wwPDB EM Validation Summary Report

Apr 1, 2026 – 07:06 PM JST

PDB ID	:	9X2B / pdb_00009x2b
EMDB ID	:	EMD-66476
Title	:	Cryo-EM structure of PsoA in apo state (PsoA-PKS-II)
Authors	:	Sun, L.; Bai, L.
Deposited on	:	2025-10-04
Resolution	:	3.39 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:

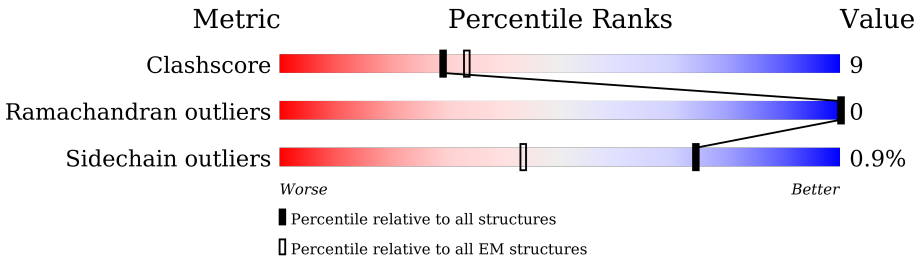
EMDB validation analysis	:	0.0.1.dev132
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

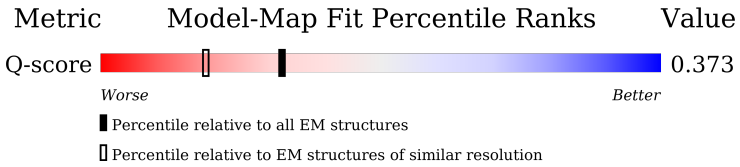
1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.39 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	14220 (2.89 - 3.89)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	4007	9% 48% 11% 41%
1	B	4007	47% 12% 41%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 72161 atoms, of which 35907 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 PKS-NRPS hybrid synthetase psoA.

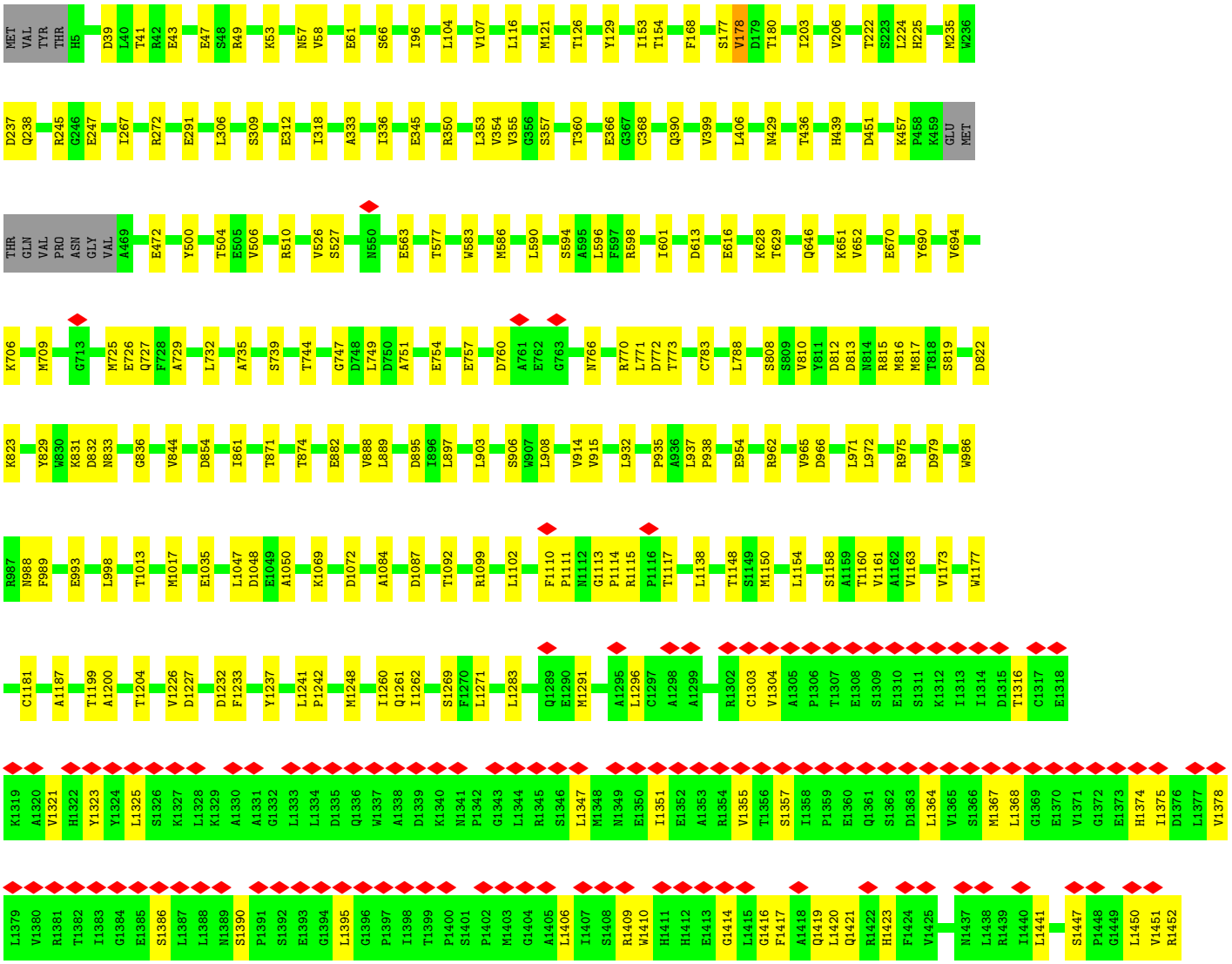
Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	2368	Total	C	H	N	O	S	0	0
			36099	11410	17963	3177	3468	81		
1	B	2365	Total	C	H	N	O	S	0	0
			36062	11399	17944	3174	3464	81		

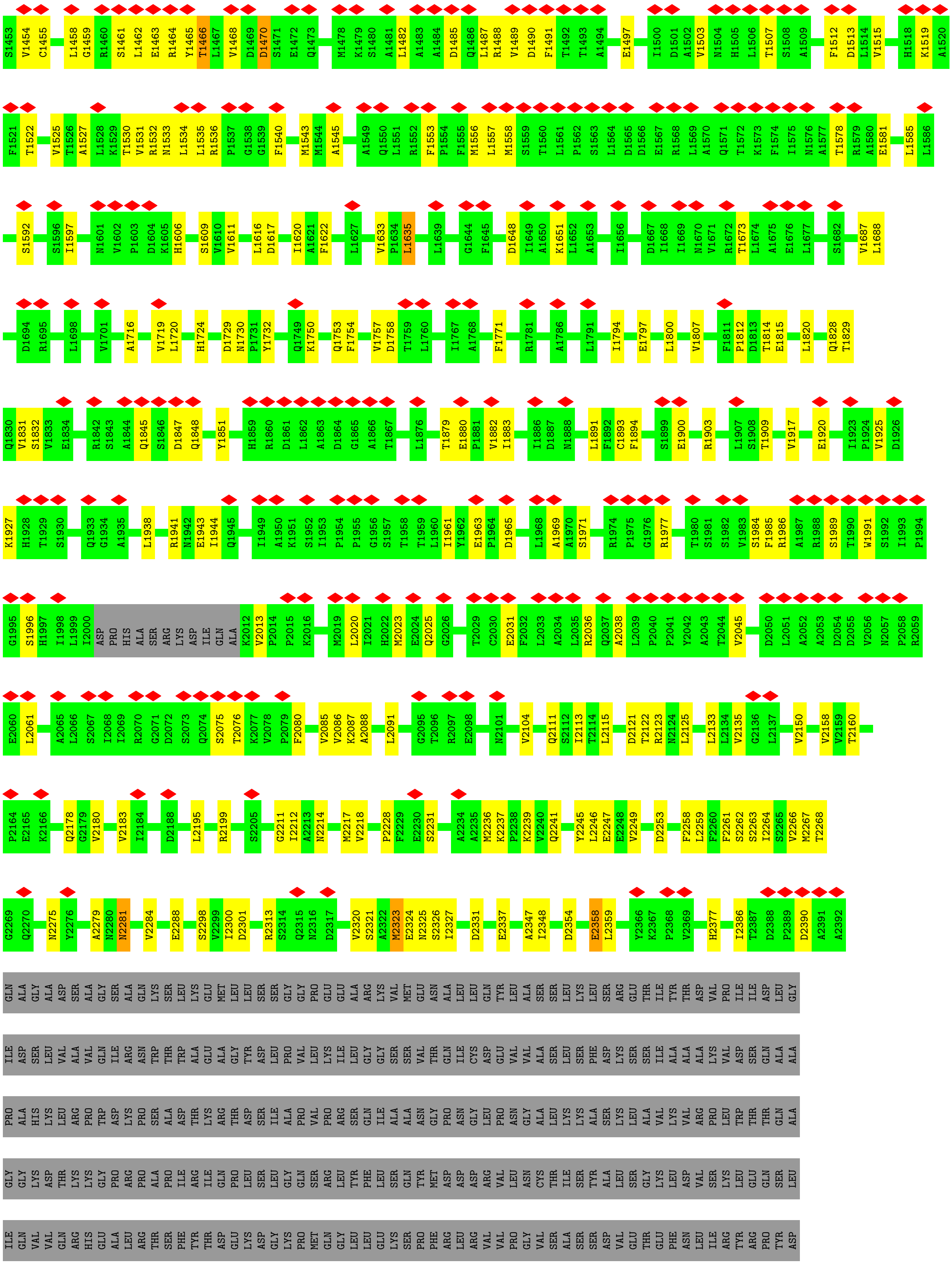
3 Residue-property plots (i)

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: PKS-NRPS hybrid synthetase psoA

Chain A:




S1453 V1454 C1455 L1458 G1459 R1460 S1461 L1462 E1463 R1464 Y1465 T1466 L1467 V1468 D1469 D1470 S1471 E1472 Q1473 M1478 K1479 S1480 A1481 L1482 A1483 A1484 D1485 Q1486 L1487 R1488 V1489 D1490 F1491 T1492 T1493 A1494 E1497 I1500 D1501 A1502 V1503 N1504 H1505 L1506 T1507 S1508 A1509 F1512 D1513 L1514 V1515 H1518 K1519 A1520
F1521 T1522 V1525 T1526 A1527 L1528 K1529 T1530 V1531 R1532 N1533 L1534 L1535 R1536 P1537 G1538 G1539 F1540 M1543 M1544 A1545 A1549 Q1550 L1551 R1552 F1553 P1554 F1555 M1556 L1557 M1558 S1559 T1560 L1561 P1562 S1563 L1564 D1565 D1566 E1567 R1568 L1569 A1570 Q1571 T1572 K1573 F1574 I1575 N1576 A1577 T1578 R1579 A1580 E1581 L1585 L1586
S1592 S1596 I1597 N1601 V1602 P1603 D1604 K1605 H1606 S1609 V1610 V1611 L1616 D1617 I1620 A1621 F1622 L1627 V1633 P1634 L1635 L1639 G1644 F1645 D1648 I1649 A1650 K1651 L1652 A1653 I1656 D1667 I1668 I1669 N1670 V1671 R1672 T1673 L1674 A1675 E1676 L1677 S1682 V1687 L1688
D1694 R1695 L1698 V1701 A1716 V1719 L1720 H1724 D1729 N1730 P1731 Y1732 Q1749 K1750 Q1753 F1754 V1757 D1758 T1759 L1760 I1767 A1768 F1771 R1781 A1786 L1791 I1794 E1797 L1800 V1807 F1811 P1812 D1813 T1814 E1815 L1820 Q1828 T1829
Q1830 V1831 S1832 V1833 E1834 R1842 S1843 A1844 Q1845 S1846 D1847 Q1848 Y1851 H1859 R1860 D1861 L1862 A1863 D1864 G1865 A1866 T1867 L1876 T1879 E1880 P1881 V1882 I1883 I1886 D1887 N1888 L1891 F1892 C1893 F1894 S1899 E1900 R1903 L1907 S1908 T1909 V1917 E1920 I1923 P1924 V1925 D1926
K1927 H1928 T1929 S1930 Q1933 G1934 A1935 L1938 R1941 N1942 E1943 I1944 Q1945 I1949 A1950 K1951 S1952 I1953 P1954 P1955 G1956 S1957 T1958 T1959 L1960 I1961 Y1962 E1963 P1964 D1965 L1968 A1969 A1970 S1971 R1974 P1975 G1976 R1977 T1980 S1981 S1982 V1983 S1984 F1985 R1986 A1987 R1988 S1989 T1990 W1991 S1992 I1993 P1994
G1995 S1996 H1997 I1998 L1999 I2000 ASP PRO HIS ALA SER ARG LYS ASP ILE GLN ALA K2012 V2013 P2014 P2015 K2016 M2019 L2020 I2021 H2022 M2023 E2024 Q2025 G2026 T2029 C2030 E2031 F2032 L2033 A2034 L2035 R2036 Q2037 A2038 L2039 P2040 P2041 Y2042 A2043 T2044 V2045 D2050 L2051 A2052 A2053 D2054 D2055 V2056 N2057 P2058 R2059
E2060 L2061 A2065 L2066 S2067 I2068 I2069 R2070 G2071 D2072 S2073 Q2074 S2075 T2076 K2077 V2078 P2079 F2080 V2085 V2086 K2087 A2088 L2091 G2095 T2096 R2097 E2098 N2101 V2104 Q2111 S2112 I2113 T2114 L2115 D2121 T2122 R2123 N2124 L2125 L2133 L2134 V2135 G2136 L2137 V2150 V2158 V2159 T2160
P2164 E2165 K2166 Q2178 G2179 V2180 V2183 I2184 D2188 L2195 R2199 S2205 G2211 I2212 A2213 N2214 M2217 V2218 P2228 F2229 E2230 S2231 A2234 A2235 M2236 K2237 P2238 K2239 V2240 Q2241 Y2245 L2246 E2247 E2248 V2249 D2253 F2258 L2259 F2260 F2261 S2262 S2263 I2264 S2265 V2266 M2267 T2268
G2269 Q2270 N2275 Y2276 A2279 N2280 N2281 V2284 E2288 S2298 V2299 I2300 D2301 R2313 S2314 Q2315 N2316 D2317 V2320 S2321 A2322 M2323 E2324 N2325 S2326 I2327 D2331 E2337 A2347 I2348 D2354 E2358 L2359 Y2366 K2367 P2368 V2369 H2377 I2386 T2387 D2388 P2389 D2390 A2391 A2392
GLN ALA GLY ALA ASP SER ALA GLY SER ALA GLN LYS SER LEU LYS GLU MET LEU LEU SER SER GLY GLY PRO GLU GLU ALA ARG LYS VAL MET GLU ASN ALA LEU LEU GLN TYR LEU ALA ALA SER SER LEU LYS LEU SER ARG GLU THR ILE TYR THR ASP VAL PRO ILE ILE ASP LEU GLY
ILE ASP SER LEU VAL ALA VAL GLN ILE ARG ASN TRP THR TRP ALA GLU ALA GLY TYR ASP LEU PRO VAL LEU LYS ILE LEU GLY GLY SER SER VAL THR GLN ILE CYS ASP GLU VAL VAL ALA SER LEU SER PHE ASP LYS SER SER ILE ALA ALA ALA LYS VAL ASP SER GLN ALA ALA
PRO ALA HIS LYS LEU ARG PRO TRP ASP LYS PRO SER ALA ASP THR LYS ARG THR ASP SER ILE ALA PRO VAL PRO ARG SER GLN ILE ALA ALA ASN GLY PRO ASN GLY LEU PRO ASN GLY ALA LEU LYS LYS ALA SER LYS LEU ALA VAL LYS VAL ARG PRO LEU TRP THR THR GLN ALA
GLY GLY LYS ASP THR LYS LYS GLY PRO ARG PRO ALA PRO ILE ARG ILE GLN PRO LEU SER LEU GLY GLN SER ARG LEU TYR PHE LEU SER GLN TYR MET ASP ASP ARG VAL LEU ASN CYS THR ILE SER TYR ALA LEU SER GLY LYS LEU ASP VAL SER LYS LEU GLU GLN SER LEU
ILE GLN VAL VAL GLN ARG HIS GLU ALA LEU ARG THR SER PHE TYR THR ASP GLU LYS ASP GLY LYS PRO MET GLN GLY LEU LEU GLU LYS SER PRO PHE ARG LEU ARG VAL VAL PRO GLY VAL SER ALA SER SER ASP VAL GLU THR GLU PHE ASN LEU ILE ARG TYR ARG PRO TYR ASP

LEU GLU GLN ALA ASP THR PHE ALA ALA THR LEU LEU SER HIS SER PRO ASP SER HIS THR LEU ILE CYS GLY TYR HIS HIS ILE ILE MET ASP GLY VAL SER TRP GLN ILE PHE GLN LYS ASP LEU ALA MET PHE TYR ASN ASN SER GLY ILE ALA ASP SER ALA LYS HIS LEU PRO ALA

GLN TYR SER GLU PHE THR ARG LYS GLN GLN GLU ASP LEU SER CYS GLY ALA TYR ALA GLU ARG LEU ARG PHE PHE GLN ASP GLN PHE ARG GLU PRO VAL GLU SER LEU PRO LEU PHE PRO PHE ALA LYS VAL GLY THR ARG LYS VAL VAL LYS GLN TYR ALA VAL GLN GLU ALA THR THR

HIS LEU ASN ALA LYS VAL VAL SER ALA ILE LYS GLN ALA SER GLN THR SER ARG THR THR PRO PHE HIS PHE TYR LEU SER ALA PHE GLN VAL LEU LEU HIS ARG LEU LEU GLU THR ASP LYS MET CYS ILE GLY VAL VAL ASP ALA ASN ARG SER ASP GLN ASN PHE VAL ASN THR ILE

GLY PHE PHE LEU GLU THR ILE PRO LEU TRP PHE LYS VAL ASN SER GLU GLN ARG PHE VAL GLU LEU LEU LYS GLU THR ARG THR LYS ALA TYR ALA ALA LEU ALA GLN THR GLY VAL PRO THR GLU GLU ILE LEU ARG ALA CYS GLY VAL ALA SER SER THR THR GLU THR PRO LEU PHE

GLN VAL CYS PHE ASN TYR ARG MET GLY ALA GLY ARG THR ALA ALA LEU GLN GLY VAL GLU MET LYS PHE LEU ASP TYR VAL ASP ALA GLN ASN PRO PHE ASP LEU VAL ALA THR VAL ASP ASP LEU ASP ASP GLY THR ALA MET ILE THR LEU TYR LEU GLN ASP TYR LEU TYR ASP GLN

GLU GLY ALA GLN LEU LEU ALA THR MET TYR ALA ASN VAL LEU GLN VAL LEU ALA GLU ASN PRO GLU ARG LEU VAL GLY SER VAL SER ILE SER ASN ALA THR LEU GLU ASP GLU GLY VAL LYS LEU GLY THR GLY PRO ILE LEU ASP LEU VAL ALA PRO SER THR PRO THR LEU SER LYS

ILE PHE HIS THR TRP VAL ASP LYS ASP PRO HIS ALA LEU ALA VAL LYS ASP THR THR GLY LYS SER LYS THR TYR VAL GLN LEU ALA GLU ARG ALA ASN ALA ILE ALA ALA SER LEU LEU ASN ALA GLY ALA ALA PRO SER ILE PRO ILE GLY VAL LEU LEU ASP PRO GLY VAL ASP THR

ILE ALA THR ILE LEU ALA ILE LEU ARG ILE GLY ALA ALA TYR VAL PRO LEU ASP THR ARG SER SER ASP ALA VAL LEU SER ASP ILE LEU GLN GLU SER GLN PRO GLY ILE VAL ILE HIS HIS SER ALA THR ALA PRO ARG SER GLN ILE LEU LEU LYS ALA SER ALA LYS THR LYS LEU

VAL THR LEU ASN ALA ALA VAL PRO GLN LYS THR ILE ARG LYS ILE GLN ASP VAL SER VAL PRO GLU GLY LEU ALA MET ILE LEU TYR THR SER GLY SER THR GLY SER PRO LYS GLY ILE PRO LEU THR ASN ALA ASN ILE ARG THR PRO ILE LEU GLY VAL SER GLU ARG VAL PRO LEU GLY

ARG GLU VAL VAL LEU GLN GLN SER GLY GLN GLY PHE ASP ALA ALA VAL TYR GLN ILE PHE ILE ALA LEU ALA ASN GLY GLY THR LEU ILE MET VAL ASP ASN ARG ASP ASP PRO ALA LYS VAL ALA ALA LEU MET ALA GLN GLU SER VAL THR CYS THR THR HIS ILE VAL SER GLU MET

GLN ALA LEU LEU LYS TYR GLY TYR ASP GLU LEU ARG ASN CYS SER SER TRP ARG ILE ALA MET VAL ALA GLY GLU ALA PHE THR VAL HIS LEU LEU ASP GLN PHE ARG ALA LEU ASN ARG PRO ASP LEU LYS VAL ILE ASN ALA TYR GLY PRO THR GLU ALA SER ILE CYS SER SER LEU

GLY GLU VAL SER PHE ASN ARG ILE SER SER SER GLU THR SER ILE PRO ILE GLY LYS ALA ILE PRO ASN TYR GLY THR TYR ILE VAL ASP GLN HIS CYS LYS PRO VAL PRO LEU GLY TRP PRO GLY GLU VAL ALA ILE ALA GLY PRO GLY VAL ALA SER GLY TYR LEU ASN LEU GLY GLU

LEU THR GLN ALA LYS PHE ARG SER ALA ALA THR LEU GLY GLU VAL PHE GLY SER ASP CYS LEU TYR LEU THR GLY ASP ARG GLY ARG MET LEU SER ASP GLY SER ILE VAL LEU SER GLY ARG VAL ASP GLY ASP ASP GLN VAL LYS ILE ARG GLY HIS ARG VAL GLN LEU GLY ASP VAL

