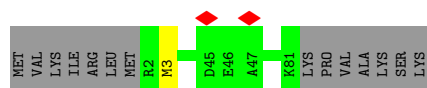
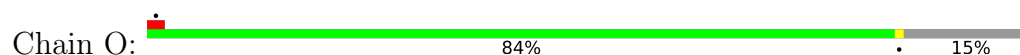
- Molecule 16: 30S ribosomal protein S14 type Z



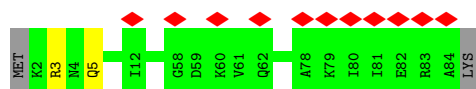
- Molecule 17: 30S ribosomal protein S15



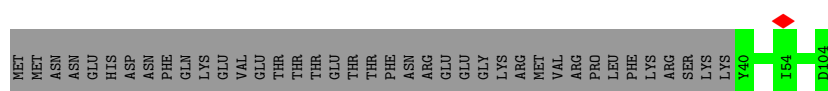
- Molecule 18: 30S ribosomal protein S16



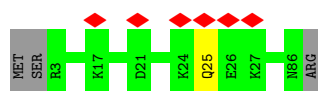
- Molecule 19: 30S ribosomal protein S17



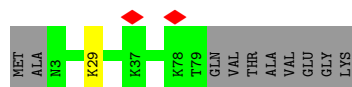
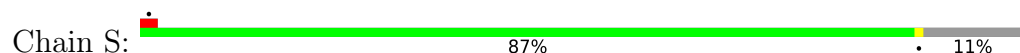
- Molecule 20: 30S ribosomal protein S18



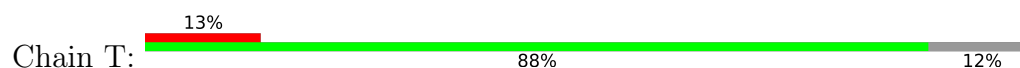
- Molecule 21: 30S ribosomal protein S19



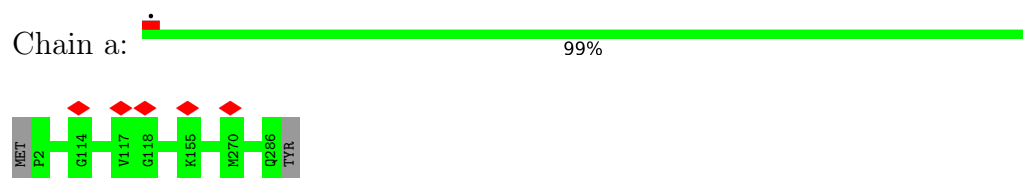
- Molecule 22: 30S ribosomal protein S20



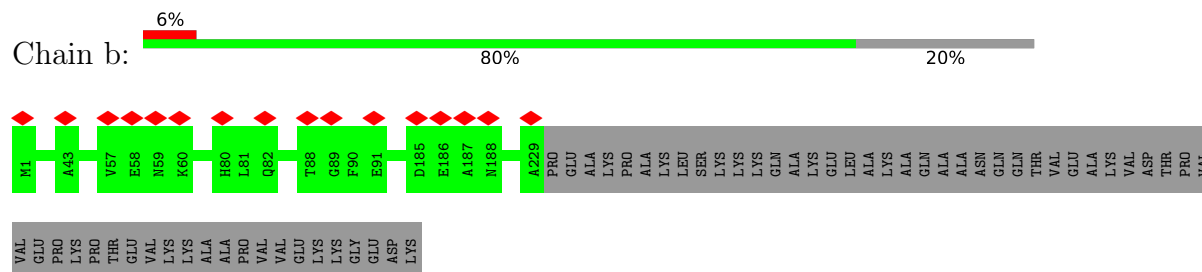
- Molecule 23: 30S ribosomal protein S21



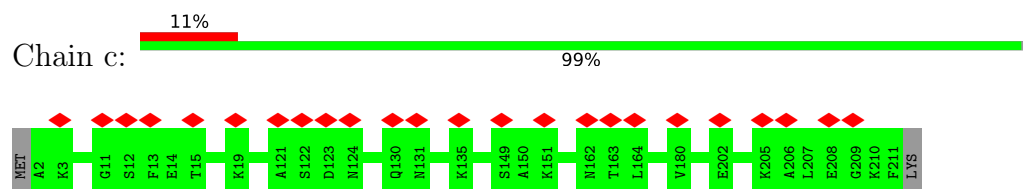
- Molecule 24: 50S ribosomal protein L2



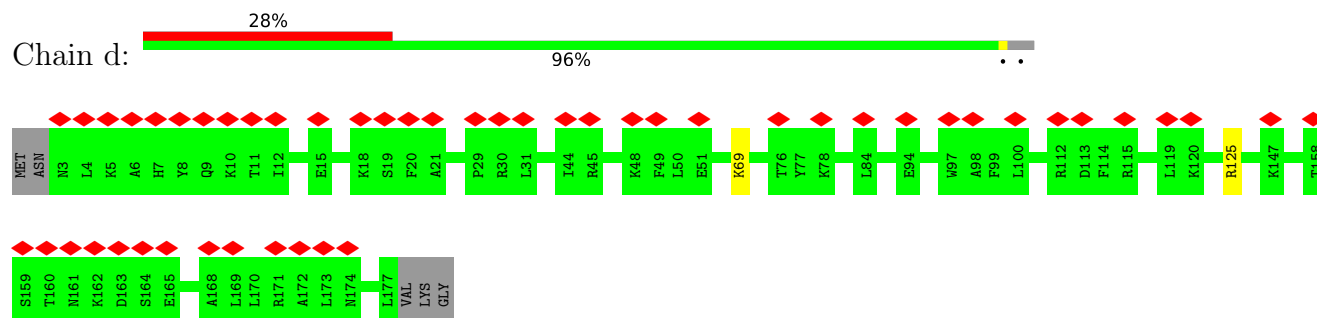
- Molecule 25: 50S ribosomal protein L3



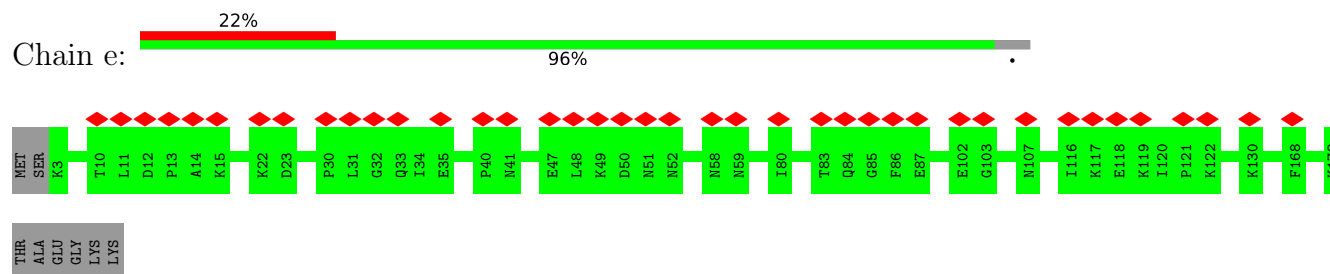
- Molecule 26: 50S ribosomal protein L4



- Molecule 27: 50S ribosomal protein L5

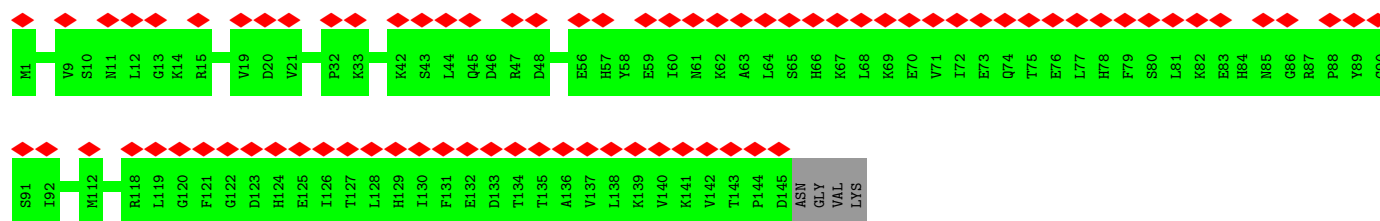


- Molecule 28: 50S ribosomal protein L6

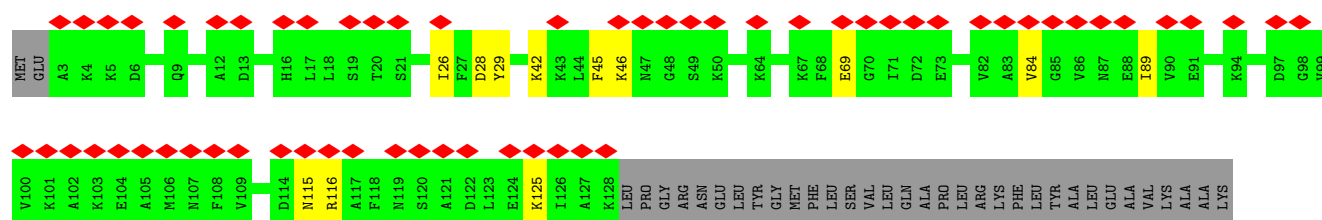
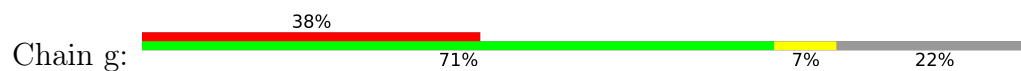


- Molecule 29: 50S ribosomal protein L9

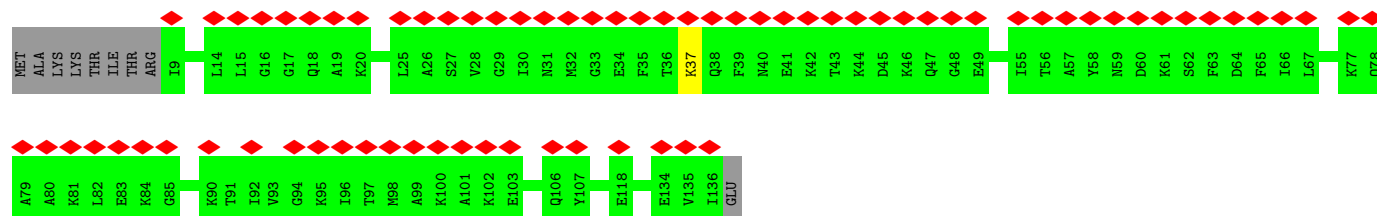
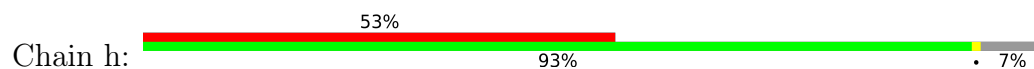




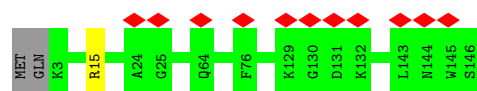
• Molecule 30: 50S ribosomal protein L10



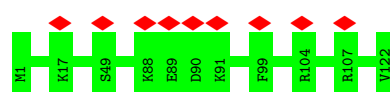
• Molecule 31: 50S ribosomal protein L11



• Molecule 32: 50S ribosomal protein L13

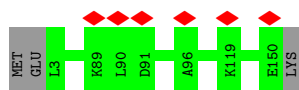


• Molecule 33: 50S ribosomal protein L14

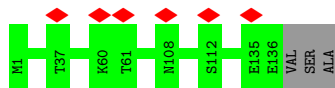


• Molecule 34: 50S ribosomal protein L15

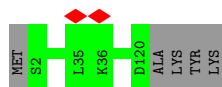




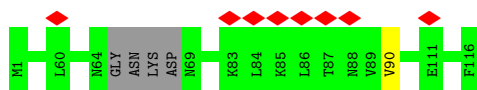
- Molecule 35: 50S ribosomal protein L16



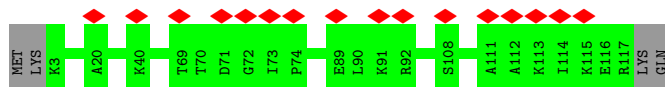
- Molecule 36: 50S ribosomal protein L17



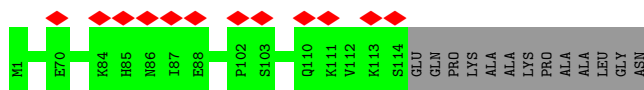
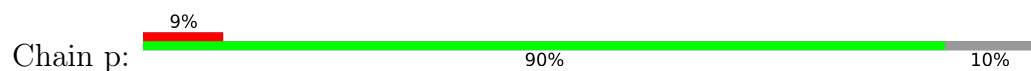
- Molecule 37: 50S ribosomal protein L18



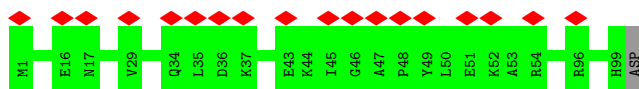
- Molecule 38: 50S ribosomal protein L19



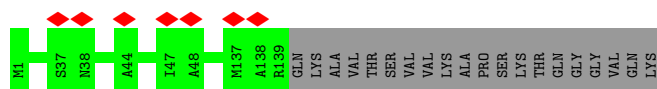
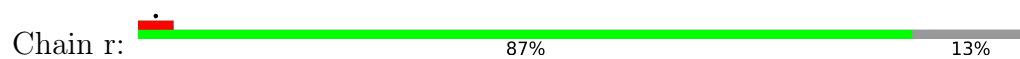
- Molecule 39: 50S ribosomal protein L20



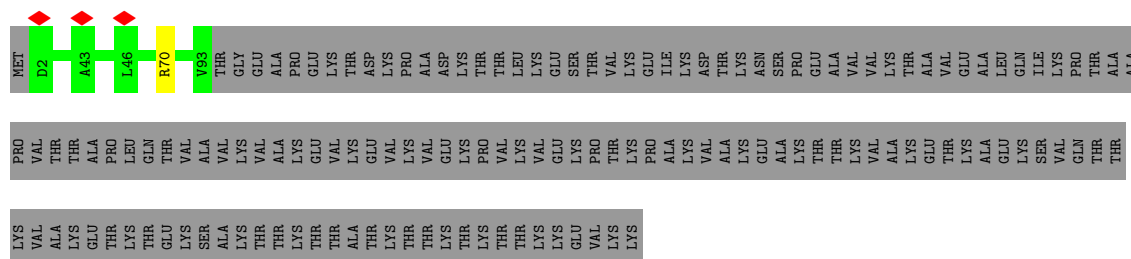
- Molecule 40: 50S ribosomal protein L21



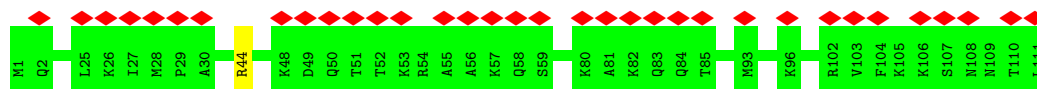
- Molecule 41: 50S ribosomal protein L22



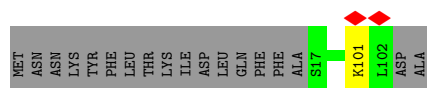
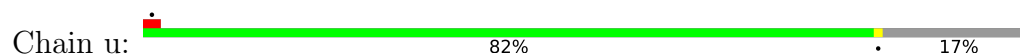
- Molecule 42: 50S ribosomal protein L23



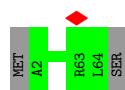
- Molecule 43: 50S ribosomal protein L24



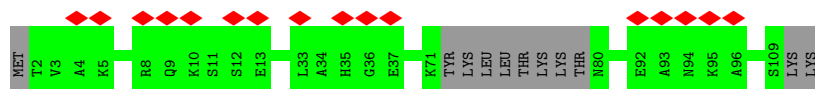
- Molecule 44: 50S ribosomal protein L27



