

The Globally Warm Scarf

Scarf stripe pattern by Joan Sheldon, based on global temperature data (see references), for use in knitting, crochet, Tunisian crochet, or other crafts.

Tunisian crochet stitch pattern “Standing Waves” by Joan Sheldon, 2015.

Original scarf by Joan Sheldon, 2015.

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The stripe pattern in this scarf is a representation of the average surface temperature of Earth for each year from 1600 to present. I chose a generally recognizable cold-hot color scheme: blue for cooler, red for warmer, and purple for the pre-industrial average temperature. Each color represents a 0.2 degree C (about 0.4 degree F) range of temperature. A neutral or mid-range color (purple) represents 0.1 degrees C below to 0.1 degrees C above the long-term “normal” temperature from 1600-1900. One “cool” color (blue) indicates years cooler than normal by 0.1-0.3 degrees C. Increasingly dark shades of a “warm” color (red) represent warmer years, starting with 0.1-0.3 degrees above normal for the lightest red and proceeding to darker red for each 0.2 degrees C increase in temperature.

These may seem like small temperature changes compared to the normal daily and seasonal temperature swings that we experience, but making the whole seasonal cycle just 1-2 degrees warmer overall across the globe represents a tremendous amount of extra heat that can melt polar ice, feed energy to hurricanes, and shift agricultural zones.



My original scarf: the purple end of this scarf starts at year 1600 and the red ends at 2014.

The stripe pattern shows several important aspects of the temperature record:

There are more warm colors than cool colors: the higher-than-normal temperatures vary over a broader range than the lower-than-normal temperatures.

For over 300 years (1600-1900, and even earlier than that), the variation in annual average temperature was slight, represented by the single blue and the first red color appearing only occasionally in otherwise long stretches of purple.

There was an unusually long cool period from about 1885-1917.

There has been rapid and unusual warming since the mid-20th century, which is not evident at any other time in the historical record.

My original scarf was constructed using Tunisian crochet, but the stripe pattern can be adapted to many crafts including knitting and conventional crochet. The main concern with choosing yarn, construction technique, and stitch pattern is to achieve a fine gauge so that data from 400+ years can be represented in a length that is a wearable scarf. 26 or 27 data years per 4 inches in length is a good target gauge. Below I point out some ways to achieve that depending on your chosen craft.

The pattern calls for frequent color changes especially after the late 1880s. These are easier to implement if unused colors can be carried along the same edge of the work. This is easily accomplished with Tunisian crochet because each row is worked in a forward pass and a return pass, so color changes will always occur on the same edge (right for a right-handed crocheter). For conventional crochet or knitting, you have two options: 1) If you work 1 row per data year you will find that sometimes yarn will be dropped on one edge and needed again on the other edge, so you will have to break and rejoin yarn more often and you will have more tails to weave in at the end of the project, or 2) If you work 2 rows per data year in a short stitch, your carried yarn will always be on the same edge ready for pickup but you will be working a very large number of rows. I give complete directions for the Tunisian crochet version below because it's the technique I used, and it's less well known than other yarn crafts. I give some guidelines for conventional crochet and knitted versions but you should swatch to work out a stitch pattern and hook or needle size that gives you the recommended gauge.

You could start at the most recent year and work backwards through the years until you get a scarf length that you like; however, starting at the beginning and working the timeline forward gives you a chance to reflect on the temperatures as they have changed through time, and I highly recommend that you experience the data in this way. Connecting historical events and your own lifetime to the timeline of temperature changes as you work can add a surprisingly emotional dimension to the construction process of your crafted piece.

Yarn recommendations: Consult the stripe pattern page for the number of colors needed. You may, of course, choose a color scheme other than blue/purple/red. Yarn amounts will depend on your technique and gauge, but my original scarf used 470 yards of neutral and 15-62 yards of each of the other colors. A fine yarn is required to achieve the recommended gauge: how fine depends on whether you plan to work 1 or 2 rows for each data year, as discussed above. For Tunisian crochet (1 row per data year) or knitting (2 rows per data year), the recommended gauge can be achieved with fingering weight yarn. For conventional crochet (2 rows per data year), you may need to use a laceweight yarn and small hooks if you want to work all the data years. (I have not worked out gauges for laceweight yarn.) You could start the scarf at the year 1700 if it better suits your yarn and gauge.