ALA ARG ALA LEU VAL GLN ALA SER ARG GLY VAL PHE ALA ASP ALA ALA VAL ILE LEU LYS GLY ASP ASP THR SER ASN PRO GLN LEU VAL ALA TYR VAL VAL PHE SER ARG THR SER ASN ILE GLN ASP GLN GLN THR TYR LEU ARG GLN LEU ASN GLN ASP LEU PRO VAL PRO ALA TYR

MET ARG PRO ALA ILE THR ILE PRO LEU ASP THR LEU PRO VAL THR ASP ARG GLY LYS LEU ASP SER LYS LYS LEU ALA SER LEU PRO LEU PRO SER ILE SER VAL ASP TYR GLU GLU ASP GLU GLN LEU THR PRO THR GLU ALA ARG LEU ARG ASP VAL TRP LYS ASN VAL LEU GLY ASP

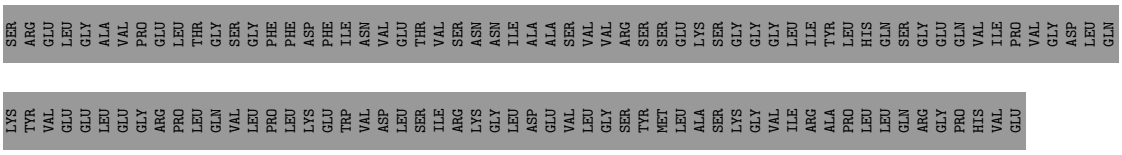
ILE ALA SER SER ILE PRO ILE ARG ARG SER SER ASP PHE PHE SER VAL GLY GLY ASN SER LEU ILE LEU LEU ALA LEU LYS ALA GLU ILE ALA GLN VAL PHE GLY VAL GLY LEU SER VAL SER GLU LEU PHE GLN ALA SER THR LEU GLU LEU LEU ALA ALA ARG LEU ASP GLY THR SER

LEU LEU ALA GLN ILE ASN TRP GLU GLU GLU THR ALA PRO ASP GLU THR GLN PHE THR LEU PRO PRO PRO ILE ASN GLY ILE ASN GLY HIS GLY SER SER ASN GLY HIS ALA GLN GLY ILE SER VAL LEU LEU THR GLY ALA THR GLY PHE LEU GLY GLY HIS ILE LEU ARG GLN LEU VAL

GLN LEU PRO SER VAL GLU HIS VAL HIS CYS VAL ALA ILE ARG PRO ASN LYS VAL ASP VAL ARG ARG GLN LEU SER VAL GLU SER PRO LYS ILE ILE ARG TYR SER GLY ASP LEU ALA LEU PRO ASN MET GLY MET SER GLU SER GLU PHE SER ASP LEU PHE LYS SER ILE ASP VAL ILE

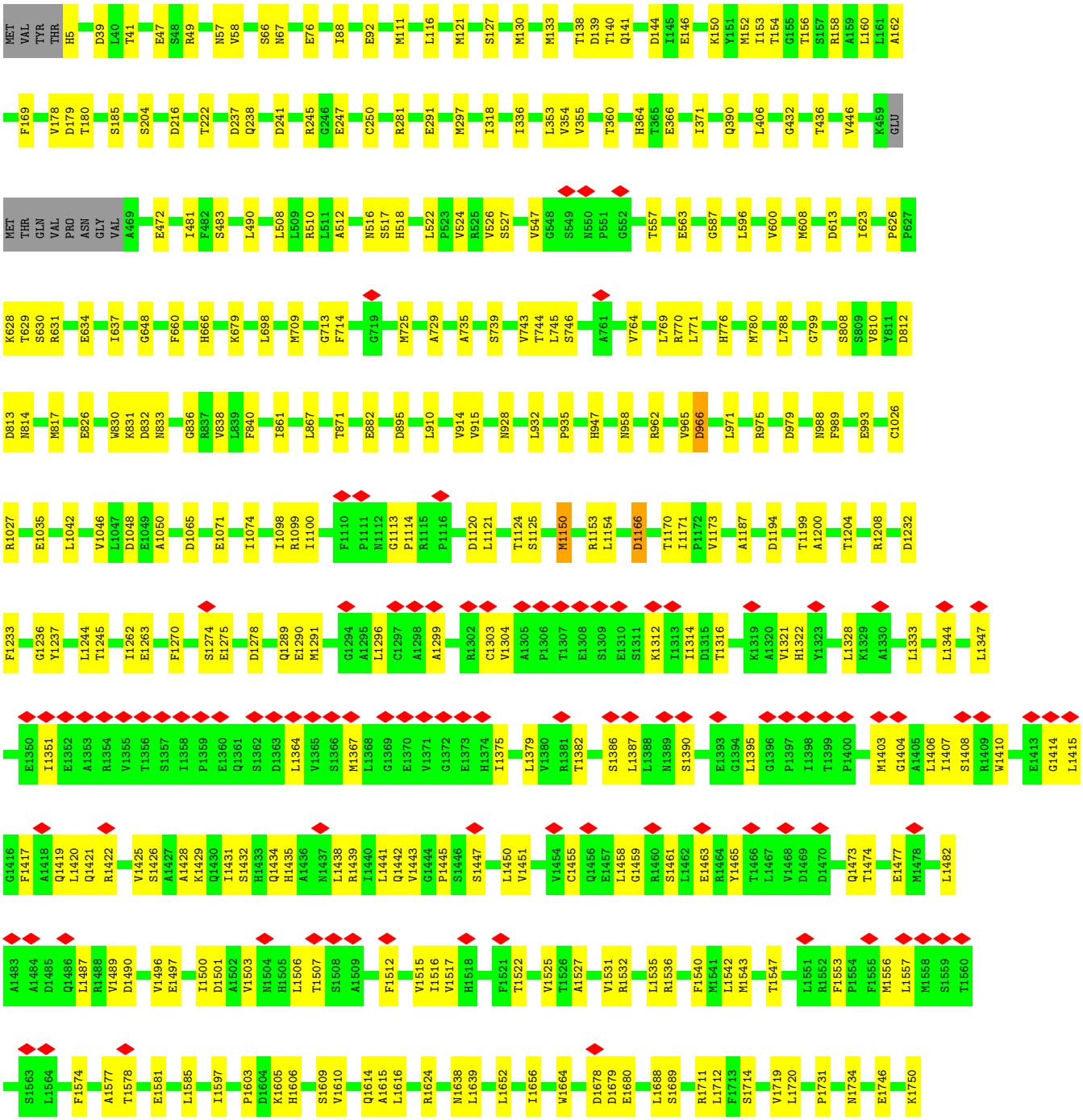
VAL HIS ASN GLY ALA GLU VAL SER HIS MET LYS ASN TYR ARG SER LEU ARG ALA ALA ASN PHE LEU SER THR VAL GLY LEU ALA ARG ALA ALA VAL SER ARG GLY ILE PRO ILE HIS TYR ILE SER SER THR GLY GLY VAL ALA ARG LEU SER VAL ALA ASP GLU GLN ASN PRO GLU ALA SER LEU

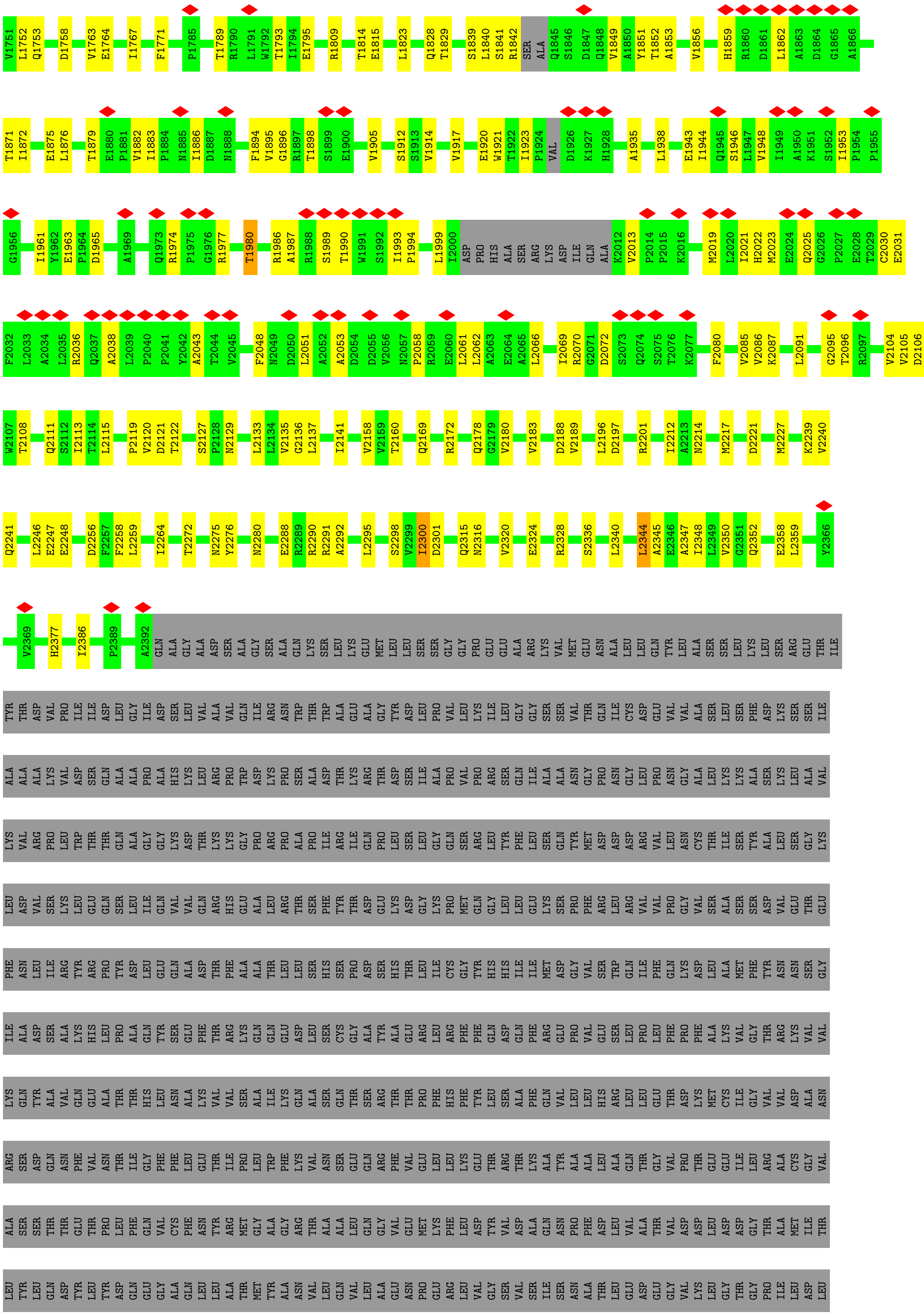
ALA ALA PHE HIS PRO PRO ILE ASP GLY SER ASP GLY TYR VAL ALA SER LYS TRP ALA SER GLU VAL PHE LEU GLU LYS VAL GLN ARG ARG PHE GLN GLY GLN VAL TRP ILE HIS ARG PRO SER SER ILE THR GLY ASP VAL PRO ASP ASN ASP ILE ALA HIS SER LEU LEU LYS PHE



• Molecule 1: PKS-NRPS hybrid synthetase psoA

Chain B:




V1751 L1752 Q1753 D1758 V1763 E1764 I1767 F1771 P1785 T1789 R1790 L1791 W1792 T1793 I1794 E1795 R1809 T1814 E1815 L1823 Q1828 T1829 S1839 L1840 S1841 R1842 SER ALA Q1845 S1846 D1847 Q1848 V1849 A1850 Y1851 T1852 A1853 V1856 H1859 R1860 D1861 L1862 A1863 D1864 G1865 A1866
T1871 I1872 E1875 L1876 T1879 E1880 P1881 V1882 I1883 P1884 N1885 I1886 D1887 N1888 F1894 V1895 G1896 R1897 T1898 S1899 E1900 V1905 S1912 S1913 V1914 V1917 E1920 W1921 T1922 I1923 P1924 VAL D1926 K1927 H1928 A1935 L1938 E1943 I1944 Q1945 S1946 L1947 V1948 I1949 A1950 K1951 S1952 I1953 P1954 P1955
G1956 I1961 Y1962 E1963 P1964 D1965 A1969 Q1973 R1974 P1975 G1976 R1977 T1980 R1986 A1987 R1988 S1989 T1990 W1991 S1992 I1993 P1994 L1999 I2000 ASP PRO HIS ALA SER ARG LYS ASP ILE GLN ALA K2012 V2013 P2014 P2015 K2016 M2019 L2020 I2021 H2022 M2023 E2024 Q2025 G2026 P2027 E2028 T2029 C2030 E2031
F2032 L2033 A2034 L2035 R2036 Q2037 A2038 L2039 P2040 P2041 Y2042 A2043 T2044 V2045 F2048 N2049 D2050 L2051 A2052 A2053 D2054 D2055 V2056 N2057 P2058 R2059 E2060 L2061 L2062 A2063 E2064 A2065 L2066 I2069 R2070 G2071 D2072 S2073 Q2074 S2075 T2076 K2077 F2080 V2085 V2086 K2087 L2091 G2095 T2096 R2097 V2104 V2105 D2106
W2107 T2108 Q2111 S2112 I2113 T2114 L2115 P2119 V2120 D2121 T2122 S2127 P2128 N2129 L2133 L2134 V2135 G2136 L2137 I2141 V2158 V2159 T2160 Q2169 R2172 Q2178 G2179 V2180 V2183 D2188 V2189 L2196 D2197 R2201 I2212 A2213 N2214 M2217 D2221 M2227 K2239 V2240
Q2241 L2246 E2247 E2248 D2256 F2257 F2258 L2259 I2264 T2272 N2275 Y2276 N2280 E2288 R2289 R2290 R2291 A2292 L2295 S2298 V2299 I2300 D2301 Q2315 N2316 V2320 E2324 R2328 S2336 L2340 L2344 A2345 E2346 A2347 I2348 L2349 V2350 G2351 Q2352 E2358 L2359 Y2366
V2369 H2377 I2386 P2389 A2392 GLN ALA GLY ALA ASP SER ALA GLY SER ALA GLN LYS SER LEU LYS GLU MET LEU LEU SER SER GLY GLY PRO GLU GLU ALA ARG LYS VAL MET GLU ASN ALA LEU LEU GLN TYR LEU ALA SER SER LEU LYS LEU SER ARG GLU THR ILE
TYR THR ASP VAL PRO ILE ILE ASP LEU GLY ILE ASP SER LEU VAL ALA VAL GLN ILE ARG ASN TRP THR TRP ALA GLU ALA GLY TYR ASP LEU PRO VAL LEU LYS ILE LEU GLY GLY SER SER VAL THR GLN ILE CYS ASP GLU VAL VAL ALA SER LEU SER PHE ASP LYS SER SER ILE
ALA ALA ALA LYS VAL ASP SER GLN ALA ALA PRO ALA HIS LYS LEU ARG PRO TRP ASP LYS PRO SER ALA ASP THR LYS ARG THR ASP SER ILE ALA PRO VAL PRO ARG SER GLN ILE ALA ALA ASN GLY PRO ASN GLY LEU PRO ASN GLY ALA LEU LYS LYS ALA SER LYS LEU ALA VAL
LYS VAL ARG PRO LEU TRP THR THR GLN ALA GLY GLY LYS ASP THR LYS LYS GLY PRO ARG PRO ALA PRO ILE ARG ILE GLN PRO LEU SER LEU GLY GLN SER ARG LEU TYR PHE LEU SER GLN TYR MET ASP ASP ASP ARG VAL LEU ASN CYS THR ILE SER TYR ALA LEU SER GLY LYS
LEU ASP VAL SER LYS LEU GLU GLN SER LEU ILE GLN VAL VAL GLN ARG HIS GLU ALA LEU ARG THR SER PHE TYR THR ASP GLU LYS ASP GLY LYS PRO MET GLN GLY LEU LEU GLU LYS SER PRO PHE ARG LEU ARG VAL PRO GLY VAL SER ALA SER SER ASP VAL GLU THR GLU
PHE ASN LEU ILE ARG TYR ARG PRO TYR ASP LEU GLU GLN ALA ASP THR PHE ALA ALA THR LEU LEU SER HIS SER PRO ASP SER HIS THR LEU ILE CYS GLY TYR HIS HIS ILE ILE MET ASP GLY VAL SER TRP GLN ILE PHE GLN LYS ASP LEU ALA MET PHE TYR ASN ASN SER GLY
ILE ALA ASP SER ALA LYS HIS LEU PRO ALA GLN TYR SER GLU PHE THR ARG LYS GLN GLN GLU ASP LEU SER CYS GLY ALA TYR ALA GLU ARG LEU ARG PHE PHE GLN ASP GLN PHE ARG GLU PRO VAL GLU SER LEU PRO LEU PHE PRO PHE ALA LYS VAL GLY THR ARG LYS VAL VAL
LYS GLN TYR ALA VAL GLN GLU ALA THR THR HIS LEU ASN ALA LYS VAL VAL SER ALA ILE LYS GLN ALA SER GLN THR SER ARG THR THR PRO PHE HIS PHE TYR LEU SER ALA PHE GLN VAL LEU LEU HIS ARG LEU LEU GLU THR ASP LYS MET CYS ILE GLY VAL VAL ASP ALA ASN
ARG SER ASP GLN ASN PHE VAL ASN THR ILE GLY PHE PHE LEU GLU THR ILE PRO LEU TRP PHE LYS VAL ASN SER GLU GLN ARG PHE VAL GLU LEU LEU LYS GLU THR ARG THR LYS ALA TYR ALA ALA LEU ALA GLN THR GLY VAL PRO THR GLU GLU ILE LEU ARG ALA CYS GLY VAL
ALA SER SER THR THR GLU THR PRO LEU PHE GLN VAL CYS PHE ASN TYR ARG MET GLY ALA GLY ARG THR ALA ALA LEU GLN GLY VAL GLU MET LYS PHE LEU ASP TYR VAL ASP ALA GLN ASN PRO PHE ASP LEU VAL ALA THR VAL ASP ASP LEU ASP ASP GLY THR ALA MET ILE THR
LEU TYR LEU GLN ASP TYR LEU TYR ASP GLN GLU GLY ALA GLN LEU LEU ALA THR MET TYR ALA ASN VAL LEU GLN VAL LEU ALA GLU ASN PRO GLU ARG LEU VAL GLY SER VAL SER ILE SER ASN ALA THR LEU GLU ASP GLU GLY VAL LYS LEU GLY THR GLY PRO ILE LEU ASP LEU

VAL ALA PRO SER THR PRO THR LEU SER LYS ILE PHE HIS THR TRP VAL ASP LYS ASP PRO HIS ALA LEU ALA VAL LYS ASP THR THR GLY LYS SER LYS THR TYR VAL GLN LEU ALA GLU ARG ALA ASN ALA ILE ALA ALA SER LEU LEU ASN ALA GLY ALA ALA PRO SER ILE PRO ILE

GLY VAL LEU LEU ASP PRO GLY VAL ASP THR ILE ALA THR ILE LEU ALA ILE LEU ARG ILE GLY ALA ALA TYR VAL PRO LEU ASP THR ARG SER SER ASP ALA VAL LEU SER ASP ILE LEU GLN GLU SER GLN PRO GLY ILE VAL ILE HIS HIS SER ALA THR ALA PRO ARG SER GLN ILE

LEU LEU LYS ALA SER ALA LYS THR LYS LEU VAL THR LEU ASN ALA VAL PRO GLN LYS THR ILE ARG LYS ILE GLN ASP VAL SER VAL PRO GLU GLY LEU ALA MET ILE LEU TYR THR SER GLY SER THR GLY SER PRO LYS GLY ILE PRO LEU THR ASN ALA ASN ILE ARG THR PRO ILE

LEU GLY VAL SER GLU ARG VAL PRO LEU GLY ARG GLU VAL VAL LEU GLN GLN SER GLY GLN GLY PHE ASP ALA ALA VAL TYR GLN ILE PHE ILE ALA LEU ALA ASN GLY GLY THR LEU ILE MET VAL ASP ASN ARG ASP PRO ALA LYS VAL ALA ALA LEU MET ALA GLN GLU SER VAL

THR CYS THR THR HIS ILE VAL SER GLU MET GLN ALA LEU LEU LYS TYR GLY TYR ASP GLU LEU ARG ASN CYS SER SER TRP ARG ILE ALA MET VAL ALA GLY GLU ALA PHE THR VAL HIS LEU LEU ASP GLN PHE ARG ALA LEU ASN ARG PRO ASP LEU LYS VAL ILE ASN ALA TYR GLY

PRO THR GLU ALA SER ILE CYS SER SER LEU GLY GLU VAL SER PHE ASN ARG ILE SER SER SER GLU THR SER ILE PRO ILE GLY LYS ALA ILE PRO ASN TYR GLY THR TYR ILE VAL ASP GLN HIS CYS LYS PRO VAL PRO LEU GLY TRP PRO GLY GLU VAL ALA ILE ALA GLY PRO GLY

VAL ALA SER GLY TYR LEU ASN LEU GLY GLU LEU THR GLN ALA LYS PHE ARG SER ALA ALA THR LEU GLY GLU VAL PHE GLY SER ASP CYS LEU TYR LEU THR GLY ASP ARG GLY ARG MET LEU SER ASP GLY SER ILE VAL LEU SER GLY ARG VAL ASP GLY ASP ASP GLN VAL LYS ILE

ARG GLY HIS ARG VAL GLN LEU GLY ASP VAL ALA ARG ALA LEU VAL GLN ALA SER ARG GLY VAL PHE ALA ASP ALA ALA VAL ILE LEU LYS GLY ASP ASP THR SER ASN PRO GLN LEU VAL ALA TYR VAL VAL PHE SER ARG THR SER ASN ILE GLN ASP GLN GLN THR TYR LEU ARG GLN

LEU ASN GLN ASP LEU PRO VAL PRO ALA TYR MET ARG PRO ALA ILE THR ILE PRO LEU ASP THR LEU PRO VAL THR ASP ARG GLY LYS LEU ASP SER LYS LYS LEU ALA SER LEU PRO LEU PRO SER ILE SER VAL ASP TYR GLU GLU ASP GLU GLN LEU THR PRO THR GLU ALA ARG LEU

