

**Data shown in Figure 4**  
**Annual average  $\delta^{18}\text{O}$  for the 1983 and 2003 Quelccaya cores**

Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$
2002	-16.66		1957	-15.82	-15.92	1912	-17.84	-16.89
2001	-17.04		1956	-17.71	-16.52	1911	-19.69	-18.00
2000	-20.25		1955	-18.44	-18.46	1910	-18.68	-19.56
1999	-17.81		1954	-19.67	-18.38	1909	-19.31	-19.29
1998	-16.57		1953	-18.09	-19.23	1908	-18.63	-19.76
1997	-15.09		1952	-18.69	-17.51	1907	-15.07	-18.32
1996	-15.46		1951	-19.11	-18.42	1906	-14.82	-15.34
1995	-16.03		1950	-18.01	-18.84	1905	-16.61	-14.75
1994	-16.23		1949	-18.28	-18.07	1904	-17.38	-18.37
1993	-16.55		1948	-16.80	-17.89	1903	-18.63	-18.80
1992	-16.75		1947	-18.90	-16.85	1902	-18.45	-17.56
1991	-16.67		1946	-18.70	-18.34	1901	-16.77	-15.39
1990	-16.78		1945	-16.44	-18.32	1900	-16.60	-16.16
1989	-16.45		1944	-17.66	-15.50	1899	-18.43	-18.16
1988	-16.86		1943	-15.93	-17.39	1898	-19.07	-18.47
1987	-17.40		1942	-15.93	-15.57	1897	-17.34	-17.18
1986	-17.01		1941	-13.95	-16.32	1896	-16.64	-16.45
1985	-17.30		1940	-16.32	-14.47	1895	-18.55	-18.77
1984	-19.10		1939	-16.51	-14.86	1894	-20.38	-19.89
1983	-18.01		1938	-15.79	-15.79	1893	-19.43	-20.02
1982	-17.29	-19.22	1937	-15.65	-15.66	1892	-18.34	-18.07
1981	-16.95	-17.44	1936	-17.20	-15.54	1891	-18.25	-18.54
1980	-16.92	-16.01	1935	-18.66	-16.25	1890	-19.09	-18.68
1979	-17.37	-17.38	1934	-19.03	-17.80	1889	-17.21	-18.63
1978	-17.73	-17.27	1933	-19.79	-18.47	1888	-15.97	-16.81
1977	-18.05	-17.94	1932	-20.20	-18.87	1887	-17.65	-17.07
1976	-18.22	-17.87	1931	-17.96	-19.14	1886	-19.31	-18.82
1975	-19.20	-18.75	1930	-17.65	-17.42	1885	-18.42	-18.73
1974	-19.66	-19.75	1929	-17.36	-17.94	1884	-18.64	-18.98
1973	-19.04	-19.63	1928	-17.17	-17.09	1883	-17.59	-17.87
1972	-19.06	-19.01	1927	-16.05	-17.54	1882	-17.85	-18.15
1971	-19.01	-18.82	1926	-16.41	-15.80	1881	-16.76	-16.47
1970	-17.22	-18.97	1925	-16.39	-16.46	1880	-18.19	-17.69
1969	-15.81	-16.32	1924	-17.53	-16.72	1879	-19.14	-18.40
1968	-16.13	-15.39	1923	-18.66	-17.33	1878	-15.78	-15.28
1967	-15.95	-16.07	1922	-19.92	-18.79	1877	-18.75	-18.48
1966	-16.23	-16.11	1921	-19.79	-20.14	1876	-17.95	-18.43
1965	-16.14	-16.29	1920	-18.19	-19.36	1875	-20.52	-20.10
1964	-16.77	-16.55	1919	-19.01	-17.65	1874	-19.84	-20.20
1963	-17.73	-17.01	1918	-18.42	-19.65	1873	-20.53	-19.21
1962	-18.13	-18.06	1917	-18.29	-19.16	1872	-19.53	-19.33
1961	-17.33	-17.96	1916	-17.29	-17.79	1871	-19.11	-19.76
1960	-17.93	-17.62	1915	-15.73	-17.28	1870	-18.96	-19.04
1959	-16.74	-17.79	1914	-17.59	-15.58	1869	-17.98	-18.09
1958	-16.06	-15.91	1913	-16.32	-17.40	1868	-20.30	-19.66