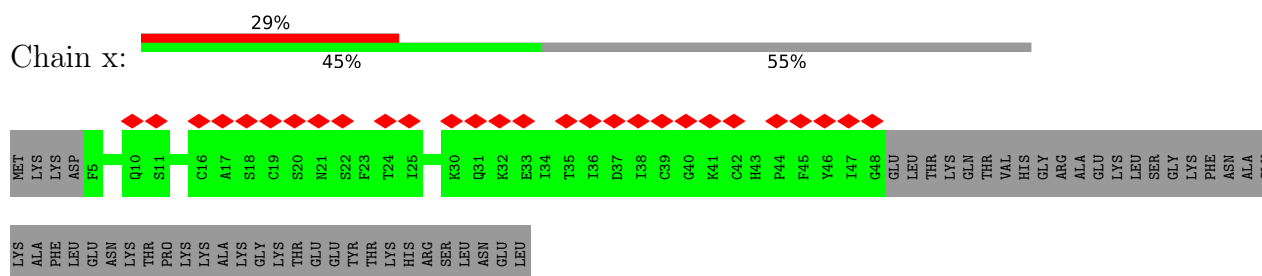
- Molecule 45: 50S ribosomal protein L28



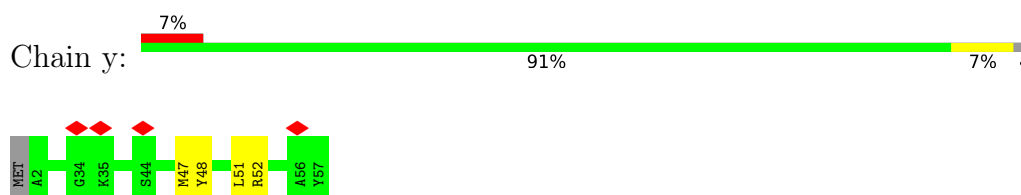
- Molecule 46: 50S ribosomal protein L29



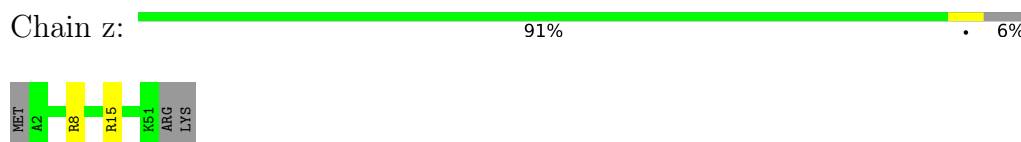
- Molecule 47: 50S ribosomal protein L31



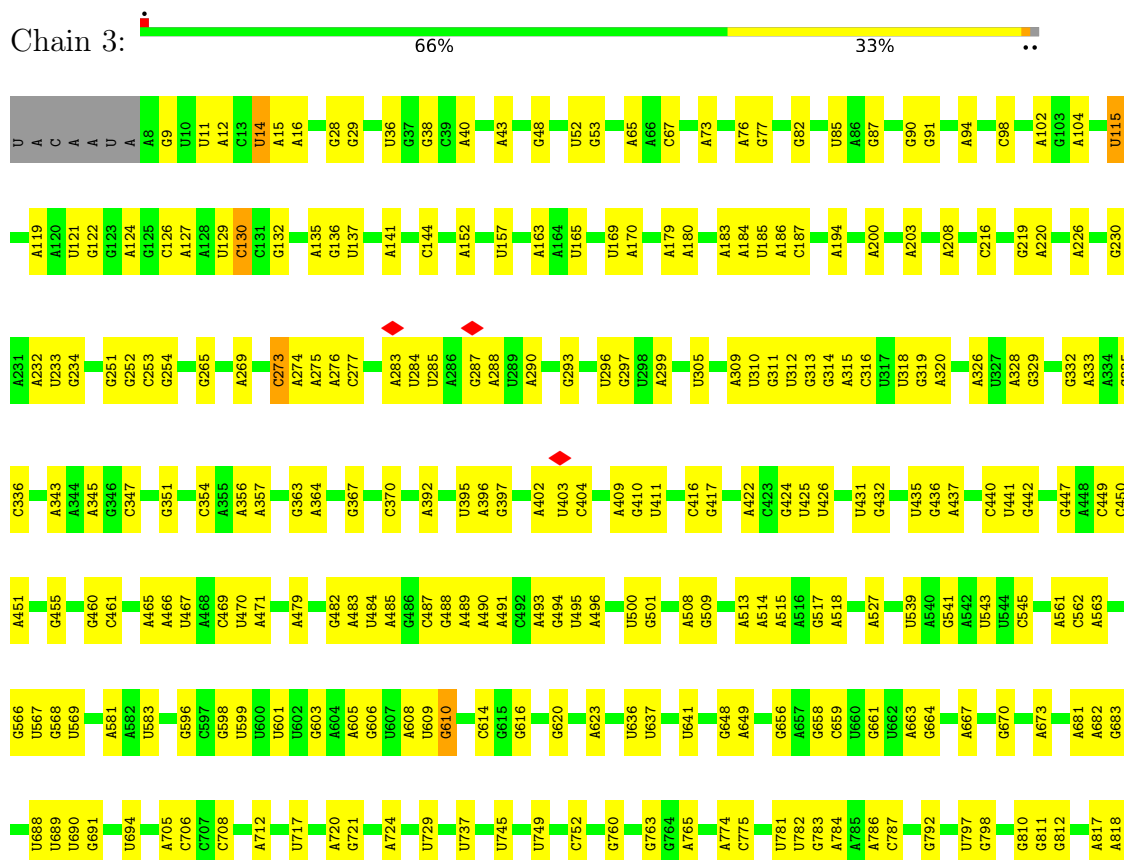
- Molecule 48: 50S ribosomal protein L32



- Molecule 49: 50S ribosomal protein L33 1

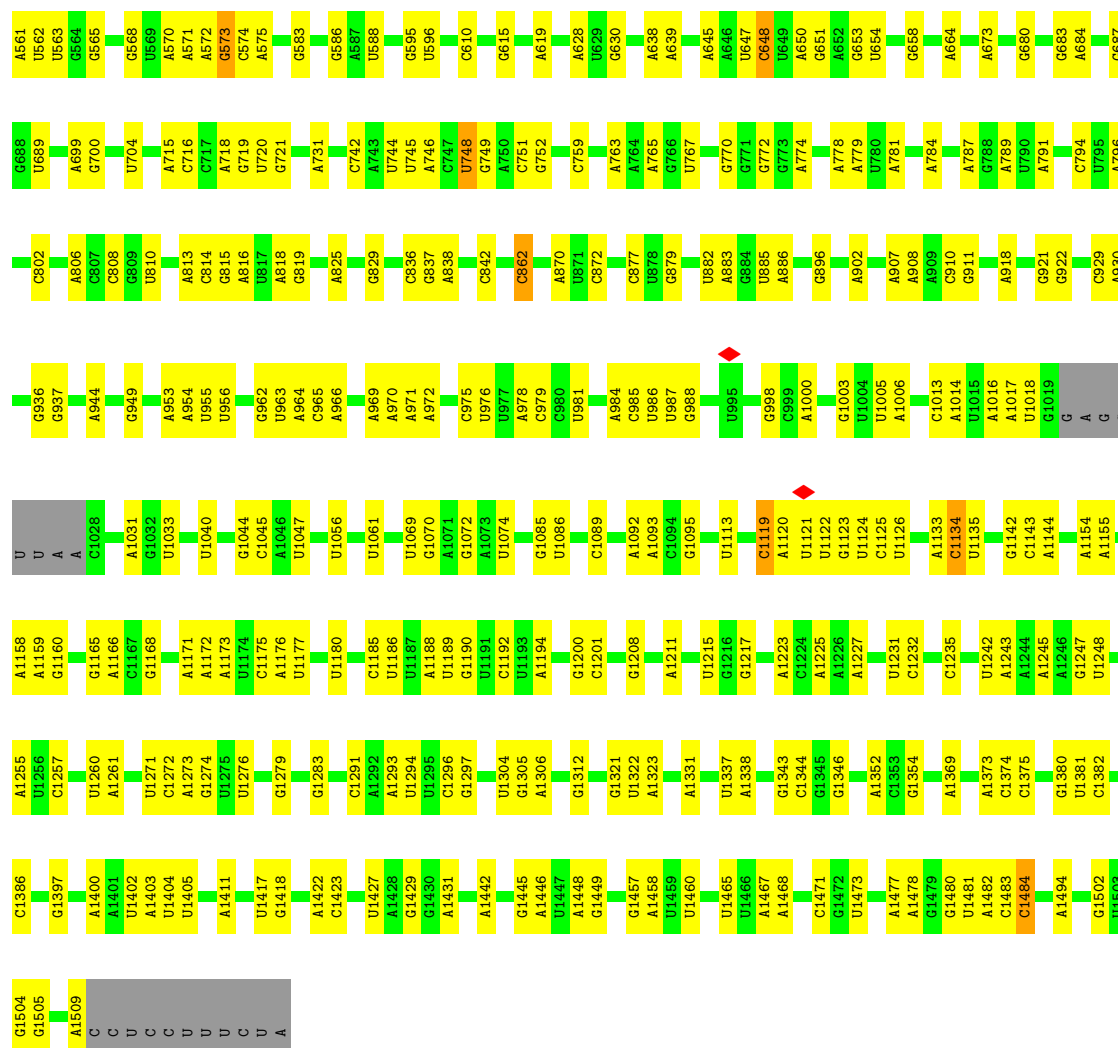


- Molecule 50: 23S ribosomal RNA



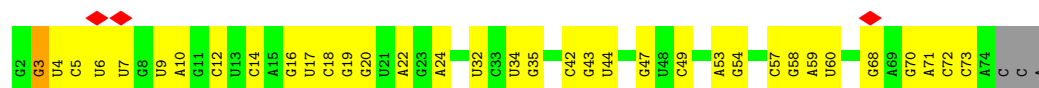
U2226	U2231	G2232	A2233	G2238	G2242	G2246	G2247	G2250	U2251	G2254	G2258	C2272	A2276	A2277	A2286	G2290	U2291	A2292	C2293	A2294	A2296	G2297	C2305	C2310	G2311	G2312	U2313	U2314	G2315	G2316	A2317	A2318	A2319	U2320	G2333	G2341	U2342	A2343	A2344	G2349																
U2138	C2139	G2140	A2141	C2144	A2145	A2146	U2149	U2153	A2154	G2155	U2159	U2160	G2161	U2162	A2165	G2169	A2178	U2179	U2180	A2181	C2182	U2183	C2187	G2190	U2191	U2192	U2193	G2194	U2195	U2196	U2197	C2198	U2200	A2201	U2202	A2206	A2207	G2211	U2212	U2218	U2219	A2220	C2221	C2222	C2223											
A2042	C2043	G2050	G2053	C2057	A2061	C2062	G2063	A2064	A2065	A2066	A2067	C2068	A2069	A2070	U2075	G2076	A2077	U2083	G2087	A2094	U2099	G2100	A2101	U2102	G2106	A2107	C2108	A2109	U2110	U2111	A2112	U2113	C2114	A2115	U2116	G2117	G2120	A2123	A2124	U2125	A2126	G2131	G2132	A2133	A2137											
U1820	G1821	A1822	G1824	A1828	U1834	G1835	A1836	C1837	C1840	U1841	C1842	C1843	C1844	C1845	A1846	G1849	C1850	U1851	A1862	A1865	G1866	G1867	A1868	G1869	U1870	C1877	C1881	A1884	G1885	U1888	U1889	A1890	A1891	C1899	C1900	C1901	A1907	A1908	C1909	G1910	G1913	G1914	A1920	C1921												
A1716	C1717	C1720	G1721	U1727	A1732	G1733	G1737	G1741	U1744	G1747	U1748	C1758	A1762	G1763	U1764	G1765	A1766	G1768	A1769	A1770	C1771	G1774	G1775	G1776	G1777	A1780	G1783	U1786	A1787	A1788	C1789	U1790	A1791	A1792	A1793	A1796	U1801	C1807	C1808	A1817																
C1591	A1592	U1593	G1594	A1600	A1603	U1609	U1612	G1616	U1617	A1618	A1619	U1623	C1632	A1637	G1640	A1641	G1642	U1643	A1644	C1651	A1656	A1660	A1661	G1668	A1669	U1670	A1680	G1681	C1682	G1683	U1686	G1687	G1695	A1699	A1703	C1706	U1707	G1708	C1709																	
U1502	A1503	G1504	G1508	U1509	A1510	A1513	U1514	C1518	U1522	C1523	C1524	G1528	A1532	U1533	A1534	A1537	G1542	U1543	G1544	A1545	U1546	G1547	A1548	U1549	A1559	U	A1462	G1463	A1464	U1465	U1466	U1467	U1468	C1469	U1478	A1479	A1480	U1481	U1482	U1486	U1487	A1485	U1486	G1483	G1484	U1581	U1584	A1585	U1586	U1587	A1588	U1589	U1590			
U1380	G1388	A1274	A1277	G1402	A1406	U1407	A1412	A1413	C1414	A1415	A1420	A1421	U1422	C1426	A1431	C1432	A1435	C1436	U1437	C1444	U1445	U1446	G1456	A1457	U1334	U1339	U1340	U1341	C1342	C1343	U1349	G1353	U1357	U1360	U1369	A1370	G1371	U1372	C1373	U1374	G1375	C1376	A1377	C1378	C1379											
U1268	A1274	A1277	A1281	G1282	A1283	A1284	U1285	G1286	C1287	U1297	A1298	U1303	U1304	C1317	C1320	A1323	A1324	C1325	C1326	G1327	A1328	U1329	U1330	U1334	U1339	U1340	U1341	C1342	C1343	U1349	G1353	U1357	U1360	U1369	A1370	G1371	U1372	C1373	U1374	G1375	C1376	A1377	C1378	C1379												
U1151	U1152	U1153	G1157	A1162	U1165	U1166	U1167	A1168	A1169	C1170	G1171	U1176	A1177	A1186	A1191	U1192	A1204	A1208	U1209	A1210	U1211	C1212	G1215	U1216	G1217	U1229	A1233	U1234	U1235	G1236	U1241	G1242	A1243	A1250	G1251	C1252	G1253	A1256	G1257	C1258	A1259	G1265	G1266	A1267												
U1054	A1055	A1056	G1057	A1061	A1062	A1063	A1064	G1065	U1068	G1069	G1075	A1080	A1081	A1082	A1083	C1087	A1088	A1089	A1092	U1093	G1094	U1095	U1096	G1097	U1100	U1101	C1103	A1104	A1105	G1106	U1113	G1122	A1123	G1124	U1125	U1129	C1132	C1139	U1140	U1141	A1146	G1147	U1148	U1149	U1150											
U819	U820	C821	C822	A823	A824	U825	C826	G827	A828	G836	A837	G840	C841	C847	U847	A848	C949	U950	C951	A954	G957	C958	A969	U970	A971	G975	C976	C1087	A1088	A1089	A1092	U1093	G1094	U1095	U1096	G1010	U1113	G1122	A1123	G1124	U1125	U1129	C1132	A1132	A1032	A1033	A1045	A1046	A1047	A1048	U1049	A1050	G928	G929	U932	A933