Optional marking at regular intervals: Every 50 data rows, I carried a thin silver thread along with the working yarn for one row (corresponding to years 1650, 1700, 1750, etc.).

Tunisian Crochet

This technique is ideal for a project of this type because you can work 1 row per data year and always carry unused yarn for color changes along the same edge. If you are not familiar with Tunisian crochet (which, I know, is poorly named, but it seems to be the name we have for it at present), there are several pictorial guides on the internet that will help you get started and visualize where to insert your hook for each stitch type. Fingering weight yarn and a 4 mm hook were used for my original scarf. To combat the tendency of Tunisian crochet to curl, I suggest using my stitch pattern Standing Waves, which alternates stitches that tend to curl in opposite directions.

Globally Warm Scarf: Standing Waves Tunisian Crochet Stitch Pattern

This pattern alternates groups of Tunisian Simple Stitches and Tunisian Reverse Stitches. For simple stitch, on forward pass insert hook under front vertical strand of stitch below, yo and pull up a loop. For reverse stitch, on forward pass insert hook behind work and under back vertical strand of stitch below, yo and pull up a loop.



Standing Waves Tunisian crochet stitch pattern

Foundation Row 1: Using the color for the first year that you plan to work, ch 38. Either chain somewhat loosely or use a hook 1 size larger to make the chain, then switch to the hook to be used for the rest of the project. Forward pass: working into the back ridge loops of the chain, insert hook into the first* ch from the hook, yo, pull up a loop. Repeat [insert hook into next ch, yo, pull up a loop] across, keeping all loops on the hook (39 loops). Return pass: yo and pull through one loop on the hook, repeat [yo and pull through 2 loops] until 1 loop remains on the hook. This foundation row represents the first data year.

*Many instructions elsewhere for the Tunisian crochet foundation row incorporate 1 more chain than is really needed and then start with the 2nd ch from the hook, but this can leave you with a bumpy right corner. Starting in the 1st ch gives a neater corner.

Row 2: Forward pass: pick up loops as follows: sk the first vertical bar (edge), then 5 reverse st, repeat [3 simple st, 5 reverse st] 4 times, then for last (selvedge) st insert hook under both last front vertical and last back vertical strands in row, yo and pull up a loop (39 loops). Return pass: yo and pull through one loop on the hook, repeat [yo and pull through 2 loops] until 1 loop remains on the hook.

Row 3: Forward pass: pick up loops as follows: sk the first vertical bar (edge), then 1 reverse st, 3 simple st, repeat [5 reverse st, 3 simple st] 4 times, 1 reverse st, then for last (selvedge) st insert hook under both last front vertical and last back vertical strands in

row, yo and pull up a loop (39 loops). Return pass: yo and pull through one loop on the hook, repeat [yo and pull through 2 loops] until 1 loop remains on the hook.

Repeat rows 2 and 3 for pattern, changing colors according to the chart on attached pages. When changing colors, drop old color and pick up new color before the last yo on return pass of the previous row, as the last loop on the hook becomes the edge of the next row.

Carrying unused strands: I carried yarn only if it would be used again within a few rows, and broke off at the color changes otherwise. To carry yarn along the edge neatly in Tunisian crochet, flip carried strands across the work (front-to-back or back-to-front) in the space between the first loop of the new row (on the hook) and the first st. If carrying for more than one row, flip again at the start of the next row. This essentially weaves the carried strand into the edge of the work as you go, until you need it again.

Last Row: In order to give the last row a finished look similar to the first row, complete the last data row in pattern (as Row 2 or Row 3), then with same color, pick up loops as for alternate pattern (Row 3 or Row 2) but complete each st individually as a sl st: insert hook (front vertical for simple, back vertical for reverse), yo, pull through both loops on hook. At end of row, finish off.

Weave in all loose ends in a same-color row to hide them.