ARG ASP VAL TRP LYS ASN VAL LEU GLY ASP ILE ALA SER SER ILE PRO ILE ARG ARG SER SER ASP PHE PHE SER VAL GLY GLY ASN SER LEU ILE LEU LEU ALA LEU LYS ALA GLU ILE ALA GLN VAL PHE GLY VAL GLY LEU SER VAL SER GLU LEU PHE GLN ALA SER THR LEU GLU

LEU LEU ALA ALA ARG LEU ASP GLY THR SER LEU LEU ALA GLN ILE ASN TRP GLU GLU GLU THR ALA PRO ASP GLU THR GLN PHE THR LEU PRO PRO PRO ILE ASN GLY ILE ASN GLY HIS GLY SER SER ASN GLY HIS ALA GLN GLY ILE SER VAL LEU LEU THR GLY ALA THR GLY PHE

LEU GLY GLY HIS ILE LEU ARG GLN LEU VAL GLN LEU PRO SER VAL GLU HIS VAL HIS CYS VAL ALA ILE ARG PRO ASN LYS VAL ASP VAL ARG ARG GLN LEU SER VAL GLU SER PRO LYS ILE ILE ARG TYR SER GLY ASP LEU ALA LEU PRO ASN MET GLY MET SER GLU SER GLU PHE

SER ASP LEU PHE LYS SER ILE ASP VAL ILE VAL HIS ASN GLY ALA GLU VAL SER HIS MET LYS ASN TYR ARG SER LEU ARG ALA ALA ASN PHE LEU SER THR VAL GLY LEU ALA ARG ALA ALA VAL SER ARG GLY ILE PRO ILE HIS TYR ILE SER THR GLY GLY VAL ALA ARG LEU SER

VAL ALA ASP GLU GLN PRO GLU ALA SER LEU ALA ALA PHE HIS PRO PRO ILE ASP GLY SER ASP GLY TYR VAL ALA SER LYS TRP ALA SER GLU VAL PHE LEU GLU LYS VAL GLN ARG ARG PHE GLN GLY GLN VAL TRP ILE HIS ARG PRO SER SER ILE THR GLY ASP ASP VAL PRO ASP

ASN ASP ILE ALA HIS SER LEU LEU LYS PHE SER ARG GLU LEU GLY ALA VAL PRO GLU LEU THR GLY SER GLY PHE PHE ASP PHE ILE ASN VAL GLU THR VAL SER ASN ASN ILE ALA ALA SER VAL VAL ARG SER SER GLU LYS SER GLY GLY GLY LEU ILE TYR LEU HIS GLN SER GLY

GLU GLN VAL ILE PRO VAL GLY ASP LEU GLN LYS TYR VAL GLU GLU LEU GLU GLY ARG PRO LEU GLN VAL LEU PRO LEU LYS GLU TRP VAL ASP LEU SER ILE ARG LYS GLY LEU ASP GLU VAL LEU GLY SER TYR MET LEU ALA SER LYS GLY VAL ILE ARG ALA PRO LEU LEU GLN ARG

GLY PRO HIS VAL GLU

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	30549	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.482	Depositor
Minimum map value	-0.265	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.05	Depositor
Map size (Å)	426.24, 426.24, 426.24	wwPDB
Map dimensions	576, 576, 576	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.74, 0.74, 0.74	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	A	0.13	0/18531	0.27	0/25201
1	B	0.13	0/18511	0.26	0/25170
All	All	0.13	0/37042	0.27	0/50371

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	18136	17963	17969	314	0
1	B	18118	17944	17948	344	0
All	All	36254	35907	35917	653	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 9.

The worst 5 of 653 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:1455:CYS:O	1:A:1459:GLY:N	2.05	0.90
1:A:2258:PHE:O	1:A:2298:SER:OG	1.92	0.88

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1421:GLN:OE1	1:A:1447:SER:OG	1.93	0.87
1:B:510:ARG:NH2	1:B:935:PRO:O	2.12	0.83
1:B:512:ALA:O	1:B:516:ASN:ND2	2.12	0.83

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	2362/4007 (59%)	2218 (94%)	144 (6%)	0	100	100
1	B	2355/4007 (59%)	2217 (94%)	138 (6%)	0	100	100
All	All	4717/8014 (59%)	4435 (94%)	282 (6%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1969/3338 (59%)	1953 (99%)	16 (1%)	79	87
1	B	1967/3338 (59%)	1949 (99%)	18 (1%)	75	86
All	All	3936/6676 (59%)	3902 (99%)	34 (1%)	74	86

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1965	ASP
1	B	1980	THR
1	B	2300	ILE
1	A	2113	ILE
1	A	1900	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	394	ASN
1	B	960	ASN
1	B	2312	GLN
1	B	599	GLN
1	B	1238	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no 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.

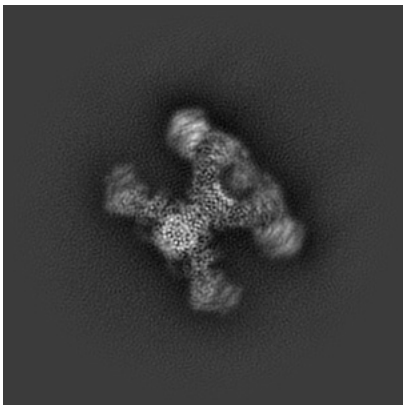
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-66476. These allow visual inspection of the internal detail of the map and identification of artifacts.

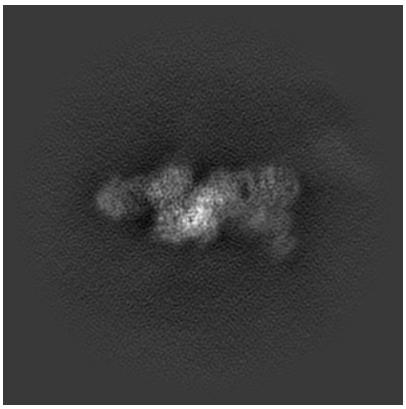
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

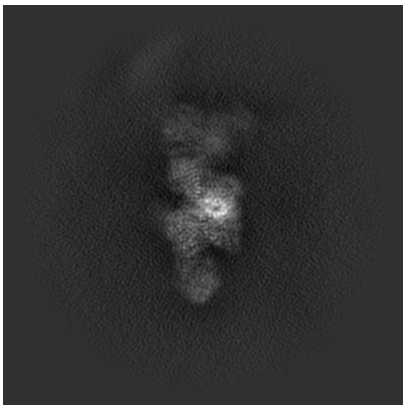
6.1.1 Primary map



X

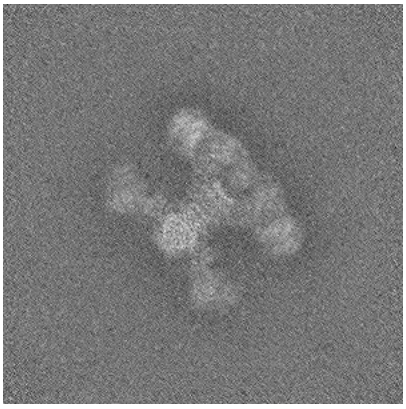


Y

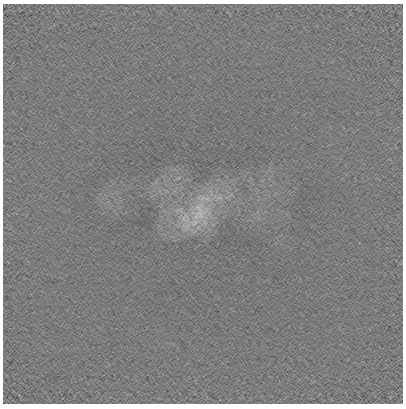


Z

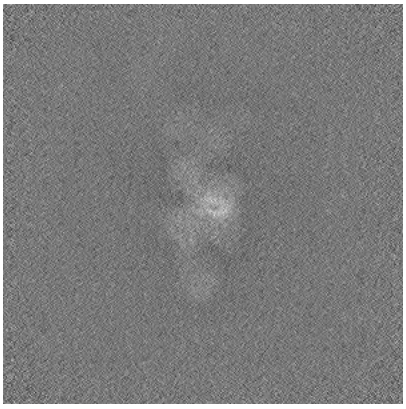
6.1.2 Raw map



X



Y

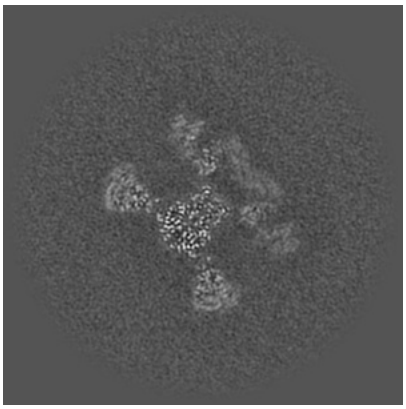


Z

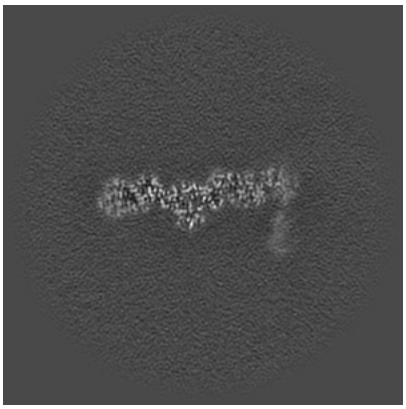
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