• Molecule 53: tRNA-Phe

Chain 8: 50% 45%



4 Experimental information

Property	Value	Source
EM reconstruction method	SUBTOMOGRAM AVERAGING	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of subtomograms used	675	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	3.2	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3750	Depositor
Magnification	81000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.831	Depositor
Minimum map value	-0.134	Depositor
Average map value	0.024	Depositor
Map value standard deviation	0.100	Depositor
Recommended contour level	0.35	Depositor
Map size (Å)	435.328, 435.328, 435.328	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.7005, 1.7005, 1.7005	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0	0.23	0/383	0.45	0/504
2	1	0.22	0/484	0.42	0/637
3	2	0.22	0/306	0.48	0/401
4	A	0.24	0/1954	0.44	0/2642
5	B	0.24	0/1721	0.45	0/2323
6	C	0.24	0/1691	0.42	0/2267
7	D	0.24	0/1188	0.46	0/1593
8	E	0.24	0/1384	0.47	0/1867
9	F	0.23	0/1266	0.46	0/1700
10	G	0.24	0/1126	0.50	1/1517 (0.1%)
11	H	0.26	0/1044	0.49	0/1395
12	I	0.25	0/820	0.49	0/1103
13	J	0.25	0/844	0.45	0/1136
14	K	0.28	0/1094	0.54	0/1468
15	L	0.23	0/962	0.46	0/1289
16	M	0.26	0/483	0.46	0/643
17	N	0.23	0/679	0.44	0/907
18	O	0.25	0/659	0.47	0/885
19	P	0.23	0/684	0.48	0/913
20	Q	0.24	0/545	0.43	0/730
21	R	0.25	0/698	0.49	0/936
22	S	0.23	0/631	0.40	0/838
23	T	0.22	0/475	0.40	0/621
24	a	0.24	0/2267	0.48	0/3044
25	b	0.25	0/1795	0.48	0/2412
26	c	0.24	0/1671	0.44	0/2246
27	d	0.24	0/1409	0.47	0/1894
28	e	0.25	0/1420	0.48	0/1912
29	f	0.24	0/1183	0.47	0/1587
30	g	0.40	0/969	0.63	0/1295
31	h	0.25	0/968	0.45	0/1298
32	i	0.24	0/1186	0.43	0/1592
33	j	0.24	0/953	0.48	0/1275
34	k	0.25	0/1170	0.46	0/1559

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
35	l	0.25	0/1104	0.44	0/1481
36	m	0.23	0/973	0.44	0/1309
37	n	0.24	0/897	0.47	0/1198
38	o	0.25	0/948	0.46	0/1262
39	p	0.23	0/961	0.38	0/1278
40	q	0.25	0/828	0.49	0/1111
41	r	0.25	0/1077	0.44	0/1441
42	s	0.24	0/732	0.48	0/988
43	t	0.25	0/879	0.49	0/1165
44	u	0.25	0/665	0.47	0/884
45	v	0.22	0/519	0.45	0/695
46	w	0.22	0/826	0.39	0/1104
47	x	0.24	0/353	0.45	0/474
48	y	0.30	0/457	0.56	0/601
49	z	0.24	0/412	0.44	0/547
50	3	0.22	0/69073	0.85	70/107710 (0.1%)
51	4	0.23	0/2505	0.84	0/3902
52	5	0.22	0/35768	0.84	28/55764 (0.1%)
53	8	0.25	0/1739	0.87	1/2710 (0.0%)
All	All	0.23	0/156828	0.76	100/234053 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
6	C	0	1
9	F	0	1
21	R	0	1
37	n	0	1
All	All	0	4

There are no bond length outliers.

All (100) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
50	3	2620	C	N3-C2-O2	-9.45	115.28	121.90
50	3	2114	C	N3-C2-O2	-9.39	115.33	121.90
50	3	370	C	N3-C2-O2	-8.83	115.72	121.90
50	3	67	C	N1-C2-O2	8.69	124.11	118.90
50	3	2070	C	N1-C2-O2	8.33	123.90	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
52	5	751	C	C2-N1-C1'	8.26	127.89	118.80
52	5	268	C	N3-C2-O2	-8.05	116.26	121.90
50	3	130	C	N1-C2-O2	7.73	123.54	118.90
50	3	2857	C	N1-C2-O2	7.67	123.50	118.90
52	5	748	U	C2-N1-C1'	7.26	126.41	117.70
50	3	67	C	N3-C2-O2	-6.95	117.03	121.90
50	3	1844	C	N3-C2-O2	-6.92	117.06	121.90
50	3	14	U	C2-N1-C1'	6.91	125.99	117.70
50	3	1432	C	N3-C2-O2	-6.88	117.08	121.90
50	3	2070	C	C2-N1-C1'	6.86	126.35	118.80
50	3	2689	C	N3-C2-O2	-6.81	117.14	121.90
52	5	1484	C	N3-C2-O2	-6.70	117.21	121.90
50	3	2620	C	N1-C2-O2	6.65	122.89	118.90
50	3	14	U	N1-C2-O2	6.64	127.45	122.80
50	3	1087	C	C2-N1-C1'	6.60	126.06	118.80
52	5	751	C	C6-N1-C1'	-6.58	112.90	120.80
52	5	1484	C	C6-N1-C2	-6.57	117.67	120.30
50	3	370	C	C6-N1-C2	-6.46	117.72	120.30
52	5	509	C	C6-N1-C1'	6.40	128.48	120.80
50	3	1087	C	N1-C2-O2	6.32	122.69	118.90
50	3	2739	C	N3-C2-O2	-6.30	117.49	121.90
50	3	2108	C	N1-C2-O2	6.29	122.68	118.90
50	3	610	G	N3-C4-N9	6.26	129.75	126.00
50	3	1524	C	N1-C2-O2	6.24	122.64	118.90
52	5	751	C	N1-C2-O2	6.22	122.63	118.90
50	3	2114	C	N1-C2-O2	6.22	122.63	118.90
50	3	115	U	C2-N1-C1'	6.20	125.14	117.70
10	G	108	LEU	CA-CB-CG	6.18	129.52	115.30
50	3	2070	C	N3-C2-O2	-6.17	117.58	121.90
52	5	502	C	N1-C2-O2	6.17	122.60	118.90
50	3	1341	U	C2-N1-C1'	6.10	125.02	117.70
50	3	1720	C	C2-N1-C1'	6.01	125.42	118.80
50	3	91	G	N3-C2-N2	6.00	124.10	119.90
50	3	2735	G	N1-C2-N2	-5.94	110.85	116.20
50	3	2064	G	C5-C6-O6	5.89	132.14	128.60
50	3	610	G	N9-C4-C5	-5.89	103.04	105.40
50	3	659	C	N3-C2-O2	-5.87	117.80	121.90
50	3	469	C	N3-C2-O2	-5.79	117.85	121.90
53	8	3	G	N3-C4-N9	-5.76	122.54	126.00
52	5	648	C	N1-C2-O2	5.74	122.34	118.90
50	3	2064	G	N1-C6-O6	-5.74	116.46	119.90
50	3	91	G	C5-C6-O6	5.68	132.01	128.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
50	3	1341	U	N1-C2-O2	5.68	126.78	122.80
50	3	1087	C	N3-C2-O2	-5.66	117.94	121.90
52	5	1386	C	N3-C2-O2	-5.65	117.94	121.90
50	3	91	G	N1-C6-O6	-5.63	116.52	119.90
50	3	1192	U	C2-N1-C1'	5.61	124.43	117.70
50	3	610	G	C4-C5-N7	5.60	113.04	110.80
50	3	67	C	N3-C4-N4	-5.59	114.08	118.00
52	5	748	U	C6-N1-C1'	-5.57	113.40	121.20
50	3	2728	U	N1-C2-O2	5.56	126.69	122.80
52	5	1386	C	N1-C2-O2	5.54	122.22	118.90
50	3	130	C	C2-N1-C1'	5.52	124.87	118.80
50	3	273	C	C2-N1-C1'	5.52	124.87	118.80
50	3	1948	C	N1-C2-O2	5.52	122.21	118.90
52	5	248	U	C2-N1-C1'	5.51	124.32	117.70
50	3	67	C	C5-C4-N4	5.51	124.06	120.20
52	5	885	U	N1-C2-O2	5.45	126.62	122.80
50	3	2190	G	N3-C4-N9	5.45	129.27	126.00
50	3	1970	C	C2-N1-C1'	5.42	124.76	118.80
52	5	509	C	C2-N1-C1'	-5.41	112.85	118.80
50	3	216	C	N1-C2-O2	5.34	122.10	118.90
50	3	2857	C	N3-C2-O2	-5.33	118.17	121.90
50	3	2620	C	C6-N1-C2	-5.32	118.17	120.30
50	3	2192	U	C2-N1-C1'	5.29	124.05	117.70
52	5	268	C	C6-N1-C2	-5.29	118.19	120.30
50	3	216	C	N3-C2-O2	-5.28	118.20	121.90
50	3	469	C	C6-N1-C1'	5.27	127.13	120.80
50	3	2735	G	N3-C2-N2	5.27	123.59	119.90
50	3	659	C	N1-C2-O2	5.26	122.06	118.90
50	3	1842	G	N3-C4-N9	5.26	129.16	126.00
52	5	502	C	C2-N1-C1'	5.26	124.58	118.80
50	3	1087	C	C6-N1-C2	-5.23	118.21	120.30
50	3	1096	U	OP1-P-O3'	5.22	116.69	105.20
50	3	469	C	C2-N1-C1'	-5.21	113.06	118.80
50	3	14	U	N3-C2-O2	-5.16	118.59	122.20
52	5	1119	C	N1-C2-O2	5.16	122.00	118.90
52	5	509	C	N3-C2-O2	-5.14	118.30	121.90
52	5	648	C	N3-C2-O2	-5.14	118.30	121.90
50	3	1341	U	N3-C2-O2	-5.14	118.60	122.20
52	5	1134	C	C2-N1-C1'	5.14	124.45	118.80
50	3	1432	C	C6-N1-C2	-5.12	118.25	120.30
50	3	2190	G	N3-C4-C5	-5.12	126.04	128.60
52	5	862	C	C2-N1-C1'	5.11	124.42	118.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
50	3	370	C	N1-C2-O2	5.10	121.96	118.90
50	3	610	G	C6-C5-N7	-5.10	127.34	130.40
52	5	573	G	C4-N9-C1'	-5.10	119.87	126.50
50	3	2475	C	C2-N1-C1'	5.08	124.39	118.80
50	3	1096	U	P-O3'-C3'	5.08	125.79	119.70
52	5	1502	G	C5-C6-O6	5.07	131.64	128.60
52	5	173	U	C2-N1-C1'	5.06	123.77	117.70
52	5	885	U	N3-C2-O2	-5.05	118.66	122.20
50	3	2728	U	C2-N1-C1'	5.03	123.73	117.70
52	5	1483	C	N1-C2-O2	5.02	121.91	118.90
50	3	1842	G	C4-N9-C1'	5.02	133.03	126.50

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	C	19	LEU	Peptide
9	F	113	LYS	Peptide
21	R	25	GLN	Peptide
37	n	90	VAL	Peptide

5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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	0	45/48 (94%)	41 (91%)	4 (9%)	0	100	100
2	1	57/59 (97%)	55 (96%)	2 (4%)	0	100	100
3	2	35/37 (95%)	32 (91%)	3 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	A	238/294 (81%)	216 (91%)	22 (9%)	0	100	100
5	B	213/273 (78%)	201 (94%)	12 (6%)	0	100	100
6	C	201/205 (98%)	182 (90%)	18 (9%)	1 (0%)	25	64
7	D	151/219 (69%)	140 (93%)	11 (7%)	0	100	100
8	E	165/215 (77%)	149 (90%)	16 (10%)	0	100	100
9	F	152/155 (98%)	134 (88%)	16 (10%)	2 (1%)	10	43
10	G	139/142 (98%)	128 (92%)	11 (8%)	0	100	100
11	H	126/132 (96%)	110 (87%)	16 (13%)	0	100	100
12	I	99/108 (92%)	82 (83%)	17 (17%)	0	100	100
13	J	112/121 (93%)	107 (96%)	5 (4%)	0	100	100
14	K	134/139 (96%)	118 (88%)	16 (12%)	0	100	100
15	L	116/124 (94%)	107 (92%)	9 (8%)	0	100	100
16	M	58/61 (95%)	49 (84%)	9 (16%)	0	100	100
17	N	81/86 (94%)	78 (96%)	3 (4%)	0	100	100
18	O	78/94 (83%)	70 (90%)	8 (10%)	0	100	100
19	P	81/85 (95%)	74 (91%)	7 (9%)	0	100	100
20	Q	63/104 (61%)	54 (86%)	9 (14%)	0	100	100
21	R	82/87 (94%)	72 (88%)	10 (12%)	0	100	100
22	S	75/87 (86%)	73 (97%)	2 (3%)	0	100	100
23	T	51/60 (85%)	50 (98%)	1 (2%)	0	100	100
24	a	283/287 (99%)	257 (91%)	26 (9%)	0	100	100
25	b	227/287 (79%)	203 (89%)	24 (11%)	0	100	100
26	c	208/212 (98%)	194 (93%)	14 (7%)	0	100	100
27	d	173/180 (96%)	164 (95%)	9 (5%)	0	100	100
28	e	174/184 (95%)	167 (96%)	7 (4%)	0	100	100
29	f	143/149 (96%)	127 (89%)	16 (11%)	0	100	100
30	g	124/161 (77%)	114 (92%)	10 (8%)	0	100	100
31	h	126/137 (92%)	119 (94%)	7 (6%)	0	100	100
32	i	142/146 (97%)	132 (93%)	10 (7%)	0	100	100
33	j	120/122 (98%)	115 (96%)	5 (4%)	0	100	100
34	k	146/151 (97%)	133 (91%)	13 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
35	l	134/139 (96%)	126 (94%)	8 (6%)	0	100	100
36	m	117/124 (94%)	108 (92%)	9 (8%)	0	100	100
37	n	108/116 (93%)	100 (93%)	8 (7%)	0	100	100
38	o	113/119 (95%)	109 (96%)	4 (4%)	0	100	100
39	p	112/127 (88%)	110 (98%)	2 (2%)	0	100	100
40	q	97/100 (97%)	87 (90%)	10 (10%)	0	100	100
41	r	137/159 (86%)	128 (93%)	9 (7%)	0	100	100
42	s	90/237 (38%)	83 (92%)	7 (8%)	0	100	100
43	t	109/111 (98%)	102 (94%)	7 (6%)	0	100	100
44	u	84/104 (81%)	75 (89%)	9 (11%)	0	100	100
45	v	61/65 (94%)	59 (97%)	2 (3%)	0	100	100
46	w	96/111 (86%)	91 (95%)	5 (5%)	0	100	100
47	x	42/97 (43%)	37 (88%)	5 (12%)	0	100	100
48	y	54/57 (95%)	51 (94%)	3 (6%)	0	100	100
49	z	48/53 (91%)	44 (92%)	4 (8%)	0	100	100
All	All	5820/6670 (87%)	5357 (92%)	460 (8%)	3 (0%)	50	83

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
9	F	113	LYS
6	C	146	ALA
9	F	114	THR