Conventional Crochet

Based on some swatching I did, I think the best way to accomplish this scarf using conventional crochet is to use the shortest stitch you can (some variant of sl st) and work 2 rows per data year, which will return carried yarn to the same side each time. Slip stitching in only the front loops of the row below (st st flo) produces a pretty fabric that is dense (short rows) but not too thick. It does stretch vertically (and get skinnier). My swatch with fingering weight sock yarn and a 4 mm hook measures 30 st and 44 rows in 4" (a little larger than recommended gauge). At "rest" a scarf using this weight yarn for 416 data years, with 832 rows, might be 75" before stretching, so you might want to start in the year 1700 (316 years, 632 rows, 58") unless you like a really long scarf. Or try laceweight yarn.

Globally Warm Scarf: Crochet Slip Stitch, Front Loops Only

Using the color for the first year that you plan to work, make a foundation chain. Ch 45 using fingering weight yarn would be about 6", but width is up to you.

Row 1: starting in 1st ch from hook, sl st in back ridge loops of the chain going across. Turn. (There is no turning ch for sl st rows.)

Row 2: sl st in flo of each st. Turn. These 2 rows represent the first data year and should be done in the same color.

Continue as for Row 2, working 2 rows per data year and changing colors according to the chart on attached pages. When changing colors, drop old color and pick up new color before the last sl st of the previous row, as the last loop on the hook becomes part of the next row.

After last row, finish off and weave in all loose ends in a same-color row to hide them.

I would be happy to update with more explicit recommendations on sizes based on feedback if you let me know how yours turns out.



Crochet slip stitch, front loops only

Knitting

Using garter stitch will control curl, and working 2 rows per data year will keep carried yarns on the same side. Based on a swatch I made, for fingering weight sock yarn I would suggest using US size 4 (3.5 mm) needles: I got my recommended gauge of 52 rows (26 data years) per 4 inches and the fabric drape is similar to my original Tunisian crochet scarf. Please swatch before committing to a project. If you would prefer a looser gauge, start at year 1650 or 1700 OR start at the last year and work backwards until you get a scarf length that you like.

Globally Warm Scarf: Knitted Garter Stitch

Using the color for the first year that you plan to work, cast on using a long tail cast on. CO 32 st using fingering weight yarn and 3.5 mm needles would be about 6", but width is up to you.

Row 1: Knit all st in same color as CO. The CO and Row 1 represent the first data year.

For each subsequent data year, knit 2 rows, changing colors according to the chart on the attached pages.

Last Data Year: In order to give the last pair of rows a finished look similar to the cast on, knit 1 row and then bind off in the same color using Elizabeth Zimmermann's sewn bind off or another stretchy bind off method of your choice.

Weave in all loose ends in a same-color row to hide them.



Knitted garter stitch, fingering weight yarn on 3.5 mm needles

Thanks to Lea Redmond and her Sky Scarf project for inspiration, and to Dr. Michael Mann and the NASA GISS lab for providing the data.

References:

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Mann, M.E. and P.D. Jones. 2003. Global surface temperatures over the past two millennia. *Geophysical Research Letters* 30(15): 1820.

Redmond, L. 2011. Sky Scarf. <http://www.leafcutterdesigns.com>.

I designed this data visualization in 2015 and presented it at the [2015 conference of the Coastal & Estuarine Research Federation](#). The pattern was first released February 7, 2017, and this updated version was released January 17, 2024. I release annual updates as new data become available.

Please encourage others to visit my website www.sheldonfiberdesigns.net to download their own copy of the latest version so that I can gauge interest in the pattern.

This pattern is offered free of charge, in hopes that it fosters greater understanding of recent temperature trends and historical context. If you are so inspired, please “pay it forward” by making a donation to an environmental charity of your choice.