6.2.1 Primary map



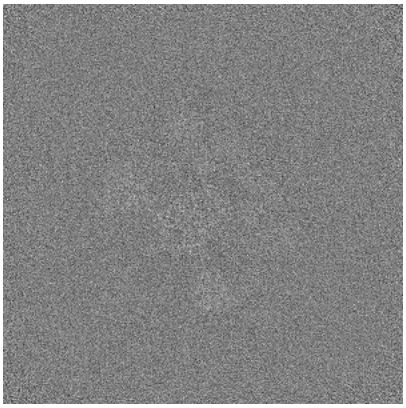
X Index: 288



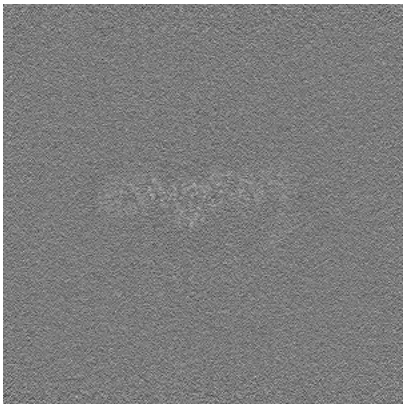
Y Index: 288

Z Index: 288

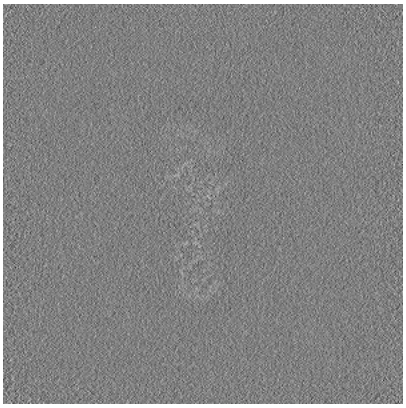
6.2.2 Raw map



X Index: 288



Y Index: 288

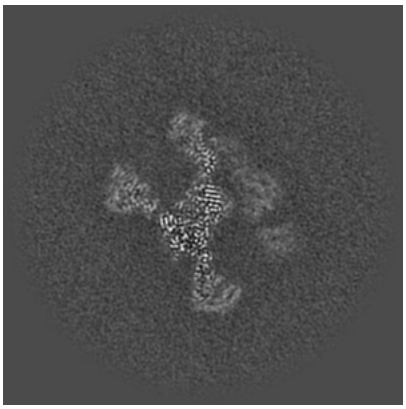


Z Index: 288

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

6.3 Largest variance slices (i)

6.3.1 Primary map

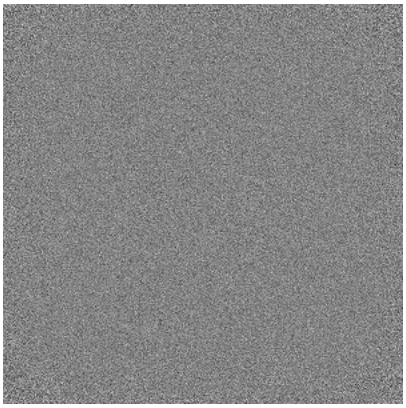


X Index: 294

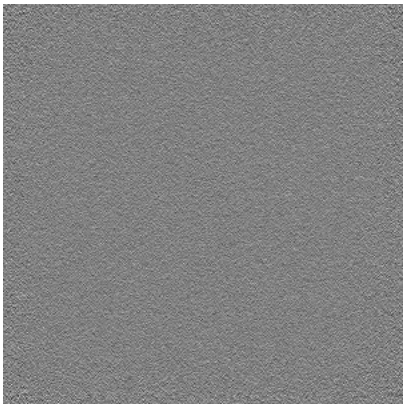
Y Index: 276

Z Index: 284

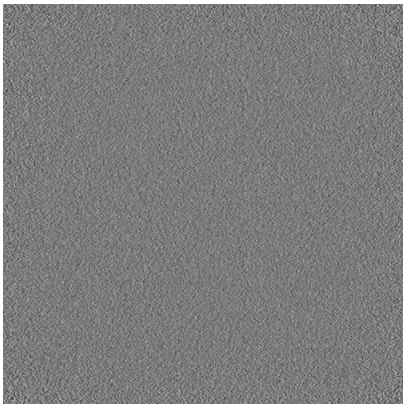
6.3.2 Raw map



X Index: 0



Y Index: 0

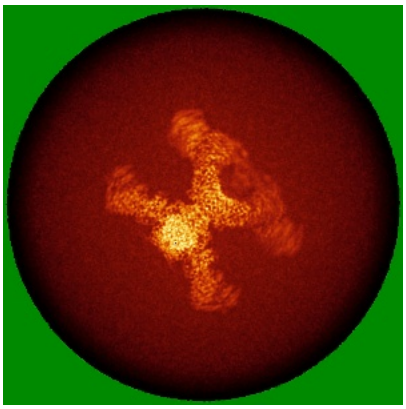


Z Index: 0

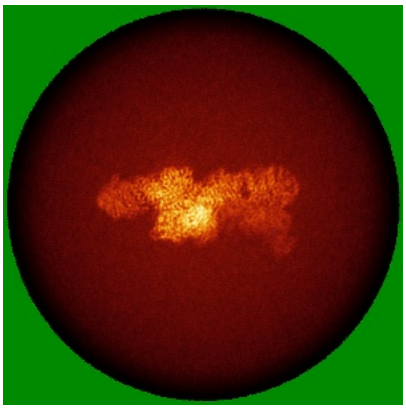
The images above show the largest variance slices of the map in three orthogonal directions.

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

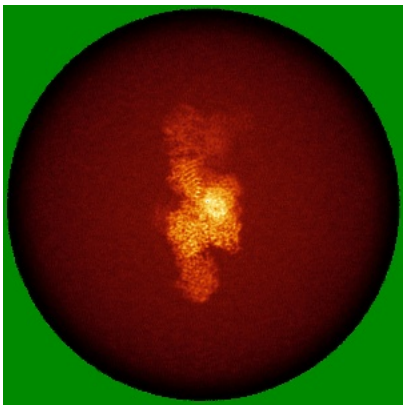
6.4.1 Primary map



X

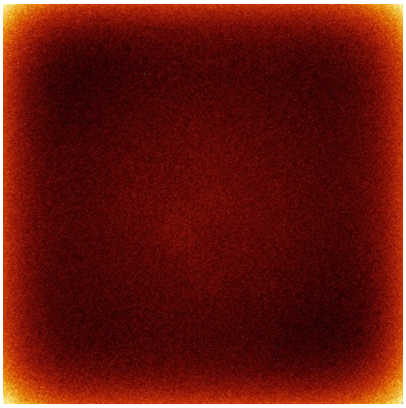


Y

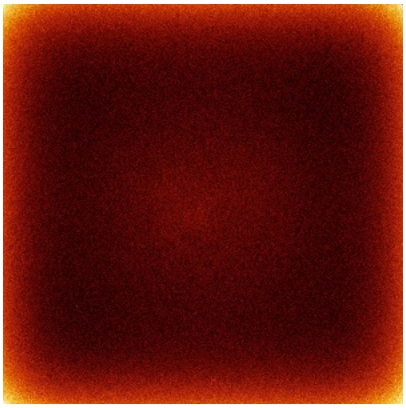


Z

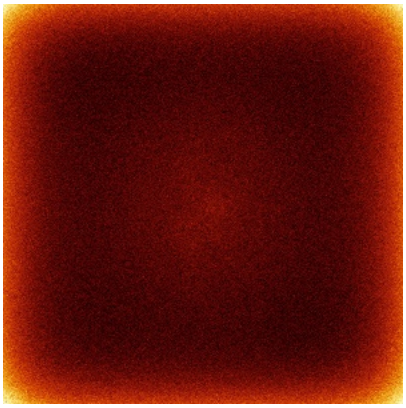
6.4.2 Raw map



X



Y

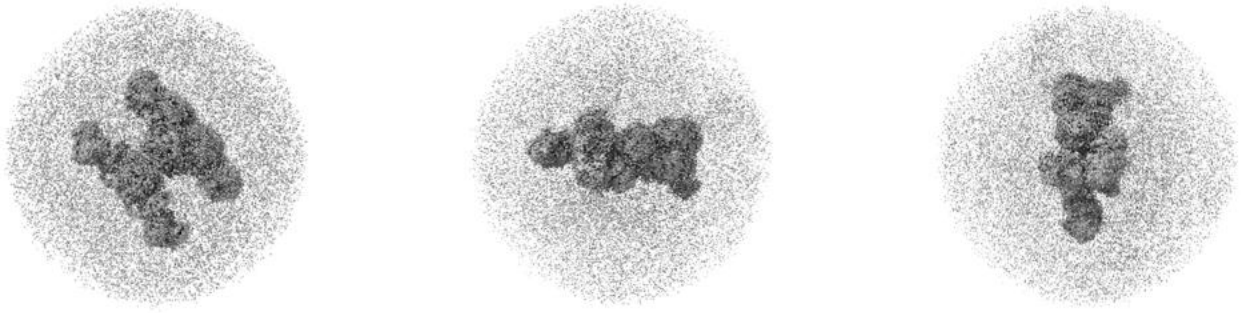


Z

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)

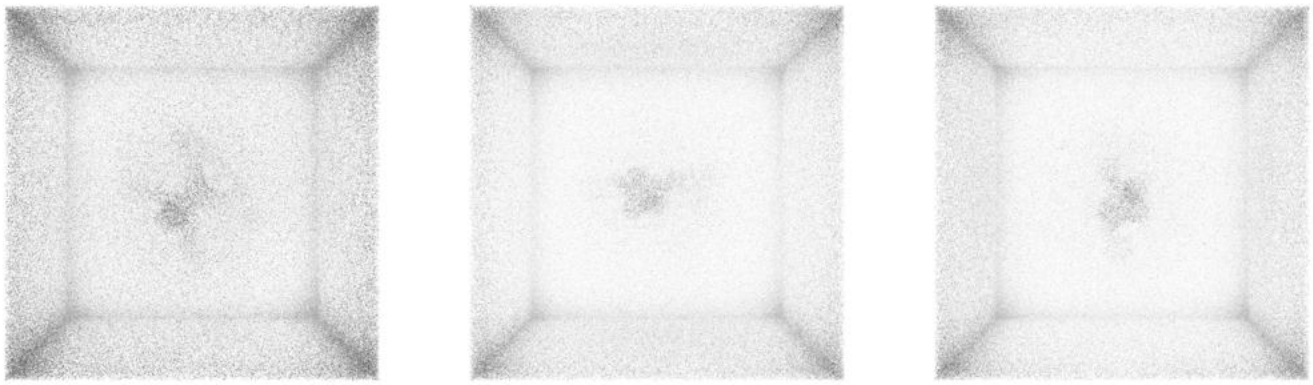
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.05. 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.

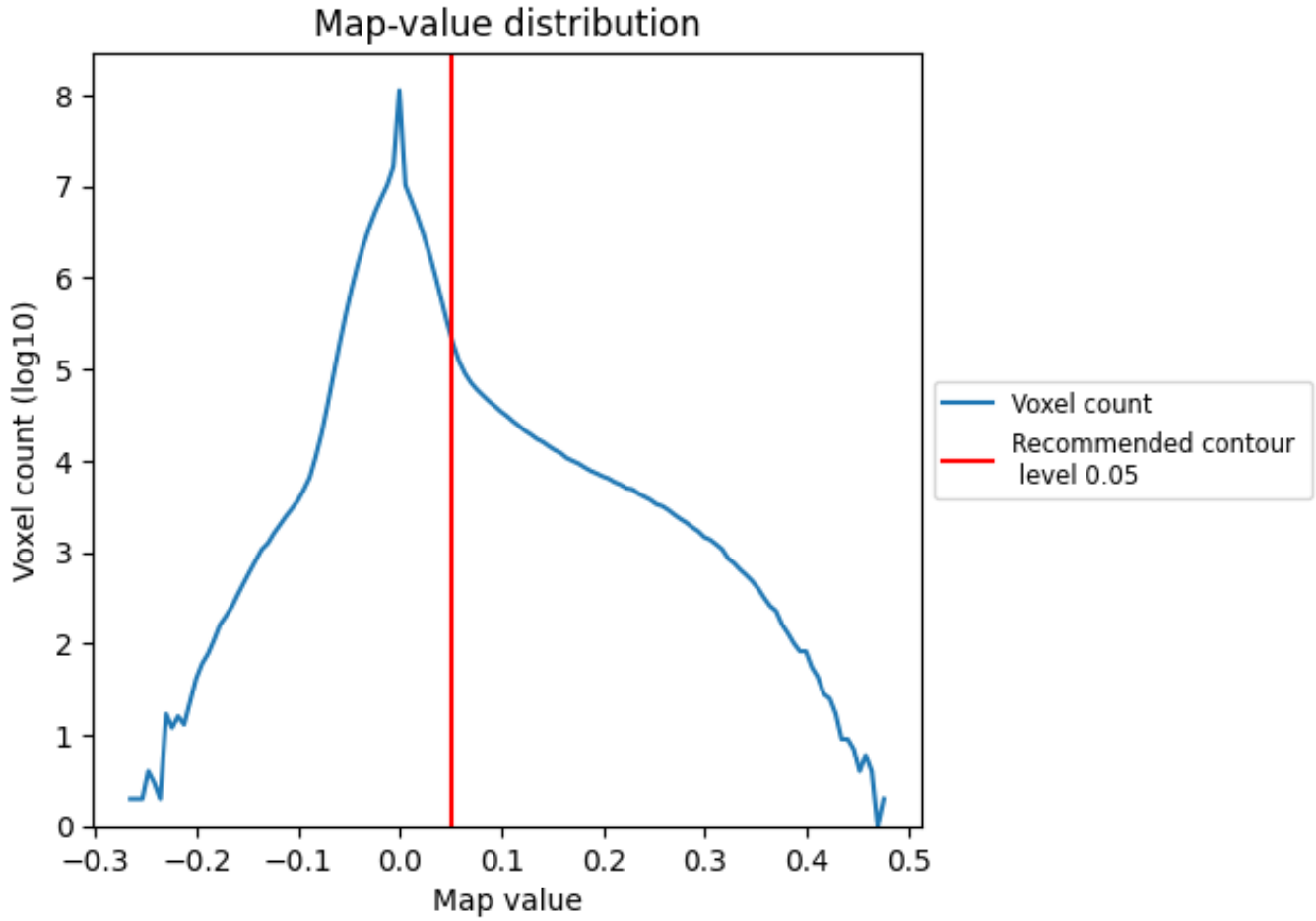
6.6 Mask visualisation (i)