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	0	40/41 (98%)	40 (100%)	0	100	100
2	1	51/51 (100%)	51 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	2	35/35 (100%)	34 (97%)	1 (3%)	37	56
4	A	212/262 (81%)	211 (100%)	1 (0%)	86	89
5	B	180/232 (78%)	180 (100%)	0	100	100
6	C	181/183 (99%)	181 (100%)	0	100	100
7	D	123/178 (69%)	123 (100%)	0	100	100
8	E	150/196 (76%)	148 (99%)	2 (1%)	65	77
9	F	131/132 (99%)	129 (98%)	2 (2%)	60	75
10	G	123/124 (99%)	123 (100%)	0	100	100
11	H	111/115 (96%)	111 (100%)	0	100	100
12	I	95/99 (96%)	95 (100%)	0	100	100
13	J	91/97 (94%)	91 (100%)	0	100	100
14	K	117/120 (98%)	110 (94%)	7 (6%)	16	37
15	L	100/105 (95%)	99 (99%)	1 (1%)	73	82
16	M	47/48 (98%)	46 (98%)	1 (2%)	48	66
17	N	76/78 (97%)	75 (99%)	1 (1%)	65	77
18	O	69/82 (84%)	68 (99%)	1 (1%)	62	75
19	P	73/75 (97%)	71 (97%)	2 (3%)	40	58
20	Q	56/94 (60%)	56 (100%)	0	100	100
21	R	74/77 (96%)	74 (100%)	0	100	100
22	S	70/77 (91%)	69 (99%)	1 (1%)	62	75
23	T	49/56 (88%)	49 (100%)	0	100	100
24	a	241/243 (99%)	241 (100%)	0	100	100
25	b	186/233 (80%)	186 (100%)	0	100	100
26	c	182/184 (99%)	182 (100%)	0	100	100
27	d	150/154 (97%)	148 (99%)	2 (1%)	65	77
28	e	153/159 (96%)	153 (100%)	0	100	100
29	f	123/134 (92%)	123 (100%)	0	100	100
30	g	101/129 (78%)	89 (88%)	12 (12%)	4	16
31	h	102/110 (93%)	101 (99%)	1 (1%)	73	82
32	i	126/128 (98%)	125 (99%)	1 (1%)	79	85
33	j	103/103 (100%)	103 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	k	123/126 (98%)	123 (100%)	0	100	100
35	l	113/115 (98%)	113 (100%)	0	100	100
36	m	105/109 (96%)	105 (100%)	0	100	100
37	n	96/99 (97%)	96 (100%)	0	100	100
38	o	101/105 (96%)	101 (100%)	0	100	100
39	p	100/108 (93%)	100 (100%)	0	100	100
40	q	90/91 (99%)	90 (100%)	0	100	100
41	r	116/132 (88%)	116 (100%)	0	100	100
42	s	82/208 (39%)	81 (99%)	1 (1%)	67	78
43	t	96/96 (100%)	95 (99%)	1 (1%)	73	82
44	u	69/85 (81%)	68 (99%)	1 (1%)	62	75
45	v	58/60 (97%)	58 (100%)	0	100	100
46	w	87/98 (89%)	87 (100%)	0	100	100
47	x	41/86 (48%)	41 (100%)	0	100	100
48	y	48/49 (98%)	44 (92%)	4 (8%)	9	27
49	z	47/50 (94%)	45 (96%)	2 (4%)	25	46
All	All	5093/5751 (89%)	5048 (99%)	45 (1%)	74	83

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	2	21	GLN
4	A	73	LYS
8	E	80	LYS
8	E	153	LYS
9	F	8	LYS
9	F	113	LYS
14	K	116	ASP
14	K	117	THR
14	K	118	VAL
14	K	120	VAL
14	K	121	GLU
14	K	122	LYS
14	K	127	ARG
15	L	46	LYS
16	M	41	ARG

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Mol	Chain	Res	Type
17	N	80	LYS
18	O	3	MET
19	P	3	ARG
19	P	5	GLN
22	S	29	LYS
27	d	69	LYS
27	d	125	ARG
30	g	26	ILE
30	g	28	ASP
30	g	29	TYR
30	g	42	LYS
30	g	45	PHE
30	g	46	LYS
30	g	69	GLU
30	g	84	VAL
30	g	89	ILE
30	g	115	ASN
30	g	116	ARG
30	g	125	LYS
31	h	37	LYS
32	i	15	ARG
42	s	70	ARG
43	t	44	ARG
44	u	101	LYS
48	y	47	MET
48	y	48	TYR
48	y	51	LEU
48	y	52	ARG
49	z	8	ARG
49	z	15	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

Mol	Chain	Res	Type
2	1	32	HIS
4	A	29	HIS
4	A	38	ASN
4	A	66	GLN
4	A	203	ASN
6	C	58	GLN
6	C	61	GLN
6	C	119	HIS

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Mol	Chain	Res	Type
14	K	86	ASN
15	L	76	ASN
16	M	25	GLN
17	N	43	ASN
20	Q	80	GLN
20	Q	82	HIS
21	R	69	HIS
22	S	21	ASN
24	a	15	HIS
24	a	238	HIS
25	b	63	ASN
25	b	73	ASN
26	c	68	GLN
28	e	63	GLN
29	f	61	ASN
32	i	51	GLN
32	i	74	ASN
34	k	39	GLN
36	m	58	ASN
36	m	59	ASN
39	p	40	GLN
40	q	85	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
50	3	2875/2907 (98%)	934 (32%)	32 (1%)
51	4	103/108 (95%)	40 (38%)	1 (0%)
52	5	1490/1520 (98%)	459 (30%)	10 (0%)
53	8	72/76 (94%)	34 (47%)	2 (2%)
All	All	4540/4611 (98%)	1467 (32%)	45 (0%)

All (1467) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
50	3	9	G
50	3	11	U
50	3	12	A
50	3	14	U
50	3	15	A
50	3	16	A

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Mol	Chain	Res	Type
50	3	28	G
50	3	29	G
50	3	36	U
50	3	38	G
50	3	40	A
50	3	43	A
50	3	48	G
50	3	52	U
50	3	53	G
50	3	65	A
50	3	73	A
50	3	76	A
50	3	77	G
50	3	82	G
50	3	85	U
50	3	87	G
50	3	90	G
50	3	94	A
50	3	98	C
50	3	102	A
50	3	104	A
50	3	115	U
50	3	119	A
50	3	121	U
50	3	122	G
50	3	124	A
50	3	126	C
50	3	127	A
50	3	129	U
50	3	130	C
50	3	132	G
50	3	135	A
50	3	136	G
50	3	137	U
50	3	141	A
50	3	144	C
50	3	152	A
50	3	157	U
50	3	163	A
50	3	165	U
50	3	169	U
50	3	170	A

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Mol	Chain	Res	Type
50	3	179	A
50	3	180	A
50	3	183	A
50	3	184	A
50	3	185	U
50	3	186	A
50	3	187	C
50	3	194	A
50	3	200	A
50	3	203	A
50	3	208	A
50	3	219	G
50	3	220	A
50	3	226	A
50	3	230	G
50	3	232	A
50	3	233	U
50	3	234	G
50	3	251	G
50	3	252	G
50	3	253	C
50	3	254	G
50	3	265	G
50	3	269	A
50	3	273	C
50	3	274	A
50	3	275	A
50	3	276	A
50	3	277	C
50	3	283	A
50	3	284	U
50	3	285	U
50	3	287	G
50	3	288	A
50	3	290	A
50	3	293	G
50	3	296	U
50	3	297	G
50	3	299	A
50	3	305	U
50	3	309	A
50	3	310	U

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Mol	Chain	Res	Type
50	3	312	U
50	3	313	G
50	3	314	G
50	3	315	A
50	3	316	C
50	3	318	U
50	3	319	G
50	3	320	A
50	3	326	A
50	3	328	A
50	3	329	G
50	3	332	G
50	3	333	A
50	3	335	G
50	3	336	C
50	3	343	A
50	3	345	A
50	3	347	C
50	3	351	G
50	3	354	C
50	3	356	A
50	3	357	A
50	3	363	G
50	3	364	A
50	3	367	G
50	3	392	A
50	3	395	U
50	3	396	A
50	3	397	G
50	3	402	A
50	3	403	U
50	3	404	C
50	3	409	A
50	3	411	U
50	3	416	C
50	3	417	G
50	3	422	A
50	3	424	G
50	3	425	U
50	3	426	U
50	3	431	U
50	3	432	G

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Mol	Chain	Res	Type
50	3	435	U
50	3	436	G
50	3	437	A
50	3	440	C
50	3	441	U
50	3	442	G
50	3	447	G
50	3	449	C
50	3	450	C
50	3	451	A
50	3	455	G
50	3	460	G
50	3	461	C
50	3	465	A
50	3	466	A
50	3	467	U
50	3	470	U
50	3	471	A
50	3	479	A
50	3	482	G
50	3	483	A
50	3	484	U
50	3	485	A
50	3	487	C
50	3	488	G
50	3	489	A
50	3	490	A
50	3	491	A
50	3	494	G
50	3	495	U
50	3	496	A
50	3	500	U
50	3	501	G
50	3	509	G
50	3	513	A
50	3	514	A
50	3	515	A
50	3	517	G
50	3	518	A
50	3	527	A
50	3	539	U
50	3	541	G

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Mol	Chain	Res	Type
50	3	543	U
50	3	545	C
50	3	561	A
50	3	562	C
50	3	563	A
50	3	566	G
50	3	567	U
50	3	568	G
50	3	569	U
50	3	581	A
50	3	583	U
50	3	596	G
50	3	598	G
50	3	599	U
50	3	601	U
50	3	603	G
50	3	605	A
50	3	606	G
50	3	608	A
50	3	609	U
50	3	610	G
50	3	614	C
50	3	616	G
50	3	620	G
50	3	623	A
50	3	636	U
50	3	637	U
50	3	641	U
50	3	648	G
50	3	649	A
50	3	656	G
50	3	658	G
50	3	661	G
50	3	663	A
50	3	664	G
50	3	667	A
50	3	670	G
50	3	673	A
50	3	681	A
50	3	682	A
50	3	683	G
50	3	689	U

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Mol	Chain	Res	Type
50	3	690	U
50	3	691	G
50	3	694	U
50	3	705	A
50	3	706	C
50	3	708	C
50	3	712	A
50	3	717	U
50	3	720	A
50	3	721	G
50	3	724	A
50	3	729	U
50	3	737	U
50	3	745	U
50	3	749	U
50	3	752	C
50	3	760	G
50	3	763	G
50	3	765	A
50	3	774	A
50	3	775	C
50	3	781	U
50	3	782	U
50	3	783	G
50	3	784	A
50	3	786	A
50	3	787	C
50	3	792	G
50	3	797	U
50	3	798	G
50	3	810	G
50	3	811	G
50	3	812	G
50	3	817	A
50	3	818	A
50	3	819	U
50	3	820	U
50	3	822	C
50	3	823	A
50	3	824	A
50	3	825	U
50	3	826	C

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Mol	Chain	Res	Type
50	3	827	G
50	3	828	A
50	3	836	G
50	3	837	A
50	3	840	G
50	3	841	C
50	3	847	C
50	3	854	A
50	3	863	U
50	3	866	G
50	3	868	C
50	3	870	A
50	3	873	G
50	3	881	A
50	3	882	C
50	3	883	A
50	3	885	A
50	3	892	G
50	3	895	G
50	3	896	U
50	3	902	U
50	3	903	A
50	3	912	A
50	3	917	G
50	3	929	G
50	3	932	U
50	3	933	A
50	3	936	G
50	3	944	U
50	3	947	A
50	3	948	A
50	3	949	C
50	3	950	U
50	3	951	C
50	3	954	A
50	3	957	G
50	3	958	C
50	3	969	A
50	3	971	U
50	3	975	G
50	3	976	C
50	3	981	A

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Mol	Chain	Res	Type
50	3	983	A
50	3	989	G
50	3	994	U
50	3	995	A
50	3	997	G
50	3	998	C
50	3	1001	C
50	3	1005	G
50	3	1008	A
50	3	1009	A
50	3	1010	G
50	3	1016	A
50	3	1026	A
50	3	1027	U
50	3	1032	A
50	3	1033	A
50	3	1045	A
50	3	1046	A
50	3	1048	A
50	3	1049	U
50	3	1050	A
50	3	1052	A
50	3	1053	C
50	3	1055	A
50	3	1057	G
50	3	1061	A
50	3	1062	A
50	3	1063	A
50	3	1065	G
50	3	1068	U
50	3	1069	G
50	3	1075	G
50	3	1080	A
50	3	1081	A
50	3	1082	A
50	3	1083	A
50	3	1088	A
50	3	1089	A
50	3	1092	A
50	3	1093	U
50	3	1095	U
50	3	1096	U

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Mol	Chain	Res	Type
50	3	1097	G
50	3	1100	U
50	3	1102	A
50	3	1104	A
50	3	1105	A
50	3	1106	G
50	3	1113	U
50	3	1122	G
50	3	1123	A
50	3	1124	G
50	3	1125	U
50	3	1129	U
50	3	1132	C
50	3	1139	C
50	3	1141	U
50	3	1146	A
50	3	1147	G
50	3	1148	U
50	3	1149	G
50	3	1151	U
50	3	1153	U
50	3	1157	G
50	3	1162	A
50	3	1165	U
50	3	1166	G
50	3	1167	U
50	3	1168	A
50	3	1170	C
50	3	1171	G
50	3	1176	U
50	3	1177	A
50	3	1186	A
50	3	1191	A
50	3	1204	A
50	3	1208	A
50	3	1209	U
50	3	1210	A
50	3	1212	C
50	3	1215	G
50	3	1216	U
50	3	1217	G
50	3	1229	U

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Mol	Chain	Res	Type
50	3	1233	A
50	3	1234	U
50	3	1235	U
50	3	1236	G
50	3	1241	U
50	3	1242	G
50	3	1243	A
50	3	1250	A
50	3	1251	G
50	3	1253	G
50	3	1256	A
50	3	1257	G
50	3	1259	A
50	3	1265	G
50	3	1266	G
50	3	1268	U
50	3	1274	A
50	3	1277	A
50	3	1281	A
50	3	1283	A
50	3	1284	A
50	3	1285	U
50	3	1286	G
50	3	1287	C
50	3	1298	A
50	3	1303	U
50	3	1304	U
50	3	1317	C
50	3	1320	C
50	3	1323	A
50	3	1325	C
50	3	1326	C
50	3	1328	A
50	3	1329	U
50	3	1330	U
50	3	1334	U
50	3	1339	U
50	3	1340	U
50	3	1342	C
50	3	1343	C
50	3	1349	C
50	3	1353	G

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Mol	Chain	Res	Type
50	3	1357	U
50	3	1360	U
50	3	1369	U
50	3	1371	G
50	3	1373	C
50	3	1375	G
50	3	1376	G
50	3	1378	C
50	3	1380	U
50	3	1388	G
50	3	1393	A
50	3	1402	G
50	3	1406	A
50	3	1407	U
50	3	1412	A
50	3	1413	A
50	3	1415	A
50	3	1420	A
50	3	1421	A
50	3	1422	U
50	3	1426	C
50	3	1431	A
50	3	1432	C
50	3	1435	A
50	3	1437	A
50	3	1444	C
50	3	1445	U
50	3	1456	C
50	3	1457	A
50	3	1461	A
50	3	1463	G
50	3	1464	G
50	3	1466	U
50	3	1467	U
50	3	1469	C
50	3	1478	U
50	3	1480	A
50	3	1481	U
50	3	1482	U
50	3	1483	G
50	3	1485	A
50	3	1486	U

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Mol	Chain	Res	Type
50	3	1487	U
50	3	1493	A
50	3	1497	A
50	3	1498	U
50	3	1502	A
50	3	1503	A
50	3	1504	G
50	3	1508	G
50	3	1510	A
50	3	1513	A
50	3	1514	U
50	3	1518	C
50	3	1522	U
50	3	1523	C
50	3	1528	G
50	3	1532	A
50	3	1534	A
50	3	1537	A
50	3	1542	G
50	3	1544	G
50	3	1546	U
50	3	1548	A
50	3	1549	U
50	3	1571	G
50	3	1579	G
50	3	1581	U
50	3	1584	U
50	3	1585	A
50	3	1586	U
50	3	1587	U
50	3	1588	A
50	3	1589	A
50	3	1590	U
50	3	1591	C
50	3	1592	A
50	3	1594	G
50	3	1600	A
50	3	1603	A
50	3	1609	U
50	3	1612	U
50	3	1616	G
50	3	1618	U

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Mol	Chain	Res	Type
50	3	1619	A
50	3	1623	U
50	3	1632	C
50	3	1637	A
50	3	1640	G
50	3	1641	A
50	3	1642	G
50	3	1643	A
50	3	1644	A
50	3	1651	C
50	3	1656	A
50	3	1660	A
50	3	1661	A
50	3	1668	G
50	3	1670	U
50	3	1680	A
50	3	1681	G
50	3	1682	C
50	3	1683	G
50	3	1687	G
50	3	1695	G
50	3	1699	A
50	3	1703	A
50	3	1706	C
50	3	1707	U
50	3	1708	G
50	3	1709	C
50	3	1716	A
50	3	1717	C
50	3	1720	C
50	3	1721	G
50	3	1727	U
50	3	1732	A
50	3	1733	G
50	3	1737	G
50	3	1741	G
50	3	1744	U
50	3	1747	G
50	3	1748	U
50	3	1758	C
50	3	1762	A
50	3	1763	G