**Globally Warm Scarf:
Temperature Categories
and Stripe Pattern**

Color #	Category	Suggested Color
1	Cool1	Blue (light)
2	Normal	Purple or a Neutral
3	Warm1	Red1 (lightest)
4	Warm2	Red2
5	Warm3	Red3
6	Warm4	Red4
7	Warm5	Red5
8	Warm6	Red6
9	Warm7	Red7 (darkest)

Year	Category
1600	Normal
1601	Normal
1602	Normal
1603	Normal
1604	Normal
1605	Cool1
1606	Cool1
1607	Cool1
1608	Cool1
1609	Normal
1610	Normal
1611	Normal
1612	Normal
1613	Normal
1614	Normal
1615	Normal
1616	Normal
1617	Normal
1618	Normal
1619	Normal
1620	Normal
1621	Normal
1622	Normal
1623	Normal
1624	Normal
1625	Normal
1626	Normal
1627	Normal

Year	Category
1628	Normal
1629	Normal
1630	Normal
1631	Normal
1632	Normal
1633	Normal
1634	Normal
1635	Normal
1636	Normal
1637	Normal
1638	Normal
1639	Normal
1640	Normal
1641	Normal
1642	Normal
1643	Normal
1644	Normal
1645	Normal
1646	Normal
1647	Cool1
1648	Cool1
1649	Cool1
1650	Normal
1651	Normal
1652	Normal
1653	Normal
1654	Normal
1655	Warm1

Year	Category
1656	Warm1
1657	Warm1
1658	Normal
1659	Normal
1660	Normal
1661	Normal
1662	Normal
1663	Normal
1664	Normal
1665	Normal
1666	Normal
1667	Normal
1668	Normal
1669	Normal
1670	Normal
1671	Normal
1672	Normal
1673	Normal
1674	Normal
1675	Normal
1676	Normal
1677	Normal
1678	Normal
1679	Normal
1680	Normal
1681	Normal
1682	Normal
1683	Normal

Year	Category
1684	Normal
1685	Normal
1686	Normal
1687	Normal
1688	Normal
1689	Normal
1690	Normal
1691	Normal
1692	Normal
1693	Normal
1694	Normal
1695	Normal
1696	Normal
1697	Cool1
1698	Cool1
1699	Cool1
1700	Cool1
1701	Normal
1702	Normal
1703	Normal
1704	Normal
1705	Normal
1706	Normal
1707	Normal
1708	Normal
1709	Normal
1710	Normal
1711	Normal
1712	Normal
1713	Normal
1714	Normal
1715	Normal
1716	Normal
1717	Normal
1718	Normal
1719	Normal
1720	Normal
1721	Normal
1722	Normal
1723	Normal

Year	Category
1724	Normal
1725	Normal
1726	Normal
1727	Normal
1728	Normal
1729	Normal
1730	Normal
1731	Normal
1732	Normal
1733	Normal
1734	Normal
1735	Normal
1736	Normal
1737	Normal
1738	Normal
1739	Normal
1740	Warm1
1741	Warm1
1742	Warm1
1743	Warm1
1744	Warm1
1745	Normal
1746	Normal
1747	Normal
1748	Normal
1749	Normal
1750	Normal
1751	Normal
1752	Normal
1753	Normal
1754	Normal
1755	Normal
1756	Normal
1757	Normal
1758	Normal
1759	Normal
1760	Normal
1761	Normal
1762	Normal
1763	Normal

Year	Category
1764	Normal
1765	Normal
1766	Normal
1767	Normal
1768	Warm1
1769	Warm1
1770	Warm1
1771	Warm1
1772	Normal
1773	Normal
1774	Normal
1775	Normal
1776	Normal
1777	Normal
1778	Normal
1779	Normal
1780	Normal
1781	Normal
1782	Normal
1783	Normal
1784	Normal
1785	Normal
1786	Normal
1787	Normal
1788	Normal
1789	Normal
1790	Normal
1791	Normal
1792	Normal
1793	Normal
1794	Normal
1795	Normal
1796	Normal
1797	Normal
1798	Normal
1799	Normal
1800	Normal
1801	Normal
1802	Normal
1803	Normal