**Data shown in Figure 4**  
**Annual average  $\delta^{18}\text{O}$  for the 1983 and 2003 Quelccaya cores**

Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$
1867	-19.05	-19.23	1822	-18.68	-19.06	1777	-19.72	-19.62
1866	-15.24	-15.47	1821	-17.34	-17.39	1776	-21.36	-20.48
1865	-17.07	-17.40	1820	-24.35	-23.71	1775	-20.09	-18.50
1864	-21.27	-19.86	1819	-20.08	-19.61	1774	-17.37	-17.87
1863	-18.41	-18.08	1818	-20.52	-20.22	1773	-18.11	-18.79
1862	-17.68	-17.28	1817	-21.06	-20.83	1772	-18.05	-17.58
1861	-20.40	-20.33	1816	-20.13	-20.76	1771	-17.49	-17.61
1860	-19.58	-19.03	1815	-19.84	-19.81	1770	-18.53	-18.63
1859	-18.79	-18.66	1814	-18.34	-19.02	1769	-20.35	-19.93
1858	-18.69	-19.15	1813	-19.80	-19.56	1768	-20.78	-19.72
1857	-17.66	-17.76	1812	-17.41	-18.08	1767	-17.10	-16.78
1856	-16.28	-16.59	1811	-20.27	-19.20	1766	-18.74	-18.67
1855	-17.53	-17.61	1810	-19.77	-20.42	1765	-18.33	-19.15
1854	-18.54	-18.20	1809	-19.65	-18.85	1764	-17.91	-18.29
1853	-18.78	-18.32	1808	-18.51	-18.87	1763	-18.17	-17.97
1852	-17.65	-18.04	1807	-20.86	-21.21	1762	-19.90	-19.40
1851	-19.73	-19.44	1806	-18.77	-17.36	1761	-19.49	-18.75
1850	-18.87	-18.53	1805	-14.78	-15.67	1760	-17.57	-18.21
1849	-20.16	-19.21	1804	-17.42	-17.57	1759	-20.14	-19.90
1848	-17.75	-19.02	1803	-19.06	-19.44	1758	-21.63	-22.75
1847	-15.70	-16.29	1802	-20.31	-19.30	1757	-20.89	-20.21
1846	-18.23	-17.99	1801	-18.84	-17.39	1756	-18.10	-18.80
1845	-17.31	-17.36	1800	-16.47	-17.16	1755	-18.93	-18.77
1844	-16.39	-17.11	1799	-19.93	-20.50	1754	-19.74	-19.79
1843	-18.99	-18.19	1798	-19.68	-19.72	1753	-19.82	-18.87
1842	-18.01	-18.82	1797	-21.21	-19.83	1752	-19.58	-18.68
1841	-16.86	-16.37	1796	-16.94	-17.15	1751	-17.58	-17.63
1840	-18.67	-18.12	1795	-17.73	-17.16	1750	-17.96	-18.57
1839	-16.71	-17.15	1794	-16.05	-16.33	1749	-16.11	-17.30
1838	-20.40	-18.90	1793	-15.76	-16.49	1748	-15.12	-14.86
1837	-18.61	-19.03	1792	-16.87	-17.00	1747	-19.81	-19.11
1836	-16.49	-17.70	1791	-18.51	-18.70	1746	-20.62	-20.40
1835	-19.89	-18.98	1790	-19.99	-19.64	1745	-18.17	-18.66
1834	-15.57	-16.60	1789	-19.78	-18.55	1744	-20.93	-20.43
1833	-19.02	-18.18	1788	-17.76	-18.75	1743	-20.65	-20.64
1832	-18.07	-17.93	1787	-19.71	-19.44	1742	-19.26	-19.54
1831	-18.42	-19.07	1786	-19.65	-19.57	1741	-16.94	-16.55
1830	-17.72	-17.60	1785	-19.33	-17.39	1740	-17.69	-17.17
1829	-16.55	-16.06	1784	-14.63	-16.56	1739	-17.40	-17.93
1828	-17.49	-17.42	1783	-19.38	-18.11	1738	-17.03	-16.63
1827	-17.40	-17.31	1782	-19.15	-18.02	1737	-19.08	-18.64
1826	-15.80	-14.47	1781	-17.49	-18.27	1736	-19.27	-19.17
1825	-18.26	-19.08	1780	-20.09	-20.92	1735	-18.16	-18.57
1824	-20.22	-19.50	1779	-21.26	-20.24	1734	-20.80	-21.16
1823	-18.46	-18.24	1778	-18.03	-18.40	1733	-19.56	-19.43