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Mol	Chain	Res	Type
50	3	1764	U
50	3	1765	G
50	3	1766	A
50	3	1767	A
50	3	1769	A
50	3	1770	A
50	3	1771	C
50	3	1774	G
50	3	1776	G
50	3	1777	G
50	3	1780	A
50	3	1783	G
50	3	1786	U
50	3	1787	A
50	3	1788	A
50	3	1790	U
50	3	1791	A
50	3	1793	A
50	3	1796	A
50	3	1801	U
50	3	1807	C
50	3	1808	C
50	3	1817	A
50	3	1821	G
50	3	1823	U
50	3	1824	G
50	3	1828	A
50	3	1834	U
50	3	1836	A
50	3	1837	C
50	3	1840	C
50	3	1842	G
50	3	1843	C
50	3	1846	A
50	3	1849	G
50	3	1851	U
50	3	1862	A
50	3	1865	A
50	3	1866	G
50	3	1868	A
50	3	1869	G
50	3	1870	G

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Mol	Chain	Res	Type
50	3	1881	C
50	3	1884	A
50	3	1885	G
50	3	1888	U
50	3	1890	U
50	3	1891	A
50	3	1899	C
50	3	1901	C
50	3	1907	A
50	3	1908	A
50	3	1910	G
50	3	1913	G
50	3	1914	G
50	3	1920	A
50	3	1921	C
50	3	1936	G
50	3	1937	G
50	3	1938	U
50	3	1943	A
50	3	1945	A
50	3	1948	C
50	3	1949	C
50	3	1952	G
50	3	1961	A
50	3	1962	U
50	3	1970	C
50	3	1971	G
50	3	1972	C
50	3	1974	U
50	3	1977	A
50	3	1979	G
50	3	1982	G
50	3	1987	C
50	3	1988	A
50	3	1991	U
50	3	1998	U
50	3	1999	G
50	3	2000	U
50	3	2004	G
50	3	2009	U
50	3	2011	G
50	3	2013	C

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Mol	Chain	Res	Type
50	3	2018	U
50	3	2020	A
50	3	2027	G
50	3	2028	G
50	3	2030	A
50	3	2037	A
50	3	2038	A
50	3	2039	G
50	3	2040	A
50	3	2041	C
50	3	2043	C
50	3	2050	G
50	3	2053	G
50	3	2057	C
50	3	2061	A
50	3	2062	C
50	3	2063	G
50	3	2064	G
50	3	2066	A
50	3	2067	A
50	3	2068	G
50	3	2069	A
50	3	2070	C
50	3	2075	U
50	3	2076	G
50	3	2077	A
50	3	2083	U
50	3	2087	G
50	3	2094	A
50	3	2099	U
50	3	2100	G
50	3	2102	U
50	3	2106	G
50	3	2107	A
50	3	2109	A
50	3	2110	U
50	3	2111	U
50	3	2112	A
50	3	2114	C
50	3	2115	A
50	3	2116	U
50	3	2117	G

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Mol	Chain	Res	Type
50	3	2120	G
50	3	2123	A
50	3	2124	A
50	3	2125	U
50	3	2126	A
50	3	2131	G
50	3	2132	G
50	3	2133	A
50	3	2138	U
50	3	2139	C
50	3	2140	G
50	3	2141	A
50	3	2144	C
50	3	2145	A
50	3	2146	A
50	3	2149	U
50	3	2153	U
50	3	2154	A
50	3	2156	G
50	3	2161	G
50	3	2165	A
50	3	2169	G
50	3	2178	A
50	3	2180	U
50	3	2181	A
50	3	2187	C
50	3	2193	U
50	3	2194	G
50	3	2195	U
50	3	2196	G
50	3	2198	G
50	3	2200	U
50	3	2202	U
50	3	2206	A
50	3	2207	A
50	3	2211	G
50	3	2212	U
50	3	2218	U
50	3	2220	A
50	3	2221	U
50	3	2222	C
50	3	2223	C

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Mol	Chain	Res	Type
50	3	2226	U
50	3	2231	A
50	3	2233	A
50	3	2238	G
50	3	2242	G
50	3	2246	G
50	3	2247	G
50	3	2250	G
50	3	2251	U
50	3	2254	G
50	3	2258	G
50	3	2272	C
50	3	2276	A
50	3	2277	A
50	3	2286	A
50	3	2290	G
50	3	2291	U
50	3	2293	C
50	3	2295	A
50	3	2297	G
50	3	2305	C
50	3	2310	C
50	3	2311	G
50	3	2313	U
50	3	2315	G
50	3	2316	G
50	3	2317	A
50	3	2319	A
50	3	2320	U
50	3	2333	G
50	3	2341	G
50	3	2342	U
50	3	2343	A
50	3	2344	A
50	3	2349	G
50	3	2355	C
50	3	2357	G
50	3	2358	U
50	3	2362	A
50	3	2365	U
50	3	2370	G
50	3	2380	U

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Mol	Chain	Res	Type
50	3	2391	G
50	3	2393	C
50	3	2396	A
50	3	2397	G
50	3	2398	U
50	3	2404	G
50	3	2406	U
50	3	2410	C
50	3	2412	A
50	3	2414	U
50	3	2417	G
50	3	2422	G
50	3	2431	U
50	3	2432	C
50	3	2433	A
50	3	2436	G
50	3	2437	G
50	3	2438	A
50	3	2440	A
50	3	2443	A
50	3	2444	G
50	3	2449	U
50	3	2453	G
50	3	2455	G
50	3	2456	A
50	3	2466	G
50	3	2470	C
50	3	2474	C
50	3	2477	A
50	3	2481	U
50	3	2484	A
50	3	2486	A
50	3	2488	C
50	3	2492	G
50	3	2495	A
50	3	2497	U
50	3	2499	U
50	3	2506	C
50	3	2507	C
50	3	2509	C
50	3	2511	A
50	3	2512	U

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Mol	Chain	Res	Type
50	3	2513	G
50	3	2521	A
50	3	2524	U
50	3	2526	A
50	3	2527	U
50	3	2528	C
50	3	2530	U
50	3	2535	C
50	3	2537	G
50	3	2538	A
50	3	2543	G
50	3	2544	G
50	3	2546	U
50	3	2551	G
50	3	2555	U
50	3	2557	G
50	3	2561	G
50	3	2574	A
50	3	2575	G
50	3	2580	A
50	3	2581	C
50	3	2584	G
50	3	2585	A
50	3	2586	G
50	3	2591	G
50	3	2593	U
50	3	2594	C
50	3	2595	A
50	3	2604	U
50	3	2605	G
50	3	2610	A
50	3	2611	G
50	3	2618	C
50	3	2619	C
50	3	2622	A
50	3	2632	C
50	3	2637	A
50	3	2638	G
50	3	2642	G
50	3	2647	A
50	3	2653	G
50	3	2654	U

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Mol	Chain	Res	Type
50	3	2662	A
50	3	2663	G
50	3	2666	C
50	3	2668	A
50	3	2669	G
50	3	2673	A
50	3	2681	G
50	3	2689	C
50	3	2690	U
50	3	2691	C
50	3	2693	U
50	3	2694	A
50	3	2697	C
50	3	2698	U
50	3	2705	G
50	3	2708	G
50	3	2717	G
50	3	2721	C
50	3	2722	G
50	3	2723	C
50	3	2730	G
50	3	2734	C
50	3	2735	G
50	3	2737	G
50	3	2739	C
50	3	2740	U
50	3	2744	A
50	3	2747	U
50	3	2752	G
50	3	2753	C
50	3	2756	A
50	3	2758	A
50	3	2760	C
50	3	2763	C
50	3	2765	A
50	3	2769	G
50	3	2772	A
50	3	2773	A
50	3	2774	A
50	3	2775	C
50	3	2777	A
50	3	2781	C

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Mol	Chain	Res	Type
50	3	2782	A
50	3	2785	G
50	3	2786	A
50	3	2787	U
50	3	2799	U
50	3	2800	U
50	3	2803	G
50	3	2804	C
50	3	2805	A
50	3	2806	A
50	3	2807	G
50	3	2811	G
50	3	2813	A
50	3	2821	U
50	3	2822	C
50	3	2824	A
50	3	2825	A
50	3	2828	C
50	3	2831	U
50	3	2837	U
50	3	2840	U
50	3	2847	C
50	3	2849	G
50	3	2852	G
50	3	2858	A
50	3	2862	U
50	3	2863	G
50	3	2865	U
50	3	2868	G
50	3	2870	U
50	3	2871	G
50	3	2874	C
50	3	2876	G
50	3	2878	G
50	3	2881	A
50	3	2883	A
50	3	2884	C
50	3	2887	A
50	3	2888	U
50	3	2889	U
50	3	2890	G
50	3	2895	A

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Mol	Chain	Res	Type
50	3	2896	G
50	3	2897	G
50	3	2898	A
50	3	2899	C
51	4	7	G
51	4	10	C
51	4	11	A
51	4	12	U
51	4	16	G
51	4	22	G
51	4	23	A
51	4	25	A
51	4	27	A
51	4	28	C
51	4	31	G
51	4	36	C
51	4	39	U
51	4	40	U
51	4	41	C
51	4	42	G
51	4	47	C
51	4	48	A
51	4	49	G
51	4	51	A
51	4	54	U
51	4	55	A
51	4	60	C
51	4	64	G
51	4	65	G
51	4	71	A
51	4	72	A
51	4	80	G
51	4	86	G
51	4	88	G
51	4	89	A
51	4	91	A
51	4	92	A
51	4	93	U
51	4	98	A
51	4	99	A
51	4	102	A
51	4	106	A

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Mol	Chain	Res	Type
51	4	107	G
51	4	108	C
52	5	8	G
52	5	10	G
52	5	15	U
52	5	21	U
52	5	24	C
52	5	28	G
52	5	29	G
52	5	32	U
52	5	33	A
52	5	34	A
52	5	40	G
52	5	48	C
52	5	49	C
52	5	50	U
52	5	51	A
52	5	52	A
52	5	61	A
52	5	62	G
52	5	66	A
52	5	70	A
52	5	74	U
52	5	80	U
52	5	85	U
52	5	86	A
52	5	87	G
52	5	93	A
52	5	95	C
52	5	96	G
52	5	101	A
52	5	104	A
52	5	106	C
52	5	107	A
52	5	114	C
52	5	115	A
52	5	117	U
52	5	128	A
52	5	129	U
52	5	131	G
52	5	138	A
52	5	141	A

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Mol	Chain	Res	Type
52	5	146	A
52	5	148	A
52	5	149	G
52	5	160	A
52	5	163	G
52	5	167	A
52	5	169	G
52	5	174	U
52	5	180	C
52	5	190	A
52	5	194	U
52	5	197	A
52	5	199	A
52	5	200	G
52	5	201	G
52	5	218	U
52	5	220	U
52	5	236	C
52	5	239	A
52	5	240	U
52	5	241	C
52	5	243	G
52	5	247	G
52	5	249	U
52	5	259	A
52	5	260	C
52	5	262	G
52	5	263	C
52	5	269	A
52	5	276	U
52	5	277	G
52	5	280	G
52	5	285	G
52	5	294	A
52	5	297	A
52	5	302	A
52	5	307	C
52	5	311	A
52	5	317	A
52	5	323	A
52	5	324	C
52	5	325	A

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Mol	Chain	Res	Type
52	5	326	C
52	5	328	G
52	5	342	G
52	5	346	G
52	5	347	G
52	5	348	C
52	5	350	G
52	5	352	A
52	5	353	G
52	5	357	G
52	5	362	U
52	5	363	U
52	5	364	U
52	5	368	C
52	5	369	A
52	5	374	G
52	5	377	A
52	5	378	A
52	5	379	A
52	5	380	G
52	5	382	U
52	5	384	G
52	5	388	G
52	5	393	A
52	5	394	U
52	5	400	G
52	5	401	U
52	5	402	G
52	5	408	U
52	5	409	G
52	5	410	A
52	5	411	A
52	5	417	U
52	5	418	U
52	5	419	A
52	5	420	A
52	5	421	G
52	5	423	U
52	5	426	U
52	5	433	C
52	5	436	U
52	5	440	U

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Mol	Chain	Res	Type
52	5	441	U
52	5	448	A
52	5	449	A
52	5	450	U
52	5	451	G
52	5	452	A
52	5	453	C
52	5	455	U
52	5	456	U
52	5	457	A
52	5	463	U
52	5	464	A
52	5	467	G
52	5	469	C
52	5	473	A
52	5	476	U
52	5	478	G
52	5	479	A
52	5	481	U
52	5	482	G
52	5	483	U
52	5	487	A
52	5	488	U
52	5	489	U
52	5	494	A
52	5	495	U
52	5	496	A
52	5	503	G
52	5	507	A
52	5	508	A
52	5	509	C
52	5	516	C
52	5	517	C
52	5	523	U
52	5	526	C
52	5	528	G
52	5	529	U
52	5	530	A
52	5	531	A
52	5	532	U
52	5	533	A
52	5	534	C

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Mol	Chain	Res	Type
52	5	537	A
52	5	542	G
52	5	544	A
52	5	545	A
52	5	548	G
52	5	552	U
52	5	560	U
52	5	561	A
52	5	562	U
52	5	563	U
52	5	565	G
52	5	568	G
52	5	570	A
52	5	571	A
52	5	572	A
52	5	573	G
52	5	574	C
52	5	575	A
52	5	583	G
52	5	586	G
52	5	588	U
52	5	595	G
52	5	596	U
52	5	610	C
52	5	615	G
52	5	619	A
52	5	628	A
52	5	630	G
52	5	638	A
52	5	639	A
52	5	645	A
52	5	647	U
52	5	648	C
52	5	650	A
52	5	651	G
52	5	653	G
52	5	654	U
52	5	658	G
52	5	664	A
52	5	673	A
52	5	680	G
52	5	683	G

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Mol	Chain	Res	Type
52	5	684	A
52	5	687	G
52	5	689	U
52	5	699	A
52	5	700	G
52	5	704	U
52	5	715	A
52	5	716	C
52	5	718	A
52	5	719	G
52	5	720	U
52	5	721	G
52	5	731	A
52	5	742	C
52	5	744	U
52	5	745	U
52	5	746	A
52	5	749	G
52	5	752	G
52	5	759	C
52	5	763	A
52	5	765	A
52	5	767	U
52	5	770	G
52	5	772	G
52	5	774	A
52	5	778	A
52	5	779	A
52	5	781	A
52	5	784	A
52	5	787	A
52	5	789	A
52	5	791	A
52	5	794	C
52	5	796	A
52	5	802	C
52	5	806	A
52	5	808	C
52	5	810	U
52	5	813	A
52	5	814	C
52	5	815	G

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Mol	Chain	Res	Type
52	5	816	A
52	5	818	A
52	5	819	G
52	5	825	A
52	5	829	G
52	5	836	C
52	5	837	G
52	5	838	A
52	5	842	C
52	5	862	C
52	5	870	A
52	5	872	C
52	5	877	C
52	5	879	G
52	5	882	U
52	5	883	A
52	5	886	A
52	5	896	G
52	5	902	A
52	5	907	A
52	5	908	A
52	5	910	C
52	5	911	G
52	5	918	A
52	5	921	G
52	5	922	G
52	5	929	C
52	5	930	A
52	5	936	G
52	5	937	G
52	5	944	A
52	5	949	G
52	5	953	A
52	5	954	A
52	5	955	U
52	5	956	U
52	5	962	G
52	5	963	U
52	5	964	A
52	5	965	C
52	5	966	A
52	5	969	A