Year	Category
1804	Normal
1805	Normal
1806	Normal
1807	Normal
1808	Normal
1809	Normal
1810	Normal
1811	Normal
1812	Normal
1813	Normal
1814	Normal
1815	Normal
1816	Normal
1817	Normal
1818	Normal
1819	Normal
1820	Normal
1821	Normal
1822	Normal
1823	Normal
1824	Normal
1825	Normal
1826	Normal
1827	Normal
1828	Normal
1829	Normal
1830	Normal
1831	Normal
1832	Normal
1833	Normal
1834	Normal
1835	Normal
1836	Cool1
1837	Cool1
1838	Cool1
1839	Cool1
1840	Cool1
1841	Cool1
1842	Normal
1843	Normal

Year	Category
1844	Normal
1845	Normal
1846	Normal
1847	Normal
1848	Normal
1849	Normal
1850	Normal
1851	Normal
1852	Normal
1853	Normal
1854	Normal
1855	Normal
1856	Normal
1857	Normal
1858	Normal
1859	Normal
1860	Normal
1861	Warm1
1862	Warm1
1863	Normal
1864	Normal
1865	Normal
1866	Normal
1867	Normal
1868	Normal
1869	Normal
1870	Normal
1871	Normal
1872	Warm1
1873	Warm1
1874	Warm1
1875	Normal
1876	Normal
1877	Normal
1878	Normal
1879	Normal
1880	Normal
1881	Warm1
1882	Normal
1883	Normal

Year	Category
1884	Normal
1885	Cool1
1886	Cool1
1887	Cool1
1888	Normal
1889	Normal
1890	Cool1
1891	Normal
1892	Normal
1893	Cool1
1894	Cool1
1895	Normal
1896	Normal
1897	Normal
1898	Normal
1899	Normal
1900	Warm1
1901	Normal
1902	Normal
1903	Cool1
1904	Cool1
1905	Normal
1906	Normal
1907	Cool1
1908	Cool1
1909	Cool1
1910	Cool1
1911	Cool1
1912	Cool1
1913	Cool1
1914	Normal
1915	Normal
1916	Cool1
1917	Cool1
1918	Normal
1919	Normal
1920	Normal
1921	Normal
1922	Normal
1923	Normal

Year	Category
1924	Normal
1925	Normal
1926	Normal
1927	Normal
1928	Normal
1929	Cool1
1930	Normal
1931	Warm1
1932	Normal
1933	Normal
1934	Normal
1935	Normal
1936	Normal
1937	Warm1
1938	Warm1
1939	Warm1
1940	Warm2
1941	Warm2
1942	Warm1
1943	Warm1
1944	Warm2
1945	Warm1
1946	Warm1
1947	Warm1
1948	Normal
1949	Normal
1950	Normal
1951	Warm1
1952	Warm1
1953	Warm1
1954	Normal
1955	Normal
1956	Normal
1957	Warm1
1958	Warm1
1959	Warm1
1960	Warm1
1961	Warm1
1962	Warm1
1963	Warm1

Year	Category
1964	Normal
1965	Normal
1966	Warm1
1967	Warm1
1968	Warm1
1969	Warm1
1970	Warm1
1971	Warm1
1972	Warm1
1973	Warm2
1974	Warm1
1975	Warm1
1976	Normal
1977	Warm2
1978	Warm1
1979	Warm2
1980	Warm2
1981	Warm3
1982	Warm2
1983	Warm3
1984	Warm2
1985	Warm2
1986	Warm2
1987	Warm3
1988	Warm3
1989	Warm2
1990	Warm3
1991	Warm3
1992	Warm2
1993	Warm2
1994	Warm3
1995	Warm3
1996	Warm3
1997	Warm3
1998	Warm4
1999	Warm3
2000	Warm3
2001	Warm4
2002	Warm4
2003	Warm4

Year	Category
2004	Warm4
2005	Warm4
2006	Warm4
2007	Warm4
2008	Warm4
2009	Warm4
2010	Warm5
2011	Warm4
2012	Warm4
2013	Warm4
2014	Warm5
2015	Warm5
2016	Warm6
2017	Warm6
2018	Warm5
2019	Warm6
2020	Warm6
2021	Warm5
2022	Warm5
2023	Warm7