**Data shown in Figure 4**  
**Annual average  $\delta^{18}\text{O}$  for the 1983 and 2003 Quelccaya cores**

Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$
1732	-22.02	-22.90	1687	-17.31	-16.51	1642	-18.41	-22.40
1731	-19.86	-19.94	1686	-20.89	-19.75	1641	-21.29	-19.15
1730	-19.43	-19.52	1685	-19.06	-19.48	1640	-19.64	-17.29
1729	-16.03	-16.32	1684	-18.41	-18.31	1639	-17.65	-19.78
1728	-17.65	-17.35	1683	-16.65	-19.03	1638	-20.88	-19.59
1727	-19.30	-19.15	1682	-19.97	-17.01	1637	-18.59	-17.66
1726	-20.97	-20.07	1681	-17.51	-18.79	1636	-17.97	-13.41
1725	-23.02	-21.57	1680	-17.99	-20.37	1635	-13.57	-15.93
1724	-14.53	-14.96	1679	-21.03	-20.20	1634	-15.56	-18.03
1723	-15.70	-15.36	1678	-20.32	-19.84	1633	-17.62	-17.65
1722	-16.13	-16.09	1677	-19.36	-17.72	1632	-17.21	-19.09
1721	-18.19	-18.87	1676	-18.26	-19.85	1631	-19.09	-20.31
1720	-17.14	-17.32	1675	-20.38	-18.55	1630	-20.42	-18.89
1719	-17.90	-18.28	1674	-19.19	-19.47	1629	-19.06	-21.34
1718	-20.48	-19.38	1673	-18.83	-20.29	1628	-20.12	-19.47
1717	-20.12	-19.94	1672	-19.96	-19.24	1627	-19.84	-19.95
1716	-20.09	-20.62	1671	-19.16	-17.20	1626	-19.08	-19.62
1715	-18.56	-19.87	1670	-17.50	-19.14	1625	-19.86	-17.53
1714	-18.19	-18.76	1669	-19.28	-18.88	1624	-17.26	-17.35
1713	-14.76	-16.20	1668	-17.66	-18.68	1623	-17.07	-19.85
1712	-18.84	-17.21	1667	-20.71	-19.48	1622	-20.04	-18.79
1711	-17.18	-17.04	1666	-18.97	-18.36	1621	-18.39	-17.25
1710	-18.86	-17.21	1665	-18.57	-22.48	1620	-17.41	-17.34
1709	-15.81	-16.00	1664	-21.91	-20.09	1619	-17.35	-16.91
1708	-20.83	-20.64	1663	-19.99	-20.56	1618	-16.98	-18.32
1707	-18.36	-18.11	1662	-20.38	-15.81	1617	-18.03	-18.70
1706	-21.20	-19.82	1661	-14.34	-18.58	1616	-18.09	-18.71
1705	-19.95	-19.58	1660	-20.23	-20.28	1615	-18.79	-18.37
1704	-19.97	-19.67	1659	-19.41	-17.55	1614	-18.31	-18.87
1703	-18.76	-19.82	1658	-17.87	-17.12	1613	-19.92	-18.29
1702	-18.83	-18.90	1657	-17.25	-14.48	1612	-18.06	-18.73
1701	-20.98	-19.75	1656	-15.58	-17.37	1611	-19.58	-19.79
1700	-18.63	-18.49	1655	-17.12	-18.35	1610	-16.57	-17.88
1699	-19.76	-19.49	1654	-19.55	-19.68	1609	-16.67	-17.16
1698	-20.01	-21.77	1653	-18.65	-18.13	1608	-17.21	-16.83
1697	-19.97	-19.28	1652	-18.32	-16.71	1607	-17.48	-16.94
1696	-18.21	-18.60	1651	-17.25	-19.84	1606	-16.94	-18.27
1695	-18.02	-18.10	1650	-19.93	-17.99	1605	-18.89	-18.84
1694	-16.19	-16.39	1649	-18.03	-18.33	1604	-19.72	-19.02
1693	-18.10	-17.98	1648	-18.88	-16.00	1603	-18.68	-20.13
1692	-19.79	-19.73	1647	-16.58	-16.86	1602	-19.72	-20.68
1691	-16.34	-16.52	1646	-17.31	-18.23	1601	-20.86	-20.87
1690	-21.67	-20.76	1645	-18.69	-17.15	1600	-20.69	-18.78
1689	-19.83	-20.83	1644	-17.59	-20.59	1599	-18.17	-18.67
1688	-17.15	-17.44	1643	-21.67	-18.71	1598	-18.25	-17.92