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Mol	Chain	Res	Type
52	5	970	A
52	5	971	A
52	5	972	A
52	5	976	U
52	5	978	A
52	5	979	C
52	5	981	U
52	5	984	A
52	5	985	C
52	5	986	U
52	5	987	U
52	5	988	G
52	5	998	G
52	5	1000	A
52	5	1003	G
52	5	1005	U
52	5	1006	A
52	5	1013	C
52	5	1014	A
52	5	1016	A
52	5	1017	A
52	5	1018	U
52	5	1031	A
52	5	1033	U
52	5	1040	U
52	5	1044	G
52	5	1045	C
52	5	1047	U
52	5	1056	U
52	5	1061	U
52	5	1069	U
52	5	1070	G
52	5	1072	G
52	5	1074	U
52	5	1085	G
52	5	1086	U
52	5	1089	C
52	5	1092	A
52	5	1093	A
52	5	1095	G
52	5	1113	U
52	5	1119	C

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Mol	Chain	Res	Type
52	5	1120	A
52	5	1121	U
52	5	1122	U
52	5	1123	G
52	5	1124	U
52	5	1125	C
52	5	1126	U
52	5	1133	A
52	5	1134	C
52	5	1135	U
52	5	1142	G
52	5	1143	C
52	5	1144	A
52	5	1154	A
52	5	1155	A
52	5	1158	A
52	5	1159	A
52	5	1160	G
52	5	1165	G
52	5	1166	A
52	5	1168	G
52	5	1171	A
52	5	1172	A
52	5	1173	A
52	5	1175	C
52	5	1176	A
52	5	1177	U
52	5	1180	U
52	5	1185	C
52	5	1186	U
52	5	1188	A
52	5	1189	U
52	5	1190	G
52	5	1192	C
52	5	1194	A
52	5	1200	G
52	5	1201	C
52	5	1208	G
52	5	1211	A
52	5	1215	U
52	5	1217	G
52	5	1223	A

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Mol	Chain	Res	Type
52	5	1225	A
52	5	1227	A
52	5	1231	U
52	5	1232	C
52	5	1235	C
52	5	1242	U
52	5	1243	A
52	5	1245	A
52	5	1247	G
52	5	1248	U
52	5	1255	A
52	5	1257	C
52	5	1260	U
52	5	1261	A
52	5	1271	U
52	5	1272	C
52	5	1273	A
52	5	1274	G
52	5	1276	U
52	5	1279	G
52	5	1283	G
52	5	1291	C
52	5	1293	A
52	5	1294	U
52	5	1296	C
52	5	1297	G
52	5	1304	U
52	5	1305	G
52	5	1306	A
52	5	1312	G
52	5	1321	G
52	5	1322	U
52	5	1323	A
52	5	1331	A
52	5	1337	U
52	5	1338	A
52	5	1343	G
52	5	1344	C
52	5	1346	G
52	5	1352	A
52	5	1354	G
52	5	1369	A

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Mol	Chain	Res	Type
52	5	1373	A
52	5	1374	C
52	5	1375	C
52	5	1380	G
52	5	1381	U
52	5	1382	C
52	5	1397	G
52	5	1400	A
52	5	1402	U
52	5	1403	A
52	5	1404	U
52	5	1405	U
52	5	1411	A
52	5	1417	U
52	5	1418	G
52	5	1422	A
52	5	1423	C
52	5	1427	U
52	5	1429	G
52	5	1431	A
52	5	1442	A
52	5	1446	A
52	5	1448	A
52	5	1449	G
52	5	1458	A
52	5	1460	U
52	5	1465	U
52	5	1467	A
52	5	1468	A
52	5	1471	C
52	5	1473	U
52	5	1477	A
52	5	1478	A
52	5	1480	G
52	5	1481	U
52	5	1482	A
52	5	1484	C
52	5	1494	A
52	5	1504	G
52	5	1505	G
52	5	1509	A
53	8	3	G

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Mol	Chain	Res	Type
53	8	4	U
53	8	5	C
53	8	6	U
53	8	7	U
53	8	9	U
53	8	10	A
53	8	12	C
53	8	14	C
53	8	17	U
53	8	18	C
53	8	19	G
53	8	20	G
53	8	22	A
53	8	24	A
53	8	32	U
53	8	34	U
53	8	35	G
53	8	42	C
53	8	43	G
53	8	44	U
53	8	47	G
53	8	49	C
53	8	53	A
53	8	54	G
53	8	57	C
53	8	58	G
53	8	59	A
53	8	60	U
53	8	68	G
53	8	70	G
53	8	71	A
53	8	72	C
53	8	73	C

All (45) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
50	3	284	U
50	3	311	G
50	3	315	A
50	3	395	U
50	3	410	G

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Mol	Chain	Res	Type
50	3	425	U
50	3	493	A
50	3	500	U
50	3	508	A
50	3	513	A
50	3	688	U
50	3	689	U
50	3	1045	A
50	3	1048	A
50	3	1095	U
50	3	1096	U
50	3	1124	G
50	3	1209	U
50	3	1297	U
50	3	1465	U
50	3	1587	U
50	3	1686	U
50	3	1820	U
50	3	1822	A
50	3	2116	U
50	3	2140	G
50	3	2583	U
50	3	2590	G
50	3	2668	A
50	3	2764	U
50	3	2862	U
50	3	2897	G
51	4	54	U
52	5	387	G
52	5	448	A
52	5	529	U
52	5	595	G
52	5	748	U
52	5	962	G
52	5	975	C
52	5	1133	A
52	5	1445	G
52	5	1457	G
53	8	16	G
53	8	71	A

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](#)

There are no ligands in this entry.

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.

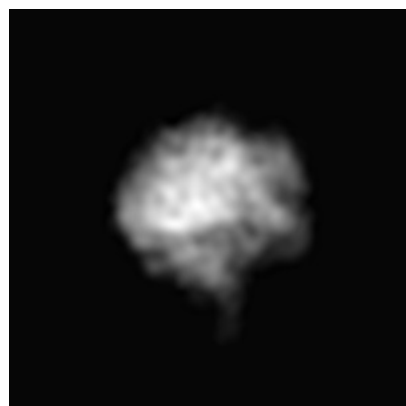
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13282. These allow visual inspection of the internal detail of the map and identification of artifacts.

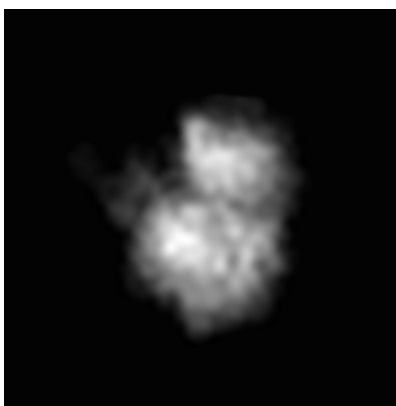
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

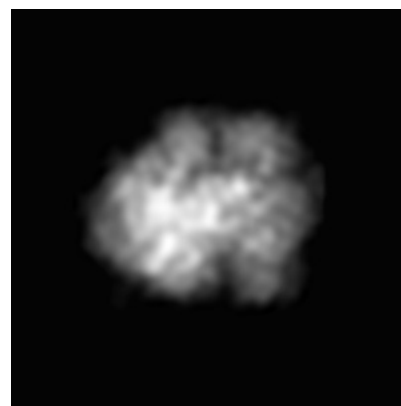
6.1.1 Primary map



X

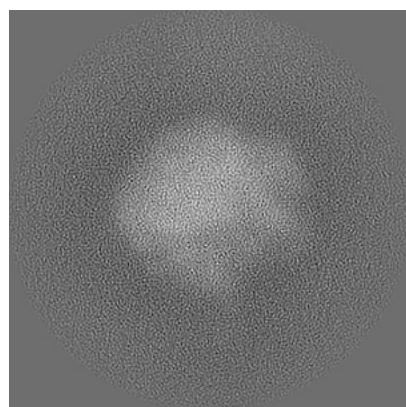


Y

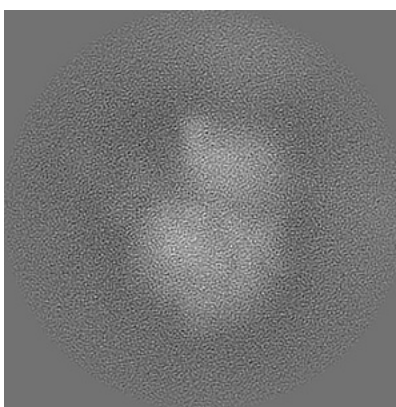


Z

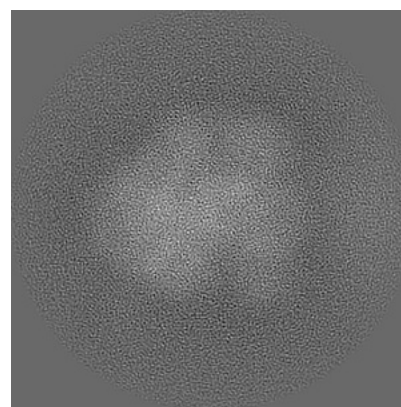
6.1.2 Raw map



X



Y

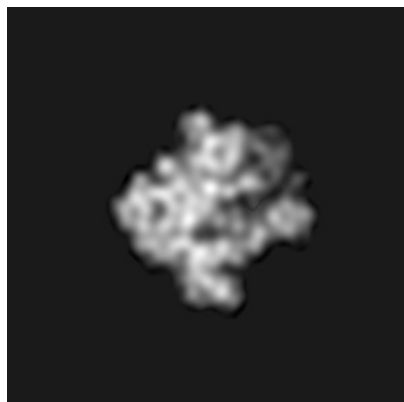


Z

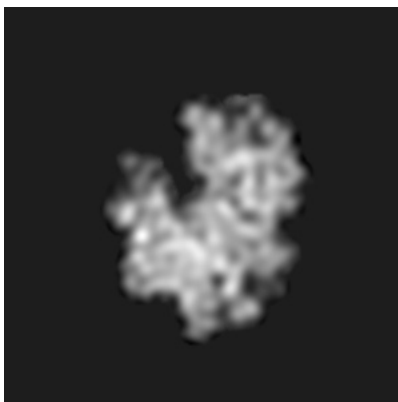
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

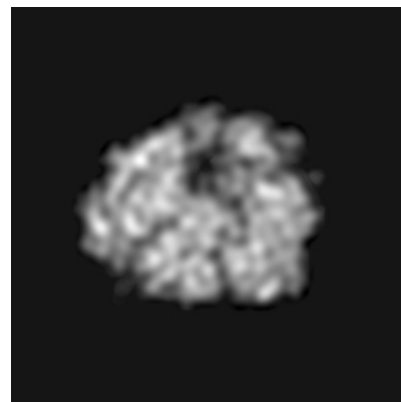
6.2.1 Primary map



X Index: 128

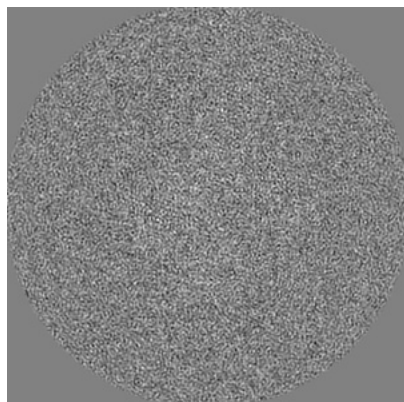


Y Index: 128

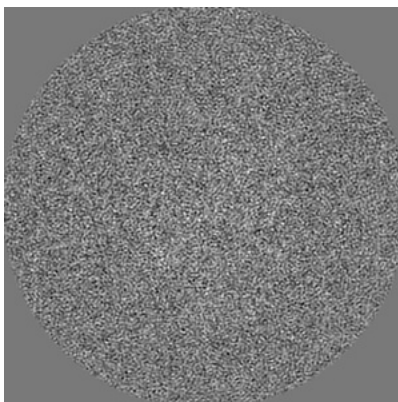


Z Index: 128

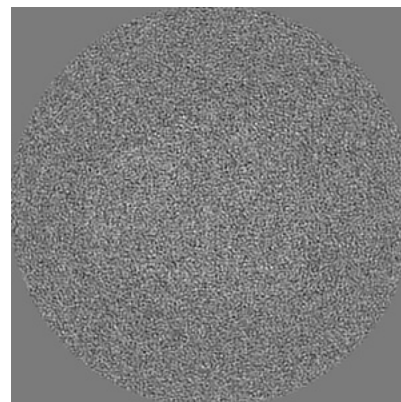
6.2.2 Raw map



X Index: 128



Y Index: 128



Z Index: 128

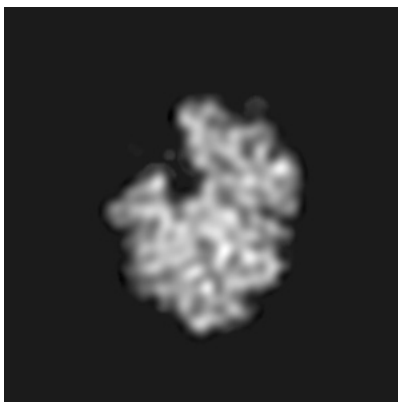
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

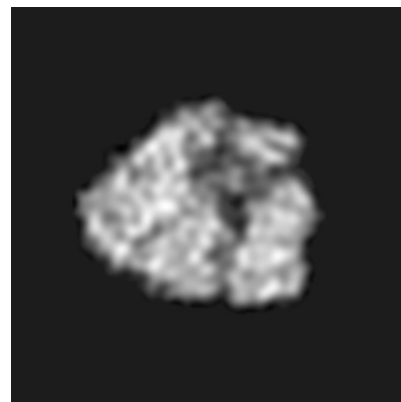
6.3.1 Primary map



X Index: 100

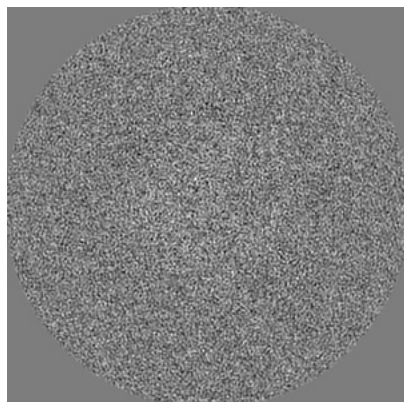


Y Index: 119

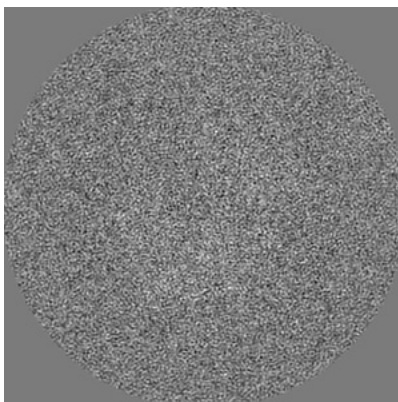


Z Index: 123

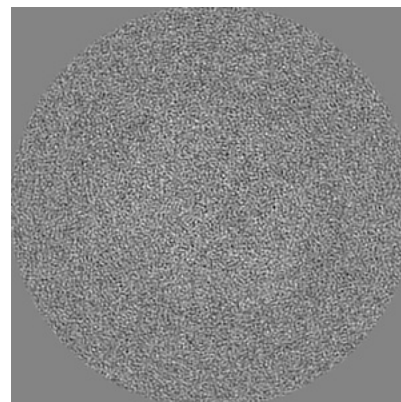
6.3.2 Raw map



X Index: 127



Y Index: 129



Z Index: 122

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

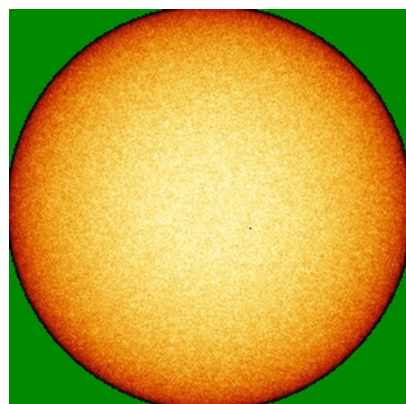


Y

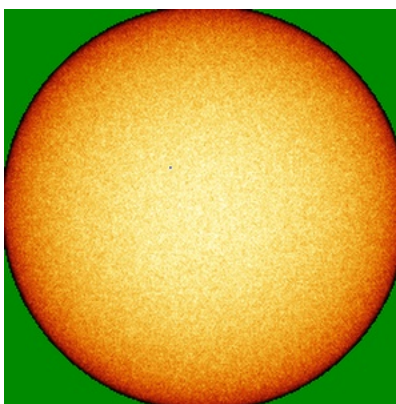


Z

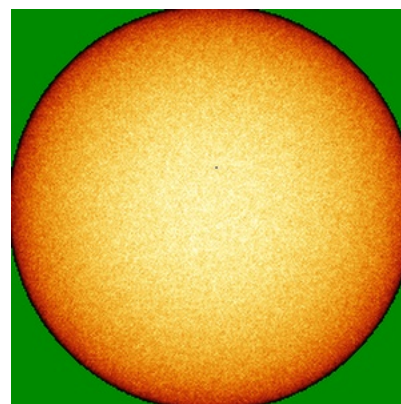
6.4.2 Raw map



X



Y

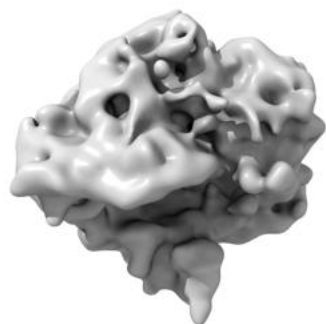


Z

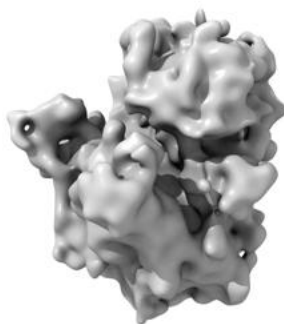
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