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

7 Map analysis

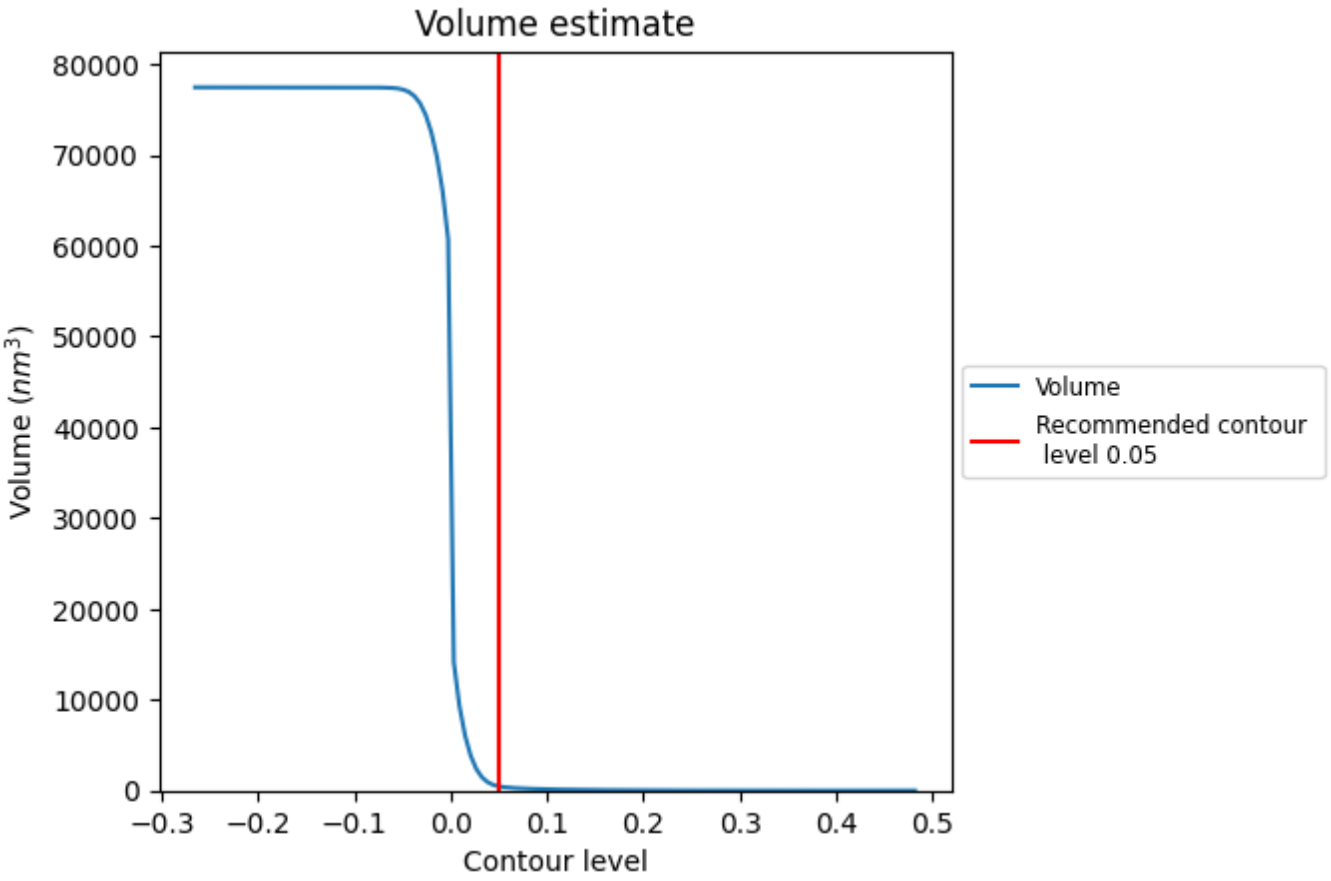
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

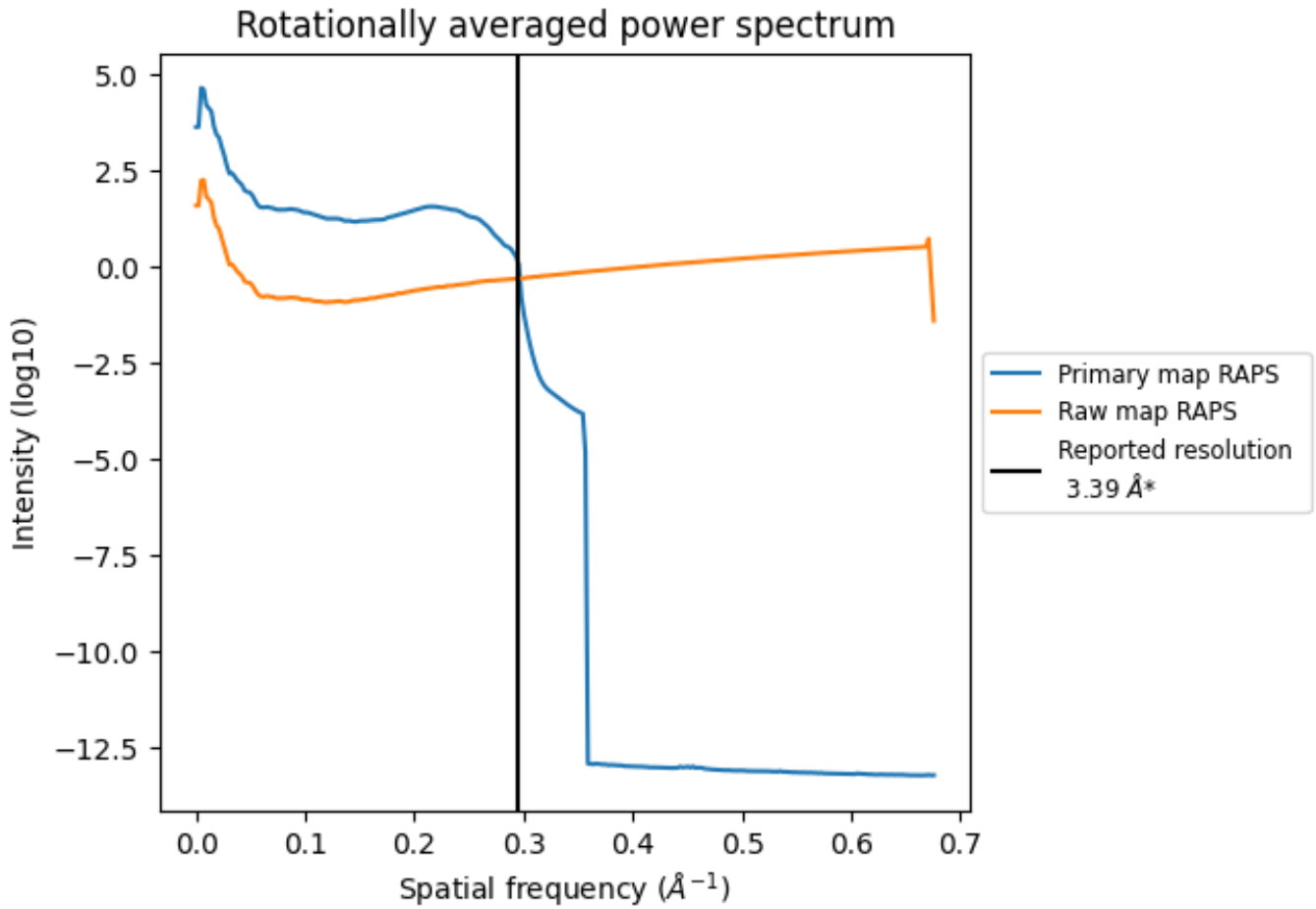
7.2 Volume estimate (i)



The volume at the recommended contour level is 464 nm^3; this corresponds to an approximate mass of 419 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)