**Data shown in Figure 4**  
**Annual average  $\delta^{18}\text{O}$  for the 1983 and 2003 Quelccaya cores**

Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$	Year	2003 core $\delta^{18}\text{O}$	1983 core $\delta^{18}\text{O}$
1597	-17.33	-17.69	1553	-20.81	-20.40
1596	-17.71	-16.81	1552	-18.26	-18.50
1595	-16.31	-16.53	1551	-16.38	-17.03
1594	-16.22	-16.94	1550	-18.30	-17.94
1593	-17.38	-17.34	1549	-20.05	-18.77
1592	-17.00	-17.66	1548	-20.80	-19.90
1591	-17.88	-18.16	1547	-18.38	-18.73
1590	-18.28	-18.36	1546	-16.77	-17.50
1589	-18.25	-18.69	1545	-20.30	-18.57
1588	-18.89	-19.74	1544	-17.97	-19.09
1587	-19.75	-18.87	1543	-18.75	-18.28
1586	-18.14	-19.78	1542	-17.69	-18.60
1585	-19.80	-16.87	1541	-19.97	-19.19
1584	-15.87	-15.75	1540	-16.82	-18.28
1583	-16.03	-17.69			
1582	-17.69	-18.03			
1581	-18.06	-18.90			
1580	-19.03	-18.03			
1579	-18.14	-19.49			
1578	-19.86	-21.08			
1577	-21.50	-19.13			
1576	-19.45	-19.36			
1575	-19.66	-18.72			
1574	-18.94	-17.17			
1573	-17.55	-20.10			
1572	-19.68	-21.29			
1571	-20.87	-16.00			
1570	-16.64	-19.27			
1569	-19.19	-20.43			
1568	-20.49	-19.34			
1567	-19.20	-19.07			
1566	-14.22	-13.04			
1565	-17.47	-17.57			
1564	-17.06	-17.01			
1563	-18.31	-18.09			
1562	-20.10	-19.89			
1561	-18.13	-18.29			
1560	-19.78	-20.11			
1559	-18.52	-17.93			
1558	-18.88	-19.48			
1557	-17.11	-17.52			
1556	-18.43	-18.38			
1555	-17.72	-17.70			
1554	-18.45	-17.85			

**Notes:**  
 Quelccaya 1983 core data  
 average of annual data from Summit core and Core 1  
 Quelccaya 2003 core data  
 annual data from Summit Dome core