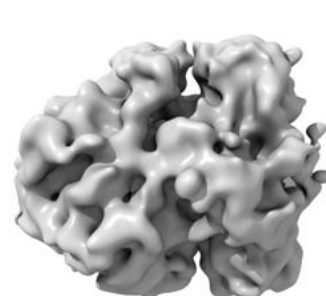
6.5.1 Primary map



X



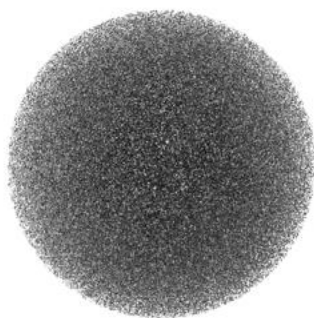
Y



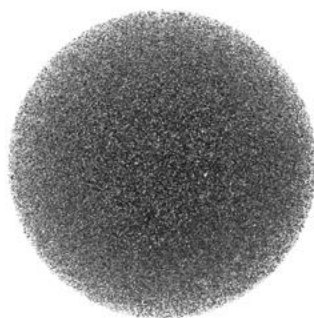
Z

The images above show the 3D surface view of the map at the recommended contour level 0.35. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

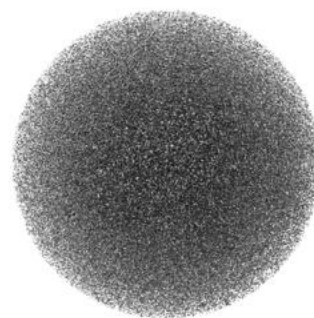
6.5.2 Raw map



X



Y



Z

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.

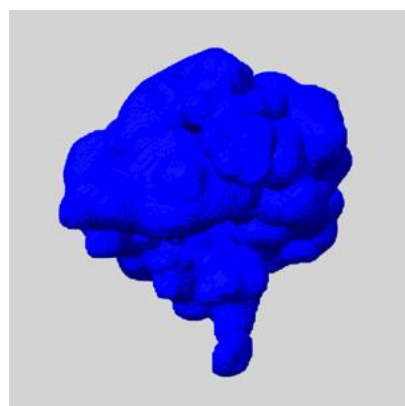
6.6 Mask visualisation [i](#)

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

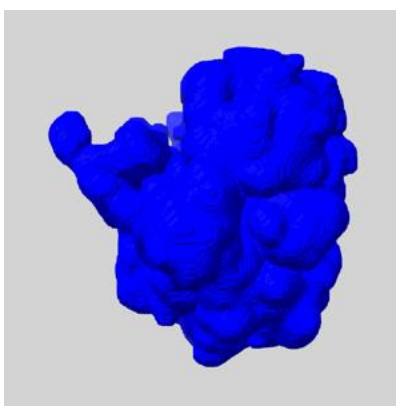
A mask typically either:

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

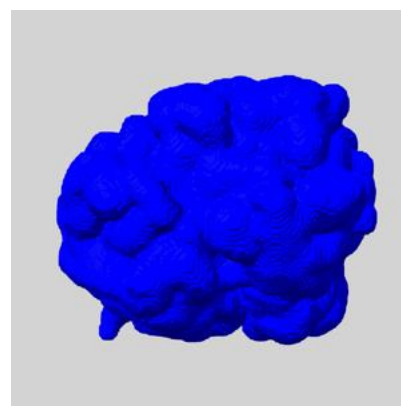
6.6.1 emd_13282_msk_1.map [i](#)



X



Y

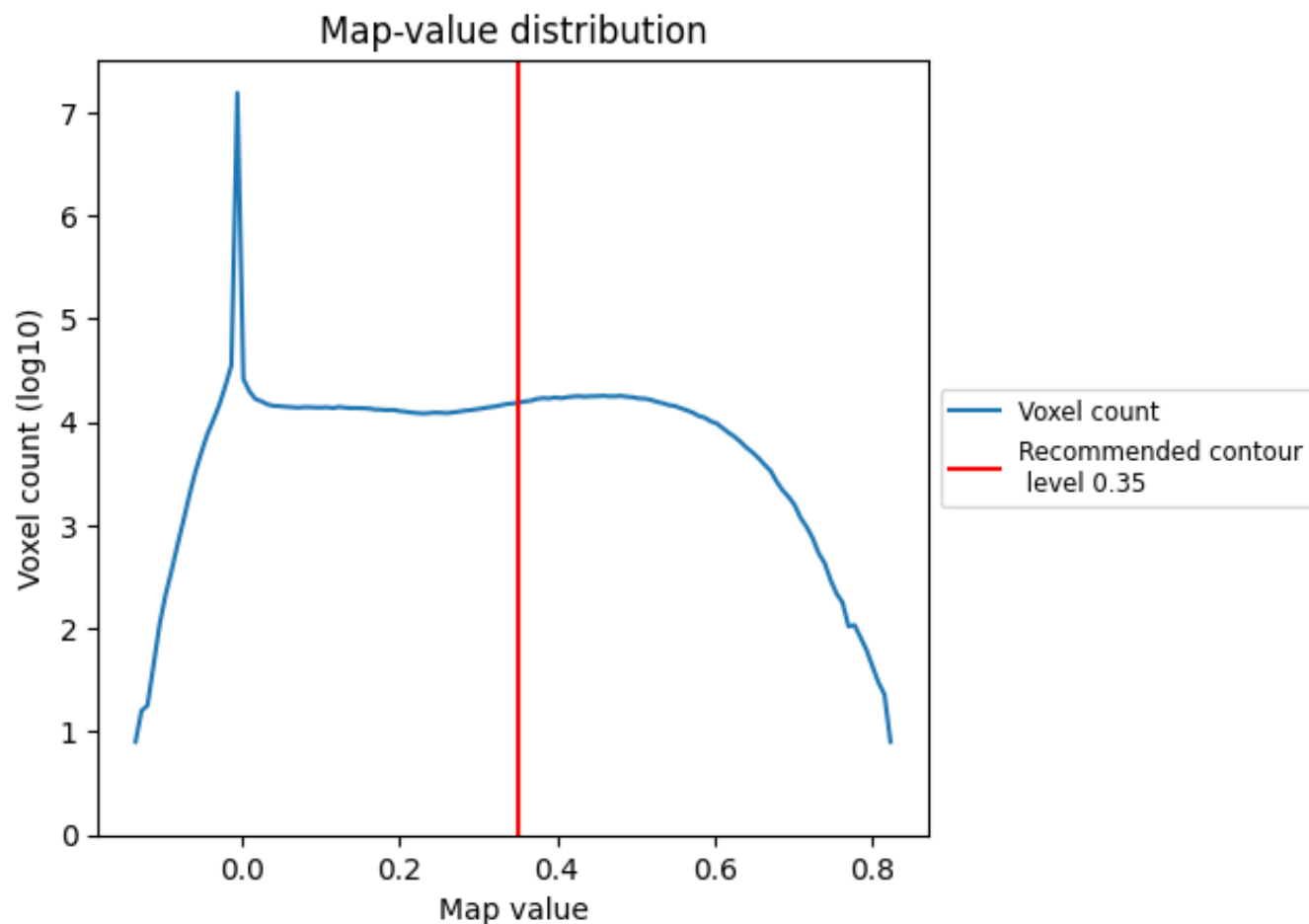


Z

7 Map analysis [i](#)

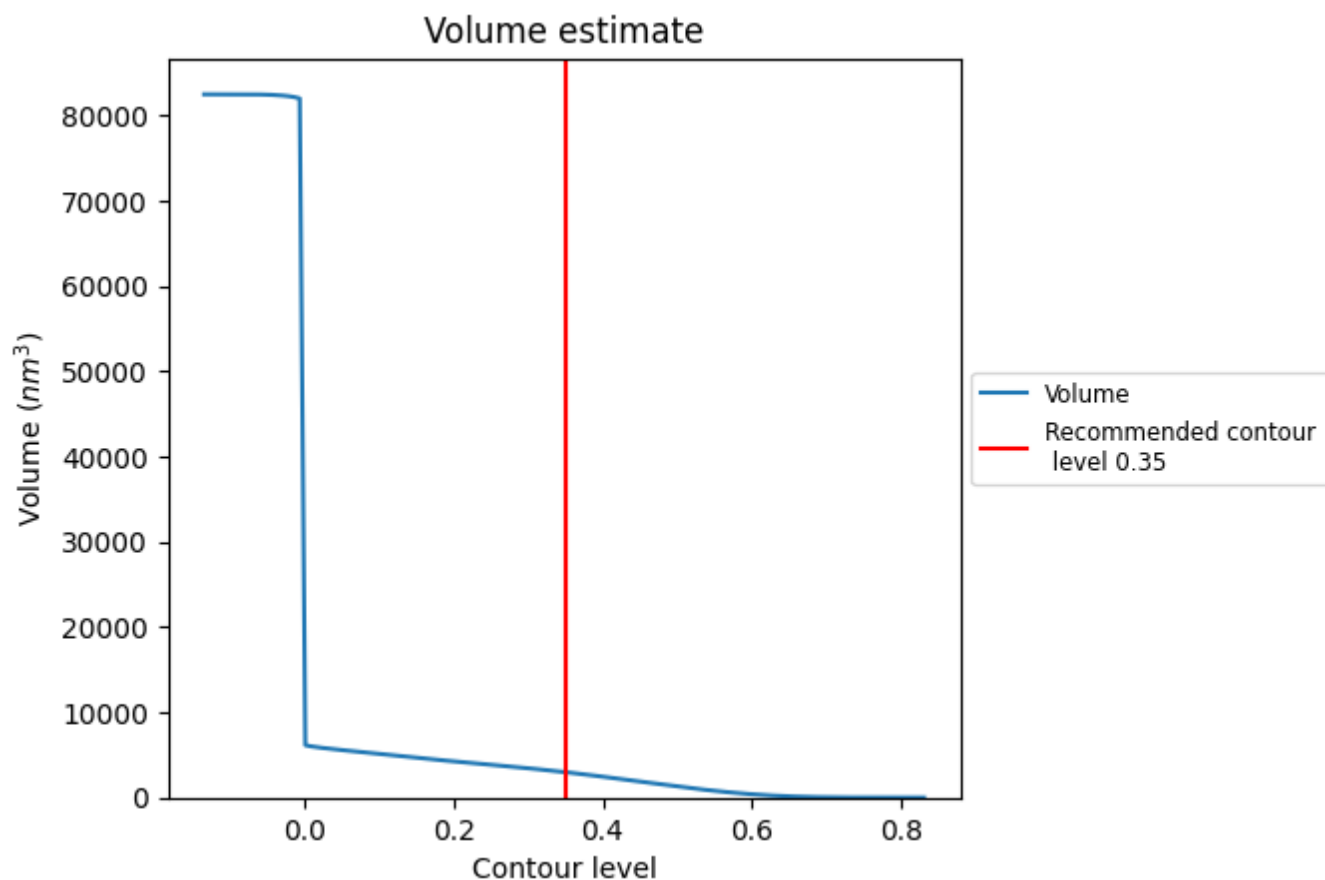
This section contains the results of statistical analysis of the map.

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.

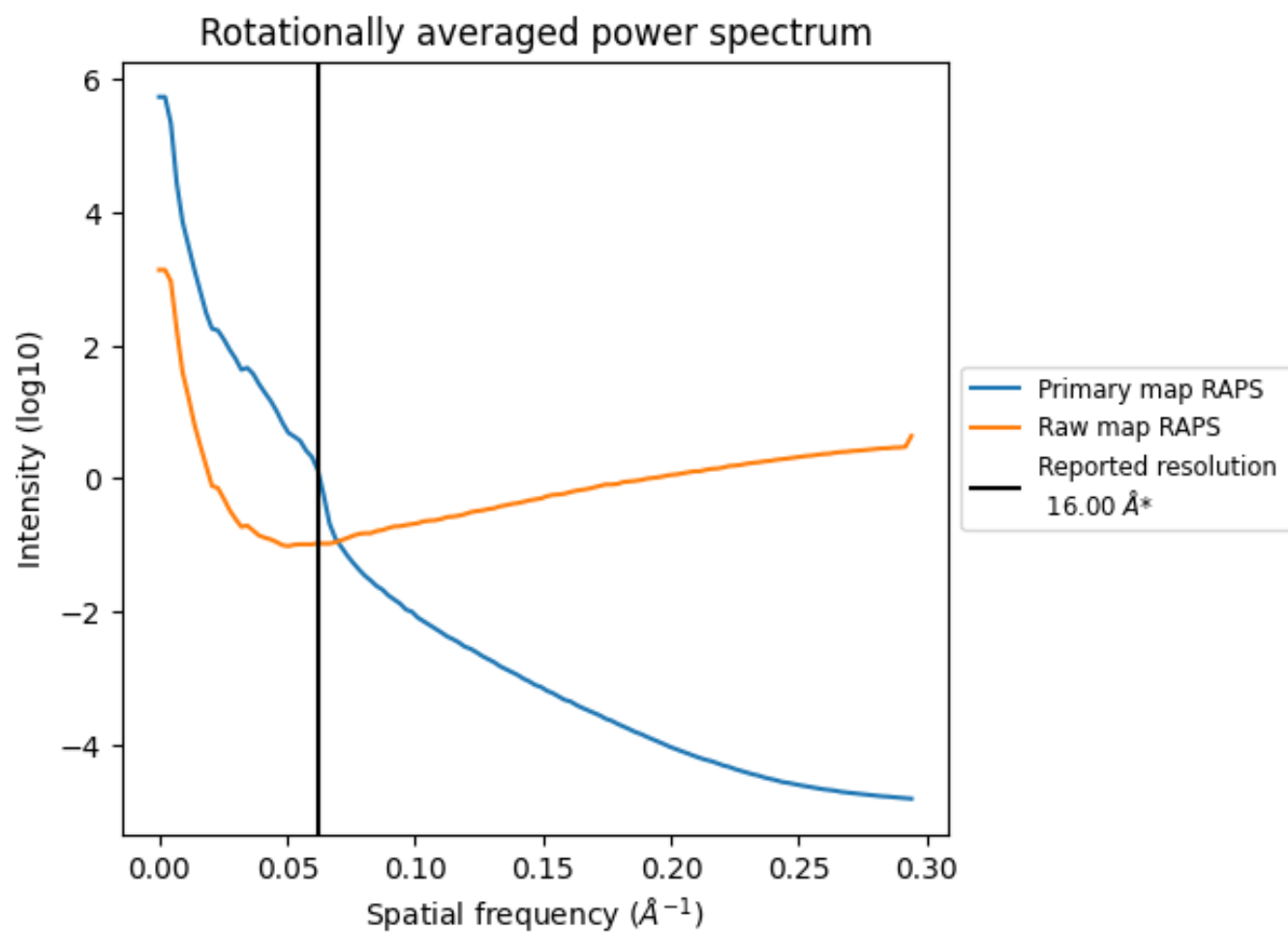
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 2979 nm³; this corresponds to an approximate mass of 2691 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 ⓘ