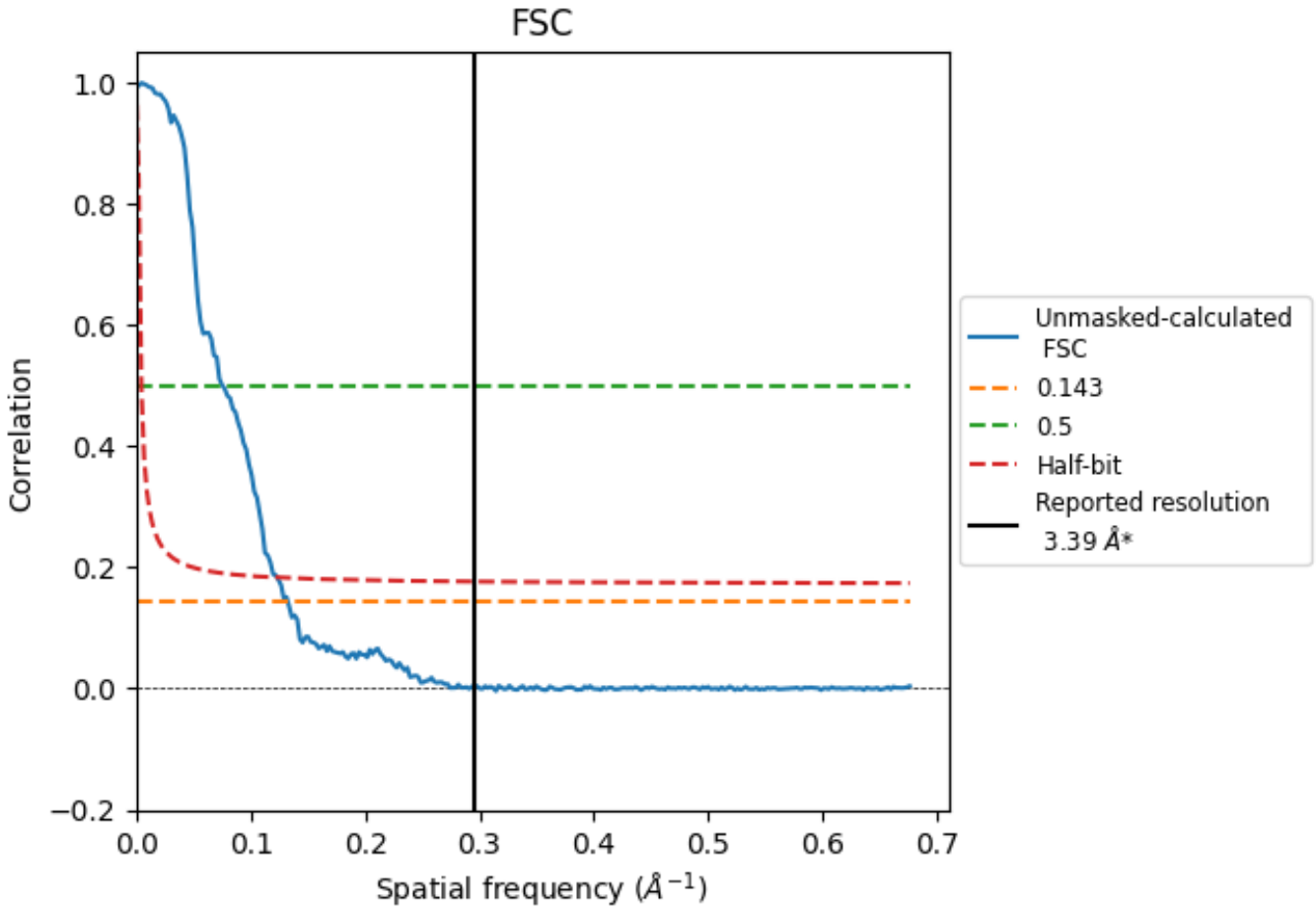


*Reported resolution corresponds to spatial frequency of 0.295 $Å^{-1}$

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.295 Å^{-1}

8.2 Resolution estimates (i)

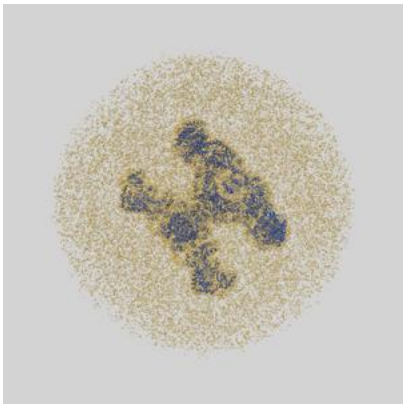
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.39	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.55	13.30	8.11

*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 7.55 differs from the reported value 3.39 by more than 10 %

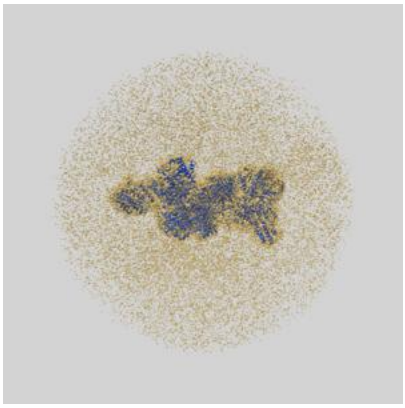
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-66476 and PDB model 9X2B. Per-residue inclusion information can be found in section 3 on page 4.

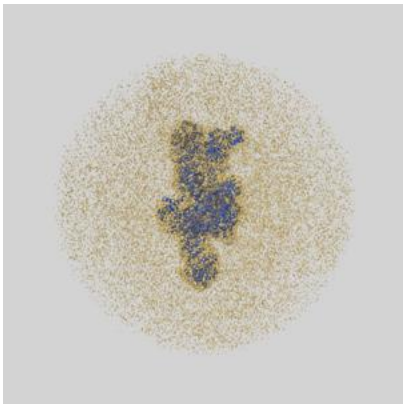
9.1 Map-model overlay



X



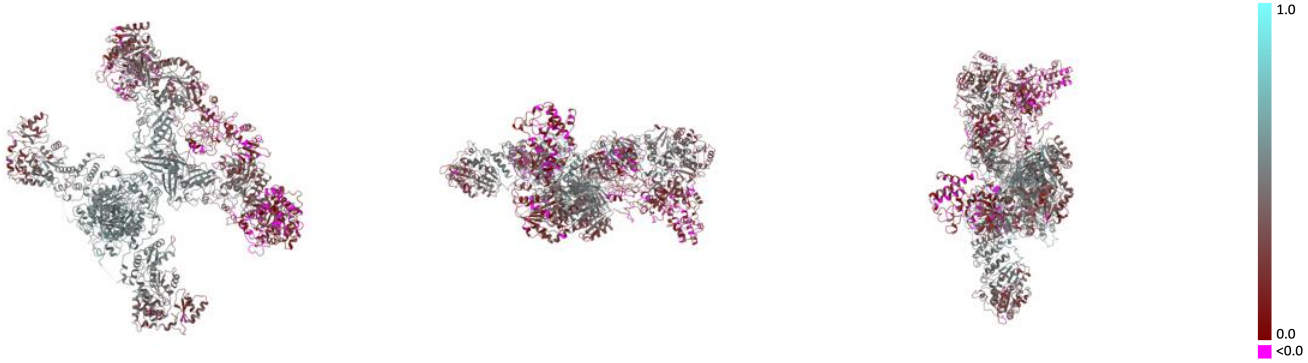
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.05 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

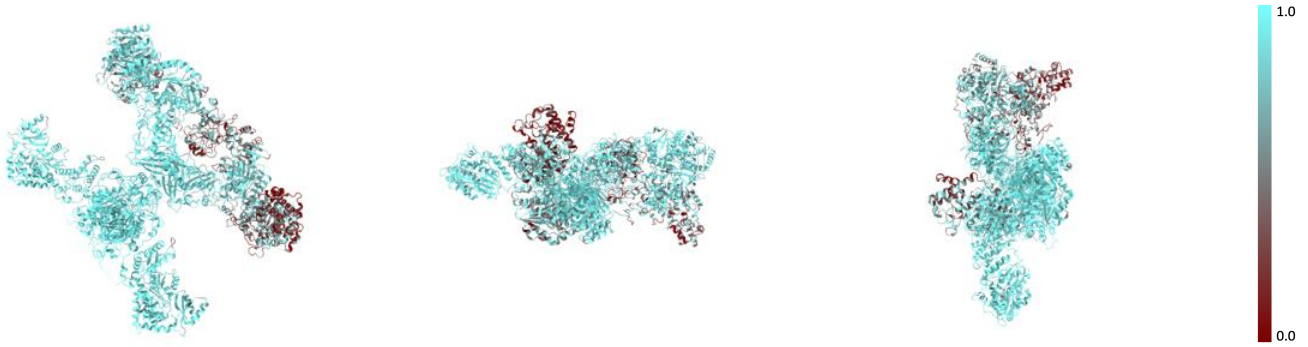
9.2 Q-score mapped to coordinate model (i)



X Y Z

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

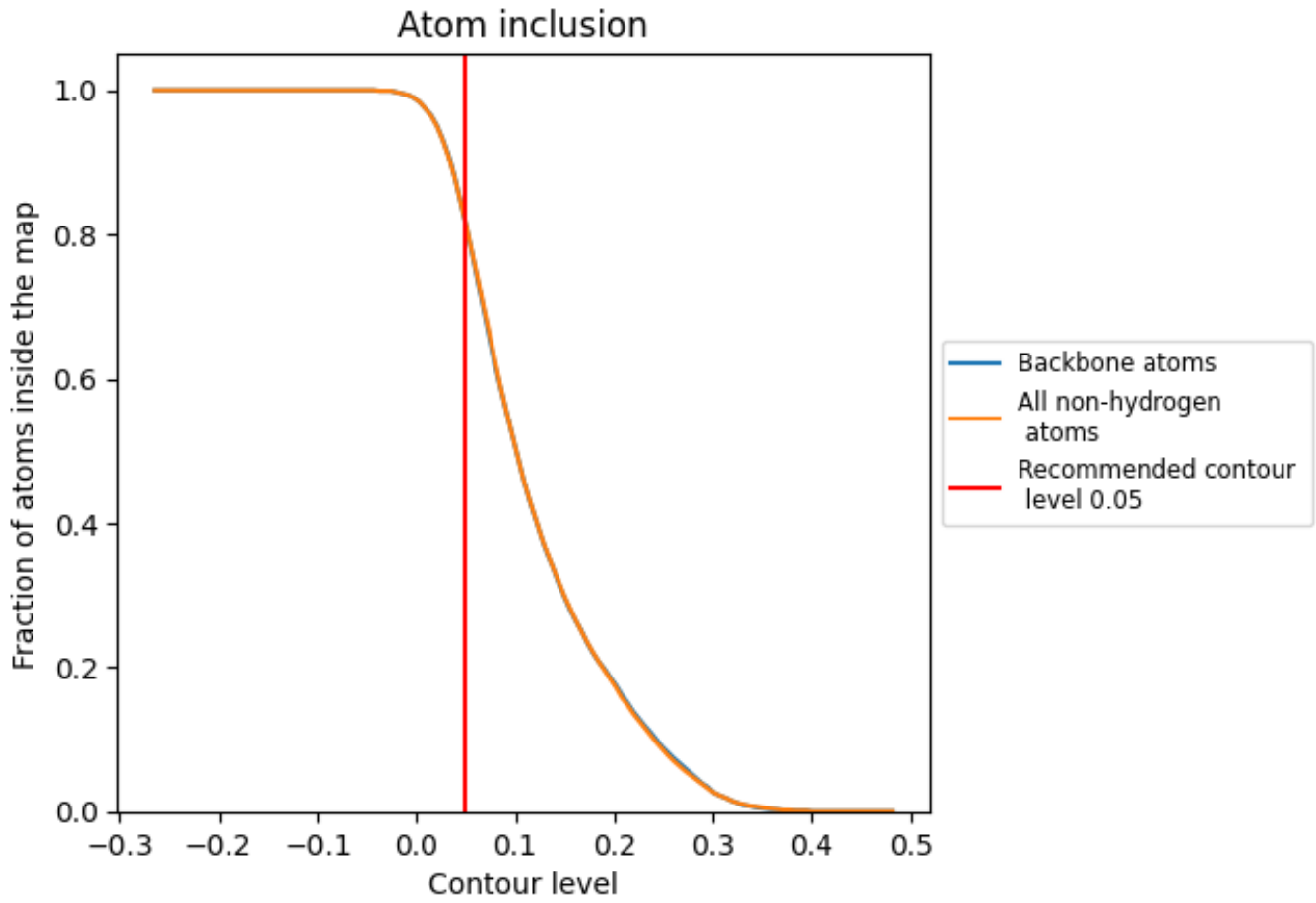
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.05).

9.4 Atom inclusion (i)



At the recommended contour level, 81% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.05) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8150	0.3730
A	0.7690	0.3580
B	0.8600	0.3870