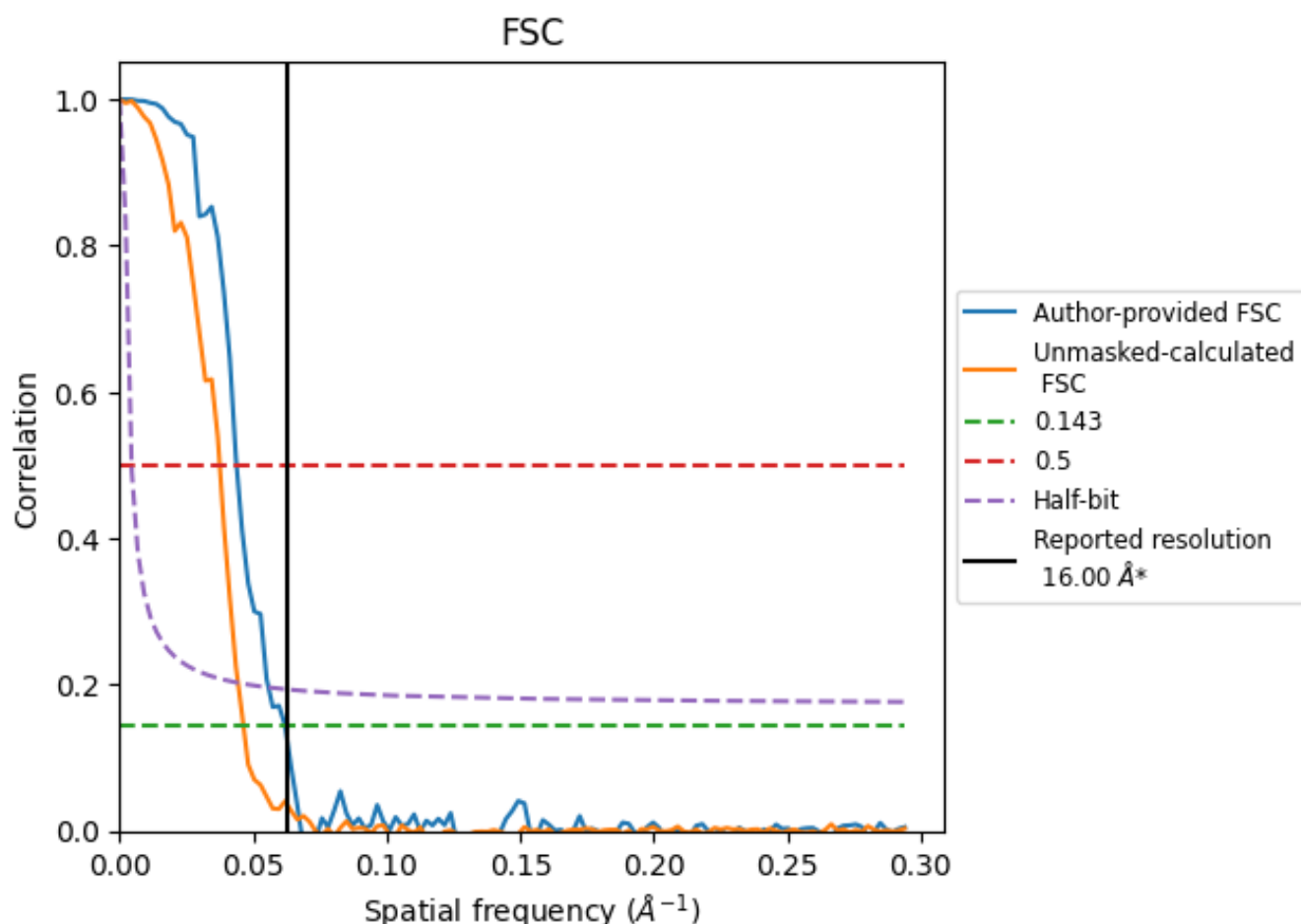


*Reported resolution corresponds to spatial frequency of 0.062 Å⁻¹

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 0.062 Å⁻¹

8.2 Resolution estimates [i](#)

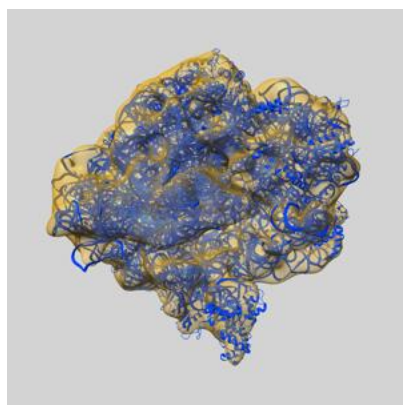
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	16.00	-	-
Author-provided FSC curve	16.10	22.78	17.89
Unmasked-calculated*	21.51	26.67	22.52

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 21.51 differs from the reported value 16.0 by more than 10 %

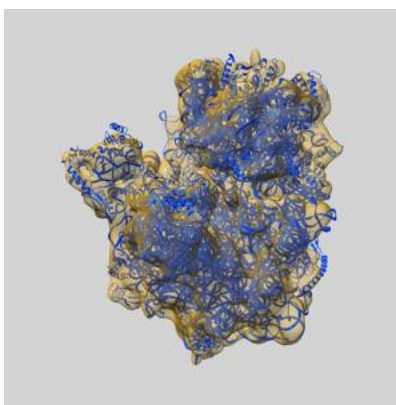
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-13282 and PDB model 7PAS. Per-residue inclusion information can be found in [section 3](#) on [page 13](#).

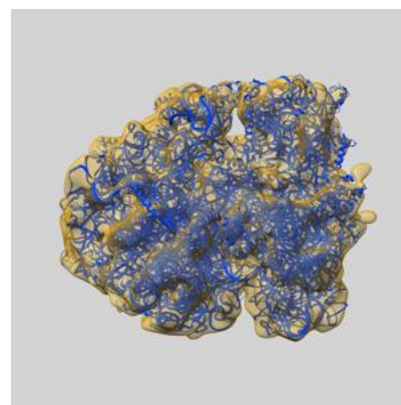
9.1 Map-model overlay [i](#)



X



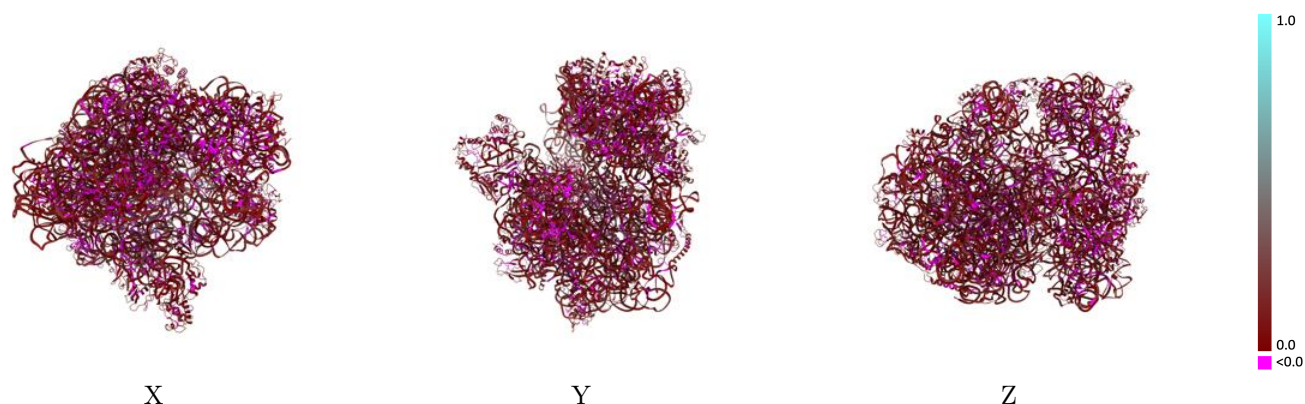
Y



Z

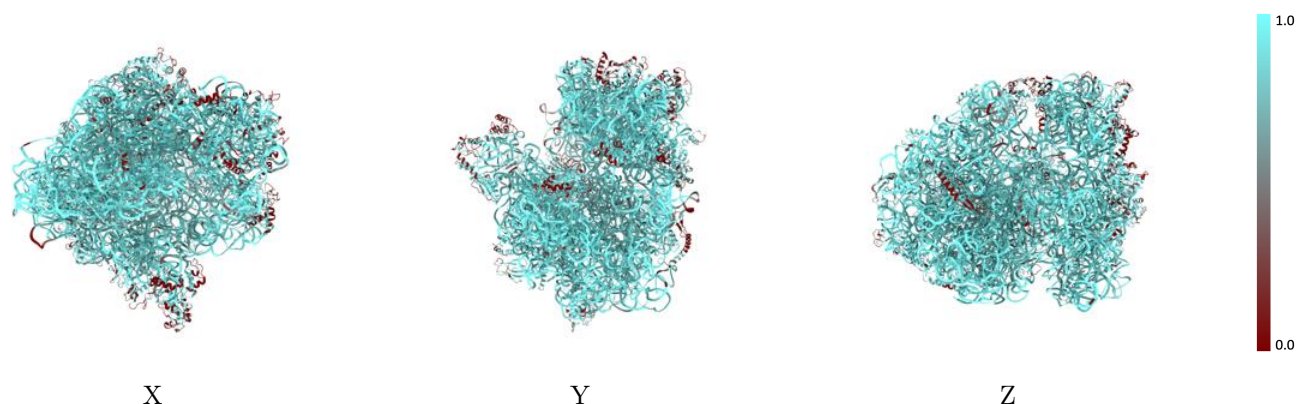
The images above show the 3D surface view of the map at the recommended contour level 0.35 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



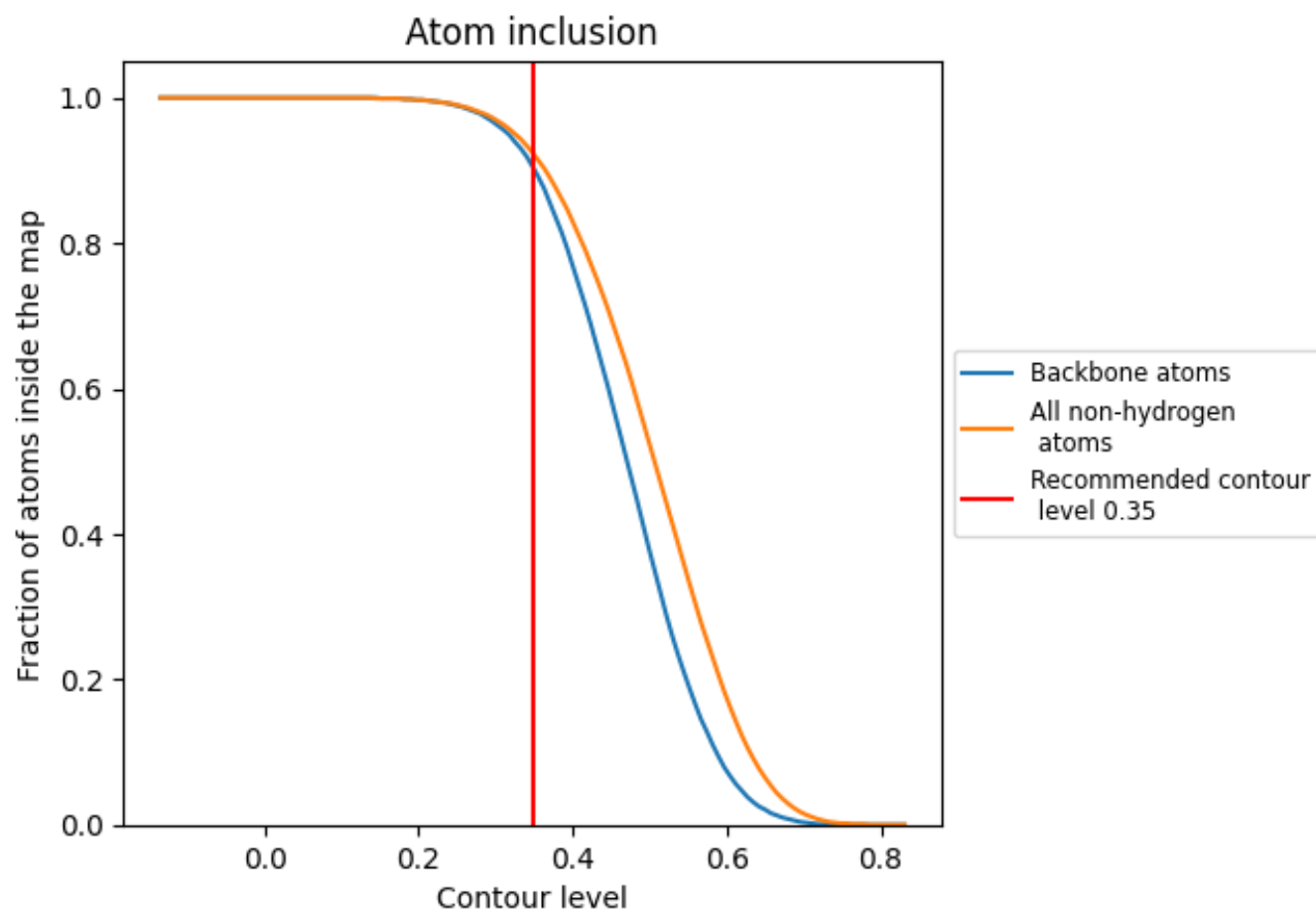
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.35).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 92% 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 (0.35) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9220	 0.0690
0	 1.0000	 0.0170
1	 0.9980	 -0.0070
2	 0.9760	 -0.0040
3	 0.9810	 0.0810
4	 0.9680	 0.0870
5	 0.9720	 0.0790
8	 0.9040	 0.0960
A	 0.6370	 0.0660
B	 0.6700	 0.0430
C	 0.8310	 0.0380
D	 0.8540	 0.0470
E	 0.7020	 0.0820
F	 0.7380	 0.0690
G	 0.7710	 0.0490
H	 0.7590	 0.0530
I	 0.6870	 0.0310
J	 0.8210	 0.0360
K	 0.9650	 0.0310
L	 0.6400	 0.0550
M	 0.9580	 0.0350
N	 0.8910	 0.0570
O	 0.9670	 0.0150
P	 0.8620	 0.0570
Q	 0.9830	 0.0510
R	 0.8630	 0.0550
S	 0.9610	 0.0260
T	 0.7920	 0.0260
a	 0.9690	 0.0320
b	 0.8860	 0.0290
c	 0.8760	 0.0510
d	 0.6580	 0.0580
e	 0.7030	 0.0550
f	 0.4190	 0.0600
g	 0.5290	 0.0730



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Chain	Atom inclusion	Q-score
h	 0.3770	 0.0690
i	 0.9090	 0.0240
j	 0.8900	 0.0310
k	 0.9350	 0.0220
l	 0.9450	 0.0400
m	 0.9630	 0.0060
n	 0.9020	 0.0280
o	 0.8260	 0.0430
p	 0.8800	 0.0110
q	 0.8010	 0.0620
r	 0.9420	 0.0490
s	 0.9630	 0.0250
t	 0.6280	 0.0520
u	 0.9700	 0.0190
v	 0.9620	 0.0080
w	 0.8000	 0.0620
x	 0.3940	 0.1020
y	 0.8890	 0.0230
z	 1.0000	 0.0840